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Technical Report Overview

Report: Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) 2020 Report

Overview: This report presents the 2020 results of the local aquatic effects monitoring program (LAEMP) developed for Teck's Fording River Operations (FRO). The report presents data and evaluation of current conditions and collects baseline data to support future evaluation of changes related to commissioning of an active water treatment facility that will be treating water from Cataract, Swift, and Kilmarnock creeks.

This report was prepared for Teck by Minnow Environmental Inc. and Lotic Environmental Ltd.

For More Information
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Future studies will be made available at **teck.com/elkvalley**

Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) 2020 Report

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Fording River Operation
Local Aquatic Effects Monitoring Program 2020 Report

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EXECUTIVE SUMMARY

Discharges from Teck's coal mines to the Elk River watershed are authorized by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) through permits that are issued under provisions of the *Environmental Management Act*. Permit 107517 specifies the terms and conditions associated with those discharges. Permit 107517 also requires that Teck develop a local aquatic effects monitoring program (LAEMP) related to continued development of Fording River Operation (FRO) and the future commissioning of the Fording River Operations Active Water Treatment Facility - South (FRO AWTF-S) that will be treating waters from Cataract, Swift, and Kilmarnock creeks at FRO.

The first FRO LAEMP study design for 2016 to 2018 was submitted in accordance with the Permit requirement on June 1, 2016 (Minnow 2016) and subsequently approved by ENV on October 24, 2016. With the delay in construction and operation of the FRO AWTF-S, the second FRO LAEMP study design for 2019 and 2020 was submitted on May 31, 2019 (Minnow and Lotic 2019a). In consideration of potential existing and future mine-related influences at FRO, the following study questions were developed in consultation with the Environmental Monitoring Committee (EMC) during study design development (Minnow 2016, Minnow and Lotic 2019a) and in response to data evaluation in the first three years of the FRO LAEMP cycle (Minnow 2017a, Minnow and Lotic 2018, Minnow and Lotic 2019b):

1. Are nitrate concentrations increasing, and if so, are they adversely affecting biota?
2. Is active water treatment affecting biological productivity downstream in the Fording River?
3. Are tissue selenium concentrations reduced downstream from the AWTF?
4. Is AWTF operation affecting aquatic biota through thermal effects or concentrations of treatment-related constituents other than nutrients or selenium?
5. Is re-direction of water potentially affecting biota in the Fording River?
6. What are the factors contributing to the variations in percent Ephemeroptera?
7. What is the benthic invertebrate community structure in the reach of the Fording River that goes dry, and can changes be correlated with flow conditions?

Annual LAEMP reports have been submitted on May 31st each year since 2017. Each annual report has expanded on the understanding of potential causes of the observed changes in the benthic invertebrate community, and sampling plans were updated annually to reflect new learnings and knowledge gaps within the upper Fording River study area (Minnow 2017b,

Minnow 2018a, Minnow and Lotic 2019a, Minnow and Lotic 2020b). Throughout this period, benthic invertebrate community abundance and richness has consistently been within the normal range throughout the study area; however, a spatial decrease (i.e., in an upstream to downstream direction) in the relative abundance of mayflies (% Ephemeroptera) has persisted in the upper Fording River in the area downstream of Kilmarnock Creek to upstream of Ewin Creek in September in each year since identified in the first FRO LAEMP report (Minnow 2017a, Minnow and Lotic 2018, Minnow and Lotic 2019, Minnow and Lotic 2020b). The second annual report (Minnow and Lotic 2018) did not identify a single, direct cause of the decrease in % Ephemeroptera in the upper Fording River but analysis suggested that a combination of both mine-related and natural factors (e.g., water quality, calcite, substrate size, flow) were contributing to the observed decrease. The third annual report (Minnow and Lotic 2019) found that reduced % Ephemeroptera often corresponded with increases in % Plecoptera, leading to the proportion of Ephemeroptera-Plecoptera-Trichoptera (EPT) remaining within the normal range. The report identified strong negative correlations between % Ephemeroptera and the aqueous concentrations of nitrate and selenium concentrations, but a strong positive correlation between % Ephemeroptera and pebble size (i.e., D84) and a significant but weaker correlation with temperature. Correlation analysis in 2019 further demonstrated strong negative correlations between individual BIC endpoints and one or more key water quality constituents, but habitat variables did not correlate as strongly. Redundancy analysis demonstrated strong co-variation between habitat and stressor variables when explaining BIC variation in the study area, and after accounting for the shared variation between stressors and habitat the remaining variation in stressors could not explain BIC differences among monitoring areas. Drying surveys in 2019 identified both spatial and temporal variability in instream drying and that areas drying seasonally have BIC metrics within their normal ranges in September.

The 2020 FRO LAEMP provided baseline monitoring data for pre-commissioning of FRO AWTF- S, as well as insights into physical, chemical, and biological conditions that occur in the upper Fording River. The evaluation of data related to Study Question #1 found that although nitrate concentrations remained stable over time in the study area, concentrations were sufficiently high in some areas to potentially affect the biota. A correlation between nitrate concentrations and key BIC metrics (e.g., % EPT and % Ephemeroptera) was identified; however, due to covariation between nitrate and other mine-related water quality constituents, as well as between water quality and habitat variables, no clear conclusions can be made for a direct cause and effect relationship between nitrate concentrations and effects to biota in the FRO LAEMP study area.

Baseline data to address Study Questions #2 to #5 were collected during the 2020 FRO LAEMP sampling programs. To date, benthic invertebrate biomass and density, nutrient (phosphorus)

concentrations, benthic invertebrate tissue selenium concentrations, and water temperature and discharge flows have been relatively consistent across the baseline study period. Upon commissioning of the FRO AWTF-S, pre-commmissioning data will be used for comparisons to post-commissioning data to identify any potential changes as a result of treatment. The analysis of these data will be discussed with the EMC prior to reporting in 2022.

The results of the 2020 FRO LAEMP to support Study Question #6 identified a spatial decrease in % Ephemeroptera from upstream to downstream, between the Compliance Point (FR_FRCP1) to upstream of Ewin Creek, consistent with previous LAEMP reports (Minnow 2017a, Minnow and Lotic 2018, 2019b, 2020b). In general, abundance metrics (total, EPT, Ephemeroptera, Plecoptera, Trichoptera, Chironomidae) were within the normal ranges and have remained consisted over time. Although areas having low % Ephemeroptera continued to have high percent and abundance of Plecoptera families (Capniidae, Nemouridae, Perlodidae), % EPT was below the site-specific normal ranges throughout most of the FRO LAEMP study area. Benthic invertebrate community endpoints (% EPT, % Ephemeroptera, and % Plecoptera) at the Multiplate culvert returned to historical values in 2020, supporting the hypothesis that the 2019 results were because of sampling in a microhabitat not representative of the area.

It is clear through the evaluation of the BIC data in the 2020 FRO LAEMP that both habitat and water quality factors are affecting variation in BIC communities; however, it remains very difficult to separate the effect of individual contributions of each variable to the observed effects on BIC. Several key habitat variables were identified as significantly contributing to the variation in BIC, including water velocity, water depth, substrate size, embeddedness, watershed slope, and watershed area. Variations in these habitat characteristics were apparent from upstream to downstream, similar to increases in the aqueous concentrations of mine-related constituents, making it difficult to identify the contribution of individual variables to the variation in BIC. That said, the factors affecting variation in BIC are likely not the same across the FRO LAEMP study area. In the upper study area, effects to BIC in the Fording River downstream of the confluence with Henretta Creek are likely due to increased braiding in recent years, resulting in habitat changes over time; however, it remains unclear what factors are contributing to the variation in BIC at RG_FOUSH and will be evaluated in future FRO LAEMPs. The BIC in the middle study area is likely impacted by both concentrations of mine-related constituents seasonally greater than EVWQP benchmarks as well as habitat differences related to subsurface flow and seasonal drying, especially downstream from the Compliance point (FR_FRCP1). The lower study area represents an area with substantial groundwater input and sees conditions that differ from upstream areas. Shifts in community from Ephemeroptera-dominated to Plecoptera-dominated likely reflect changing habitat preferences, but could also be related to water quality, especially at RG_FRUPO where concentrations of constituents such as nitrate,

selenium, and sulphate are consistently among the highest in the FRO LAEMP study area. Continued evaluation of BIC following an improvement in water quality related to the commissioning of the FRO AWTF-S, as well as the use of BIC predictive modelling tools currently being developed under the RAEMP (Minnow 2021) will aid in the interpretation of monitoring data to support answering Study Question #6.

Drying surveys in the FRO LAEMP to support Study Question #7 have identified annual variability in seasonal drying both spatially and temporally throughout the study area that is likely related in part to annual fluctuations in factors such as precipitation and snowpack. Furthermore, drying begins earlier in the northern survey area compared to the southern survey area potentially due to its proximity to headwaters and smaller catchment area. Upon ice-out, benthic invertebrate communities were different in areas that dry seasonally compared to those that remain wetted year-round; however, most BIC endpoints (total abundance, EPT abundance, and percent and abundance Ephemeroptera) were similar to permanently wetted areas within two to eight weeks post-rewatering, indicating a significant but temporary effect of drying on the BIC. Only % Ephemeroptera remained lower in areas that dry as compared to permanently wetted areas throughout the study period, but a direct connection to drying remains unclear due to varying habitat and water quality conditions in this section of the Fording River.

The results from the 2020 FRO LAEMP report provide supporting information to help answer Management Question 5 and to support Management Question 2 from Teck's Adaptive Management Plan (Teck 2018).

TABLE OF CONTENTS

APPENDIX I REFERENCE AREA COMPARISONS

APPENDIX J LAB REPORTS

APPENDIX K HYDROLOGY GRADING

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ALS – ALS Environmental
AMP – Adaptive Management Plan
ANOVA – Analysis of Variance
AWTF – Active Water Treatment Facility
BCWQG – British Columbia Water Quality Guidelines
BIC – Benthic Invertebrate Community
CA – Correspondence Analysis
CABIN – Canadian Aquatic Biomonitoring Network
CCA – Canonical Correspondence Analysis
CI – Calcite Index
CMm – Coal Mountain Mine
CRC ICP-MS – Coupled Plasma-Mass Spectrometry
CSM – Conceptual Site Model
CVAFS – Cold Vapour Atomic Fluorescence Spectroscopy
DO – Dissolved Oxygen
DOC – Dissolved Organic Carbon
DQO – Data Quality Objectives
DQR – Data Quality Review
EFN – Environmental Flow Needs
EMC – Environmental Monitoring Committee
EMPR – Ministry of Energy, Mines and Petroleum Resources
ENV – Environment and Climate Change Strategy
EoC – Evaluation of Cause
EPT – Ephemeroptera-Plecoptera-Trichoptera
EVFFHC – Elk Valley Fish and Fish Habitat Committee
EVO – Elkview Operation
EVWQP – Elk Valley Water Quality Plan
EWT – Early Warning Triggers
FRO – Fording River Operation
FRO-N SRF – Fording River Operation – North Saturate Rock Fill
FRO AWTF-S – Fording River Operation Active Water Treatment Facility - South
GC/MS – Gas Chromatography with Mass Spectrometric Detection
GHO – Greenhills Operation
GPS – Global Positioning System

HSD – Honestly Significant Difference
IC-ICP-CRC-MS – Inductively Coupled Plasma Collision Reaction Cell Mass Spectrometry
ICP-MS – Inductively Coupled Plasma Mass Spectrophotometry
ICP-QQQ-MS – Inductively Coupled Plasma Triple Quadrupole Mass Spectrometry
K-M – Kaplan-Meier
KNC – Ktunaxa Nation Council
LA-ICPMS – Laser Ablation Inductively Coupled Plasma Spectrometry
LAEMP – Local Aquatic Effects Monitoring Program
LCO – Line Creek Operation
LM – Linear Model
LMM – Linear Mixed-Effects Model
LPL – Lowest Practical Level
LRL – Laboratory Reporting Limit
MOD – Magnitude of Difference
MOE – Ministry of the Environment
NAD – North American Datum
OEMP – Operational Environmental Monitoring Program
PAH – Polycyclic Aromatic Hydrocarbons
PC – Principal Components
PCA – Principal Component Analysis
pCCA – Partial Correspondence Analysis
QA/QC – Quality Assurance / Quality Control
RAEMP – Regional Aquatic Effects Monitoring Program
RISC – Resources Information Standards Committee
SME – Subject Matter Expert
TDS – Total Dissolved Solids
TKN – Total Kjeldahl Nitrogen
TSS – Total Suspended Solids
Teck – Teck Coal Limited
TOC – Total Organic Carbon
UTM – Universal Transverse Mercator system
VIF – Variance Inflation Factor
WCT – Westslope Cutthroat Trout
WCT RWG – Westslope Cutthroat Trout Recovery Working Group
WLC – West Line Creek
WSQG – Working Sediment Quality Guidelines

1 INTRODUCTION

1.1 Background

Teck Coal Limited (Teck) operates four steelmaking coal mines in the Elk River watershed, which are the Fording River Operation (FRO), Greenhills Operation (GHO), Line Creek Operation (LCO), and Elkview Operation (EVO; Figure 1.1). A fifth mine, Coal Mountain Mine (CMm), is also owned by Teck and located in the Elk River watershed; however, it is no longer in operation and has been moved into the care and maintenance designation. Discharges from the mines to the Elk River watershed are authorized by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) through permits that are issued under provisions of the *Environmental Management Act*. Permit 107517 specifies the terms and conditions associated with discharges from Teck's five Elk Valley mine operations.

Permit 107517 required that Teck develop a local aquatic effects monitoring program (LAEMP) related to ongoing mining at FRO and the future commissioning of the Fording River Operation Active Water Treatment Facility - South (FRO AWTF-S) that will treat waters from Cataract, Swift, and Kilmarnock Creeks (Figure 1.2). Section 9.3.2 of Permit 107517 outlined the requirements for the first cycle of the LAEMP as follows:

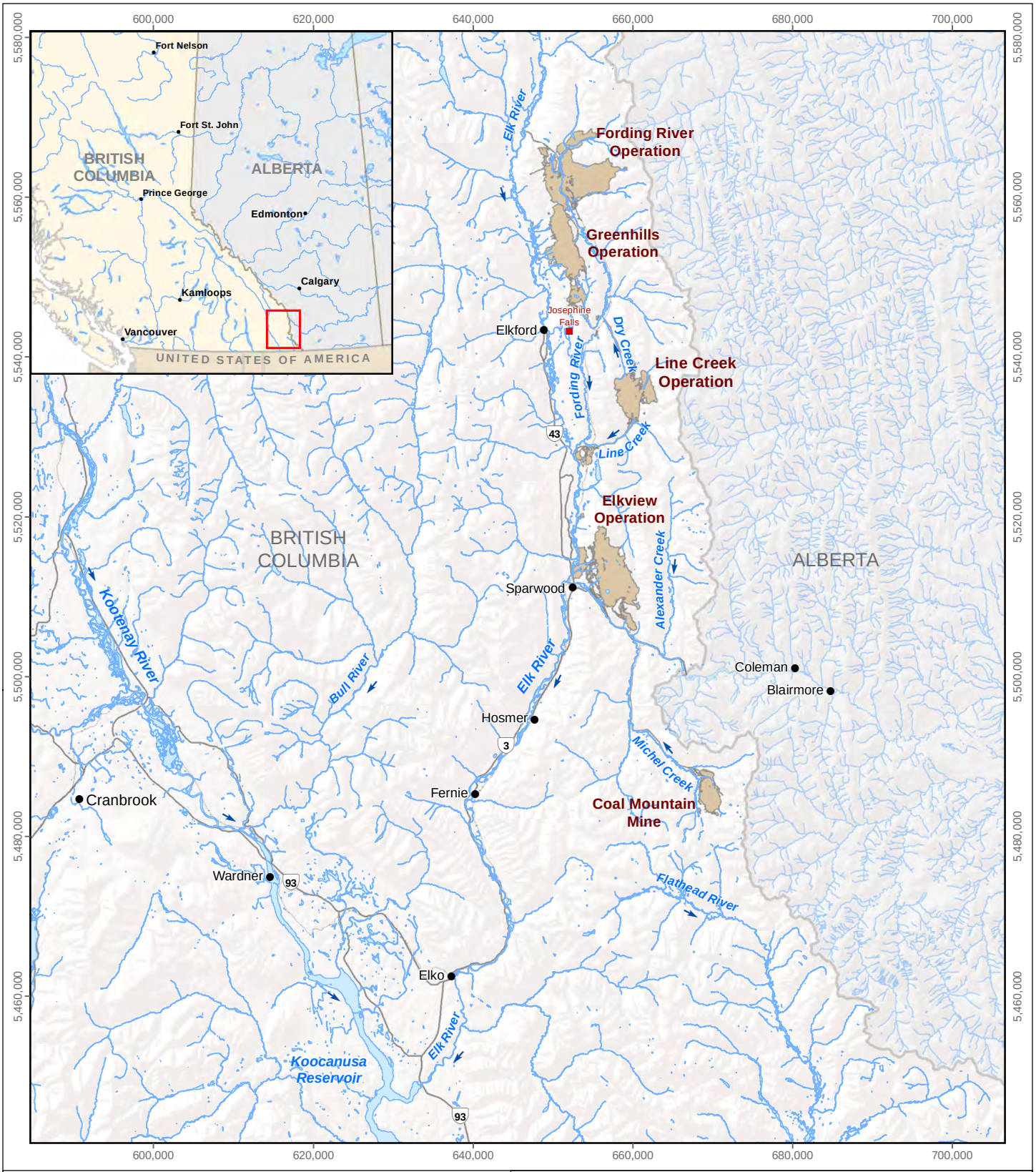
> *"The Permittee must complete to the satisfaction of MOE a study design for a LAEMP which will focus on the upper Fording River for 2016-2018 by June 1, 2016. The study design must be reviewed by the EMC[1] and be designed to an appropriate temporal scale to capture short term, local effects to the immediate receiving environment."*

Also, Section 10.5 of Permit 107517 states:

> *"The LAEMP Annual Reports must be reported on in accordance with generally accepted standards of good scientific practice in a written report and submitted to the Director by May 31 of each year following the data collection calendar year."*

In addition to monitoring under the LAEMP, Teck's regional aquatic effects monitoring program (RAEMP) is a requirement under Permit 107517, and provides comprehensive routine monitoring

[1] EMC refers to the Environmental Monitoring Committee, which Teck was required to form under Permit 107517. The EMC consists of representatives from Teck, ENV, the Ministry of Energy, Mines and Petroleum Resources (EMPR), Environment Canada, the Ktunaxa Nation Council (KNC), Interior Health Authority, and an independent scientist. Environment Canada has agreed to provide input on a case-by-case basis when requested by the other members of the EMC, but has not yet been called upon to participate. The EMC reviews submissions and provides technical advice to Teck and the ENV Director regarding monitoring programs



LEGEND

Teck Coal Mine Operation

Teck's Coal Mine Operations within the Elk River Watershed, Southeast British Columbia

0 10 20 40 km

Projection: North American Datum 1983 UTM Zone 11 U

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Project 207202.0009

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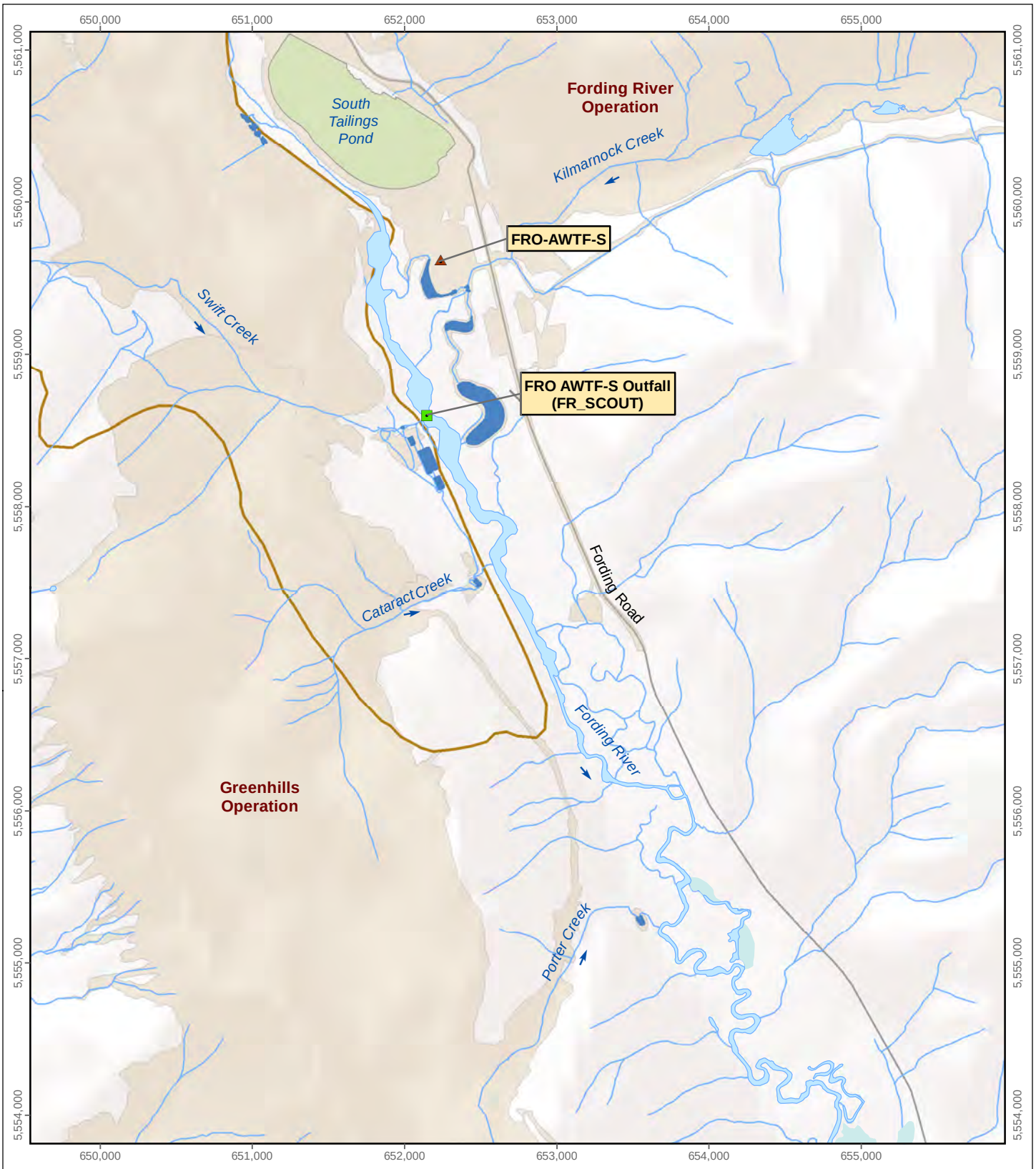
Figure 1.1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\3- FRO LAEMP Report\20-09 Figure 1.1 Teck Coal Limited Operation.mxd



LEGEND

- Water Treatment Facility
- Water Outfall
- Settling Pond
- Tailings Pond
- Fording Swift Project Footprint
- Teck Coal Mine Operation

Fording River Operations South AWTF

0 0.5 1 2 km

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Figure 1.2

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and assessment of potential mine-related effects on the aquatic environment downstream from Teck's mines in the Elk Valley (i.e., annual sampling and more comprehensive monitoring every three years, with the next cycle of sampling to be completed in September 2021). Teck conducts a variety of additional programs to monitor, evaluate, and/or manage the aquatic effects of mining operations within the Elk Valley at local and regional scales:

- Water quality monitoring
- Calcite monitoring
- Chronic Toxicity Testing Program
- Fish population monitoring
- Fish habitat management
- Tributary Management Plan
- Environmental Flow Needs (EFN)
- Operational Environmental Monitoring Program (OEMP)
- Adaptive Management Plan

The first FRO LAEMP study design was submitted in accordance with the Permit requirement on June 1, 2016 (Minnow 2016) and subsequently approved by ENV on October 24, 2016. This first cycle represented a period of monitoring of current conditions with respect to the future FRO AWTF-S. In addition to the need for monitoring data prior to active water treatment, there were also concerns related to potential increases in aqueous nitrate concentrations in the Fording River prior to initiation of water treatment, as projected in the Elk Valley Water Quality Plan (EVWQP; Teck 2014). Changes in biota related to changing flows in portions of the Fording River as a result of re-direction of water (i.e., re-direction of flows from Cataract, Swift, and Kilmarnock creeks for treatment or water management purposes) were also considered in the LAEMP study design. Seasonal drying surveys were added to the FRO LAEMP at the end of the first cycle (i.e., Fall 2017) to document the spatial and temporal extent of drying in the study area, and to contribute to the understanding of the potential effects of drying on biota. A study design for the second FRO LAEMP cycle was submitted on May 31, 2019 (Minnow and Lotic 2019a). This second study design was developed to cover the remaining period (2019 to 2020) prior to the commissioning of the FRO AWTF-S and, as such, continued to focus on monitoring of current conditions pre-treatment, the effects of nitrate and other mine-related constituents on the benthic invertebrate community (BIC), and the spatial and temporal patterns in seasonal drying throughout the study area (Minnow and Lotic 2019a, 2020a).

The first five years of the FRO LAEMP were focused on understanding conditions prior to the commissioning of the FRO AWTF-S and how habitat, water quality parameters (including nitrate), and seasonal drying may affect BIC in the study area. Contrary to EVWQP projections, nitrate concentrations have not increased in the upper Fording River and have not changed concurrently with observed temporal changes in BIC endpoints (% Ephemeroptera and % Ephemeroptera-Plecoptera-Trichoptera [EPT] combined; Minnow and Lotic 2019b, 2020b). A major finding of the FRO LAEMP has been an effect on % Ephemeroptera in the lower part of the study area (from downstream of Cataract Creek to upstream of Ewin Creek) which has consistently been below the regional normal range throughout the FRO LAEMP study period (Minnow 2017a, Minnow and Lotic 2018, Minnow and Lotic 2019b, 2020b). Although several water quality stressors (nitrate, total selenium, sulphate, and total dissolved solids [TDS]) have been identified as correlating strongly and negatively with % Ephemeroptera (Minnow and Lotic 2018, Minnow and Lotic 2019b, 2020b), there is also a strong co-variation between habitat variables and stressors and variation in stressors alone could not explain differences in BIC among monitoring areas (Minnow and Lotic 2020b). Seasonal drying in the study area has varied both spatially and temporally but most BIC endpoints in areas that dry seasonally have consistently been within normal ranges (Minnow and Lotic 2019b, 2020b).

The 2019 westslope cutthroat trout (WCT) population monitoring program identified a steep decline in the WCT population numbers in 2019 compared to 2017 (74% lower for juveniles and 93% lower for adults) within the upper Fording River, including the FRO LAEMP study area (Cope 2020). As a result, Teck gathered subject matter experts (SMEs) to evaluate causal factors that may have contributed to the decline in the WCT population. The subsequent evaluation of cause (EoC) incorporated results from previous FRO LAEMP reports, as well as other related studies, to identify the factors that may have contributed to WCT mortality, specifically in the winter of 2018 and 2019. Teck continues to work collaboratively with the Ktunaxa Nation Council (KNC), government regulators, the EMC, the Elk Valley Fish and Fish Habitat Committee (EVFFHC), and independent experts to gather more data and address ongoing protection of fish. The WCT Recovery Working Group (WCT RWG) has since been established, which is composed of experts from the above groups with the primary goal of facilitating the recovery of the WCT population in the upper Fording River.

The goal of the FRO LAEMP is to assess site-specific conditions on a frequent and localized basis, as required, until sufficient data have been collected, concerns no longer exist, or relevant monitoring can be incorporated into the RAEMP. The primary focus of the FRO LAEMP is to monitor aquatic health, particularly as it relates to conditions post-commissioning of water treatment compared to conditions prior to commissioning. Through consultation with the EMC

during the preparation of the first and second LAEMP cycles, and the evaluation of data collected in the FRO LAEMP, the following study questions were developed:

1. Are nitrate concentrations increasing, and if so, are they adversely affecting biota?
2. Is active water treatment affecting biological productivity downstream in the Fording River?
3. Are tissue selenium concentrations reduced downstream from the AWTF?
4. Is AWTF operation affecting aquatic biota through thermal effects or concentrations of treatment-related constituents other than nutrients or selenium?
5. Is re-direction of water potentially affecting biota in the Fording River?
6. What are the factors contributing to the variations in % Ephemeroptera?
7. What is the benthic invertebrate community structure in the reach of the Fording River that goes dry, and can changes be correlated with flow conditions?

Study question 1 was investigated through monitoring of nitrate concentrations and BIC structure as part of annual sampling in the FRO LAEMP. Water quality samples collected concurrently with BIC samples were combined with Teck's routine water quality monitoring data from stations along the upper Fording River to augment the temporal dataset. Additional information related to habitat (e.g., seasonal drying reaches, flow, substrate type, calcite, temperature) and biological requirements for benthic invertebrate taxa were used to support findings and discussion.

Study questions 2 to 5 relate specifically to active water treatment at FRO AWTF-S, which is scheduled to be commissioned in Q3 2021. Monitoring under the LAEMP up to and including 2020 to support these questions have captured pre-treatment aquatic conditions to which data will be compared once the facility is operational.

Study question 6 has been addressed through a detailed evaluation of the BIC in the FRO LAEMP study area, and through an interpretation of the results compared to regional and site-specific normal ranges and chemical and physical stressors.

Study question 7 has been addressed through monthly monitoring of surface flow conditions (August to April) in the Fording River from Chauncey Creek upstream to the south tailings pond (Southern Drying Survey), from the Multiplate upstream to upstream of mining influences (Northern Drying Survey), and of three kilometers of Henretta Creek, starting upstream of Henretta Lake (upper Henretta Drying Survey). Year-round continuous monitoring of water level and temperature at 13 locations (loggers) within this area also contributed to understanding seasonal drying. Biological data being collected to support study question 6 were incorporated into the evaluation of study question 7, which included the recolonization sampling plan in 2020.

Relevant information obtained under other programs, such as the regional calcite and chronic toxicity monitoring programs are also summarized in the LAEMP. The results of the fifth year (2020 calendar year – January to December) of monitoring for the FRO LAEMP are the subject of this report, which includes comparison to previous years of data.

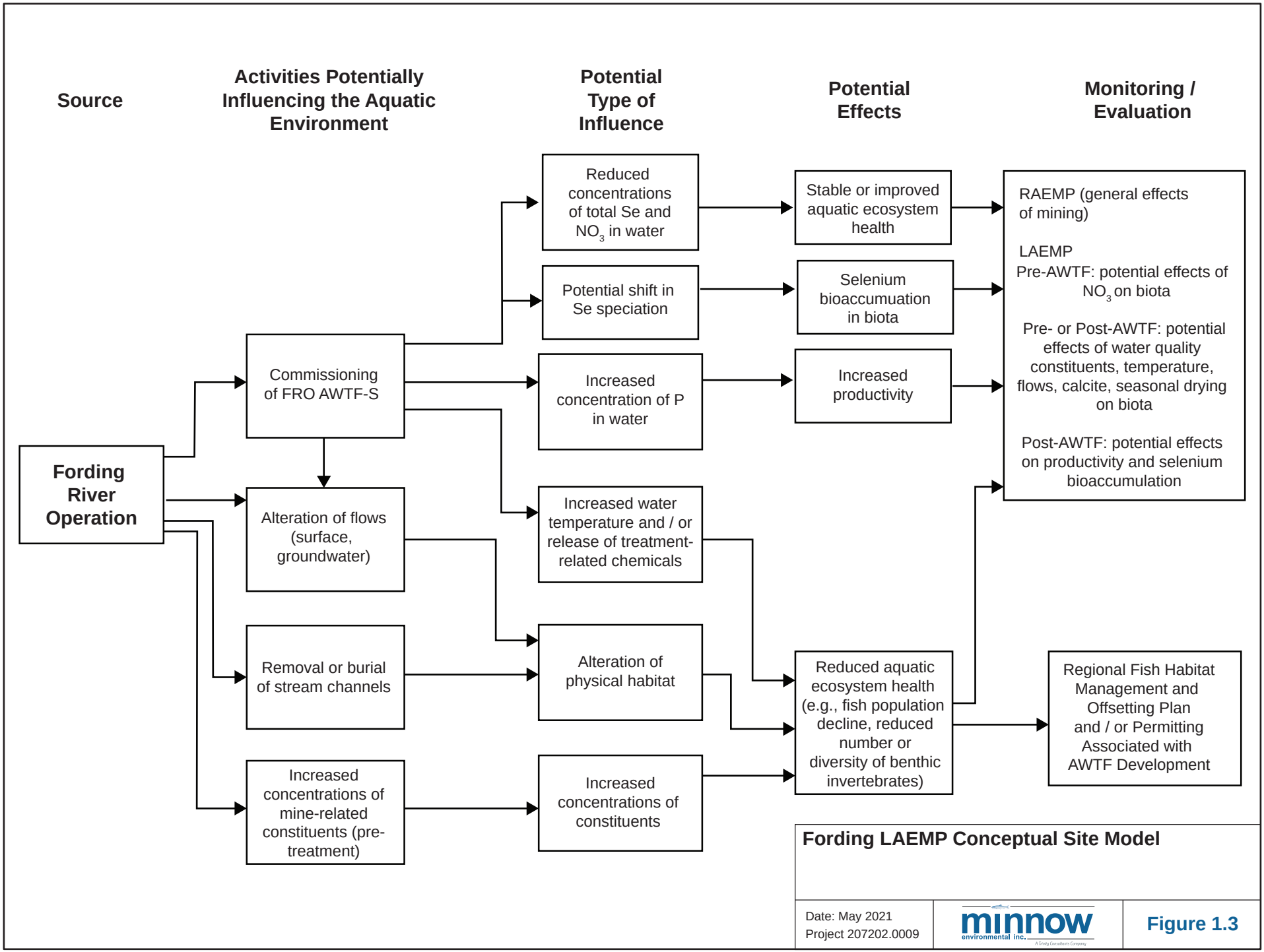
1.2 Conceptual Site Model

A conceptual site model (CSM) is a written and/or illustrative depiction of relationships between human activities that disturb the environment and the ways such disturbances can alter the ecosystem and affect biological receptors. Potential effects on aquatic receptors in the upper Fording River, both prior to and after the commissioning of the future FRO AWTF-S in Q3 2021, were considered in a CSM (Figure 1.3). Assessment endpoints are the valued attributes of an ecosystem upon which management actions focus (USEPA 1998, 2003). Assessment endpoints considered in the FRO LAEMP are described in Section 2.1. Assessment endpoints are evaluated using measurement endpoints. Typically, multiple measurement endpoints are used to support evaluation and interpretation of each assessment endpoint to conclude if the assessment endpoints/receptors are being protected.

As illustrated by the CSM, assessment and measurement endpoints may be affected through physical and/or chemical processes related to mining and operation of the AWTF (Figure 1.3). Biological measurements relating directly to population or community characteristics are referred to as direct indicators. Mine-related stressors (including tissue selenium concentrations) will also be monitored as part of the FRO LAEMP and are referred to as indirect indicators. Laboratory chronic toxicity data (semi-direct indicators) are incorporated into the FRO LAEMP, as appropriate (Golder 2021b). Measurement of indirect and semi-direct indicators contribute to understanding if observed effects on individual receptors are mine-related. Effects may act singly or in combination to influence aquatic populations and/or communities by changing the abundance or resilience of aquatic receptors (Figure 1.3) and are evaluated by monitoring benthic invertebrates as biological receptors within the FRO LAEMP. The study questions (Section 1.1) were developed in consideration of the potential effects identified in the CSM (Figure 1.3).

1.3 Linkages to the Adaptive Management Plan for Teck Coal in the Elk Valley

As required in Permit 107517 Section 11, Teck has developed an Adaptive Management Plan (AMP) to support implementation of the EVWQP to achieve water quality and calcite targets, protect human health, groundwater, and aquatic ecosystem health (Teck 2018). Following an adaptive management framework, the AMP identifies six Management Questions that are re-evaluated at regular intervals as part of AMP updates through the EVWQP implementation.



Fording LAEMP Conceptual Site Model

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Figure 1.3

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The AMP also identifies key uncertainties that need to be reduced to fill gaps in current understanding and support achievement of the EVWQP objectives.

The FRO LAEMP was designed to monitor conditions in the upper Fording River in advance of FRO AWTF-S operation and answer specific questions on an annual basis (Section 1.2). Each annual LAEMP cycle (results are reported on May 31st of each year for the preceding calendar year) will also be used for tracking issues for which a potential need for responses under the AMP framework has been identified, including the biological triggers assessments. Biological triggers are intended as a simple way to flag potential unexpected monitoring results that may require additional evaluation and action under the adaptive management response framework. For example, seasonal drying between Swift and Cataract Creeks was observed in late 2018, resulting in flows in the Fording River at the FRO Compliance Point consisting predominantly of water from Cataract Creek. To evaluate the potential effects on biota in the area downstream of Cataract Creek, two additional biological sampling events were included in December 2018 and February 2019 (Minnow and Lotic 2020b). More recently in June of 2020, benthic invertebrate tissue selenium concentrations were anomalously high in three out of five replicates at RG_FRCP1SW. This resulted in an investigation (Luoma 2021) of annelid presence in composite-taxa benthic invertebrate tissue samples and the effects on selenium concentrations. In the 2020 FRO LAEMP, % EPT) and composite-taxa benthic invertebrate tissue selenium concentration were assessed against their respective biological triggers (additional information and methods pertaining to this analysis can be found in Appendix H).

In addition to addressing questions specific to the FRO LAEMP on an annual basis, monitoring data from the LAEMP will contribute to the broader data set assessed every three years within the RAEMP. The RAEMP is designed to evaluate AMP Management Question #5 (i.e., “Does monitoring indicate that mine-related changes in aquatic ecosystem conditions are consistent with expectations?”). During the development of the AMP, a number of uncertainties related to Management Question #5 were identified that were summed up as Key Uncertainty 5.1 (i.e., “How will monitoring data be used to identify potentially important mine-related effects on the aquatic ecosystem?”). Teck continues to work with its consultants and the EMC to address and reduce Key Uncertainty 5.1 and its underlying uncertainties.

Data from the LAEMP and RAEMP will also contribute to answering AMP Management Question #2 (i.e., “Will aquatic ecosystem health be protected by meeting the long-term site performance objectives?). A Key Uncertainty associated with Management Question #2 is “How will the science-based benchmarks be validated and updated?” with underlying uncertainty about how aquatic monitoring data will be used to validate and update

the benchmarks. Progress on reducing these uncertainties, and associated learnings, will be described in Annual AMP Reports.

The second annual AMP report was submitted in July 2020 and included data from 2019 (Teck 2020). This report identified EWTs for total dissolved solids (TDS) and uranium at the Fording River Compliance Point (FR_FRCP1). The annual surface water quality report for 2020 identified early warning triggers (EWTs) for nitrite, TDS, and uranium at FR_FRCP1 (Teck 2021). Trigger values were not met for nitrite at FR_FRCP1 in 2019; however, both TDS and uranium were above their trigger values in that year. The implementation of these adaptive management actions is not constrained to the AMP or LAEMP annual reporting cycles but may be (and have been) triggered at any time during the monitoring and reporting cycle.

Please refer to the AMP (Teck 2018) for more information on the adaptive management framework, the Management Questions, the key uncertainties, the response framework, continuous improvement, linkages between the AMP and other EVWQP programs, and AMP reporting.

2 METHODS

2.1 Overview

Data collected and evaluated in relation to each of the FRO LAEMP study questions were summarized (Table 2.1). Biological samples (BIC and benthic invertebrate tissue) were collected in June, September, and December from locations within the study area extending from the Fording River and Henretta Creek upstream of FRO, through the operation and downstream to between Chauncey Creek and Ewin Creek (Figure 2.1; Table 2.2). Benthic invertebrate community samples were collected at each FRO LAEMP biological monitoring area in June and September, and a subset of biological monitoring areas upstream and downstream of the Compliance point (FR_FRCP1) in December 2020 (Table 2.2), consistent with previous years. Benthic invertebrate tissue and water (quality and selenium speciation) sampling occurred throughout the study area in June September, and December at all FRO LAEMP biological monitoring areas (Table 2.2). Consistent with previous years, winter conditions prevented access to RG_FO26 and RG_HENUP in December 2020, so RG_UFR1 was used as the reference area for that sampling program. Benthic invertebrate biomass and density sampling, as well as sediment sampling, was conducted in September only at biological monitoring areas sampled the previous year (Table 2.2).

A recolonization sampling plan was included in the 2020 FRO LAEMP to monitor the progression of BIC recolonization of areas that experienced seasonal drying following reconnection of the Fording River in the spring. Monitoring occurred at two biological monitoring areas (RG_FOUSH and RG_FOUKI) upstream of areas known to dry seasonally, four areas (RG_FOBCP, RG_FOBCPD, RG_FRCP1SW, and RG_FRCP1SWD) within the section of the Fording River in the southern survey section that typically dries in the winter, and one area (RG_FOUEW) downstream of the seasonally dry section of the Fording River (Table 2.3; Figure 2.2). Two of the biological monitoring areas (RG_FOBCPD and RG_FRCP1SWD) included in the recolonization sampling plan were not part of the FRO LAEMP but were added 600 and 450 meters downstream of their parent stations (RG_FOBCP and RG_FRCP1SW), respectively, during April to June sampling to increase the spatial resolution through the section that dries. The first sampling campaign occurred at ice out between April 6-16, as monitoring areas rewetted. The second sampling campaign occurred 2-3 weeks after ice out (end of April), and the third took place in the middle of June during annual LAEMP sampling (Table 2.3).

Water level (flow) and temperature were monitored continuously at established gauges throughout the study area (Table 2.4; Figure 2.3). Drying surveys were conducted monthly between January and reconnection, and August through December 2020 within the Southern

Table 2.1: Summary of the 2020 FRO LAEMP

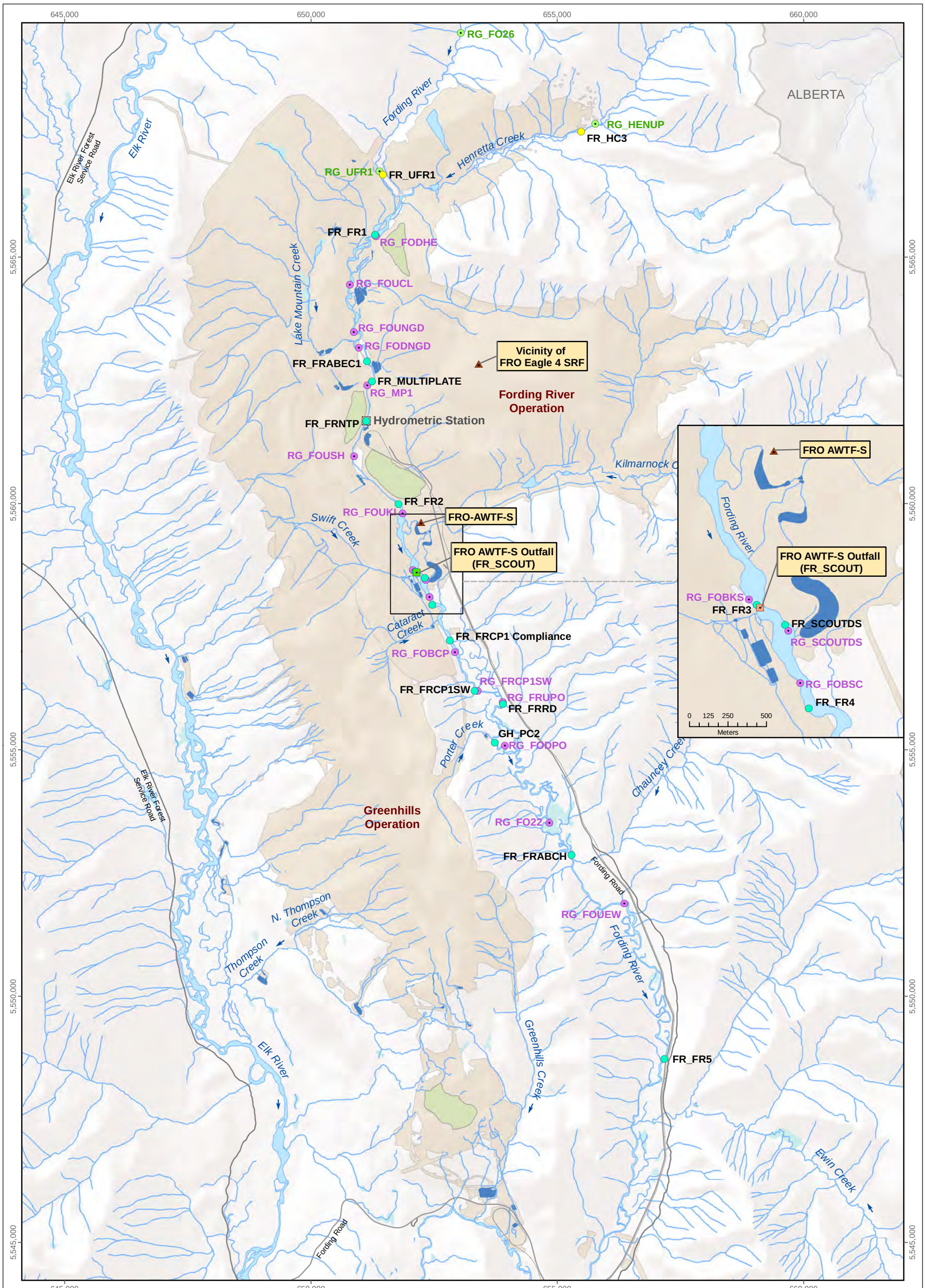
Study Questions	Context	Assessment Endpoints	Measurement Endpoints[a]				How Data Will be Evaluated to Address Study Question
			Water	Water Sampling Stations	Biological	Biological Sampling Areas	
1. Are nitrate concentrations increasing and, if so, are they adversely affecting aquatic biota?	Nitrate concentrations are predicted (in the EVWQP) to increase prior to commissioning of the AWTF.	Benthic invertebrate community (BIC) relative to nitrate concentrations in the upper Fording River.	Nitrate concentrations in water, surface water chronic toxicity tests (quarterly and semi-annually)	FR_UFR1, FR_HC3, FR_FR1, FR_MULTIPLATE, FR_FRNTP, FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRRD, GH_PC2, FR_FRABCH, FR_FR5; Chronic toxicity tests at FR_UFR1, FR_FRCP1 and FR_FRABCH only	Benthic invertebrate community structure	RG_HENUP (Ref), RG_FO26 (Ref), RG_UFR1 (Ref), RG_FODHE, RG_FOUCL, RG_FOUNGD, RG_FODNGD, RG_MP1, RG_FOUSH, RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW	1. Evaluate nitrate concentrations relative to predictions in the EVWQP. 2. Determine if benthic invertebrate community endpoints are outside of regional and/or site-specifc normal ranges or moving away from the normal ranges commensurate with observed nitrate concentrations. 3. Determine if benthic invertebrate community results correspond with expectations based on nitrate concentrations in water relative to the EVWQP benchmarks for nitrate.
2. Is active water treatment affecting biological productivity downstream in the Fording River?	The AWTF is not scheduled to be commissioned until Q3 2021, so sampling in 2020 will be collection of baseline data so that questions can be answered after the AWTF operation commences.	Biological productivity downstream from the AWTF discharge post- compared to pre-AWTF commissioning and relative to productivity observed upstream from the discharge.	Nutrient concentrations	FR_UFR1, FR_HC3, FR_FR1, FR_MULTIPLATE, FR_FRNTP, FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRRD, GH_PC2, FR_FRABCH, FR_FR5	Benthic invertebrate biomass (September), benthic invertebrate community structure (September)	Community - as above; Biomass - RG_FO26 (Ref), RG_HENUP (Ref), RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FO22	Pre-AWTF Commissioning: 1. Continue to collect baseline data indicative of productivity based on benthic invertebrate samples collected upstream and downstream of the future water treatment discharge location. 2. Continue to collect aqueous total phosphorus and orthophosphate data upstream and downstream of the future water treatment discharge location.
3. Are tissue selenium concentrations reduced downstream from the AWTF?		Tissue selenium concentrations downstream from the AWTF discharge post- compared to pre-AWTF commissioning and relative to concentrations observed upstream from the discharge.	Total and dissolved selenium concentrations, and selenium speciation	FR_UFR1, FR_HC3, FR_FR1, FR_MULTIPLATE, FR_FRNTP, FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRRD, GH_PC2, FR_FRABCH, FR_FR5	Benthic invertebrate tissue selenium (composite-taxa samples)	Invertebrate tissue - RG_HENUP (Ref), RG_FO26 (Ref), RG_UFR1 (Ref), RG_FODHE, RG_FOUCL, RG_FOUNGD, RG_FODNGD, RG_MP1, RG_FOUSH, RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW	Pre-AWTF Commissioning: 1. Continue to collect baseline tissue selenium data from benthic invertebrates sampled upstream and downstream of the future treatment discharge location. 2. Continue to collect aqueous total selenium and selenium speciation data upstream and downstream of the future water treatment discharge location.
4. Is AWTF operation affecting aquatic biota through thermal effects or concentrations of treatment-related constituents other than nutrients or selenium?		Potential thermal effects or other treatment related constituents of interest on biota downstream from the AWTF.	Temperature data loggers	Temperature and flow data loggers at FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRCP1SW, FR_FRRD, GH_PC2, FR_FRABCH	Benthic invertebrate community structure	Community - RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW	Pre-AWTF Commissioning: 1. Continue routine water quality monitoring upstream and downstream of the future water treatment discharge location. 2. Continue to collect baseline temperature data through temperature loggers upstream and downstream of the future water treatment discharge location. 3. Biological data collected for other purposes (above) will also serve as baseline data for this question.

[a] Sediment samples were also collected at RG_HENUP, RG_FO26, RG_FOUKI, RG_SCOUTDS, RG_FOBKS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, and RG_FO22 to support various LAEMP and operational requirements.

Table 2.1: Summary of the 2020 FRO LAEMP

Study Questions	Context	Assessment Endpoints	Measurement Endpoints[a]				How Data Will be Evaluated to Address Study Question
			Water	Water Sampling Stations	Biological	Biological Sampling Areas	
5. Is re-direction of water potentially affecting biota in the Fording River?	As mining development progresses, water will be re-routed for treatment, which may alter water flows in the upper Fording River compared to current conditions.	Potential effects on biota due to changes in flow and constituent water concentration	Order constituents, plus nickel and other WQ constituents with Early Warning Triggers (EWT) in surface water, chronic toxicity tests (quarterly and semi-annually); level (flow) data loggers	FR_UFR1, FR_HC3, FR_FR1, FR_MULTIPLATE, FR_FRNTP, FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRRD, GH_PC2, FR_FRABCH, FR_FR5; Chronic toxicity tests at FR_UFR1, FR_FRCP1 and FR_FRABCH only; Temperature and flow data loggers at FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRCP1SW, FR_FRRD, GH_PC2, FR_FRABCH	Benthic invertebrate community structure and composite benthic invertebrate tissue selenium	Community - RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW	1. Spatial changes in constituent concentrations may result from re-direction of water. 2. Evaluation of potential effects on biota in relation to changes in flows will be monitored through the LAEMP as well as further investigations completed by FRO in the development of the FRO-AWTF-S.
6. What are the factors contributing to the variations in percent Ephemeroptera?	A consistent spatial (upstream to downstream) and temporal decrease in percent Ephemeroptera has been observed in the upper Fording River. Data collected during the 2020 FRO LAEMP will build on the investigation of cause initiated in the previous LAEMP cycle.	Benthic invertebrate community, tissue chemistry, water quality, sediment quality, and habitat (e.g., seasonal drying, flow, substrate type, calcite, temperature).	Order constituents, plus nickel and other WQ constituents with Early Warning Triggers (EWT) in surface water, chronic toxicity tests (quarterly and semi-annually)	FR_UFR1, FR_HC3, FR_FR1, FR_MULTIPLATE, FR_FRNTP, FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRRD, GH_PC2, FR_FRABCH, FR_FR5; Chronic toxicity tests at FR_UFR1, FR_FRCP1 and FR_FRABCH only	Benthic invertebrate community structure and composite-taxa benthic invertebrate tissue selenium (June, September, December)	RG_HENUP (Ref), RG_FO26 (Ref), RG_UFR1 (Ref), RG_FODHE, RG_FOUCL, RG_FOUNGD, RG_FODNGD, RG_MP1, RG_FOUSH, RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW	1. Determine if benthic invertebrate community endpoints are outside of regional and/or site-specific normal ranges or moving away from the normal ranges commensurate with observed sulphate, selenium, nickel and/or other water quality constituent concentrations. 2. Determine if benthic invertebrate community endpoints are outside of regional and/or site-specific normal ranges or moving away from normal ranges in accordance with other potential stressors, both mine-related and/or natural. 3. Determine if mine-related and/or natural stressors correlate with % Ephemeroptera and other BIC metrics. 4. Investigate seasonal patterns in BIC.
7. What is the benthic invertebrate community structure in the reach of the Fording River that goes dry, and can changes be correlated with flow conditions?	Sections of the upper Fording River have been observed to dry in the winter. The spatial and temporal extent of drying is being characterized, and the effects on benthic invertebrate communities assessed.	Monthly surveys of dry sections between August and April (annual); benthic invertebrate community.	Temperature and level data loggers (continuous). Field *in situ* water quality	Temperature and flow data loggers at FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRCP1SW, FR_FRRD, GH_PC2, FR_FRABCH	'Benthic invertebrate community structure	RG_HENUP (Ref), RG_FO26 (Ref), RG_UFR1 (Ref), RG_FODHE, RG_FOUCL, RG_FOUNGD, RG_FODNGD, RG_MP1, RG_FOUSH, RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW	1. Determine the spatial and temporal extent and annual variability of seasonal drying in the upper Fording River. 2. Evaluate benthic invertebrate community in the sections that dry annually.

[a] Sediment samples were also collected at RG_HENUP, RG_FO26, RG_FOUKI, RG_SCOUTDS, RG_FOBKS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, and RG_FO22 to support various LAEMP and operational requirements.



LEGEND

Water Monitoring Station
- Mine-exposed
- Reference

Biological Sampling Area
- Mine-exposed
- Reference

- Hydrometric Station
- Water Treatment Facility
- Water Outfall
- Teck Coal Mine Operation

Monitoring Locations in the Upper Fording River, FRO LAEMP, 2020

0 1 2 4
km

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Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure 2.1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\3- FRO LAEMP Report\20-09 Figure 2.1 Monitoring Locations in Upper Fording River.mxd

Table 2.2: Summary of Annual Samples Collected for the FRO LAEMP, 2020

Biological Monitoring Area (Associated Teck Water Station)		Area Description	Biological Monitoring Area UTM Coordinates		Water Quality						Sediment Quality			Benthic Invertebrates								
					Water Chemistry			Selenium						Hess			Kick and Sweep					
														Biomass (# of samples)			Community (# of samples)			Composite-taxon Selenium (# of samples)[c]		
			Easting	Northing	June	Sept	Dec	June	Sept	Dec	June	Sept	Dec	June	Sept	Dec	June	Sept	Dec	June	Sept	Dec
Reference	RG_HENUP (FR_HC3)	Henretta Creek u/s all mine operations	655771	5567710	1	1	-	1	1	-	-	3	-	-	10	-	3	3	-	3	3	-
	RG_FO26[d] (FR_UFR1)	Fording River u/s Henretta (u/s all mines)	655965	5552879	1	1	-	1	1	-	-	3	-	-	10	-	3	3	-	3	3	-
	RG_UFR1[ad] (FR_UFR1)	Fording River u/s Henretta at Teck WQ station	651376	5566758	1	1	1	1	1	1	-	-	-	-	-	-	3	3	3	5	5	5
Mine-exposed	RG_FODHE (FR_FR1)	Fording River d/s Henretta Creek	651320	5565422	1	1	x	1	1	x	-	-	-	-	-	-	3	3	-	3	3	x
	RG_FOUCL	Fording River u/s of Clode Creek	650787	5564445	1	1	1	1	1	1	-	-	-	-	-	-	3	3	-	3	3	3
	RG_FOUNGD	Fording River u/s NGD	650870	5563476	1	1	1	1	1	1	-	-	-	-	-	-	3	3	-	3	3	3
	RG_FODNGD (FR_FRABEC1)	Fording River d/s Lake Mountain Creek/ North Greenhills Diversion	650972	5563162	1	1	1	1	1	1	-	-	-	-	-	-	3	3	-	3	3	3
	RG_MP1 (FR_MULTIPLATE)	Fording River d/s Multiplate d/s Eagle Ponds	651143	5562400	1	1	1	1	1	1	-	-	-	-	-	-	3	3	-	3	3	3
	RG_FOUSH (FR_FRNTP)	Fording River u/s Shandley Creek	650876	5560957	1	1	1	1	1	1	-	-	-	-	-	-	3	3	-	3	3	3
	RG_FOUKI (FR_FR2)	Fording River u/s Kilmarnock Creek	651859	5559804	1	1	1	1	1	1	-	5	-	-	10	-	3	3	3	5	5	5
	RG_FOBKS (GH_FR3)	Fording River between Kilmarnock Creek & Swift Creek	652074	5558652	1	1	1	1	1	1	-	5	-	-	10	-	3	3	-	5	5	5
	RG_SCOUTDS (FR_SCOUTDS)	Fording River d/s of FRO AWTF-S outfall	652307	5558501	1	1	1	1	1	1	-	5	-	-	10	-	3	3	3	5	5	5
	RG_FOBSC[c] (FR_FR4)	Fording River d/s Swift Creek, u/s Cataract Creek	652407	5558109	1	1	1	1	1	1	-	-	-	-	10	-	3	3	3	5	5	5
	RG_FOBCP (FR_FRCP1)	Fording River between Cataract & Porter Creek (Compliance Point)	652920	5556982	1	1	1	1	1	1	-	5	-	-	10	-	3	5	x	5	5	5
	RG_FRCP1SW (FR_FRCP1SW)	Fording River ~1150 m d/s of Compliance Point	653387	5556201	1	1	x	1	1	x	-	-	-	-	10	-	3	3	-	5	5	x
	RG_FRUPO (FR_FRRD)	Fording River u/s of Porter Creek	653894	5555975	1	1	1	1	1	1	-	5	-	-	10	-	3	3	3	5	5	5
	RG_FODPO (GH_PC2)	Fording River d/s Porter Creek, u/s Chauncey Creek	653935	5555085	1	1	1	1	1	1	-	-	-	-	-	-	3	3	3	5	5	5
	RG_FO22 (FR_FRABCH)	Fording River u/s Chauncey Creek	654841	5553523	1	1	1	1	1	1	-	5	-	-	10	-	1[b]	5	-	5	5	5
	RG_FOUEW (FR_FR5)	Fording River d/s Chauncey Creek, u/s Ewin Creek	656365	5551875	1	1	1	1	1	1	-	-	-	-	-	-	3	3	3	5	5	5

Notes: '-' indicates sample that was not taken because it was not a part of the sampling design; 'x' indicates sample that was not taken because of drying and/or ice conditions.

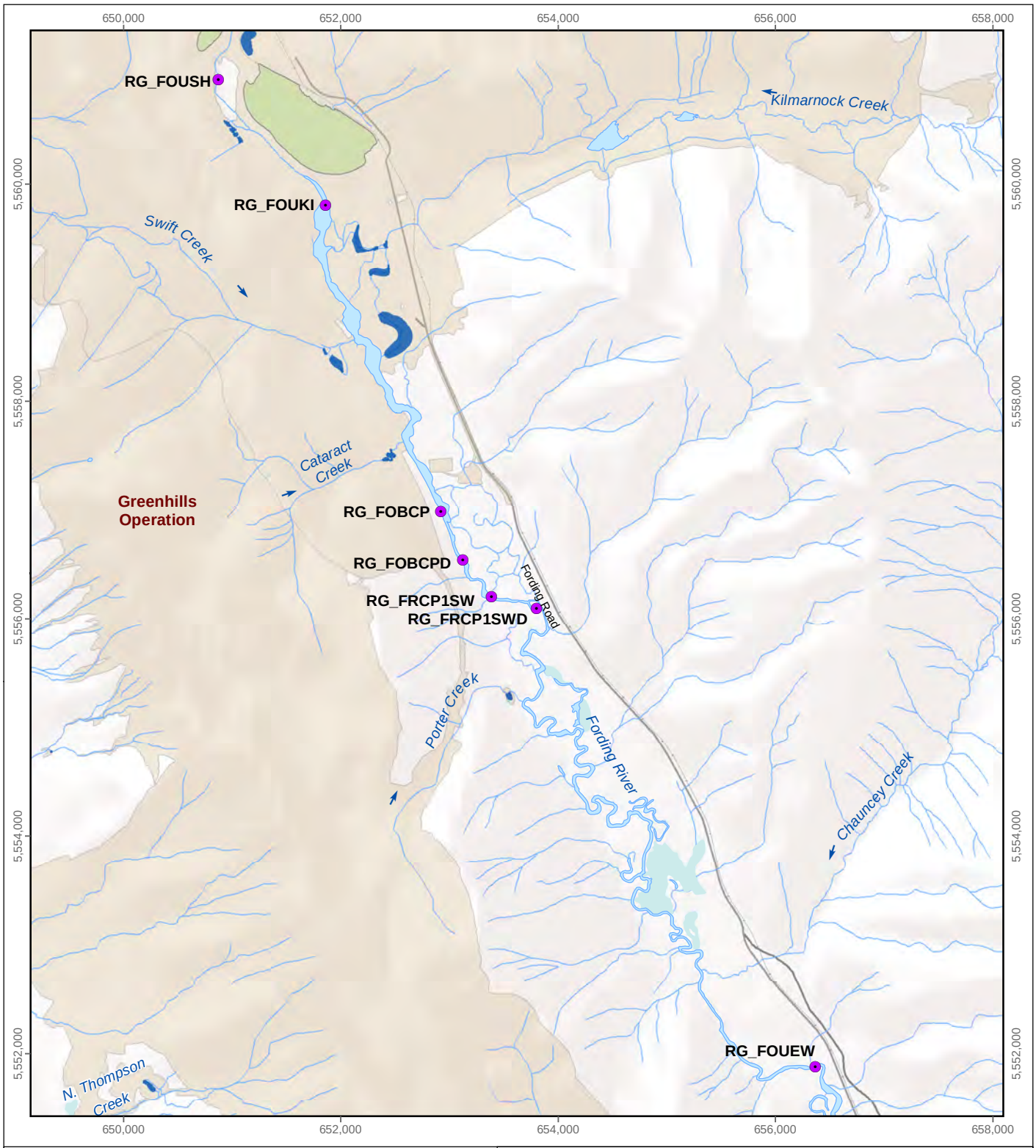
[a] RG_UFR1 was used as a reference area in winter months when there was no access to RG_FO26 or RG_HENUP. It was added for June and September to overlap with the other reference areas for comparison, particularly for the BACI study.
[b] only one replicate was taken because there was a lack of riffle habitat due to high waters from freshet
[c] n=5 for composite-taxon tissue samples in areas associated with the BACI study for commissioning FRO AWTF-S.
[d] the water quality monitoring station is the same for biological monitoring stations RG_FO26 and RG_UFR1.

Table 2.3: Recolonization Sampling Plan Summary, FRO LAEMP, 2019 and 2020

Area		Water Quality (# of samples)					Benthic Invertebrate Community Samples Kick and Sweep (# of samples)				
		Post-freshet	**Re-watering**	**Pre-freshet**	**Freshet**	**Post-freshet**	**Post-freshet**	**Re-watering**	**Pre-freshet**	**Freshet**	**Post-freshet**
Proposed Timing		Mid-September 2019[b]	Early April 2020	Late April 2020	Mid June 2020[a]	Mid-September 2020[b]	Mid-September 2019[b]	Early April 2020	Late April 2020	Mid June 2020[a]	Mid-September 2020[b]
Upstream of Dry	RG_FOUSH	3	1	1	1	1	3	3	3	3	3
	RG_FOUKI	3	1	1	1	1	3	3	3	3	3
Areas that Dry Sesaonally	RG_FOBCP	5	1	1	1	1	5	3	3	3	5
	RG_FOBCPD	-	1	1	1	-	-	3	3	3	-
	RG_FRCP1SW	3	1	1	1	1	3	3	3	3	3
	RG_FRCP1SWD	-	1	1	1	-	-	3	3	3	-
Downstream of Dry	RG_FOUEW	3	1	1	1	1	3	3	3	3	3

[a] Associated with June LAEMP sampling (Table 2.2).

[b] Was not originally a part of the study design for the recolonization study so does not include samples from RG_FOBCPD and RG_FRCP1SW. Data from FRO LAEMP September 2019 and 2020 was added for better temporal resolution.



LEGEND

- Benthic Invertebrate Sampling Location
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Note: Dewatering Sections in December 2018. Conditions may change in 2019/2020.

Locations of Recolonization Sampling, FRO LAEMP, 2020

0 0.5 1 2 km

N W E S

Projection: North American Datum 1983 UTM Zone 11 T

Date: May 2021
Project 207202.0009

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Figure 2.2

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\3- FRO LAEMP Report\20-09 Figure 2.2 Locations of Recolonization, 2020.mxd

Table 2.4: Stations Associated with Drying Surveys, Manual Flow Measurements, and Hydrometric and Water Temperature Loggers, FRO LAEMP, 2020

Water Station ID[d]		Location Description	UTM (11U)		Drying Survey Frequency[d]	Manual Discharge Measurements	HOBO Level Logger	Solinst LevelVent Logger	Barometer
			Easting	Northing					
Ref	FR_UFR1[b]	Upper Fording River upstream of Henretta confluence	651472	5566717	M	Y	-	Y	-
Mine-exposed	FR_FR1[b]	Fording River at the Turnbull	651289	5565415	M	Y	-	Y	-
	FR_FRUPP	Fording River upstream of Post pond	650923	5565169	M	N	-	-	-
	FR_FOUCL	Fording River upstream of Clode	650787	5564445	M	N	-	-	-
	FR_FRDSCC1[b]	Fording River downstream of Clode confluence	650840	5563925	M	Y	-	Y	-
	FR_MULTIPLATE	Fording River at Multiplate	651280	5562515	M	N	-	-	-
	FR_FR2	Fording River downstream of the north tailings pond	651781	5559984	M	Y	Y	Y	Y
	FR_FR3	Fording River immediately upstream of the proposed AWTF discharge	652125	5558620	M	Y	Y	Y	-
	FR_SCOUTDS[a]	Fording River downstream of the proposed AWTF discharge	652272	5558373	M	Y	-	Y	-
	FR_FR4	Fording River between Swift Creek reach 1 channel and Cataract Creek	652464	5557943	M	Y	-	Y	Y
	FR_FRCP1	Fording River Compliance Point	652823	5557220	M	Y	Y	Y	-
	FR_FRCP1SW	Fording River ~1150 m downstream of the Compliance Point	653324	5556197	M	Y	Y	Y	-
	FR_FRRD	Fording River upstream Porter Creek	653897	5555925	M	Y	Y	Y	-
	GH_PC2	Fording River downstream of Porter	653734	5555147	M	Y	Y	Y	-
	FR_FRABCH[c]	Fording River upstream of Chauncey Creek	655282	5552799	M	N	Y	Y	-

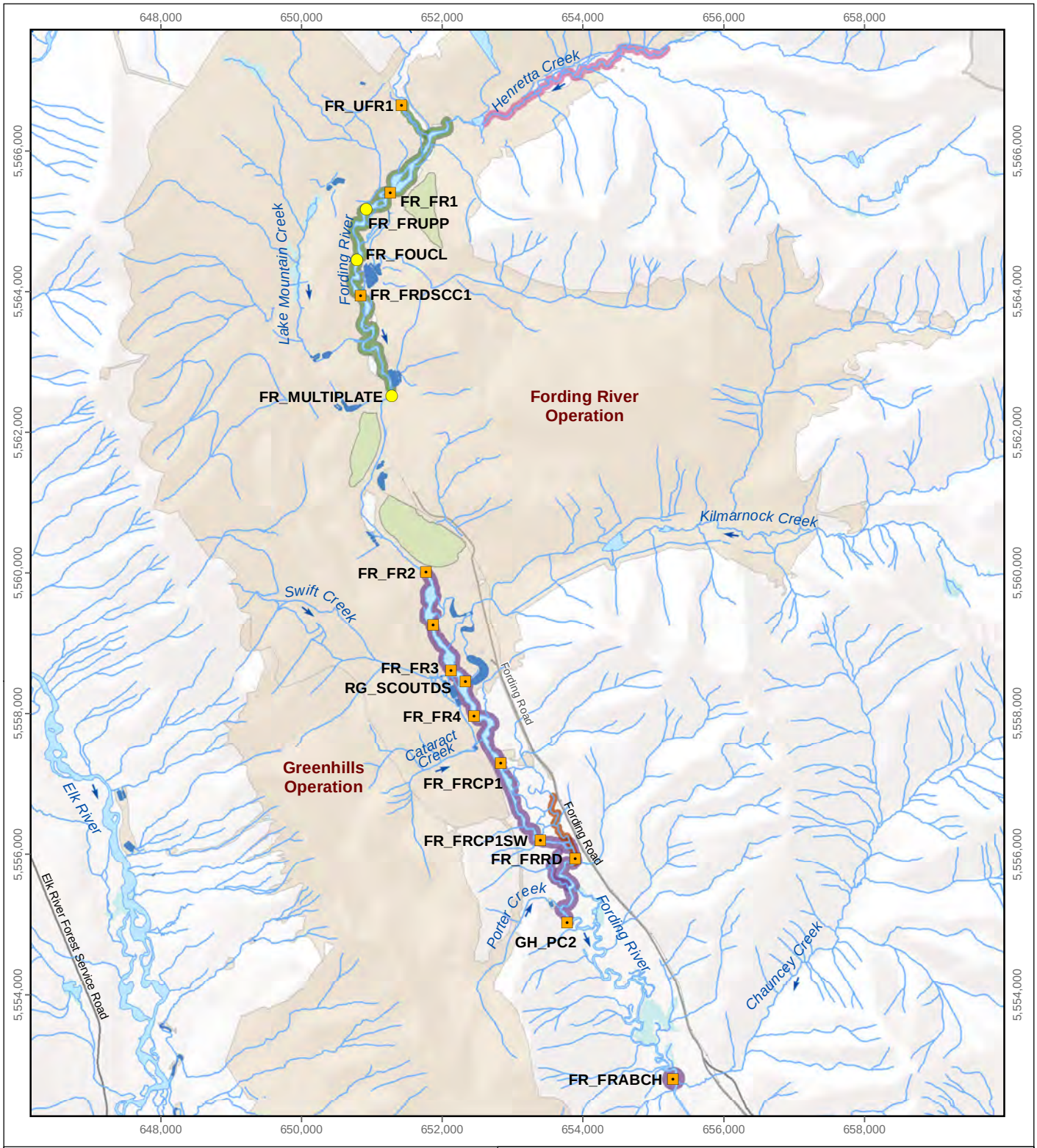
Note: "-" indicates station not having data logger type.

[a] Data logger location previously located at FR_AWTF-S was relocated to RG_SCOUTDS to align with updated outfall location for FRO AWTF-S.

[b] Data loggers added in summer 2020 to support fording north water treatment surveys.

[c] Previously called 'FRABCH-new', data logger is where water quality samples, temperature, and water level data is all collected; FRABCH(old) was removed.

[d] drying surveys begin in August and continue until reconnection of the Fording River.



LEGEND

- Continuous Logger Station
- Water Quality Monitoring Station
- Greenhouse Side Channel
- Upper Henretta Drying Survey
- Northern Drying Survey
- Southern Drying Survey
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Drying Surveys and Continuous Water Monitoring Stations in the Upper Fording River, FRO LAEMP, 2020

0 1 2 4 km

Projection: North American Datum 1983 UTM Zone 11 U

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Figure 2.3

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\3- FRO LAEMP Report\20-09 Figure 2.3 Drying Surveys.mxd

(12.6 km long), Northern (6.1 km long), and upper Henretta (3 km long) drying survey areas (Table 2.4; Figure 2.3). The upper Henretta drying surveys were added in 2020 as a result of drying observed in September 2020 during the Regional Calcite Monitoring Program in Henretta Creek upstream of Henretta lake and upstream of FRO licensed consumptive water use locations.

2.2 Water Quality

2.2.1 Sample Collection

Water quality and selenium speciation samples, as well as *in situ* water quality data (i.e., temperature, flow, pH, conductivity, and DO), were collected concurrently with all biological sampling (Table 2.2). In addition, routine water quality monitoring data collected by Teck and that correspond with biological sampling areas were included in the FRO LAEMP (Table 2.5 and Figure 2.1)

All water samples collected concurrent with biological sampling were collected by wading into the river and filling sampling bottles from below the surface of the water. For water quality samples, preservatives were added to samples for total and dissolved metals, total organic carbon, and dissolved mercury, while field filtering was applied to all samples being analyzed for dissolved constituents. For selenium speciation sampling, a preservative was added to total selenium samples, both a preservative and field filtering was applied to dissolved selenium, and field filtering and sample freezing was applied to selenium speciation samples.

2.2.2 Laboratory Analysis

Water samples were analyzed by ALS Environmental (ALS; Calgary, AB) for parameters consistent with Permit 107517 (i.e., conventional parameters, major ions, nutrients, and total and dissolved metals) using standard methods. Samples were analyzed for the following analytes using the methods indicated in parentheses:

- total organic carbon (TOC) and dissolved organic carbon (DOC) (combustion method; American Public Health Association [APHA] 5310 for TOC);
- Total suspended solids (TSS) and total dissolved solids (TDS) (gravimetric method; APHA 2540 D and C for TSS and TDS, respectively);
- alkalinity (potentiometric titration; APHA 2320);
- turbidity (nephelometric method; APHA 2130 Turbidity);
- hardness, as $CaCO_3$ (by calculation; APHA 2340 B);

Table 2.5: Summary of Teck Routine Water Quality Monitoring Associated with the FRO LAEMP, 2020

Location Description	Water Station ID[h]	EMS Number	UTM (11U)		Water Quality Samples			
			Easting	Northing	Designation	Field parameters[a]	All other parameters required under mine permits[b]	Toxicity[c]
Fording River upstream of FRO	FR_UFR1 (RG_FO26 and RG_UFR1)	E216777	651459	5566677	Reference	W/M	W/M	Q[d]
Henretta Creek upstream of FRO	FR_HC3 (RG_HENUP)	E300096	655489	5567547	Reference	W/M	W/M	-
Fording River downstream of Henretta Creek	FR_FR1 (RG_FODHE)	0200251	651304	5565451	Exposed	W/M	W/M	-
Fording River Multiplate Culvert on Greenhills Access Road	FR_MULTIPLATE[e] (RG_MP1)	N/A	651238	5562482	Exposed	W[e]	W[e]	-
Fording River downstream of the North Tailings Pond	FR_FRNTP[e]	N/A	651122	5561675	Exposed	W[e]	W[e]	-
Fording River upstream of the proposed AWTF discharge	FR_FR2 (RG_FOUKI)	0200201	651781	5559984	Exposed	W	W	-
Fording River immediately upstream of the proposed AWTF discharge	FR_FR3[eg] (RG_FOBKS)	N/A	652125	5558620	Exposed	M[e]	M[e]	-
Fording River immediately downstream of the proposed AWTF discharge	FR_SCOUTDS (RG_SCOUTDS)	N/A	652307	5558501	Exposed	M	M	-
Fording River between Swift and Cataract	FR_FR4[e] (RG_FOBSC)	0200311	652464	5557943	Exposed	M[e]	M[e]	-
Fording River Operation Old Compliance Point	FR_FRCP1 (RG_FOBCP)	E300071	652823	5557220	Exposed	W/M	W/M	Q
Fording River upstream Porter Creek	FR_FRRD[i] (RG_FRUPO)	E300097	653897	5555925	Exposed	M	M	-
Fording River downstream of Porter	GH_PC2[e] (RG_FODPO)	E287431	653734	5555147	Exposed	M[e]	M[e]	-
Fording River Operation New Compliance Point.	FR_FRABCH[e] (RG_FO22)	E223753	655293	5552865	Exposed	W/M[e]	W/M[e]	Q[df]
Fording River upstream of Ewin Creek	FR_FR5[e] (RG_FOUEW)	N/A	657174	5548724	Exposed	M[e]	M[e]	-

Notes: M - monthly; W/M - weekly during freshet (March 15 to July 15); Q - quarterly; N/A - Not Applicable; "-" indicates no data available.

[a] Dissolved oxygen, temperature, specific conductance, pH.

[b] Total and dissolved metals, total and dissolved organic carbon, nutrients, major ions, etc. as per Table 18 of Permit 107517.

[c] Chronic toxicity as per Permit 107517 requirements.

[d] Not required by Permit 107517; FR_UFR1 is used as a reference location in the chronic toxicity program. Frequency may change depending on the needs of the program.

[e] Non permitted location, frequency may change in 2020.

[f] Chronic toxicity started in Q4 2018 at this location.

[g] This sampling location, previously called GH_FR3, was merged to FR_FR3 for data management purposes.

[h] Biological monitoring areas associated with water quality monitoring stations are outlined in brackets.

- total and dissolved metals[2], (collision cell inductively coupled plasma - mass spectrometry and inductively coupled plasma - optical emission spectrophotometry; APHA 3030 B&E / Environmental Protection Agency (EPA) SW-846 6020A, and EPA 3005A/6010B, respectively);
- bromide, chloride, fluoride, and sulphate (ion chromatography; APHA 4110 B);
- ammonia, as N (fluorescence; J. Env. Monit., 2005, 7:37-42);
- nitrate and nitrite, as N (ion chromatography; EPA 300.0);
- total Kjeldahl nitrogen (TKN) (fluorescence; APHA 4500-NORG D.); and
- orthophosphate and total phosphorus (colourimetric method; APHA 4500-P Phosphorus).

Selenium speciation analysis was conducted by Brooks Applied Labs (Bothell, Washington) using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Analytes included selenate, selenite, dimethylselenoxide, methylseleninic acid, methaneselenonic acid, selenocyanate, selenomethionine, selenosulphate, and unknown selenium species). Selenium species were first separated on an ion exchange column and then detected using a collision/reaction cell-equipped inductively coupled plasma mass spectrophotometry (ICP-MS). The applied method was optimized to provide interference-free quantitation of individual selenium species at part-per-trillion (ppt) levels. Total (filtered and unfiltered) selenium analyses were also performed by Brooks Applied Labs using inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). Water samples were collected into borosilicate glass containers and preserved to a pH < 2 with nitric acid. An aliquot of each preserved sample was further digested with nitric and hydrochloric acids in a closed vessel (bomb) prior to analysis. The applied sample collection, preservation, digestion, and analytical procedures are designed to accurately quantify selenium in the presence of potential interferences (e.g., chloride and bromide) and regardless of the chemical form of selenium present in solution (e.g., ionic, particulate, or volatile molecular forms).

Quality Assurance/Quality Control (QA/QC) associated with routine water sampling is described by Teck in annual water quality reports submitted under Permit 107517 (e.g., Teck 2021). Duplicate water quality samples taken concurrently with biological samples were reviewed in Appendix A. Overall, water chemistry data were of acceptable quality and considered acceptable for this study.

[2] Here and elsewhere in this document, “metals” includes metalloids, such as selenium.

2.2.3 Data Analysis

Water quality assessment focused on constituents with EWTs. Total mercury was not included as the source of aqueous mercury concentrations in the Elk Valley is not considered mining (Teck 2019a). Total phosphorus and orthophosphate were included in water quality assessment to address study question #2. Data extracted from Teck's EQuIS database were screened for text values and converted to a common unit (e.g., all metal concentrations were converted to mg/L). Values reported as less than a poor laboratory reporting limit (LRL) were removed from the data set, unless they consisted of 80% or more of the data. Poor LRLs were defined as values reported as < LRL and the LRL exceeding the maximum observed (detected) value for that parameter.

Routine water quality monitoring results were screened against British Columbia Water Quality Guidelines (BCWQG; BCMOE 2017, 2018) as part of Teck's Annual Water Quality Monitoring Report under Permit 107517 (Teck 2021). Water samples taken concurrently with biological monitoring samples were integrated with routine water quality monitoring stations for a more complete data set. Routine water quality monitoring stations were matched with concurrent water samples according to proximity, with some exceptions (RG_FO26/FR_UFR1 and RG_FOUEW/FR_FR5) beyond out of range of a suitable match. Constituents with EWTs were compared to BCWQG and/or EVWQP benchmarks and interim screening benchmarks for nickel, as applicable, for the 2020 calendar year. Plots of these constituent concentrations, and nutrients (total phosphorus and orthophosphate), from 2012 to 2020 were prepared individually for each monitoring station and also as combined plots to allow for visual comparison among stations.

Potential changes in constituents with EWTs and nutrients (total phosphorus and orthophosphate) at individual stations were analyzed statistically to evaluate (1) if there was an increase or decrease since the base year of monitoring (2012 or the earliest year if monitoring was initiated post-2012), (2) whether the annual mean was within the range of historical annual means, and (3) if the current monitoring year (2020) was different from the previous monitoring year (2019).

Monthly mean concentrations of each constituent were estimated using the Kaplan-Meier (K-M) method. The method involves transforming the left censored (i.e., < value) data set to a right censored (i.e., > value) data set, and then using the K-M estimator (used to estimate the mean survival time in survival analysis) to estimate the mean. The calculation was conducted using the survfit() function in the survival package (Therneau 2017) in R and involves calculating the area under the K-M survival curve. The K-M method is non-parametric and can accommodate multiple LRLs. The method of estimating the mean is equivalent to using the distribution of detectable values below the LRL to represent values that are < LRL. For example, the mean of

the data set {1, 2, <4, 5} is estimated as the mean of 1, 2, [½×1 + ½×2], and 5 which is 2.375. The value <4 is replaced by the distribution of values below 4 (i.e., 1 and 2 with equal weight of ½). Similarly, the mean of the data set {1, 1.6, 2, 2.1, <4, 5} is estimated as the mean of 1, 1.6, 2, 2.1, [¼×1 + ¼×1.6 + ¼×2 + ¼×2.1], and 5 which is 2.229. Again, the value <4 is replaced by the distribution of values below 4 (i.e., 1, 1.6, 2, and 2.1 with equal weight of ¼). If there is only one LRL and no detected values below the LRL, then the K-M estimate of the mean is equivalent to replacing the value below the LRL with the LRL (i.e., the best estimate for the values < LRL is the LRL).

Temporal changes in monthly mean concentrations for water quality parameters were evaluated for each station (reference and mine-exposed) from 2012 to 2020. Only years with at least six months and only stations with at least three years of data were included in the analysis. Because of the presence of LRLs for most parameters, a censored regression analysis of variance (ANOVA) model with factors *Year* and *Month* and assuming a log-normal distribution of the response variable was fit with maximum likelihood estimation for each station. The significance of each term in the model was assessed using likelihood-ratio tests to determine if there is a significant change in log-likelihood with the addition of the term in the model. This tested for an overall difference among years (including the *Month* term in the model controlled for seasonal effects within a year). If the *Year* term was significant ($\alpha = 0.05$) then post-hoc contrasts were conducted to test for pairwise differences among years with an $\alpha = 0.05$ in a Tukey's HSD test which corrects for the number of comparisons.

For each year, a percent magnitude of difference from the base year (i.e., first year with minimum number of months) was calculated as:

$$\frac{Year_i - Base\ Year}{Base\ Year} \times 100\ \%$$

and the significant difference between 2020 and previous years was assessed.

A principal components analysis (PCA) is a multivariate approach which transforms a group of 'n' variables into a smaller new set of uncorrelated variables (the principal components; PCs). The principal components are defined to be linear combinations of the original 'n' variables. A PCA was conducted using Kaplan-Meier mean water chemistry parameters calculated over the year prior to the benthic sampling date. Seasons were defined based on changes in water chemistry across a year and designed to capture high and low concentration periods throughout a year. For each year, four seasons were defined: winter (December to March), early spring (May), spring (June) and summer (July). Each season had to have at least one record for an annual concentration to be calculated and used in the PCA. Because a PCA cannot incorporate LRL values, any parameters with >25% of the mean values below the LRL were excluded from

the PCA and Kaplan-Meier mean values at the LRL were replaced with the LRL (Farnham et al. 2002). When there was more than one LRL for a given parameter, or detected values were below the highest LRL, these values were replaced with the highest LRL. The contribution of individual parameters to the first two principal components were quantified by calculating their correlation using a Pearson's correlation coefficient. The PCA and correlation analysis were conducted in R (R Core Team 2019).

2.3 Hydrology

2.3.1 Seasonal Drying

2.3.1.1 Field Methods

Monthly drying surveys were completed from January to April 2020, and August to December 2020, to evaluate surface water connectivity along the Fording River in the FRO LAEMP study area. Methods followed those used in previous years (e.g., Minnow and Lotic 2019b). In general, the southern survey covered a 12.8 km section of the Fording River from the Chauncey Creek confluence (FR_FRABCH) upstream to the south tailings pond (FR_FR2; Table 2.4; Figure 2.3). The northern survey covered a 6.1 km section of the Fording River from the Multiplate culvert (FR_MULTIPLATE) upstream past the Henretta Creek confluence (FR_UFR1). Drying surveys were completed biweekly from January to April in 2020 to closely monitor the changing drying conditions in areas known to dry during low flow conditions. Field crews walked each section to delineate any extent of drying observed by marking them with a handheld global positioning system (GPS in Universal Transverse Mercator system [UTM] coordinates, using North American Datum [NAD] 83) to facilitate mapping. Drying sections and GPS tracks were also recorded on an iPad with a geo-referenced map to facilitate mapping and estimate the extent of drying. Isolated pools, fish, and wildlife observations are also recorded. Water quality samples were collected from January to April 2020 from eight stations in the southern survey section (FR_FRABCH, GH_PC2, FR_FRRD, FR_FRCP1SW, FR_FRCP1, FR_FR4, GH_FR3, and FR_FR2) and six stations in the northern survey section (FR_MULTIPLATE, FR_FRDSCC1, FR_FOUCL, FR_FRUPP, FR_FR1, and FR_UFR1) and any isolated pools found.

Monthly surveys in 2020 included two modifications/additions from previous years. These were:

1. Side channel #2 was added to the southern survey in November 2020. This side channel starts downstream of FR_FRCP1SW and reconnects to the Fording River upstream of the Porter Creek confluence (GH_PC2), allowing some flow to bypass station FR_FRRD.

2. In October 2020, an additional survey was added on Henretta Creek to monitor a drying section observed upstream of Fording River Operations licensed water use. The Henretta Creek survey covers a section of approximately 3 km upstream of Henretta Lake.

2.3.1.2 Data analysis

Coordinates (GPS) and tracks collected during monthly surveys were mapped to display the monthly conditions and any observed drying sections of the Fording River. The results of monthly surveys were used, in combination with water level logger data, to determine when an area had become dry between visits. These observations where then corroborated by water temperature and level logger records to estimate the exact dates when sections of the Fording went dry.

2.3.2 Water Level and Temperature

2.3.2.1 Data Collection

Water level and temperature were continuously monitored using a combination of Solinst 3250 LevelVent Dataloggers (primary) and Onset Hobo U-20 level-loggers (secondary) at 12 hydrometric stations in 2020 (Table 2.4). The combination of loggers was added for protection against the loss of data in the event of a logger malfunction. The loggers were programed to record water level and water temperature at 15-minute intervals. Data was downloaded from the loggers in April before freshet and in October before freeze up to avoid data loss. Loggers were winterized in October to prevent damage from freezing.

Hydrometric station FR_AWTF-S was removed from the drying survey sampling plan in July 2020 and a new hydrometric station was installed at FR_SCOUTDS as a result of the relocation of the FRO AWTF-S outfall. The stilling well upstream of FR_FRABCH (i.e., FR_FRABCH_old) was also removed in July 2020 as it was redundant to the stilling well with a water level logger at FR_FRABCH in line with Fording River Operations water quality sampling site. The stilling wells at FR_AWTF-S, FR_FRCP1, FR_FR4, and FR_FR3 were damaged during freshet in June 2020. Data from FR_AWTF-S and FR_FR4 was not able to be recovered from May 1 to July 23, 2020. Data from the Hobo U-20 level logger from FR_FR3 and Solinst LevelVent logger from FR_FRCP1 were recovered. The stilling wells were reinstalled at FR_FRCP1, FR_FR4, and FR_FR3 in July 2020. Three new hydrometric stations (FR_FRDSCC1, FR_FR1, and FR_UFR1) were installed with Solinst LevelVent Loggers in July 2020 to monitor water level and temperature in the northern survey.

2.3.2.2 Data Analysis

Continuous water level data were collected and corrected for barometric pressure from October 2017 to October 2020. For each hydrometric station, a log-linear stage-discharge curve

was generated using manual stage and discharge measurements. Stage (m) and discharge (m^3/s) values were manually verified and measurements with suspected errors or high uncertainty (e.g., flows conducted under ice conditions) were removed from further analyses. All stage measurements below 0.001 m were treated as 'dry' and were excluded. Benchmarks were checked for each site and shifts were corrected. The water level record was also verified by comparing to manual measurements and spikes and other erroneous readings were cleaned and shifts due to relocation of loggers were corrected. Hourly discharge and stage records were compared against manual observations to calculate the Offset (m), Absolute Error (m^3/s), and the mean Relative Error (Absolute Error divided by Measured Flow; %; Appendix Table C.1).

Solinst LevelVent data were preferentially used to extend the water level and temperature records at each site as they have increased measurement accuracy. Hobo U20 level logger records were used in the event of data loss or logger malfunction. Solinst LevelVent loggers internally correct for barometric pressure, therefore no correction was required after download. Water level (pressure) data were corrected using Solinst Levellogger 4.4.0 software and a reference water stage relative to the staff gauge at each location to create a continuous record of water stage in meters. Water level was subsequently converted to discharge to generate annual hydrographs (Section 3.2). Water level and temperature records were used in combination with field observations to determine the date when a site was observed to be dry or rewetted between monthly surveys.

2.3.3 Flow

2.3.3.1 Data Collection

Field crews collected discharge measurements monthly at each location using a Hach EM950 velocity meter where surface flow conditions permitted. Flow measurements were consistent with those reported previously (Minnow and Lotic 2018, 2019b, 2020b), following the Manual of British Columbia Hydrometric Standards (RISC 2009). During ice covered visits, a transect was cut into the ice by hand or a minimum of five holes were drilled through the ice with an auger to get an estimate for discharge. Winter flow measurements affected by ice are unlikely to serve as reliable data points to create a stage-discharge relationship and were not used in stage-discharge development. Two high flow measurements at each site were collected in June 2020 using a Sontek M9 ADP unit to enable flows to be collected without wading and to assist in developing the upper end of each rating curve. Benchmark surveys were completed at each site before level loggers were downloaded to determine if the stilling well had shifted and to comply with Resources Information Standards Committee (RISC) standards (RISC 2009).

2.3.3.2 Data Analysis

Manual discharge measurements and stage readings from the staff gauge were used to develop a power function stage-discharge relationship for each site. A stage discharge relationship is required to convert the continuous water level records into discharge. Stage (m) and discharge (m^3/s) values were manually verified and qualitatively determined outliers (relative to the existing relationship) or measurements with high uncertainty (e.g., flows conducted under ice conditions) were removed from further analyses. All stage measurements below 0.001 m were treated as 'dry' and were excluded. A discharge time series (i.e., hydrograph) was plotted for each site and qualitatively assessed. Lotic retained MacDonald Hydrology Consultants for senior review and quality grading of the hydrological data. Grades were assigned following British Columbia Ministry of Environment Hydrological RISC Standards (RISC 2009; see Appendix K)

2.4 Substrate Quality

2.4.1 Sediment

2.4.1.1 Sample Collection

Sediment quality samples were collected concurrently with benthic invertebrate sampling at eight areas in 2020 (RG_HENUP, RG_FO26, RG_FOUKI, RG_SCOUTDS, RG_FOBKS, RG_FOBCP, RG_FRUPO, and RG_FO22; Table 2.2). Five replicates were collected at mine-exposed areas, and three replicates were collected at reference areas, consistent with methods outlined in the 2021 to 2023 RAEMP study design (Minnow 2021a). Sediment samples were collected using a stainless-steel spoon and were transferred into glass jars for analysis of polycyclic aromatic hydrocarbons (PAHs), and into polyethylene bags for all other analyses (i.e., metals, moisture content, total organic carbon, and particle size distribution). Surficial sediment was collected by slowly and carefully placing the spoon on the sediment surface in a manner that minimized disturbance and inserting the spoon into the sediment to capture sediment to a depth of 1 to 2 cm, where possible. The spoon was then slowly lifted to the surface to avoid sample washout. The content of each spoonful was inspected to confirm that it was predominantly fine sediment (i.e., no pieces of vegetation, woody debris, or rocks), and, if acceptable, was placed into a clean plastic tub. This procedure was repeated to form a composite sample representative of the sampling area with sufficient material for analysis, and the stainless-steel spoon was used to homogenize the sediment. Sampling equipment was rinsed with site water between stations. Due to shear stress and deposition characteristics of lotic environments in the upper Fording River, sediment was collected in small pockets of depositional areas, predominantly along the riverbank and often behind habitat structures that reduced flow.

These areas were generally found within 10 to 100 meters of riffles where biological samples were collected.

For QA/QC purposes, duplicate (split) samples were collected at a frequency of approximately 4.5% of the total number of samples for monitoring areas in the FRO LAEMP (i.e., two duplicate samples), but an overall frequency of 10% was sampled in the Elk River watershed as part of the greater RAEMP and LAEMP sampling in September 2020 and will be evaluated in the 2020 to 2022 RAEMP report. Following collection, samples were placed in a refrigerator at approximately 4°C until submission to the analytical laboratory.

2.4.1.2 Laboratory Analysis

Samples for chemical analysis were sent to ALS Environmental (ALS; Calgary, AB). The laboratory was instructed to thoroughly homogenize each sediment sample (according to standard laboratory protocols), to confirm the aliquots taken for analysis were representative and comparable.

Sediment samples were analyzed using the following methods: metals by CRC ICP-MS (EPA 200.2/6020A), mercury by Cold Vapour Atomic Fluorescence Spectroscopy (CVAFS; EPA 200.2/245.7), TOC by combustion method (Bartels and Sparks 2009), and PAHs by rotary extraction using hexane/acetone (EPA 3570/8270) followed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Particle size distribution was determined by dry sieving (coarse particles), wet sieving (sand), and the pipette sedimentation method (fine particles). Moisture content was determined gravimetrically by drying the sample at 105°C.

QA/QC for sediment samples included the collection of one field duplicate sample at each of RG_FO26 and RG_FRCP1SW, with subsequent assessment of laboratory duplicates, spike recoveries, and certified reference materials. Data quality was reviewed in Appendix A of the present report. Sediment chemistry data were of acceptable quality.

2.4.1.3 Data Analysis

Sediment quality data were tabulated, summarized, and compared to British Columbia Working Sediment Quality Guidelines (WSQGs), except for selenium concentrations which were compared to the alert concentrations (BCMOE 2017, BCMOECCS 2019). The sediment data were also compared to reference area normal ranges, which were the 2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers (Minnow 2021b, in preparation). Normal ranges could not be calculated for several PAHs because most of the values were below laboratory reporting limits (LRL). Data from 2017 to 2020 were plotted for all parameters for which a WSQG was available and visually assessed for temporal changes.

2.4.2 Calcite

Calcite presence and concretion measurements were collected concurrently with BIC sampling in September 2020. For each of the rocks measured during the 100-pebble count (see Section 2.5.1.3), calcite presence (score = 1) or absence (score = 0) was recorded and the degree of concretion was assessed by determining if the rock was removed with negligible resistance (not concreted; score = 0), noticeable resistance (partially concreted; score = 1), or was immovable (fully concreted; score = 2). If distinct particles were not visible due to heavy calcification, values of 1 (for presence) and 2 (for concretion) were recorded. Similarly, if fines were encountered and calcite presence could not be visually confirmed, values of 0 (for presence) and 0 (for concretion) were recorded. If rocks were visible under fine material, the rock was selected for calcite characterization.

2.4.2.1 Data Analysis

A calcite index (CI) was calculated as follows (Teck 2016):

$CI = CI_p + CI_c$

Where:

$$CI = Calcite\ Index$$

$$CI_p = Calcite\ Presence\ Score = \frac{Number\ of\ particles\ with\ calcite}{Number\ of\ particles\ counted}$$

$$CI_c = Calcite\ Concretion\ Score = \frac{Sum\ of\ particle\ concretion\ scores}{Number\ of\ particles\ counted}$$

Calcite data collected as part of the Regional Calcite Monitoring Program (Lotic 2021) were reported but were not used in analyses as the calcite measurements taken concurrently with biological sampling were deemed more appropriate because they are specific to the areas sampled for benthic invertebrates (i.e., riffles).

Calcite measurements made among 40 reference areas sampled in 2015 were used to characterize the normal range as part of the 2015 to 2016 RAEMP report (Minnow 2018b), and the upper limit (97.5th percentile) was defined as CI = 1.0.

Pebble size metrics (D16 and D84) were calculated as the 16th and 84th percentiles of 100 pebbles collected from the 100-pebble count and used as an indicator of particle size in correlation analyses (Appendix Table F.62).

2.5 Benthic Invertebrates

2.5.1 Community Structure

2.5.1.1 Sample Collection

Triplicate BIC samples were collected at each of the FRO LAEMP biological monitoring areas in June and September 2020, except for RG_FOBCP and RG_FO22 where five replicates were collected in September to fulfill requirements under the 2018 to 2020 RAEMP study design (Table 2.2; Minnow 2018c). Consistent with previous years, triplicate samples were also collected in December 2020 at select areas in the lower part of the study area to understand how seasonal drying in the southern survey area may affect BIC (Table 2.2). Sampling of BIC deviated from the study design on two occasions due to local site conditions at the time of sampling. First, in June only one replicate of the intended three BIC samples were collected at biological monitoring area RG_FO22 (located in the Fording River upstream of Chauncey Creek) due to limited accessible riffle habitat as a result of high water conditions associated with the freshet, and second, BIC samples were not collected at biological monitoring area RG_FOBCP (located at the Compliance Point) in December due to very thick ice conditions at the time of sampling.

Benthic invertebrate community sampling followed the Canadian Aquatic Biomonitoring Network (CABIN) method, which involved 3-minute travelling kick sampling in riffle habitats into a net with a triangular aperture measuring 36 cm per side and mesh having 400 µm openings (Environment Canada 2012a). During sampling, the field technician moved across the stream channel (from bank to bank, depending on stream depth and width) in an upstream direction. With the net being held immediately downstream of the technician's feet, the detritus and invertebrates disturbed from the substrate were passively collected in the kick-net by the stream current. After three minutes of sampling time, the sampler returned to the stream bank with the sample. The kick-net was rinsed with water to move debris and invertebrates into the collection cup at the bottom of the net. The collection cup was then removed and the contents poured into a labelled plastic jar and preserved to a level of 10% buffered formalin in ambient water. Replicate samples were spaced either in separate riffles or a minimum of 50 m apart (when the area was a continuous riffle).

2.5.1.2 Laboratory Analysis

Benthic invertebrate community samples were sent to Cordillera Consulting (lead taxonomist Scott Finlayson), in Summerland BC, for sorting and taxonomic identification. Organisms were identified to the lowest practical level (LPL) (typically genus or species). At the beginning of the sorting process, each sample was examined and evaluated for estimation of total invertebrate numbers. If the total number was estimated to be greater than 600, then the

laboratory's sub-sampling protocol was followed. A minimum of 5% of each sample was sorted, in accordance with Quality Assurance/Quality Control (QA/QC) requirements of Environment Canada (2014). Sorting efficiency and sub-sampling accuracy and precision were quantified using methods specified by Environment Canada (2012b, 2014).

A data quality review (DQR) was conducted on the 2020 BIC data and is included in Appendix A of the present report. Overall, benthic invertebrate community structure data were of acceptable quality and the associated data can be used with a high level of confidence in the derivation of conclusions.

2.5.1.3 Supporting Measures

Consistent with the requirements of the CABIN sampling protocol, supporting habitat information (i.e., water velocity and depth, *in situ* water quality [temperature, dissolved oxygen (DO), conductivity, pH], canopy cover, substrate characteristics [Wolman 100-pebble count]) was collected concurrent with benthic invertebrate communities sampled in riffle habitats (Environment Canada 2012a). Periphyton scores were also ascribed to each biological monitoring area during September sampling, and according to CABIN sampling protocol (Environment Canada 2012a). The scoring was ascribed as follows:

1 – rocks not slippery, no obvious colour (<0.5mm thick);

2 – rocks slightly slippery, yellow-brown to light green in colour (0.5-1mm thick);

3 – rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick);

4 – rocks are very slippery, numerous clumps (5-20mm thick); and

5 – rocks mostly obscured by algae mat, may have long strands (>20mm thick).

2.5.1.4 Data Analysis

To address the investigation into the changes in BIC structure, endpoints of total sample abundance, richness (LPL taxonomy), percent (%) and total abundance of Chirnonomidae, EPT, Ephemeroptera, Plecoptera, and Trichoptera individually, and total abundance of key Ephemeroptera families (Baetidae, Heptageniidaie, Ephemerellidae) were plotted spatially and temporally. Autotrophic to Heterotrophic Index, Shredder Index, Filtering to Collector Index, Predator Index, and Benthic to Hyporheic Index (Tables 2.6; Appendix Table E.1 were also computed for each biological monitoring area from CABIN kick samples and using the following equations:

$$Autotrophic\ to\ Heterotrophic\ Index = log10\left(\frac{Scrapers}{Shredders+Collector\ Gatherers+Filterers}\right)$$

Table 2.6: Benthic Invertebrate Community Index Descriptions, FRO LAEMP, 2020

Index	Description
Autotrophic to Heterotrophic Index	Reflects the ratio of energy use by the benthic invertebrate community (BIC) as primary productivity within the stream from algae growth to heterotrophic energy sources (e.g., leaves and sticks)
Shredder Index	Reflects the ratio of coarse particulate organic matter (CPOM) to fine particulate matter (FPOM) used by BIC
Filtering Collector Index	Reflects the ratio of suspended Fine Particular Organic Matter (FPOM) to depositional FPOM used by the BIC
Predator Index	Reflects the abundance of predators
Benthic to Hyporheic Index	Reflects the ratio of habitats used by BIC, reflects sediment stability and flow permanence

$$Filtering\ Collector\ Index = log10\left(\frac{Filterers}{Collector\ Gatherers}\right)$$

$$Predator\ Index = log10\left(\frac{Predators}{All\ other\ Feeding\ Groups}\right)$$

$$Benthic\ to\ Hyporheic\ Index = log10\left(\frac{Burrowers}{Clingers + Sprawlers}\right)$$

$$Shredder\ Index = log10\left(\frac{Shredders}{Collector\ Gatherers + Filterers}\right)$$

Benthic invertebrate community data collected in September were compared to regional normal (reference area) ranges and habitat adjusted site-specific normal ranges. The regional normal range is defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 2012 to 2019 data) reported in the 2017 to 2019 RAEMP report (Minnow 2020a). The site-specific normal ranges were calculated as prediction intervals from the final habitat model (Minnow 2020a). Ninety-fifth percentile prediction intervals were calculated from linear mixed-effects models using simulations (n=100,000) to generate residual variation in random-effects terms. For Ephemeroptera and EPT Abundance endpoints, the prediction intervals from the % Ephemeroptera and % EPT models were multiplied by the prediction intervals from the Abundance model to generate the taxa specific abundance predictions. Prediction intervals were calculated using the predictInterval() function in the merTools R package (Knowles and Frederick, 2019). The residuals from the habitat models (observed minus model predicted values; on the transformed scale) were used in correlation analyses below (Section 2.6).

Endpoints from September were plotted spatially (2020), and temporally (2012 to 2020) for each area where data were available. Seasonal data for 2018 to 2020 were plotted by area but were not compared to normal ranges. Insufficient seasonal reference data are available for the development of normal ranges in months other than September. The relative composition of BIC was plotted spatially by monitoring area for each season where samples were collected in 2020.

Temporal changes in benthic endpoints calculated from September kick and sweep data were evaluated for 2012 to 2020. For some (but not all) years there were replicate data for a given area within a year. Thus, for each endpoint, an ANOVA with factors *Year*, *Area* and *Year* × *Area* was fit. The best transformation for each endpoint was chosen as the transformation for which a Shapiro-Wilk's test on the residuals gave the highest P-value (i.e., most normally distributed). If there was a significant *Year* term, the variability within years and areas from the full model was used to test for significant differences between all pairwise comparisons of year for each area (i.e., is the difference between year *i* and year *j* greater than would be expected given the

variability within areas for all stations for which we have replicates). This assumes the variability to be consistent among areas and years but allows for comparisons between years without replicates. Significance of the pairwise comparisons was assessed with an α of 0.05 in a Tukey's Honestly Significant Difference test (HSD) which corrects for the number of comparisons.

For each year, a magnitude of difference from the base year (i.e., first year with data) was calculated as:

$$\frac{Year_i - Base\ Year}{Pooled\ SD}$$

and the significant differences between 2020 and previous years was assessed. All statistics were conducted in R (R Core Team 2019).

Benthic invertebrate community structure was also assessed using a multivariate ordination technique known as CA, which is used to create synthetic species abundance axes extracted in a sequential manner. Each score (number) on a CA axis is the sum of a weighted vector of species abundances. Species with correlated abundances vary together and have similar weights and scores on a CA axis. When depicted in two-dimensional plots, taxa that tend to co-occur plot together, while those that rarely co-occur plot farther apart. Similarly, areas sharing many taxa plot closest to one another, while those with little in common plot furthest apart. The greatest variation among either taxa or areas is explained by the first axis, with other axes accounting for progressively less variation. Therefore, this type of multivariate analysis describes not only which areas have distinct benthic communities, but also how these benthic communities differ among areas (i.e., which particular taxa differ in abundance). Prior to CA, the data were log (x+1) transformed and screened for rare taxa, as these can distort results. Taxa occurring at five or fewer of the areas, and constituting less than 0.5% (1% for CA on September data at the Family Level) of the total organism abundance, were removed from the analysis. Scores for both taxa and areas were calculated using the vegan package (Oksanen et al. 2019) in R (R Core Team 2019) to evaluate the associations of organisms and stations. A separate CA was conducted for September 2012 to 2020 at the family and lowest-practical levels as well as for seasonal data from 2018 to 2020 at the family and lowest-practical levels.

Patterns of benthic invertebrate recolonization of the intermittently dry section of the Fording River (RG_FOBCP to RG_FRCP1SWD) were investigated over a period from September 2019 to September 2020. Five time periods were identified for analysis: September 2019, early-April 2020, late-April 2020, mid-June 2020, and September 2020. Data from September 2019 and 2020 data were included in the analysis to give better temporal resolution of recolonizing benthic invertebrates; however, because RG_FOBCPD and RG_FRCP1SW were not a part of the original recolonization sampling plan (and the FRO LAEMP), BIC data was not

collected at these locations in September sampling campaigns. A suite of benthic invertebrate community endpoints were analyzed using a two-way ANOVA, with pairwise post-hoc contrasts between stations within each time period calculated using Tukey's Honestly Significant Differences. Magnitudes of difference (MOD) were calculated relative to RG_FOUKI as $(mean_{station} - mean_{RG\_FOUKI})/SD_{pooled}$ within each time period. Means were calculated as estimated marginal means from the full ANOVA model on the transformed scale. Patterns in community composition were also evaluated using Correspondence Analysis (CA) on ln(x+1) transformed abundances from a LPL community matrix. Taxa present at fewer than 5% of samples, and those that accounted for less than 1% of the total abundance in the dataset were excluded from the analysis. Results were visualized as a scatterplot of station and taxa scores. A partial Correspondence Analysis was also performed.

2.5.2 Tissue Selenium Concentrations

2.5.2.1 Sample Collection

In June, September, and December 2020, three tissue samples were collected from the reference (RG_HENUP and RG_FO26) and mine-exposed (RG_FODHE downstream to RG_FOUSH) biological monitoring areas that are not included in the proposed FRO AWTF-S commissioning sampling plan (Table 2.2). Replicates of five tissue samples were collected at areas (RG_UFR1, RG_FOUKI, RG_FOBKS, RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_FRUPO, RG_FODPO, RG_FO22, RG_FOUEW; Table 2.2) associated with the FRO AWTF- S commissioning sampling plan in June, September, and December 2020 to give stronger statistical power and to ensure a balanced (i.e., same number of replicates taken pre- and post-commissioning) sampling design pre- and post-commissioning. Samples were not collected at RG_FODHE and RG_FRCP1SW in December 2020 because the areas were dry or frozen.

Composite-taxa benthic invertebrate tissue samples were collected for selenium analysis using the kick sampling method described in Section 2.5.1, except that the sampling was not timed, and kicking continued until sufficient sample was collected. Replicate samples were collected either in separate riffles or a minimum of 50 m apart (when the area was a continuous riffle). Invertebrates were picked free of debris in the field, placed into sterile labelled cryovials and stored in a cooler with ice packs until they were transferred to a freezer later in the day. Approximately 2 g of wet tissue were collected for each sample where possible, and composite-taxa samples were representative (proportional) of the invertebrates collected from the kick and sweep.

2.5.2.2 Laboratory Analysis

Benthic invertebrate tissue samples were kept in a freezer until they were shipped in coolers on ice to TrichAnalytics Inc. (Trich) in Saanichton, BC. At the laboratory, samples were freeze-dried and analyzed for metals (including selenium) using laser ablation inductively coupled plasma spectrometry (LA-ICPMS). Results were reported on a dry weight (dw) basis, along with moisture content (based on the difference between wet and freeze-dried sample weights).

A DQR was conducted on the 2020 benthic invertebrate tissue data and is included in Appendix A of the present report. Laboratory precision was evaluated based on duplicate analysis of benthic invertebrate tissue samples (n = 23) and results were within the data quality objectives (DQO) set by TrichAnalytics. Benthic invertebrate tissue data collected for the present study were of good quality and the associated data can be used with a good level of confidence in the derivation of conclusions.

2.5.2.3 Data Analysis

Composite-taxa benthic invertebrate tissue selenium concentrations were plotted for each station from 2012 to 2020 and for all stations in 2020 relative to:

- the regional normal (reference area) range, defined as the 2.5th and 97.5th percentiles of tissue selenium concentrations measured in reference areas that have not been disturbed by mining in historical studies completed in the Elk River watershed from 1996 to 2019 reported in RAEMP (Minnow 2020a);
- data from previous sampling periods from 2012 to present, where available;
- the Level 1 EVWQP benchmarks for effects to invertebrates (13 milligrams/kilogram [mg/kg] dry weight [dw]), dietary effects to birds (15 mg/kg dw), and dietary effects to juvenile fish (11 mg/kg dw; Golder 2014);
- the Level 2 EVWQP benchmarks for effects to invertebrates (20 milligrams/kilogram [mg/kg] dry weight [dw]), dietary effects to birds (22 mg/kg dw), and dietary effects to juvenile fish (18 mg/kg dw; Golder 2014); and
- the Level 3 EVWQP benchmarks for effects to invertebrates (27 milligrams/kilogram [mg/kg] dry weight [dw]), dietary effects to birds (41 mg/kg dw), and dietary effects to juvenile fish (26 mg/kg dw; Golder 2014).

Additionally, tissue selenium concentrations were paired with corresponding water selenium concentrations and compared to the selenium bioaccumulation model (Golder 2020a).

2.5.3 Biomass

2.5.3.1 Sample Collection

Ten replicate stations were sampled at each of ten biological monitoring areas (RG_FO26, RG_HENUP, RG_FOUKI, RG_SCOUTDS, RG_FOBKS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW, RG_ FRUPO, and RG_FO22) in September 2020 for analysis of benthic invertebrate biomass and density (Table 2.2; Figure 2.1). Benthic invertebrates were collected using a Hess sampler with 500 µm mesh, for measurement of biomass and community endpoints relative to the area sampled. Stations were located a minimum of 5 m a part, so they were representative of the overall monitoring area. A single sample was collected at each station by carefully inserting the base of the Hess sampler into the substrate to a depth of approximately 5 to 10 cm. Gravel or cobble enclosed within the Hess sampler was carefully washed while allowing the current to carry dislodged organisms into the mesh collection net. Organisms collected into the net were rinsed into the bottom of the net, and then into a labelled wide-mouth plastic jar. Samples were preserved to a level of 10% buffered formalin in ambient water within approximately 6 hours of collection to ensure that biomass was not lost through predation or decomposition of tissues before the samples were sorted at the laboratory.

2.5.3.2 Laboratory Analysis

Benthic invertebrate biomass samples were sent to ZEAS Inc. (lead taxonomist Danuta Zaranko) in Nobleton, ON, for sorting and taxonomic identification. Preserved organisms in each sample were sorted from the sample debris into groups separated at the family-level of taxonomy for weighing. Each family group of organisms was placed onto a fine cloth to drain excess surface moisture before being weighed to the nearest 0.0001 g. Total biomass and density were reported for each sample (preserved wet weight). No QA/QC was conducted as the entire sample was sorted and processed.

2.5.3.3 Data Analysis

Laboratory data for benthic invertebrate biomass and density samples were converted to units of number of organisms per square meter (org/m^2) based on the known area sampled. Biomass and density data from 2017 to 2020 were plotted and changes were visually compared to assess spatial and temporal patterns pre-commissioning of the FRO AWTF-S.

2.6 Integrated Analysis

To determine what physical and chemical characteristics may be driving trends in BIC, Spearman Rank Correlations were conducted between percent (%) and total abundance of Ephemeroptera and Plecoptera, individually, EPT combined, Chironomidae, the residuals from the site-specific

normal range model for total abundance, richness, percent and total abundance of EPT and Ephemeroptera, the indices described in Table 2.6, and CA Axis 1 and CA Axis 2 against a variety of physical and chemical parameters (Appendix Table F.1). For water chemistry parameters, annual mean concentrations were calculated for different seasons and then averaged across the year prior to the benthic sampling date. Seasons were defined based on changes in water chemistry across a year and designed to capture high and low concentration periods throughout a year. For each year, four seasons were defined: winter (December to March), early spring (May), spring (June) and summer (July). Each season had to have at least one record. Significant correlations were assessed at $\alpha = 0.05$, Bonferroni corrected for 36 independent comparisons (corrected $\alpha = 0.05/36 = 0.00139$). Water chemistry parameters were also analyzed by PCA (Section 2.2.3) to combine multiple water quality variables into PC1 and PC2, and included in the correlation analysis. To ensure correlations were comparable among different constituents, only complete records (i.e., a value for every water and BIC endpoint) were included in the analysis. Correlation results were visualized using a heatmap, with colours corresponding to the strengths of the correlation (as measured by the Spearman Rho, and varies from -1 to +1). In order to visualize the similarities among correlations between BIC endpoints and physical and chemical characteristics, the axes show hierarchical clustering diagrams using unweighted paired group mean method with arithmetic mean.

Additional analyses were performed to assess the potential relationships between temporal trends in BIC endpoints and nitrate concentrations within stations and across the watershed from long-term September sampling. Concurrent nitrate concentrations were analyzed with a Linear Model (LM) using log10-transformed nitrate because there were no replicate samples taken. Benthic invertebrate community endpoints were analyzed with Linear Mixed-Effects Models (LMM; with the following transformations: abundance and richness were log10-transformed, % EPT and % Ephemeroptera were logit-transformed) to account for replicate samples taken for some years. The LM was fit with a continuous Year term, a Station factor term, and an interaction between Year and Station. The LMM was fit with a fixed-effect continuous Year term, as well as a fixed-effect Year by Station interaction. Stations were also specified as random-effect intercepts to account for differences in the number of replicates taken, and differences between stations in baseline nitrate concentrations. Regression coefficients were standardized as Effect Sizes to allow comparison between endpoints. Effect Sizes were calculated as regression slope coefficients (representing time) divided by the standard error of the regression coefficient from LM and LMM. Station specific (represented by the Year by Station interaction terms) and watershed wide slopes (represented by the global Year term) were tested using estimated marginal mean slope coefficients to determine whether slopes were significantly different from zero. Only stations with a minimum of 4 years of data were included in the analysis.

A Canonical Correspondence Analysis (CCA) was performed to investigate patterns in BIC in June and September of 2018 to 2020 relative to habitat (Table 2.7) and stressor variables. Lowest Practical Level benthic invertebrate abundances were ln(X+1) transformed to reduce the effects of the most dominant taxa in order to better understand differences between sites that vary greatly in abundance. Replicates taken at an area within a year were averaged, and only areas with 3 years of June and September data were included in the analysis. Taxa present at fewer than 5% of samples, and those that accounted for less than 1% of the total abundance in the dataset were excluded from the analysis. The CCA constrained CA axes by a suite of predictor variables by applying a multivariate multiple regression to the CA axis. This resulted in a set of new CCA axis that were linear combinations of the predictor variables (i.e., habitat or stressor) that explained a subset of variation of the original CA. Partial CCA (pCCA) was further used to account for the effects of one set of predictors before constraining on a second set (i.e., the variation in one set of predictors was conditioned out of the response, before applying a second set of predictors to the residuals of the first; Legendre and Legendre 2012). The significance of each predictor was evaluated using a permutation-based ANOVA with 10,000 permutations, and the relative importance of individual predictors assessed using the associated pseudo F-statistic (Legendre et al. 2011). Limitations in available data (e.g., field habitat, water quality) resulted in only a subset of sites that had all necessary input data and could therefore be included in the CCA (Table 2.8). The spatial and temporal coverage was enough to provide a general overview of the patterns exhibited by BIC.

Variables were selected for inclusion in the CCA model using backwards variable elimination method with permutation-based ANOVA. The Variance Inflation Factor (VIF) of the final variables were all below 20 indicating the variable coefficients were not inflated by the presence of correlation among explanatory variables (i.e., no multicollinearity). For water quality variables, only concurrent water data was included, and only parameters with fewer than 25% of observations below the detection limit were considered. In addition to the selected habitat and stressor variables, a factor variable representing season was included in the analysis. This factor variable was included individually, representing differences between seasons, and as an interaction with habitat and stressor variables. The multivariate multiple regression component of the CCA models fitted regression lines to CA axis representing the habitat and stressor variables. When an interaction term was present, a separate regression line was fit for each season, and the statistical test identified whether the additional variation explained by the interaction was significant. For example, a significant Season-Nitrate interaction suggested the BIC gradients identified in the CA responded differently to nitrate in June vs. September. All analyses were done in R 4.0.5 (R Core Team 2021), using the Vegan package (Oksanen et al., 2020).

Table 2.7: Summary of Habitat Variables Used in Canonical Correspondence Analysis of Benthic Invertebrate Community, FRO LAEMP, 2020

Variable Source	Habitat Variables
Steam Characteristics	Mean Depth
	Mean Velocity
Substrate	Embeddedness
	D16
	D84
GIS	% Watershed greater than 30% slope
	Station Gradient
	Watershed Area

Table 2.8: Summary of Locations with Complete Datasets for Canonical Correspondence Analysis, FRO LAEMP, 2020

Biological Monitoring Area	2018	2019	2020
RG_HENUP	✓	✓	✓
RG_FO26	✓	✓	✓
RG_UFR1	x	x	x
RG_FODHE	✓	✓	✓
RG_FOUCL	x	x	x
RG_FOUNGD	✓	✓	✓
RG_FODNGD	✓	✓	✓
RG_MP1	✓	✓	✓
RG_FOUSH	✓	✓	✓
RG_FOUKI	✓	✓	✓
RG_FOBKS	✓	✓	✓
RG_SCOUTDS	x	x	x
RG_FOBSC	✓	✓	✓
RG_FOBCP	✓	✓	✓
RG_FRCP1SW	x	x	x
RG_FRUPO	✓	✓	✓
RG_FODPO	✓	✓	✓
RG_FO22	✓	✓	✓
RG_FOUEW	✓	✓	✓

Note: 'x' denotes biological monitoring areas and years not included in the Canonical Correspondence Analysis

3 RESULTS

3.1 Water Chemistry

3.1.1 Water Quality

Water quality data will be interpreted to address Study Questions #1, #2, #3, #4, and #6 (see Sections 4.1, 4.2, 4.3, 4.4, and 4.6). Constituents with EWTs under the AMP were plotted from 2012 to 2020 and compared with BCWQG, as well as EVWQP benchmarks and screening values (Appendix Tables B.1 and B.2; Appendix Figures B.1 to B.36). Water quality constituents were summarized, tabulated, and screened against relevant BCWQGs, EVWQP benchmarks, and screening values (Appendix Table B.1). Dissolved cadmium concentrations were below the EVWQP Level 1 benchmark at water quality stations in 2020 (Appendix Table B.1; Appendix Figure B.4). Sulphate concentrations were above the EVWQP Level 1 benchmark from the proposed FRO AWTF-S outfall location downstream to the FRO Compliance Point (FR_SCOUTDS, FR_FR4, and FR_FRCP1) throughout the winter months (Appendix Table B.1; Appendix Figure B.16). Except for the freshet period, nitrate concentrations were above the EVWQP Level 1 benchmark at all water quality stations evaluated in the FRO LAEMP, and above the EVWQP Level 2 benchmark at all stations except for FR_FRABEC1 (downstream of the historical Lake Mountain Creek input), FR_FRCP1SW (one kilometer downstream of the Compliance Point), and FR_FR5 (the area upstream of the Ewin Creek confluence; Appendix Table B.1; Appendix Figure B.11). Total selenium was seasonally (dry months of summer, fall, and winter) above the EVWQP Level 1 benchmark at the eight stations within the FRO LAEMP study area located downstream of FR_FR3 (located in the Fording River upstream of the future FRO AWTF-S Cataract Swift outfall location) and above the EVWQP Level 2 benchmark at FR_FR4 (Fording River upstream of the historical Cataract Creek confluence) and FR_FRCP1 (Fording River downstream of the Cataract Creek confluence; Compliance Point; Appendix Table B.1; Appendix Figure B.15). Total nickel was above the Level 1 interim screening value (Teck 2017) from FR_MULTIPLATE (Fording River downstream of the multiplate culvert pool) downstream to FR_FRABCH (Fording River upstream of Chauncey Creek), the Level 2 interim screening value from FR_MULTIPLATE downstream to FR_FRCP1, and above the Level 3 interim screening value at FR_FRCP1 (Appendix Table B.1; Appendix Figure B.10). The seasonal extent of total nickel exceeding screening values varied by station. Total dissolved solids were above the Level 1 screening value (Teck 2018) at FR_SCOUTDS, FR_FR4, FR_FRCP1, and FR_FRRD for periods of the winter, but was variable among stations (Appendix Table B.1; Appendix Figure B.6). Nitrite concentrations were seasonally above the long-term BCWQG from FR_MULTIPLATE downstream to FR_FRCP1SW (Appendix Table B.2; Appendix Figure B.12), while total uranium concentrations were above the

long-term BCWQG at FR_FRCP1 for one anomalously high sample in the winter (Appendix Table B.1; Appendix Figure B.17). Total zinc at FR_MULTIPLATE was above the long-term BCWQG for one sample in spring 2020 but that sample was also uncharacteristically high compared to other samples taken at FR_MULTIPLATE (Appendix Table B.1; Appendix Figure B.18). Similarly, concentrations of several metals, including total nickel and total zinc were anomalously high in one sample at each of the reference areas (FR_HC3; Henretta Creek upstream of mining and FR_UFR1; Fording River upstream of mining) in May 2020 (Appendix Table B.1). These samples were collected as part of Teck's routine water quality monitoring, and subsequent samples were consistent with historical concentrations. Concentrations of water quality constituents were typically the highest in the winter months when flow conditions were lowest (Appendix Figures B.1 to B.36). None of the other constituents (total antimony, total barium, total boron, dissolved cobalt, total manganese, and total molybdenum) with EWTs were above relevant guidelines or benchmarks. No BCWQG is available for total lithium.

Seasonal mean concentrations of order constituents (nitrate, total selenium, dissolved cadmium, and sulphate) and total nickel in 2020 were plotted spatially (Appendix Figure B.37). Total selenium concentrations were highest between RG_SCOUTDS and RG_FRUPO, peaking at RG_FOBCP, in winter 2020 (Appendix Figure B.37). Nitrate concentrations were consistently elevated from RG_FODHE downstream to RG_FO22 throughout the winter when compared to reference areas and RG_FODHE (Appendix Figure B.37). Sulphate concentrations followed a similar spatial pattern to total selenium and were highest between RG_SCOUTDS and RG_FRUPO during August and winter (Appendix Figure B.37). Dissolved cadmium concentrations peaked at RG_FOBSC in June/July and were consistently highest from RG_FRUPO downstream to RG_FOUEW throughout the freshet (Appendix Figure B.37). Total nickel concentrations varied spatially in a similar way to both total selenium and sulphate: the highest concentrations were observed between RG_SCOUTDS and RG_FRUPO; however, unlike sulphate and total selenium, nickel concentrations were frequently highest during freshet, particularly in the lower section of the study area (RG_FRUPO downstream to RG_FOUEW; Appendix Figure B.37).

To evaluate changes in water quality over time (2012 to 2020), nutrients and constituents with early warning triggers were statistically analyzed for temporal trends (Appendix Table B.3). Annual mean dissolved cadmium concentrations were significantly higher in 2020 at FR_FRCP1 and FR_FRRD compared to the base year; however, only FR_FRCP1 was higher in 2020 compared to annual historical means (Appendix Table B.3), and all values were below EVWQP Level 1 benchmark (Appendix Table B.1). Total nickel concentrations in 2020 were higher than the base year and the range of historical annual means at FR_MULTIPLATE, FR_FR2, FR_FR4,

and was higher than the base year but similar to some historical annual means at FR_FRABCH (Appendix Table B.3). Nitrate concentrations were significantly higher than the base year at FR_FR2 and FR_FR4 but were not significantly different than the range of annual historical means at any of the stations within the study area (Appendix Table B.3). Although nitrate concentrations in 2020 were higher than the base year at both reference areas (FR_UFR1 and FR_HC3), concentrations were similar to annual historical means and below BCWQGs and EVWQP benchmarks (Appendix Tables B.1 and B.3). Nitrite concentrations were similar in 2020 compared to base year at most stations in the study area except FR_FRCP1 where concentrations were higher compared to base year and compared to historical annual means (Appendix Table B.3). Total selenium concentrations were higher at FR_FR2, FR_FR4, FR_FRRD, and GH_PC2 in 2020 compared to base year, however, only FR_FR4 was higher in 2020 compared to the range of annual historical means (Appendix Table B.3). The annual mean sulphate concentrations in 2020 were not significantly different at most stations when compared to base year or historical annual means, except FR_FR4 where concentrations were higher at FR_FR4 compared to base year and compared to the range of annual historical means (Appendix Table B.3). Total dissolved solids were higher in 2020 compared to the base year at FR_FR2 and FR_FR4 and higher at FR_FR4 when compared to historical annual means (Appendix Table B.3). Nitrate, total selenium, and sulphate, concentrations were all significantly lower in 2020 compared to the base year of 2018 at FR_MULTIPLATE (Appendix Table B.3). Annual mean concentrations of total phosphorus were not statistically different than the base year or the annual historical means at any stations throughout the study area (Appendix Table B.3). Orthophosphate was significantly higher at FR_UFR1 and GH_PC2 compared to the base year but was similar to annual historical means at all stations throughout the study area (Appendix B.3). While some statistically significant changes were observed for other constituents with EWTs, concentrations were below guidelines or benchmarks.

Constituent concentrations, particularly TDS, total nickel, total selenium, nitrate, and sulphate were higher than historical values at FR_FRCP1 in the winter of 2018 and 2019 as a result of low flow conditions and seasonal drying between Swift and Cataract creeks (i.e., upstream; Appendix Figures B.1 to B.36). In response to elevated aqueous concentrations of mine-related constituents at FR_FRCP1, and in preparation for water treatment at FRO AWTF-S, Cataract Creek was diverted through Swift Ponds to Swift Creek (i.e., upstream of FR_SCOUTDS and FR_FR4) in August of 2019. Concentrations of these constituents (TDS, total nickel, total selenium, nitrate, and sulphate) were within the historical range at the Compliance Point after diversion in the winter of 2019 to 2020 (Appendix Figures B.1 to B.18). Following water diversion, concentrations of mine-related constituents were higher in 2020 compared to previous

years at water quality stations directly downstream of the Swift Creek channel (i.e., FR_FR4; Appendix Table B.3) and could be attributed to the water diversion.

Principal component analysis (PCA) was conducted on water quality samples from 2012 to 2020 (Appendix Table B.4). Principal component axis 1 (PC1) and principal component axis 2 (PC2) explained 50% and 28% of the variation in water chemistry, respectively. Almost all water quality constituents had significant and strong positive correlations with PC1, whereas fewer constituents had a significant and strong negative correlation with PC2 (Appendix Table B.4). Most constituents included in the PCA correlated strongly with PC1. As a result, the explanatory power of PC1 was high, but the influence of individual constituents remained low.

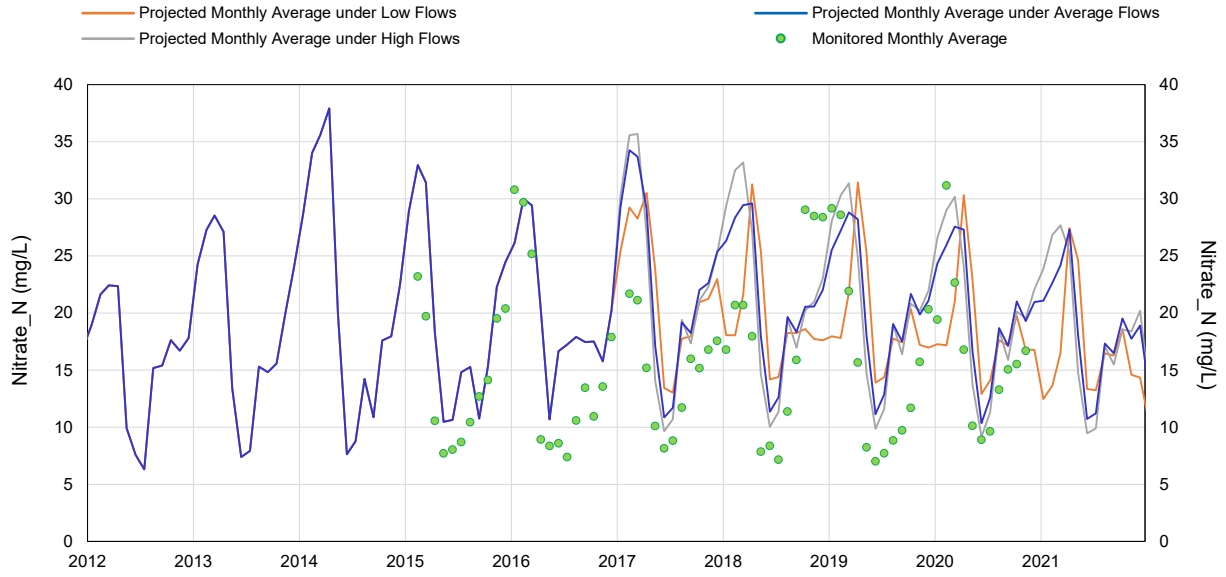
3.1.1.1 Nitrate Model

Nitrate concentrations were modelled in the EVWQP (Teck 2014) for the FRO Compliance Point (FR_FRCP1) and the GHO Fording River Compliance Point (GH_FR1), which is also the Fording River Order Station. The GHO Fording River Compliance Point is located downstream from the FRO LAEMP study area and includes additional water from two reference tributaries, Chauncey Creek and Ewin Creek, and mine-exposed tributaries, Greenhills Creek and LCO Dry Creek. Monitored nitrate concentrations at FR_FRCP1 and GH_FR1 have been consistently lower than model projections under average flows (Golder 2017, Golder 2018, Golder 2020b, Golder 2021a), except at FR_FRPC1 in winter of 2018 and 2019, and at GH_FR1 in Q4 2020 (Figure 3.1; Golder 2021a). Nitrate concentrations were elevated at FR_FRCP1 in winter 2018 and 2019 because water in the Fording River was predominately from Cataract Creek as a result of seasonal drying upstream. The subsequent diversion of Cataract Creek to upstream of the area that dries seasonally may have helped maintain nitrate concentrations below model projections under average flows (Figure 3.1; Golder 2021a). Updated projections for 2017 to 2022 do not suggest increases in nitrate concentrations at FR_FRCP1 or GH_FR1 (Figure 3.1; Golder 2021a).

3.1.2 Selenium Speciation

Aqueous selenium speciation data will be interpreted to address Study Question #3 (see Section 4.3). Selenium speciation samples were collected during each sampling event in 2020 to provide a baseline understanding of speciation in the study area before the commissioning of the FRO AWTF-S and the Fording River Operation – North Saturated Rock Fill (FRO-N SRF), and to compare to benthic invertebrate tissue selenium concentrations (Appendix Table B.5). Selenium concentrations varied by sampling event, with September and December having higher concentrations than June for all selenium species (Appendix Table B.5). Selenate was the dominant species present in all samples, with very low concentrations of the more bioavailable reduced species of selenium compared to the concentration of selenate.

FRO Compliance Point (FR_FRCP1; E300071)



GHO Fording River Compliance Point (GH_FR1; 0200378)

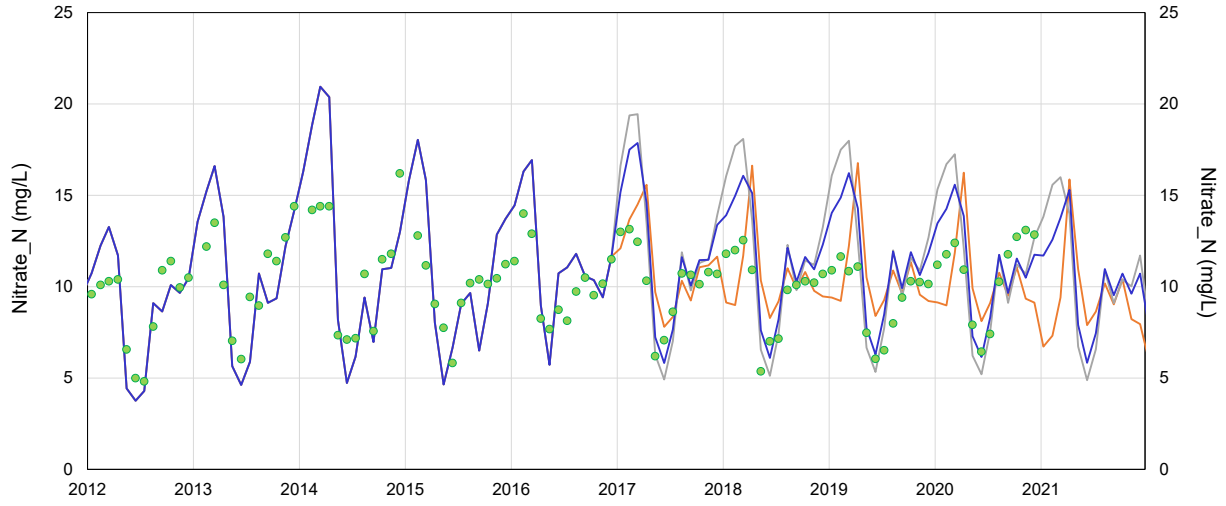


Figure 3.1: Average Monthly Nitrate Concentrations for FR_FRCP1 and GH_FR1 under Low, Medium and High Flows, FRO LAEMP, 2020[a]

Notes: The solid orange, blue, and grey lines correspond to the modelled monthly average of flows and concentrations under low, average, and high flows, respectively. Monitored monthly average concentrations are indicated by green circles.

[a] Golder 2021a

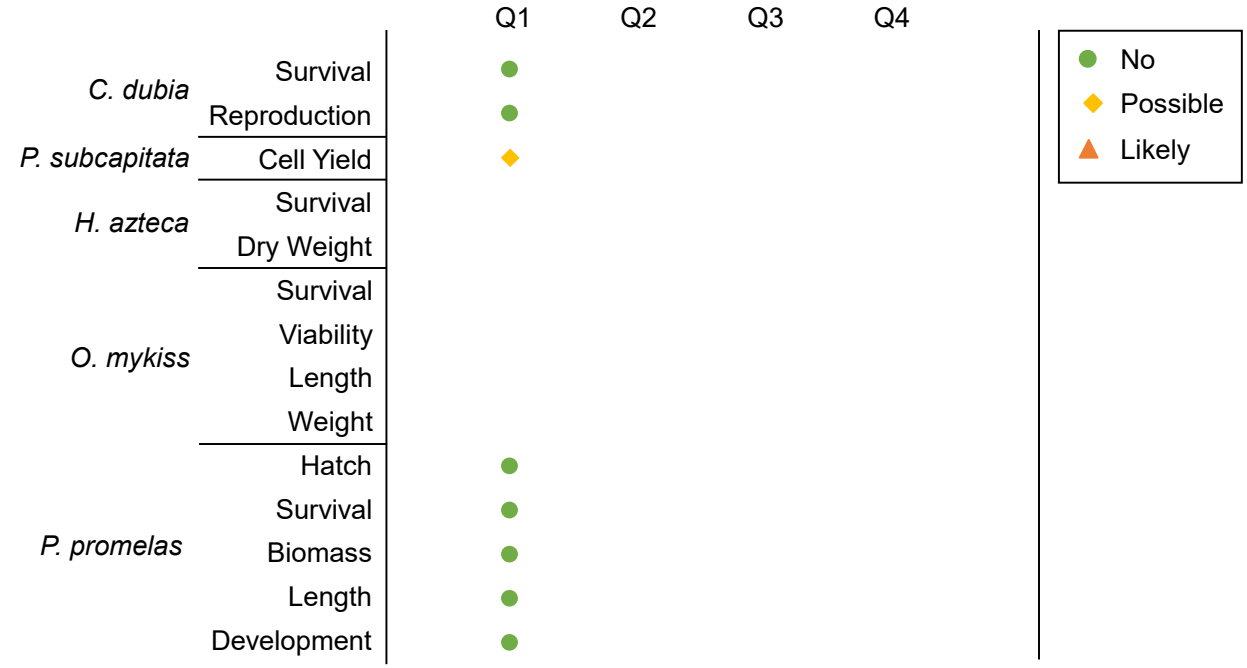
Concentrations of selenite were the highest after selenate and were highest at biological monitoring areas between RG_MP1 and RG_FRCP1SW, with lower concentrations from RG_FRUPO downstream to RG_FOUEW (Appendix Table B.5). Other than selenite, the only other reduced selenium species above detection limits was the organoselenium species methylseleninic acid, which was detected at RG_FOUKI, RG_FOBCP, and RG_FRCP1SW, in September, at RG_SCOUTDS and RG_FOBSC in December, and at RG_SCOUTDS in June. Reference areas had low concentrations of selenate compared to mine exposed areas and had no reduced selenium.

3.1.3 Chronic Toxicity

Chronic toxicity testing will be interpreted to address Study Questions #1 and #6 (see Sections 4.1 and 4.6). Chronic toxicity tests were completed at FRO Compliance Point (FR_FRCP1), FR_FRABCH (new FRO Compliance Point starting in 2021), and FR_UFR1 (reference area) on a quarterly and semi-annual basis in 2020, and results were summarized quarterly and annually in accordance with Permit 107517 (Golder 2021b). Station FR_FR4 was sampled in Q1 (only) as an alternate collection location in response to winter conditions in the Fording River, where flow at FR_FRCP1 was limited to an isolated pool at the time of sampling. Chronic toxicity tests were added for FR_FRABCH in the fourth quarter (Q4) of 2018 to inform the investigation of the Fording River Compliance Point relocation, and because it better represents mixed Fording River water quality than FR_FRCP1, where mid-winter flows from Cataract Creek have historically influenced concentrations (Golder 2020b). Results (reported in the 2020 Chronic Toxicity Report [Golder 2021b]) were categorized by effects ratings of 'no,' 'possible,' and 'likely' adverse response of five organisms (*Ceriodaphnia dubia, Pseudokirschneriella subcapitata, Hyalella Azteca, Oncorhynchus mykiss,* and *Pimephales promelas*) endpoints to water sampled from each station outlined above.

Overall, there were no adverse responses for any endpoint for each organism in water from the three stations sampled in Q2 and Q3 of 2020 (Figure 3.2). At FR_FR4 in Q1 (only quarter measured at this station), seven of the eight endpoints assessed had no adverse responses, and although one possible adverse response occurred for *P. subcapitata* cell yield (Figure 3.2), it could not be attributed to any water quality constituents (Golder 2021b). Tests using water sampled from the Compliance Point (FR_FRCP1) showed no adverse responses in any quarter for nine out of fourteen endpoints but two of the fourteen endpoints assessed in Q1 had possible or likely adverse responses and four out of the fourteen endpoints had likely adverse responses in Q4 (Figure 3.2). Specifically, *Ceriodaphnia dubia* reproduction had likely adverse responses for both winter quarters, and was attributed most to nickel concentrations, but sulphate/TDS and nitrate may have also contributed to observed responses

FR_FR4



FR_FRCP1

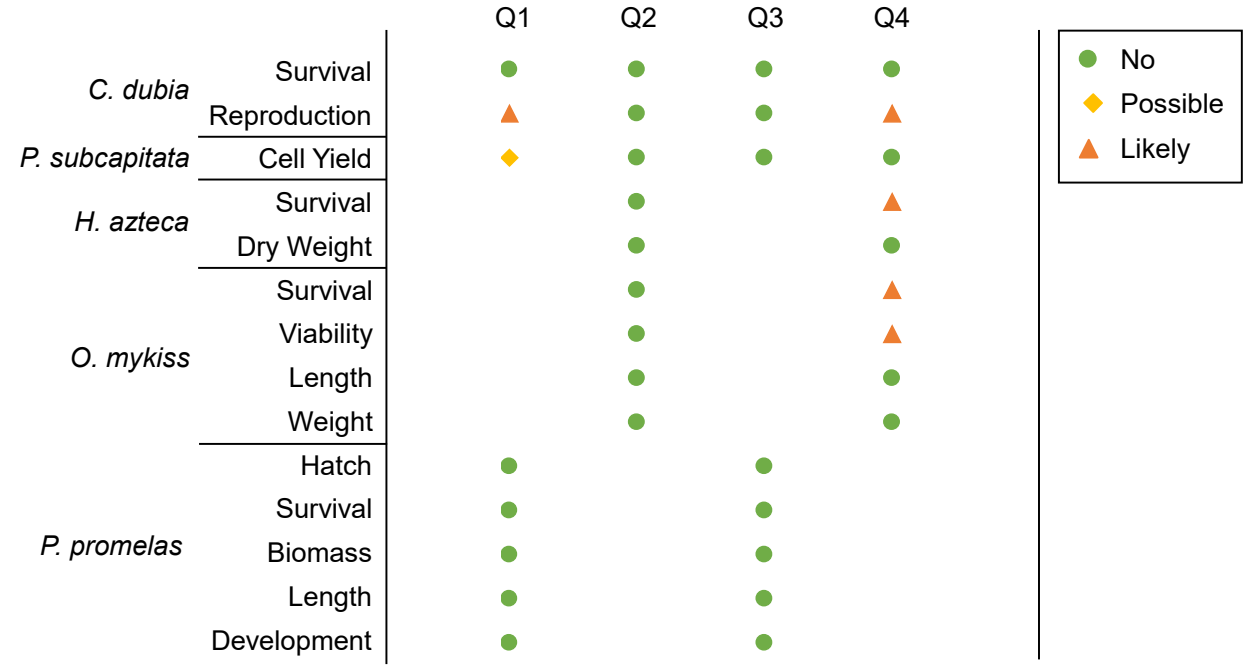


Figure 3.2: Summary of Chronic Toxicity Test Results by Category at FR_FR4, FR_FRCP1 and FR_FRABCH, FRO LAEMP, 2020 (Golder 2021b)

FR_FRABCH

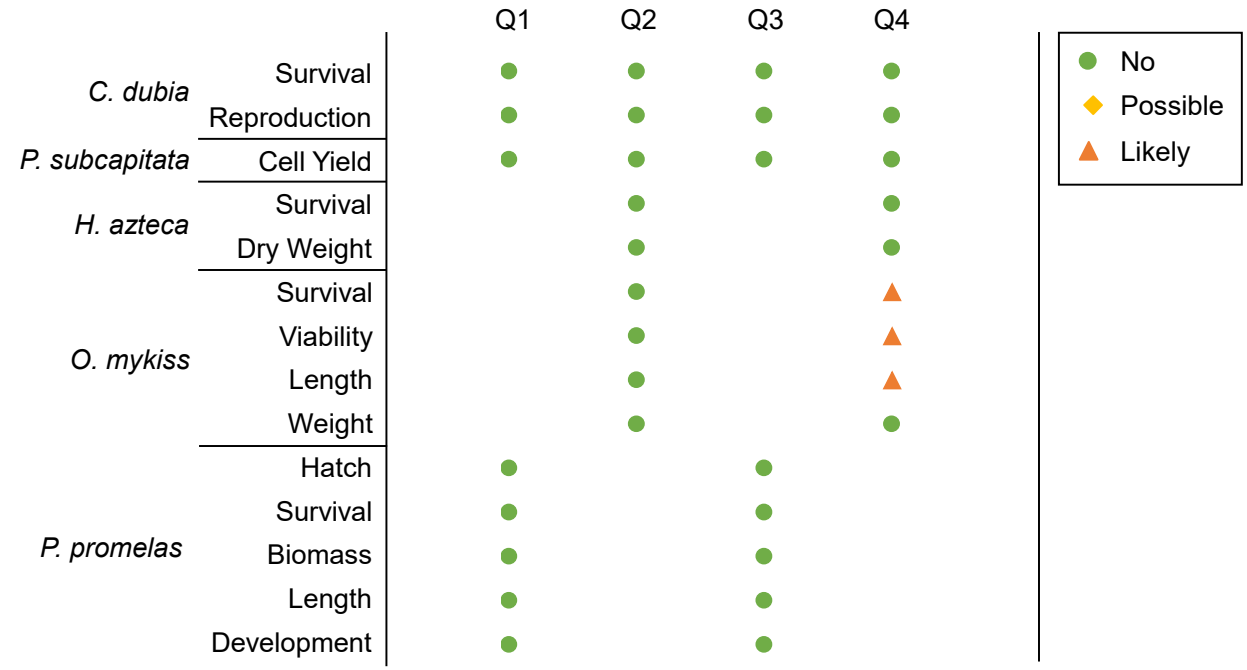


Figure 3.2: Summary of Chronic Toxicity Test Results by Category at FR_FRABCH, FRO LAEMP, 2020[a]

Notes:

[a] Golder 2021b

(Golder 2021b). Cell yield of *P. subcapitata* at FR_FRCP1 had a possible adverse response in Q1, but this response could not be attributed to any water quality constituents (Golder 2021b). In Q4, the amphipod *Hyalella azteca* had a likely adverse response for survival which was not associated with any specific water quality constituent, but high inter replicate variability may have contributed to the lack of data interpretability (Golder 2021b). Rainbow trout (*Oncorhynchus mykiss*) had likely adverse responses for both survival and viability in Q4 at FR_FRCP1 which was most strongly linked to TDS in water and microbes affecting one of the four replicates in the test (Golder 2021b). The most downstream station tested within the study area (FR_FRABCH; the new Compliance Point starting in 2021) had no adverse responses throughout the first three quarters of 2020 for any endpoint, but had likely adverse responses for survival, viability, and length for *O. mykiss* in Q4 (Figure 3.2), which was most strongly linked to nitrate in water and microbes affecting one of the four replicates in the test (Golder 2021b).

Comparisons of chronic toxicity responses over time were made at FR_FRCP1 and FR_FRABCH. Except for Q4 2018 when upstream drying caused flows to come predominately from Cataract Creek, responses at FR_FRCP1 have been relatively consistent over time (Golder 2021b). Seasonally drying (only to a lesser extent than in 2018) may have also contributed to the seasonal toxicity testing responses observed at FR_FRCP1 in winter months compared spring and summer (Golder 2021b). Responses at FR_FRABCH have also been relatively consistent over time and have shown fewer and lower magnitude responses compared to FR_FRCP1 (Golder 2021b).

3.2 Hydrology

3.2.1 Seasonal Surveys of Dry Sections

Seasonal drying observations will be interpreted to address Study Questions #6 and #7 (see Sections 4.6 and 4.7). Biweekly drying surveys were completed from January until the Fording River was reconnected in April 2020 and monthly surveys from August to December 2020. Two surveys were also completed in June to capture high discharge measurements. In the southern survey the dry section between FR_FRCP1 and FR_FRRD was first observed dry on January 6, 2020 and rewetted on April 13, 2020 (Table 3.1). Station FR_FRCP1SW was wetted but under significant ice cover during the December 18 to 20, 2019 survey and dry on the January 6 to 10, 2020 survey. The level logger at FR_FRCP1SW was encased in ice between the December 2019 and January 2020 surveys so the exact date of drying could not be determined. The dry section between FR_FRCP1 and FR_FRRD at its maximum length in January 2020 was 2.2 km, which included hydrometric stations FR_FRCP1 and FR_FRCP1SW (Appendix Figure C.1). Station FR_FRCP1 was observed rewetted on January 20, 2020 creating a second dry section between FR_FRCP1 and

Table 3.1: **Drying Dates at Hydrometric Stations, FRO LAEMP, 2017 to 2020**

Site	2017			2018												2019												2020											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Henretta Survey																																						
Henretta Drying Section																																				Sept*			
North Section																																							
FR_UFR1																																							
FR_FR1																																						Dec. 14*	
FR_FRUPP																														Mar. 2*- Mar. 30*									
FR_FOUCL																																							
FR_FRDSCC1																																							
FR_MULTIPLATE																																							
Northern Drying Section																										Nov.19*				Apr. 14*							Oct. 13*		
South Section																																							
FR_FR2																																							
FR_FR3																																							
FR_SCOUTDS															Dec 6*			Mar 13*																					
FR_FR4																	Jan. 29*-Mar. 13*																						
FR_FRCP1																											Jan. 6* - Jan.20*												
FR_FRCP1SW			Dec. 17			Mar. 24						Sep. 9						Mar. 12*											Jan 6*			Apr 13							Dec. 14*	
FR_FRRD																																							
GH_PC2																																							
FR_FRABCH																																							
Southern Drying Section			Dec. 17			Mar. 24						Sep. 9						Mar. 13*											Jan 6*			Apr 13							Dec. 14*	

Dry.
Drying (periodically).
Wet.
No surveys conducted.

Note: " * " indicates the approximate date,

FR_FR4 which was 250 m in length and remained dry until the March 30, 2020 survey (Appendix Figures C.1 to C.3). The extent of drying in the southern survey area was significantly lower in April (Appendix Figure C.4) until it was fully reconnected April 13, 2020 (Table 3.1). The southern section remained wetted through the summer and fall until the December 14, 2020 survey, when a section between FR_FRCP1SW and upstream of FR_FRRD was observed dry, including the first 200m of Side channel #2 (Appendix Figures C.5 to C.7).

In the northern survey two dry sections were first observed on November 19, 2019 between FR_FR1 and FR_FRUPP, but the extent of drying increased by February 4, 2020 to include an area downstream of FR_FRUPP (Table 3.1; Appendix Figures C.1 to C.2). As of March 2, 2020, the maximum length of the dry sections was 0.8 km and intermittently spanned ~0.95 km. These dry sections in the northern survey area were observed to be rewetted during the April 14, 2020 survey (Table 3.1). The northern section of the northern survey area remained wetted until October 13, 2020 when a dry section was again observed between FR_FR1 and FR_FRUPP (Table 3.1; Appendix Figure C.5). A section of the Fording River upstream of the Henretta Creek confluence, and of FRO licensed consumptive water use locations, was observed dry October 13, 2020, which expanded in November and December (Appendix Figures C.5 to C.7). The dry sections in the northern drying survey totaled 0.85 km in length, intermittently spanning over 1.5 km, including station FR_FR1 in December 2020 (Appendix Figure C.7).

The Henretta Creek survey was added in October 2020 after drying was observed during calcite monitoring in September 2020. Three dry sections were observed during the October 13, 2020 survey which remained dry for the rest of the year (Table 3.1; Appendix Figures C.5 to C.7). The maximum length of drying observed in the Henretta Creek survey area in 2020 was 1.47 km in December.

The number of dry days for each hydrometric station for each year were summarized from 2017 to 2020, where the number of days were days per drying season, not per year (Table 3.2). For example, the 97 days dry at FR_FRCP1SW cover the winter 2017/18 period. To visualize when drying began and ended within each drying survey area, and the overall length of the drying each season, the data were also plotted (Figure 3.3). Drying in 2019/2020 in the southern survey area was similar to 2017/2018, whereas the drying observed in 2018/2019 starting earlier in the year and lasted much longer (Figure 3.3).

3.2.2 Temperature

Water temperature data will be interpreted to address Study Questions #4 and #6 (see Sections 4.4 and 4.6). Continuous water temperature data records were used to plot daily low, mean, and maximum temperatures from October 2017 to October 2020 (Appendix Figures C.8 to C.19). The 2017 FRO LAEMP report identified three distinct winter thermal regimes in the southern

Table 3.2: Number of Dry Days at Hydrometric Stations, FRO LAEMP, 2017 to 2020

Site	2017/18	2018/19	2019/20
North Section			
FR_UFR1	-	-	0
FR_FR1	-	-	0
FR_FRUPP	-	-	28
FR_FOUCL	-	-	0
FR_FRDSCC1	-	-	0
FR_MULTIPLATE	-	-	0
Northern Drying Section	-	-	147
South Section			
FR_FR2	0	0	0
FR_FR3	0	0	0
FR_SCOUTDS	0	98	0
FR_FR4	0	43	0
FR_FRCP1	0	0	14
FR_FRCP1SW	97	184	98
FR_FRRD	0	0	0
GH_PC2	0	0	0
FR_FRABCH	0	0	0
Southern Drying Section	97	185	98

Note: "-" indicates no data available

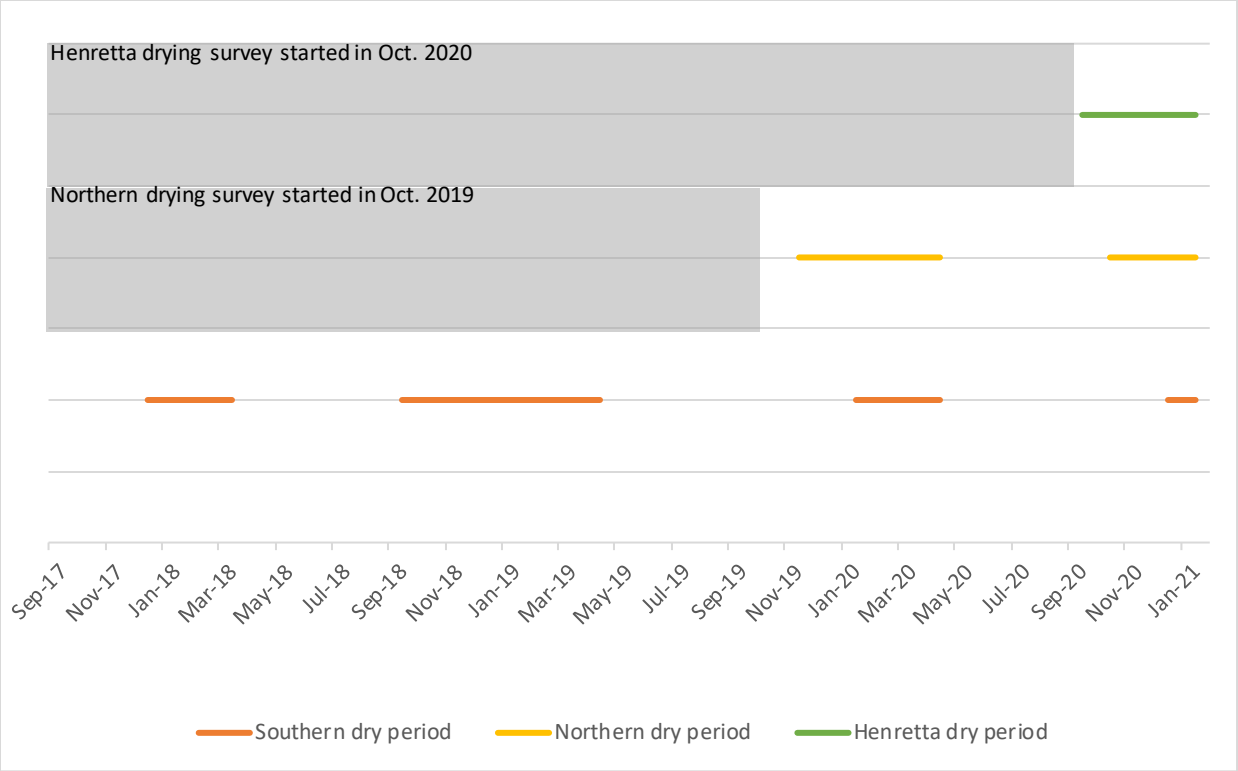


Figure 3.3: Comparison of Drying Periods Within Each Survey Area from 2017 to 2020

Notes: Grey shaded areas represent periods when no surveys occurred in the northern and Henretta survey area. Drying conditions in the northern and southern survey sections on the Fording River have been historically documented as early as the 1970's (Lister and Kerr Wood Leidel 1980). A drying survey was started in the southern section in September 2017, the northern drying survey was added in October 2019, and Henretta creek survey added in October 2020.

survey from FR_FR2 to FR_FRABCH (Minnow and Lotic 2018). These temperature regimes were observed from 2017 to 2020 and identified as: 1) the upper portion of the southern survey area, which included FR_FR2 and represented a typical year-round surface flow with low groundwater contribution; 2) areas of seasonal drying represented by FR_FRCP1SW; and 3) the lower portion of the southern survey area from GH_PC2 to FR_FRABCH having areas of higher groundwater contribution (SNC Lavalin 2021). Areas in the upper and drying regions of the southern survey area experienced more extreme high and low temperatures compared to the lower portion which had buffered temperatures; however, the annual means at each station were similar (Table 3.3). Water temperature in 2020 was comparable between study years with the highest water temperatures seen in 2018 (Table 3.3).

3.2.3 Water Level and Flows

Water level and flow data will be interpreted to address Study Questions #5 and #7 (see Sections 4.5 and 4.7). Mean, minimum, and maximum discharges were calculated from the water level records for each station in 2017, 2018, 2019, and 2020 using the stage-discharge relationship (Table 3.4; Appendix Figures C.8 to C.19). The data from 2017 only included October until the end of the year so mean, minimum, and maximum discharges were skewed to fall seasonal flows. Peak instantaneous and mean annual discharge calculated from the stage discharge relationships for each site were higher in 2020 across all stations compared to other surveyed years, except at FR_FR3 and FR_FR4 which were both lower (Table 3.4). The 2020 data from FR_FR3 and FR_FR4 should, however, be interpreted with caution due to data logger issues which are highlighted below. The stilling well at FR_FR4 and FR_AWTF-S were damaged during freshet 2020 (i.e., June), and since the data were not able to be recovered from May 1 to July 23, 2020, the peak flow event at these stations was not captured (Appendix Figure C.11). The discharge record calculated from the stage discharge relationship for FR_FR3 did not match manual discharge measurements or follow seasonal flow variations, therefore are not considered to accurately represent site discharge (Appendix Figure C.10). Stage-discharge relationships have not been developed for newly installed stations FR_SCOUTDS, FR_FRDSCC1, FR_FR1, and FR_UFR1 as of 2020 due to limited manual stage and discharge historical measurements.

3.3 Substrate Quality

3.3.1 Sediment

Sediment chemistry data is used to support Study Question #6 (see Section 4.6). Sediment chemistry data were collected to support the questions related to BIC structure. Samples collected from mine-exposed areas in September 2020 had concentrations of cadmium and nickel higher than the lower WSQGs (Appendix Table D.1; Appendix Figure D.1).

Table 3.3: Summary Table of Water Temperature record at Hydrometric Stations, FRO LAEMP, 2017 to 2020

Site	2017			2018			2019			2020		
	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)	Max (°C)	Min (°C)	Mean (°C)
FR_UFR1	-	-	-	-	-	-	-	-	-	12.8	2.6	7.3
FR_FR1	-	-	-	-	-	-	-	-	-	13.9	1.5	7.5
FR_FRDSCC1	-	-	-	-	-	-	-	-	-	11.5	4.6	7.9
FR_FR2	7.0	-0.1	1.7	16.3	-0.1	4.5	15.0	-1.0	4.1	14.1	-0.2	4.9
AWTF-S	-	-	-	8.7	-0.1	2.3	15.5	-0.2	4.1	8.1	-0.3	0.7
FR_FR3	7.6	0.0	1.5	16.0	-0.1	2.0	15.0	0.0	4.6	17.2	0.0	5.1
FR_SCOUTDS	-	-	-	-	-	-	-	-	-	16.7	3.1	10.0
FR_FR4	7.3	-0.1	1.2	20.8	-0.1	4.9	16.1	-1.1	5.6	17.1	-0.1	4.5
FR_FRCP1	6.8	-0.2	1.0	18.6	-0.2	5.0	14.9	-0.2	5.5	16.1	-0.2	4.8
FR_FRCP1SW	6.3	-2.6	0.4	20.3	-3.6	4.9	15.5	-5.2	5.2	17.5	-0.5	5.1
FR_FRRD	5.8	-4.4	0.5	19.6	-22.1	2.8	13.4	-30.6	1.9	12.6	-14.6	3.7
GH_PC2	6.5	2.4	4.4	11.7	1.5	5.5	11.5	2.4	6.0	11.5	2.4	5.2
FR_FRABCH	-	-	-	7.5	-1.6	2.7	12.6	-5.2	4.0	10.6	-0.2	4.7

Notes - "-" indicates no data available.

Table 3.4: Summary Table of Calculated Discharge for Hydrometric Stations, FRO LAEMP, 2017 to 2020

Site	2017			2018			2019			2020		
	Max (m^3/s)	Min (m^3/s)	Mean (m^3/s)	Max (m^3/s)	Min (m^3/s)	Mean (m^3/s)	Max (m^3/s)	Min (m^3/s)	Mean (m^3/s)	Max (m^3/s)	Min (m^3/s)	Mean (m^3/s)
FR_AWTF-S	-	-	-	0.937	0.003	0.391	5.619	0.011	1.782	-	-	-
FR_FR2	0.988	0.390	0.612	8.069	0.254	1.394	6.091	0.200	1.511	9.751	0.397	1.787
FR_FR3	0.497	0.330	0.428	0.620	0.333	0.464	0.503	0.354	0.459	0.469	0.300	0.402
FR_FR4	0.652	0.206	0.369	12.537	0.049	2.665	7.228	0.082	1.742	3.423	0.422	0.950
FR_FRCP1	0.499	0.090	0.221	16.710	0.016	1.718	6.529	0.246	1.657	38.298	0.181	3.532
FR_FRCP1SW	0.656	0.204	0.409	17.417	0.021	2.228	6.025	0.053	1.128	22.978	0.108	2.969
FR_FRRD	0.496	0.158	0.288	19.192	0.104	2.045	7.969	0.084	1.584	28.604	0.209	3.623
GH_PC2	0.852	0.368	0.627	14.812	0.304	2.261	7.636	0.448	1.990	23.160	0.432	2.456

Notes: "-" indicates no data available

Concentrations of cadmium were within the regional normal ranges at all mine-exposed areas, except for a few replicates at both RG_SCOUTDS and RG_FOBCP. Sediment nickel concentrations were within the regional normal range at RG_FOUKI, RG_FRUPO, and RG_FO22, but above the normal range for some or all replicates from RG_FOBKS downstream to RG_FOBCP. Manganese concentrations were above WSQGs from RG_FOUKI downstream to RG_FRUPO but were below guidelines at RG_FO22 and below the upper limit of the regional normal range at all mine-exposed areas (Appendix Table D.1; Appendix Figure D.1). Zinc concentrations in 2020 were consistently higher than the lower WSQGs at RG_FOUKI, RG_SCOUTDS and RG_FOBCP, but with the exception of one replicate at RG_SCOUTDS and RG_FOBCP were within the regional normal range (Appendix Table D.1; Appendix Figure D.1). Almost all samples at RG_FOUKI and RG_FOBCP, as well as one replicate sample at both RG_FOBKS and RG_FO22 had selenium concentrations that were above the alert concentration; however, all replicates were within the regional normal range (Appendix Table D.1; Appendix Figure D.1). Samples collected from RG_HENUP (reference) had concentrations of cadmium, manganese and nickel higher than the lower WSQG but within the normal ranges for those metals (Appendix Table D.1; Appendix Figure D.1). In general, metal concentrations were the lowest at RG_FO26 (reference), having no samples above any of the guidelines and concentrations were near the lower limit of the normal range for most metals.

Concentrations of many PAHs were higher than the lower or upper WSQGs in sediment at all the sampled areas in 2020 (Appendix Table D.1; Appendix Figure D.2). Acenaphthene was above the lower or upper WSQG at all mine-exposed areas while acenaphthylene was above the lower WSQG at all areas except RG_FO22 (Appendix Table D.1; Appendix Figure D.2). Chrysene, dibenz(a,h)anthracene, fluorene, 2-methylnaphthalene, naphthalene, and phenanthrene were above the lower WSQG in mine exposed areas, and with the exception of 2-methylnaphthalene, most of the samples were above the upper WSQG from RG_FOBCP upstream to RG_FOUKI (Appendix Table D.1; Appendix Figure D.2). Of the PAHs with regional normal ranges, all of them had concentrations that were greater than the normal range in one or more replicate samples from RG_FOUKI downstream to RG_FOBCP (Appendix Figure D.2). Polycyclic aromatic hydrocarbons above the LRL exhibited the same spatial pattern in mine-exposed areas, with the highest concentrations observed in the most upstream mine-exposed area (RG_FOUKI) and concentrations decreasing with distance downstream (Appendix Figure D.2). As with metals, PAH concentrations at RG_HENUP were higher than RG_FO26, and were above the lower WSQGs for acenaphthene, chrysene, fluorene, naphthalene, and phenanthrene, and the upper WSQG for 2-methylnaphthalene (Appendix Table D.1; Appendix Figure D.2).

3.3.2 Calcite

Calcite data will be interpreted to address Study Question #6 (see Section 4.6). Calcite was measured concurrently with BIC sampling in September 2020 (Appendix Table D.2). Consistent with previous years, Calcite Index (CI) values measured in the FRO LAEMP monitoring locations in 2020 varied throughout the river but were similar to the previous year and below 1.0 at all areas except one replicate at RG_FODNGD, RG_FOUSH, and RG_FODPO, two replicates at RG_FOUEW, and three replicates (of five replicates total) at RG_FOBCP (Appendix Table D.2). Calcite Index values at reference area RG_HENUP was 0.0 for all replicates, however, contrary to previous years, CI was much lower for all replicates at reference area RG_F026 (CI: 0.0 to 0.1). Annual calcite assessments for the Regional Calcite Monitoring Program were conducted in September 2020. Calcite Index measures associated with the Regional Calcite Monitoring Program were consistent with previous years and below 1.0 except at RG_FOUEW, which had a CI of 1.0 (Appendix Table D.2). Throughout the study period CI assessments have consistently been lower for the Regional Calcite Monitoring Program compared to CIs measured within the FRO LAEMP (Appendix Table D.2). This was attributed to differences in sampling methods, as the Regional Calcite Monitoring Program assesses 100-m-long reaches and containing a variety of habitat types (e.g., riffle, run, pool), whereas FRO LAEMP measurements are conducted within targeted riffle habitat in the immediate proximity of BIC sample collection (Lotic 2021).

Similar to CI, calcite concretion varied through the study area in 2020 but was similar to previous years (Appendix Table D.2). Except for RG_FODNGD (0.00 to 0.15) and RG_FOUSH (0.00 to 0.14), concretion values were low (0.00 to 0.02) from RG_FODHE downstream to RG_FOBKS, and at RG_FRCP1SW, RG_FRUPO, and RG_FO22. The highest concretion values in the FRO LAEMP study area were at RG_FOBCP (0.02 to 0.71) and RG_FOUEW (0.00 to 0.72), which was consistent with the previous year.

3.4 Benthic Invertebrate

3.4.1 Biological Productivity

Benthic invertebrate productivity data will be interpreted to address Study Question #2 (see Section 4.2). Benthic invertebrate biomass and density samples were collected in September from 2017 to 2020 to assess biological productivity before commissioning of the FRO AWTF-S (Figure 3.4). Although spatial variation was observed, benthic invertebrate density and biomass in 2020 was consistent with previous years within each biological monitoring area. Overall, density and biomass was highest at areas in the lower part of the study area and at the reference area RG_FO26.

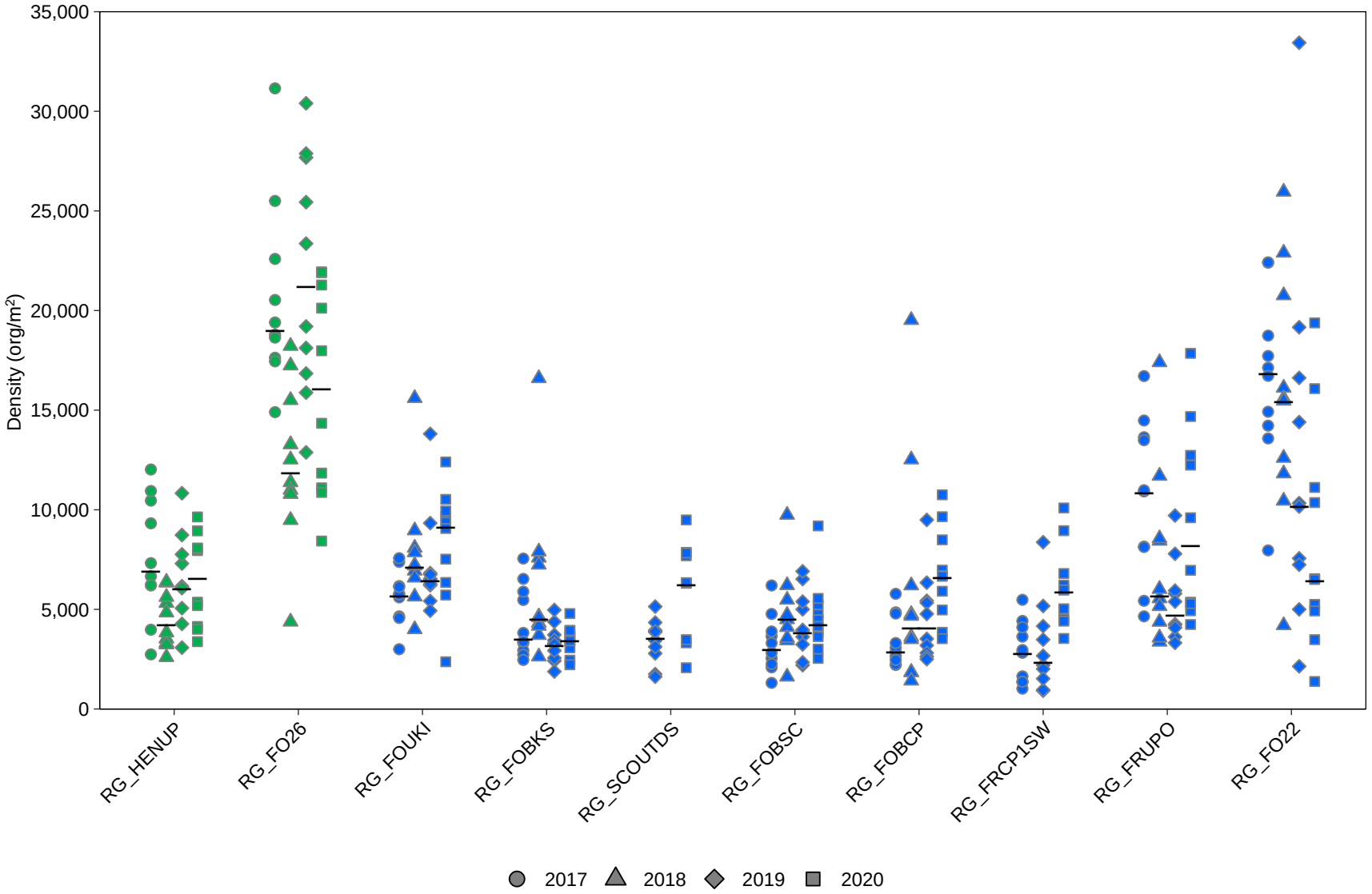


Figure 3.4: Total Benthic Invertebrate Density and Biomass (Hess Sampling) by Area, FRO LAEMP, 2017 to 2020

Note: Black lines denote the measure of central tendancy calculated in the statistical model.

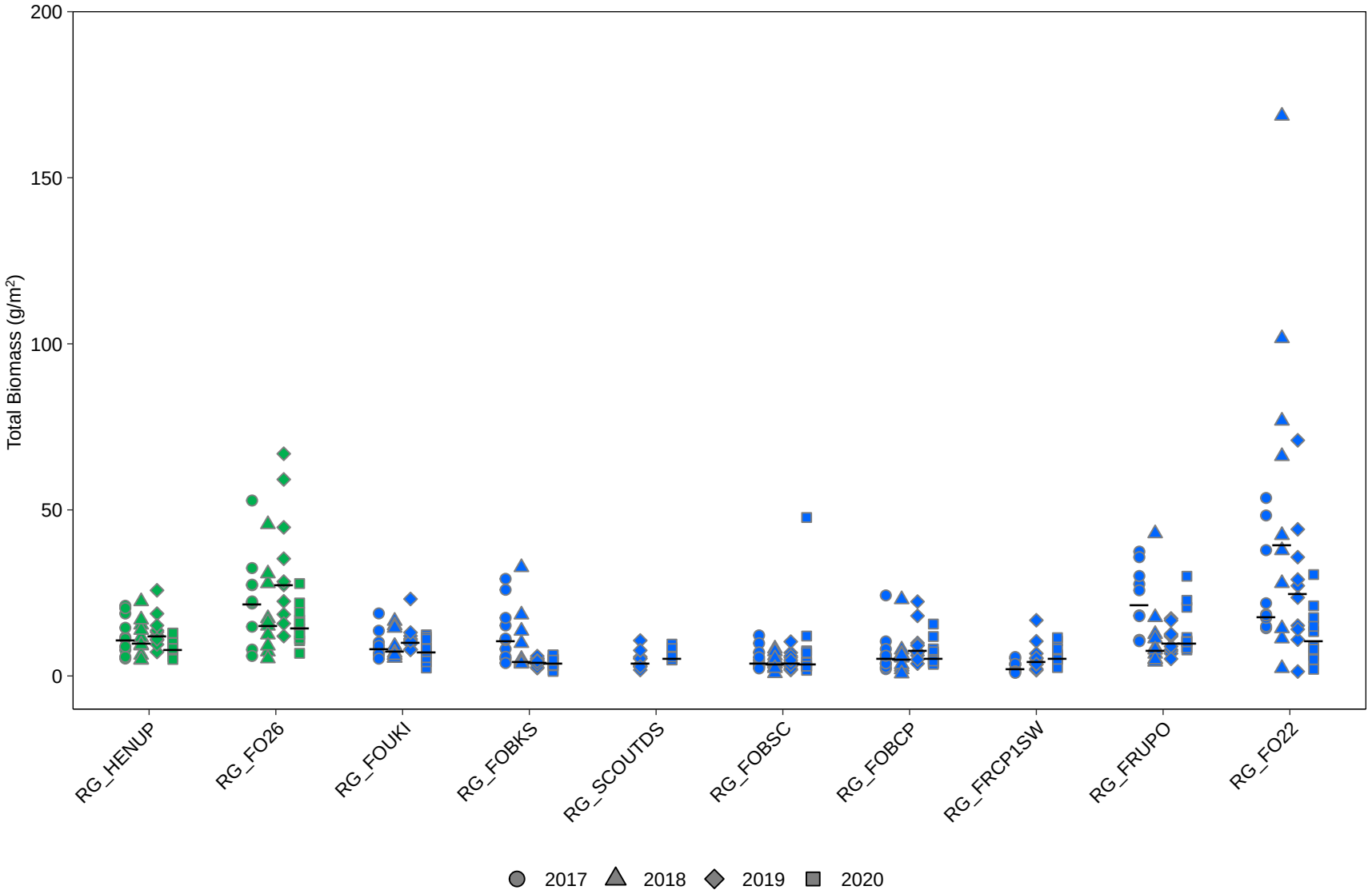


Figure 3.4: Total Benthic Invertebrate Density and Biomass (Hess Sampling) by Area, FRO LAEMP, 2017 to 2020

Note: Black lines denote the measure of central tendancy calculated in the statistical model.

The 2020 CABIN scores for periphyton indicated that at both reference areas and at RG_FODHE and RG_FRUPO the rocks were noticeably slippery with patches of thicker green to brown algae (Periphyton coverage score of 3 out of 5; Appendix Table G.70). Substrate at RG_FODNGD, RG_FOUSH, RG_FOUKI, RG_SCOUTDS, RG_FOBSC, RG_FODPO, and RG_FOUEW was slightly slippery and yellow-brown to light green in colour (Periphyton coverage score of 2 out of 5). All other locations in the study area were not slippery with no obvious colour (Periphyton coverage score of 1 out of 5; Appendix Table G.70).

3.4.2 Tissue Chemistry

Benthic invertebrate tissue chemistry data will be interpreted to address Study Question #3 (see Section 4.3). Composite-taxa benthic invertebrate tissue samples were collected in June, September, and December 2020. Benthic invertebrate tissue selenium concentrations were within the reference normal range in 151 of 200 samples collected from mine-exposed areas in 2020, with the majority of samples with tissue selenium concentrations above normal ranges occurring in September (Table 3.5). Tissue selenium concentrations were below the EVWQP Level 1 benchmarks for fish, benthic invertebrates, and birds, with some exceptions (Table 3.5; Figure 3.5). At RG_FRCP1SW in June, one of the five replicate samples was above the Level 3 benchmarks for juvenile birds, while two of the five replicates were above Level 3 benchmarks for benthic invertebrates. At RG_FRCP1SW in September, replicates one, two, and three were above EVWQP Level 1 benchmarks for juvenile fish, juvenile birds, and benthic invertebrates, respectively (Table 3.5; Figure 3.5). At RG_FOUCL, RG_MP1, RG_FOUKI, RG_FOBKS, and RG_FOBSC one to two replicates were above the EVWQP Level 1 benchmarks for juvenile fish in September (Table 3.5; Figure 3.5). Except for RG_SCOUTDS, all biological monitoring areas from RG_FOUCL downstream to RG_FOUEW had at least one replicate that was above upper limit of the reference normal range in September (Table 3.5; Figure 3.5). One replicate at RG_FOBSC and RG_FOBCP, and two replicates at RG_FOUEW were above the upper limit of the normal range in December. Benthic invertebrate tissue selenium concentrations were similar at all three reference areas in June and September 2020 (Table 3.5; Appendix I).Benthic invertebrate tissue selenium concentrations in June, September, and December 2020 were assessed against the biological trigger values (information pertaining to the determination of the biological trigger value can be found in Appendix H). Biological trigger evaluation for each replicate from FRO LAEMP monitoring areas with available water quality projections (i.e., six mine-exposed areas [RG_FODHE, RG_FOUKI, RG_FOBSC, RG_FOBCP, RG_FODPO, and RG_FO22] and one reference area [RG_FO26]; Appendix H). No replicate samples at mine-exposed areas exceeded biological trigger values for tissue

Table 3.5: Selenium Concentration in Composite-taxa Benthic Invertebrate Tissue, FRO LAEMP, 2020

Biological Monitoring Area		Composite-taxa Tissue Selenium (µg/g dw)														
		June					September					December				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Reference	RG_HENUP	5.1	7.5	3.6	-	-	6.0	6.9	5.7	-	-	-	-	-	-	-
	RG_FO26	4.4	4.0	5.0	-	-	3.9	5.0	4.8	-	-	-	-	-	-	-
	RG_UFR1[a]	3.8	6.4	5.3	4.1	3.6	6.5	4.9	6.3	5.8	4.4	4.7	3.9	3.9	3.5	4.8
Mine-exposed	RG_FODHE	5.7	5.4	3.3	-	-	8.1	8.1	7.5	-	-	x	x	x	-	-
	RG_FOUCL	7.9	5.5	6.6	-	-	13	10	6.7	-	-	6.4	5.9	5.8	-	-
	RG_FOUNGD	4.5	4.7	4.3	-	-	11	11	9.6	-	-	5.1	6.7	6.3	-	-
	RG_FODNGD	6.3	5.8	2.5	-	-	6.9	7.9	9.6	-	-	6.0	5.6	5.7	-	-
	RG_MP1	6.1	6.8	6.7	-	-	13	12	9.6	-	-	5.7	5.9	6.0	-	-
	RG_FOUSH	6.3	4.5	7.7	-	-	8.1	7.3	11	-	-	5.8	4.7	5.3	-	-
	RG_FOUKI	6.3	6.8	6.3	4.9	4.8	9.4	9.0	8.5	12	11	5.6	6.2	4.2	5.6	3.0
	RG_FOBKS	6.0	4.4	6.6	6.0	5.9	6.6	13	11	11	7.8	7.0	8.0	5.8	7.6	8.0
	RG_SCOUTDS	5.2	5.3	4.9	7.2	7.5	8.5	8.5	7.6	7.1	8.0	4.3	7.6	5.3	5.7	5.9
	RG_FOBSC	5.0	5.6	4.9	7.4	4.2	10	12	8.2	11	12	7.3	8.6	6.1	8.1	9.4
	RG_FOBCP	5.3	6.4	5.3	4.9	4.3	11	9.9	9.9	11	11	8.9	6.5	6.9	5.8	4.4
	RG_FRCP1SW[b]	39	29	100	6.7	5.2	13	16	14	8.2	7.4	x	x	x	x	x
	RG_FRUPO	4.5	5.7	4.2	7.7	7.4	9.5	9.1	10	9.4	10	5.1	3.6	5.0	5.0	4.9
	RG_FODPO	6.2	6.9	5.5	6.7	5.5	9.3	6.7	7.2	7.1	10	3.8	3.3	3.1	4.5	4.1
	RG_FO22	6.7	5.5	8.2	-	-	9.1	8.4	11	8.9	10	6.1	6.1	7.2	4.0	4.7
	RG_FOUEW	6.1	4.5	5.0	5.3	6.7	7.5	7.1	9.7	9.1	9.9	5.8	7.3	4.9	9.1	9.5

Value > EVWQP Level 1 benchmark of 11 mg/kg dw for dietary effects to juvenile fish (Teck 2014).
Value > EVWQP Level 2 benchmark of 18 mg/kg dw for dietary effects to juvenile fish (Teck 2014).
Value > EVWQP Level 3 benchmark of 26 mg/kg dw for dietary effects to juvenile fish (Teck 2014).
Value > EVWQP Level 1 benchmark of 13 mg/kg dw for effects to benthic invertebrates (Teck 2014).
Value > EVWQP Level 2 benchmark of 20 mg/kg dw for effects to benthic invertebrates (Teck 2014).
Value > EVWQP Level 3 benchmark of 27 mg/kg dw for effects to benthic invertebrates (Teck 2014).
Value > EVWQP Level 1 benchmark of 15 mg/kg dw for dietary effects to juvenile birds (Teck 2014).
Value > EVWQP Level 2 benchmark of 22 mg/kg dw for dietary effects to juvenile birds (Teck 2014).
Value > EVWQP Level 3 benchmark of 41 mg/kg dw for dietary effects to juvenile birds (Teck 2014).
Value > upper limit of normal range of (8.74 mg/kg dw; Minnow 2020).

Note: '-' indicates sample that was not taken because it was not a part of the sampling design; 'x' indicates sample that was not taken because of drying and/or ice conditions.

[a] RG_UFR1 was used as a reference location in December when there was no access to RG_FO26 or RG_HENUP.

[b] High tissue selenium levels in June at FRCP1SW are believed to be a result of samples containing a high proportion of annelids.

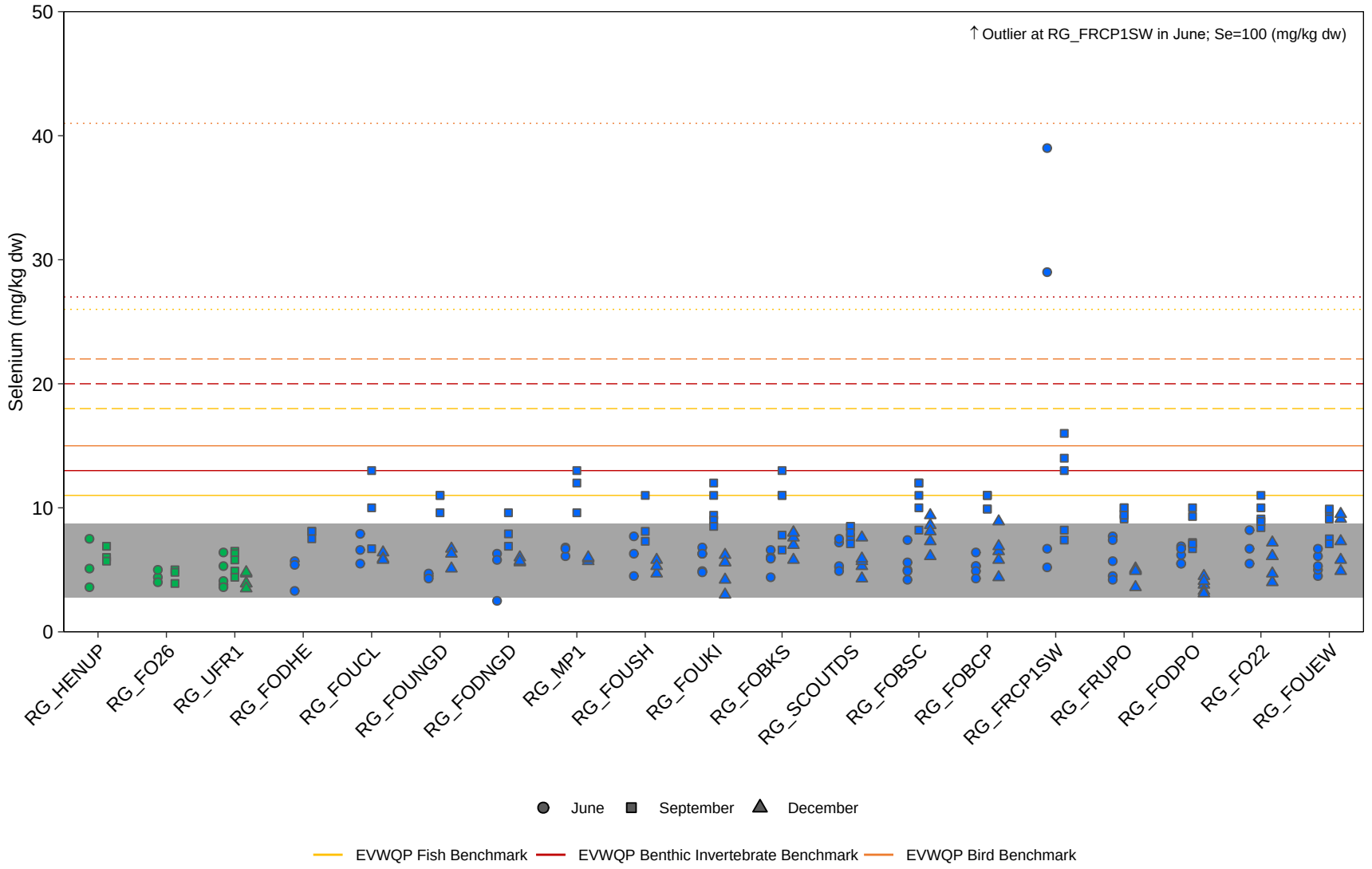


Figure 3.5: Composite-taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2020

Notes: Green represents reference stations and blue represents mine-exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

selenium concentrations (above the 97.5th percentile of normal range and above the 95% prediction interval; Appendix H), but several replicates were above the Level 1 benchmark for juvenile fish at RG_FOUKI, RG_FOBSC, RG_FOBCP, and RG_FO22 in September.

Aqueous selenium species were plotted with composite-taxa tissue selenium concentrations relative to time (Appendix Table E.2; Appendix Figure E.11). Areas (RG_MP1 downstream to RG_FRCP1SW) having elevated concentrations of aqueous total selenium, and particularly reduced forms of selenium (Appendix Table B.5), had elevated concentrations of tissue selenium concentrations (Appendix Figure E.11). Paired aqueous total selenium concentrations and tissue selenium concentrations were plotted against the selenium bioaccumulation model (Golder 2020a). All values except four anomalously high replicates from RG_FRCP1SW in June 2019 and 2020, and one replicate from RG_FOBCP in December 2018 fell near or within the prediction limits, (Figure 3.6), suggesting that tissue concentrations were expected based on the selenium concentrations in the water.

3.4.3 Benthic Invertebrate Community

3.4.3.1 Spatial and Temporal BIC Endpoints

Spatial and temporal benthic invertebrate community data will be interpreted to address Study Questions #1, #4, #5, #6, and #7 (see Sections 4.1, 4.4, 4.5, 4.6, and 4.7). Benthic invertebrate community metrics calculated based on September 2020 data were plotted spatially and compared to regional normal ranges for all endpoints, and to site-specific normal ranges for total abundance, richness, and percent and total abundance for EPT and Ephemeroptera (Figures 3.7 to 3.16). Total benthic invertebrate abundance and LPL richness was within or above the regional and site-specific normal range at all FRO LAEMP areas in 2020, including areas with low % Ephemeroptera and/or % EPT (Figure 3.7).

Although total Ephemeroptera abundance was within the regional and site-specific normal range throughout the study area in September 2020 (Figure 3.8), % Ephemeroptera was below the normal range in the lower part of the study area (Figure 3.9). Specifically, % Ephemeroptera was below the regional normal range from RG_FRCP1SW downstream to the lower extent of the study area upstream of Ewin Creek (RG_FOUEW), and below the site-specific normal range from downstream of the Swift Bridge and the future FRO AWTF-S outfall (RG_SCOUTDS) to RG_FOUEW located upstream of Ewin Creek (Figure 3.9). While Ephemeroptera abundance was within the regional normal range throughout the study area, a similar upstream to downstream decrease was observed, and a similar pattern was identified in the abundance of two Ephemeroptera families: Heptageniidae and Ephemerellidae (Figures 3.10 and 3.11).

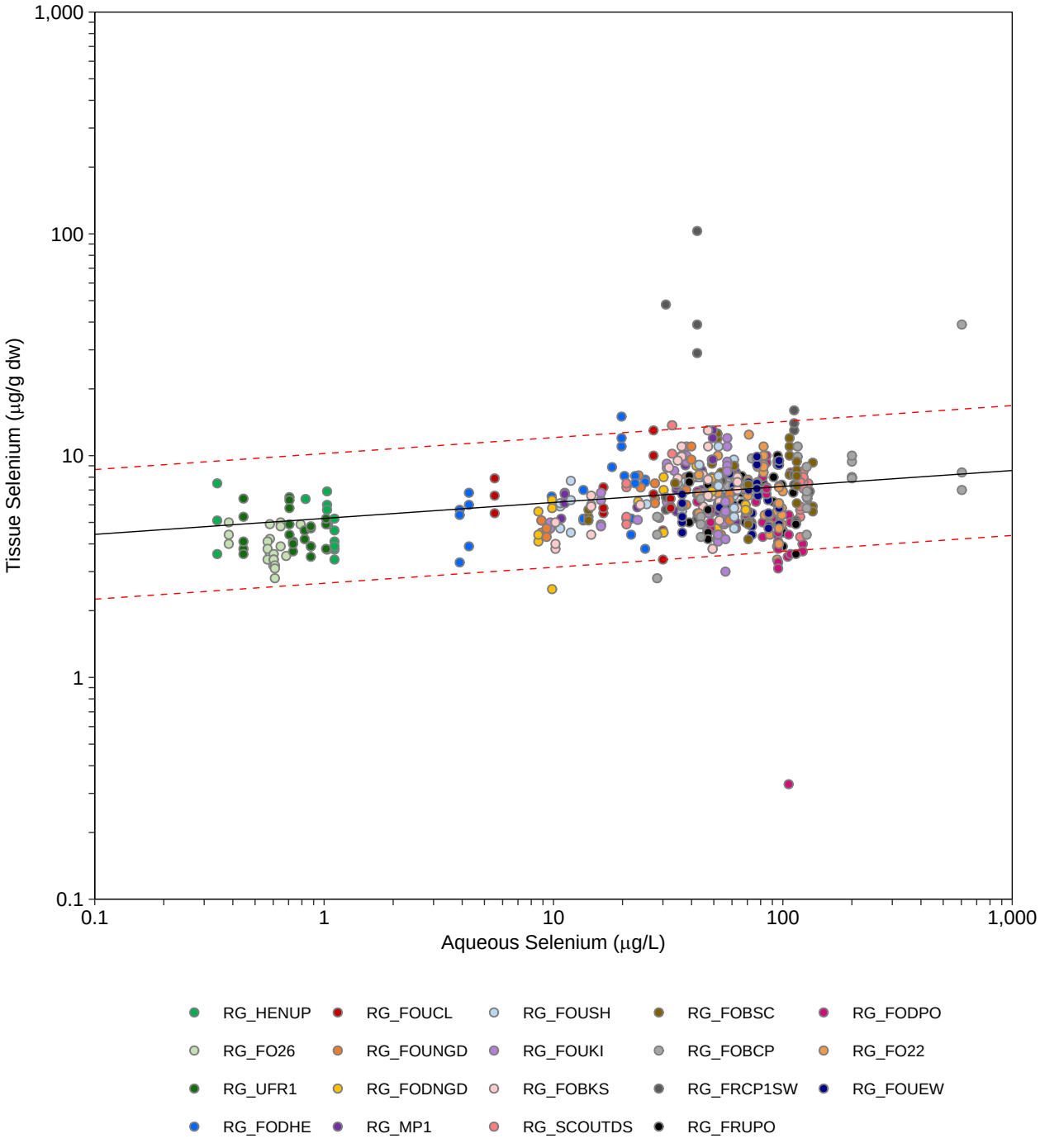


Figure 3.6: Observed and Modeled Selenium Concentrations in Benthic Invertebrate Composite Samples Relative to Aqueous Selenium Concentrations at Stations Upstream and Downstream of Fording River Operations, FRO LAEMP, 2012 to 2020

Notes: Mean benthic invertebrate selenium concentrations (solid black line) were estimated using a one-step water to benthic invertebrate selenium accumulation model: $\log10[Se]_{benthic\ invertebrate}=0.717+0.072 \times \log10[Se]_{aq}$ (Golder 2020). The 95% prediction limits for a single value from the one-step water to benthic invertebrate selenium accumulation model are plotted as dashed red lines. Reference areas are shown in green.

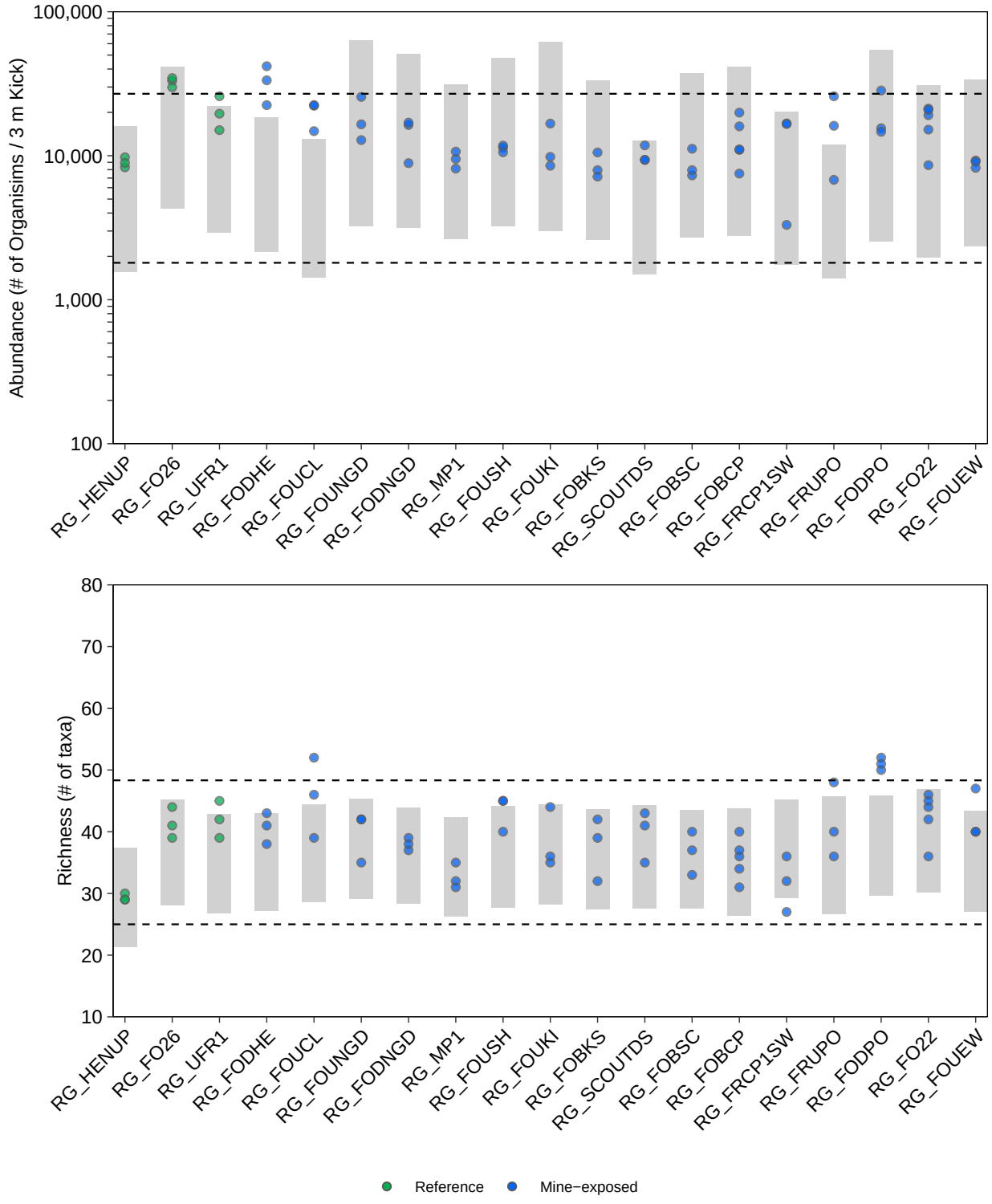


Figure 3.7: Benthic Invertebrate Abundance and Richness, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

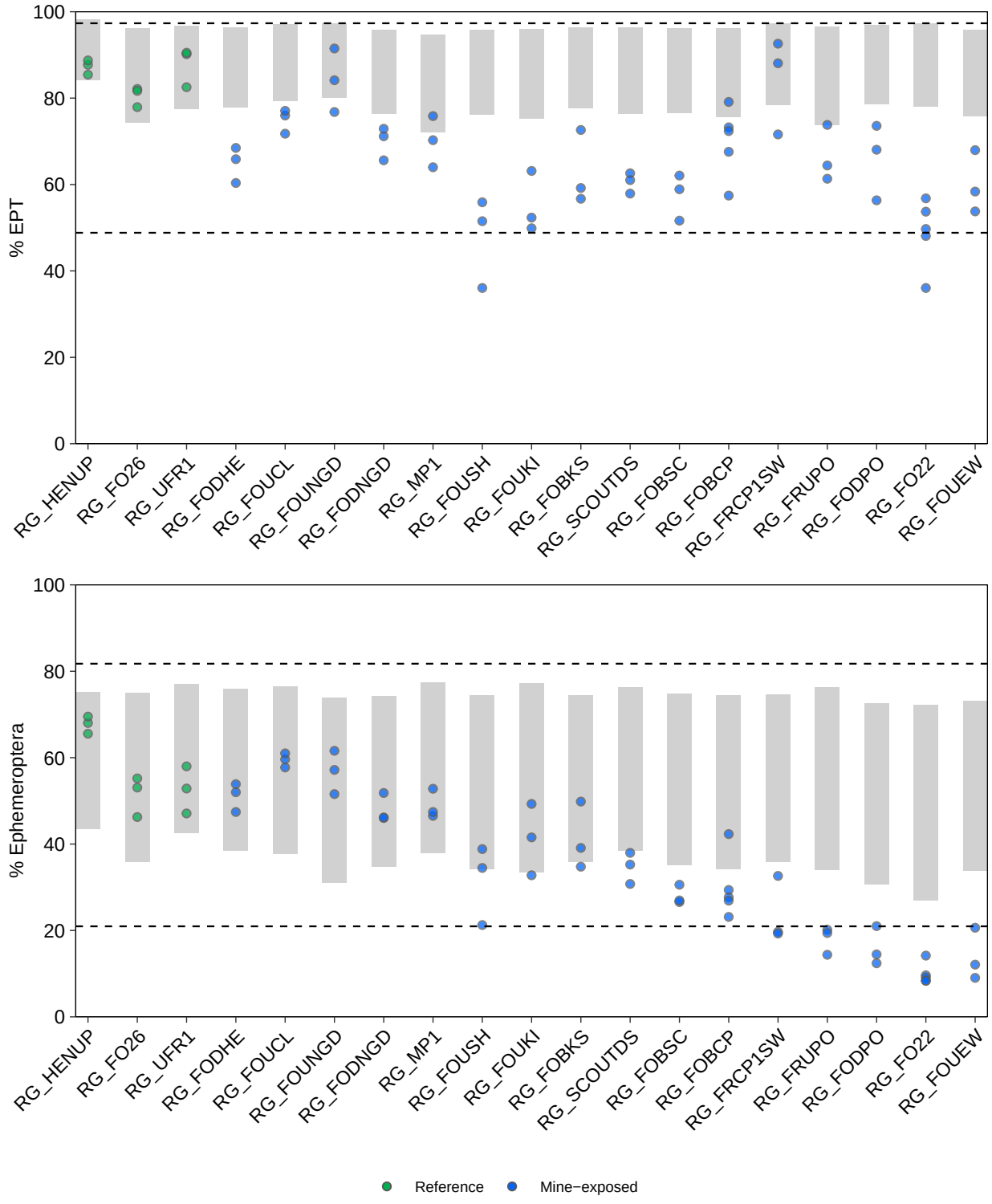


Figure 3.8: Benthic Invertebrate % EPT and % Ephemeroptera, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

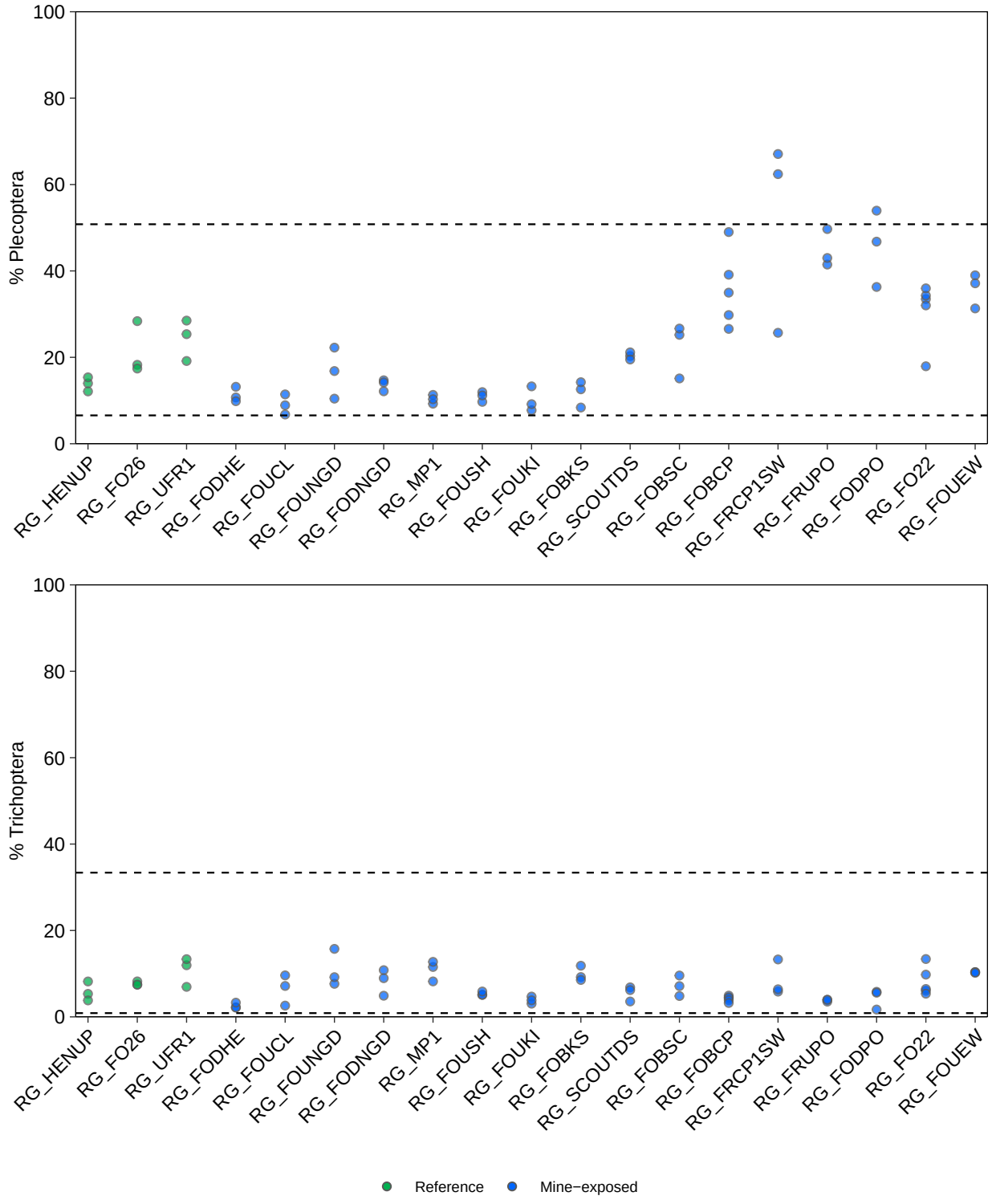


Figure 3.9: Benthic Invertebrate % Plecoptera and % Trichoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

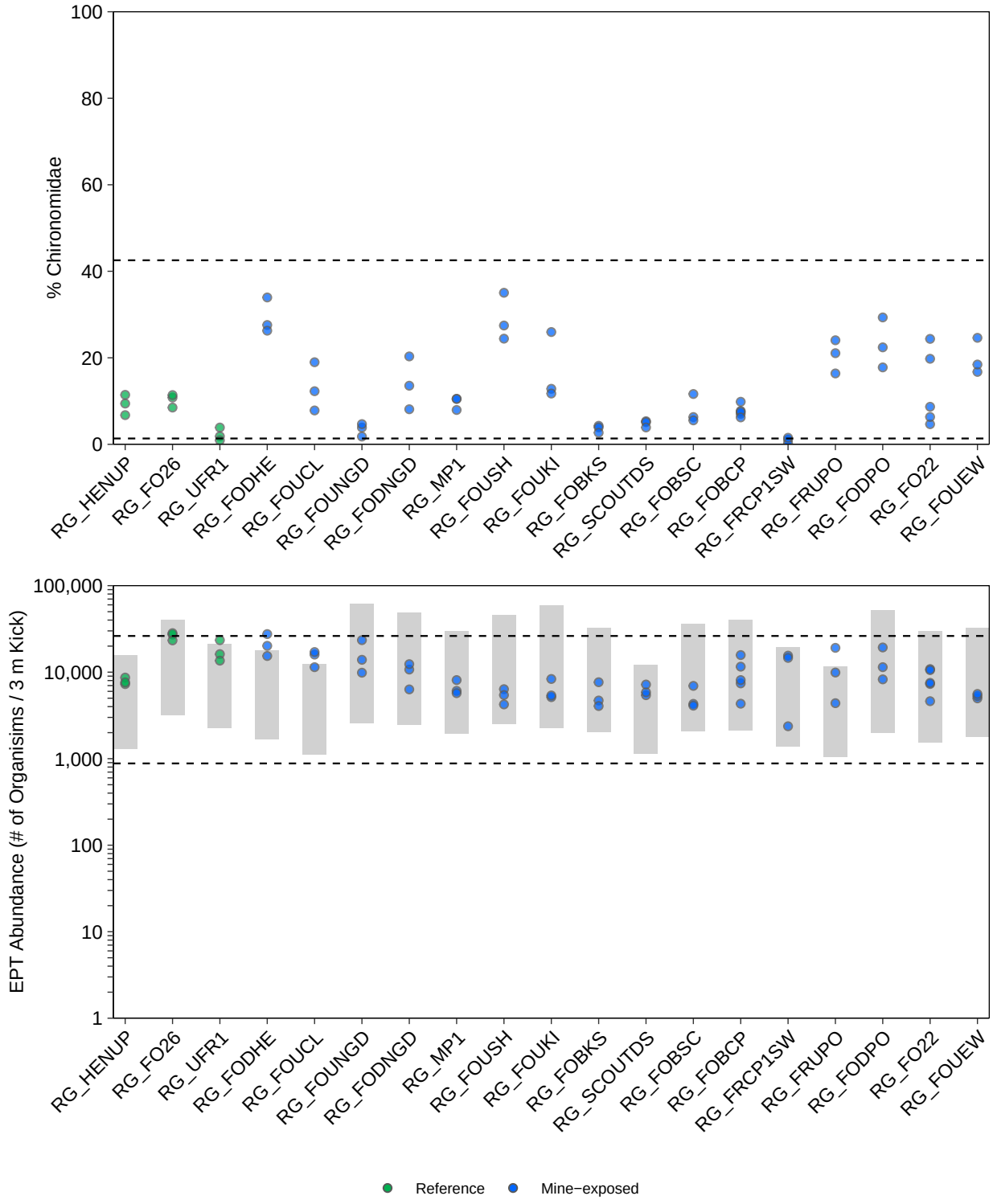


Figure 3.10: Benthic Invertebrate % Chironomidae and EPT Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

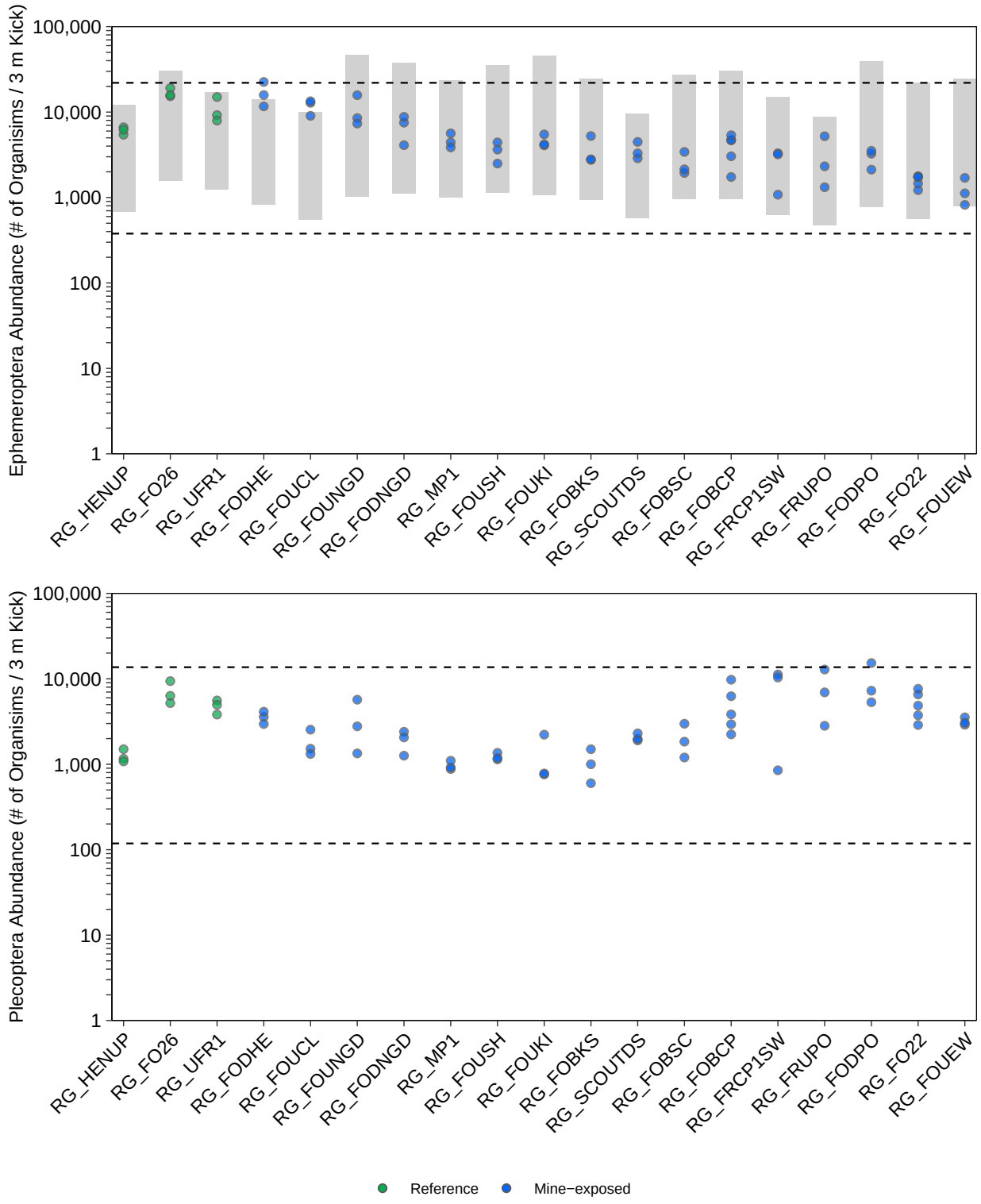


Figure 3.11: Benthic Invertebrate Ephemeroptera Abundance and Plecoptera Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

Baetidae, another Ephemeroptera family within the study area did not exhibit any obvious spatial pattern (Figure 3.10).

Consistent with previous years, both total Plecoptera abundance and % Plecoptera were within or above the upper limit of the regional normal range in September 2020, and were relatively high at the areas where % Ephemeroptera was low compared to areas located elsewhere in the study area (Figures 3.8, 3.9, and 3.12). In the lower section of the study area (RG_FOBCP to RG_FOUEW), % Plecoptera accounted for approximately 35% to 60% of all benthic invertebrates, but relative abundance was lower in the upper study area where % Ephemeroptera was within both the regional and site-specific normal ranges (Figures 3.9 and 3.12). Total Trichoptera abundance and % Trichoptera were within the regional normal range throughout the study area (Figures 3.12 and 3.13).

Consistent with previous years, % EPT in September 2020 remained within the regional normal range as a result of relatively high abundance of Plecoptera and, to a lesser extent, Trichoptera in areas where Ephemeroptera abundance and relative abundance was lower than the normal ranges (Figure 3.8, 3.9, and 3.13). However, except for two replicates at RG_FRCP1SW and one replicate each at RG_FOBCP and RG_FRUPO, % EPT was below the site-specific normal range from upstream of Shandley Creek (RG_FOUSH) downstream to RG_FOUEW (Figure 3.9). Total abundance of EPT was within the regional and site-specific normal range throughout the study area (Figure 3.14).

The Autotrophic to Heterotrophic Index in September 2020 was lowest at RG_FOUSH and, with the exception of RG_FO22, from RG_FOBSC downstream to RG_FOUEW (Figure 3.11), suggesting that organisms in these areas may utilize more (heterotrophic energy) food sources originating from terrestrial sources compared to those originating from within the river and its tributaries. The Filtering Collector Index was consistent throughout the mine-exposed areas but higher in the reference areas (Figure 3.15), which may be a consequence being further up in the watershed where there is less deposited material for collectors to forage. The lowest proportions of predators were observed at RG_FOUSH, RG_FOUKI, and RG_FRCP1SW (Figure 3.15). The Benthic to Hyporheic Index was lowest at RG_FODHE, and from RG_FRUPO downstream to RG_FOUEW (Figure 3.16). Low Benthic to Hyporheic indices in the lower part of the study area (RG_FRUPO downstream to RG_FOUEW) was likely facilitated by the deeper, slower flowing water characteristic of these areas and that favor invertebrates who burrow under the substratum. None of the BIC index endpoints demonstrated patterns that were consistent with patterns observed in the benthic invertebrate communities.

To provide additional information on the benthic invertebrate communities in the FRO LAEMP study area, correspondence analysis was conducted on September family-level relative

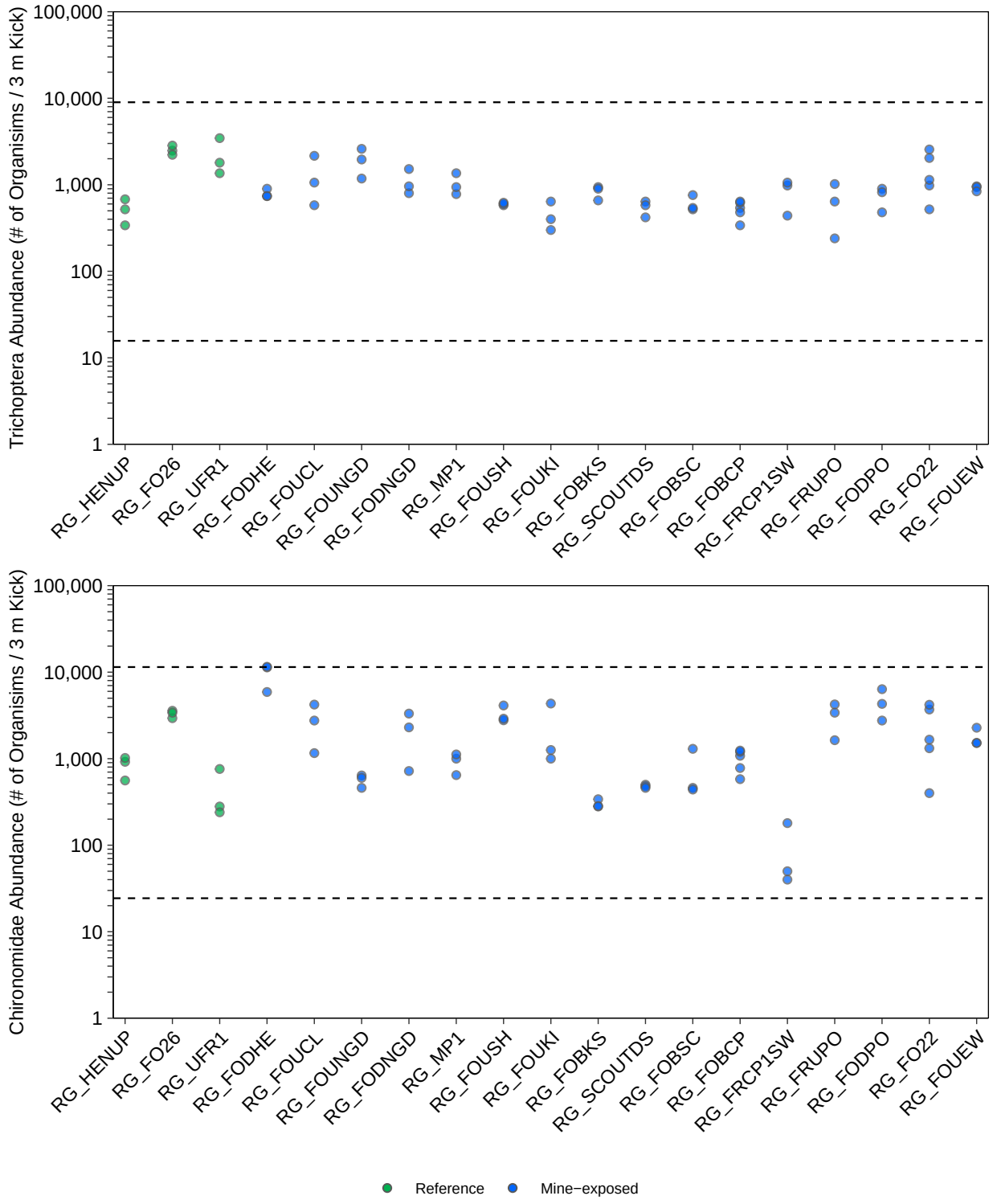


Figure 3.12: Benthic Invertebrate Trichoptera Abundance and Chironomidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

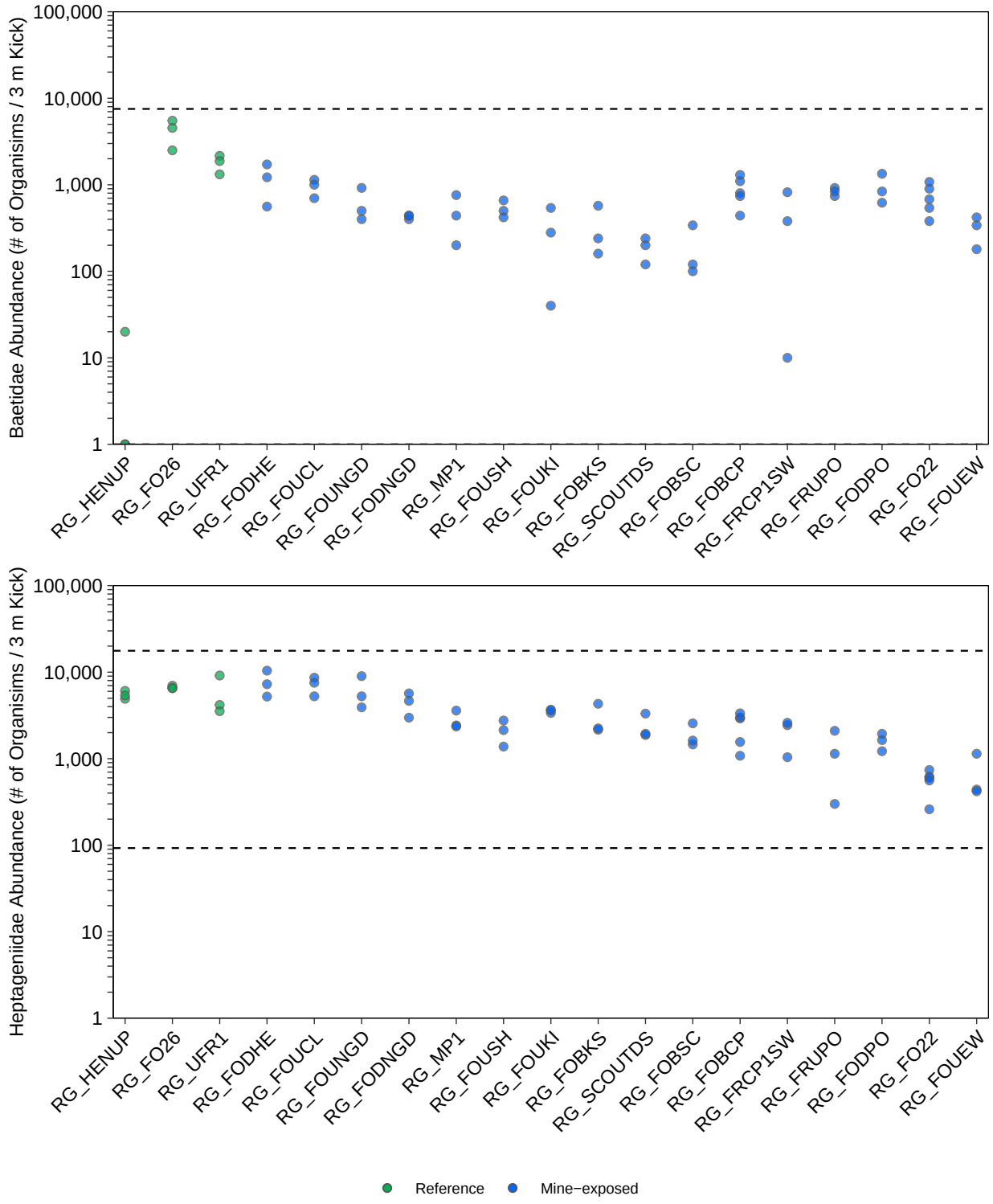


Figure 3.13: Benthic Invertebrate Baetidae Abundance and Heptageniidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

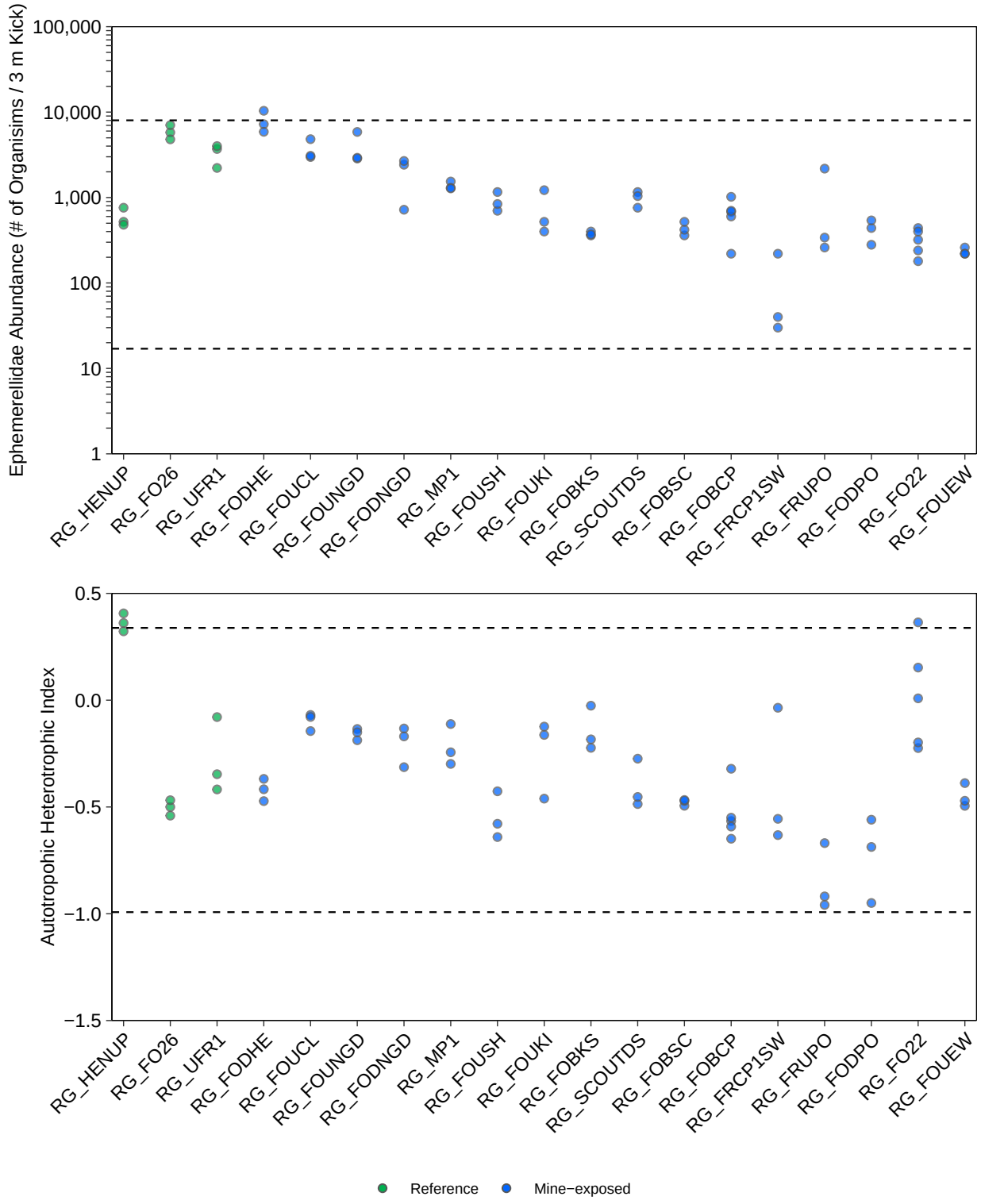


Figure 3.14: Benthic Invertebrate Ephemerellidae Abundance and Autotropohic Heterotrophic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

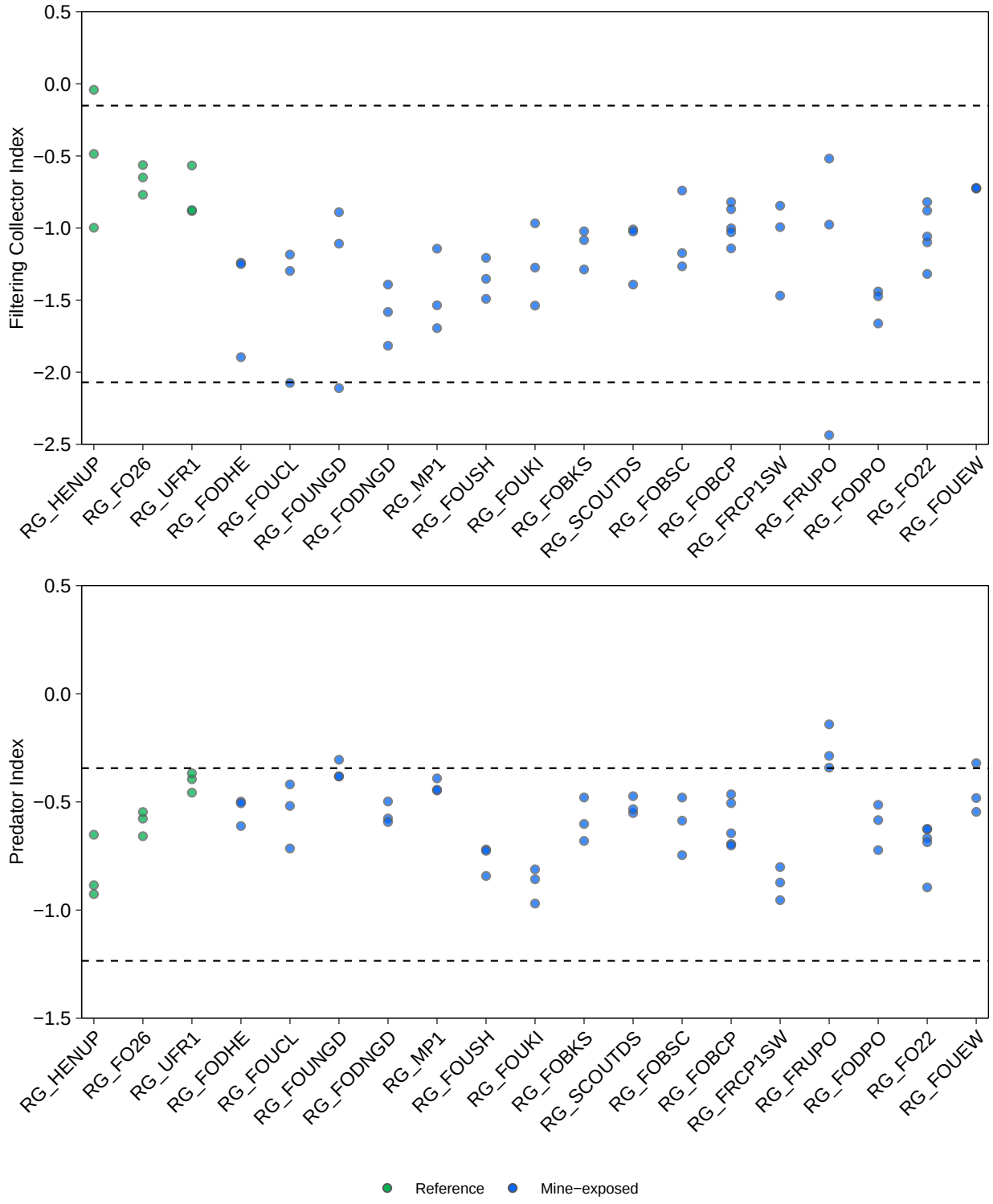


Figure 3.15: Benthic Invertebrate Filtering Collector Index and Predator Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

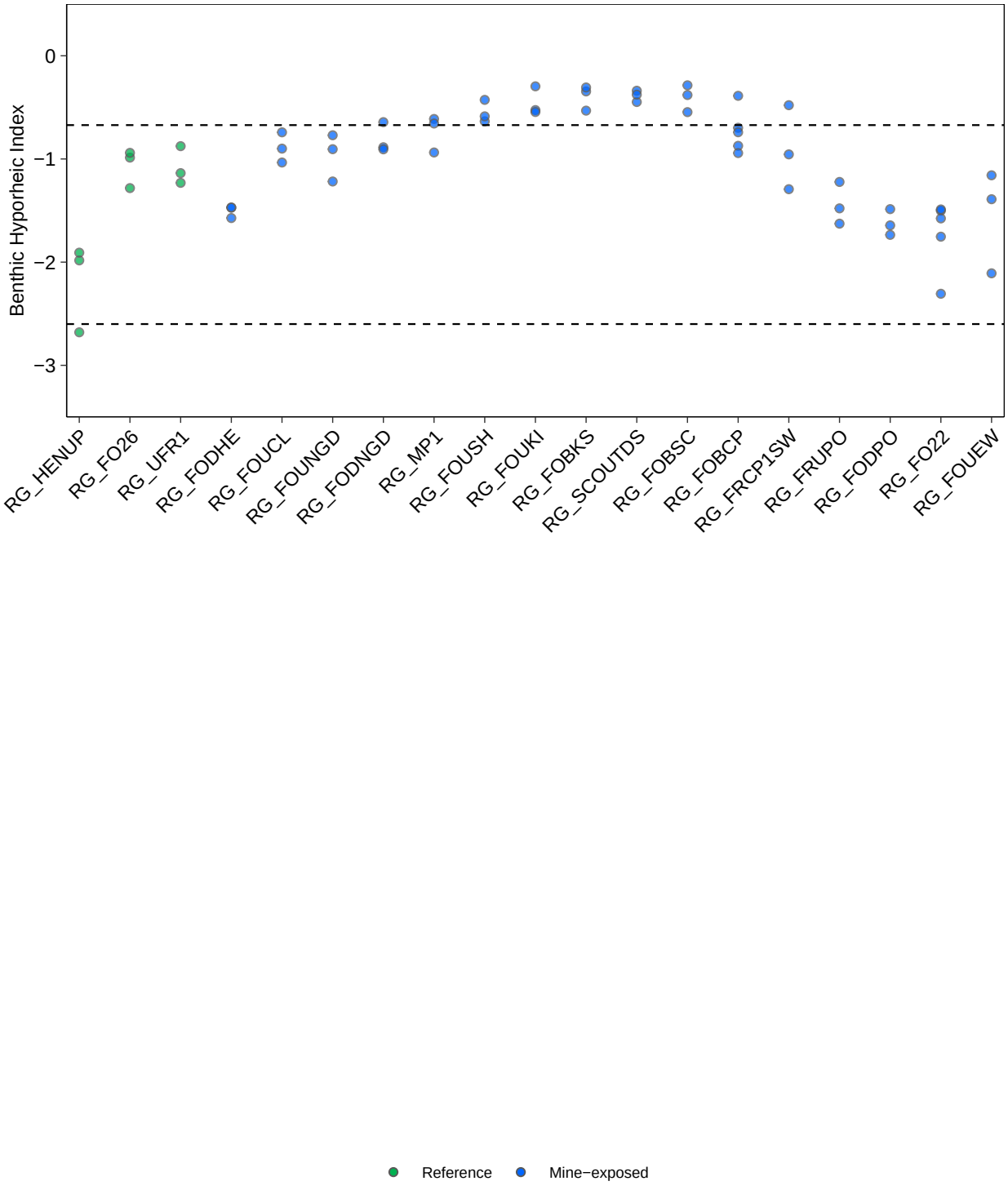


Figure 3.16: Benthic Invertebrate Benthic Hyporheic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

abundance data for all study years (2012 to 2020; Appendix Tables E.3 and E.4; Appendix Figures E.12 and E.13), with CA axis 1 (CA1) and CA axis 2 (CA2) accounting for 29.0% and 11.7% of the variability in the community, respectively. The four most downstream areas (RG_FRUPO, RG_FODPO, RG_FO22, and RG_FOUEW) were separated from the rest of the areas along CA1, with RG_FO22 being the most divergent area (Appendix Figure E.13), which was similar to previous results (Minnow and Lotic 2019b, 2020b). The taxon driving the separation in the negative direction on CA1 was the riffle beetle (Family Elmidae; Order Coleoptera), with significant influences from Glossosomatidae (Trichoptera), Capniidae (Plecoptera), and Tipulidae (Diptera; Appendix Table E.4; Appendix Figure E.13). Taxa driving CA1 in the positive direction were largely families of Ephemeroptera, such as Ameletidae, Ephemerellidae and Heptageniidae, with significant influences from Hydropsychidae (Trichoptera), Sperchontidae (Coleoptera), Psychodidae (Diptera), and Ceratopogonidae (Diptera; Appendix Table E.4; Appendix Figure E.13). Reference and mine-exposed areas were separated along CA2, which was strongly driven by Diptera families in the negative direction (mine-exposed areas), and Chloroperlidae (Plecoptera) and Ephemeroptera taxa in the positive direction (reference areas). Correspondence analysis was also conducted using LPL relative abundance data and yielded similar results as the family-level CA (Appendix Tables E.5 and E.6; Appendix Figures E.14 and E.15).

In June and September 2020 all three reference areas were sampled in preparation for FRO AWTF-S commissioning and to understand potential differences among monitoring areas sampled in the summer (RG_HENUP and RG_FO26) compared to winter (RG_UFR1[3]). All BIC endpoints were higher at RG_FO26 and RG_UFR1 compared to RG_HENUP, except for % Ephemeroptera which was higher at RG_HENUP compared to the other two reference areas (Appendix I). Benthic invertebrate communities were similar at RG_FO26 and RG_UFR1 in June and September 2020, suggesting a high level of comparability in winter and summer reference area data.

Percent EPT in September 2020 was assessed against the biological trigger values (information pertaining to the determination of the biological trigger value can be found in Appendix H). This was completed for FRO LAEMP monitoring areas with available water quality projections (i.e., six mine-exposed areas [RG_FODHE, RG_FOUKI, RG_FOBSC, RG_FOBCP, RG_FODPO, and RG_FO22] and one reference area [RG_FO26]; see Appendix H for details). Except for one replicate at the Compliance Point (RG_FOBCP), replicates from all mine-exposed areas had % EPT that were lower than the biological trigger value. Percent EPT

[3] The only reference area accessible in winter is RG_URF1. No road maintenance is available for access to RG_FO26 and RG_HENUP, and both areas represent high avalanche risk.

at these areas has previously been flagged for further investigation in past FRO LAEMP reports and the RAEMP based on benthic invertebrate community results (Minnow 2020b). Further information regarding the % EPT biological trigger as it pertains to the FRO LAEMP can be found in Appendix H and discussion of causes of lower % EPT in the study area is found in Section 4.6.

Benthic invertebrate community metrics were plotted relative to previous years and to the regional normal range for all endpoints, and endpoints (total abundance, richness, and percent and total abundance for EPT and Ephemeroptera) for the site-specific normal range (Appendix Figures E.16 to E.36). Temporal trends in BIC metrics were also examined statistically to determine whether a change has occurred since the base year, and/or compared to previous years (Appendix Tables E.7 to E.21).

In 2020, total benthic invertebrate abundance was unchanged compared to previous years throughout the study area except at RG_FOBCP and RG_FO22 where total abundance increased in 2020 compared to 2019 (Appendix Table E.7; Appendix Figure E.16). Lowest practical level richness increased compared to the base year at RG_FODHE, RG_FOUSH, and RG_FOBKS, and LPL richness at both RG_FODPO and RG_FO22 was higher in 2020 compared to 2019 (Appendix Table E.8; Appendix Figure E.17). In 2020, % EPT was significantly lower than the base year at RG_FODHE, RG_FOUSH, and RG_FOUKI, while % EPT at both RG_MP1 and RG_FOBCP was higher in 2020 compared to 2019 (Appendix Table E.9; Appendix Figure E.18). Percent Ephemeroptera was significantly lower than the base year at the majority of mine-exposed areas (exceptions were RG_FOUCL, RG_FOUNGD, RG_MP1, RG_SCOUTDS, RG_FRCP1SW, and RG_FRUPO), and was lower at RG_FOUNGD and RG_FOUEW, but higher at RG_MP1 when comparing 2020 to 2019 (Appendix Table E.10; Appendix Figure E.19). Percent Plecoptera was significantly higher than the base year at RG_MP1, RG_FOBSC, and RG_FOBCP, and was higher at RG_FO26, RG_FOUNGD, and RG_MP1 in 2020 compared to 2019 (Appendix Table E.11; Appendix Figure E.20). Percent Trichoptera was higher in 2020 compared to the base year at RG_MP1, and increased at RG_FOUNGD and RG_FOUEW in 2020 compared to 2019 (Appendix Table E.12; Appendix Figure E.21). At RG_FOUCL, % Chironomids was significantly lower in 2020 compared to the base year and compared to 2019; however, they increased significantly at RG_FODHE, RG_FOUSH, and RG_FOUKI when compared to the base year (Appendix Table E.13; Appendix Figure E.22). Abundance of EPT increased at RG_FRCP1SW in 2020 compared to the base year or 2017, and increased at RG_FOBCP in 2020 compared to 2019 (Appendix Table E.14; Appendix Figure E.23). Ephemeroptera abundance increased at both RG_FO26 and at RG_FRCP1SW in 2020 compared to the base year, and increased at both RG_FOBCP and RG_FRUPO in 2020

compared to 2019 (Appendix Table E.15; Appendix Figure E.24). Plecoptera and Trichoptera abundances increased at RG_FOBCP and RG_FO22, respectively, when comparing 2020 to base year, and Plecoptera abundance increased at RG_F026, RG_FOUKI, and RG_FOBCP in 2020 compared to 2019 while Trichoptera abundance increased at RG_FOBSC and RG_FOBCP compared to the previous year (Appendix Tables E.16 and E.17; Appendix Figures E.25 and E.26). Of the Ephemeroptera families, Ephemerellidae and Heptageniidae both had no clear pattern in terms of increases or decreases throughout the study area (Appendix Tables E.19 and E.20; Appendix Figures E.28 and E.29). Specifically, Ephemerellidae was significantly lower at RG_FODPO but significantly higher at RG_FOUNGD and RG_FO26 when comparing 2020 to base year, and was lower at RG_FOUNGD but higher at RG_FOBCP and RG_FRUPO when comparing 2020 to 2019 (Appendix Table E.19; Appendix Figure E.28). Likewise, Heptageniidae was significantly lower at RG_FOUSH when comparing 2020 to base year, but was significantly higher at RG_MP1, RG_FOUKI, RG_FOBCP, and RG_FODPO when comparing 2020 to 2019 and higher at RG_FRCP1SW when comparing 2020 to the base year (Appendix Table E.20; Appendix Figure E.29).

Benthic invertebrate community index endpoints were plotted temporally to determine if changes in BIC represented a shift in the functional communities over time. Benthic invertebrate community indices were within the regional normal ranges except the Predator Index, which was above the upper limit of the normal range at RG_FRUPO for all study years (Appendix Figure E.33), and the Benthic Hyporheic Index, which was at or above the upper limit of the normal range from RG_FOUKI downstream to RG_FOBCP throughout the study period (Appendix Figures E.34). The Autotrophic to Heterotrophic Index was lower at RG_FO26 in 2020 compared to 2019, was lower at RG_MP1 in 2018 compared to other years, and has been decreasing at RG_FODHE and RG_FOUSH over time (Appendix Figure E.31). The Filtering Collector Index was consistent across the study years at most areas in the FRO LAEMP except RG_FRUPO, where it was lower in 2019 compared to other years (Appendix Figure E.32). The Predator Index was consistent across the study years at most areas, except for at RG_FRCP1SW where the index was lower in 2020 compared to previous years within the study period (Appendix Figure E.33). The Hyporheic Benthic Index was consistent across all study years and areas (Appendix Figure E.34).

3.4.3.2 Seasonal

Seasonal benthic invertebrate community data will be interpreted to address Study Questions #1, #4, #5, #6, and #7 (see Sections 4.1, 4.4, 4.5, 4.6, and 4.7). Seasonal changes in BIC were visually compared using data collected in June, August, September and December 2018, February, June, September, and December 2019, and June, September and December 2020 to

identify potential seasonal patterns. Only a subset of monitoring areas were sampled in the winter programs due to study design considerations and ice conditions (Minnow 2019). Key BIC metrics were plotted over the eleven sampling periods (Appendix Figures E.35 to E.53). Total abundance was the lowest in June and increasing through September and plateauing or decreasing in December (Appendix Figure E.35). No consistent seasonal pattern in LPL richness was observed among the sampling areas (Appendix Figure E.36). Percent Ephemeroptera was lowest in the winter months when % Plecoptera was highest (Appendix Figures E.38 and E.39), while % Trichoptera and % EPT showed no consistent seasonal pattern across monitoring areas (Appendix Figures E.40 and E.37). The abundance of Plecoptera and EPT was lowest in June and increased through September and December (Appendix Figures E.44 and E.42); however, the abundance of Ephemeroptera, including families within Ephemeroptera (i.e., Baetidae, Heptageniidae, and Ephemerellidae) and Trichoptera was inconsistent across seasons among the monitoring areas (Appendix Figures E.43, E.45, and E.48 to E.49). Specifically, there were increases in abundance from June to September at some biological monitoring areas, but no changes across seasons at other areas. Percent and abundance of Chironomids also showed no seasonal patterns among the monitoring areas (Appendix Figures E.41 and E.46).

The Autotrophic to Heterotrophic Index was higher in the spring and summer months compared to winter (Appendix Figure E.50), which is consistent with higher available instream primary productivity throughout those months. The Filtering Collector Index was higher in September compared to June at reference areas, but was similar between the two seasons at mine-exposed areas (Appendix Figure E.51). The Predator Index was lower in winter months compared to summer, with the exception of RG_FOBSC in general and RG_FOUEW in 2019, where the index was similar between winter and summer months (Appendix Figure E.52). The Benthic to Hyporheic Index increased from June to September but was similar or lower than September through the winter months (Appendix Figure E.53).

Relative BIC composition was visually compared among the sampling periods, and across biological monitoring areas, to identify seasonal patterns (Figure 3.17). Consistent with 2019 results, downstream areas (i.e., FR_FRUPO to RG_FOUEW) were dominated by Nemouridae in the winter months compared to upstream areas (Figure 3.17). Except for RG_FO22, areas (RG_FOUSH, and RG_SCOUTDS downstream to RG_FOUEW) that had % Ephemeroptera below the site-specific normal range in September had similar proportions of Ephemeroptera as the rest of the study area in June (Figure 3.17). Although Baetidae proportions were comparatively low from RG_FOBCP downstream to RG_FOUEW, the high proportion of Heptageniidae maintained a high overall proportion of Ephemeroptera during the June sampling period. In September, downstream areas having low % Ephemeroptera had relatively

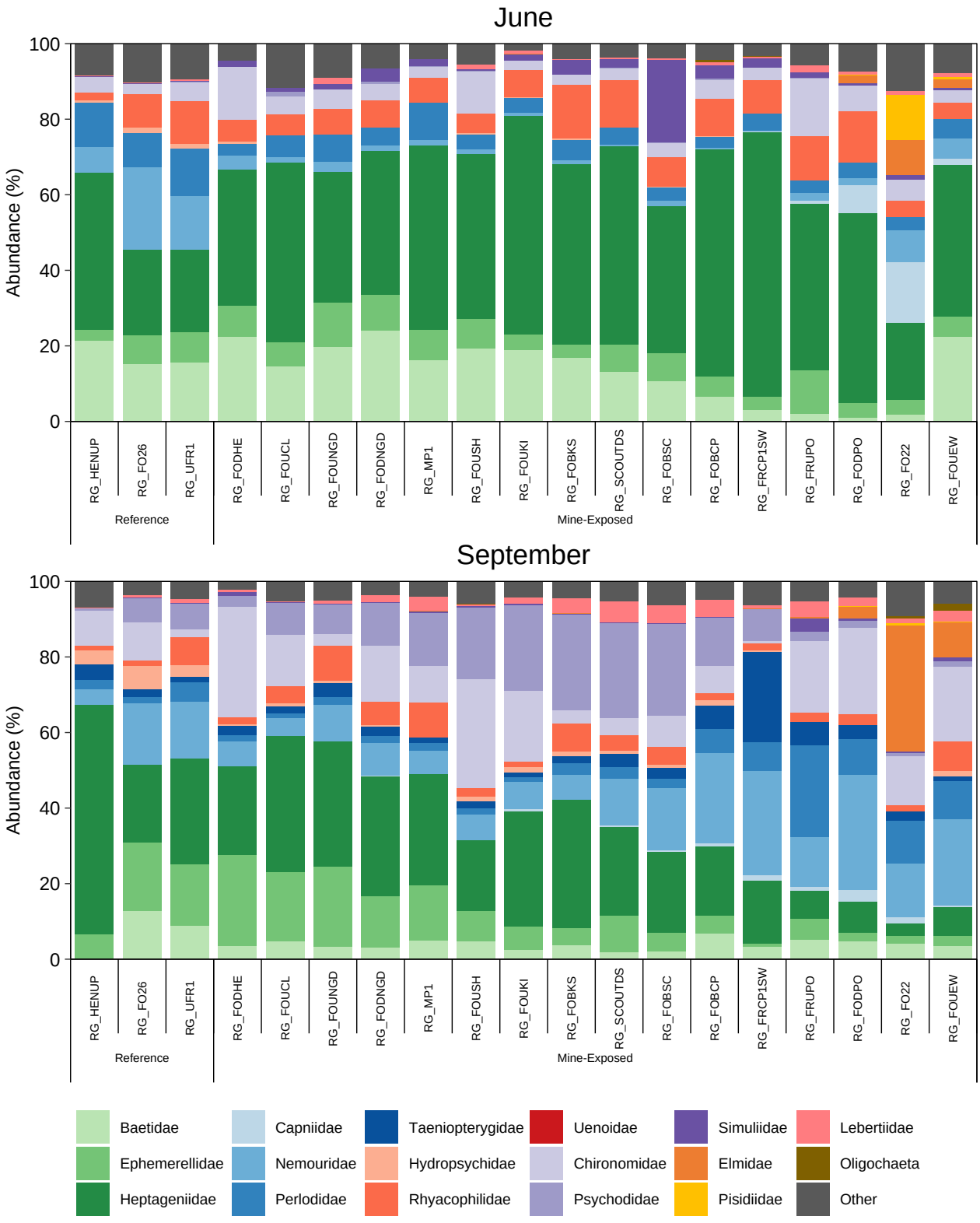


Figure 3.17: Benthic Invertebrate Community Percent Composition, FRO LAEMP, June to December 2020

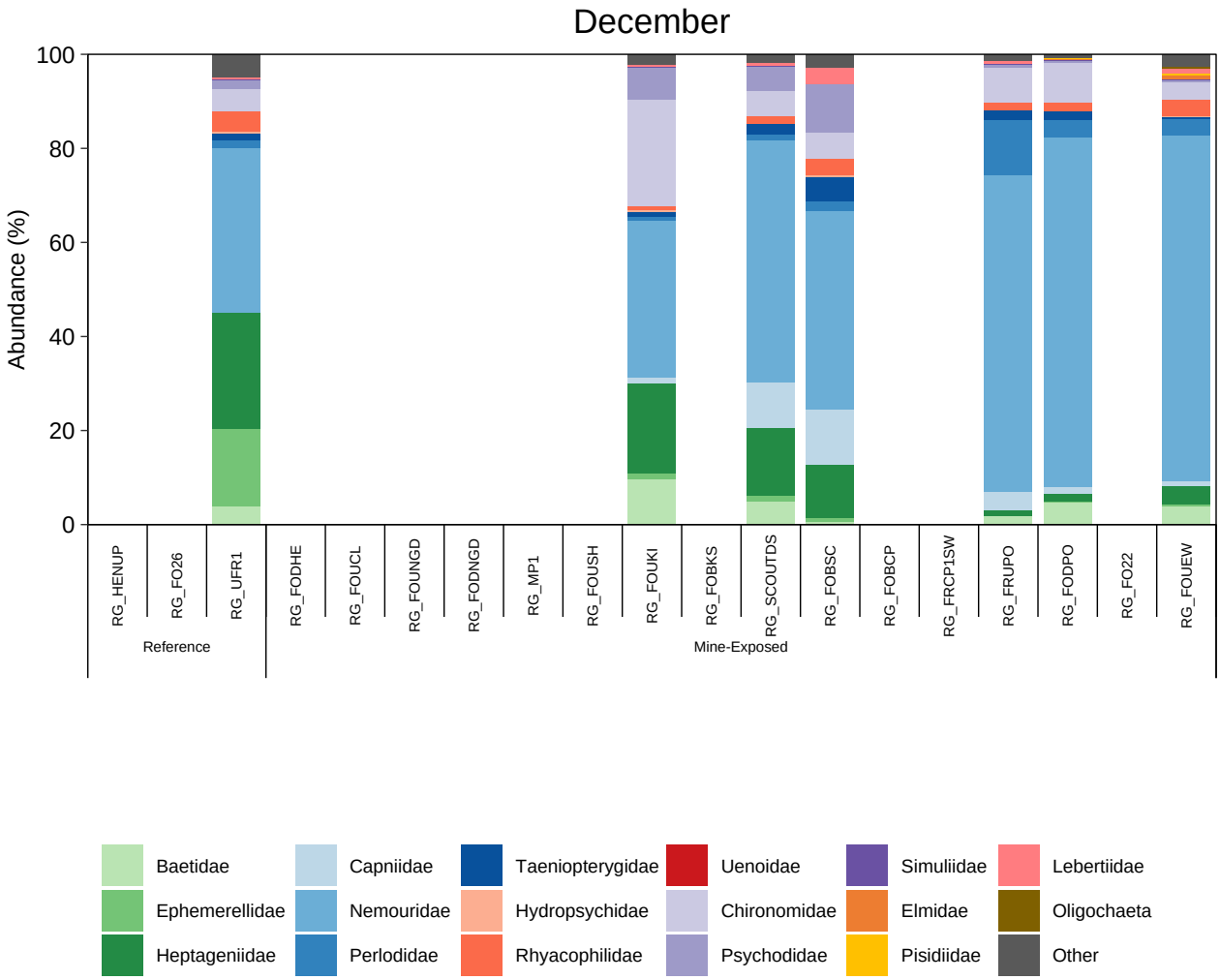


Figure 3.17: Benthic Invertebrate Community Percent Composition, FRO LAEMP, June to December 2020

high proportions of Plecoptera, particularly species from the families Perlodidae and Nemouridae (Figure 3.17). The riffle beetle Elmidae was highly abundant at RG_FO22 in September, and Psychodidae and Chironomidae were more abundant at RG_FOUSH and RG_FOUKI than other areas within the study area.

Feeding and habitat indices were visually compared to identify seasonal patterns across areas (Appendix Figures E.54 and E.55). In June and December there was a higher proportion of shredders from RG_FRUPO downstream to RG_FOUEW compared to the rest of the study area (Appendix Figure E.54). Except for RG_FO22, burrowers were hardly present in the study area in June 2020; however, in the drier months of September and December they became more prominent, particularly from RG_FOUSH downstream to RG_FRCP1SW (Appendix Figure E.55). Sprawlers were the dominant BIC habitat group in December, particularly in the most downstream areas of the study area (Appendix Figure E.55).

To provide additional information on seasonal patterns of benthic invertebrate communities in the upper Fording River, correspondence analysis was conducted on seasonal family-level relative abundance data from 2018 to 2020 (Appendix Tables E.22 and E.23; Appendix Figure E.56 and E.57), with CA axis 1 (CA1) and CA axis 2 (CA2) accounting for 21.3% and 13.6% of the variability in the community, respectively. The seasonal CA data demonstrated separation from upstream to downstream along CA1 and seasons along CA2 (spring and summer in the positive direction, fall and winter in the negative direction; Appendix Figure E.56). Ephemeroptera families strongly influenced CA1 in the negative direction, and Trichoptera families (Limnephilidae and Glossosomatidae) as well Elmidae, and Capniidae had strong influences in the positive direction. These results were largely driven by the differences in the most downstream areas (RG_FRUPO, RG_FODPO, RG_FO22, and RG_FOUEW) compared to upstream, particularly in September and December (Appendix Table E.23). A CA was also conducted using LPL relative abundance data and yielded similar results in terms of separation of areas from upstream and downstream but lacked clear separation between reference and mine-exposed areas (Appendix Tables E.24 and E.25; Appendix Figure E.58 and E.59).

3.4.3.3 Recolonization

Recolonization benthic invertebrate community data will be interpreted to address Study Questions #6, and #7 (see Sections 4.6, and 4.7). To further understand the effects of seasonal drying on BIC structure in the upper Fording River, a recolonization sampling program was conducted. Areas that frequently dry seasonally (RG_FOBCP downstream to RG_FRCP1SWD) were compared to areas (upstream: RG_FOUSH and RG_FOUKI; and downstream: RG_FOUEW) that remain wetted year-round (Figures 3.18 to 3.20; Appendix Figures E.60 to E.64; Appendix Table E.26). For spatial comparisons, endpoint values

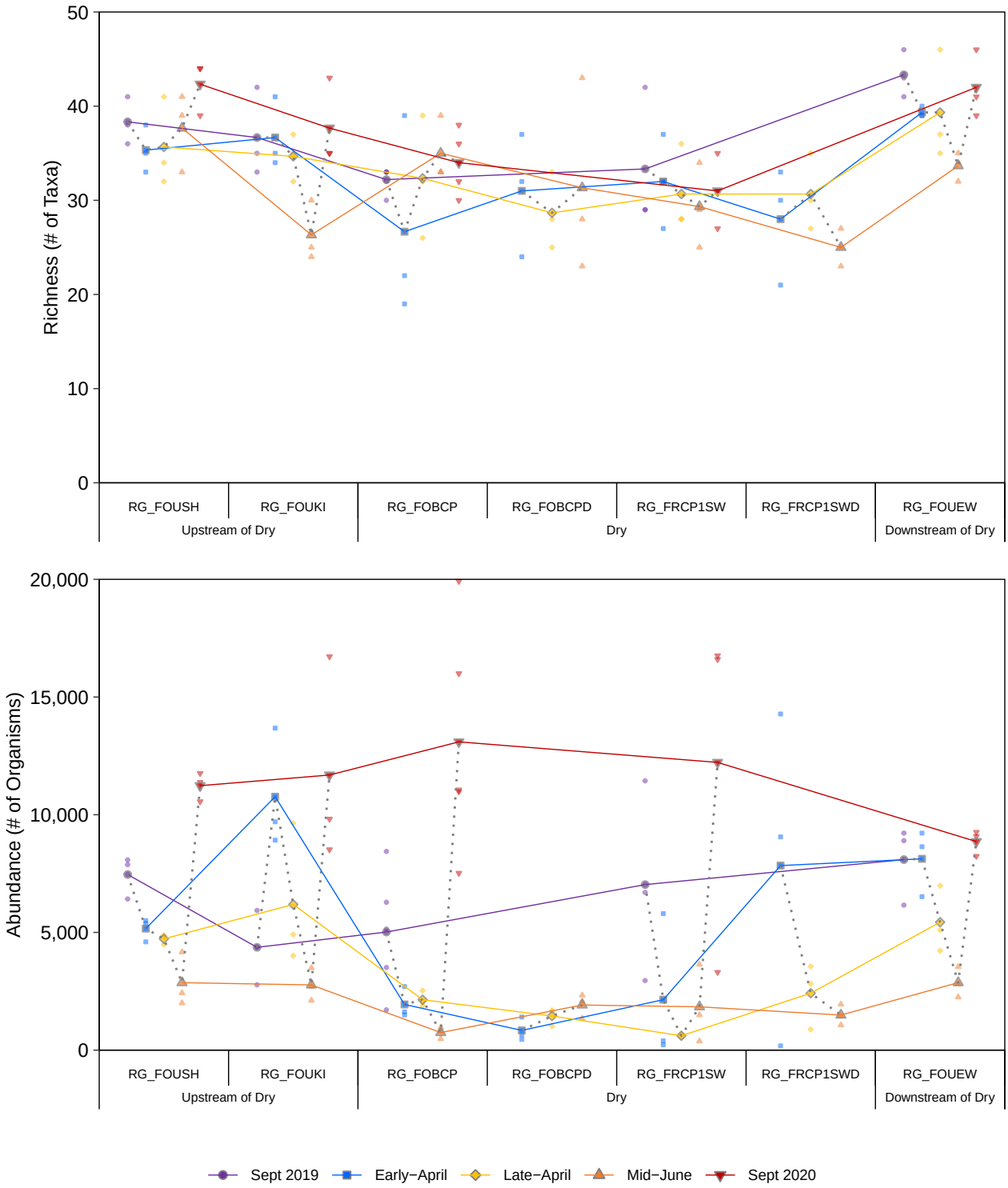


Figure 3.18: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

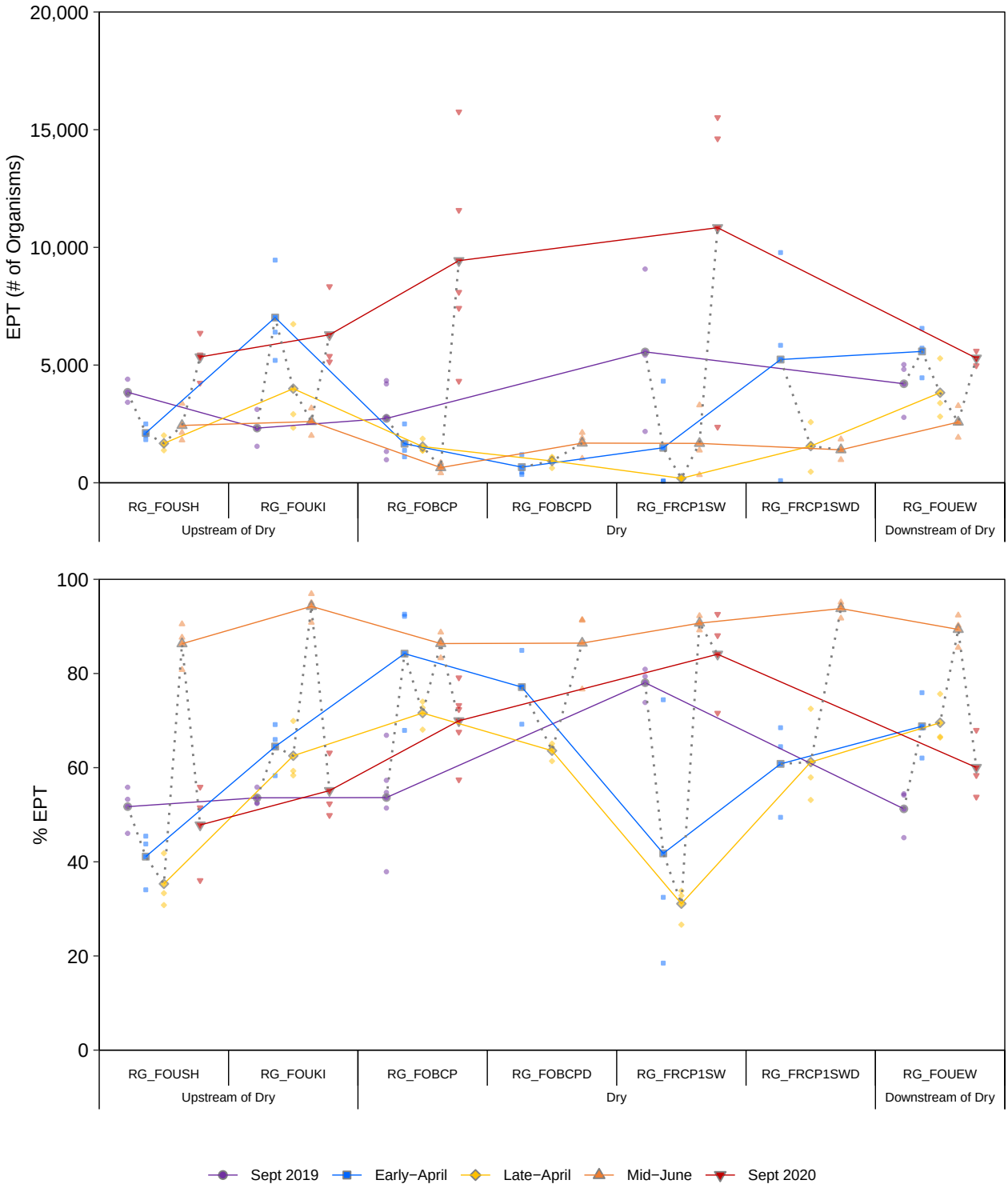


Figure 3.19: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

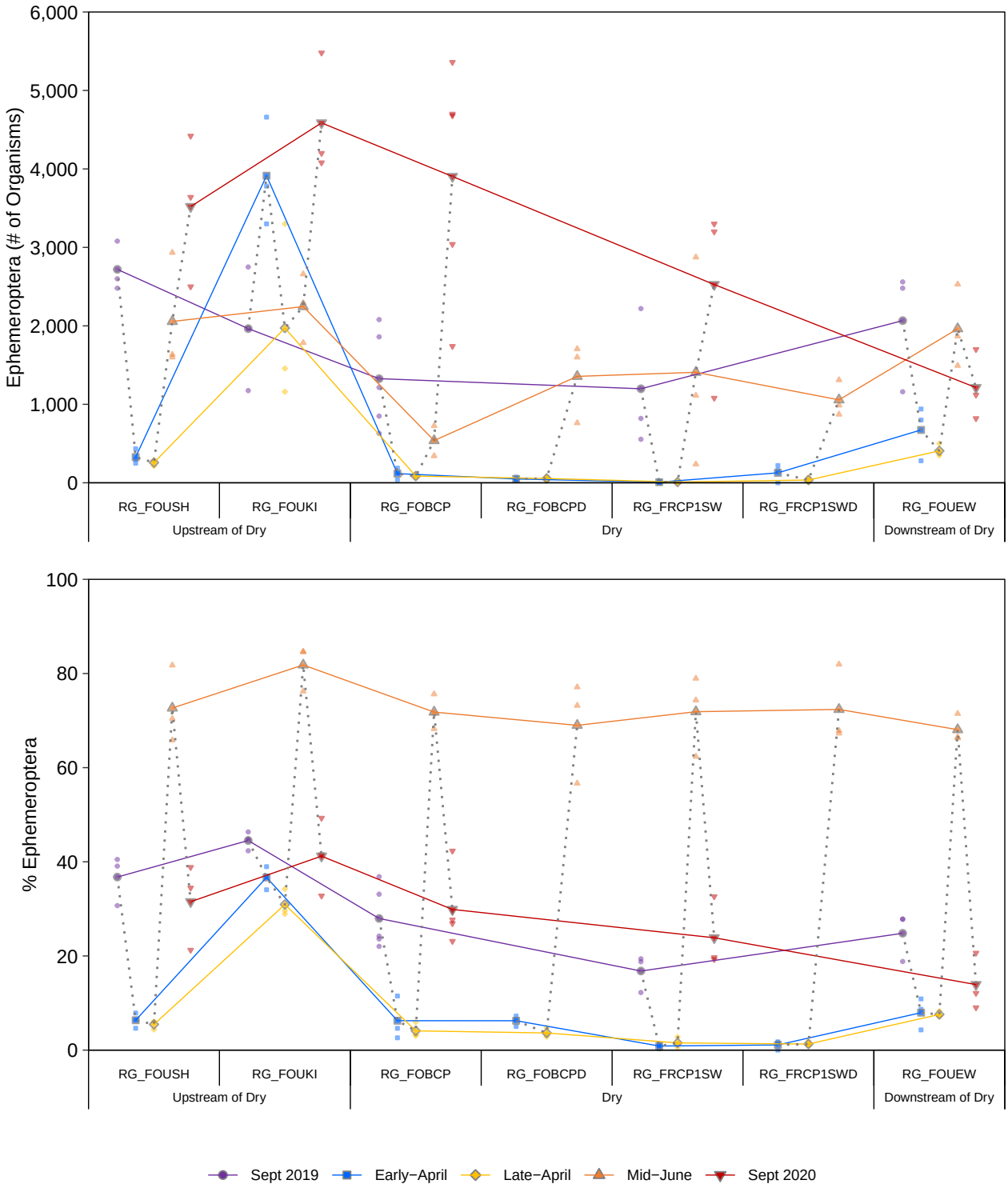


Figure 3.20: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

at areas that dry seasonally were compared to RG_FOUKI (baseline) as it was the closest upstream area that remains wetted year-round (Appendix Table E.26). Key BIC endpoints (total abundance, EPT abundance, and % and abundance Ephemeroptera) were significantly lower at areas that dry seasonally during the April sampling periods, and most endpoints recovered by June or September (Figure 3.18 to 3.20; Appendix Table E.26). While total abundance and abundance of Ephemeroptera and EPT returned to levels similar to RG_FOUKI in as little as two to eight weeks, percent Ephemeroptera did not become statistically similar to RG_FOUKI at any point during the study period (Appendix Table E.26). Percent Ephemeroptera, however, was similar to other areas (RG_FOUSH and RG_FOUEW) that remain wetted year-round by late April or June (Appendix Table E.26). Percent Plecoptera was highest in September and April, but lowest in June at all areas regardless of their hydrology (Appendix Table E.26; Appendix Figure E.60). Percent EPT exhibited conflicting patterns for recolonization throughout the study area (Figure 3.19; Appendix Table E.26), which was likely driven by inverse recolonization trends of Plecoptera compared to Ephemeroptera. The BIC structure in areas that dry seasonally started to resemble that of areas that remain wetted year-round by late April and June. This was visually demonstrated by correspondence analysis (Appendix Figure E.65), as areas that were wetted year-round grouped with areas that dry seasonally in late April and June.

Benthic invertebrate community feeding and habitat indices were also evaluated during the rewetting period in the study area. Percent Shredders were lowest in June throughout the study area regardless of if the biological monitoring area was wetted year-round or not (Appendix Table E.26; Appendix Figure E.61). Percent Scrapper-Grazer and Autotrophic to Heterotrophic Indices were lower in April compared to June and September at all areas with the study area (Appendix Table E.26; Appendix Figure E.62). Percent Burrowers and Benthic to Hyporheic indices were similar throughout the seasons at areas that dry seasonally and ones that remain wetted year-round (Appendix Table E.26; Appendix Figures E.63 and E.64).

3.5 Integrated Analysis

3.5.1 Time Trend Analyses of Nitrate Concentrations and BIC

To further investigate study question #1, temporal comparisons of key BIC endpoints (total BIC abundance, richness, % EPT and % Ephemeroptera) and nitrate concentrations were explored. Total BIC abundance, richness, % Ephemeroptera and % EPT were plotted with nitrate concentrations across the study period to visually compare temporal patterns in BIC endpoints relative to changes in nitrate concentrations (Appendix Figures F.1 to F.4). Total abundance and richness have remained largely constant across the study period (2012 to 2020) throughout the study area, and when small changes in abundance and richness occurred, they did not

correspond with concurrent changes in nitrate concentrations (Appendix Figures F.1 and F.2). Concurrent patterns in % Ephemeroptera and aqueous nitrate concentrations were observed in some areas over the study period (RG_FOUNGD in 2017 and 2019, RG_FOUKI in 2016, RG_FOBSC in 2016, and RG_FO22 and RG_FOUEW in 2019) but they were not consistent, and there were also years and areas (RG_FOUNGD in 2015, RG_MP1 in 2017, RG_FOUSH in 2015, RG_FRCP1SW in 2020, RG_FRUPO in 2020) where changes in % Ephemeroptera were not associated with fluctuations in nitrate concentrations (Appendix Figure F.3). There was no clear pattern of temporal changes of % EPT concurrent with changes in nitrate concentrations (Appendix Figure F.4).

To statistically analyze how nitrate concentrations may have changed over time relative to BIC, a novel temporal trend analysis was conducted (Table 3.6). This analysis evaluated changes in nitrate concentrations and key BIC endpoints (total BIC abundance, richness, % EPT and % Ephemeroptera) at each FRO LAEMP biological monitoring area throughout the study period (2012 to 2020). Significant changes in nitrate concentrations were observed at reference location RG_FO26 (decreased) and RG_FOBSC (increased), while all other areas remained unchanged throughout the study period (Table 3.6). The increases in nitrate concentrations at RG_FOBSC throughout the study period occurred in concert with increases in richness, but abundance, % EPT and % Ephemeroptera were unchanged. Areas having significantly decreased % EPT and % Ephemeroptera throughout the study period (i.e., a significant p-value and a negative slope) where not associated with significant increases in nitrate concentrations (Table 3.6). Moreover, areas in the lower part of the study area (RG_FOBCP downstream to RG_FOUEW) that consistently have % EPT and % Ephemeroptera below the site-specific and/or regional normal range did not appear to demonstrate increases in nitrate concentrations.

3.5.2 Correlation Analysis

To further investigate variations in BIC , correlations between chemical (water quality constituents, PC1 and PC2) and physical (CI, calcite %, concreted score, embeddedness, pebble size [D16, D84], water velocity, water depth, temperature) parameters and BIC metrics (abundance, richness, percent and abundance of Ephemeroptera, Plecoptera, Trichoptera, EPT, and Chironomidae, family-level and LPL CA1, and CA2, feeding and habitat indices, and residuals of percent and abundance Ephemeroptera, as well as % EPT, from the habitat model; Minnow 2020a) were completed (Figure 3.21; Appendix Table F.1; Appendix Figure F.5). Annual mean water quality concentrations (2018 to 2020) calculated from four different seasons (described in Section 2.6) were used for the correlation analysis. This approach summarized chemistry values most representative of the biological monitoring areas throughout the years

Table 3.6: Temporal Changes in Water Quality Parameters and Benthic Invertebrate Community Endpoints in the FRO LAEMP, September 2012 to 2020

Station	Water Quality		Benthic Invertebrate Community							
	Nitrate		Abundance		Richness		%EPT		%E	
	Effect Size	P-Value	Effect Size	P-Value	Effect Size	P-Value	Effect Size	P-Value	Effect Size	P-Value
RG_HENUP	-1.4	0.172	-0.33	0.739	1.1	0.253	-1.7	0.089	0.39	0.697
RG_FO26	-2.4	0.022	2.5	0.015	1.3	0.202	-1.1	0.268	-0.93	0.352
RG_FODHE	-1.2	0.230	1.7	0.089	3.2	0.002	-4.4	<0.001	-2.7	0.007
RG_FOUNGD	0.63	0.532	1.5	0.141	1.9	0.053	0.60	0.549	0.13	0.897
RG_FODNGD	-1.0	0.306	0.62	0.533	0.46	0.645	-1.0	0.305	-0.72	0.475
RG_MP1	1.0	0.310	-0.51	0.609	1.4	0.163	-1.2	0.217	-2.1	0.042
RG_FOUSH	1.0	0.302	-0.67	0.504	3.7	<0.001	-3.3	0.001	-4.4	<0.001
RG_FOUKI	0.81	0.419	0.19	0.847	2.2	0.026	-3.2	0.002	-3.0	0.003
RG_FOBKS	0.83	0.411	1.7	0.092	3.5	<0.001	-1.1	0.257	-2.0	0.048
RG_FOBSC	6.4	<0.001	0.85	0.397	2.0	0.049	-0.24	0.809	-1.5	0.138
RG_FOBCP	0.026	0.979	1.4	0.152	1.5	0.136	-2.1	0.036	-2.3	0.020
RG_FRUPO	0.39	0.701	-0.32	0.751	0.31	0.761	-1.6	0.111	1.2	0.224
RG_FODPO	-0.34	0.732	0.44	0.660	3.2	0.002	-1.6	0.121	-0.72	0.473
RG_FO22	-0.068	0.946	-0.83	0.408	1.6	0.103	-1.5	0.140	0.16	0.870
RG_FOUEW	-0.20	0.841	0.78	0.439	1.00	0.320	-2.3	0.020	-3.3	0.001
Overall	0.097	0.923	1.9	0.054	5.7	<0.001	-5.8	<0.001	-3.7	<0.001

P-value < 0.1

Notes: Water quality parameters were analyzed with a Linear Model (LM) using log10-transformed Nitrate because there were no replicate samples taken. Benthic invertebrate communities were analyzed with Linear Mixed-Effects Models (LMM) using transformations (Abundance and Richness were log10- transformed, %EPT and %E were logit-transformed) to account for replicate samples taken for some years. Effect Sizes were calculated as regression slope coefficients (representing time) divided by the standard error of the regression coefficient from LM and LMM. P-values indicate if slopes are significantly different from zero. Only stations with a minimum of 4 years of data were included in the analysis.

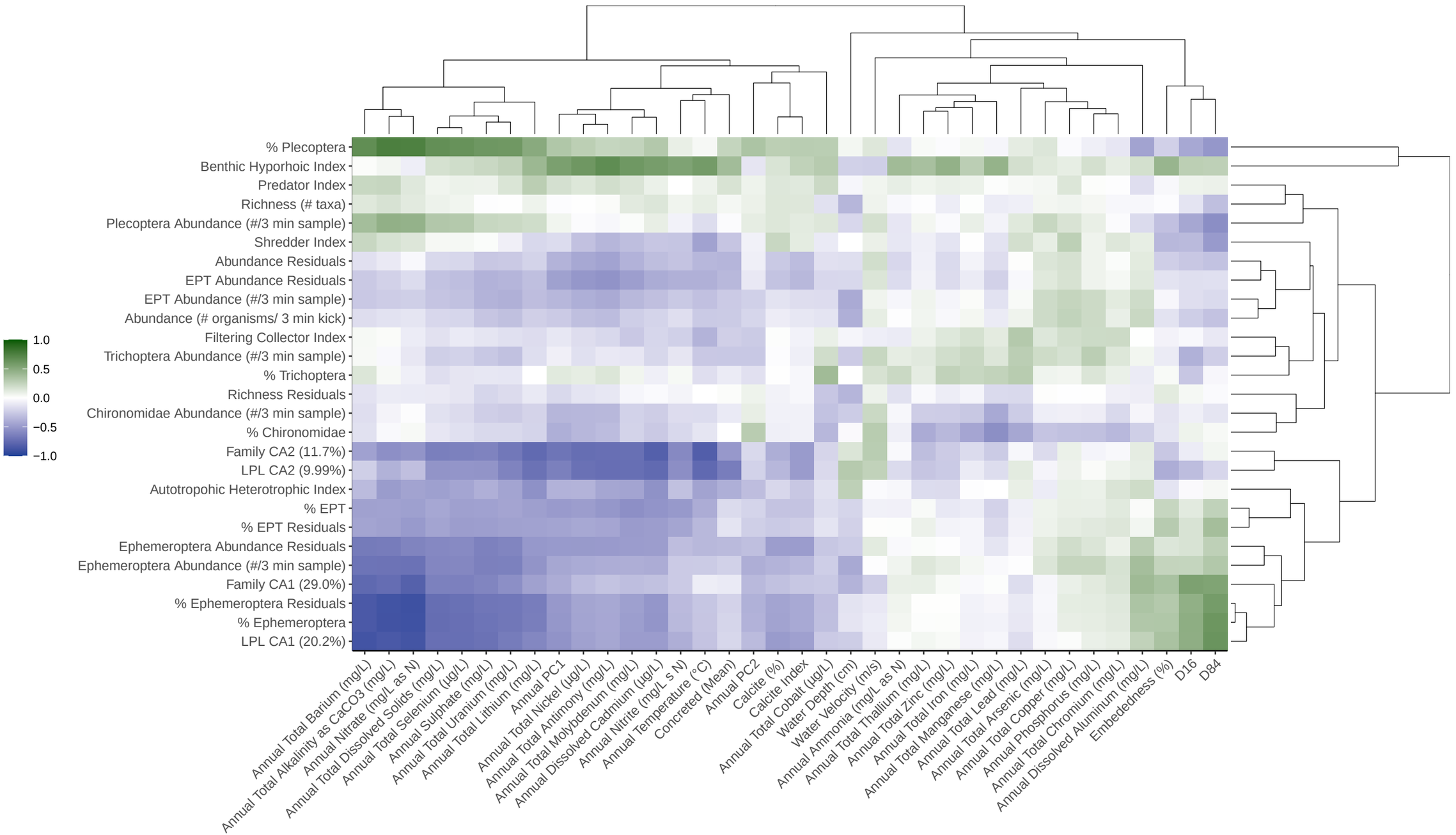


Figure 3.21: Heatmap of Correlation Coefficients between Benthic Invertebrate Community Endpoints and Water Quality Parameters, as well as Calcite Variables, FRO LAEMP, 2012 to 2020

Notes: Cluster diagrams on x− and y−axis represent similarities among benthic invertebrate community endpoints and water quality parameters using Euclidean distances clustered according to UPGMA (unweighted pair group method with arithmetic mean). The legend on the left shows strength of correlation (as measured by Spearman Rho, and varies between -1 and +1) denoted by colour.

analyzed (2018 to 2020) while retaining as many biological monitoring areas throughout the study area as possible.

Correlations between chemical and physical parameters and BIC metrics were summarized in a heatmap of correlation coefficients (Figure 3.21). Hierarchical clustering showed groupings of parameters that correlated similarly with BIC endpoints. Parameters that clustered together and had the strongest correlations with BIC metrics were total barium, total alkalinity, nitrate, TDS, total selenium, sulphate, total uranium, and total lithium for water constituents, and embeddedness, D16, and D84 for physical parameters (Figure 3.21). Percent Ephemeroptera, % EPT, Ephemeroptera abundance, and their residuals from the habitat model, as well as family-level and LPL CA1 also showed similarities among correlations.

Parameters having a strong correlation ($r_s \geq |0.6|$) and which were significantly correlated ($p<0.00139$; Bonforreni correction of 0.05/36 independent comparisons) were plotted (Appendix Figure F.5), and all correlations were summarized (Appendix Table F.1). For physical parameters, only D84 (correlated with % Ephemeroptera and LPL CA1) and Concretion Score (correlated with LPL CA2) correlated strongly ($r_s \geq 0.6$) with the BIC metrics, but many were statistically significant, particularly with % Ephemeroptera (Appendix Table F.1). Many water quality constituents (nitrate, total selenium, sulphate, TDS, total uranium, total barium) correlated strongly with key BIC metrics (i.e., % Ephemeroptera, % Plecoptera, Ephemeroptera Abundance, % Ephemeroptera Residuals, Ephemeroptera Abundance Residuals, Benthic Hyporheic Index, and Family-Level and LPL CA1 and CA2) in 2020 (Appendix Table F.1). Of the key BIC endpoints having strong correlations to key water quality constituents, only % Plecoptera had positive correlations while all others were negative.

3.5.3 Canonical Correspondence Analysis

Canonical Correspondence Analysis will be interpreted to address Study Questions #1, #4, #5, #6, and #7 (see Sections 4.1, 4.4, 4.5, 4.6, and 4.7). Benthic invertebrate communities have been sampled in multiple seasons for the past three years (2018 to 2020) in the FRO LAEMP study area. Benthic invertebrate community samples were collected at all FRO LAEMP monitoring areas in June and September, while sampling in December was restricted to a subset of monitoring areas upstream and downstream of the Compliance Point. Samples were only collected in August sampling in 2018. The effects of water quality and habitat on BIC were investigated between seasons with a CCA (Table 3.7; Figure 3.22). Season (June and September) was included as a predictor variable to better understand how habitat and water affect BIC at different times of the year. Overall, 28% of the BIC variation was explained by habitat, water, and season (predictor groups) but a significant proportion (13%) was shared between the three predictor groups (Table 3.7; Figure 3.22). After removing shared

Table 3.7: Variation Explained by Predictor Groups in Canonical Correspondence Analysis on Benthic Invertebrate Communities, FRO LAEMP, 2020

Predictor Group	R^2_{adj}	P-Value
Habitat	0.188	0.001
Season	0.0847	0.001
Water	0.161	0.001
Habitat + Season	0.240	0.001
Habitat + Water	0.248	0.001
Water + Season	0.204	0.001
Habitat + Water + Season	0.282	0.001
Uniquely Habitat	0.0780	0.001
Uniquely Season	0.0335	0.001
Uniquely Water	0.0416	0.001
Shared between Habitat and Season	0.00915	-
Shared between Water and Season	0.0188	-
Shared between Habitat and Water	0.0773	-
Shared between Habitat, Water and Season	0.0232	-
Unexplained Residuals	0.718	-

Indicates P-Value < 0.05.

Note: "-" indicates no contrast possible.

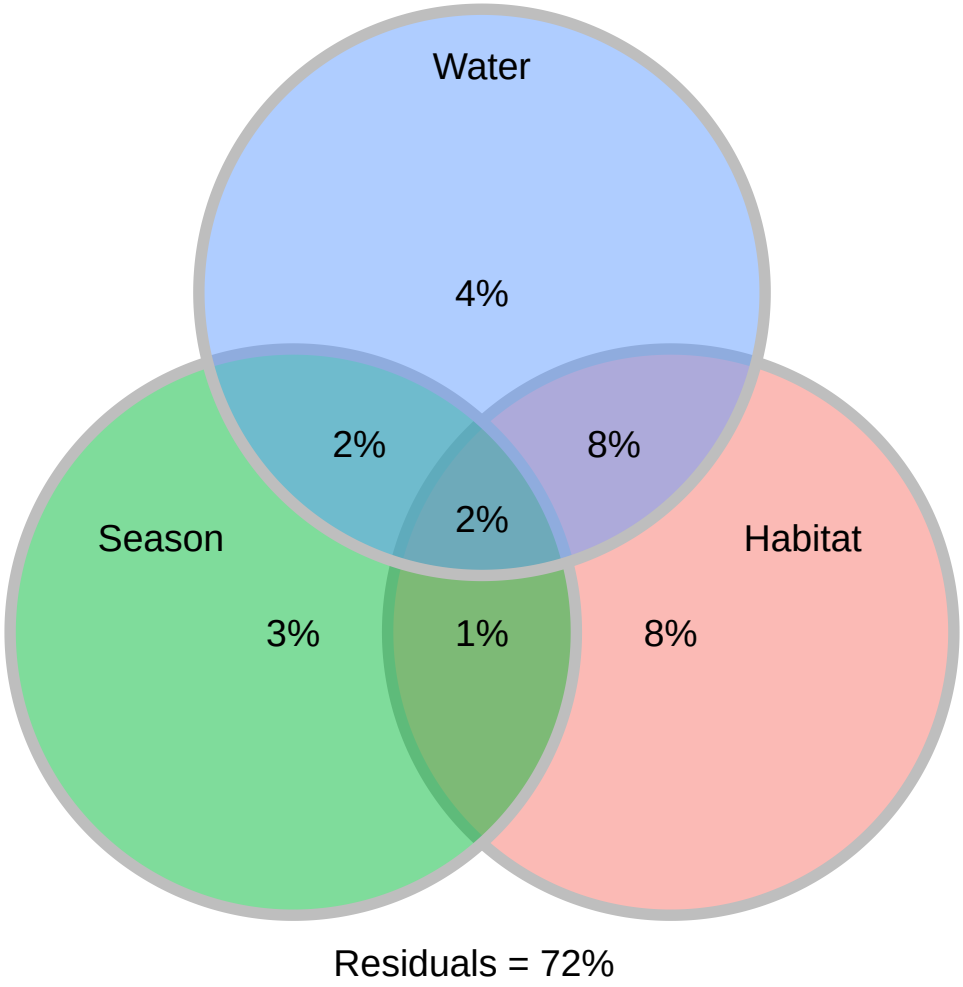


Figure 3.22: Variance Partitioning Between Habitat, Water and Season Using Partial Canonical Correspondence Analysis of Benthic Invertebrate Communities in June and September, FRO LAEMP, 2018 to 2020

Notes: Lowest Practical Level taxon abundances were ln(x+1) transformed prior to analysis. Taxa that made up less than 1% of total abundance or occurred in fewer than 5% of samples were excluded from analysis.

variation, only 8%, 4%, and 3% of the BIC variation was uniquely associated with habitat, water, and season, respectively (Table 3.7; Figure 3.22). The unexplained residuals accounted for 72% of the BIC variation.

Several ordinations were used to describe how water and habitat variables affected BIC variation, and if they interacted with season. An unconstrained ordination (correspondence analysis) demonstrated clear separation of the seasons along CA1, while clear spatial separation (from upstream to downstream) was demonstrated along CA2 (Appendix Figure F.6). After constraining the data by habitat variables, seasonal and spatial separation persisted, and that separation was differentially driven by various habitat variables (Appendix Table F.5; Appendix Figure F.7). For example, watershed area and substrate sizes affected the BIC separation from upstream to downstream of the study area, while mean water velocity and depth affected the seasonal separation (Appendix Figure F.7). On an annual basis (without seasonal interactions) most habitat variables significantly affected BIC variation individually, and in a multivariate context (i.e., after accounting for other habitat variables; Appendix Table F.2). Only substrate embeddedness and % watershed > 30% slope did not significantly affect BIC variation in the multivariate context but were significant individually (Appendix Table F.2). This difference in significance suggests these variables share variation with other predictors, meaning they do not contribute much additional information when included in a multivariate model. Embeddedness as well as water velocity and watershed area also affected BIC variation differently between seasons (i.e., there was significant interaction with season; Appendix Table F.2), suggesting these predictors have differentiating effects on BIC in June vs. September. The remaining variables were not significant between seasons and therefore have consistent relationships with BIC over the course of the year. After accounting for water quality differences among stations, most habitat variables remained significant on an annual basis, except for substrate embeddedness and % watershed > 30% in the multivariate context (Appendix Table F.5). When constrained by habitat, mean velocity and watershed area remained significant seasonally, but embeddedness became non-significant, while % watershed > 30% slope became significant (Appendix Tables F.2 and F.5. These changes in significance after accounting for water quality indicate that the seasonal effects of embeddedness on BIC variation may covary with water quality variables.

The CCA constraining BIC variation by water quality, showed almost all water quality parameters significantly affected BIC variation individually, and in a multivariate context on both an annual and seasonal basis. The seasonal differences, and upstream-downstream patterns were apparent on both CA1 and CA2 (Appendix Figure F.7). Most water quality parameters increased towards the downstream direction, but temperature and nickel also separated the seasons (Appendix Figure F.7). Selenium was the only parameter which did not significantly affect BIC

variation in an annual multivariate context, but was significant individually and seasonally (Appendix Table F.3). This suggests that annually, selenium shared variability with nitrate and/or TDS, but contributed significant unique variation when considered seasonally. All water quality parameters in the model described variation in BIC differentially by season (i.e., there was significant interaction with season; Appendix Table F.3 and F.5; Appendix Figure F.7). After constraining the variation in BIC by water quality, neither nitrate nor selenium significantly affected BIC variation individually, nor in a multivariate context when considered annually, but both remained significant seasonally (Appendix Table F.4). This suggests that after accounting for habitat differences, the effect of selenium and nitrate are more important at explaining variation in BIC in a seasonal context, rather than averaging their effects over the whole year. Overall, the CCA analysis demonstrated significant shared variation among the predictor groups (water, habitat, and season), and that most habitat variables and water quality parameters affected BIC variation.

4 DATA EVALUATION AND DISCUSSION

4.1 Study Question #1

4.1.1 Overview

Study Question #1 (Are nitrate concentrations increasing, and if so, are they adversely affecting biota?) was developed because the EVWQP projected increases of nitrate concentrations throughout the study area over time (Teck 2014). Previous FRO LAEMP reports have demonstrated that, contrary to original projections (Teck 2014), nitrate concentrations have not increased significantly over time, although they are greater than EVWQP effects benchmarks in some areas (Minnow and Lotic 2019b, 2020b). While nitrate concentrations were at levels that may lead to effects on BIC, other water quality constituents as well as site-specific habitat conditions were also likely contributing to variations in BIC throughout the study area (Minnow and Lotic 2019b, 2020b). To address Study Question #1, aqueous nitrate concentration and BIC data were collected throughout the FRO LAEMP study area in 2020. In addition, chronic toxicity testing was completed on water from several locations within the FRO LAEMP study area as part of the Chronic Toxicity Program under Permit 107517.

4.1.2 Nitrate Concentrations

Updated model projections in 2021 identified a decreasing pattern in projected nitrate concentrations between 2014 and 2020 at both the FRO Compliance Point (FR_FRCP1) and the Fording River Order Station (GH_FR1; Figure 3.1; Golder 2021a), and analysis of measured nitrate concentrations has detected no significant changes over time in most areas monitored under the FRO LAEMP. Measured nitrate concentrations were below model predictions throughout the study period, except during the winter of 2018 and 2019 at FR_FRCP1, when seasonal drying in the Fording River upstream of the confluence with Cataract Creek caused flows through the Compliance Point to be predominately from Cataract Creek. Nitrate concentrations were also similar to previous years at most stations throughout the study area (Minnow and Lotic 2019b, 2020b).

4.1.3 Biota in Relation to Nitrate Concentrations

While nitrate concentrations in some areas had the potential for effects on biota, covariation of nitrate with other mine-related water quality constituents and habitat variables made it difficult to attribute observed variations in the BIC directly to nitrate alone. Although nitrate concentrations were above EVWQP benchmarks at many FRO LAEMP biological monitoring areas (primarily throughout the low-flow period between late fall and winter), most BIC endpoints were within site-specific and/or regional normal ranges, except % EPT (below site-specific normal ranges at most

mine-exposed areas) and % Ephemeroptera (below both regional and site-specific normal ranges between RG_FRUPO and RG_FOUEW). Although lower % EPT was not associated with increased metric values for any one BIC endpoint, areas that had lower % Ephemeroptera had high abundances of Plecoptera, which was associated with community shifts driven by effects of both water quality and habitat variables (discussed further in Section 4.6). A comparison of temporal patterns in BIC endpoints (% Ephemeroptera and % EPT) with temporal changes in nitrate concentrations did not identify any clear connections between nitrate concentrations and BIC metrics using a temporal trend model designed to detect concurrent changes between the two measures. However, strong negative correlations between nitrate and percent and abundance Ephemeroptera and % EPT were identified, indicating that while a direct cause and effect relationship could not be confirmed, effects to BIC were more prevalent in areas where nitrate concentrations were high. This was further supported by the CCA, which identified nitrate as significantly contributing to BIC variation within a season (June or September); however, the overall contribution of season to the variability in BIC was stronger than nitrate when BIC variation was considered in a multivariate context across the whole year. Seasonal changes in water quality predictors (nickel, nitrate, nitrite, selenium, TDS, uranium, temperature) and habitat variables (water velocity, % watershed > 30% slope, watershed area, embeddedness) affected BIC variation throughout the study area. Chronic toxicity testing in 2020 identified nitrate as being linked to rainbow trout (*O. mykiss*) survival, viability, and length and may have contributed to reproduction responses for *C. dubia*; however, other factors (sulphate/TDS concentrations, and microbial effects) may have also contributed to chronic toxicity effects (Golder 2021b). Overall, results from chronic toxicity testing suggested the combined influence of multiple stressors as contributing to toxicity. Taken together, results highlighted that the observed variation in BIC within the study areas is a result of complex interactions among both natural (e.g., habitat, season) and mine-related (e.g., water quality) variables and cannot be attributed solely to nitrate.

4.1.4 Summary

Overall, although nitrate concentrations remained stable over time in the study area, concentrations were sufficiently high in some areas to potentially affect the biota. A correlation between nitrate concentrations and key BIC metrics (e.g., % EPT and % Ephemeroptera) was identified; however, due to covariation between nitrate and other mine-related water quality constituents, as well as between water quality and habitat variables, no clear conclusions can be made for a direct cause and effect relationship between nitrate concentrations and effects to biota in the FRO LAEMP study area. Water treatment is being commissioned in the study area in 2021 with the intent of significantly reducing nitrate and selenium loads into the upper Fording River. Evaluation of BIC following an improvement in water quality, as well as the use of BIC predictive

modelling tools currently being developed under the RAEMP (Minnow 2021) will aid in the interpretation of monitoring data to support answering Study Question #1.

4.2 Study Question #2 (Current Condition)

4.2.1 Overview

Study Question #2 (Is active water treatment affecting biological productivity downstream in the Fording River?) was developed to understand how water treatment may affect biological productivity downstream of the FRO AWTF-S outfall as a result of potentially increased phosphorus loads into the upper Fording River due to treatment processes. Benthic invertebrate biomass and density were utilized as the proxy for primary productivity because they are less variable compared to periphyton. To address the study question, aqueous nutrient (total phosphorus and orthophosphate) concentrations and benthic invertebrate biomass and density data were collected within the study area. Results from 2020 represent the conditions prior to commissioning.

4.2.2 Nutrient Concentrations and Benthic Invertebrate Biomass and Density

Nutrient concentrations and biological productivity have been consistent over time in the study area prior to commissioning of the FRO AWTF-S. Total phosphorus and orthophosphate concentrations were similar across most years (2012 to 2020) at mine-exposed biological monitoring areas included in the FRO LAEMP, and no clear spatial patterns were identified. Benthic invertebrate biomass and density has remained consistent at each biological monitoring area throughout the study period (2017 to 2020).

4.2.3 Summary

Total phosphorus and orthophosphate concentrations as well as benthic invertebrate productivity have remained consistent in the study area. Pre-commissioning nutrient concentrations and productivity data will be used for comparisons to post-commissioning data to identify any potential changes to productivity as a result of treatment.

4.3 Study Question #3 (Current Condition)

4.3.1 Overview

Study Question #3 (Are tissue selenium concentrations reduced downstream from the AWTF?) was developed to understand how FRO AWTF-S may affect benthic invertebrate tissue selenium concentrations downstream of water treatment. The FRO AWTF-S was designed to remove up to 50% of total selenium downstream in the Fording River (Teck 2019c), which should result in reduced tissue selenium concentrations (Golder 2020a); however, although the FRO AWTF- S

was also designed to mitigate generation of reduced selenium (Teck 2019c), water treatment may increase concentrations of the more bioavailable reduced species, as was observed when the West Line Creek (WLC) AWTF was commissioned in 2017 prior to installation of the Advance Oxidation Process (AOP; Minnow 2018b). As such, Study Question #3 was developed, and aqueous selenium (total selenium and selenium speciation) concentrations and composite-taxa benthic invertebrate tissue selenium data were collected pre-commissioning of the FRO AWTF- S.

4.3.2 Benthic Invertebrate Tissue Selenium Concentrations

Benthic invertebrate tissue selenium concentrations were highest in areas that had the highest aqueous total and reduced selenium concentrations. Patterns in water chemistry demonstrated a peak of aqueous reduced selenium concentrations between RG_FOBCP and RG_FRCP1SW, which corresponded to areas where tissue selenium concentrations were highest. Concentrations of aqueous reduced selenium species, and consequently tissue selenium concentrations, were lower at RG_FRUPO downstream to RG_FOUEW compared to areas immediately upstream (i.e., RG_FOBCP and RG_FRCP1SW), which may be attributed to the significant influence of groundwater in these areas (SNC Lavalin 2021). Additional flow and load accretion work being completed on the Fording River in 2021 under the mass balance investigation will further verify this interpretation. Anomalously high tissue selenium concentrations were observed at RG_FRCP1SW (located upstream of the groundwater input) in June 2020, and further investigation has suggested that the cause was potentially a result of a high biomass proportion of annelids within the composite-taxa samples, as composite samples with annelids have been associated with higher tissue selenium concentrations compared to composite samples without annelids (Luoma 2021). Due to a high freshet in June 2020, sampling at RG_FRCP1SW was restricted to areas closer to the riverbank compared to where samples are typically collected within riffles in the middle of the river in September. This may have resulted in sampling habitat more suitable to annelids (i.e., slower flowing waters with relatively small substrate; Luoma 2020, Pan et al 2012), resulting in high proportions of annelid biomass in tissue samples. Except for the three replicates in June, all tissue samples were below EVWQP benchmarks in June and December and most monitoring areas were below benchmarks in September. Although most areas had replicates above the upper limit of the normal range in September, improvement in water quality related to the commissioning of the FRO AWTF-S is expected to reduce benthic invertebrate tissue selenium concentrations.

Seasonal drying and the subsequent diversion of Cataract Creek through Swift Ponds and out the Swift Creek channel (i.e., upstream of RG_SCOUTDS and RG_FOBSC) in August 2019 has not resulted in changes to benthic invertebrate tissue selenium concentrations. Although there

was an increase in tissue selenium concentrations at RG_FOBSC (downstream of the diverted Cataract Creek) in September 2019 compared to September 2018 immediately following the water diversion, concentrations returned to pre-diversion levels in September 2020. Tissue selenium concentrations at RG_FOBCP were also similar in September 2019 and 2020 compared to pre-diversion in September 2018. Comparisons pre- and post-diversion could not be made at RG_SCOUTDS because sampling began at this area after the diversion.

4.3.3 Summary

Benthic invertebrate tissue selenium concentrations within the FRO LAEMP study area were as expected based on water chemistry in most areas in 2020 and were highest in monitoring areas where total and bioavailable selenium species were detected at the highest concentrations. Overall, few samples had concentrations greater than EVWQP effects benchmarks in 2020. Diversion of Cataract Creek had no effect on downstream tissue selenium concentrations. Future sampling will continue to monitor tissue selenium concentrations in the study area, and current data will be used as a basis for comparison post commissioning of the FRO AWTF- S in Q3 2021.

4.4 Study Question #4 (Current Condition)

4.4.1 Overview

Study Question #4 (Is AWTF operation affecting aquatic biota through thermal effects or concentrations of treatment-related constituents other than nutrients or selenium?) was developed to understand any potential thermal or treatment-related constituent effects to biota from commissioning of FRO AWTF-S. To address the study question, water quality and BIC data were collected throughout the study area, and temperature loggers were installed to collect data upstream and downstream of the future FRO AWTF-S outfall. The FRO AWTF-S will be commissioned in Q3 2021 so current data reflects the condition prior to treatment.

4.4.2 Water Temperature and BIC

Water temperature in the Fording River from downstream of the Greenhouse Side Channel (FR_FRRD) to upstream of the Porter Creek confluence (GH_PC2) differed seasonally compared to the rest of the study area. Seasonal patterns in water temperature at individual stations throughout the study area highlighted the difference in water temperature between FR_FRRD and GH_PC2 and stations upstream with a smaller temperature range throughout the year and winter temperatures that did not drop below zero. Drying surveys in the study area confirmed that the downstream portion of the study area remained wetted year-round. The area is likely buffered from extreme cold and warm temperatures in the winter and summer, respectively, due to the influence of groundwater (SNC Lavalin 2021) throughout the reach. Temperature data gathered

prior to treatment will be used as a basis for comparison following the commissioning of the AWTF and will also be used to track potential changes in temperature in the study area not related to treatment.

Although there were no strong correlations between water temperature and any of the BIC endpoints analyzed (except for family-level CA2), the CCA identified temperature as significantly contributing to BIC variation singularly and in a multivariate context; however, the effects of water temperature on BIC varied by season, and the large amount of shared variation among water quality and habitat made interpretation of the effect of water temperature alone on the variation in BIC difficult (see Section 4.6). The influence of water temperature on BIC may change should changes in water temperature be detected downstream of the FRO AWTF-S following commissioning. Treatment related constituents and their potential effects on biota will be evaluated post-commissioning of FRO AWTF-S.

4.4.3 Summary

Large seasonal variations in water temperature have been identified in areas upstream of the Greenhouse side channel confluence (FR_FRRD/RG_FRUPO) compared to water temperatures downstream in the section of the upper Fording River that receives significant groundwater input. Water temperature together with other water quality and habitat variables had an effect on BIC variation, but the extent of the variation in BIC that can be explained by water temperature alone could not be determined due to significant covariation between water quality and habitat variables. The pre-commissioning water temperature and BIC data will be used as a comparison to post-commissioning data to identify any potential effects from water treatment.

4.5 Study Question #5 (Current Condition)

4.5.1 Overview

Study Question #5 (Is re-direction of water potentially affecting biota in the Fording River?) was developed to understand how water re-direction, particularly for commissioning of FRO AWTF-S, within the study area may affect biota. To address this study question, level (flow) loggers were installed to collect data upstream and downstream of the future FRO AWTF-S outfall, and BIC data were collected throughout the study area. The FRO AWTF-S will be commissioned in Q3 2021 so current data reflect the condition prior to treatment.

4.5.2 Water Flow and BIC

Overall, flows were consistent among stations during low flow periods (late summer, fall and winter) in the study area, but a pattern of increasing flow from upstream to downstream was apparent during freshet and was likely attributive to cumulative input from snowmelt in both the

mainstem and the tributaries. Annual mean flow rates were the lowest throughout the study area in 2019 compared to other years (2018 and 2020), which was likely related to the relatively small freshet at all stations in 2019 and was indicative of a low snowpack year and a dry summer and fall of 2018.

Benthic invertebrate tissue selenium concentrations and BIC endpoints were unchanged as a result of redirection of Cataract Creek (Sections 3.4.2 and 3.4.3.1). There were no strong correlations between *in situ* water velocity measurements (proportional to flow rates) and any of the BIC endpoints analyzed, although CCA identified mean water velocity as significantly contributing to BIC variation in a multivariate context. Similar to temperature, the influence of water velocity on BIC varied by season and increased from upstream to downstream in a similar way as a number of mine-related stressors, making it difficult to attribute changes in BIC to water velocity alone (see Sections 4.6 and 4.7).

4.5.3 Summary

Diversion of Cataract Creek has caused no measurable difference in flow rates at the FRO Compliance Point and downstream to Porter Creek (GH_PC2), but flow rates changed throughout the study area as a result of annual variability. Redirection of water could not be associated directly with changes in biota (i.e., tissue selenium concentrations, BIC endpoints). Data collected prior to forward flow through the FRO AWTF-S will be used as a basis for comparison post treatment to understand the effects of operational changes in water movement on the biota in the study area.

4.6 Study Question #6

4.6.1 Overview

Study Question #6 (What are the factors contributing to the variations in percent Ephemeroptera?) was added to the FRO LAEMP in 2018 because previous FRO LAEMP reports identified a consistent spatial decrease (in an upstream to downstream direction) in % Ephemeroptera in the upper Fording River from downstream of Kilmarnock Creek to upstream of Ewin Creek (Minnow 2017a, Minnow and Lotic 2018, 2019b, 2020b). Decreases in % Ephemeroptera have not been associated with losses in taxa, but rather, a shift in community structure (Minnow and Lotic 2020b). Most notably, this has persisted in the lower study area where low % Ephemeroptera has been complimented by higher abundances of Plecoptera and Trichoptera compared to other areas, resulting in fewer effects on % EPT (Minnow and Lotic 2018, 2019b, 2020b). Correlation analyses conducted in previous FRO LAEMP reports found that several water quality parameters correlated negatively with percent and abundance of Ephemeroptera while % Plecoptera correlated positively (Minnow and Lotic 2019b, 2020b).

Further analysis found significant covariation among habitat variables and water quality stressors, and after removing the variation in BIC shared by both habitat and water quality (i.e., the variation that could not be separated), the water stressors alone could not explain BIC differences among monitoring areas (Minnow and Lotic 2020b).

Analysis and interpretation of data collected in 2020 has furthered the understanding of the BIC in the upper Fording River at monitoring areas included in the FRO LAEMP. Data has indicated that multiple factors are influencing the variation in BIC in the study area (i.e., changes in BIC are due to both mine-related water quality stressors and habitat differences among monitoring areas), and the variability attributed to each is very difficult to separate. It has also become increasing clear that the factors affecting the BIC are different depending on the location within the study area, and as such, each area (upper study area, middle study area, and lower study area) is discussed separately. The following sections interpret the BIC, particularly % Ephemeroptera, data as it relates to habitat and water quality in the study area.

4.6.2 Upper Study Area

The upper study area extends from downstream of the Henretta Creek confluence (RG_FODHE) to upstream of Shandley Creek (RG_FOUSH) and is generally characterized by shallow, fast flowing water with relatively coarse substrate compared to other areas, resulting in a low proportion of benthic invertebrates that burrow in the substrate. Water temperatures in the upper study area are typically lower in the winter and higher in the summer compared to the lower study area as a result of the shallower depths and minimal groundwater influence (SNC Lavalin 2021). Recent drying surveys (see Sections 3.2 and 4.7) have determined that the northern part of the upper study area is prone to seasonal drying, but the spatial extent of which is small compared to reaches that dry in the southern study area (e.g., around FR_FRCP1SW). Concentrations of mine-related water quality constituents are consistently lower throughout the upper study area compared to downstream but do increase from upstream to downstream as additional mine inputs are added to the system.

Benthic invertebrate communities, including % Ephemeroptera, in the upper study area have consistently been within both the site-specific and regional normal range with a few exceptions. In 2019, a community shift of reduced relative abundances of Ephemeroptera, Plectopera, and EPT with a subsequent increase in % Chironomids at the multiplate culvert (RG_MP1) was observed; however, all endpoints returned to within normal ranges consistent with historical patterns in 2020. Visual inspection of the water quality data at RG_MP1 did not suggest variations in concentrations of mine-related constituents across this period, but a decrease in the site-specific normal ranges in 2019 relative to other years suggested a change in habitat in that year. Further investigation identified sampling in a different microhabitat related to the

constructed riffles in that section of the Fording River as the potential cause of the sudden change in BIC structure (Minnow 2020a) and the rapid return to historical values in 2020 supported this hypothesis.

Although percent and abundance of Ephemeroptera, Plectoptera, and Trichoptera, as well as abundance of EPT, have consistently been within the regional normal range, % EPT has decreased to below normal ranges at RG_FODHE and RG_FOUSH in recent years. The decreases in % EPT at RG_FODHE has likely been related to habitat changes associated with increased braiding following recent freshets. Increased braiding has changed the channels making them shallower, more dispersed, and having less thermal mass (i.e., prone to temperature swings) compared to previous years. These habitat changes may have also influenced the duration and spatial extent of drying around RG_FODHE as the area was observed dry during December 2020 sampling, but surveys were not conducted prior to 2020 to verify the temporal extent. The cause of reduced % EPT at RG_FOUSH was not related to decreases in abundances of Ephemeroptera, Plectoptera, or Trichoptera, but rather, significant increases in the abundance of chironomids. The reason for the shift in community structure at RG_FOUSH is currently unknown as habitat has remained relatively unchanged, and water chemistry data is limited to concurrent biological monitoring, making comparisons to previous years difficult. Visual comparison of concurrent water quality data, however, does not indicate substantial changes.

4.6.3 Middle Study Area

The middle study area begins upstream of Kilmarnock Creek (RG_FOUKI) and extends downstream of the FRO Compliance Point (RG_FRCP1SW). Like the upper study area, this area is generally characterized by relatively fast flowing and shallow water, and coarse substrate, which supports a low proportion of burrowing benthic invertebrates. It also has greater fluctuations in seasonal water temperatures compared to the lower study area and extensive season drying, particularly between upstream of the Compliance Point to downstream of RG_FRCP1SW. The middle study area has consistently had the highest concentrations of mine-related constituents (e.g., total selenium, sulphate, total nickel, dissolved cadmium) compared to the rest of the FRO LAEMP study area, particularly in the area where water begins to go subsurface upstream of the FRO Compliance Point (Minnow and Lotic 2019b, 2020b; SNC Lavalin 2021).

Habitat and water quality differences were apparent from upstream to downstream through the middle study area and were associated with variations in BIC. Fewer differences in BIC structure among monitoring areas were observed in June compared to September, suggesting that effects of habitat and water quality on BIC differed by season. This was supported by the clear spatial separation by season identified in the CCA and was related to habitat variables such as water

velocity and depth. In September, however, while abundance metrics (EPT, Ephemeroptera, Plecoptera, Trichoptera, Chironomidae) were within regional and site-specific (where available) normal ranges, % EPT was below the site-specific normal ranges through most of the middle study area. A spatial pattern of decreasing % Ephemeroptera and to a lesser extent Ephemeroptera abundance from upstream to downstream was identified, with values at the monitoring areas in the lower portion of the middle study area (i.e., RG_SCOUTDS, RG_FOBSC, RG_FOBCP, RG_FRCP1SW) below the site-specific normal ranges for % Ephemeroptera. Abundance and % Plecoptera, on the other hand, followed an opposite spatial pattern, with the lowest values observed in the upper portion of the study area, and the highest values observed in the lower portion of the study area. While a single cause of the shift in community within the middle study area cannot clearly be identified, riverbed topography changes leading to Fording River flows going subsurface (SNC Lavalin 2021) during periods of low flow in the areas around RG_FOBCP and RG_FRCP1SW are likely influencing BIC structure in these areas (see Section 4.7). Changes in topography can influence habitat variables such as water depth and velocity, substrate size, and embeddedness, all of which have been identified as contributing significantly to BIC variation. In addition, concentrations of mine-related constituents (e.g., nitrate, selenium, sulphate) have historically been elevated relative to EVWQP benchmarks in these areas as a result of inputs from Cataract Creek and from inputs to the Fording River upstream. These constituents and others (nitrate, sulphate, TDS, dissolved aluminum, total barium, total lithium, total selenium, total uranium) have also been identified as correlating significantly with key BIC endpoints, and chronic toxicity results at the FRO Compliance point (FR_FRCP1, associated with RG_FOBCP) identified seasonal adverse responses in water fleas (*C. dubia*; Q1, Q4) and rainbow trout (*O. mykiss*; Q4) linked to one or more water quality constituent (e.g., TDS/sulphate, nitrate, nickel). Although several metals (aluminum, barium, lithium, uranium) correlated strongly with BIC endpoints, they were not identified as causative, as their concentrations were below BCWQGs and the strong correlations were likely attributed to the covariation among most mine-related water quality constituents. Overall, consistent with results from previous FRO LAEMP reports, the combination of habitat variables and water chemistry are contributing to variations in BIC in the middle study area, but a single causal factor cannot be determined due to strong covariation among water quality constituents and habitat variables.

4.6.4 Lower Study Area

The lower study area begins upstream of Porter Creek (RG_FRUPO) and extends downstream to upstream of Ewin Creek (RG_FOUEW) and has habitat characteristics markedly different than the upper and middle study areas. Specifically, the lower study area has slow flowing, deep water, and comparatively small substrate that supports a different BIC structure with a higher proportion

of burrowers compared to the other study areas. It is also characterized by water temperatures that are buffered from extreme cold and heat in the winter and summer, respectively, making the temperature regime distinct compared to the upper and middle study areas. The substantial influence of groundwater that originates upstream in Kilmarnock Creek and goes to ground through the Kilmarnock Creek alluvial fan (SNC Lavalin 2021) buffers water temperatures providing a unique signature of mine-related constituent concentrations compared to immediately upstream in the Fording River.

Consistent with previous FRO LAEMP reports, abundance endpoints (EPT, Ephemeroptera, Plecoptera, Trichoptera, Chironomidae) were within the site-specific (where available) and/or regional normal range throughout the lower study area; however, the relative abundances of EPT and Ephemeroptera remained below the site-specific and/or the regional normal range in September (Minnow 2017a, Minnow and Lotic 2018, Minnow and Lotic 2019b, 2020b). Low % Ephemeroptera in the study area was related to lower abundance of two Ephemeroptera families Heptageniidae and Ephemerellidae compared to other areas within the FRO LAEMP study area, particularly in September (Minnow and Lotic 2020b). The low % Ephemeroptera does not appear to co-occur with losses in specific genera (i.e., all genera are present in each area, albeit at lower abundances). Instead, it co-occurs with increases in abundances of other taxa. Specifically, in September these downstream areas, especially RG_FRUPO, have relatively high proportions and abundance of the Plecoptera families Capniidae and Perlodidae. The high proportion of Perlodidae in particular, a predator, may be a factor explaining low proportions of Ephemeroptera in some areas, especially if the differences in physical and chemical conditions may already be favoring Plecoptera populations. Area RG_FO22, located upstream of Chauncey Creek in a section of the Fording River characterized by slower flows, increased depth, smaller substrate size, and increased sedimentation compared to other areas, exhibited a unique community structure in both June and September. The BIC included a large number of riffle beetles (Family Elmidae) in both June and September, and a notable proportion of bivalves (Family Pisidiidae) in June, which were largely absent from other parts of the study area. Differences between RG_FO22 and other areas is likely related primarily to the distinct habitat conditions.

Effects to BIC in the lower study area may also be influenced by water chemistry, particularly in periods of lower flow when concentrations of mine-related constituents are the highest. Seasonal differences in mine-related constituents significantly contributed to BIC variation in the CCA, and concentrations tended to be the highest at RG_FRUPO, located downstream of the Greenhouse Side Channel in the upper portion of the lower study area. Strong negative correlations were identified between percent and abundance of Ephemeroptera and mine-related constituents, and strong positive correlations between percent and abundance of Plecoptera and

mine-related constituents. This suggested that % Ephemeroptera was likely to be lower in areas where concentrations were highest, but covariability between mine-related water quality stressors and habitat variables make it difficult to determine a single direct cause, especially in the lower study area where notable differences in habitat compared to upper and middle study areas have been observed.

The differential effect of seasonal water chemistry on biota in the lower study area was also observed at FR_FRABCH, located just upstream of Chauncey Creek and downstream of RG_FO22, during chronic toxicity texting. Although the relationships between results of chronic toxicity testing for laboratory organisms and results in BIC observed in the field are complex, both the chronic toxicity and BIC endpoints indicated adverse effects in seasons where flows are the lowest (i.e., fall and winter) but not during freshet.

4.6.5 Summary

It is clear through the evaluation of the BIC data in the FRO LAEMP study area that both habitat and water quality factors are affecting variation in BIC communities; however, it remains difficult to separate the effect of individual contributions of each variable to the observed effects on BIC. In general, abundance metrics (total, EPT, Ephemeroptera, Plecoptera, Trichoptera, Chironomidae) were within the normal ranges and have remained consisted over time. Percent EPT was below the site-specific normal ranges throughout most of the FRO LAEMP study area, while % Ephemeroptera exhibited a decreasing spatial pattern from upstream to downstream, with values within the normal ranges in the upper study area, below the site-specific normal ranges but within the regional normal range for most of the middle study area, and below both the site-specific and regional normal ranges in the lower study area. Several key habitat variables were identified as significantly contributing to the variation in BIC, including water velocity, water depth, substrate size, embeddedness, watershed slope, and watershed area. Variations in these habitat characteristics were apparent from upstream to downstream similar to increases in the aqueous concentrations of mine-related constituents, making it difficult to identify the contribution of individual variables to the variation in BIC. That said, factors influencing BIC in the upper study area at RG_FODHE are likely related to habitat changes associated with river braiding, but it remains unclear what factors are contributing to the variation in BIC at RG_FOUSH and will be evaluated in future FRO LAEMP reports. The middle study area is impacted by both concentrations of mine-related constituents seasonally greater than EVWQP benchmarks as well as dynamic changes in water flow related to subsurface flow and seasonal drying, especially at and downstream from the Compliance point (associated with RG_FOBCP). The lower study area represents an area with substantial groundwater input and sees conditions that differ from upstream areas. Shifts in community from Ephemeroptera-dominated to Plecoptera-dominated

likely reflects changing habitat preferences, but could also be related to water quality tolerance, especially at RG_FRUPO, where concentrations of constituents such as nitrate, selenium, and sulphate are the highest. Continued evaluation of BIC following an improvement in water quality related to the commissioning of the FRO AWTF-S, as well as the use of BIC predictive modelling tools currently being developed under the RAEMP (Minnow 2021a) will aid in the interpretation of monitoring data to support answering Study Question #6.

4.7 Study Question #7

4.7.1 Overview

Study Question #7 (What is the benthic invertebrate community structure in the reach of the Fording River that goes dry, and can changes be correlated with flow conditions?) was added to the FRO LAEMP in 2018 to help understand how seasonal drying may affect variations in BIC. The 2017 FRO LAEMP report first described a 1.5 km dry section downstream of the FRO Compliance Point (FR_FRCP1) to just upstream of FR_FRRD from December 2017 to March 2018 (Minnow and Lotic 2018), encompassing one FRO LAEMP biological monitoring area (RG_FRCP1SW). In winter 2018 to 2019, the same section of the Fording River was observed to dry, as well as a second section upstream of FR_FRCP1 to upstream of Swift Creek (FR_FR3; Minnow and Lotic 2019b, 2020b). This survey area, known as the southern survey area, includes a 12.6 km long area of the Fording River extending from Chauncey Creek (FR_FRABCH) upstream to the south tailings pond (FR_FR2). The northern survey section (6.1 km long) extends from the Fording River at the Multiplate culvert (FR_MUTLIPLATE) upstream past the confluence with Henretta Creek (FR_UFR1) and had comparatively small dry sections (300 to 350 m) from FR_FR1 to upstream of Post Ponds in December 2019 (FR_FRUPP; Minnow and Lotic 2020b). Previous reports have not identified a clear connection between seasonal drying and BIC endpoints in September (Minnow and Lotic 2019b, 2020b), thus, a sampling plan was conducted in spring 2020 to better understand the BIC at the time of rewatering and through the recolonization period.

4.7.2 Seasonal Drying

Seasonal drying has occurred in the same region of the southern survey area each year, but the duration and spatial extent has varied annually. A dry section of the Fording River has occurred in the southern section from upstream of FR_FRRD to the FRO Compliance Point (FR_FRCP1) each year; however, in the winter of 2018/2019 additional dry reaches were observed between upstream of the historical Cataract Creek confluence and FR_FR3 (located downstream of Kilmarnock Creek in the Fording River) that were not observed in other survey years. Drying in fall 2018 was observed three months earlier than in fall of 2017, 2019, and 2020, resulting in

approximately 90 more days of dry conditions. Spring freshet in 2019 had relatively low flow rates compared to other years, and a longer period of time between the 2018 and 2019 freshet compared to the length of time between the 2019 and 2020 freshet, which was a result of the dry summer/fall 2018 and low winter snowpack (Spencer et al. 2019, Thornton et al. 2020), which helps explain the extent of drying in the winter of 2018/2019. Extremely low ambient temperatures observed in February 2019 may have also contributed to the greater spatial extent and longer duration of seasonal drying in the winter of 2018/2019 (Minnow and Lotic 2020b). Drying in the southern survey area was first observed in January 2020 over the 2019/2020 winter low-flow period, and the spatial and temporal extent was similar to the winter of 2017/2018. Rewetting of the dry areas occurred in late March to early April 2020.

Although the spatial extent of seasonal drying was less in the northern survey section compared to the southern section in winter 2019/2020, the duration was longer. This was likely a result of the overall riverbed topography and channel depths in this part of the FRO LAEMP study area. It may also be because the northern survey area is closer to the headwaters and as such, captures a smaller watershed area with lower flow volumes, particularly during periods of lower flow (i.e., winter). Similarly, topography and channel characteristics, coupled with low groundwater influence likely contributed to early drying in the upper Henretta survey area compared to survey areas in the Fording River in the fall of 2020 (MacDonald et al. 2014, Spencer et al. 2019).

4.7.3 Benthic Invertebrate Community

Benthic invertebrate communities in areas that dry seasonally have been within normal ranges for most endpoints evaluated (e.g., abundance metrics, richness), but the relative abundance of EPT and Ephemeroptera have been below the site-specific normal ranges and close to or marginally lower than the regional normal range in September. The direct connection between drying/rewetting and BIC structure has been difficult due to the timing of sampling and the presence of contribution factors other than drying that may be influencing the BIC in the area (i.e., water quality; Minnow and Lotic 2019b; 2020b). To further address the impact of drying on BIC, sampling was conducted to capture the recolonization of benthic invertebrates in areas that dry compared to areas that remain wetted, following ice-out and rewetting in spring 2020. Benthic invertebrate endpoints in the areas that dried were statistically different from areas that remained wetted immediately after rewatering. Results demonstrated that most BIC endpoints (LPL Richness and abundance [total, EPT, Ephemeroptera, and Plecoptera]) in areas that dried were similar to areas that remain wet throughout the year within as little as two to eight weeks, which is consistent with literature and likely reflects recolonization by drift from upstream (Wallace 1990). The recolonization of % Ephemeroptera was less clear, as values remained

lower than the permanently wetted area chosen for comparison (RG_FOUKI) throughout the study period (i.e., until September, but were associated with a higher proportion of Plecoptera in the same areas. While the study demonstrated an overall transient effect of drying on the BIC, other factors such as variations in aqueous concentrations of mine-related constituents among biological monitoring areas make a direct comparison of the effects of drying difficult (see section 4.6). It is likely, however, that the habitat characteristics (e.g., water depth, water velocity, substrate, topography) around the areas that dry, and the influence of drying, may also play a role in shaping the benthic invertebrate community as well.

4.7.4 Summary

Benthic invertebrate sampling in spring 2020 after the rewatering of dry sections identified a difference in BIC in areas that dry immediately after rewatering, but most BIC endpoints became similar to permanently wetted areas within two to eight weeks post-rewatering, indicating a significant but temporary effect of drying on the BIC. A shift in the dominant taxa from Ephemeroptera to Plecoptera, however, may be attributed to the habitat characteristics in the areas that dry but the overall impact on BIC appears to be low.

5 CONCLUSIONS

Data was collected in 2020 to assess the current aquatic conditions in the FRO LAEMP study area prior to commissioning of the FRO AWTF-S in Q3 of 2021 (Study Questions #2 to #5), and to evaluate study questions related to nitrate concentrations (Study Question #1), variability in benthic invertebrate communities (Study Question #6), and seasonal drying (Study Question #7; Table 5.1). Nitrate concentrations in the upper Fording River study area have not increased over time during the FRO LAEMP study period, but have consistently been greater than EVWQP benchmarks during seasons when flows are low (i.e., fall and winter), which, together with other mine-related constituents and seasonal fluctuations in some habitat variables, contribute to BIC variation.

The results of the 2020 FRO LAEMP identified a spatial decrease in % Ephemeroptera from upstream to downstream, between downstream of the historical Cataract Creek confluence and upstream of Ewin Creek, consistent with previous LAEMP reports. A concurrent, albeit less pronounced, pattern was observed in Ephemeroptera abundance, but values remained within both regional and site-specific normal ranges throughout the FRO LAEMP study area, and consistent changes over time within areas were not observed. In addition, most areas with low % Ephemeroptera had high % Plecoptera compared to other locations. Strong negative correlations between several key BIC endpoints (percent and abundance of Ephemeroptera, residuals of percent and abundance of Ephemeroptera, CA1 and CA2) and one or more mine-related water quality constituents (nitrate, nitrite, total selenium, total nickel, sulphate, total dissolved solids, PC1 and PC2) were identified, but canonical correspondence analysis demonstrated a large amount of co-variation among habitat and water quality variables spatially, and seasonal (June and September) differences in the relationships were apparent. Overall, both habitat and water quality variables appear to be important predictors of BIC variation within the study area, but the individual contributions are difficult to separate. Currently, a BIC predictive model is being developed under the RAEMP to address the complex interactions between physical and chemical stressors and habitat variables and their effects on BIC, and will be used to support answering study questions in future LAEMP reports.

Interannual variability in the spatial and temporal extent of seasonal drying has been identified in the FRO LAEMP study area. Although seasonal drying began much earlier in the northern survey area compared to the southern survey area in 2019/2020, they became rewetted at the same time. The spatial and temporal extent of seasonal drying in the southern survey area during the winter of 2019/2020 was similar to that of 2017/2018, with drying observed in early January only in the section of the Fording River from upstream of the Greenhouse Side Channel to the FRO Compliance Point (FR_FRCP1/RG_FOBCP). Upon rewetting, BIC structure at the

Table 5.1: Summary of Results (Study Questions #1, #6, and #7), FRO LAEMP, 2020

Evaluation	Assessment Endpoint	Indicator Type	Measurement Endpoint	Evaluation Criteria	Results	Conclusion
Are nitrate concentrations increasing, and if so, are they adversely affecting biota?	Benthic invertebrate abundance and assemblage	Direct	Benthic invertebrate community (BIC) endpoints	Benthic invertebrate community relative to nitrate concentrations in the upper Fording River	BIC endpoints did not change concurrently with changes in nitrate concentrations when analyzed with a temporal trend model designed to detect concurrent changes between the two measures. Strong negative correlations of key BIC endpoints (% and abundance of Ephemeroptera, residuals of % and abundance Ephemeroptera, CA1 and CA2) occurred with nitrate; however, significant covariation among water quality constituents and habitat variables make the effects of nitrate concentrations on BIC hard to elucidate.	Nitrate concentrations have not been changing over time in the FRO LAEMP study area, but were higher than EVWQP benchmarks in most areas where changes in BIC occur, and were negatively correlated with BIC endpoints in the study area. The effect of nitrate concentrations on BIC variation remains unclear due to significant covariation between habitat and water quality variables.
		Semi-indirect	Chronic Toxicity Testing	*Ceriodaphnia dubia, Pseudokirchneriella subcapitata, Hyalella azteca, Oncorhynchus mykiss,* and *Pimephales promelas* relative to water samples at, FR_FR4, the Compliance Point (FR_FRCP1), and FR_FRABCH (the proposed new Compliance Point).	Chronic toxicity tests identified nitrate as correlating with *Ceriodaphnia dubia* and *Oncorhynchus mykiss* in winter months. There were no adverse effects observed for any endpoint in the spring and summer.	
		Indirect	Surface water nitrate concentrations	Evaluate nitrate concentrations relative to predictions in the EVWQP, benchmarks, and past observations	Nitrate concentrations were consistent with predictions from EVWQP modelling and have not been increasing in the study area. Nitrate concentrations were higher than EVWQP benchmark(s) at most mine-exposed areas.	
What are the factors contributing to the variations in percent Ephemeroptera?	Benthic invertebrate abundance and assemblage	Direct	Benthic invertebrate community endpoints (abundance, richness (LPL taxonomy), percent (%) and total abundance of Ephemeroptera-Plecoptera-Trichoptera (EPT), Ephemeroptera, Plecoptera, Trichoptera, and Chironomidae and total abundance of key Ephemeroptera families [Baetidae, Heptageniidae, Ephemerellidae])	Spatial and temporal comparisons to site-specific and regional normal ranges for September, and seasonal assessments for June, September, and December.	% Ephemeroptera returned to historical values at RG_MP1 in 2020, but was below the regional normal range from RG_FRCP1SW downstream to RG_FOUEW, and below the site-specific normal range from RG_SCOUTDS downstream to RG_FOUEW. Ephemeroptera abundance was within the regional normal range throughout the study area, but a decrease from upstream to downstream was observed which was driven by decreases in Heptageniidae and Ephemerellidae, similar to previous years. Plecoptera (% and abundance) was higher where Ephemeroptera was low, helping to maintain higher % EPT within regional normal ranges but below site-specific normal ranges at most monitoring areas. Downstream areas having low % Ephemeroptera were dominated by two Plectoptera families (Capniidae and Nemouridae) in September and winter.	Consistent with previous years, % Ephemeroptera was below normal ranges in the lower study area but these values were not associated with loss of taxa, but rather, increases in abundance of other taxa, particularly Plecoptera. Significant and strong correlations between water quality and BIC endpoints were identified. CCA demonstrated significant interactions between habitat and water quality variables such that individual effects on variability in BIC was difficult to determine. Seasonal differences in BIC endpoints were associated with seasonal variation in water chemistry and habitat, but similar to spatial relationships, covariability among stressors and habitat was apparent.
			Benthic invertebrate community feeding and habitat indices	Spatial and temporal comparisons to site-specific and regional normal ranges for September, and seasonal assessments for June, September, and December.	Similar to 2019, BIC endpoint patterns were not consistent with patterns of high and low % Ephemeroptera.	
			Community Composition	Correspondence analysis (CA) to assess difference in community structure among areas from 2012 to 2020.	Similar to previous years, CA1 identified a clear difference in community composition in areas experiencing low % Ephemeroptera related to higher proportions of taxa other than Ephemeroptera (e.g., Elmidae, Coleoptera, Glossosomatidae, Capniidae, and Tipulidae). CA2 separated reference from mine-exposed areas.	

Note: NR = Normal Range. BIC = Benthic Invertebrate Community. CA = Correspondence Analysis. CI = Calcite Index. EPT = Ephemeroptera,-Plecoptera-Trichoptera. EVWQP = Elk Valley Water Quality Plan. FRO = Fording River Operations. LPL = Lowest Practical Level. PCA = Principal Component Analysis. TDS = Total Dissolved Solids
WSQG = Working Sediment Quality Guidelines. Study Questions #2 to #5 were not included in the summary table because the FRO AWTF-S was not commissioned in 2020.

Table 5.1: Summary of Results (Study Questions #1, #6, and #7), FRO LAEMP, 2020

Evaluation	Assessment Endpoint	Indicator Type	Measurement Endpoint	Evaluation Criteria	Results	Conclusion
What are the factors contributing to the variations in percent Ephemeroptera?	Benthic invertebrate abundance and assemblage	Semi-indirect	Chronic Toxicity Testing	*Ceriodaphnia dubia, Pseudokirchneriella subcapitata, Hyalella azteca, Oncorhynchus mykiss,* and *Pimephales promelas* relative to water samples at, FR_FR4, the Compliance Point (FR_FRCP1), and FR_FRABCH (the proposed new Compliance Point.	Effects on chronic toxicity endpoints (i.e., for *Ceriodaphnia dubia* and *Oncorhynchus mykiss*) were correlated with mine-related constituents (nitrate, nickel, sulphate/TDS) in winter months, but there were no adverse effects observed for any endpoint in the spring and summer.	Consistent with previous years, % Ephemeroptera was below normal ranges in the lower study area but these values were not associated with loss of taxa, but rather, increases in abundance of other taxa, particularly Plecoptera. Significant and strong correlations between water quality and BIC endpoints were identified. CCA demonstrated significant interactions between habitat and water quality variables such that individual effects on variability in BIC was difficult to determine. Seasonal differences in BIC endpoints were associated with seasonal variation in water chemistry and habitat, but similar to spatial relationships, covariability among stressors and habitat was apparent.
		Indirect	Tissue selenium concentrations	Concentrations relative to normal ranges, EVWQP effect benchmarks, and past observations	Most benthic invertebrate tissue samples were below regional normal ranges and EVWQP benchmarks in June and December. One benthic invertebrate tissue sample each was above EVWQP level 1 benchmark (juvenile fish, juvenile birds, and benthic invertebrates) at RG_FRCP1SW in September. At RG_FOUCL, RG_MP1, RG_FOUKI, RG_FOBKS, and RG_FOBSC one to two replicates were above the EVWQP Level 1 benchmarks for juvenile fish in September. The anomalously high samples at RG_FRCP1SW in June were believed to be from a high proportion of annelids in the composite-taxa samples.	
			Surface water chemistry	Concentrations of mine-related constituents relative to EVWQP effect benchmarks, interim screening values, and past observations.	Concentrations of water quality constituents were highest in winter months. Nitrate concentrations exceeded Level 2 benchmark at most stations in the study area but have not been changing with time. Sulphate concentrations were above the EVWQP Level 1 benchmark from FR_SCOUTDS downstream to FR_FRCP1. Total selenium was above the Level 1 benchmark at all stations downstream of FR_FR3 but only increased relative to historical means at FR_FR4. Total nickel was above the Level 2 interim screening value from FR_MULTIPLATE downstream to FR_FRCP1 where increases were observed compared to historical means. Total dissolved solids were above the Level 1 screening value at FR_SCOUTDS, FR_FR4, FR_FRCP1, and FR_FRRD but only increased at FR_FR4 compared to historical means.	
				Principal component analysis (PCA) to assess contributions of various water quality variables to PCA1 and PCA2	The majority of variability in water quality was explained by PC1 (50%) and PC2 (28%) and PC1 had strong positive correlations with all mine-related constituents.	
			Temperature and Flow	Continuous Monitoring of temperature and discharge at FR_UFR1, FR_FR1, FR_FRDSSC1, FR_FR2, FR_FR3, FR_SCOUTDS, FR_FR4, FR_FRCP1, FR_FRCP1SW, FR_FRRD, GH_PC2, FR_FRABC evaluated over time	The lower study are (FR_FRRD and GH_PC2) were warmer in the winter and cooler in the summer compared to areas upstream. Flow rates were highest in the lower study area, particularly throughout the freshet.	
			Sediment chemistry	Concentrations relative to BC working sediment quality guidelines (WSQGs)	Cadmium, manganese, and nickel exceeded the lower WSQG at most mine-exposed areas; Total zinc was above lower WSQG from RG_FOUKI downstream to RG_FOBCP, and almost all samples at RG_FOUKI and RG_FOBCP, as well as one replicate sample at both RG_FOBKS and RG_FO22 had selenium concentrations that were above the alert concentration. Concentrations of many PAHs were higher than lower or upper WSQGs at all mine-exposed sample areas, with the highest concentrations found at RG_FOUKI and then decreasing in an upstream to downstream pattern.	

Note: NR = Normal Range. BIC = Benthic Invertebrate Community. CA = Correspondence Analysis. CI = Calcite Index. EPT = Ephemeroptera,-Plecoptera-Trichoptera. EVWQP = Elk Valley Water Quality Plan. FRO = Fording River Operations. LPL = Lowest Practical Level. PCA = Principal Component Analysis. TDS = Total Dissolved Solids
WSQG = Working Sediment Quality Guidelines. Study Questions #2 to #5 were not included in the summary table because the FRO AWTF-S was not commissioned in 2020.

Table 5.1: Summary of Results (Study Questions #1, #6, and #7), FRO LAEMP, 2020

Evaluation	Assessment Endpoint	Indicator Type	Measurement Endpoint	Evaluation Criteria	Results	Conclusion
What are the factors contributing to the variations in percent Ephemeroptera?	Benthic invertebrate abundance and assemblage	Indirect	Calcite	Calcite index relative to known or suspected effect levels and past observations	Calcite indices varied throughout the river but were generally similar to the previous year and below 1.0 at almost every area.	Consistent with previous years, % Ephemeroptera was below normal ranges in the lower study area but these values were not associated with loss of taxa, but rather, increases in abundance of other taxa, particularly Plecoptera. Significant and strong correlations between water quality and BIC endpoints were identified. CCA demonstrated significant interactions between habitat and water quality variables such that individual effects on variability in BIC was difficult to determine. Seasonal differences in BIC endpoints were associated with seasonal variation in water chemistry and habitat, but similar to spatial relationships, covariability among stressors and habitat was apparent.
			Correlations between physical and chemical factors, and BIC metrics	Physical: CI, Calcite %, Concreted Score, embeddedness, pebble size, water velocity, water depth, temperature; Chemical: PC1, PC2, individual constituents; BIC metrics: Percent Ephemeroptera, Plecoptera, %EPT, and Chironomidae, Abundance Ephemeroptera, Plecoptera, Trichoptera, EPT, and Chironomidae, Habitat Model Residuals for Abundance, Richness, % Ephemeroptera, and % EPT, Feeding and Habitat Indices, CA1, CA2 for BIC Family and LPL	% Ephemeroptera was negatively correlated with nitrate, selenium, sulphate, total dissolved solids, PC1 and PC2 while % Plecoptera was positively correlated; Ephemeroptera abundance, and Family CA1 and CA2 were negatively correlated with most constituents included in the correlation analysis; Physical habitat variables did not correlate strongly with BIC metrics in 2020, but some significant correlations were identified (% Ephemeroptera; Calcite Index, Calcite Presence, embeddedness, and D84).	
			Canonical Correspondence Analysis	Habitat Variables: mean depth, mean velocity, embeddedness, substrate size D16, D84, % Watershed greater than 30% slope, watershed area, station gradient; Water Quality Parameters: Total Nickel, Nitrate, Nitrite, Total Selenium, Total Dissolved Solids, Total Uranium, Temperature	Habitat and water quality parameters, along with season, explained 28% of the BIC variation but 13% was shared by all three predictor groups. Season had a strong effect on several habitat (water velocity, substrate embeddedness, watershed area, and watershed slope) parameters and all water quality predictors when explaining BIC variation. Many habitat and water quality predictors had a strong upstream to downstream effect on BIC variation, and most affected the BIC differentially with season. The significant amount of shared variation made it impossible to identify any one variable as contributing to BIC variation.	
What is the benthic invertebrate community structure in the reach of the Fording River that goes dry, and can changes be correlated with flow conditions?	Benthic invertebrate abundance and assemblage	Direct	Benthic invertebrate community endpoints (abundance, richness (LPL taxonomy), percent (%) and total abundance of Ephemeroptera-Plecoptera-Trichoptera (EPT), Ephemeroptera, Plecoptera, Trichoptera, and Chironomidae and total abundance of key Ephemeroptera families [Baetidae, Heptageniidaie, Ephemerellidae])	Benthic invertebrate community (temporally and spatially) in areas that dry seasonally relative to areas that remain wetted year-round	Key BIC endpoints (total abundance, EPT abundance, and % and abundance Ephemeroptera) were significantly lower at areas that dry seasonally during the April sampling periods, but most endpoints recovered within as little as two to eight weeks. Percent Ephemeroptera remained lower in areas that had dried compared to RG_FOUKI (wetted area for comparison) throughout the study period, but % Plecoptera was higher.	Seasonal drying varies spatially and temporally throughout the study area and is likely related in part to annual fluctuations in factors such as precipitation and snow pack. Drying begins earlier in the northern survey area compared to the southern survey area potentially due to its proximity to headwaters and smaller catchment area. Recolonization of BIC occurs within as little as two to eight weeks in areas that go dry for BIC endpoints except % Ephemeroptera, but a direct connection to drying remains unclear due to varying habitat and water quality conditions in the section of Fording River.
	Benthic invertebrate abundance and assemblage	Direct	Benthic invertebrate community feeding and habitat indices	Benthic invertebrate community feeding and habitat indices (temporally and spatially) in areas that dry seasonally relative to areas that remain wetted year-round	There were no significant patterns of feeding and habitat indices between areas that dry seasonally and areas that remain wetted year round, including the Benthic to Hyporheic Index with identifies the proportion of organisms the burrow into the hyporheic zone compared to those that remain on the surface.	
	Assessment of dewatering in the upper Fording River	Indirect	Monthly dewatering surveys, Temperature and level data loggers (continuous). Field *in situ* water quality.	Spatial and temporal extent of seasonal drying	Seasonally drying in the southern survey in 2019/2020 began at the beginning of January and lasted until mid-April, resulting in similar temporal and spatial extent of drying observed during the winter of 2017/2018. Drying in both the winters of 2019/2020 and 2017/2018 resulted in approximately 90 fewer days of drying compared to the extremely dry winter of 2018/2019, spanning from FR_FRCP1 to upstream of FR_FRRD, which was much less than the extent of drying up to downstream of FR_FR3 observed in 2018/2019. The northern survey area began drying in mid-November between FR_FR1 and FR_FRUPP and also lasted until mid-April, but the spatial extent was much less than that of the southern survey area. In the upper Henretta drying survey (upstream of FRO licensed water usage) drying began even earlier than areas in the Fording River, with first observations of drying in September.	

Note: NR = Normal Range. BIC = Benthic Invertebrate Community. CA = Correspondence Analysis. CI = Calcite Index. EPT = Ephemeroptera,-Plecoptera-Trichoptera. EVWQP = Elk Valley Water Quality Plan. FRO = Fording River Operations. LPL = Lowest Practical Level. PCA = Principal Component Analysis. TDS = Total Dissolved Solids
WSQG = Working Sediment Quality Guidelines. Study Questions #2 to #5 were not included in the summary table because the FRO AWTF-S was not commissioned in 2020.

monitoring areas within the sections that seasonally dry was significantly different than at areas that remain wetted throughout the year. Most endpoints returned to levels similar to the wetted areas within two to eight weeks, except for % Ephemeroptera, which remained lower throughout the year, and % Plecoptera, which was highest in the areas where % Ephemeroptera was the lowest. While a direct relationship with drying could not be confirmed, it is possible that habitat features within the areas that dry are influencing the BIC structure.

The results from the FRO LAEMP provide information that supports Teck's Adaptive Management Program (Teck 2018), and Table 5.2 summarizes material presented in this report that is relevant to the AMP. The results from this study also supported the evaluation of biological triggers which are intended to identify unexpected monitoring results that may lead to responses under the AMP response framework. Biological trigger results indicated that all mine-exposed areas evaluated (RG_FODHE, RG_FOUKI, RG_FOBSC, RG_FOBCP, RG_FODPO, and RG_FO22) exceeded the % EPT biological trigger but not the benthic invertebrate selenium concentration tissue-based trigger (Table 5.3). As discussed in the report, uncertainty remains around the cause of biological responses associated with the change in % EPT at the areas identified by the biological triggers, this trigger, along with other BIC endpoints, will continue to be monitored as part of the 2021 FRO LAEMP and the RAEMP. Other efforts are also currently underway (i.e., BIC predictive modeling) to resolve uncertainty around effects of mine-related stressors on benthic invertebrate community endpoints (further information regarding the response for these biological triggers can be found in Appendix H). Overall, results of the biological trigger evaluation were consistent with the findings of the integrated assessment conducted under the 2020 FRO LAEMP. Given that current biological triggers were sufficient to identify monitoring areas where biological responses are occurring, no additional biological triggers are recommended at this time.

Table 5.2: Summary of Findings, Responses and Adjustments Related to the FRO LAEMP in 2020

Program Name	Study Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2020	EMC Engagement
FRO LAEMP	Are nitrate concentrations increasing, and if so, are they adversely affecting biota?	Evaluate nitrate concentrations relative to projections in the EVWQP.	Nitrate concentrations at RG_FRCP1 have consistently been below model projections under average flows, except at FR_FRCP1 in the winter of 2018 and 2019 when upstream drying caused flows at this location to be predominately from Cataract Creek. Subsequent diversion upstream through Swift Ponds and out the Swift Creek channel has reduced measured nitrate concentrations at FR_FRCP1 to below projections throughout the year, and updated projections show decreasing nitrate concentrations over time. The linear time trends model demonstrated no concurrent changes in nitrate concentrations with changes in BIC endpoints, but correlation analyses have demonstrated strong negative correlations with many key BIC endpoints, indicating that while a direct cause and effect relationship could not be confirmed, effects were more prevalent in areas where nitrate concentrations were high. Canonical Correspondence Analysis further determined that nitrate concentrations are related to variations in BIC, but the shared variation among other water quality constituents, habitat variables, and the season predictor could not be separated and all effect BIC variation.	There were no responses and adjustments in 2020	- Draft data package of 2017 results submitted to EMC Feb 15, 2018; Additional results for early 2018 presented May 3 and submitted October 23, 2018 - Report of 2017 results submitted to ENV/EMC May 31, 2018 - 2018 Study design submitted to ENV/EMC May 31, 2018 - In-person meetings on Feb 22 and May 2; and conference call on March 27, 2018 - Written input from EMC received between June 1 and July 18, 2018 - Draft data package of additional 2018 results submitted to EMC March 22, 2019 and discussed at in-person meeting March February 22, 2019 -Report of 2018 results submitted to ENV/EMC May 31, 2019 -Second FRO LAEMP study design (2019-2020) submitted May 31, 2019 -Written input from 2018 FRO LAEMP report received July 2019 -Draft data package of 2019 FRO LAEMP report data submitted March 3, 2020 -Written input from 2019 FRO LAEMP data package received March 17, 2020 -Report of 2019 results submitted to ENV/EMC May 31, 2020 -Study design amendment letter for the 2019-2020 FRO LAEMP Study Design submitted to ENV/EMC June 1, 2020 -Conference call December 3, 2020 to discuss study question and study design updates for next FRO LAEMP cycle -Written input from EMC about study question and study design updates received December 17, 2020 -Conference call February 3, 2021 to discuss study question and study design updates for next FRO LAEMP cycle -Written input from EMC about study question and study design updates received February 18, 2021 -Conference call February 23, 2021 to discuss study question and study design updates for next FRO LAEMP cycle -Third FRO LAEMP study design (2021-2023) submitted April 1, 2021 -Draft data package data package of 2020 FRO LAEMP report data submitted April 8, 2021 -Written input from 2020 FRO LAEMP data package received April 22, 2021
		Determine if benthic invertebrate community endpoints are outside of site specific and regional normal ranges or moving away from normal ranges in accordance with observed nitrate concentrations.			
		Determine if benthic invertebrate community results correspond with expectations based on nitrate concentrations in water relative to the site-specific benchmark for nitrate.			
FRO LAEMP	Is active water treatment affecting biological productivity downstream in the Fording River?	FRO AWTF-S has not yet been commissioned. Data collection in 2020 continues to represent pre-AWTF conditions so they can be compared to post-commissioning conditions.	Data were summarized and reported.	There were no responses and adjustments in 2020	-
	Are tissue selenium concentrations reduced downstream from the AWTF?				
	Is AWTF operation affecting aquatic biota through thermal effects or concentrations of treatment-related constituents other than nutrients or selenium?				
	Is re-direction of water potentially affecting biota in the Fording River?				

Table 5.2: Summary of Findings, Responses and Adjustments Related to the FRO LAEMP in 2020

Program Name	Study Question(s)	Data Evaluation Process	Outcome(s)	Responses & Adjustments in 2020	EMC Engagement
FRO LAEMP	What are the factors contributing to the variations in percent Ephemeroptera?	Determine if benthic invertebrate community endpoints, particularly Ephemeroptera and associated families, are outside of site-specific and regional normal ranges or moving away from the normal ranges.	Consistent with previous years, an upstream to downstream decrease in % Ephemeroptera was observed in September 2020 with areas from RG_SCOUTDS downstream to RG_FOUEW below site-specific normal ranges, and areas from RG_FRCP1SW downstream to RG_FOUEW below both site-specific and regional normal ranges. A similar upstream to downstream gradient was also observed in Ephemeroptera abundance and key families (Heptageniidae and Ephemerellidae), but they remained within their regional normal ranges. The low % Ephemeroptera in these downstream areas was not associated with loss of taxa, but instead increases of families of Plecoptera (Capniidae, Nemouridae, Perlodidae), as percent and abundance of Plecoptera was near the upper limit of the regional normal range for most areas where Ephemeroptera were low. Key water quality constituents (nitrate, sulphate, TDS, total selenium) correlated strongly and negatively with most key BIC metrics except % Plecoptera, which correlated positively. Significant, albeit weaker in most cases, correlations between habitat variables (calcite index, embeddedness, D84, D16) were also identified. Canonical Correspondence Analysis (CCA) identified significant covariation among habitat and water quality variables, both spatially and by season (June and September). Many habitat variables (water velocity, substrate embeddedness, watershed area, and watershed slope) and all water quality variables were differentially associated with BIC variation by season, which highlights the potential for a seasonally different effect of stressors on BIC (i.e., the relationship between stressors and habitat and the effects on BIC may be seasonally dependent). The shared variation between the predictor groups in the CCA made it difficult to identify the individual effects of a variable on BIC endpoints.	Included additional BIC and habitat endpoints in correlation analysis	-
		Investigate connection between benthic invertebrate community and water chemistry, benthic invertebrate tissue chemistry and sediment chemistry. Determine if habitat data can explain BIC variability in the FRO LAEMP study area.		-added Canonical Correspondence Analysis with season as a predictor to the integrated analysis	
FRO LAEMP	What is the benthic invertebrate community structure in the reach of the Fording River that goes dry, and can changes be correlated with flow conditions?	Determine if benthic invertebrate community endpoints are similar in areas that dry seasonally compared to areas that remain wetted throughout the year.	Immediately upon rewetting, key BIC endpoints (total abundance, EPT abundance, and % and abundance Ephemeroptera) at areas that dry seasonally were significantly different than areas that remain wetted year-round; however, except for % Ephemeroptera, all endpoints were similar to continuously wetted areas within as little as two to eight weeks. Although % Ephemeroptera at areas that seasonally dry remained below the comparison station (RG_FOUKI) throughout the study period, they were similar to other areas (RG_FOUSH and RG_FOUEW) that remain wetted by late April or June.	Added the upper Henretta Survey Area to monthly drying surveys	-

Notes: ATWF = Active Water Treatment Facility; LAEMP = Local Aquatic Effects Monitoring Program; EMC = Environmental Monitoring Committee; ENV = Ministry of Environment and Climate Change Strategy; FRO = Fording River Operation; EVWQP = Elk Valley Water Quality Plan; BIC = Benthic Invertebrate Community; CCA = Canonical Correspondence Analysis; EPT = Ephemeroptera-Plectoptera-Trichoptera;

Table 5.3: Summary of Biological Trigger Analysis for Percent EPT and Selenium Benthic Invertebrate Tissue, FRO LAEMP, 2020

Waterbody	Area		% EPT [a]		Selenium BIT [b]	
			Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger [c]	Number Replicates Evaluated	Number of Replicates Reaching Biological Trigger [d]
Fording River	RG_FO26	Reference	3	0	6	0
	RG_FODHE	Mine-exposed	3	3	6	0
	RG_FOUKI		3	3	15	0
	RG_FOBSC[e]		3	3	20	0
	RG_FOBCP		5	4	15	0
	RG_FODPO		3	3	15	0
	RG_FO22		5	5	15	0

Notes: % EPT = Percent EPT (Ephemeroptera ([mayflies], Plecoptera [stoneflies], and Trichoptera [caddisflies]); Selenium BIT = Selenium concentrations in benthic invertebrate tissue (mg/kg dw).

[a] Biological Trigger analysis for %EPT was for the September sampling event.

[b] Biological Trigger analysis for Selenium BIT was for the June, September, and December sampling events.

[c] Number of Replicates Reaching Biological Trigger for % EPT refers to those replicates which were below both triggering steps (i.e., below the lower 2.5th percentile of the habitat-adjusted normal range and expectations [as based on predicted ADIT Scores]. See section H.2.2 for more details.

[d] Number of Replicates Reaching Biological Trigger for Selenium BIT refers to those replicates which were above both triggering steps (i.e., above the upper 97.5th percentile prediction limit of the regional normal range and expectations [as based on the predicted 95% percentile from the water to benthic invertebrate selenium bioaccumulation model]). See section H.2.3 for more details.

[e] BIT samples were collected at this location in November 2020 to support a scope outside the FRO LAEMP, however, BIT samples were screened against biological trigger values.

6 REFERENCES

Bartels, J.M., and D.L. Sparks. 2009. Methods of Soil Analysis: Chemical Methods, Part 3. Soil Science Society of America. 1390 pp.

BCMOE (British Columbia Ministry of Environment). 2017. Working Water Quality Guidelines for British Columbia. Updated June 2017.

BCMOE. 2018. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Summary Report. 37 pp

British Columbia Ministry of Environment and Climate Change Strategy (BCMOECCS). 2019. British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Updated June 2019.

Environment Canada. 2012a. Field Manual: Wadeable Streams. Canadian Aquatic Biomonitoring Network (CABIN).

Environment Canada. 2012b. Metal Mining Technical Guidance for Environmental Effects Monitoring. ISBN 978-1-100-20496-3.

Environment Canada. 2014. Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples. Canadian Aquatic Biomonitoring Network (CABIN). May.

Farnham, I.M., Singh, A.K., Stetzenbach, K.J., Johannesson, K.H. 2002. Treatment of nondetects in multivariate analysis of groundwater geochemistry data. Chemometrics and Intelligent Laboratory Systems. 60:265-281.

Golder. (Golder Associates Ltd.). 2014. Benchmark Derivation Report for Selenium. Elk Valley Water Quality Plan. Report Number 13-1349-0006. July.

Golder. 2017. Comparison of Monitored and Modelled Water Quality for the Elk Valley. March 31, 2017.

Golder. 2018. Comparison of Monitored and Modelled Water Quality for the Elk Valley. March 29, 2018.

Golder. 2020a. Technical memorandum – Updates to the Lotic and Lentic Statistical Bioaccumulation Models for Selenium in the Elk Valley. Prepared for Teck Coal Limited. November 2020.

Golder. 2020b. Comparison of Monitored and Modelled Water Quality for the Elk Valley. Prepared for Teck Coal Limited, Sparwood, British Columbia. March 31, 2019.

Golder. 2021a. Comparison of Monitored and Modelled Water Quality for the Elk Valley. Prepared for Teck Coal Limited, Sparwood, British Columbia. March 18, 2021.

Golder. 2021b. 2020 Chronic Toxicity Program – Elk Valley Testing to Satisfy Permit Requirements; Interpretive Report. Submitted to Teck Coal Ltd. April, 2021.

Knowles, J.E., C. Frederick. 2019. merTools: Tools for Analyzing Mixed Effect Regression Models. R package version 0.5.0. https://CRAN.R-project.org/package=merTools

Legendre, P. and Legendre, L. (2012). Numerical Ecology. 3rd English ed. Elsevier.

Legendre, P., Oksanen, J., and ter Braak, C.J.F. 2011. Testing the significant of canonical axes in redundancy analysis. Methods in Ecology and Evolution. 2, 269-277

Lister, D.B. 1980. Fording River Aquatic Environment Study. Prepared by D.B. Listers & Associated Ltd. (D.B. Listers) & Kerr Wood Leidel Associated Ltd. (Kerr Wood Leidel) for Teck Coal Limited, Fording River Operations. 77 pp. + app.

Lotic (Lotic Environmental). 2021. Teck Coal Ltd. Regional Calcite Monitoring Program 2020 Annual Report. Prepared for Teck Coal Limited, Sparwood, BC. April 2021.

Luoma, S. 2021. Technical Memorandum - Selenium bioaccumulation in annelids collected from the Fording and Elk Rivers. Prepared for Teck Coal Limited, Sparwood, BC. January 2021.

MacDonald, R.J., Boon, S., Byrne, J.M., Silins, U. 2014. A comparison of surface and subsurface controls on summer temperature in a headwater stream. Hydrological Processes. 28:2338-2347.

Minnow. (Minnow Environmental Inc.). 2016. Study Design for the Fording Swift Local Aquatic Effects Monitoring Program (LAEMP). Prepared for Teck Coal Limited, Sparwood, BC. May 2016. Project #167202.0047.

Minnow. 2017a. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) Report, 2016. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #167202.0075.

Minnow. 2017b. Updated Sampling Design for 2017 FRO LAEMP. Prepared for Teck Coal Limited, Sparwood, British Columbia. September. Project #167202.0075.

Minnow. 2018a. Updated Sampling Design for 2018 FRO LAEMP. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #187202.0022.

Minnow. 2018b. Elk River Watershed Regional Aquatic Effects Monitoring Program (RAEMP) Final Report, 2015-2016. Prepared for Teck Coal Limited, Sparwood, British Columbia. January. Project #2561.

Minnow. 2018c. Study Design for the Regional Aquatic Effects Monitoring Program, 2018 to 2020. Prepared for Teck Coal Limited, Sparwood, British Columbia. March. Project #177202.0053. Minnow and Lotic Environmental (Lotic).

Minnow. 2019. Study Design for the 2019 Line Creek Local Aquatic Effects Monitoring Program (LAEMP). Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #187202.0026

Minnow. 2020a. Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2017 to 2019.

Minnow. 2020b. Line Creek Local Aquatic Effects Monitoring Program (LAEMP) Report, 2019. Prepared for Teck Coal Limited, Sparwood, BC. April. Project 197202.0006.

Minnow. 2021a. Study Design for the Regional Aquatic Effects Monitoring Program, 2021 to 2023. Prepared for Teck Coal Limited, Sparwood, British Columbia. February. Project #207202.0006.

Minnow. 2021b. Greenhills Creek Aquatic Monitoring Program 2021 Report. Prepared for Teck Coal Limited, Sparwood, BC. In preparation.

Minnow and Lotic. 2018. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) Report, 2017. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #177202.0022.

Minnow and Lotic. 2019a. Study Design for the Fording River Operations Local Aquatic Effects Monitoring Program (FRO LAEMP), 2019-2020. Prepared for Teck Coal Limited, Sparwood, BC. May 31, 2019. Project 197202.0004.

Minnow and Lotic. 2019b. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) 2018 Report, 2018. Prepared for Teck Coal Limited, Sparwood, British Columbia. May 2019. Project #197202.0022.

Minnow and Lotic. 2020a. Study Design Amendment Letter for the 2019-2020 FRO LAEMP Study Design. Prepared for Teck Coal Limited, Sparwood, British Columbia. June. Project #207202.0009.

Minnow and Lotic. 2020b. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) 2019 Report. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #197202.0004.

Oksanen, J., F.G. Blanchet, M. Friendly, R. Kindt, P. Legendre, D. McGlinn, P.R. Minchin, R.B. O'Hara, G.L. Simpson, P. Solymos, M. Henry, H. Stevens, E. Szoecs, H. Wagner. 2019. vegan: Community Ecology Package. R package version 2.5-4. https://CRAN.R-project.org/package=vegan

Oksanen, J., F.G. Blanchet, M. Friendly, R. Kindt, P. Legendre, D. McGlinn, P.R. Minchin, R.B. O'Hara, G.L. Simpson, P. Solymos, M. Henry, H. Stevens, E. Szoecs, H. Wagner. 2020. vegan: Community Ecology Package. R package version 2.5-4. https://CRAN.R-project.org/package=vegan

Pan, B., Wang, Z., Xu, M., Xing, L. 2012. Relation between stream habitat conditions and macroinvertebrate assemblages in three Chinese rivers. Quaternary International. 282(19): 178-183.

R Core Team. 2019. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

R Core Team. 2021. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

RISC (Resource Inventory Standards Committee). 2009. Manual of British Columbia Hydrometric Standards. 137 pp.

SNC Lavalin. 2021. 2020 Annual Report: Elk Valley Regional and Site-Specific Groundwater Monitoring Programs. Prepared for Teck Coal Limited, Sparwood, British Columbia. March 2021.

Spencer, S.A., Silins, U., Anderson, A.E. 2019. Precipitation-Runoff and Storage Dynamics in Watersheds Underlain by Till and Permeable Bedrock in Alberta's Rock Mountains. Water Resources Research. 55:10,690-10,706.

Teck (Teck Coal Limited). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for Approval on July 22, 2014.

Teck. 2016. Measurement of the Calcite Index. Standard Practices and Procedures – TC-CI-01.

Teck. 2017. Coal Mountain Operations Care and Maintenance Integrated Water Management Plan. December 2017. Appendix C Aquatic Health Assessment.

Teck. 2019a. Permit 107517 Annual Water Quality Monitoring Report. Submitted to ENV on March 31, 2019.

Teck. 2020. Permit 107517 Water Quality Monitoring Annual Report. Submitted to ENV on March 31, 2020.

Teck. 2021. Permit 107517 Surface Water Quality Monitoring Annual Report. Submitted to ENV on March 31, 2021.

Teck (Teck Resources Limited). 2018. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. December 2019.

Teck. 2019b. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley – 2018 Annual Report. July 2019.

Teck. 2019c. Operations Application: Fording River Operations Active Water Treatment Facility South. November.

Teck. 2020. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley – 2019 Annual Report. July 2020.

Therneau, T.M. 2017. Survival analysis. Package "survival" for R. April 4, 2017. URL https://cran.r-project.org/web/packages/survival/survival.pdf.

Thornton, M.M., Shrestha, R., Wei, Y., Thornton, P.E., Kao, S., Wilson, B.E. 2020. Daymet: Daily Surface Weather Data on a 1-km Grid for North America, Version 4. ORNL DAAC, Oak Ridge, Tennessee, USA. http://doi.org/10.3334/ORNLDAAC/1840

USEPA (United States Environmental Protection Agency). 1998. Guidelines for Ecological Risk Assessment. Risk Assessment Forum. Washington, DC: EPA/630/R-95/002F.

USEPA. 2003. Generic Ecological Assessment Endpoints (GEAEs) for Ecological Risk Assessment. Risk Assessment Forum, Washington, DC. EPA/630/P-02/004F. October.

Wallace, J.B. 1990. Recovery of lotic macroinvertebrate communities from disturbance. Environmental Management. 14(5): 605-620.

APPENDIX A
DATA QUALITY
REPORT

APPENDIX A DATA QUALITY REVIEW

A1 INTRODUCTION

A1.1 Background

A variety of factors can influence the physical, chemical, and biological measurements made in an environmental study and thus affect the accuracy and/or precision of the data. Depending on their magnitude, both inaccuracy and imprecision have the potential to affect the reliability of conclusions made from the data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and/or temporal variability in the environment).

Data quality, as a concept, is meaningful only when it relates to the intended use of the data. That is, one must know the context in which the data will be interpreted to establish a relevant basis for judging whether the data set is adequate. A Data Quality Review (DQR) involves comparisons of field and laboratory measurement performance to Data Quality Objectives (DQOs) established for a particular study, such as evaluation of Laboratory Reporting Limits (LRLs), blank sample data, data precision (based on field and laboratory duplicate samples), and data accuracy (based on matrix spike recoveries and/or analysis of standards or certified reference materials [CRM]).

Samples for chemical analyses were sent to laboratories accredited by the Canadian Association of Laboratory Accreditation (CALA) or the National Environmental Laboratory Accreditation Program (NELAP). Data were reviewed to determine if DQOs set by the laboratory were met (Table A.1). Programs involving many samples and analytes often yield some results that exceed DQOs. This is particularly so for multi-element scans because the analytical conditions are not necessarily optimal for every element included in the scan.

This DQR was conducted on laboratory data reported in 2020 for samples collected in support of the Fording River Operations Local Aquatic Effects Monitoring Program (FRO LAEMP). The objective of the DQR was to define the overall quality of the data, and, by extension, the confidence with which the data can be used to derive conclusions. The intent of the DQR is not to reject measurements that did not meet a DQO, but to ensure that questionable data received more scrutiny to determine what effects, if any, were had on interpretation of results within the context of the project.

Table A.1: Laboratory Data Quality Objectives for the FRO LAEMP, 2020

Quality Control Measure	Quality Control Sample Type/Check	Study Component[a]			
		Water Chemistry	Selenium Speciation	Sediment Chemistry	Benthic Invertebrate Tissue Chemistry
		ALS	Brooks	ALS	TrichAnalytics
Analytical Laboratory LRLs	Comparison of actual LRL versus target LRL	LRL for each parameter should be at least as low as applicable guidelines, benchmarks, and screening values	LRL for each parameter should be at least as low as applicable guidelines, benchmarks, and screening values	LRL for each parameter should be at least as low as applicable guidelines and benchmarks	LRL for each parameter should be at least as low as applicable guidelines and benchmarks
Blank Analysis	Field or Laboratory Blank	Concentrations measured in blank samples should be < LRL	-	-	-
Laboratory Precision	Laboratory Duplicates	≤10% RPD (conductivity) ≤15% RPD (ORP, turbidity) ≤20% RPD (all remaining analytes)	≤20% RPD (total selenium) ≤25% RPD (selenium species)	≤5% RPD (particle size) ≤20% RPD (moisture) ≤30% RPD (all remaining analytes) ≤40% RPD (aluminum, barium, lead, mercury, molybdenum, potassium, silver, sodium, strontium, tin, titanium) ≤50% RPD (PAHs) Within 2-times the LRL (pH)	≤60% RPD (calcium and strontium) ≤40% RPD (all remaining analytes)
Accuracy	Recovery of Blank Spike	6.9 to 7.1 (pH) 60 to 140% (total silicon) 75 to 125% (TKN) 80 to 120% (orthophosphate, phosphorus, TOC, DOC, total and dissolved metals) 85 to 115% (TSS, TDS, turbidity, alkalinity, ammonia, Br) 90 to 110% (conductivity, Cl, F, nitrate, nitrite, sulfate)	75 to 125% (methylseleninic acid, selenate, selenite, selenocyanate, selenomethionine, total selenium)	50 to 130% (naphthalene) 50 to 150% (Acridine, Benzo(e)pyrene, 1-Methylnaphthalene, Perylene, Quinoline) 60 to 130% (all remaining PAHs) 80 to 120% (inorganic carbon, metals) 90 to 110% (moisture, TOC)	-
	Recovery of Matrix Spike	70 to 130% (TKN, orthophosphate, phosphorus, TOC, DOC, total and dissolved metals) 75 to 125% (ammonia, Br, Cl, F, nitrate, nitrite, sulfate)	75 to 125% (methylseleninic acid, selenate, selenite, selenocyanate, selenomethionine, total selenium)	50 to 150% (PAHs)	-
	Matrix Spike Duplicate	-	75 to 125% (selenate, selenite, selenocyanate, selenomethionine, total selenium)	-	-
	Recovery of Certified Reference Material	80 to 120% (orthophosphate, phosphorus) 85 to 115% (turbidity, alkalinity) 90 to 110% (conductivity) 210 to 230% (ORP) 6.9 to 7.1 (pH)	75 to 125% (total selenium)	70 to 130% (metals)	60 to 140% (antimony, barium, boron, silver, tin, titanium) 70 to 130% (all remaining analytes) 90 to 110% (selenium)
	Internal Reference Material	-	-	60 to 130% (PAHs) 80 to 120% (inorganic carbon, total carbon) 7.4 to 8 (pH 1:2 soil:water)	-
	Laboratory Control Sample	6.9 to 7.1 (pH) 75 to 125% (TKN) 80 to 120% (ORP, P, DOC, TOC, all metals) 85 to 115% (all remaining analytes) 90 to 110% (conductivity, fluoride, nitrate, nitrite, sulfate)	-	60 to 130% (PAHs) 80 to 120% (metals) 90 to 110% (inorganic carbon, total carbon) 90 to 110% (moisture) 6.8 to 7.2 (pH 1:2 soil:water)	-

Notes: ALS = ALS Environmental; LRL = Laboratory Reporting Limit; - = not applicable; < = less than; ≤ = less than or equal to; % = percent; RPD = Relative Percent Difference; DQO = Data Quality Objectives; ORP = oxidation-reduction potential; PAHs = polycyclic aromatic hydrocarbons; TKN = Total Kjeldahl Nitrogen; TOC = total organic carbon; DOC = dissolved organic carbon; TSS = total suspended solids; TDS = total dissolved solids; QC = quality control; mg/kg dw = milligrams per kilogram dry weight.

[a] If no guideline or benchmark exists for an analyte, the LRL should be less than predictions.

A1.2 Laboratory Reporting Limits

An LRL is the lowest concentration of an analyte that can be reported with a reasonable degree of accuracy and precision and is ideally synonymous with the lower limit of quantitation (LLOQ). The LLOQ is the lowest concentration of an analyte that can be reliably measured within specific limits of precision and accuracy during routine operating conditions, as opposed to being detected which, in most cases, is the lowest concentration on the calibration curve. The LRL is typically three to ten times the method detection limit (MDL); however, some guidelines are so low the LRL is equal to the MDL to meet the guideline. Achieving satisfactory LRLs is important when comparing concentrations to guidelines for that medium. If the LRL is above the guideline, the data cannot be accurately interpreted. Consistency is also important for LRLs when taking consecutive samples. Changes in LRLs between laboratory reports can affect summary calculations and introduce confounding factors when assessing trends. For the present study, LRLs were screened against guidelines and Elk Valley Water Quality Plan (EVWQP) benchmarks, as appropriate.

A1.3 Quality Control Samples

Typically, a DQR involves the examination of analytical results associated with several types of Quality Control (QC) samples collected (or prepared) in the field and laboratory. Quality control samples collected for this project, and a description of each QC sample type, are as follows:

- **Blanks** are samples of de-ionized water and/or appropriate reagent(s) that are handled and analyzed in the same way as regular samples. These samples reflect contamination of samples occurring in the field (in the case of field or travel blanks) or in the laboratory (in the case of laboratory or method blanks). Concentrations of analytes should be below the LRL.
- **Laboratory Duplicates** are replicate sub-samples created in the laboratory from randomly selected field samples which are sub-sampled and then analyzed independently using identical analytical methods. The laboratory duplicate sample results reflect variability introduced during laboratory sample handling and analysis and thus provide a measure of laboratory precision.
- **Field Duplicates** are samples collected from a randomly selected field station that are homogenized to the extent possible, split, and analyzed separately in the laboratory. The duplicate samples are handled and analyzed in an identical manner in the laboratory. These samples reflect variability introduced during the handling of

field samples (e.g., during homogenization), both in the field and laboratory, and therefore provide a measure of field sampling and laboratory precision.

- **Spike Recovery Samples** are created in the laboratory by adding a known amount/concentration of a given analyte (or mixture of analytes) to a randomly selected test sample previously divided to create two sub-samples. The spiked and regular sub-samples are then analyzed in an identical manner. The spike recovery represents the difference between the measured spike amount (total amount in the spiked sample minus the amount in the original sample) relative to the known spike amount (as a percentage). Two types of spike recovery samples are commonly analyzed. Spiked blanks (or blank spikes, BS) are created using laboratory control materials whereas matrix spikes (MS) are created using field-collected samples. The analysis of spiked samples provides an indication of the accuracy of analytical results.
- **CRM** or **IRM** are commercially-prepared (or commercially-homogenized) reference materials containing known chemical concentrations that are processed and analyzed along with batches of environmental samples. The sample results are then compared to target results to provide a measure of analytical accuracy. The results are reported as the percent of the known concentration that was recovered in the analysis.
- **LCS** are laboratory control samples created in the laboratory to have a known analyte concentration in a matrix free of interferences, such as deionized water or reference sand. The sample results are compared to the target results to confirm that the analytical method is accurate in a purified reference sample. The results are reported as the percent of the known concentration that was recovered in the analysis.
- **Organism Recovery Checks** for benthic invertebrate community samples involves the reprocessing of previously sorted material from a randomly selected sample to determine the number of invertebrates that were not recovered during the original sample processing. The reprocessing is conducted by an analyst not involved during the original processing to reduce bias. This check allows the determination of accuracy through assessment of recovery efficiency.
- **Sub-sampling error** is assessed for studies in which benthic invertebrate community samples require sub-sampling (due to excessive sample volume and/or invertebrate density). By comparing the numbers of benthic invertebrates recovered between at least two sub-samples, this measure provides an evaluation of how effective the sub-sampling method was in evenly dividing the original sample. Therefore, sub-sampling error provides a measure of analytical accuracy and precision. The processing of entire benthic invertebrate community samples in representative sample fractions also allows an evaluation of sub-sampling accuracy.

A2 WATER CHEMISTRY

A2.1 Laboratory Reporting Limits

The analytical reports for water chemistry from ALS Environmental (ALS) and Brooks Applied Labs (BAL; see Appendix J for laboratory reports) were examined to assess LRLs relative to analyte concentrations and applicable guidelines (Tables A.2 and A.3). Water quality data from 2020 were entered directly into Teck's EQuIS database, and thus were assessed as part of Teck's annual water quality reporting for 2020. The LRLs for water quality analytes were assessed relative to British Columbia Water Quality Guidelines (BC WQG; BCMOECCS 2019, 2021) for the protection of freshwater aquatic life, Elk Valley Water Quality Plan (EVWQP) benchmarks and screening values for water quality (Teck 2014), and relevant site-specific benchmarks.

Several analytes were consistently reported at concentrations less than the LRL (i.e., in 100% of samples; Tables A.2 and A.3). For those analytes with one or more result(s) below the LRL, achieved LRLs were consistently lower than the BC water quality guidelines and EVWQP benchmarks and screening values for water quality (Teck 2014); therefore, the achieved LRLs were appropriate for this study.

A2.2 Laboratory and Field Blanks

A total of 316 method blank samples for water chemistry (not including those for selenium speciation) were analyzed by ALS (Appendix J). These blank samples consisted of 1,247 individual analyte results. A concentration above the LRL was recorded in four method blank samples for one analyte in each sample:

- total calcium in one sample (see laboratory report L2462043 in Appendix J);
- total copper in one sample (see laboratory report L2463454 in Appendix J);
- dissolved calcium in one sample (see laboratory report L2505599 in Appendix J); and,
- dissolved magnesium in one sample (see laboratory report L2507219 in Appendix J).

All of the above results were within 1.5-times the LRL and below any applicable guidelines. The number of detectable concentrations was relatively low among laboratory blank samples (< 1%). As such, these results are expected to have a negligible impact on data interpretability.

A total of 37 laboratory blank samples were analyzed by BAL for selenium speciation, resulting in 165 individual analyte results. Detectable concentrations of total selenium were reported in nine laboratory blank samples, and detectable concentrations of selenite were reported in two laboratory blanks samples; however, these concentrations of total selenium and selenite were

Table A.2: Laboratory Reporting Limit (LRL) Evaluation of Water Chemistry Analytes with < LRL Results, FRO LAEMP, 2020

Parameter	Units	BC WQG[a]		EVWQP Level 1 Benchmarks/ Relevant Screening Values[b]	Range of LRLs[c]	No. Sample Results < LRL	No. LRLs > Guideline
		Long-term	Short-term				
Physical Tests							
Total Suspended Solids	mg/L	-	-	-	1	34 (50.0%)	-
Turbidity	NTU	-	-	-	0.1	2 (2.94%)	-
Anions and Nutrients							
Acidity (as $CaCO_3$)	mg/L	-	-	-	1	62 (91.2%)	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	-	-	-	1	14 (20.6%)	-
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	-	-	-	1	43 (63.2%)	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	-	-	-	1	54 (79.4%)	-
Bromide (Br)	mg/L	-	-	-	0.05 to 0.25	68 (100%)	-
Chloride (Cl)	mg/L	150	600	-	0.1 to 2.5	21 (30.9%)	0
Ammonia, Total (as N)	mg/L	0.102	0.752	-	0.005	12 (17.6%)	0
Nitrite (as N)[d]	mg/L	0.0200	0.0600	-	0.001 to 0.005	15 (22.1%)	0
Total Kjeldahl Nitrogen	mg/L	-	-	-	0.05 to 0.25	46 (67.6%)	-
Orthophosphate-Dissolved	mg/L	-	-	-	0.001	21 (30.9%)	-
Phosphorus (P)-Total	mg/L	-	-	-	0.002 to 0.005	27 (39.7%)	-
Organic / Inorganic Carbon							
Dissolved Organic Carbon	mg/L	-	-	-	0.5	21 (30.9%)	-
Total Organic Carbon	mg/L	-	-	-	0.5	20 (29.4%)	-
Total Metals							
Aluminum	mg/L	-	-	-	0.003	11 (16.2%)	-
Antimony	mg/L	0.00900	-	-	0.0001	16 (23.5%)	0
Arsenic	mg/L	-	0.00500	-	0.0001	19 (27.9%)	0
Beryllium	ug/L	0.130	-	-	0.02	68 (100%)	0
Bismuth	mg/L	-	-	-	0.00005	68 (100%)	-
Boron	mg/L	1.20	-	-	0.01	39 (57.4%)	0
Chromium[e]	mg/L	0.00100	-	-	0.0001	16 (23.5%)	0
Cobalt	ug/L	4.00	110	-	0.1	35 (51.5%)	0
Copper	mg/L	0.200	0.200	-	0.0005	59 (86.8%)	0
Iron	mg/L	-	1.00	-	0.01	16 (23.5%)	0
Lead[f]	mg/L	0.00674	0.0879	-	0.00005	39 (57.4%)	0
Lithium	mg/L	-	-	-	0.001	1 (1.47%)	-
Manganese[g]	mg/L	1.07	1.71	-	0.0001	1 (1.47%)	0
Mercury[g]	ug/L	0.00125	-	-	0.0005	37 (54.4%)	0
Nickel[f]	mg/L	0.0999	-	0.00530	0.0005	10 (14.7%)	0
Silver[f]	mg/L	0.00150	0.00300	-	0.00001	68 (100%)	0
Thallium	mg/L	0.000800	-	-	0.00001	48 (70.6%)	0
Zinc[f]	mg/L	0.0195	0.0450	-	0.003	40 (58.8%)	0
Dissolved Metals							
Aluminum	mg/L	0.0500	0.100	-	0.003	53 (77.9%)	0
Antimony	mg/L	-	-	-	0.0001	18 (26.5%)	-
Arsenic	mg/L	-	-	-	0.0001	48 (70.6%)	-
Beryllium	ug/L	-	-	-	0.02	68 (100%)	-
Bismuth	mg/L	-	-	-	0.00005	68 (100%)	-
Boron	mg/L	-	-	-	0.01	43 (63.2%)	-
Cadmium[f]	ug/L	0.221	0.625	0.142	0.005	2 (2.94%)	0
Chromium	mg/L	-	-	-	0.0001	39 (57.4%)	-
Cobalt	ug/L	-	-	-	0.1	47 (69.1%)	-
Copper	mg/L	0.200	0.200	-	0.0002	41 (60.3%)	0
Iron	mg/L	-	0.350	-	0.01	52 (76.5%)	0
Lead[f]	mg/L	-	-	-	0.00005	67 (98.5%)	-
Lithium	mg/L	-	-	-	0.001	1 (1.47%)	-
Manganese	mg/L	-	-	-	0.0001	1 (1.47%)	-
Mercury[g]	ug/L	-	-	-	0.005	67 (98.5%)	-
Nickelf	mg/L	-	-	-	0.0005	11 (16.2%)	-
Silver[f]	mg/L	-	-	-	0.00001	68 (100%)	-
Thallium	mg/L	-	-	-	0.00001	47 (69.1%)	-
Tin	mg/L	-	-	-	0.0001	68 (100%)	-
Titanium	mg/L	-	-	-	0.01	68 (100%)	-
Vanadium	mg/L	-	-	-	0.0005	68 (100%)	-
Zinc[f]	mg/L	-	-	-	0.001	12 (17.6%)	-

Shading indicates an LRL greater than the lowest EVWQP Level 1 benchmark (Teck 2014) or relevant, site-specific screening value.

Shading indicates an LRL greater than the lowest BC WQG for the protection of freshwater aquatic life (BCMOECCS 2019 and 2021).

Notes: Only analytes with one or more sample results < LRL are displayed. The total number of samples in 2020 (n) was 68. EVWQP = Elk Valley Water Quality Plan; LRL = Laboratory Reporting Limit, "-" indicates no applicable guideline exists.

[a] British Columbia Water Quality Guidelines for the protection of Aquatic Life (BCMOECCS 2019, 2021).

[b] Where more than one EVWQP Level 1 benchmark or screening value was applicable, the most conservative (lowest) value was used.

[c] The LRLs for all analytes were consistently less than the applicable EVWQP Level 1 benchmarks (Teck 2014) or screening values (Golder 2014; Teck 2020).

[d] Minimum water quality guidelines for Nitrite (as N) reported in BCMOECCS (2021) for chloride concentrations < 2 mg/L.

[e] Guideline for Chromium VI (0.001 mg/L) was selected, as this is the principal species found in surface waters.

[f] Hardness-based guidelines calculated using the minimum hardness observed for all samples (106 mg/L).

[g] The most conservative guideline (0.00125 µg/L) was applied.

Table A.3: Laboratory Reporting Limit (LRL) Evaluation for Selenium Speciation Analyses, FRO LAEMP, 2020

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Selenite	µg/L	0.05	2 (50.0%)
Dimethylselenoxide	µg/L	0.01	4 (100%)
Methylseleninic acid	µg/L	0.01	4 (100%)
Methaneselenonic acid[a]	µg/L	0.01	4 (100%)
Selenocyanate	µg/L	0.04	4 (100%)
Selenosulphate	µg/L	0.06	4 (100%)
Selenomethionine	µg/L	0.01	4 (100%)
Unknown Selenium Species	µg/L	0.06	4 (100%)

Notes: only analytes with one or more sample results < LRL are displayed. The total number of samples in 2020 (n) was 4. LRL = Laboratory Reporting Limit. "-" indicates that no applicable guideline exists for that analyte. No applicable BC WQG short-term guidelines exist for selenium or selenium species. All LRLs were below the Elk Valley Water Quality Plan and BC WQG long-term guideline for total selenium.

[a] The selenium species methaneselenonic acid was identified as an “unknown” selenium species eluting between methylseleninic acid and selenomethionine in 2020 laboratory results. This species has been identified as methaneselenoic acid for the purposes of interpretatio n.

below the LRL (therefore meeting the DQO; Table A.1) despite exceeding the method detection limit (see Section A1.2 for a description of the difference between the method detection limit and laboratory reporting limits). Only one analyte (selenate) in one laboratory blank sample had reportable concentrations greater than the LRL (2-times the LRL; see laboratory report 2012244 in Appendix J). Overall, the number of detectable concentrations was relatively low among laboratory blank samples (< 1%). These results are expected to have a negligible impact on data interpretability for this study.

Nine field blank samples and eight trip blank samples were submitted to ALS for water chemistry analyses to assess the potential for field sampling contamination (Table A.4). The same DQOs that were used for laboratory blanks were also used for field blanks (i.e., concentrations should be < LRL). Of the 1,272 analyte results for field and trip blanks, only 49 (3.85%) had concentrations greater than the LRL (Table A.4). For analytes with reported concentrations greater than the LRL, only three concentrations of ammonia in three trip blanks were greater than 5-times the LRL (see laboratory reports L2463657, L2463454, and L2442109 in Appendix J). Field and trip blank samples were not collected for selenium speciation.

A2.3 Data Accuracy and Precision

Data accuracy for water chemistry analyses completed by ALS Environmental (excluding selenium speciation) was evaluated based on results for 15 certified reference materials (CRM) samples, 316 laboratory control samples (LCS), and 25 matrix spike (MS) samples (Appendix J). All CRM and LCS results met the laboratory DQO (Table A.1), with the exception of total silicon in one LCS sample where the laboratory DQO was exceeded by less than 10% (see laboratory report L2502320 in Appendix J). Of the 353 MS individual analytes results, 48 (13.6%) exceeded the laboratory DQO. For these results, concentrations were high in the background samples (i.e., the field sample used as the base for the MS sample), and the analytical laboratory was unable to accurately calculate the recovery of the spiked material. Affected analytes in MS samples include the following:

- nitrate (as N) in one sample;
- total barium, calcium, magnesium, selenium, and strontium in five samples;
- dissolved barium, calcium, magnesium, and strontium in six samples; and
- dissolved selenium in five samples.

Accuracy for all other analytes and MS samples was within the laboratory DQO and accuracy based on CRM and LCS was excellent. Therefore, the overall accuracy achieved by the laboratory was considered good.

Table A.4: Field Blank and Trip Blank Evaluation for Water Chemistry Analyses, FRO LAEMP, 2020

Parameter	Units	Range of LRLs	No. Field Blank Sample Results > LRL	No. Trip Blank Sample Results > LRL
Anions and Nutrients				
Acidity (as $CaCO_3$)	mg/L	-	8 (88.9%)	8 (100%)
Ammonia, Total (as N)	mg/L	0.005	4 (44.4%)	4 (50%)
Total Metals				
Barium	mg/L	0.0001	2 (22.2%)	0
Chromium	mg/L	0.0001	1 (11.1%)	0
Copper	mg/L	0.0005	2 (22.2%)	0
Lead	mg/L	0.00005	1 (11.1%)	0
Manganese	mg/L	0.0001	2 (22.2%)	0
Sodium	mg/L	0.05	2 (22.2%)	0
Strontium	mg/L	0.0002	2 (22.2%)	0
Tin	mg/L	0.0001	1 (11.1%)	0
Dissolved Metals				
Barium	mg/L	0.0001	2 (22.2%)	-
Copper	mg/L	0.0002	2 (22.2%)	-
Silicon	mg/L	0.05	2 (22.2%)	-
Sodium	mg/L	0.05	2 (22.2%)	0
Strontium	mg/L	0.0002	2 (22.2%)	-
Tin	mg/L	0.0001	2 (22.2%)	-

Notes: Only analytes with one or more blank results > LRL are displayed. Nine field blanks and eight trip blanks were analyzed. For dissolved metals, only Cd, Mg, K and Na were analyzed in trip blanks. LRL = Laboratory Reporting Limit. "-" indicates analyte was not analyzed in that sample type.

Data accuracy for selenium speciation completed by BAL was evaluated based on 23 blank spike (BS) samples, 19 CRM samples, 15 MS samples, and 15 matrix spike duplicate (MSD) samples (Appendix J). All BS, CRM, MS, and MSD samples met the laboratory DQO. Therefore, the overall accuracy achieved by the laboratory was considered excellent.

Analytical precision of water chemistry analyses completed by ALS (excluding selenium speciation), was evaluated by examining a total of 38 laboratory duplicate samples (Appendix J). For all paired samples, concentration comparisons were within the DQO set by the analytical laboratory. Analytical precision of selenium speciation analyses completed by BAL was evaluated by examining 15 laboratory duplicate samples (Appendix J). For all paired samples, concentration comparisons were within the DQO set by the analytical laboratory. Therefore, laboratory analytical precision can be considered good for both ALS and BAL results.

Six sets of field duplicate samples were collected to assess field sampling precision of water chemistry measured by ALS (excluding selenium speciation; Table A.5). Relative percent differences (RPDs) between field duplicate samples for most analytes (> 90% of detected analytes) was below 30%, with the exceptions of:

- total suspended solids in two sets of samples (RPD = 43.9 to 109%);
- turbidity in two sets of samples (RPD = 33.3 to 51.9%);
- acidity in one set of samples (RPD = 62.3%);
- ammonia in four sets of samples (RPD = 40.5 to 140%);
- dissolved orthophosphate in one set of samples (RPD = 33.3%);
- total aluminum in one set of samples (RPD = 60.5%);
- total arsenic in one set of samples (RPD = 122%);
- total chromium in three sets of samples (RPD = 33.3 to 72.7%);
- total manganese in one set of samples (RPD = 40.5%);
- dissolved aluminum in two sets of samples (RPD = 84.6 to 102%);
- dissolved iron in one set of samples (RPD = 65.1%);
- dissolved manganese in one set of samples (RPD = 33.6%); and
- dissolved zinc in one set of samples (RPD = 57.1%).

For ten of the results listed above, the higher RPDs between paired results is due to at least one of these concentrations being detected below the LRL, where greater variability among paired results is anticipated. Eleven pairs of samples in which RPDs exceeded 30% did not have at least one result near the LRL. As only 3.98% of all RPDs exceeded 30%, field sampling

Table A.5: Field Duplicate Results for Water Chemistry Analyses, FRO LAEMP, 2020

Parameter	Units	RG_FOBCP_WS	RG_RIVER_WS	RPD (%)	RG_FOBCPD_WS	RG_RIVER_WS	RPD (%)	RG_FOUEW_WS	RG_RIVER_WS	RPD (%)
		28-Apr-20	28-Apr-20		18-Jun-20	18-Jun-20		19-Jun-20	19-Jun-20	
Physical Tests										
Conductivity (@ 25°C)	µS/cm	856	858	0.233	578	580	0.345	569	569	0
Hardness (as $CaCO_3$)	mg/L	517	516	0.194	330	317	4.02	301	303	0.662
pH	pH	8.51	8.51	0	8.37	8.38	0.119	8.42	8.42	0
ORP	mV	336	307	9.02	298	260	13.6	326	305	6.66
Total Suspended Solids	mg/L	7.5	4.8	43.9	4.6	4.3	6.74	8.9	10.7	18.4
Total Dissolved Solids	mg/L	661	635	4.01	430	402	6.73	406	435	6.9
Turbidity	NTU	4.43	4.26	3.91	1.74	1.45	18.2	3.2	3.76	16.1
Anions and Nutrients										
Acidity (as $CaCO_3$)	mg/L	<1	<1	-	<1	<1	-	<1	<1	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	171	168	1.77	<1	<1	-	<1	<1	-
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	12.8	12.4	3.17	<1	<1	-	<1	<1	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1	<1	-	185	184	0.542	171	167	2.37
Alkalinity, Total (as $CaCO_3$)	mg/L	183	180	1.65	185	184	0.542	171	167	2.37
Bromide (Br)	mg/L	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Chloride (Cl)	mg/L	0.72	0.74	2.74	<0.5	<0.5	-	<0.5	<0.5	-
Fluoride	mg/L	0.15	0.149	0.669	0.198	0.185	6.79	0.135	0.135	0
Ammonia, Total (as N)	mg/L	0.0114	0.0092	21.4	0.0118	0.0178	40.5	0.0194	0.0316	47.8
Nitrate (as N)	mg/L	16.2	16.2	0	9.57	9.79	2.27	9.34	9.29	0.537
Nitrite (as N)	mg/L	0.0222	0.0218	1.82	0.0077	0.007	9.52	0.0041	0.0055	29.2
Total Kjeldahl Nitrogen	mg/L	<0.25	<0.05	-	0.196	0.254	25.8	<0.25	<0.05	-
Orthophosphate-Dissolved	mg/L	<0.001	<0.001	-	0.0013	0.0016	20.7	0.0014	0.0016	13.3
Phosphorus (P)-Total	mg/L	0.0066	0.007	5.88	0.0072	0.0063	13.3	0.0114	0.015	27.3
Sulfate	mg/L	264	263	0.38	119	120	0.837	118	117	0.851
Organic / Inorganic Carbon										
Dissolved Organic Carbon	mg/L	2.5	2.24	11	1.37	1.18	14.9	1.67	2.04	19.9
Total Organic Carbon	mg/L	2.49	2.27	9.24	1.31	1.37	4.48	1.58	1.88	17.3
Total Metals										
Aluminum	mg/L	0.0855	0.0903	5.46	0.034	0.0374	9.52	0.106	0.127	18
Antimony	mg/L	0.00046	0.00042	9.09	0.00028	0.0003	6.9	0.0002	0.0002	0
Arsenic	mg/L	0.00078	0.00019	122	0.00011	0.00011	0	0.00015	0.00015	0
Barium	mg/L	0.0599	0.0611	1.98	0.0418	0.0433	3.53	0.0564	0.0594	5.18
Beryllium	ug/L	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Cadmium	ug/L	0.153	0.16	4.47	0.106	0.108	1.87	0.0638	0.0703	9.69
Calcium	mg/L	110	114	3.57	74.7	78.1	4.45	73.5	74.7	1.62
Chromium	mg/L	0.00025	0.00024	4.08	0.00015	0.00022	37.8	0.00027	0.00026	3.77
Cobalt	ug/L	0.54	0.57	5.41	<0.1	0.1	0	0.12	0.12	0
Copper	mg/L	0.00065	0.00062	4.72	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Iron	mg/L	0.07	0.071	1.42	0.042	0.043	2.35	0.118	0.144	19.8
Lead	mg/L	0.000088	0.000079	10.8	<0.00005	<0.00005	-	0.000102	0.000123	18.7
Lithium	mg/L	0.0285	0.0296	3.79	0.0238	0.0248	4.12	0.0204	0.0204	0
Magnesium	mg/L	53	54.4	2.61	33.9	33.9	0	32.7	32.9	0.61
Manganese	mg/L	0.0108	0.0108	0	0.0047	0.00451	4.13	0.00765	0.00882	14.2
Mercury	ug/L	0.00173	0.00141	20.4	0.0009	0.00087	3.39	0.0013	0.00145	10.9
Molybdenum	mg/L	0.00289	0.00296	2.39	0.00182	0.00191	4.83	0.00126	0.00128	1.57
Nickel	mg/L	0.0138	0.0144	4.26	0.0039	0.00401	2.78	0.00237	0.00243	2.5
Potassium	mg/L	2.12	2.19	3.25	1.48	1.5	1.34	1.26	1.28	1.57
Selenium	ug/L	78.1	81.2	3.89	39.6	40.4	2	36.4	36.7	0.821
Silicon	mg/L	1.8	1.82	1.1	1.78	1.81	1.67	1.99	1.93	3.06
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	1.43	1.44	0.697	1.31	1.32	0.76	1.25	1.27	1.59
Strontium	mg/L	0.14	0.141	0.712	0.0924	0.0951	2.88	0.0919	0.0923	0.434
Thallium	mg/L	0.000022	0.000019	14.6	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00338	0.00351	3.77	0.00212	0.00211	0.473	0.0018	0.00181	0.554
Vanadium	mg/L	0.00072	0.00072	0	<0.0005	<0.0005	-	0.00058	0.00061	5.04
Zinc	mg/L	0.0089	0.0076	15.8	0.0044	0.0038	14.6	<0.003	0.0031	3.28
Dissolved Metals										
Aluminum	mg/L	0.0058	0.0055	5.31	<0.003	<0.003	-	<0.003	<0.003	-
Antimony	mg/L	0.00039	0.00039	0	0.00028	0.00028	0	0.0002	0.00021	4.88
Arsenic	mg/L	0.00016	0.00016	0	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Barium	mg/L	0.0636	0.0641	0.783	0.0447	0.044	1.58	0.056	0.0517	7.99
Beryllium	ug/L	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Cadmium	ug/L	0.132	0.129	2.3	0.104	0.0912	13.1	0.0486	0.0555	13.3
Calcium	mg/L	113	117	3.48	75.7	73.2	3.36	69.7	70.3	0.857
Chromium	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Cobalt	ug/L	0.5	0.47	6.19	<0.1	<0.1	-	<0.1	<0.1	-
Copper	mg/L	0.00043	0.00043	0	0.00025	0.00021	17.4	<0.0002	<0.0002	-
Iron	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Lithium	mg/L	0.0321	0.032	0.312	0.0248	0.0238	4.12	0.018	0.0186	3.28
Magnesium	mg/L	56.7	54.5	3.96	34.2	32.7	4.48	30.9	30.9	0
Manganese	mg/L	0.00721	0.0073	1.24	0.00144	0.00144	0	0.00178	0.00191	7.05
Mercury	ug/L	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-
Molybdenum	mg/L	0.00287	0.00283	1.4	0.00192	0.00188	2.11	0.00132	0.00135	2.25
Nickel	mg/L	0.0135	0.0134	0.743	0.004	0.00386	3.56	0.00204	0.00212	3.85
Potassium	mg/L	2.08	2.06	0.966	1.67	1.6	4.28	1.24	1.27	2.39
Selenium	ug/L	81.4	78.3	3.88	42.4	41.1	3.11	39.6	40.3	1.75
Silicon	mg/L	1.64	1.64	0	1.8	1.74	3.39	1.72	1.7	1.17
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	1.39	1.36	2.18	1.44	1.39	3.53	1.35	1.36	0.738
Strontium	mg/L	0.139	0.142	2.14	0.0958	0.096	0.209	0.0956	0.0949	0.735
Thallium	mg/L	0.000017	0.000013	26.7	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00337	0.00342	1.47	0.00219	0.00227	3.59	0.00201	0.00198	1.5
Vanadium	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Zinc	mg/L	0.0054	0.0054	0	0.0035	0.0033	5.88	0.0016	0.002	22.2

RPD >30%.

Notes: the RPD was calculated using < LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

Table A.5: Field Duplicate Results for Water Chemistry Analyses, FRO LAEMP, 2020

Parameter	Units	RG_FOUKI_WS	RG_RIVER_WS	RPD (%)	RG_FRUPO_WS_LAEMP_FRO	RG_RIVER_WS	RPD (%)	RG_HENUP_WS	RG_RIVER_WS	RPD (%)
		7-Apr-20	7-Apr-20		10-Dec-20	10-Dec-20		15-Sep-20	15-Sep-20	
Physical Tests										
Conductivity (@ 25°C)	µS/cm	975	975	0	1240	1250	0.803	308	311	0.969
Hardness (as $CaCO_3$)	mg/L	597	587	1.69	765	792	3.47	156	164	5
pH	pH	8.33	8.33	0	8.26	8.21	0.607	8.12	8.12	0
ORP	mV	399	416	4.17	405	397	2	420	429	2.12
Total Suspended Solids	mg/L	2.3	2.3	0	<1	3.4	109	<1	<1	-
Total Dissolved Solids	mg/L	761	812	6.48	1000	980	2.02	181	190	4.85
Turbidity	NTU	0.67	0.5	29.1	<0.1	0.17	51.9	0.14	<0.1	33.3
Anions and Nutrients										
Acidity (as $CaCO_3$)	mg/L	<1	<1	-	2.1	4	62.3	<1	<1	-
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	202	198	2	268	277	3.3	106	107	0.939
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	6	8	28.6	<1	<1	-	<1	<1	-
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<1	<1	-	<1	<1	-	<1	<1	-
Alkalinity, Total (as $CaCO_3$)	mg/L	208	206	0.966	268	277	3.3	106	107	0.939
Bromide (Br)	mg/L	<0.05	<0.05	-	<0.25	<0.25	-	<0.05	<0.05	-
Chloride (Cl)	mg/L	1.62	1.88	14.9	2	2.28	13.1	0.17	0.16	6.06
Fluoride	mg/L	0.159	0.174	9.01	0.12	0.12	0	0.33	0.329	0.303
Ammonia, Total (as N)	mg/L	0.0128	0.0172	29.3	<0.005	0.0281	140	0.016	0.0086	60.2
Nitrate (as N)	mg/L	19.7	19.9	1.01	30.8	30.9	0.324	0.188	0.201	6.68
Nitrite (as N)	mg/L	0.0129	0.0114	12.3	<0.005	<0.005	-	<0.001	<0.001	-
Total Kjeldahl Nitrogen	mg/L	<0.05	<0.05	-	<0.05	<0.05	-	0.054	<0.05	7.69
Orthophosphate-Dissolved	mg/L	<0.001	0.0014	33.3	0.0035	0.0033	5.88	0.0013	0.0011	16.7
Phosphorus (P)-Total	mg/L	<0.002	<0.002	-	0.0031	0.004	25.4	<0.002	<0.002	-
Sulfate	mg/L	299	300	0.334	373	376	0.801	54.5	54.6	0.183
Organic / Inorganic Carbon										
Dissolved Organic Carbon	mg/L	0.92	1.17	23.9	<0.5	<0.5	-	<0.5	<0.5	-
Total Organic Carbon	mg/L	0.98	1.23	22.6	<0.5	<0.5	-	<0.5	<0.5	-
Total Metals										
Aluminum	mg/L	<0.003	<0.003	-	<0.003	0.0056	60.5	<0.003	0.0034	12.5
Antimony	mg/L	0.0003	0.0003	0	<0.0001	0.00012	18.2	<0.0001	<0.0001	-
Arsenic	mg/L	0.0001	0.00011	9.52	<0.0001	<0.0001	-	<0.0001	0.00011	9.52
Barium	mg/L	0.0976	0.0974	0.205	0.148	0.146	1.36	0.0126	0.0128	1.57
Beryllium	ug/L	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	0.011	0.011	0	0.016	0.016	0	<0.01	<0.01	-
Cadmium	ug/L	0.0674	0.0762	12.3	0.0606	0.061	0.658	0.006	<0.005	18.2
Calcium	mg/L	130	129	0.772	170	169	0.59	45.7	46.1	0.871
Chromium	mg/L	<0.0001	<0.0001	-	0.0001	0.00014	33.3	0.0003	0.00014	72.7
Cobalt	ug/L	0.12	0.11	8.7	0.11	0.12	8.7	<0.1	<0.1	-
Copper	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Iron	mg/L	0.031	0.029	6.67	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Lithium	mg/L	0.0579	0.0587	1.37	0.0547	0.0526	3.91	0.0011	<0.001	9.52
Magnesium	mg/L	59.5	59.9	0.67	78.8	78.7	0.127	10.5	10.5	0
Manganese	mg/L	0.0148	0.015	1.34	0.00067	0.00101	40.5	<0.0001	<0.0001	-
Mercury	ug/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Molybdenum	mg/L	0.00178	0.00179	0.56	0.000791	0.000819	3.48	0.000573	0.000553	3.55
Nickel	mg/L	0.00502	0.00479	4.69	0.00064	0.00059	8.13	<0.0005	<0.0005	-
Potassium	mg/L	2.26	2.26	0	2.51	2.48	1.2	0.193	0.198	2.56
Selenium	ug/L	59.9	61.4	2.47	114	116	1.74	1.03	1.1	6.57
Silicon	mg/L	1.75	1.78	1.7	2.53	2.59	2.34	1.25	1.22	2.43
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	2.47	2.5	1.21	3.25	3.26	0.307	0.32	0.329	2.77
Strontium	mg/L	0.208	0.208	0	0.198	0.205	3.47	0.139	0.139	0
Thallium	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00384	0.00396	3.08	0.00485	0.00483	0.413	0.000762	0.000754	1.06
Vanadium	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Zinc	mg/L	<0.003	<0.003	-	<0.003	<0.003	-	<0.003	<0.003	-
Dissolved Metals										
Aluminum	mg/L	<0.003	0.0074	84.6	<0.003	0.0092	102	<0.003	<0.003	-
Antimony	mg/L	0.00027	0.00026	3.77	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Arsenic	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Barium	mg/L	0.0988	0.0967	2.15	0.126	0.124	1.6	0.0131	0.0134	2.26
Beryllium	ug/L	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Bismuth	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Boron	mg/L	<0.01	<0.01	-	0.018	0.019	5.41	<0.01	<0.01	-
Cadmium	ug/L	0.0621	0.0715	14.1	0.0474	0.0537	12.5	<0.005	<0.005	-
Calcium	mg/L	140	138	1.44	179	188	4.9	45.8	49.1	6.95
Chromium	mg/L	<0.0001	0.00012	18.2	0.00017	0.00015	12.5	0.00012	0.00012	0
Cobalt	ug/L	0.11	0.12	8.7	0.11	0.11	0	<0.1	<0.1	-
Copper	mg/L	<0.0002	<0.0002	-	<0.0002	<0.0002	-	<0.0002	<0.0002	-
Iron	mg/L	0.029	0.057	65.1	<0.01	<0.01	-	<0.01	<0.01	-
Lead	mg/L	<0.00005	<0.00005	-	<0.00005	<0.00005	-	<0.00005	<0.00005	-
Lithium	mg/L	0.0603	0.0592	1.84	0.0616	0.0596	3.3	0.0011	<0.001	9.52
Magnesium	mg/L	60.3	59.2	1.84	77.1	78.3	1.54	10.1	10	0.995
Manganese	mg/L	0.015	0.0171	13.1	0.00062	0.00087	33.6	<0.0001	<0.0001	-
Mercury	ug/L	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	-
Molybdenum	mg/L	0.00169	0.00161	4.85	0.000759	0.000757	0.264	0.000574	0.00058	1.04
Nickel	mg/L	0.00472	0.00477	1.05	0.0008	0.00081	1.24	<0.0005	<0.0005	-
Potassium	mg/L	2.39	2.43	1.66	2.64	2.64	0	0.204	0.202	0.985
Selenium	ug/L	61.4	61.8	0.649	130	132	1.53	1.06	0.993	6.53
Silicon	mg/L	1.73	1.77	2.29	2.44	2.47	1.22	1.11	1.15	3.54
Silver	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Sodium	mg/L	2.49	2.57	3.16	3.13	3.2	2.21	0.323	0.318	1.56
Strontium	mg/L	0.212	0.199	6.33	0.2	0.198	1.01	0.143	0.144	0.697
Thallium	mg/L	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	-
Tin	mg/L	<0.0001	<0.0001	-	<0.0001	<0.0001	-	<0.0001	<0.0001	-
Titanium	mg/L	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Uranium	mg/L	0.00394	0.00375	4.94	0.00448	0.00447	0.223	0.000806	0.0008	0.747
Vanadium	mg/L	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-
Zinc	mg/L	0.0019	0.0025	27.3	<0.001	0.0018	57.1	0.0011	0.0012	8.70

RPD >30%.

Notes: the RPD was calculated using < LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

precision for water chemistry was considered acceptable for the purposes of this study. Field duplicate samples were not collected for selenium speciation.

Recommended hold times for oxidation-reduction potential (ORP) and pH were exceeded for all water chemistry samples prior to receipt of samples by ALS (Appendix J). The hold times for these analyses is 0.25 h, which is not feasible to meet while working in the field. Recommended hold times for turbidity and low-level detection of nitrate and nitrite (three days) was also exceeded by one to two days in eight water chemistry samples (see laboratory reports L2462043 and L2463454 in Appendix J). All other recommended hold times were met for all samples.

A2.4 Data Quality Statement

Water chemistry data collected for the present study were of acceptable quality as characterized by good detectability, concentrations below LRLs in almost all method blank samples, good laboratory precision and accuracy, and acceptable field sampling precision. Therefore, the associated data are considered acceptable for this study.

A3 SEDIMENT CHEMISTRY

A3.1 Laboratory Reporting Limits

The analytical reports for sediment chemistry from ALS (see Appendix J for laboratory reports) were examined to assess LRLs relative to applicable guidelines (Table A.6). The LRLs for these analytes were assessed relative to existing British Columbia Working Sediment Quality Guidelines (BC WSQG; BCMOECCS 2021).

Several analytes were entirely reported below the LRL (i.e., in 100% of samples; Table A.6). For all metals and several polycyclic aromatic hydrocarbons (PAHs) with one or more result below the LRL, achieved LRLs were consistently lower than applicable guidelines for sediment quality (BCMOECCS 2021). However, LRLs for acenaphthene, acenaphthylene, benz(a)anthracene, chrysene, and dibenz(a,h)anthracene exceeded the lower BC WSQG (i.e., Interim Sediment Quality Guideline) in 31.6 to 91.3% of samples. The LRLs for acenapthelene also exceeded the upper BC WSQG (i.e., Probable Effect Limit) in 10.9% of samples tested . The reason for these high LRLs was due to a combination of chromatographic interference due to PAH co-elution effects and high moisture content (resulting in low sample volume) in specific sediment samples. Overall, the LRLs for most analytes, with the exception of a few PAHs as noted above, were considered appropriate for this study.

A3.2 Laboratory Blanks

A total of 20 method blank samples for sediment chemistry were analyzed by ALS (Appendix J), consisting of 247 individual analyte results. All reported method blank results were within the laboratory DQO (Table A.1). Thus, the method blank results for this study indicated no inadvertent contamination of sediment samples within the laboratory during analysis.

A3.3 Data Accuracy and Precision

Data accuracy for sediment chemistry analyses completed by ALS was evaluated based on the analysis of three CRM samples, 18 Internal Reference Material (IRM) samples, and 23 LCS samples. All CRM, IRM, and LCS results met the laboratory DQO (Table A.1). Therefore, the accuracy achieved by the laboratory was considered excellent.

Analytical precision of water chemistry analyses completed by ALS was evaluated by examining a total of nine laboratory duplicate samples (Appendix J). Relative percent differences (RPDs) between all laboratory duplicate samples were within the laboratory DQO, with the exception of one analyte (fluoranthene) in one pair of samples, which

Table A.6: Laboratory Reporting Limit (LRL) Evaluation for Sediment Chemistry Analytes with <LRL Results, FRO LAEMP, 2020

Parameter	Units	BC WSQGs		Range of LRLs	No. LRLs > ISQG	No. LRLs > PEL	No. Sample Results < LRL
		ISQG	PEL				
Metals							
Antimony	mg/kg	-	-	0.1	-	-	2 (4.35%)
Beryllium	mg/kg	-	-	0.1	-	-	2 (4.35%)
Bismuth	mg/kg	-	-	0.2	-	-	46 (100%)
Boron	mg/kg	-	-	5	-	-	3 (6.52%)
Mercury	mg/kg	0.170	0.486	0.005	0	0	2 (4.35%)
Silver	mg/kg	0.500	-	0.1	0	-	3 (6.52%)
Sulfur	mg/kg	-	-	1,000	-	-	37 (80.4%)
Thallium	mg/kg	-	-	0.05	-	-	3 (6.52%)
Tin	mg/kg	-	-	2	-	-	46 (100%)
Tungsten	mg/kg	-	-	0.5	-	-	46 (100%)
Zirconium	mg/kg	-	-	1	-	-	27 (58.7%)
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	0.00671	0.0889	0.005 to 0.18	42 (91.3%)	5 (10.9%)	46 (100%)
Acenaphthylene	mg/kg	0.00587	0.128	0.005 to 0.04	7 (36.8%)	0	19 (41.3%)
Acridine	mg/kg	-	-	0.01 to 0.3	-	-	46 (100%)
Anthracene	mg/kg	0.0469	0.245	0.004 to 0.04	0	0	20 (43.5%)
Benz(a)anthracene	mg/kg	0.0317	0.385	0.01 to 0.12	6 (31.6%)	0	19 (41.3%)
Benzo(a)pyrene	mg/kg	0.0319	0.782	0.01 to 0.025	0	0	24 (52.2%)
Benzo(b&j)fluoranthene	mg/kg	-	-	0.01 to 0.05	-	-	5 (10.9%)
Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.015 to 0.051	-	-	6 (13.0%)
Benzo(g,h,i)perylene	mg/kg	0.170	0.320	0.01 to 0.025	0	0	13 (28.3%)
Benzo(k)fluoranthene	mg/kg	0.240	13.4	0.01 to 0.03	0	0	43 (93.5%)
Benzo(e)pyrene	mg/kg	-	-	0.01 to 0.025	-	-	3 (6.52%)
Chrysene	mg/kg	0.0571	0.862	0.01 to 0.22	10 (76.9%)	0	13 (28.3%)
Dibenz(a,h)anthracene	mg/kg	0.00622	0.135	0.005 to 0.03	13 (68.4%)	0	19 (41.3%)
Fluoranthene	mg/kg	0.111	2.36	0.01 to 0.025	0	0	5 (10.9%)
Fluorene	mg/kg	0.0212	0.144	0.01 to 0.025	0	0	2 (4.35%)
Indeno(1,2,3-c,d)pyrene	mg/kg	0.200	3.20	0.01 to 0.025	0	0	40 (87.0%)
1-Methylnaphthalene	mg/kg	-	-	0.012 to 0.05	-	-	3 (6.52%)
Naphthalene	mg/kg	0.0346	0.391	0.01 to 0.025	0	0	1 (2.17%)
Perylene	mg/kg	-	-	0.01 to 0.025	-	-	41 (89.1%)
Pyrene	mg/kg	0.0530	0.875	0.01 to 0.025	0	0	3 (6.52%)
Quinoline	mg/kg	-	-	0.012 to 0.05	-	-	46 (100%)

Shading indicates an LRL greater than the lower WSQG

Shading indicates an LRL greater than the both the upper WSQG and the lower WSQG

Notes: Only analytes with one or more blank results > LRL are displayed. The total number of samples was n = 21. BC WSQGs = British Columbia Sediment Quality Guidelines (BCMOECCS 2021); ISQG = Interim Sediment Quality Guideline; PEL = Probable Effects Limit; LRL = Laboratory Reporting Limit; - = no applicable guideline exists; BCMOECCS = British Columbia Ministry of Environment and Climate Change Strategy.

was deemed to be outside the laboratory DQO due to sample heterogeneity (see laboratory report L2508974 in Appendix J). Since all other analytes were within the laboratory DQO, laboratory precision was considered good.

Two sets of field duplicate samples were collected to assess the precision of field sampling of sediment chemistry (Table A.7). Samples were collected as split samples (i.e., a larger sample was homogenized and then split into two duplicate sub-samples), and as such some variability was expected based on the inherent heterogeneity of sediments.

Field duplicate samples for most metals (> 90%) had RPDs that were below 30% with the exceptions of:

- aluminum in one set of samples (RPD = 39.1%);
- antimony in two sets of samples (RPD = 51.9 to 63.9%); and
- potassium in one set of samples (RPD = 44.0%).

For one of the results listed above, the higher RPD between paired results is due to at least one of these concentrations being detected below the LRL, where greater variability among paired results is anticipated.

Variability among paired results was greater for PAHs than for metals. Due to low detectability PAHs (i.e., results below the LRL), only 20 RPD values could be calculated. Of these, several PAHs had RPD values greater than 30% including:

- anthracene in one set of samples (RPD = 36.8%);
- benz(a)anthracene in one set of samples (RPD = 60%);
- benzo(b&j)fluoranthene in one set of samples (RPD = 70%);
- benzo(b+j+k)fluoranthene in one set of samples (RPD = 70%);
- benzo(g,h,i)perylene in one set of samples (RPD = 54.5%);
- benzo(e)pyrene in one set of samples (RPD = 69.6%);
- chrysene in one set of samples (RPD = 43.6%);
- dibenz(a,h)anthracene in one set of samples (RPD = 64.2%);
- fluorene in one set of samples (RPD = 34.0%); and
- napthalene in one set of samples (RPD = 41.2%).

None of the results listed above for PAHs had at least one result near or below the LRL.

Overall, as only 5.71% of RPDs for metals exceeded 30%, field precision and reproducibility were considered adequate for metals. The greater variability observed for PAHs is likely attributed to residual heterogeneity in the samples. Subtle differences in the distribution of fine

Table A.7: Field Duplicate Results for Sediment Samples, FRO LAEMP, 2020

Parameter	Unit	Sample ID		RPD (%)	Sample ID		RPD (%)
		RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-3X_2020-09-22_1445		RG_FRCP1SW_SE-02_2020-09-22_1030	RG_RIVER_SE-2X_2020-09-22_1030	
Physical Tests							
% Moisture	%	34.1	34.9	2.32	45.4	55.5	20.0
pH (1:2 soil:water)	pH	8.41	8.68	3.16	8.51	8.66	1.75
Organic Carbon							
Total Organic Carbon	%	5.36	6.40	17.7	5.96	6.88	14.3
Metals							
Aluminum	mg/kg	1,890	1,730	8.84	8,660	5,830	39.1
Antimony	mg/kg	0	<0.1	51.9	0	0.640	63.9
Arsenic	mg/kg	1.44	1.26	13.3	4.95	4.77	3.70
Barium	mg/kg	18.0	15.1	17.5	205	189	8.12
Beryllium	mg/kg	0	0	7.41	0.640	0.590	8.13
Bismuth	mg/kg	<0.20	<0.2	-	<0.20	<0.2	-
Boron	mg/kg	<5.0	<5	-	10.0	7.70	26.0
Cadmium	mg/kg	0	0	1.16	1.50	1.63	8.31
Calcium	mg/kg	259,000	255,000	1.56	43,000	45,500	5.65
Chromium	mg/kg	7.05	6.32	10.9	15.1	12.1	22.1
Cobalt	mg/kg	1.12	1.09	2.71	5.74	5.82	1.38
Copper	mg/kg	1.79	1.49	18.3	13.3	14.1	5.84
Iron	mg/kg	3,190	2,920	8.84	14,100	13,000	8.12
Lead	mg/kg	2.05	1.83	11.3	7.92	7.96	0.504
Lithium	mg/kg	8.30	8.10	2.44	10.6	9.9	6.83
Magnesium	mg/kg	46,900	48,000	2.32	11,400	11,400	0
Manganese	mg/kg	111	112	0.897	511	516	0.974
Mercury	mg/kg	0	0	9.52	0	0	20.6
Molybdenum	mg/kg	0	0	2.99	1.37	1.51	9.72
Nickel	mg/kg	7.68	7.51	2.24	46.4	50.0	7.47
Phosphorus	mg/kg	354	375	5.76	1,350	1,280	5.32
Potassium	mg/kg	610	560	8.55	2,330	1,490	44.0
Selenium	mg/kg	0	0	3.08	1.70	2.01	16.7
Silver	mg/kg	<0.10	<0.10	-	0	0	16.2
Sodium	mg/kg	182	181	0.551	88.0	76.0	14.6
Strontium	mg/kg	112	112	0	69.0	63.7	7.99
Sulfur	mg/kg	<1,000	<1,000	-	<1,000	<1,000	-
Thallium	mg/kg	<0.050	<0.05	-	0	0	10.9
Tin	mg/kg	<2.0	<2.0	-	<2.0	<2	-
Titanium	mg/kg	23.6	21.0	11.7	31.4	27.8	12.2
Tungsten	mg/kg	<0.50	<0.50	-	<0.50	<0.5	-
Uranium	mg/kg	0	0	2.88	1.08	1.07	0.930
Vanadium	mg/kg	7.34	6.70	9.12	36.7	29.3	22.4
Zinc	mg/kg	42.1	40.3	4.37	132	143	8.00
Zirconium	mg/kg	<1.0	<1	-	1.30	1.20	8.00
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	<0.0050	<0.0050	-	<0.040	<0.035	-
Acenaphthylene	mg/kg	<0.0050	<0.0050	-	0.00630	0.00520	19.1
Acridine	mg/kg	<0.010	<0.010	-	<0.060	<0.05	-
Anthracene	mg/kg	<0.0040	<0.0040	-	0.00620	0.00900	36.8
Benz(a)anthracene	mg/kg	<0.010	<0.010	-	0.0260	0.0140	60.0
Benzo(a)pyrene	mg/kg	<0.010	<0.010	-	0.0120	<0.010	18.2
Benzo(b&j)fluoranthene	mg/kg	<0.010	<0.010	-	0.0540	0.0260	70.0
Benzo(b+j+k)fluoranthene	mg/kg	<0.015	<0.015	-	0.0540	0.0260	70.0
Benzo(g,h,i)perylene	mg/kg	<0.010	<0.010	-	0.0210	0.0120	54.5
Benzo(k)fluoranthene	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-
Benzo(e)pyrene	mg/kg	<0.010	<0.010	-	0.0620	0.0300	69.6
Chrysene	mg/kg	<0.010	<0.010	-	0.148	0.0950	43.6
Dibenz(a,h)anthracene	mg/kg	<0.0050	<0.0050	-	0.0105	0.00540	64.2
Fluoranthene	mg/kg	<0.010	<0.010	-	0.0230	0.0240	4.26
Fluorene	mg/kg	<0.010	<0.010	-	0.110	0.0780	34.0
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-
1-Methylnaphthalene	mg/kg	<0.050	<0.050	-	0.478	0.371	25.2
2-Methylnaphthalene	mg/kg	0	0	19.1	0.769	0.598	25.0
Naphthalene	mg/kg	0	0	23.5	0.272	0.179	41.2
Perylene	mg/kg	<0.010	<0.010	-	<0.010	<0.010	-
Phenanthrene	mg/kg	0	0	2.82	0.530	0.455	15.2
Pyrene	mg/kg	<0.010	<0.010	-	0.0410	0.0320	24.7
Quinoline	mg/kg	<0.050	<0.050	-	<0.050	<0.05	-

Indicates RPD > 30%.

Notes: RPD was not calculated if both results were < LRL. If only one result was < LRL, the LRL was substituted for that value to calculate RPD. RPD = relative percent difference; "-"= no data/not calculated; LRL = Laboratory Reporting Limit.

particulate matter and associated PAHs amongst split samples may exist even after homogenization in the field. Additionally, the transfer of sample material from one container (i.e., the bin in which the samples were homogenized) to another (i.e., the sample jar or bag) may introduce variability (Weiner 2013).

A3.4 Data Quality Statement

Sediment chemistry data collected for the present study were of acceptable quality as characterized by good detectability (with the exception of a few PAHs), negligible analyte concentrations in method blanks, good laboratory precision and accuracy, and good field sampling precision (particularly for metals). Field sampling precision was lower for PAHs. Overall, the associated data were considered acceptable for this study.

A4 BENTHIC INVERTEBRATE COMMUNITY

A4.1 Organism Sorting Efficiency

The analytical laboratory reports for benthic invertebrate community structure from Cordillera Consulting Inc. (see Appendix J for laboratory reports) were examined to assess sub-sampling accuracy.

Canadian Aquatic Biomonitoring Network (CABIN) protocols were followed for sub-sampling (i.e., a minimum count of 300 invertebrates), which often resulted in only 5% of a sample being assessed (Table A.8). Out of 185 total benthic invertebrate community structure samples, 173 (93.5%) were subsampled. The amount of material sorted in each sample ranged from 5 to 100% of the total sample volume (Table A.8).

Sub-sampling efficiency was assessed by comparing the numbers of benthic invertebrates recovered between at least two sub-samples. Both the precision and accuracy of sub-sampling efficiency assessments in 2020 met the laboratory's DQO in all cases (≤ 20%; Table A.9). Thus, the precision and accuracy for sub-sampling of benthic invertebrate community samples was considered excellent.

A4.2 Organism Sorting Efficiency

To measure the effectiveness of the sorters, at least 10% of samples were selected at random for resorting analysis by a different sorter (n = 12). Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was excellent, achieving an average of 99.7% for the community structure samples assessed (Table A.10). Recovery in quality control samples was above the laboratory's DQO (≥ 95%), so organism sorting efficiency was considered excellent.

A4.3 Taxonomic Identification Accuracy

The laboratory performed an internal audit of taxonomic identification for roughly 10% of all samples (n = 18; Table A.11). The analysts reported total identification error rate (TIR) of 0 to 0.24%, percent difference in enumeration (PDE) of 0 to 0.938%, percent taxonomic disagreement (PTD) of 0.244 to 1.86%, and Bray Curtis Dissimilarity Index (BCDI, a measure of the differences in identifications between different analysts) of 0.001 to 0.12; Table A.11). The laboratory DQO was based on TIR as per CABIN laboratory methods (< 5% TIR; Environment Canada 2014; Tables A.9). Since TIR was below 5% for all samples, the taxonomic accuracy of the analysis was considered excellent.

Table A.8: Sub-Sampling Percentages and Total Organism Recovery for Benthic Invertebrate Community Samples, FRO LAEMP, 2020

Sample ID	Month	Date	Laboratory ID	% Sampled	# Invertebrates
RG_FOBCPD_BIC-01_2020-04-15	April	15-Apr-20	CC202805	24%	338
RG_FOBCPD_BIC-02_2020-04-15		15-Apr-20	CC202806	100%	457
RG_FOBCPD_BIC-03_2020-04-15		15-Apr-20	CC202807	50%	325
RG_FRCP1SW_BIC-01_2020-04-16		16-Apr-20	CC202808	100%	396
RG_FRCP1SW_BIC-02_2020-04-16		16-Apr-20	CC202809	100%	229
RG_FRCP1SW_BIC-03_2020-04-16		16-Apr-20	CC202810	6%	348
RG_FOUSH_BIC-01_2020-04-07		07-Apr-20	CC202811	6%	323
RG_FOUSH_BIC-02_2020-04-07		07-Apr-20	CC202812	7%	322
RG_FOUSH_BIC-03_2020-04-07		07-Apr-20	CC202813	6%	330
RG_FOUEW_BIC-01_2020-04-08		08-Apr-20	CC202814	5%	326
RG_FOUEW_BIC-02_2020-04-08		08-Apr-20	CC202815	5%	432
RG_FOUEW_BIC-03_2020-04-08		08-Apr-20	CC202816	5%	461
RG_FOUKI_BIC-01_2020-04-07		07-Apr-20	CC202817	5%	446
RG_FOUKI_BIC-02_2020-04-07		07-Apr-20	CC202818	5%	485
RG_FOUKI_BIC-03_2020-04-07		07-Apr-20	CC202819	5%	684
RG_FOBCP_BIC-01_2020-04-06		06-Apr-20	CC202820	23%	374
RG_FOBCP_BIC-02_2020-04-06		06-Apr-20	CC202821	12%	324
RG_FOBCP_BIC-03_2020-04-06		06-Apr-20	CC202822	23%	344
RG_FRCP1SWD_BIC-01_2020-04-16		16-Apr-20	CC202823	5%	453
RG_FRCP1SWD_BIC-02_2020-04-16		16-Apr-20	CC202824	5%	714
RG_FRCP1SWD_BIC-03_2020-04-16		16-Apr-20	CC202825	100%	182
RG_FOUKI_BIC-01_2020-04-29		29-Apr-20	CC202826	7%	344
RG_FOUKI_BIC-02_2020-04-29		29-Apr-20	CC202827	10%	401
RG_FOUKI_BIC-03_2020-04-29		29-Apr-20	CC202828	5%	482
RG_FOUEW_BIC-01_2020-04-28		28-Apr-20	CC202829	6%	419
RG_FOUEW_BIC-02_2020-04-28		28-Apr-20	CC202830	7%	357
RG_FOUEW_BIC-03_2020-04-28		28-Apr-20	CC202831	8%	338
RG_FOBCP_BIC-01_2020-04-28		28-Apr-20	CC202832	17%	319
RG_FOBCP_BIC-02_2020-04-28		28-Apr-20	CC202833	20%	404
RG_FOBCP_BIC-03_2020-04-28		28-Apr-20	CC202834	14%	354
RG_FOUSH_BIC-01_2020-04-29		29-Apr-20	CC202835	10%	448
RG_FOUSH_BIC-02_2020-04-29		29-Apr-20	CC202836	7%	342
RG_FOUSH_BIC-03_2020-04-29		29-Apr-20	CC202837	8%	385
RG_FOBCPD_BIC-01_2020-04-28		28-Apr-20	CC202838	20%	328
RG_FOBCPD_BIC-02_2020-04-28		28-Apr-20	CC202839	20%	338
RG_FOBCPD_BIC-03_2020-04-28		28-Apr-20	CC202840	31%	316
RG_FRCP1SW_BIC-01_2020-04-30		30-Apr-20	CC202841	48%	319
RG_FRCP1SW_BIC-02_2020-04-30		30-Apr-20	CC202842	50%	323
RG_FRCP1SW_BIC-03_2020-04-30		30-Apr-20	CC202843	100%	526
RG_FRCP1SWD_BIC-01_2020-04-30		30-Apr-20	CC202844	13%	366
RG_FRCP1SWD_BIC-02_2020-04-30		30-Apr-20	CC202845	9%	320
RG_FRCP1SWD_BIC-03_2020-04-30		30-Apr-20	CC202846	38%	335
RG_HENUP_BIC-01_2020-06-15	June	15-Jun-20	CC210077	50%	479
RG_HENUP_BIC-02_2020-06-15		15-Jun-20	CC210078	33%	342
RG_HENUP_BIC-03_2020-06-15		15-Jun-20	CC210079	26%	358
RG_FODHE_BIC-01_2020-06-15		15-Jun-20	CC210080	15%	327
RG_FODHE_BIC-02_2020-06-15		15-Jun-20	CC210081	50%	389
RG_FODHE_BIC-03_2020-06-15		15-Jun-20	CC210082	17%	320
RG_MP1_BIC-01_2020-06-15		15-Jun-20	CC210083	8%	371
RG_MP1_BIC-02_2020-06-15		15-Jun-20	CC210084	18%	339
RG_MP1_BIC-03_2020-06-15		15-Jun-20	CC210085	29%	378
RG_FOUCL_BIC-01_2020-06-15		15-Jun-20	CC210086	31%	340
RG_FOUCL_BIC-02_2020-06-15		15-Jun-20	CC210087	36%	342
RG_FOUCL_BIC-03_2020-06-15		15-Jun-20	CC210088	100%	174
RG_FOUNGD_BIC-01_2020-06-16		16-Jun-20	CC210089	20%	352
RG_FOUNGD_BIC-02_2020-06-16		16-Jun-20	CC210090	21%	368
RG_FOUNGD_BIC-03_2020-06-16		16-Jun-20	CC210091	10%	346
RG_FODNGD_BIC-01_2020-06-16		16-Jun-20	CC210092	50%	409
RG_FODNGD_BIC-02_2020-06-16		16-Jun-20	CC210093	100%	519
RG_FODNGD_BIC-03_2020-06-16		16-Jun-20	CC210094	15%	357
RG_FOBKS_BIC-01_2020-06-16		16-Jun-20	CC210095	100%	567
RG_FOBKS_BIC-02_2020-06-16		16-Jun-20	CC210096	100%	612
RG_FOBKS_BIC-03_2020-06-16		16-Jun-20	CC210097	50%	248
RG_SCOUTDS_BIC-01_2020-06-16		16-Jun-20	CC210098	15%	351
RG_SCOUTDS_BIC-02_2020-06-16		16-Jun-20	CC210099	50%	327
RG_SCOUTDS_BIC-03_2020-06-16		16-Jun-20	CC210100	33%	344
RG_FOUKI_BIC-01_2020-06-17		17-Jun-20	CC210101	10%	349
RG_FOUKI_BIC-02_2020-06-17		17-Jun-20	CC210102	12%	325
RG_FOUKI_BIC-03_2020-06-17		17-Jun-20	CC210103	20%	422
RG_FOBCP_BIC-01_2020-06-17		17-Jun-20	CC210104	100%	478
RG_FOBCP_BIC-02_2020-06-17		17-Jun-20	CC210105	45%	359
RG_FOBCP_BIC-03_2020-06-17		17-Jun-20	CC210106	50%	480
RG_FO26_BIC-01_2020-06-17		17-Jun-20	CC210107	7%	350
RG_FO26_BIC-02_2020-06-17		17-Jun-20	CC210108	27%	332
RG_FO26_BIC-03_2020-06-17		17-Jun-20	CC210109	12%	372
RG_UFR1_BIC-01_2020-06-17		17-Jun-20	CC210110	10%	322
RG_UFR1_BIC-02_2020-06-17		17-Jun-20	CC210111	8%	405
RG_UFR1_BIC-03_2020-06-17		17-Jun-20	CC210112	25%	411
RG_FOBSC_BIC-01_2020-06-18		18-Jun-20	CC210113	27%	355
RG_FOBSC_BIC-02_2020-06-18		18-Jun-20	CC210114	12%	335
RG_FOBSC_BIC-03_2020-06-18		18-Jun-20	CC210115	11%	335
RG_FOBCPD_BIC-01_2020-06-18		18-Jun-20	CC210116	16%	332
RG_FOBCPD_BIC-02_2020-06-18		18-Jun-20	CC210117	29%	390
RG_FOBCPD_BIC-03_2020-06-18		18-Jun-20	CC210118	16%	373
RG_FRCP1SW_BIC-01_2020-06-18		18-Jun-20	CC210119	100%	380
RG_FRCP1SW_BIC-02_2020-06-18		18-Jun-20	CC210120	25%	374
RG_FRCP1SW_BIC-03_2020-06-18		18-Jun-20	CC210121	12%	437
RG_FRCP1SWD_BIC-01_2020-06-18		18-Jun-20	CC210122	25%	364
RG_FRCP1SWD_BIC-02_2020-06-18		18-Jun-20	CC210123	19%	370
RG_FRCP1SWD_BIC-03_2020-06-18		18-Jun-20	CC210124	25%	266
RG_FODPO_BIC-01_2020-06-19		19-Jun-20	CC210125	100%	440
RG_FODPO_BIC-02_2020-06-19		19-Jun-20	CC210126	14%	331

Table A.8: Sub-Sampling Percentages and Total Organism Recovery for Benthic Invertebrate Community Samples, FRO LAEMP, 2020

Sample ID	Month	Date	Laboratory ID	% Sampled	# Invertebrates
RG_FODPO_BIC-03_2020-06-19	June	19-Jun-20	CC210127	13%	324
RG_FRUPO_BIC-01_2020-06-19		19-Jun-20	CC210128	9%	230
RG_FRUPO_BIC-02_2020-06-19		19-Jun-20	CC210129	15%	374
RG_FRUPO_BIC-03_2020-06-19		19-Jun-20	CC210130	14%	343
RG_FOUEW_BIC-01_2020-06-19		19-Jun-20	CC210131	15%	338
RG_FOUEW_BIC-02_2020-06-19		19-Jun-20	CC210132	12%	337
RG_FOUEW_BIC-03_2020-06-19		19-Jun-20	CC210133	10%	354
RG_FO22_BIC-02_2020-06-19		19-Jun-20	CC210134	14%	331
RG_FOUSH_BIC-01_2020-06-23		23-Jun-20	CC210135	20%	400
RG_FOUSH_BIC-02_2020-06-23		23-Jun-20	CC210136	9%	375
RG_FOUSH_BIC-03_2020-06-23		23-Jun-20	CC210137	13%	316
RG_HENUP_BIC-1_2020-09-15	September	15-Sep-20	CC210861	5%	415
RG_HENUP_BIC-2_2020-09-15		15-Sep-20	CC210862	5%	488
RG_HENUP_BIC-3_2020-09-15		15-Sep-20	CC210863	5%	446
RG_UFR1_BIC-1_2020-09-16		16-Sep-20	CC210864	5%	979
RG_UFR1_BIC-2_2020-09-16		16-Sep-20	CC210865	5%	753
RG_UFR1_BIC-3_2020-09-16		16-Sep-20	CC210866	5%	1,295
RG_FODHE_BIC-1_2020-09-15		15-Sep-20	CC210867	5%	1,670
RG_FODHE_BIC-2_2020-09-15		15-Sep-20	CC210868	5%	2,092
RG_FODHE_BIC-3_2020-09-15		15-Sep-20	CC210869	5%	1,123
RG_FOUCL_BIC-1_2020-09-10		10-Sep-20	CC210870	5%	1,112
RG_FOUCL_BIC-2_2020-09-10		10-Sep-20	CC210871	5%	1,124
RG_FOUCL_BIC-3_2020-09-10		10-Sep-20	CC210872	5%	741
RG_FOUNGD_BIC-1_2020-09-10		10-Sep-20	CC210873	5%	826
RG_FOUNGD_BIC-2_2020-09-10		10-Sep-20	CC210874	5%	1,281
RG_FOUNGD_BIC-3_2020-09-10		10-Sep-20	CC210875	5%	642
RG_FODNGD_BIC-1_2020-09-21		21-Sep-20	CC210876	5%	817
RG_FODNGD_BIC-2_2020-09-21		21-Sep-20	CC210877	5%	444
RG_FODNGD_BIC-3_2020-09-21		21-Sep-20	CC210878	5%	849
RG_MP1_BIC-1_2020-09-15		15-Sep-20	CC210879	5%	475
RG_MP1_BIC-2_2020-09-15		15-Sep-20	CC210880	5%	407
RG_MP1_BIC-3_2020-09-15		15-Sep-20	CC210881	5%	534
RG_FOUSH_BIC-1_2020-09-21		21-Sep-20	CC210882	5%	569
RG_FOUSH_BIC-2_2020-09-21		21-Sep-20	CC210883	5%	588
RG_FOUSH_BIC-3_2020-09-21		21-Sep-20	CC210884	5%	528
RG_FOUKI_BIC-1_2020-09-14		14-Sep-20	CC210885	5%	491
RG_FOUKI_BIC-2_2020-09-14		14-Sep-20	CC210886	5%	426
RG_FOUKI_BIC-3_2020-09-14		14-Sep-20	CC210887	5%	836
RG_FOBKS-BIC-1_2020-09-10		10-Sep-20	CC210888	5%	397
RG_FOBKS-BIC-2_2020-09-10		10-Sep-20	CC210889	5%	358
RG_FOBKS-BIC-3_2020-09-10		10-Sep-20	CC210890	6%	632
RG_SCOUTDS_BIC-1_2020-09-17		17-Sep-20	CC210891	5%	468
RG_SCOUTDS_BIC-2_2020-09-17		17-Sep-20	CC210892	5%	468
RG_SCOUTDS_BIC-3_2020-09-17		17-Sep-20	CC210893	5%	590
RG_FOBSC_BIC-1_2020-09-18		18-Sep-20	CC210894	5%	365
RG_FOBSC_BIC-2_2020-09-18		18-Sep-20	CC210895	5%	397
RG_FOBSC_BIC-3_2020-09-18		18-Sep-20	CC210896	5%	559
RG_FRUPO_BIC-1_2020-09-12		12-Sep-20	CC210897	5%	1,294
RG_FRUPO_BIC-2_2020-09-12		12-Sep-20	CC210898	5%	340
RG_FRUPO_BIC-3_2020-09-12		12-Sep-20	CC210899	5%	807
RG_FODPO_BIC-1_2020-09-11		11-Sep-20	CC210900	5%	776
RG_FODPO_BIC-2_2020-09-11		11-Sep-20	CC210901	5%	1,418
RG_FODPO_BIC-3_2020-09-11		11-Sep-20	CC210902	5%	733
RG_FO22_BIC-1_2020-09-11		11-Sep-20	CC210903	5%	430
RG_FO22_BIC-2_2020-09-11		11-Sep-20	CC210904	5%	759
RG_FO22_BIC-3_2020-09-11		11-Sep-20	CC210905	5%	956
RG_FO22_BIC-4_2020-09-11		11-Sep-20	CC210906	5%	1,063
RG_FO22_BIC-5_2020-09-11		11-Sep-20	CC210907	5%	1,043
RG_FOUEW_BIC-1_2020-09-11		11-Sep-20	CC210908	5%	463
RG_FOUEW_BIC-2_2020-09-11		11-Sep-20	CC210909	5%	454
RG_FOUEW_BIC-3_2020-09-11		11-Sep-20	CC210910	5%	412
RG_FOBCP-BIC-1_2020-09-16		16-Sep-20	CC210911	5%	549
RG_FOBCP-BIC-2_2020-09-16		16-Sep-20	CC210912	5%	553
RG_FOBCP-BIC-3_2020-09-16		16-Sep-20	CC210913	5%	376
RG_FOBCP-BIC-4_2020-09-16		16-Sep-20	CC210914	5%	800
RG_FOBCP-BIC-5_2020-09-16		16-Sep-20	CC210915	5%	996
RG_FRCP1SW_BIC-1_2020-09-22		22-Sep-20	CC210916	5%	838
RG_FRCP1SW_BIC-2_2020-09-22		22-Sep-20	CC210917	5%	830
RG_FRCP1SW_BIC-3_2020-09-22		22-Sep-20	CC210918	10%	331
RG_FO26_BIC-1_2020-09-17		17-Sep-20	CC210919	5%	1,656
RG_FO26_BIC-2_2020-09-17		17-Sep-20	CC210920	5%	1,730
RG_FO26_BIC-3_2020-09-17		17-Sep-20	CC210921	5%	1,494
RG_UFR1_BIC-01_2020-12-08	December	08-Dec-20	CC211616	5%	1,736
RG_UFR1_BIC-02_2020-12-08		08-Dec-20	CC211617	5%	1,168
RG_UFR1_BIC-03_2020-12-08		08-Dec-20	CC211618	5%	1,296
RG_FOUKI_BIC-01_2020-12-09		09-Dec-20	CC211619	5%	767
RG_FOUKI_BIC-02_2020-12-09		09-Dec-20	CC211620	5%	735
RG_FOUKI_BIC-03_2020-12-09		09-Dec-20	CC211621	5%	361
RG_SCOUTDS_BIC-01_2020-12-07		07-Dec-20	CC211622	5%	1,174
RG_SCOUTDS_BIC-02_2020-12-07		07-Dec-20	CC211623	5%	700
RG_SCOUTDS_BIC-03_2020-12-07		07-Dec-20	CC211624	5%	655
RG_FOBSC_BIC-01_2020-12-07		07-Dec-20	CC211625	20%	463
RG_FOBSC_BIC-02_2020-12-07		07-Dec-20	CC211626	20%	338
RG_FOBSC_BIC-03_2020-12-07		07-Dec-20	CC211627	17%	344
RG_FRUPO_BIC-01_ 2020-12-10		10-Dec-20	CC211628	5%	1,560
RG_FRUPO_BIC-02_2020-12-10		10-Dec-20	CC211629	5%	786
RG_FRUPO_BIC-03_ 2020-12-10		10-Dec-20	CC211630	5%	994
RG_FODPO_BIC-01_2020-12-09		09-Dec-20	CC211631	5%	2,327
RG_FODPO_BIC-02_2020-12-09		09-Dec-20	CC211632	5%	3,489
RG_FODPO_BIC-03_2020-12-09		09-Dec-20	CC211633	5%	2,442
RG_FOUEW_BIC-01_2020-12-10		10-Dec-20	CC211634	5%	387
RG_FOUEW_BIC-02_2020-12-10		10-Dec-20	CC211635	5%	859
RG_FOUEW_BIC-03_2020-12-10		10-Dec-20	CC211636	5%	651

Table A.9: **Sub-sampling Precision and Accuracy Error for Benthic Invertebrate Community Samples, FRO LAEMP, 2020**

Laboratory ID	Sample ID	# of Organisms in Subsample																				Total # of Organisms	Precision Error		Accuracy Error	
	Subsample #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Min (%)	Max (%)	Min (%)	Max (%)
CC202807	RG_FOBCPD_BIC-03	324	321	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	645	0.93	0.93	0.47	0.47
CC202835	RG_FOUSH_BIC-01	444	478	520	494	464	467	529	499	492	525	-	-	-	-	-	-	-	-	-	-	4912	0.40	16.1	0.16	9.61
CC202833	RG_FOBCP_BIC-02	381	357	348	384	384	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,854	0	9.38	2.75	6.15
CC202827	RG_FOUKI_BIC-02	393	363	363	404	356	387	388	383	341	364	-	-	-	-	-	-	-	-	-	-	3,742	0	15.6	2.35	8.87
CC210106	RG_FOBCP_BIC-03_2020-06-17	459	462	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	921	0.65	0.65	0.33	0.33
CC210135	RG_FOUSH_BIC-01_2020-06-23	381	346	351	366	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,844	1.42	13.5	0.76	8.46
CC210077	RG_HENUP_BIC-01_2020-06-15	454	445	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	899	1.98	1.98	1.0	1.0
CC210124	RG_FRCP1SWD_BIC-03_2020-06-18	338	317	325	333	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,313	1.48	6.21	0.99	3.43
CC210103	RG_FOUKI_BIC-03_2020-06-17	418	418	431	414	417	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,098	0	3.94	0.38	2.72
CC210089	RG_FOUNGD_BIC-01_2020-06-16	336	328	320	318	311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,613	0.62	7.44	0.81	4.15
CC210905	FO22_BIC_3	925	916	943	920	959	976	914	939	918	953	911	997	945	895	913	908	913	965	846	931	18,587	0	15.2	0.18	8.97
CC210880	RG_MP1_BIC_2	411	388	396	375	331	364	400	369	343	411	377	381	329	382	405	383	330	395	406	397	7,573	0	20.0	0.44	13.1
CC210918	RG_FRCP1SW_BIC_3	334	344	283	301	336	306	324	305	311	353	-	-	-	-	-	-	-	-	-	-	3,197	0.33	19.8	1.35	11.5
CC210894	RG_FOBSC_BIC_1	364	332	338	352	329	327	354	369	328	329	363	371	332	336	346	345	378	359	337	341	6,930	0	13.5	0.140	9.09
CC210881	RG_MP1_BIC_3	531	590	599	521	531	561	530	546	560	540	540	522	571	551	551	502	576	522	547	538	10,929	0	16.2	0.08	9.62
CC210913	RG_FOBCP_BIC_3	378	379	374	342	390	382	400	367	388	388	364	346	369	381	380	352	373	377	354	353	7,437	0	14.5	0.31	8.03
CC211626	2020_RG-FOBSC_BIC-2	332	337	348	346	371	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,734	0.57	10.5	0.23	6.98
CC211625	2020_RG_FOBSC_BIC-01	459	430	420	441	396	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,146	2.33	13.7	0.19	7.74
																						Average	**0.60**	**11.1**	**0.72**	**6.68**

Note: "-" = sub-sample not taken.

Table A.10: Organism Recovery Results for Benthic Invertebrate Community Samples, FRO LAEMP, 2020

Sample ID	Laboratory ID	Number of Organisms Recovered (Initial Sort)	Taxon	Number of Organisms in Re-sort	% Efficiency
RG_FRCP1SW_BIC-03_2020-04-16	CC202810	346	Chironomidae	1	99.4%
			Plecoptera	1	
RG_FOUEW_BIC-03_2020-04-08	CC202816	460	Trichoptera	1	99.8%
RG_FOUEW_BIC-01_2020-04-28	CC202829	418	Chironomidae	1	99.8%
RG_FOUSH_BIC-02_2020-04-29	CC202836	339	Chironomidae	3	99.1%
RG_HENUP_BIC-3_2020-09-15	CC210863	445	Trombidiformes	1	99.8%
RG_SCOUTDS_BIC-3_2020-09-17	CC210893	590	No invertebrates found[a]	0	100%
RG_FODPO_BIC-3_2020-09-11	CC210902	729	Heptageniidae	1	99.5%
			Plecoptera	3	
RG_FO22_BIC-4_2020-09-11	CC210906	1,058	Coleoptera	1	99.5%
			Baetidae	1	
			Plecoptera	2	
			Bivalvia	1	
RG_FOUEW_BIC-1_2020-09-11	CC210908	463	No invertebrates found[a]	0	100%
RG_FOBCP_BIC-4_2020-09-16	CC210914	798	Chironomidae	1	99.8%
			Ephemerellidae	1	
RG_UFR1_BIC-03_2020-12-08	CC211618	1,294	Plecoptera	2	99.8%
RG_FOUEW_BIC-02_2020-12-10	CC211635	858	Plecoptera	1	99.9%
Average Recovery					99.7%

Notes: "-" = not applicable. As sorting progressed, 10% of samples were randomly chosen by senior members of the sorting team for resorting. All sorters working on a project had at least one sample resorted by another sorter. An efficiency of 90% was expected. If 90 / 95% efficiency was not met, samples from that sorter were re-sorted. To calculate sorting efficiency the following formula was used: (# organisms missed / total organisms found)*100.

[a] No organisms were recovered when material that previously been sorted was re-examined by a different member of the sorting team.

Table A.11: Taxonomic Quality Control Results for Benthic Invertebrate Community Samples[a], FRO LAEMP, 2020

Sample ID	Laboratory ID	Taxa Identified	TIR	PDE	PTD	BCDI
RG_FOBCPD_BIC-01_2020-04-15	CC202805	338	0	0	0.296	0.00296
RG_FOUEW_BIC-02_2020-04-08	CC202815	430	0.230	0.232	1.16	0.00928
RG_FRCP1SWD_BIC-02_2020-04-16	CC202824	712	0	0.140	0.700	0.00561
RG_FRCP1SW_BIC-02_2020-04-30	CC202842	317	0	0.938	1.86	0.00938
RG_HENUP_BIC-01_2020-06-15	CC210077	477	0	0.209	0.63	0.00418
RG_FOUCL_BIC-01_2020-06-15	CC210086	338	0	0.295	0.59	0.00295
RG_FODNGD_BIC-01_2020-06-16	CC210092	409	0	0	0.24	0.00244
RG_FO26_BIC-01_2020-06-17	CC210107	350	0	0	0.29	0.00286
RG_FOBSC_BIC-03_2020-06-18	CC210115	335	0	0	0.30	0.00299
RG_FRUPO_BIC-03_2020-06-19	CC210130	342	0	0.146	0.29	0.00146
RG_HENUP_BIC-1_2020-09-15	CC210861	413	0.240	0.242	0.96	0.00725
RG_FOUCL_BIC-2_2020-09-10	CC210871	1,125	0	0.044	0.71	0.00667
RG_FOUSH_BIC-3_2020-09-21	CC210884	525	0	0.285	1.52	0.01235
RG_FOBSC_BIC-3_2020-09-18	CC210896	557	0.180	0.179	0.89	0.00717
RG_FODPO_BIC-3_2020-09-11	CC210902	724	0	0.618	1.77	0.01167
RG_FOUEW_BIC-2_2020-09-11	CC210909	450	0	0.442	0.881	0.00442
RG_FOUKI_BIC-02_2020-12-09	CC211620	735	0.140	0	0.408	0.00408
RG_FOUKI_BIC-03_2020-12-09	CC211621	362	0	0.138	0.829	0.00692

Values did not meet the data quality objective of < 5% for TIR.

Notes: TIR = Total Identification Error Rate, PDE = Percent Difference in Enumeration, PTD = Percent Taxonomic Disagreement, BCDI = Bray Curtis Dissimilarity Index to quantify differences in identifications.

[a] For error rationale and calculations, refer to laboratory report (Appendix J).

A4.4 Data Quality Statement

Benthic invertebrate community structure data were of acceptable quality as characterized by good sorting efficiency, subsampling precision and accuracy, and excellent taxonomic identification accuracy. Therefore, the associated data can be used with a high level of confidence in the derivation of conclusions.

A5 BENTHIC INVERTEBRATE TISSUE CHEMISTRY

A5.1 Laboratory Reporting Limits

Analytical reports of benthic invertebrate tissue metal concentrations from TrichAnalytics (see Appendix J for laboratory reports) were examined to provide an inventory of analyte results below the LRL and to compare the LRLs for these analytes to available benchmarks (Table A.12). The primary focus of interpretation of benthic invertebrate tissue chemistry results for the FRO LAEMP was selenium. Selenium was detectable (i.e., > LRL) in all benthic invertebrate samples, therefore comparison of the selenium LRL to the applicable benchmark (i.e., Elk Valley Water Quality Plan Level 1 benchmark for effects to invertebrates [13 mg/kg dry weight]; Teck 2014) was not necessary to assess whether adequate detectability was achieved. Overall, the detectability of selenium in all samples (i.e., > LRL) indicates that the achieved LRLs were suitable for the study.

A5.2 Data Accuracy and Precision

Data accuracy was evaluated based on the analysis of 30 CRM samples consisting of a total of 840 individual analytes results (Appendix J). The CRM analyses met the laboratory DQO (Table A.1) with the exceptions of:

- eleven results for antimony (precision of 20.4 to 39%);
- one result for cadmium (accuracy of 134%);
- one result for lead (precision of 31.3%);
- three results for tin (accuracy of 147%; precision of 21 to 28%); and
- one result for uranium (precision of 21.0%).

As indicated above, selenium was the primary focus of interpretation for benthic invertebrate tissue chemistry results for the FRO LAEMP. As such, the DQO exceedances for the other analytes listed above would not affect data interpretation. Accuracy achieved by the laboratory in this study can therefore be considered good.

Laboratory precision was evaluated based on duplicate analysis of benthic invertebrate tissue samples (n = 23; Appendix J). Laboratory duplicate results for benthic invertebrate tissue were within the DQO set by TrichAnalytics, with the exceptions of copper in one set of samples (RPD = 47.6%) and uranium in one set of samples (RPD = 46.7%). The DQO for laboratory precision was met for all selenium results. Since selenium is the focus of benthic invertebrate tissue chemistry interpretation for the FRO LAEMP, laboratory analytical precision can be considered good for this study.

Table A.12: Laboratory Reporting Limit (LRL) Evaluation of Benthic Tissue Chemistry Analytes with < LRL Results, FRO LAEMP, 2020

Parameter	Units	Range of LRLs	No. Sample Results < LRL
Metals			
Antimony	ppm	0.004 to 0.008	1 (0.422%)
Arsenic	ppm	0.391 to 0.582	97 (40.9%)
Mercury	ppm	0.031 to 0.045	64 (27.0%)

Notes: Only analytes with one or more sample results < LRL are displayed. The total number of samples analyzed (n) was 237. LRL = Laboratory Reporting Limit. LRLs were above applicable guidelines for selenium.

A5.3 Data Quality Statement

Benthic invertebrate tissue data collected for the present study were of good quality as characterized by good detectability, appropriate LRLs, and good laboratory precision and accuracy. Therefore, the associated data can be used with a good level of confidence in the derivation of conclusions for this study.

A6 DATA QUALITY STATEMENT

Overall, the quality of the data collected for this project was considered acceptable for the derivation of conclusions associated with the objectives of the 2020 FRO LAEMP.

A7 REFERENCES

BCMOECCS (British Columbia Ministry of Environment and Climate Change Strategy). 2019. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture. Summary Report. Water and Sustainability Branch. August 2019.

BCMOECCS. 2021. Working Water Quality Guidelines for British Columbia [online]. Updated February 2021. Available at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/bc_env_working_water_quality_guidelines.pdf.

Environment Canada. 2014. Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples. Canadian Aquatic Biomonitoring Network (CABIN). April.

Golder (Golder Associates Ltd.). 2014. Benchmark Derivation Report for Selenium. Annex E of the Elk Valley Water Quality Plan. Prepared for Teck Coal Limited. July 2014.

Teck (Teck Coal Ltd.). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.

Weiner, E.R. 2013. Applications of Environmental Aquatic Chemistry: A Practical Guide, Third Edition. CRC Press, Boca Raton, FL.

APPENDIX B
WATER

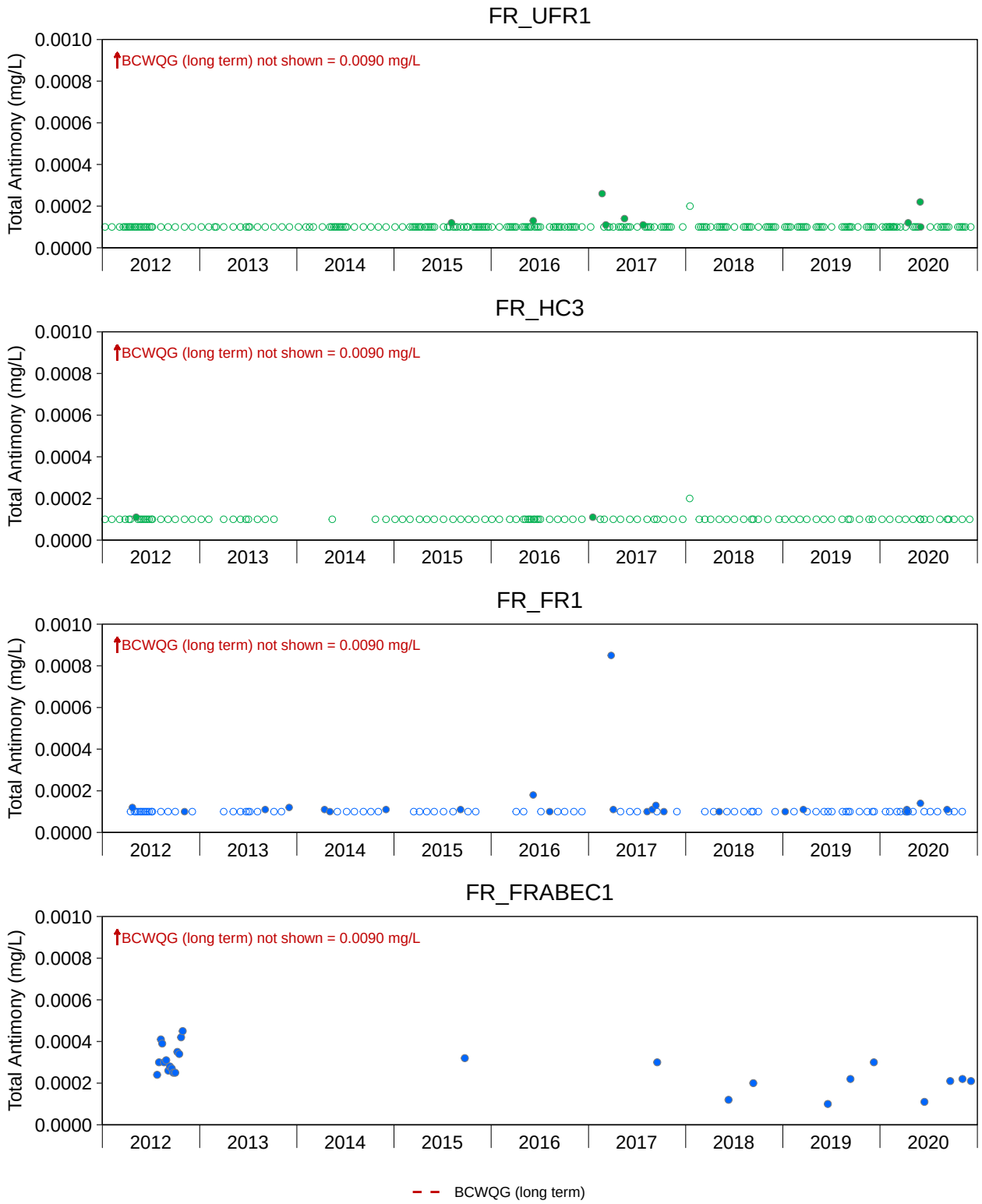
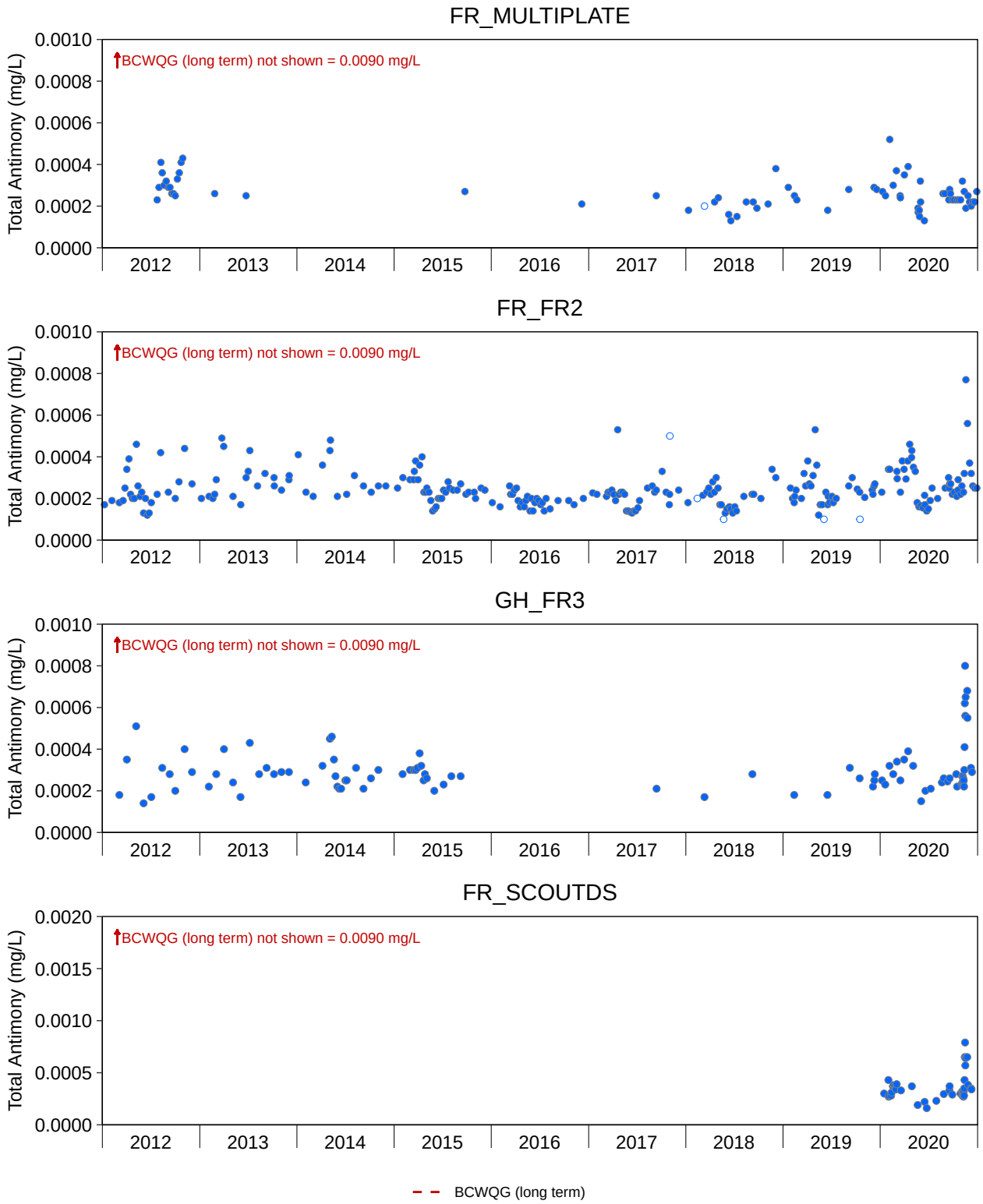


Figure B.1: Time Series Plots for Total Antimony Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).



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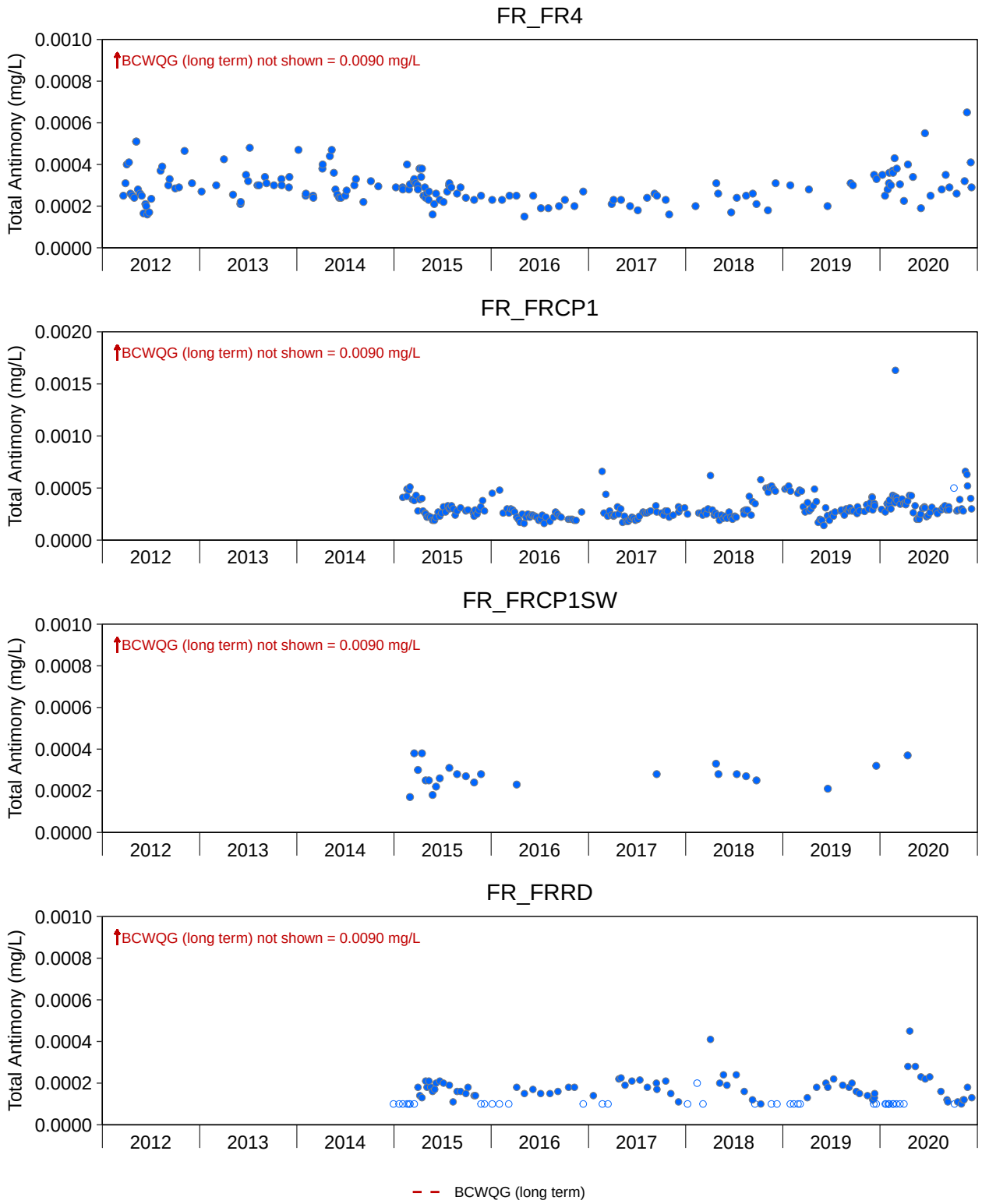

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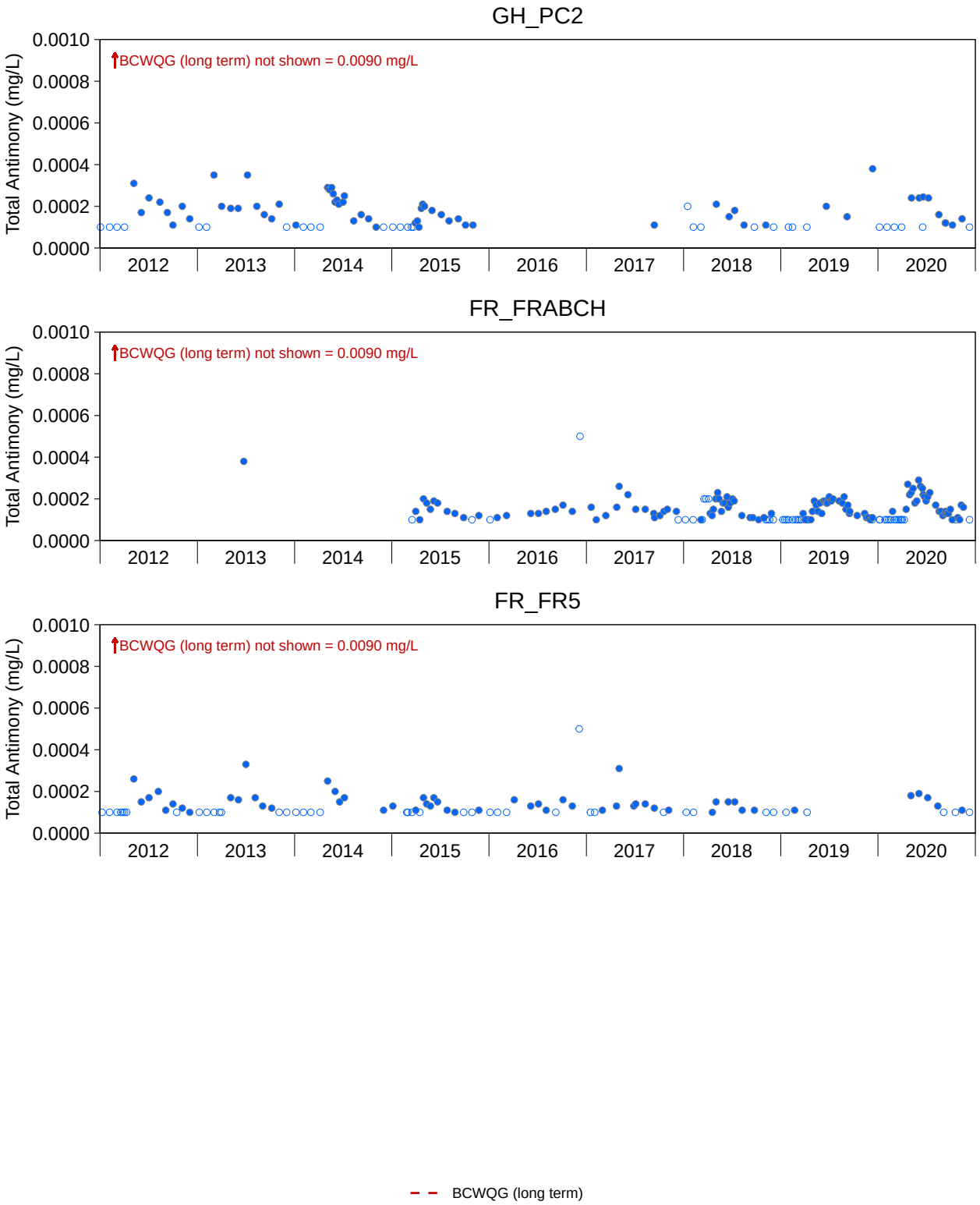

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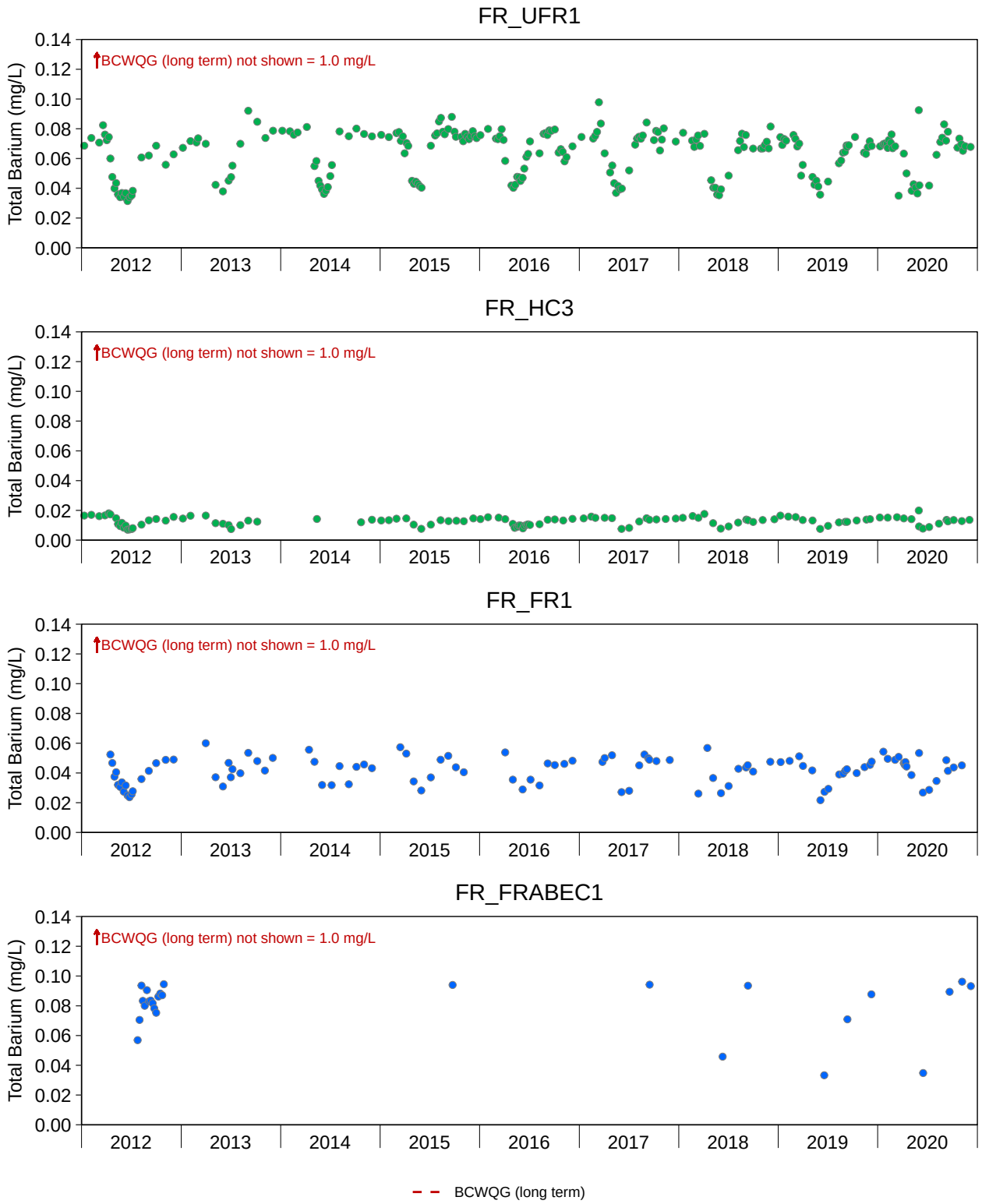
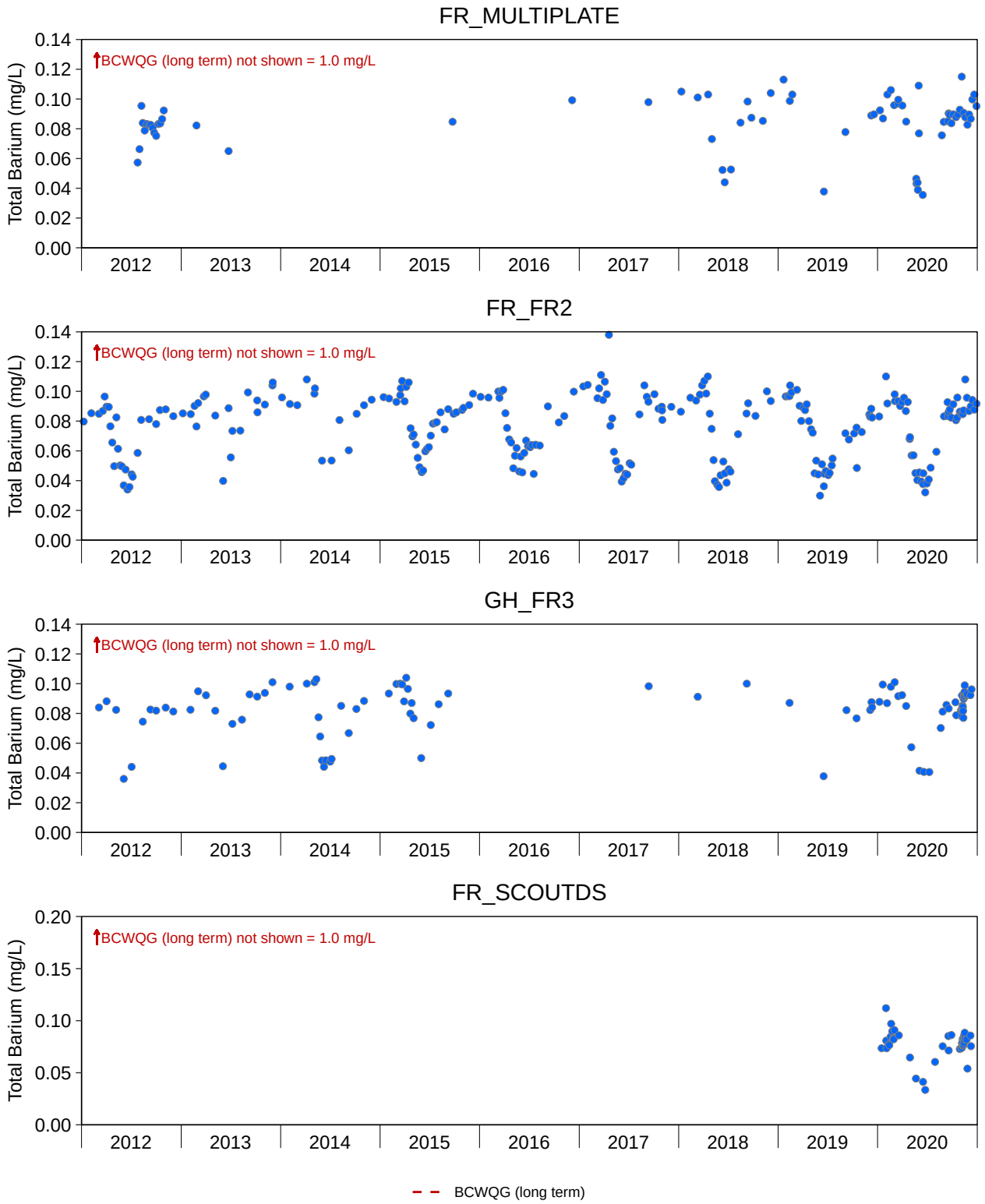


Figure B.2: Time Series Plots for Total Barium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).



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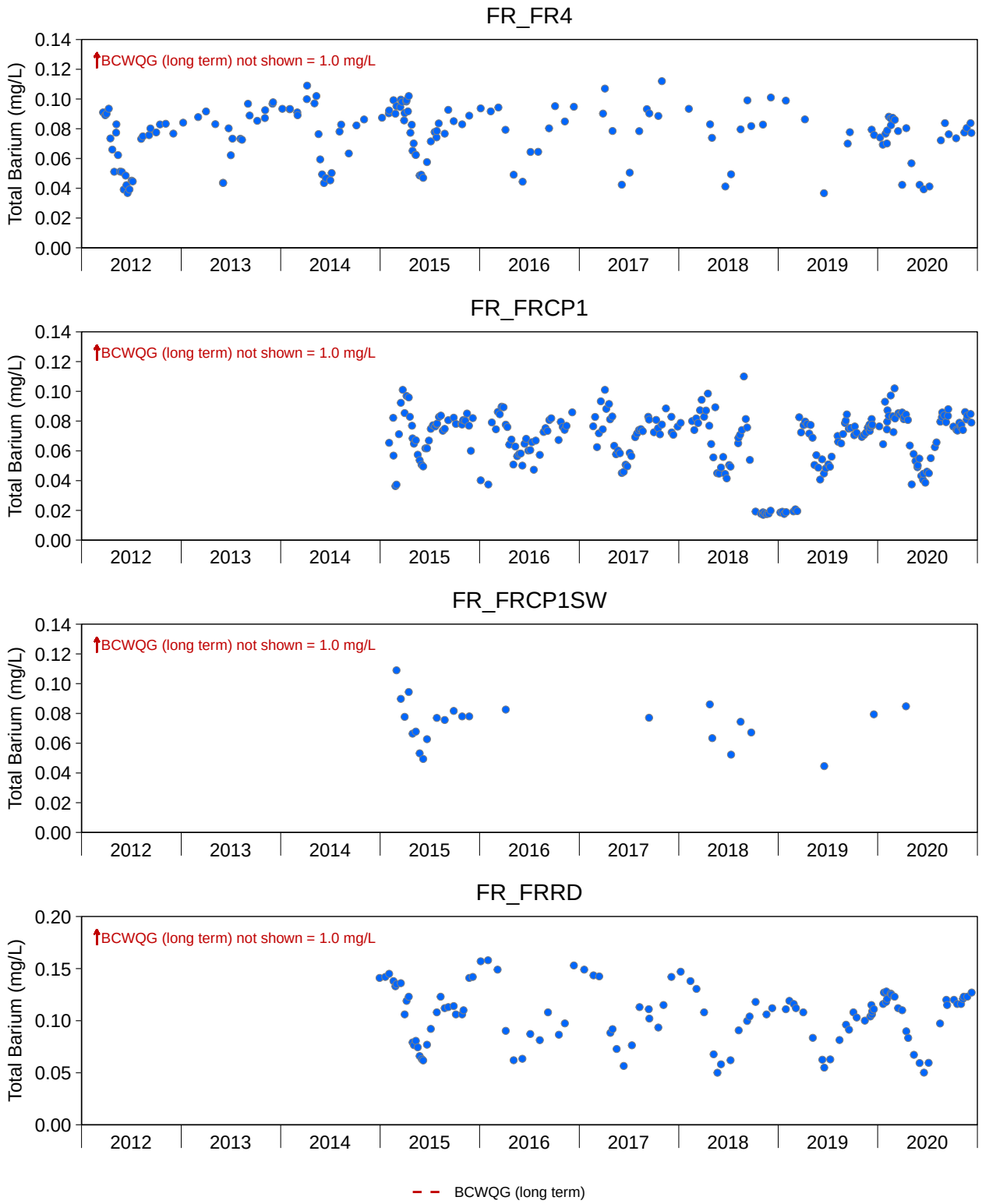

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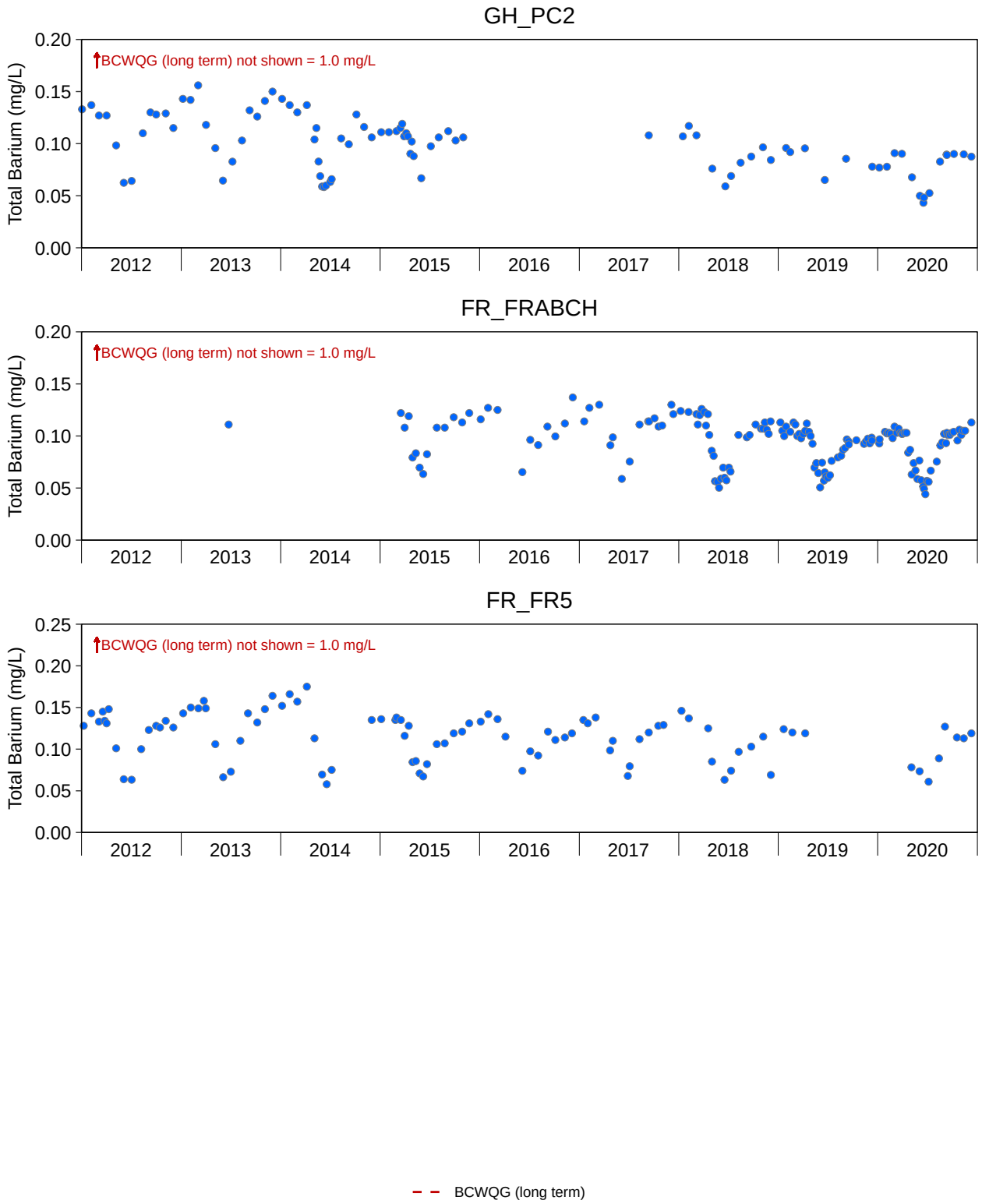
Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).



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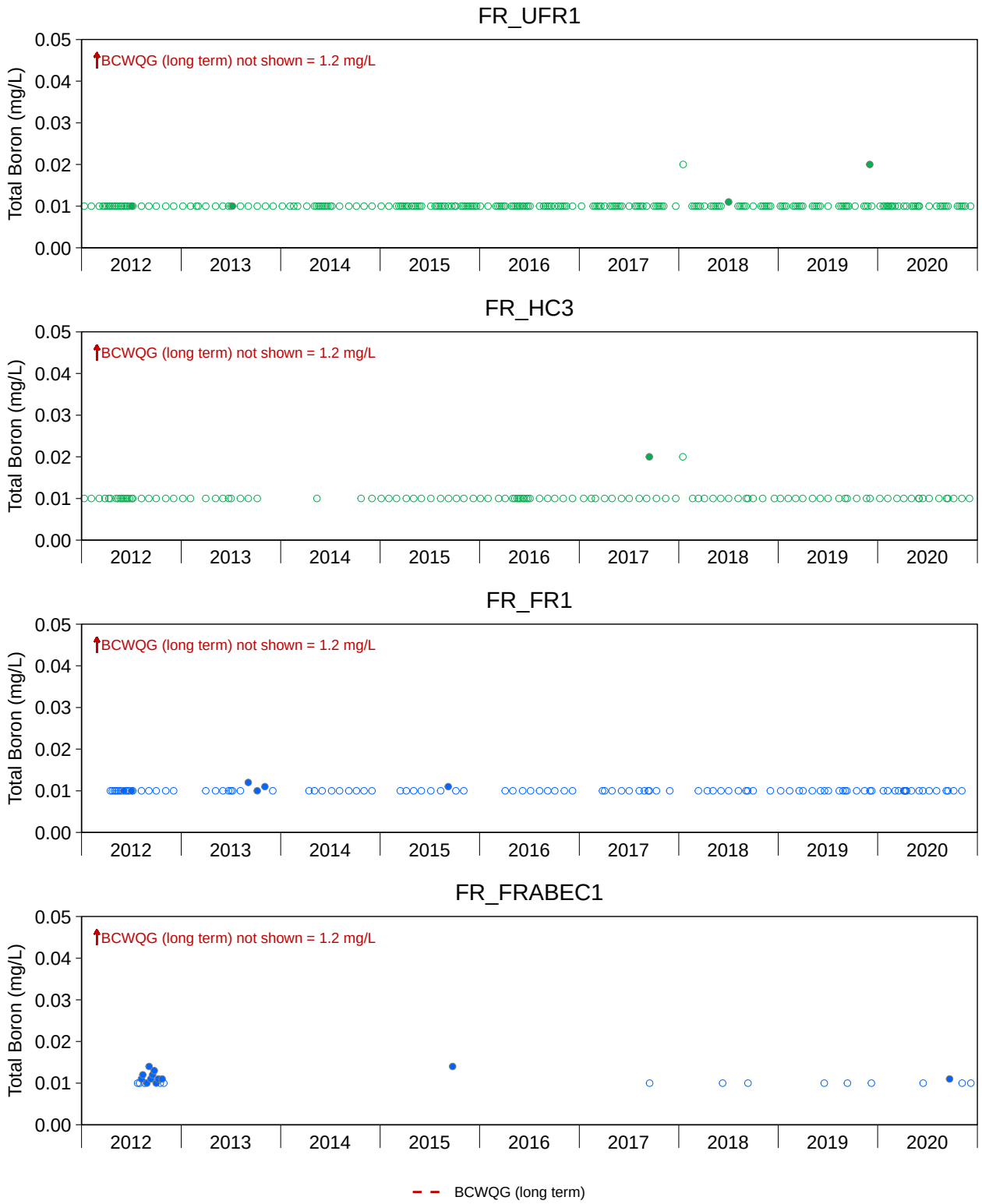
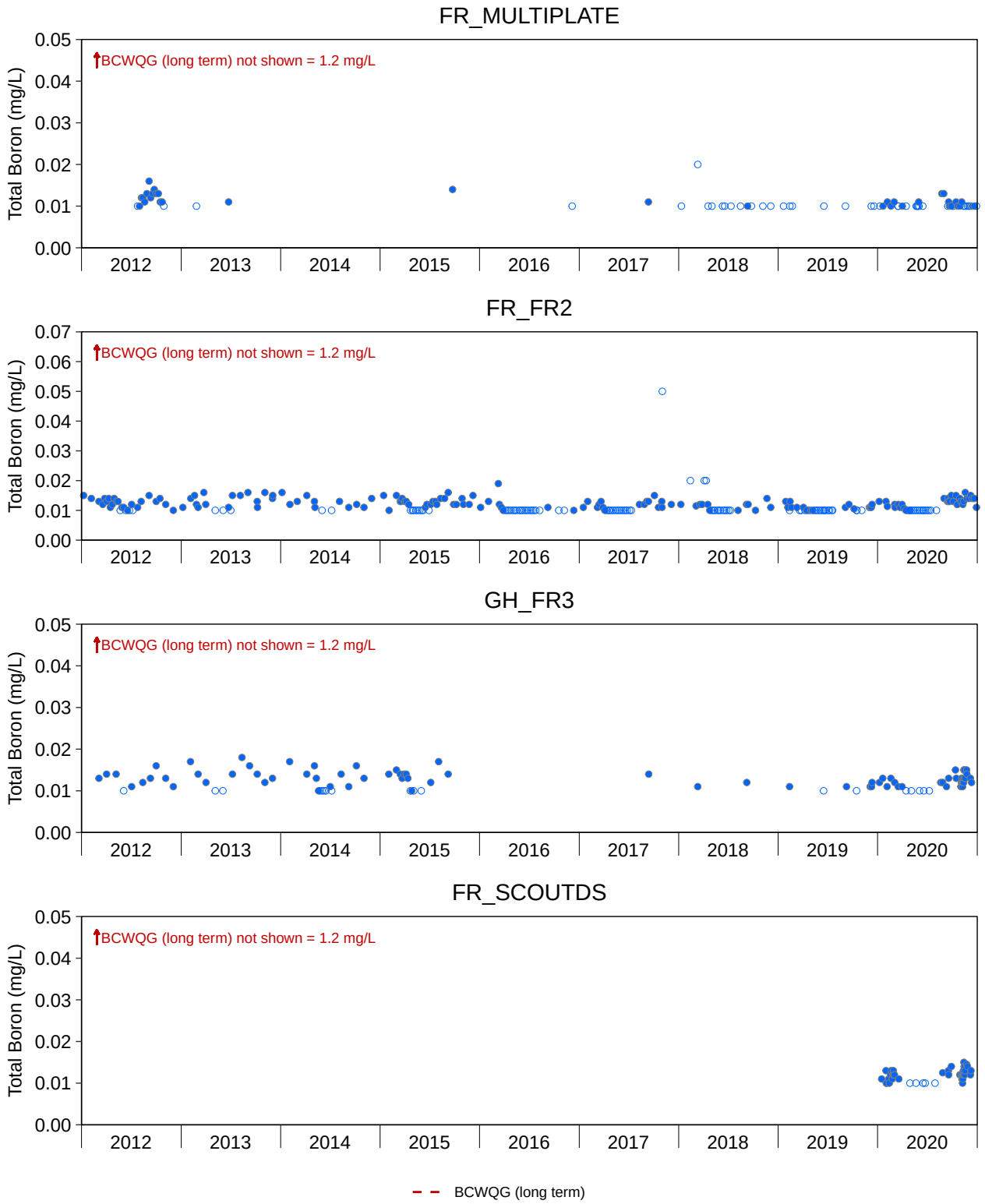


Figure B.3: Time Series Plots for Total Boron Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).



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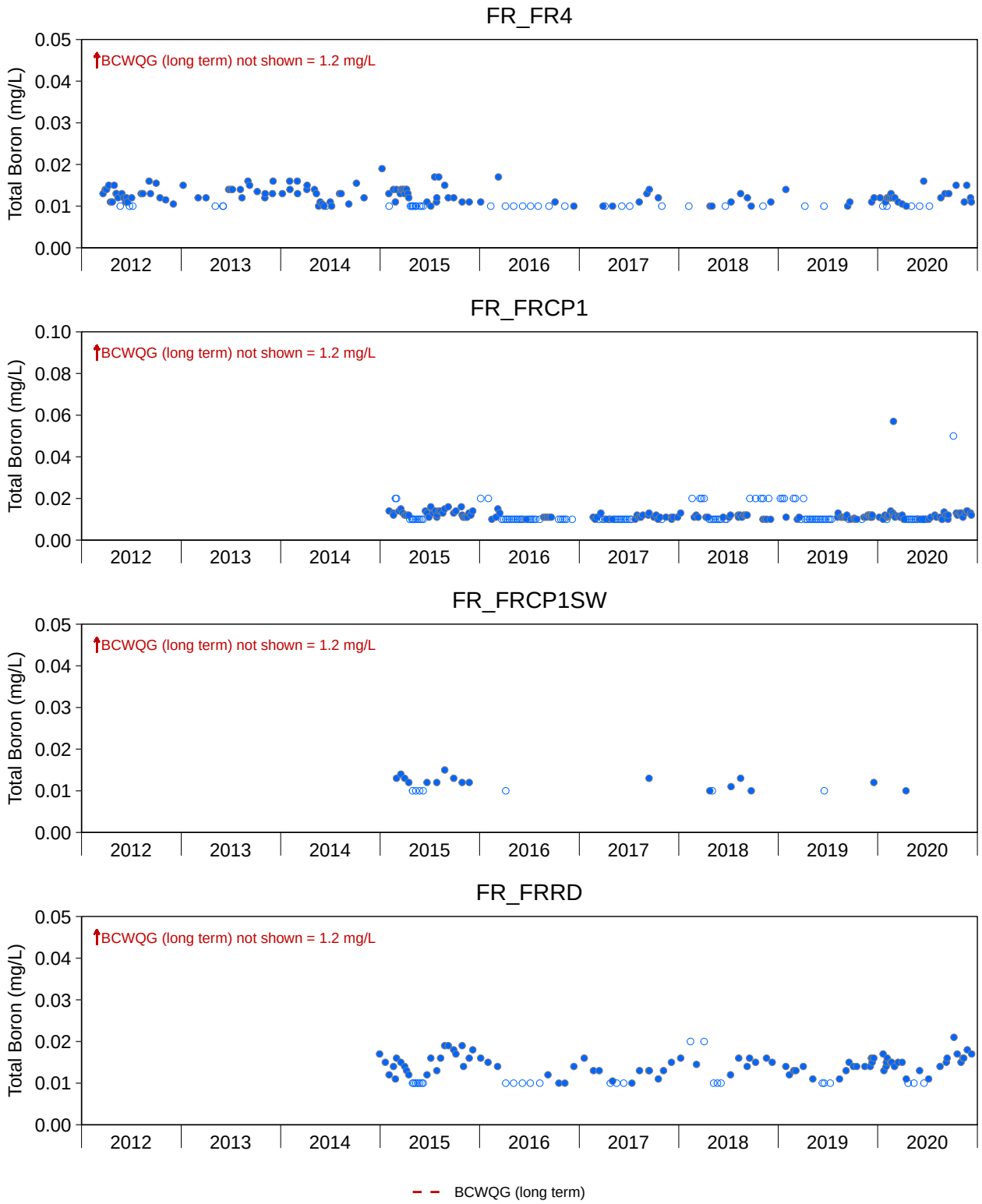

Figure B.3: Time Series Plots for Total Boron Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

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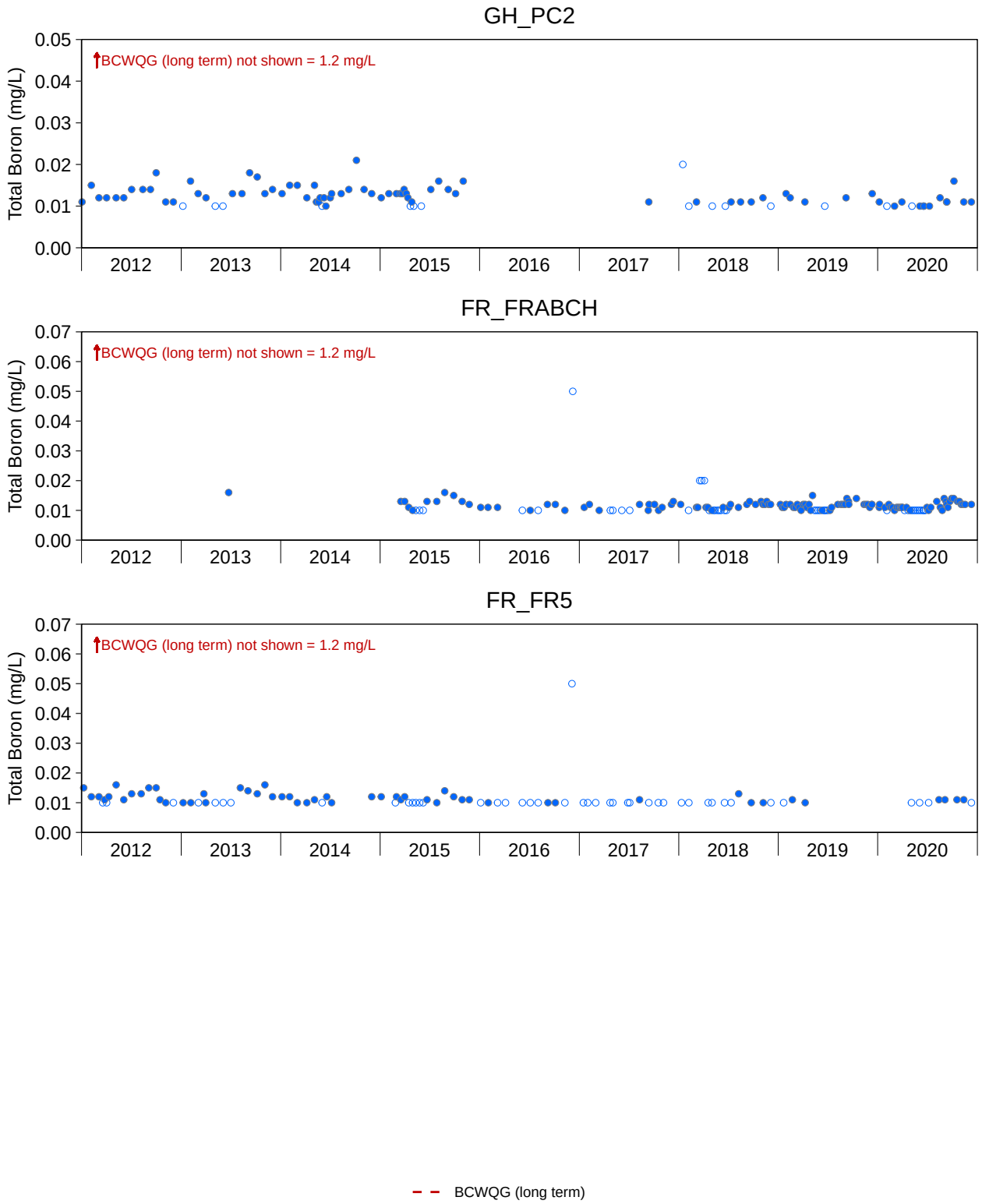

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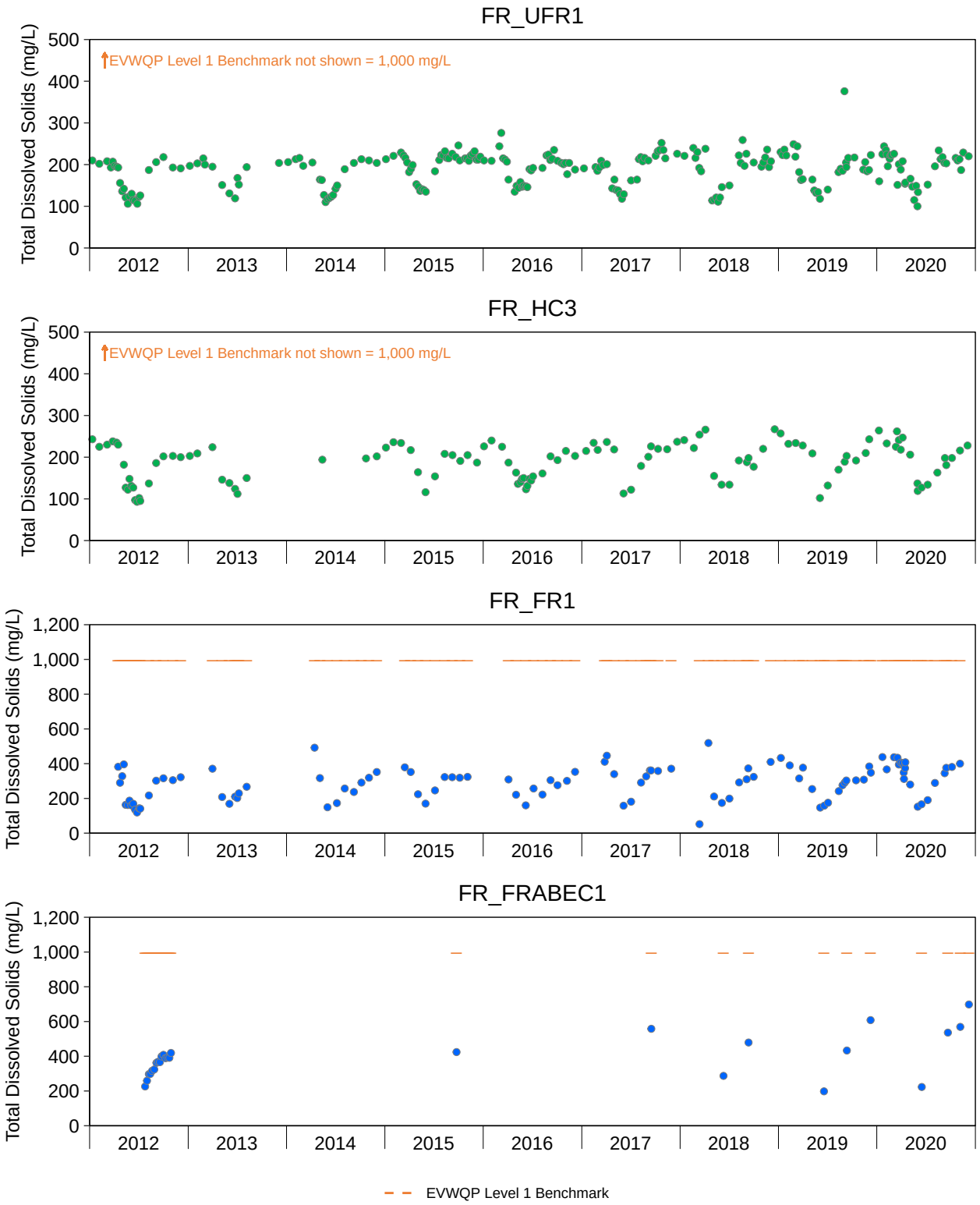

Figure B.4: Time Series Plots for Total Dissolved Solids Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

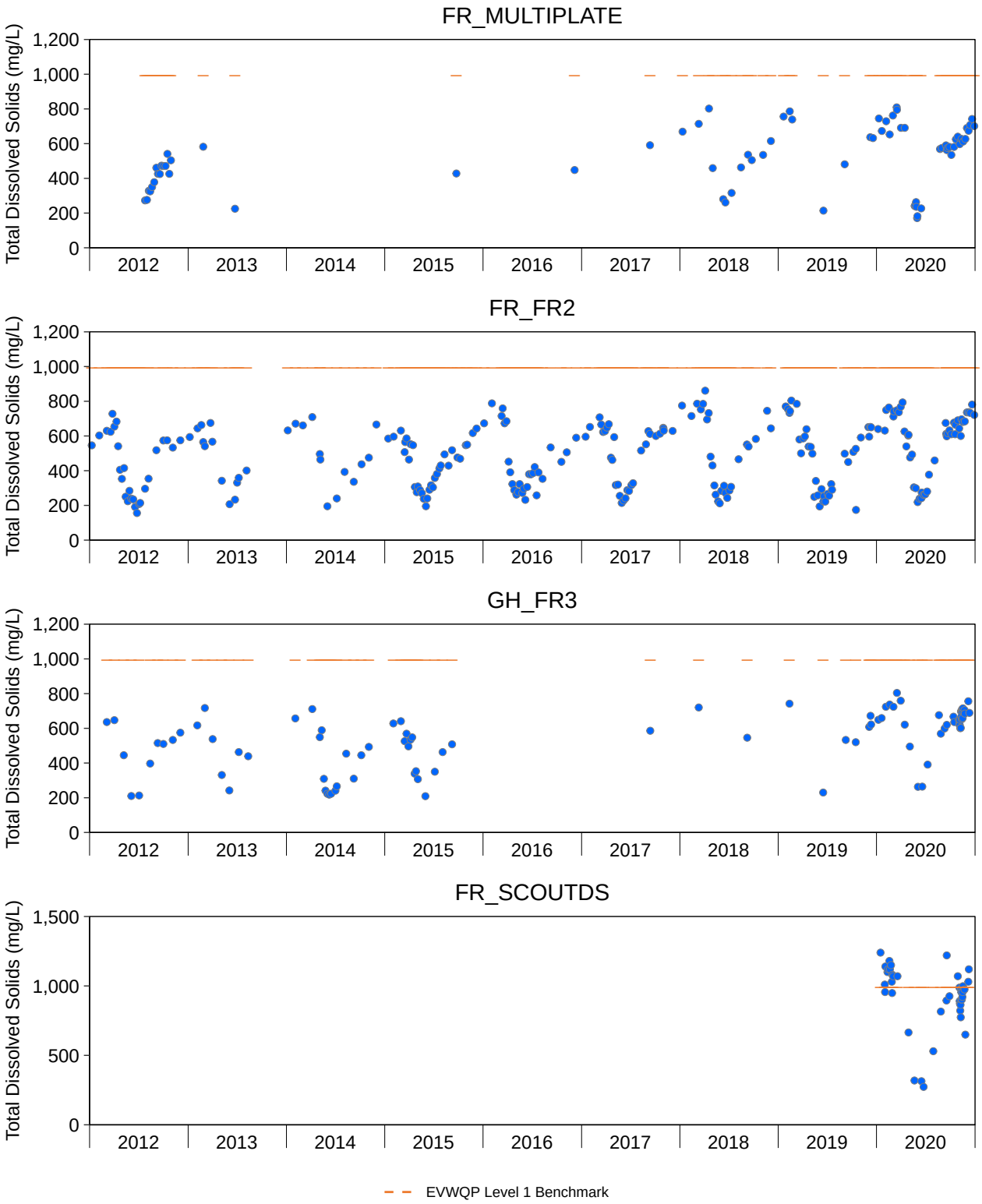

Figure B.4: Time Series Plots for Total Dissolved Solids Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

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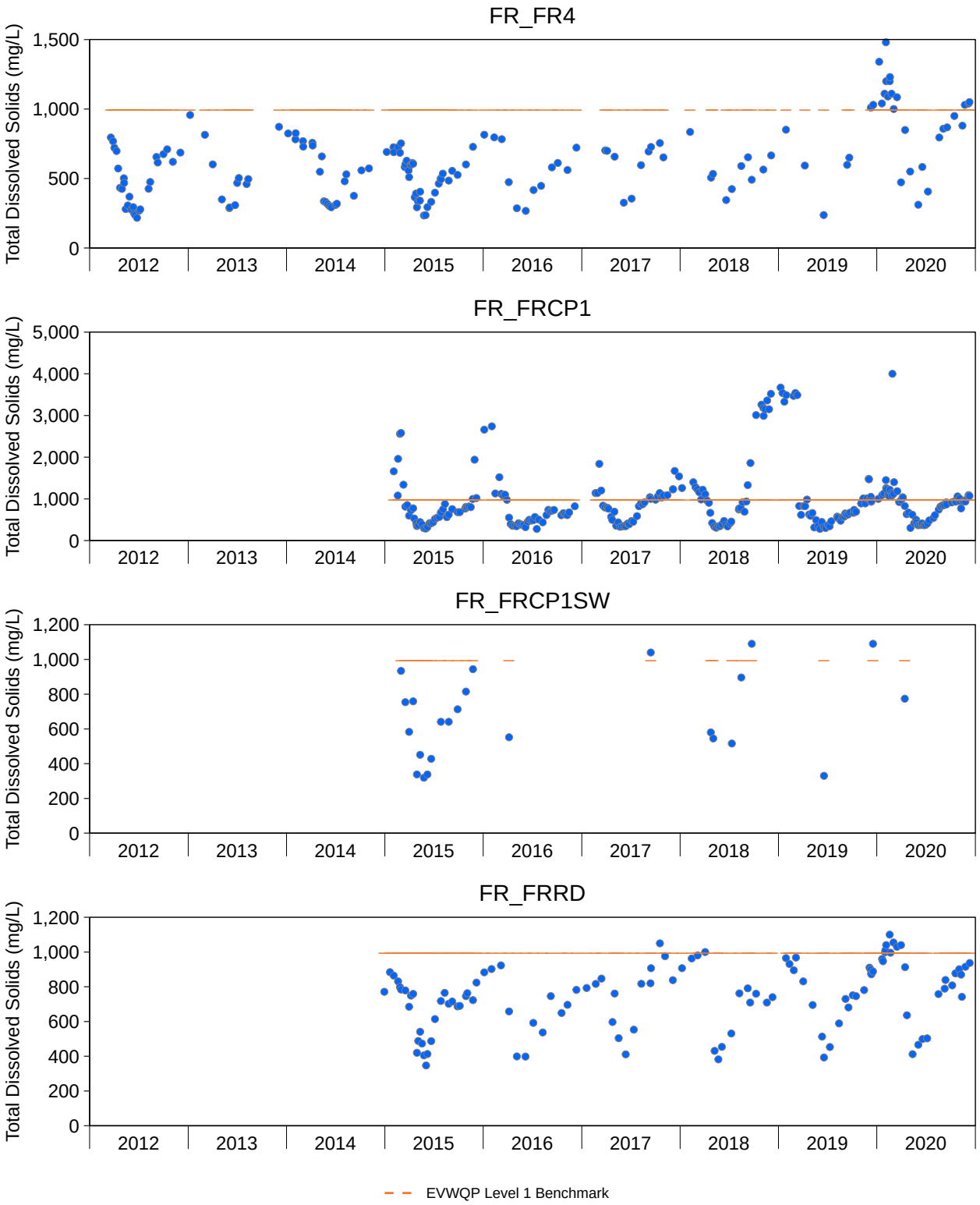

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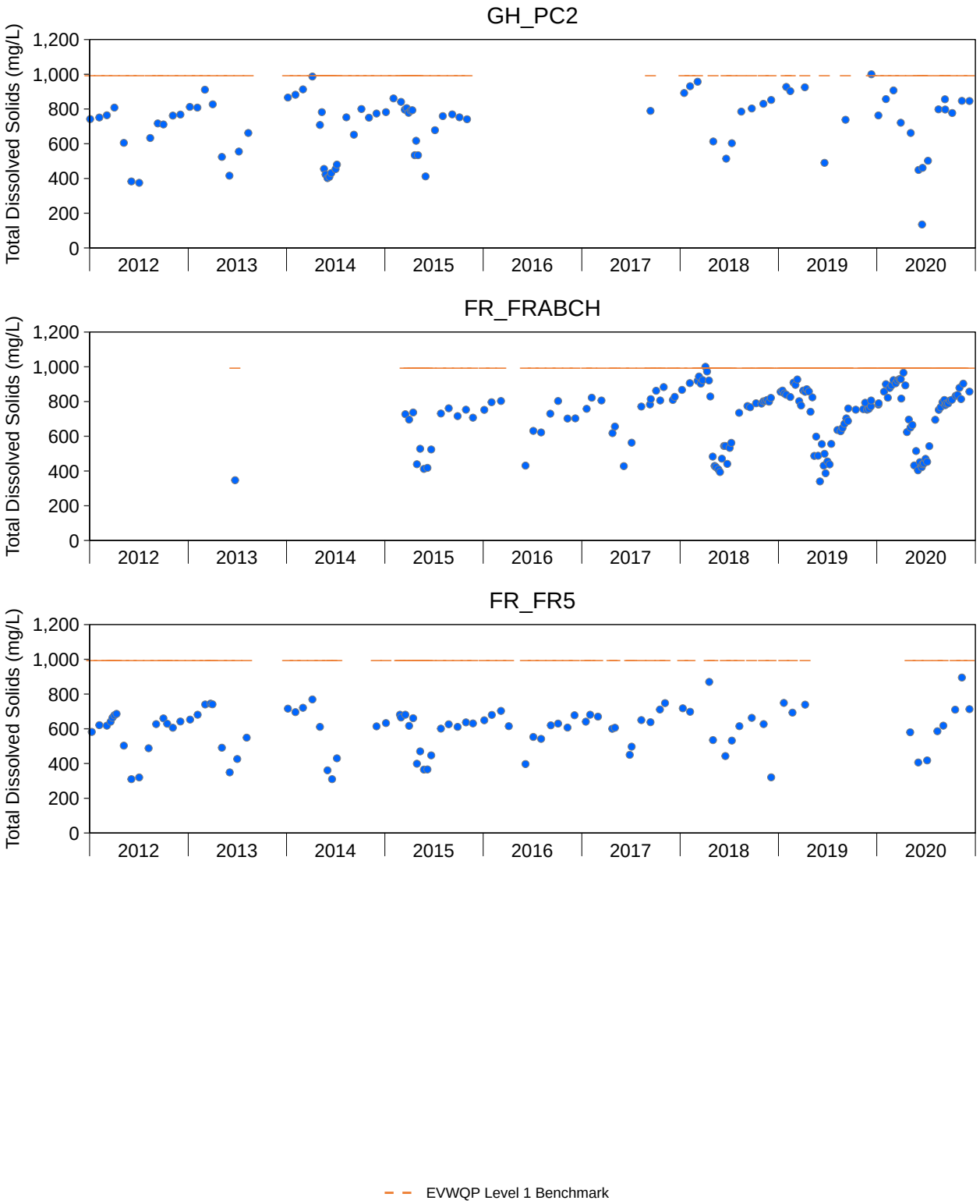

Figure B.4: Time Series Plots for Total Dissolved Solids Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

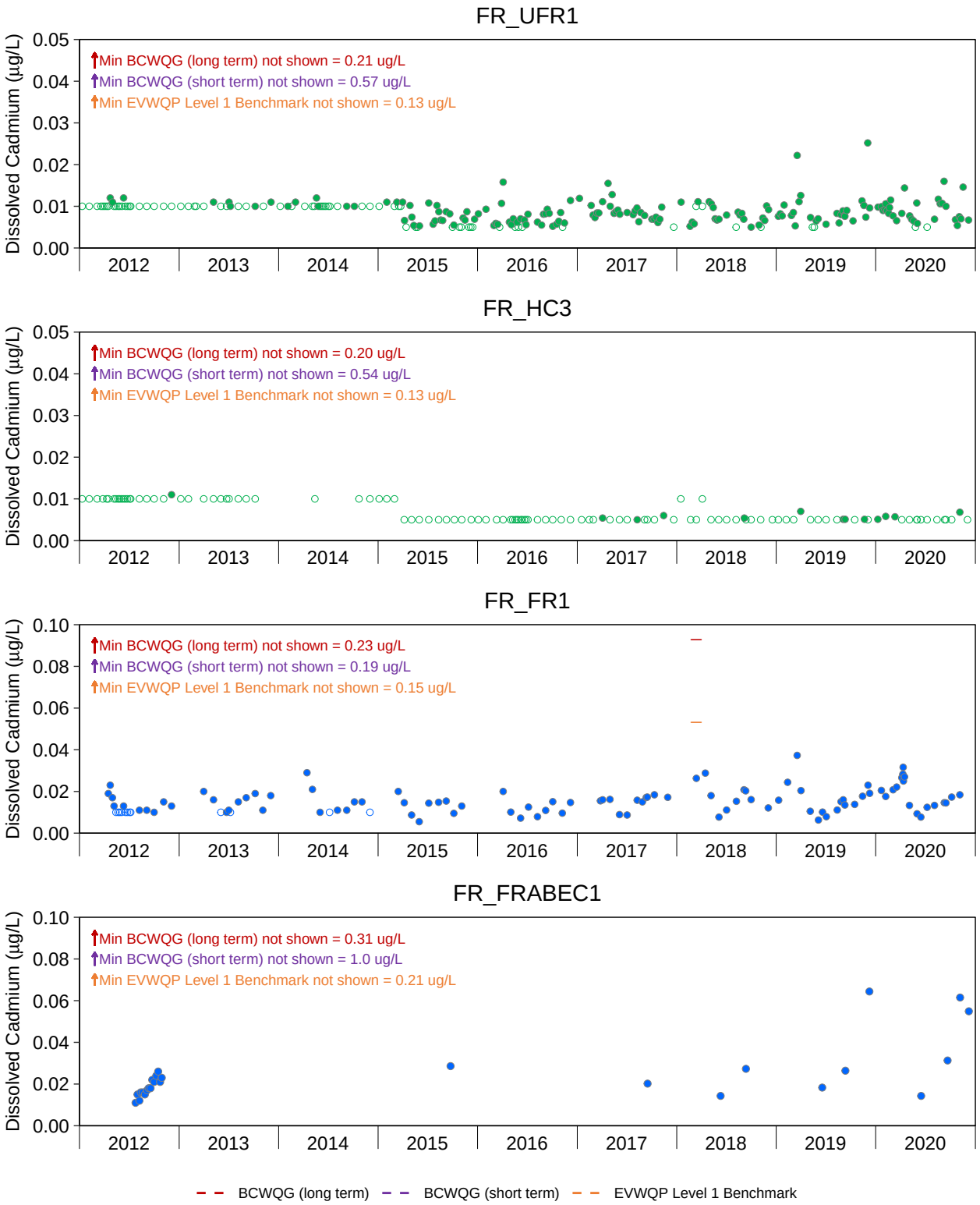

Figure B.5: Time Series Plots for Dissolved Cadmium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

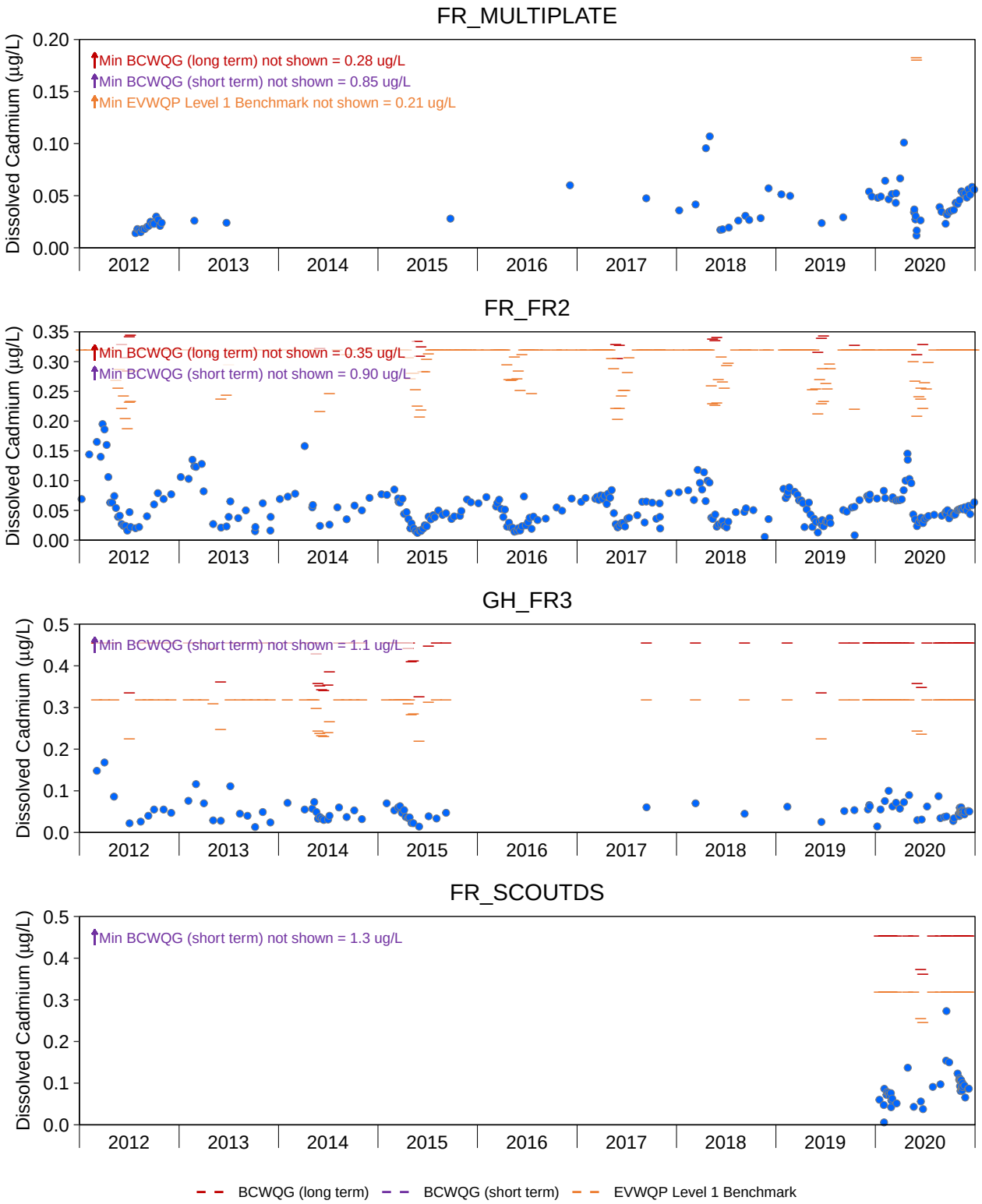

Figure B.5: Time Series Plots for Dissolved Cadmium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

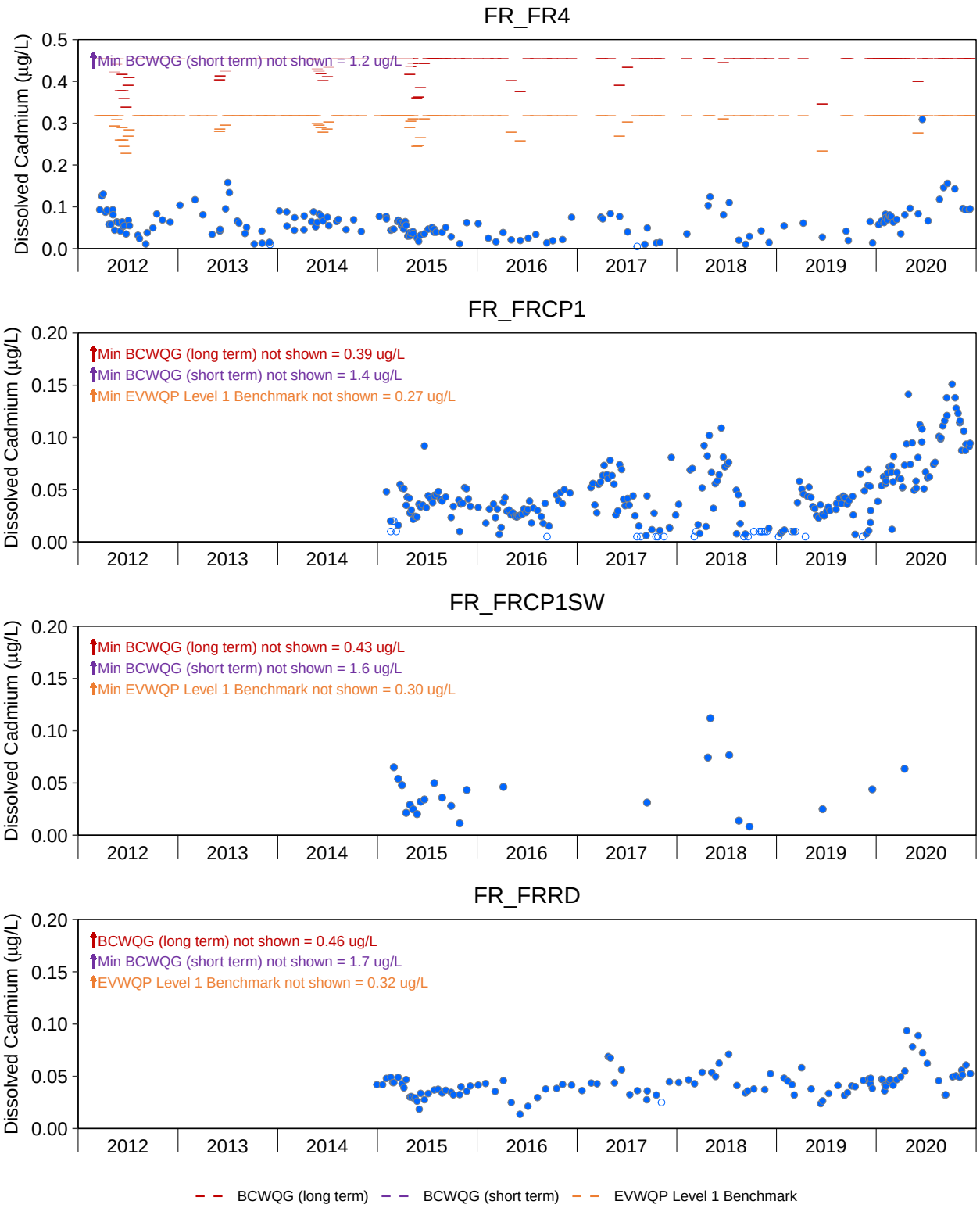

Figure B.5: Time Series Plots for Dissolved Cadmium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

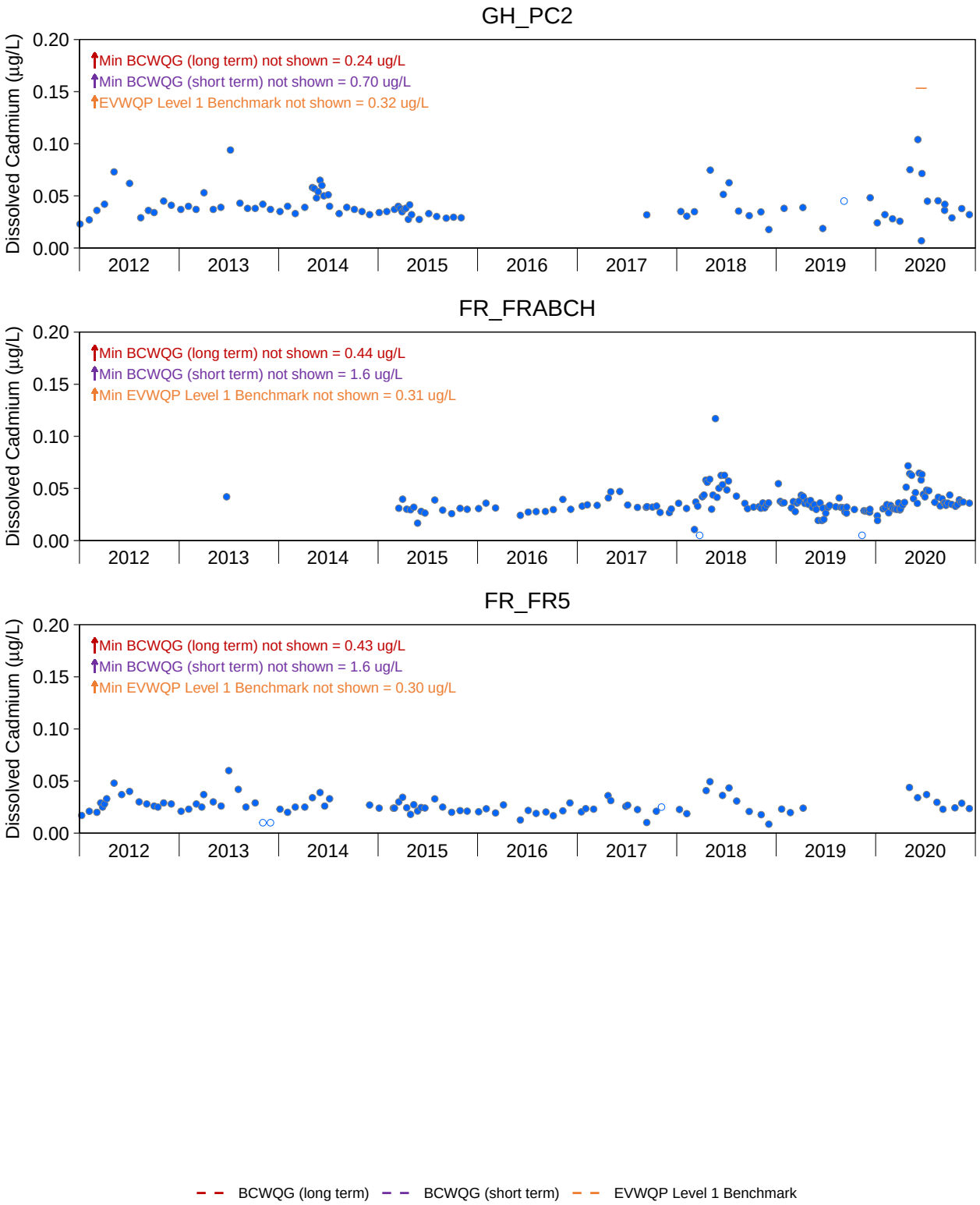

Figure B.5: Time Series Plots for Dissolved Cadmium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

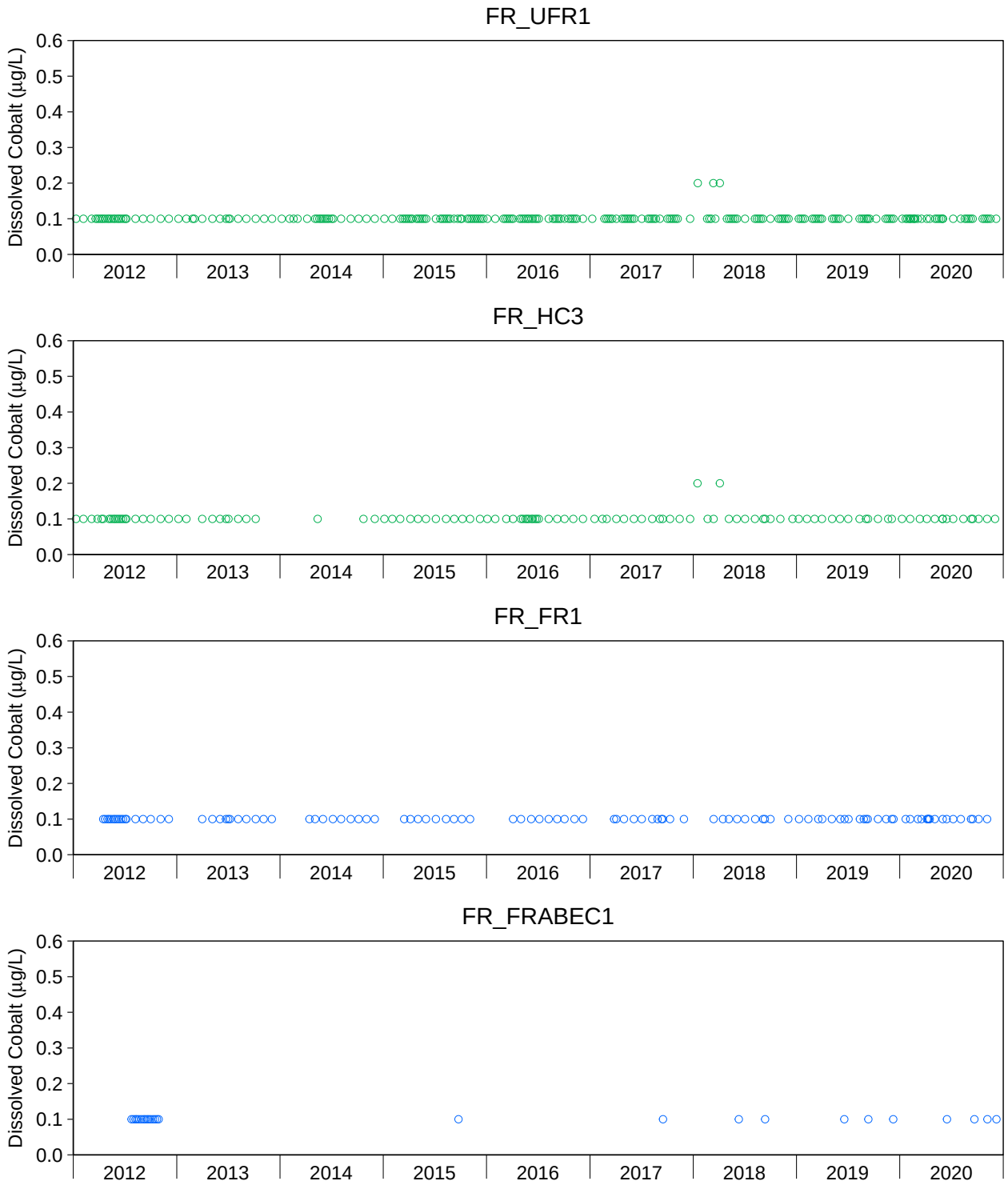

Figure B.6: Time Series Plots for Dissolved Cobalt Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

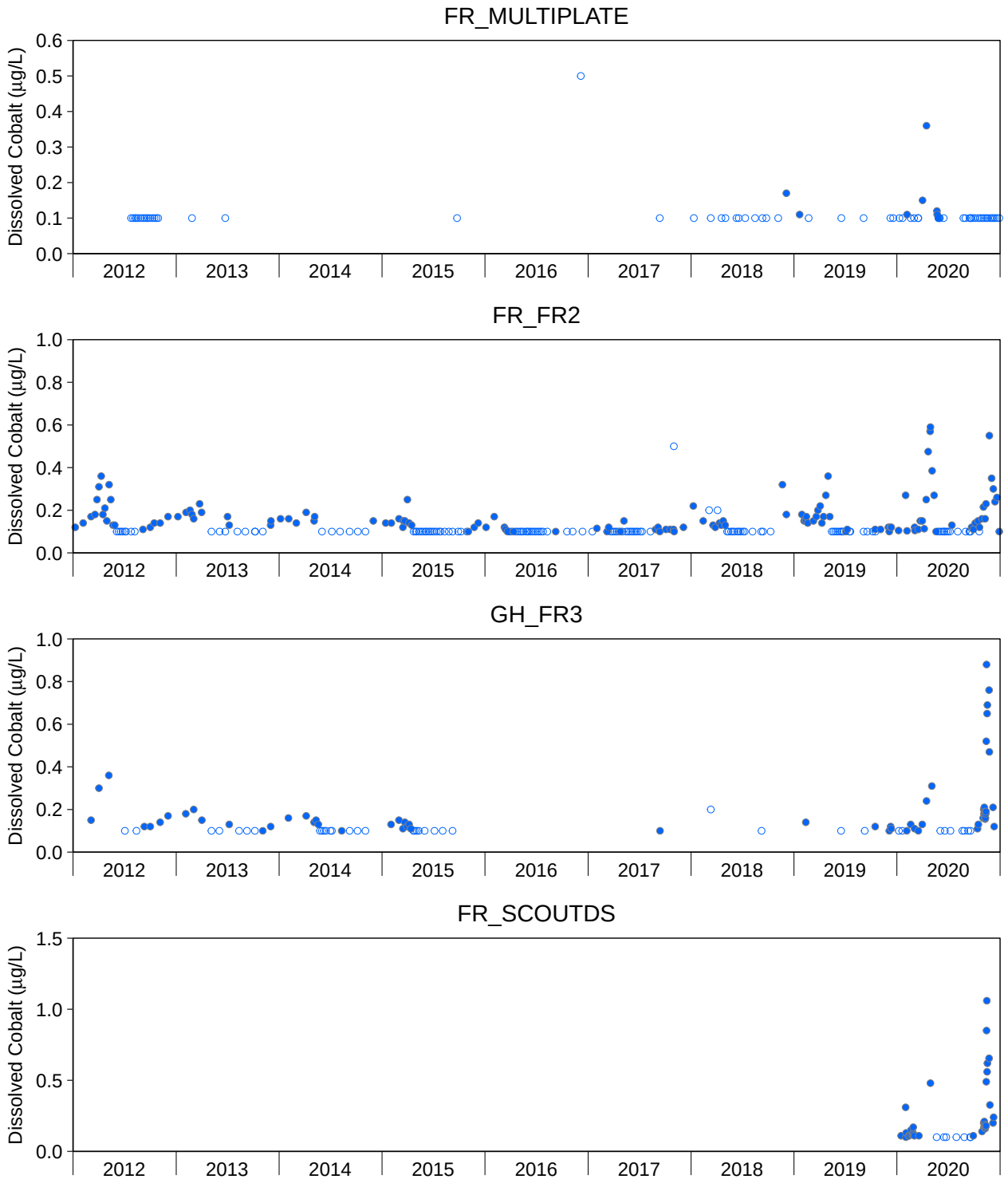

Figure B.6: Time Series Plots for Dissolved Cobalt Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

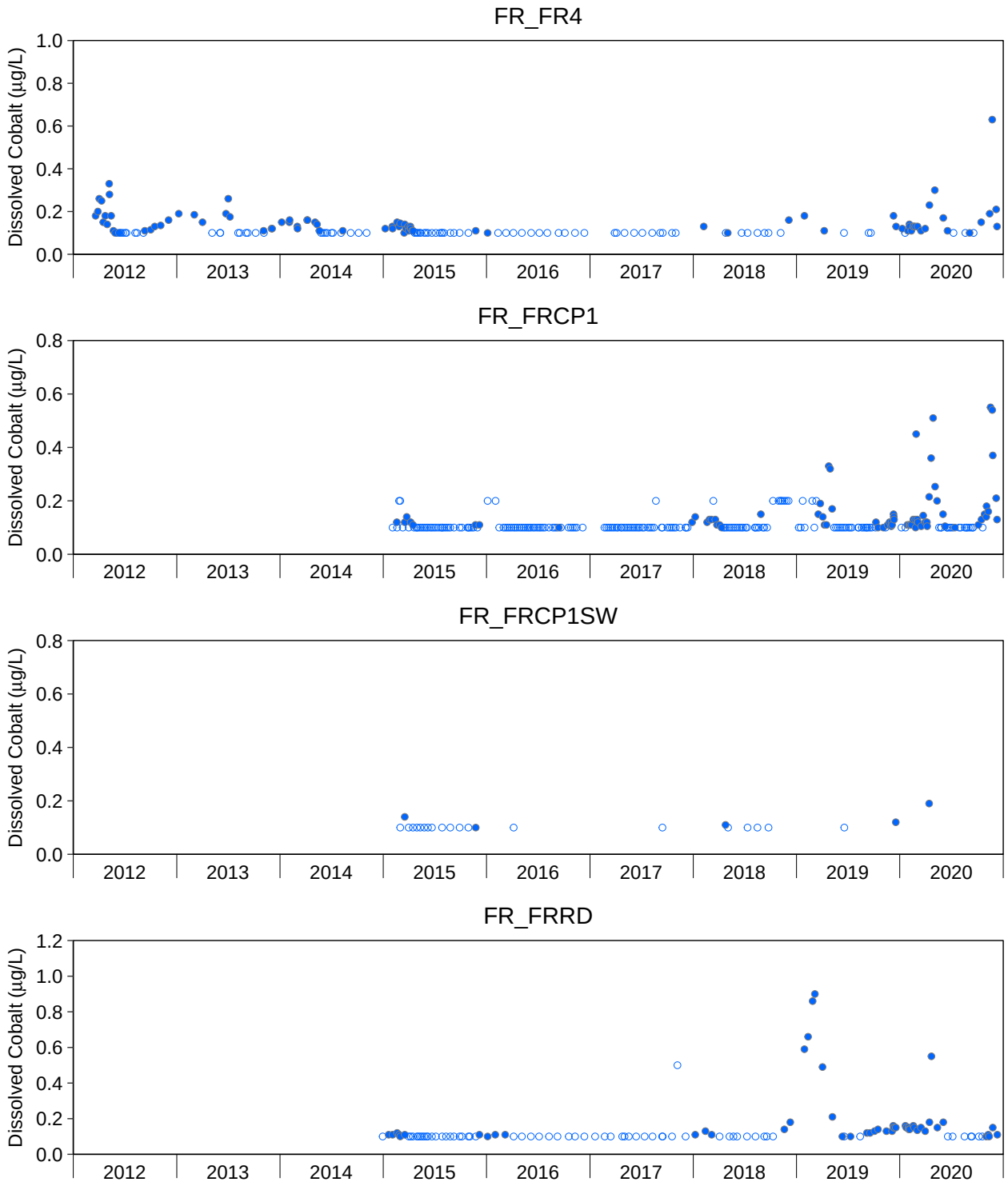

Figure B.6: Time Series Plots for Dissolved Cobalt Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

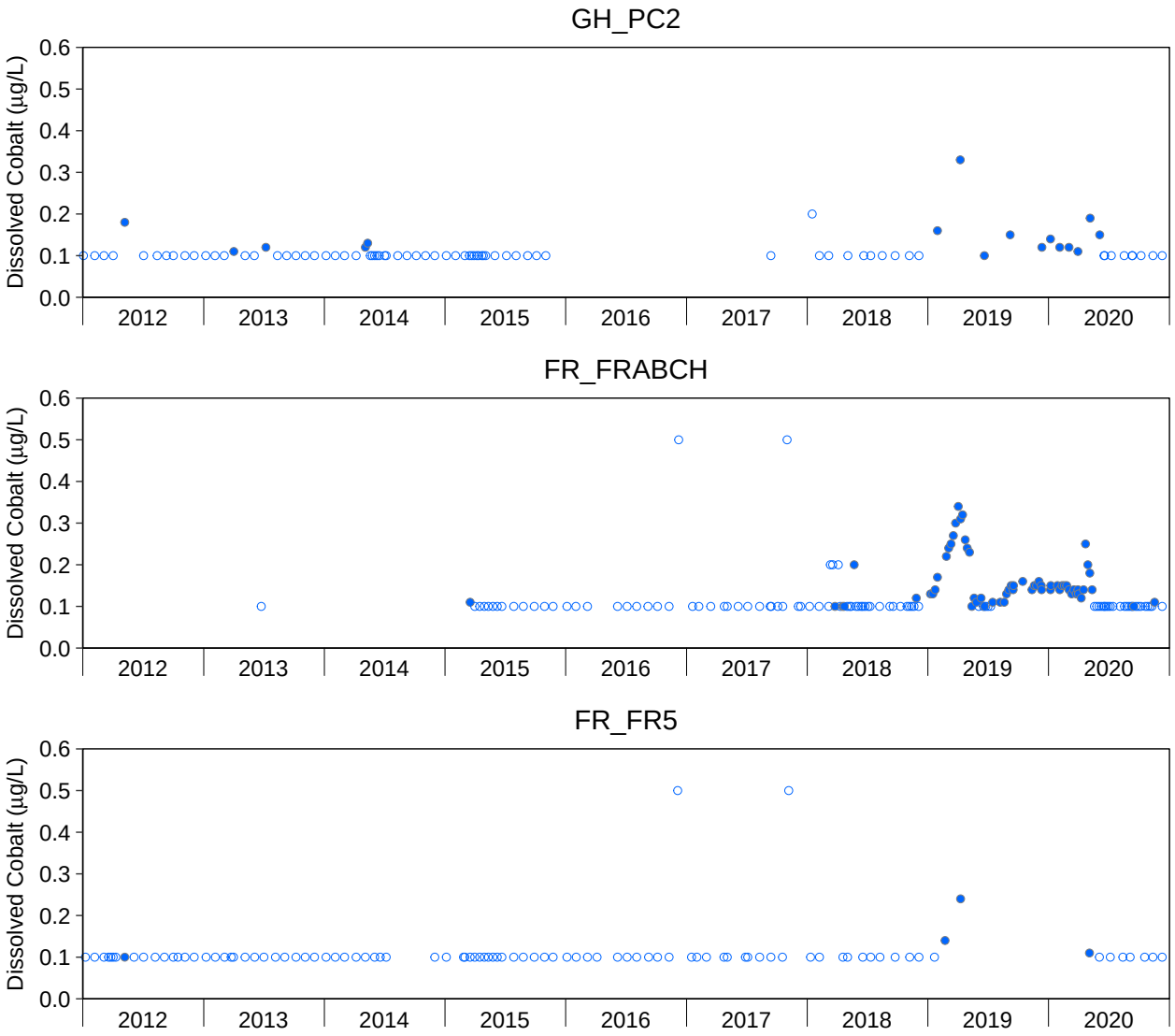

Figure B.6: Time Series Plots for Dissolved Cobalt Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

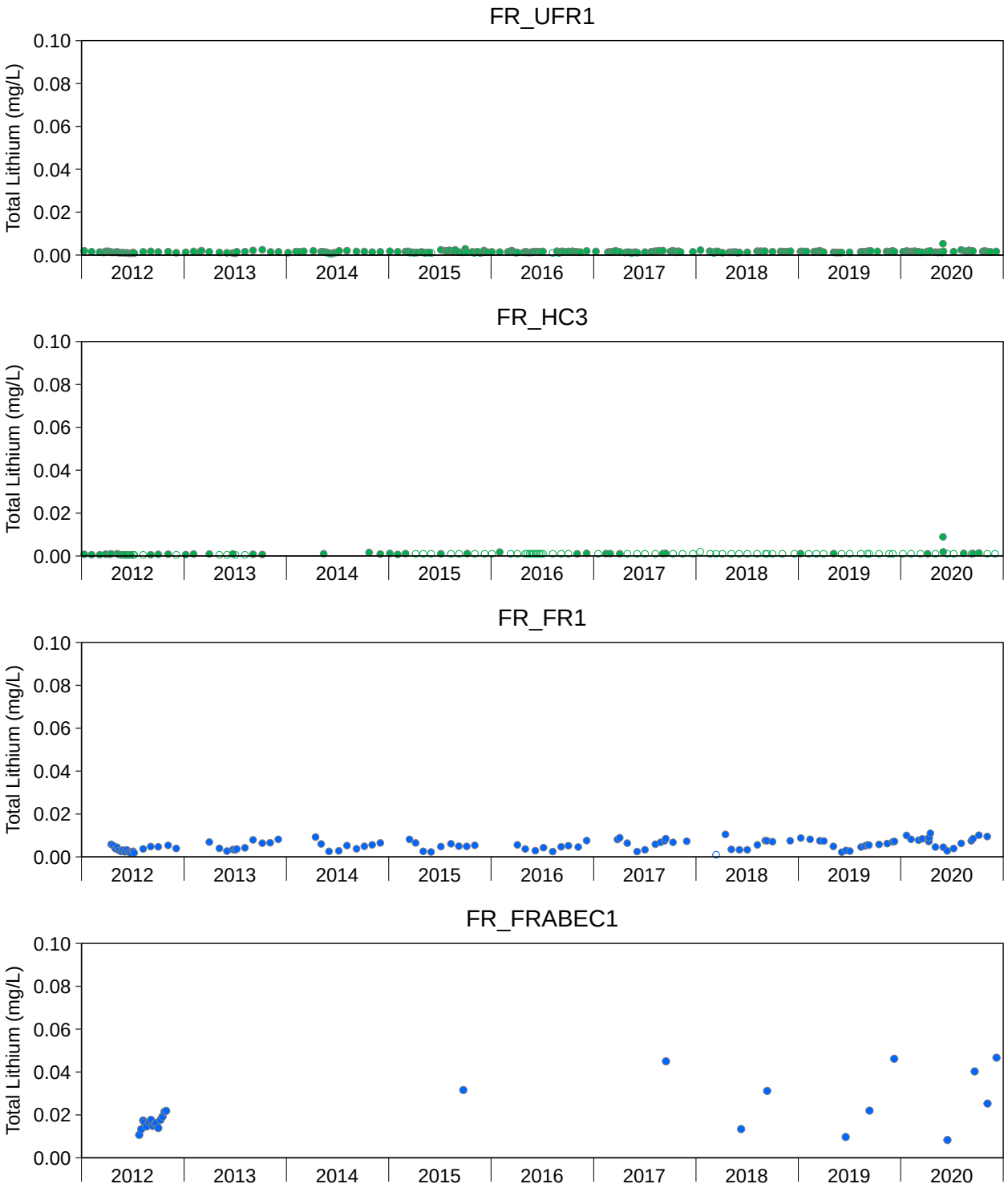

Figure B.7: Time Series Plots for Total Lithium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

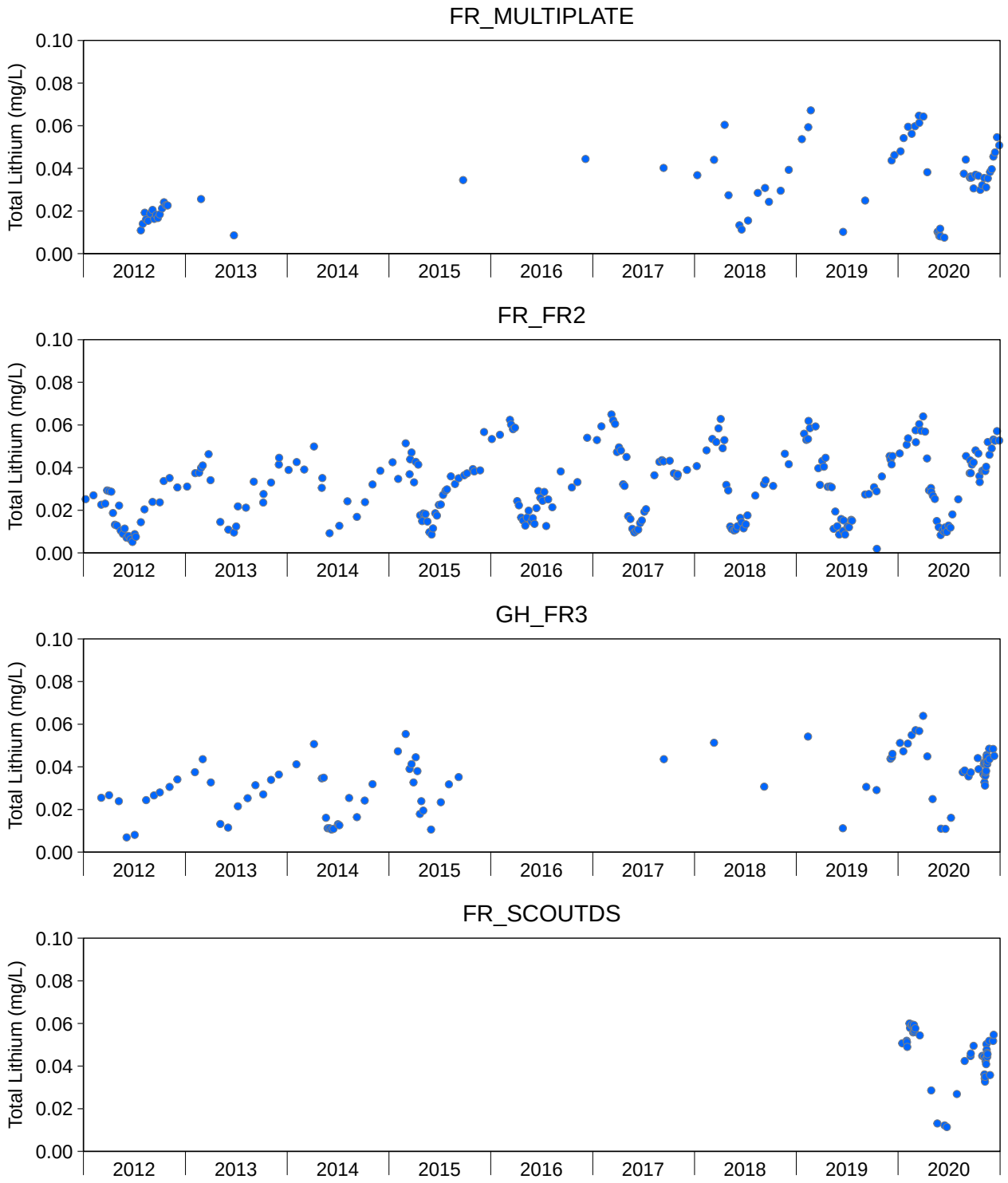

Figure B.7: Time Series Plots for Total Lithium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

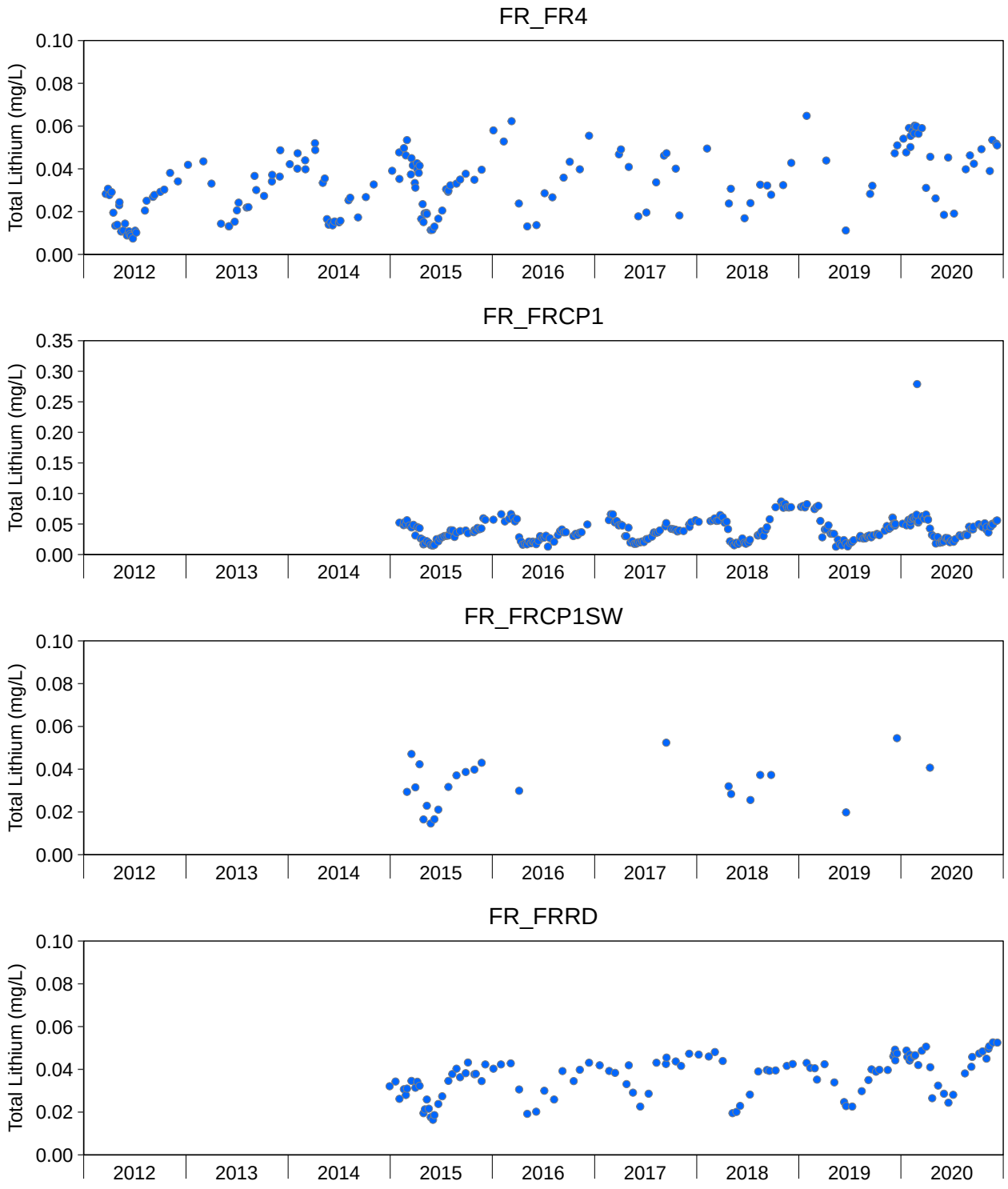

Figure B.7: Time Series Plots for Total Lithium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

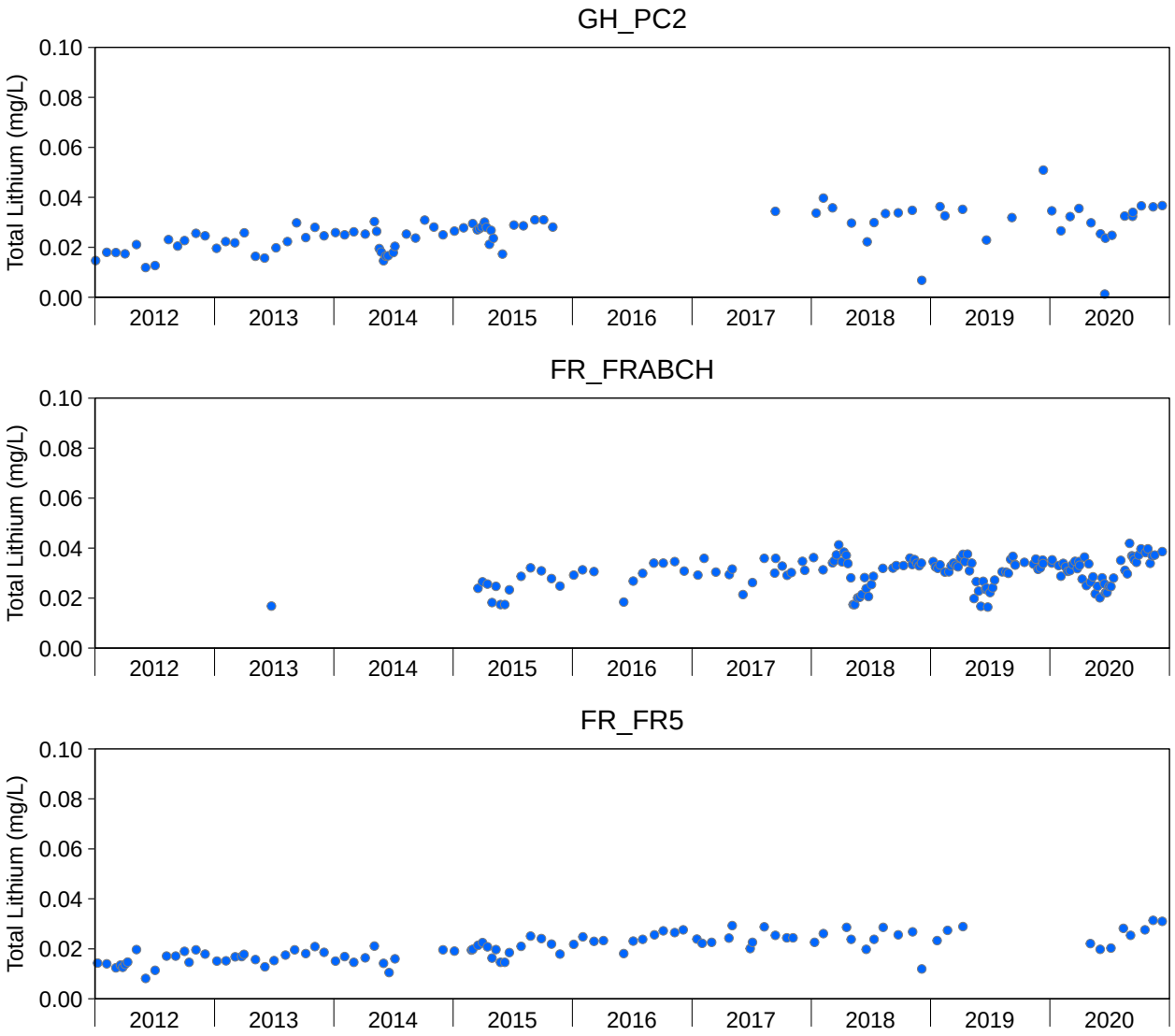

Figure B.7: Time Series Plots for Total Lithium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

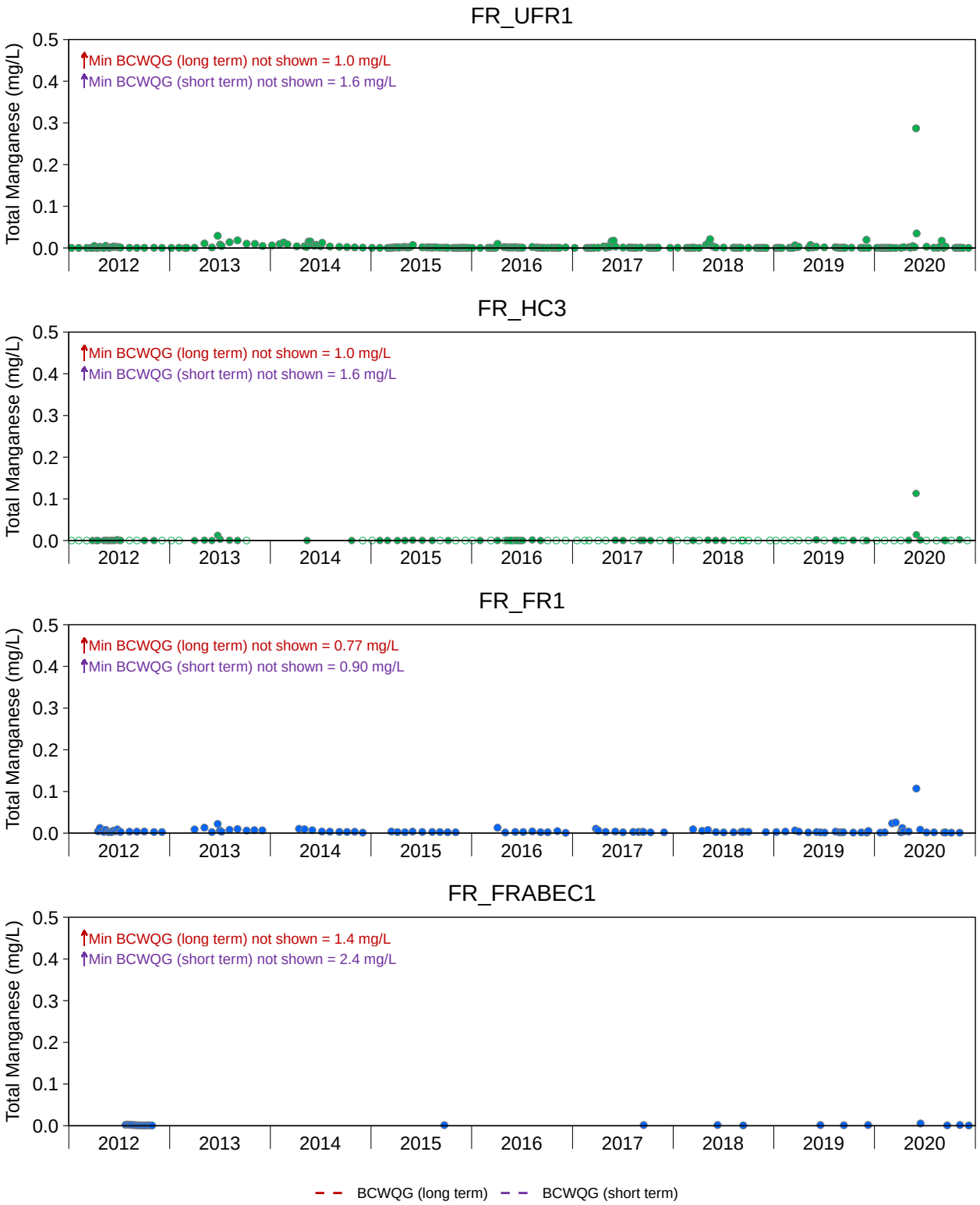

Figure B.8: Time Series Plots for Total Manganese Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

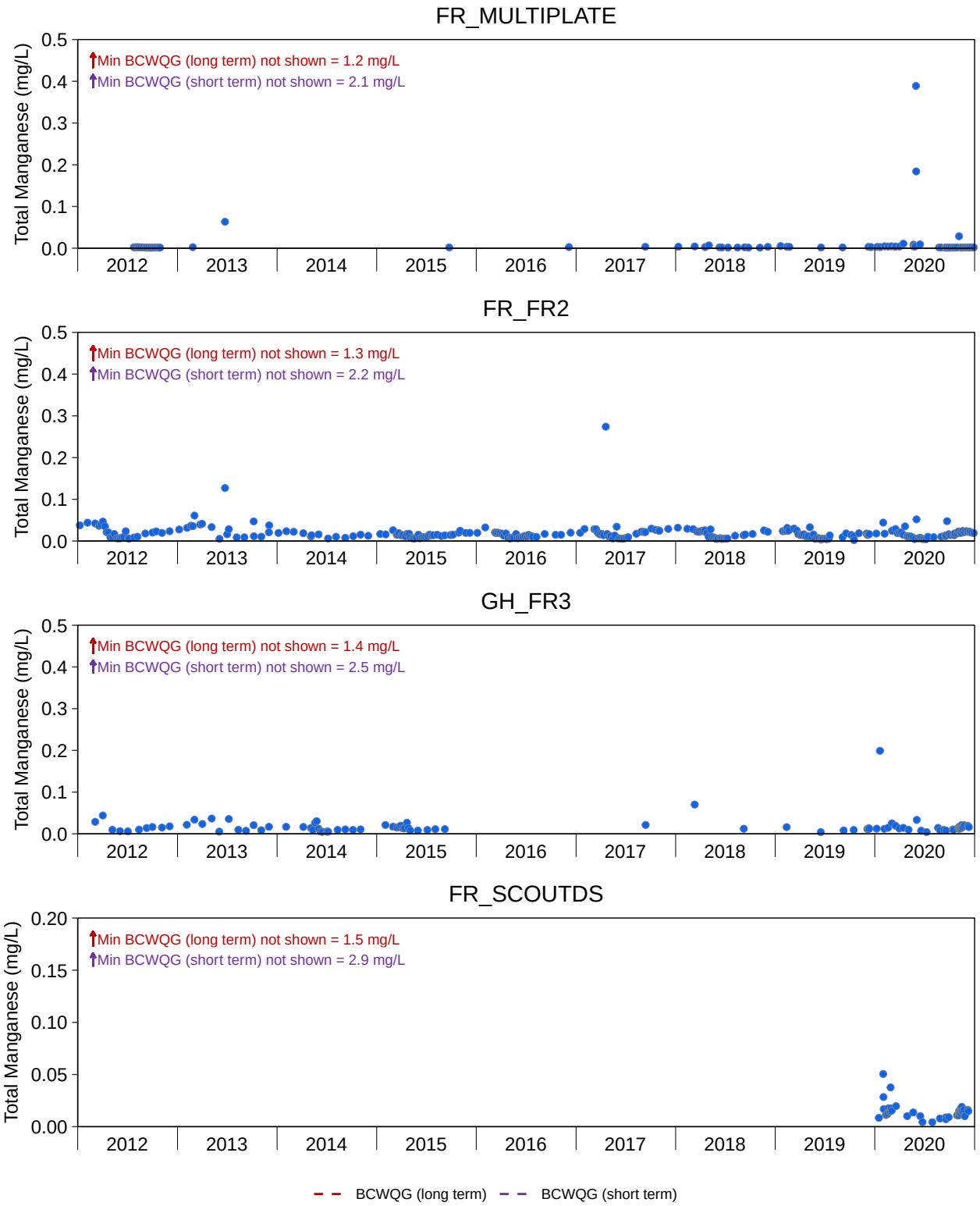

Figure B.8: Time Series Plots for Total Manganese Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

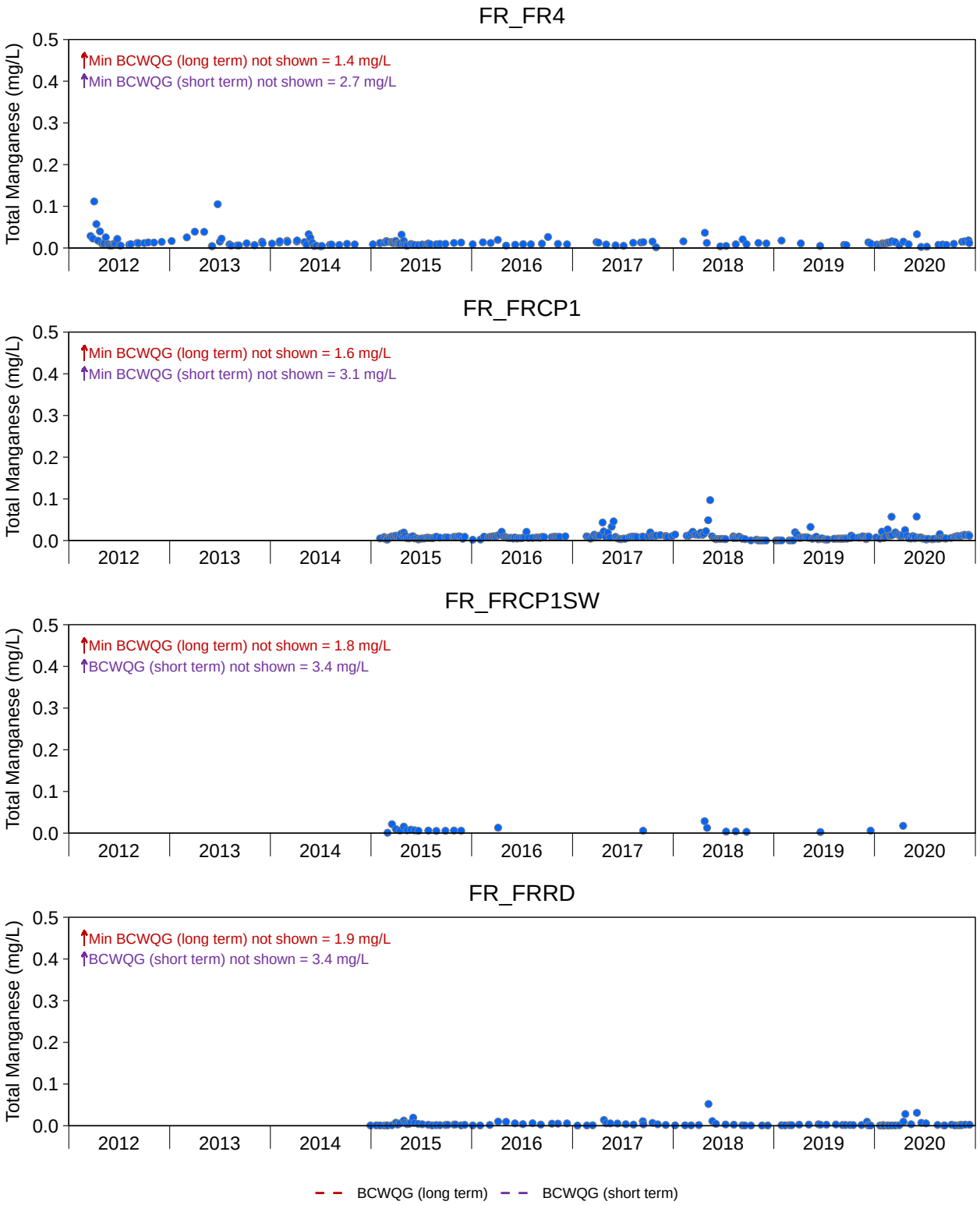

Figure B.8: Time Series Plots for Total Manganese Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

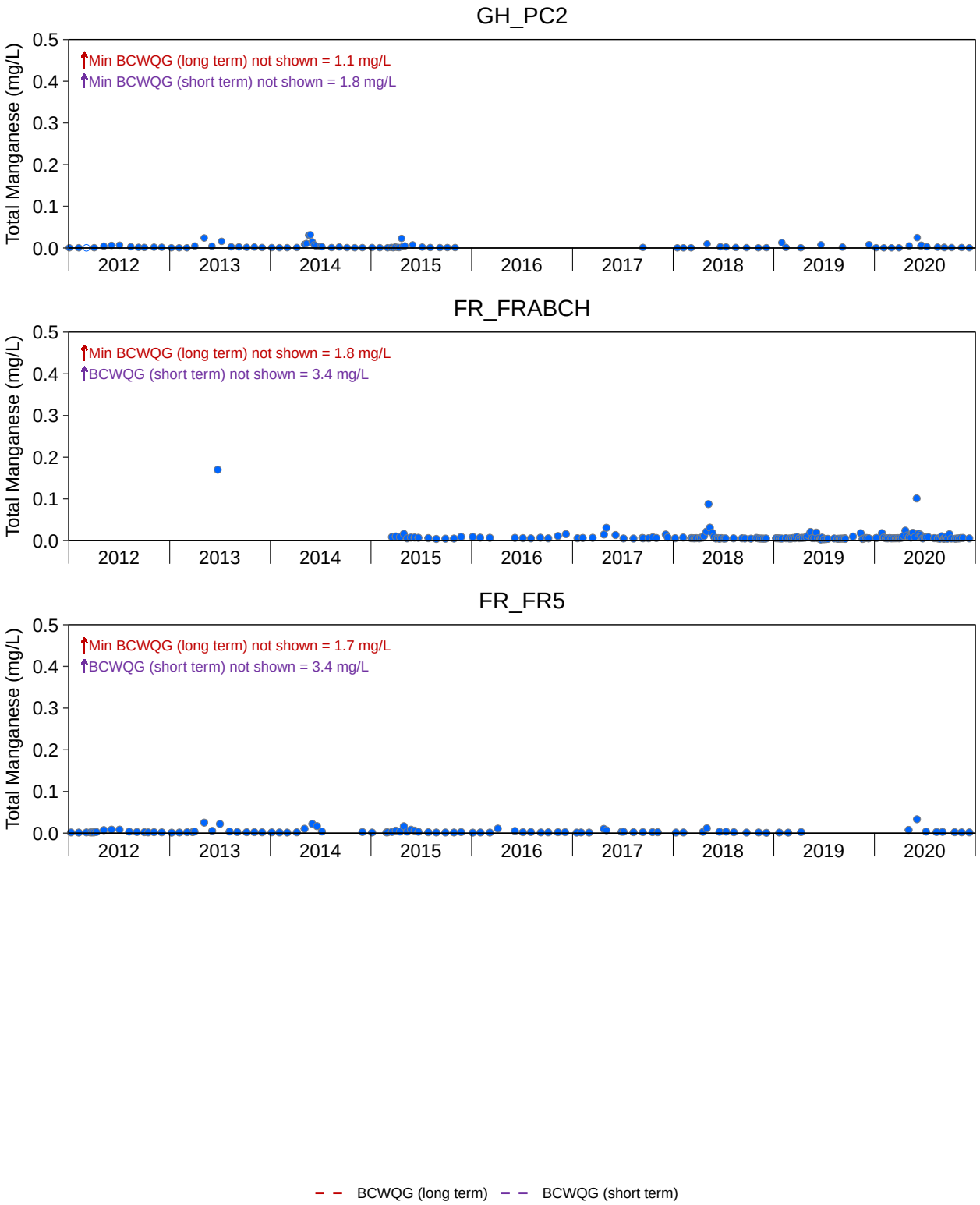

Figure B.8: Time Series Plots for Total Manganese Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

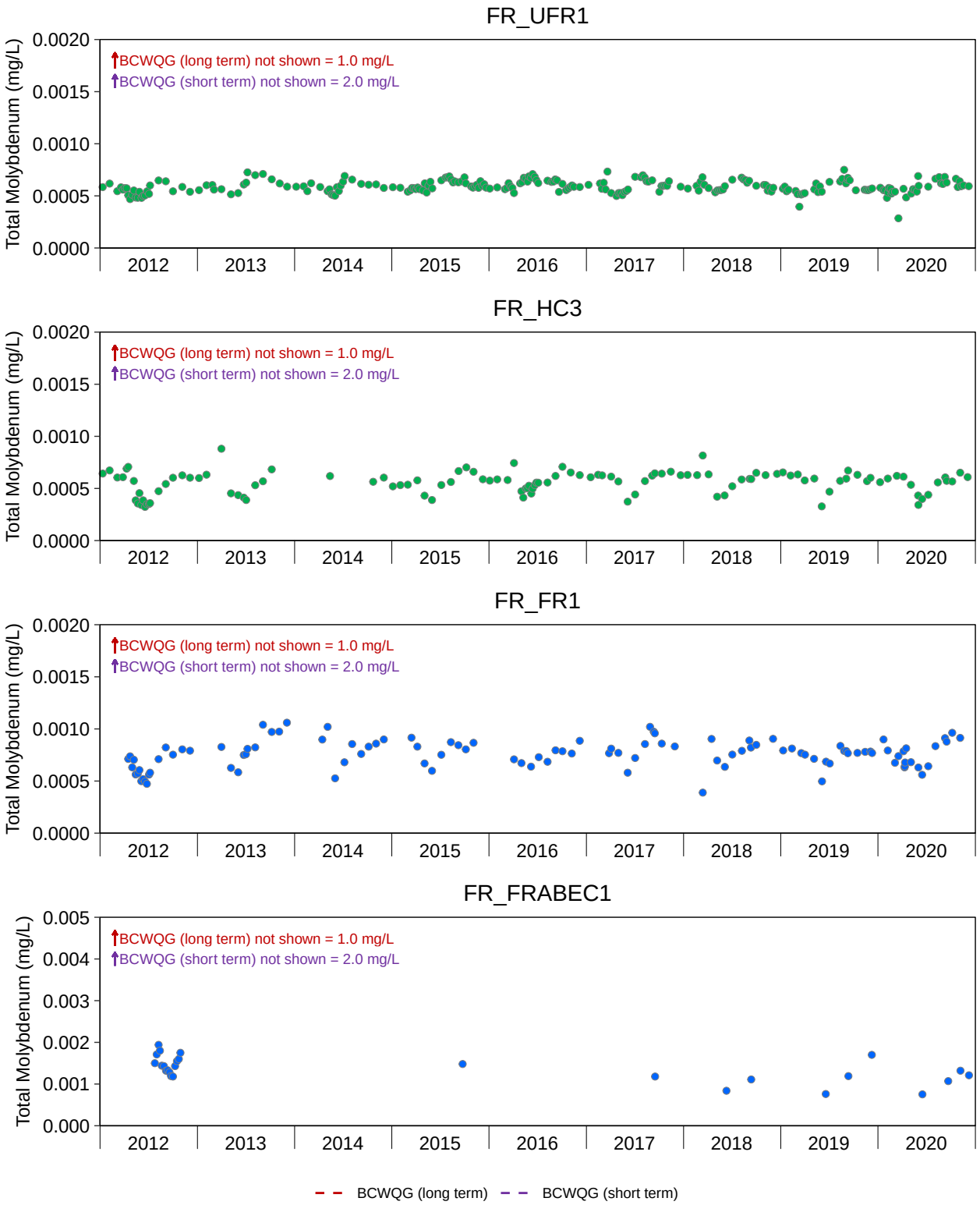

Figure B.9: Time Series Plots for Total Molybdenum Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

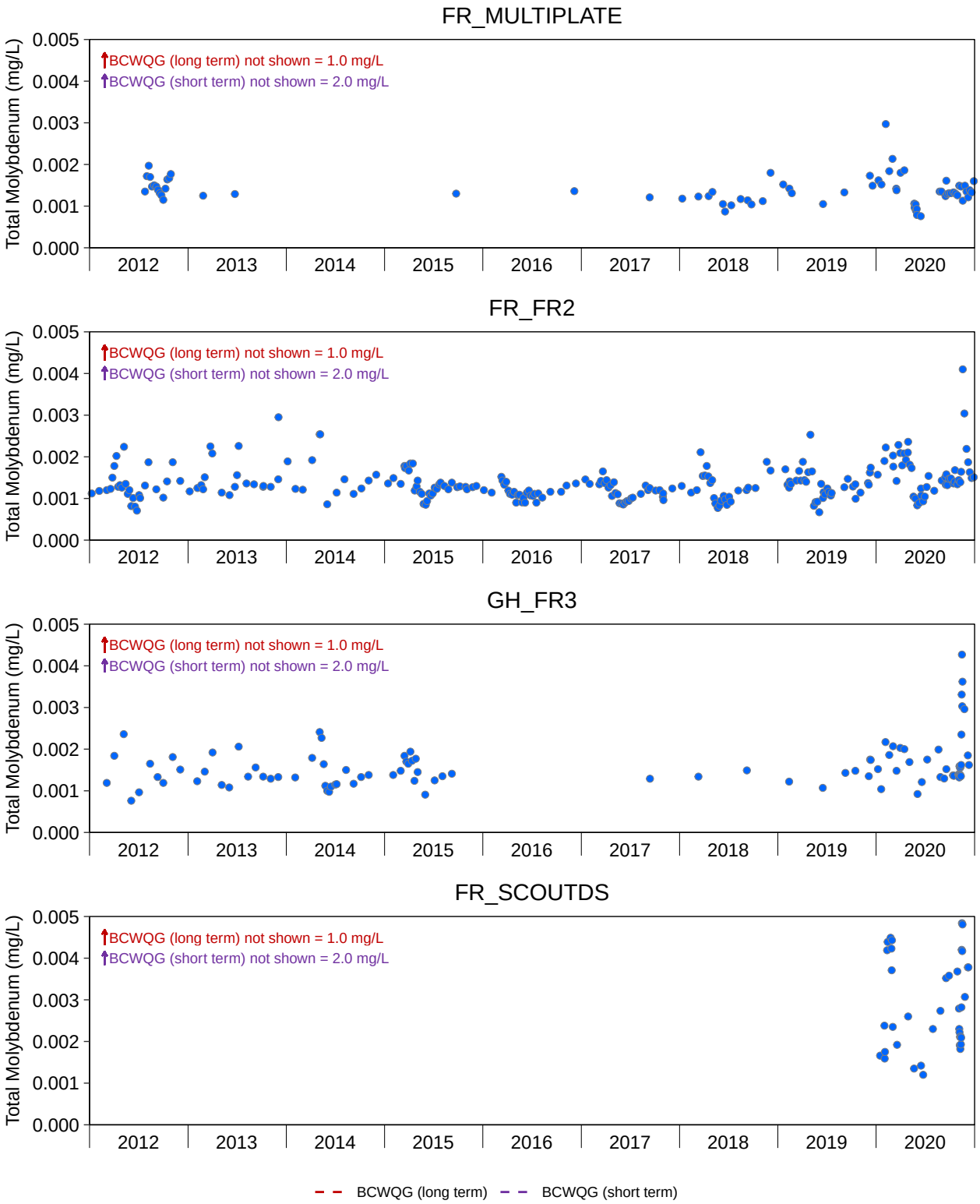

Figure B.9: Time Series Plots for Total Molybdenum Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

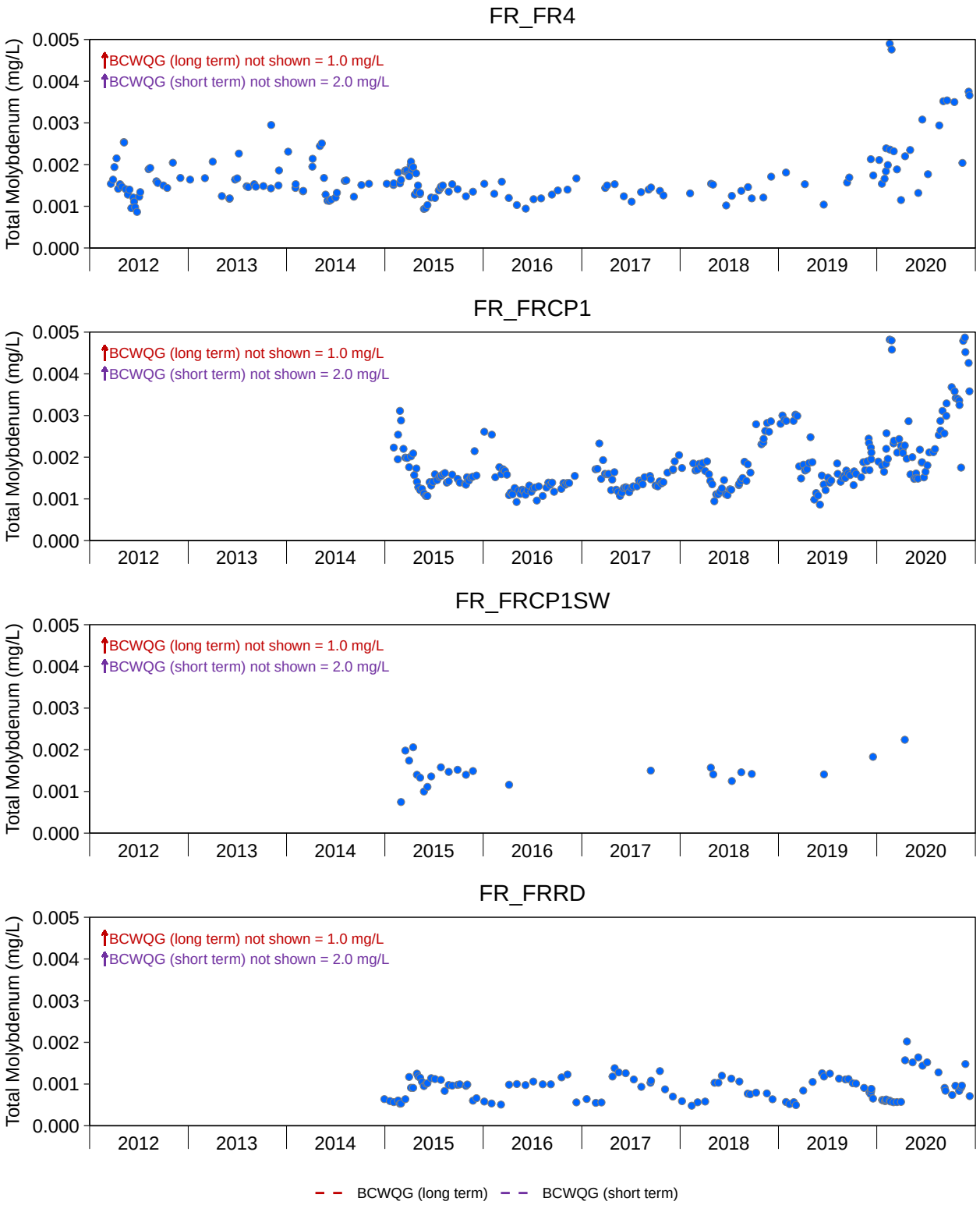

Figure B.9: Time Series Plots for Total Molybdenum Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

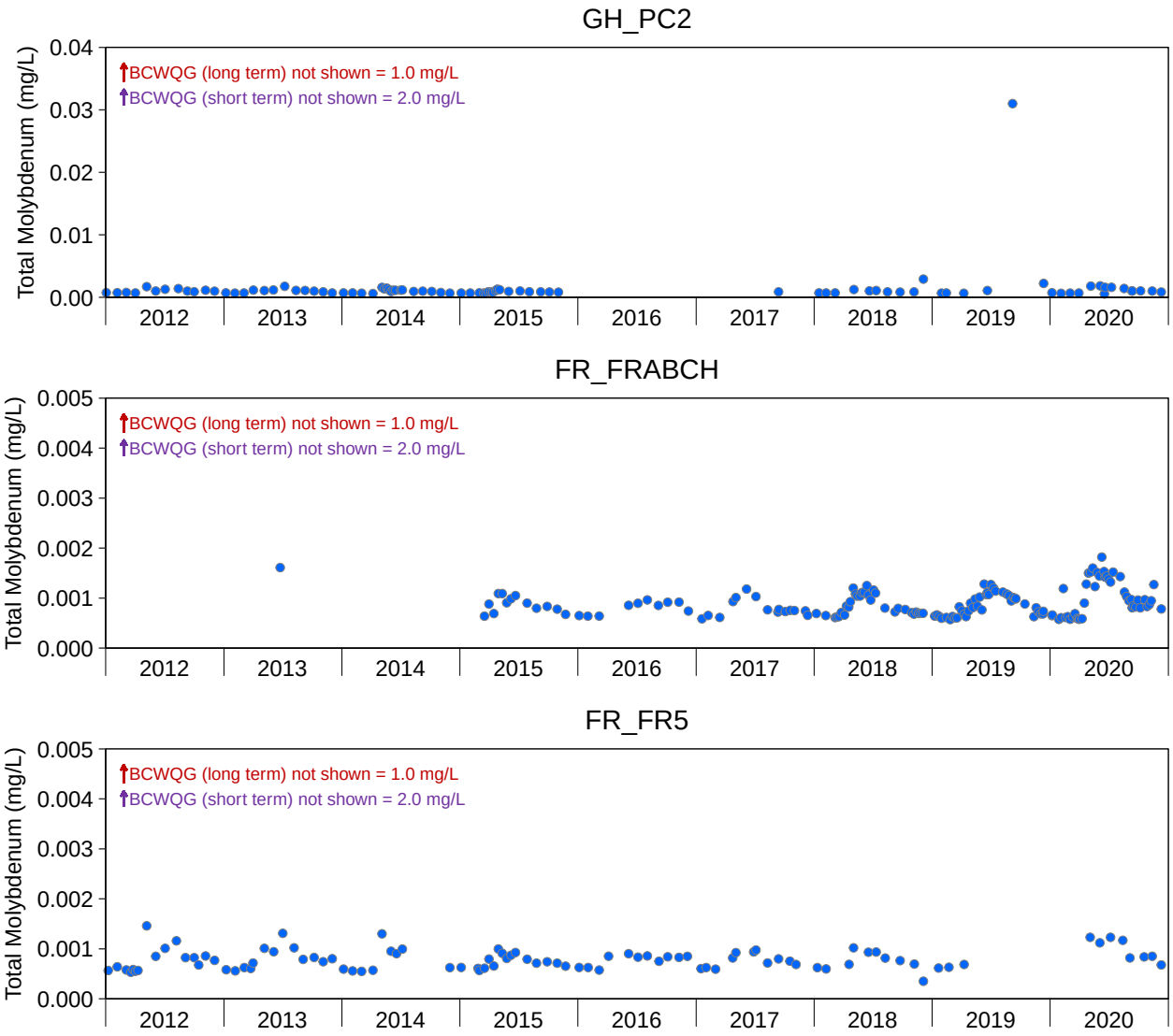

Figure B.9: Time Series Plots for Total Molybdenum Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

Figure B.10: Time Series Plots for Total Nickel Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

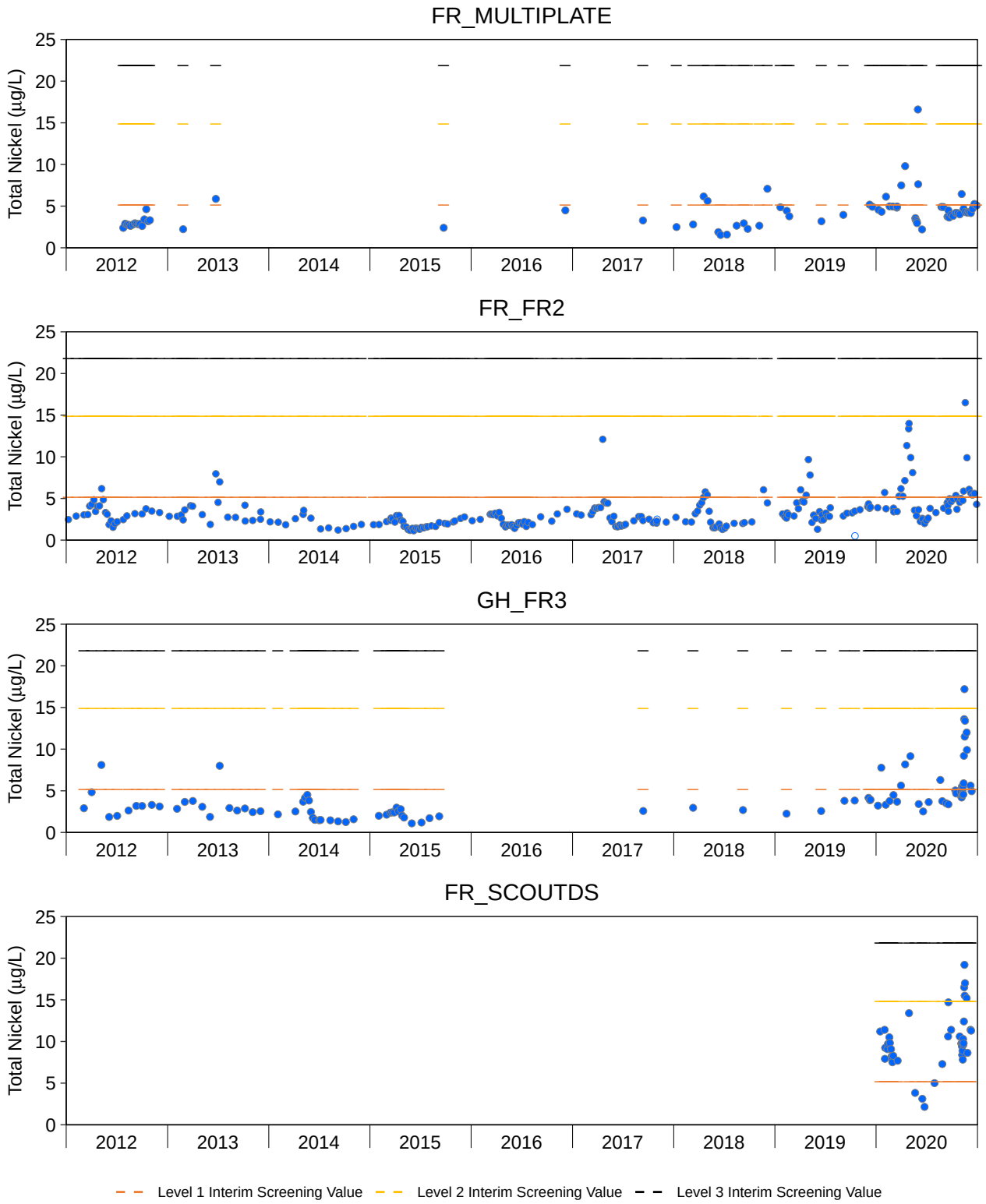

Figure B.10: Time Series Plots for Total Nickel Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

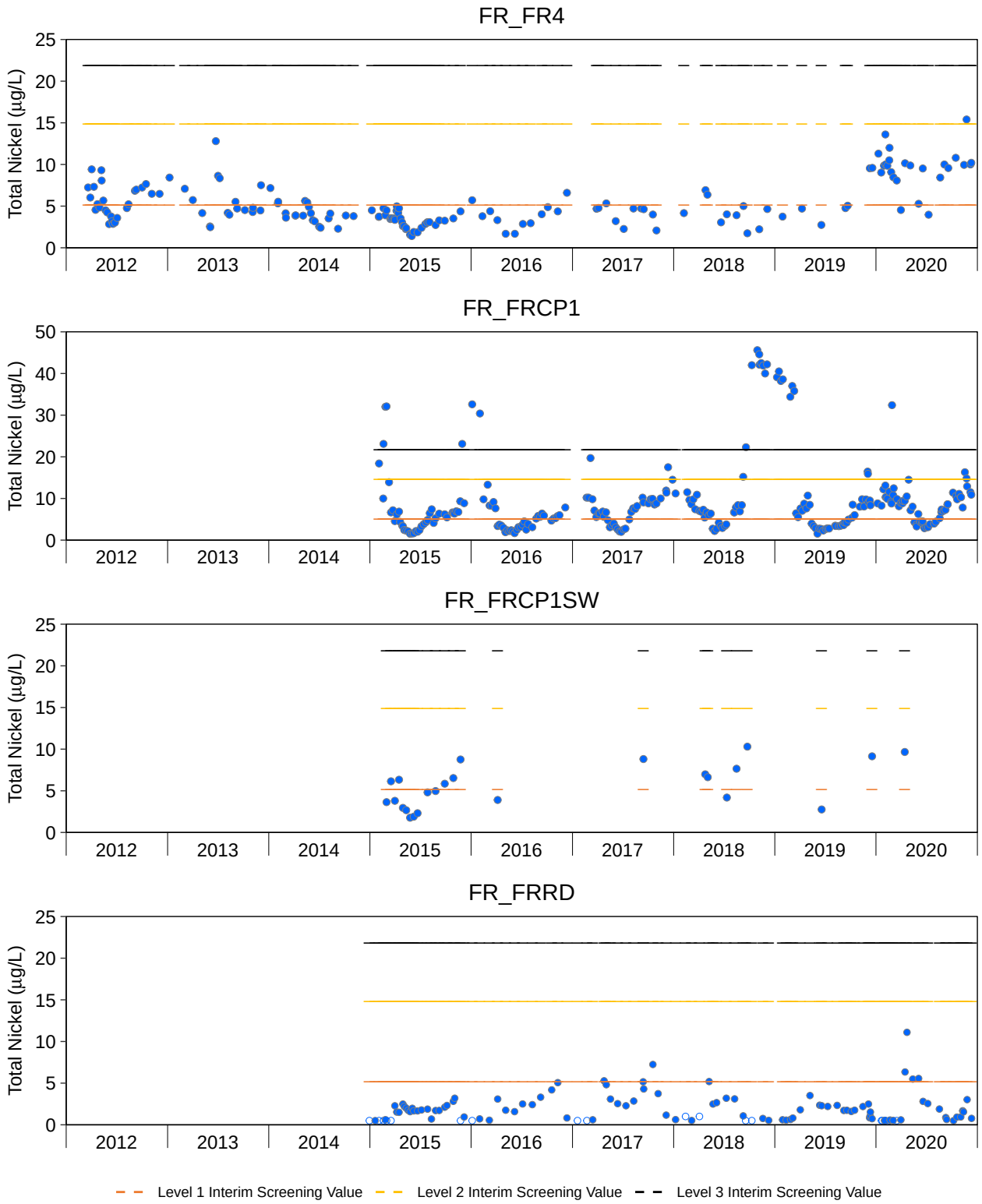

Figure B.10: Time Series Plots for Total Nickel Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

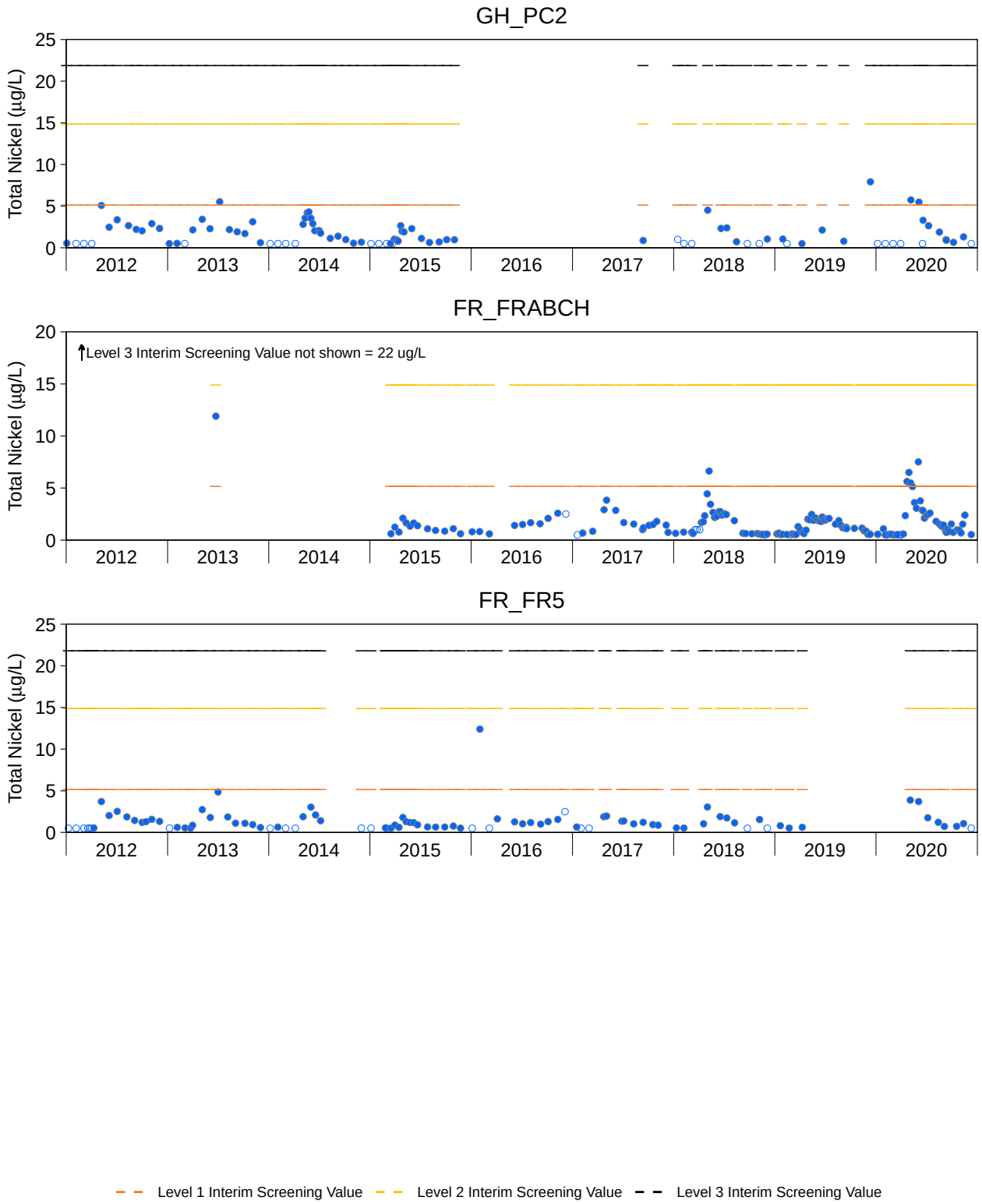

Figure B.10: Time Series Plots for Total Nickel Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

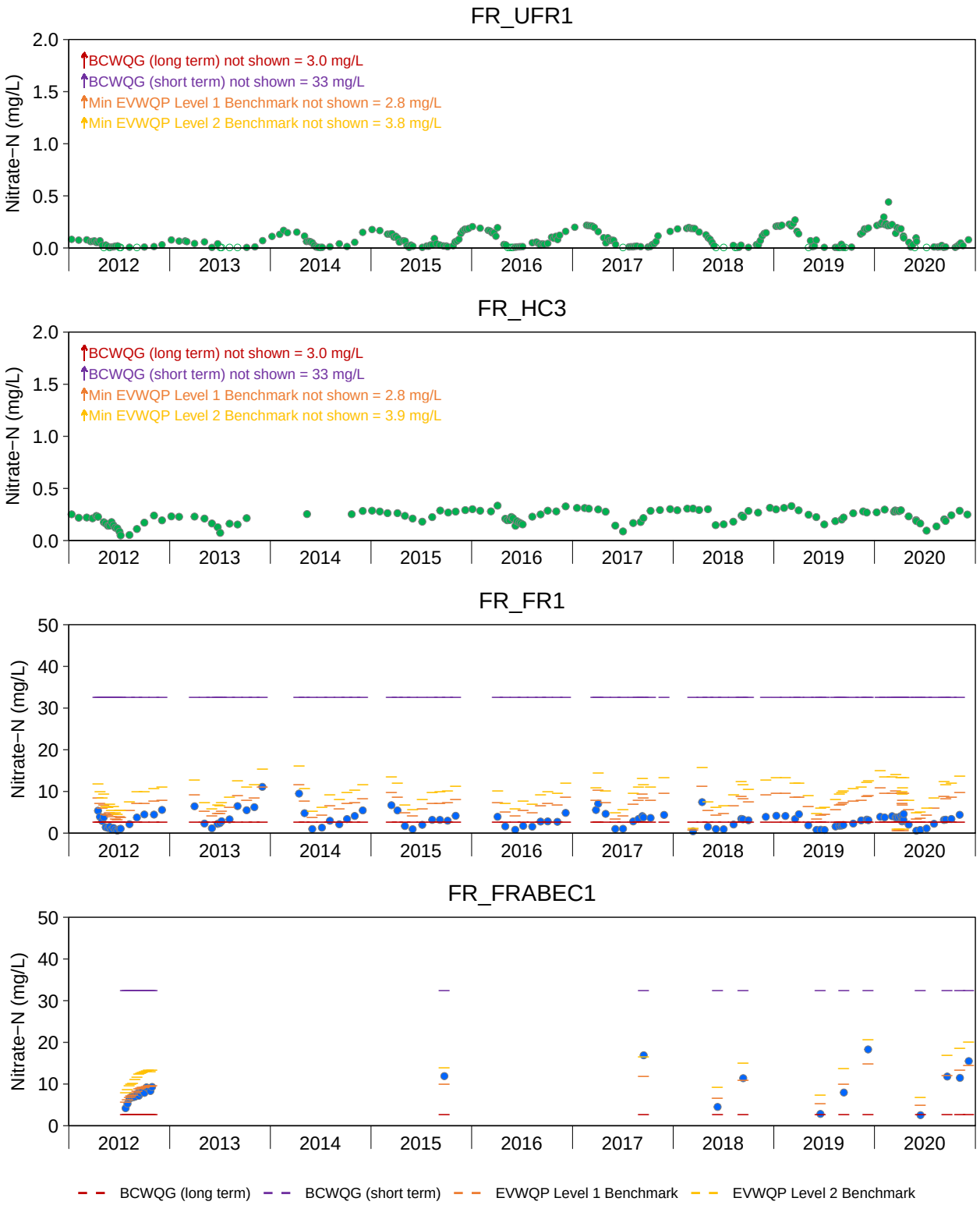

Figure B.11: Time Series Plots for Nitrate−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

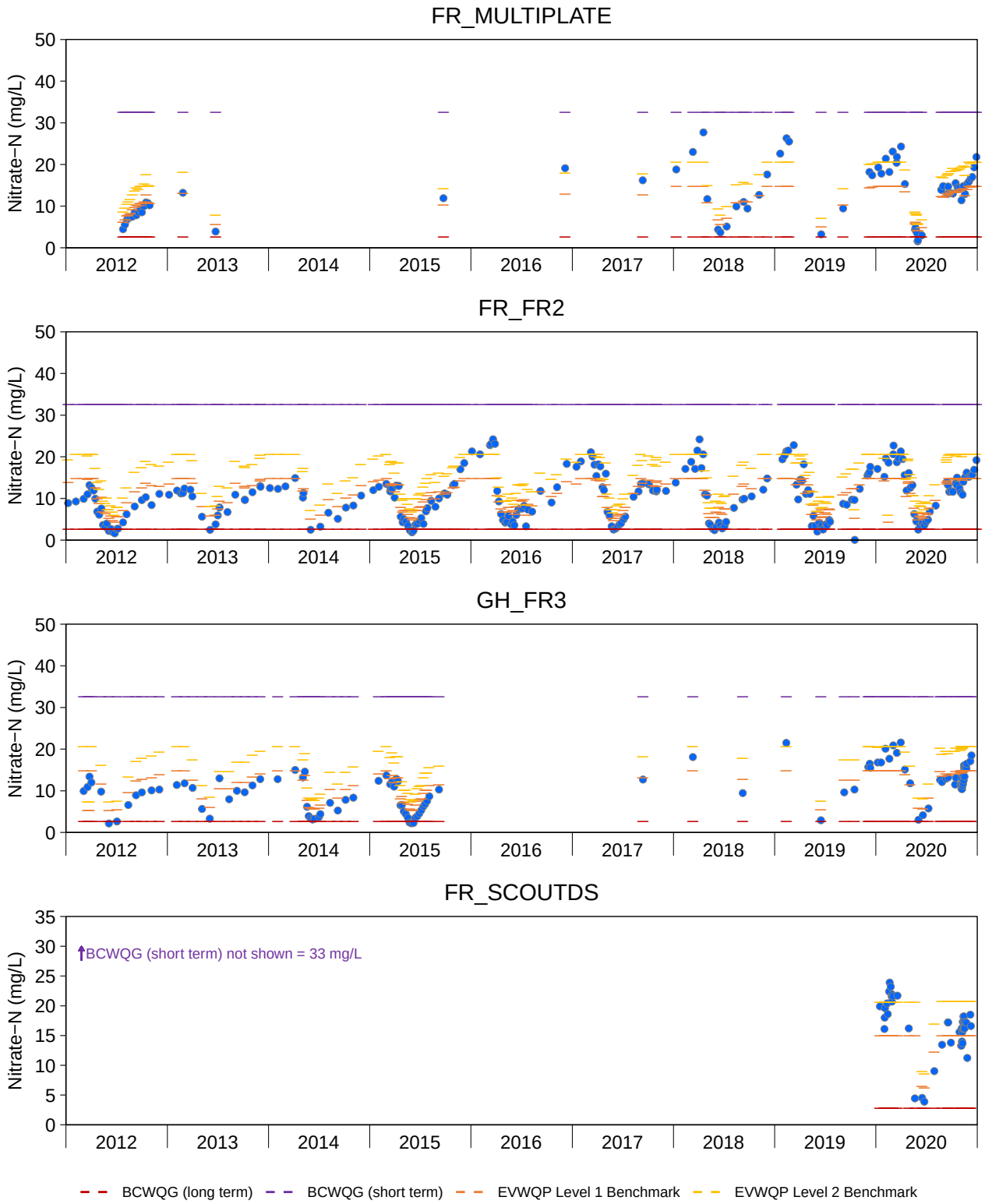

Figure B.11: Time Series Plots for Nitrate−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

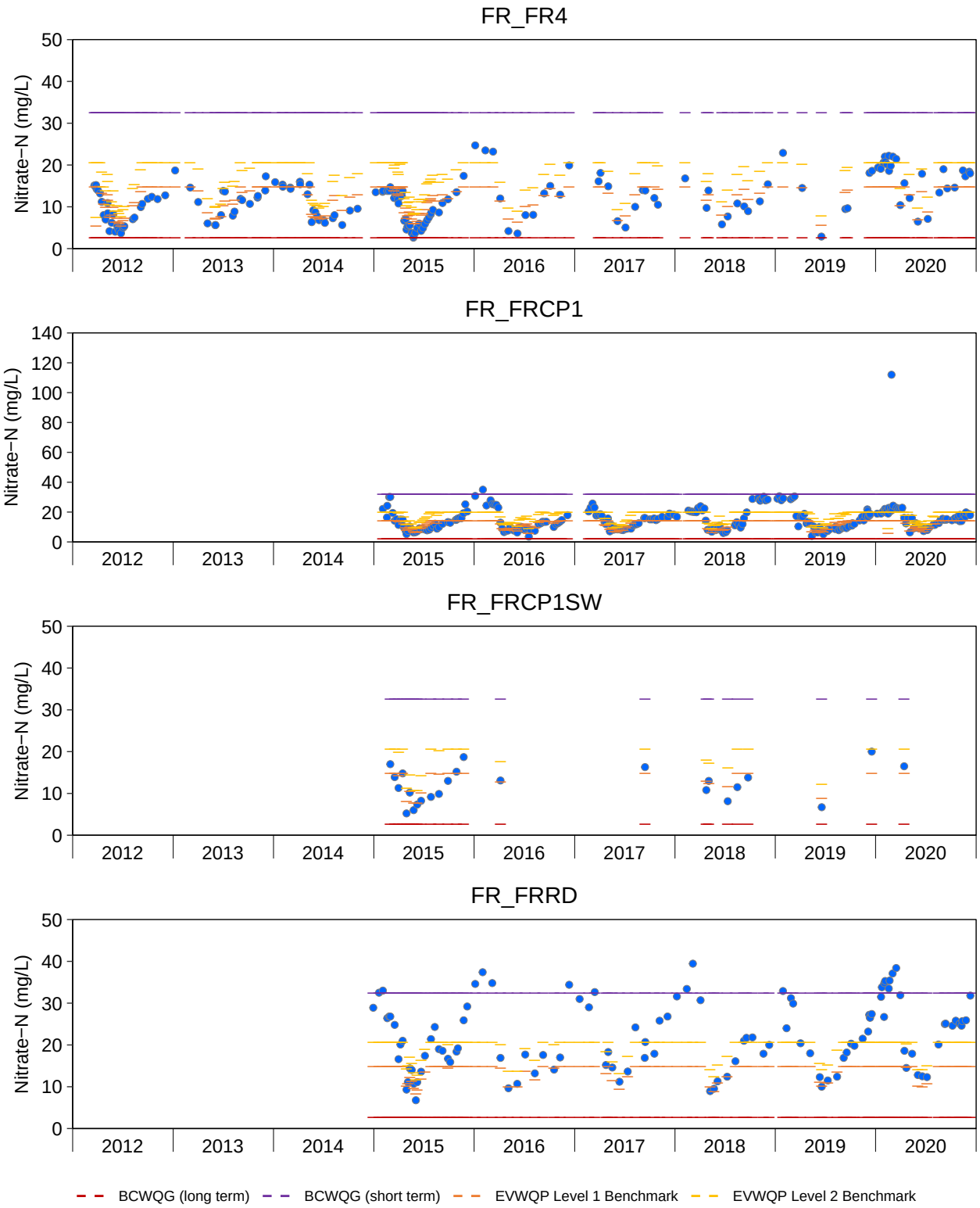

Figure B.11: Time Series Plots for Nitrate−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

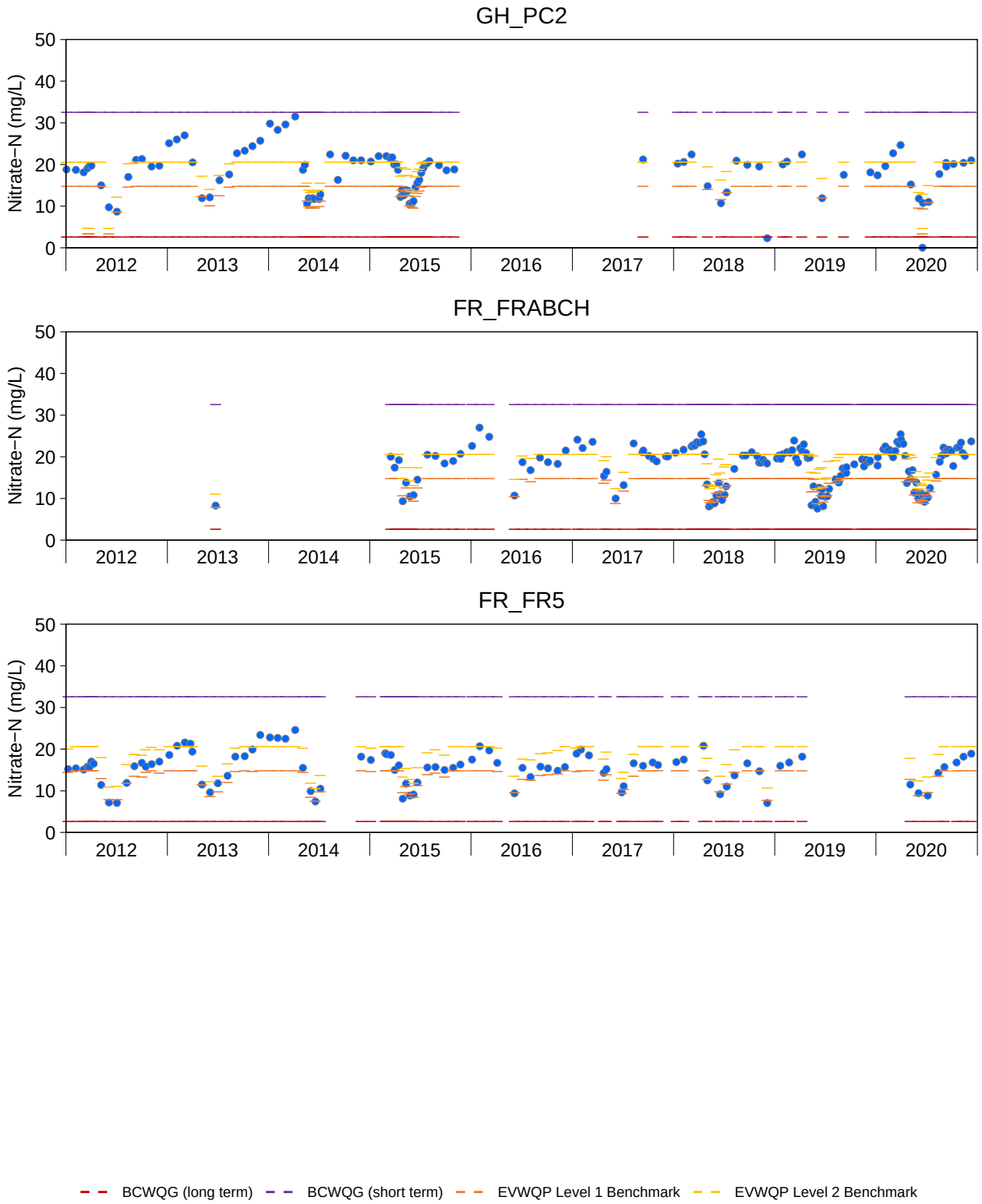

Figure B.11: Time Series Plots for Nitrate−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

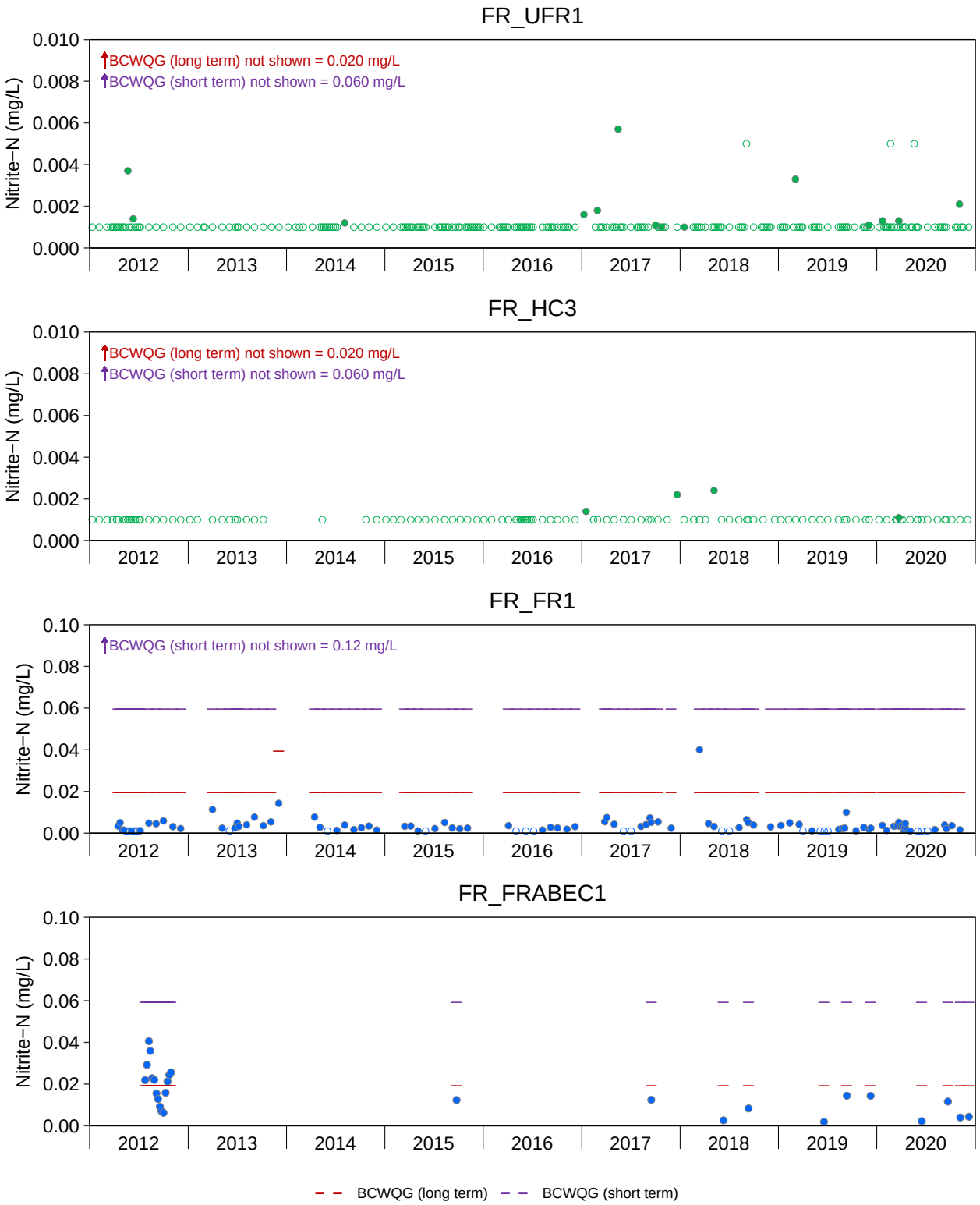

Figure B.12: Time Series Plots for Nitrite−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concenrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

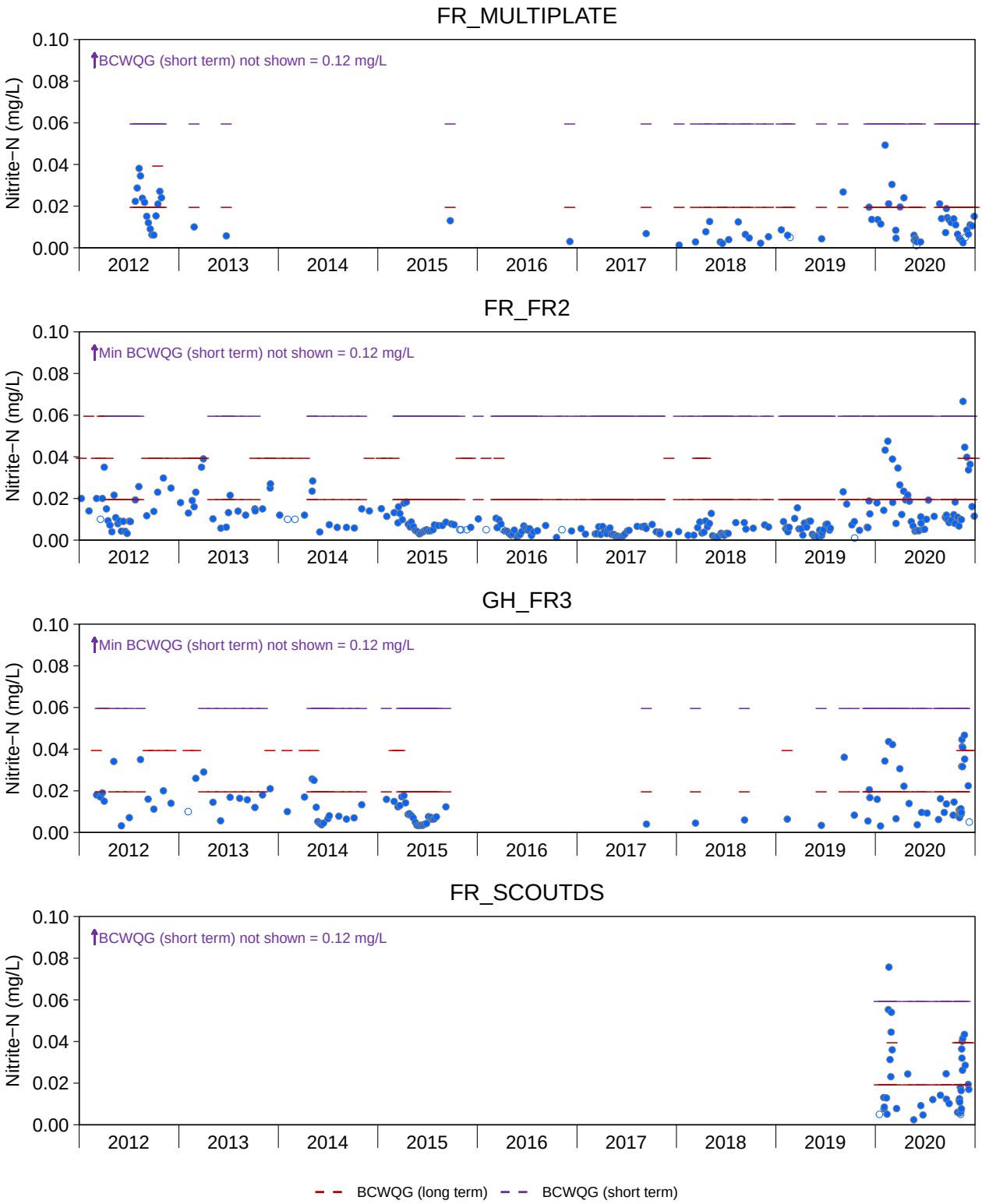

Figure B.12: Time Series Plots for Nitrite−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concenrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

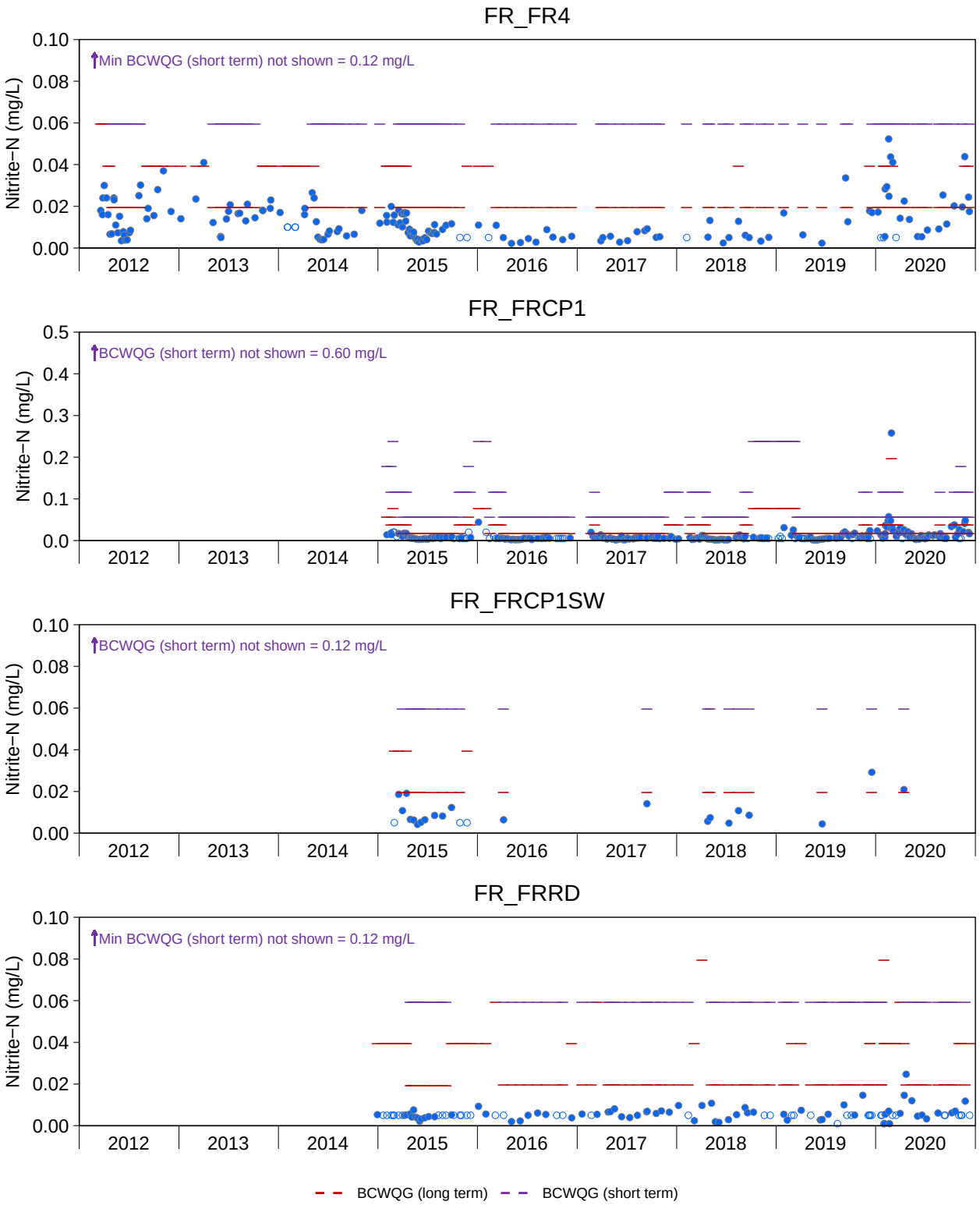

Figure B.12: Time Series Plots for Nitrite−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concenrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

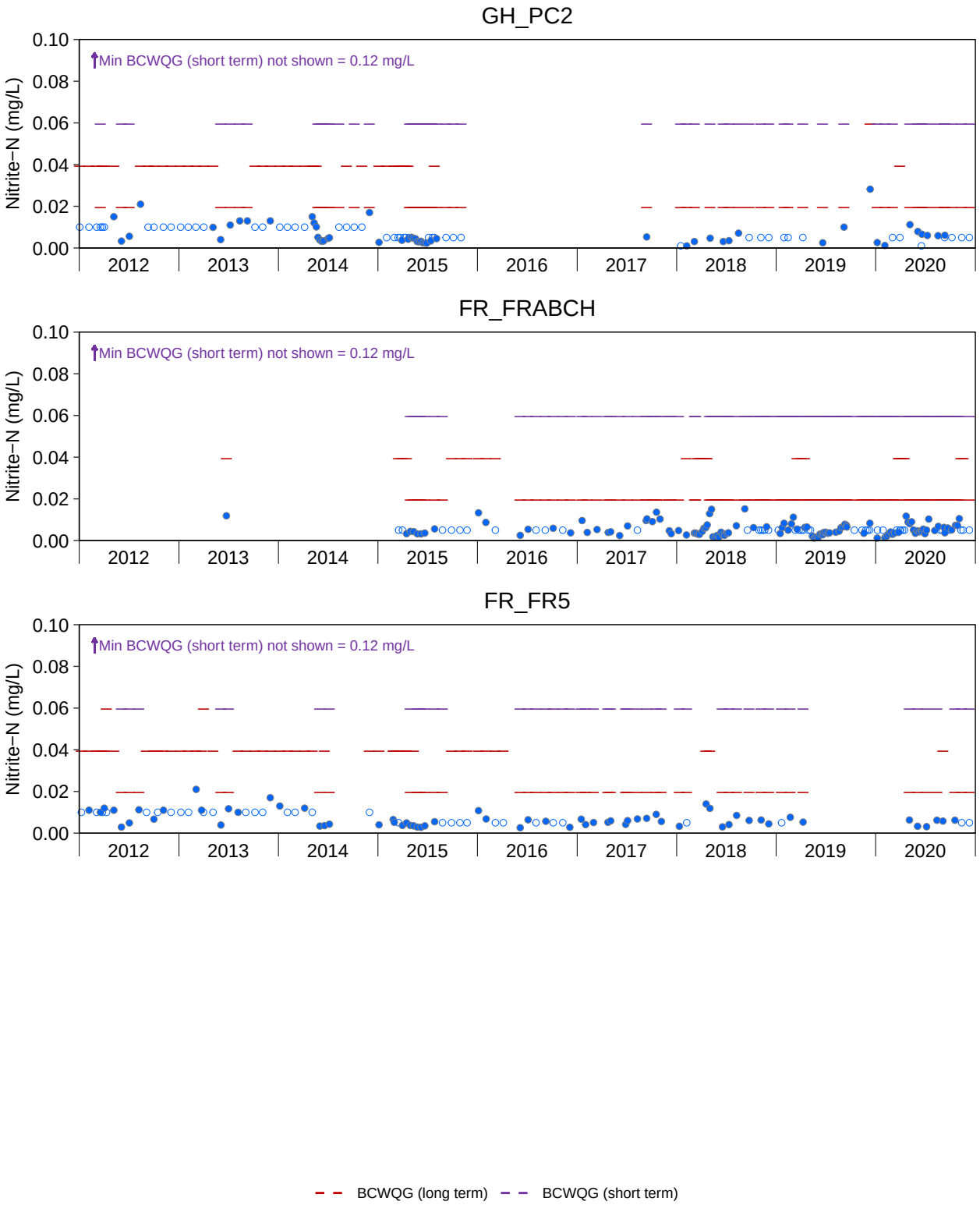

Figure B.12: Time Series Plots for Nitrite−N Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water chloride concenrations. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

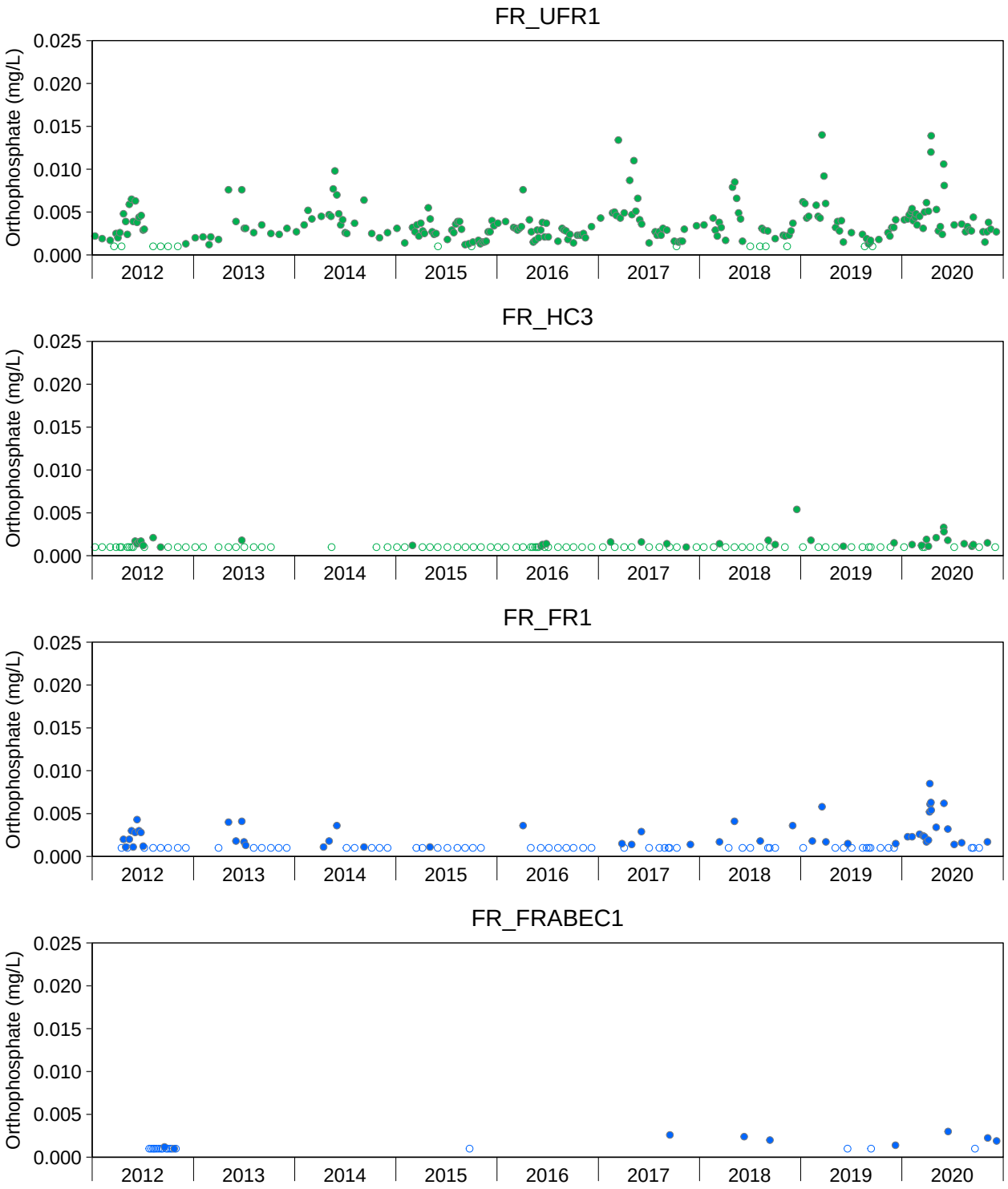

Figure B.13: Time Series Plots for Orthophosphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

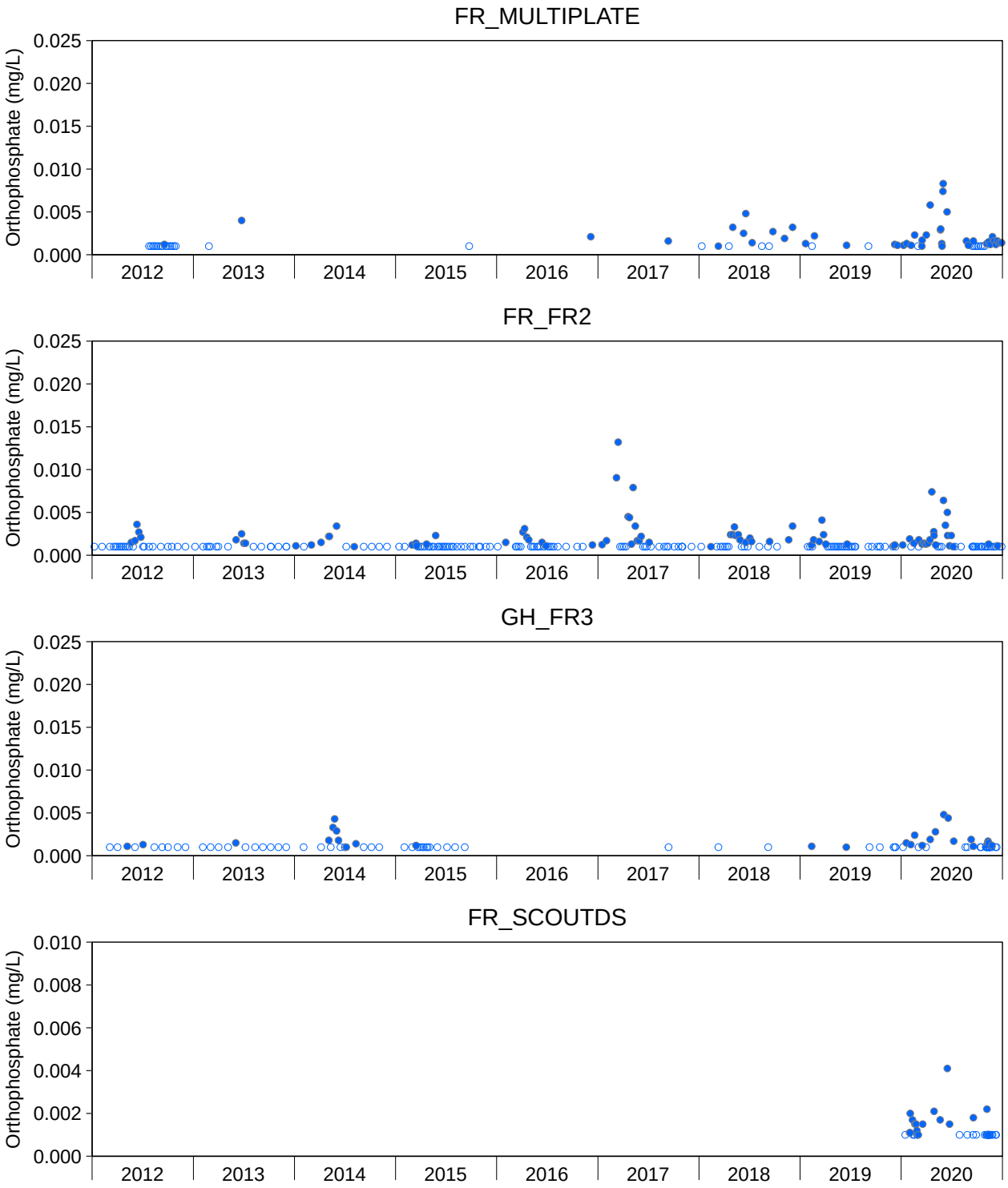

Figure B.13: Time Series Plots for Orthophosphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

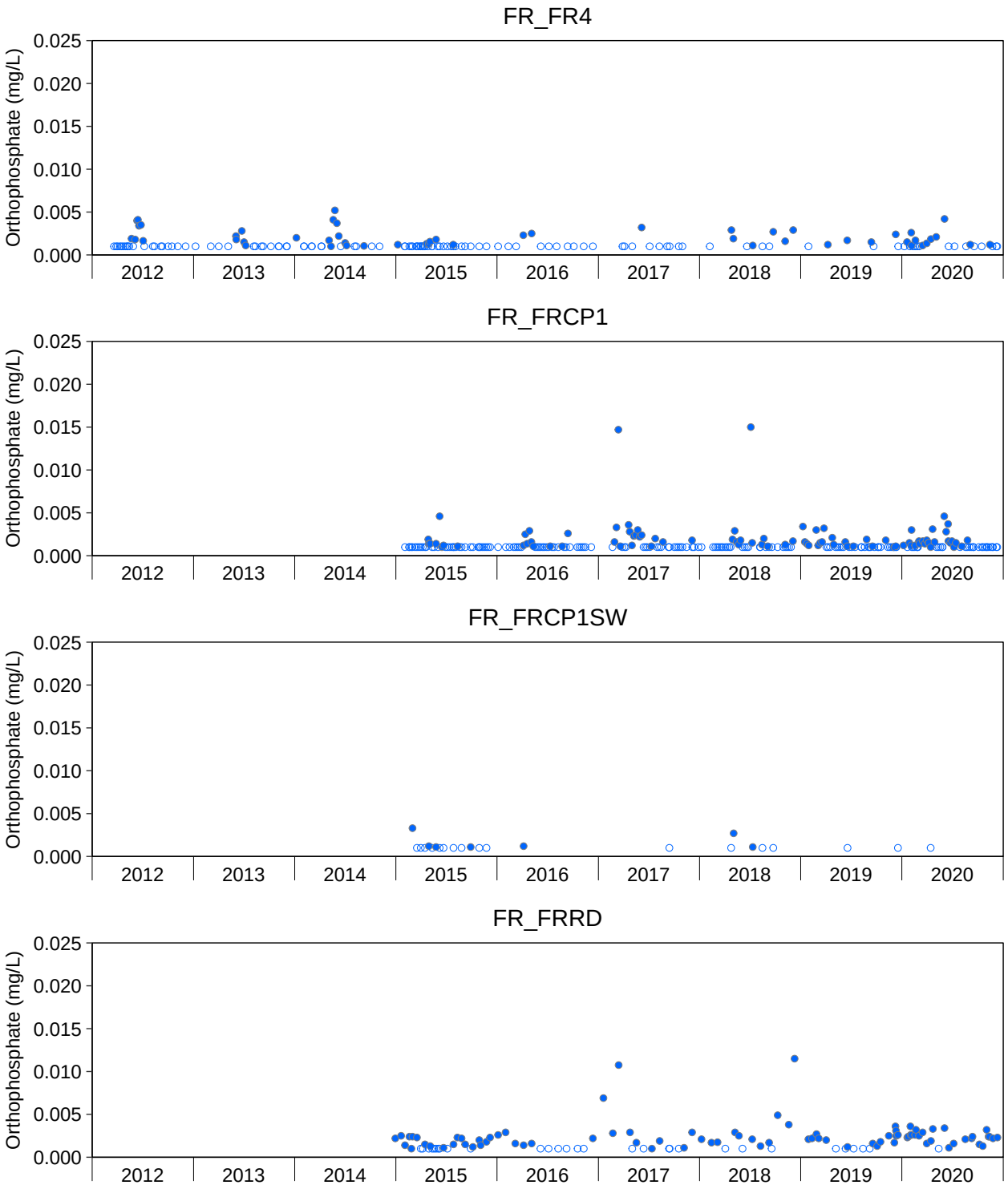

Figure B.13: Time Series Plots for Orthophosphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

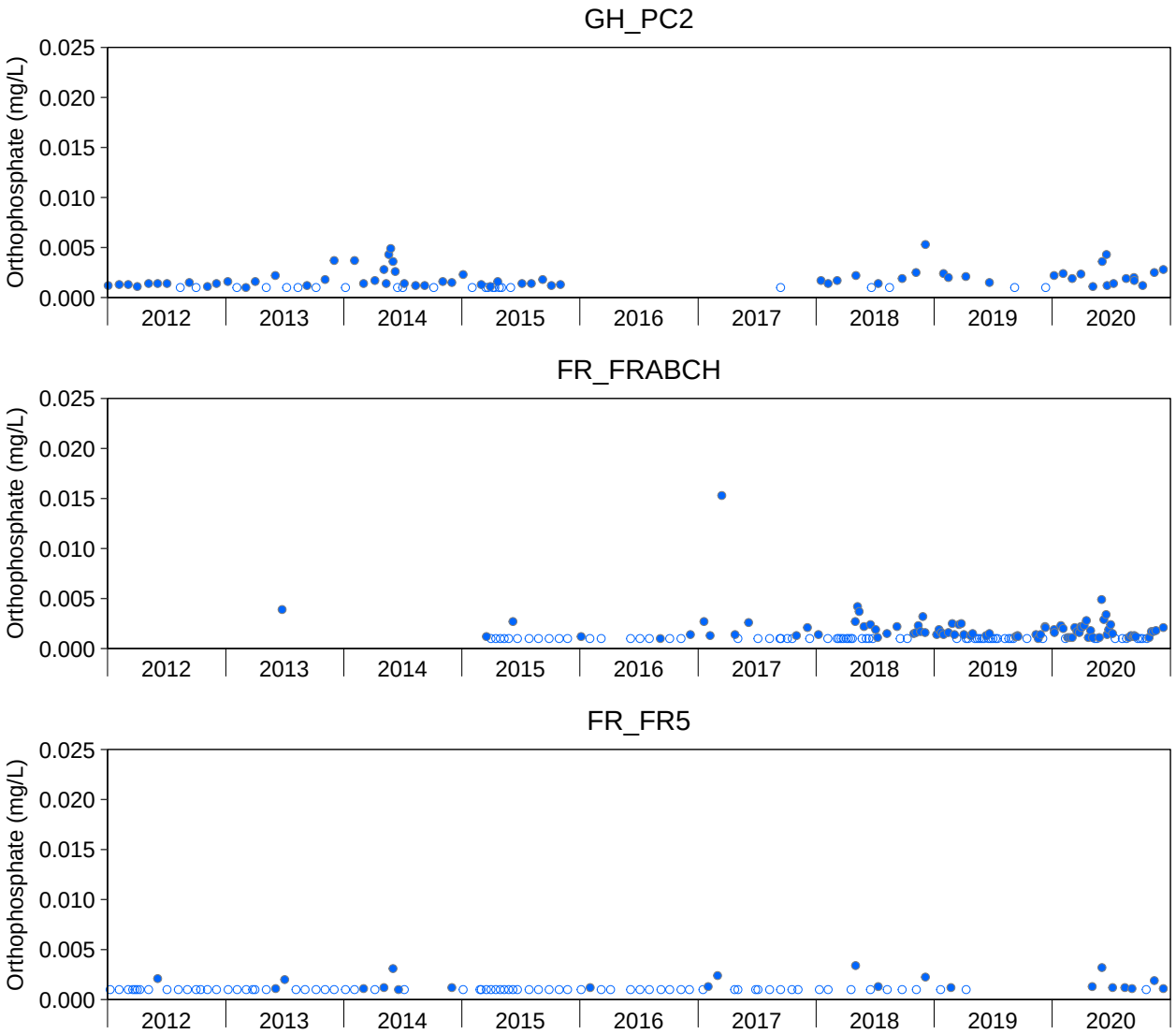

Figure B.13: Time Series Plots for Orthophosphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

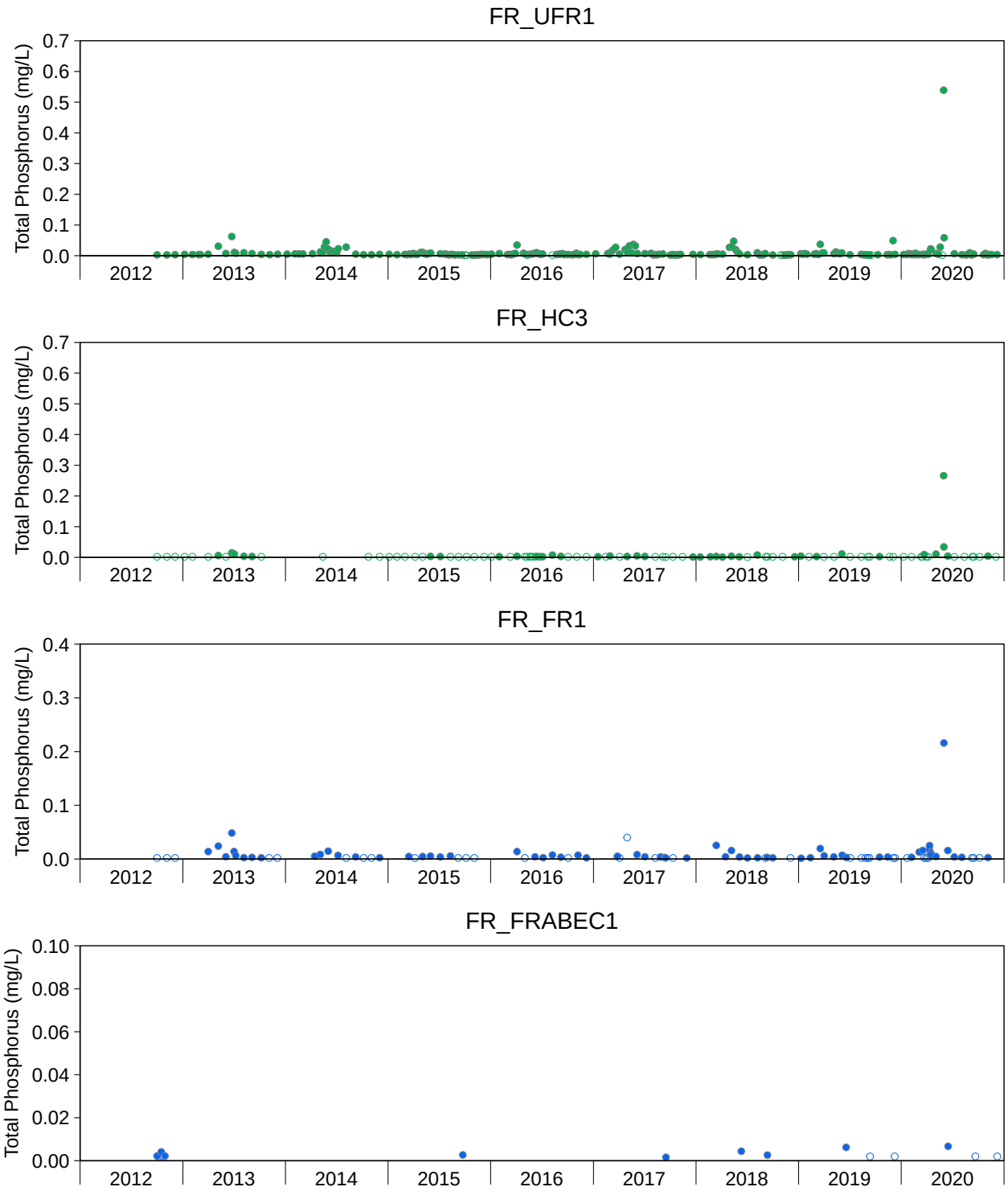

Figure B.14: Time Series Plots for Total Phosphorus Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

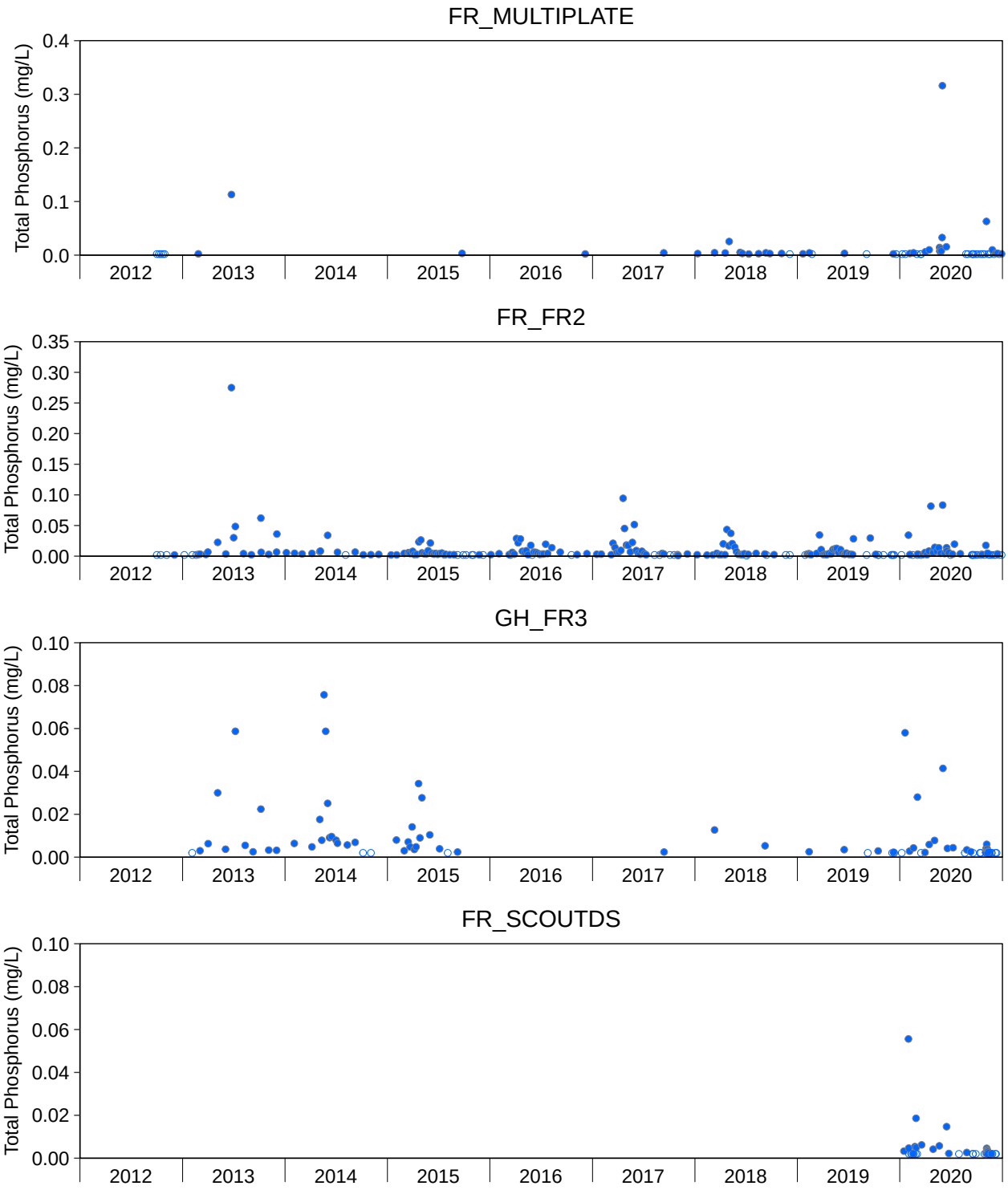

Figure B.14: Time Series Plots for Total Phosphorus Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

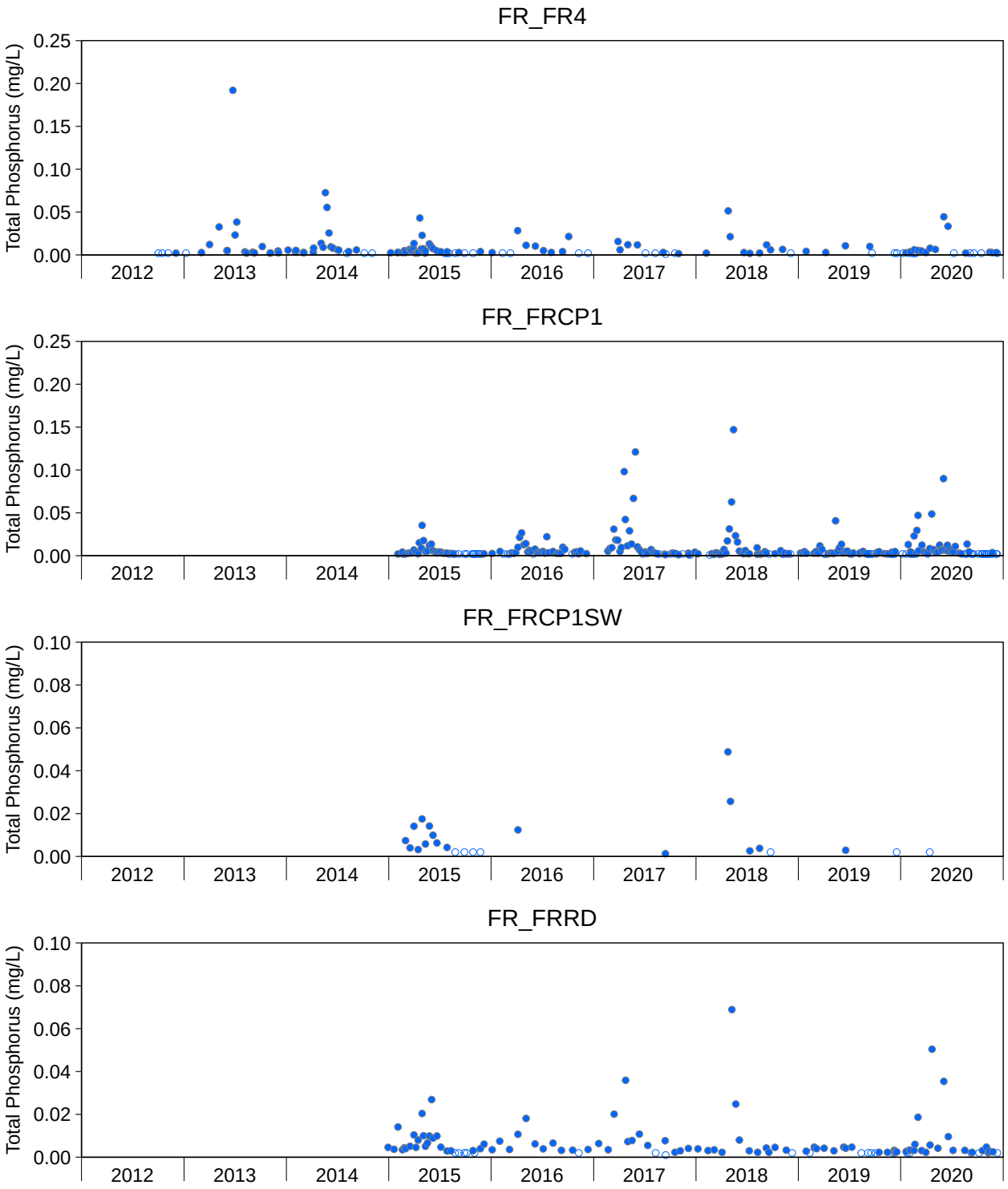

Figure B.14: Time Series Plots for Total Phosphorus Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

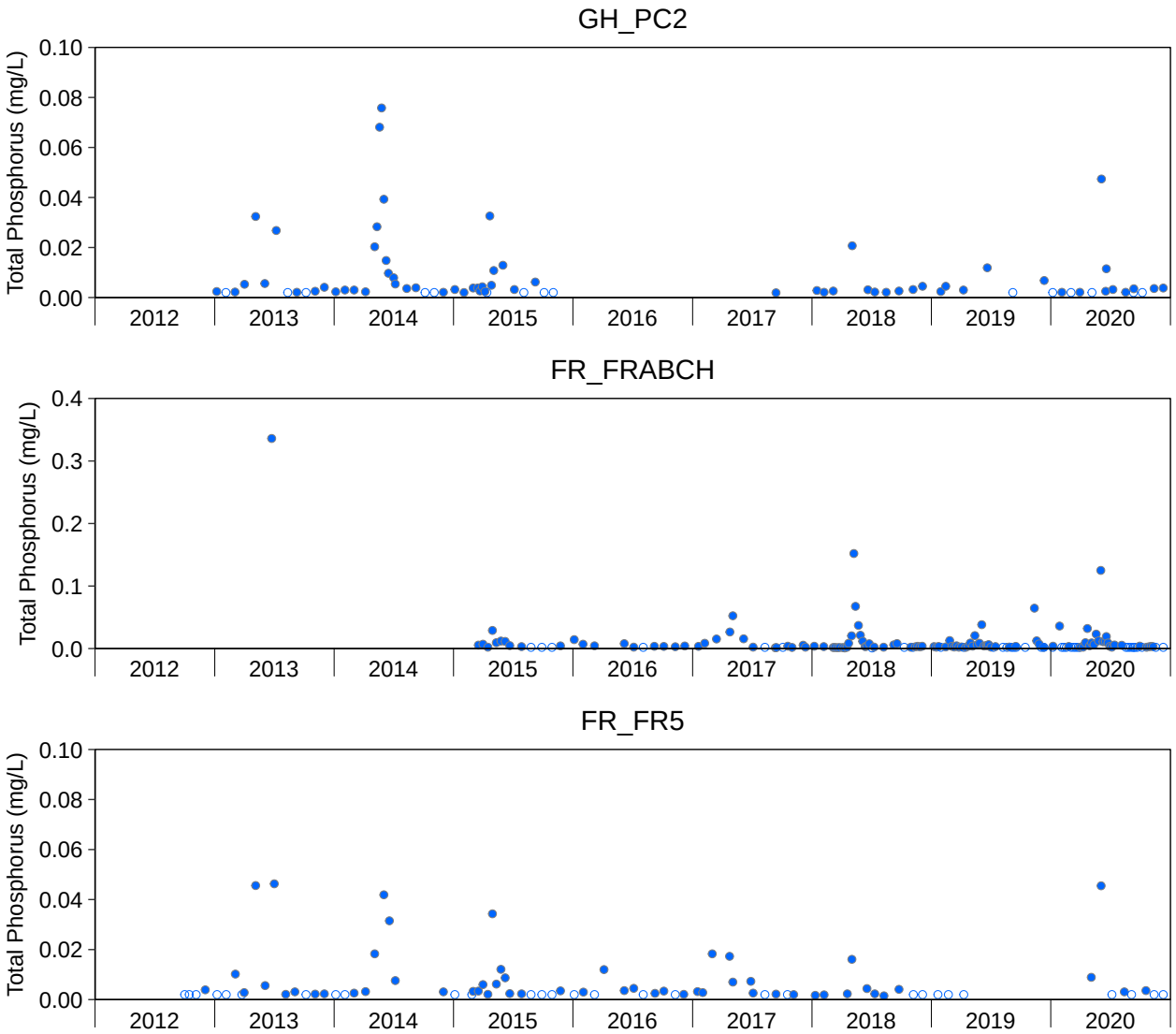

Figure B.14: Time Series Plots for Total Phosphorus Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL.

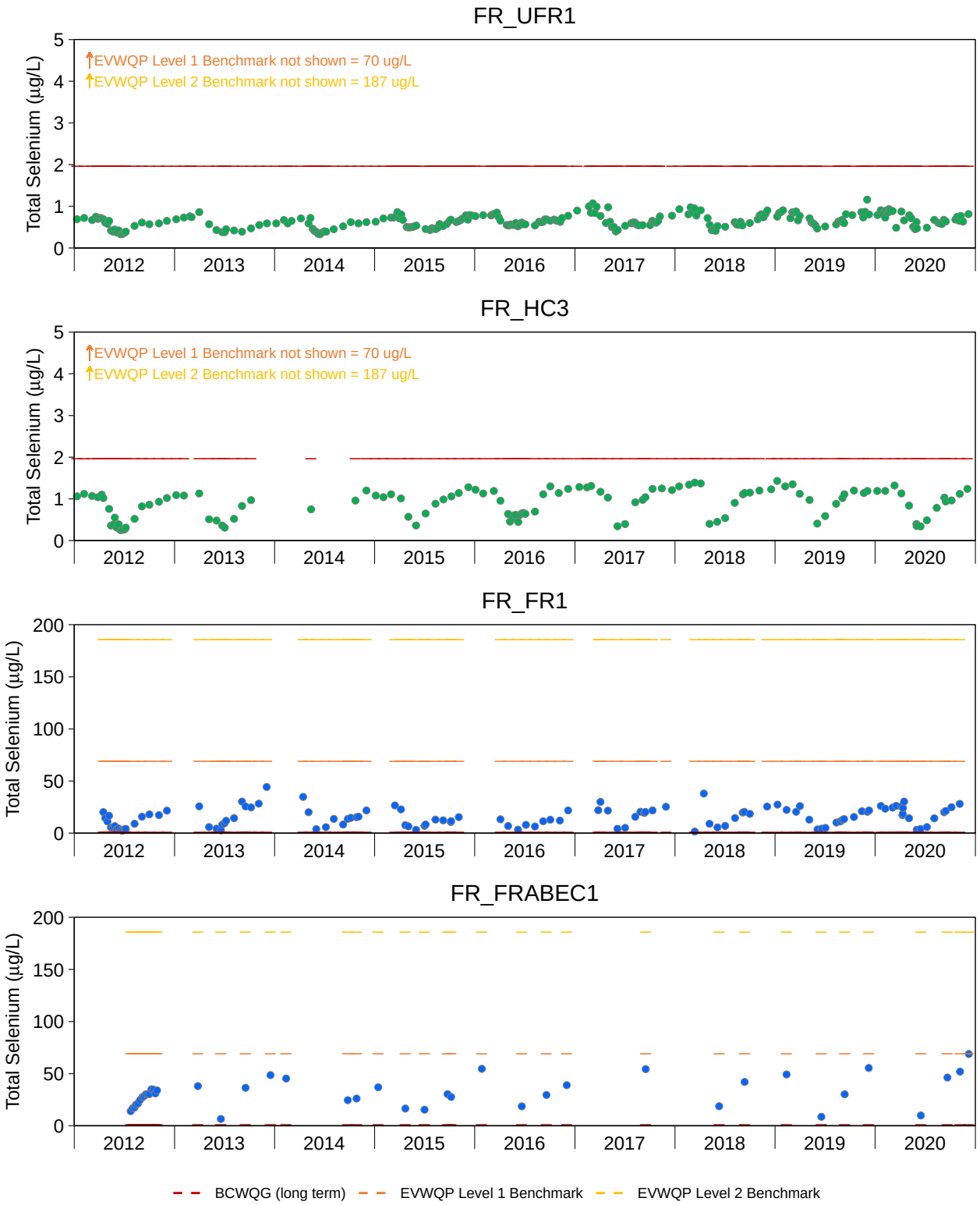

Figure B.15: Time Series Plots for Total Selenium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

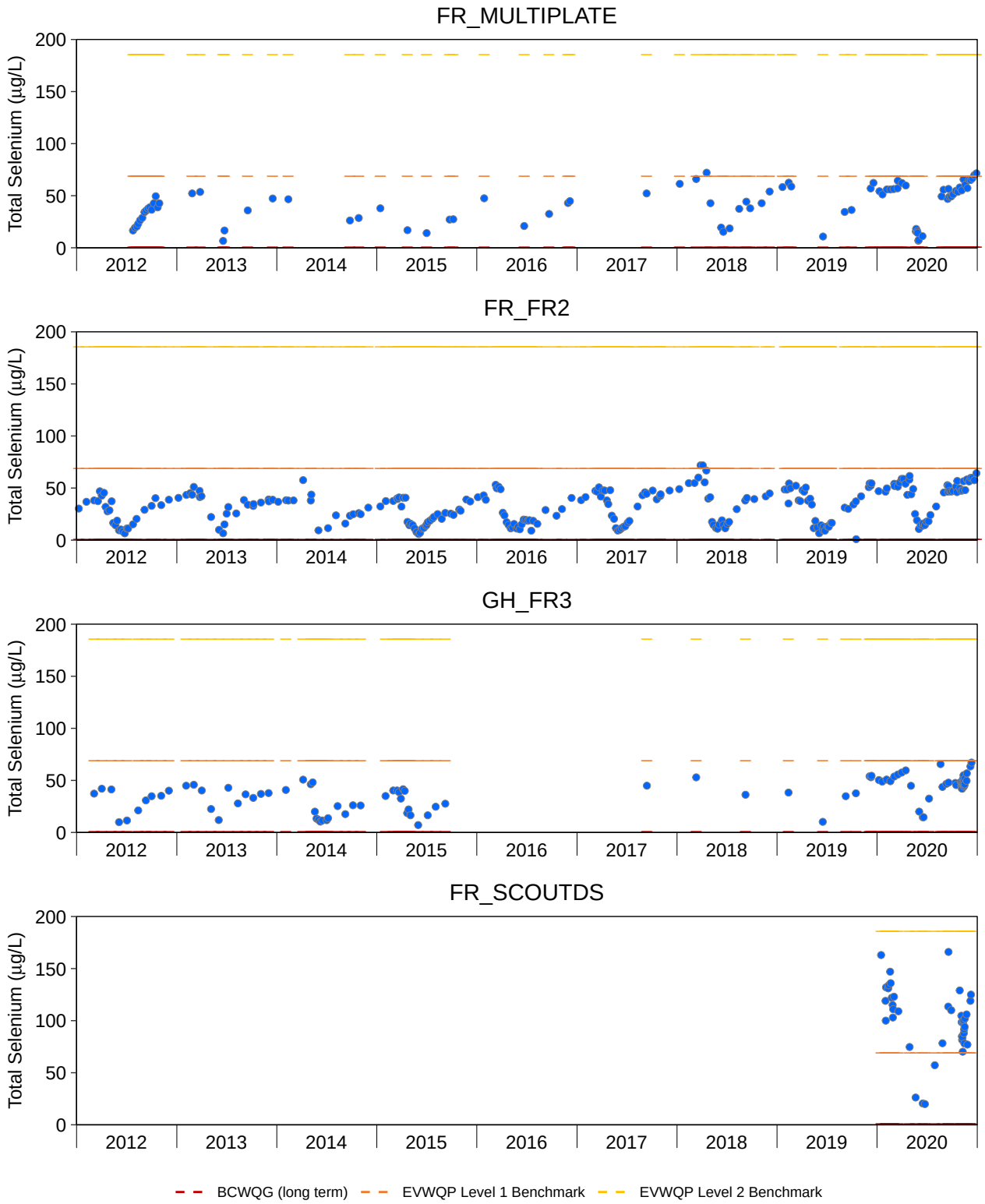

Figure B.15: Time Series Plots for Total Selenium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

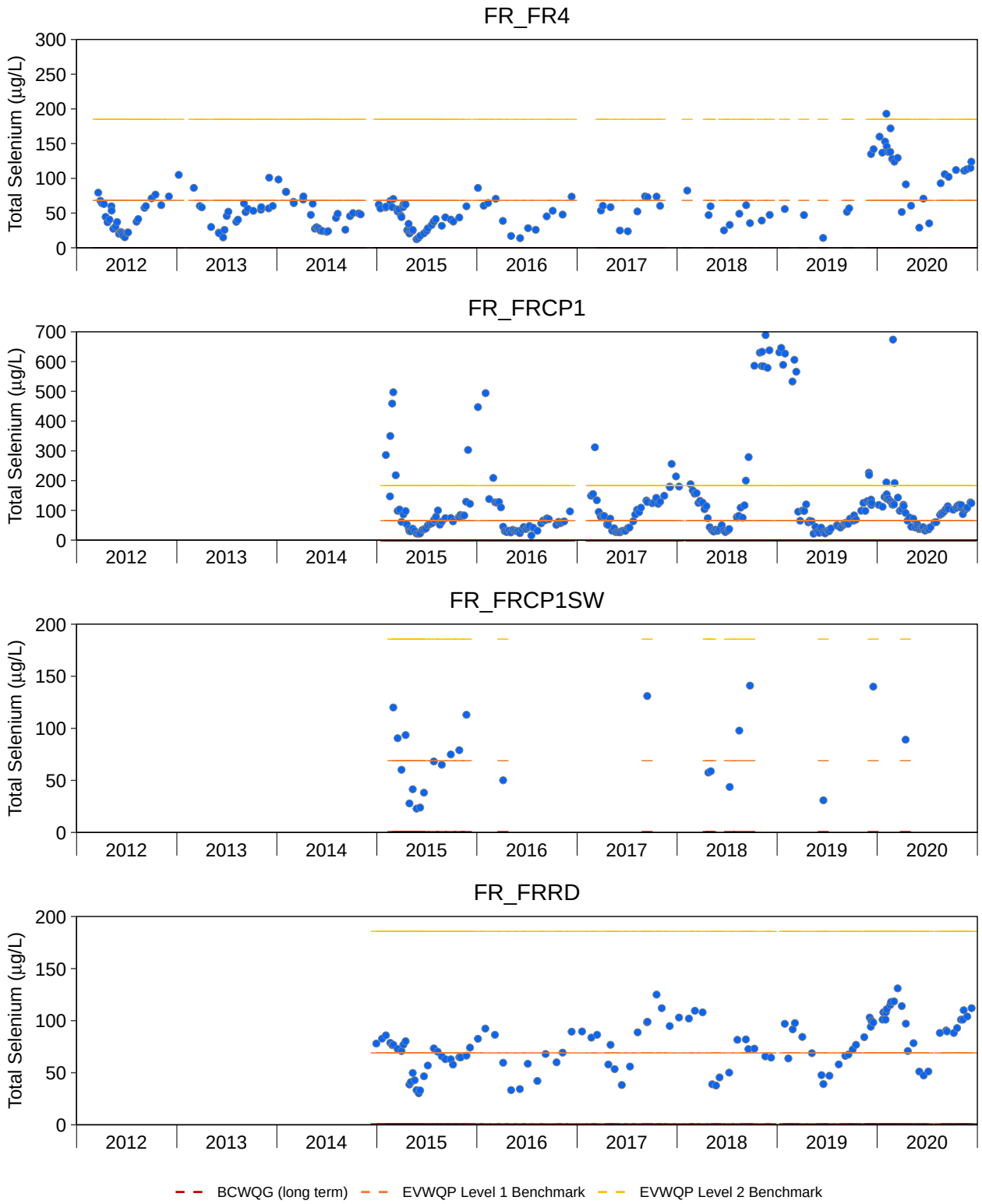

Figure B.15: Time Series Plots for Total Selenium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

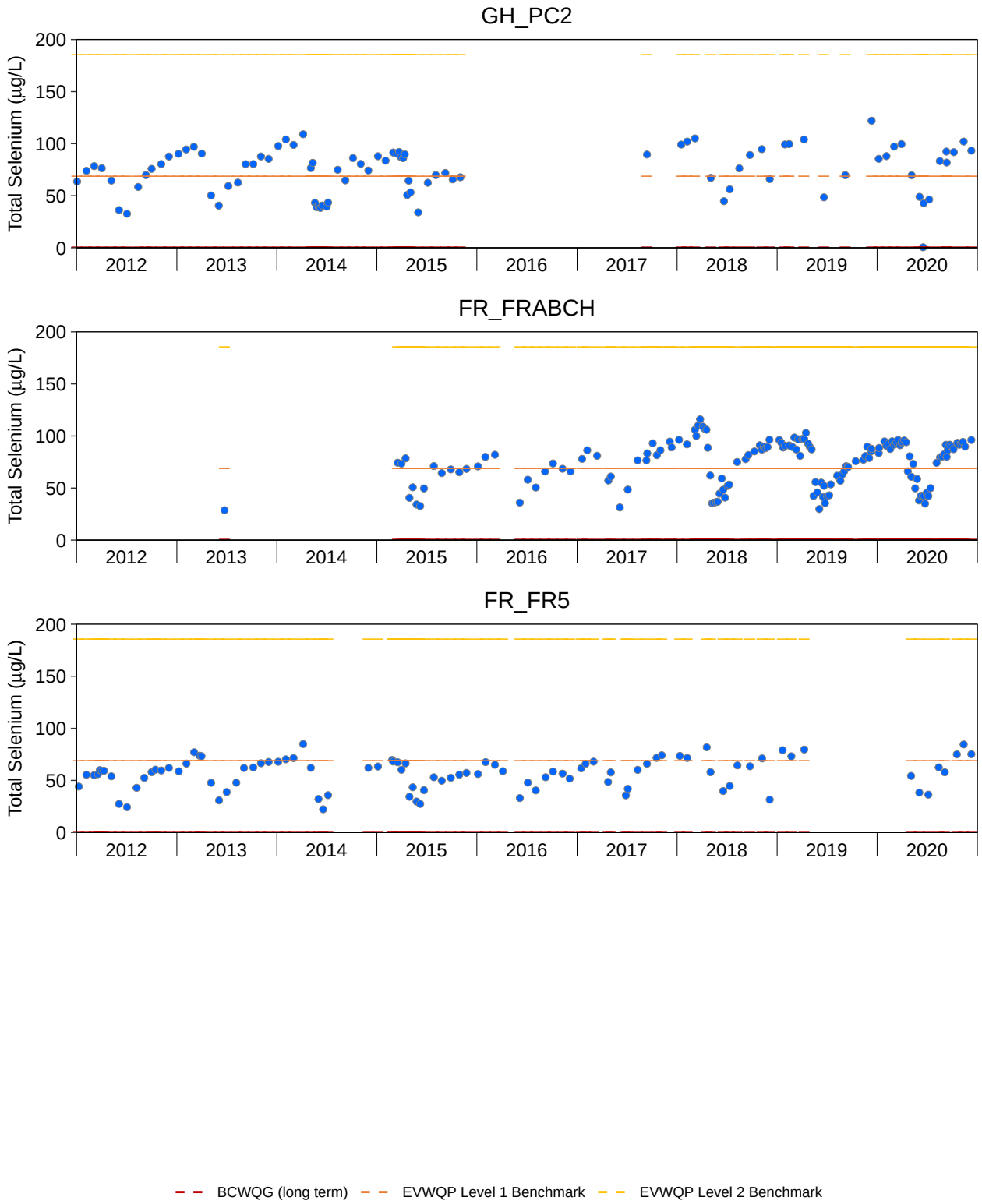

Figure B.15: Time Series Plots for Total Selenium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

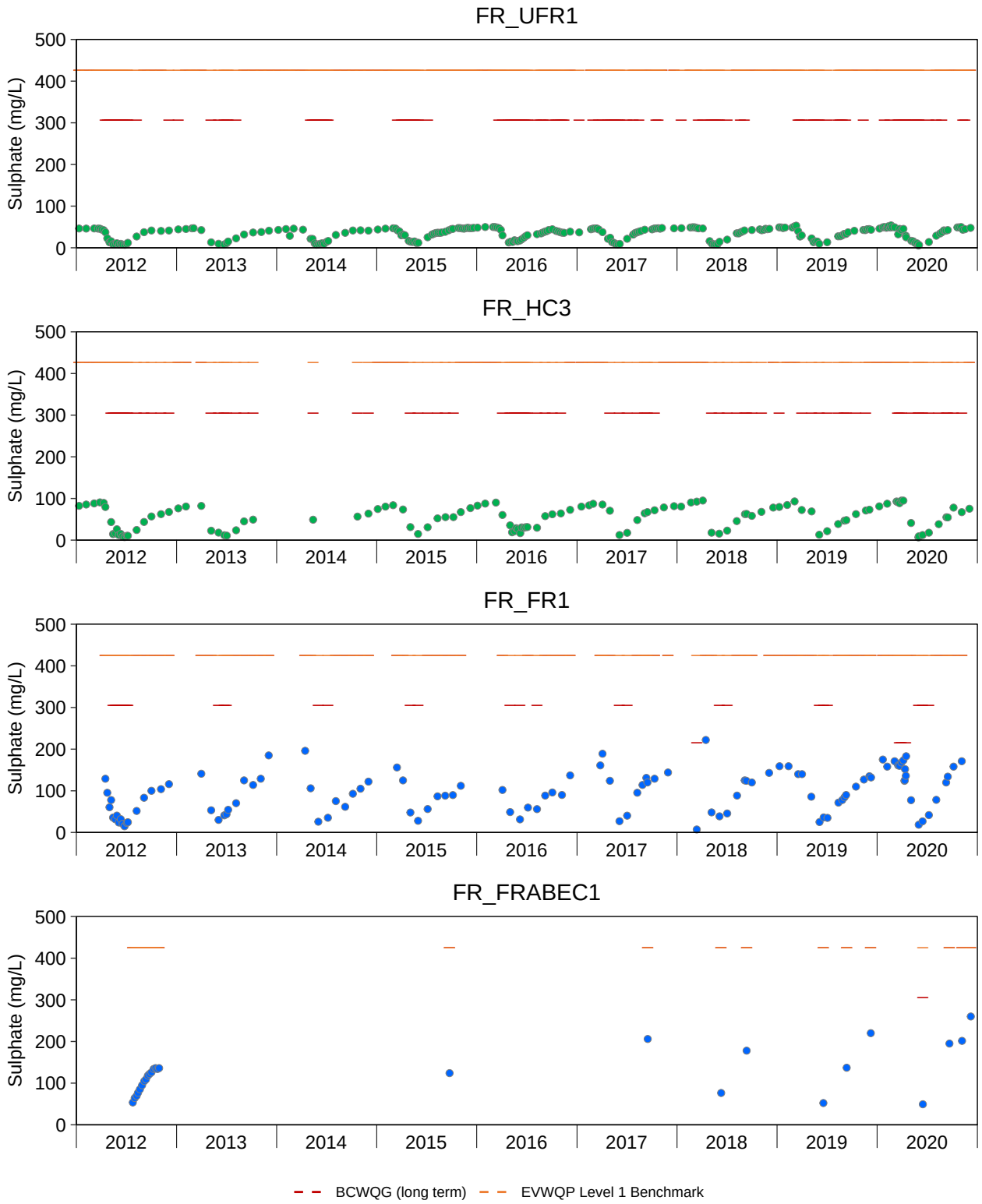

Figure B.16: Time Series Plots for Sulphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

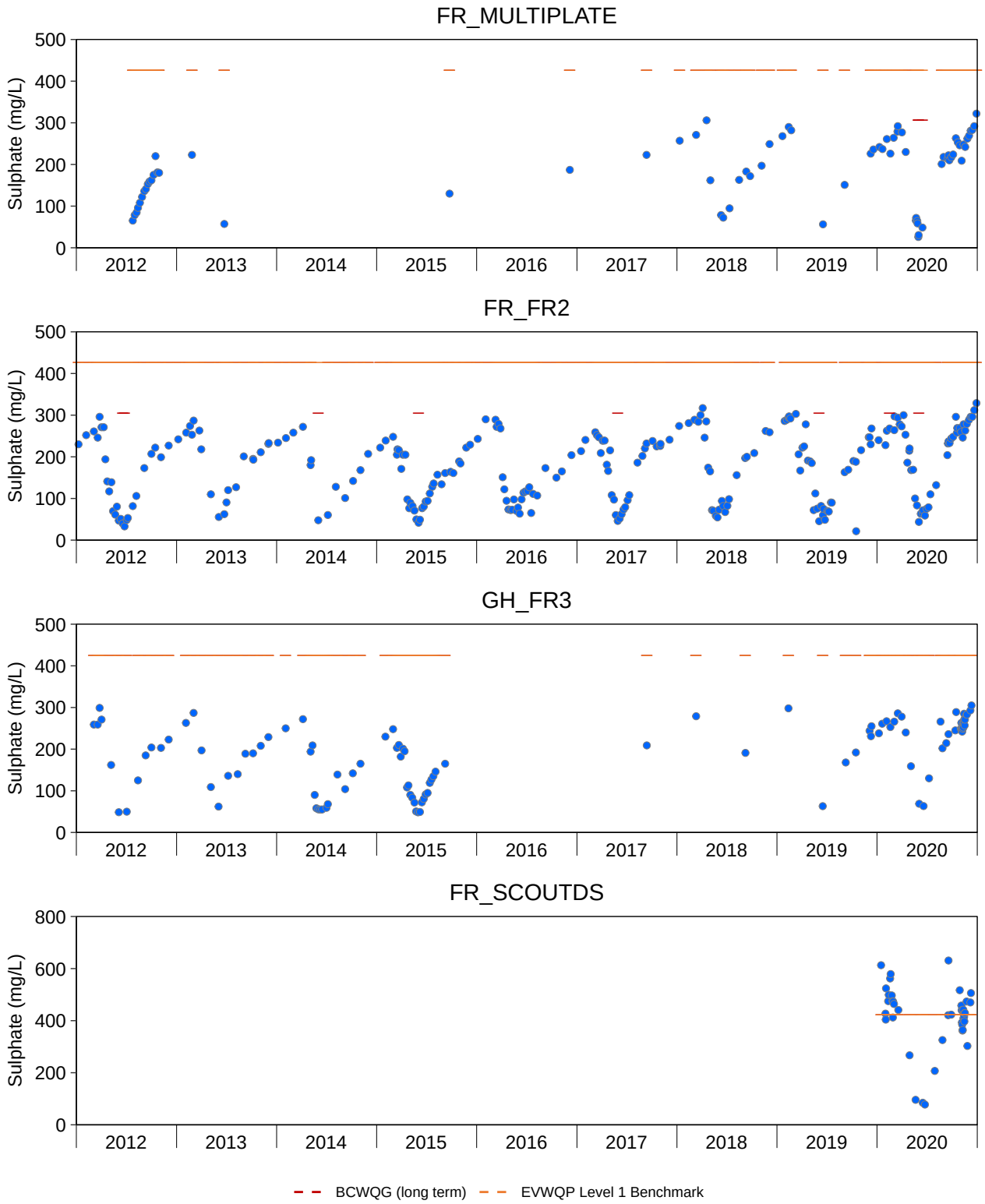

Figure B.16: Time Series Plots for Sulphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

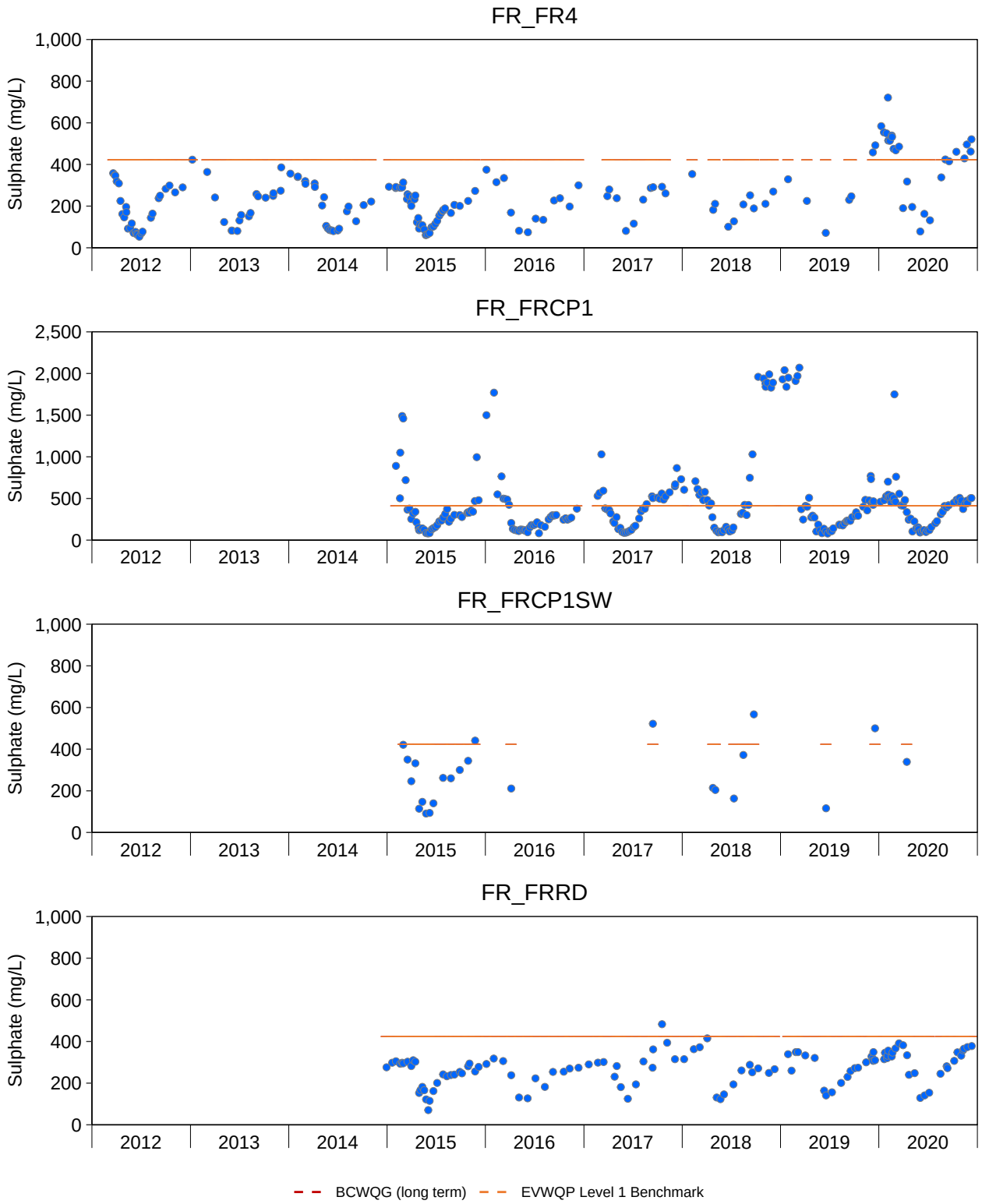

Figure B.16: Time Series Plots for Sulphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

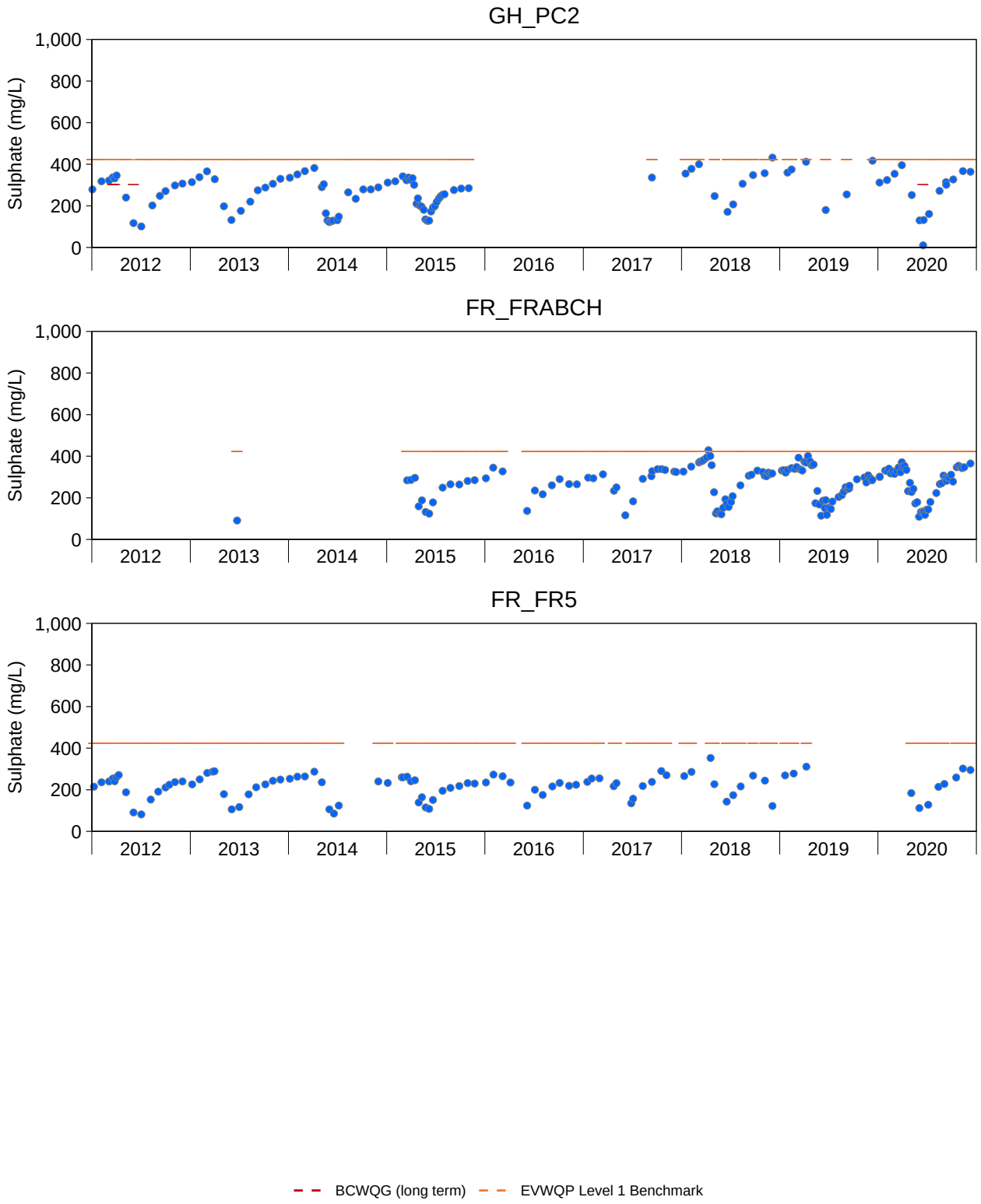

Figure B.16: Time Series Plots for Sulphate Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

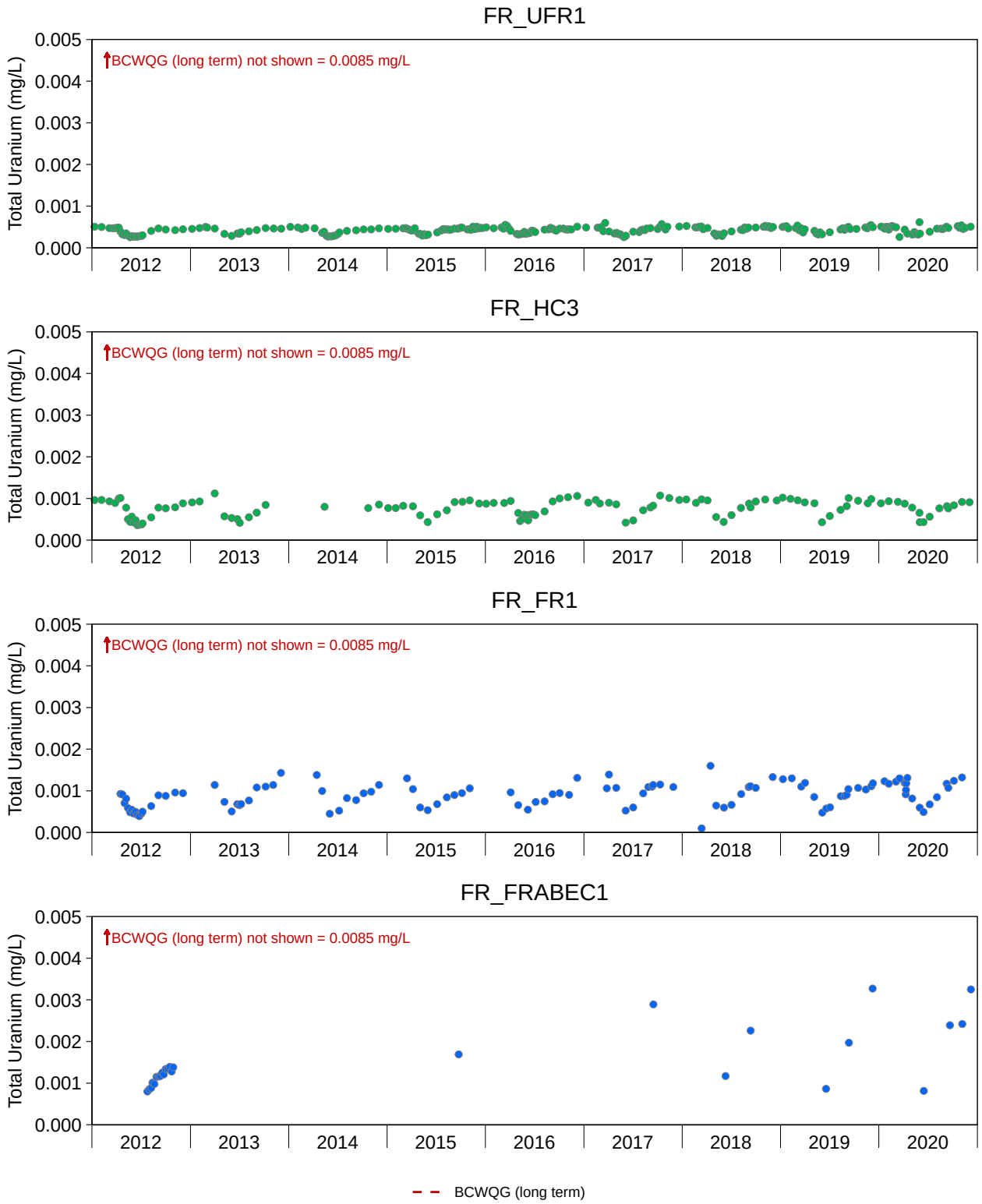

Figure B.17: Time Series Plots for Total Uranium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

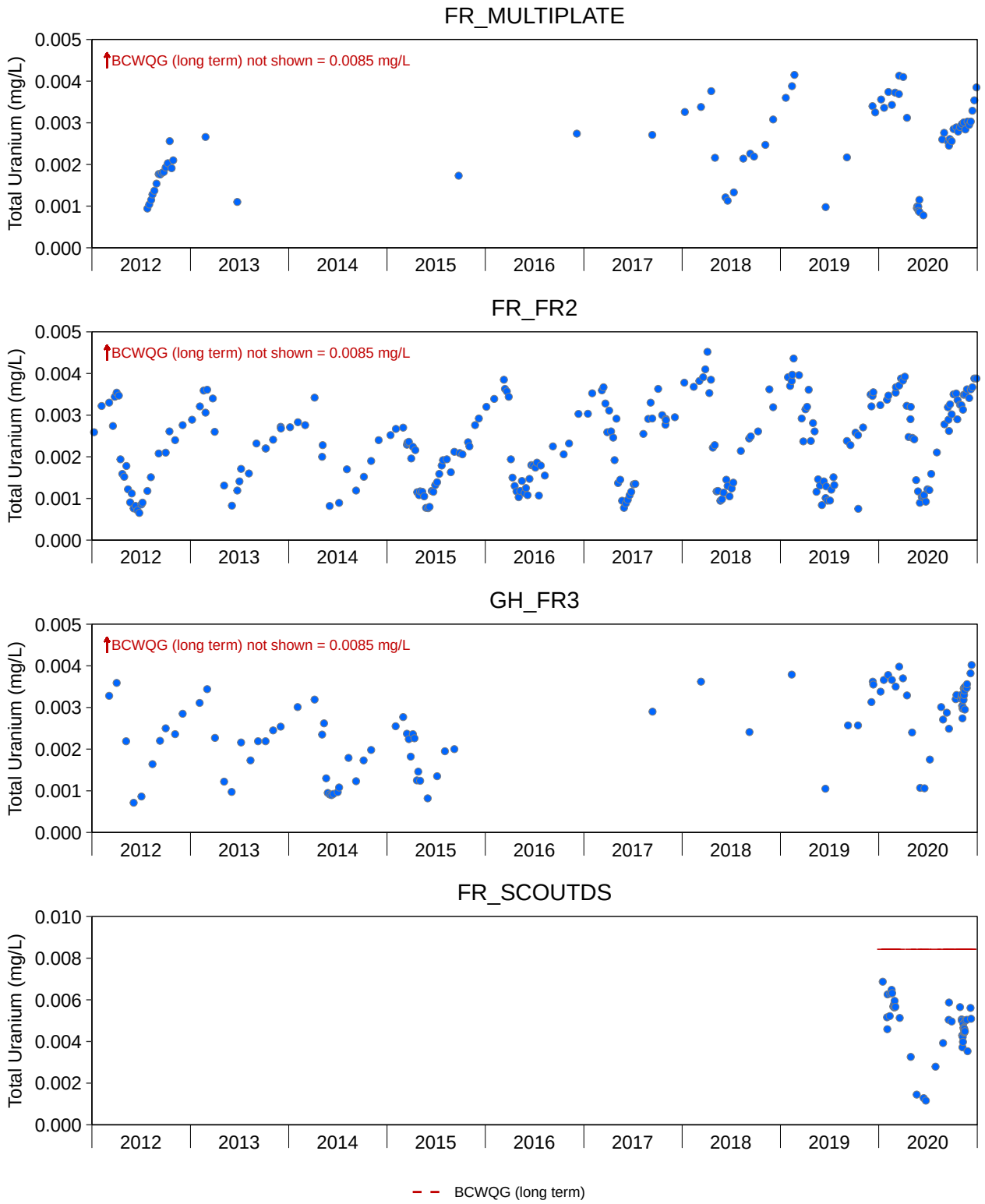

Figure B.17: Time Series Plots for Total Uranium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

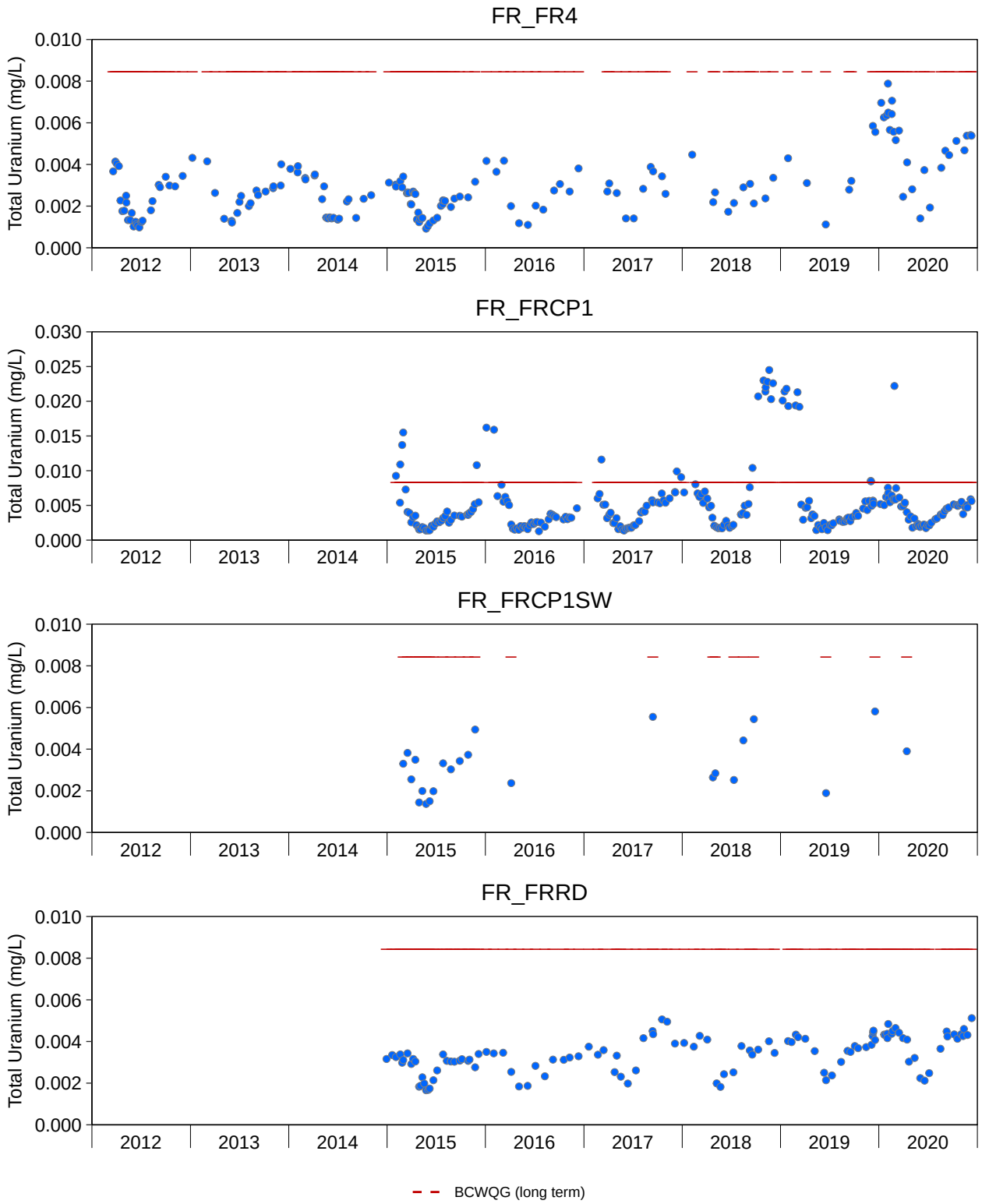

Figure B.17: Time Series Plots for Total Uranium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

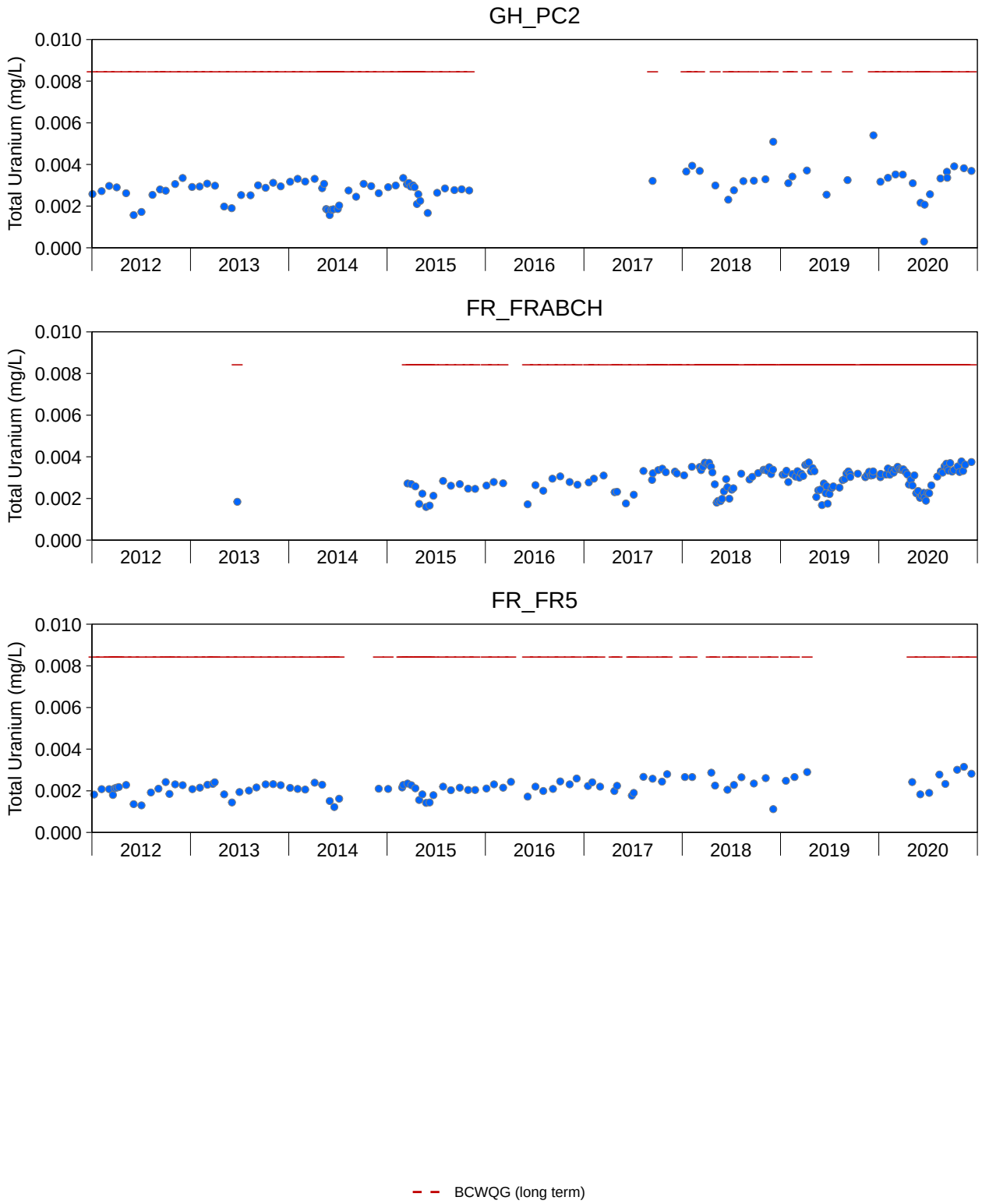

Figure B.17: Time Series Plots for Total Uranium Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Note: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

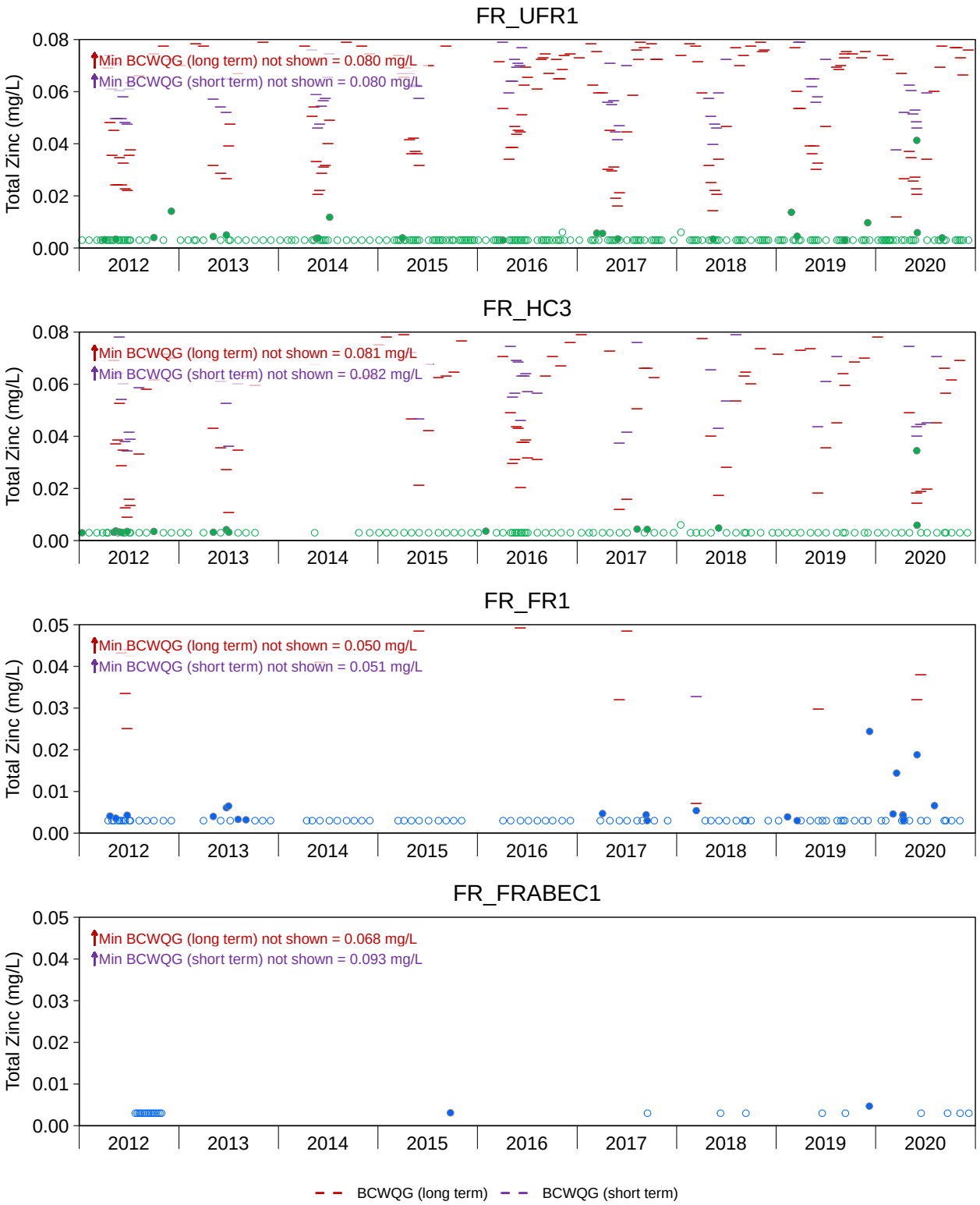

Figure B.18: Time Series Plots for Total Zinc Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

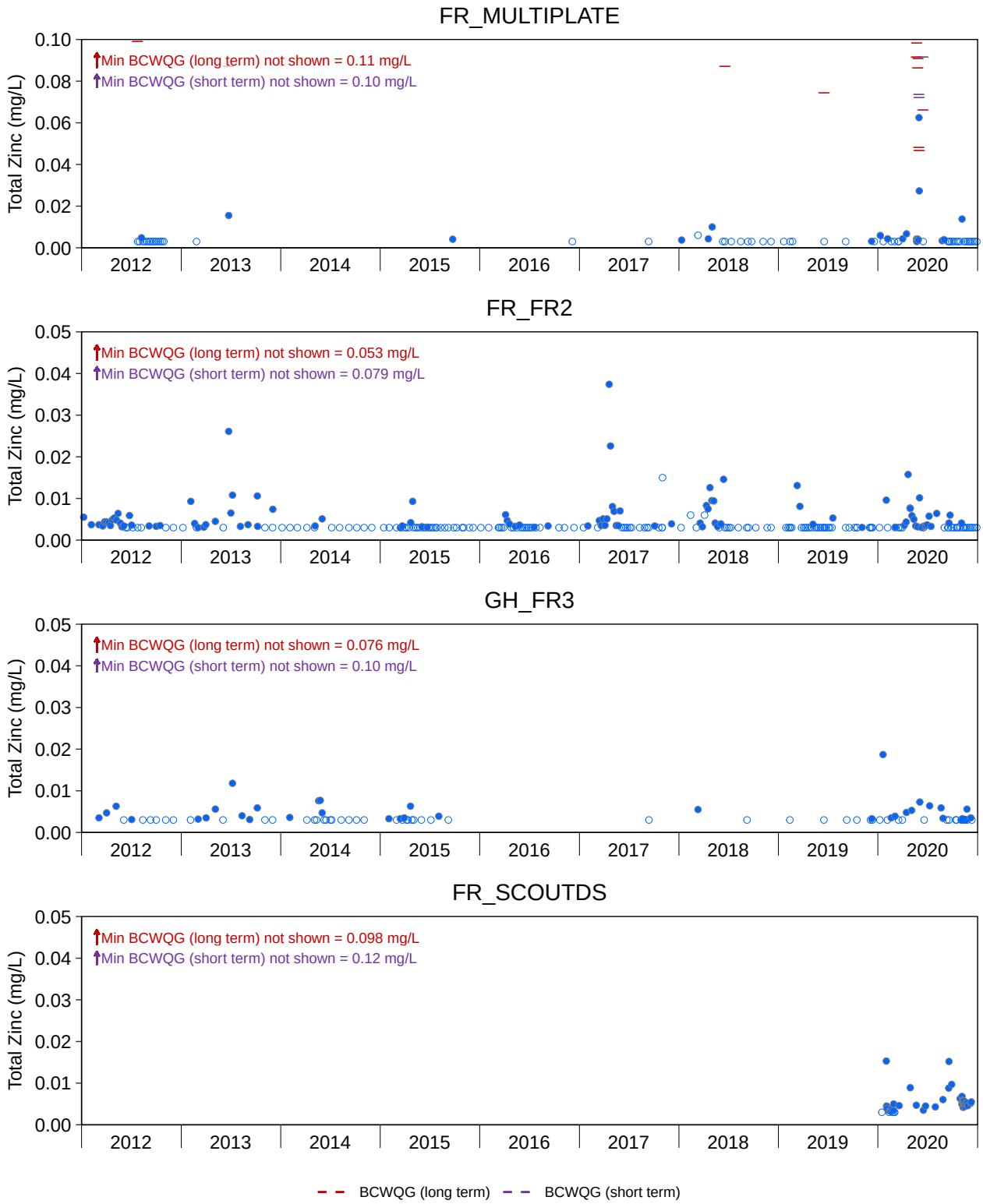

Figure B.18: Time Series Plots for Total Zinc Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

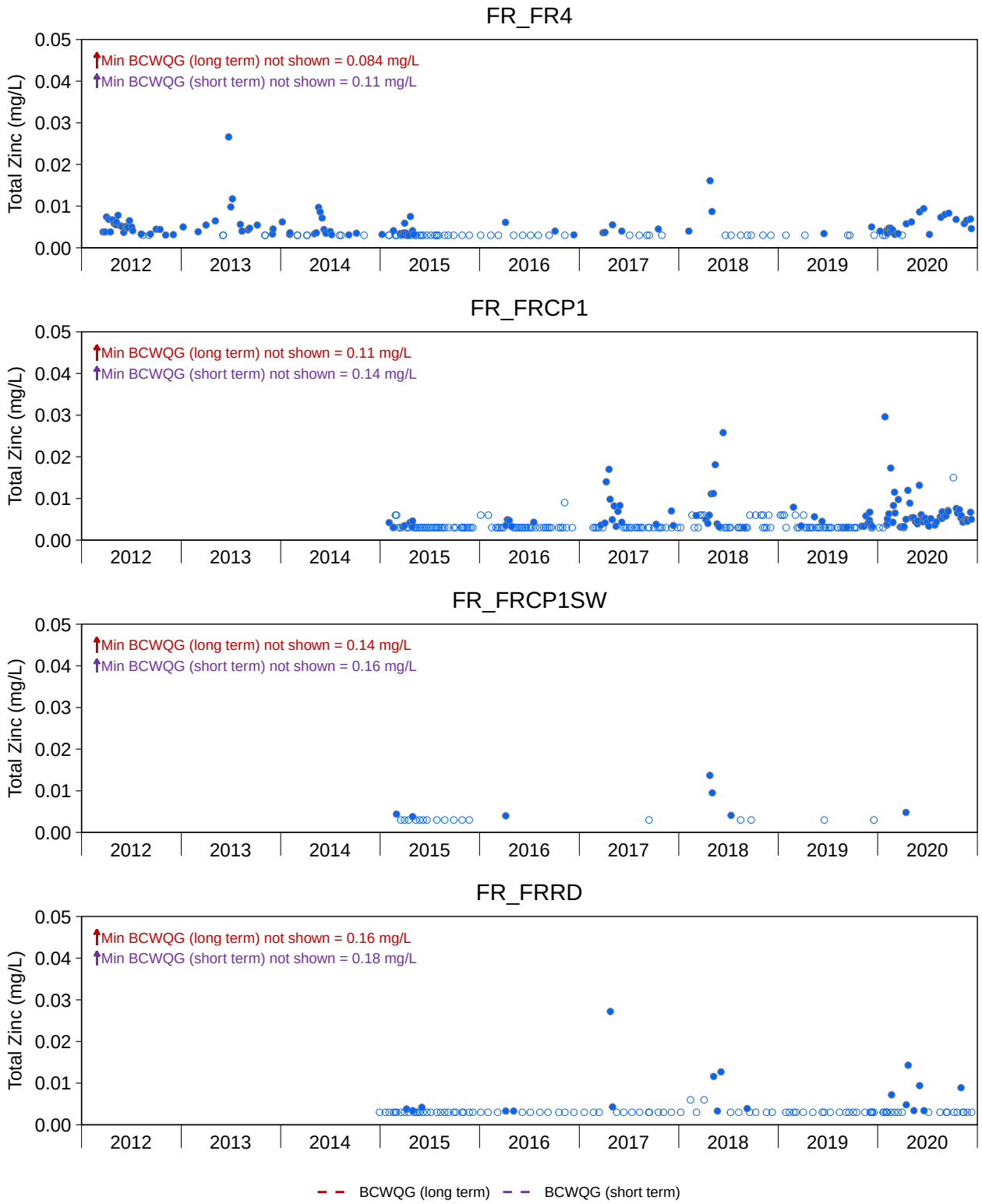

Figure B.18: Time Series Plots for Total Zinc Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

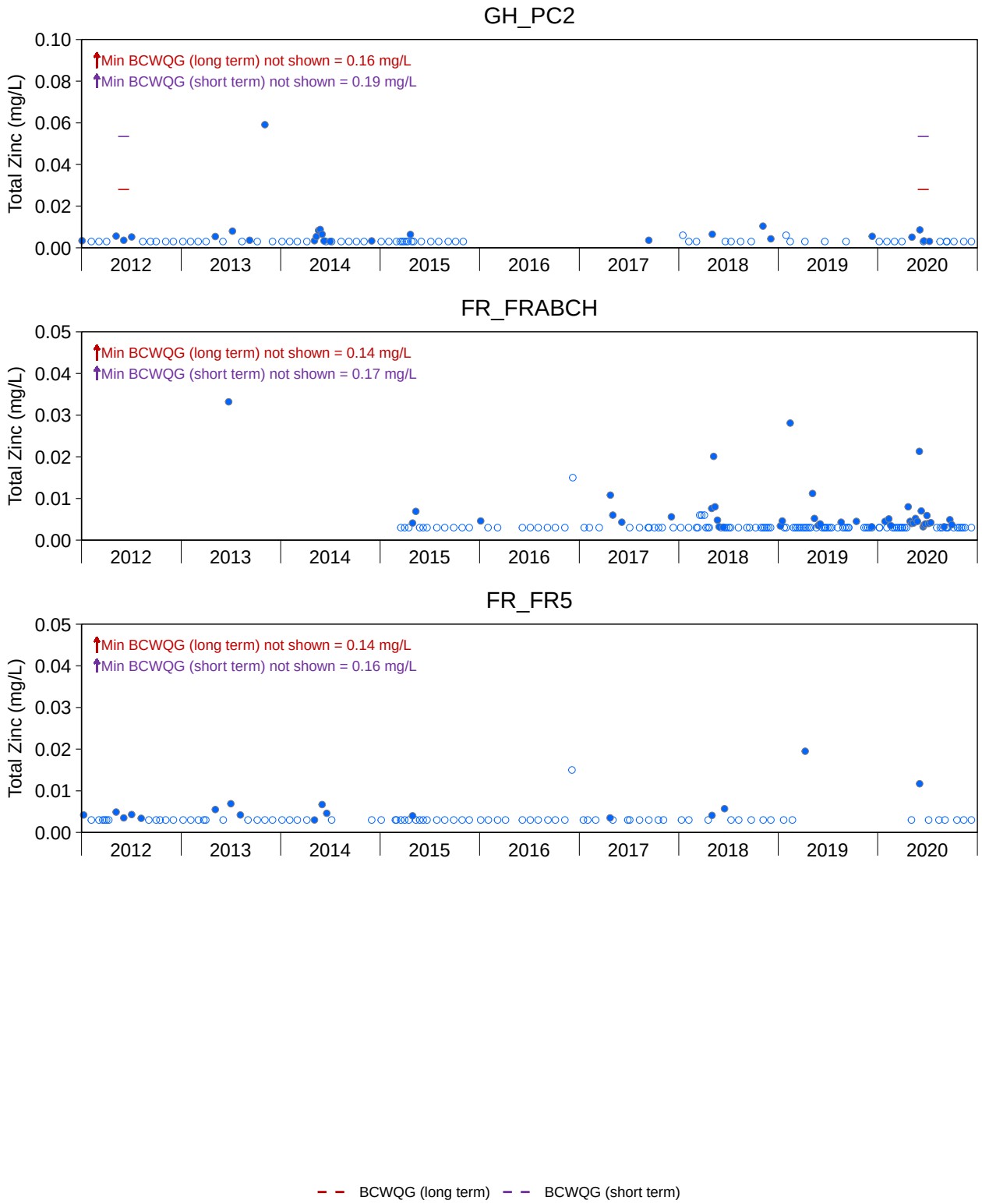

Figure B.18: Time Series Plots for Total Zinc Concentrations from FRO LAEMP Sampling Areas, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL. Guidelines are dependent on water hardness. Constituent was plotted because it was identified as a mine−related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018).

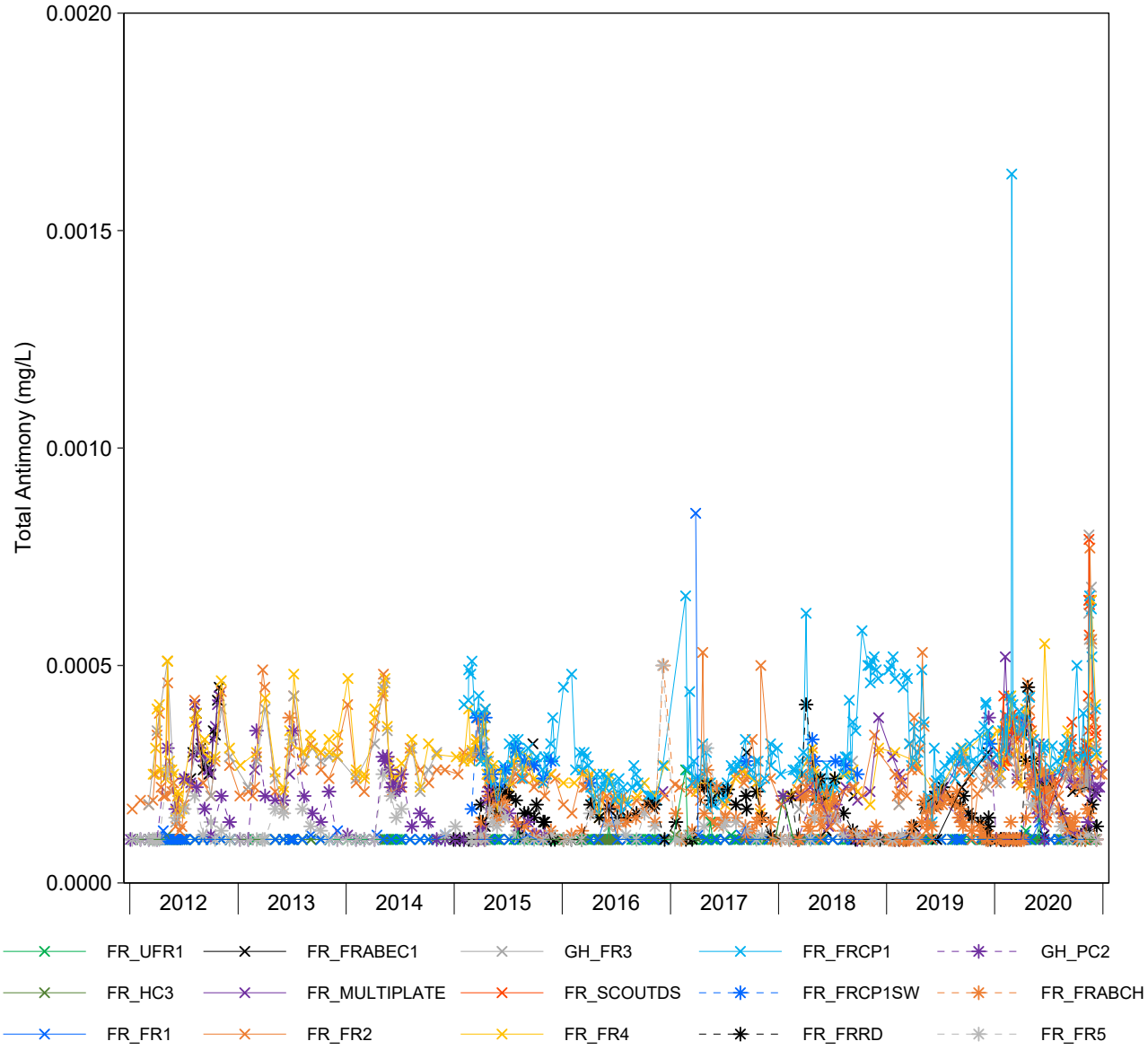

Figure B.19: Time Series Plots for Aqueous Total Antimony Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.00010 and 0.00050 mg/L). Total Antimony was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

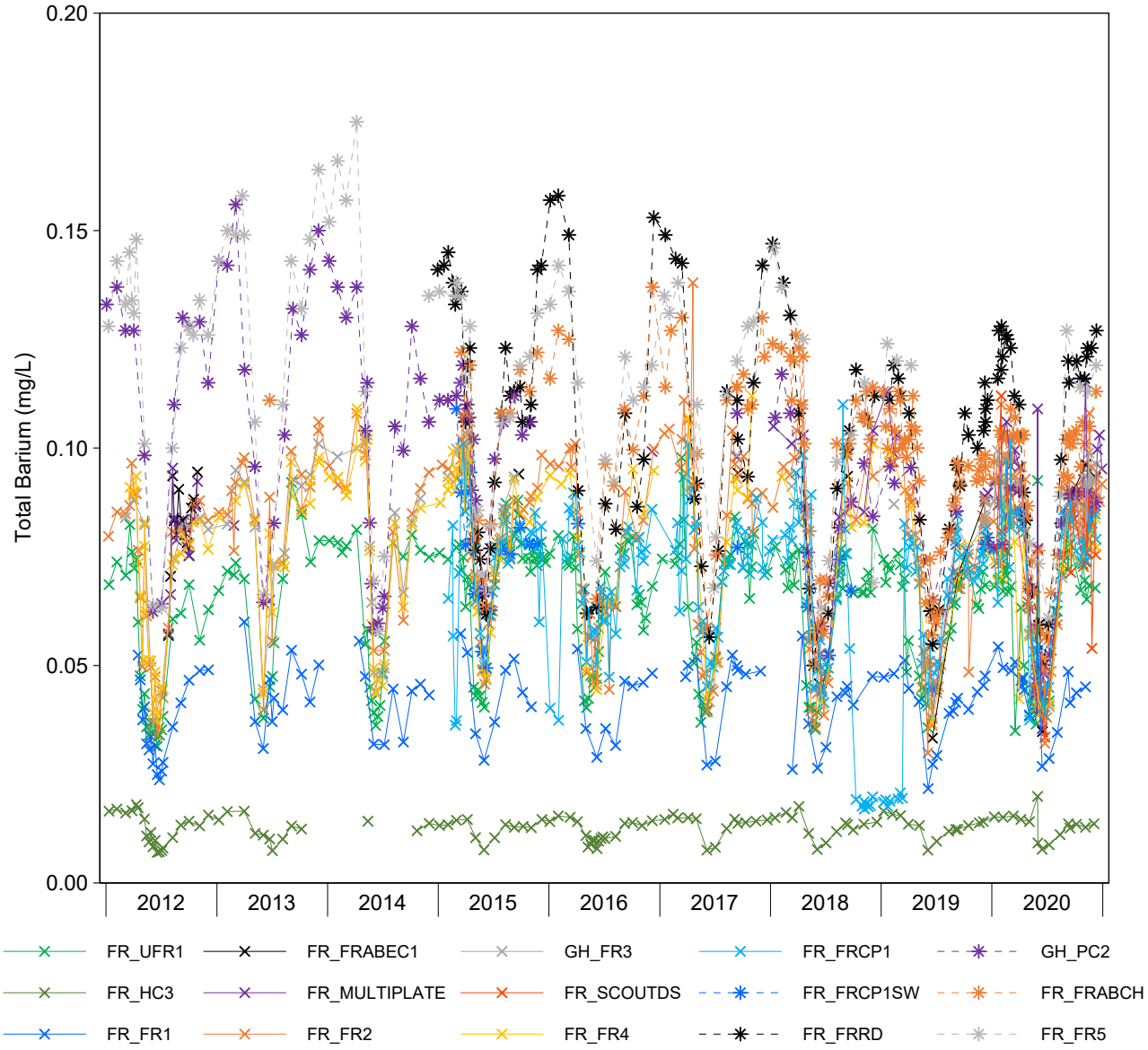

Figure B.20: Time Series Plots for Aqueous Total Barium Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: No values below the LRL. Total Barium was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2019). Lines included for station differentiation.

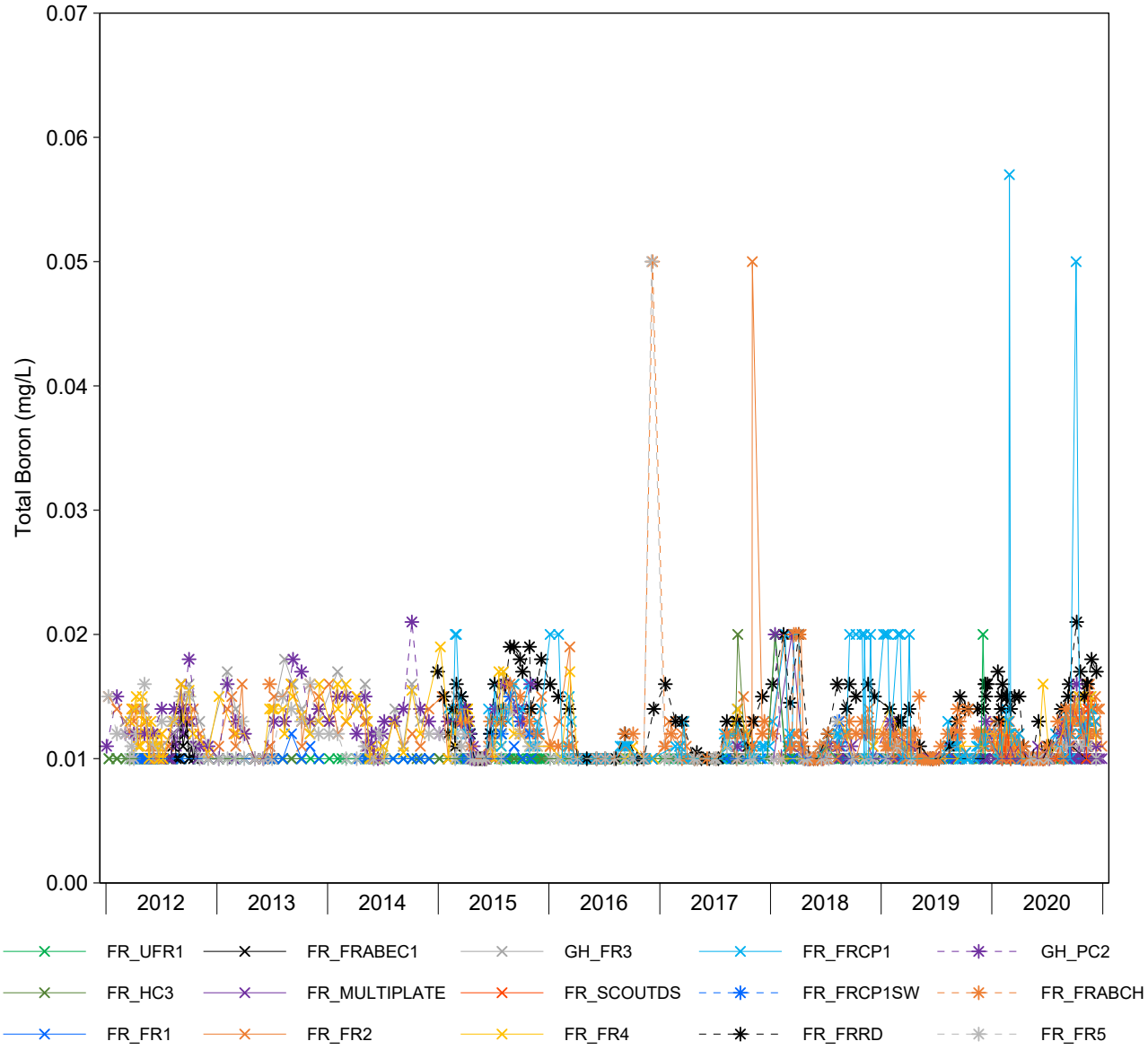

Figure B.21: Time Series Plots for Aqueous Total Boron Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.010 and 0.050 mg/L). Total Boron was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

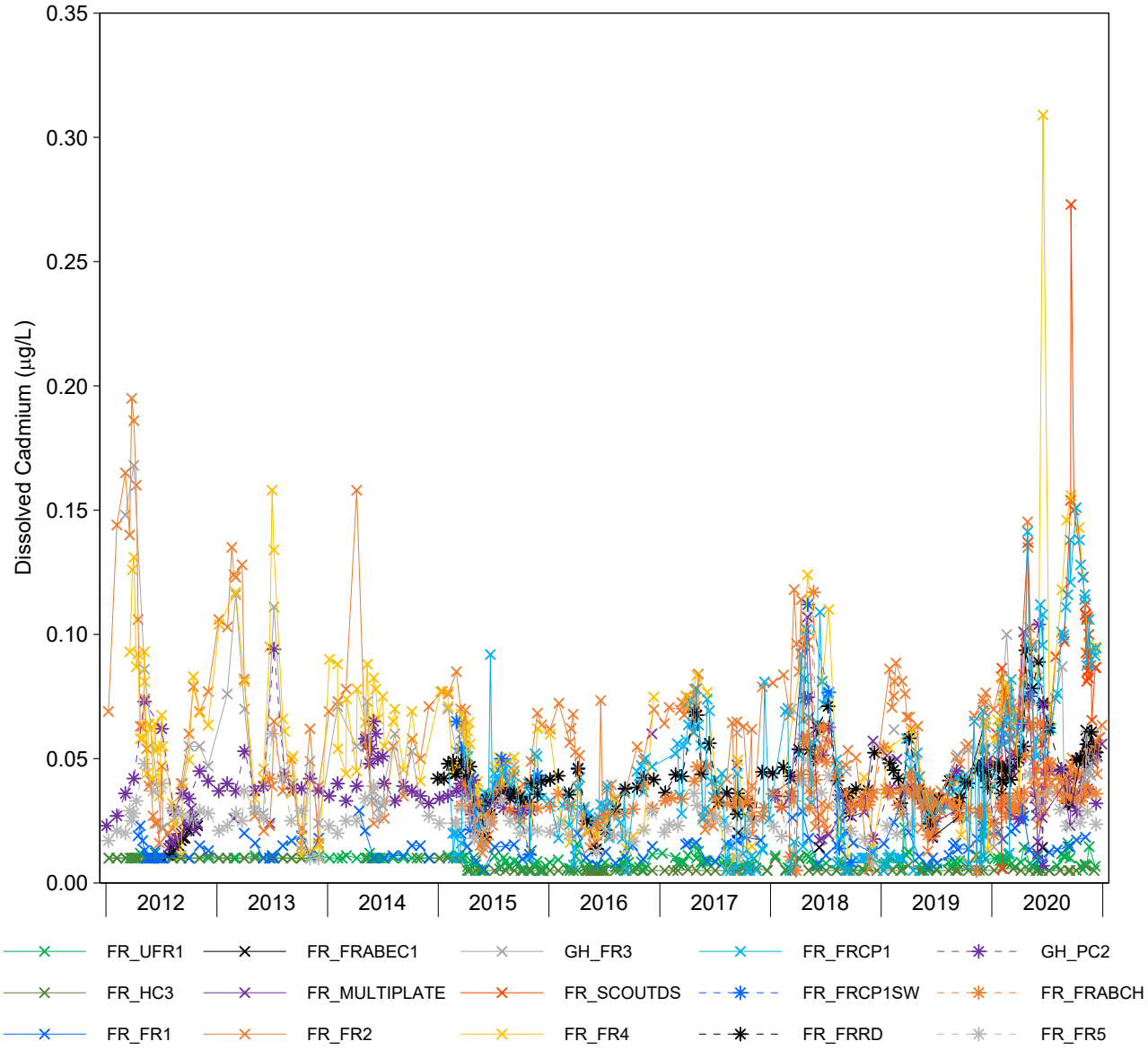

Figure B.22: Time Series Plots for Aqueous Dissolved Cadmium Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0050 and 0.045 mg/L). Dissolved Cadmium was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

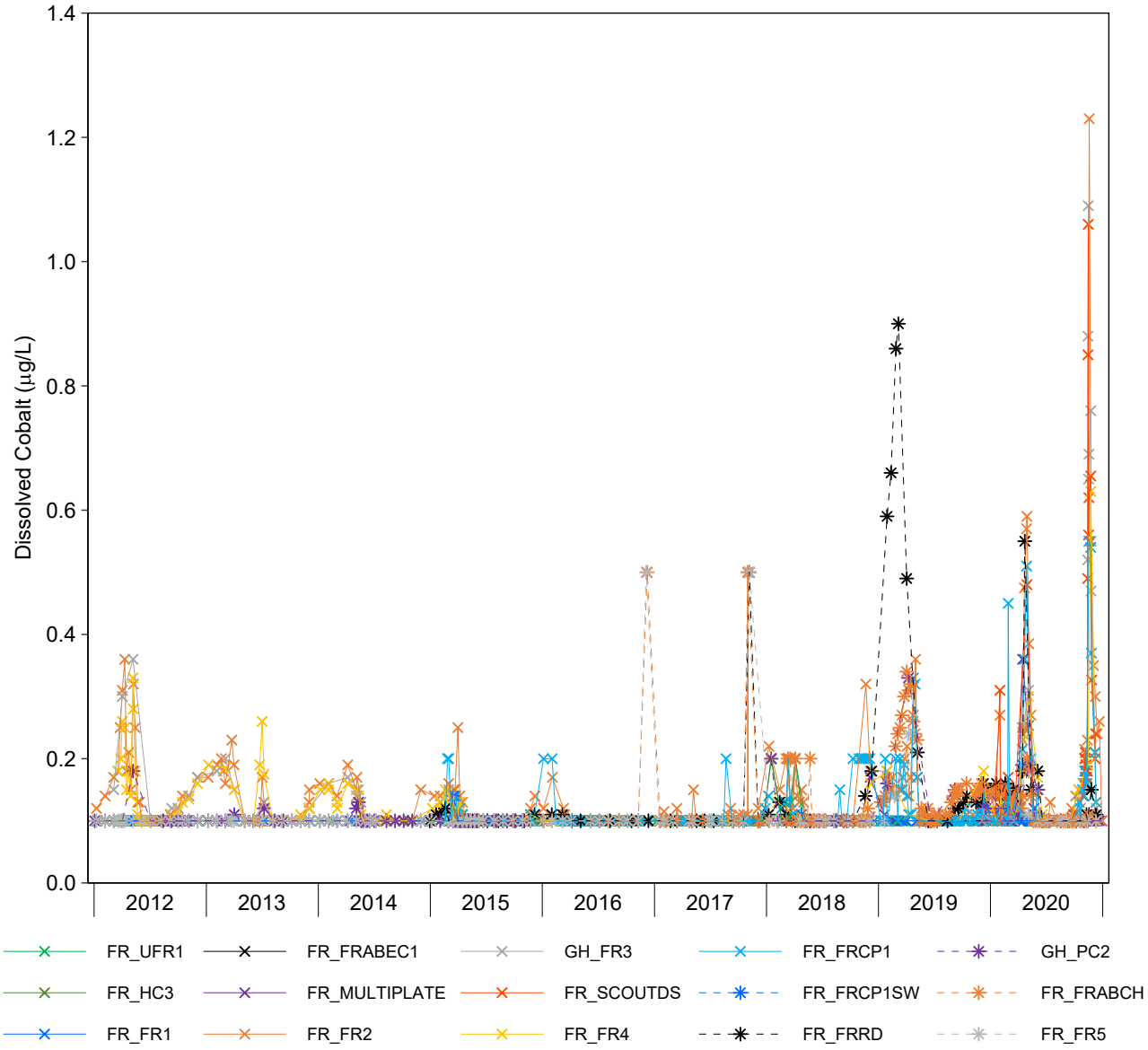

Figure B.23: Time Series Plots for Aqueous Dissolved Cobalt Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.10 and 0.50 mg/L). Dissolved Cobalt was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

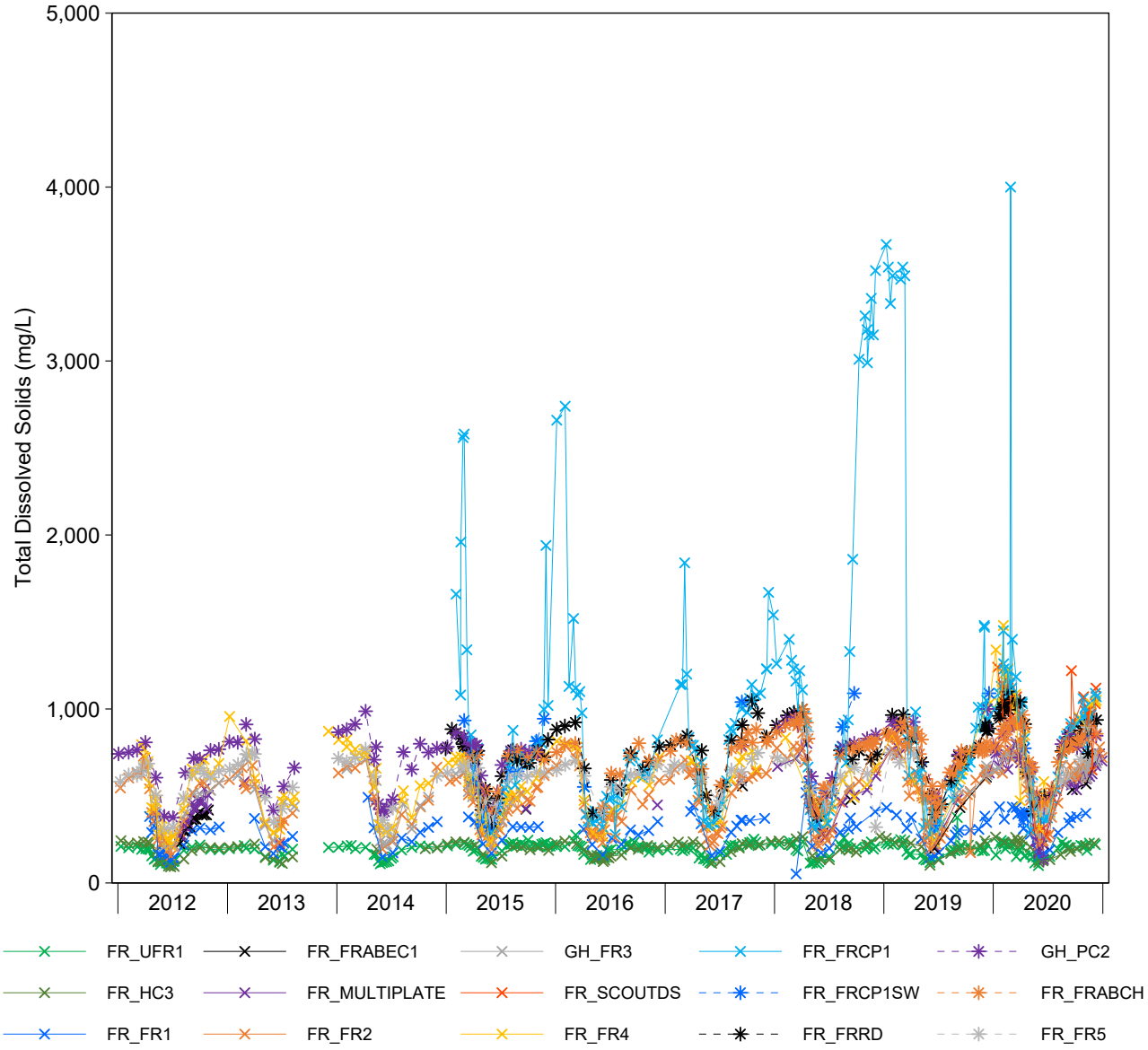

Figure B.24: Time Series Plots for Aqueous Total Dissolved Solids Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: No values below the LRL. Total Dissolved Solids were plotted because they were identified as mine-related constituents in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

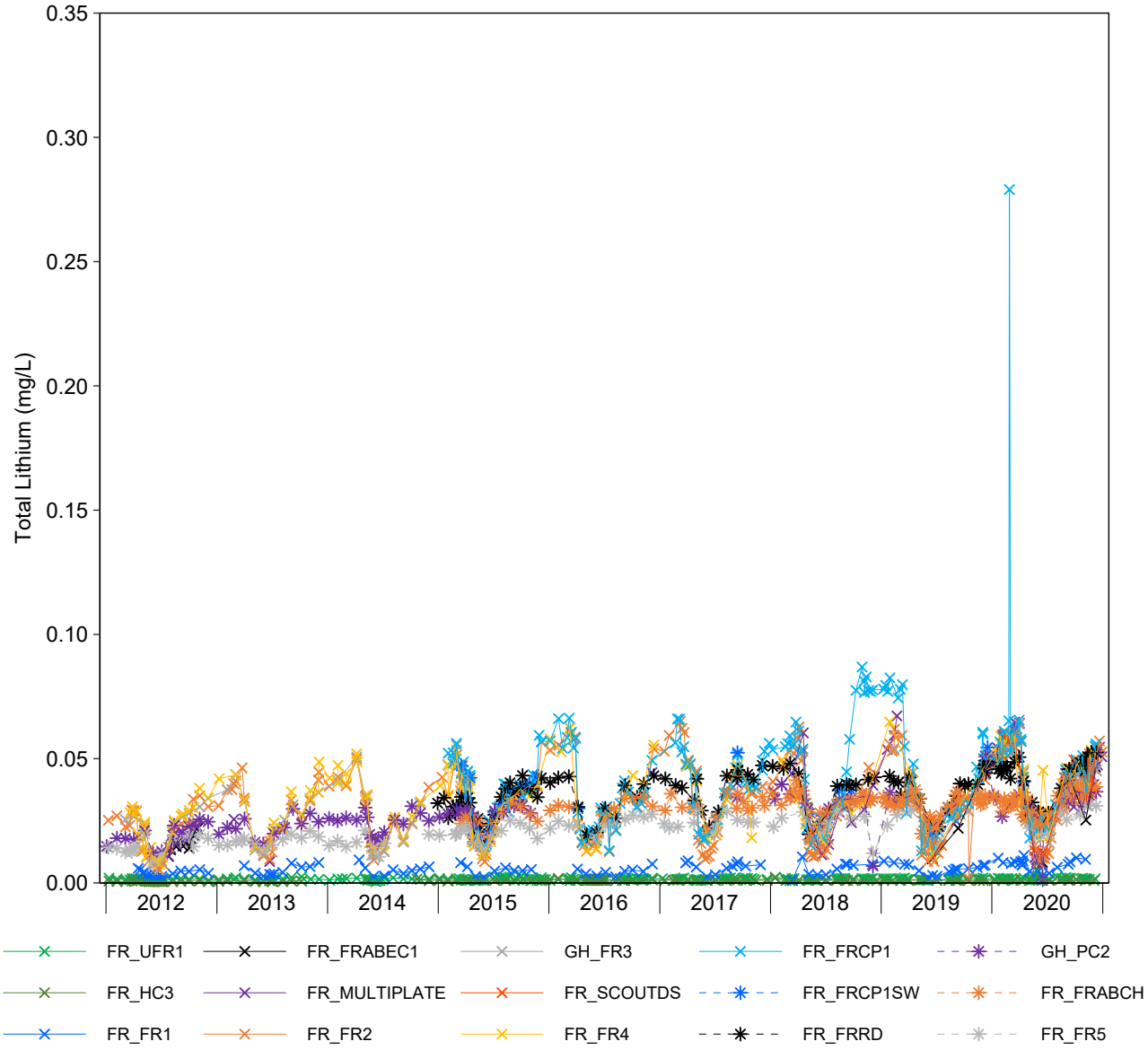

Figure B.25: Time Series Plots for Aqueous Total Lithium Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.00050 and 0.0020 mg/L). Total Lithium was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

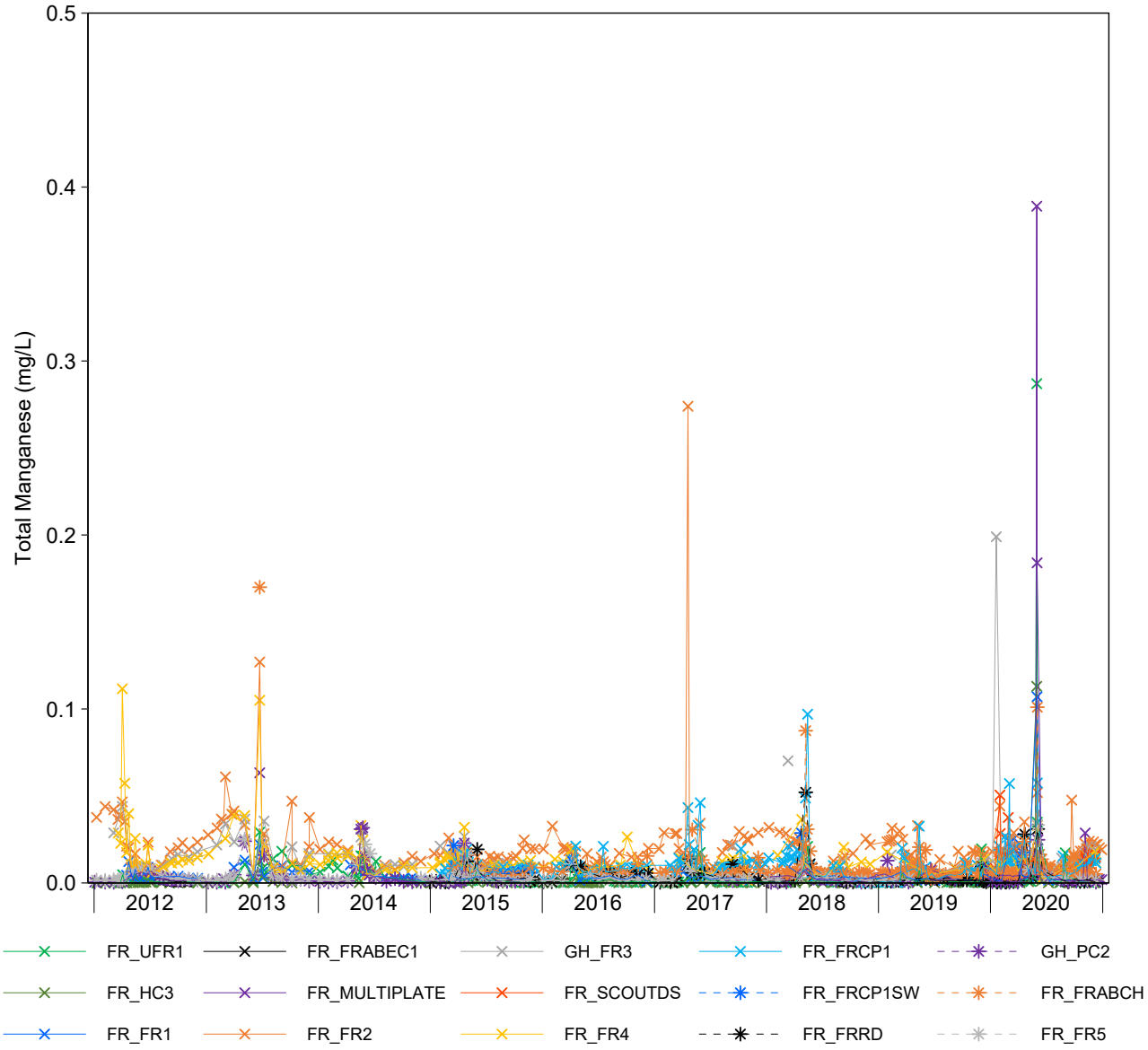

Figure B.26: Time Series Plots for Aqueous Total Manganese Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.000050 and 0.00040 mg/L). Total Manganese was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

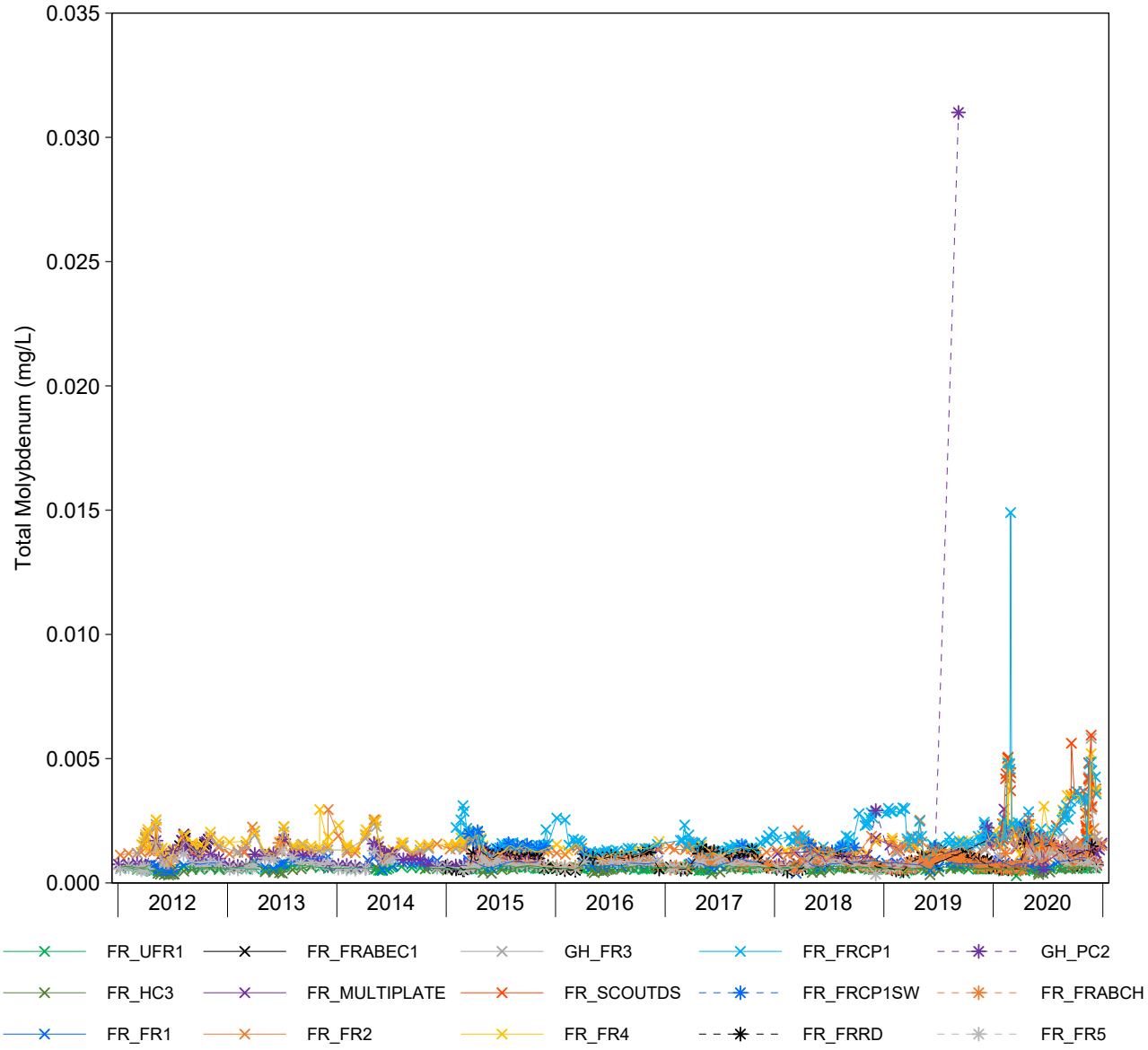

Figure B.27: Time Series Plots for Aqueous Total Molybdenum Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: No values below the LRL. Total Molybdenum was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2019). Lines included for station differentiation.

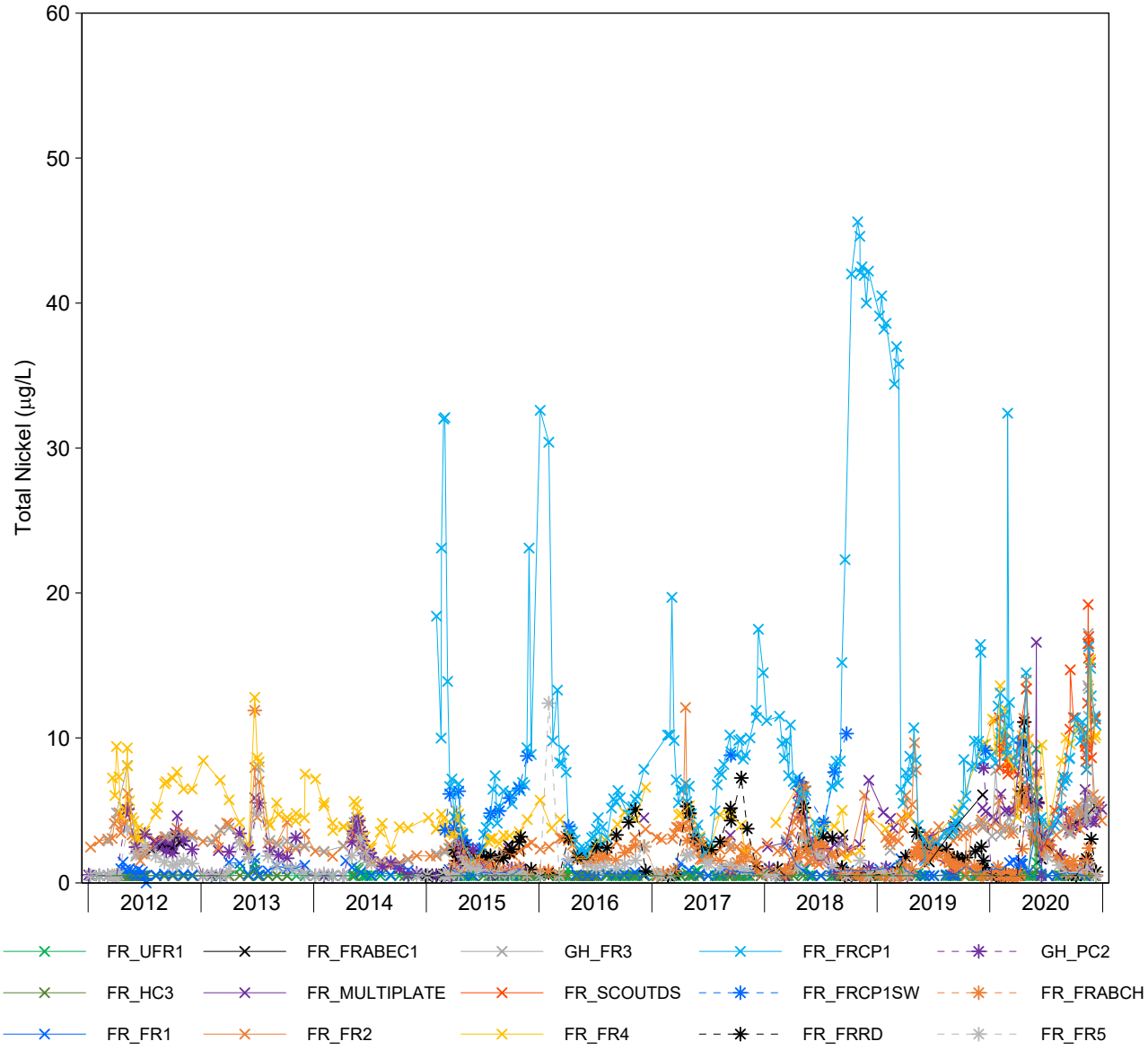

Figure B.28: Time Series Plots for Aqueous Total Nickel Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.50 and 2.5 mg/L). Total Nickel was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2019). Lines included for station differentiation.

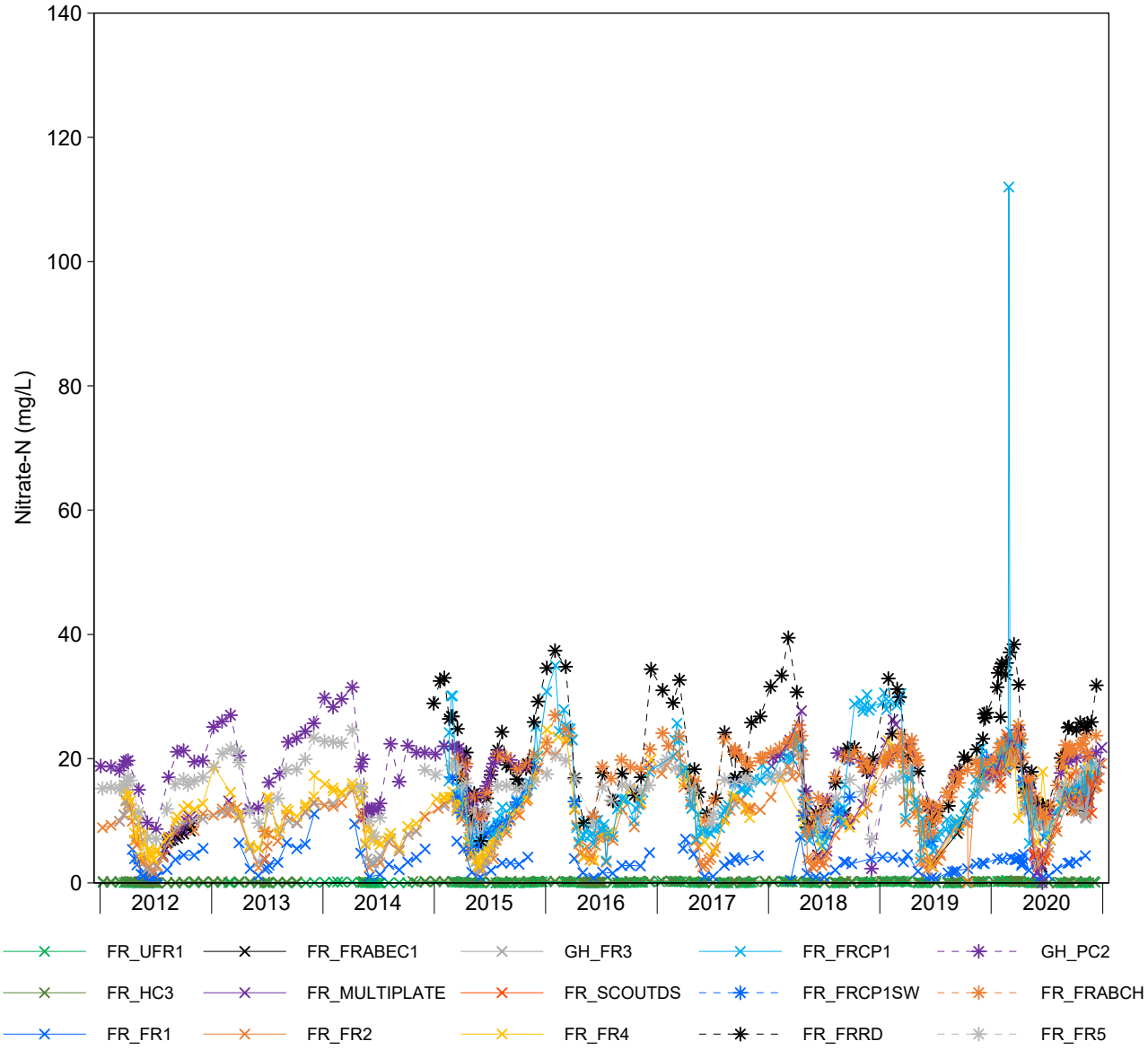

Figure B.29: Time Series Plots for Aqueous Nitrate-N Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0050 and 0.0050 mg/L). Nitrate was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2019). Lines included for station differentiation.

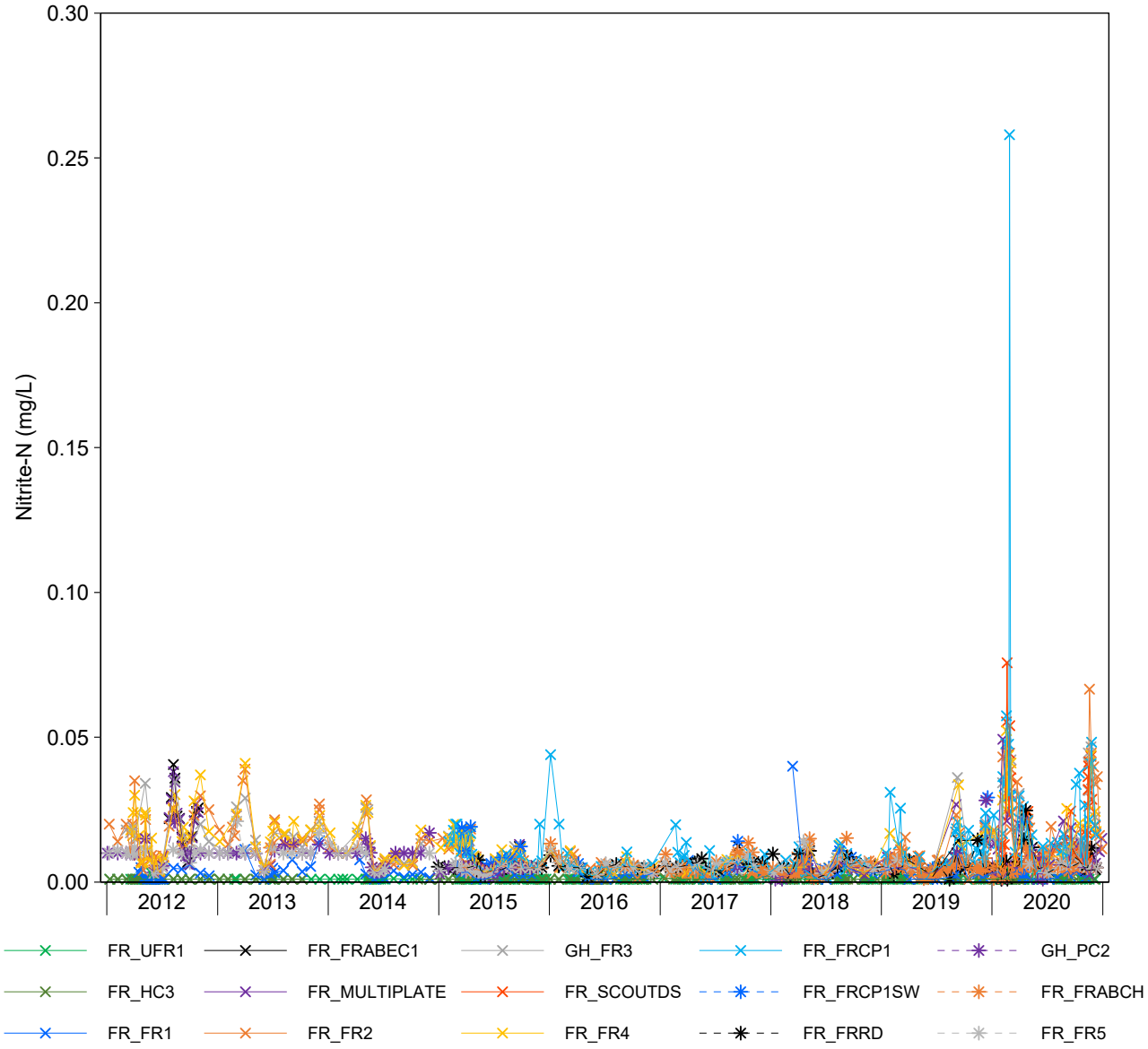

Figure B.30: Time Series Plots for Aqueous Nitrite-N Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0010 and 0.020 mg/L). Nitrite was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2019). Lines included for station differentiation.

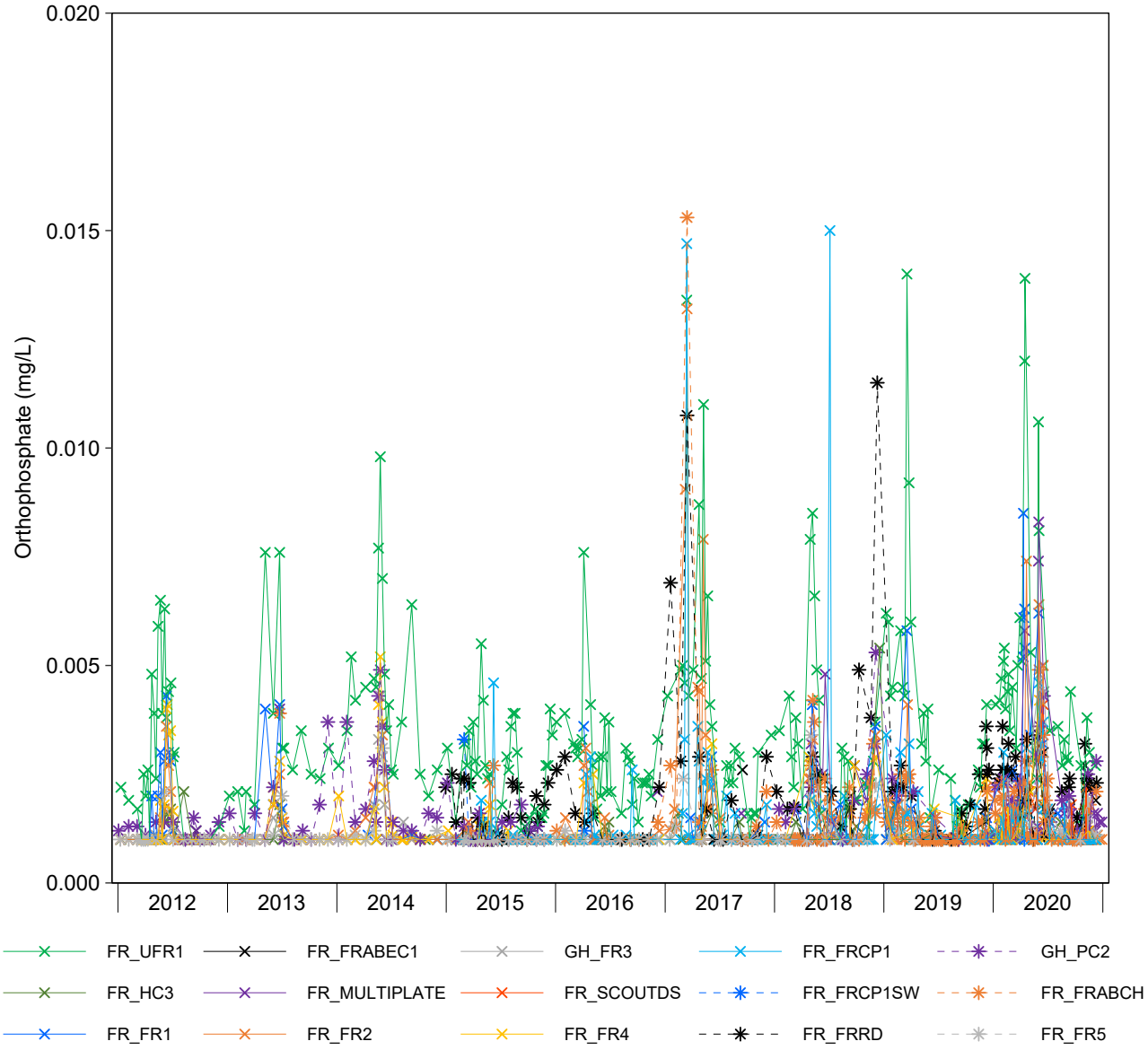

Figure B.31: Time Series Plots for Aqueous Orthophosphate Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0010 and 0.0010 mg/L). Lines included for station differentiation.

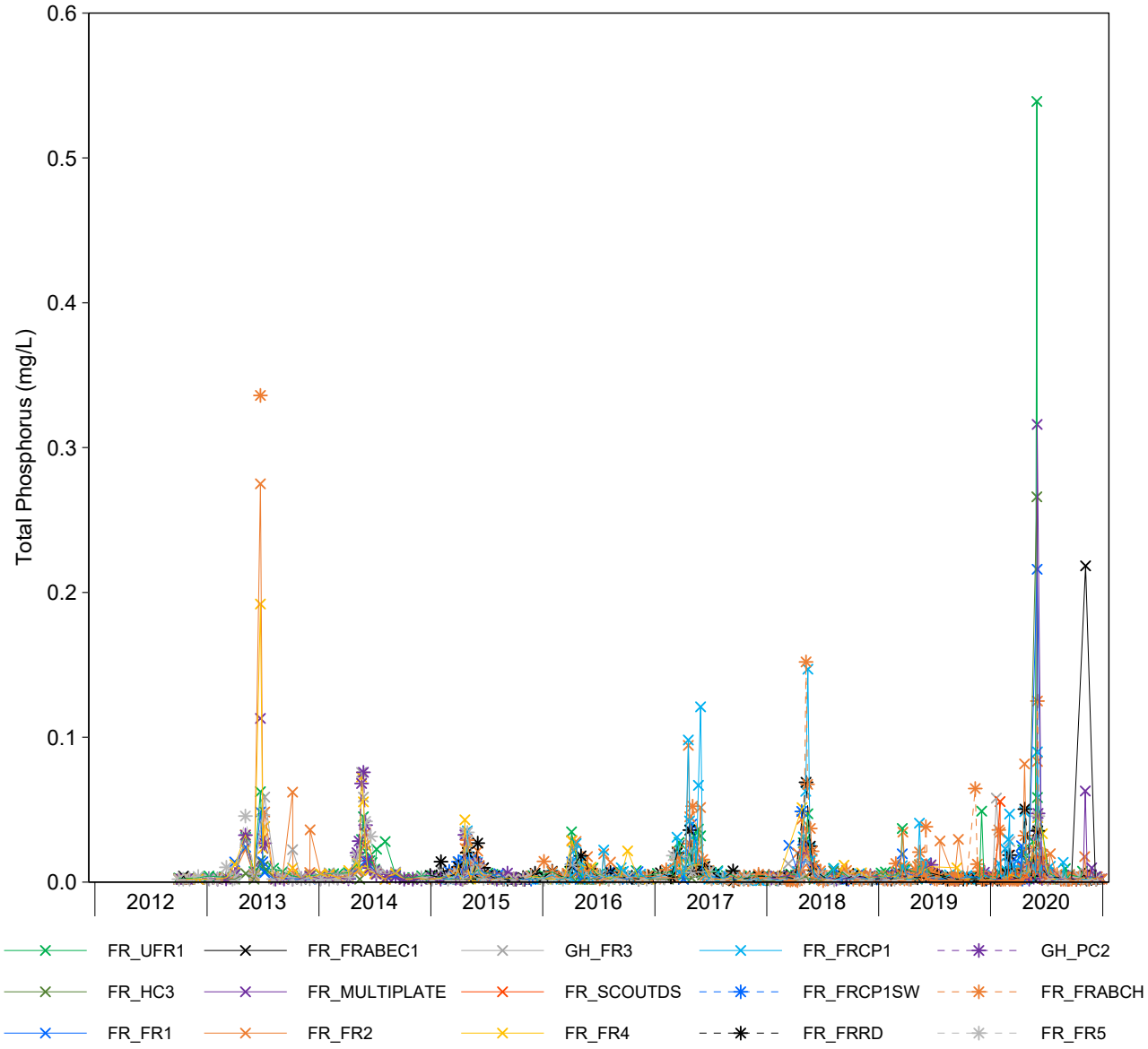

Figure B.32: Time Series Plots for Aqueous Total Phosphorus Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0010 and 0.040 mg/L). Lines included for station differentiation.

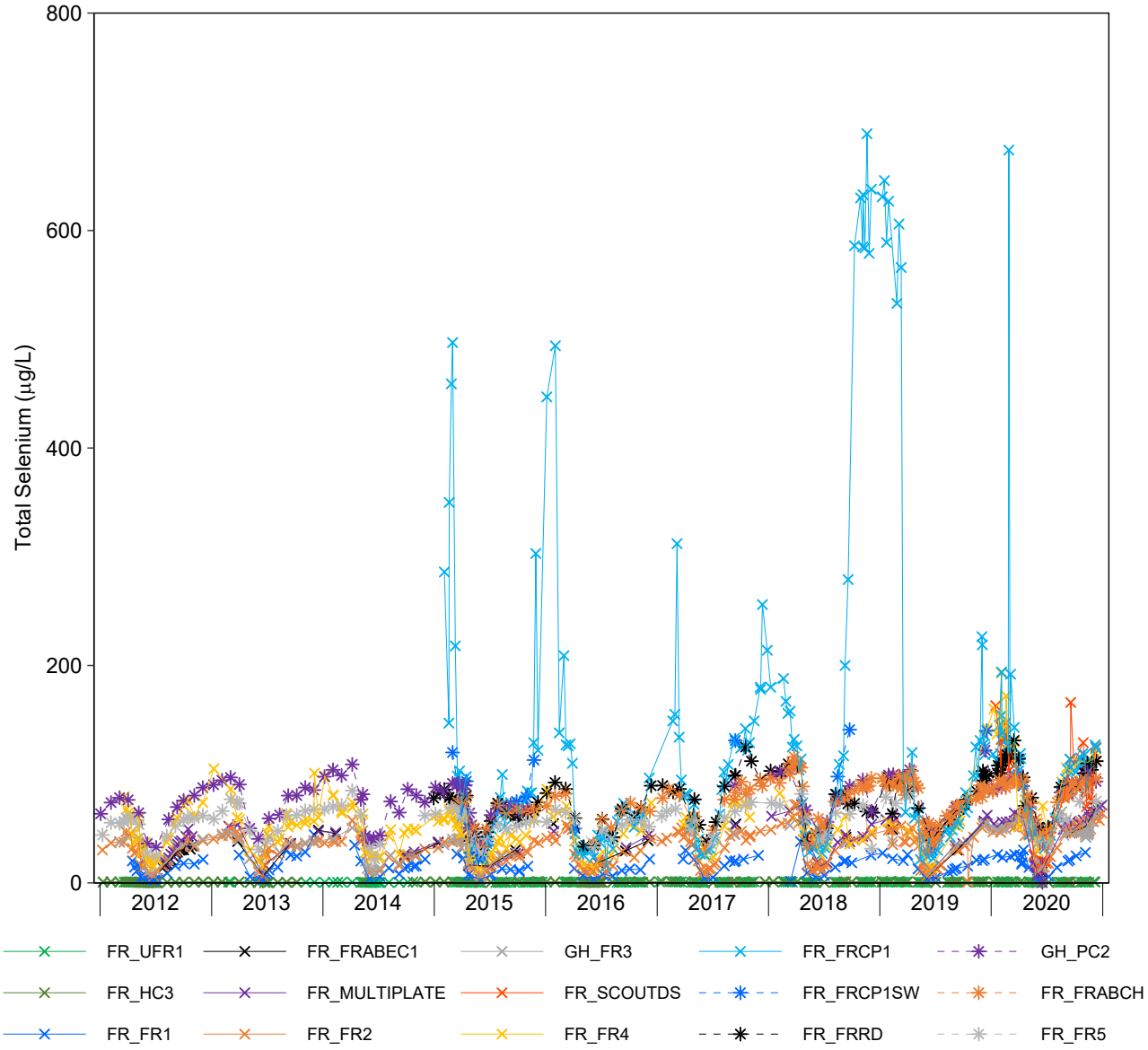

Figure B.33: Time Series Plots for Aqueous Total Selenium Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: No values below the LRL. Total Selenium was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

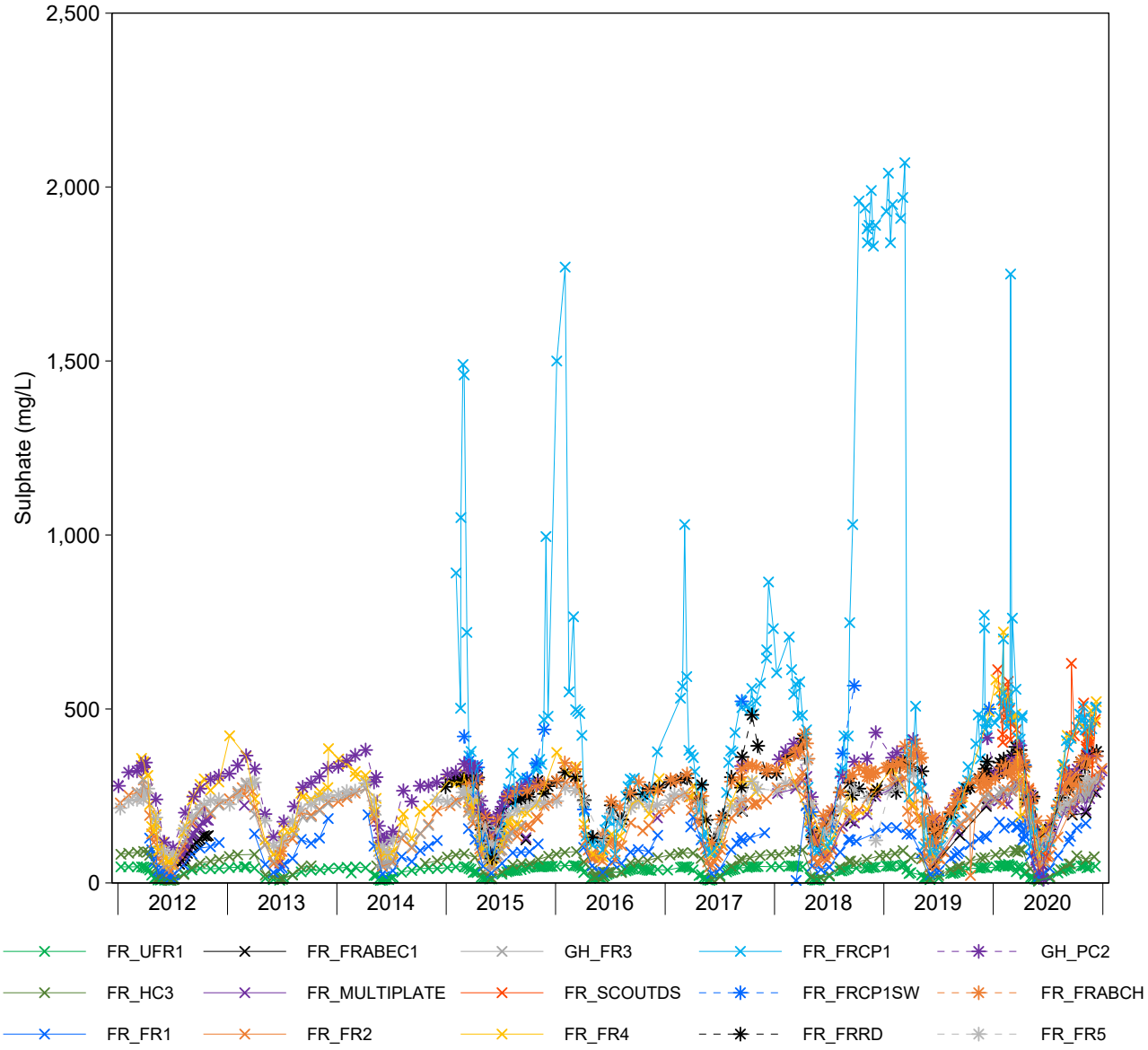

Figure B.34: Time Series Plots for Aqueous Sulphate Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: No values below the LRL. Sulphate was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

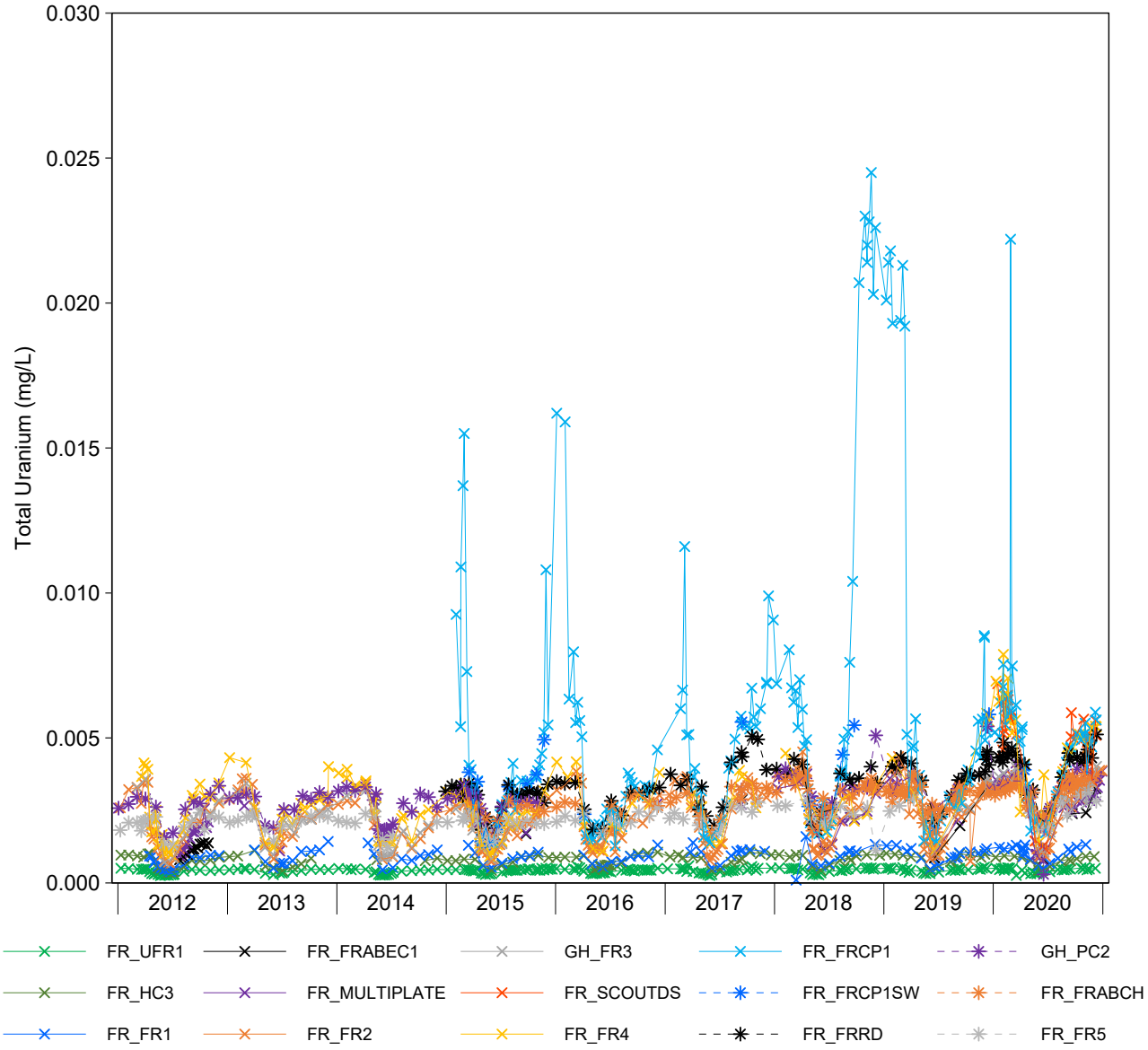

Figure B.35: Time Series Plots for Aqueous Total Uranium Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: No values below the LRL. Uranium was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

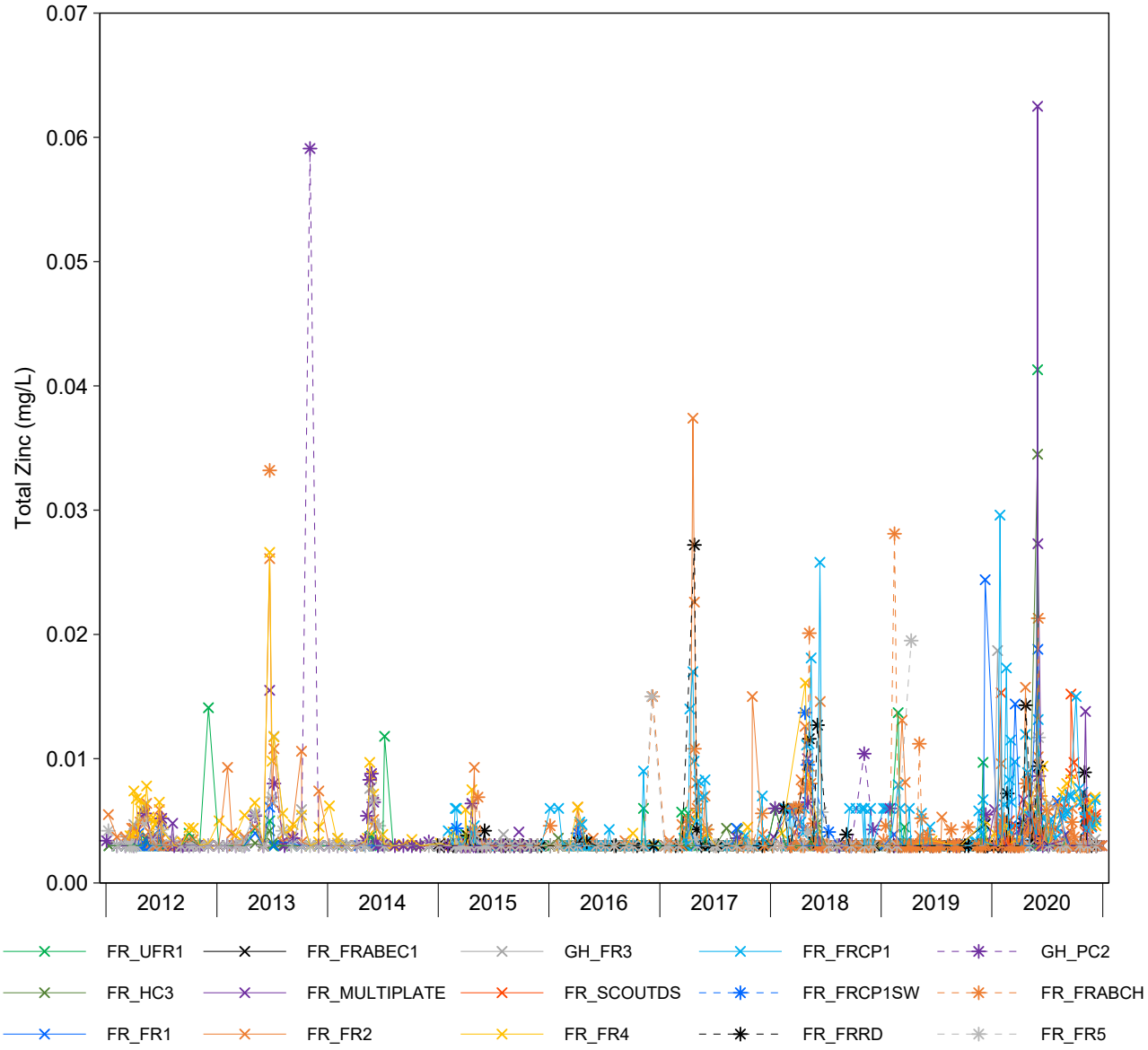

Figure B.36: Time Series Plots for Aqueous Total Zinc Concentrations from the FRO LAEMP Sampling Stations, 2012 to 2020

Notes: Concentrations reported below the laboratory reporting limit (LRL) are plotted at the LRL (LRLs between 0.0030 and 0.015 mg/L). Total Zinc was plotted because it was identified as a mine-related constituent in the Adaptive Management Plan and an early warning trigger was defined (Azimuth 2018). Lines included for station differentiation.

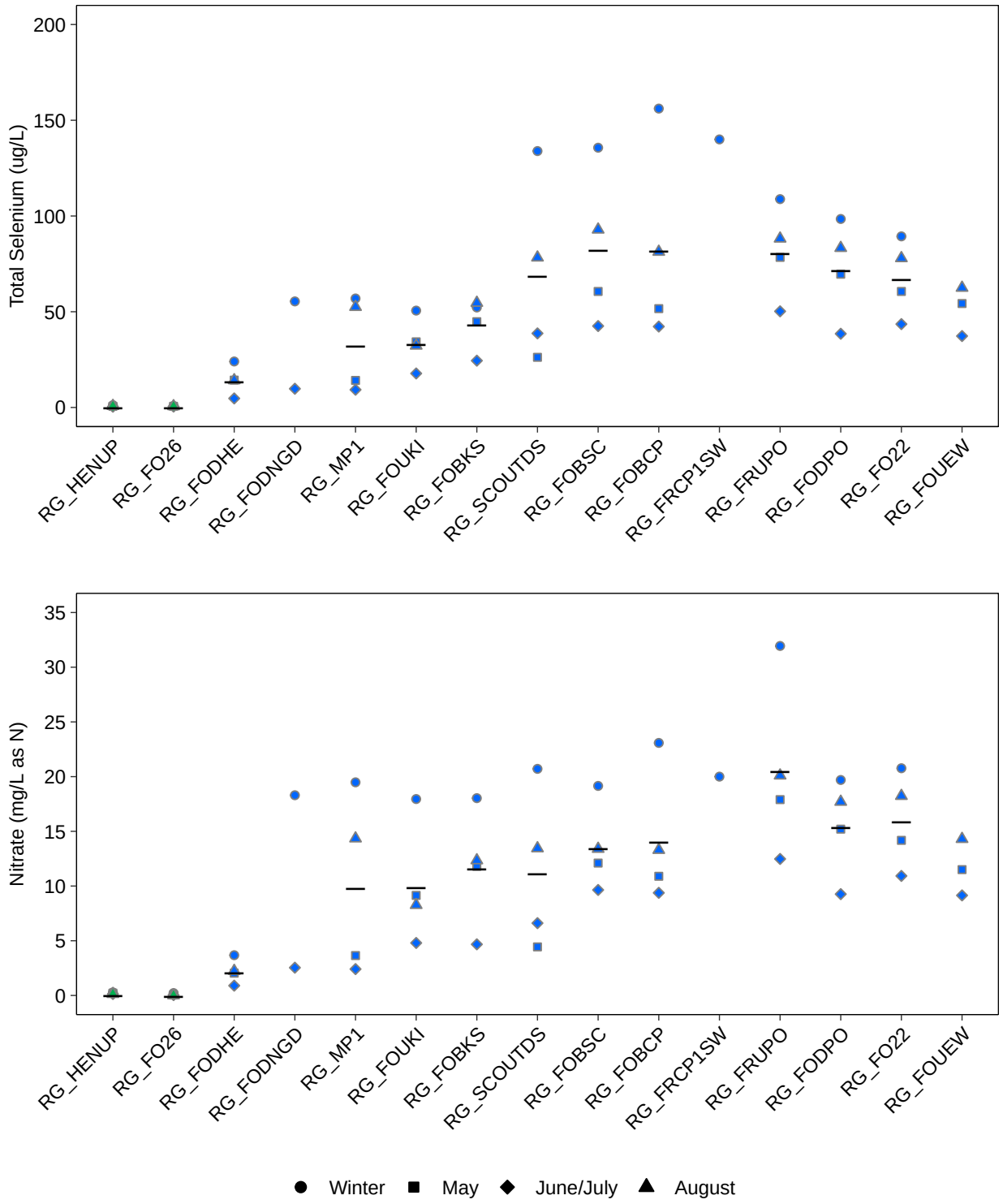

Figure B.37: Seasonal Means for Select Water Quality Parameters, FRO LAEMP, 2020

Notes: Winter is comprised of December 2019 to March 2020. Annual means are depicted with a black bar and are only presented when data is avalable from all four seasons. Reference areas are shown in green and mine−exposed areas are shown in blue. Censored values are shown with hollow shapes.

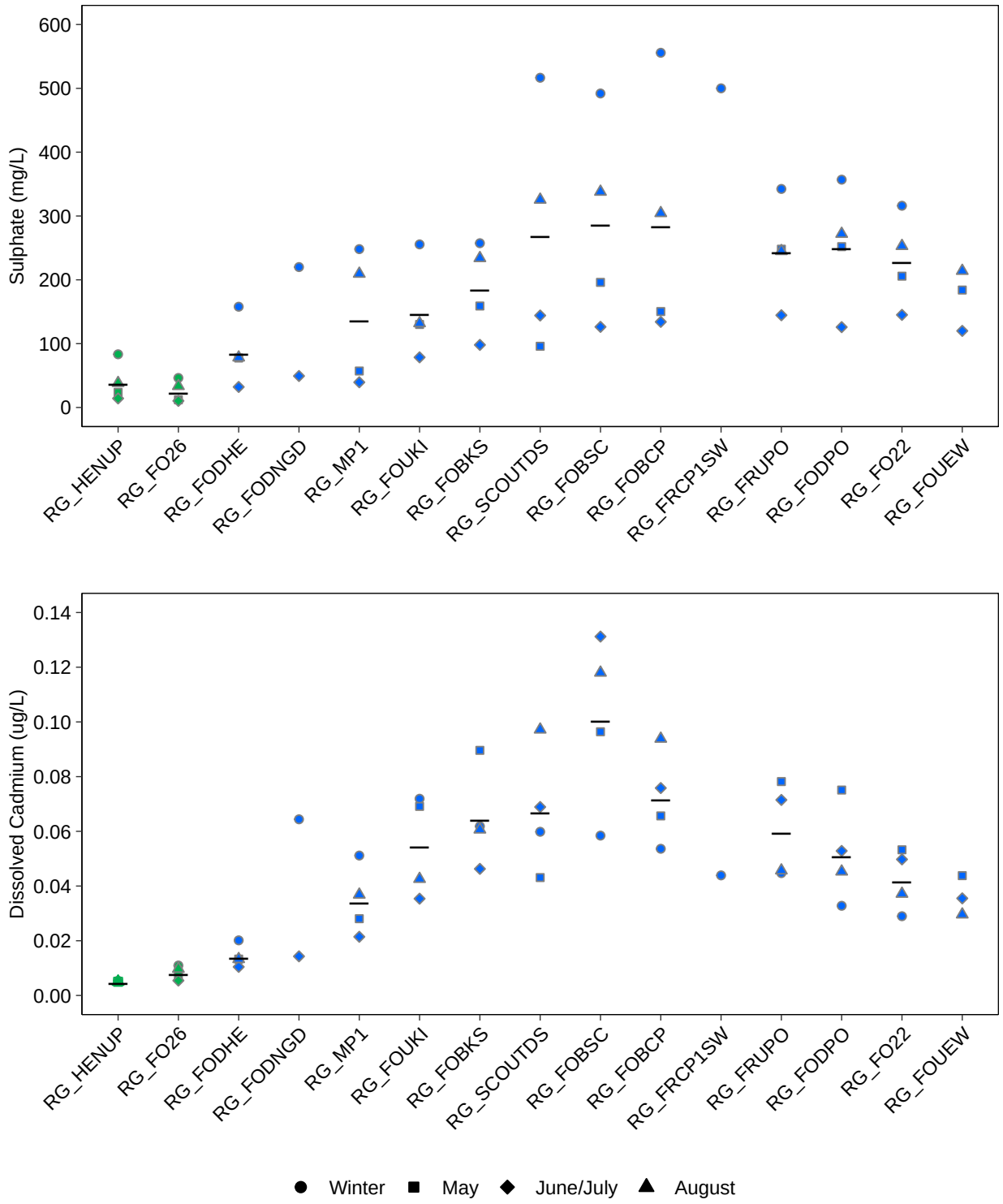

Figure B.37: Seasonal Means for Select Water Quality Parameters, FRO LAEMP, 2020

Notes: Winter is comprised of December 2019 to March 2020. Annual means are depicted with a black bar and are only presented when data is avalable from all four seasons. Reference areas are shown in green and mine−exposed areas are shown in blue. Censored values are shown with hollow shapes.

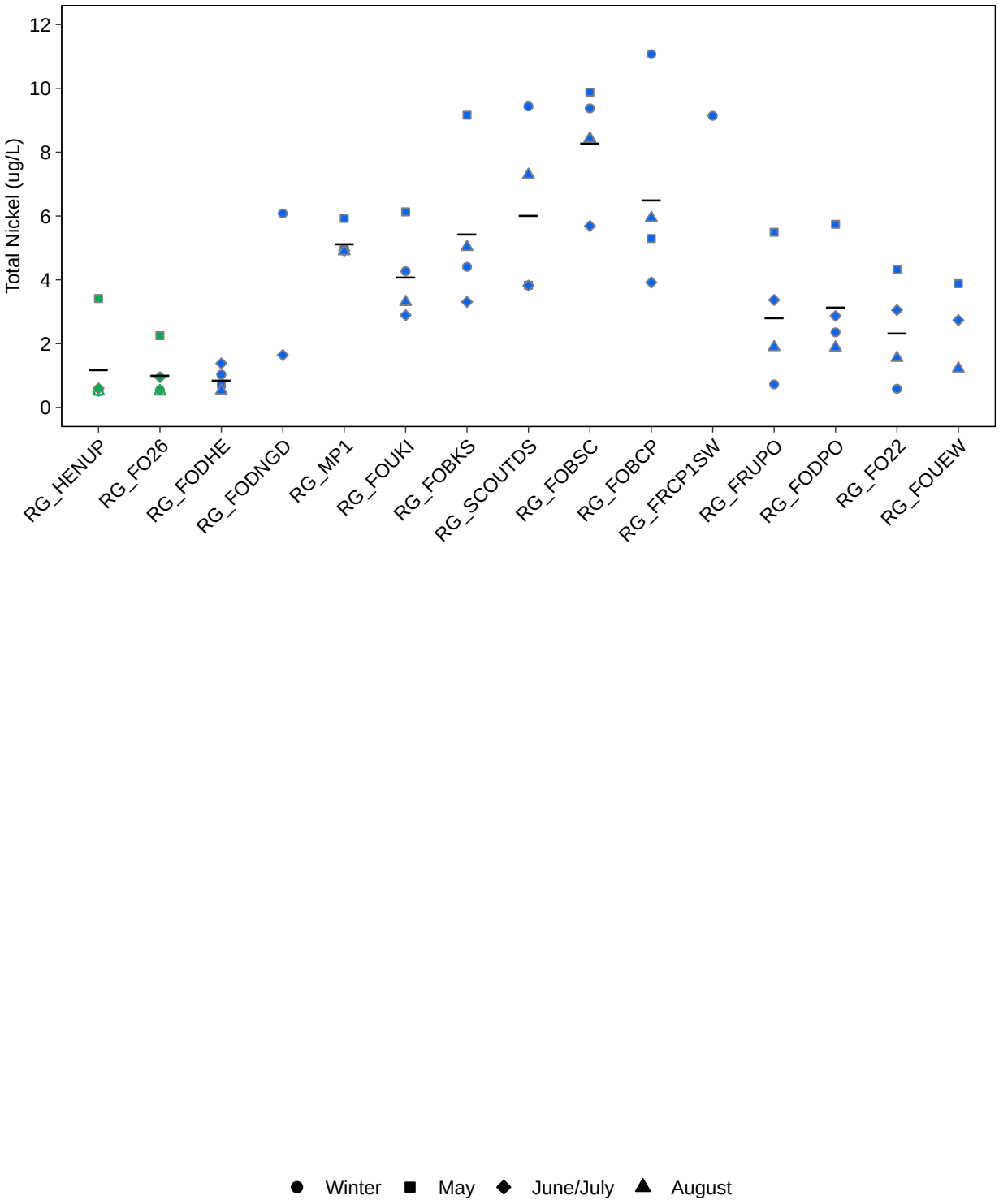

Figure B.37: Seasonal Means for Select Water Quality Parameters, FRO LAEMP, 2020

Notes: Winter is comprised of December 2019 to March 2020. Annual means are depicted with a black bar and are only presented when data is avalable from all four seasons. Reference areas are shown in green and mine−exposed areas are shown in blue. Censored values are shown with hollow shapes.

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Total Dissolved Solids (mg/L)[c]	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)
FR_UFR1	n	35	35	41	41	35	35	35
	Annual Minimum	100	7.12	7.23	9.77	97.7	<0.005	<0.001
	Annual Maximum	244	8.47	9.21	13.9	154	0.441	<0.005
	Annual Mean	192	8.24	8.28	11.8	135	0.114	0.00105
	Annual Median	204	8.26	8.33	12.1	143	0.0789	<0.001
	% < LRL	0%	0%	0%	0%	0%	6%	91%
	% > BCWQG[a]	-	0%	2%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	0%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	0%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_HC3	n	18	18	27	27	18	18	18
	Annual Minimum	119	8.00	8.06	9.93	96.1	0.0950	<0.001
	Annual Maximum	264	8.31	8.96	13.3	126	0.297	0.00110
	Annual Mean	200	8.18	8.39	11.8	108	0.232	0.00101
	Annual Median	211	8.20	8.29	11.8	106	0.246	<0.001
	% < LRL	0%	0%	0%	0%	0%	0%	94%
	% > BCWQG[a]	-	0%	0%	0%	0%	0%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	0%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	0%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FR1	n	21	21	33	33	21	21	21
	Annual Minimum	152	7.99	7.18	10.0	108	0.579	<0.001
	Annual Maximum	438	8.35	9.20	13.8	158	4.60	0.00520
	Annual Mean	347	8.26	8.28	11.6	134	3.13	0.00254
	Annual Median	376	8.29	8.41	11.3	137	3.40	0.00240
	% < LRL	0%	0%	0%	0%	0%	0.0%	14%
	% > BCWQG[a]	-	0%	6%	0%	0%	71%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	14%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	14%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FRABEC1	n	4	4	4	4	4	4	4
	Annual Minimum	223	8.11	7.83	7.50	122	2.54	0.00220
	Annual Maximum	698	8.37	8.32	10.9	192	15.5	0.0116
	Annual Mean	506	8.26	8.10	9.44	166	10.3	0.00551
	Annual Median	552	8.28	8.13	9.66	176	11.6	0.00412
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%
	% > BCWQG[a]	-	0%	0%	25%	0%	75%	0%
	% > BCWQG[b]	-	-	-	25%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	25%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	0%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_MULTIPLATE	n	35	35	50	50	35	35	35
	Annual Minimum	171	8.03	6.82	9.03	111	1.56	<0.001
	Annual Maximum	809	8.41	8.51	12.8	218	24.3	0.0493
	Annual Mean	569	8.25	8.12	10.9	173	14.0	0.0116
	Annual Median	625	8.25	8.23	11.0	183	14.8	0.0105
	% < LRL	0%	0%	0%	0%	0%	0%	6%
	% > BCWQG[a]	-	0%	0%	0%	0%	91%	14%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	69%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	14%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FR2	n	47	47	58	58	47	47	47
	Annual Minimum	219	8.12	6.83	9.57	120	2.52	0.00430
	Annual Maximum	794	8.54	8.94	45.8	225	22.7	0.0666
	Annual Mean	580	8.29	8.27	11.8	185	13.0	0.0181
	Annual Median	631	8.29	8.35	11.3	194	13.6	0.0120
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	98%	26%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	47%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	6%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FR3	n	36	36	34	35	38	36	36
	Annual Minimum	263	8.10	7.25	8.92	135	3.04	0.00310
	Annual Maximum	804	8.44	8.68	14.6	271	21.6	0.0467
	Annual Mean	637	8.23	8.24	11.2	197	13.8	0.0191
	Annual Median	659	8.20	8.34	11.2	199	13.3	0.0126
	% < LRL	0%	0%	0%	0%	0%	0.0%	3%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	33%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	44%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	6%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_SCOUTDS	n	42	42	39	37	48	42	42
	Annual Minimum	273	7.34	7.72	9.51	136	3.88	0.00240
	Annual Maximum	1,240	8.51	8.84	14.6	275	23.9	0.0757
	Annual Mean	924.5	8.28	8.26	11.6	228	16.5	0.0209
	Annual Median	965.5	8.33	8.32	11.7	236	17.2	0.0136
	% < LRL	0%	0%	0%	0%	0%	0.0%	5%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	31%
	% > BCWQG[b]	-	-	-	0%	-	0%	2%
	% > EVWQP Level 1 Benchmark	38%	-	-	-	-	74%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	17%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Ammonia (mg/L)	Sulphate (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)
FR_UFR1	n	35	35	35	35	32	32	32	32
	Annual Minimum	<0.005	5.38	0.130	0.0750	<0.0001	<0.0001	0.0350	<0.00002
	Annual Maximum	0.153	53.8	<2.5	0.213	0.000220	0.00224	0.0925	0.000315
	Annual Mean	0.0195	37.3	0.178	0.126	0.000104	0.000198	0.0636	0.0000299
	Annual Median	0.00880	43.3	0.150	0.125	<0.0001	0.000110	0.0682	<0.00002
	% < LRL	29%	0%	74%	3%	91%	34%	0%	94%
	% > BCWQG[a]	6%	0%	0%	-	0%	-	0%	3%
	% > BCWQG[b]	6%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_HC3	n	18	18	18	18	15	15	15	15
	Annual Minimum	<0.005	6.46	0.170	0.146	<0.0001	<0.0001	0.00773	<0.00002
	Annual Maximum	0.0407	94.9	0.800	0.466	<0.0001	0.00103	0.0199	0.000135
	Annual Mean	0.0110	60.3	0.238	0.308	<0.0001	0.000181	0.0131	0.0000277
	Annual Median	0.00635	71.2	0.220	0.315	<0.0001	0.000110	0.0136	<0.00002
	% < LRL	44%	0%	72%	0%	100%	33%	0%	93%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	7%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR1	n	21	21	21	21	18	18	18	18
	Annual Minimum	<0.005	18.6	0.180	0.115	<0.0001	<0.0001	0.0268	<0.00002
	Annual Maximum	0.0580	183	0.860	0.285	0.000140	0.000840	0.0543	0.0000950
	Annual Mean	0.0145	129	0.270	0.186	0.000103	0.000172	0.0441	0.0000242
	Annual Median	0.00980	152	0.220	0.185	<0.0001	0.000125	0.0460	<0.00002
	% < LRL	24%	0%	81%	0%	78%	28%	0%	94%
	% > BCWQG[a]	19%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	19%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRABEC1	n	4	4	4	4	4	4	4	4
	Annual Minimum	0.00600	49.3	0.340	0.0980	0.000110	<0.0001	0.0348	<0.00002
	Annual Maximum	0.0262	260	0.610	0.153	0.000220	0.000160	0.0962	<0.00002
	Annual Mean	0.0126	176	0.455	0.129	0.000188	0.000137	0.0784	<0.00002
	Annual Median	0.00905	198	0.435	0.132	0.000210	0.000145	0.0913	<0.00002
	% < LRL	0%	0%	25%	0%	0%	25%	0%	100%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_MULTIPLATE	n	35	35	35	35	35	35	35	35
	Annual Minimum	<0.005	25.9	0.480	0.0530	0.000130	<0.0001	0.0355	<0.00002
	Annual Maximum	0.741	322	1.08	0.236	0.000520	0.00293	0.115	0.000374
	Annual Mean	0.0633	210	0.669	0.154	0.000254	0.000260	0.0850	0.0000363
	Annual Median	0.0328	237	0.610	0.160	0.000240	0.000110	0.0895	<0.00002
	% < LRL	9%	0%	17%	0%	0%	31%	0%	91%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	6%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR2	n	47	47	47	47	47	47	47	47
	Annual Minimum	<0.005	43.7	<0.5	0.0740	0.000140	<0.0001	0.0321	<0.00002
	Annual Maximum	0.814	329	<2.5	0.229	0.000770	0.000550	0.110	0.0000710
	Annual Mean	0.0733	216	1.23	0.169	0.000286	0.000167	0.0769	0.0000224
	Annual Median	0.0227	246	1.27	0.172	0.000260	0.000150	0.0862	<0.00002
	% < LRL	2%	0%	23%	0%	0%	11%	0%	94%
	% > BCWQG[a]	2%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR3	n	37	36	36	36	37	37	37	37
	Annual Minimum	<0.005	63.3	<0.5	0.110	0.000150	<0.0001	0.0406	<0.00002
	Annual Maximum	0.825	305	3.72	0.224	0.000800	0.000430	0.101	0.0000320
	Annual Mean	0.156	243	1.49	0.169	0.000329	0.000148	0.0834	0.0000206
	Annual Median	0.0518	259	1.48	0.170	0.000270	0.000130	0.0869	<0.00002
	% < LRL	3%	0%	11%	0%	0%	8%	0%	95%
	% > BCWQG[a]	14%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_SCOUTDS	n	42	42	42	42	42	42	42	42
	Annual Minimum	0.00540	77.7	<0.5	0.0480	0.000160	<0.0001	0.0335	<0.00002
	Annual Maximum	0.726	631	2.60	0.210	0.000790	0.000610	0.112	<0.0002
	Annual Mean	0.119	415	1.68	0.156	0.000358	0.000159	0.0772	0.0000223
	Annual Median	0.0525	429	1.72	0.160	0.000330	0.000145	0.0792	<0.00002
	% < LRL	0%	0%	31%	0%	0%	5%	0%	98%
	% > BCWQG[a]	17%	48%	0%	-	0%	-	0%	2%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	48%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Total Boron (mg/L)	Total Chromium (mg/L)	Total Cobalt (mg/L)	Total Iron (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Manganese (mg/L)	Total Mercury (mg/L)
FR_UFR1	n	32	32	32	32	32	32	32	32
	Annual Minimum	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.00120	0.000160	<0.0000005
	Annual Maximum	<0.01	0.00557	0.00256	5.94	0.00413	0.00530	0.287	0.0000241
	Annual Mean	<0.01	0.000363	0.000186	0.240	0.000203	0.00178	0.0115	0.00000167
	Annual Median	<0.01	0.000130	<0.0001	<0.01	<0.00005	0.00170	0.000490	<0.0000005
	% < LRL	100%	9%	91%	53%	81%	0%	0%	59%
	% > BCWQG[a]	0%	6%	0%	-	0%	-	0%	22%
	% > BCWQG[b]	-	-	0%	3%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_HC3	n	15	15	15	15	15	15	15	15
	Annual Minimum	<0.01	0.000120	<0.0001	<0.01	<0.00005	<0.001	<0.0001	<0.0000005
	Annual Maximum	<0.01	0.00519	0.000840	2.06	0.00154	0.00890	0.113	0.00000780
	Annual Mean	<0.01	0.000522	0.000150	0.160	0.000156	0.00163	0.00881	0.00000107
	Annual Median	<0.01	0.000140	<0.0001	<0.01	<0.00005	<0.001	<0.0001	<0.0000005
	% < LRL	100%	0%	87%	67%	87%	60%	60%	73%
	% > BCWQG[a]	0%	7%	0%	-	0%	-	0%	13%
	% > BCWQG[b]	-	-	0%	7%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR1	n	18	18	18	18	18	18	18	18
	Annual Minimum	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.00280	0.00108	<0.0000005
	Annual Maximum	<0.01	0.00217	0.000960	1.88	0.00144	0.0110	0.107	0.00000872
	Annual Mean	<0.01	0.000327	0.000158	0.158	0.000155	0.00750	0.0118	0.00000171
	Annual Median	<0.01	0.000180	<0.0001	0.0225	<0.00005	0.00800	0.00290	0.000000565
	% < LRL	100%	17%	72%	39%	56%	0%	0%	50%
	% > BCWQG[a]	0%	6%	0%	-	0%	-	0%	44%
	% > BCWQG[b]	-	-	0%	6%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRABEC1	n	4	4	4	4	4	4	4	4
	Annual Minimum	<0.01	0.000120	<0.0001	<0.01	<0.00005	0.00830	0.000610	<0.0000005
	Annual Maximum	0.0110	0.000220	<0.0001	0.0850	0.0000730	0.0467	0.00536	0.00000758
	Annual Mean	0.0102	0.000158	<0.0001	0.0330	0.0000558	0.0302	0.00215	0.00000259
	Annual Median	<0.01	0.000145	<0.0001	0.0185	<0.00005	0.0328	0.00131	0.00000114
	% < LRL	75%	0%	100%	50%	75%	0%	0%	50%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	50%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_MULTIPLATE	n	35	35	35	35	35	35	35	35
	Annual Minimum	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.00750	0.00122	<0.0000005
	Annual Maximum	0.0130	0.00774	0.00344	7.01	0.00507	0.0647	0.389	0.0000330
	Annual Mean	0.0103	0.000544	0.000289	0.344	0.000303	0.0373	0.0201	0.00000222
	Annual Median	<0.01	0.000130	<0.0001	<0.01	<0.00005	0.0370	0.00208	<0.0000005
	% < LRL	51%	6%	69%	57%	71%	0%	0%	74%
	% > BCWQG[a]	0%	9%	0%	-	0%	-	0%	26%
	% > BCWQG[b]	-	-	0%	9%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR2	n	47	47	47	47	47	47	47	46
	Annual Minimum	<0.01	<0.0001	<0.0001	0.0190	<0.00005	0.00835	0.00426	<0.0000005
	Annual Maximum	0.0160	0.00135	0.00128	0.956	0.000834	0.0640	0.0520	0.00000766
	Annual Mean	0.0119	0.000226	0.000267	0.115	0.000112	0.0374	0.0178	0.00000108
	Annual Median	0.0120	0.000130	0.000160	0.0510	<0.00005	0.0404	0.0176	<0.0000005
	% < LRL	32%	15%	17%	0%	62%	0%	0%	57%
	% > BCWQG[a]	0%	6%	0%	-	0%	-	0%	26%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR3	n	37	37	37	37	37	37	37	37
	Annual Minimum	<0.01	<0.0001	<0.0001	0.0160	<0.00005	0.0109	0.00430	<0.0000005
	Annual Maximum	0.0150	0.000880	0.00107	1.41	0.000503	0.0639	0.199	0.00000920
	Annual Mean	0.0123	0.000179	0.000306	0.100	0.0000778	0.0405	0.0200	0.000000933
	Annual Median	0.0120	0.000120	0.000200	0.0480	<0.00005	0.0420	0.0144	<0.0000005
	% < LRL	14%	22%	14%	0%	76%	0%	0%	68%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	11%
	% > BCWQG[b]	-	-	0%	3%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_SCOUTDS	n	42	42	42	42	42	42	42	42
	Annual Minimum	<0.01	<0.0001	<0.0001	0.0110	<0.00005	0.0114	0.00426	<0.0000005
	Annual Maximum	0.0150	0.00238	0.00100	1.18	0.00173	0.0600	0.0505	0.00000610
	Annual Mean	0.0119	0.000260	0.000278	0.0852	0.000104	0.0448	0.0149	0.000000888
	Annual Median	0.0120	0.000130	0.000200	0.0450	<0.00005	0.0460	0.0140	<0.0000005
	% < LRL	12%	19%	12%	0%	76%	0%	0%	62%
	% > BCWQG[a]	0%	5%	0%	-	0%	-	0%	19%
	% > BCWQG[b]	-	-	0%	2%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Total Molybdenum (mg/L)	Total Nickel (mg/L)[c]	Total Selenium (mg/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)
FR_UFR1	n	32	32	32	32	32	32	32	32
	Annual Minimum	0.000285	<0.0005	0.000452	<0.00001	<0.00001	0.000259	<0.003	<0.003
	Annual Maximum	0.000690	0.00924	0.000931	0.0000950	0.000151	0.000615	0.0413	0.0176
	Annual Mean	0.000575	0.000816	0.000709	0.0000137	0.0000150	0.000451	0.00432	0.00413
	Annual Median	0.000577	<0.0005	0.000698	<0.00001	<0.00001	0.000474	<0.003	<0.003
	% < LRL	0%	88%	0%	91%	88%	0%	91%	75%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	3%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	3%	0%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_HC3	n	15	15	15	15	15	15	15	15
	Annual Minimum	0.000342	<0.0005	0.000340	<0.00001	<0.00001	0.000431	<0.003	<0.003
	Annual Maximum	0.000651	0.00633	0.00132	0.0000430	0.0000580	0.000934	0.0345	0.0100
	Annual Mean	0.000540	0.000914	0.000887	0.0000122	0.0000132	0.000765	0.00529	0.00368
	Annual Median	0.000567	<0.0005	0.000962	<0.00001	<0.00001	0.000815	<0.003	<0.003
	% < LRL	0%	87%	0%	93%	93%	0%	87%	80%
	% > BCWQG[a]	0%	-	0%	0%	0%	0%	7%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	7%	0%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FR1	n	18	18	18	18	18	18	18	18
	Annual Minimum	0.000560	<0.0005	0.00328	<0.00001	<0.00001	0.000490	<0.003	<0.003
	Annual Maximum	0.000963	0.00389	0.0303	0.0000400	0.0000530	0.00132	0.0188	0.0846
	Annual Mean	0.000760	0.00111	0.0196	0.0000139	0.0000129	0.00104	0.00495	0.0102
	Annual Median	0.000762	0.000905	0.0224	<0.00001	<0.00001	0.00117	<0.003	<0.003
	% < LRL	0%	11%	0%	72%	83%	0%	61%	67%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	6%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FRABEC1	n	4	4	4	4	4	4	4	4
	Annual Minimum	0.000753	0.00164	0.00978	<0.00001	<0.00001	0.000814	<0.003	<0.003
	Annual Maximum	0.00132	0.00530	0.0688	<0.00001	<0.00001	0.00325	<0.003	0.00410
	Annual Mean	0.00109	0.00386	0.0442	<0.00001	<0.00001	0.00222	<0.003	0.00328
	Annual Median	0.00114	0.00425	0.0491	<0.00001	<0.00001	0.00240	<0.003	0.00300
	% < LRL	0%	0%	0%	100%	100%	0%	100%	50%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_MULTIPLATE	n	35	35	35	35	35	35	35	35
	Annual Minimum	0.000758	0.00220	0.00681	<0.00001	<0.00001	0.000778	<0.003	<0.003
	Annual Maximum	0.00297	0.0166	0.0715	0.000134	0.000182	0.00413	0.0625	0.0188
	Annual Mean	0.00139	0.00504	0.0488	0.0000158	0.0000184	0.00271	0.00609	0.00401
	Annual Median	0.00135	0.00450	0.0557	<0.00001	<0.00001	0.00290	<0.003	<0.003
	% < LRL	0%	0%	0%	86%	83%	0%	63%	86%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	3%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	17%	3%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	3%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FR2	n	47	47	47	47	47	47	47	47
	Annual Minimum	0.000834	0.00199	0.0107	<0.00001	<0.00001	0.000895	<0.003	<0.003
	Annual Maximum	0.00410	0.0165	0.0643	0.0000410	0.0000505	0.00392	0.0158	0.0184
	Annual Mean	0.00165	0.00541	0.0444	0.0000109	0.0000136	0.00282	0.00420	0.00377
	Annual Median	0.00151	0.00462	0.0480	<0.00001	<0.00001	0.00322	<0.003	<0.003
	% < LRL	0%	0%	0%	94%	64%	0%	53%	79%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	34%	0%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	2%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FR3	n	37	37	38	37	37	37	37	37
	Annual Minimum	0.000923	0.00252	0.0146	<0.00001	<0.00001	0.00106	<0.003	<0.003
	Annual Maximum	0.00582	0.0172	0.0671	0.0000140	0.0000240	0.00402	0.0187	0.00860
	Annual Mean	0.00195	0.00627	0.0472	0.0000101	0.0000126	0.00313	0.00396	0.00315
	Annual Median	0.00159	0.00495	0.0481	<0.00001	<0.00001	0.00329	<0.003	<0.003
	% < LRL	0%	0%	0%	97%	59%	0%	68%	95%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	43%	0%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	3%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_SCOUTDS	n	42	42	42	42	42	42	42	42
	Annual Minimum	0.00120	0.00215	0.0199	<0.00001	<0.00001	0.00116	<0.003	0.00180
	Annual Maximum	0.00594	0.0192	0.166	<0.00005	0.0000590	0.00687	0.0153	0.0301
	Annual Mean	0.00314	0.0100	0.101	<0.00001	0.0000161	0.00474	0.00541	0.00409
	Annual Median	0.00280	0.00969	0.103	<0.00001	0.0000145	0.00500	0.00485	0.00280
	% < LRL	0%	0%	0%	100%	19%	0%	12%	79%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	90%	90%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	12%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Dissolved Cadmium (mg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
FR_UFR1	n	32	32	32
	Annual Minimum	<0.000005	<0.0002	<0.01
	Annual Maximum	0.0000160	0.000540	0.0300
	Annual Mean	0.00000892	0.000233	0.0116
	Annual Median	0.00000860	<0.0002	<0.01
	% < LRL	6%	69%	91%
	% > BCWQG[a]	0%	3%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_HC3	n	15	15	15
	Annual Minimum	<0.000005	<0.0002	<0.01
	Annual Maximum	0.00000680	0.000210	<0.01
	Annual Mean	0.00000523	0.000201	<0.01
	Annual Median	<0.000005	<0.0002	<0.01
	% < LRL	73%	87%	100%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FR1	n	18	18	18
	Annual Minimum	0.00000770	<0.0002	<0.01
	Annual Maximum	0.0000316	0.000500	0.0500
	Annual Mean	0.0000189	0.000241	0.0130
	Annual Median	0.0000180	<0.0002	<0.01
	% < LRL	0%	56%	78%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FRABEC1	n	4	4	4
	Annual Minimum	0.0000143	<0.0002	<0.01
	Annual Maximum	0.0000615	0.000240	<0.01
	Annual Mean	0.0000405	0.000213	<0.01
	Annual Median	0.0000431	0.000205	<0.01
	% < LRL	0%	50%	100%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_MULTIPLATE	n	35	35	35
	Annual Minimum	0.0000118	<0.0002	<0.01
	Annual Maximum	0.000101	0.000720	0.0180
	Annual Mean	0.0000438	0.000245	0.0104
	Annual Median	0.0000432	<0.0002	<0.01
	% < LRL	0%	63%	94%
	% > BCWQG[a]	0%	3%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FR2	n	47	47	47
	Annual Minimum	0.0000235	<0.0002	<0.01
	Annual Maximum	0.000145	0.000475	0.0370
	Annual Mean	0.0000577	0.000243	0.0182
	Annual Median	0.0000504	<0.0002	0.0185
	% < LRL	0%	55%	32%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FR3	n	37	37	37
	Annual Minimum	0.0000144	<0.0002	<0.01
	Annual Maximum	0.000100	0.000530	0.0440
	Annual Mean	0.0000518	0.000236	0.0169
	Annual Median	0.0000500	<0.0002	0.0160
	% < LRL	0%	73%	24%
	% > BCWQG[a]	0%	5%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_SCOUTDS	n	42	42	42
	Annual Minimum	0.00000580	<0.0002	<0.01
	Annual Maximum	0.000273	0.000630	0.0300
	Annual Mean	0.0000884	0.000276	0.0158
	Annual Median	0.0000860	0.000233	0.0150
	% < LRL	0%	33%	29%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Total Dissolved Solids (mg/L)[c]	Lab pH	Field pH	Dissolved Oxygen (mg/L)	Alkalinity (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)
FR_FR4	n	25	25	23	23	25	25	25
	Annual Minimum	311	6.60	6.93	9.85	109	6.45	<0.005
	Annual Maximum	1,480	8.45	8.54	14.7	273	22.2	0.0523
	Annual Mean	941.1	8.23	8.19	11.6	224	17.2	0.0200
	Annual Median	1,030	8.33	8.33	11.8	237	18.6	0.0175
	% < LRL	0%	0%	0%	0%	0%	0.0%	12%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	40%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	52%	-	-	-	-	72%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	16%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FRCP1	n	56	56	54	54	56	56	56
	Annual Minimum	303	7.00	6.83	1.45	90.5	6.35	0.00270
	Annual Maximum	4,000	8.57	8.97	14.4	574	112	0.258
	Annual Mean	903	8.31	8.28	11.0	223	17.7	0.0220
	Annual Median	928.5	8.36	8.37	11.3	226	16.0	0.0144
	% < LRL	0%	0%	0%	0%	0%	0.0%	7%
	% > BCWQG[a]	-	0%	0%	2%	0%	100%	27%
	% > BCWQG[b]	-	-	-	2%	-	2%	0%
	% > EVWQP Level 1 Benchmark	36%	-	-	-	-	66%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	23%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FRCP1SW	n	1	1	1	1	1	1	1
	Annual Minimum	774	8.38	7.41	11.4	197	16.5	0.0209
	Annual Maximum	774	8.38	7.41	11.4	197	16.5	0.0209
	Annual Mean	774	8.38	7.41	11.4	197	16.5	0.0209
	Annual Median	774	8.38	7.41	11.4	197	16.5	0.0209
	% < LRL	0%	0%	0%	0%	0%	0.0%	0%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	100%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	100%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	0%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FRRD	n	26	26	27	27	26	26	26
	Annual Minimum	412	7.98	7.12	8.40	169	12.3	<0.001
	Annual Maximum	1,100	8.46	8.45	12.1	298	38.4	0.0247
	Annual Mean	848	8.21	7.86	10.1	249	26.2	0.00534
	Annual Median	907	8.21	7.87	10.1	268	25.8	0.00460
	% < LRL	0%	0%	0%	0%	0%	0.0%	42%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	4%
	% > BCWQG[b]	-	-	-	0%	-	27%	0%
	% > EVWQP Level 1 Benchmark	23%	-	-	-	-	96%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	73%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
GH_PC2	n	15	15	16	16	15	15	15
	Annual Minimum	135	7.96	7.36	7.69	119	0.0215	<0.001
	Annual Maximum	907	8.45	8.52	11.2	244	24.6	0.0112
	Annual Mean	692	8.26	7.93	9.87	210	16.8	0.00387
	Annual Median	777	8.26	7.88	9.79	223	19.5	0.00260
	% < LRL	0%	0%	0%	0%	0%	0.0%	47%
	% > BCWQG[a]	-	0%	0%	6%	0%	93%	0%
	% > BCWQG[b]	-	-	-	6%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	87%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	20%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FRABCH	n	45	45	45	45	45	45	45
	Annual Minimum	404	8.06	7.21	6.21	169	9.19	0.00120
	Annual Maximum	966	8.57	8.85	13.1	256	25.4	0.0117
	Annual Mean	741	8.26	8.21	10.2	219	18.5	0.00483
	Annual Median	796	8.26	8.19	10.1	226	20.2	0.00430
	% < LRL	0%	0%	0%	0%	0%	0.0%	31%
	% > BCWQG[a]	-	0%	0%	2%	0%	100%	0%
	% > BCWQG[b]	-	-	-	2%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	91%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	44%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-
FR_FR5	n	8	8	8	8	8	8	8
	Annual Minimum	406	8.14	7.82	9.18	171	8.86	0.00310
	Annual Maximum	895	8.45	8.69	12.2	214	18.9	0.00630
	Annual Mean	616	8.29	8.31	10.5	196	14.2	0.00466
	Annual Median	602	8.28	8.28	10.7	201	15.0	0.00455
	% < LRL	0%	0%	0%	0%	0%	0.0%	25%
	% > BCWQG[a]	-	0%	0%	0%	0%	100%	0%
	% > BCWQG[b]	-	-	-	0%	-	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-	-	-	75%	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	0%	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia Working or Accepted Water Quality Guideline

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness or chloride), guidelines were screened using concurrent concentrations. When concurrent hardness or chloride concentrations were not measured, the most conservative concentration observed for that station was used to estimate the guidelines or benchmark. All summary statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Screening Value instead of EVWQP Level 1 Benchmark.

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Ammonia (mg/L)	Sulphate (mg/L)	Total Chloride (mg/L)	Total Fluoride (mg/L)	Total Antimony (mg/L)	Total Arsenic (mg/L)	Total Barium (mg/L)	Total Beryllium (mg/L)
FR_FR4	n	25	25	25	25	25	25	25	25
	Annual Minimum	<0.005	78.2	<0.5	0.0950	0.000190	<0.0001	0.0393	<0.00002
	Annual Maximum	0.648	721	3.20	0.230	0.000650	0.000310	0.0881	0.0000340
	Annual Mean	0.0683	422	1.62	0.156	0.000340	0.000138	0.0722	0.0000206
	Annual Median	0.0184	468	1.86	0.150	0.000320	0.000120	0.0772	<0.00002
	% < LRL	12%	0%	36%	0%	0%	4%	0%	96%
	% > BCWQG[a]	4%	60%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	60%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRCP1	n	56	56	56	56	55	55	55	55
	Annual Minimum	<0.005	91.2	<0.5	0.0905	0.000200	<0.0001	0.0375	<0.00002
	Annual Maximum	0.646	1,750	11.0	0.230	0.00163	0.000750	0.102	<0.0001
	Annual Mean	0.0758	395	1.70	0.160	0.000358	0.000178	0.0727	0.0000213
	Annual Median	0.0195	428	1.74	0.158	0.000310	0.000150	0.0790	<0.00002
	% < LRL	11%	0%	38%	2%	2%	9%	0%	95%
	% > BCWQG[a]	5%	50%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	50%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRCP1SW	n	1	1	1	1	1	1	1	1
	Annual Minimum	0.0174	339	1.39	0.168	0.000370	0.000220	0.0848	<0.00002
	Annual Maximum	0.0174	339	1.39	0.168	0.000370	0.000220	0.0848	<0.00002
	Annual Mean	0.0174	339	1.39	0.168	0.000370	0.000220	0.0848	<0.00002
	Annual Median	0.0174	339	1.39	0.168	0.000370	0.000220	0.0848	<0.00002
	% < LRL	0%	0%	0%	0%	0%	0%	0%	100%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRRD	n	26	26	26	26	26	26	26	26
	Annual Minimum	<0.005	129	0.590	0.0870	<0.0001	<0.0001	0.0501	<0.00002
	Annual Maximum	0.116	391	7.71	0.180	0.000450	0.000420	0.128	0.0000330
	Annual Mean	0.0214	307	2.34	0.136	0.000152	0.000146	0.107	0.0000207
	Annual Median	0.0105	332	2.07	0.130	0.000110	0.000110	0.117	<0.00002
	% < LRL	19%	0%	8%	4%	42%	38%	0%	92%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
GH_PC2	n	15	15	15	15	15	15	15	15
	Annual Minimum	<0.005	10.3	<0.5	0.100	<0.0001	<0.0001	0.0432	<0.00002
	Annual Maximum	0.0404	396	2.60	0.184	0.000245	0.000330	0.0909	0.0000280
	Annual Mean	0.0124	268	1.21	0.138	0.000148	0.000144	0.0751	0.0000205
	Annual Median	0.00890	312	1.26	0.142	0.000120	0.000120	0.0827	<0.00002
	% < LRL	13%	0%	27%	0%	40%	40%	0%	93%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRABCH	n	45	45	45	45	45	45	45	45
	Annual Minimum	<0.005	109	0.520	0.0830	<0.0001	<0.0001	0.0441	<0.00002
	Annual Maximum	0.134	371	4.35	0.194	0.000290	0.00104	0.113	0.000109
	Annual Mean	0.0185	274	1.57	0.136	0.000153	0.000161	0.0892	0.0000220
	Annual Median	0.0132	301	1.55	0.140	0.000140	0.000120	0.101	<0.00002
	% < LRL	7%	0%	11%	7%	33%	36%	0%	96%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR5	n	8	8	8	8	8	8	8	8
	Annual Minimum	<0.005	112	0.960	0.110	<0.0001	<0.0001	0.0609	<0.00002
	Annual Maximum	0.0234	302	2.28	0.172	0.000190	0.000380	0.127	0.0000310
	Annual Mean	0.00895	215	1.54	0.147	0.000135	0.000152	0.0968	0.0000214
	Annual Median	0.00610	221	1.50	0.152	0.000120	0.000130	0.101	<0.00002
	% < LRL	38%	0%	0%	0%	38%	25%	0%	88%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	0%
	% > BCWQG[b]	0%	-	0%	0%	-	0%	-	-
	% > EVWQP Level 1 Benchmark	-	0%	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Total Boron (mg/L)	Total Chromium (mg/L)	Total Cobalt (mg/L)	Total Iron (mg/L)	Total Lead (mg/L)	Total Lithium (mg/L)	Total Manganese (mg/L)	Total Mercury (mg/L)
FR_FR4	n	25	25	25	25	25	25	25	25
	Annual Minimum	<0.01	<0.0001	<0.0001	0.0180	<0.00005	0.0185	0.00256	<0.0000005
	Annual Maximum	0.0160	0.000530	0.000650	0.456	0.000378	0.0602	0.0330	0.00000310
	Annual Mean	0.0118	0.000154	0.000186	0.0582	0.0000665	0.0470	0.0116	0.000000691
	Annual Median	0.0120	0.000115	0.000140	0.0380	<0.00005	0.0502	0.0110	<0.0000005
	% < LRL	20%	24%	16%	0%	84%	0%	0%	68%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	8%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRCP1	n	55	55	55	55	55	55	55	55
	Annual Minimum	<0.01	<0.0001	<0.0001	0.0110	<0.00005	0.0180	0.00262	<0.0000005
	Annual Maximum	0.0570	0.00118	0.000690	1.16	0.000730	0.279	0.0574	0.00000596
	Annual Mean	0.0121	0.000230	0.000210	0.100	0.000105	0.0464	0.0114	0.00000100
	Annual Median	0.0110	0.000140	0.000140	0.0360	<0.00005	0.0455	0.00907	<0.0000005
	% < LRL	25%	16%	24%	2%	53%	0%	0%	53%
	% > BCWQG[a]	0%	2%	0%	-	0%	-	0%	18%
	% > BCWQG[b]	-	-	0%	2%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRCP1SW	n	1	1	1	1	1	1	1	1
	Annual Minimum	0.0100	0.000300	0.000330	0.131	0.000105	0.0407	0.0176	0.00000142
	Annual Maximum	0.0100	0.000300	0.000330	0.131	0.000105	0.0407	0.0176	0.00000142
	Annual Mean	0.0100	0.000300	0.000330	0.131	0.000105	0.0407	0.0176	0.00000142
	Annual Median	0.0100	0.000300	0.000330	0.131	0.000105	0.0407	0.0176	0.00000142
	% < LRL	0%	0%	0%	0%	0%	0%	0%	0%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	100%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRRD	n	26	26	26	26	26	26	26	26
	Annual Minimum	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.0244	0.000390	<0.0000005
	Annual Maximum	0.0210	0.000900	0.000980	0.586	0.000490	0.0526	0.0310	<0.000005
	Annual Mean	0.0146	0.000211	0.000183	0.0586	0.0000845	0.0430	0.00417	0.000000793
	Annual Median	0.0150	0.000160	0.000140	<0.01	<0.00005	0.0458	0.00137	<0.0000005
	% < LRL	12%	8%	15%	58%	81%	0%	0%	77%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	15%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
GH_PC2	n	15	15	15	15	15	15	15	15
	Annual Minimum	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.00130	0.000360	<0.0000005
	Annual Maximum	0.0160	0.000520	0.000410	0.512	0.000371	0.0367	0.0248	0.00000284
	Annual Mean	0.0109	0.000169	0.000138	0.0564	0.0000755	0.0295	0.00351	0.000000818
	Annual Median	0.0110	0.000130	<0.0001	<0.01	<0.00005	0.0324	0.00110	<0.0000005
	% < LRL	20%	13%	53%	60%	73%	0%	0%	67%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	13%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FRABCH	n	45	45	45	45	45	45	45	45
	Annual Minimum	<0.01	<0.0001	<0.0001	0.0100	<0.00005	0.0201	0.00417	<0.0000005
	Annual Maximum	0.0140	0.00213	0.00118	2.33	0.00153	0.0419	0.101	0.00000690
	Annual Mean	0.0112	0.000224	0.000174	0.125	0.000115	0.0317	0.0101	0.000000961
	Annual Median	0.0110	0.000140	0.000150	0.0365	<0.00005	0.0331	0.00608	<0.0000005
	% < LRL	27%	2%	11%	0%	56%	0%	0%	60%
	% > BCWQG[a]	0%	2%	0%	-	0%	-	0%	24%
	% > BCWQG[b]	-	-	0%	2%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-
FR_FR5	n	8	8	8	8	8	8	8	8
	Annual Minimum	<0.01	<0.0001	<0.0001	<0.01	<0.00005	0.0198	0.00185	<0.0000005
	Annual Maximum	0.0110	0.000730	0.000420	0.720	0.000563	0.0314	0.0333	0.00000370
	Annual Mean	0.0105	0.000210	0.000148	0.114	0.000117	0.0257	0.00709	0.00000101
	Annual Median	0.0105	0.000125	<0.0001	0.0190	<0.00005	0.0265	0.00289	<0.0000005
	% < LRL	50%	25%	75%	38%	75%	0%	0%	63%
	% > BCWQG[a]	0%	0%	0%	-	0%	-	0%	13%
	% > BCWQG[b]	-	-	0%	0%	0%	-	0%	-
	% > EVWQP Level 1 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	-	-	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Total Molybdenum (mg/L)	Total Nickel (mg/L)[c]	Total Selenium (mg/L)	Total Silver (mg/L)	Total Thallium (mg/L)	Total Uranium (mg/L)	Total Zinc (mg/L)	Dissolved Aluminum (mg/L)
FR_FR4	n	25	25	25	25	25	25	25	25
	Annual Minimum	0.00115	0.00397	0.0289	<0.00001	<0.00001	0.00141	<0.003	<0.003
	Annual Maximum	0.00520	0.0154	0.193	0.0000100	0.0000250	0.00788	0.00940	0.00460
	Annual Mean	0.00271	0.00958	0.113	0.0000100	0.0000142	0.00499	0.00529	0.00310
	Annual Median	0.00235	0.00988	0.115	<0.00001	0.0000140	0.00538	0.00470	<0.003
	% < LRL	0%	0%	0%	96%	8%	0%	12%	88%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	88%	84%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	4%	4%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FRCP1	n	55	55	55	55	55	55	55	55
	Annual Minimum	0.00148	0.00286	0.0319	<0.00001	<0.00001	0.00173	<0.003	<0.003
	Annual Maximum	0.0149	0.0324	0.674	0.000138	<0.00005	0.0222	0.0296	0.0154
	Annual Mean	0.00286	0.00897	0.107	0.0000137	0.0000149	0.00467	0.00627	0.00361
	Annual Median	0.00228	0.00884	0.104	<0.00001	0.0000120	0.00475	0.00520	<0.003
	% < LRL	0%	0%	0%	89%	29%	0%	7%	87%
	% > BCWQG[a]	0%	-	100%	0%	0%	2%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	76%	73%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	4%	5%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	2%	-	-	-	-	-	-
FR_FRCP1SW	n	1	1	1	1	1	1	1	1
	Annual Minimum	0.00224	0.00966	0.0891	<0.00001	0.0000170	0.00390	0.00480	<0.003
	Annual Maximum	0.00224	0.00966	0.0891	<0.00001	0.0000170	0.00390	0.00480	<0.003
	Annual Mean	0.00224	0.00966	0.0891	<0.00001	0.0000170	0.00390	0.00480	<0.003
	Annual Median	0.00224	0.00966	0.0891	<0.00001	0.0000170	0.00390	0.00480	<0.003
	% < LRL	0%	0%	0%	100%	0%	0%	0%	100%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	100%	100%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FRRD	n	26	26	26	26	26	26	26	26
	Annual Minimum	0.000564	<0.0005	0.0474	<0.00001	<0.00001	0.00212	<0.003	<0.003
	Annual Maximum	0.00202	0.0111	0.131	0.0000170	0.0000330	0.00512	0.0143	0.0192
	Annual Mean	0.000972	0.00199	0.0961	0.0000104	0.0000113	0.00403	0.00417	0.00362
	Annual Median	0.000837	0.000820	0.101	<0.00001	<0.00001	0.00431	<0.003	<0.003
	% < LRL	0%	19%	0%	88%	92%	0%	73%	92%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	15%	88%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
GH_PC2	n	15	15	15	15	15	15	15	15
	Annual Minimum	0.000535	<0.0005	0.000445	<0.00001	<0.00001	0.000296	<0.003	<0.003
	Annual Maximum	0.00183	0.00574	0.102	<0.00001	0.0000170	0.00391	0.00860	0.00330
	Annual Mean	0.00109	0.00172	0.0749	<0.00001	0.0000105	0.00303	0.00354	0.00302
	Annual Median	0.00100	0.000900	0.0854	<0.00001	<0.00001	0.00336	<0.003	<0.003
	% < LRL	0%	40%	0%	100%	93%	0%	73%	93%
	% > BCWQG[a]	0%	-	93%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	13%	67%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FRABCH	n	45	45	45	45	45	45	45	45
	Annual Minimum	0.000574	<0.0005	0.0351	<0.00001	<0.00001	0.00189	<0.003	<0.003
	Annual Maximum	0.00182	0.00751	0.0962	0.0000440	0.0000590	0.00378	0.0213	0.0132
	Annual Mean	0.00102	0.00189	0.0780	0.0000109	0.0000115	0.00307	0.00407	0.00325
	Annual Median	0.000947	0.00109	0.0875	<0.00001	<0.00001	0.00327	<0.003	<0.003
	% < LRL	0%	11%	0%	93%	91%	0%	56%	96%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	9%	73%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-
FR_FR5	n	8	8	8	8	8	8	8	8
	Annual Minimum	0.000678	<0.0005	0.0363	<0.00001	<0.00001	0.00183	<0.003	<0.003
	Annual Maximum	0.00123	0.00388	0.0845	0.0000130	0.0000210	0.00315	0.0117	0.00590
	Annual Mean	0.000992	0.00170	0.0605	0.0000104	0.0000114	0.00253	0.00409	0.00336
	Annual Median	0.000985	0.00114	0.0602	<0.00001	<0.00001	0.00260	<0.003	<0.003
	% < LRL	0%	13%	0%	88%	88%	0%	88%	88%
	% > BCWQG[a]	0%	-	100%	0%	0%	0%	0%	0%
	% > BCWQG[b]	0%	-	-	0%	-	-	0%	0%
	% > EVWQP Level 1 Benchmark	-	0%	38%	-	-	-	-	-
	% > EVWQP Level 2 Benchmark	-	0%	0%	-	-	-	-	-
	% > EVWQP Level 3 Benchmark	-	0%	-	-	-	-	-	-

> 5% of samples exceed the guideline or benchmark.
> 50% of samples exceed the guideline or benchmark.
> 95% of samples exceed the guideline or benchmark.

Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.1: Summary of Water Chemistry Data for Key Constituents at Monitoring Stations Monitoring Stations, FRO LAEMP, 2020

Station	Summary Statistic	Dissolved Cadmium (mg/L)	Dissolved Copper (mg/L)	Dissolved Iron (mg/L)
FR_FR4	n	25	25	25
	Annual Minimum	0.0000354	<0.0002	<0.01
	Annual Maximum	0.000309	0.000550	0.0270
	Annual Mean	0.0000956	0.000262	0.0147
	Annual Median	0.0000807	0.000210	0.0130
	% < LRL	0%	48%	32%
	% > BCWQG[a]	0%	4%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FRCP1	n	55	55	55
	Annual Minimum	0.0000120	<0.0002	<0.01
	Annual Maximum	0.000151	0.00191	0.0350
	Annual Mean	0.0000835	0.000308	0.0138
	Annual Median	0.0000762	0.000225	0.0120
	% < LRL	0%	35%	36%
	% > BCWQG[a]	0%	2%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FRCP1SW	n	1	1	1
	Annual Minimum	0.0000636	0.000330	<0.01
	Annual Maximum	0.0000636	0.000330	<0.01
	Annual Mean	0.0000636	0.000330	<0.01
	Annual Median	0.0000636	0.000330	<0.01
	% < LRL	0%	0%	100%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FRRD	n	26	26	26
	Annual Minimum	0.0000321	<0.0002	<0.01
	Annual Maximum	0.0000936	0.000480	0.0170
	Annual Mean	0.0000528	0.000216	0.0103
	Annual Median	0.0000493	<0.0002	<0.01
	% < LRL	0%	77%	96%
	% > BCWQG[a]	0%	4%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
GH_PC2	n	15	15	15
	Annual Minimum	0.00000690	<0.0002	<0.01
	Annual Maximum	0.000104	0.000420	<0.01
	Annual Mean	0.0000423	0.000245	<0.01
	Annual Median	0.0000361	<0.0002	<0.01
	% < LRL	0%	60%	100%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FRABCH	n	45	45	45
	Annual Minimum	0.0000192	<0.0002	<0.01
	Annual Maximum	0.0000717	0.000350	0.0220
	Annual Mean	0.0000397	0.000211	0.0109
	Annual Median	0.0000361	<0.0002	<0.01
	% < LRL	0%	76%	76%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-
FR_FR5	n	8	8	8
	Annual Minimum	0.0000229	<0.0002	<0.01
	Annual Maximum	0.0000438	0.000330	0.0100
	Annual Mean	0.0000305	0.000222	0.0100
	Annual Median	0.0000292	<0.0002	<0.01
	% < LRL	0%	63%	88%
	% > BCWQG[a]	0%	0%	-
	% > BCWQG[b]	0%	0%	0%
	% > EVWQP Level 1 Benchmark	0%	-	-
	% > EVWQP Level 2 Benchmark	-	-	-
	% > EVWQP Level 3 Benchmark	-	-	-

> 5% of samples exceed the guideline or benchmark.
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Notes: "LRL" = laboratory reporting limit. "BCWQG" = British Columbia W

[a] Long-term average BCQWG for the Protection of Aquatic Life.

[b] Short-term maximum BCQWG for the Protection of Aquatic Life. For gui
When concurrent hardness or chloride concentrations were not measured
statistics are reported to 3 significant figures.

[c] Total Dissolved Solids and Nickel were screened against the Level 1 Scr

Table B.2: British Columbia Water Quality Guidelines, Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Constituents Assessed, FRO LAEMP, 2020

Variable		Units	British Columbia Water Quality Guidelines [a]				Site-Specific Benchmark [b]
			Long-term Average	Short-term Maximum	Year	Status	
Non-Metals	Total Alkalinity	mg/L	For dissolved calcium = < 4mg/L, WQG = <10 For dissolved calcium = 4 to 8 mg/L, WQG = 10 to 20 For dissolved calcuim = > 8 mg/L, WQG = > 20	-	2015	Working	-
	Unionized Ammonia [c]	mg/L	pH and Temperature dependent (tabular)	pH and Temperature dependent (tabular)	2009	Approved	-
	Chloride	mg/L	150	600	2003	Approved	-
	Fluoride	mg/L	-	For hardness ≤ 10 mg/L, WQG = 0.4 For hardness > 10 mg/L, WQG = [-51.73 + 92.57 × $\log_{10}$(hardness)]×0.01 Maximum applicable hardness = 385 mg/L	1990	Approved	-
	Nitrate-N	mg/L	3	33	2009	Approved	Level 1 EVWQP benchmark= $10^{1.0003[\log(\text{hardness})]-1.52}$ Maximum applicable hardness = 500 mg/L Level 2 EVWQP benchmark= $10^{1.0003[\log(\text{hardness})]-1.38}$ Maximum applicable hardness = 500 mg/L
	Nitrite-N [d]	mg/L	0.02 to 0.20	0.06 to 0.60	2009	Approved	-
	Dissolved oxygen [e]	mg/L	For buried embryo/alevin life stages, WQG (water column) = 11 WQG (interstitial) = 8 For other life stages, WQG (water column) = 8	For buried embryo/alevin life stages, WQG (water column) = 9 WQG (interstitial) = 6 For other life stages, WQG (water column) = 5	1997	Approved	-
	pH [f]	pH units	6.5 - 9.0		1991	Approved	-
	Sulphate [g]	mg/L	128 to 429 Maximum applicable hardness = 250 mg/L	-	2013	Approved	Level 1 EVWQP Benchmark = BCWQG = 429
	Total Dissolved Solids	mg/L	-	-	-	-	Level 1 Screening Value = 1000

[a] British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

[b] When appropriate, site-specific Elk Valley Water Quality Plan Benchmarks (EVWQP; Teck 2014) or interim screening values were applied in addition to or instead of BC water quality guidelines. Interim screening values are displayed for nickel (Golder 2017; Coal Mountain Operations Aquatic Health Assessment Report).

[c] Temperature and pH dependent; range of minimum and maximum values.

[d] Dependent on concurrent chloride, range of values reported (BCMOE 2019)

[e] Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

[f] Unrestricted change permitted within this pH range.

[g] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values is lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[h] Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[i] The most conservative guideline (0.00000125 mg/L) was applied.

Table B.2: British Columbia Water Quality Guidelines, Site-Specific Elk Valley Water Quality Plan (EVWQP) Benchmarks, and Interim Screening Values for Constituents Assessed, FRO LAEMP, 2020

Variable			Units	British Columbia Water Quality Guidelines [a]				Site-Specific Benchmark [b]
				Long-term Average	Short-term Maximum	Year	Status	
Metals and Metalloids	Total	Antimony (III)	mg/L	0.009	-	2015	Working	-
		Arsenic	mg/L	-	0.005	2002	Approved	-
		Barium	mg/L	1	-	2015	Working	-
		Beryllium	mg/L	0.00013	-	2015	Working	-
		Boron	mg/L	1.2	-	2003	Approved	-
		Chromium [h]	mg/L	For Cr(VI), WQG = 0.001 For Cr(III), WQG = 0.0089	-	2015	Working	-
		Cobalt	mg/L	0.004	0.11	2004	Approved	-
		Iron	mg/L	-	1	2008	Approved	-
		Lead [g]	mg/L	For hardness ≤ 8 mg/L, none proposed For hardness 8 to 360 mg/L, WQG = 0.001×{3.31+ exp[1.273 × ln(hardness) - 4.704]} No more than 20% of samples in a 30-d period should be >1.5X the guideline. Maximum applicable hardness = 360 mg/L	For hardness ≤ 8 mg/L, WQG ≤ 0.003 For hardness 8 to 360 mg/L, WQG = 0.001×{exp[1.273 × ln(hardness) - 1.460]} Maximum applicable hardness = 360 mg/L	1987	Approved	-
		Manganese [g]	mg/L	For hardness 37 to 450 mg/L, WQG ≤ 0.004 × hardness + 0.605 Maximum applicable hardness = 450 mg/L	For hardness 25 to 259 mg/L, WQG ≤ 0.01102 × hardness + 0.54 Maximum applicable hardness = 259 mg/L	2001	Approved	-
		Mercury [i]	mg/L	MeHg ≤ 0.5% of THg, WQG = 0.00002 Else, WQG = [0.0001/(MeHg/THg)] OR When MeHg = 0.5% of THg, WQG= 0.00002 When MeHg = 1.0% of THg, WQG = 0.00001 When MeHg = 8.0% of THg, WQG= 0.00000125	-	2001	Approved	-
		Molybdenum	mg/L	1	2	1986	Approved	-
		Nickel [g]	mg/L	-	-	-	-	Level 1 Interim Screening Value = 0.0053 Level 2 Interim Screening Value = 0.015 Level 3 Interim Screening Value = 0.022
		Selenium	µg/L	2	-	2014	Approved	Level 1 EVWQP Benchmark = 19 Level 2 EVWQP Benchmark = 74
		Silver [f]	mg/L	For hardness ≤ 100 mg/L, WQG = 0.00005 For hardness > 100 mg/L, WQG = 0.0015	For hardness ≤ 100 mg/L, WQG = 0.0001 For hardness > 100 mg/L, WQG = 0.003	1996	Approved	-
		Thallium	mg/L	0.0008	-	1997	Working	-
		Uranium	mg/L	0.0085	-	2011	Working	-
		Zinc [g]	mg/L	For hardness ≤ 90 mg/L, WQG = 0.0075	For hardness ≤ 90 mg/L, WQG = 0.033	1999	Approved	-
	Dissolved	Aluminum	mg/L	When pH ≥ 6.5, WQG = 0.05 When pH < 6.5, WQG = exp[1.6 - 3.327(median pH)+ 0.402(median pH)^2]	When pH ≥ 6.5, WQG = 0.1 When pH < 6.5, WQG = exp[1.209 - 2.426(pH)+ 0.286 (pH)^2]	2001	Approved	-
		Cadmium [g]	µg/L	For hardness = 3.4 to 285 mg/L, WQG = {exp[0.736×ln(hardness) - 4.943]} Maximum applicable hardness = 285 mg/L	For hardness = 7 to 455 mg/L, WQG = {exp[1.03×ln(hardness)-5.274]} Maximum applicable hardness = 455 mg/L	2015	Approved	Level 1 EVWQP Benchmark = $10^{0.83(\log(\text{hardness}))-2.53}$ Maximum applicable hardness = 285 mg/L
		Copper	mg/L	Biotic Ligand Model	Biotic Ligand Model	2019	Approved	-
		Iron	mg/L	-	WQG = 0.35 mg/L	2008	Approved	-

[a] British Columbia Working (BCMOE 2017) or Accepted (BCMOE 2019) Water Quality Guidelines for the Protection of Aquatic Life. For guidelines dependent on other analytes (e.g., hardness), guidelines were screened using concurrent values.

[b] When appropriate, site-specific Elk Valley Water Quality Plan Benchmarks (EVWQP; Teck 2014) or interim screening values were applied in addition to or instead of BC water quality guidelines. Interim screening values are displayed for nickel (Golder 2017; Coal Mountain Operations Aquatic Health Assessment Report).

[c] Temperature and pH dependent; range of minimum and maximum values.

[d] Dependent on concurrent chloride, range of values reported (BCMOE 2019)

[e] Dissolved oxygen guidelines represent a minimum value, and so exceedances were quantified below this guideline.

[f] Unrestricted change permitted within this pH range.

[g] For hardness-based guidelines, concurrent hardness values were used for calculating guidelines. If hardness values exceeding the maximum applicable hardness, then guidelines were determined using the maximum applicable hardness. If hardness values is lower than the minimum hardness, then guidelines were determined using the minimum hardness.

[h] Chromium(VI) is the dominant oxidation state in oxygenated environments, and so its guideline was applied.

[i] The most conservative guideline (0.00000125 mg/L) was applied.

Table B.3 Temporal Changes in Water Chemistry Constituents at Stations, FRO LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation [a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b) [c]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012-2019	2020 vs. 2019
Total Antimony	Reference	FR_UFR1	1	0.339	-	-	-	-	-	ns	-	-	ns	-	-	-	-	-	A	-	-	A	No	-
		FR_HC3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mine-exposed	FR_FR1	2	0.099	-	-	ns	-	-	ns	-	-	ns	-	-	A	-	-	A	-	-	A	No	-
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	<0.001	-	-	-	-	-	-	b	-	**27**	-	-	-	-	-	-	B	-	A	↑	-
		FR_FR2	8	<0.001	b	15	13	1.4	**-25**	-10	-15	-3.6	15	ABC	A	AB	ABC	D	BCD	CD	ABC	AB	No	No
		FR_FR3	3	0.803	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	2.1	0.40	-10	**-28**	**-27**	**-23**	-	20	AB	AB	AB	BC	D	CD	CD	-	A	No	-
		FR_FRCP1	5	0.002	-	-	-	b	-19	-10	1.7	3.8	11	-	-	-	AB	B	AB	A	A	A	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.143	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		GH_PC2	6	0.004	b	21	-8.9	-14	-	-	-33	23	-15	AB	A	AB	AB	-	-	B	A	AB	No	No
		FR_FRABCH	5	0.003	-	-	-	b	15	**29**	3.5	12	22	-	-	-	B	AB	A	B	AB	AB	No	No
		FR_FR5	6	0.364	ns	ns	ns	ns	ns	ns	ns	-	-	A	A	A	A	A	A	A	-	-	-	-
Total Barium	Reference	FR_UFR1	8	<0.001	b	**17**	**21**	**20**	**17**	**18**	10	4.9	6.2	D	ABC	A	AB	ABC	ABC	ABCD	CD	BCD	No	No
		FR_HC3	7	0.752	ns	ns	-	ns	ns	ns	ns	ns	ns	A	A	-	A	A	A	A	A	A	No	No
	Mine-exposed	FR_FR1	8	0.056	ns	ns	ns	ns	ns	ns	ns	ns	ns	A	A	A	A	A	A	A	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.011	-	-	-	-	-	-	b	-	**-8.3**	-	-	-	-	-	-	A	-	B	↓	-
		FR_FR2	8	0.001	b	**18**	13	15	7.2	13	5.9	-1.5	3.0	BC	A	ABC	AB	ABC	ABC	ABC	C	ABC	No	No
		FR_FR3	3	0.002	b	14	8.7	18	-	-	-	-	-	B	A	AB	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	**17**	10	**15**	6.9	**16**	9.2	-	-4.1	BC	A	AB	A	ABC	A	ABC	-	C	No	-
		FR_FRCP1	5	0.008	-	-	-	b	-7.0	-0.37	-31	-27	3.6	-	-	-	A	A	A	A	A	A	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.002	-	-	-	b	-8.2	-5.8	**-12**	**-16**	-12	-	-	-	A	AB	AB	B	B	AB	No	No
		GH_PC2	6	<0.001	b	6.8	-3.6	-8.2	-	-	**-19**	**-24**	**-30**	AB	A	AB	B	-	-	C	CD	D	No	No
		FR_FRABCH	5	<0.001	-	-	-	b	-5.1	-5.4	**-10**	**-18**	**-20**	-	-	-	A	AB	AB	BC	C	C	No	No
		FR_FR5	6	<0.001	b	11	13	0.43	-0.85	-0.30	-10	-	-	AB	A	A	AB	AB	AB	B	-	-	-	-
Total Boron	Reference	FR_UFR1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_HC3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mine-exposed	FR_FR1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FR2	8	<0.001	b	2.7	-3.1	-0.61	**-22**	-12	**-15**	**-17**	-10	AB	A	ABC	AB	D	BCD	CD	D	ABCD	No	No
		FR_FR3	3	0.711	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	2.5	1.2	-1.0	**-23**	-18	-15	-	-5.8	AB	A	A	AB	C	BC	ABC	-	ABC	No	-
		FR_FRCP1	5	<0.001	-	-	-	b	**-23**	**-16**	**-14**	**-20**	-6.1	-	-	-	A	C	C	BC	C	AB	No	↑
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	<0.001	-	-	-	b	**-25**	**-18**	-7.2	**-14**	-4.3	-	-	-	A	C	BC	AB	BC	AB	No	No
		GH_PC2	6	<0.001	b	-0.38	5.7	-1.8	-	-	**-21**	-5.6	**-16**	A	A	A	A	-	-	B	AB	B	No	No
		FR_FRABCH	5	<0.001	-	-	-	b	**-18**	**-17**	**-12**	**-9.4**	**-14**	-	-	-	A	C	C	BC	B	BC	No	No
		FR_FR5	5	<0.001	b	-7.3	-5.2	-12	**-30**	-	**-26**	-	-	A	A	A	AB	C	-	BC	-	-	-	-

P-value < 0.05 (annual variation).
> 20% Decrease in concentration.
> 33% Decrease in concentration.
> 43% Decrease in concentration.
> 50% Decrease in concentration.
> 25% Increase in concentration.
> 50% Increase in concentration.
> 75% Increase in concentration.
> 100% Increase in concentration.
***Bold** Significant increase or decrease from base year [b].

Notes: "ns" = not significant. "-" insufficient data for comparison where insufficient data is less than 6 months of recorded data.

[a] The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

[b] Magnitude of Difference (MOD) was calculated as the concentrations in each year minus the concentration in the first year divided by the concentration in the fist year × 100.

[c] Significance between each year determined using all pairwise comparisons with Tukey correction.

Table B.3 Temporal Changes in Water Chemistry Constituents at Stations, FRO LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation [a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b) [c]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012-2019	2020 vs. 2019
Dissolved Cadmium	Reference	FR_UFR1	8	0.361	ns	ns	ns	ns	ns	ns	ns	ns	ns	A	A	A	A	A	A	A	A	A	No	No
		FR_HC3	2	0.544	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	A	-	A	A	No	No
	Mine-exposed	FR_FR1	8	0.044	b	22	11	-4.2	-4.8	14	27	17	15	A	A	A	A	A	A	A	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.219	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	8	0.273	ns	ns	ns	ns	ns	ns	ns	ns	ns	A	A	A	A	A	A	A	A	A	No	No
		FR_FR3	3	0.045	b	-22	-17	-44	-	-	-	-	-	A	AB	AB	B	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	-20	2.9	-32	**-55**	-40	-23	-	43	AB	ABC	AB	BC	C	BC	ABC	-	A	No	-
Dissolved Cadmium	Mine-exposed	FR_FRCP1	5	<0.001	-	-	-	b	-8.2	-16	-23	-20	**159**	-	-	-	B	B	B	B	B	A	↑	↑
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	<0.001	-	-	-	b	-11	9.1	28	6.9	**46**	-	-	-	BC	C	ABC	AB	BC	A	No	↑
		GH_PC2	5	0.012	b	9.2	0.43	-21	-	-	-3.8	-	-1.3	AB	A	AB	B	-	-	AB	-	AB	No	-
		FR_FRABCH	5	0.004	-	-	-	b	7.7	19	**33**	6.7	26	-	-	-	B	AB	AB	A	B	AB	No	No
		FR_FR5	6	0.106	ns	ns	ns	ns	ns	ns	ns	-	-	A	A	A	A	A	A	A	-	-	-	-
Total Cobalt	Reference	FR_UFR1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_HC3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mine-exposed	FR_FR1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FR2	8	0.007	b	-13	-18	-28	**-37**	-27	-9.5	-8.4	7.4	A	AB	AB	AB	B	AB	AB	AB	A	No	No
		FR_FR3	3	<0.001	b	-30	-34	-52	-	-	-	-	-	A	B	B	B	-	-	-	-	-	-	-
		FR_FR4	5	0.001	b	-13	-25	-38	-	-	-42	-	17	AB	AB	AB	B	-	-	B	-	A	No	-
		FR_FRCP1	3	<0.001	-	-	-	b	-	-	27	29	**85**	-	-	-	B	-	-	B	B	A	↑	↑
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	4	<0.001	-	-	-	b	-12	-	31	**310**	**109**	-	-	-	C	C	-	BC	A	B	No	↓
		GH_PC2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRABCH	2	<0.001	-	-	-	-	-	-	b	**99**	**42**	-	-	-	-	-	-	C	A	B	No	↓
		FR_FR5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Lithium	Reference	FR_UFR1	8	0.064	ns	ns	ns	ns	ns	ns	ns	ns	**ns**	B	AB	AB	AB	AB	AB	AB	AB	A	No	No
		FR_HC3	5	0.052	ns	ns	-	ns	ns	ns	-	-	**ns**	B	B	-	AB	AB	AB	-	-	A	No	-
	Mine-exposed	FR_FR1	8	0.008	b	38	26	29	13	**62**	22	37	**68**	B	AB	AB	AB	AB	A	AB	AB	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.334	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	8	<0.001	b	**31**	**33**	**60**	**59**	**73**	**55**	**46**	**64**	C	B	B	AB	AB	A	AB	AB	AB	No	No
		FR_FR3	3	0.026	b	21	16	37	-	-	-	-	-	B	AB	AB	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	24	24	**36**	**44**	**67**	**39**	-	**79**	C	BC	BC	AB	AB	A	AB	-	A	No	-
		FR_FRCP1	5	0.018	-	-	-	b	-6.3	6.7	18	0.29	13	-	-	-	AB	B	AB	A	AB	AB	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	<0.001	-	-	-	b	2.9	**18**	**16**	11	**29**	-	-	-	C	BC	AB	AB	ABC	A	No	No
		GH_PC2	6	<0.001	b	19	**30**	**42**	-	-	**51**	**93**	**63**	D	CD	BC	ABC	-	-	ABC	A	AB	No	No
		FR_FRABCH	5	<0.001	-	-	-	b	11	**16**	**19**	**17**	**20**	-	-	-	B	AB	A	A	A	A	No	No
		FR_FR5	6	<0.001	b	13	16	**35**	**62**	**63**	**56**	-	-	D	D	CD	BC	A	A	AB	-	-	-	-

P-value < 0.05 (annual variation).
> 20% Decrease in concentration.
> 33% Decrease in concentration.
> 43% Decrease in concentration.
> 50% Decrease in concentration.
> 25% Increase in concentration.
> 50% Increase in concentration.
> 75% Increase in concentration.
> 100% Increase in concentration.
***Bold** Significant increase or decrease from base year [b].

Notes: "ns" = not significant. "-" insufficient data for comparison where insufficient data is less than 6 months of recorded data.

[a] The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

[b] Magnitude of Difference (MOD) was calculated as the concentrations in each year minus the concentration in the first year divided by the concentration in the fist year × 100.

[c] Significance between each year determined using all pairwise comparisons with Tukey correction.

Table B.3 Temporal Changes in Water Chemistry Constituents at Stations, FRO LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation [a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b) [c]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012-2019	2020 vs. 2019
Total Manganese	Reference	FR_UFR1	8	<0.001	b	**500**	**732**	77	58	73	53	149	189	C	AB	A	C	C	C	C	BC	ABC	No	No
		FR_HC3	7	0.248	ns	ns	-	ns	ns	ns	ns	ns	ns	A	A	-	A	A	A	A	A	A	No	No
	Mine-exposed	FR_FR1	8	<0.001	b	**107**	4.2	-42	-26	-29	-21	-38	12	B	A	B	B	B	B	B	B	AB	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.006	-	-	-	-	-	-	b	-	**227**	-	-	-	-	-	-	B	-	A	↑	-
		FR_FR2	8	<0.001	b	32	-29	-24	-22	8.4	-14	-29	-20	AB	A	B	B	B	AB	AB	B	B	No	No
		FR_FR3	3	0.134	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	0.028	b	19	-26	-25	-23	-31	-19	-	-18	AB	A	AB	AB	AB	B	AB	-	AB	No	-
		FR_FRCP1	5	0.020	-	-	-	b	3.5	41	-35	-41	54	-	-	-	A	A	A	A	A	A	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.016	-	-	-	b	63	30	-28	-11	-8.0	-	-	-	AB	A	AB	B	AB	AB	No	No
		GH_PC2	6	0.002	b	49	7.5	10	-	-	-38	150	-16	ABC	AB	ABC	ABC	-	-	C	A	BC	No	↓
		FR_FRABCH	5	0.079	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FR5	6	0.063	ns	ns	ns	ns	ns	ns	ns	-	-	AB	A	AB	AB	AB	AB	B	-	-	-	-
Total Molybdenum	Reference	FR_UFR1	8	0.009	b	6.9	5.2	6.1	6.7	6.1	5.3	0.69	0.97	A	A	A	A	A	A	A	A	A	No	No
		FR_HC3	7	0.110	ns	ns	-	ns	ns	ns	ns	ns	ns	A	A	-	A	A	A	A	A	A	No	No
	Mine-exposed	FR_FR1	8	0.001	b	**23**	16	**18**	6.9	**19**	8.7	8.2	11	B	A	AB	A	AB	A	AB	AB	AB	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.160	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	8	<0.001	b	11	6.9	0.15	-12	-9.9	-2.6	2.1	23	ABCD	AB	ABC	ABCD	D	CD	BCD	ABCD	A	No	No
		FR_FR3	3	0.981	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	2.8	-1.0	-9.0	-19	-10	-16	-	**66**	BC	B	BC	BC	C	BC	BC	-	A	↑	-
		FR_FRCP1	5	<0.001	-	-	-	b	-12	-7.1	5.3	11	**65**	-	-	-	BC	C	BC	BC	B	A	↑	↑
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	<0.001	-	-	-	b	0.51	9.1	-8.5	3.9	**19**	-	-	-	BC	ABC	AB	C	ABC	A	No	No
		GH_PC2	6	0.020	b	-2.9	-14	-11	-	-	-3.4	**85**	2.1	B	B	B	B	-	-	B	A	AB	No	No
		FR_FRABCH	5	0.014	-	-	-	b	7.0	2.6	4.0	7.3	**20**	-	-	-	B	AB	B	B	AB	A	No	No
		FR_FR5	6	0.046	b	0.35	-7.4	-11	-0.61	-6.9	-13	-	-	A	A	A	A	A	A	A	-	-	-	-
Total Nickel	Reference	FR_UFR1	1	0.195	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	A	A	No	No
		FR_HC3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mine-exposed	FR_FR1	8	<0.001	b	**75**	37	5.8	6.1	21	33	12	44	B	A	AB	B	B	B	AB	B	AB	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	<0.001	-	-	-	-	-	-	b	-	**63**	-	-	-	-	-	-	B	-	A	↑	-
		FR_FR2	8	<0.001	b	8.0	**-39**	**-37**	-21	-12	-12	9.8	**53**	BC	B	D	D	CD	BC	BC	B	A	↑	↑
		FR_FR3	3	<0.001	b	-4.4	-43	-48	-	-	-	-	-	A	A	B	B	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	-3.5	**-33**	**-44**	**-40**	-27	-28	-	**59**	B	B	C	C	C	BC	BC	-	A	↑	-
		FR_FRCP1	5	0.024	-	-	-	b	-9.4	14	64	19	21	-	-	-	AB	B	AB	A	AB	AB	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.026	-	-	-	b	35	65	-17	27	21	-	-	-	AB	AB	A	B	AB	AB	No	No
		GH_PC2	6	0.002	b	4.8	-46	-42	-	-	-54	8.5	-38	AB	A	AB	AB	-	-	B	AB	AB	No	No
		FR_FRABCH	5	<0.001	-	-	-	b	**78**	**73**	35	31	**63**	-	-	-	B	A	A	AB	AB	A	No	No
		FR_FR5	6	0.040	b	-0.21	-38	-42	17	-18	-18	-	-	AB	AB	AB	B	A	AB	AB	-	-	-	-

P-value < 0.05 (annual variation).
> 20% Decrease in concentration.
> 33% Decrease in concentration.
> 43% Decrease in concentration.
> 50% Decrease in concentration.
> 25% Increase in concentration.
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***Bold** Significant increase or decrease from base year [b].

Notes: "ns" = not significant. "-" insufficient data for comparison where insufficient data is less than 6 months of recorded data.

[a] The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.

[b] Magnitude of Difference (MOD) was calculated as the concentrations in each year minus the concentration in the first year divided by the concentration in the fist year × 100.

[c] Significance between each year determined using all pairwise comparisons with Tukey correction.

Table B.3 Temporal Changes in Water Chemistry Constituents at Stations, FRO LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation [a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b) [c]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012-2019	2020 vs. 2019
Nitrate-N	Reference	FR_UFR1	8	<0.001	b	3.0	**171**	**205**	**229**	**232**	**145**	**177**	**144**	B	B	A	A	A	A	A	A	A	No	No
		FR_HC3	7	<0.001	b	20	-	**64**	**63**	**50**	**60**	**61**	**45**	C	BC	-	A	A	A	A	A	AB	No	No
	Mine-exposed	FR_FR1	8	<0.001	b	**59**	15	13	-17	25	-27	-25	-16	BC	A	ABC	ABC	BC	AB	C	C	BC	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.011	-	-	-	-	-	-	b	-	**-27**	-	-	-	-	-	-	A	-	B	↓	-
		FR_FR2	8	<0.001	b	26	14	**34**	**55**	**58**	**40**	**40**	**73**	D	BCD	CD	ABC	AB	AB	ABC	ABC	A	No	No
		FR_FR3	3	0.383	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	0.005	b	17	5.2	3.2	21	32	19	-	**53**	B	AB	B	B	AB	AB	AB	-	A	No	-
		FR_FRCP1	5	0.131	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.221	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		GH_PC2	6	0.052	ns	ns	ns	ns	-	-	ns	ns	ns	AB	AB	A	AB	-	-	B	AB	AB	No	No
		FR_FRABCH	5	0.122	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FR5	6	0.001	b	**25**	**32**	12	15	16	3.7	-	-	C	AB	A	ABC	ABC	ABC	BC	-	-	-	-
Nitrite-N	Reference	FR_UFR1	1	0.149	-	-	-	-	-	ns	-	-	ns	-	-	-	-	-	A	-	-	A	No	-
		FR_HC3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mine-exposed	FR_FR1	8	<0.001	b	91	-13	-26	-41	7.9	17	-45	-56	ABCD	A	BCD	BCD	BCD	ABC	AB	CD	D	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.018	-	-	-	-	-	-	b	-	101	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	8	<0.001	b	3.4	**-43**	**-52**	**-72**	**-75**	**-69**	**-55**	-3.6	A	A	BC	CD	EF	F	DEF	CDE	AB	No	↑
		FR_FR3	3	0.002	b	6.3	-33	-37	-	-	-	-	-	AB	A	BC	C	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	3.5	-43	**-52**	**-71**	**-69**	**-67**	-	-1.2	AB	A	BC	CD	D	CD	CD	-	AB	No	-
		FR_FRCP1	5	<0.001	-	-	-	b	-29	-12	-40	9.3	**123**	-	-	-	BC	BC	BC	C	B	A	↑	↑
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.056	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		GH_PC2	6	<0.001	b	19	-12	-42	-	-	**-52**	9.4	-27	AB	A	ABC	BC	-	-	C	AB	ABC	No	No
		FR_FRABCH	5	0.208	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FR5	6	<0.001	b	8.6	-13	**-49**	**-42**	-26	-26	-	-	A	A	AB	B	B	AB	AB	-	-	-	-
Orthophosphate	Reference	FR_UFR1	8	<0.001	b	**67**	**114**	27	**69**	**114**	58	**83**	**143**	C	AB	A	BC	AB	A	ABC	AB	A	No	No
		FR_HC3	4	0.038	b	-	-	-	-	-2.9	19	-15	98	A	-	-	-	-	A	A	A	A	No	No
	Mine-exposed	FR_FR1	6	0.300	ns	ns	ns	-	-	ns	ns	ns	ns	A	A	A	-	-	A	A	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.073	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	6	0.006	-	-	b	-44	-24	34	26	-23	18	-	-	AB	B	AB	A	A	AB	AB	No	No
		FR_FR3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FR4	4	0.038	b	-	28	-16	-	-	70	-	40	A	-	A	A	-	-	A	-	A	No	-
		FR_FRCP1	5	0.079	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.032	-	-	-	b	-29	19	34	-6.0	29	-	-	-	AB	B	AB	A	AB	AB	No	No
		GH_PC2	6	0.015	b	3.9	33	8.3	-	-	42	9.5	**70**	B	AB	AB	AB	-	-	AB	AB	A	No	No
		FR_FRABCH	4	0.016	-	-	-	-	b	**123**	115	73	132	-	-	-	-	B	A	AB	AB	AB	No	No
		FR_FR5	1	0.210	-	-	ns	-	-	-	ns	-	-	-	-	A	-	-	-	A	-	-	-	-

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[b] Magnitude of Difference (MOD) was calculated as the concentrations in each year minus the concentration in the first year divided by the concentration in the fist year × 100.
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Table B.3 Temporal Changes in Water Chemistry Constituents at Stations, FRO LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation [a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b) [c]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012-2019	2020 vs. 2019
Total Phosphorus	Reference	FR_UFR1	7	0.045	-	b	9.4	-40	-20	-0.26	-28	-15	16	-	A	A	A	A	A	A	A	A	No	No
		FR_HC3	5	0.463	-	ns	-	-	ns	ns	ns	ns	ns	-	A	-	-	A	A	A	A	A	No	No
	Mine-exposed	FR_FR1	7	0.132	-	ns	ns	ns	ns	ns	ns	ns	ns	-	A	A	A	A	A	A	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.962	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	7	0.031	-	b	-46	**-67**	-41	-46	**-64**	-56	-44	-	A	AB	B	AB	AB	B	AB	AB	No	No
		FR_FR3	2	0.818	-	ns	ns	ns	-	-	-	-	-	-	A	A	A	-	-	-	-	-	-	-
		FR_FR4	6	0.262	-	ns	ns	ns	ns	ns	ns	-	ns	-	A	A	A	A	A	A	-	A	No	-
		FR_FRCP1	5	0.137	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.024	-	-	-	b	4.0	24	-13	-41	4.7	-	-	-	AB	AB	A	AB	B	AB	No	No
		GH_PC2	5	0.691	-	ns	ns	ns	-	-	ns	ns	ns	-	A	A	A	-	-	A	A	A	No	No
		FR_FRABCH	5	0.630	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FR5	5	0.431	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	-	-	-	-
Total Selenium	Reference	FR_UFR1	8	<0.001	b	-3.3	-4.1	7.0	**16**	**19**	**20**	**23**	**18**	C	C	C	BC	AB	AB	AB	A	AB	No	No
		FR_HC3	7	<0.001	b	4.8	-	**22**	**30**	**33**	**32**	**38**	20	C	BC	-	AB	A	A	A	A	ABC	No	No
	Mine-exposed	FR_FR1	8	0.009	b	54	22	6.9	-12	58	8.0	22	46	AB	A	AB	AB	B	A	AB	AB	AB	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.003	-	-	-	-	-	-	b	-	**-29**	-	-	-	-	-	-	A	-	B	↓	-
		FR_FR2	8	<0.001	b	21	1.4	-4.4	-3.2	**29**	**35**	17	**54**	D	ABCD	CD	D	D	ABC	AB	BCD	A	No	↑
		FR_FR3	3	0.015	b	15	-9.0	-19	-	-	-	-	-	AB	A	AB	B	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	3.6	-3.5	-21	-22	11	-2.2	-	**78**	BC	B	BC	C	C	B	BC	-	A	↑	-
		FR_FRCP1	5	0.019	-	-	-	b	-19	10	53	11	-5.2	-	-	-	AB	B	AB	A	AB	AB	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	<0.001	-	-	-	b	-3.3	**25**	14	14	**40**	-	-	-	B	B	A	AB	AB	A	No	No
		GH_PC2	6	<0.001	b	**16**	16	6.0	-	-	**25**	**33**	**21**	C	AB	ABC	BC	-	-	A	A	AB	No	No
		FR_FRABCH	5	<0.001	-	-	-	b	-4.2	6.9	**19**	10	17	-	-	-	BC	C	ABC	A	ABC	AB	No	No
		FR_FR5	6	0.007	b	18	**23**	9.8	9.1	**20**	**25**	-	-	B	AB	A	AB	AB	A	A	-	-	-	-
Sulphate	Reference	FR_UFR1	8	0.104	ns	ns	ns	ns	ns	ns	ns	ns	ns	A	A	A	A	A	A	A	A	A	No	No
		FR_HC3	7	0.008	b	-4.2	-	23	23	**32**	21	24	11	B	B	-	AB	AB	A	AB	AB	AB	No	No
	Mine-exposed	FR_FR1	8	0.067	ns	ns	ns	ns	ns	**ns**	ns	ns	ns	B	AB	AB	AB	AB	A	AB	AB	AB	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.011	-	-	-	-	-	-	b	-	**-25**	-	-	-	-	-	-	A	-	B	↓	-
		FR_FR2	8	0.009	b	14	0.78	4.0	2.2	19	23	11	25	A	A	A	A	A	A	A	A	A	No	No
		FR_FR3	3	0.277	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	9.6	-2.2	-3.8	-6.2	21	8.8	-	**61**	B	B	B	B	B	B	B	-	A	↑	-
		FR_FRCP1	5	0.066	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	AB	B	AB	A	AB	AB	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.014	-	-	-	b	-3.5	16	7.6	11	18	-	-	-	AB	B	A	AB	AB	A	No	No
		GH_PC2	6	<0.001	b	9.2	8.0	11	-	-	**33**	**29**	14	C	BC	BC	BC	-	-	A	AB	ABC	No	No
		FR_FRABCH	5	0.437	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FR5	6	0.042	b	10	15	11	15	20	**23**	-	-	B	AB	AB	AB	AB	AB	A	-	-	-	-

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Table B.3 Temporal Changes in Water Chemistry Constituents at Stations, FRO LAEMP, 2012 to 2020

Parameter	Status	Station	Annual Variation [a]		Q1. Is there a positive or negative change in concentrations since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b) [c]									Q2. Is the 2020 annual mean greater or less than all annual historical means (2012 to 2019) and the previous year (2019)?[c]										
			DF	P-Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020 vs. 2012-2019	2020 vs. 2019
Total Dissolved Solids	Reference	FR_UFR1	8	0.029	b	6.2	4.8	**13**	9.1	6.2	7.1	5.7	6.2	B	AB	AB	A	AB	AB	AB	AB	AB	No	No
		FR_HC3	7	0.014	b	-1.6	-	7.8	5.7	11	12	9.4	10	A	A	-	A	A	A	A	A	A	No	No
	Mine-exposed	FR_FR1	7	0.113	ns	-	ns	ns	ns	ns	ns	ns	ns	A	-	A	A	A	A	A	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.057	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	8	0.004	b	6.4	3.6	6.2	6.8	17	**21**	9.9	**23**	B	AB	AB	AB	AB	AB	A	AB	A	No	No
		FR_FR3	3	0.605	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	12	1.2	-0.93	-1.9	21	9.3	-	**51**	BC	BC	BC	C	C	B	BC	-	A	↑	-
		FR_FRCP1	5	0.047	-	-	-	b	-9.4	6.8	36	11	-3.5	-	-	-	AB	B	AB	A	AB	AB	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	0.051	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		GH_PC2	6	<0.001	b	7.5	10	8.2	-	-	**21**	**22**	11	B	AB	AB	AB	-	-	A	A	AB	No	No
		FR_FRABCH	5	0.205	-	-	-	ns	ns	ns	ns	ns	ns	-	-	-	A	A	A	A	A	A	No	No
		FR_FR5	6	0.182	ns	ns	ns	ns	ns	ns	ns	-	-	A	A	A	A	A	A	A	-	-	-	-
Total Uranium	Reference	FR_UFR1	8	0.011	b	4.7	3.3	5.2	7.0	6.5	**10**	**8.8**	**8.8**	B	AB	AB	AB	AB	AB	A	A	A	No	No
		FR_HC3	7	0.005	b	2.5	-	5.2	**15**	12	12	**16**	7.3	B	AB	-	AB	A	AB	AB	A	AB	No	No
	Mine-exposed	FR_FR1	8	0.110	ns	ns	ns	ns	ns	ns	ns	ns	ns	A	A	A	A	A	A	A	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.087	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		FR_FR2	8	<0.001	b	11	-4.7	0.72	9.9	**25**	**30**	23	**34**	BC	ABC	C	BC	ABC	A	A	AB	A	No	No
		FR_FR3	3	0.167	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	4.1	-5.2	-11	-3.3	13	12	-	**67**	B	B	B	B	B	B	B	-	A	↑	-
		FR_FRCP1	5	0.013	-	-	-	b	-7.0	11	**55**	22	1.5	-	-	-	B	B	AB	A	AB	AB	No	No
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	5	<0.001	-	-	-	b	-1.6	**21**	**17**	**23**	**32**	-	-	-	B	B	A	A	A	A	No	No
		GH_PC2	6	<0.001	b	4.8	4.5	4.5	-	-	**32**	**35**	**23**	B	B	B	B	-	-	A	A	A	No	No
		FR_FRABCH	5	<0.001	-	-	-	b	3.2	11	**22**	**19**	**24**	-	-	-	B	B	AB	A	A	A	No	No
		FR_FR5	6	0.015	b	7.0	5.0	2.7	13	16	**19**	-	-	B	AB	AB	AB	AB	AB	A	-	-	-	-
Total Zinc	Reference	FR_UFR1	3	0.794	ns	-	-	-	-	ns	-	ns	ns	A	-	-	-	-	A	-	A	A	No	No
		FR_HC3	2	0.094	ns	ns	-	-	-	-	-	-	ns	A	A	-	-	-	-	-	-	A	No	-
	Mine-exposed	FR_FR1	3	0.410	ns	ns	-	-	-	-	-	ns	ns	A	A	-	-	-	-	-	A	A	No	No
		FR_FRABEC1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_MULTIPLATE	1	0.012	-	-	-	-	-	-	b	-	**93**	-	-	-	-	-	-	B	-	A	↑	-
		FR_FR2	7	<0.001	b	38	-	-44	-35	-2.5	-14	-25	-7.8	AB	A	-	B	B	AB	AB	B	AB	No	No
		FR_FR3	3	0.104	ns	ns	ns	ns	-	-	-	-	-	A	A	A	A	-	-	-	-	-	-	-
		FR_FR4	7	<0.001	b	28	-20	-40	-43	-27	-15	-	32	AB	A	AB	B	B	B	AB	-	A	No	-
		FR_FRCP1	4	<0.001	-	-	-	b	-	61	71	53	**208**	-	-	-	B	-	B	B	B	A	↑	↑
		FR_FRCP1SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		FR_FRRD	1	0.697	-	-	-	-	-	-	ns	-	ns	-	-	-	-	-	-	A	-	A	No	-
		GH_PC2	4	0.390	ns	ns	ns	-	-	-	ns	-	ns	A	A	A	-	-	-	A	-	A	No	-
		FR_FRABCH	2	0.680	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	A	-	A	A	No	No
		FR_FR5	2	0.397	ns	ns	ns	-	-	-	-	-	-	A	A	A	-	-	-	-	-	-	-	-

P-value < 0.05 (annual variation).
> 20% Decrease in concentration.
> 33% Decrease in concentration.
> 43% Decrease in concentration.
> 50% Decrease in concentration.
> 25% Increase in concentration.
> 50% Increase in concentration.
> 75% Increase in concentration.
> 100% Increase in concentration.
***Bold** Significant increase or decrease from base year [b].

Notes: "ns" = not significant. "-" insufficient data for comparison where insufficient data is less than 6 months of recorded data.
[a] The presence of annual variation was determined by a significant Year term (α = 0.05) using an ANOVA with factors Year and Month.
[b] Magnitude of Difference (MOD) was calculated as the concentrations in each year minus the concentration in the first year divided by the concentration in the fist year × 100.
[c] Significance between each year determined using all pairwise comparisons with Tukey correction.

Table B.4: Pearson Correlations of Annual Water Analytes and PCA Axis Scores, FRO LAEMP, 2012 to 2020

Variable	PCA1 (50%)		PCA2 (28%)	
	P-value	r_s	P-value	r_s
Temperature (C)	<0.001	0.605	<0.001	0.417
Total Dissolved Solids (mg/L)	<0.001	0.865	<0.001	0.415
Alkalinity (mg/L as CaCO3)	<0.001	0.814	0.001	0.382
Nitrate (mg/L)	<0.001	0.857	<0.001	0.406
Nitrite (mg/L)	<0.001	0.897	0.219	0.152
Ammonia (mg/L)	<0.001	0.412	0.004	-0.346
Phosphorus (mg/L)	<0.001	0.428	<0.001	-0.803
Sulphate (mg/L)	<0.001	0.851	<0.001	0.440
Dissolved Aluminum (mg/L)	0.402	-0.1041	<0.001	-0.414
Total Antimony (mg/L)	<0.001	0.864	0.176	0.167
Total Arsenic (mg/L)	<0.001	0.402	<0.001	-0.804
Total Barium (mg/L)	<0.001	0.707	0.1377	0.183
Dissolved Cadmium (mg/L)	<0.001	0.942	0.083	0.213
Total Chromium (mg/L)	0.0657	0.226	<0.001	-0.891
Total Cobalt (mg/L)	<0.001	0.616	<0.001	-0.642
Total Copper (mg/L)	0.004	0.345	<0.001	-0.753
Total Iron (mg/L)	<0.001	0.603	<0.001	-0.722
Total Lead (mg/L)	<0.001	0.467	<0.001	-0.834
Total Lithium (mg/L)	<0.001	0.925	0.005	0.338
Total Manganese (mg/L)	<0.001	0.798	0.002	-0.371
Total Molybdenum (mg/L)	<0.001	0.880	0.068	0.225
Total Nickel (mg/L)	<0.001	0.921	0.684	0.051
Total Selenium (mg/L)	<0.001	0.885	0.001	0.383
Total Thallium (mg/L)	<0.001	0.493	<0.001	-0.766
Total Uranium (mg/L)	<0.001	0.862	<0.001	0.402
Total Zinc (mg/L)	<0.001	0.526	<0.001	-0.715

$r_s \geq 0.6$ or ≤ -0.6.

significant correlation (p-value < 0.05).

Note: All water chemistry from January to August of the sampled year included.

Table B.5: Concentrations of Selenium Species Measured in Water Samples from Fording River, January to December, FRO LAEMP, 2020

Water Body		Biological Monitoring Area	Sample Date	Selenate (µg/L)	Selenite (µg/L)	Dimethylselenoxide (µg/L)	Methylseleninic Acid (µg/L)	Methaneselenonic Acid (µg/L)	Selenocyanate (µg/L)	Selenomethionine (µg/L)	Selenosulphate (µg/L)	Unknown Species (µg/L)	Sum of Species (µg/L)	Ratio of Selenate:Non-Selenate Selenium Species[a]
Fording River	Reference	RG_HENUP	15-Jun-20	0.255	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	0.255	-
			15-Sep-20	0.835	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	0.835	-
		RG_FO26	17-Jun-20	0.352	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	0.352	-
			12-Sep-20	0.547	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	0.547	-
		RG_UFR1	17-Jun-20	0.397	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	0.397	-
			16-Sep-20	0.503	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	0.503	-
			8-Dec-20	0.414	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.414	-
	Mine-Exposed	RG_FODHE	15-Jun-20	3.55	<0.050	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	3.55	-
			15-Sep-20	15.4	0.067	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	15.467	230
		RG_FOUCL	15-Jun-20	5.85	0.053	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	5.903	110
			10-Sep-20	23.5	0.081	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	23.581	290
			8-Dec-20	24.6	0.067	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	24.667	367
		RG_FOUNGD	16-Jun-20	7.68	0.057	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	7.737	135
			10-Sep-20	34.8	0.117	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	34.917	297
			8-Dec-20	49.6	0.08	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	49.68	620
		RG_FODNGD	16-Jun-20	7.69	0.06	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	7.75	128
			21-Sep-20	38.2	0.152	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	38.352	251
			8-Dec-20	40.2	0.109	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	40.309	369
		RG_MP1	15-Jun-20	10.2	0.096	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	10.296	106
			15-Sep-20	36.9	0.179	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	37.079	206
			9-Dec-20	54.8	0.143	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	54.943	383
		RG_FOUSH	23-Jun-20	5.79	0.066	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	5.856	87.7
			21-Sep-20	28	0.258	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	28.258	109
			9-Dec-20	40.3	0.189	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	40.489	213
		RG_FOUKI	17-Jun-20	15.7	0.149	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	15.849	105
			14-Sep-20	55.3	0.314	<0.010	0.016	<0.010	<0.040	<0.010	<0.060	<0.060	55.63	168
			9-Dec-20	45.2	0.187	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	45.387	242
		RG_FOBKS	16-Jun-20	13	0.148	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	13.148	87.8
			10-Sep-20	30.6	0.191	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	30.791	160
			7-Dec-20	47.4	0.222	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	47.622	214
		RG_SCOUTDS	16-Jun-20	20.4	0.154	<0.010	0.011	<0.010	<0.040	<0.010	<0.060	<0.060	20.565	124
			17-Sep-20	60.1	0.238	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	60.338	253
			7-Dec-20	95.8	0.312	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	96.125	295
		RG_FOBSC	18-Jun-20	79.1	0.088	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	79.188	899
			18-Sep-20	69.2	0.262	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	69.462	264
			7-Dec-20	111	0.34	<0.010	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	111.356	312
		RG_FOBCP	17-Jun-20	31.9	0.107	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	32.007	298
			16-Sep-20	73.8	0.251	<0.010	0.015	<0.010	<0.040	<0.010	<0.060	<0.060	74.066	277
			7-Dec-20	70.8	0.244	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	71.044	290
		RG_FRCP1SW	18-Jun-20	43.5	0.115	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	43.615	378
			22-Sep-20	90.9	0.375	<0.010	0.023	<0.010	<0.040	<0.010	<0.060	<0.060	91.298	228
		RG_FRUPO	19-Jun-20	29.2	0.07	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	29.27	417
			12-Sep-20	79.1	0.095	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	79.195	833
			10-Dec-20	56.1	0.073	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	56.173	768
		RG_FODPO	19-Jun-20	34.6	0.093	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	34.693	372
			11-Sep-20	62.4	0.071	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	62.471	879
			9-Dec-20	44.6	0.03	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	44.63	1,487
		RG_FO22	19-Jun-20	43.5	0.105	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	43.605	414
			11-Sep-20	74.3	0.109	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	74.409	682
			9-Dec-20	70.5	0.088	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	70.588	801
		RG_FOUEW	19-Jun-20	36.1	0.093	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	36.193	388
			11-Sep-20	51.7	0.113	<0.010	<0.010	<0.010	<0.040	<0.010	<0.060	<0.060	51.813	458
			10-Dec-20	78.5	0.151	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	78.651	520

[a] Ratio of Oxidized:Reduced Species = Selenate/(Selenite+Methylseleninic Acid). Values below the Laboratory Detection Limit were not included in the calculation.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FOBCP	RG_FOUSH	RG_FOUKI	RG_RIVER	RG_FBLANK	RG_TRIP	RG_FOBCPD
			06-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	08-Apr-20
			14:30	8:30	11:00	11:30	13:00	13:30	11:20
Physical Tests	Conductivity (@ 25C)	uS/cm	1,220	981	975	975	<2.0	<2.0	1200
	Hardness (as CaCO3)	mg/L	786	592	597	587	<0.50	<0.50	740
	pH	pH	8.2	8.3	8.3	8.3	5.2	4.9	8.15
	ORP	mV	411	392	399	416	418	390	415
	Total Suspended Solids	mg/L	17.3	2.3	2.3	2.3	<1.0	<1.0	6.9
	Total Dissolved Solids	mg/L	1040	825	761	812	<10	<10	1010
	Turbidity	NTU	1.54	0.66	0.7	0.50	<0.10	<0.10	1.81
Ions and Nutrients	Acidity (as CaCO3)	mg/L	1.9	<1.0	<1.0	<1.0	1.3	1.7	2
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	209	187	202	198	<1.0	<1.0	219
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	7	6	8	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	209	194	208	206	<1.0	<1.0	219
	Ammonia as N	mg/L	0.031	0.027	0.013	0.017	0.005	0.018	0.010
	Bromide (Br)	mg/L	<0.25	<0.050	<0.050	<0.050	<0.050	<0.050	<0.25
	Chloride (Cl)	mg/L	<2.5	1.3	1.62	1.88	<0.50	<0.50	<2.5
	Fluoride (F)	mg/L	0.16	0.15	0.16	0.17	<0.020	<0.020	0.17
	Ion Balance	%	101	102	102	101	0	0	101
	Nitrate (as N)	mg/L	22	21	20	20	<0.0050	<0.0050	20
	Nitrite (as N)	mg/L	0.0214	0.0128	0.0129	0.0114	<0.0010	<0.0010	<0.0050
	Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0015	0.0013	<0.0010	0.0014	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0088
	Sulfate (SO4)	mg/L	475	302	299	300	<0.30	<0.30	431
	Anion Sum	meq/L	16	12	12	12	<0.10	<0.10	15
	Cation Sum	meq/L	16	12	12	12	<0.10	<0.10	15
	Cation - Anion Balance	%	0.7	1.2	1.1	0.4	0.00	0.00	0.5
Carbon	Dissolved Organic Carbon	mg/L	1.00	1.10	0.92	1.17	<0.50	-	0.97
	Total Organic Carbon	mg/L	1.02	0.97	1.0	1.23	<0.50	<0.50	0.89
Total Metals	Aluminum (Al)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0378
	Antimony (Sb)-Total	mg/L	0.00036	0.00034	0.00030	0.00030	<0.00010	<0.00010	0.00032
	Arsenic (As)-Total	mg/L	0.00013	0.00012	0.0001	0.00011	<0.00010	<0.00010	0.00011
	Barium (Ba)-Total	mg/L	0.081	0.10	0.098	0.10	<0.00010	<0.00010	0.08
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.010	<0.010	0.011	0.011	<0.010	<0.010	0.011
	Cadmium (Cd)-Total	ug/L	0.050	0.062	0.067	0.076	<0.0050	<0.0050	0.086
	Calcium (Ca)-Total	mg/L	156	130	130	129	<0.050	<0.050	168
	Chromium (Cr)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00020
	Cobalt (Co)-Total	ug/L	0.12	<0.10	0.12	0.11	<0.10	<0.10	0.16
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.022	0.051	0.031	0.029	<0.010	<0.010	0.093
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000065
	Lithium (Li)-Total	mg/L	0.058	0.060	0.058	0.059	<0.0010	<0.0010	0.058
	Magnesium (Mg)-Total	mg/L	88	60	60	60	<0.10	<0.10	82
	Manganese (Mn)-Total	mg/L	0.009	0.0202	0.015	0.0150	<0.00010	<0.00010	0.0166
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00071
	Molybdenum (Mo)-Total	mg/L	0.0022	0.00196	0.0018	0.0018	<0.000050	<0.000050	0.00185
	Nickel (Ni)-Total	mg/L	0.0088	0.00608	0.0050	0.0048	<0.00050	<0.00050	0.00909
	Potassium (K)-Total	mg/L	2.6	2.2	2.3	2.3	<0.050	<0.050	2.3
	Selenium (Se)-Total	ug/L	119	66	60	61	<0.050	<0.050	107
	Silicon (Si)-Total	mg/L	1.8	1.8	1.8	1.8	<0.10	<0.10	2.1
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	2.4	2.2	2.5	2.5	<0.050	<0.050	2.4
	Strontium (Sr)-Total	mg/L	0.20	0.21	0.21	0.21	<0.00020	<0.00020	0.20
	Thallium (Tl)-Total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000014
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0053	0.0039	0.0038	0.0040	<0.000010	<0.000010	0.0051
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0035
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	0.0076	0.0067	<0.0030	0.0074	<0.0030	-	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00032	0.00029	0.00027	0.00026	<0.00010	-	0.0003
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.08	0.10	0.10	0.10	<0.00010	-	0.0803
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.052	0.062	0.062	0.072	<0.0050	-	0.0573
	Calcium (Ca)-Dissolved	mg/L	168	141	140	138	<0.050	<0.050	157
	Chromium (Cr)-Dissolved	mg/L	0.0001	0.00010	<0.00010	0.00012	<0.00010	-	<0.00010
	Cobalt (Co)-Dissolved	ug/L	0.12	0.11	0.11	0.12	<0.10	-	0.11
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	0.00026
	Iron (Fe)-Dissolved	mg/L	0.035	0.074	0.029	0.057	<0.010	-	0.01
	Lead (Pb)-Dissolved	mg/L	0.000363	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.062	0.062	0.060	0.059	<0.0010	-	0.0563
	Magnesium (Mg)-Dissolved	mg/L	89	58	60	59	<0.10	<0.0050	84.6
	Manganese (Mn)-Dissolved	mg/L	0.010	0.0223	0.015	0.0171	<0.00010	-	0.0106
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	-	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.0020	0.00181	0.0017	0.0016	<0.000050	-	0.002
	Nickel (Ni)-Dissolved	mg/L	0.0086	0.00604	0.0047	0.0048	<0.00050	-	0.00856
	Potassium (K)-Dissolved	mg/L	2.8	2.3	2.4	2.4	<0.050	<0.050	2.36
	Selenium (Se)-Dissolved	ug/L	121	67	61	62	<0.050	-	114
	Silicon (Si)-Dissolved	mg/L	1.8	1.7	1.7	1.8	<0.050	-	1.79
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010
	Sodium (Na)-Dissolved	mg/L	2.5	2.3	2.5	2.6	<0.050	<0.050	2.21
	Strontium (Sr)-Dissolved	mg/L	0.21	0.21	0.21	0.20	<0.00020	-	0.179
	Thallium (Tl)-Dissolved	mg/L	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	-	0.00001
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010
	Uranium (U)-Dissolved	mg/L	0.0051	0.0039	0.0039	0.0038	<0.000010	-	0.00479
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0024	0.0026	0.0019	0.0025	<0.0010	-	0.0025

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FOUEW	RG_FOBCPD	RG_FRCP1SWD	RG_FRCP1SW	RG_FOBCPD	RG_FOUSH	RG_RIVER
			08-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20
			13:00	11:30	10:00	12:00	10:30	10:30	11:50
Physical Tests	Conductivity (@ 25C)	uS/cm	1,110	945	997	974	861	754	858
	Hardness (as CaCO3)	mg/L	672	576	605	586	508	442	516
	pH	pH	8.2	8.4	8.4	8.4	8.5	8.5	8.5
	ORP	mV	429	370	429	376	284	310	307
	Total Suspended Solids	mg/L	<1.0	3.9	4	5.1	6.5	7.6	4.8
	Total Dissolved Solids	mg/L	926	772	838	874	656	534	635
	Turbidity	NTU	0.3	5.83	5.6	5.23	4.44	7.50	4.26
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	244	181	195	183	166	159	168
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	11	10.4	11	11.4	9.4	12.4
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	244	192	205	194	177	168	180
	Ammonia as N	mg/L	0.007	0.014	0.012	0.030	0.008	0.0268	0.0092
	Bromide (Br)	mg/L	<0.25	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	2.6	1.22	1.27	1.27	0.7	<0.50	0.74
	Fluoride (F)	mg/L	0.14	0.16	0.15	0.15	0.15	0.13	0.15
	Ion Balance	%	98	97	97	97	100	105	102
	Nitrate (as N)	mg/L	24	16	17	17	16.30	14.7	16.2
	Nitrite (as N)	mg/L	<0.0050	0.0145	0.0128	0.0160	0.0197	0.0178	0.0218
	Total Kjeldahl Nitrogen	mg/L	<0.050	-	-	-	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0015	0.0019	0.0015	0.0015	0.0012	0.0031	<0.0010
	Phosphorus (P)-Total	mg/L	<0.0020	0.0034	<0.0020	0.0052	0.0077	0.009	0.0070
	Sulfate (SO4)	mg/L	349	333	350	344	265	196	263
	Anion Sum	meq/L	14	12	13	12	10.2	8.5	10.3
	Cation Sum	meq/L	14	12	12	12	10.3	9.0	10.4
	Cation - Anion Balance	%	-1.10	-1.40	-1.60	-1.8	0.10	2.7	0.8
Carbon	Dissolved Organic Carbon	mg/L	<0.50	1.68	1.72	1.66	1.97	1.9	2.24
	Total Organic Carbon	mg/L	<0.50	2.03	1.72	2.60	2.3	2.2	2.27
Total Metals	Aluminum (Al)-Total	mg/L	0.0111	0.135	0.1220	0.1210	0.1130	0.099	0.090
	Antimony (Sb)-Total	mg/L	<0.00010	0.00038	0.00036	0.00036	0.00043	0.00043	0.00042
	Arsenic (As)-Total	mg/L	<0.00010	0.00020	0.00019	0.00020	0.00017	0.00018	0.00019
	Barium (Ba)-Total	mg/L	0.094	0.08	0.086	0.09	0.061	0.065	0.061
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.011	0.01	0.011	0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	0.036	0.088	0.094	0.088	0.1620	0.166	0.160
	Calcium (Ca)-Total	mg/L	158	132	138	143	112	101	114
	Chromium (Cr)-Total	mg/L	0.00017	0.00035	0.00028	0.00029	0.00065	0.00026	0.00024
	Cobalt (Co)-Total	ug/L	0.13	0.32	0.25	0.30	1.01	0.65	0.58
	Copper (Cu)-Total	mg/L	<0.00050	0.00051	<0.00050	0.00055	0.00065	0.00067	0.00062
	Iron (Fe)-Total	mg/L	0.022	0.11	0.098	0.129	0.075	0.089	0.071
	Lead (Pb)-Total	mg/L	<0.000050	0.00012	0.000089	0.000101	0.000099	0.000118	0.000079
	Lithium (Li)-Total	mg/L	0.036	0.040	0.045	0.045	0.0291	0.028	0.030
	Magnesium (Mg)-Total	mg/L	67	67	71	70	55	44	54
	Manganese (Mn)-Total	mg/L	0.0052	0.013	0.0140	0.0150	0.01070	0.0117	0.0108
	Mercury (Hg)-Total	ug/L	<0.00050	0.00153	0.00125	0.00132	0.0014	0.00170	0.00141
	Molybdenum (Mo)-Total	mg/L	0.0006	0.0023	0.00218	0.00221	0.00321	0.0021	0.0030
	Nickel (Ni)-Total	mg/L	<0.00050	0.0097	0.0101	0.00989	0.0166	0.0146	0.0144
	Potassium (K)-Total	mg/L	1.6	2.2	2.3	2.3	2.18	1.96	2.19
	Selenium (Se)-Total	ug/L	91	89	98	94	78.9	61	81
	Silicon (Si)-Total	mg/L	2.4	2.1	2.1	2.0	1.9	2.0	1.8
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	2.9	1.9	2.0	2.0	1.44	1.27	1.44
	Strontium (Sr)-Total	mg/L	0.19	0.17	0.17	0.17	0.147	0.147	0.141
	Thallium (Tl)-Total	mg/L	<0.000010	0.000017	0.000014	0.000015	0.000016	0.000019	0.000019
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0032	0.0037	0.0039	0.0038	0.00348	0.0030	0.0035
	Vanadium (V)-Total	mg/L	<0.00050	0.00103	0.00093	0.00094	0.00082	0.00084	0.00072
	Zinc (Zn)-Total	mg/L	<0.0030	0.0051	0.0053	0.005	0.0091	0.0088	0.0076
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0057	0.0056	0.0055
	Antimony (Sb)-Dissolved	mg/L	<0.00010	0.00035	0.00034	0.00035	0.0004	0.00038	0.00039
	Arsenic (As)-Dissolved	mg/L	<0.00010	0.00015	0.00014	0.00013	0.00017	0.00017	0.00016
	Barium (Ba)-Dissolved	mg/L	0.105	0.0835	0.0877	0.0834	0.0643	0.075	0.064
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.0295	0.0825	0.0757	0.085	0.135	0.130	0.129
	Calcium (Ca)-Dissolved	mg/L	154	127	132	127	113	102	117
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved	ug/L	0.13	0.23	0.22	0.22	0.47	0.58	0.47
	Copper (Cu)-Dissolved	mg/L	<0.00020	0.0004	0.00035	0.00033	0.00046	0.0004	0.00043
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.0339	0.0418	0.0436	0.0446	0.0317	0.030	0.032
	Magnesium (Mg)-Dissolved	mg/L	69.7	62.7	67	65.5	54.9	46	55
	Manganese (Mn)-Dissolved	mg/L	0.00514	0.00951	0.0111	0.00899	0.00753	0.00848	0.0073
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.000587	0.0021	0.00205	0.00198	0.00269	0.0020	0.0028
	Nickel (Ni)-Dissolved	mg/L	<0.00050	0.00922	0.00966	0.00903	0.0132	0.0136	0.0134
	Potassium (K)-Dissolved	mg/L	1.7	2.37	2.39	2.33	2.03	1.9	2.06
	Selenium (Se)-Dissolved	ug/L	95.9	89	96.1	96.6	80.2	59	78
	Silicon (Si)-Dissolved	mg/L	2.18	1.73	1.74	1.71	1.71	1.8	1.6
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	2.77	1.83	1.92	1.88	1.35	1.3	1.36
	Strontium (Sr)-Dissolved	mg/L	0.18	0.154	0.16	0.156	0.138	0.135	0.142
	Thallium (Tl)-Dissolved	mg/L	<0.000010	0.000012	0.000011	0.000012	0.000016	0.000016	0.000013
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.00309	0.0039	0.00405	0.00406	0.00348	0.0029	0.0034
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	<0.0010	0.0029	0.0033	0.0026	0.0066	0.0069	0.0054

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_TRIP	RG_FBLANK	RG_FOBCP	RG_FOUKI	RG_FOUEW	RG_FRCP1SWD	RG_FRCP1SW
			28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	30-Apr-20	30-Apr-20
			11:50	11:50	12:00	13:00	15:00	9:30	11:30
Physical Tests	Conductivity (@ 25C)	uS/cm	<2.0	<2.0	856	769	836	845	792
	Hardness (as CaCO3)	mg/L	<0.50	<0.50	517	475	498	537	501
	pH	pH	5.5	5.5	8.5	8.5	8.5	8.4	8.5
	ORP	mV	424	418	336	306	440	328	294
	Total Suspended Solids	mg/L	<1.0	<1.0	7.5	6.7	3.6	7.9	9.6
	Total Dissolved Solids	mg/L	<10	-	661	607	655	673	618
	Turbidity	NTU	<0.10	<0.10	4.43	5.88	2.39	8.04	9.20
Ions and Nutrients	Acidity (as CaCO3)	mg/L	1.4	1.4	<1.0	<1.0	<1.0	1.6	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	<1.0	<1.0	171	166	182	183	167
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	12.8	11	13.0	7	11.6
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	<1.0	<1.0	183	177	195	190	179
	Ammonia as N	mg/L	0.0284	<0.0050	0.0114	0.0227	0.0077	0.010	0.012
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	<0.50	<0.50	0.72	0.67	1.41	1.05	0.73
	Fluoride (F)	mg/L	<0.020	<0.020	0.15	0.15	0.15	0.16	0.16
	Ion Balance	%	0	0	101	103	100	104	104
	Nitrate (as N)	mg/L	<0.0050	<0.0050	16.2	16.1	14.9	16.6	15
	Nitrite (as N)	mg/L	<0.0010	<0.0010	0.0222	0.0217	0.0117	0.0173	0.0177
	Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.25	<0.25	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	0.0023	0.0016	<0.0010	0.0013
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	0.0066	0.0053	0.0047	0.0037	0.0062
	Sulfate (SO4)	mg/L	<0.30	<0.30	264	220	243	260	243
	Anion Sum	meq/L	<0.10	<0.10	10.3	9.3	10.1	10.4	9.7
	Cation Sum	meq/L	<0.10	<0.10	10.4	9.6	10.1	10.8	10.1
	Cation - Anion Balance	%	0.0	0.0	0.5	1.70	0.10	1.9	1.90
Carbon	Dissolved Organic Carbon	mg/L	-	<0.50	2.50	1.95	1.30	2.02	2.54
	Total Organic Carbon	mg/L	<0.50	<0.50	2.49	2.2	1.39	2.5	2.84
Total Metals	Aluminum (Al)-Total	mg/L	<0.0030	<0.0030	0.0855	0.080	0.069	0.148	0.150
	Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	0.00046	0.00043	0.00027	0.00036	0.00039
	Arsenic (As)-Total	mg/L	<0.00010	<0.00010	0.00078	0.00021	0.00017	0.00020	0.00022
	Barium (Ba)-Total	mg/L	<0.00010	<0.00010	0.060	0.069	0.079	0.068	0.062
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	<0.0050	<0.0050	0.153	0.160	0.078	0.129	0.146
	Calcium (Ca)-Total	mg/L	<0.050	<0.050	110	105	114	121	114
	Chromium (Cr)-Total	mg/L	<0.00010	<0.00010	0.00025	0.00027	0.00018	0.00034	0.00031
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	0.54	0.64	0.26	0.46	0.51
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	0.00065	0.00062	0.0005	0.00063	0.00065
	Iron (Fe)-Total	mg/L	<0.010	<0.010	0.070	0.077	0.090	0.125	0.118
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	0.000088	0.000105	0.000095	0.000163	0.000146
	Lithium (Li)-Total	mg/L	<0.0010	<0.0010	0.0285	0.0286	0.025	0.0319	0.030
	Magnesium (Mg)-Total	mg/L	<0.10	<0.10	53	47	52	51	48
	Manganese (Mn)-Total	mg/L	<0.00010	<0.00010	0.0108	0.0113	0.0106	0.0096	0.0110
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	0.00173	0.00162	0.00102	0.0019	0.00210
	Molybdenum (Mo)-Total	mg/L	<0.000050	<0.000050	0.0029	0.00236	0.0017	0.00227	0.0025
	Nickel (Ni)-Total	mg/L	<0.00050	<0.00050	0.0138	0.0140	0.0061	0.0112	0.0125
	Potassium (K)-Total	mg/L	<0.050	<0.050	2.12	2.17	1.8	2.06	2.0
	Selenium (Se)-Total	ug/L	<0.050	<0.050	78	61.6	71	75.3	71
	Silicon (Si)-Total	mg/L	<0.10	<0.10	1.8	1.9	2.1	1.9	1.8
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	<0.050	<0.050	1.43	1.43	2.1	1.52	1.3
	Strontium (Sr)-Total	mg/L	<0.00020	<0.00020	0.140	0.147	0.146	0.140	0.14
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	0.000022	0.000021	<0.000010	0.000023	0.000022
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	<0.000010	<0.000010	0.00338	0.00320	0.0029	0.00338	0.0029
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	0.00072	0.00079	0.00053	0.00106	0.00107
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	0.0089	0.0076	0.0053	0.0069	0.0077
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	-	<0.0030	0.0058	0.0067	<0.0030	0.0048	0.006
	Antimony (Sb)-Dissolved	mg/L	-	<0.00010	0.00039	0.0004	0.00020	0.00033	0.00036
	Arsenic (As)-Dissolved	mg/L	-	<0.00010	0.00016	0.00015	0.0001	0.00013	0.00019
	Barium (Ba)-Dissolved	mg/L	-	<0.00010	0.064	0.069	0.084	0.069	0.064
	Beryllium (Be)-Dissolved	ug/L	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved	ug/L	-	<0.0050	0.132	0.135	0.058	0.105	0.118
	Calcium (Ca)-Dissolved	mg/L	<0.050	<0.050	113	111	112	118	111
	Chromium (Cr)-Dissolved	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved	ug/L	-	<0.10	0.5	0.59	0.19	0.39	0.44
	Copper (Cu)-Dissolved	mg/L	-	<0.00020	0.00043	0.00045	0.00024	0.00041	0.00045
	Iron (Fe)-Dissolved	mg/L	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	-	<0.0010	0.032	0.0313	0.027	0.032	0.029
	Magnesium (Mg)-Dissolved	mg/L	<0.0050	<0.10	57	48	53	59	55
	Manganese (Mn)-Dissolved	mg/L	-	<0.00010	0.0072	0.00895	0.0063	0.0055	0.00569
	Mercury (Hg)-Dissolved	mg/L	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	-	<0.000050	0.0029	0.00213	0.0015	0.00225	0.0025
	Nickel (Ni)-Dissolved	mg/L	-	<0.00050	0.0135	0.0132	0.0053	0.0115	0.0130
	Potassium (K)-Dissolved	mg/L	<0.050	<0.050	2.08	2.10	1.7	2.09	2.1
	Selenium (Se)-Dissolved	ug/L	-	<0.050	81	62.6	68	79.5	73
	Silicon (Si)-Dissolved	mg/L	-	<0.050	1.6	1.8	1.9	1.6	1.5
	Silver (Ag)-Dissolved	mg/L	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	<0.050	<0.050	1.39	1.39	1.9	1.61	1.4
	Strontium (Sr)-Dissolved	mg/L	-	<0.00020	0.139	0.142	0.142	0.144	0.13
	Thallium (Tl)-Dissolved	mg/L	-	<0.000010	0.000017	0.000014	<0.000010	0.000013	0.000014
	Tin (Sn)-Dissolved	mg/L	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	-	<0.000010	0.0034	0.00305	0.0028	0.00322	0.0030
	Vanadium (V)-Dissolved	mg/L	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	-	<0.0010	0.0054	0.0063	0.0025	0.004	0.0041

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_HENUP	RG_FOUCL	RG_FODHE	RG_MP1	RG_FODNGD	RG_FOBKS	RG_FOUNGD
			15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20
			11:00	11:00	13:30	15:00	8:30	10:30	12:000
Physical Tests	Conductivity (@ 25C)	uS/cm	196	270	249	321	325	381	320
	Hardness (as CaCO3)	mg/L	106	142	131	169	170	200	172
	pH	pH	8.2	8.2	8.2	8.3	8.3	8.3	8.3
	ORP	mV	486	493	403	261	293	320	449
	Total Suspended Solids	mg/L	3.6	12.8	8.9	21.0	8.2	12.9	5.2
	Total Dissolved Solids	mg/L	127	192	166	227	223	264	213
	Turbidity	NTU	1.35	5.91	3.41	7.40	2.7	2.4	2.1
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	96	114	108	119	122	132	121
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	96	114	108	119	122	135	121
	Ammonia as N	mg/L	0.0169	0.0114	0.0253	0.0291	0.0067	0.043	0.0124
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F)	mg/L	0.15	0.13	0.13	0.12	0.13	0.14	0.13
	Ion Balance	%	98	94	95	95	95	94	97
	Nitrate (as N)	mg/L	0.2	1.18	0.771	2.99	3	4	2
	Nitrite (as N)	mg/L	<0.0010	0.001	<0.0010	0.0028	0.0022	0.0096	0.0020
	Total Kjeldahl Nitrogen	mg/L	<0.050	0.31	0.239	0.217	0.278	0.278	0.277
	Orthophosphate-Dissolved (as P)	mg/L	0.0018	0.0041	0.0032	0.0050	0.0030	0.0044	0.0034
	Phosphorus (P)-Total	mg/L	0.0040	0.0160	0.0158	0.0155	0.007	0.0041	0.008
	Sulfate (SO4)	mg/L	12	33	27	49	49	63	48
	Anion Sum	meq/L	2.2	3.1	2.8	3.6	3.6	4.3	3.6
	Cation Sum	meq/L	2.1	2.9	2.6	3.4	3.4	4.1	3.5
	Cation - Anion Balance	%	-1.20	-3.10	-2.4	-2.6	-2.80	-3.3	-1.7
Carbon	Dissolved Organic Carbon	mg/L	0.6	1.46	1.28	1.6	1.5	1.59	1.4
	Total Organic Carbon	mg/L	0.6	1.68	1.4	1.8	1.6	1.7	1.5
Total Metals	Aluminum (Al)-Total	mg/L	0.026	0.0844	0.0815	0.0758	0.074	0.065	0.067
	Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	<0.00010	0.00013	0.00011	0.00020	<0.00010
	Arsenic (As)-Total	mg/L	0.00011	0.00016	0.00016	0.00017	0.00015	0.00015	0.00014
	Barium (Ba)-Total	mg/L	0.008	0.031	0.027	0.0355	0.035	0.041	0.035
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	0.006	0.027	0.031	0.0418	0.031	0.045	0.026
	Calcium (Ca)-Total	mg/L	33	42	38	45	44	52	43
	Chromium (Cr)-Total	mg/L	0.00015	0.00022	0.00023	0.00021	0.00022	0.00021	0.00015
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	<0.10	0.11	<0.10	0.14	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.019	0.077	0.081	0.081	0.085	0.087	0.069
	Lead (Pb)-Total	mg/L	<0.000050	0.000093	0.000099	0.000101	0.000073	0.000085	0.000058
	Lithium (Li)-Total	mg/L	<0.0010	0.0034	0.0028	0.0075	0.008	0.011	0.008
	Magnesium (Mg)-Total	mg/L	6	11	11	14.4	15	18	15
	Manganese (Mn)-Total	mg/L	0.0011	0.0080	0.00839	0.00915	0.0054	0.0075	0.0046
	Mercury (Hg)-Total	ug/L	0.00059	0.00172	0.00172	0.00147	0.0018	0.00151	0.00124
	Molybdenum (Mo)-Total	mg/L	0.0004	0.00061	0.00056	0.00076	0.0008	0.0012	0.0007
	Nickel (Ni)-Total	mg/L	<0.00050	0.00099	0.00063	0.0022	0.0016	0.0025	0.0015
	Potassium (K)-Total	mg/L	0.2	0.45	0.41	0.65	0.6	1.0	0.6
	Selenium (Se)-Total	ug/L	0	5.5	3.90	11.20	10	15	9
	Silicon (Si)-Total	mg/L	1.1	1.7	1.7	1.74	1.7	1.8	1.7
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	0.2	0.45	0.43	0.58	0.6	0.7	0.6
	Strontium (Sr)-Total	mg/L	0.06	0.066	0.066	0.073	0.08	0.08	0.08
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0004	0.00056	0.00049	0.00078	0.0008	0.0011	0.0008
	Vanadium (V)-Total	mg/L	<0.00050	0.00052	0.00052	0.00057	0.00053	0.00053	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	0.0032	0.0034	<0.0030	<0.0030	0.003	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	0.00019	<0.00010
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	0.00014	0.00011	0.00011	0.00012	0.00012
	Barium (Ba)-Dissolved	mg/L	0.008	0.031	0.027	0.0343	0.036	0.040	0.035
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved	ug/L	<0.0050	0.014	0.0077	0.0263	0.014	0.031	0.019
	Calcium (Ca)-Dissolved	mg/L	33	38	35	43	43	49	45
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	<0.00020	0.00021	<0.00020	0.00025	0.00021	0.00028	<0.00020
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	<0.0010	0.0031	0.0025	0.0072	0.008	0.010	0.008
	Magnesium (Mg)-Dissolved	mg/L	6	12	10	14.7	15	19	14
	Manganese (Mn)-Dissolved	mg/L	0.0002	0.00104	0.00131	0.00118	0.0009	0.0020	0.0010
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.0004	0.00057	0.00056	0.00079	0.0007	0.0011	0.0007
	Nickel (Ni)-Dissolved	mg/L	<0.00050	0.00081	<0.00050	0.00192	0.0015	0.0024	0.0014
	Potassium (K)-Dissolved	mg/L	0.2	0.45	0.39	0.66	0.6	1.0	0.6
	Selenium (Se)-Dissolved	ug/L	0	5.7	4.23	12.10	10	15	9
	Silicon (Si)-Dissolved	mg/L	1.0	1.6	1.5	1.59	1.6	1.7	1.6
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	0.2	0.48	0.45	0.59	0.6	0.8	0.6
	Strontium (Sr)-Dissolved	mg/L	0.06	0.063	0.064	0.068	0.07	0.08	0.07
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0004	0.00053	0.00045	0.00077	0.0008	0.0010	0.0008
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0148	<0.0010	<0.0010	0.0014	0.001	0.0014	0.0011

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_SCOUTDS	RG_FO26	RG_UFR1	RG_FOBCP	RG_FOBSC	RG_FOUKI	RG_RIVER
			16-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20	17-Jun-20	18-Jun-20
			12:00	9:00	13:00	13:00	14:00	15:00	9:00
Physical Tests	Conductivity (@ 25C)	uS/cm	432	214	216	592	796	394	580
	Hardness (as CaCO3)	mg/L	219	118	118	346	464	218	317
	pH	pH	8.3	8.3	8.3	8.4	8.4	8.4	8.4
	ORP	mV	330	502	466	448	320	424	260
	Total Suspended Solids	mg/L	10.3	3.4	5.1	7.2	<1.0	7	4.3
	Total Dissolved Solids	mg/L	314	143	135	412	583	274	402
	Turbidity	NTU	3.41	1.17	1.88	1.85	1.04	2.81	1.45
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	133	115	115	172	225	137	174
	Alkalinity, Carbonate (as CaCO3)	mg/L	5	<1.0	3.6	10.6	13.6	6.4	10.6
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	138	115	119	183	239	143	184
	Ammonia as N	mg/L	0.036	0.019	0.015	0.013	<0.0050	0.024	0.0178
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F)	mg/L	0.14	0.12	0.13	0.18	0.20	0.20	0.19
	Ion Balance	%	92	95	92	102	100	94	93
	Nitrate (as N)	mg/L	5	0.0	0.0	10	18	4.4	9.790
	Nitrite (as N)	mg/L	0.009	<0.0010	<0.0010	0.012	0.005	0.008	0.007
	Total Kjeldahl Nitrogen	mg/L	0.342	0.212	0.069	<0.050	<0.050	0.218	0.254
	Orthophosphate-Dissolved (as P)	mg/L	0.0041	0.0045	0.0043	0.0017	<0.0010	0.0023	0.0016
	Phosphorus (P)-Total	mg/L	0.0147	0.009	0.0025	0.0057	0.0334	0.0086	0.0063
	Sulfate (SO4)	mg/L	85	10	10	120	163	72	120
	Anion Sum	meq/L	5	2.5	2.6	7	9	4.7	6.9
	Cation Sum	meq/L	4.4	2.4	2.4	7	9	4.4	6.4
	Cation - Anion Balance	%	-4.4	-2.70	-4.2	1.1	0.00	-2.9	-3.4
Carbon	Dissolved Organic Carbon	mg/L	1.71	1.7	1.88	1.36	0.87	1.66	1.18
	Total Organic Carbon	mg/L	1.7	1.5	1.83	1.3	0.94	1.55	1.37
Total Metals	Aluminum (Al)-Total	mg/L	0.1160	0.029	0.0564	0.0603	0.0171	0.0724	0.037
	Antimony (Sb)-Total	mg/L	0.00022	<0.00010	<0.00010	0.00031	0.00055	0.00017	0.0003
	Arsenic (As)-Total	mg/L	0.00018	0.00011	0.00013	0.00015	<0.00010	0.00017	0.00011
	Barium (Ba)-Total	mg/L	0.041	0.031	0.043	0.045	0.039	0.045	0.043
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	0.016	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	0.061	0.011	0.016	0.128	0.329	0.045	0.108
	Calcium (Ca)-Total	mg/L	54	34	36	80	108	55	78
	Chromium (Cr)-Total	mg/L	0.00031	0.00015	0.00019	0.00017	0.00016	0.00022	0.00022
	Cobalt (Co)-Total	ug/L	0.16	<0.10	<0.10	0.13	0.14	0.12	0.11
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.160	0.024	0.051	0.072	0.019	0.096	0.043
	Lead (Pb)-Total	mg/L	0.000144	<0.000050	0.000059	0.000069	<0.000050	0.000075	<0.000050
	Lithium (Li)-Total	mg/L	0.012	0.001	0.001	0.027	0.045	0.012	0.0248
	Magnesium (Mg)-Total	mg/L	23	9	9	36	49	21	34
	Manganese (Mn)-Total	mg/L	0.0101	0.0028	0.0047	0.0075	0.0026	0.0067	0.00451
	Mercury (Hg)-Total	ug/L	0.00469	0.00102	0.00131	0.00089	0.00055	0.00108	0.00087
	Molybdenum (Mo)-Total	mg/L	0.00142	0.0006	0.0005	0.002	0.0031	0.0011	0.00191
	Nickel (Ni)-Total	mg/L	0.0031	<0.00050	<0.00050	0.00452	0.0095	0.0025	0.00401
	Potassium (K)-Total	mg/L	1.1	0.3	0.4	1.6	2.5	0.9	1.50
	Selenium (Se)-Total	ug/L	21	0	0	44	71	16	40.40
	Silicon (Si)-Total	mg/L	1.9	2.0	2.0	1.9	1.7	1.9	1.8
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	0.8	0.5	0.5	1.4	2.2	0.7	1.32
	Strontium (Sr)-Total	mg/L	0.08	0.07	0.07	0.10	0.11	0.09	0.10
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000014	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0013	0.0003	0.0003	0.0022	0.0037	0.0011	0.00211
	Vanadium (V)-Total	mg/L	0.00072	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050
	Zinc (Zn)-Total	mg/L	0.0035	<0.0030	<0.0030	0.0052	0.0094	<0.0030	0.0038
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	0.0033	<0.0030	<0.0030	0.003	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00020	<0.00010	<0.00010	0.00029	0.00056	0.00016	0.00028
	Arsenic (As)-Dissolved	mg/L	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	0.0001	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.041	0.032	0.040	0.044	0.04	0.040	0.044
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	0.016	<0.010	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.056	0.007	0.007	0.108	0.309	0.038	0.0912
	Calcium (Ca)-Dissolved	mg/L	51	33	32	81	107	55	73
	Chromium (Cr)-Dissolved	mg/L	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	0.00032	<0.00020	0.00029	0.00025	0.00032	0.00028	0.00021
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.011	0.001	0.001	0.028	0.048	0.012	0.0238
	Magnesium (Mg)-Dissolved	mg/L	23	9	9	35	48	20	33
	Manganese (Mn)-Dissolved	mg/L	0.0022	0.0002	0.0002	0.00160	0.00141	0.00237	0.00144
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.00137	0.0006	0.0006	0.002	0.0031	0.0010	0.00188
	Nickel (Ni)-Dissolved	mg/L	0.00286	<0.00050	<0.00050	0.00438	0.0095	0.0023	0.00386
	Potassium (K)-Dissolved	mg/L	1.0	0.3	0.4	1.7	2.7	1.0	1.60
	Selenium (Se)-Dissolved	ug/L	22	0	0	45	75	15	41.10
	Silicon (Si)-Dissolved	mg/L	1.7	2.0	2.0	1.8	1.7	1.8	1.7
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	0.8	0.5	0.5	1.5	2.4	0.7	1.39
	Strontium (Sr)-Dissolved	mg/L	0.08	0.07	0.07	0.10	0.11	0.09	0.10
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0013	0.0003	0.0003	0.0023	0.0038	0.0010	0.00227
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0021	<0.0010	<0.0010	0.0041	0.0094	0.0015	0.0033

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FOBCPD	RG_FBLANK	RG_TRIP	RG_FRCP1SWD	RG_FRCP1SW	RG_FO22	RG_RIVER
			18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20
			9:00	9:00	9:00	13:00	15:00	9:00	9:00
Physical Tests	Conductivity (@ 25C)	uS/cm	578	<2.0	<2.0	614	600	614	569
	Hardness (as CaCO3)	mg/L	330	<0.50	-	309	331	322	303
	pH	pH	8.4	5.6	5.5	8.4	8.4	8.4	8.4
	ORP	mV	298	273	454	508	483	257	305
	Total Suspended Solids	mg/L	4.6	<1.0	<1.0	6.1	5	12.9	10.7
	Total Dissolved Solids	mg/L	430	<10	<10	428	391	439	435
	Turbidity	NTU	1.74	<0.10	<0.10	2.12	1.99	3.76	3.76
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	1	1.3	<1.0	1.4	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	174	<1.0	<1.0	172	160	164	157
	Alkalinity, Carbonate (as CaCO3)	mg/L	10.8	<1.0	<1.0	12.4	11.2	11.4	10.6
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	185	<1.0	<1.0	184	171	175	167
	Ammonia as N	mg/L	0.0118	0.019	0.050	0.0238	0.025	0.0298	0.032
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.52	<0.50
	Fluoride (F)	mg/L	0.20	<0.020	<0.020	0.14	0.15	0.14	0.14
	Ion Balance	%	98	0	0	88	102	92	95
	Nitrate (as N)	mg/L	9.6	<0.0050	<0.0050	10.7	9.8	10.8	9.3
	Nitrite (as N)	mg/L	0.008	<0.0010	<0.0010	0.0070	0.006	0.0044	0.006
	Total Kjeldahl Nitrogen	mg/L	0.20	<0.050	<0.050	<0.25	<0.25	<0.25	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0013	<0.0010	<0.0010	0.001	0.0013	0.0014	0.0016
	Phosphorus (P)-Total	mg/L	0.0072	<0.0020	<0.0020	0.0085	0.0104	0.0192	0.0150
	Sulfate (SO4)	mg/L	119	<0.30	<0.30	128	119	133	117
	Anion Sum	meq/L	6.9	<0.10	<0.10	7.1	6.6	7.1	6.5
	Cation Sum	meq/L	6.7	<0.10	<0.10	6.3	6.7	6.5	6.1
	Cation - Anion Balance	%	-1.1	0.0	0.0	-6.30	0.90	-4.00	-2.6
Carbon	Dissolved Organic Carbon	mg/L	1.37	<0.50	-	1.61	1.73	1.66	2.04
	Total Organic Carbon	mg/L	1.31	<0.50	<0.50	1.80	1.89	2.29	1.88
Total Metals	Aluminum (Al)-Total	mg/L	0.034	<0.0030	<0.0030	0.0590	0.0564	0.1250	0.1270
	Antimony (Sb)-Total	mg/L	0.00028	<0.00010	<0.00010	0.00027	0.00029	0.00022	0.00020
	Arsenic (As)-Total	mg/L	0.00011	<0.00010	<0.00010	0.00012	0.00011	0.00014	0.00015
	Barium (Ba)-Total	mg/L	0.042	<0.00010	<0.00010	0.050	0.041	0.049	0.059
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	0.106	<0.0050	<0.0050	0.099	0.107	0.095	0.070
	Calcium (Ca)-Total	mg/L	75	<0.050	<0.050	80	76	78	75
	Chromium (Cr)-Total	mg/L	0.00015	<0.00010	<0.00010	0.00018	0.00016	0.00028	0.00026
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	<0.10	0.11	0.11	0.15	0.12
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.042	<0.010	<0.010	0.068	0.069	0.157	0.144
	Lead (Pb)-Total	mg/L	<0.000050	0.000068	<0.000050	0.000066	0.000066	0.00013	0.000123
	Lithium (Li)-Total	mg/L	0.0238	<0.0010	<0.0010	0.025	0.025	0.0221	0.020
	Magnesium (Mg)-Total	mg/L	34	<0.10	<0.10	36	32	34	33
	Manganese (Mn)-Total	mg/L	0.0047	<0.00010	<0.00010	0.00580	0.0054	0.0095	0.0088
	Mercury (Hg)-Total	ug/L	0.0009	<0.00050	<0.00050	0.00121	0.00113	0.00167	0.00145
	Molybdenum (Mo)-Total	mg/L	0.00182	<0.000050	<0.000050	0.0018	0.0018	0.00142	0.0013
	Nickel (Ni)-Total	mg/L	0.00390	<0.00050	<0.00050	0.0037	0.0039	0.00282	0.0024
	Potassium (K)-Total	mg/L	1.48	<0.050	<0.050	1.5	1.4	1.37	1.3
	Selenium (Se)-Total	ug/L	40	<0.050	<0.050	43	42	43	37
	Silicon (Si)-Total	mg/L	1.8	<0.10	<0.10	1.8	1.8	1.9	1.9
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	1.31	<0.050	<0.050	1.37	1.3	1.32	1.3
	Strontium (Sr)-Total	mg/L	0.09	<0.00020	<0.00020	0.10	0.09	0.10	0.09
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0021	<0.000010	<0.000010	0.0022	0.0021	0.0020	0.0018
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00068	0.00061
	Zinc (Zn)-Total	mg/L	0.0044	<0.0030	<0.0030	0.0036	0.0039	0.0036	0.0031
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	-	<0.0030	<0.0030	0.004	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00028	<0.00010	-	0.00029	0.00032	0.00024	0.00021
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	0.0001	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.045	<0.00010	-	0.044	0.041	0.049	0.052
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	-	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	0.01	<0.010	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.104	<0.0050	-	0.085	0.098	0.064	0.056
	Calcium (Ca)-Dissolved	mg/L	76	<0.050	<0.050	69	78	74	70
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	0.00025	<0.00020	-	0.00027	0.00023	0.0002	<0.00020
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.0248	<0.0010	-	0.023	0.026	0.0217	0.019
	Magnesium (Mg)-Dissolved	mg/L	34	<0.10	<0.0050	33	33	33	31
	Manganese (Mn)-Dissolved	mg/L	0.00144	<0.00010	-	0.00157	0.00142	0.00234	0.0019
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.00192	<0.000050	-	0.0017	0.0019	0.00145	0.0014
	Nickel (Ni)-Dissolved	mg/L	0.004	<0.00050	-	0.0034	0.0037	0.00251	0.0021
	Potassium (K)-Dissolved	mg/L	1.67	<0.050	<0.050	1.5	1.5	1.40	1.3
	Selenium (Se)-Dissolved	ug/L	42	<0.050	-	44	42	44	40
	Silicon (Si)-Dissolved	mg/L	1.8	<0.050	-	1.6	1.7	1.6	1.7
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	1.44	<0.050	<0.050	1.4	1.4	1.42	1.4
	Strontium (Sr)-Dissolved	mg/L	0.10	<0.00020	-	0.09	0.10	0.10	0.09
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	-	<0.000010	0.000011	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.00219	<0.000010	-	0.0022	0.0025	0.0022	0.0020
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0035	<0.0010	-	0.0030	0.0031	0.0024	0.002

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FOUEW	RG_FBLANK	RG_TRIP	RG_FODPO	RG_FRUPO	RG_FOUSH	RG_FOBKS
			19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	23-Jun-20	10-Sep-20
			9:00:00	9:00	9:00	13:00	14:00	9:00	8:40
Physical Tests	Conductivity (@ 25C)	uS/cm	569	<2.0	<2.0	620	648	320	756
	Hardness (as CaCO3)	mg/L	301	<0.50	<0.50	327	343	180	457
	pH	pH	8.4	5.5	5.5	8.4	8.4	8.2	8.3
	ORP	mV	326	375	310	290	456	410	522
	Total Suspended Solids	mg/L	9	<1.0	<1.0	9.4	5.9	4.3	<1.0
	Total Dissolved Solids	mg/L	406	<10	<10	494	499	208	587
	Turbidity	NTU	3.2	<0.10	<0.10	3.74	2.61	2.28	0.34
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	1.2	1.3	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	160	<1.0	<1.0	169	170	118	193
	Alkalinity, Carbonate (as CaCO3)	mg/L	10.8	<1.0	<1.0	10.0	12	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	171	<1.0	<1.0	179	182	118	193
	Ammonia as N	mg/L	0.019	0.013	0.088	0.028	0.0147	0.014	0.0055
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	<0.50	<0.50	<0.50	<0.50	0.59	<0.50	1.11
	Fluoride (F)	mg/L	0.14	<0.020	<0.020	0.14	0.14	0.19	0.20
	Ion Balance	%	93	0	0	92	93	99	99
	Nitrate (as N)	mg/L	9.3	<0.0050	<0.0050	10.8	12.50	3.0	12.9
	Nitrite (as N)	mg/L	0.004	<0.0010	<0.0010	0.006	0.0051	0.0024	0.006
	Total Kjeldahl Nitrogen	mg/L	<0.25	<0.050	<0.050	<0.050	<0.050	0.34	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0014	<0.0010	<0.0010	0.0014	0.0011	0.0010	<0.0010
	Phosphorus (P)-Total	mg/L	0.011	<0.0020	<0.0020	0.0145	0.0096	0.0041	<0.0020
	Sulfate (SO4)	mg/L	118	<0.30	<0.30	136	141	54	216
	Anion Sum	meq/L	6.6	<0.10	<0.10	7.2	7.5	3.7	9.3
	Cation Sum	meq/L	6.1	<0.10	<0.10	6.6	7.0	3.6	9.3
	Cation - Anion Balance	%	-3.4	0.00	0.0	-4.10	-3.70	-0.7	-0.3
Carbon	Dissolved Organic Carbon	mg/L	1.7	<0.50	-	1.53	0.58	0.8	<0.50
	Total Organic Carbon	mg/L	1.6	<0.50	<0.50	1.74	0.89	0.80	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	0.11	<0.0030	<0.0030	0.0679	0.0872	0.031	0.0049
	Antimony (Sb)-Total	mg/L	0.00020	<0.00010	<0.00010	0.00022	0.00022	<0.00010	0.00024
	Arsenic (As)-Total	mg/L	0.00015	<0.00010	<0.00010	0.00012	0.00015	0.00012	0.0001
	Barium (Ba)-Total	mg/L	0.056	<0.00010	<0.00010	0.047	0.050	0.032	0.086
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
	Cadmium (Cd)-Total	ug/L	0.06	<0.0050	<0.0050	0.080	0.0918	0.031	0.051
	Calcium (Ca)-Total	mg/L	74	<0.050	<0.050	78	83	43	107
	Chromium (Cr)-Total	mg/L	0.00027	<0.00010	<0.00010	0.00021	0.00025	0.00015	<0.00010
	Cobalt (Co)-Total	ug/L	0.12	<0.10	<0.10	0.12	0.11	<0.10	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.12	<0.010	<0.010	0.083	0.102	0.034	0.028
	Lead (Pb)-Total	mg/L	0.00010	<0.000050	<0.000050	0.000089	0.000092	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.020	<0.0010	<0.0010	0.022	0.0244	0.0086	0.0365
	Magnesium (Mg)-Total	mg/L	33	<0.10	<0.10	35	38	16	47
	Manganese (Mn)-Total	mg/L	0.008	<0.00010	<0.00010	0.0076	0.00697	0.0034	0.00974
	Mercury (Hg)-Total	ug/L	0.0013	<0.00050	<0.00050	0.00124	0.001	0.00073	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.0013	<0.000050	<0.000050	0.0014	0.00144	0.00077	0.00130
	Nickel (Ni)-Total	mg/L	0.0024	<0.00050	<0.00050	0.0029	0.00281	0.00168	0.00363
	Potassium (K)-Total	mg/L	1.3	<0.050	<0.050	1.4	1.52	0.67	1.87
	Selenium (Se)-Total	ug/L	36	<0.050	<0.050	42	47.2	12	47
	Silicon (Si)-Total	mg/L	2.0	<0.10	<0.10	1.8	1.8	1.6	2.0
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	1.3	<0.050	<0.050	1.3	1.45	0.5	1.68
	Strontium (Sr)-Total	mg/L	0.09	<0.00020	<0.00020	0.09	0.10	0.07	0.16
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0018	<0.000010	<0.000010	0.0020	0.0021	0.0008	0.0027
	Vanadium (V)-Total	mg/L	0.0006	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	0.003	0.0034	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	-	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00020	<0.00010	-	0.00023	0.00024	0.00012	0.00023
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.056	<0.00010	-	0.048	0.052	0.031	0.088
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	-	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	<0.010	0.01
	Cadmium (Cd)-Dissolved	ug/L	0.049	<0.0050	-	0.0575	0.0724	0.026	0.040
	Calcium (Ca)-Dissolved	mg/L	70	<0.050	<0.050	75	78	46	112
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	-	<0.00020	0.00021	<0.00020	<0.00020
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	<0.010	0.018
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.018	<0.0010	-	0.022	0.022	0.0084	0.0381
	Magnesium (Mg)-Dissolved	mg/L	31	<0.10	<0.0050	34	36	16	43
	Manganese (Mn)-Dissolved	mg/L	0.00178	<0.00010	-	0.0012	0.00114	0.00102	0.00843
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.0013	<0.000050	-	0.002	0.00148	0.00081	0.00129
	Nickel (Ni)-Dissolved	mg/L	0.0020	<0.00050	-	0.0026	0.00253	0.00162	0.00354
	Potassium (K)-Dissolved	mg/L	1.2	<0.050	<0.050	1.4	1.49	0.66	1.83
	Selenium (Se)-Dissolved	ug/L	40	<0.050	-	46	51.4	13	48
	Silicon (Si)-Dissolved	mg/L	1.7	<0.050	-	1.7	1.6	1.5	1.9
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	1.4	<0.050	<0.050	1.4	1.52	0.55	1.64
	Strontium (Sr)-Dissolved	mg/L	0.10	<0.00020	-	0.10	0.10	0.08	0.18
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0020	<0.000010	-	0.0023	0.0024	0.0008	0.0029
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0016	<0.0010	-	0.0022	0.0025	0.0014	0.0012

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_RIVER1	RG_FBLANK1	RG_TRIP1	RG_FOUCL	RG_FOUNGD	RG_FO22	RG_FOUEW
			10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	11-Sep-20	11-Sep-20
			8:59	9:12	9:15	9:15	13:20	9:00	9:20
Physical Tests	Conductivity (@ 25C)	uS/cm	776	<2.0	<2.0	562	681	1,000	959
	Hardness (as CaCO3)	mg/L	453	<0.50	-	331	399	629	586
	pH	pH	8.3	4.9	4.8	8.1	8.2	8.3	8.3
	ORP	mV	495	406	533	468	429	504	499
	Total Suspended Solids	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids	mg/L	581	<10	<10	398	492	779	738
	Turbidity	NTU	0.37	<0.10	<0.10	0.28	0.14	0.37	0.29
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	1.5	1.5	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	194	<1.0	<1.0	165	173	246	240
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	194	<1.0	<1.0	165	173	246	240
	Ammonia as N	mg/L	<0.0050	0.02	<0.0050	0.06	0.010	0.005	0.02
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	1.12	<0.10	<0.10	0.24	0.4	1.4	1.4
	Fluoride (F)	mg/L	0.20	<0.020	<0.020	0.19	0.19	0.151	0.15
	Ion Balance	%	98	0	0	100	100	104	101
	Nitrate (as N)	mg/L	13	<0.0050	<0.0050	5	11	21	19
	Nitrite (as N)	mg/L	0.0065	<0.0010	<0.0010	0.003	0.007	0.004	0.005
	Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.25	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	0.0016	0.0013	0.0013	<0.0010
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0098	<0.0020	<0.0020
	Sulfate (SO4)	mg/L	216	<0.30	<0.30	143	182	281	263
	Anion Sum	meq/L	9.3	<0.10	<0.10	6.7	8.0	12	11.7
	Cation Sum	meq/L	9.2	<0.10	<0.10	7	8	13	12
	Cation - Anion Balance	%	-0.90	0.0	0.0	0.1	0.2	1.8	0.6
Carbon	Dissolved Organic Carbon	mg/L	<0.50	<0.50	-	<0.50	<0.50	1.2	<0.50
	Total Organic Carbon	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	1.1	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	0.0051	<0.0030	<0.0030	0.0063	0.0031	0.0049	0.0034
	Antimony (Sb)-Total	mg/L	0.00023	<0.00010	<0.00010	0.00011	0.00018	0.00014	<0.00010
	Arsenic (As)-Total	mg/L	0.00011	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.086	<0.00010	<0.00010	0.088	0.089	0.103	0.100
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.011	<0.010	<0.010	<0.010	<0.010	0.012	0.011
	Cadmium (Cd)-Total	ug/L	0.044	<0.0050	<0.0050	0.017	0.031	0.036	0.035
	Calcium (Ca)-Total	mg/L	109	<0.050	<0.050	85	97	139	129
	Chromium (Cr)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.031	<0.010	<0.010	<0.010	<0.010	0.017	<0.010
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.036	<0.0010	<0.0010	0.010	0.034	0.037	0.032
	Magnesium (Mg)-Total	mg/L	47	<0.10	<0.10	28	37	65	61
	Manganese (Mn)-Total	mg/L	0.00934	<0.00010	<0.00010	0.001	0.001	0.005	0.004
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.0013	<0.000050	<0.000050	0.0007	0.0010	0.0008	0.0008
	Nickel (Ni)-Total	mg/L	0.0037	<0.00050	<0.00050	0.0008	0.0036	0.0007	0.0008
	Potassium (K)-Total	mg/L	1.8	<0.050	<0.050	0.9	1.4	1.9	1.8
	Selenium (Se)-Total	ug/L	48	<0.050	<0.050	27	40	82	77
	Silicon (Si)-Total	mg/L	2.0	<0.10	<0.10	2.0	1.9	2.3	2.3
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	1.6	<0.050	<0.050	0.8	1.2	2.5	2.5
	Strontium (Sr)-Total	mg/L	0.16	<0.00020	<0.00020	0.13	0.15	0.17	0.16
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0028	<0.000010	<0.000010	0.0012	0.0023	0.0034	0.0032
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	-	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00022	<0.00010	-	0.00011	0.00018	0.00010	<0.00010
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.083	<0.00010	-	0.093	0.091	0.109	0.104
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	-	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	0.011	<0.010	-	<0.010	<0.010	0.012	0.011
	Cadmium (Cd)-Dissolved	ug/L	0.047	<0.0050	-	0.017	0.030	0.036	0.029
	Calcium (Ca)-Dissolved	mg/L	112	<0.050	<0.050	88	103	149	140
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	-	0.00012	<0.00010	0.00012	0.0001
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020
	Iron (Fe)-Dissolved	mg/L	0.018	<0.010	-	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.038	<0.0010	-	0.010	0.036	0.038	0.035
	Magnesium (Mg)-Dissolved	mg/L	42	<0.10	<0.0050	27	35	62	57
	Manganese (Mn)-Dissolved	mg/L	0.00839	<0.00010	-	0.000	0.000	0.004	0.004
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.0013	<0.000050	-	0.0008	0.0010	0.0009	0.0008
	Nickel (Ni)-Dissolved	mg/L	0.0034	<0.00050	-	0.0006	0.0035	0.0006	0.0007
	Potassium (K)-Dissolved	mg/L	1.8	<0.050	<0.050	0.9	1.4	1.9	1.8
	Selenium (Se)-Dissolved	ug/L	48	<0.050	-	29	43	92	82
	Silicon (Si)-Dissolved	mg/L	1.9	<0.050	-	1.9	1.9	2.3	2.1
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	1.6	<0.050	<0.050	0.8	1.2	2.6	2.4
	Strontium (Sr)-Dissolved	mg/L	0.17	<0.00020	-	0.14	0.16	0.18	0.17
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	-	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0028	<0.000010	-	0.0013	0.0024	0.0034	0.0032
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0021	<0.0010	-	<0.0010	<0.0010	0.0013	0.0012

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FODPO	RG_FRUPO	RG_FOUKI	RG_HENUP	RG_RIVER	RG_FBLANK	RG_TRIP
			11-Sep-20	12-Sep-20	14-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20
			13:25	9:15	9:55	9:15	9:15	9:15	9:15
Physical Tests	Conductivity (@ 25C)	uS/cm	1,010	1,010	813	308	311	<2.0	<2.0
	Hardness (as CaCO3)	mg/L	629	645	468	156	164	<0.50	-
	pH	pH	8.2	8.1	8.2	8.1	8.1	6.0	5.5
	ORP	mV	439	486	498	420	429	465	458
	Total Suspended Solids	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids	mg/L	797	839	675	181	190	<10	<10
	Turbidity	NTU	0.10	0.22	0.41	0.14	<0.10	<0.10	<0.10
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	1.1	<1.0	<1.0	<1.0	1.7	1.9
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	234	231	183	106	107	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	234	231	183	106	107	<1.0	<1.0
	Ammonia as N	mg/L	<0.0050	0.01	0.005	0.016	0.01	<0.0050	<0.0050
	Bromide (Br)	mg/L	<0.050	<0.25	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	1.4	1.31	0.9	0.2	0.2	<0.10	<0.10
	Fluoride (F)	mg/L	0.164	0.12	0.134	0.33	0.329	<0.020	<0.020
	Ion Balance	%	103	108	106	95	100	0	0
	Nitrate (as N)	mg/L	20	25	14	0	0	<0.0050	<0.0050
	Nitrite (as N)	mg/L	0.006	<0.0050	0.011	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen	mg/L	<0.25	0.402	<0.050	0.054	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0017	0.0024	<0.0010	0.0013	0.0011	<0.0010	<0.0010
	Phosphorus (P)-Total	mg/L	0.0035	0.0023	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Sulfate (SO4)	mg/L	301	272	204	55	55	<0.30	<0.30
	Anion Sum	meq/L	12	12	9	3	3	<0.10	<0.10
	Cation Sum	meq/L	13	13	9	3	3	<0.10	<0.10
	Cation - Anion Balance	%	1.3	3.7	2.9	-2.50	-0.2	0.0	0.0
Carbon	Dissolved Organic Carbon	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	-
	Total Organic Carbon	mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	<0.0030	<0.0030	0.0041	<0.0030	0.0034	<0.0030	<0.0030
	Antimony (Sb)-Total	mg/L	0.00012	0.00011	0.00030	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total	mg/L	<0.00010	0.00011	0.00017	<0.00010	0.00011	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.089	0.115	0.09	0.013	0.013	0.000	<0.00010
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.011	0.016	0.013	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	0.041	0.040	0.055	0.006	<0.0050	<0.0050	<0.0050
	Calcium (Ca)-Total	mg/L	137	138	113	46	46	<0.050	<0.050
	Chromium (Cr)-Total	mg/L	<0.00010	<0.00010	<0.00010	0.00030	0.00014	0.00015	<0.00010
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.0008	<0.00050
	Iron (Fe)-Total	mg/L	<0.010	<0.010	0.034	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.034	0.046	0.037	0.001	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)-Total	mg/L	65	65	47	11	11	<0.10	<0.10
	Manganese (Mn)-Total	mg/L	0.001	0.0007	0.0120	<0.00010	<0.00010	0.0001	<0.00010
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.0010	0.0008	0.00151	0.00057	0.0006	<0.000050	<0.000050
	Nickel (Ni)-Total	mg/L	0.0009	0.0006	0.0045	<0.00050	<0.00050	<0.00050	<0.00050
	Potassium (K)-Total	mg/L	1.8	2.4	2.1	0.2	0.2	<0.050	<0.050
	Selenium (Se)-Total	ug/L	85	95	57	1	1	<0.050	<0.050
	Silicon (Si)-Total	mg/L	2.3	2.4	2.2	1.3	1.2	<0.10	<0.10
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	2.3	2.9	1.7	0.3	0.3	0.2	<0.050
	Strontium (Sr)-Total	mg/L	0.16	0.15	0.16	0.14	0.14	0.00	<0.00020
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0034	0.0042	0.0032	0.0008	0.0008	<0.000010	<0.000010
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	-
	Antimony (Sb)-Dissolved	mg/L	0.00011	0.00011	0.00027	<0.00010	<0.00010	<0.00010	-
	Arsenic (As)-Dissolved	mg/L	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
	Barium (Ba)-Dissolved	mg/L	0.097	0.109	0.08	0.013	0.013	0.000	-
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-
	Boron (B)-Dissolved	mg/L	0.011	0.018	0.011	<0.010	<0.010	<0.010	-
	Cadmium (Cd)-Dissolved	ug/L	0.042	0.032	0.046	<0.0050	<0.0050	<0.0050	-
	Calcium (Ca)-Dissolved	mg/L	144	151	113	46	49	<0.050	<0.050
	Chromium (Cr)-Dissolved	mg/L	0.0001	0.00011	<0.00010	0.00012	0.00012	<0.00010	-
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00033	-
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	0.018	<0.010	<0.010	<0.010	-
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-
	Lithium (Li)-Dissolved	mg/L	0.036	0.048	0.036	0.001	<0.0010	<0.0010	-
	Magnesium (Mg)-Dissolved	mg/L	65	65	45	10	10	<0.10	<0.0050
	Manganese (Mn)-Dissolved	mg/L	0.001	0.0004	0.00968	<0.00010	<0.00010	<0.00010	-
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	0.0000073	<0.0000050	<0.0000050	<0.0000050	-
	Molybdenum (Mo)-Dissolved	mg/L	0.0010	0.0009	0.00149	0.00057	0.0006	<0.000050	-
	Nickel (Ni)-Dissolved	mg/L	0.0007	<0.00050	0.0040	<0.00050	<0.00050	<0.00050	-
	Potassium (K)-Dissolved	mg/L	1.9	2.3	1.9	0.2	0.2	<0.050	<0.050
	Selenium (Se)-Dissolved	ug/L	93	100	58	1	1	<0.050	-
	Silicon (Si)-Dissolved	mg/L	2.2	2.1	1.9	1.1	1.2	0.1	-
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
	Sodium (Na)-Dissolved	mg/L	2.3	2.7	1.6	0.3	0.3	0.1	<0.050
	Strontium (Sr)-Dissolved	mg/L	0.18	0.17	0.17	0.14	0.14	0.00	-
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00016	-
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-
	Uranium (U)-Dissolved	mg/L	0.0036	0.0041	0.0028	0.0008	0.0008	<0.000010	-
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-
	Zinc (Zn)-Dissolved	mg/L	0.0012	<0.0010	0.0015	0.0011	0.0012	<0.0010	-

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FODHE	RG_MP1	RG_UFR1	RG_FO26	RG_FOBCP	RG_SCOUTDS	RG_FBLANK
			15-Sep-20	15-Sep-20	16-Sep-20	17-Sep-20	16-Sep-20	17-Sep-20	17-Sep-20
			9:30	13:05	8:20	9:15	9:30	9:30	15:30
Physical Tests	Conductivity (@ 25C)	uS/cm	499	733	354	346	1,170	1,190	<2.0
	Hardness (as CaCO3)	mg/L	286	423	188	180	672	684	<0.50
	pH	pH	8.2	8.3	8.3	8.3	8.4	8.4	5.9
	ORP	mV	357	416	418	511	499	443	504
	Total Suspended Solids	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids	mg/L	376	590	207	207	869	895	<10
	Turbidity	NTU	0.25	0.51	0.27	0.23	0.45	0.36	<0.10
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	148	177	153	145	<1.0	231	<1.0
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	1.8	<1.0	<1.0	<1.0	5.8	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	232	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	148	179	153	145	232	237	<1.0
	Ammonia as N	mg/L	0.005	<0.0050	<0.0050	0.02	<0.0050	0.01	<0.0050
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.050	<0.25	<0.25	<0.050
	Chloride (Cl)	mg/L	0.22	0.5	0.2	0.2	1.8	1.7	<0.10
	Fluoride (F)	mg/L	0.221	0.18	0.166	0.192	0.2	0.19	<0.020
	Ion Balance	%	96	96	96	93	94	93	0
	Nitrate (as N)	mg/L	3	13	0	0	15	17	<0.0050
	Nitrite (as N)	mg/L	0.0021	0.0073	<0.0010	<0.0010	0.006	0.025	<0.0010
	Total Kjeldahl Nitrogen	mg/L	0.286	<0.25	<0.050	0.156	0.426	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	0.0028	0.0023	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	0.0055	0.0043	<0.0020	<0.0020	<0.0020
	Sulfate (SO4)	mg/L	134	214	43	48	416	421	<0.30
	Anion Sum	meq/L	6	9	4	4	14	15	<0.10
	Cation Sum	meq/L	6	9	4	4	14	14	<0.10
	Cation - Anion Balance	%	-2.0	-2.3	-2.2	-3.6	-3.1	-3.4	0.0
Carbon	Dissolved Organic Carbon	mg/L	<0.50	<0.50	<0.50	<0.50	0.81	0.75	<0.50
	Total Organic Carbon	mg/L	<0.50	0.93	<0.50	<0.50	1.06	0.84	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	0.0095	0.0053	<0.0030	0.0064	<0.0030	0.0058	<0.0030
	Antimony (Sb)-Total	mg/L	<0.00010	0.00023	<0.00010	<0.00010	0.00029	0.00033	<0.00010
	Arsenic (As)-Total	mg/L	0.00011	<0.00010	0.00012	<0.00010	<0.00010	0.00012	<0.00010
	Barium (Ba)-Total	mg/L	0.041	0.085	0.079	0.050	0.088	0.085	0.000
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	0.012	0.013	<0.010
	Cadmium (Cd)-Total	ug/L	0.021	0.035	0.011	0.014	0.136	0.181	<0.0050
	Calcium (Ca)-Total	mg/L	71	106	50	52	149	150	<0.050
	Chromium (Cr)-Total	mg/L	0.00016	0.00013	0.00013	0.00014	<0.00010	0.00012	<0.00010
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00066
	Iron (Fe)-Total	mg/L	0.010	<0.010	<0.010	<0.010	0.018	0.024	<0.010
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.009	0.036	0.002	0.002	0.046	0.045	<0.0010
	Magnesium (Mg)-Total	mg/L	26	42	13	14	78	81	<0.10
	Manganese (Mn)-Total	mg/L	0.0017	0.0015	0.0003	0.0007	0.0049	0.0088	0.0002
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.00088	0.00124	0.0006	0.0007	0.0033	0.0035	<0.000050
	Nickel (Ni)-Total	mg/L	0.00061	0.00373	<0.00050	<0.00050	0.0086	0.0106	<0.00050
	Potassium (K)-Total	mg/L	0.8	1.7	0.5	0.4	2.3	2.5	<0.050
	Selenium (Se)-Total	ug/L	23	50	1	1	116	123	<0.050
	Silicon (Si)-Total	mg/L	1.6	2.0	2.0	1.9	2.1	2.2	<0.10
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	0.7	1.4	0.7	0.7	2.0	2.0	0.1
	Strontium (Sr)-Total	mg/L	0.12	0.16	0.10	0.11	0.19	0.19	0.00
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	0.000014	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0011	0.0025	0.0005	0.0005	0.0047	0.0050	<0.000010
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0069	0.0088	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	<0.00010	0.00023	<0.00010	<0.00010	0.00029	0.00033	<0.00010
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.05	0.09	0.084	0.051	0.091	0.086	0.000
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	0.01	<0.010	<0.010	0.011	0.011	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.015	0.023	0.009	0.007	0.121	0.154	<0.0050
	Calcium (Ca)-Dissolved	mg/L	74	106	53	51	146	151	<0.050
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	0.0001	<0.00010	0.0001	0.0001	<0.00010
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00032
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	0.013	0.016	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.009	0.038	0.002	0.001	0.043	0.044	<0.0010
	Magnesium (Mg)-Dissolved	mg/L	25	38	13	13	75	74	<0.10
	Manganese (Mn)-Dissolved	mg/L	0.0008	0.0012	0.0001	0.0002	0.0043	0.0075	<0.00010
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.00092	0.00122	0.0006	0.0007	0.0031	0.0036	<0.000050
	Nickel (Ni)-Dissolved	mg/L	0.00065	0.00360	<0.00050	<0.00050	0.0080	0.0099	<0.00050
	Potassium (K)-Dissolved	mg/L	0.8	1.6	0.5	0.4	2.4	2.5	<0.050
	Selenium (Se)-Dissolved	ug/L	21	51	1	1	121	130	<0.050
	Silicon (Si)-Dissolved	mg/L	1.5	1.8	2.0	1.8	1.9	1.9	0.1
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	0.6	1.4	0.7	0.6	1.8	1.8	0.1
	Strontium (Sr)-Dissolved	mg/L	0.13	0.17	0.11	0.11	0.19	0.18	0.00
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	0.000012	0.000013	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00024
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0012	0.0026	0.0005	0.0005	0.0046	0.0046	<0.000010
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	<0.0010	0.001	<0.0010	<0.0010	0.0068	0.0087	<0.0010

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FOBSC	RG_FOUSH	RG_FODNGD	RG_FRCP1SW	RG_FOBKS	RG_FOBCP	RG_SCOUTDS
			18-Sep-20	21-Sep-20	21-Sep-20	22-Sep-20	07-Dec-20	07-Dec-20	07-Dec-20
			9:30	12:00	14:55	13:55	10:15	10:30	13:15
Physical Tests	Conductivity (@ 25C)	uS/cm	1,110	834	742	1,170	965	1,330	1250
	Hardness (as CaCO3)	mg/L	696	455	410	651	575	809	780
	pH	pH	8.4	8.4	8.4	8.5	8.2	8.4	8.4
	ORP	mV	442	425	448	180	480	476	296
	Total Suspended Solids	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids	mg/L	868	618	536	930	756	1090	1030
	Turbidity	NTU	0.52	0.72	0.33	0.40	0.22	0.31	0.26
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	226	194	171	235	214	251	233
	Alkalinity, Carbonate (as CaCO3)	mg/L	10.4	4.8	3	13.6	<1.0	11.4	12
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	237	199	174	249	214	263	245
	Ammonia as N	mg/L	<0.0050	0.0289	0.006	<0.0050	0.091	0.131	0.0850
	Bromide (Br)	mg/L	<0.050	<0.050	<0.050	<0.25	<0.25	<0.25	<0.25
	Chloride (Cl)	mg/L	1.4	0.6	0.34	1.4	2.02	2.3	2.2
	Fluoride (F)	mg/L	0.154	0.14	0.133	0.14	0.11	0.11	0.11
	Ion Balance	%	97	95	99	89	100	95	98
	Nitrate (as N)	mg/L	14	13	12	14	17	19	19
	Nitrite (as N)	mg/L	0.0115	0.0133	0.0116	0.0131	0.0224	0.0197	0.0194
	Total Kjeldahl Nitrogen	mg/L	<0.25	<0.050	<0.050	<0.050	<0.050	<0.050	<0.25
	Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Sulfate (SO4)	mg/L	415	230	195	421	293	503	470
	Anion Sum	meq/L	14	10	8	15	12	17	16
	Cation Sum	meq/L	14	9	8	13	12	16	16
	Cation - Anion Balance	%	-1.4	-2.5	-0.7	-5.80	0.0	-2.3	-1.0
Carbon	Dissolved Organic Carbon	mg/L	0.95	0.69	<0.50	0.91	<0.50	1.28	1.04
	Total Organic Carbon	mg/L	0.96	0.69	<0.50	0.92	<0.50	1.43	1.04
Total Metals	Aluminum (Al)-Total	mg/L	0.0044	0.0054	0.0058	0.0042	0.0037	0.0044	0.0053
	Antimony (Sb)-Total	mg/L	0.00029	0.00025	0.00021	0.00028	0.00031	0.00040	0.00035
	Arsenic (As)-Total	mg/L	0.00010	0.00014	0.00014	0.00019	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.08	0.087	0.089	0.081	0.092	0.08	0.086
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.013	0.013	0.011	0.014	0.013	0.013	0.012
	Cadmium (Cd)-Total	ug/L	0.158	0.039	0.035	0.139	0.057	0.112	0.101
	Calcium (Ca)-Total	mg/L	148	113	107	154	136	177	165
	Chromium (Cr)-Total	mg/L	0.00011	0.00011	0.00013	<0.00010	0.00016	0.00012	0.00014
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	<0.10	<0.10	0.23	0.23	0.23
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.024	0.035	<0.010	0.018	0.042	0.03	0.038
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.00006	<0.000050
	Lithium (Li)-Total	mg/L	0.042	0.045	0.040	0.049	0.048	0.055	0.052
	Magnesium (Mg)-Total	mg/L	79	51	39	85	58	93	87
	Manganese (Mn)-Total	mg/L	0.0075	0.0116	0.0009	0.00411	0.0192	0.0139	0.0161
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.00354	0.00135	0.00107	0.00346	0.00185	0.00426	0.00378
	Nickel (Ni)-Total	mg/L	0.0096	0.00417	0.00394	0.00857	0.00562	0.0115	0.01140
	Potassium (K)-Total	mg/L	2.3	2.1	1.6	2.5	2.5	2.9	2.8
	Selenium (Se)-Total	ug/L	107	52	49	112	63	127	119
	Silicon (Si)-Total	mg/L	2.0	2.1	2.0	2.0	1.9	2.1	2.0
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	1.9	1.7	1.3	2.1	2.2	2.3	2.2
	Strontium (Sr)-Total	mg/L	0.18	0.17	0.15	0.19	0.20	0.22	0.20
	Thallium (Tl)-Total	mg/L	0.000012	<0.000010	<0.000010	<0.000010	0.000013	0.000019	0.000018
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0045	0.0028	0.0024	0.0047	0.0038	0.0059	0.0056
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	0.0083	<0.0030	<0.0030	0.0065	0.0035	0.0067	0.0052
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00029	0.00026	0.00021	0.00029	0.00031	0.00037	0.00036
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.08	0.08	0.08	0.078	0.09	0.08	0.07
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	0.012	0.011	0.011	0.014	0.012	0.012	0.012
	Cadmium (Cd)-Dissolved	ug/L	0.156	0.030	0.031	0.132	0.052	0.091	0.087
	Calcium (Ca)-Dissolved	mg/L	152	107	98	138	137	177	172
	Chromium (Cr)-Dissolved	mg/L	<0.00010	<0.00010	0.00012	0.00011	0.00013	0.00014	0.00012
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	<0.10	<0.10	0.21	0.21	0.21
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	0.00021	<0.00020	<0.00020	0.00027
	Iron (Fe)-Dissolved	mg/L	0.017	0.024	<0.010	0.014	0.025	0.019	0.023
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.041	0.042	0.040	0.048	0.046	0.052	0.051
	Magnesium (Mg)-Dissolved	mg/L	77	46	40	75	57	89	85
	Manganese (Mn)-Dissolved	mg/L	0.00689	0.0112	0.0004	0.00369	0.0186	0.01320	0.0155
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.00321	0.00138	0.00106	0.00325	0.00176	0.00388	0.00364
	Nickel (Ni)-Dissolved	mg/L	0.0093	0.00397	0.00398	0.00848	0.00553	0.0108	0.00980
	Potassium (K)-Dissolved	mg/L	2.3	2.1	1.7	2.6	2.4	2.7	2.6
	Selenium (Se)-Dissolved	ug/L	108	45	44	106	72	140	134
	Silicon (Si)-Dissolved	mg/L	1.8	1.8	2.0	1.9	1.9	1.9	1.9
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	2.0	1.6	1.3	2.1	2.2	2.3	2.2
	Strontium (Sr)-Dissolved	mg/L	0.18	0.18	0.16	0.19	0.20	0.21	0.21
	Thallium (Tl)-Dissolved	mg/L	0.000011	<0.000010	<0.000010	<0.000010	0.000012	0.000018	0.000017
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0045	0.0028	0.0026	0.0047	0.0037	0.0057	0.0056
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0081	0.0011	0.0012	0.0062	0.0065	0.0053	0.0049

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_RIVER	RG_TRIP	RG_FBLANK	RG_FOBSC	RG_FODNGD	RG_FOUNGD	RG_FOUCL
			07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	08-Dec-20	08-Dec-20	08-Dec-20
			13:20	13:40	13:40	14:00	9:30	10:30	11:30
Physical Tests	Conductivity (@ 25C)	uS/cm	1,260	<2.0	<2.0	1,270	875	813	626
	Hardness (as CaCO3)	mg/L	781	<0.50	<0.50	760	490	470	350
	pH	pH	8.4	5.6	5.6	8.4	8.3	8.3	8.2
	ORP	mV	417	453	468	455	430	426	325
	Total Suspended Solids	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids	mg/L	1,010	<10	<10	1040	698	633	474
	Turbidity	NTU	0.28	<0.10	<0.10	0.52	0.23	<0.10	0.14
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	1.1	1.1	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	248	<1.0	<1.0	235	189	184	151
	Alkalinity, Carbonate (as CaCO3)	mg/L	9.4	<1.0	<1.0	10.4	2.8	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	258	<1.0	<1.0	246	192	184	151
	Ammonia as N	mg/L	0.08	<0.0050	<0.0050	0.08	0.01	<0.0050	0.01
	Bromide (Br)	mg/L	<0.25	<0.050	<0.050	<0.25	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	2.3	<0.10	<0.10	2.4	0.5	0.5	0.3
	Fluoride (F)	mg/L	0.11	<0.020	<0.020	0.11	0.098	0.097	0.116
	Ion Balance	%	97	0	0	97	96	99	97
	Nitrate (as N)	mg/L	18	<0.0050	<0.0050	18	16	13	6
	Nitrite (as N)	mg/L	0.027	<0.0010	<0.0010	0.024	0.004	<0.0010	0.001
	Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.2
	Orthophosphate-Dissolved (as P)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	0.0019	0.0017	0.0013
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	<0.0020	0.0027	<0.0020	<0.0020	<0.0020
	Sulfate (SO4)	mg/L	465	<0.30	<0.30	462	260	237	183
	Anion Sum	meq/L	16	<0.10	<0.10	16	10	10	7
	Cation Sum	meq/L	16	<0.10	<0.10	15	10	9	7
	Cation - Anion Balance	%	-1.3	0.0	0.0	-1.8	-2.3	-0.4	-1.4
Carbon	Dissolved Organic Carbon	mg/L	0.55	-	<0.50	0.80	<0.50	<0.50	<0.50
	Total Organic Carbon	mg/L	0.80	<0.50	<0.50	0.77	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	0.0057	<0.0030	<0.0030	0.0118	0.0062	<0.0030	0.0042
	Antimony (Sb)-Total	mg/L	0.00035	<0.00010	<0.00010	0.00041	0.00021	0.00016	<0.00010
	Arsenic (As)-Total	mg/L	0.00011	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.084	<0.00010	<0.00010	0.084	0.093	0.104	0.094
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.012	<0.010	<0.010	0.012	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total	ug/L	0.098	<0.0050	<0.0050	0.115	0.061	0.045	0.017
	Calcium (Ca)-Total	mg/L	166	<0.050	<0.050	167	122	113	90
	Chromium (Cr)-Total	mg/L	0.00014	<0.00010	<0.00010	0.00019	0.00012	0.00013	0.00014
	Cobalt (Co)-Total	ug/L	0.23	<0.10	<0.10	0.24	<0.10	<0.10	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.040	<0.010	<0.010	0.058	<0.010	<0.010	<0.010
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	0.000057	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.052	<0.0010	<0.0010	0.052	0.047	0.037	0.008
	Magnesium (Mg)-Total	mg/L	87	<0.10	<0.10	85	48	43	30
	Manganese (Mn)-Total	mg/L	0.0162	<0.00010	<0.00010	0.0182	0.0006	0.0002	0.0005
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.0038	<0.000050	<0.000050	0.0038	0.0012	0.0010	0.0007
	Nickel (Ni)-Total	mg/L	0.0100	<0.00050	<0.00050	0.0100	0.0053	0.0028	<0.00050
	Potassium (K)-Total	mg/L	2.8	<0.050	<0.050	2.8	1.7	1.3	0.8
	Selenium (Se)-Total	ug/L	119	<0.050	<0.050	115	69	59	32
	Silicon (Si)-Total	mg/L	2.0	<0.10	<0.10	2.0	1.9	1.9	1.6
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	2.2	<0.050	<0.050	2.2	1.4	1.3	0.7
	Strontium (Sr)-Total	mg/L	0.21	<0.00020	<0.00020	0.21	0.19	0.19	0.16
	Thallium (Tl)-Total	mg/L	0.000016	<0.000010	<0.000010	0.000016	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0055	<0.000010	<0.000010	0.0054	0.0033	0.0027	0.0013
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	0.0050	<0.0030	<0.0030	0.0069	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	0.00035	-	<0.00010	0.00034	0.00021	0.00016	<0.00010
	Arsenic (As)-Dissolved	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.079	-	<0.00010	0.074	0.085	0.096	0.083
	Beryllium (Be)-Dissolved	ug/L	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	0.012	-	<0.010	0.012	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.098	-	<0.0050	0.093	0.055	0.042	0.016
	Calcium (Ca)-Dissolved	mg/L	171	<0.050	<0.050	163	123	118	91
	Chromium (Cr)-Dissolved	mg/L	0.00012	-	<0.00010	0.00016	0.00012	0.00012	0.00014
	Cobalt (Co)-Dissolved	ug/L	0.22	-	<0.10	0.21	<0.10	<0.10	<0.10
	Copper (Cu)-Dissolved	mg/L	<0.00020	-	<0.00020	0.00028	<0.00020	<0.00020	<0.00020
	Iron (Fe)-Dissolved	mg/L	0.025	-	<0.010	0.021	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.051	-	<0.0010	0.049	0.045	0.036	0.008
	Magnesium (Mg)-Dissolved	mg/L	86	<0.0050	<0.10	86	44	42	30
	Manganese (Mn)-Dissolved	mg/L	0.0155	-	<0.00010	0.0151	0.0004	0.0002	0.0004
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.0036	-	<0.000050	0.0034	0.0011	0.0009	0.0007
	Nickel (Ni)-Dissolved	mg/L	0.0101	-	<0.00050	0.0096	0.0049	0.0028	<0.00050
	Potassium (K)-Dissolved	mg/L	2.7	<0.050	<0.050	2.6	1.6	1.3	0.7
	Selenium (Se)-Dissolved	ug/L	134	-	<0.050	126	71	61	33
	Silicon (Si)-Dissolved	mg/L	1.9	-	<0.050	1.8	1.7	1.8	1.5
	Silver (Ag)-Dissolved	mg/L	<0.000010	-	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	2.3	<0.050	<0.050	2.3	1.4	1.4	0.7
	Strontium (Sr)-Dissolved	mg/L	0.20	-	<0.00020	0.20	0.18	0.18	0.15
	Thallium (Tl)-Dissolved	mg/L	0.000016	-	<0.000010	0.000015	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	-	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0054	-	<0.000010	0.0051	0.0031	0.0027	0.0012
	Vanadium (V)-Dissolved	mg/L	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0057	-	<0.0010	0.0053	0.0047	0.0017	0.0012

Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_UFR1	RG_MP1	RG_FOUSH	RG_FODPO	RG_FOUKI	RG_FO22	RG_FRUPO
			08-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	10-Dec-20
			12:30	9:00	10:40	11:30	13:10	15:00	10:35
Physical Tests	Conductivity (@ 25C)	uS/cm	326	923	962	1,110	955	1,090	1,240
	Hardness (as CaCO3)	mg/L	179	529	591	680	588	679	765
	pH	pH	8.3	8.4	8.2	8.3	8.3	8.1	8.3
	ORP	mV	434	426	441	432	332	428	405
	Total Suspended Solids	mg/L	3.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids	mg/L	212	700	760	863	712	882	1000
	Turbidity	NTU	0.39	0.19	0.30	0.10	0.26	0.10	<0.10
Ions and Nutrients	Acidity (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.1
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	141	179	203	242	207	222	268
	Alkalinity, Carbonate (as CaCO3)	mg/L	2.4	5.4	<1.0	2.6	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	143	184	203	245	207	222	268
	Ammonia as N	mg/L	<0.0050	0.008	<0.0050	0.01	0.09	0.01	<0.0050
	Bromide (Br)	mg/L	<0.050	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	Chloride (Cl)	mg/L	0.2	0.8	1.0	1.5	1.6	1.7	2
	Fluoride (F)	mg/L	0.087	0.14	0.14	0.12	0.15	0.11	0.12
	Ion Balance	%	94	97	103	101	103	103	101
	Nitrate (as N)	mg/L	0	18	17	20	16	23	31
	Nitrite (as N)	mg/L	<0.0010	<0.0050	0.037	<0.0050	0.035	<0.0050	<0.0050
	Total Kjeldahl Nitrogen	mg/L	<0.050	<0.050	0.382	0.158	0.447	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0015	0.0016	<0.0010	0.0027	<0.0010	0.0019	0.0035
	Phosphorus (P)-Total	mg/L	<0.0020	<0.0020	0.0021	0.0025	0.0022	<0.0020	0.0031
	Sulfate (SO4)	mg/L	46	293	304	345	301	350	373
	Anion Sum	meq/L	4	11	12	14	12	13	15
	Cation Sum	meq/L	4	11	12	14	12	14	16
	Cation - Anion Balance	%	-3.0	-1.80	1.5	0.6	1.4	1.3	0.4
Carbon	Dissolved Organic Carbon	mg/L	<0.50	0.88	0.57	<0.50	0.71	0.53	<0.50
	Total Organic Carbon	mg/L	<0.50	0.86	<0.50	<0.50	0.67	0.50	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	0.0379	<0.0030	0.0031	0.0041	0.0054	0.0039	<0.0030
	Antimony (Sb)-Total	mg/L	0.00013	0.00021	0.00031	0.00012	0.00027	<0.00010	<0.00010
	Arsenic (As)-Total	mg/L	0.00011	<0.00010	<0.00010	0.00011	0.00010	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.073	0.090	0.089	0.091	0.085	0.125	0.148
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	<0.010	<0.010	0.012	0.010	0.013	0.011	0.016
	Cadmium (Cd)-Total	ug/L	0.016	0.064	0.049	0.035	0.059	0.044	0.061
	Calcium (Ca)-Total	mg/L	50	120	126	141	124	143	170
	Chromium (Cr)-Total	mg/L	0.00022	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	0.0001
	Cobalt (Co)-Total	ug/L	<0.10	<0.10	0.36	<0.10	0.28	0.10	0.11
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.050	<0.010	0.053	<0.010	0.046	0.016	<0.010
	Lead (Pb)-Total	mg/L	0.000093	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.002	0.047	0.053	0.037	0.050	0.037	0.055
	Magnesium (Mg)-Total	mg/L	14	52	58	72	57	70	79
	Manganese (Mn)-Total	mg/L	0.0019	0.00175	0.0219	0.0010	0.0222	0.0089	0.0007
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.0006	0.00123	0.0017	0.0009	0.0016	0.0007	0.0008
	Nickel (Ni)-Total	mg/L	<0.00050	0.00499	0.0068	<0.00050	0.0055	<0.00050	0.0006
	Potassium (K)-Total	mg/L	0.4	1.6	2.1	1.8	2.1	1.8	2.5
	Selenium (Se)-Total	ug/L	1	68	61	95	56	96	114
	Silicon (Si)-Total	mg/L	1.8	1.8	1.9	2.3	1.9	2.5	2.5
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	0.7	1.6	1.9	2.5	2.2	2.6	3.3
	Strontium (Sr)-Total	mg/L	0.10	0.18	0.19	0.18	0.18	0.18	0.20
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	0.000012	<0.000010	0.000011	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0005	0.0033	0.0036	0.0037	0.0037	0.0036	0.0049
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	0.0064	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved	mg/L	<0.00010	0.0002	0.00032	<0.00010	0.00030	<0.00010	<0.00010
	Arsenic (As)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.065	0.089	0.090	0.087	0.086	0.102	0.126
	Beryllium (Be)-Dissolved	ug/L	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	<0.010	<0.010	0.014	0.012	0.015	0.013	0.018
	Cadmium (Cd)-Dissolved	ug/L	0.008	0.055	0.043	0.031	0.052	0.033	0.047
	Calcium (Ca)-Dissolved	mg/L	50	129	140	159	142	161	179
	Chromium (Cr)-Dissolved	mg/L	0.00013	0.00014	0.00011	0.00015	0.00013	0.00016	0.00017
	Cobalt (Co)-Dissolved	ug/L	<0.10	<0.10	0.34	<0.10	0.26	<0.10	0.11
	Copper (Cu)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Iron (Fe)-Dissolved	mg/L	<0.010	<0.010	0.036	<0.010	0.028	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.002	0.049	0.059	0.042	0.061	0.044	0.062
	Magnesium (Mg)-Dissolved	mg/L	13	50	59	68	57	68	77
	Manganese (Mn)-Dissolved	mg/L	0.0002	0.00175	0.0216	0.0004	0.0199	0.0067	0.0006
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.0006	0.00125	0.0017	0.0009	0.0017	0.0007	0.0008
	Nickel (Ni)-Dissolved	mg/L	<0.00050	0.00479	0.0068	<0.00050	0.0053	0.0010	0.0008
	Potassium (K)-Dissolved	mg/L	0.4	1.7	2.2	1.8	2.3	1.8	2.6
	Selenium (Se)-Dissolved	ug/L	1	76	71	103	64	102	130
	Silicon (Si)-Dissolved	mg/L	1.6	1.7	1.8	2.3	1.8	2.3	2.4
	Silver (Ag)-Dissolved	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	0.7	1.6	1.9	2.4	2.1	2.6	3.1
	Strontium (Sr)-Dissolved	mg/L	0.09	0.18	0.20	0.19	0.20	0.18	0.20
	Thallium (Tl)-Dissolved	mg/L	<0.000010	<0.000010	0.000014	<0.000010	0.000014	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0005	0.0032	0.0035	0.0036	0.0038	0.0034	0.0045
	Vanadium (V)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0012	0.0027	0.0023	<0.0010	0.0018	0.0012	<0.0010

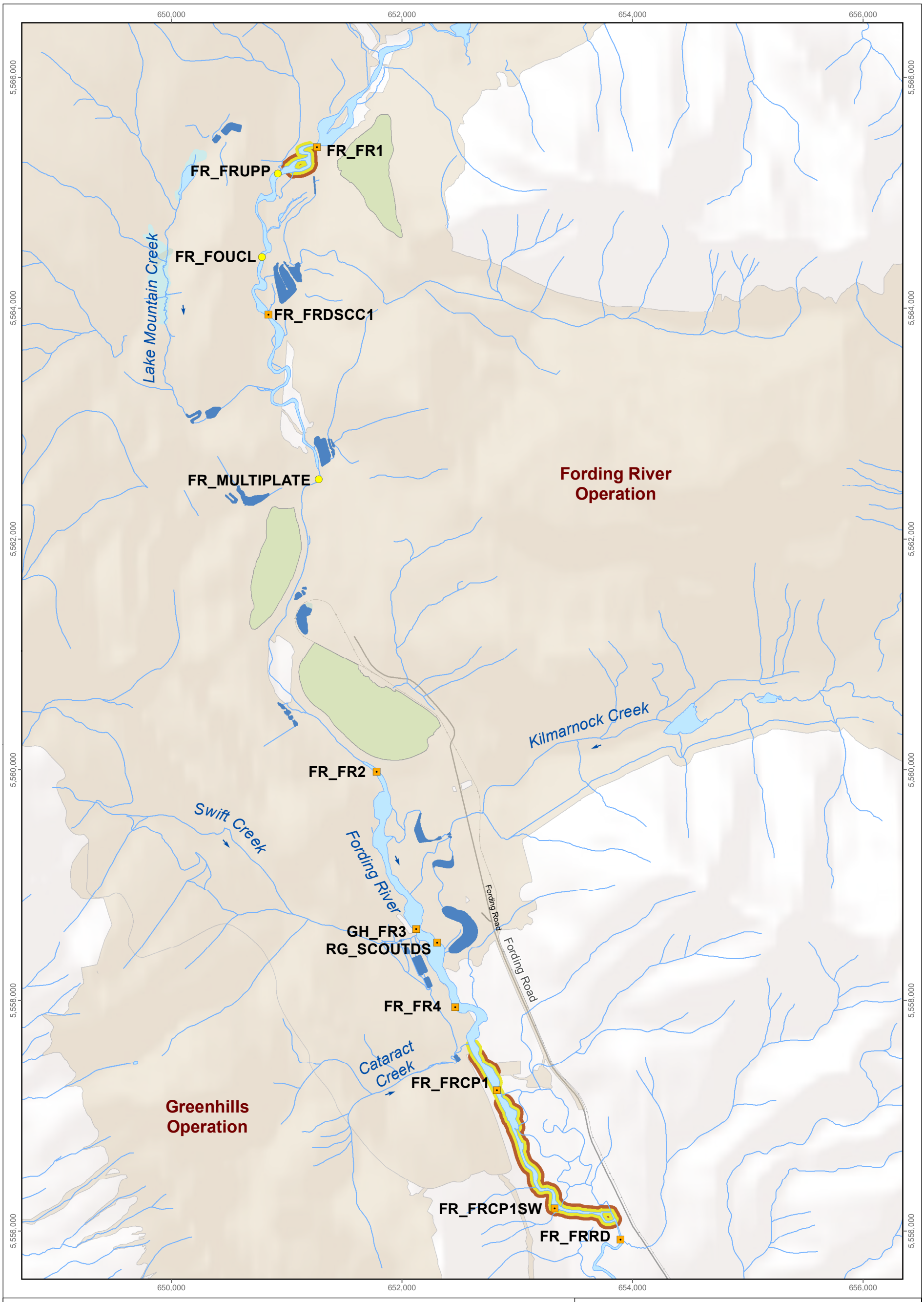
Note: "-" indicates no data available.

Table B.6: Water Quality Data for Biological Monitoring Areas, FRO LAEMP, April, June, September, and December 2020

Analytes		Units	RG_FOUEW	RG_TRIP	RG_RIVER	RG_FBLANK
			10-Dec-20	10-Dec-20	10-Dec-20	10-Dec-20
			11:20	11:56	11:56	11:56
Physical Tests	Conductivity (@ 25C)	uS/cm	1,110	<2.0	1,250	<2.0
	Hardness (as CaCO3)	mg/L	704	-	792	<0.50
	pH	pH	8.2	5.6	8.2	5.6
	ORP	mV	412	389	397	459
	Total Suspended Solids	mg/L	<1.0	<1.0	3.4	<1.0
	Total Dissolved Solids	mg/L	831	<10	980	<10
	Turbidity	NTU	0.12	<0.10	0.17	<0.10
Ions and Nutrients	Acidity (as CaCO3)	mg/L	1.4	1.3	4	1.5
	Alkalinity, Bicarbonate (as CaCO3)	mg/L	226	<1.0	277	<1.0
	Alkalinity, Carbonate (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3)	mg/L	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3)	mg/L	226	<1.0	277	<1.0
	Ammonia as N	mg/L	<0.0050	<0.0050	0.03	<0.0050
	Bromide (Br)	mg/L	<0.25	<0.050	<0.25	<0.050
	Chloride (Cl)	mg/L	1.7	<0.10	2.3	<0.10
	Fluoride (F)	mg/L	0.11	<0.020	0.12	<0.020
	Ion Balance	%	105	0	103	0
	Nitrate (as N)	mg/L	23	<0.0050	31	<0.0050
	Nitrite (as N)	mg/L	<0.0050	<0.0010	<0.0050	<0.0010
	Total Kjeldahl Nitrogen	mg/L	0.062	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P)	mg/L	0.0017	<0.0010	0.0033	<0.0010
	Phosphorus (P)-Total	mg/L	0.0063	<0.0020	0.0040	<0.0020
	Sulfate (SO4)	mg/L	354	<0.30	376	<0.30
	Anion Sum	meq/L	14	<0.10	16	<0.10
	Cation Sum	meq/L	14	<0.10	16	<0.10
	Cation - Anion Balance	%	2.3	0.0	1.3	0.0
Carbon	Dissolved Organic Carbon	mg/L	<0.50	-	<0.50	<0.50
	Total Organic Carbon	mg/L	0.57	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total	mg/L	0.0117	<0.0030	0.0056	<0.0030
	Antimony (Sb)-Total	mg/L	<0.00010	<0.00010	0.00012	<0.00010
	Arsenic (As)-Total	mg/L	0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Total	mg/L	0.13	<0.00010	0.146	<0.00010
	Beryllium (Be)-Total	ug/L	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total	mg/L	0.011	<0.010	0.016	<0.010
	Cadmium (Cd)-Total	ug/L	0.046	<0.0050	0.061	<0.0050
	Calcium (Ca)-Total	mg/L	150	<0.050	169	<0.050
	Chromium (Cr)-Total	mg/L	0.00012	<0.00010	0.00014	<0.00010
	Cobalt (Co)-Total	ug/L	0.12	<0.10	0.12	<0.10
	Copper (Cu)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total	mg/L	0.025	<0.010	<0.010	<0.010
	Lead (Pb)-Total	mg/L	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total	mg/L	0.038	<0.0010	0.053	<0.0010
	Magnesium (Mg)-Total	mg/L	69	<0.10	79	<0.10
	Manganese (Mn)-Total	mg/L	0.0052	<0.00010	0.0010	<0.00010
	Mercury (Hg)-Total	ug/L	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total	mg/L	0.00074	<0.000050	0.0008	<0.000050
	Nickel (Ni)-Total	mg/L	0.0006	<0.00050	0.0006	<0.00050
	Potassium (K)-Total	mg/L	1.8	<0.050	2.5	<0.050
	Selenium (Se)-Total	ug/L	96	<0.050	116	<0.050
	Silicon (Si)-Total	mg/L	2.5	<0.10	2.6	<0.10
	Silver (Ag)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total	mg/L	2.6	<0.050	3.3	<0.050
	Strontium (Sr)-Total	mg/L	0.19	<0.00020	0.21	<0.00020
	Thallium (Tl)-Total	mg/L	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total	mg/L	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total	mg/L	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total	mg/L	0.0036	<0.000010	0.0048	<0.000010
	Vanadium (V)-Total	mg/L	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total	mg/L	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved	mg/L	<0.0030	-	0.0092	<0.0030
	Antimony (Sb)-Dissolved	mg/L	<0.00010	-	<0.00010	<0.00010
	Arsenic (As)-Dissolved	mg/L	<0.00010	-	<0.00010	<0.00010
	Barium (Ba)-Dissolved	mg/L	0.11	-	0.124	<0.00010
	Beryllium (Be)-Dissolved	ug/L	<0.020	-	<0.020	<0.020
	Bismuth (Bi)-Dissolved	mg/L	<0.000050	-	<0.000050	<0.000050
	Boron (B)-Dissolved	mg/L	0.013	-	0.019	<0.010
	Cadmium (Cd)-Dissolved	ug/L	0.036	-	0.054	<0.0050
	Calcium (Ca)-Dissolved	mg/L	171	<0.050	188	<0.050
	Chromium (Cr)-Dissolved	mg/L	0.00015	-	0.00015	<0.00010
	Cobalt (Co)-Dissolved	ug/L	<0.10	-	0.11	<0.10
	Copper (Cu)-Dissolved	mg/L	<0.00020	-	<0.00020	<0.00020
	Iron (Fe)-Dissolved	mg/L	<0.010	-	<0.010	<0.010
	Lead (Pb)-Dissolved	mg/L	<0.000050	-	<0.000050	<0.000050
	Lithium (Li)-Dissolved	mg/L	0.044	-	0.060	<0.0010
	Magnesium (Mg)-Dissolved	mg/L	67	<0.0050	78	<0.10
	Manganese (Mn)-Dissolved	mg/L	0.00373	-	0.0009	<0.00010
	Mercury (Hg)-Dissolved	mg/L	<0.0000050	-	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved	mg/L	0.00080	-	0.0008	<0.000050
	Nickel (Ni)-Dissolved	mg/L	0.0007	-	0.0008	<0.00050
	Potassium (K)-Dissolved	mg/L	1.9	<0.050	2.6	<0.050
	Selenium (Se)-Dissolved	ug/L	108	-	132	<0.050
	Silicon (Si)-Dissolved	mg/L	2.4	-	2.5	<0.050
	Silver (Ag)-Dissolved	mg/L	<0.000010	-	<0.000010	<0.000010
	Sodium (Na)-Dissolved	mg/L	2.5	<0.050	3.2	<0.050
	Strontium (Sr)-Dissolved	mg/L	0.20	-	0.20	<0.00020
	Thallium (Tl)-Dissolved	mg/L	<0.000010	-	<0.000010	<0.000010
	Tin (Sn)-Dissolved	mg/L	<0.00010	-	<0.00010	<0.00010
	Titanium (Ti)-Dissolved	mg/L	<0.010	-	<0.010	<0.010
	Uranium (U)-Dissolved	mg/L	0.0036	-	0.0045	<0.000010
	Vanadium (V)-Dissolved	mg/L	<0.00050	-	<0.00050	<0.00050
	Zinc (Zn)-Dissolved	mg/L	0.0011	-	0.0018	<0.0010

Note: "-" indicates no data available.

APPENDIX C
HYDROLOGY



LEGEND

- Dry Section - January 06
- Dry Section - January 22
- Continuous Logger Station
- Water Quality Monitoring Station
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Drying Surveys in South Section of Fording LAEMP, January 2020

0 0.5 1 2
km

N
W E
S

Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.1

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.1 FRO Dewatering - JAN.mxd

650,000 652,000 654,000 656,000

5,566,000 5,564,000 5,562,000 5,560,000 5,558,000 5,556,000

FR_FR1
FR_FRUPP
FR_FOUCL
FR_FRDSCC1
FR_MULTIPLATE
FR_FR2
GH_FR3
RG_SCOUTDS
FR_FR4
FR_FRCP1
FR_FRCP1SW
FR_FRRD

Lake Mountain Creek
Swift Creek
Fording River
Kilmarnock Creek
Cataract Creek
Fording Road
Fording Road

Fording River Operation
Greenhills Operation

LEGEND

- Dry Section - February 07
- Dry Section - February 22
- Continuous Logger Station
- Water Quality Monitoring Station
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Drying Surveys in South Section of Fording LAEMP, February 2020

0 0.5 1 2
km

N W E S

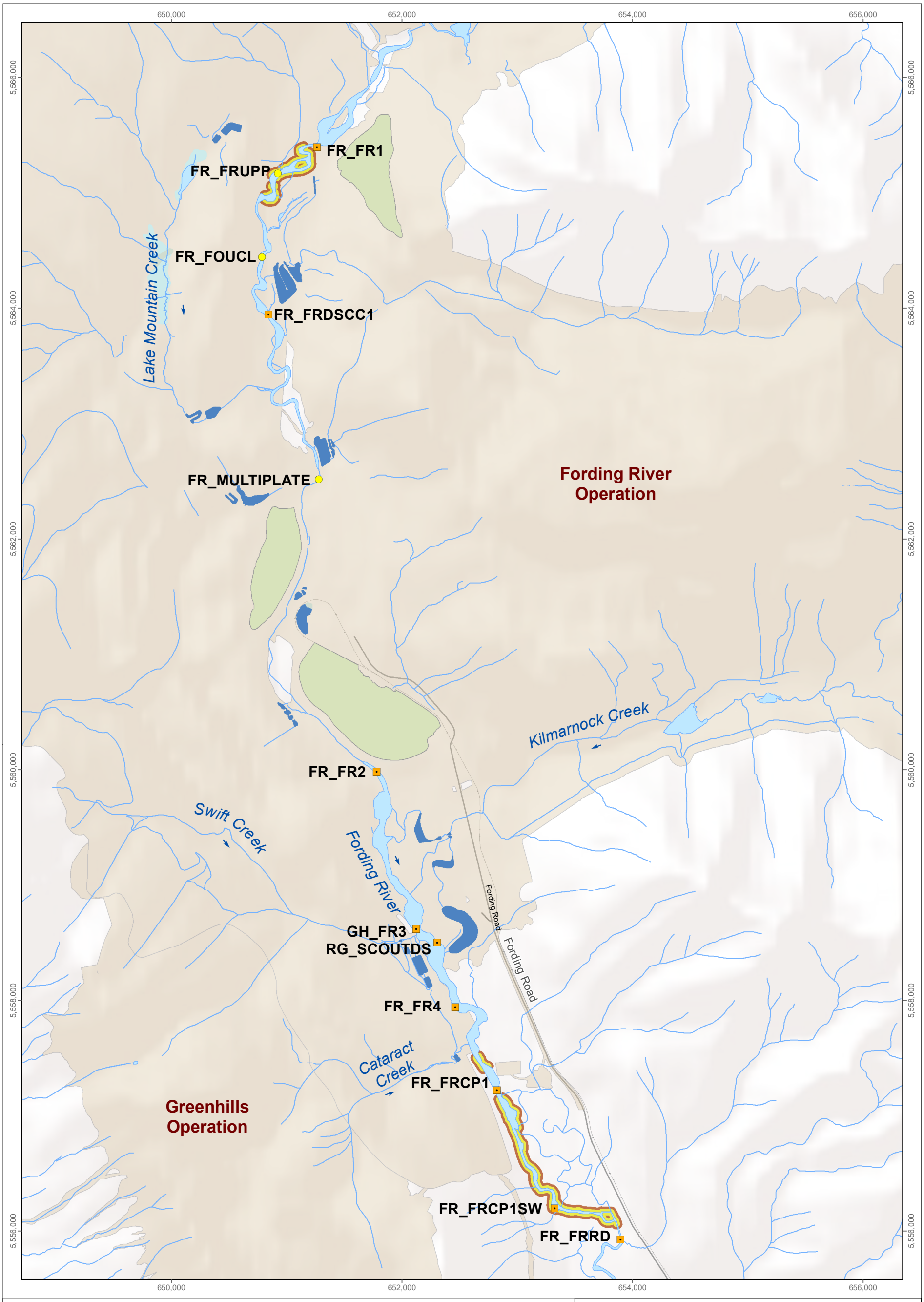
Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.2

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.2 FRO Dewatering - FEB.mxd



LEGEND

- Dry Section - March 09
- Dry Section - March 18
- Continuous Logger Station
- Water Quality Monitoring Station
- Teck Coal Mine Operation
- Settling Pond
- Tailings Pond

Drying Surveys in South Section of Fording LAEMP, March 2020

0 0.5 1 2
km

N
W E
S

Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.3

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.3 FRO Dewatering - MARCH.mxd

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5,566,000 5,564,000 5,562,000 5,560,000 5,558,000 5,556,000

FR_FR1
FR_FRUPP
FR_FOUCL
FR_FRDSCC1
FR_MULTIPLATE
FR_FR2
GH_FR3
RG_SCOUTDS
FR_FR4
FR_FRCP1
FR_FRCP1SW
FR_FRRD

Lake Mountain Creek
Swift Creek
Fording River
Kilmarnock Creek
Cataract Creek
Fording Road
Fording Road

Fording River Operation
Greenhills Operation

LEGEND

- Dry Section
- Continuous Logger Station
- Water Quality Monitoring Station
- Teck Coal Mine Operation
- Settling Pond
- Tailings Pond

Drying Surveys in South Section of Fording LAEMP, April 2020

0 0.5 1 2
km

N
W E
S

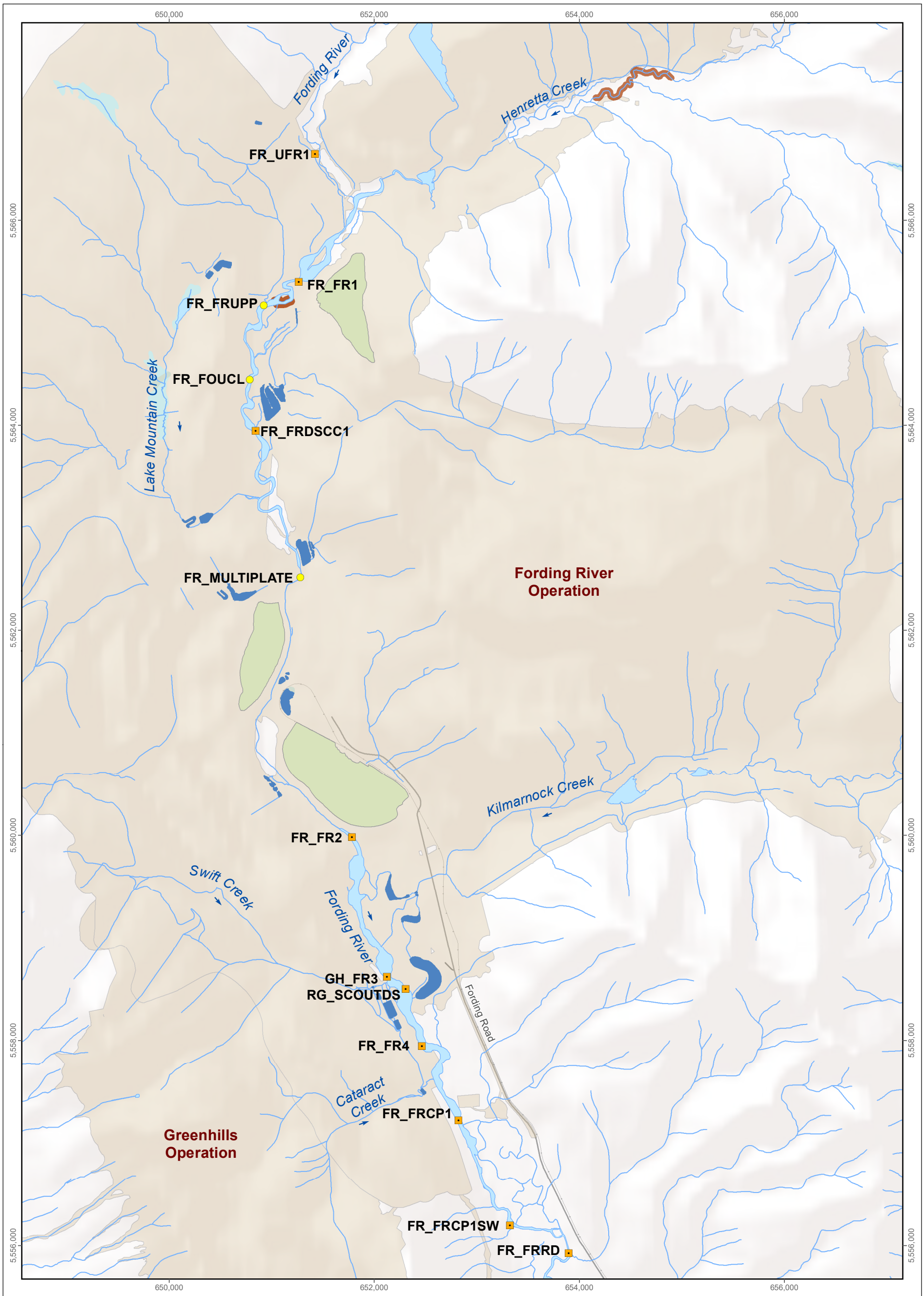
Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.4

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.4 FRO Dewatering - APRIL.mxd



LEGEND

- Dry Section
- Continuous Logger Station
- Water Quality Monitoring Station
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Drying Surveys in South Section of Fording LAEMP, October 2020

0 0.5 1 2
km

N
W E
S

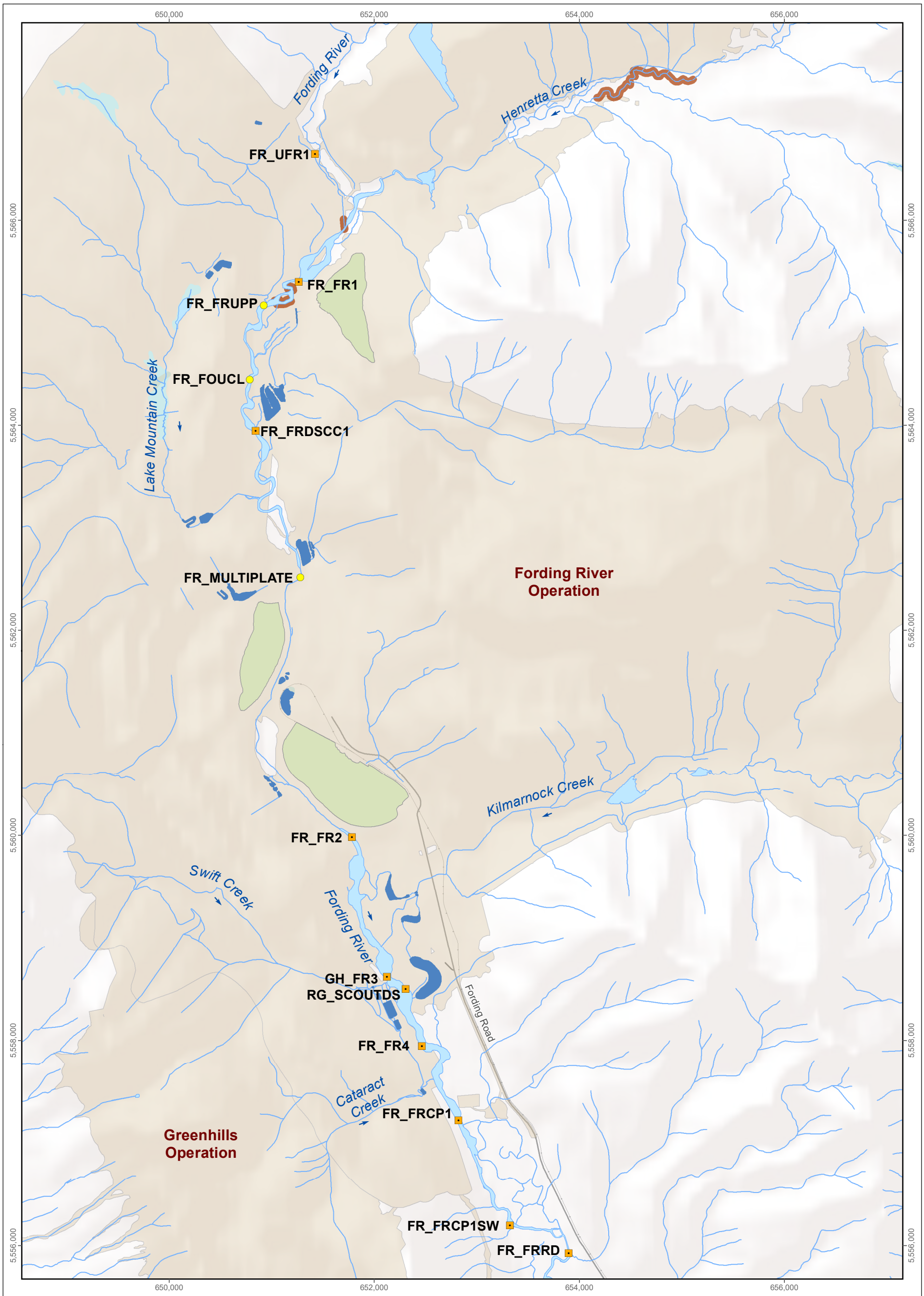
Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.5

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.5 FRO Dewatering - OCT.mxd



LEGEND

- Dry Section
- Continuous Logger Station
- Water Quality Monitoring Station
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Drying Surveys in South Section of Fording LAEMP, November 2020

0 0.5 1 2
km

N
W E
S

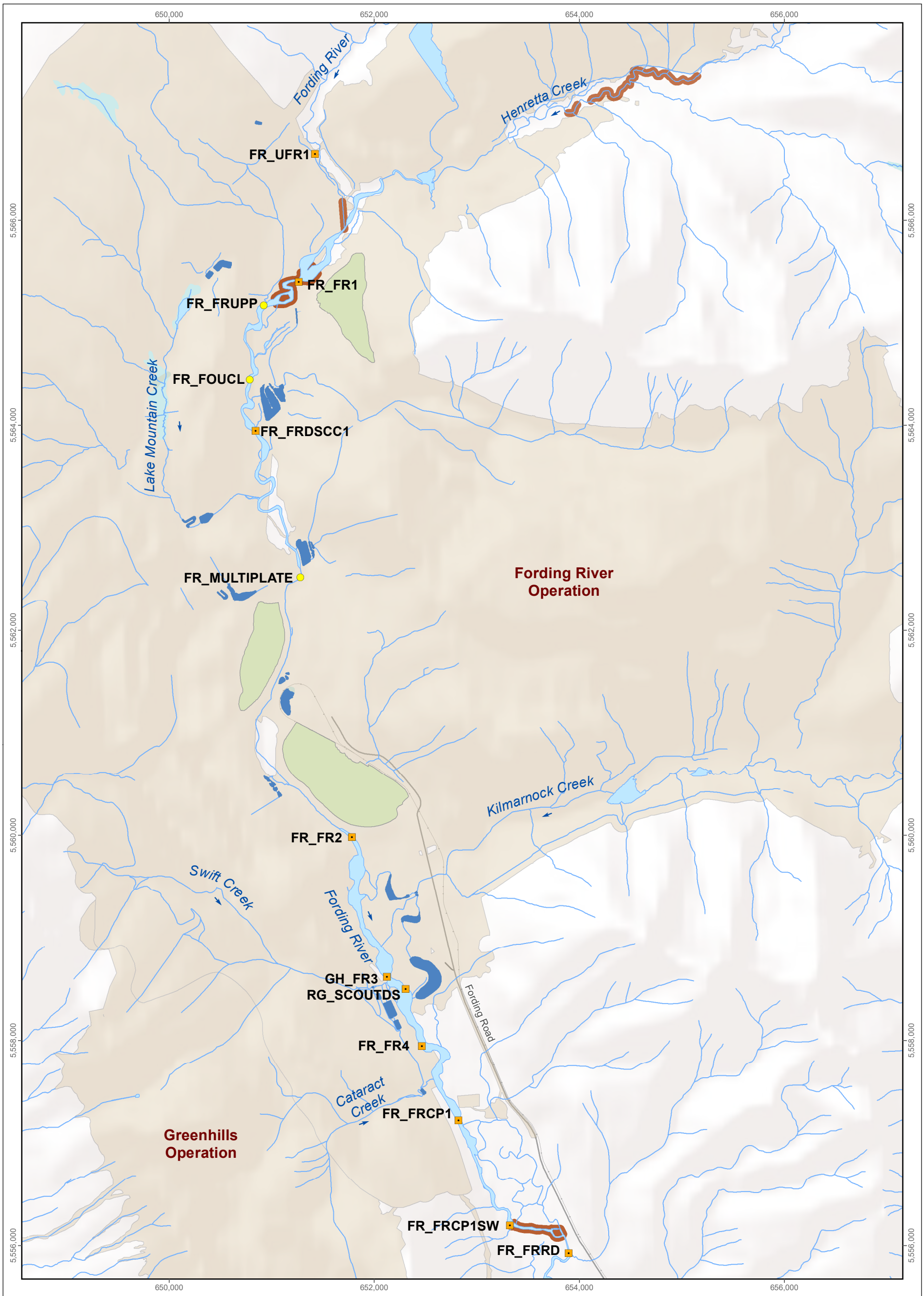
Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.6

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.6 FRO Dewatering - NOV.mxd



LEGEND

- Dry Section
- Continuous Logger Station
- Water Quality Monitoring Station
- Settling Pond
- Tailings Pond
- Teck Coal Mine Operation

Drying Surveys in South Section of Fording LAEMP, December 2020

0 0.5 1 2
km

N
W E
S

Projection: North American Datum 1983 UTM Zone 11 U

Date: May 2021
Project 207202.0009

minnow environmental inc.

Figure C.7

Document Path: C:\Users\MLaPalme\Trinity Consultants, Inc\Teck - 207202.0009 - FRO LAEMP\4 - GIS\2- FRO LAEMP\20-09 Figure C.7 FRO Dewatering - DEC.mxd

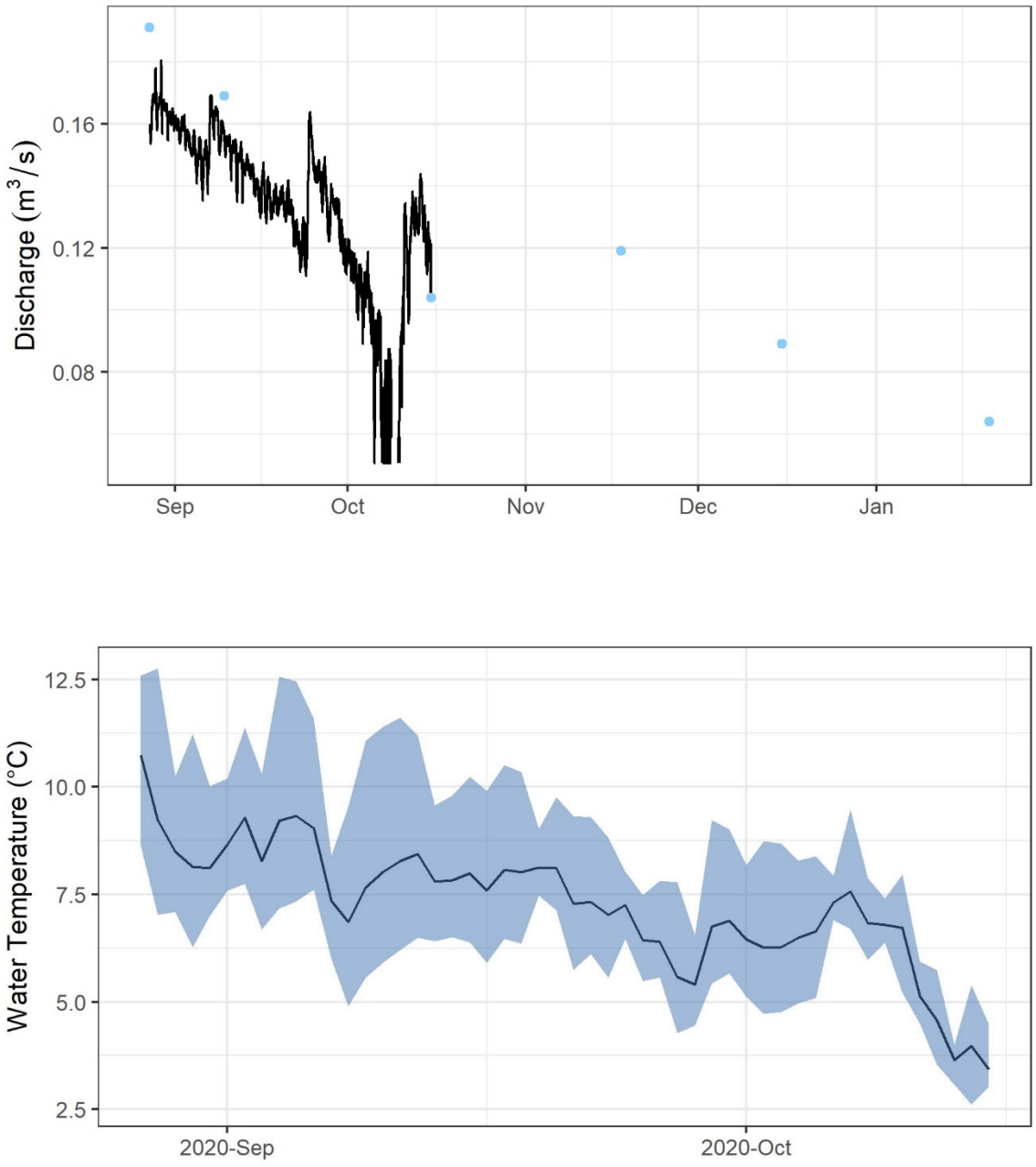


Figure C.8: Discharge and Temperate Plots for FR_UFR1, FRO LAEMP, 2020

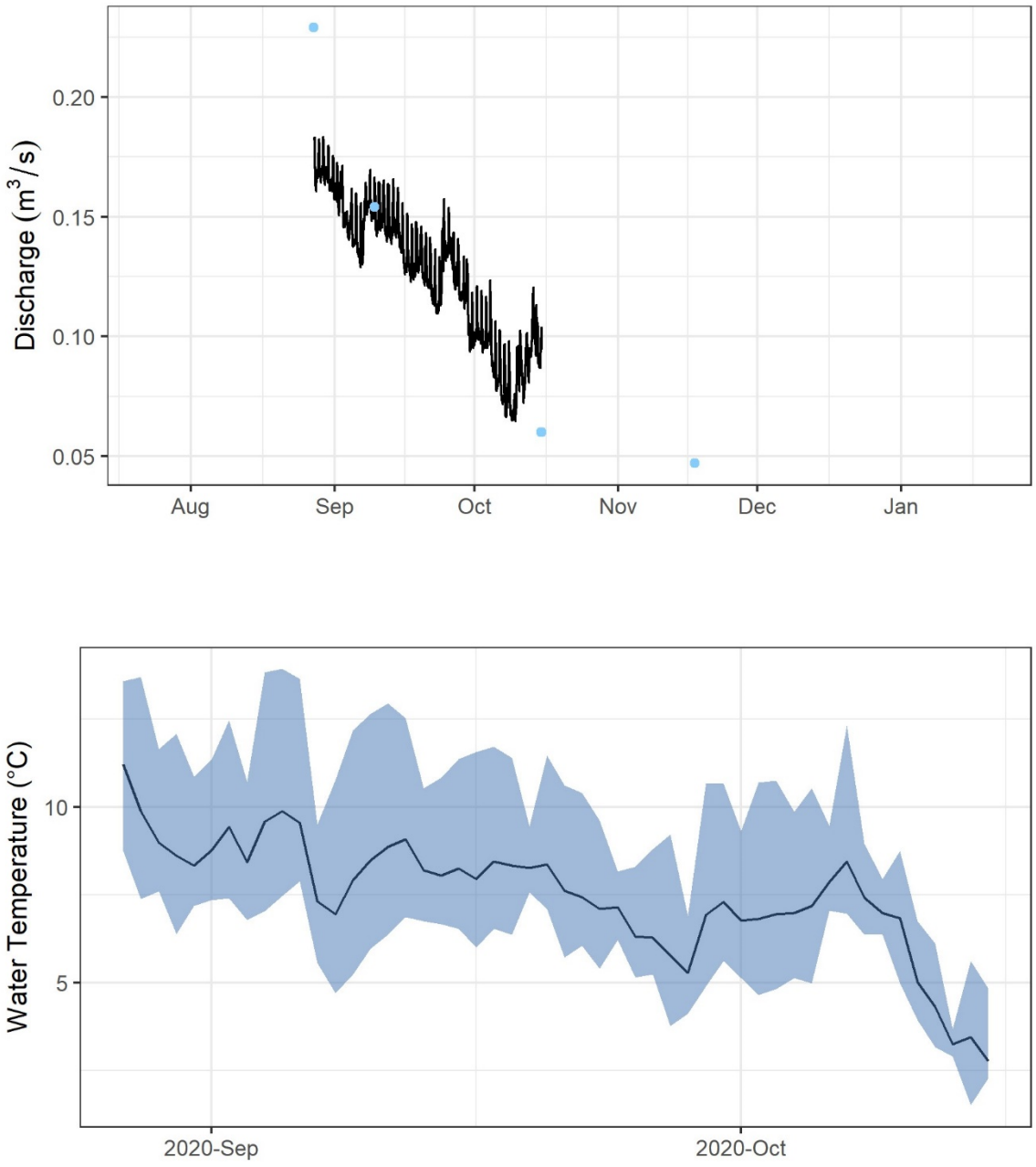


Figure C.9: Discharge and Temperate Plots for FR_FR1, FRO LAEMP, 2020

Average Discharge Measurements
Manual Discharge Measurments
Mean Temperature
Temperature Range

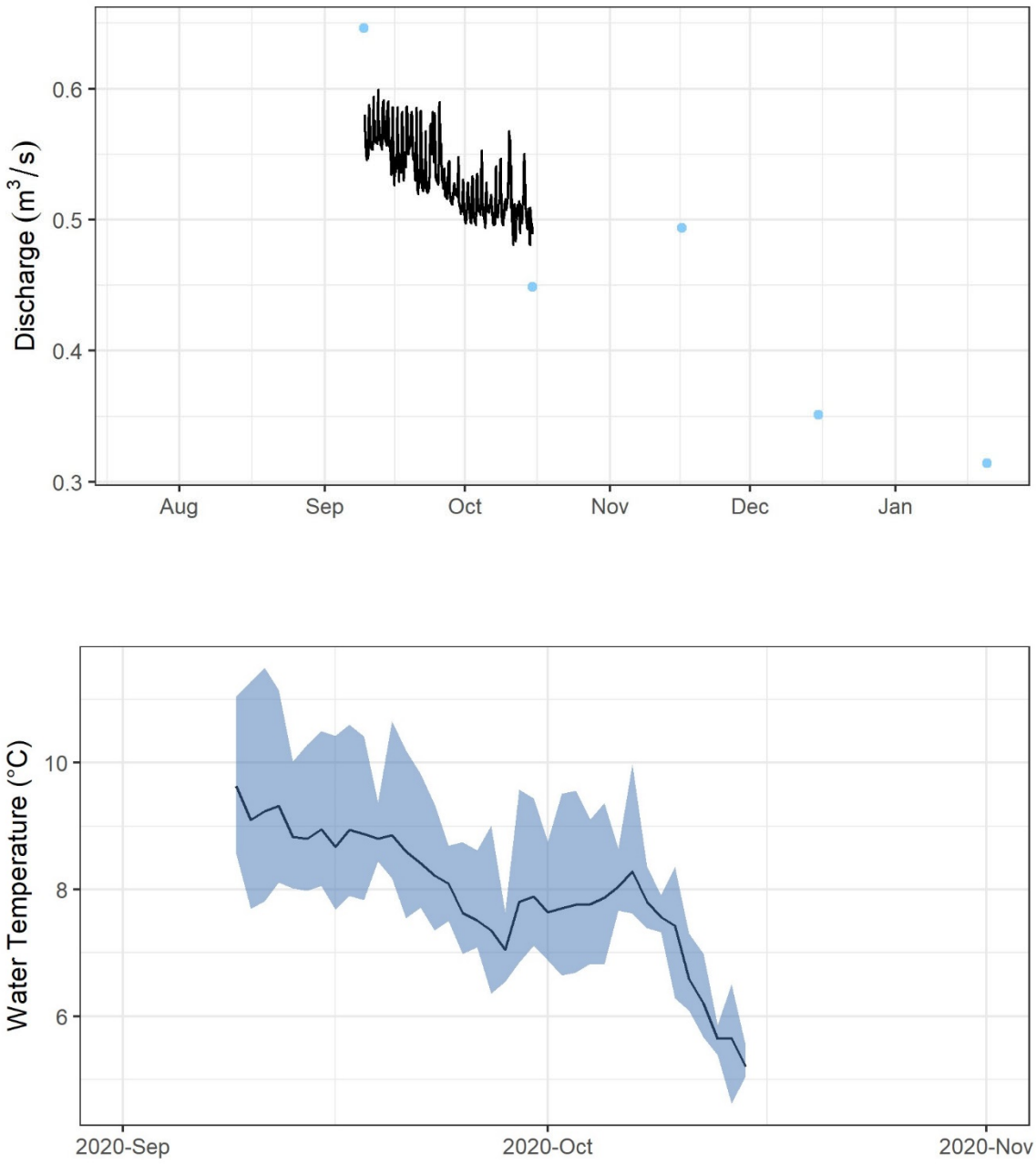


Figure C.10: Discharge and Temperate Plots for FR_FRDSCC1, FRO LAEMP, 2020

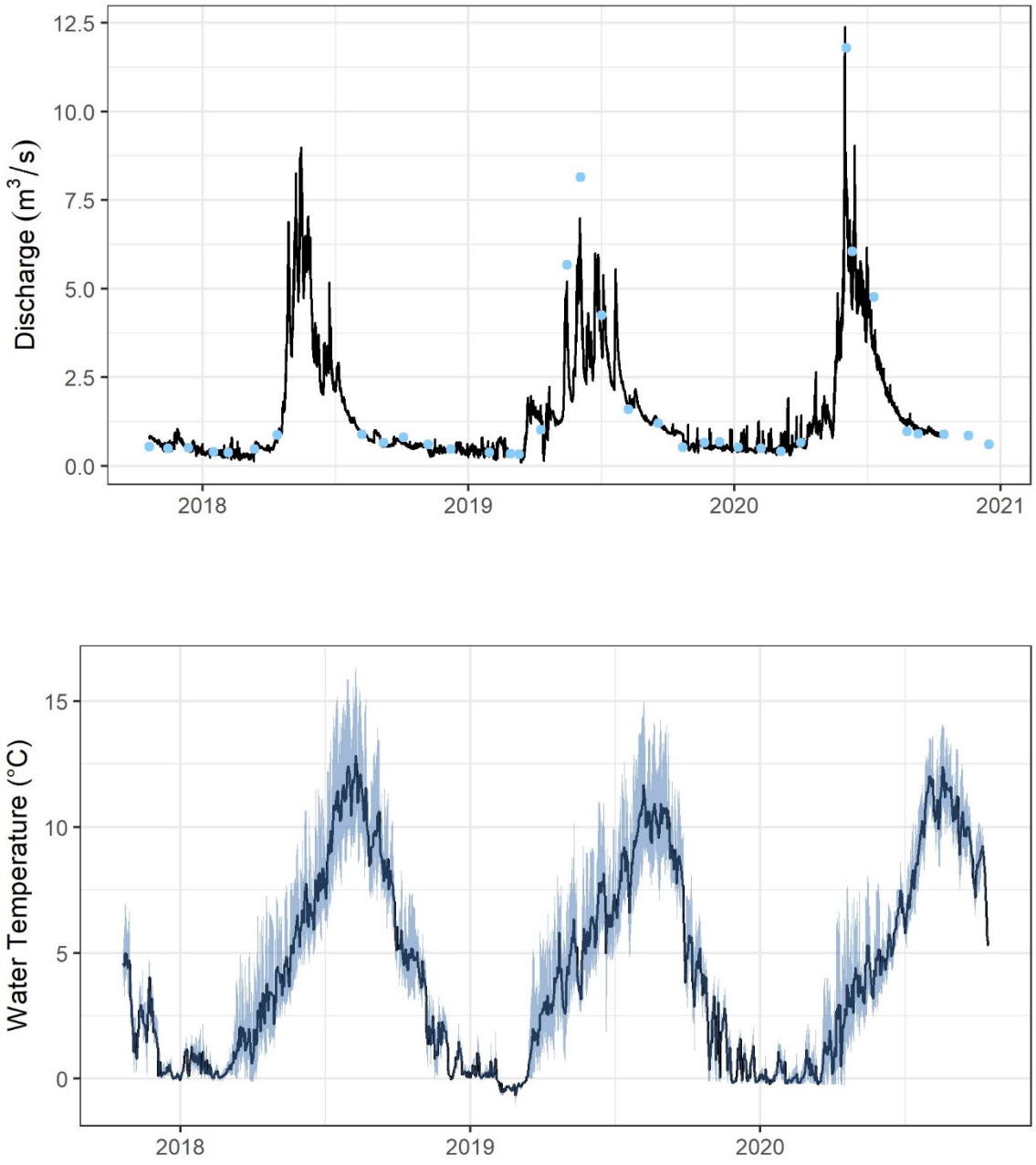


Figure C.11: Discharge and Temperate Plots for FR_FR2, FRO LAEMP, 2020

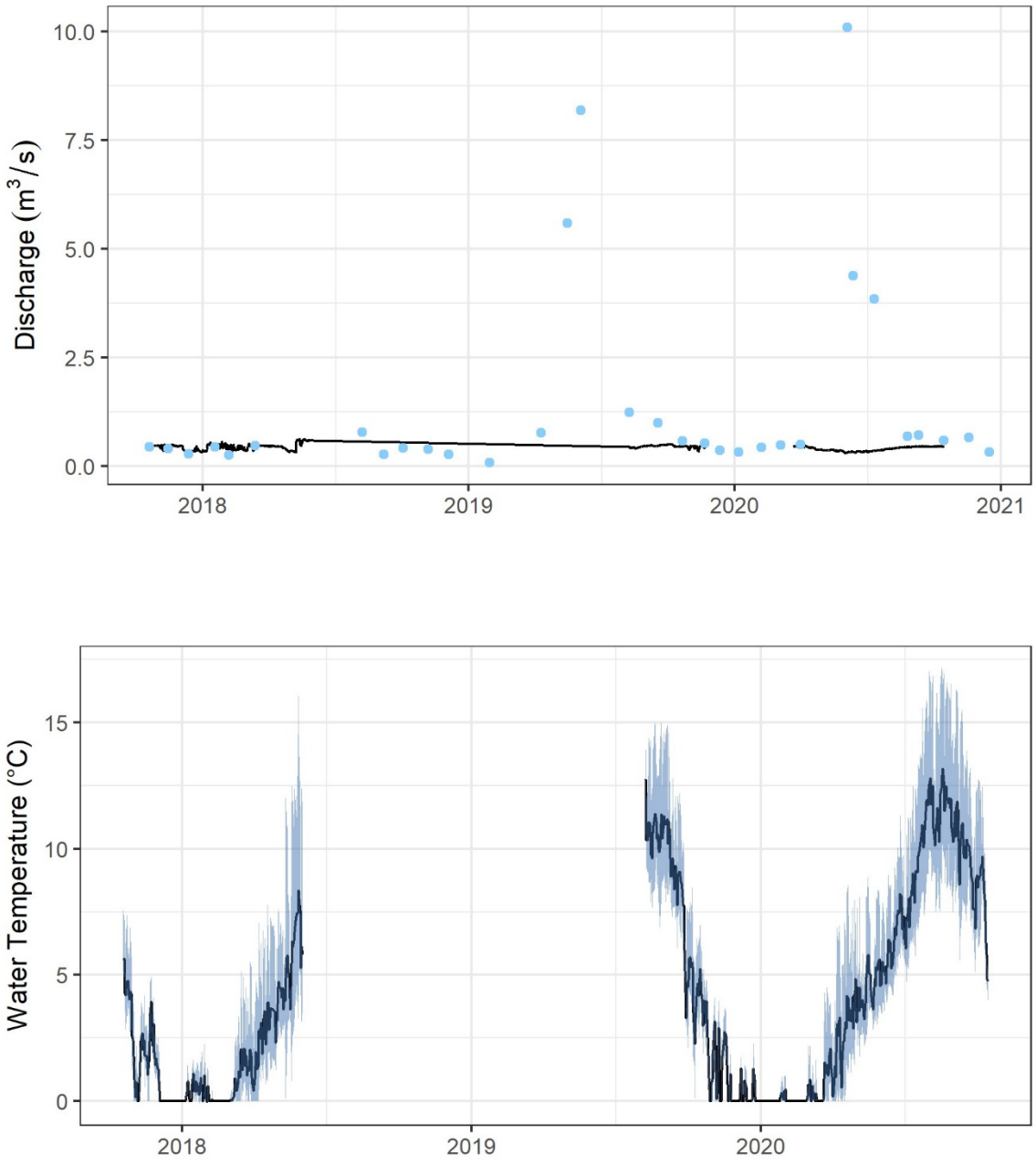


Figure C.12: Discharge and Temperate Plots for FR_FR3, FRO LAEMP, 2020

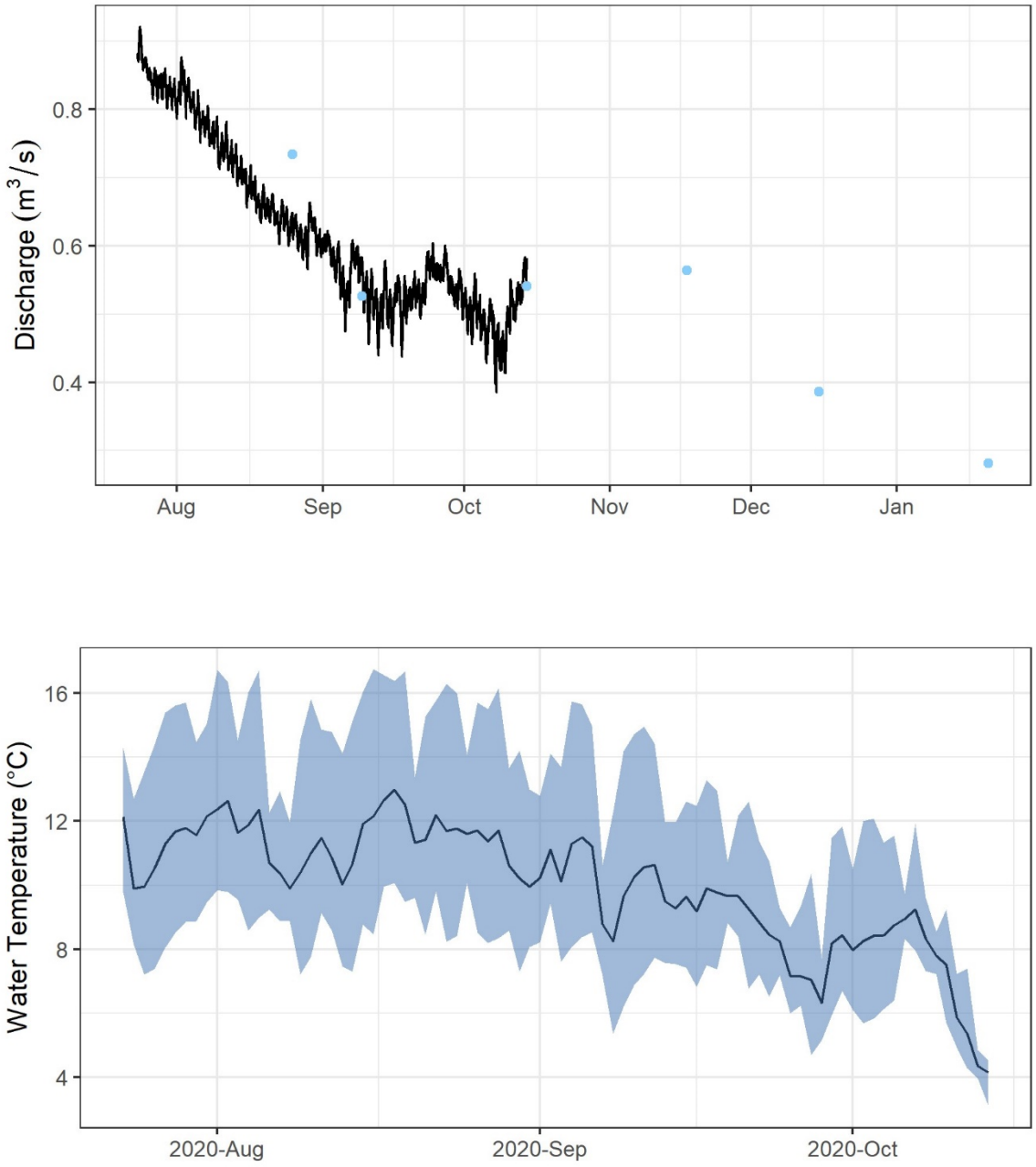


Figure C.13: Discharge and Temperate Plots for FR_SCOUTDS, FRO LAEMP, 2020

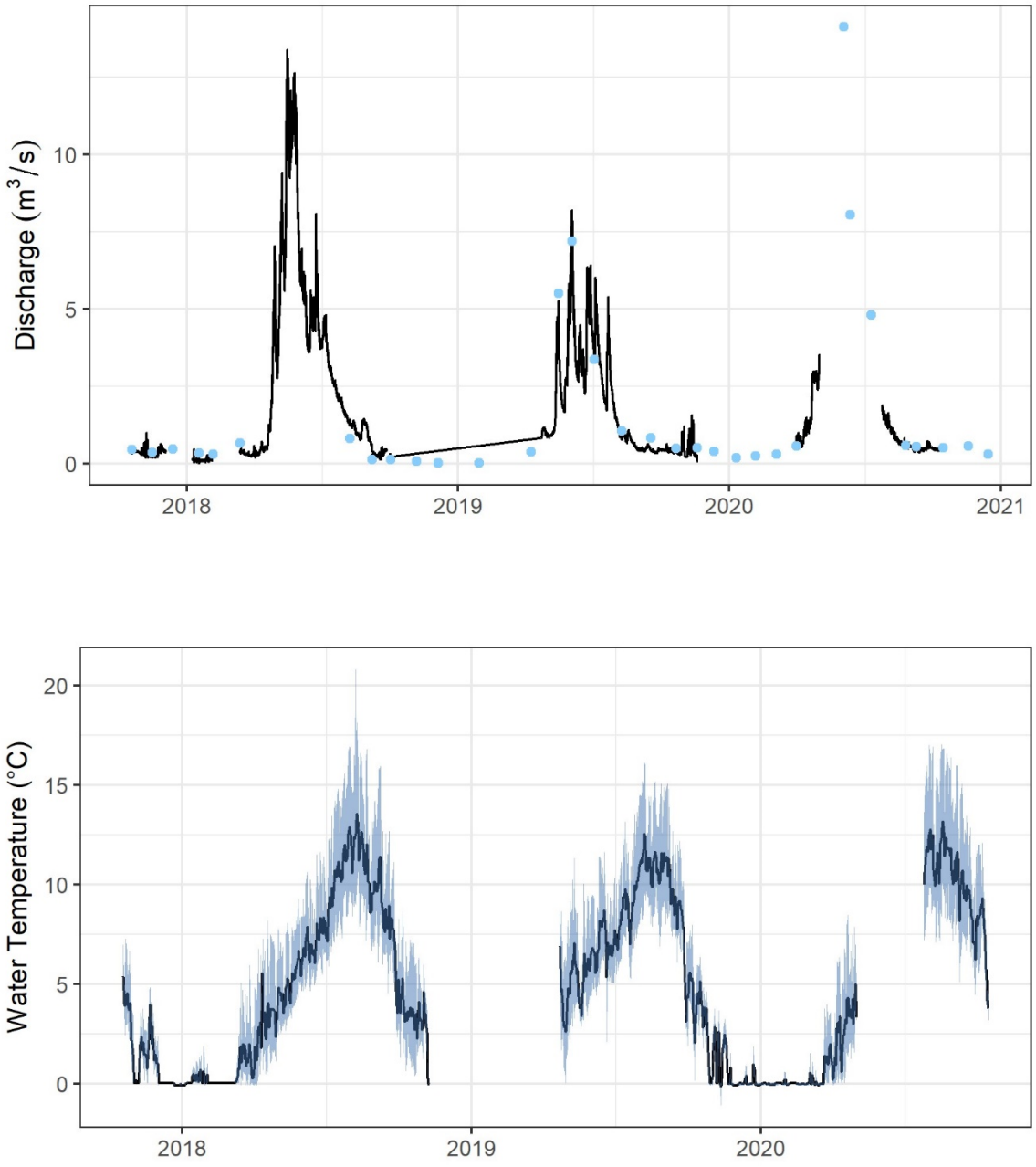


Figure C.14: Discharge and Temperate Plots for FR_FR4, FRO LAEMP, 2020

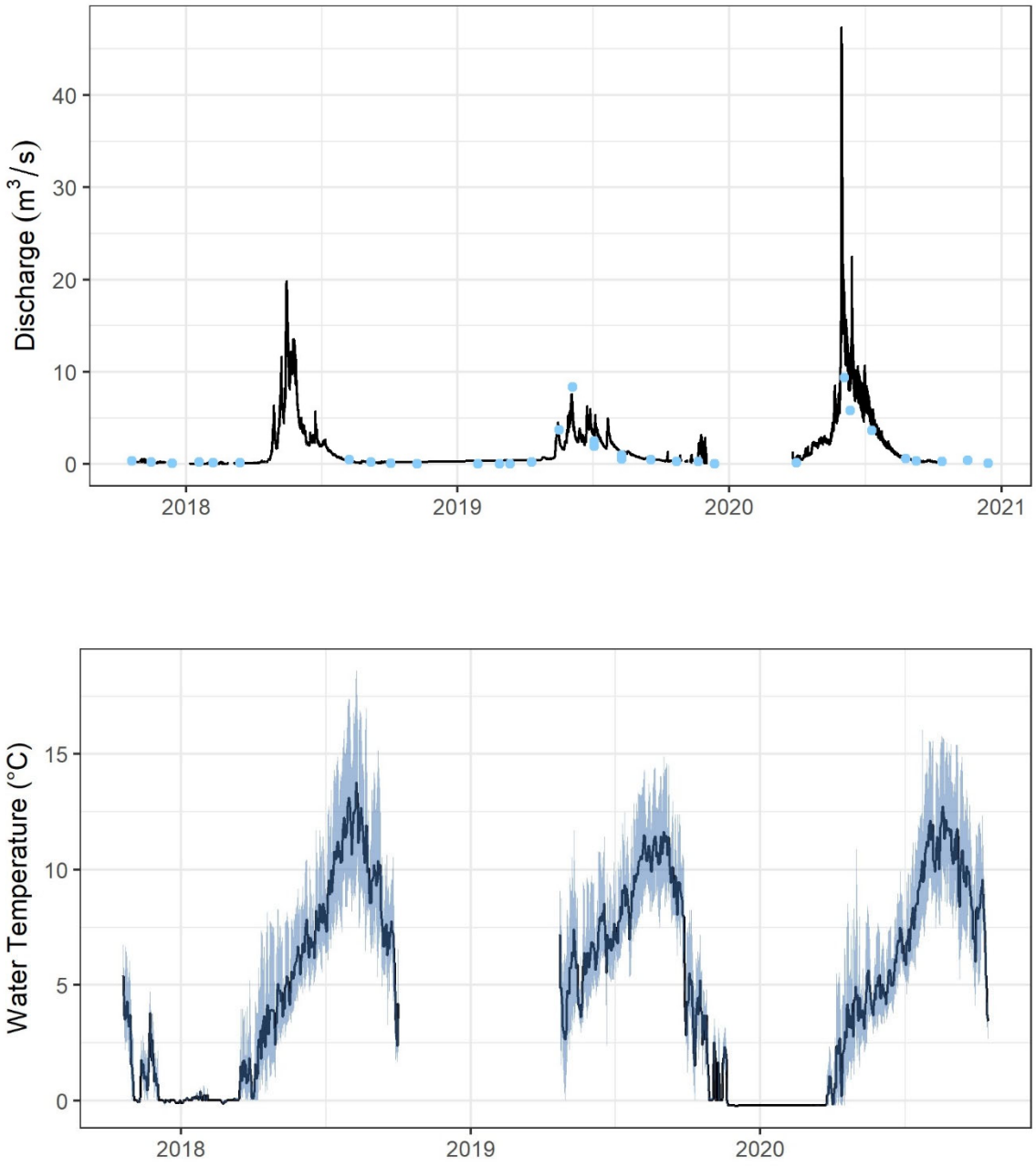


Figure C.15: Discharge and Temperate Plots for FR_FRCP1, FRO LAEMP, 2020

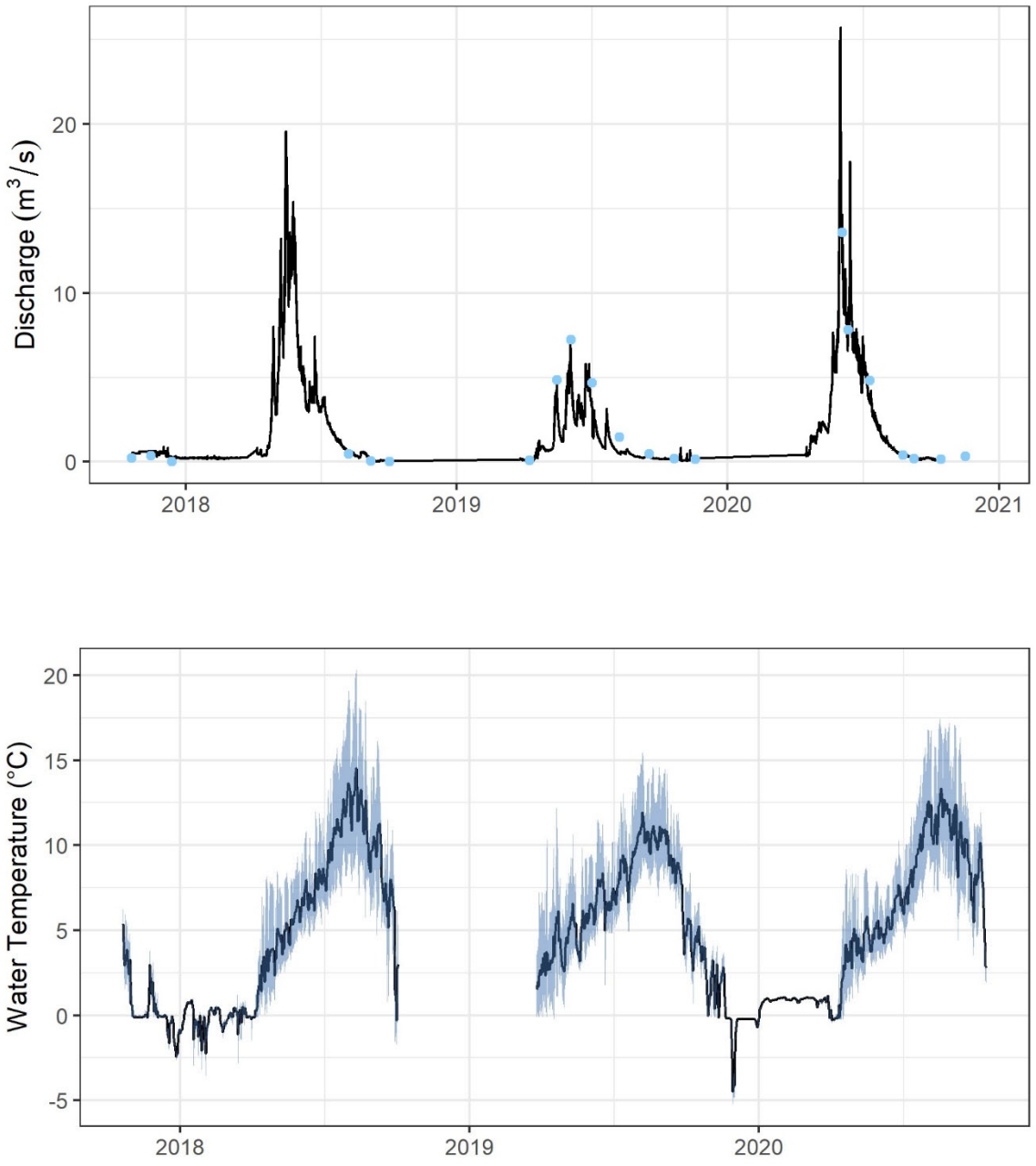


Figure C.16: Discharge and Temperate Plots for FR_FRCP1SW, FRO LAEMP, 2020

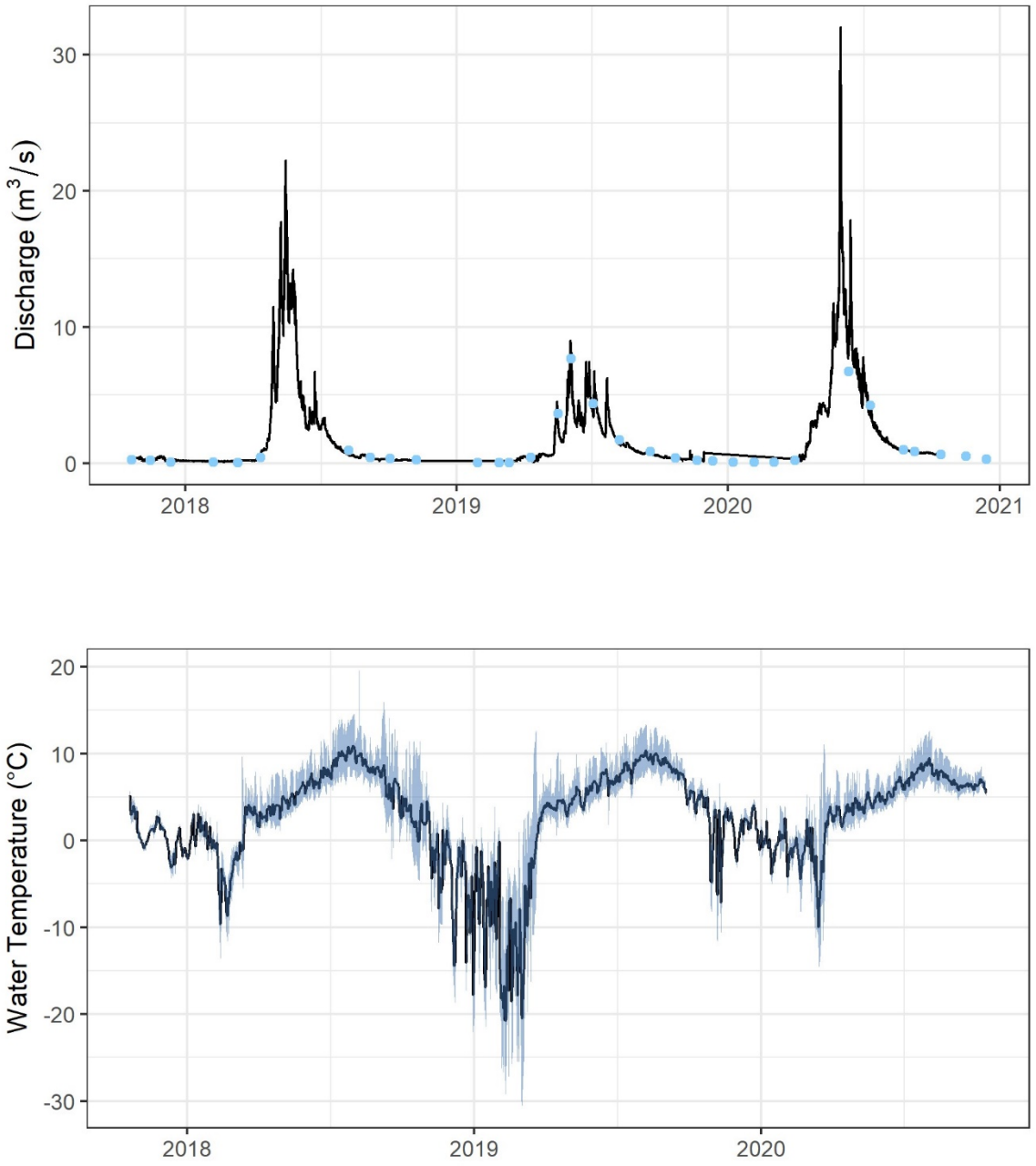


Figure C.17: Discharge and Temperate Plots for FR_FRRD, FRO LAEMP, 2020

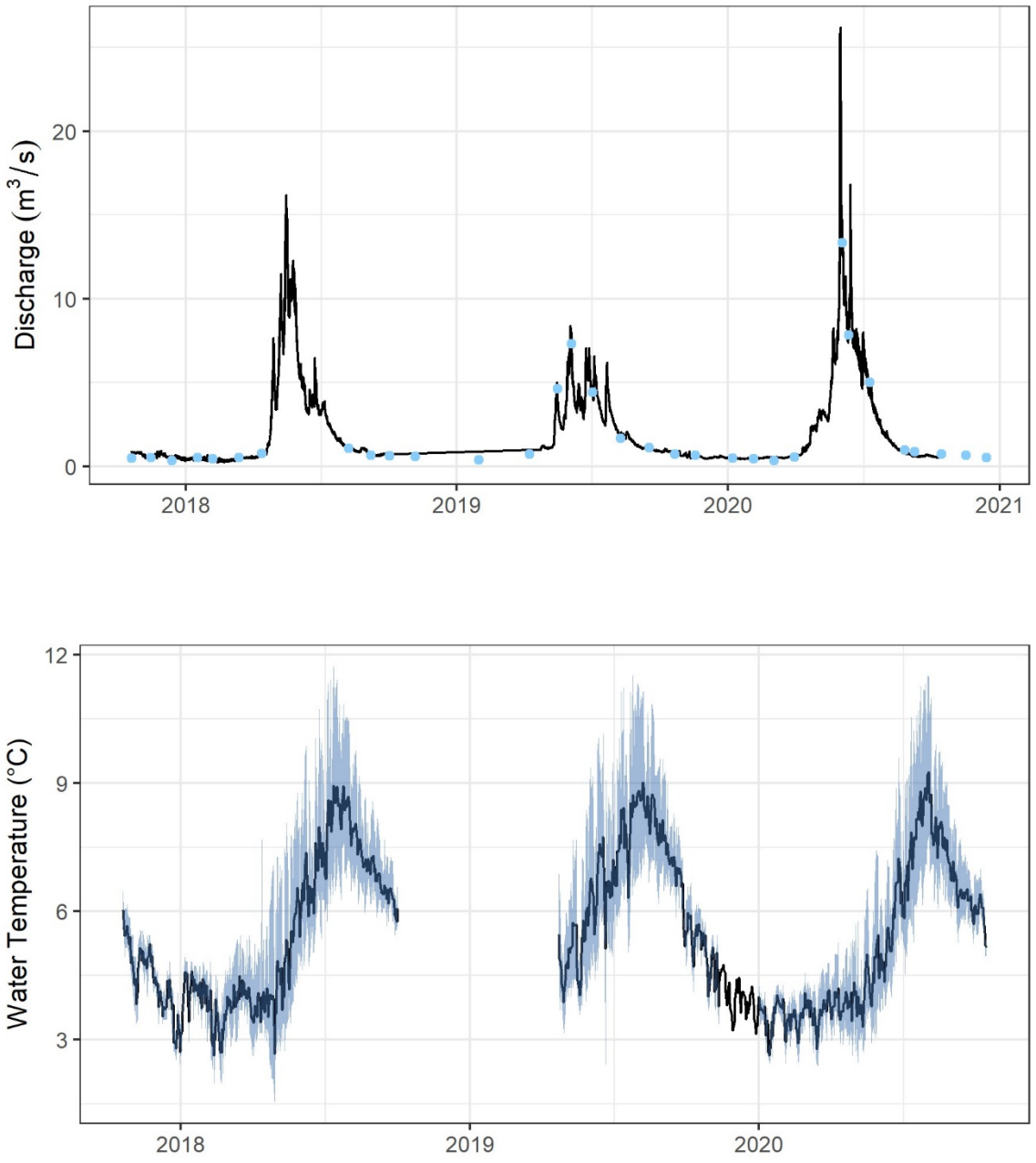


Figure C.18: Discharge and Temperate Plots for GH_PC2, FRO LAEMP, 2020

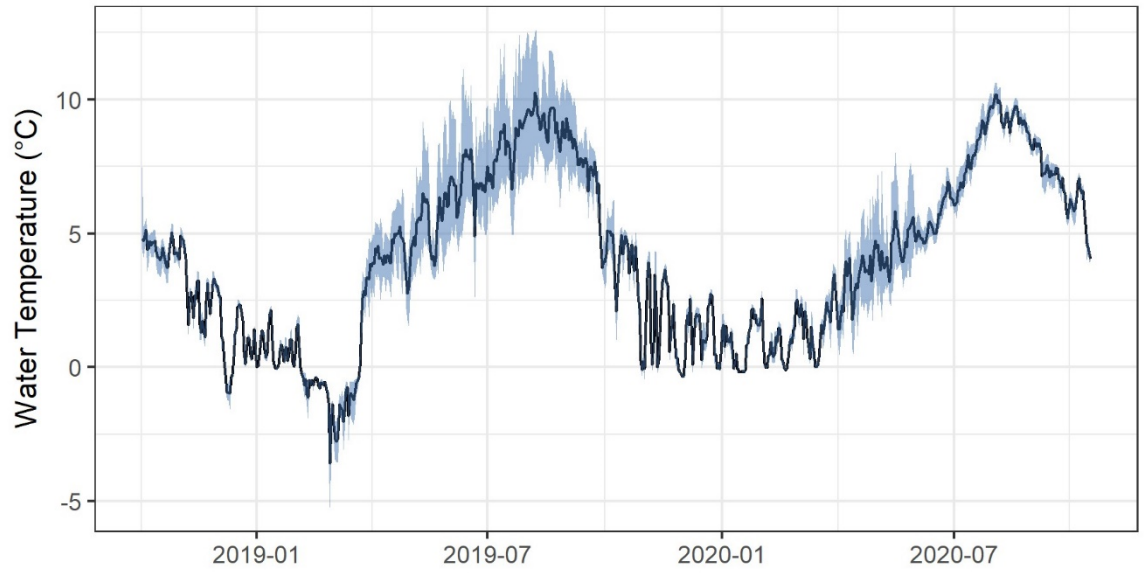


Figure C.19: Temperate Plot for FR_FRABCH, FRO LAEMP, 2020

Mean Temperature
Temperature Range

Table C.1: Summary Table of Error Statistics for Hydrometric Stations, FRO LAEMP, 2020

Site	Number of Measurements	Mean Measured Flow (m^3/s)	Max Measured Flow (m^3/s)	Mean Absolute Error (m^3/s)	Mean Relative Error (%)	Percent Extrapolated (%)
FR_FR2	26	1.48	11.79	0.37	20%	0%
FR_FR3	21	0.54	1.24	0.14	23%	0%
FR_FR4	19	1.28	7.19	0.24	31%	4%
FR_FRCP1	20	0.99	8.38	0.38	28%	6%
FR_FRCP1SW	18	2.6	13.56	0.59	30%	1%
FR_FRRD	25	1.45	7.67	0.3	19%	7%
GH_PC2	30	1.73	13.33	0.1	15%	1%

APPENDIX D
SUBSTRATE QUALITY

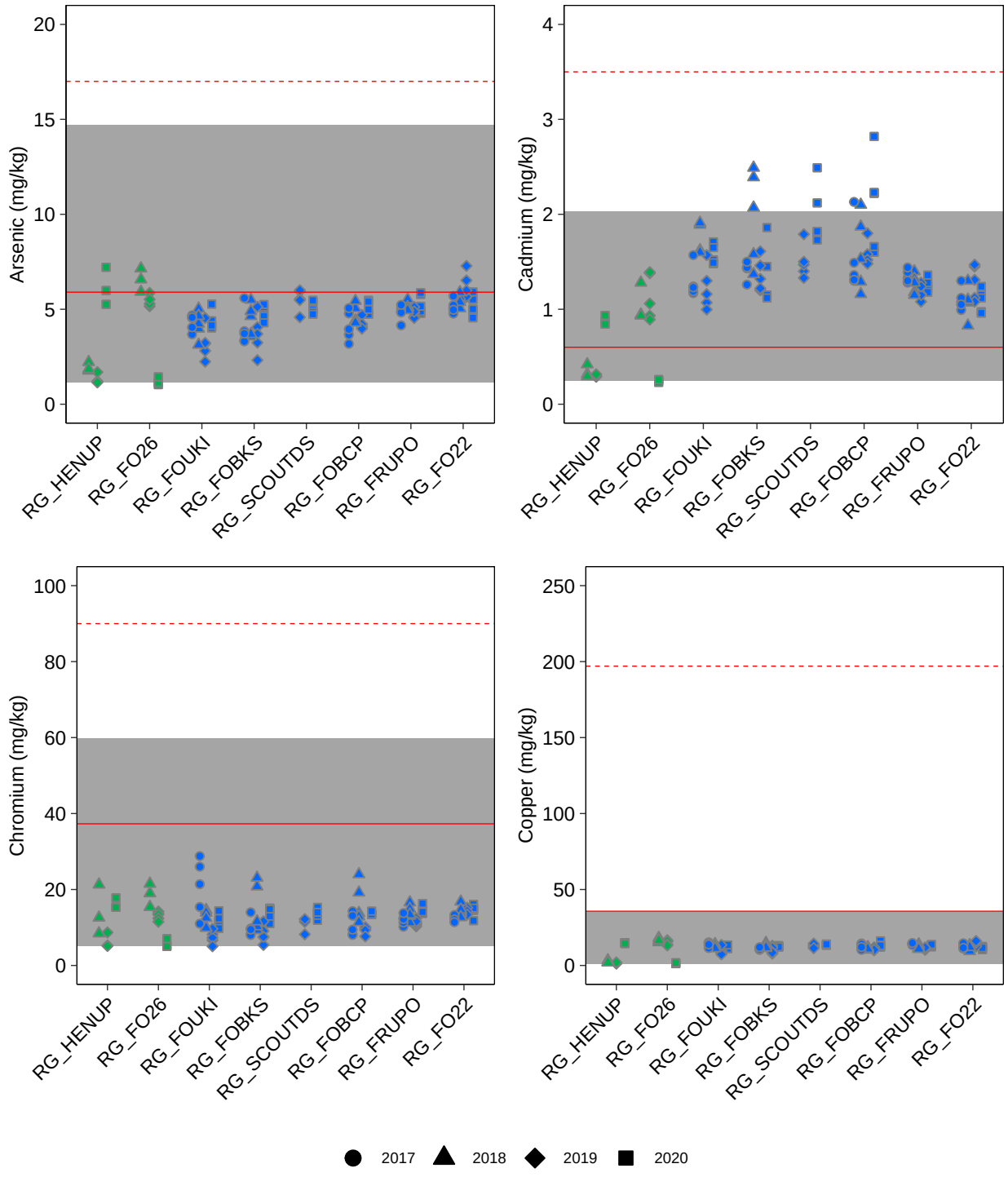
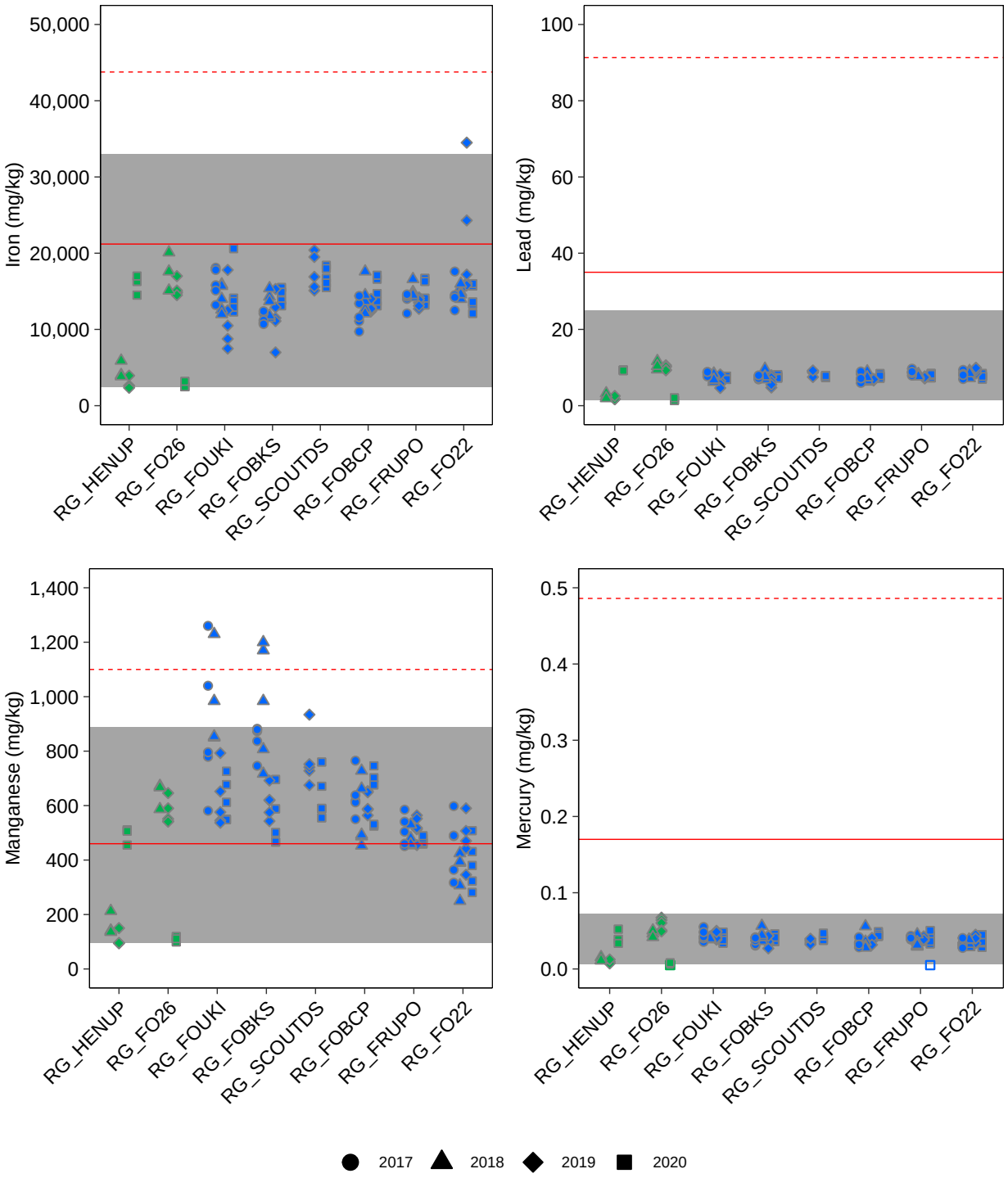


Figure D.1: Sediment Metal Concentrations Relative to BC Working Sediment Quality Guidelines (WSQG) and Two PCA loadings, FRO LAEMP, September 2017 to 2020

Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG (or alert concentration in the case of selenium). Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).



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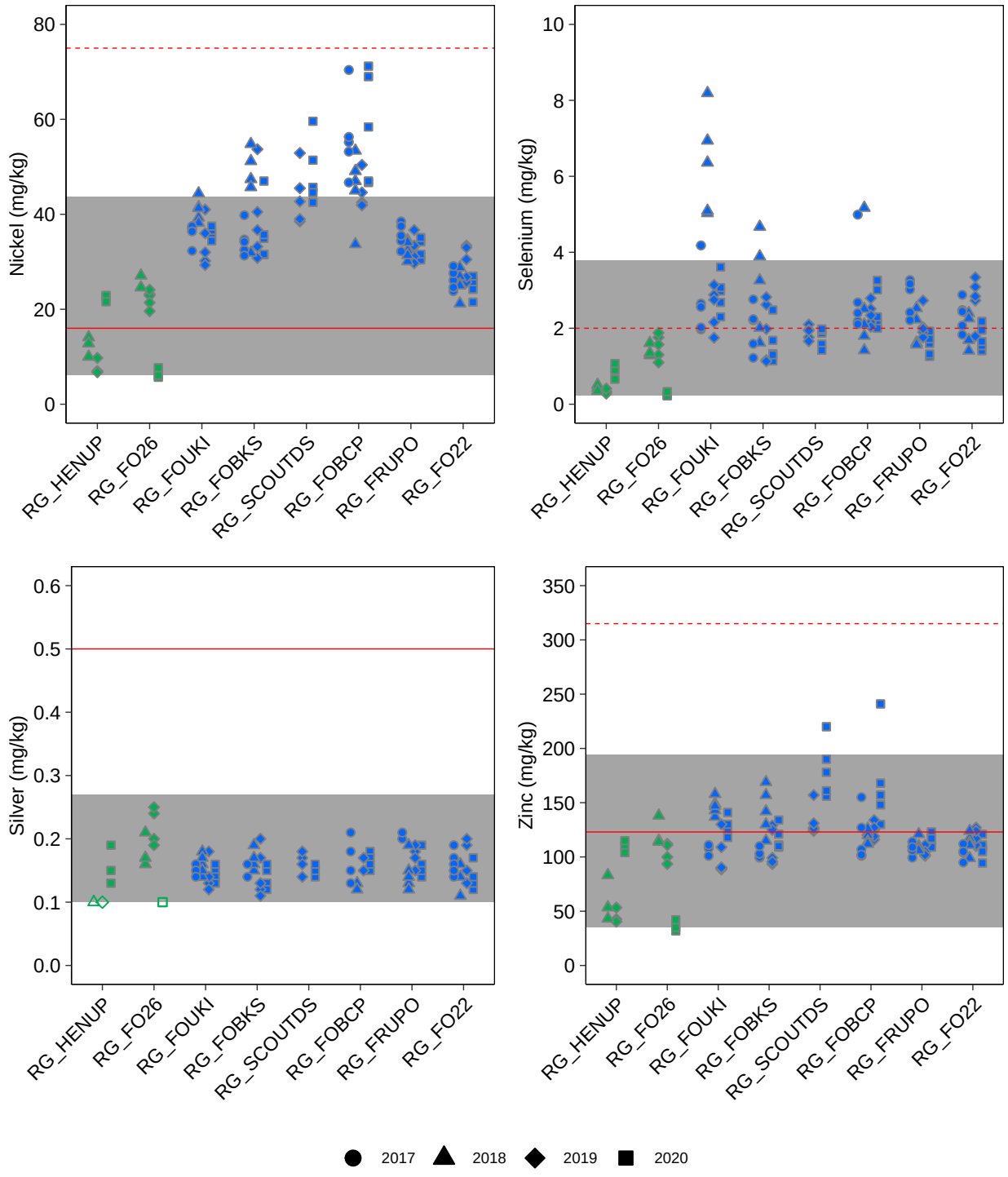
Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG (or alert concentration in the case of selenium). Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).



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Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG (or alert concentration in the case of selenium). Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).

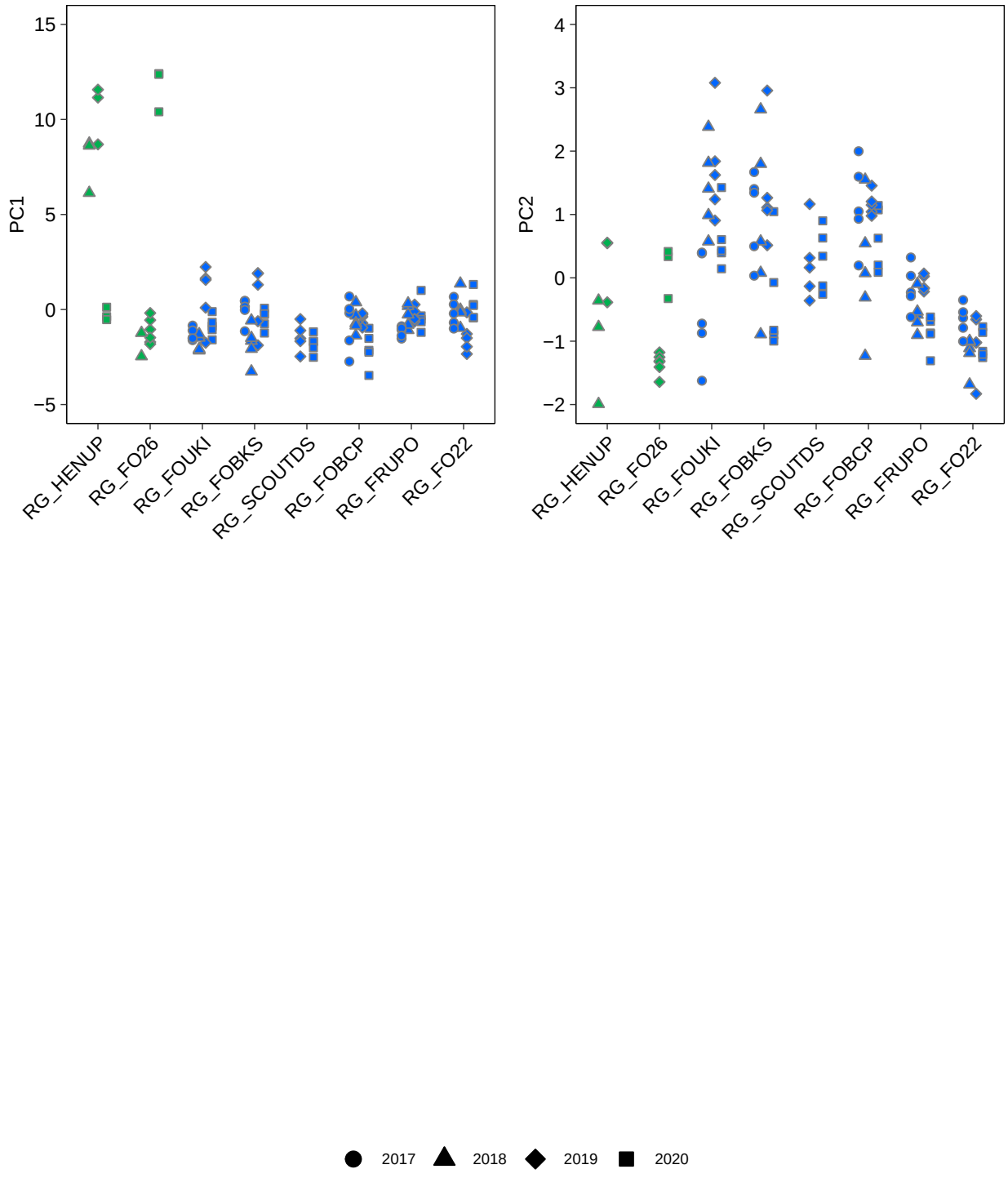

Figure D.1: Sediment Metal Concentrations Relative to BC Working Sediment Quality Guidelines (WSQG) and Two PCA loadings, FRO LAEMP, September 2017 to 2020

Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG (or alert concentration in the case of selenium). Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).

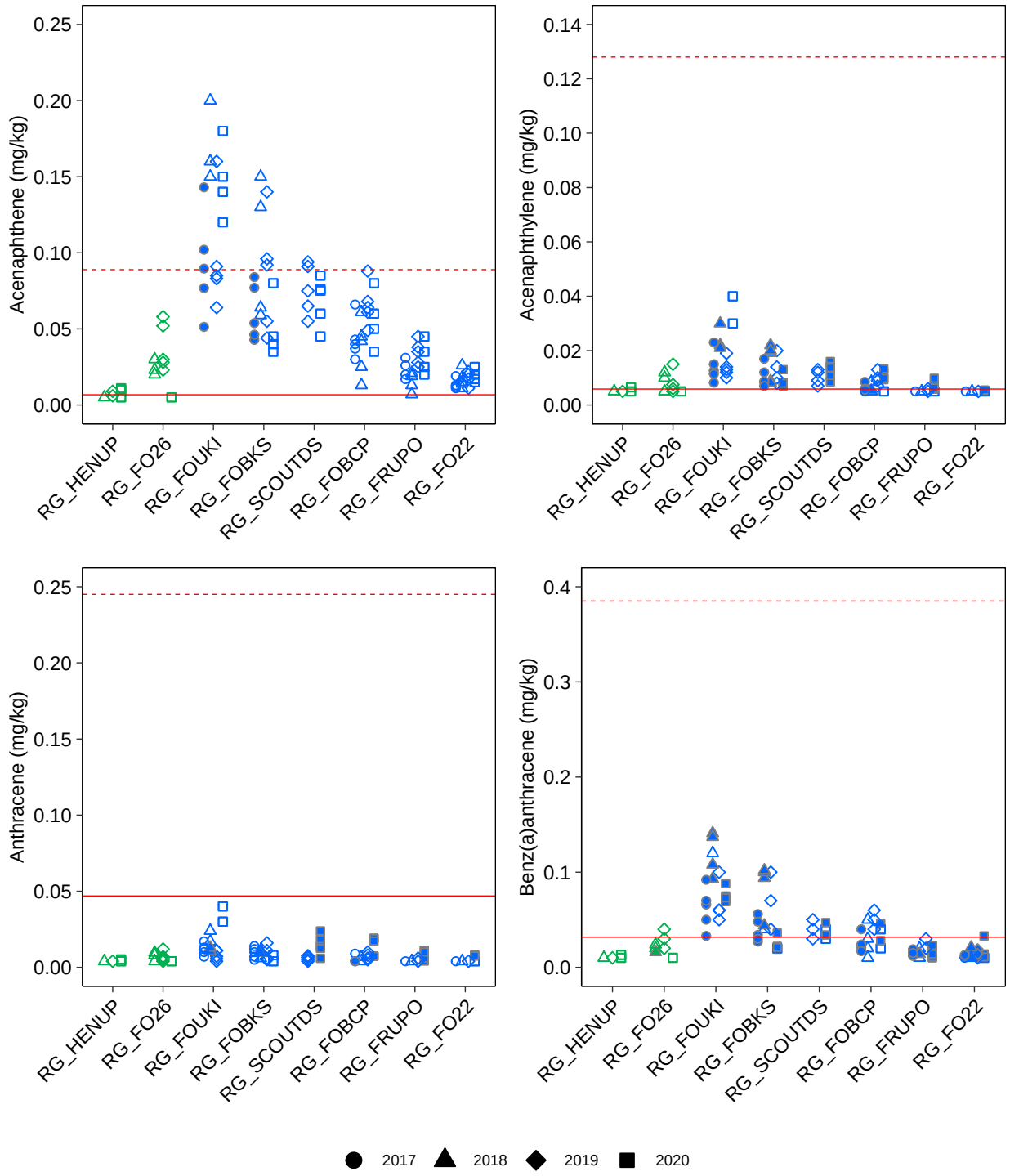

Figure D.2: Figure X.x: Sediment Polycyclic Aromatic Hydrocarbons Concentrations Relative to BC Working Sediment Quality Guidelines (WSQG), FRO LAMEP, September 2017 to 2020

Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG. Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).

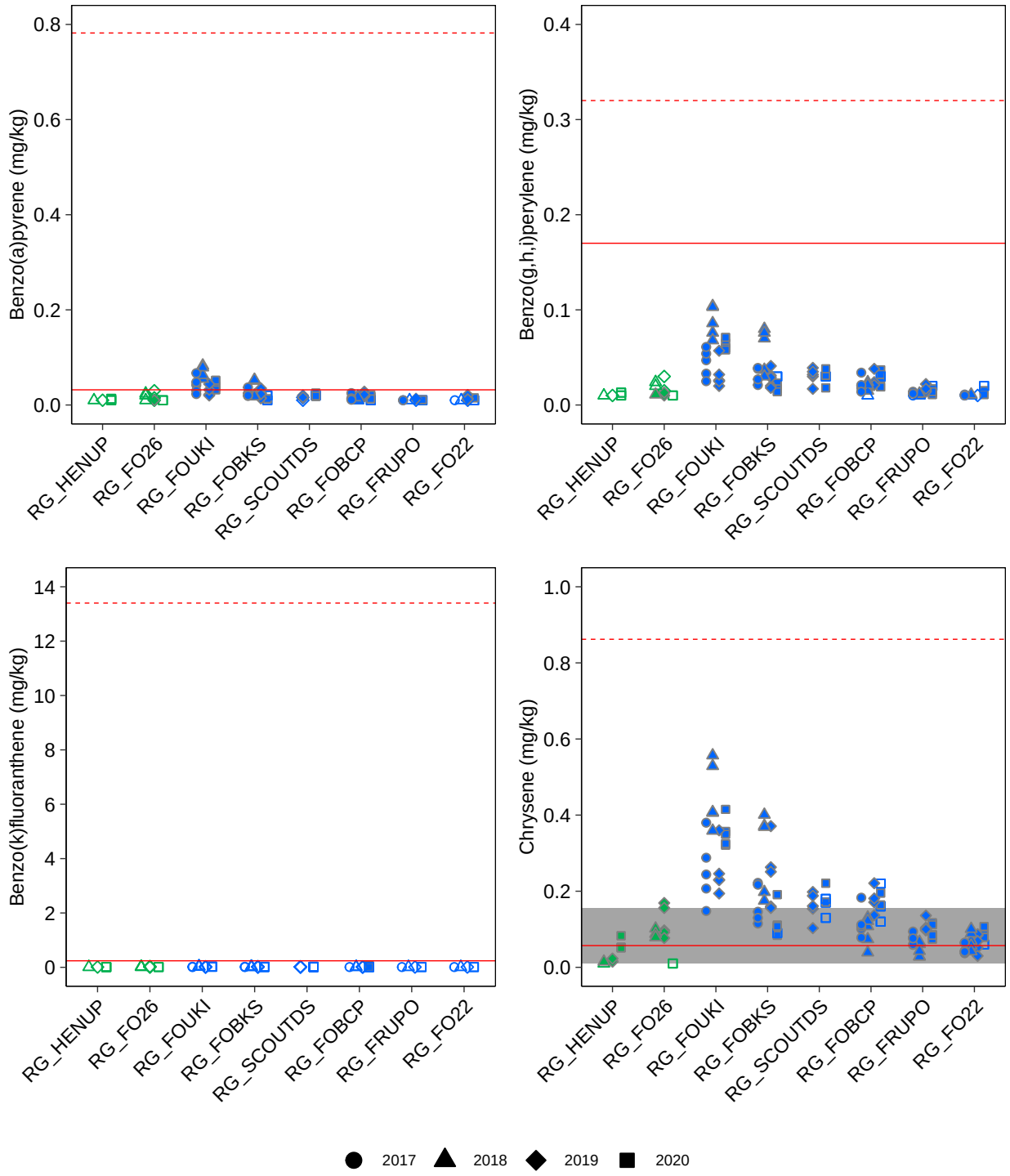

Figure D.2: Figure X.x: Sediment Polycyclic Aromatic Hydrocarbons Concentrations Relative to BC Working Sediment Quality Guidelines (WSQG), FRO LAMEP, September 2017 to 2020

Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG. Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).

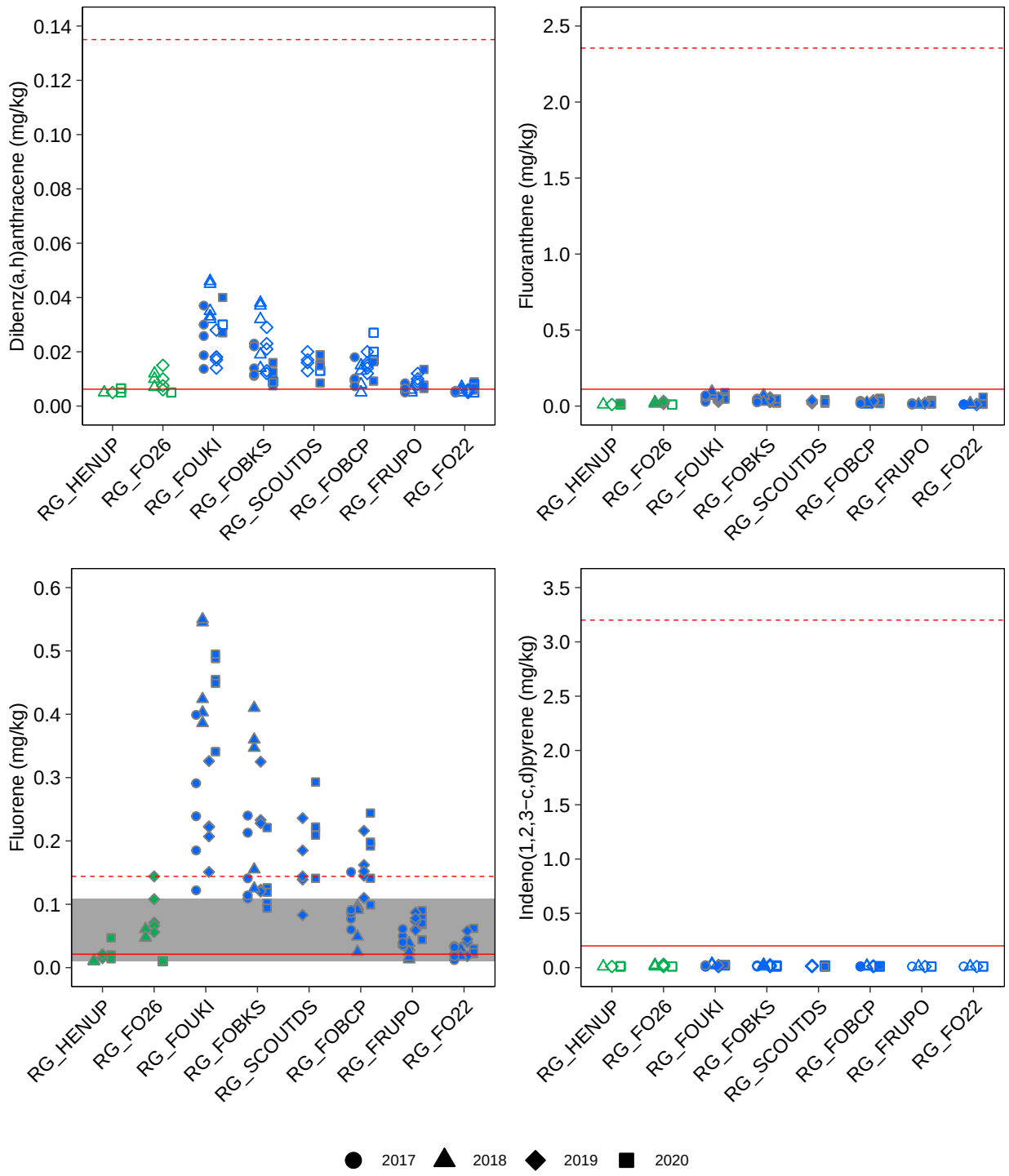

Figure D.2: Figure X.x: Sediment Polycyclic Aromatic Hydrocarbons Concentrations Relative to BC Working Sediment Quality Guidelines (WSQG), FRO LAMEP, September 2017 to 2020

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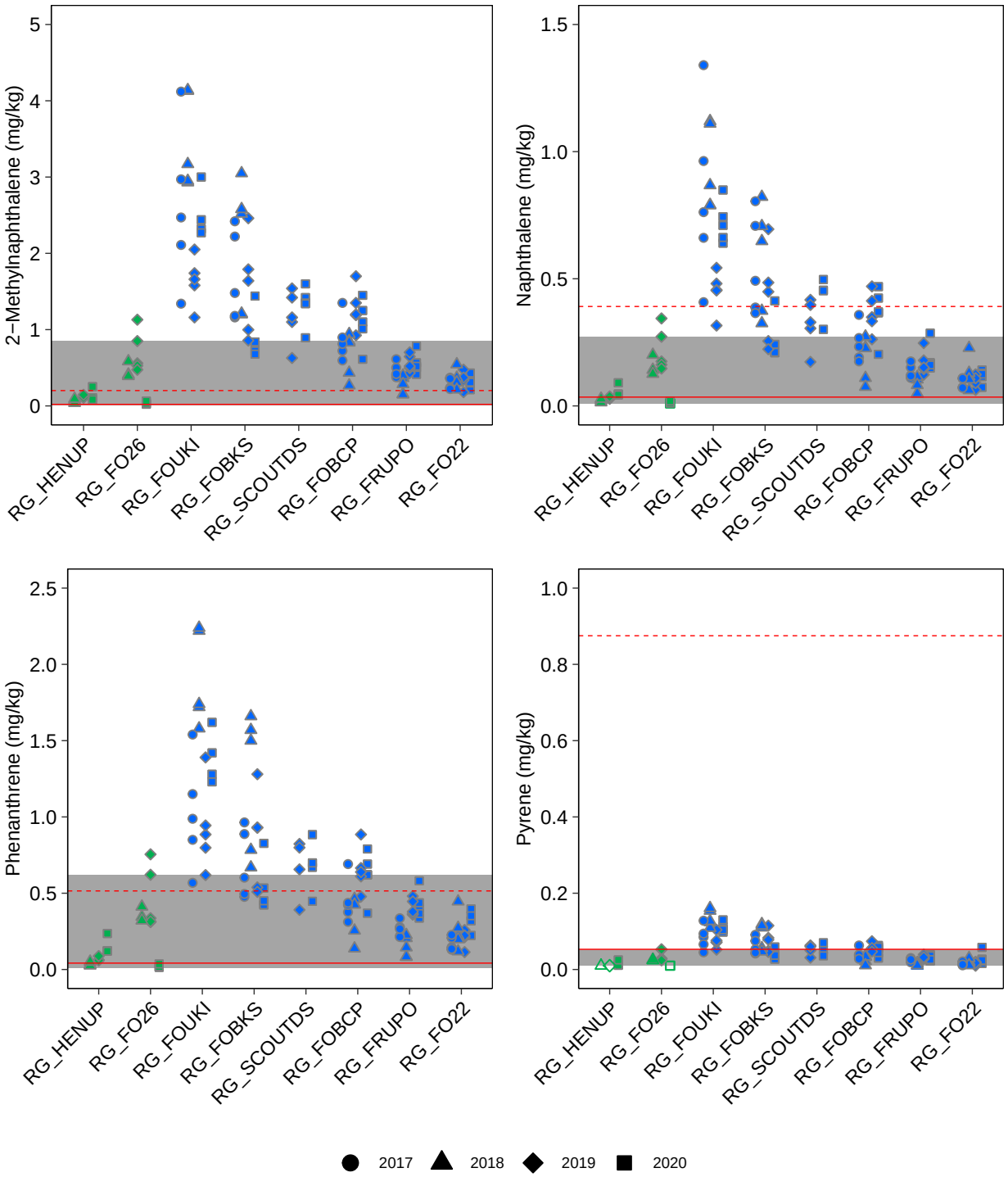

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Notes: Green presents reference stations and Blue presents mine−exposed stations. Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL value. Solid red line = Lower WSQG; hashed red line = Upper WSQG. Grey shading = the reference area normal range (2.5th and 97.5th percentiles of pooled reference area distribution after removal of outliers).

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_HENUP							
			Lower SQG	Upper SQG	RG_HENUP-1	RG_HENUP-2	RG_HENUP-3	Minimum	Median	Maximum	Mean	Standard Deviation
					15-Sep-20	15-Sep-20	15-Sep-20					
Physical Tests	Moisture	%	-	-	38.3	31.7	62.5	31.7	38.3	62.5	44.2	16.2
	pH(1:2 Soil:Water)	pH	-	-	8.33	8.48	8.22	8.22	8.33	8.48	8.34	0.131
Particle Size	% Gravel (>2 mm)	%	-	-	3.90	5.90	<1.00	<1.00	3.90	5.90	3.60	1.33
	% Sand (2.00 mm - 1.00 mm)	%	-	-	6.20	6.10	<1.00	<1.00	6.10	6.20	4.43	0.0667
	% Sand (1.00 mm - 0.50 mm)	%	-	-	14.9	17.4	2.90	2.90	14.9	17.4	11.7	7.75
	% Sand (0.50 mm - 0.25 mm)	%	-	-	30.8	37.3	19.3	19.3	30.8	37.3	29.1	9.12
	% Sand (0.25 mm - 0.125 mm)	%	-	-	29.2	20.5	29.6	20.5	29.2	29.6	26.4	5.14
	% Sand (0.125 mm - 0.063 mm	%	-	-	8.00	5.90	21.5	5.90	8.00	21.5	11.8	8.47
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	3.50	3.10	13.0	3.10	3.50	13.0	6.53	5.60
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	2.70	2.80	10.8	2.70	2.80	10.8	5.43	4.65
	% Clay (<4 µm)	%	-	-	<1.00	<1.00	1.70	<1.00	<1.00	1.70	1.23	-
	Texture	-	-	-	Sand	Sand	Loamy sand	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	5.10	4.90	5.60	4.90	5.10	5.60	5.20	0.361
Metals	Aluminum (Al)	mg/kg	-	-	8,940	8,610	8,690	8,610	8,690	8,940	8,750	172
	Antimony (Sb)	mg/kg	-	-	0.680	0.700	0.550	0.550	0.680	0.700	0.643	0.0814
	Arsenic (As)	mg/kg	5.9	17	7.21	5.99	5.26	5.26	5.99	7.21	6.15	0.985
	Barium (Ba)	mg/kg	-	-	191	178	173	173	178	191	181	9.29
	Beryllium (Be)	mg/kg	-	-	0.710	0.730	0.670	0.670	0.710	0.730	0.703	0.0306
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	11.0	10.1	11.8	10.1	11.0	11.8	11.0	0.850
	Cadmium (Cd)	mg/kg	0.60	3.5	0.867	0.843	0.935	0.843	0.867	0.935	0.882	0.0477
	Calcium (Ca)	mg/kg	-	-	56,900	58,900	53,100	53,100	56,900	58,900	56,300	2,950
	Chromium (Cr)	mg/kg	37	90	15.4	15.3	17.8	15.3	15.4	17.8	16.2	1.42
	Cobalt (Co)	mg/kg	-	-	6.48	6.38	5.74	5.74	6.38	6.48	6.20	0.401
	Copper (Cu)	mg/kg	36	197	14.9	15.0	14.4	14.4	14.9	15.0	14.8	0.321
	Iron (Fe)	mg/kg	21,200	43,766	16,300	17,000	14,500	14,500	16,300	17,000	15,900	1,290
	Lead (Pb)	mg/kg	35	91	9.33	9.35	9.19	9.19	9.33	9.35	9.29	0.0872
	Lithium (Li)	mg/kg	-	-	11.1	10.7	15.7	10.7	11.1	15.7	12.5	2.78
	Magnesium (Mg)	mg/kg	-	-	11,600	10,100	14,000	10,100	11,600	14,000	11,900	1,970
	Manganese (Mn)	mg/kg	460	1,100	511	506	455	455	506	511	491	31.0
	Mercury (Hg)	mg/kg	0.17	0.49	0.0389	0.0336	0.0522	0.0336	0.0389	0.0522	0.0416	0.00958
	Molybdenum (Mo)	mg/kg	-	-	1.63	1.58	1.54	1.54	1.58	1.63	1.58	0.0451
	Nickel (Ni)	mg/kg	16	75	22.6	22.9	21.6	21.6	22.6	22.9	22.4	0.681
	Phosphorus (P)	mg/kg	-	-	1,360	1,340	1,260	1,260	1,340	1,360	1,320	52.9
	Potassium (K)	mg/kg	-	-	2,440	2,420	2,410	2,410	2,420	2,440	2,420	15.3
	Selenium (Se)	mg/kg	2.0	-	0.900	0.660	1.07	0.660	0.900	1.07	0.877	0.206
	Silver (Ag)	mg/kg	0.50	-	0.150	0.130	0.190	0.130	0.150	0.190	0.157	0.0306
	Sodium (Na)	mg/kg	-	-	99.0	93.0	100	93.0	99.0	100	97.3	3.79
	Strontium (Sr)	mg/kg	-	-	83.2	78.3	65.8	65.8	78.3	83.2	75.8	8.97
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-
	Thallium (Tl)	mg/kg	-	-	0.250	0.257	0.252	0.250	0.252	0.257	0.253	0.00361
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	24.4	16.8	25.4	16.8	24.4	25.4	22.2	4.70
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	0.989	1.00	0.954	0.954	0.989	1.00	0.981	0.0240
	Vanadium (V)	mg/kg	-	-	35.8	36.1	32.9	32.9	35.8	36.1	34.9	1.77
	Zinc (Zn)	mg/kg	123	315	110	115	104	104	110	115	110	5.51
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	1.30	<1.00	<1.00	1.30	1.10	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0100	<0.00500	<0.0110	<0.00500	<0.0100	<0.0110	<0.00500	-
	Acenaphthylene	mg/kg	0.0059	0.13	<0.00500	<0.00500	<0.00650	<0.00500	<0.00500	<0.00650	<0.00500	-
	Acridine	mg/kg	-	-	<0.0100	<0.0100	<0.0200	<0.0100	<0.0100	<0.0200	<0.0100	-
	Anthracene	mg/kg	0.047	0.25	<0.00400	<0.00400	<0.00520	<0.00400	<0.00400	<0.00520	<0.00400	-
	Benz(a)anthracene	mg/kg	0.032	0.39	<0.0100	<0.0100	<0.0130	<0.0100	<0.0100	<0.0130	<0.0100	-
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	<0.0130	<0.0100	<0.0100	<0.0130	<0.0100	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0190	0.0170	0.0280	0.0170	0.0190	0.0280	0.0213	0.00586
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0190	0.0170	<0.0300	0.0170	0.0180	0.0190	0.0180	0.00141
	Benzo(e)pyrene	mg/kg	-	-	0.0180	0.0170	0.0280	0.0170	0.0180	0.0280	0.0210	0.00608
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	<0.0100	<0.0100	<0.0130	<0.0100	<0.0100	<0.0130	<0.0100	-
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0130	<0.0100	<0.0100	<0.0130	<0.0100	-
	Chrysene	mg/kg	0.057	0.86	0.0530	0.0510	0.0830	0.0510	0.0530	0.0830	0.0623	0.0179
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	<0.00500	<0.00500	<0.00650	<0.00500	<0.00500	<0.00650	<0.00500	-
	Fluoranthene	mg/kg	0.11	2.4	<0.0100	<0.0100	0.0180	<0.0100	<0.0100	0.0180	0.0127	-
	Fluorene	mg/kg	0.021	0.14	0.0200	0.0140	0.0470	0.0140	0.0200	0.0470	0.0270	0.0176
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0130	<0.0100	<0.0100	<0.0130	<0.0100	-
	1-Methylnaphthalene	mg/kg	-	-	0.0700	0.0510	0.157	0.0510	0.0700	0.157	0.0927	0.0565
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.108	0.0820	0.252	0.0820	0.108	0.252	0.147	0.0916
	Naphthalene	mg/kg	0.035	0.39	0.0470	0.0430	0.0910	0.0430	0.0470	0.0910	0.0603	0.0266
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0130	<0.0100	<0.0100	<0.0130	<0.0100	-
	Phenanthrene	mg/kg	0.042	0.52	0.124	0.120	0.236	0.120	0.124	0.236	0.160	0.0658
	Pyrene	mg/kg	0.053	0.88	0.0130	0.0110	0.0250	0.0110	0.0130	0.0250	0.0163	0.00757
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0130	<0.0130	<0.0500	<0.0500	<0.0130	-
	d10-Acenaphthene	%	-	-	90.2	93.5	99.5	90.2	93.5	99.5	94.4	4.71
	d12-Chrysene	%	-	-	125	126	121	121	125	126	124	2.69
	d8-Naphthalene	%	-	-	82.4	81.2	88.6	81.2	82.4	88.6	84.1	3.97
	d10-Phenanthrene	%	-	-	93.2	99.9	111	93.2	99.9	111	101	8.99
	B(a)P Total Potency Equivalent	mg/kg	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	-
	IACR (CCME)	mg/kg	-	-	0.210	0.200	0.310	0.200	0.210	0.310	0.240	0.0608

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FO26							
			Lower SQG	Upper SQG	RG_FO26-1	RG_FO26-2	RG_FO26-3	Minimum	Median	Maximum	Mean	Standard Deviation
					17-Sep-20	17-Sep-20	17-Sep-20					
Physical Tests	Moisture	%	-	-	29.0	37.1	34.1	29.0	34.1	37.1	33.4	4.10
	pH(1:2 Soil:Water)	pH	-	-	8.79	8.67	8.41	8.41	8.67	8.79	8.62	0.194
Particle Size	% Gravel (>2 mm)	%	-	-	1.70	<1.00	<1.00	<1.00	<1.00	1.70	1.23	-
	% Sand (2.00 mm - 1.00 mm)	%	-	-	3.30	4.70	4.90	3.30	4.70	4.90	4.30	0.872
	% Sand (1.00 mm - 0.50 mm)	%	-	-	15.5	17.9	7.80	7.80	15.5	17.9	13.7	5.28
	% Sand (0.50 mm - 0.25 mm)	%	-	-	32.8	41.5	15.7	15.7	32.8	41.5	30.0	13.1
	% Sand (0.25 mm - 0.125 mm)	%	-	-	21.0	21.7	19.8	19.8	21.0	21.7	20.8	0.961
	% Sand (0.125 mm - 0.063 mm	%	-	-	9.20	5.10	14.0	5.10	9.20	14.0	9.43	4.45
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	7.10	3.10	16.5	3.10	7.10	16.5	8.90	6.88
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	7.40	3.60	17.2	3.60	7.40	17.2	9.40	7.02
	% Clay (<4 µm)	%	-	-	1.90	1.40	3.20	1.40	1.90	3.20	2.17	0.929
	Texture	-	-	-	Loamy sand	Sand	Sandy loam	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	3.86	2.73	5.36	2.73	3.86	5.36	3.98	1.32
Metals	Aluminum (Al)	mg/kg	-	-	1,310	1,280	1,890	1,280	1,310	1,890	1,490	344
	Antimony (Sb)	mg/kg	-	-	<0.100	<0.100	0.170	<0.100	<0.100	0.170	0.123	-
	Arsenic (As)	mg/kg	5.9	17	1.03	1.14	1.44	1.03	1.14	1.44	1.20	0.212
	Barium (Ba)	mg/kg	-	-	13.7	13.5	18.0	13.5	13.7	18.0	15.1	2.54
	Beryllium (Be)	mg/kg	-	-	<0.100	<0.100	0.140	<0.100	<0.100	0.140	0.113	-
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-
	Cadmium (Cd)	mg/kg	0.60	3.5	0.250	0.230	0.260	0.230	0.250	0.260	0.247	0.0153
	Calcium (Ca)	mg/kg	-	-	289,000	265,000	259,000	259,000	265,000	289,000	271,000	15,900
	Chromium (Cr)	mg/kg	37	90	5.17	5.02	7.05	5.02	5.17	7.05	5.75	1.13
	Cobalt (Co)	mg/kg	-	-	0.920	0.880	1.12	0.880	0.920	1.12	0.973	0.129
	Copper (Cu)	mg/kg	36	197	1.17	1.23	1.79	1.17	1.23	1.79	1.40	0.342
	Iron (Fe)	mg/kg	21,200	43,766	2,500	2,480	3,190	2,480	2,500	3,190	2,720	404
	Lead (Pb)	mg/kg	35	91	1.48	1.37	2.05	1.37	1.48	2.05	1.63	0.365
	Lithium (Li)	mg/kg	-	-	5.30	5.40	8.30	5.30	5.40	8.30	6.33	1.70
	Magnesium (Mg)	mg/kg	-	-	37,200	31,100	46,900	31,100	37,200	46,900	38,400	7,970
	Manganese (Mn)	mg/kg	460	1,100	99.3	119	111	99.3	111	119	110	9.91
	Mercury (Hg)	mg/kg	0.17	0.49	0.00630	<0.00500	0.00800	<0.00500	0.00630	0.00800	0.00643	0.00113
	Molybdenum (Mo)	mg/kg	-	-	0.270	0.310	0.340	0.270	0.310	0.340	0.307	0.0351
	Nickel (Ni)	mg/kg	16	75	5.67	6.12	7.68	5.67	6.12	7.68	6.49	1.05
	Phosphorus (P)	mg/kg	-	-	302	281	354	281	302	354	312	37.6
	Potassium (K)	mg/kg	-	-	490	470	610	470	490	610	523	75.7
	Selenium (Se)	mg/kg	2.0	-	0.240	0.220	0.330	0.220	0.240	0.330	0.263	0.0586
	Silver (Ag)	mg/kg	0.50	-	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	-
	Sodium (Na)	mg/kg	-	-	179	158	182	158	179	182	173	13.1
	Strontium (Sr)	mg/kg	-	-	137	125	112	112	125	137	125	12.5
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	-
	Thallium (Tl)	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	-
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	16.1	14.3	23.6	14.3	16.1	23.6	18.0	4.93
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	0.451	0.446	0.445	0.445	0.446	0.451	0.447	0.00321
	Vanadium (V)	mg/kg	-	-	5.54	5.77	7.34	5.54	5.77	7.34	6.22	0.980
	Zinc (Zn)	mg/kg	123	315	31.9	35.1	42.1	31.9	35.1	42.1	36.4	5.22
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	-
	Acenaphthylene	mg/kg	0.0059	0.13	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	-
	Acridine	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Anthracene	mg/kg	0.047	0.25	<0.00400	<0.00400	<0.00400	<0.00400	<0.00400	<0.00400	<0.00400	-
	Benz(a)anthracene	mg/kg	0.032	0.39	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	<0.0150	-
	Benzo(e)pyrene	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Chrysene	mg/kg	0.057	0.86	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	-
	Fluoranthene	mg/kg	0.11	2.4	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Fluorene	mg/kg	0.021	0.14	<0.0100	0.0100	<0.0100	<0.0100	<0.0100	0.0100	0.0100	-
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	1-Methylnaphthalene	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	-
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.0220	0.0330	0.0630	0.0220	0.0330	0.0630	0.0393	0.0212
	Naphthalene	mg/kg	0.035	0.39	<0.0100	0.0110	0.0190	<0.0100	0.0110	0.0190	0.0133	0.00533
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Phenanthrene	mg/kg	0.042	0.52	0.0140	0.0180	0.0360	0.0140	0.0180	0.0360	0.0227	0.0117
	Pyrene	mg/kg	0.053	0.88	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	-
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	-
	d10-Acenaphthene	%	-	-	98.1	96.5	99.0	96.5	98.1	99.0	97.9	1.27
	d12-Chrysene	%	-	-	110	126	111	110	111	126	116	9.25
	d8-Naphthalene	%	-	-	86.7	84.5	86.0	84.5	86.0	86.7	85.7	1.12
	d10-Phenanthrene	%	-	-	90.5	95.0	100	90.5	95.0	100	95.3	5.01
	B(a)P Total Potency Equivalent	mg/kg	-	-	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	-
	IACR (CCME)	mg/kg	-	-	<0.150	<0.150	<0.150	<0.150	<0.150	<0.150	<0.150	-

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FOUKI				
			Lower SQG	Upper SQG	RG_FOUKI-1	RG_FOUKI-2	RG_FOUKI-3	RG_FOUKI-4	RG_FOUKI-5
					14-Sep-20	14-Sep-20	14-Sep-20	14-Sep-20	14-Sep-20
Physical Tests	Moisture	%	-	-	72.8	75.5	80.8	77.1	82.5
	pH(1:2 Soil:Water)	pH	-	-	8.10	8.05	8.06	8.01	8.08
Particle Size	% Gravel (>2 mm)	%	-	-	3.10	2.30	5.50	4.70	12.0
	% Sand (2.00 mm - 1.00 mm)	%	-	-	4.30	7.80	2.40	2.20	8.30
	% Sand (1.00 mm - 0.50 mm)	%	-	-	4.50	5.60	1.90	2.30	4.20
	% Sand (0.50 mm - 0.25 mm)	%	-	-	8.00	6.80	5.30	3.00	8.50
	% Sand (0.25 mm - 0.125 mm)	%	-	-	9.50	13.4	17.6	13.3	14.2
	% Sand (0.125 mm - 0.063 mm	%	-	-	13.1	13.9	11.9	15.4	12.7
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	25.2	22.5	25.2	26.8	17.7
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	27.6	23.8	26.5	27.5	19.2
	% Clay (<4 µm)	%	-	-	4.70	3.90	3.80	4.80	3.20
	Texture	-	-	-	Silt loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic Carbon	Total Organic Carbon	%	-	-	11.5	9.44	9.99	11.3	10.4
Metals	Aluminum (Al)	mg/kg	-	-	6,310	6,360	5,410	7,100	6,360
	Antimony (Sb)	mg/kg	-	-	0.540	0.560	0.460	0.430	0.510
	Arsenic (As)	mg/kg	5.9	17	4.39	4.11	4.02	4.15	5.27
	Barium (Ba)	mg/kg	-	-	199	190	206	201	203
	Beryllium (Be)	mg/kg	-	-	0.550	0.530	0.460	0.570	0.590
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200
	Boron (B)	mg/kg	-	-	9.20	8.90	8.30	10.5	8.90
	Cadmium (Cd)	mg/kg	0.60	3.5	1.48	1.52	1.71	1.49	1.65
	Calcium (Ca)	mg/kg	-	-	63,600	68,800	81,100	73,400	72,700
	Chromium (Cr)	mg/kg	37	90	11.8	11.6	9.76	12.4	14.4
	Cobalt (Co)	mg/kg	-	-	6.11	6.48	6.08	5.74	5.82
	Copper (Cu)	mg/kg	36	197	13.1	13.2	11.3	11.1	13.5
	Iron (Fe)	mg/kg	21,200	43,766	14,100	13,700	12,300	12,900	20,600
	Lead (Pb)	mg/kg	35	91	7.58	7.75	6.88	7.02	6.92
	Lithium (Li)	mg/kg	-	-	10.2	11.3	8.80	10.5	8.80
	Magnesium (Mg)	mg/kg	-	-	12,100	12,000	12,000	13,000	11,300
	Manganese (Mn)	mg/kg	460	1,100	550	612	677	548	726
	Mercury (Hg)	mg/kg	0.17	0.49	0.0456	0.0484	0.0407	0.0338	0.0378
	Molybdenum (Mo)	mg/kg	-	-	1.72	1.58	1.46	1.42	1.72
	Nickel (Ni)	mg/kg	16	75	35.2	36.0	36.6	34.4	37.5
	Phosphorus (P)	mg/kg	-	-	1,070	999	1,080	1,100	1,210
	Potassium (K)	mg/kg	-	-	1,690	1,600	1,460	1,990	1,770
	Selenium (Se)	mg/kg	2.0	-	2.68	2.98	3.61	2.30	3.07
	Silver (Ag)	mg/kg	0.50	-	0.150	0.160	0.140	0.130	0.140
	Sodium (Na)	mg/kg	-	-	82.0	89.0	89.0	107	103
	Strontium (Sr)	mg/kg	-	-	75.0	70.5	78.5	77.7	80.0
	Sulfur (S)	mg/kg	-	-	1,100	1,300	1,400	1,200	<1,000
	Thallium (Tl)	mg/kg	-	-	0.171	0.166	0.152	0.187	0.182
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00
	Titanium (Ti)	mg/kg	-	-	24.5	25.8	19.8	20.6	20.9
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500
	Uranium (U)	mg/kg	-	-	1.01	0.933	0.964	0.930	1.41
	Vanadium (V)	mg/kg	-	-	28.2	25.9	23.8	29.6	41.5
	Zinc (Zn)	mg/kg	123	315	127	125	130	118	141
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	<1.00	<1.00	<1.00
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.140	<0.180	<0.150	<0.150	<0.120
	Acenaphthylene	mg/kg	0.0059	0.13	<0.0300	<0.0400	<0.0400	<0.0300	<0.0300
	Acridine	mg/kg	-	-	<0.260	<0.290	<0.300	<0.240	<0.220
	Anthracene	mg/kg	0.047	0.25	<0.0300	<0.0400	<0.0400	<0.0300	<0.0400
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0750	0.0880	0.0710	0.0690	0.0730
	Benzo(a)pyrene	mg/kg	0.032	0.78	0.0370	0.0510	0.0400	0.0320	0.0520
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.125	0.150	0.115	0.112	0.109
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.125	0.150	0.115	0.112	0.109
	Benzo(e)pyrene	mg/kg	-	-	0.136	0.158	0.137	0.122	0.138
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0650	0.0710	0.0650	0.0600	0.0580
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0200	<0.0200	<0.0250	<0.0200	<0.0250
	Chrysene	mg/kg	0.057	0.86	0.357	0.415	0.350	0.321	0.325
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.0270	0.0400	<0.0300	<0.0300	<0.0300
	Fluoranthene	mg/kg	0.11	2.4	0.0750	0.0880	0.0610	0.0490	0.0460
	Fluorene	mg/kg	0.021	0.14	0.488	0.455	0.495	0.341	0.449
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	0.0220	0.0300	<0.0250	<0.0200	0.0280
	1-Methylnaphthalene	mg/kg	-	-	1.51	1.81	1.49	1.44	1.37
	2-Methylnaphthalene	mg/kg	0.020	0.20	2.44	3.00	2.44	2.32	2.27
	Naphthalene	mg/kg	0.035	0.39	0.710	0.849	0.744	0.640	0.662
	Perylene	mg/kg	-	-	<0.0200	<0.0200	<0.0250	<0.0200	<0.0250
	Phenanthrene	mg/kg	0.042	0.52	1.42	1.62	1.42	1.28	1.23
	Pyrene	mg/kg	0.053	0.88	0.112	0.130	0.106	0.0980	0.104
	Quinoline	mg/kg	-	-	<0.0200	<0.0200	<0.0250	<0.0200	<0.0250
	d10-Acenaphthene	%	-	-	113	124	103	110	110
	d12-Chrysene	%	-	-	130	122	125	128	128
	d8-Naphthalene	%	-	-	99.0	109	91.7	95.8	96.5
	d10-Phenanthrene	%	-	-	120	122	110	116	112
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0910	0.123	0.0800	0.0710	0.0930
	IACR (CCME)	mg/kg	-	-	1.48	1.80	1.37	1.29	1.36

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FOUKI				
			Lower SQG	Upper SQG	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	Moisture	%	-	-	72.8	77.1	82.5	77.7	3.93
	pH(1:2 Soil:Water)	pH	-	-	8.01	8.06	8.10	8.06	0.0339
Particle Size	% Gravel (>2 mm)	%	-	-	2.30	4.70	12.0	5.52	3.84
	% Sand (2.00 mm - 1.00 mm)	%	-	-	2.20	4.30	8.30	5.00	2.91
	% Sand (1.00 mm - 0.50 mm)	%	-	-	1.90	4.20	5.60	3.70	1.56
	% Sand (0.50 mm - 0.25 mm)	%	-	-	3.00	6.80	8.50	6.32	2.23
	% Sand (0.25 mm - 0.125 mm)	%	-	-	9.50	13.4	17.6	13.6	2.89
	% Sand (0.125 mm - 0.063 mm	%	-	-	11.9	13.1	15.4	13.4	1.33
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	17.7	25.2	26.8	23.5	3.58
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	19.2	26.5	27.6	24.9	3.55
	% Clay (<4 µm)	%	-	-	3.20	3.90	4.80	4.08	0.669
	Texture	-	-	-	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	9.44	10.4	11.5	10.5	0.870
Metals	Aluminum (Al)	mg/kg	-	-	5,410	6,360	7,100	6,310	600
	Antimony (Sb)	mg/kg	-	-	0.430	0.510	0.560	0.500	0.0543
	Arsenic (As)	mg/kg	5.9	17	4.02	4.15	5.27	4.39	0.512
	Barium (Ba)	mg/kg	-	-	190	201	206	200	6.06
	Beryllium (Be)	mg/kg	-	-	0.460	0.550	0.590	0.540	0.0500
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	8.30	8.90	10.5	9.16	0.817
	Cadmium (Cd)	mg/kg	0.60	3.5	1.48	1.52	1.71	1.57	0.104
	Calcium (Ca)	mg/kg	-	-	63,600	72,700	81,100	71,900	6,440
	Chromium (Cr)	mg/kg	37	90	9.76	11.8	14.4	12.0	1.67
	Cobalt (Co)	mg/kg	-	-	5.74	6.08	6.48	6.05	0.291
	Copper (Cu)	mg/kg	36	197	11.1	13.1	13.5	12.4	1.14
	Iron (Fe)	mg/kg	21,200	43,766	12,300	13,700	20,600	14,700	3,360
	Lead (Pb)	mg/kg	35	91	6.88	7.02	7.75	7.23	0.405
	Lithium (Li)	mg/kg	-	-	8.80	10.2	11.3	9.92	1.10
	Magnesium (Mg)	mg/kg	-	-	11,300	12,000	13,000	12,100	606
	Manganese (Mn)	mg/kg	460	1,100	548	612	726	623	78.4
	Mercury (Hg)	mg/kg	0.17	0.49	0.0338	0.0407	0.0484	0.0413	0.00587
	Molybdenum (Mo)	mg/kg	-	-	1.42	1.58	1.72	1.58	0.141
	Nickel (Ni)	mg/kg	16	75	34.4	36.0	37.5	35.9	1.20
	Phosphorus (P)	mg/kg	-	-	999	1,080	1,210	1,090	76.3
	Potassium (K)	mg/kg	-	-	1,460	1,690	1,990	1,700	198
	Selenium (Se)	mg/kg	2.0	-	2.30	2.98	3.61	2.93	0.486
	Silver (Ag)	mg/kg	0.50	-	0.130	0.140	0.160	0.144	0.0114
	Sodium (Na)	mg/kg	-	-	82.0	89.0	107	94.0	10.5
	Strontium (Sr)	mg/kg	-	-	70.5	77.7	80.0	76.3	3.74
	Sulfur (S)	mg/kg	-	-	<1,000	1,200	1,400	1,200	135
	Thallium (Tl)	mg/kg	-	-	0.152	0.171	0.187	0.172	0.0138
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	19.8	20.9	25.8	22.3	2.65
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	0.930	0.964	1.41	1.05	0.204
	Vanadium (V)	mg/kg	-	-	23.8	28.2	41.5	29.8	6.90
	Zinc (Zn)	mg/kg	123	315	118	127	141	128	8.41
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	<1.00	<1.00	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.120	<0.150	<0.180	<0.120	-
	Acenaphthylene	mg/kg	0.0059	0.13	<0.0300	<0.0300	<0.0400	<0.0300	-
	Acridine	mg/kg	-	-	<0.220	<0.260	<0.300	<0.220	-
	Anthracene	mg/kg	0.047	0.25	<0.0300	<0.0400	<0.0400	<0.0300	-
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0690	0.0730	0.0880	0.0752	0.00750
	Benzo(a)pyrene	mg/kg	0.032	0.78	0.0320	0.0400	0.0520	0.0424	0.00879
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.109	0.115	0.150	0.122	0.0167
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.109	0.115	0.150	0.122	0.0167
	Benzo(e)pyrene	mg/kg	-	-	0.122	0.137	0.158	0.138	0.0129
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0580	0.0650	0.0710	0.0638	0.00507
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0200	<0.0200	<0.0250	<0.0200	-
	Chrysene	mg/kg	0.057	0.86	0.321	0.350	0.415	0.354	0.0377
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.0270	0.0270	0.0400	0.0296	0.00735
	Fluoranthene	mg/kg	0.11	2.4	0.0460	0.0610	0.0880	0.0638	0.0177
	Fluorene	mg/kg	0.021	0.14	0.341	0.455	0.495	0.446	0.0618
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0200	0.0220	0.0300	0.0242	0.00427
	1-Methylnaphthalene	mg/kg	-	-	1.37	1.49	1.81	1.52	0.169
	2-Methylnaphthalene	mg/kg	0.020	0.20	2.27	2.44	3.00	2.49	0.293
	Naphthalene	mg/kg	0.035	0.39	0.640	0.710	0.849	0.721	0.0823
	Perylene	mg/kg	-	-	<0.0200	<0.0200	<0.0250	<0.0200	-
	Phenanthrene	mg/kg	0.042	0.52	1.23	1.42	1.62	1.39	0.152
	Pyrene	mg/kg	0.053	0.88	0.0980	0.106	0.130	0.110	0.0122
	Quinoline	mg/kg	-	-	<0.0200	<0.0200	<0.0250	<0.0200	-
	d10-Acenaphthene	%	-	-	103	110	124	112	7.80
	d12-Chrysene	%	-	-	122	128	130	127	3.01
	d8-Naphthalene	%	-	-	91.7	96.5	109	98.3	6.32
	d10-Phenanthrene	%	-	-	110	116	122	116	5.20
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0710	0.0910	0.123	0.0916	0.0197
	IACR (CCME)	mg/kg	-	-	1.29	1.37	1.80	1.46	0.202

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FOBKS				
			Lower SQG	Upper SQG	RG_FOBKS-1	RG_FOBKS-2	RG_FOBKS-3	RG_FOBKS-4	RG_FOBKS-5
					10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20
Physical Tests	Moisture	%	-	-	44.8	52.0	52.0	58.2	78.1
	pH(1:2 Soil:Water)	pH	-	-	8.30	8.45	8.28	8.23	8.04
Particle Size	% Gravel (>2 mm)	%	-	-	1.30	4.10	2.20	1.50	1.10
	% Sand (2.00 mm - 1.00 mm)	%	-	-	3.40	7.60	4.30	3.00	5.10
	% Sand (1.00 mm - 0.50 mm)	%	-	-	9.30	14.2	11.5	9.30	35.0
	% Sand (0.50 mm - 0.25 mm)	%	-	-	11.8	11.5	11.5	24.3	22.8
	% Sand (0.25 mm - 0.125 mm)	%	-	-	21.2	19.0	21.9	23.7	8.70
	% Sand (0.125 mm - 0.063 mm	%	-	-	17.0	15.1	15.7	12.0	5.10
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	16.0	12.6	14.6	11.2	8.80
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	16.7	13.3	15.3	12.2	11.2
	% Clay (<4 µm)	%	-	-	3.30	2.80	3.00	2.70	2.00
	Texture	-	-	-	Sandy loam	Loamy sand	Sandy loam	Loamy sand	Loamy sand
Organic Carbon	Total Organic Carbon	%	-	-	7.12	5.70	5.50	5.75	7.05
Metals	Aluminum (Al)	mg/kg	-	-	8,870	8,640	8,590	7,710	5,910
	Antimony (Sb)	mg/kg	-	-	0.340	0.300	0.590	0.560	0.560
	Arsenic (As)	mg/kg	5.9	17	4.82	5.12	5.25	4.63	4.29
	Barium (Ba)	mg/kg	-	-	221	228	209	205	198
	Beryllium (Be)	mg/kg	-	-	0.650	0.630	0.630	0.590	0.510
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200
	Boron (B)	mg/kg	-	-	9.90	8.80	10.5	9.50	9.20
	Cadmium (Cd)	mg/kg	0.60	3.5	1.15	1.12	1.15	1.45	1.86
	Calcium (Ca)	mg/kg	-	-	54,400	61,200	56,900	68,800	73,800
	Chromium (Cr)	mg/kg	37	90	15.1	14.9	14.8	12.9	11.0
	Cobalt (Co)	mg/kg	-	-	5.70	5.58	6.07	5.84	6.42
	Copper (Cu)	mg/kg	36	197	12.5	12.1	13.1	12.2	13.1
	Iron (Fe)	mg/kg	21,200	43,766	13,800	15,500	14,900	15,500	13,100
	Lead (Pb)	mg/kg	35	91	7.73	7.49	8.16	7.37	7.21
	Lithium (Li)	mg/kg	-	-	11.7	10.7	11.5	10.7	9.80
	Magnesium (Mg)	mg/kg	-	-	14,400	12,300	13,900	9,460	10,600
	Manganese (Mn)	mg/kg	460	1,100	466	467	501	588	696
	Mercury (Hg)	mg/kg	0.17	0.49	0.0443	0.0360	0.0461	0.0365	0.0415
	Molybdenum (Mo)	mg/kg	-	-	1.22	1.20	1.38	1.32	1.40
	Nickel (Ni)	mg/kg	16	75	31.5	31.6	34.9	35.7	47.0
	Phosphorus (P)	mg/kg	-	-	1,240	1,250	1,380	1,170	1,050
	Potassium (K)	mg/kg	-	-	2,390	2,350	2,310	2,070	1,550
	Selenium (Se)	mg/kg	2.0	-	1.33	1.14	1.68	1.30	2.48
	Silver (Ag)	mg/kg	0.50	-	0.150	0.130	0.160	0.120	0.160
	Sodium (Na)	mg/kg	-	-	94.0	86.0	88.0	76.0	78.0
	Strontium (Sr)	mg/kg	-	-	73.4	86.1	78.8	88.2	72.0
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	1,100
	Thallium (Tl)	mg/kg	-	-	0.224	0.213	0.235	0.202	0.184
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00
	Titanium (Ti)	mg/kg	-	-	19.3	17.3	22.2	21.2	20.4
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500
	Uranium (U)	mg/kg	-	-	1.01	1.00	1.05	0.978	1.02
	Vanadium (V)	mg/kg	-	-	35.2	34.7	35.7	32.8	26.8
	Zinc (Zn)	mg/kg	123	315	111	109	110	121	134
	Zirconium (Zr)	mg/kg	-	-	1.10	<1.00	<1.00	<1.00	<1.00
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0450	<0.0450	<0.0350	<0.0400	<0.0800
	Acenaphthylene	mg/kg	0.0059	0.13	0.00700	0.00840	0.00810	0.00800	0.0130
	Acridine	mg/kg	-	-	<0.0900	<0.0700	<0.0700	<0.0800	<0.150
	Anthracene	mg/kg	0.047	0.25	<0.00400	<0.00400	<0.00400	<0.00400	<0.00800
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0220	0.0190	<0.0200	0.0210	0.0360
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	<0.0100	0.0130	<0.0200
	Benzo(b&j)fluoranthene	mg/kg	-	-	<0.0500	<0.0400	0.0280	0.0370	0.0670
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	<0.0510	<0.0410	0.0280	0.0370	0.0670
	Benzo(e)pyrene	mg/kg	-	-	0.0440	0.0350	0.0300	0.0400	0.0700
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0230	0.0170	0.0140	0.0140	<0.0300
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200
	Chrysene	mg/kg	0.057	0.86	0.111	0.0840	<0.0900	0.108	0.191
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.0125	<0.00900	0.00750	0.00870	0.0160
	Fluoranthene	mg/kg	0.11	2.4	0.0240	0.0210	0.0200	0.0230	0.0460
	Fluorene	mg/kg	0.021	0.14	0.126	0.102	0.0940	0.119	0.221
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200
	1-Methylnaphthalene	mg/kg	-	-	0.477	0.445	0.404	0.511	0.850
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.786	0.721	0.679	0.838	1.44
	Naphthalene	mg/kg	0.035	0.39	0.240	0.209	0.211	0.242	0.413
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200
	Phenanthrene	mg/kg	0.042	0.52	0.534	0.428	0.423	0.450	0.827
	Pyrene	mg/kg	0.053	0.88	0.0350	0.0310	0.0270	0.0370	0.0590
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0200
	d10-Acenaphthene	%	-	-	97.8	98.3	98.6	98.3	101
	d12-Chrysene	%	-	-	122	127	125	87.8	88.3
	d8-Naphthalene	%	-	-	85.1	89.9	87.1	87.4	91.4
	d10-Phenanthrene	%	-	-	104	96.9	102	96.4	104
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0250	<0.0200	<0.0200	0.0300	0.0400
	IACR (CCME)	mg/kg	-	-	0.380	0.290	0.310	0.460	0.790

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FOBKS				
			Lower SQG	Upper SQG	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	Moisture	%	-	-	44.8	52.0	78.1	57.0	12.7
	pH(1:2 Soil:Water)	pH	-	-	8.04	8.28	8.45	8.26	0.148
Particle Size	% Gravel (>2 mm)	%	-	-	1.10	1.50	4.10	2.04	1.22
	% Sand (2.00 mm - 1.00 mm)	%	-	-	3.00	4.30	7.60	4.68	1.82
	% Sand (1.00 mm - 0.50 mm)	%	-	-	9.30	11.5	35.0	15.9	10.9
	% Sand (0.50 mm - 0.25 mm)	%	-	-	11.5	11.8	24.3	16.4	6.57
	% Sand (0.25 mm - 0.125 mm)	%	-	-	8.70	21.2	23.7	18.9	5.95
	% Sand (0.125 mm - 0.063 mm	%	-	-	5.10	15.1	17.0	13.0	4.77
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	8.80	12.6	16.0	12.6	2.83
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	11.2	13.3	16.7	13.7	2.25
	% Clay (<4 µm)	%	-	-	2.00	2.80	3.30	2.76	0.483
	Texture	-	-	-	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	5.50	5.75	7.12	6.22	0.792
Metals	Aluminum (Al)	mg/kg	-	-	5,910	8,590	8,870	7,940	1,220
	Antimony (Sb)	mg/kg	-	-	0.300	0.560	0.590	0.470	0.138
	Arsenic (As)	mg/kg	5.9	17	4.29	4.82	5.25	4.82	0.385
	Barium (Ba)	mg/kg	-	-	198	209	228	212	12.2
	Beryllium (Be)	mg/kg	-	-	0.510	0.630	0.650	0.602	0.0559
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	8.80	9.50	10.5	9.58	0.653
	Cadmium (Cd)	mg/kg	0.60	3.5	1.12	1.15	1.86	1.35	0.317
	Calcium (Ca)	mg/kg	-	-	54,400	61,200	73,800	63,000	8,130
	Chromium (Cr)	mg/kg	37	90	11.0	14.8	15.1	13.7	1.77
	Cobalt (Co)	mg/kg	-	-	5.58	5.84	6.42	5.92	0.333
	Copper (Cu)	mg/kg	36	197	12.1	12.5	13.1	12.6	0.480
	Iron (Fe)	mg/kg	21,200	43,766	13,100	14,900	15,500	14,600	1,070
	Lead (Pb)	mg/kg	35	91	7.21	7.49	8.16	7.59	0.370
	Lithium (Li)	mg/kg	-	-	9.80	10.7	11.7	10.9	0.756
	Magnesium (Mg)	mg/kg	-	-	9,460	12,300	14,400	12,100	2,110
	Manganese (Mn)	mg/kg	460	1,100	466	501	696	544	98.6
	Mercury (Hg)	mg/kg	0.17	0.49	0.0360	0.0415	0.0461	0.0409	0.00454
	Molybdenum (Mo)	mg/kg	-	-	1.20	1.32	1.40	1.30	0.0910
	Nickel (Ni)	mg/kg	16	75	31.5	34.9	47.0	36.1	6.36
	Phosphorus (P)	mg/kg	-	-	1,050	1,240	1,380	1,220	121
	Potassium (K)	mg/kg	-	-	1,550	2,310	2,390	2,130	349
	Selenium (Se)	mg/kg	2.0	-	1.14	1.33	2.48	1.59	0.537
	Silver (Ag)	mg/kg	0.50	-	0.120	0.150	0.160	0.144	0.0182
	Sodium (Na)	mg/kg	-	-	76.0	86.0	94.0	84.4	7.40
	Strontium (Sr)	mg/kg	-	-	72.0	78.8	88.2	79.7	7.30
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	1,100	1,020	-
	Thallium (Tl)	mg/kg	-	-	0.184	0.213	0.235	0.212	0.0197
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	17.3	20.4	22.2	20.1	1.88
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	0.978	1.01	1.05	1.01	0.0265
	Vanadium (V)	mg/kg	-	-	26.8	34.7	35.7	33.0	3.66
	Zinc (Zn)	mg/kg	123	315	109	111	134	117	10.7
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	1.10	1.02	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0350	<0.0450	<0.0800	<0.0350	-
	Acenaphthylene	mg/kg	0.0059	0.13	0.00700	0.00810	0.0130	0.00890	0.00235
	Acridine	mg/kg	-	-	<0.0700	<0.0800	<0.150	<0.0700	-
	Anthracene	mg/kg	0.047	0.25	<0.00400	<0.00400	<0.00800	<0.00400	-
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0190	0.0210	0.0360	0.0234	0.00740
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	0.0130	0.0107	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0280	0.0370	0.0670	0.0394	0.0183
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0280	0.0370	0.0670	0.0394	0.0183
	Benzo(e)pyrene	mg/kg	-	-	0.0300	0.0400	0.0700	0.0438	0.0156
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0140	0.0155	0.0230	0.0170	0.00424
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0200	<0.0100	-
	Chrysene	mg/kg	0.057	0.86	0.0840	0.108	0.191	0.116	0.0455
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.00750	0.00870	0.0160	0.0106	0.00376
	Fluoranthene	mg/kg	0.11	2.4	0.0200	0.0230	0.0460	0.0268	0.0108
	Fluorene	mg/kg	0.021	0.14	0.0940	0.119	0.221	0.132	0.0512
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0200	<0.0100	-
	1-Methylnaphthalene	mg/kg	-	-	0.404	0.477	0.850	0.537	0.179
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.679	0.786	1.44	0.893	0.312
	Naphthalene	mg/kg	0.035	0.39	0.209	0.240	0.413	0.263	0.0853
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0200	<0.0100	-
	Phenanthrene	mg/kg	0.042	0.52	0.423	0.450	0.827	0.532	0.171
	Pyrene	mg/kg	0.053	0.88	0.0270	0.0350	0.0590	0.0378	0.0125
	Quinoline	mg/kg	-	-	<0.0200	<0.0500	<0.0500	<0.0200	-
	d10-Acenaphthene	%	-	-	97.8	98.3	101	98.7	1.09
	d12-Chrysene	%	-	-	87.8	122	127	110	20.1
	d8-Naphthalene	%	-	-	85.1	87.4	91.4	88.2	2.48
	d10-Phenanthrene	%	-	-	96.4	102	104	101	3.80
	B(a)P Total Potency Equivalent	mg/kg	-	-	<0.0200	0.0250	0.0400	0.0270	0.00714
	IACR (CCME)	mg/kg	-	-	0.290	0.380	0.790	0.446	0.204

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_SCOUTDS				
			Lower SQG	Upper SQG	RG_SCOUTDS-1	RG_SCOUTDS-2	RG_SCOUTDS-3	RG_SCOUTDS-4	RG_SCOUTDS-5
					17-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20
Physical Tests	Moisture	%	-	-	64.2	72.1	56.4	75.6	53.0
	pH(1:2 Soil:Water)	pH	-	-	8.30	8.22	8.20	8.30	8.40
Particle Size	% Gravel (>2 mm)	%	-	-	3.60	4.90	3.20	3.50	<1.00
	% Sand (2.00 mm - 1.00 mm)	%	-	-	6.90	14.0	19.1	5.20	2.60
	% Sand (1.00 mm - 0.50 mm)	%	-	-	16.6	14.6	18.6	13.7	22.6
	% Sand (0.50 mm - 0.25 mm)	%	-	-	31.1	14.2	12.1	14.0	30.8
	% Sand (0.25 mm - 0.125 mm)	%	-	-	7.40	8.60	6.00	6.80	7.60
	% Sand (0.125 mm - 0.063 mm	%	-	-	3.40	4.20	3.90	6.90	3.80
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	13.3	16.9	14.8	19.2	10.9
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	15.4	19.9	18.3	24.4	16.3
	% Clay (<4 µm)	%	-	-	2.30	2.60	3.80	6.20	5.20
	Texture	-	-	-	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Organic Carbon	Total Organic Carbon	%	-	-	8.85	8.56	9.31	8.19	10.1
Metals	Aluminum (Al)	mg/kg	-	-	8,280	7,310	8,310	6,510	8,850
	Antimony (Sb)	mg/kg	-	-	0.730	0.660	0.560	0.680	0.630
	Arsenic (As)	mg/kg	5.9	17	5.47	4.86	4.74	4.98	5.41
	Barium (Ba)	mg/kg	-	-	217	204	256	200	228
	Beryllium (Be)	mg/kg	-	-	0.680	0.600	0.620	0.600	0.670
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200
	Boron (B)	mg/kg	-	-	9.70	9.80	10.7	8.30	10.6
	Cadmium (Cd)	mg/kg	0.60	3.5	1.82	2.12	2.49	1.73	1.81
	Calcium (Ca)	mg/kg	-	-	45,400	50,100	52,600	50,800	49,400
	Chromium (Cr)	mg/kg	37	90	13.8	13.2	14.0	11.9	15.3
	Cobalt (Co)	mg/kg	-	-	6.19	6.71	7.40	5.76	6.24
	Copper (Cu)	mg/kg	36	197	14.1	13.9	14.1	13.3	13.6
	Iron (Fe)	mg/kg	21,200	43,766	18,000	15,500	16,100	16,700	18,400
	Lead (Pb)	mg/kg	35	91	7.92	7.38	7.82	7.46	7.73
	Lithium (Li)	mg/kg	-	-	10.2	9.20	11.5	9.20	10.4
	Magnesium (Mg)	mg/kg	-	-	8,020	8,980	10,600	8,480	9,490
	Manganese (Mn)	mg/kg	460	1,100	590	671	760	555	588
	Mercury (Hg)	mg/kg	0.17	0.49	0.0378	0.0431	0.0469	0.0375	0.0399
	Molybdenum (Mo)	mg/kg	-	-	1.59	1.57	1.45	1.66	1.57
	Nickel (Ni)	mg/kg	16	75	44.6	51.4	59.6	42.5	45.7
	Phosphorus (P)	mg/kg	-	-	1,260	1,160	1,280	1,150	1,440
	Potassium (K)	mg/kg	-	-	2,260	2,050	2,120	1,780	2,350
	Selenium (Se)	mg/kg	2.0	-	1.42	1.94	1.98	1.87	1.58
	Silver (Ag)	mg/kg	0.50	-	0.150	0.160	0.150	0.140	0.150
	Sodium (Na)	mg/kg	-	-	79.0	77.0	86.0	72.0	87.0
	Strontium (Sr)	mg/kg	-	-	81.2	77.2	90.9	78.9	76.9
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000
	Thallium (Tl)	mg/kg	-	-	0.232	0.211	0.218	0.201	0.238
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00
	Titanium (Ti)	mg/kg	-	-	23.1	20.8	23.2	25.3	24.2
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500
	Uranium (U)	mg/kg	-	-	1.11	0.973	0.956	1.05	1.13
	Vanadium (V)	mg/kg	-	-	36.6	34.4	34.3	31.4	38.9
	Zinc (Zn)	mg/kg	123	315	178	190	220	156	161
	Zirconium (Zr)	mg/kg	-	-	1.10	<1.00	<1.00	<1.00	1.00
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0760	<0.0850	<0.0600	<0.0750	<0.0450
	Acenaphthylene	mg/kg	0.0059	0.13	0.0108	0.0142	0.0137	0.0160	0.00850
	Acridine	mg/kg	-	-	<0.120	<0.160	<0.120	<0.100	<0.0800
	Anthracene	mg/kg	0.047	0.25	0.00590	0.0124	0.0239	0.0182	0.0137
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0340	0.0470	<0.0300	<0.0400	<0.0300
	Benzo(a)pyrene	mg/kg	0.032	0.78	0.0180	0.0250	0.0190	<0.0200	<0.0200
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0580	0.0820	0.0620	0.0540	0.0360
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0580	0.0820	0.0620	0.0540	0.0360
	Benzo(e)pyrene	mg/kg	-	-	0.0690	0.0980	0.0700	0.0600	0.0440
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0310	0.0380	0.0310	<0.0300	0.0180
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0130	<0.0170	<0.0100	<0.0200	<0.0100
	Chrysene	mg/kg	0.057	0.86	0.171	0.221	<0.180	<0.170	<0.130
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.0156	0.0189	0.0148	<0.0130	0.00850
	Fluoranthene	mg/kg	0.11	2.4	0.0350	0.0430	0.0280	0.0290	0.0190
	Fluorene	mg/kg	0.021	0.14	0.209	0.293	0.222	0.218	0.141
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0130	<0.0170	0.0100	<0.0200	<0.0100
	1-Methylnaphthalene	mg/kg	-	-	0.818	0.983	0.802	0.814	0.524
	2-Methylnaphthalene	mg/kg	0.020	0.20	1.35	1.60	1.34	1.42	0.893
	Naphthalene	mg/kg	0.035	0.39	0.453	0.497	0.453	0.455	0.301
	Perylene	mg/kg	-	-	<0.0130	<0.0170	<0.0100	<0.0200	<0.0100
	Phenanthrene	mg/kg	0.042	0.52	0.670	0.884	0.698	0.699	0.447
	Pyrene	mg/kg	0.053	0.88	0.0510	0.0700	0.0510	0.0510	0.0360
	Quinoline	mg/kg	-	-	<0.0130	<0.0170	<0.0500	<0.0200	<0.0500
	d10-Acenaphthene	%	-	-	107	107	106	104	102
	d12-Chrysene	%	-	-	91.6	93.5	90.6	87.9	87.6
	d8-Naphthalene	%	-	-	104	103	103	104	104
	d10-Phenanthrene	%	-	-	95.0	98.0	92.5	93.0	88.0
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0460	0.0610	0.0440	0.0270	0.0250
	IACR (CCME)	mg/kg	-	-	0.710	0.980	0.630	0.560	0.400

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_SCOUTDS				
			Lower SQG	Upper SQG	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	Moisture	%	-	-	53.0	64.2	75.6	64.3	12.7
	pH(1:2 Soil:Water)	pH	-	-	8.20	8.30	8.40	8.28	0.148
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	3.50	4.90	3.24	1.22
	% Sand (2.00 mm - 1.00 mm)	%	-	-	2.60	6.90	19.1	9.56	1.82
	% Sand (1.00 mm - 0.50 mm)	%	-	-	13.7	16.6	22.6	17.2	10.9
	% Sand (0.50 mm - 0.25 mm)	%	-	-	12.1	14.2	31.1	20.4	6.57
	% Sand (0.25 mm - 0.125 mm)	%	-	-	6.00	7.40	8.60	7.28	5.95
	% Sand (0.125 mm - 0.063 mm	%	-	-	3.40	3.90	6.90	4.44	4.77
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	10.9	14.8	19.2	15.0	2.83
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	15.4	18.3	24.4	18.9	2.25
	% Clay (<4 µm)	%	-	-	2.30	3.80	6.20	4.02	0.483
	Texture	-	-	-	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	8.19	8.85	10.1	9.00	0.792
Metals	Aluminum (Al)	mg/kg	-	-	6,510	8,280	8,850	7,850	1,220
	Antimony (Sb)	mg/kg	-	-	0.560	0.660	0.730	0.652	0.138
	Arsenic (As)	mg/kg	5.9	17	4.74	4.98	5.47	5.09	0.385
	Barium (Ba)	mg/kg	-	-	200	217	256	221	12.2
	Beryllium (Be)	mg/kg	-	-	0.600	0.620	0.680	0.634	0.0559
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	8.30	9.80	10.7	9.82	0.653
	Cadmium (Cd)	mg/kg	0.60	3.5	1.73	1.82	2.49	1.99	0.317
	Calcium (Ca)	mg/kg	-	-	45,400	50,100	52,600	49,700	8,130
	Chromium (Cr)	mg/kg	37	90	11.9	13.8	15.3	13.6	1.77
	Cobalt (Co)	mg/kg	-	-	5.76	6.24	7.40	6.46	0.333
	Copper (Cu)	mg/kg	36	197	13.3	13.9	14.1	13.8	0.480
	Iron (Fe)	mg/kg	21,200	43,766	15,500	16,700	18,400	16,900	1,070
	Lead (Pb)	mg/kg	35	91	7.38	7.73	7.92	7.66	0.370
	Lithium (Li)	mg/kg	-	-	9.20	10.2	11.5	10.1	0.756
	Magnesium (Mg)	mg/kg	-	-	8,020	8,980	10,600	9,110	2,110
	Manganese (Mn)	mg/kg	460	1,100	555	590	760	633	98.6
	Mercury (Hg)	mg/kg	0.17	0.49	0.0375	0.0399	0.0469	0.0410	0.00454
	Molybdenum (Mo)	mg/kg	-	-	1.45	1.57	1.66	1.57	0.0910
	Nickel (Ni)	mg/kg	16	75	42.5	45.7	59.6	48.8	6.36
	Phosphorus (P)	mg/kg	-	-	1,150	1,260	1,440	1,260	121
	Potassium (K)	mg/kg	-	-	1,780	2,120	2,350	2,110	349
	Selenium (Se)	mg/kg	2.0	-	1.42	1.87	1.98	1.76	0.537
	Silver (Ag)	mg/kg	0.50	-	0.140	0.150	0.160	0.150	0.0182
	Sodium (Na)	mg/kg	-	-	72.0	79.0	87.0	80.2	7.40
	Strontium (Sr)	mg/kg	-	-	76.9	78.9	90.9	81.0	7.30
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	-
	Thallium (Tl)	mg/kg	-	-	0.201	0.218	0.238	0.220	0.0197
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	20.8	23.2	25.3	23.3	1.88
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	0.956	1.05	1.13	1.04	0.0265
	Vanadium (V)	mg/kg	-	-	31.4	34.4	38.9	35.1	3.66
	Zinc (Zn)	mg/kg	123	315	156	178	220	181	10.7
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	1.10	1.02	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0450	<0.0750	<0.0850	<0.0450	-
	Acenaphthylene	mg/kg	0.0059	0.13	0.00850	0.0137	0.0160	0.0126	0.00235
	Acridine	mg/kg	-	-	<0.0800	<0.120	<0.160	<0.0800	-
	Anthracene	mg/kg	0.047	0.25	0.00590	0.0137	0.0239	0.0148	-
	Benz(a)anthracene	mg/kg	0.032	0.39	<0.0300	<0.0300	0.0470	0.0345	0.00740
	Benzo(a)pyrene	mg/kg	0.032	0.78	0.0180	0.0190	0.0250	0.0198	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0360	0.0580	0.0820	0.0584	0.0183
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0360	0.0580	0.0820	0.0584	0.0183
	Benzo(e)pyrene	mg/kg	-	-	0.0440	0.0690	0.0980	0.0682	0.0156
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0180	0.0310	0.0380	0.0272	0.00424
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0130	<0.0200	<0.0100	-
	Chrysene	mg/kg	0.057	0.86	<0.130	<0.170	0.221	0.159	0.0455
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.00850	0.0148	0.0189	0.0133	0.00376
	Fluoranthene	mg/kg	0.11	2.4	0.0190	0.0290	0.0430	0.0308	0.0108
	Fluorene	mg/kg	0.021	0.14	0.141	0.218	0.293	0.217	0.0512
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	0.0100	0.0100	0.0100	-
	1-Methylnaphthalene	mg/kg	-	-	0.524	0.814	0.983	0.788	0.179
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.893	1.35	1.60	1.32	0.312
	Naphthalene	mg/kg	0.035	0.39	0.301	0.453	0.497	0.432	0.0853
	Perylene	mg/kg	-	-	<0.0100	<0.0130	<0.0200	<0.0100	-
	Phenanthrene	mg/kg	0.042	0.52	0.447	0.698	0.884	0.680	0.171
	Pyrene	mg/kg	0.053	0.88	0.0360	0.0510	0.0700	0.0518	0.0125
	Quinoline	mg/kg	-	-	<0.0130	<0.0200	<0.0500	<0.0130	-
	d10-Acenaphthene	%	-	-	102	106	107	105	1.09
	d12-Chrysene	%	-	-	87.6	90.6	93.5	90.2	20.1
	d8-Naphthalene	%	-	-	103	104	104	103	2.48
	d10-Phenanthrene	%	-	-	88.0	93.0	98.0	93.3	3.80
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0250	0.0440	0.0610	0.0406	0.00714
	IACR (CCME)	mg/kg	-	-	0.400	0.630	0.980	0.656	0.204

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FOBCP				
			Lower SQG	Upper SQG	RG_FOBCP-1	RG_FOBCP-2	RG_FOBCP-3	RG_FOBCP-4	RG_FOBCP-5
					16-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20
Physical Tests	Moisture	%	-	-	65.8	50.3	47.3	49.7	61.0
	pH(1:2 Soil:Water)	pH	-	-	8.27	8.30	8.34	8.34	8.55
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	1.80	<1.00	3.10	<1.00
	% Sand (2.00 mm - 1.00 mm)	%	-	-	11.5	5.20	<1.00	1.00	2.50
	% Sand (1.00 mm - 0.50 mm)	%	-	-	22.0	9.30	1.10	2.60	8.70
	% Sand (0.50 mm - 0.25 mm)	%	-	-	6.00	16.9	12.4	10.6	17.0
	% Sand (0.25 mm - 0.125 mm)	%	-	-	4.60	16.0	31.9	16.4	18.5
	% Sand (0.125 mm - 0.063 mm	%	-	-	2.80	8.30	18.3	10.8	10.6
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	22.7	18.4	16.4	19.7	17.9
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	26.6	21.0	16.1	28.3	20.2
	% Clay (<4 µm)	%	-	-	3.70	3.10	2.80	7.50	3.80
	Texture	-	-	-	Silt loam	Sandy loam	Sandy loam	ilt loam / Sandy loar	Sandy loam
Organic Carbon	Total Organic Carbon	%	-	-	10.2	6.47	4.69	6.94	5.24
Metals	Aluminum (Al)	mg/kg	-	-	6,770	6,980	7,420	6,940	8,160
	Antimony (Sb)	mg/kg	-	-	0.680	0.660	0.580	0.500	0.600
	Arsenic (As)	mg/kg	5.9	17	5.47	5.40	4.75	4.73	4.99
	Barium (Ba)	mg/kg	-	-	269	235	193	243	215
	Beryllium (Be)	mg/kg	-	-	0.600	0.630	0.590	0.510	0.600
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200
	Boron (B)	mg/kg	-	-	9.30	10.1	10.2	8.90	10.4
	Cadmium (Cd)	mg/kg	0.60	3.5	2.82	2.22	1.60	2.23	1.66
	Calcium (Ca)	mg/kg	-	-	58,800	74,700	57,300	87,000	56,300
	Chromium (Cr)	mg/kg	37	90	13.4	13.4	13.6	13.5	14.3
	Cobalt (Co)	mg/kg	-	-	7.83	6.93	5.95	6.53	6.39
	Copper (Cu)	mg/kg	36	197	16.2	13.4	12.1	13.1	13.1
	Iron (Fe)	mg/kg	21,200	43,766	16,600	17,100	13,100	13,700	14,700
	Lead (Pb)	mg/kg	35	91	8.43	7.62	7.53	7.18	7.85
	Lithium (Li)	mg/kg	-	-	9.20	10.0	10.2	9.00	10.8
	Magnesium (Mg)	mg/kg	-	-	10,800	11,700	13,000	12,900	14,100
	Manganese (Mn)	mg/kg	460	1,100	746	702	525	676	531
	Mercury (Hg)	mg/kg	0.17	0.49	0.0489	0.0427	0.0441	0.0458	0.0434
	Molybdenum (Mo)	mg/kg	-	-	1.70	1.61	1.33	1.34	1.40
	Nickel (Ni)	mg/kg	16	75	69.0	58.4	46.7	71.2	47.0
	Phosphorus (P)	mg/kg	-	-	1,400	1,340	1,340	1,320	1,340
	Potassium (K)	mg/kg	-	-	1,800	1,940	2,040	1,900	2,090
	Selenium (Se)	mg/kg	2.0	-	3.01	2.13	2.00	3.26	2.30
	Silver (Ag)	mg/kg	0.50	-	0.180	0.150	0.150	0.170	0.160
	Sodium (Na)	mg/kg	-	-	88.0	89.0	88.0	92.0	90.0
	Strontium (Sr)	mg/kg	-	-	103	89.4	71.5	77.8	75.7
	Sulfur (S)	mg/kg	-	-	1,100	<1,000	<1,000	1,000	<1,000
	Thallium (Tl)	mg/kg	-	-	0.237	0.254	0.235	0.262	0.234
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00
	Titanium (Ti)	mg/kg	-	-	25.1	21.9	20.8	25.2	23.5
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500
	Uranium (U)	mg/kg	-	-	1.16	1.17	1.05	1.10	1.02
	Vanadium (V)	mg/kg	-	-	33.4	36.0	32.8	32.1	33.8
	Zinc (Zn)	mg/kg	123	315	241	168	130	157	148
	Zirconium (Zr)	mg/kg	-	-	1.00	<1.00	1.00	<1.00	<1.00
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0600	<0.0600	<0.0350	<0.0800	<0.0500
	Acenaphthylene	mg/kg	0.0059	0.13	0.0122	0.00930	<0.00500	0.0133	0.00980
	Acridine	mg/kg	-	-	<0.120	<0.120	<0.0600	<0.130	<0.0800
	Anthracene	mg/kg	0.047	0.25	0.0191	0.0190	0.00740	0.0173	0.00730
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0460	<0.0400	<0.0200	<0.0400	0.0280
	Benzo(a)pyrene	mg/kg	0.032	0.78	0.0180	0.0170	<0.0100	0.0210	0.0130
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0750	0.0730	0.0390	0.0650	0.0530
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0950	0.143	0.0390	0.0790	0.0530
	Benzo(e)pyrene	mg/kg	-	-	0.0850	0.0730	0.0440	0.0760	0.0610
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0370	0.0280	0.0190	0.0320	<0.0300
	Benzo(k)fluoranthene	mg/kg	0.24	13	0.0200	0.0710	<0.0100	0.0140	<0.0130
	Chrysene	mg/kg	0.057	0.86	0.195	<0.160	<0.120	<0.220	0.164
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	<0.0270	<0.0170	0.00920	<0.0200	0.0163
	Fluoranthene	mg/kg	0.11	2.4	0.0510	0.0360	0.0160	0.0330	0.0320
	Fluorene	mg/kg	0.021	0.14	0.192	0.198	0.0990	0.244	0.141
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	0.0160	<0.0100	<0.0100	<0.0100	<0.0130
	1-Methylnaphthalene	mg/kg	-	-	0.670	0.763	0.378	0.898	0.631
	2-Methylnaphthalene	mg/kg	0.020	0.20	1.10	1.25	0.612	1.45	1.01
	Naphthalene	mg/kg	0.035	0.39	0.366	0.424	0.203	0.469	0.370
	Perylene	mg/kg	-	-	<0.0130	<0.0100	<0.0100	<0.0100	<0.0130
	Phenanthrene	mg/kg	0.042	0.52	0.622	0.691	0.369	0.790	0.620
	Pyrene	mg/kg	0.053	0.88	0.0630	0.0550	0.0300	0.0590	0.0440
	Quinoline	mg/kg	-	-	<0.0130	<0.0500	<0.0500	<0.0500	<0.0130
	d10-Acenaphthene	%	-	-	104	105	100	104	104
	d12-Chrysene	%	-	-	92.1	92.3	86.0	88.4	91.1
	d8-Naphthalene	%	-	-	99.2	102	98.5	95.7	103
	d10-Phenanthrene	%	-	-	97.4	91.6	89.5	93.5	96.9
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0500	0.0430	0.0210	0.0420	0.0410
	IACR (CCME)	mg/kg	-	-	0.950	1.08	0.390	0.710	0.650

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FOBCP				
			Lower SQG	Upper SQG	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	Moisture	%	-	-	47.3	50.3	65.8	54.8	12.7
	pH(1:2 Soil:Water)	pH	-	-	8.27	8.34	8.55	8.36	0.148
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	<1.00	3.10	1.58	1.22
	% Sand (2.00 mm - 1.00 mm)	%	-	-	<1.00	2.50	11.5	4.24	1.82
	% Sand (1.00 mm - 0.50 mm)	%	-	-	1.10	8.70	22.0	8.74	10.9
	% Sand (0.50 mm - 0.25 mm)	%	-	-	6.00	12.4	17.0	12.6	6.57
	% Sand (0.25 mm - 0.125 mm)	%	-	-	4.60	16.4	31.9	17.5	5.95
	% Sand (0.125 mm - 0.063 mm	%	-	-	2.80	10.6	18.3	10.2	4.77
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	16.4	18.4	22.7	19.0	2.83
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	16.1	21.0	28.3	22.4	2.25
	% Clay (<4 µm)	%	-	-	2.80	3.70	7.50	4.18	0.483
	Texture	-	-	-	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	4.69	6.47	10.2	6.71	0.792
Metals	Aluminum (Al)	mg/kg	-	-	6,770	6,980	8,160	7,250	1,220
	Antimony (Sb)	mg/kg	-	-	0.500	0.600	0.680	0.604	0.138
	Arsenic (As)	mg/kg	5.9	17	4.73	4.99	5.47	5.07	0.385
	Barium (Ba)	mg/kg	-	-	193	235	269	231	12.2
	Beryllium (Be)	mg/kg	-	-	0.510	0.600	0.630	0.586	0.0559
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	8.90	10.1	10.4	9.78	0.653
	Cadmium (Cd)	mg/kg	0.60	3.5	1.60	2.22	2.82	2.11	0.317
	Calcium (Ca)	mg/kg	-	-	56,300	58,800	87,000	66,800	8,130
	Chromium (Cr)	mg/kg	37	90	13.4	13.5	14.3	13.6	1.77
	Cobalt (Co)	mg/kg	-	-	5.95	6.53	7.83	6.73	0.333
	Copper (Cu)	mg/kg	36	197	12.1	13.1	16.2	13.6	0.480
	Iron (Fe)	mg/kg	21,200	43,766	13,100	14,700	17,100	15,000	1,070
	Lead (Pb)	mg/kg	35	91	7.18	7.62	8.43	7.72	0.370
	Lithium (Li)	mg/kg	-	-	9.00	10.0	10.8	9.84	0.756
	Magnesium (Mg)	mg/kg	-	-	10,800	12,900	14,100	12,500	2,110
	Manganese (Mn)	mg/kg	460	1,100	525	676	746	636	98.6
	Mercury (Hg)	mg/kg	0.17	0.49	0.0427	0.0441	0.0489	0.0450	0.00454
	Molybdenum (Mo)	mg/kg	-	-	1.33	1.40	1.70	1.48	0.0910
	Nickel (Ni)	mg/kg	16	75	46.7	58.4	71.2	58.5	6.36
	Phosphorus (P)	mg/kg	-	-	1,320	1,340	1,400	1,350	121
	Potassium (K)	mg/kg	-	-	1,800	1,940	2,090	1,950	349
	Selenium (Se)	mg/kg	2.0	-	2.00	2.30	3.26	2.54	0.537
	Silver (Ag)	mg/kg	0.50	-	0.150	0.160	0.180	0.162	0.0182
	Sodium (Na)	mg/kg	-	-	88.0	89.0	92.0	89.4	7.40
	Strontium (Sr)	mg/kg	-	-	71.5	77.8	103	83.5	7.30
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	1,100	1,020	-
	Thallium (Tl)	mg/kg	-	-	0.234	0.237	0.262	0.244	0.0197
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	20.8	23.5	25.2	23.3	1.88
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	1.02	1.10	1.17	1.10	0.0265
	Vanadium (V)	mg/kg	-	-	32.1	33.4	36.0	33.6	3.66
	Zinc (Zn)	mg/kg	123	315	130	157	241	169	10.7
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	1.00	1.00	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0350	<0.0600	<0.0800	<0.0350	-
	Acenaphthylene	mg/kg	0.0059	0.13	<0.00500	0.00980	0.0133	0.00992	0.00235
	Acridine	mg/kg	-	-	<0.0600	<0.120	<0.130	<0.0600	-
	Anthracene	mg/kg	0.047	0.25	0.00730	0.0173	0.0191	0.0140	-
	Benz(a)anthracene	mg/kg	0.032	0.39	<0.0200	0.0280	0.0460	0.0284	0.00740
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	0.0170	0.0210	0.0158	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0390	0.0650	0.0750	0.0610	0.0183
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0390	0.0790	0.143	0.0818	0.0183
	Benzo(e)pyrene	mg/kg	-	-	0.0440	0.0730	0.0850	0.0678	0.0156
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0190	0.0280	0.0370	0.0279	0.00424
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	0.0140	0.0710	0.0250	-
	Chrysene	mg/kg	0.057	0.86	<0.120	0.142	0.195	0.150	0.0455
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.00920	0.0127	0.0163	0.0127	0.00376
	Fluoranthene	mg/kg	0.11	2.4	0.0160	0.0330	0.0510	0.0336	0.0108
	Fluorene	mg/kg	0.021	0.14	0.0990	0.192	0.244	0.175	0.0512
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	0.0160	0.0112	-
	1-Methylnaphthalene	mg/kg	-	-	0.378	0.670	0.898	0.668	0.179
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.612	1.10	1.45	1.08	0.312
	Naphthalene	mg/kg	0.035	0.39	0.203	0.370	0.469	0.366	0.0853
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0130	<0.0100	-
	Phenanthrene	mg/kg	0.042	0.52	0.369	0.622	0.790	0.618	0.171
	Pyrene	mg/kg	0.053	0.88	0.0300	0.0550	0.0630	0.0502	0.0125
	Quinoline	mg/kg	-	-	<0.0130	<0.0500	<0.0500	<0.0130	-
	d10-Acenaphthene	%	-	-	100	104	105	104	1.09
	d12-Chrysene	%	-	-	86.0	91.1	92.3	90.0	20.1
	d8-Naphthalene	%	-	-	95.7	99.2	103	99.6	2.48
	d10-Phenanthrene	%	-	-	89.5	93.5	97.4	93.8	3.80
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0210	0.0420	0.0500	0.0394	0.00714
	IACR (CCME)	mg/kg	-	-	0.390	0.710	1.08	0.756	0.204

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FRUPO				
			Lower SQG	Upper SQG	RG_FRUPO-1	RG_FRUPO-2	RG_FRUPO-3	RG_FRUPO-4	RG_FRUPO-5
					12-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20
Physical Tests	Moisture	%	-	-	43.5	48.9	37.4	37.9	43.6
	pH(1:2 Soil:Water)	pH	-	-	8.36	8.24	8.72	8.73	8.30
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	<1.00	<1.00	<1.00	<1.00
	% Sand (2.00 mm - 1.00 mm)	%	-	-	4.80	1.10	<1.00	1.70	<1.00
	% Sand (1.00 mm - 0.50 mm)	%	-	-	13.7	2.10	4.60	17.5	1.40
	% Sand (0.50 mm - 0.25 mm)	%	-	-	7.70	9.30	27.5	19.5	13.8
	% Sand (0.25 mm - 0.125 mm)	%	-	-	9.90	24.9	31.7	20.8	20.3
	% Sand (0.125 mm - 0.063 mm	%	-	-	24.2	20.6	15.6	17.0	23.1
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	18.7	18.7	9.20	10.5	18.2
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	17.2	18.9	8.60	10.2	18.8
	% Clay (<4 µm)	%	-	-	3.50	4.10	2.80	2.90	4.30
	Texture	-	-	-	Sandy loam	Sandy loam	Loamy sand	Loamy sand	Sandy loam
Organic Carbon	Total Organic Carbon	%	-	-	3.97	5.04	3.43	4.18	5.09
Metals	Aluminum (Al)	mg/kg	-	-	7,960	7,220	9,300	6,970	6,920
	Antimony (Sb)	mg/kg	-	-	0.550	0.550	0.660	0.720	0.690
	Arsenic (As)	mg/kg	5.9	17	4.79	4.89	5.78	5.87	5.16
	Barium (Ba)	mg/kg	-	-	189	190	217	215	196
	Beryllium (Be)	mg/kg	-	-	0.560	0.580	0.670	0.650	0.610
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200
	Boron (B)	mg/kg	-	-	10.0	9.80	11.5	8.80	9.50
	Cadmium (Cd)	mg/kg	0.60	3.5	1.25	1.21	1.18	1.28	1.36
	Calcium (Ca)	mg/kg	-	-	48,800	41,000	42,300	43,000	48,300
	Chromium (Cr)	mg/kg	37	90	14.9	14.4	16.3	13.7	14.1
	Cobalt (Co)	mg/kg	-	-	5.37	5.35	6.16	5.75	5.85
	Copper (Cu)	mg/kg	36	197	12.3	12.3	13.2	13.4	13.8
	Iron (Fe)	mg/kg	21,200	43,766	13,800	13,200	16,700	16,300	14,100
	Lead (Pb)	mg/kg	35	91	7.29	7.38	8.47	7.93	8.23
	Lithium (Li)	mg/kg	-	-	9.60	9.30	11.0	9.00	10.4
	Magnesium (Mg)	mg/kg	-	-	14,300	11,700	11,400	10,200	13,100
	Manganese (Mn)	mg/kg	460	1,100	459	464	480	464	489
	Mercury (Hg)	mg/kg	0.17	0.49	<0.00500	0.0433	0.0329	0.0362	0.0504
	Molybdenum (Mo)	mg/kg	-	-	1.32	1.34	1.45	1.69	1.51
	Nickel (Ni)	mg/kg	16	75	31.2	30.4	31.6	34.2	35.1
	Phosphorus (P)	mg/kg	-	-	1,380	1,240	1,510	1,460	1,400
	Potassium (K)	mg/kg	-	-	2,160	2,050	2,540	1,940	1,870
	Selenium (Se)	mg/kg	2.0	-	1.60	1.72	1.26	1.32	1.92
	Silver (Ag)	mg/kg	0.50	-	0.160	0.160	0.140	0.150	0.190
	Sodium (Na)	mg/kg	-	-	87.0	82.0	95.0	75.0	83.0
	Strontium (Sr)	mg/kg	-	-	66.4	60.4	73.9	71.3	67.6
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000
	Thallium (Tl)	mg/kg	-	-	0.222	0.216	0.240	0.226	0.244
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00
	Titanium (Ti)	mg/kg	-	-	21.3	22.9	24.3	20.0	32.5
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500
	Uranium (U)	mg/kg	-	-	1.10	1.06	1.14	1.17	1.14
	Vanadium (V)	mg/kg	-	-	34.9	34.2	40.7	36.2	33.1
	Zinc (Zn)	mg/kg	123	315	110	109	120	123	117
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	1.30	<1.00	1.30
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0350	<0.0450	<0.0200	<0.0200	<0.0250
	Acenaphthylene	mg/kg	0.0059	0.13	0.00740	0.00980	<0.00500	0.00580	0.00630
	Acridine	mg/kg	-	-	<0.0500	<0.0600	<0.0300	<0.0400	<0.0500
	Anthracene	mg/kg	0.047	0.25	0.0113	0.00420	0.00610	0.0111	0.0101
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0220	0.0230	0.0100	0.0110	0.0140
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	0.0110	<0.0100	<0.0100	<0.0100
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0390	0.0360	0.0230	0.0240	0.0260
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0390	0.0360	0.0230	0.0240	0.0260
	Benzo(e)pyrene	mg/kg	-	-	0.0410	0.0420	0.0270	0.0270	0.0300
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0170	<0.0200	0.0130	0.0110	0.0140
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
	Chrysene	mg/kg	0.057	0.86	0.117	0.112	0.0860	0.0740	0.0840
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.0135	0.00770	0.00720	0.00650	0.00740
	Fluoranthene	mg/kg	0.11	2.4	0.0380	0.0270	0.0170	0.0140	0.0150
	Fluorene	mg/kg	0.021	0.14	0.0810	0.0900	0.0440	0.0680	0.0700
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
	1-Methylnaphthalene	mg/kg	-	-	0.350	0.495	0.271	0.309	0.326
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.565	0.784	0.414	0.504	0.520
	Naphthalene	mg/kg	0.035	0.39	0.170	0.286	0.149	0.166	0.161
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
	Phenanthrene	mg/kg	0.042	0.52	0.402	0.581	0.337	0.367	0.437
	Pyrene	mg/kg	0.053	0.88	0.0390	0.0360	0.0220	0.0240	0.0260
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
	d10-Acenaphthene	%	-	-	98.8	97.2	97.7	99.9	96.9
	d12-Chrysene	%	-	-	125	125	125	127	121
	d8-Naphthalene	%	-	-	86.9	88.1	89.5	91.2	86.5
	d10-Phenanthrene	%	-	-	99.2	105	102	110	106
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0270	0.0270	<0.0200	<0.0200	<0.0200
	IACR (CCME)	mg/kg	-	-	0.470	0.450	0.300	0.290	0.330

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FRUPO				
			Lower SQG	Upper SQG	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	Moisture	%	-	-	37.4	43.5	48.9	42.3	12.7
	pH(1:2 Soil:Water)	pH	-	-	8.24	8.36	8.73	8.47	0.148
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	<1.00	<1.00	<1.00	1.22
	% Sand (2.00 mm - 1.00 mm)	%	-	-	<1.00	1.10	4.80	1.92	1.82
	% Sand (1.00 mm - 0.50 mm)	%	-	-	1.40	4.60	17.5	7.86	10.9
	% Sand (0.50 mm - 0.25 mm)	%	-	-	7.70	13.8	27.5	15.6	6.57
	% Sand (0.25 mm - 0.125 mm)	%	-	-	9.90	20.8	31.7	21.5	5.95
	% Sand (0.125 mm - 0.063 mm	%	-	-	15.6	20.6	24.2	20.1	4.77
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	9.20	18.2	18.7	15.1	2.83
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	8.60	17.2	18.9	14.7	2.25
	% Clay (<4 µm)	%	-	-	2.80	3.50	4.30	3.52	0.483
	Texture	-	-	-	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	3.43	4.18	5.09	4.34	0.792
Metals	Aluminum (Al)	mg/kg	-	-	6,920	7,220	9,300	7,670	1,220
	Antimony (Sb)	mg/kg	-	-	0.550	0.660	0.720	0.634	0.138
	Arsenic (As)	mg/kg	5.9	17	4.79	5.16	5.87	5.30	0.385
	Barium (Ba)	mg/kg	-	-	189	196	217	201	12.2
	Beryllium (Be)	mg/kg	-	-	0.560	0.610	0.670	0.614	0.0559
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	8.80	9.80	11.5	9.92	0.653
	Cadmium (Cd)	mg/kg	0.60	3.5	1.18	1.25	1.36	1.26	0.317
	Calcium (Ca)	mg/kg	-	-	41,000	43,000	48,800	44,700	8,130
	Chromium (Cr)	mg/kg	37	90	13.7	14.4	16.3	14.7	1.77
	Cobalt (Co)	mg/kg	-	-	5.35	5.75	6.16	5.70	0.333
	Copper (Cu)	mg/kg	36	197	12.3	13.2	13.8	13.0	0.480
	Iron (Fe)	mg/kg	21,200	43,766	13,200	14,100	16,700	14,800	1,070
	Lead (Pb)	mg/kg	35	91	7.29	7.93	8.47	7.86	0.370
	Lithium (Li)	mg/kg	-	-	9.00	9.60	11.0	9.86	0.756
	Magnesium (Mg)	mg/kg	-	-	10,200	11,700	14,300	12,100	2,110
	Manganese (Mn)	mg/kg	460	1,100	459	464	489	471	98.6
	Mercury (Hg)	mg/kg	0.17	0.49	<0.00500	0.0362	0.0504	0.0336	0.00454
	Molybdenum (Mo)	mg/kg	-	-	1.32	1.45	1.69	1.46	0.0910
	Nickel (Ni)	mg/kg	16	75	30.4	31.6	35.1	32.5	6.36
	Phosphorus (P)	mg/kg	-	-	1,240	1,400	1,510	1,400	121
	Potassium (K)	mg/kg	-	-	1,870	2,050	2,540	2,110	349
	Selenium (Se)	mg/kg	2.0	-	1.26	1.60	1.92	1.56	0.537
	Silver (Ag)	mg/kg	0.50	-	0.140	0.160	0.190	0.160	0.0182
	Sodium (Na)	mg/kg	-	-	75.0	83.0	95.0	84.4	7.40
	Strontium (Sr)	mg/kg	-	-	60.4	67.6	73.9	67.9	7.30
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	-
	Thallium (Tl)	mg/kg	-	-	0.216	0.226	0.244	0.230	0.0197
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	20.0	22.9	32.5	24.2	1.88
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	1.06	1.14	1.17	1.12	0.0265
	Vanadium (V)	mg/kg	-	-	33.1	34.9	40.7	35.8	3.66
	Zinc (Zn)	mg/kg	123	315	109	117	123	116	10.7
	Zirconium (Zr)	mg/kg	-	-	<1.00	<1.00	1.30	1.12	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0200	<0.0250	<0.0450	<0.0200	-
	Acenaphthylene	mg/kg	0.0059	0.13	<0.00500	0.00630	0.00980	0.00686	0.00235
	Acridine	mg/kg	-	-	<0.0300	<0.0500	<0.0600	<0.0300	-
	Anthracene	mg/kg	0.047	0.25	0.00420	0.0101	0.0113	0.00856	-
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0100	0.0140	0.0230	0.0160	0.00740
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	0.0110	0.0102	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0230	0.0260	0.0390	0.0296	0.0183
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0230	0.0260	0.0390	0.0296	0.0183
	Benzo(e)pyrene	mg/kg	-	-	0.0270	0.0300	0.0420	0.0334	0.0156
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0110	0.0135	0.0170	0.0138	0.00424
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0100	<0.0100	-
	Chrysene	mg/kg	0.057	0.86	0.0740	0.0860	0.117	0.0946	0.0455
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.00650	0.00740	0.0135	0.00846	0.00376
	Fluoranthene	mg/kg	0.11	2.4	0.0140	0.0170	0.0380	0.0222	0.0108
	Fluorene	mg/kg	0.021	0.14	0.0440	0.0700	0.0900	0.0706	0.0512
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0100	<0.0100	-
	1-Methylnaphthalene	mg/kg	-	-	0.271	0.326	0.495	0.350	0.179
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.414	0.520	0.784	0.557	0.312
	Naphthalene	mg/kg	0.035	0.39	0.149	0.166	0.286	0.186	0.0853
	Perylene	mg/kg	-	-	<0.0100	<0.0100	<0.0100	<0.0100	-
	Phenanthrene	mg/kg	0.042	0.52	0.337	0.402	0.581	0.425	0.171
	Pyrene	mg/kg	0.053	0.88	0.0220	0.0260	0.0390	0.0294	0.0125
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	-
	d10-Acenaphthene	%	-	-	96.9	97.7	99.9	98.1	1.09
	d12-Chrysene	%	-	-	121	125	127	124	20.1
	d8-Naphthalene	%	-	-	86.5	88.1	91.2	88.4	2.48
	d10-Phenanthrene	%	-	-	99.2	105	110	104	3.80
	B(a)P Total Potency Equivalent	mg/kg	-	-	<0.0200	<0.0200	0.0270	0.0228	0.00714
	IACR (CCME)	mg/kg	-	-	0.290	0.330	0.470	0.368	0.204

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FO22				
			Lower SQG	Upper SQG	RG_FO22-1	RG_FO22-2	RG_FO22-3	RG_FO22-4	RG_FO22-5
					11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20
Physical Tests	Moisture	%	-	-	48.8	36.6	39.4	38.6	42.0
	pH(1:2 Soil:Water)	pH	-	-	8.22	8.26	8.37	8.30	8.30
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	<1.00	<1.00	1.80	<1.00
	% Sand (2.00 mm - 1.00 mm)	%	-	-	<1.00	1.50	<1.00	<1.00	<1.00
	% Sand (1.00 mm - 0.50 mm)	%	-	-	<1.00	12.3	<1.00	2.30	<1.00
	% Sand (0.50 mm - 0.25 mm)	%	-	-	3.70	30.9	3.80	27.0	5.10
	% Sand (0.25 mm - 0.125 mm)	%	-	-	22.0	27.5	34.6	41.4	36.2
	% Sand (0.125 mm - 0.063 mm	%	-	-	24.1	10.3	33.9	10.0	27.4
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	23.3	7.50	14.8	7.40	15.7
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	22.8	7.80	10.3	7.50	12.8
	% Clay (<4 µm)	%	-	-	3.40	2.00	2.30	2.30	2.30
	Texture	-	-	-	Sandy loam	Loamy sand	Loamy sand	Loamy sand	Loamy sand
Organic Carbon	Total Organic Carbon	%	-	-	4.61	2.77	3.07	4.28	3.94
Metals	Aluminum (Al)	mg/kg	-	-	7,370	8,860	6,000	8,000	8,090
	Antimony (Sb)	mg/kg	-	-	0.570	0.480	0.510	0.670	0.530
	Arsenic (As)	mg/kg	5.9	17	4.92	5.52	4.55	5.91	5.01
	Barium (Ba)	mg/kg	-	-	191	205	159	209	191
	Beryllium (Be)	mg/kg	-	-	0.590	0.650	0.500	0.670	0.600
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	<0.200
	Boron (B)	mg/kg	-	-	10.2	10.3	6.90	9.70	10.4
	Cadmium (Cd)	mg/kg	0.60	3.5	1.24	0.974	0.960	1.15	1.12
	Calcium (Ca)	mg/kg	-	-	40,400	26,200	37,500	30,600	37,500
	Chromium (Cr)	mg/kg	37	90	14.5	16.1	11.8	14.8	15.1
	Cobalt (Co)	mg/kg	-	-	5.25	5.61	4.58	5.99	5.00
	Copper (Cu)	mg/kg	36	197	12.2	11.4	10.4	12.5	11.6
	Iron (Fe)	mg/kg	21,200	43,766	13,300	15,700	12,100	16,000	13,600
	Lead (Pb)	mg/kg	35	91	7.59	7.81	6.96	8.45	7.65
	Lithium (Li)	mg/kg	-	-	9.80	9.40	8.10	8.80	9.50
	Magnesium (Mg)	mg/kg	-	-	13,200	8,010	12,500	9,120	12,100
	Manganese (Mn)	mg/kg	460	1,100	431	508	281	380	323
	Mercury (Hg)	mg/kg	0.17	0.49	0.0450	0.0284	0.0341	0.0357	0.0448
	Molybdenum (Mo)	mg/kg	-	-	1.35	1.26	1.03	1.40	1.17
	Nickel (Ni)	mg/kg	16	75	26.2	25.7	21.5	27.0	24.2
	Phosphorus (P)	mg/kg	-	-	1,600	1,600	1,390	1,740	1,540
	Potassium (K)	mg/kg	-	-	1,970	2,600	1,520	2,160	2,170
	Selenium (Se)	mg/kg	2.0	-	2.18	1.41	1.54	1.95	1.65
	Silver (Ag)	mg/kg	0.50	-	0.170	0.120	0.130	0.140	0.140
	Sodium (Na)	mg/kg	-	-	84.0	75.0	80.0	78.0	85.0
	Strontium (Sr)	mg/kg	-	-	61.7	68.9	54.1	71.2	61.5
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000
	Thallium (Tl)	mg/kg	-	-	0.213	0.225	0.185	0.219	0.219
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	<2.00
	Titanium (Ti)	mg/kg	-	-	23.4	14.0	25.6	23.3	23.1
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	<0.500
	Uranium (U)	mg/kg	-	-	1.12	1.10	0.954	1.22	1.07
	Vanadium (V)	mg/kg	-	-	33.6	39.7	27.6	37.8	35.7
	Zinc (Zn)	mg/kg	123	315	108	111	94.4	121	105
	Zirconium (Zr)	mg/kg	-	-	1.10	<1.00	1.00	1.10	1.00
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0250	<0.0150	<0.0170	<0.0170	<0.0200
	Acenaphthylene	mg/kg	0.0059	0.13	0.00550	<0.00500	<0.00500	<0.00500	<0.00500
	Acridine	mg/kg	-	-	<0.0400	<0.0200	<0.0300	<0.0200	<0.0200
	Anthracene	mg/kg	0.047	0.25	<0.00400	<0.00400	0.00830	<0.00400	0.00750
	Benz(a)anthracene	mg/kg	0.032	0.39	0.0140	<0.0100	0.0330	<0.0100	0.0110
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	0.0150	<0.0100	<0.0100
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0360	0.0220	0.0400	0.0250	0.0240
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0360	0.0220	0.0400	0.0250	0.0240
	Benzo(e)pyrene	mg/kg	-	-	0.0380	0.0210	0.0330	0.0270	0.0240
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0150	0.0110	<0.0200	0.0110	<0.0200
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
	Chrysene	mg/kg	0.057	0.86	0.107	<0.0600	0.0860	0.0800	0.0790
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	0.00890	<0.00500	0.00590	0.00690	<0.00800
	Fluoranthene	mg/kg	0.11	2.4	0.0200	0.0110	0.0590	0.0160	0.0140
	Fluorene	mg/kg	0.021	0.14	0.0620	0.0220	0.0270	0.0300	0.0240
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
	1-Methylnaphthalene	mg/kg	-	-	0.268	0.142	0.202	0.204	0.202
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.431	0.213	0.300	0.325	0.311
	Naphthalene	mg/kg	0.035	0.39	0.141	0.0730	0.115	0.129	0.125
	Perylene	mg/kg	-	-	0.0290	0.0140	0.0220	0.0210	0.0210
	Phenanthrene	mg/kg	0.042	0.52	0.397	0.223	0.319	0.319	0.352
	Pyrene	mg/kg	0.053	0.88	0.0270	0.0160	0.0580	0.0220	0.0240
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
	d10-Acenaphthene	%	-	-	97.1	96.3	96.3	95.4	99.0
	d12-Chrysene	%	-	-	128	119	121	119	125
	d8-Naphthalene	%	-	-	87.1	84.6	87.3	81.7	88.9
	d10-Phenanthrene	%	-	-	109	104	95.0	104	109
	B(a)P Total Potency Equivalent	mg/kg	-	-	0.0210	<0.0200	0.0300	<0.0200	<0.0200
	IACR (CCME)	mg/kg	-	-	0.410	0.220	0.490	0.290	0.280

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.1: Chemistry of Sediment Samples Collected Concurrent with Biological Samples, FRO LAEMP, September 2020

Parameter		Units	BC Sediment Quality Guidelines		RG_FO22				
			Lower SQG	Upper SQG	Minimum	Median	Maximum	Mean	Standard Deviation
Physical Tests	Moisture	%	-	-	36.6	39.4	48.8	41.1	12.7
	pH(1:2 Soil:Water)	pH	-	-	8.22	8.30	8.37	8.29	0.148
Particle Size	% Gravel (>2 mm)	%	-	-	<1.00	<1.00	1.80	1.16	1.22
	% Sand (2.00 mm - 1.00 mm)	%	-	-	<1.00	<1.00	1.50	1.10	1.82
	% Sand (1.00 mm - 0.50 mm)	%	-	-	<1.00	<1.00	12.3	3.52	10.9
	% Sand (0.50 mm - 0.25 mm)	%	-	-	3.70	5.10	30.9	14.1	6.57
	% Sand (0.25 mm - 0.125 mm)	%	-	-	22.0	34.6	41.4	32.3	5.95
	% Sand (0.125 mm - 0.063 mm	%	-	-	10.0	24.1	33.9	21.1	4.77
	% Silt (0.063 mm - 0.0312 mm)	%	-	-	7.40	14.8	23.3	13.7	2.83
	% Silt (0.0312 mm - 0.004 mm)	%	-	-	7.50	10.3	22.8	12.2	2.25
	% Clay (<4 µm)	%	-	-	2.00	2.30	3.40	2.46	0.483
	Texture	-	-	-	-	-	-	-	-
Organic Carbon	Total Organic Carbon	%	-	-	2.77	3.94	4.61	3.73	0.792
Metals	Aluminum (Al)	mg/kg	-	-	6,000	8,000	8,860	7,660	1,220
	Antimony (Sb)	mg/kg	-	-	0.480	0.530	0.670	0.552	0.138
	Arsenic (As)	mg/kg	5.9	17	4.55	5.01	5.91	5.18	0.385
	Barium (Ba)	mg/kg	-	-	159	191	209	191	12.2
	Beryllium (Be)	mg/kg	-	-	0.500	0.600	0.670	0.602	0.0559
	Bismuth (Bi)	mg/kg	-	-	<0.200	<0.200	<0.200	<0.200	-
	Boron (B)	mg/kg	-	-	6.90	10.2	10.4	9.50	0.653
	Cadmium (Cd)	mg/kg	0.60	3.5	0.960	1.12	1.24	1.09	0.317
	Calcium (Ca)	mg/kg	-	-	26,200	37,500	40,400	34,400	8,130
	Chromium (Cr)	mg/kg	37	90	11.8	14.8	16.1	14.5	1.77
	Cobalt (Co)	mg/kg	-	-	4.58	5.25	5.99	5.29	0.333
	Copper (Cu)	mg/kg	36	197	10.4	11.6	12.5	11.6	0.480
	Iron (Fe)	mg/kg	21,200	43,766	12,100	13,600	16,000	14,100	1,070
	Lead (Pb)	mg/kg	35	91	6.96	7.65	8.45	7.69	0.370
	Lithium (Li)	mg/kg	-	-	8.10	9.40	9.80	9.12	0.756
	Magnesium (Mg)	mg/kg	-	-	8,010	12,100	13,200	11,000	2,110
	Manganese (Mn)	mg/kg	460	1,100	281	380	508	385	98.6
	Mercury (Hg)	mg/kg	0.17	0.49	0.0284	0.0357	0.0450	0.0376	0.00454
	Molybdenum (Mo)	mg/kg	-	-	1.03	1.26	1.40	1.24	0.0910
	Nickel (Ni)	mg/kg	16	75	21.5	25.7	27.0	24.9	6.36
	Phosphorus (P)	mg/kg	-	-	1,390	1,600	1,740	1,570	121
	Potassium (K)	mg/kg	-	-	1,520	2,160	2,600	2,080	349
	Selenium (Se)	mg/kg	2.0	-	1.41	1.65	2.18	1.75	0.537
	Silver (Ag)	mg/kg	0.50	-	0.120	0.140	0.170	0.140	0.0182
	Sodium (Na)	mg/kg	-	-	75.0	80.0	85.0	80.4	7.40
	Strontium (Sr)	mg/kg	-	-	54.1	61.7	71.2	63.5	7.30
	Sulfur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	-
	Thallium (Tl)	mg/kg	-	-	0.185	0.219	0.225	0.212	0.0197
	Tin (Sn)	mg/kg	-	-	<2.00	<2.00	<2.00	<2.00	-
	Titanium (Ti)	mg/kg	-	-	14.0	23.3	25.6	21.9	1.88
	Tungsten (W)	mg/kg	-	-	<0.500	<0.500	<0.500	<0.500	-
	Uranium (U)	mg/kg	-	-	0.954	1.10	1.22	1.09	0.0265
	Vanadium (V)	mg/kg	-	-	27.6	35.7	39.7	34.9	3.66
	Zinc (Zn)	mg/kg	123	315	94.4	108	121	108	10.7
	Zirconium (Zr)	mg/kg	-	-	<1.00	1.00	1.10	1.04	-
Polycyclic Aromatic Hydrocarbons	Acenaphthene	mg/kg	0.0067	0.089	<0.0150	<0.0170	<0.0250	<0.0150	-
	Acenaphthylene	mg/kg	0.0059	0.13	<0.00500	<0.00500	0.00550	0.00510	0.00235
	Acridine	mg/kg	-	-	<0.0200	<0.0200	<0.0400	<0.0200	-
	Anthracene	mg/kg	0.047	0.25	<0.00400	<0.00400	0.00830	0.00556	-
	Benz(a)anthracene	mg/kg	0.032	0.39	<0.0100	0.0110	0.0330	0.0156	0.00740
	Benzo(a)pyrene	mg/kg	0.032	0.78	<0.0100	<0.0100	0.0150	0.0110	-
	Benzo(b&j)fluoranthene	mg/kg	-	-	0.0220	0.0250	0.0400	0.0294	0.0183
	Benzo(b+j+k)fluoranthene	mg/kg	-	-	0.0220	0.0250	0.0400	0.0294	0.0183
	Benzo(e)pyrene	mg/kg	-	-	0.0210	0.0270	0.0380	0.0286	0.0156
	Benzo(g,h,i)perylene	mg/kg	0.17	3.2	0.0110	0.0110	0.0150	0.0123	0.00424
	Benzo(k)fluoranthene	mg/kg	0.24	13	<0.0100	<0.0100	<0.0100	<0.0100	-
	Chrysene	mg/kg	0.057	0.86	<0.0600	0.0800	0.107	0.0824	0.0455
	Dibenz(a,h)anthracene	mg/kg	0.0062	0.14	<0.00500	0.00590	0.00890	0.00653	0.00376
	Fluoranthene	mg/kg	0.11	2.4	0.0110	0.0160	0.0590	0.0240	0.0108
	Fluorene	mg/kg	0.021	0.14	0.0220	0.0270	0.0620	0.0330	0.0512
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.20	3.2	<0.0100	<0.0100	<0.0100	<0.0100	-
	1-Methylnaphthalene	mg/kg	-	-	0.142	0.202	0.268	0.204	0.179
	2-Methylnaphthalene	mg/kg	0.020	0.20	0.213	0.311	0.431	0.316	0.312
	Naphthalene	mg/kg	0.035	0.39	0.0730	0.125	0.141	0.117	0.0853
	Perylene	mg/kg	-	-	0.0140	0.0210	0.0290	0.0214	-
	Phenanthrene	mg/kg	0.042	0.52	0.223	0.319	0.397	0.322	0.171
	Pyrene	mg/kg	0.053	0.88	0.0160	0.0240	0.0580	0.0294	0.0125
	Quinoline	mg/kg	-	-	<0.0500	<0.0500	<0.0500	<0.0500	-
	d10-Acenaphthene	%	-	-	95.4	96.3	99.0	96.8	1.09
	d12-Chrysene	%	-	-	119	121	128	122	20.1
	d8-Naphthalene	%	-	-	81.7	87.1	88.9	85.9	2.48
	d10-Phenanthrene	%	-	-	95.0	104	109	104	3.80
	B(a)P Total Potency Equivalent	mg/kg	-	-	<0.0200	<0.0200	0.0300	0.0222	0.00714
	IACR (CCME)	mg/kg	-	-	0.220	0.290	0.490	0.338	0.204

Value > Lower Working Sediment Quality Guideline (WSQG).

Value > Upper Working Sediment Quality Guideline (WSQG, or alert concentration in the case of Selenium).

Notes: All summary stats calculated to 3 significant figures. "-" indicates no data available.

Table D.2: Calcite Index Values in the Fording River, FRO LAEMP, 2013 to 2020

Biological Monitoring Area	Teck Water Station	Calcite Reach	Regional Calcite Monitoring Program Calcite Index Within Reaches								Calcite Index at Benthic Invertebrate Monitoring Areas Within Riffles													
			2013	2014	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018					2019					
RG_HENUP	FR_HC3	HENR3	0.0	0.0	0.0	-	-	-		-	0.1	0.0	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	-	-
RG_FO26	FR_UFR1	FORD12	0.0	0.0	0.0	0.3	-	0.3	0.3	0.2	0.9	0.8	0.6	0.9	1.0	0.7	-	-	1.0	1.0	1.0	-	-
RG_UFR1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RG_FODHE	FR_FR1	FORD11	0.0	0.0	0.0	-	-	0.3	-	0.2	0.9	0.0	0.9	0.6	0.4	0.8	-	-	0.2	0.1	0.1	-	-
RG_FOUCL	-										-	-	-	-	-	-	-	-	0.9	1.1	1.0	-	-
RG_FOUNGD	-										0.8	-	0.6	1.0	1.1	0.9	-	-	0.5	0.7	0.5	-	-
RG_FODNGD	FR_FRABEC1	-	-	-	-	-	-	-	-	-	0.8	-	1.0	0.9	0.9	1.0	-	-	0.4	0.4	0.4	-	-
RG_MP1	FR_MULTIPLATE	FORD10	0.0	0.0	0.0	-	-	0.6	-	0.5	1.0	-	1.0	1.4	1.1	1.1	-	-	0.5	0.6	0.7	-	-
RG_FOUSH	-										1.0	-	0.9	1.0	1.0	0.9	-	-	1.1	1.0	1.1	-	-
RG_FOUKI	FR_FR2										1.0	1.8	0.8	0.6	0.8	0.6	-	-	0.5	0.5	0.5	-	-
RG_SCOUTDS	-	FORD9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	-	-
RG_FOBKS	GH_FR3		0.0	0.0	0.0	0.0	0.3	0.7	0.5	0.4	0.9	2.0	0.5	0.8	0.5	0.7	-	-	0.8	0.9	0.9	-	-
RG_FOBSC	FR_FR4										1.2	1.8	1.1	1.0	1.0	1.0	-	-	0.3	0.2	0.3	-	-
RG_FOBCP	FR_FRCP1										1.3	1.6	1.1	0.9	1.2	1.1	1.4	1.4	0.9	0.6	1.3	-	-
RG_FRCP1SW	FR_FRCP1SW		-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	0.4	0.1	0.7	-	-
RG_FRUPO	FR_FRRD	FORD8	0.3	0.5	0.5	-	-	0.6	-	0.7	-	-	1.0	1.0	1.0	1.0	-	-	1.0	0.7	1.1	-	-
RG_FODPO	GH_PC2										0.9	1.0	0.9	0.9	0.9	1.0	-	-	0.5	0.5	0.9	-	-
RG_FO22	FR_FRABCH										0.8	-	1.0	1.0	0.8	1.0	0.9	1.0	0.9	0.8	0.9	0.9	0.5
RG_FOUEW	FR_FR5	FORD7/6	0.6	0.7	1.0	0.6	0.7	0.8	0.9	1.0	1.0	1.0	1.0	1.1	1.0	1.0	-	-	0.6	1.0	1.1	-	-

Notes: Refer to Appendix Figure B.2 for calcite reaches. "-" indicates that no calcite monitoring was completed.

[a] RG_UFR1 was added to September sampling in 2020 to compare with the historical reference monitoring stations RG_HENUP and RG_FO26.

Table D.2: Calcite Index Values in the Fording River, FRO LAEMP, 2013 to 2020

Biological Monitoring Area	Teck Water Station	Calcite Reach	Calcite Index at Benthic Invertebrate Monitoring Areas Within Riffles					Calcite Concretion at Benthic Invertebrate Monitoring Areas Within Riffles																	
			2020[a]					2015	2016	2017	2018					2019					2020[a]				
RG_HENUP	FR_HC3	HENR3	0.0	0.0	0.0	-	-	0.0	0.0	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-
RG_FO26	FR_UFR1	FORD12	0.0	0.0	0.1	-	-	0.0	0.0	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-
RG_UFR1	-	-	0.0	0.0	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	-	-
RG_FODHE	FR_FR1	FORD11	0.8	0.9	0.7	-	-	0.0	0.0	0.00	0.00	0.00	0.00	-	-	0.00	0.04	0.00	-	-	0.00	0.00	0.00	-	-
RG_FOUCL	-		0.6	0.0	0.0	-	-	-	-	-	-	-	-	-	-	0.00	0.08	0.00	-	-	0.00	0.00	0.00	-	-
RG_FOUNGD	-		0.1	0.0	0.1	-	-	0.0	-	0.00	-	0.08	0.00	-	-	0.03	0.08	0.01	-	-	0.00	0.00	0.00	-	-
RG_FODNGD	FR_FRABEC1	-	1.0	0.9	0.8	-	-	0.0	-	0.00	0.03	0.00	0.06	-	-	0.00	0.01	0.00	-	-	0.15	0.00	0.00	-	-
RG_MP1	FR_MULTIPLATE	FORD10	0.8	0.9	0.7	-	-	0.0	-	0.00	0.55	0.24	0.28	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-
RG_FOUSH	-		1.1	0.9	0.9	-	-	0.0	-	0.01	0.00	0.00	0.02	-	-	0.12	0.01	0.09	-	-	0.14	0.10	0.00	-	-
RG_FOUKI	FR_FR2		0.5	0.5	0.9	-	-	0.0	0.8	0.00	0.00	0.00	0.00	-	-	0.00	0.00	0.02	-	-	0.00	0.00	0.02	-	-
RG_SCOUTDS	-	FORD9	0.6	0.6	0.6	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	-	-	0.01	0.01	0.00	-	-
RG_FOBKS	GH_FR3		0.7	0.8	0.5	-	-	0.0	1.0	0.00	0.03	0.00	0.00	-	-	0.01	0.02	0.08	-	-	0.00	0.02	0.02	-	-
RG_FOBSC	FR_FR4		0.7	0.9	0.9	-	-	-	0.8	0.06	0.00	0.01	0.06	-	-	0.00	0.01	0.00	-	-	0.03	0.13	0.17	-	-
RG_FOBCP	FR_FRCP1		0.9	0.8	1.2	1.7	1.2	0.3	0.6	0.07	0.07	0.24	0.14	0.39	0.46	0.08	0.11	0.45	-	-	0.05	0.02	0.30	0.71	0.28
RG_FRCP1SW	FR_FRCP1SW		0.2	0.5	0.6	-	-	-	-	0.03	-	-	-	-	-	0.00	0.00	0.00	-	-	0.00	0.00	0.00	-	-
RG_FRUPO	FR_FRRD	FORD8	0.1	0.1	0.2	-	-	-	-	0.00	0.00	0.06	0.00	-	-	0.10	0.06	0.10	-	-	0.01	0.00	0.00	-	-
RG_FODPO	GH_PC2		0.8	1.1	0.9	-	-	0.0	0.0	0.00	0.00	0.00	0.01	-	-	0.01	0.01	0.04	-	-	0.02	0.21	0.06	-	-
RG_FO22	FR_FRABCH		0.4	0.8	0.7	0.9	0.7	0.0	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RG_FOUEW	FR_FR5	FORD7/6	1.8	1.1	0.8	-	-	0.0	0.0	0.00	0.06	0.00	0.00	-	-	0.14	0.02	0.07	-	-	0.77	0.12	0.00	-	-

Notes: Refer to Appendix Figure B.2 for calcite reaches. "-" indicates that no calcite monitoring was completed.

[a] RG_UFR1 was added to September sampling in 2020 to compare with the historical reference monitoring stations RG_HENUP and RG_FO26.

APPENDIX E
BENTHIC
INVERTEBRATES

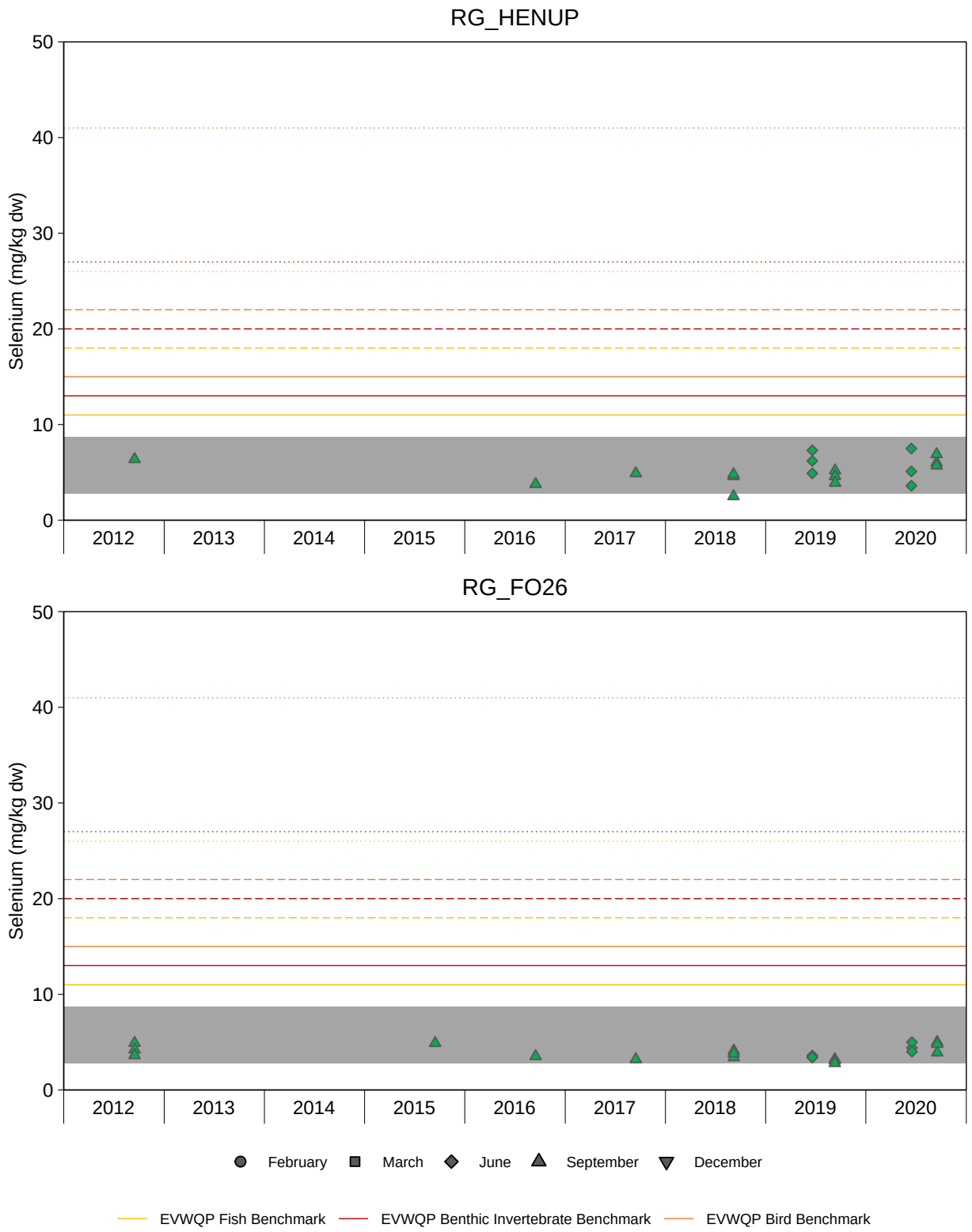


Figure E.1: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

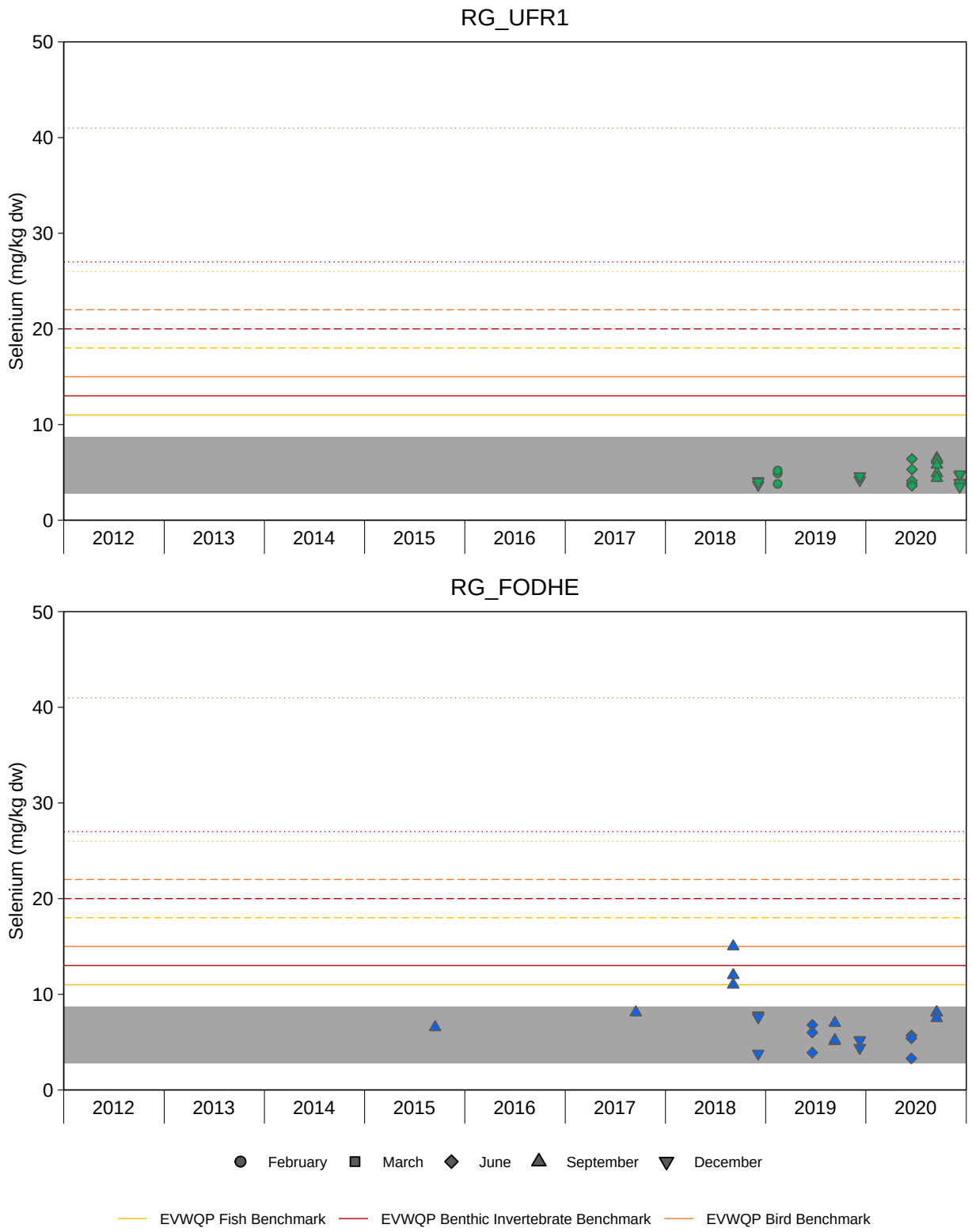


Figure E.2: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

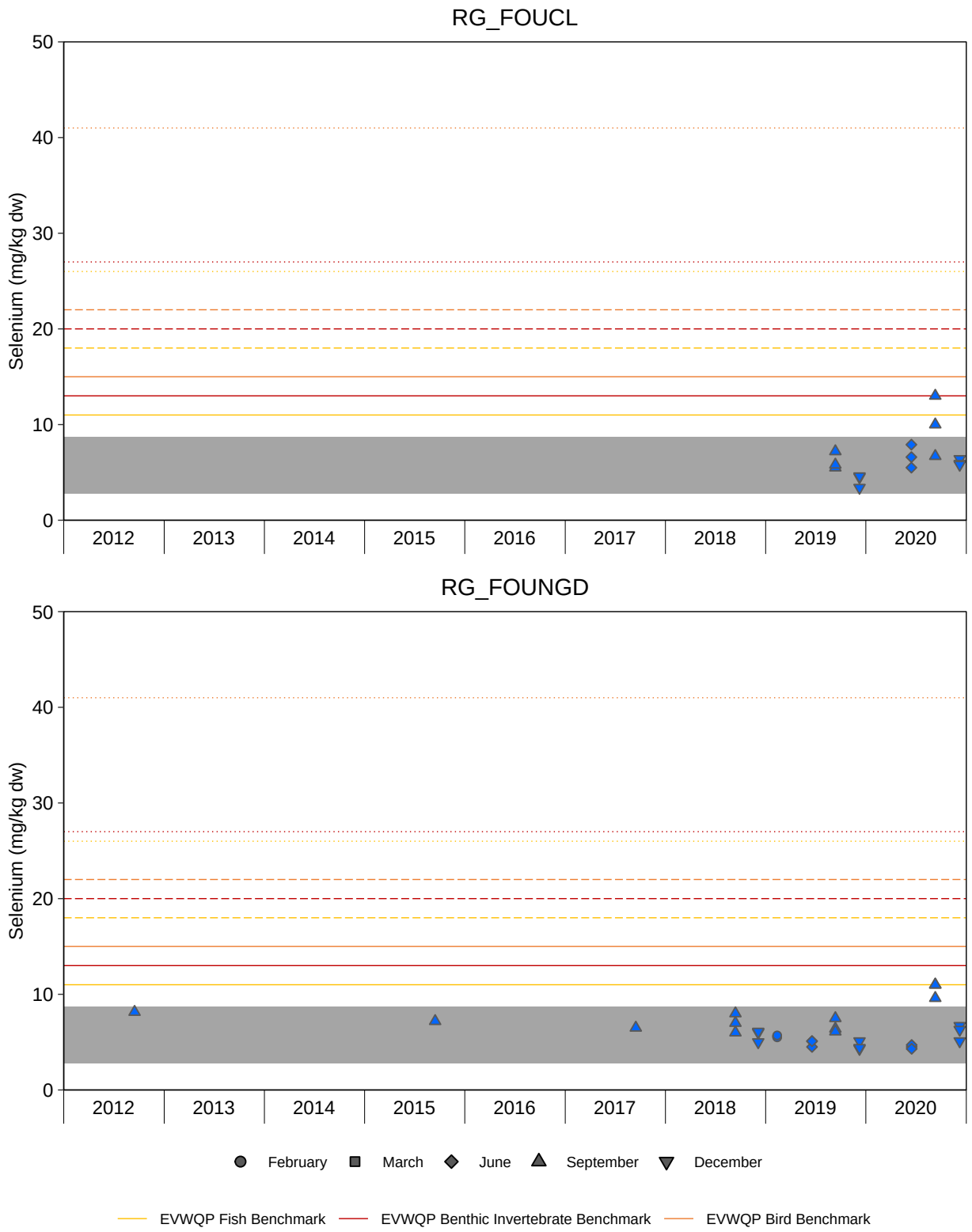


Figure E.3: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

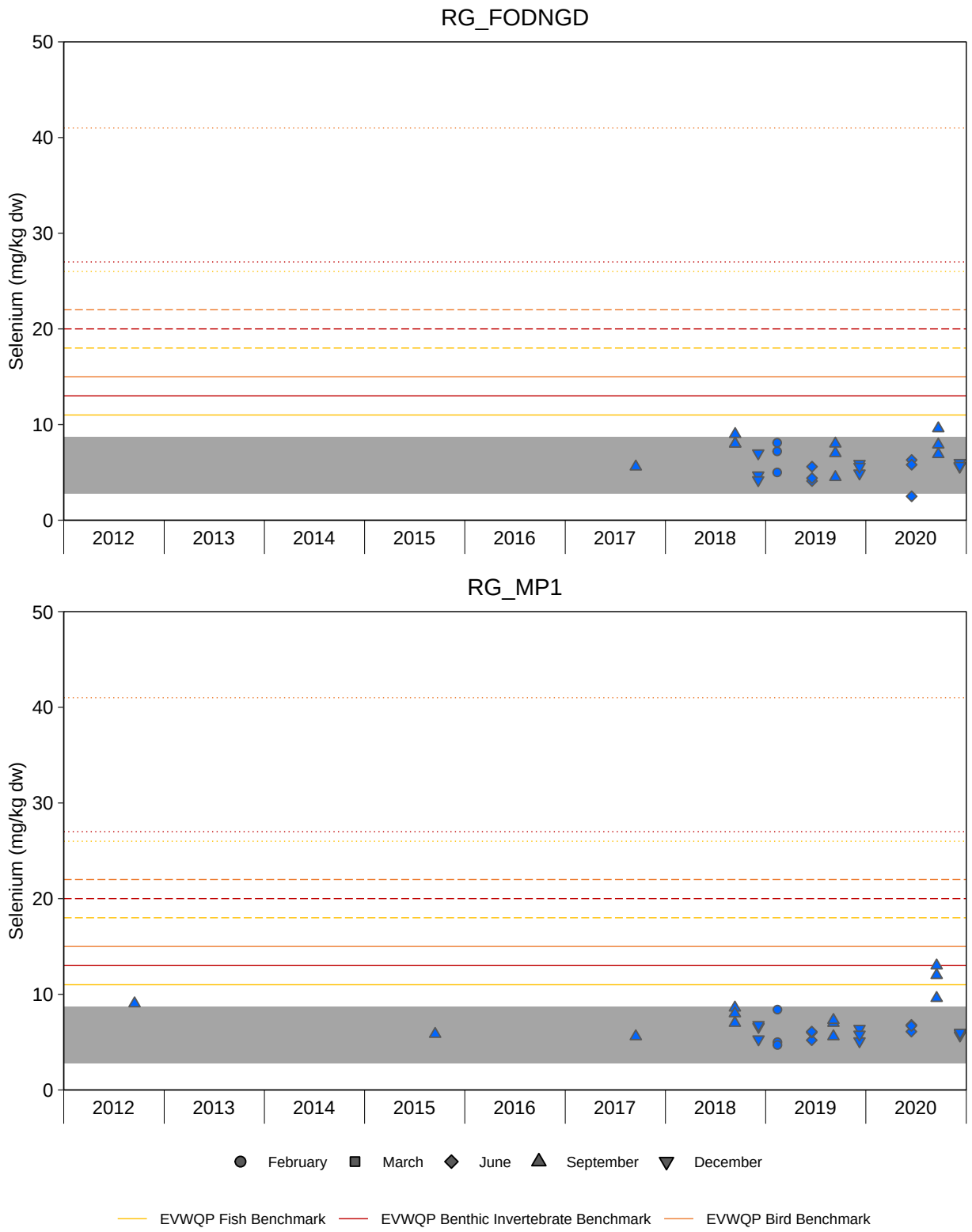


Figure E.4: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

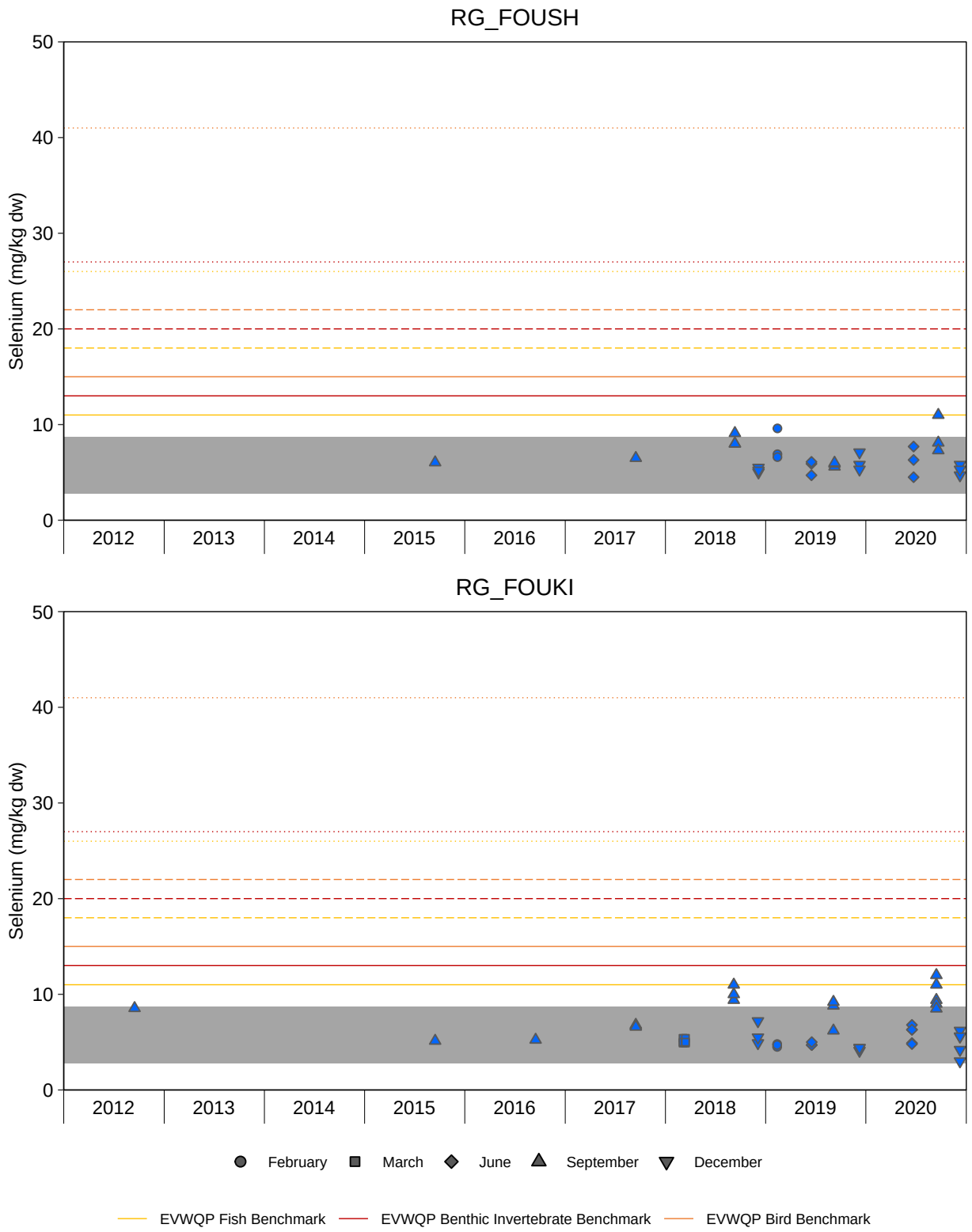


Figure E.5: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

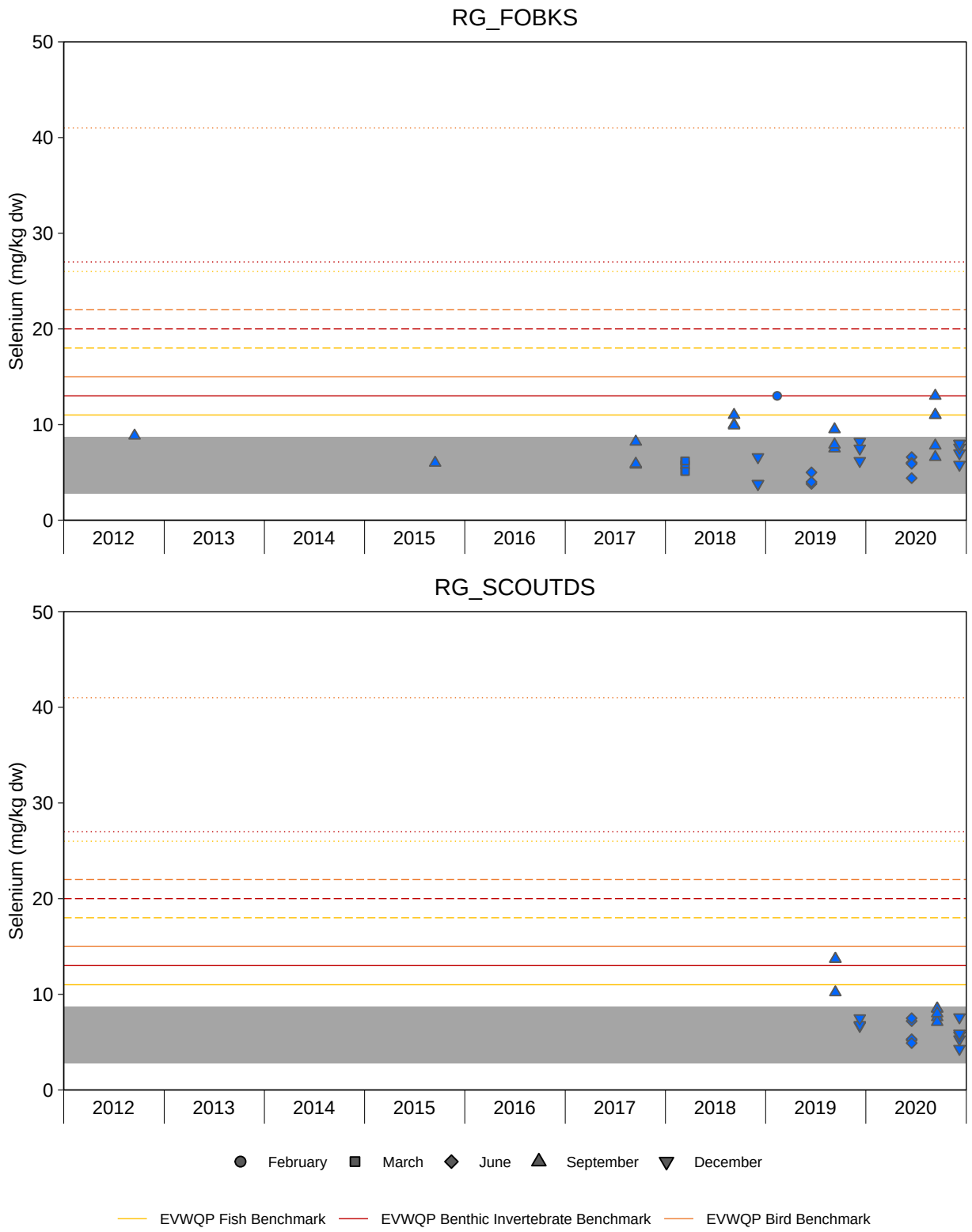


Figure E.6: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

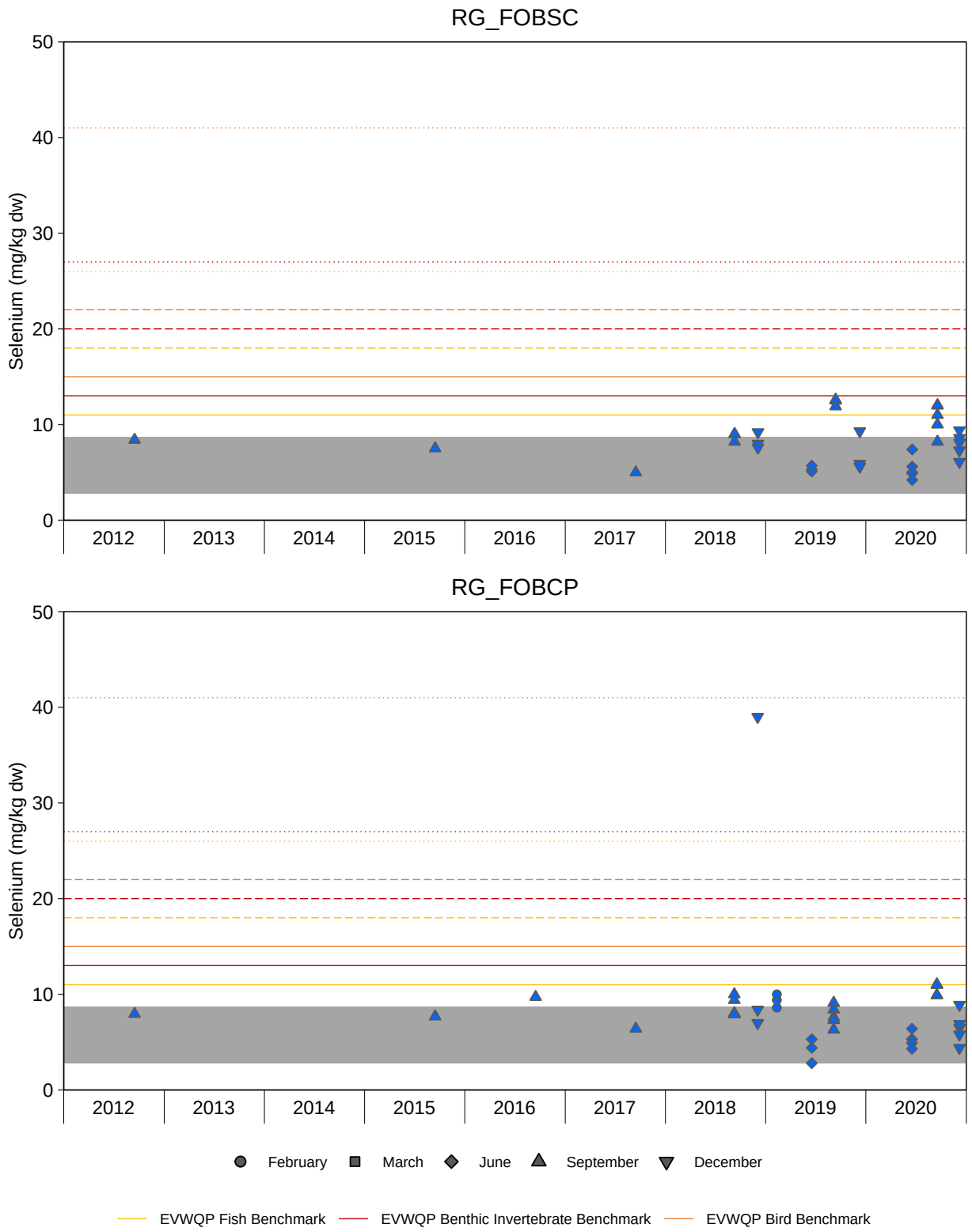


Figure E.7: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

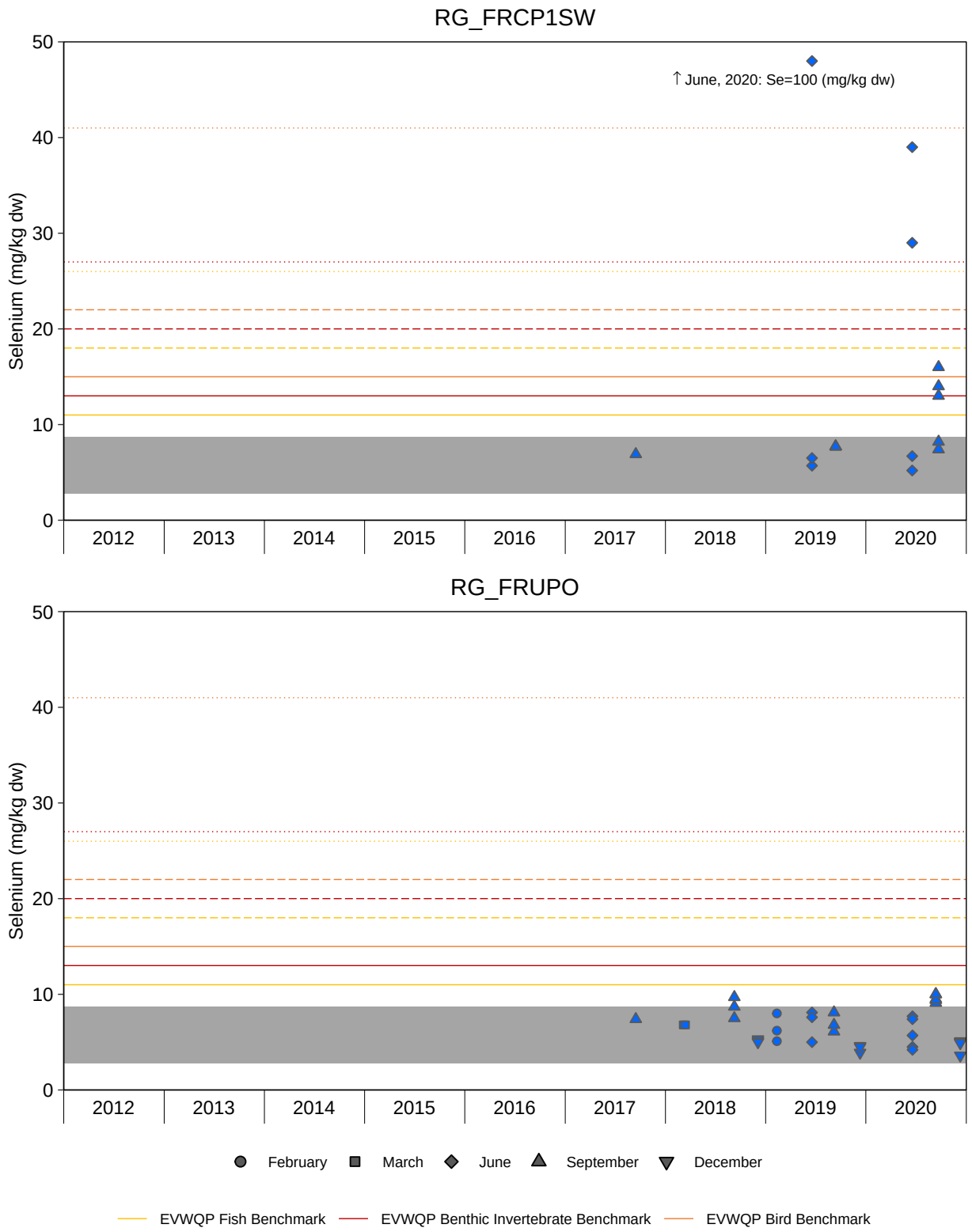


Figure E.8: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

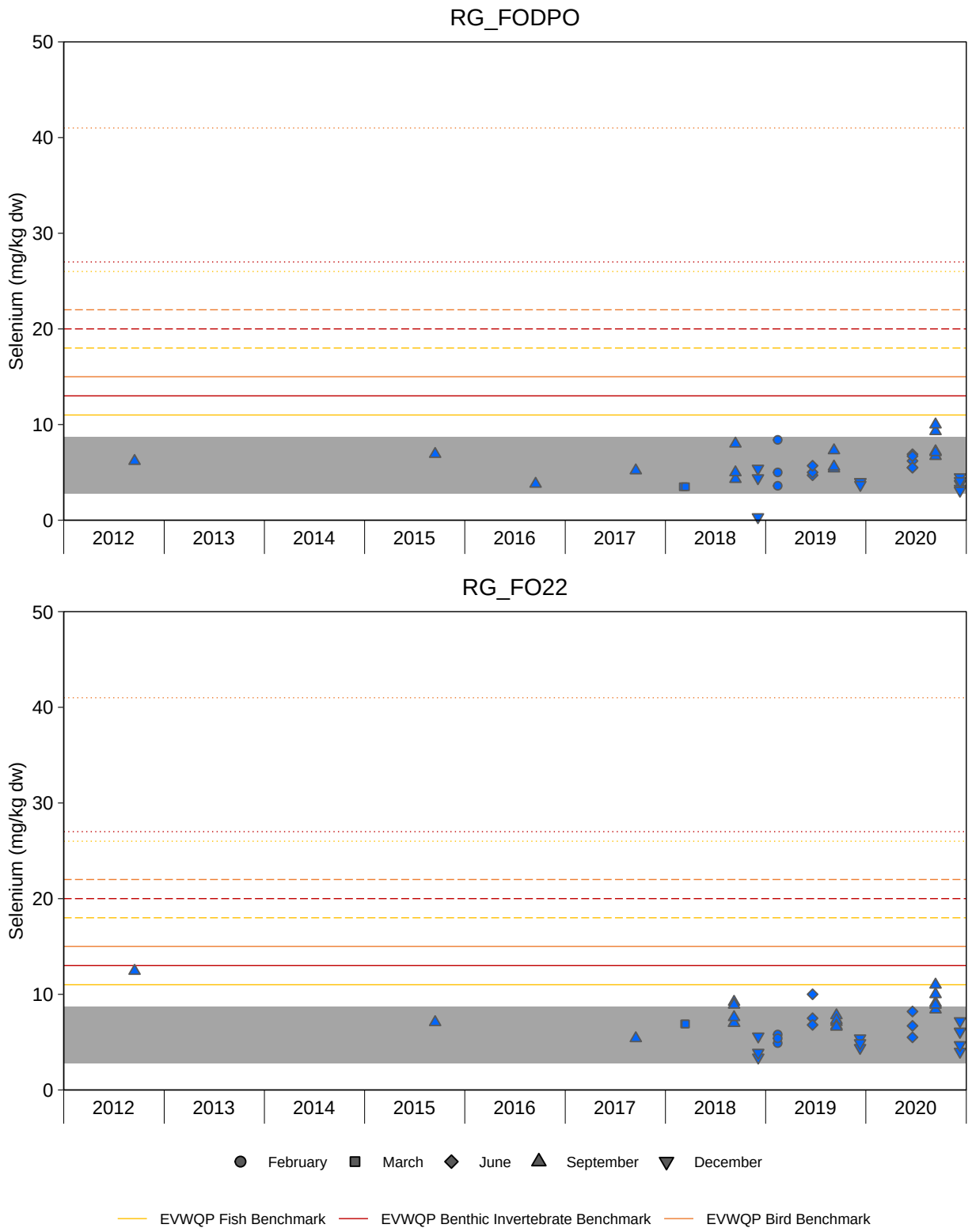


Figure E.9: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

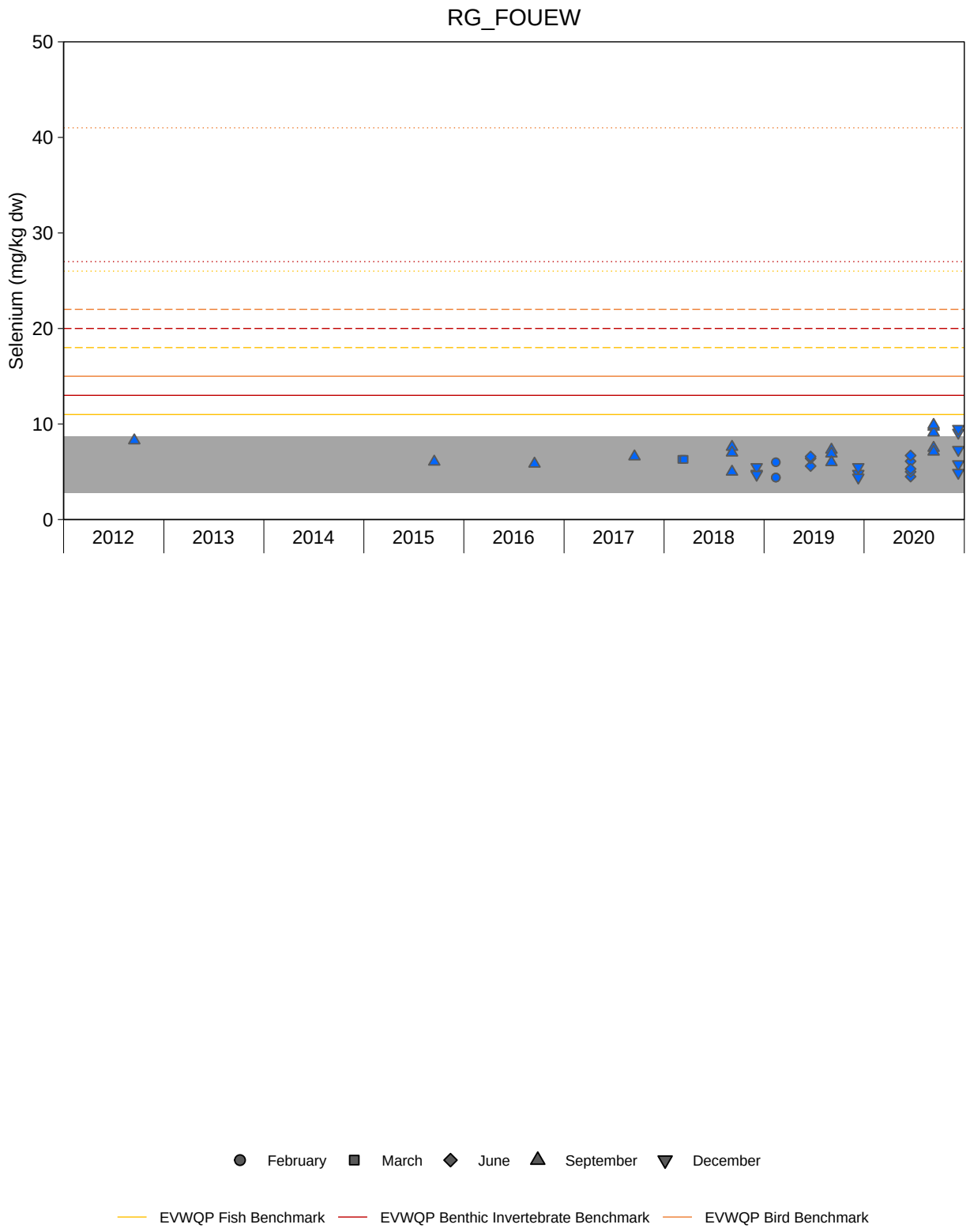


Figure E.10: Composite−taxa Benthic Invertebrate Tissue Concentrations, FRO LAEMP, 2012 to 2020

Notes: Green represents reference stations and blue represents mine−exposed stations. Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. Level 1 benchmarks are shown with a solid line, level two benchmarks are shown with a dashed line, and level three benchmarks are shown with a dotted line.

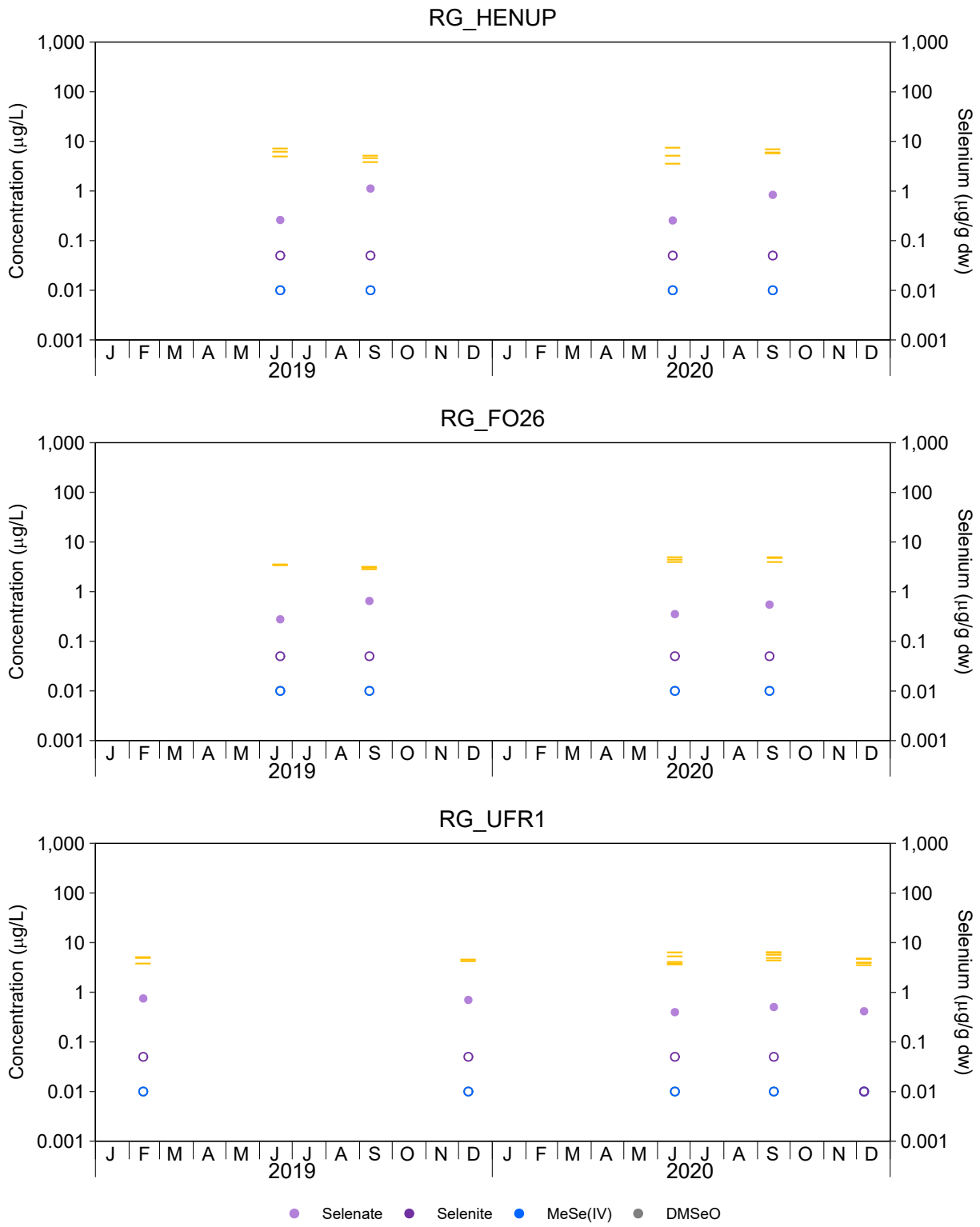


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

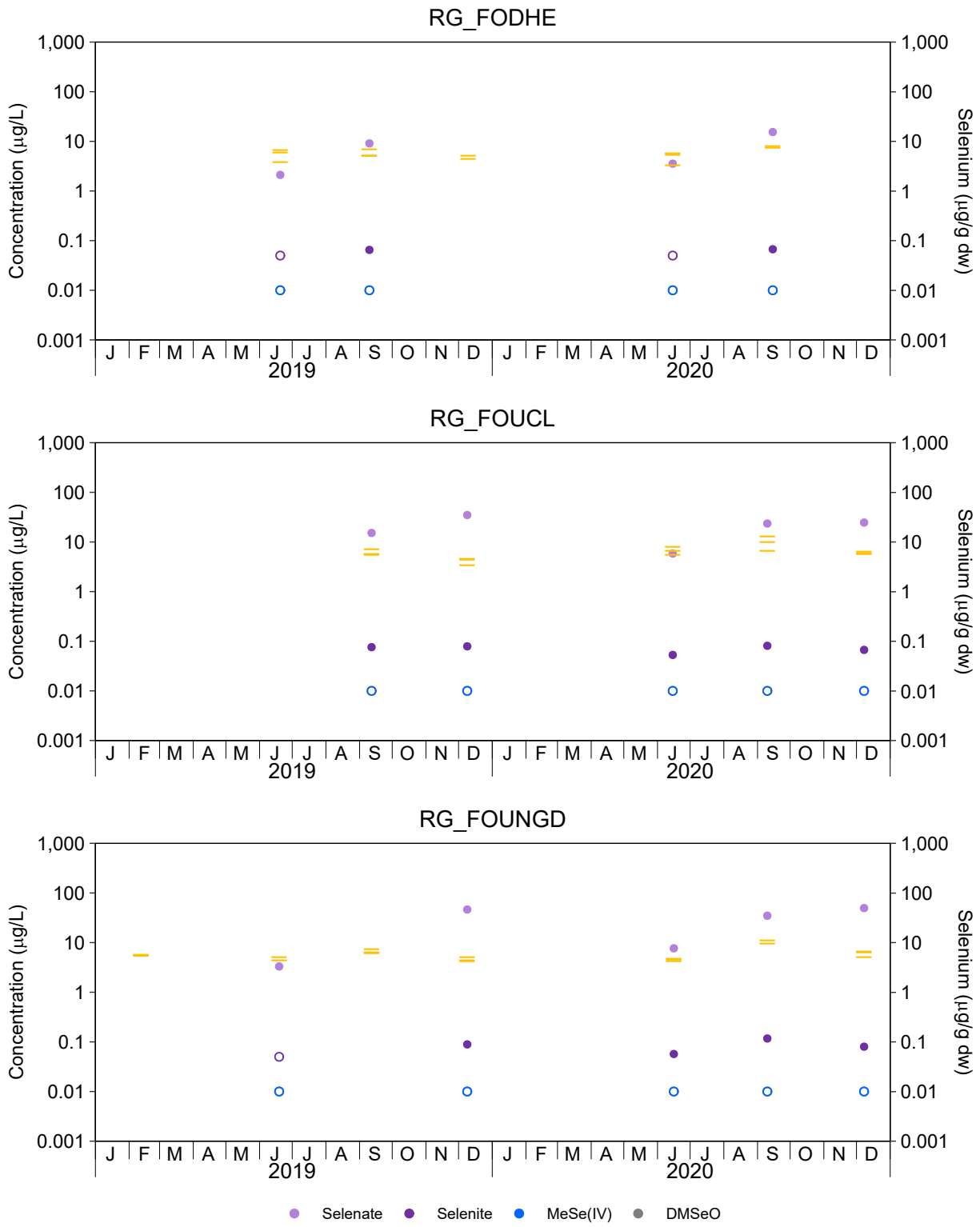


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

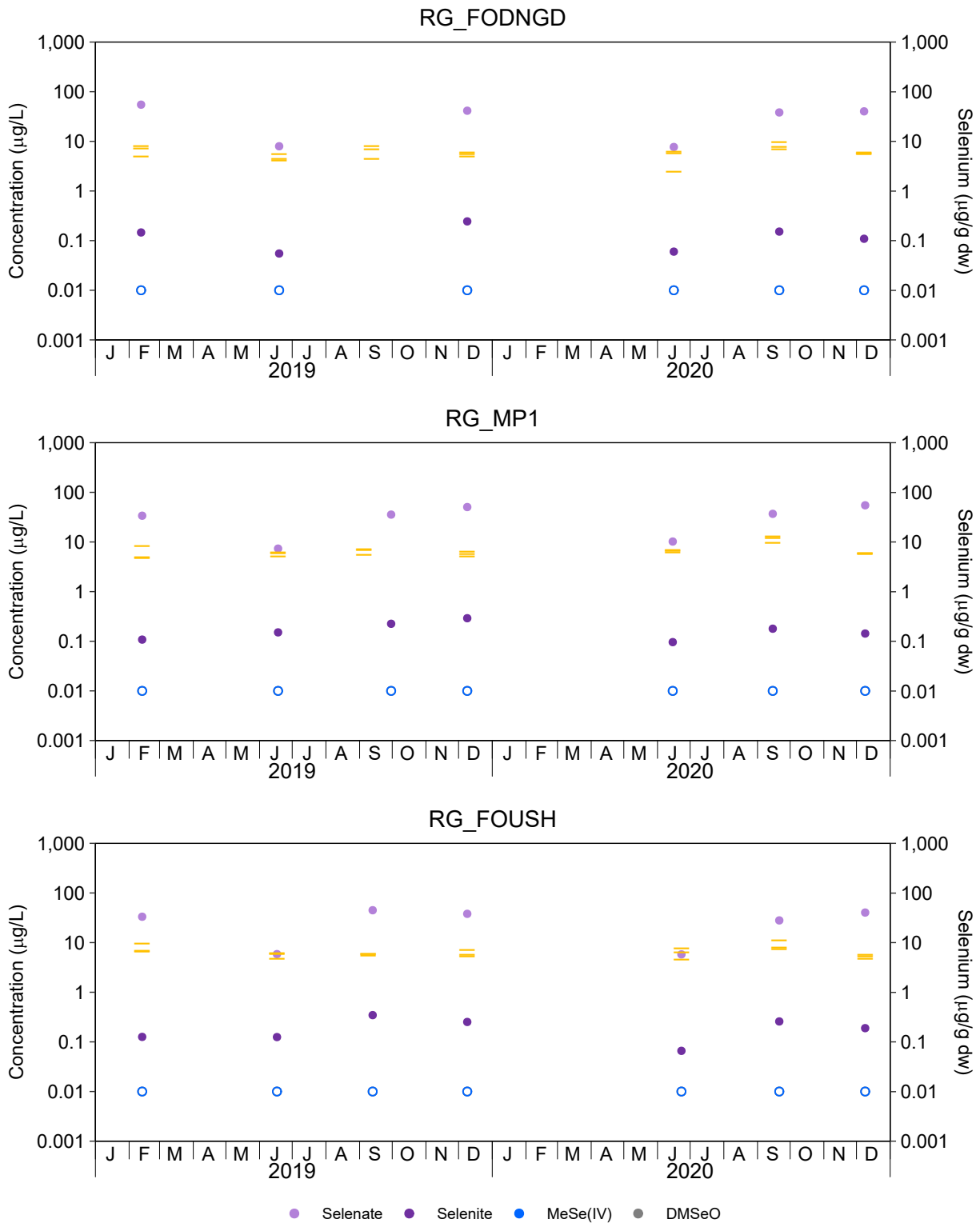


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

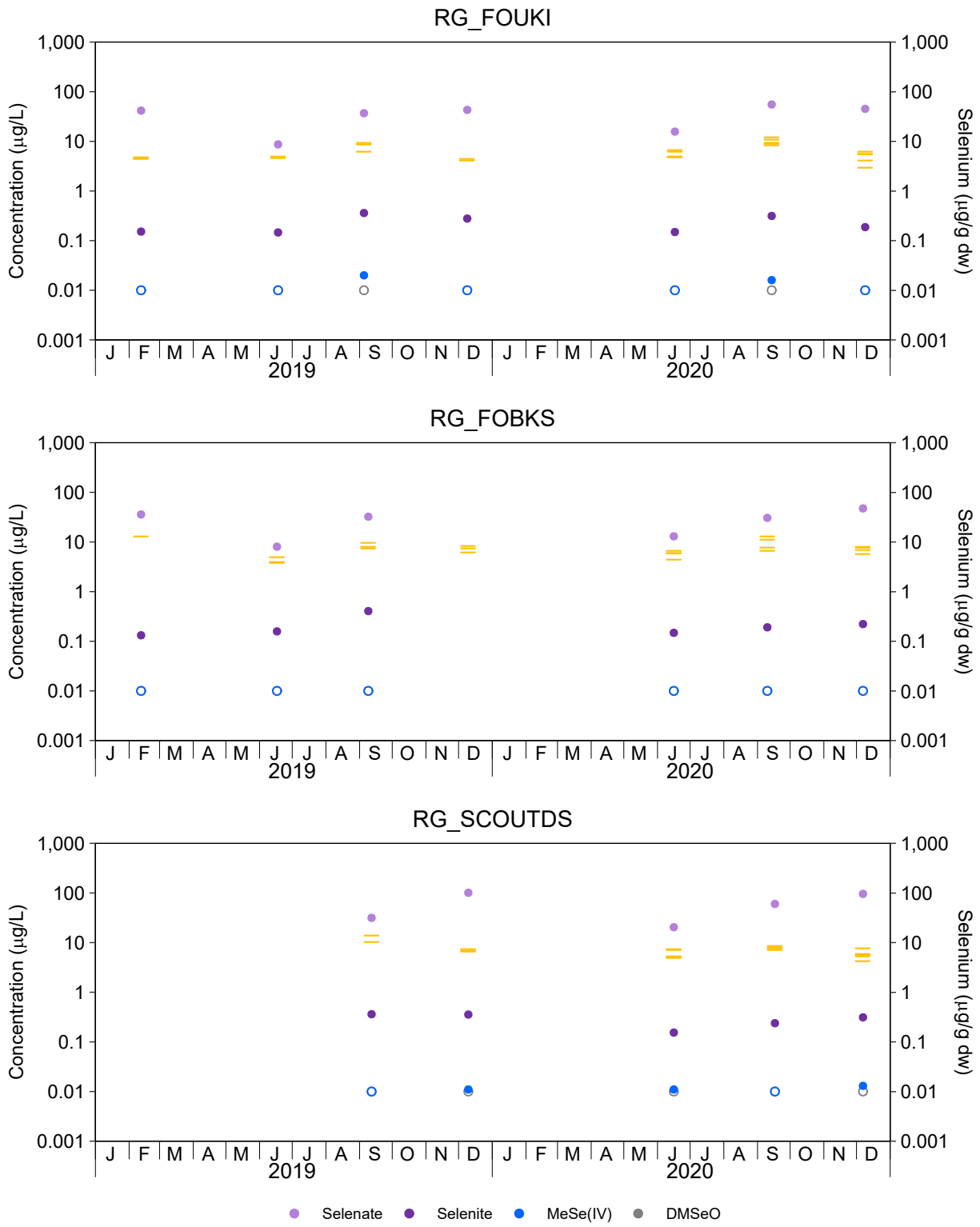


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

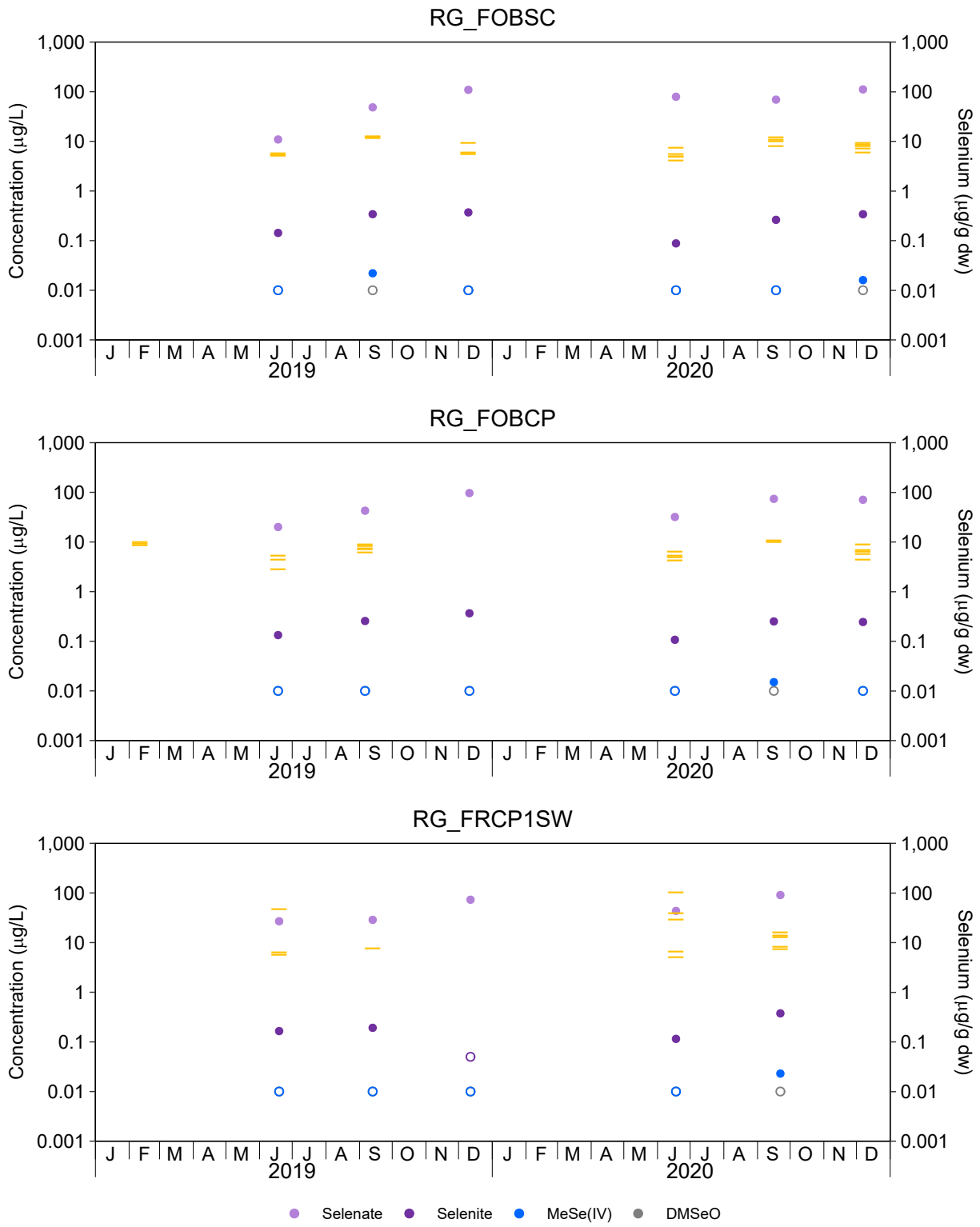


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

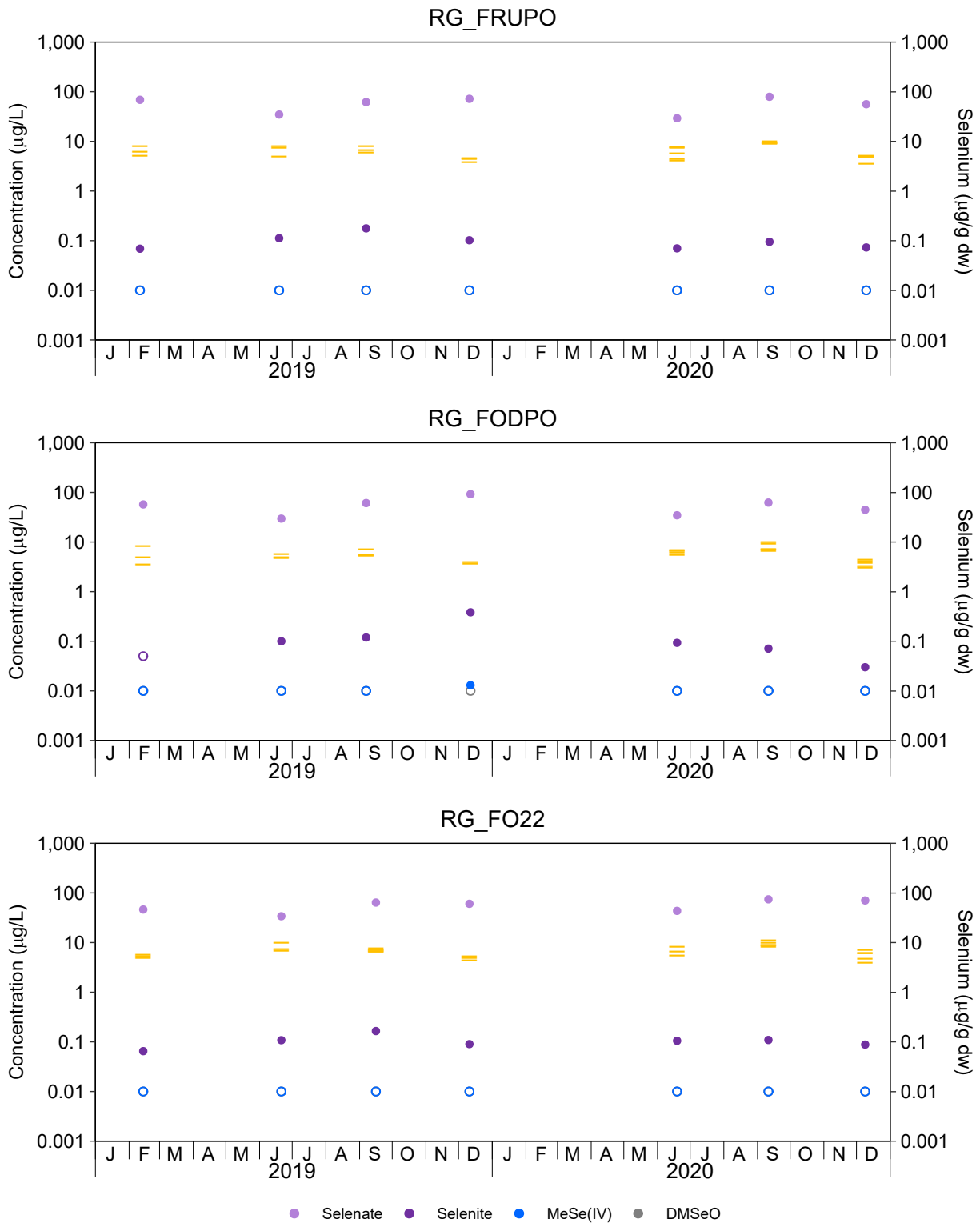


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

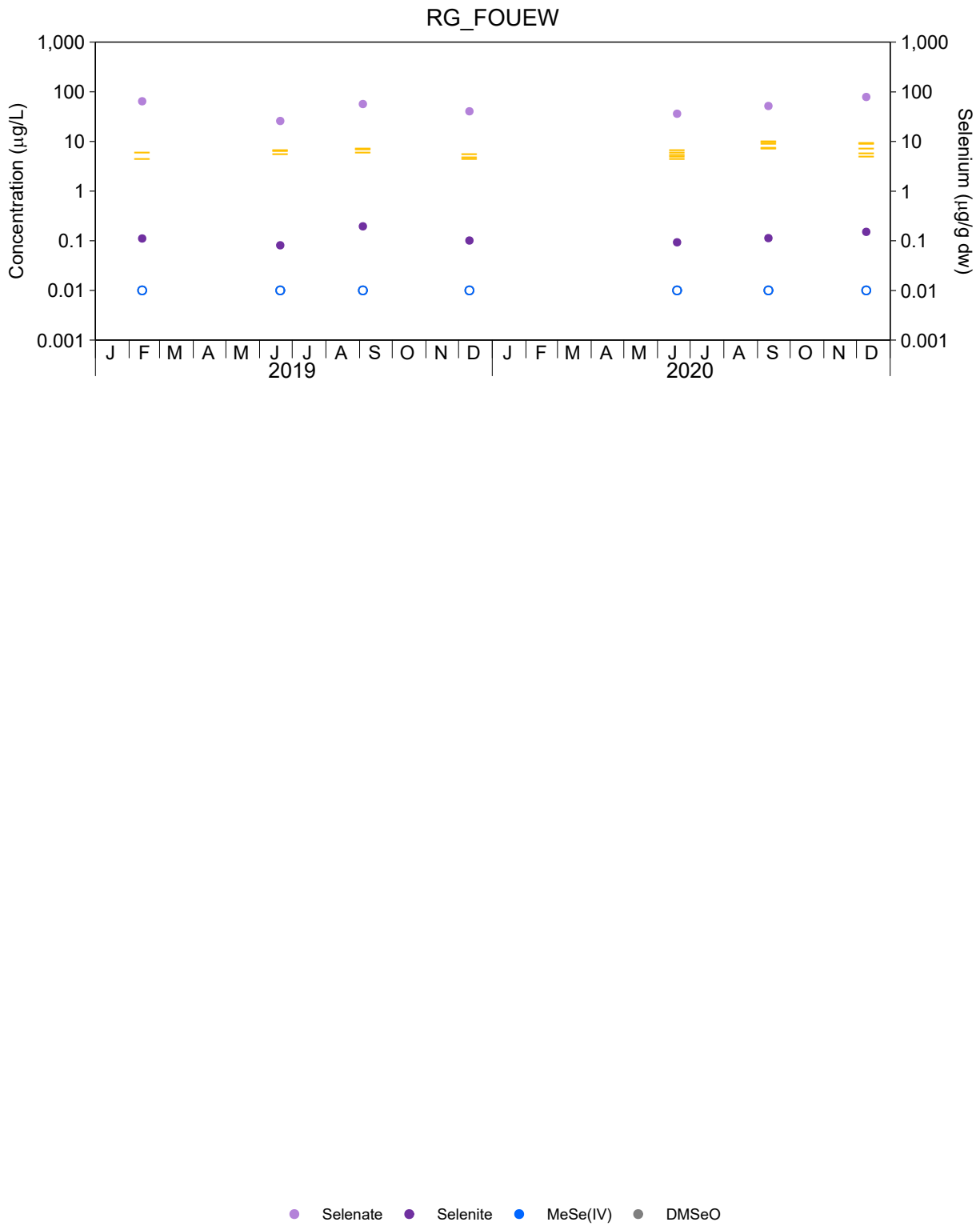


Figure E.11: Aqueous Selenium Species Concentrations at Mine-exposed and Reference Stations in Fording River, FRO LAEMP, January 2019 to December 2020

Notes: Samples at the laboratory reporting limit (LRL) are plotted with an open Symbol. Benthic composite tissue concentrations plotted with orange bars.

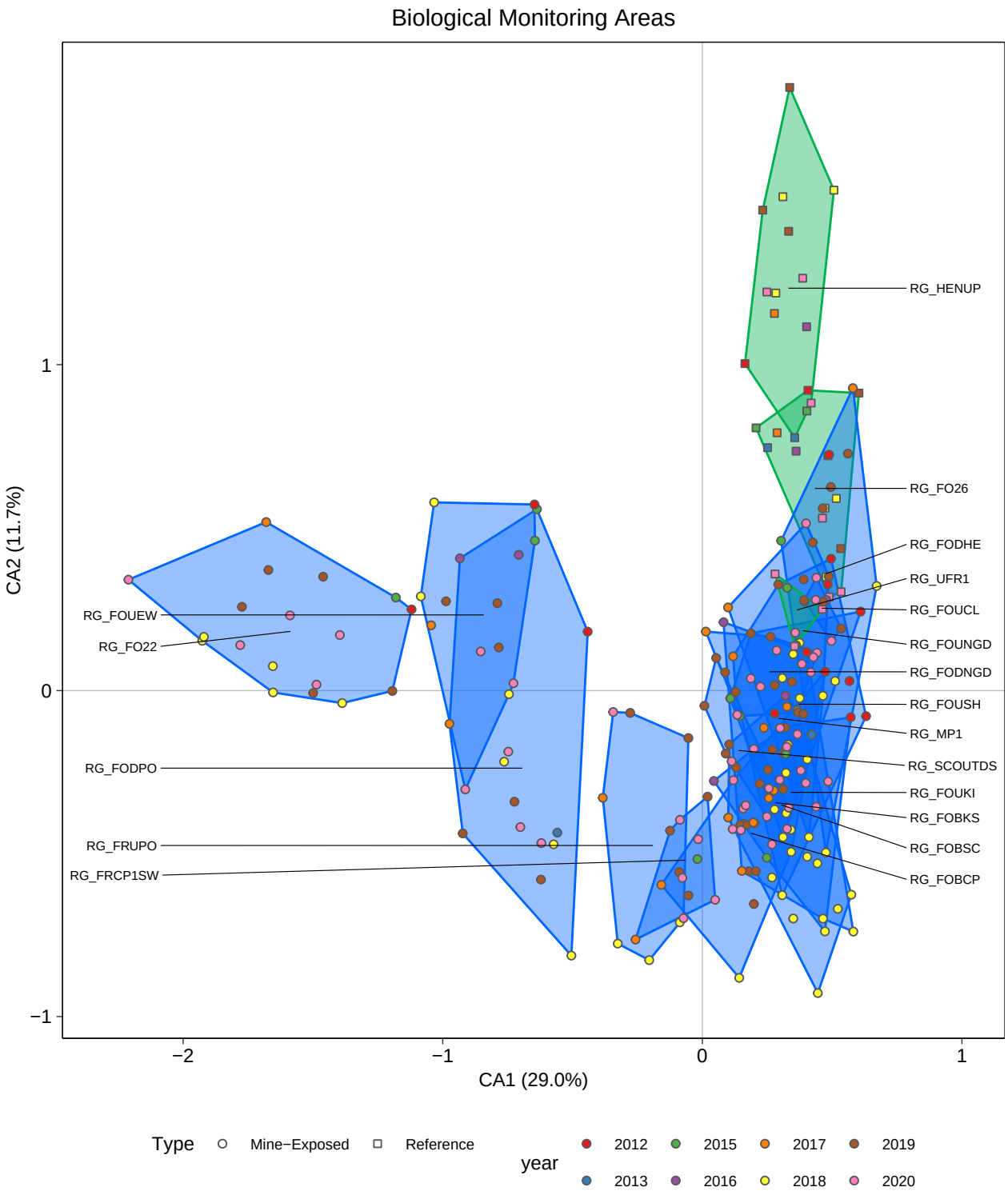


Figure E.12: Benthic Invertebrate Community Family Level Correspondence Analysis, FRO LAEMP, September 2012 to 2020

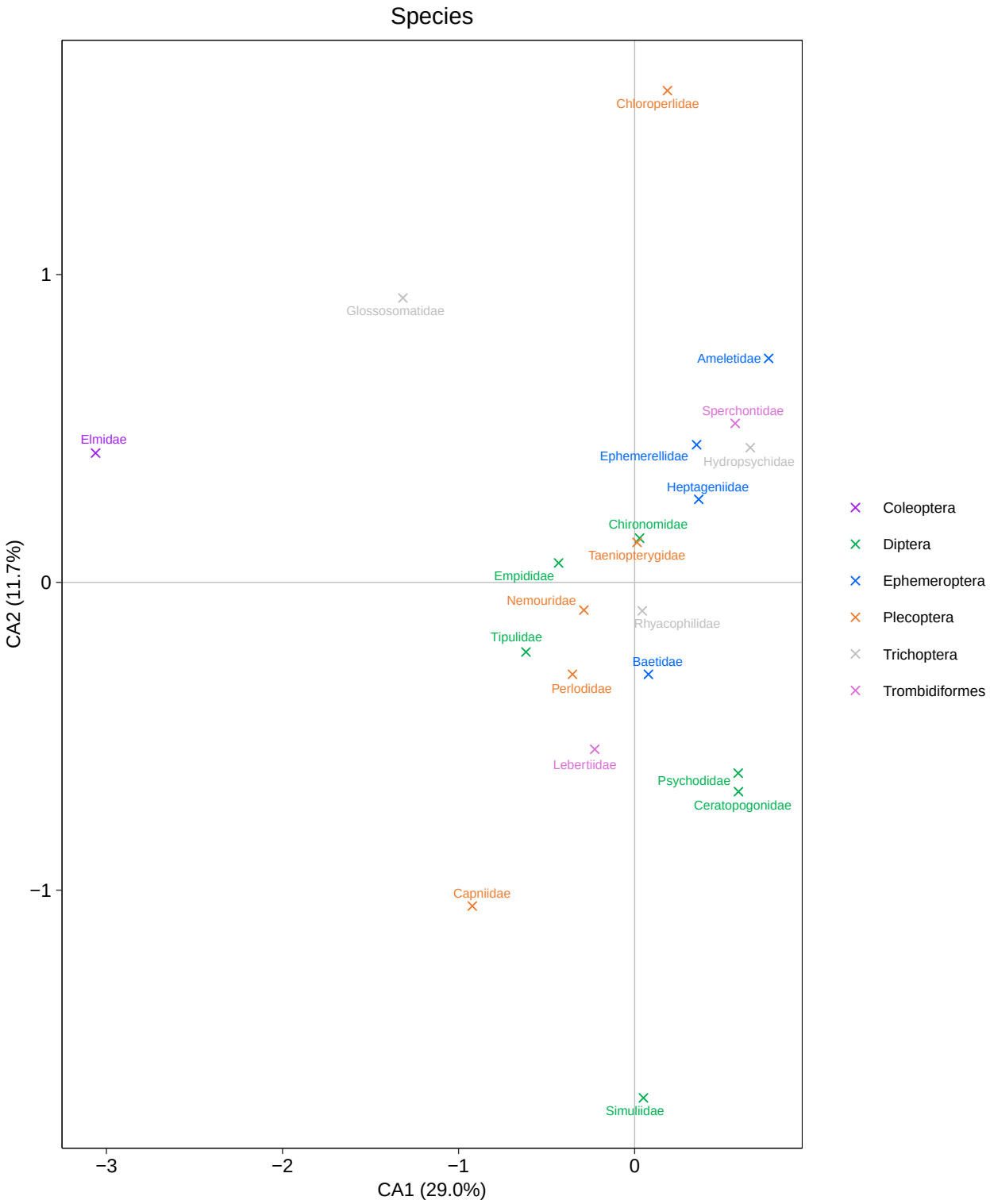


Figure E.13: Benthic Invertebrate Community Family Level Correspondence Analysis, FRO LAEMP, September 2012 to 2020

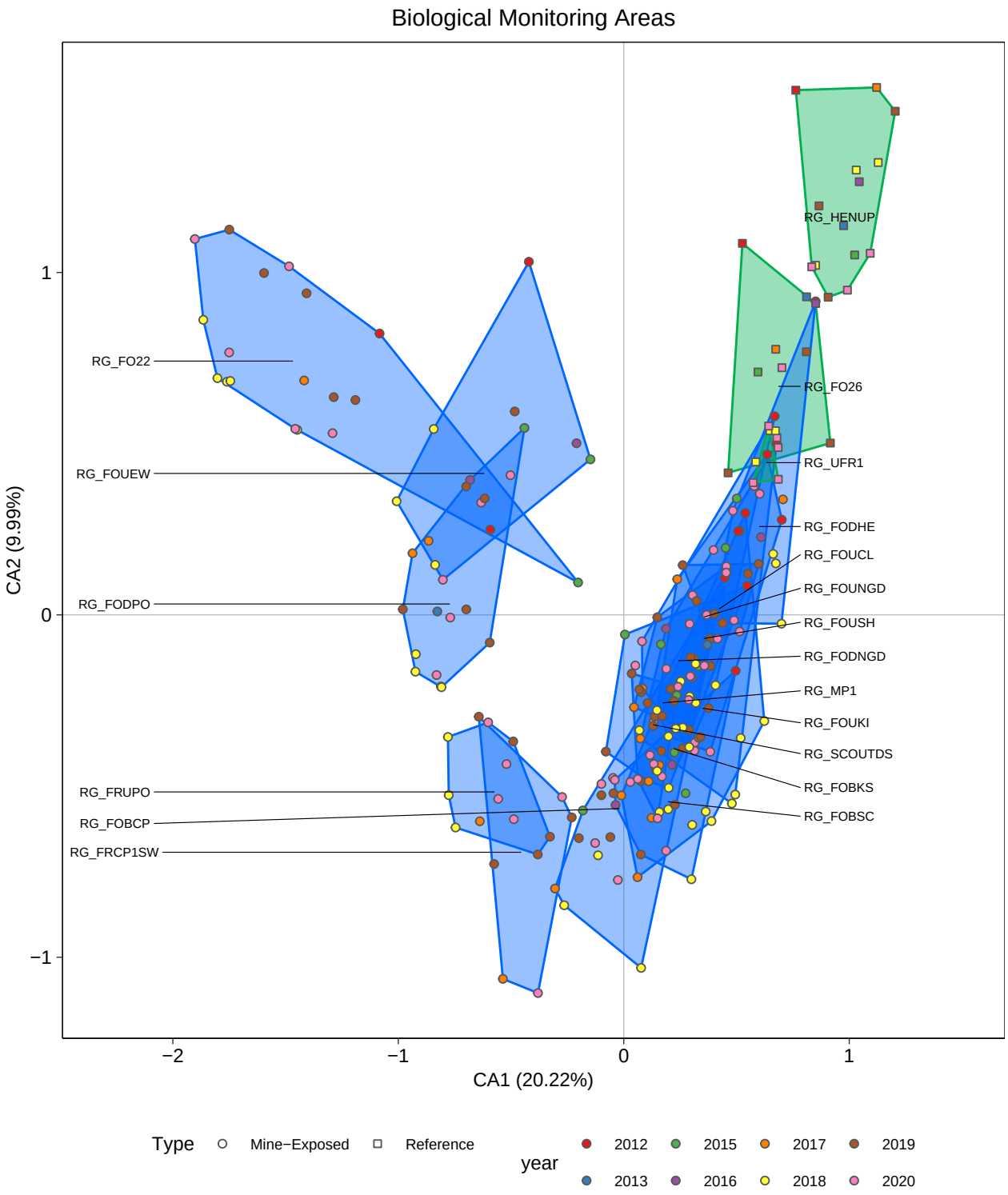


Figure E.14: Benthic Invertebrate Community Lowest-Practical-Level Correspondence Analysis, FRO LAEMP, September 2012 to 2020

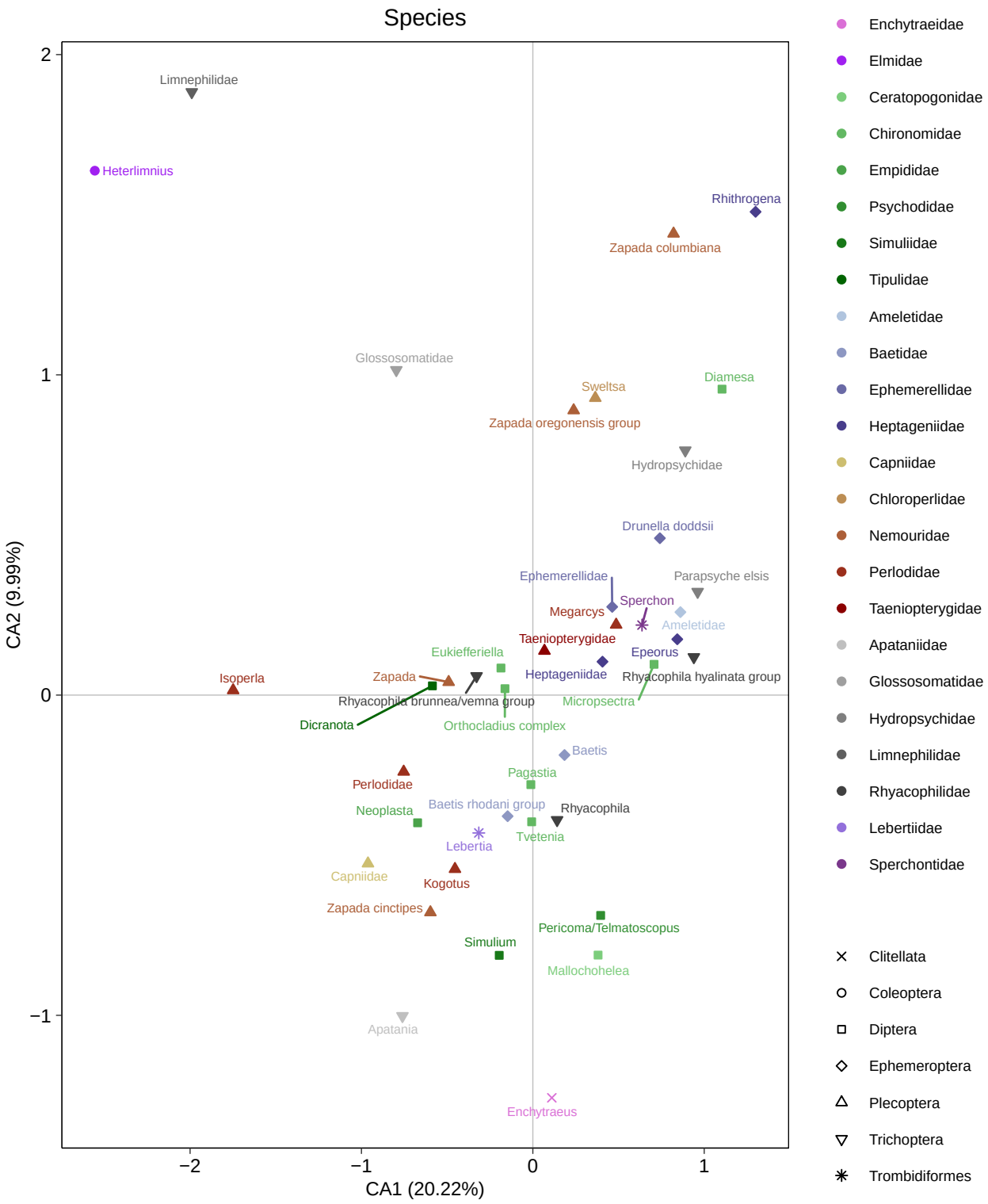


Figure E.15: L Benthic Invertebrate Community Lowest-Practical-Level Correspondence Analysis, FRO LAEMP, September 2012 to 2020

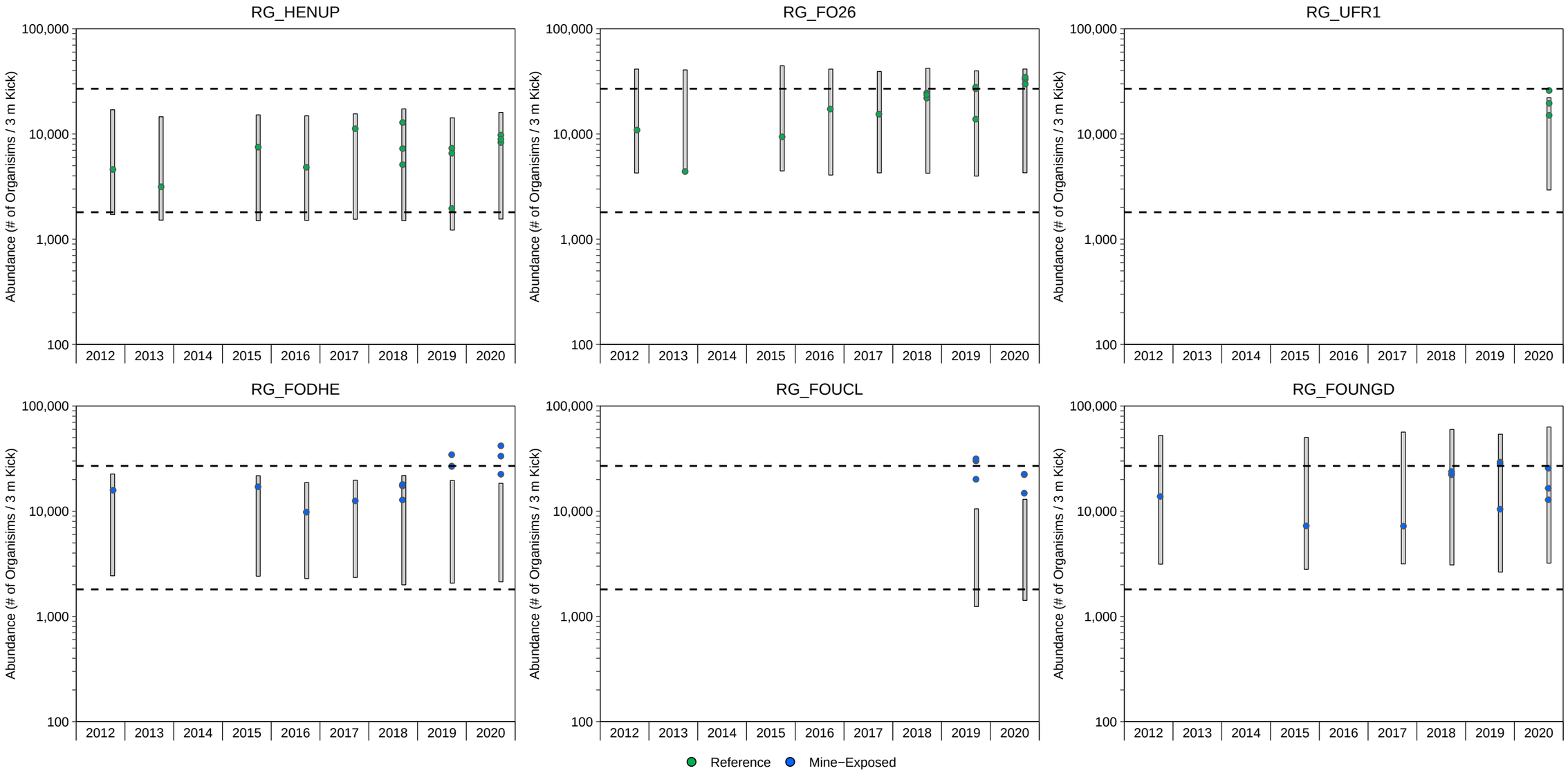


Figure E.16: Benthic Invertebrate Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

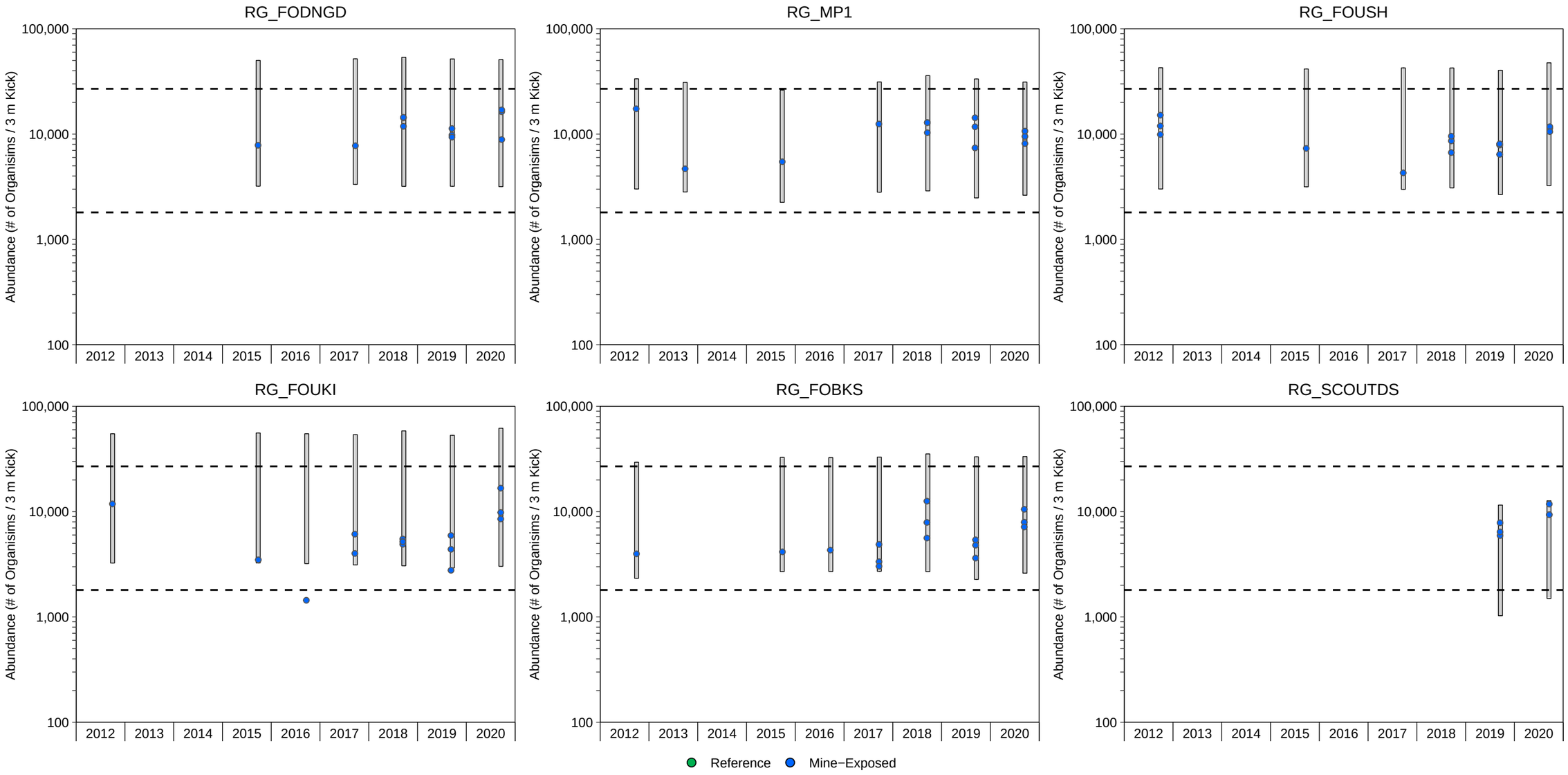


Figure E.16: Benthic Invertebrate Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

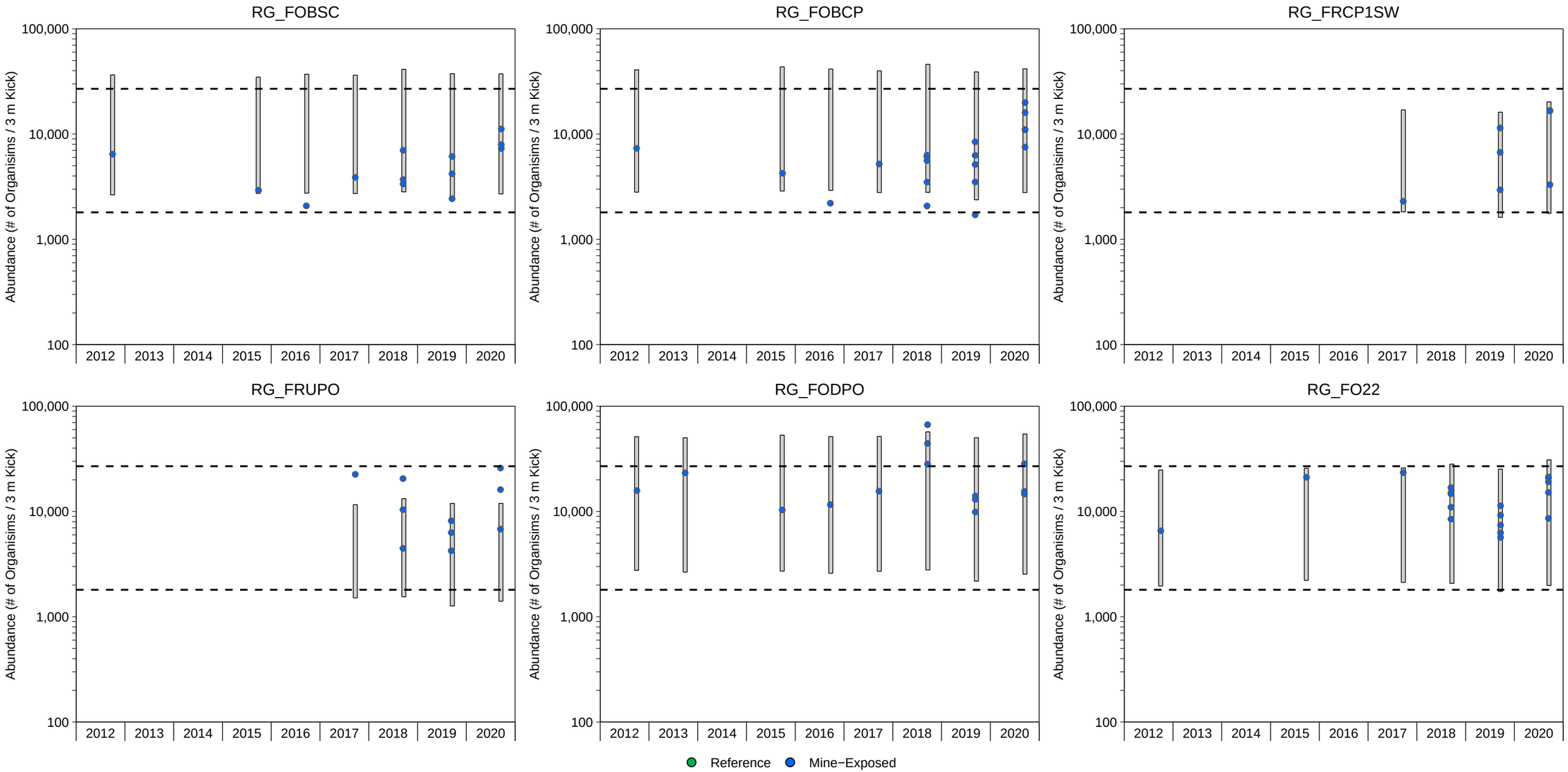


Figure E.16: Benthic Invertebrate Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

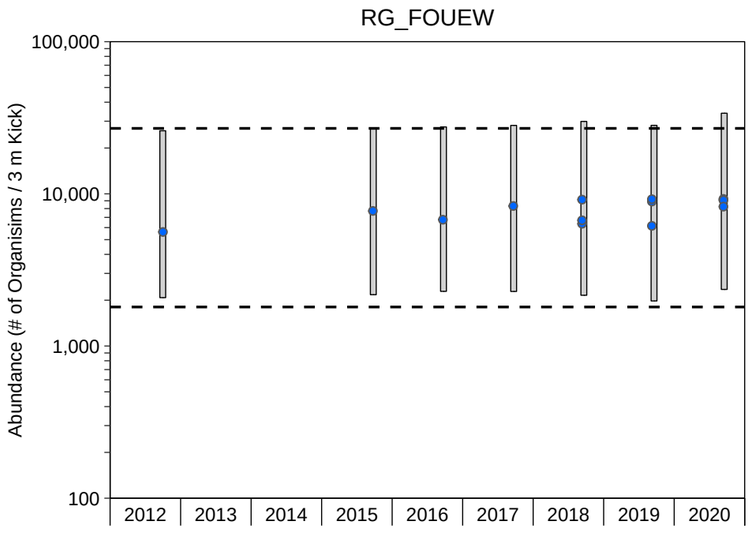


Figure E.16: Benthic Invertebrate Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

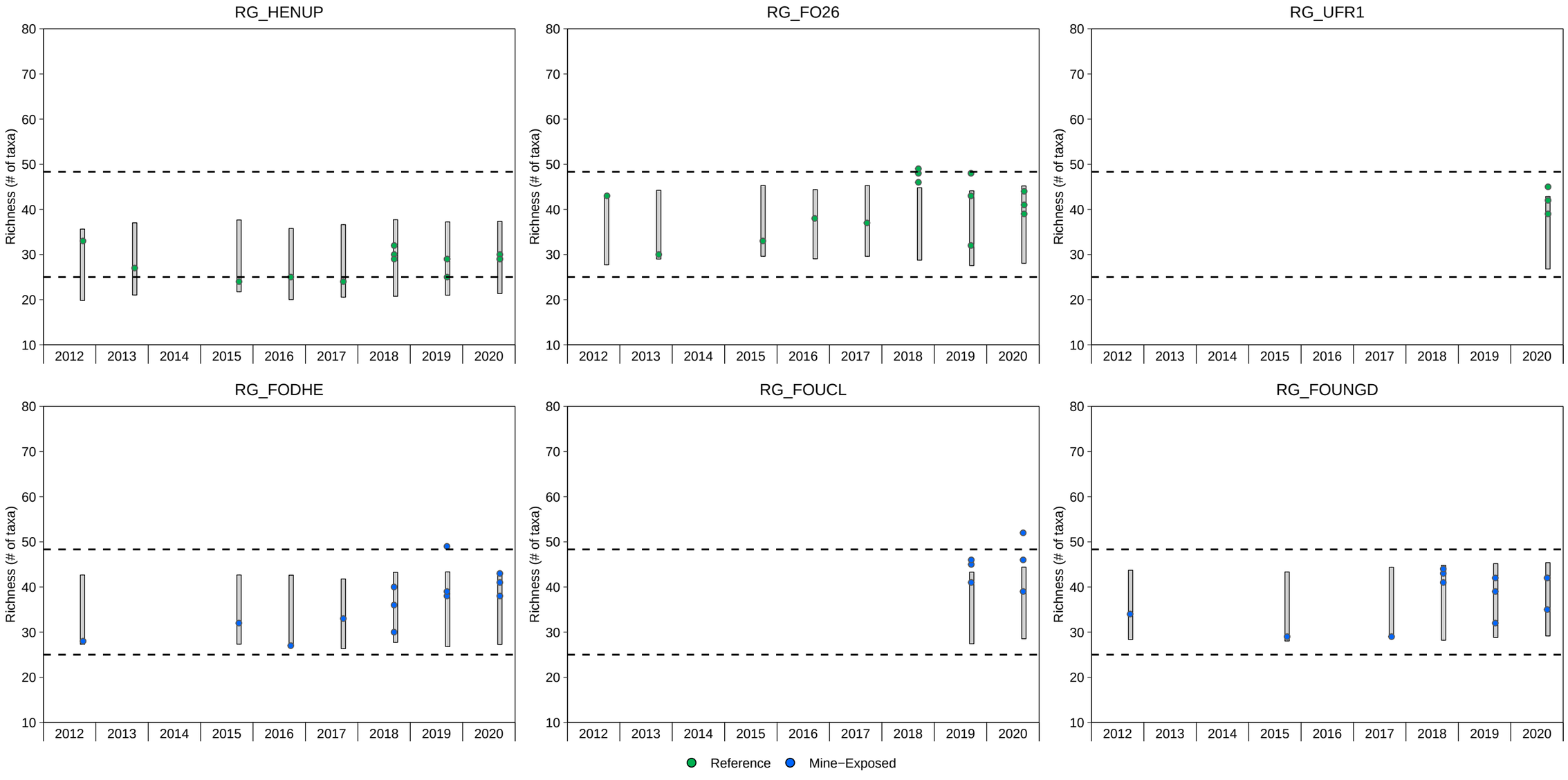


Figure E.17: Benthic Invertebrate Richness, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

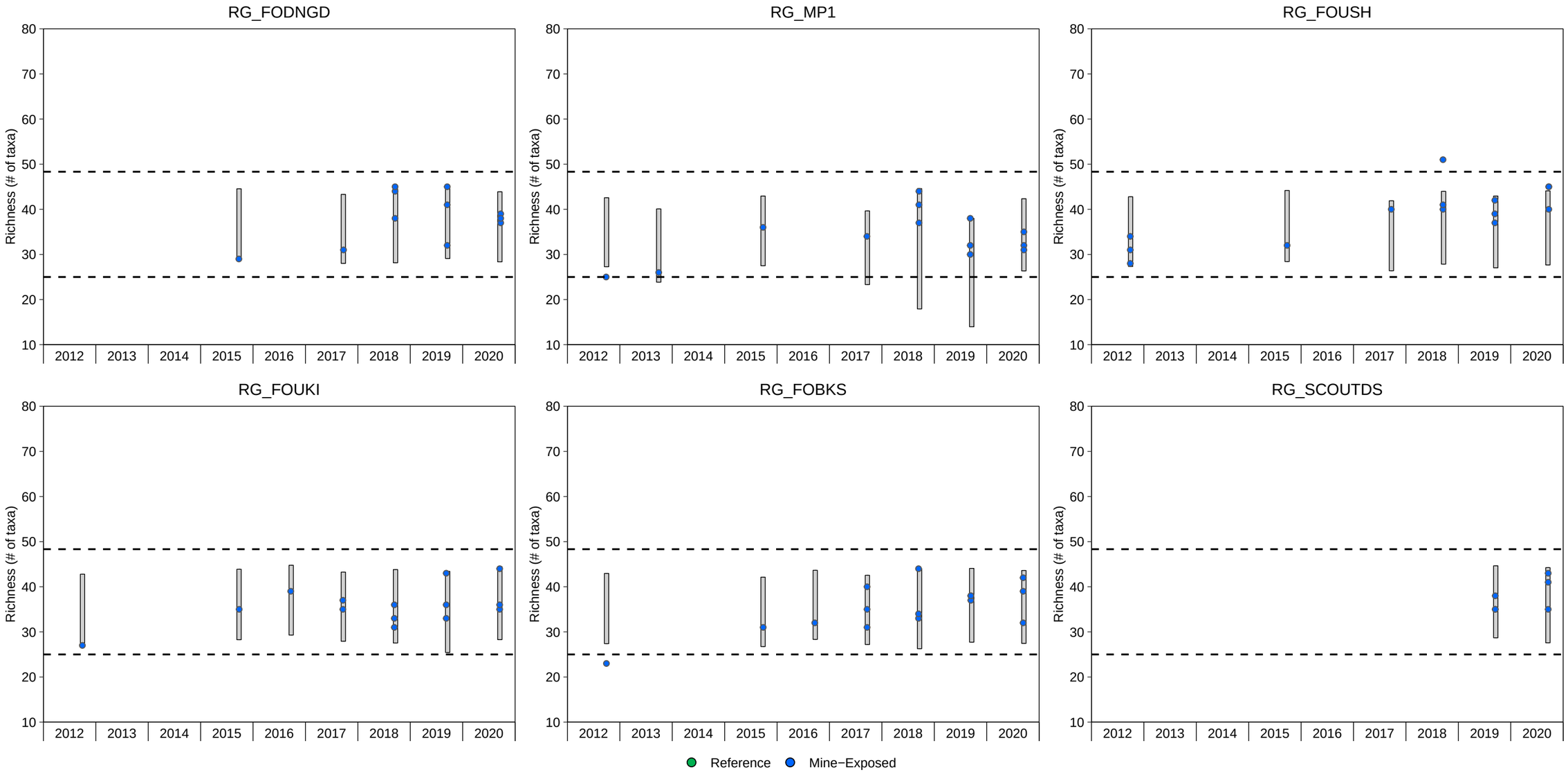


Figure E.17: Benthic Invertebrate Richness, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

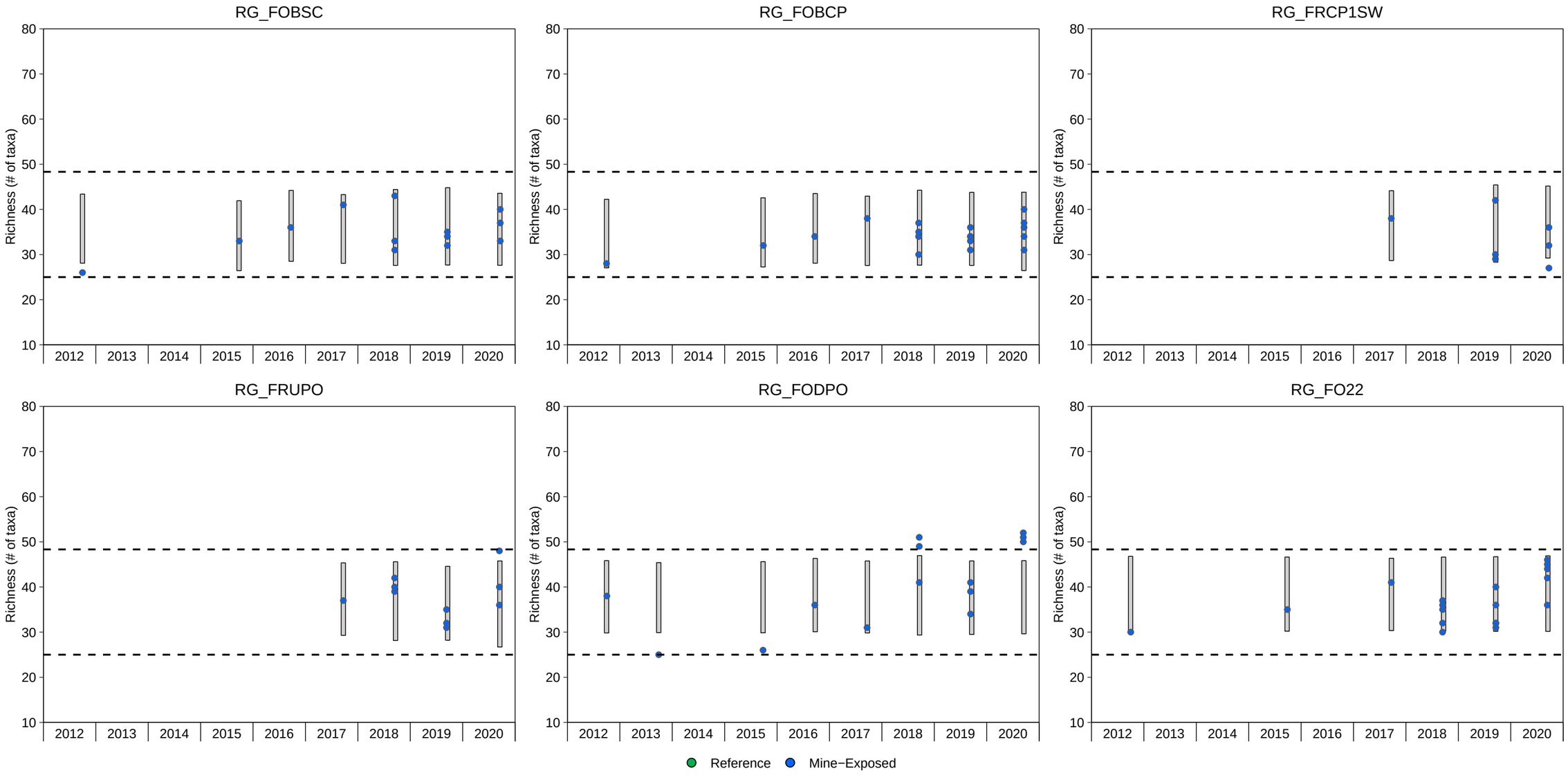


Figure E.17: Benthic Invertebrate Richness, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

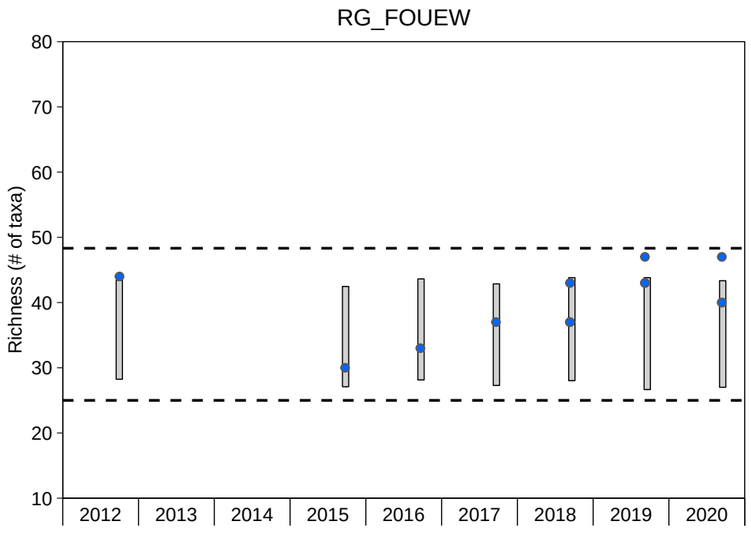


Figure E.17: Benthic Invertebrate Richness, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

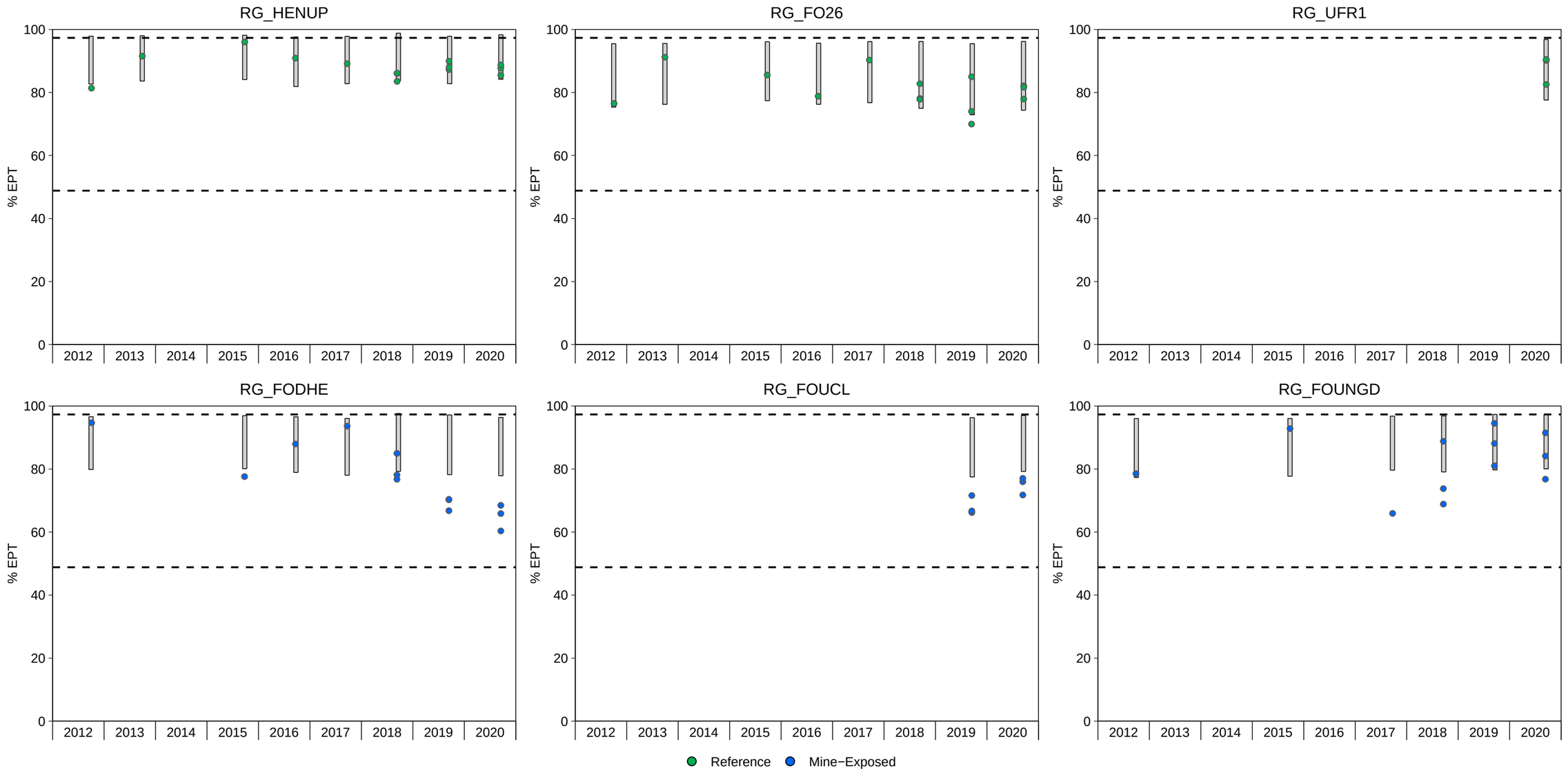


Figure E.18: Benthic Invertebrate % EPT, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

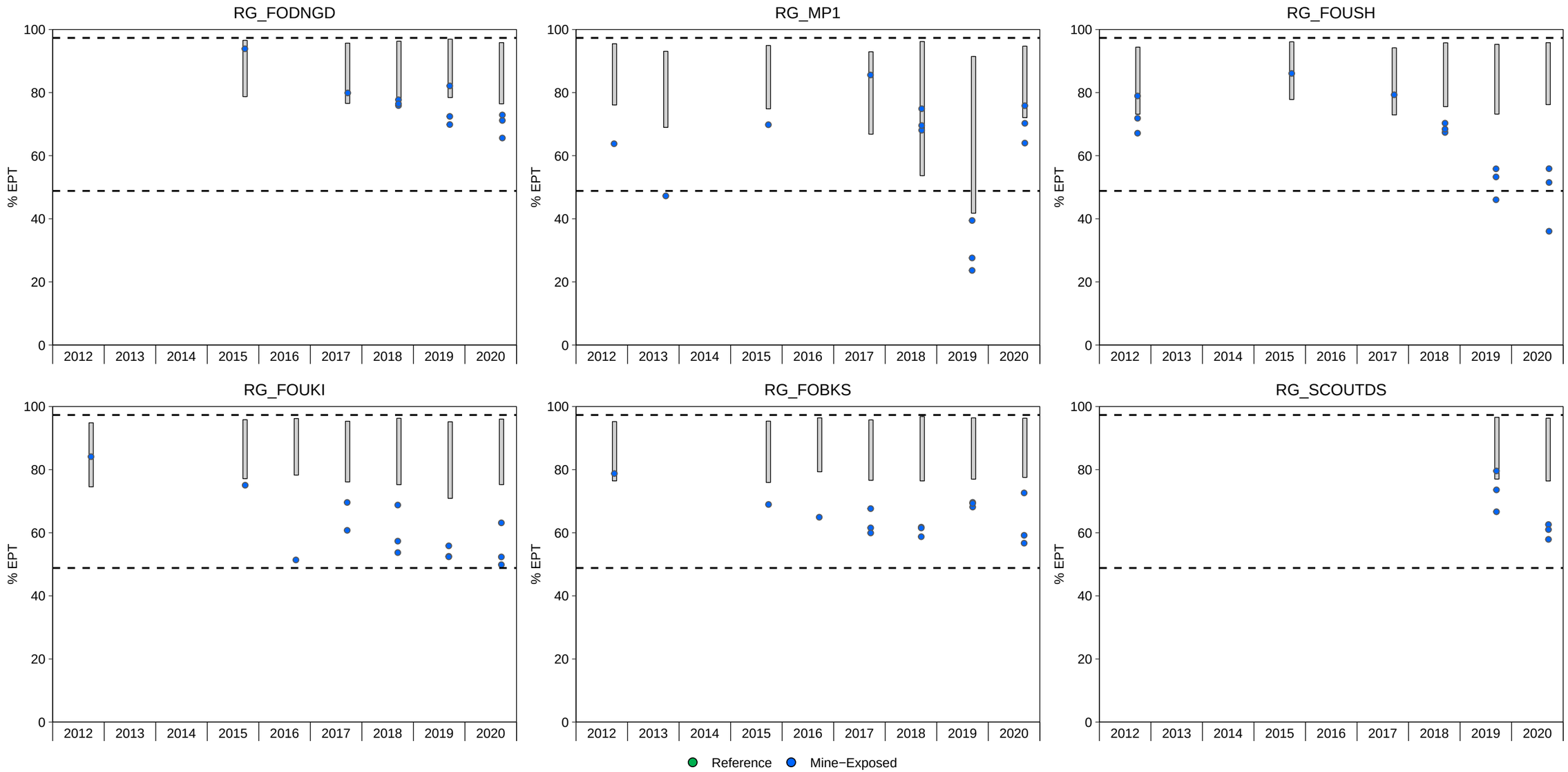


Figure E.18: Benthic Invertebrate % EPT, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

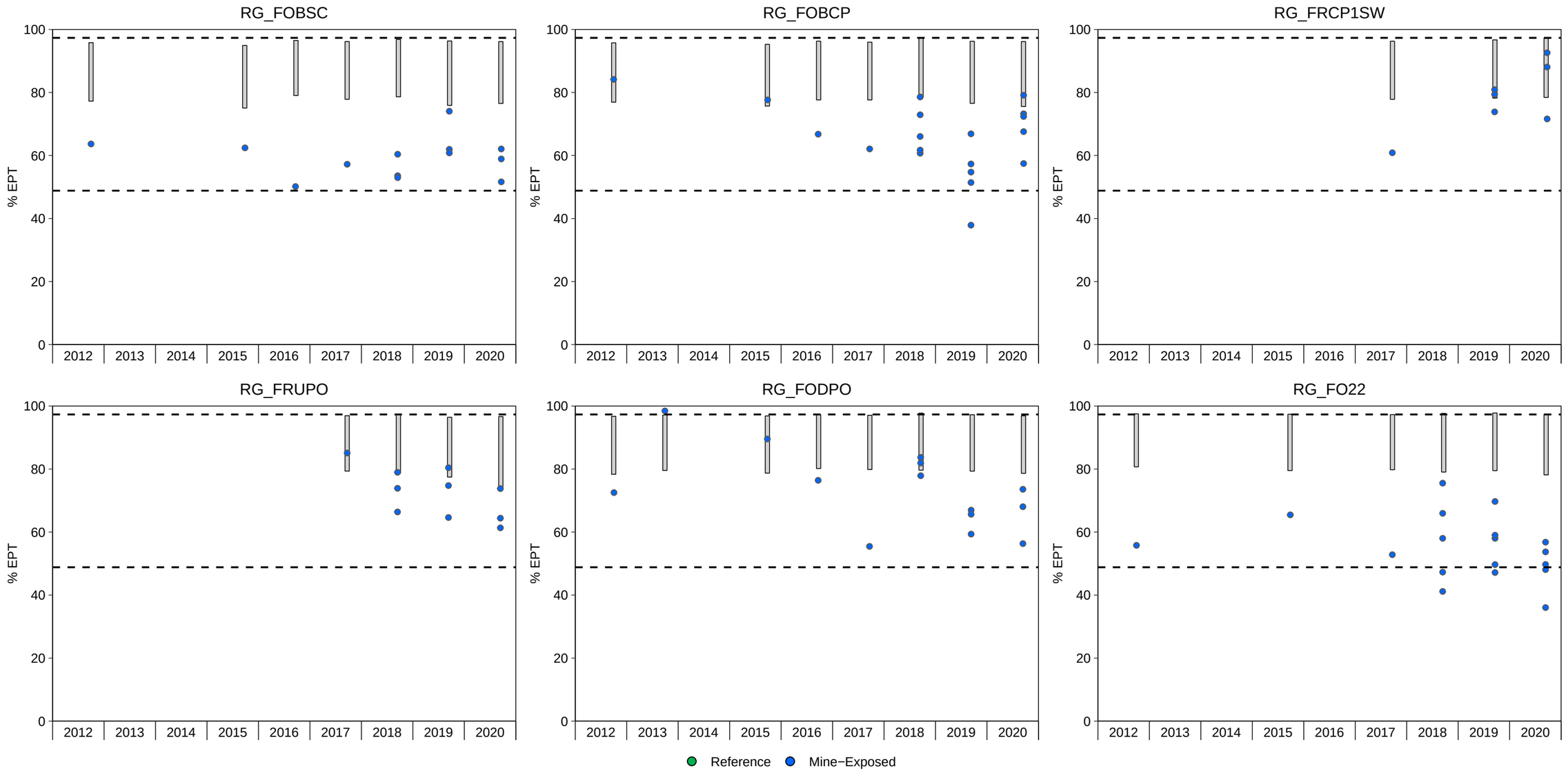


Figure E.18: Benthic Invertebrate % EPT, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

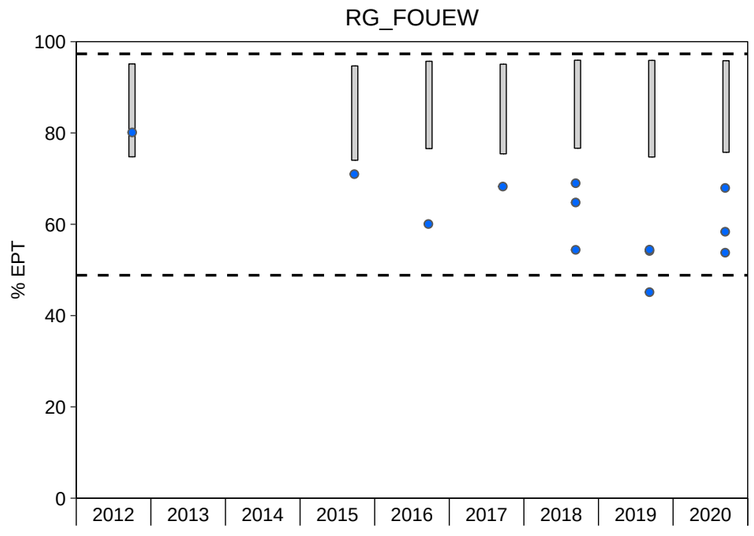


Figure E.18: Benthic Invertebrate % EPT, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

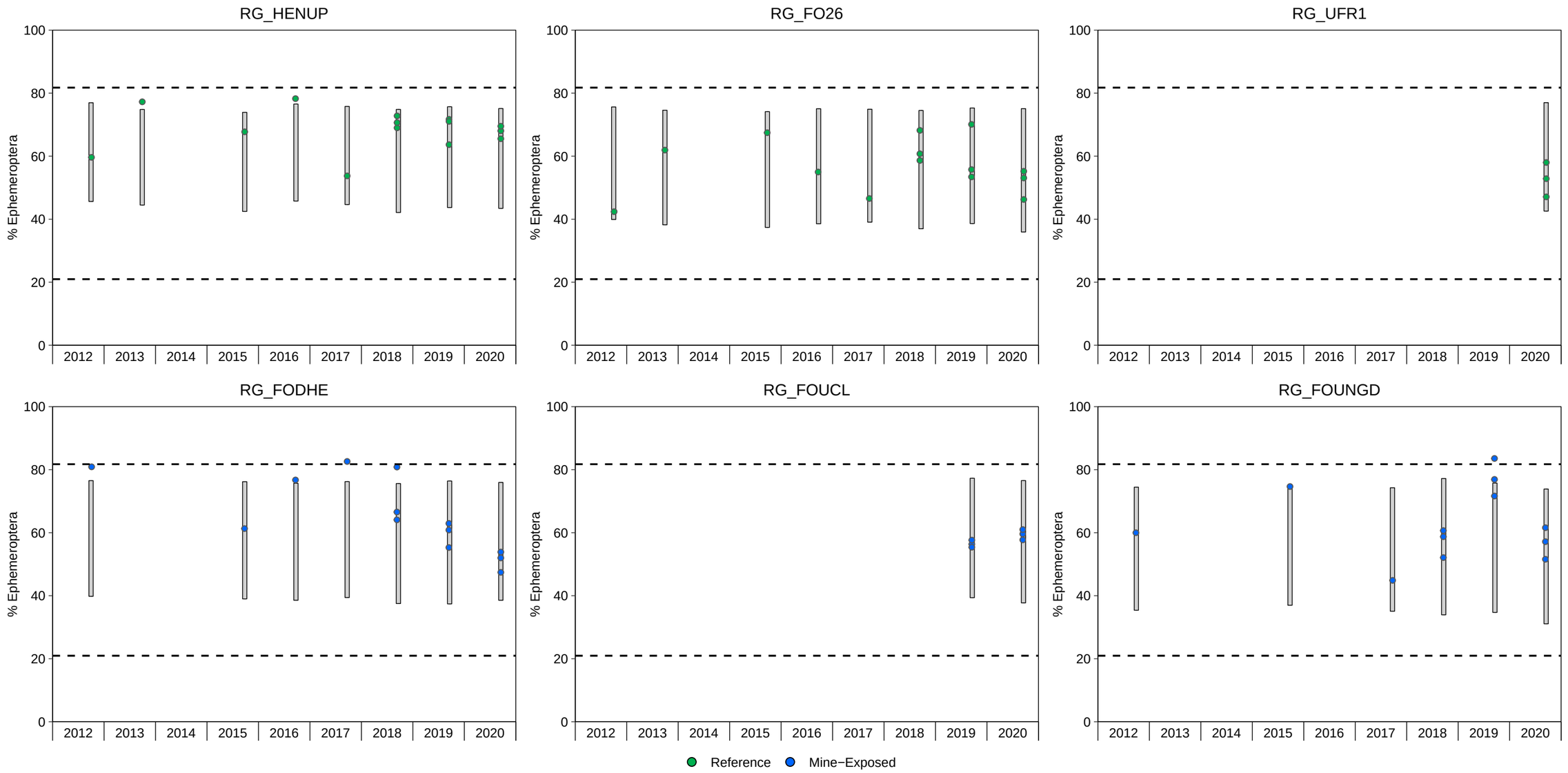


Figure E.19: Benthic Invertebrate % Ephemeroptera, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

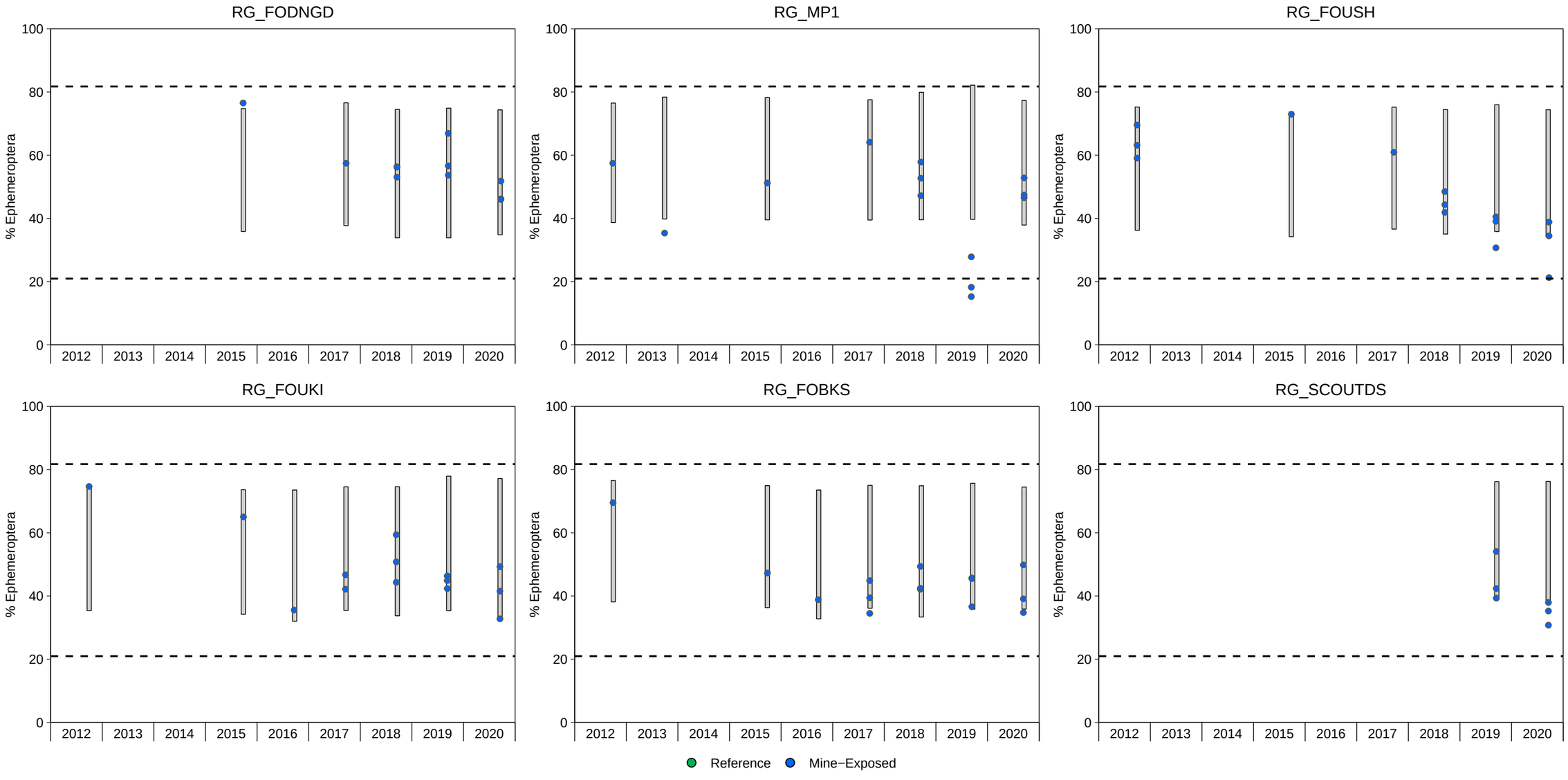


Figure E.19: Benthic Invertebrate % Ephemeroptera, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

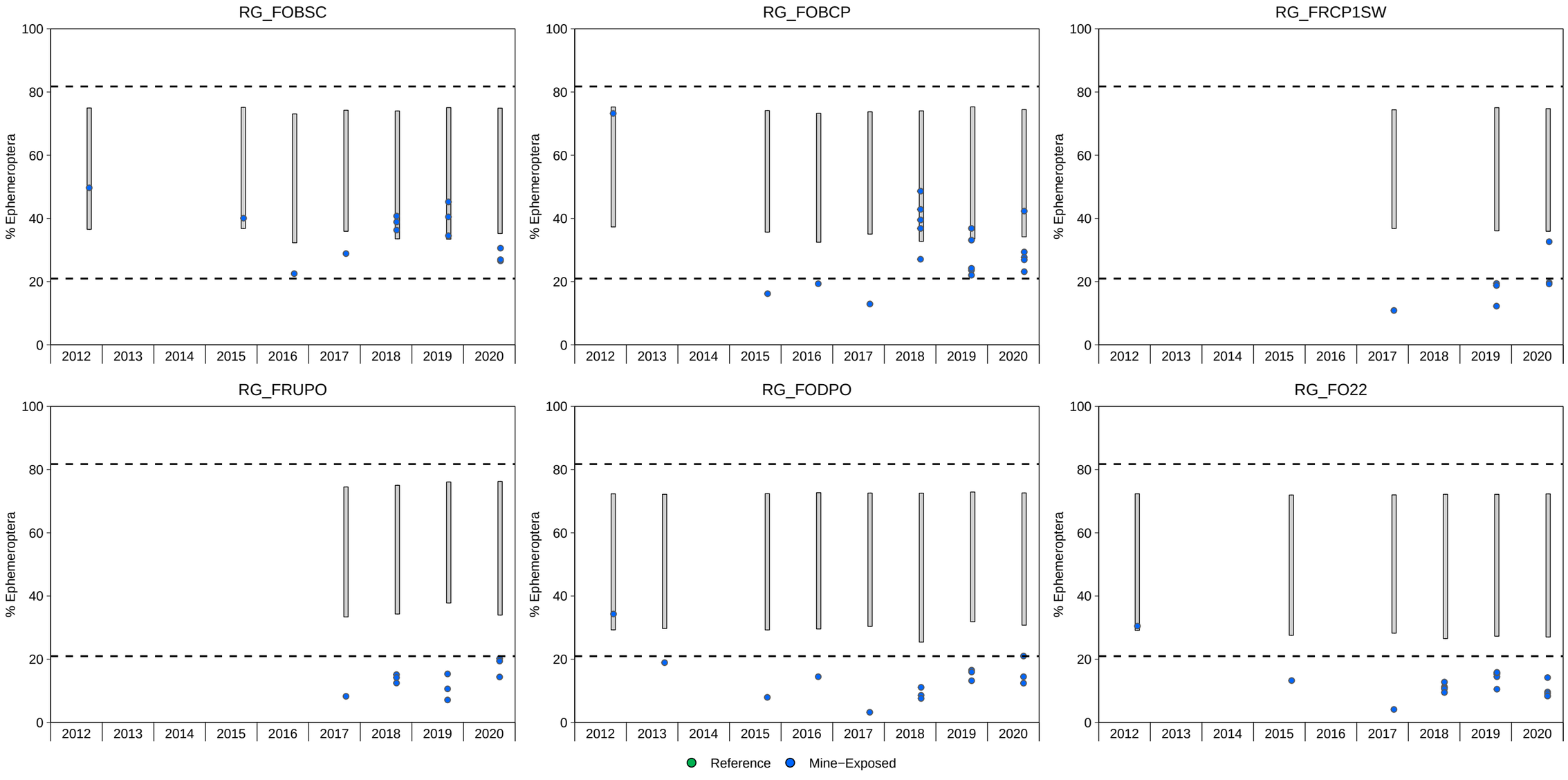
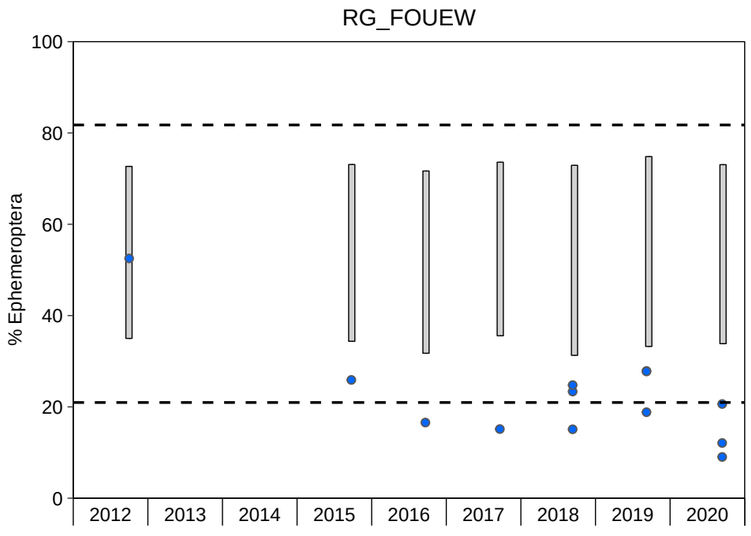


Figure E.19: Benthic Invertebrate % Ephemeroptera, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.19: Benthic Invertebrate % Ephemeroptera, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

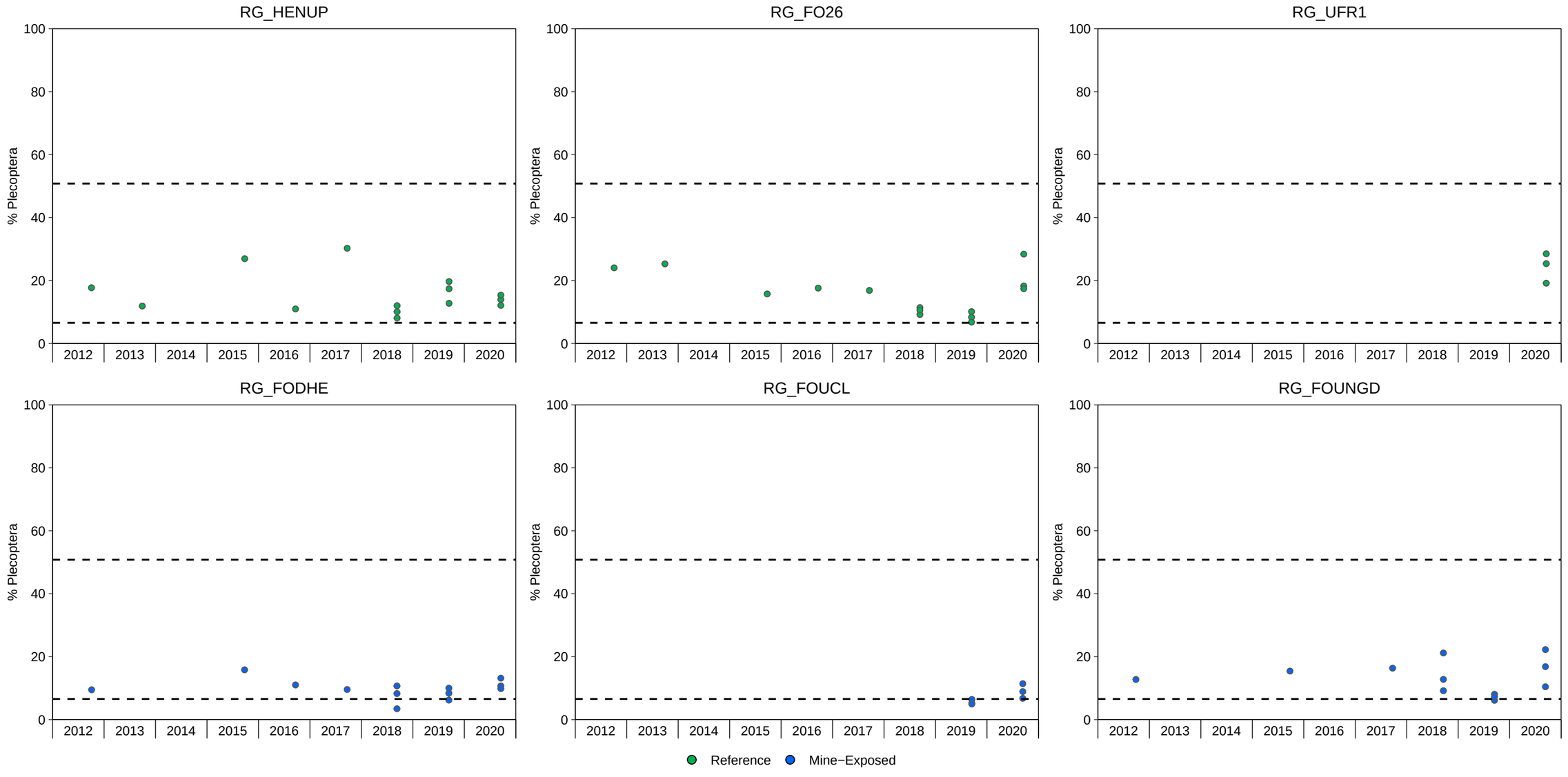


Figure E.20: Benthic Invertebrate % Plecoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

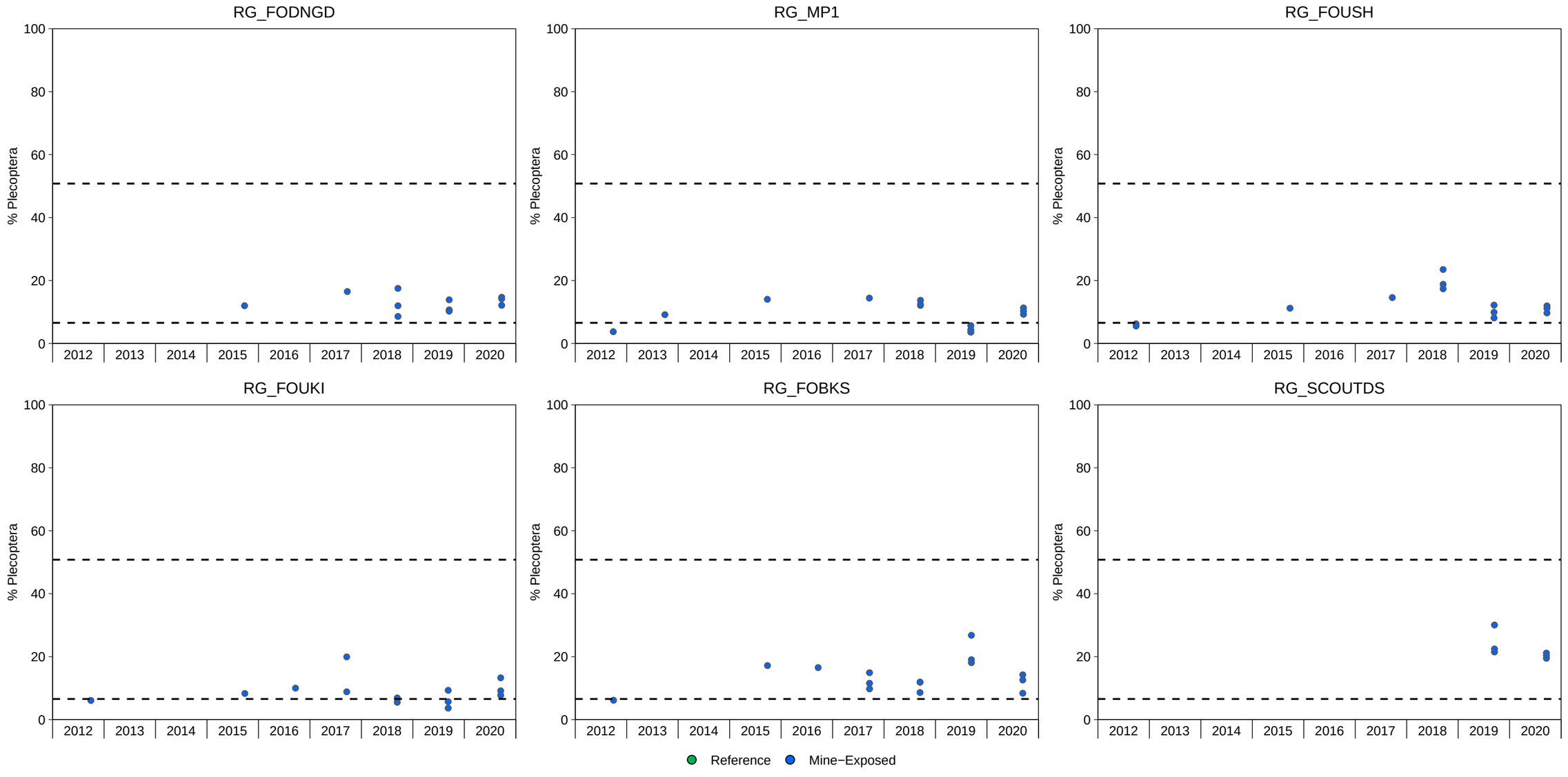


Figure E.20: Benthic Invertebrate % Plecoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

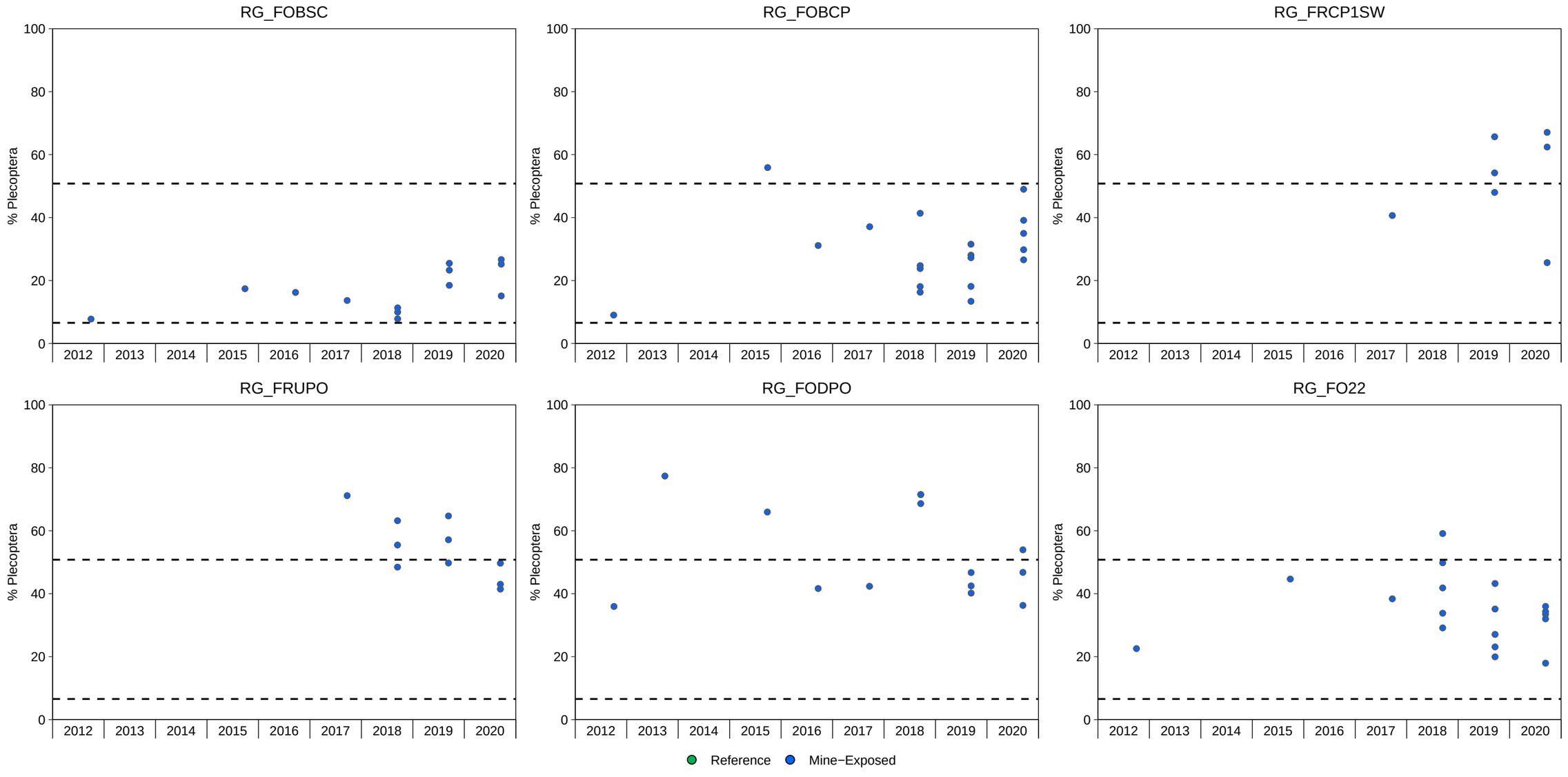
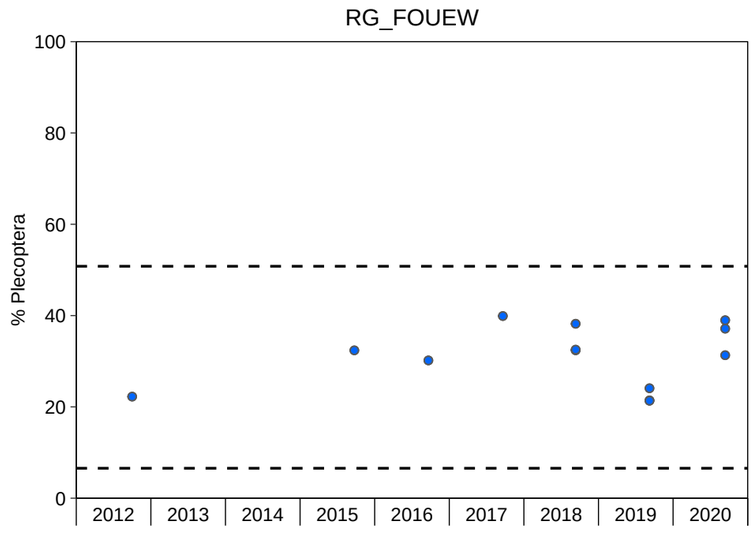


Figure E.20: Benthic Invertebrate % Plecoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.20: Benthic Invertebrate % Plecoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

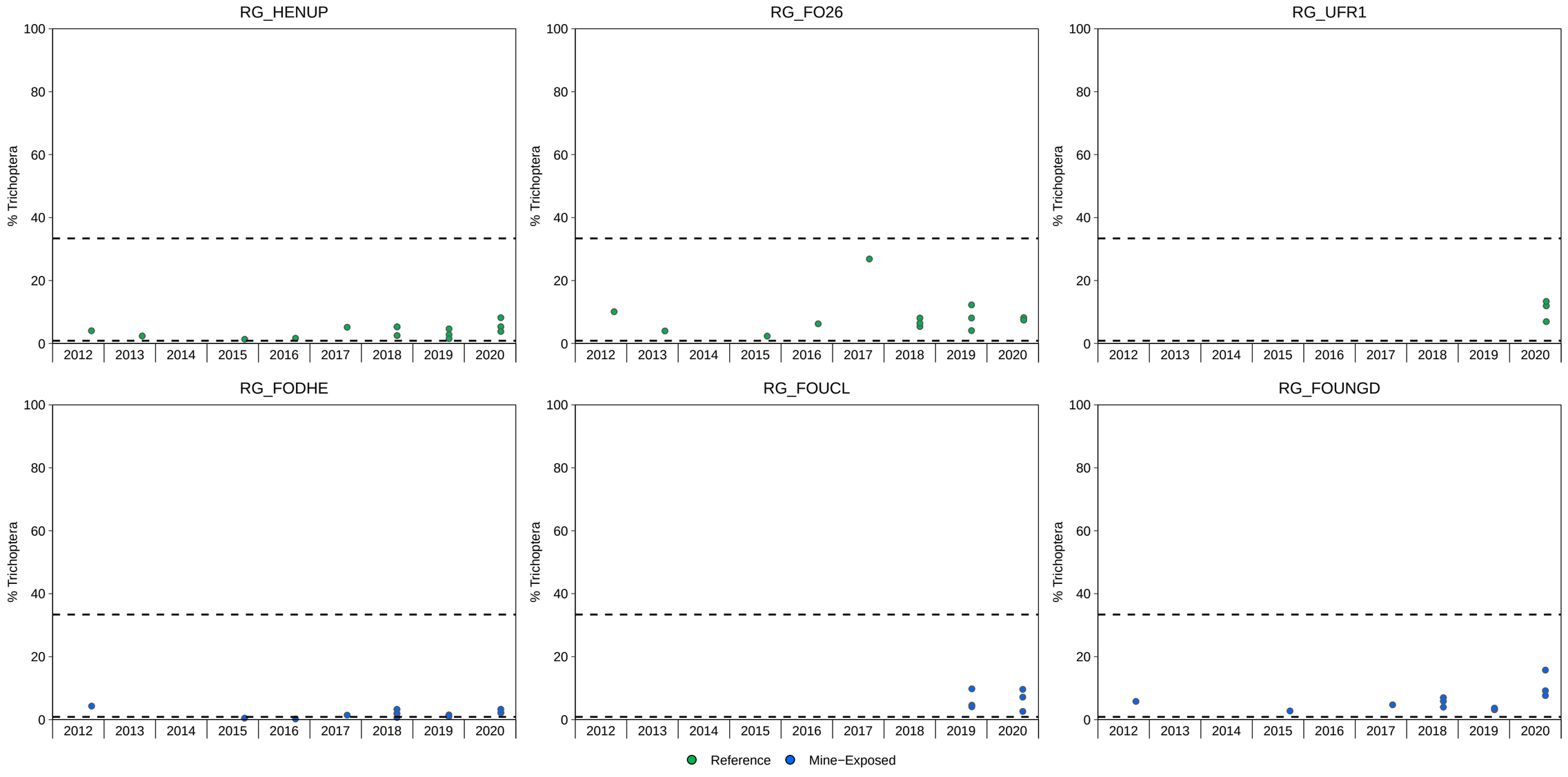


Figure E.21: Benthic Invertebrate % Trichoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

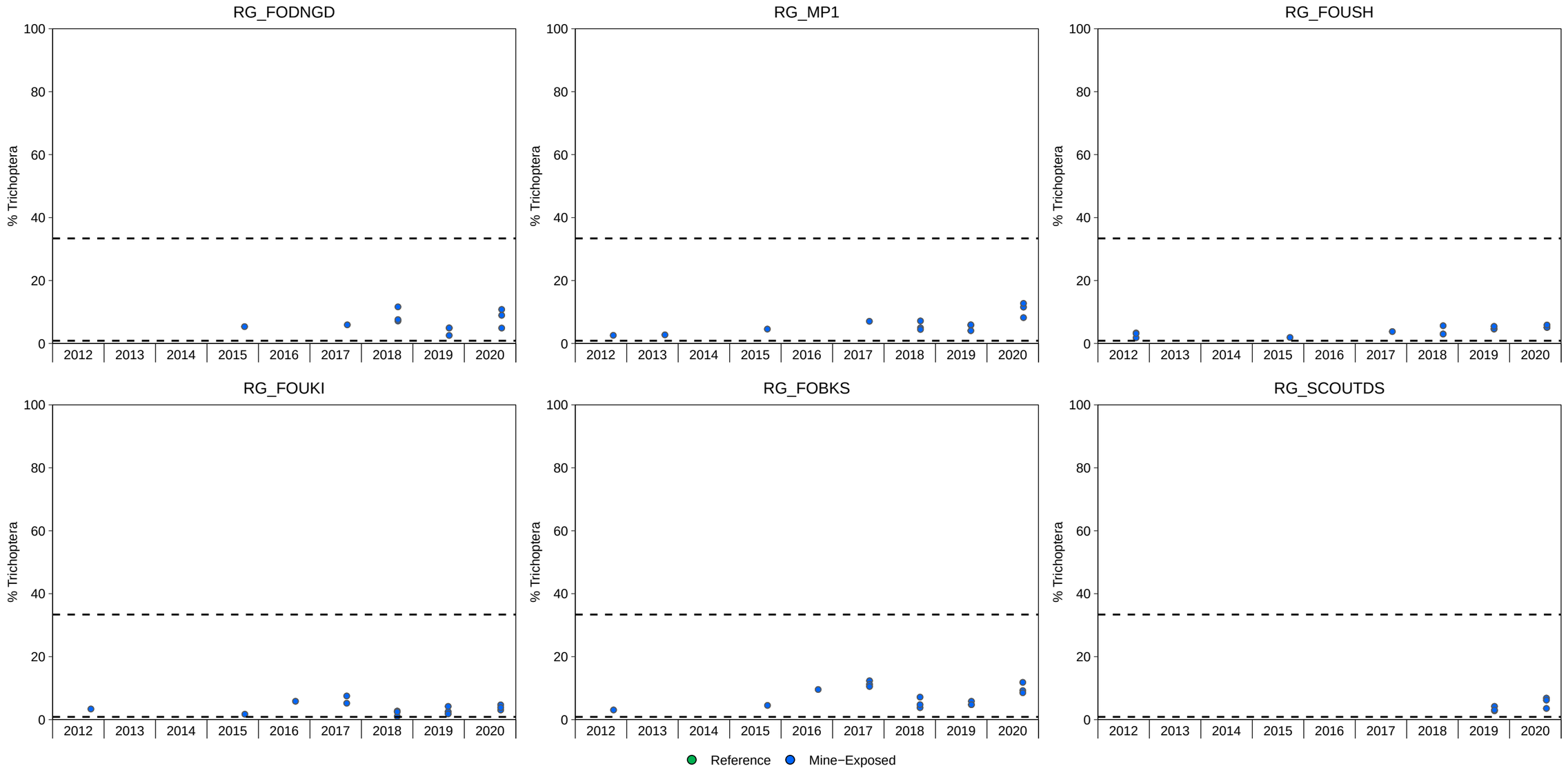


Figure E.21: Benthic Invertebrate % Trichoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

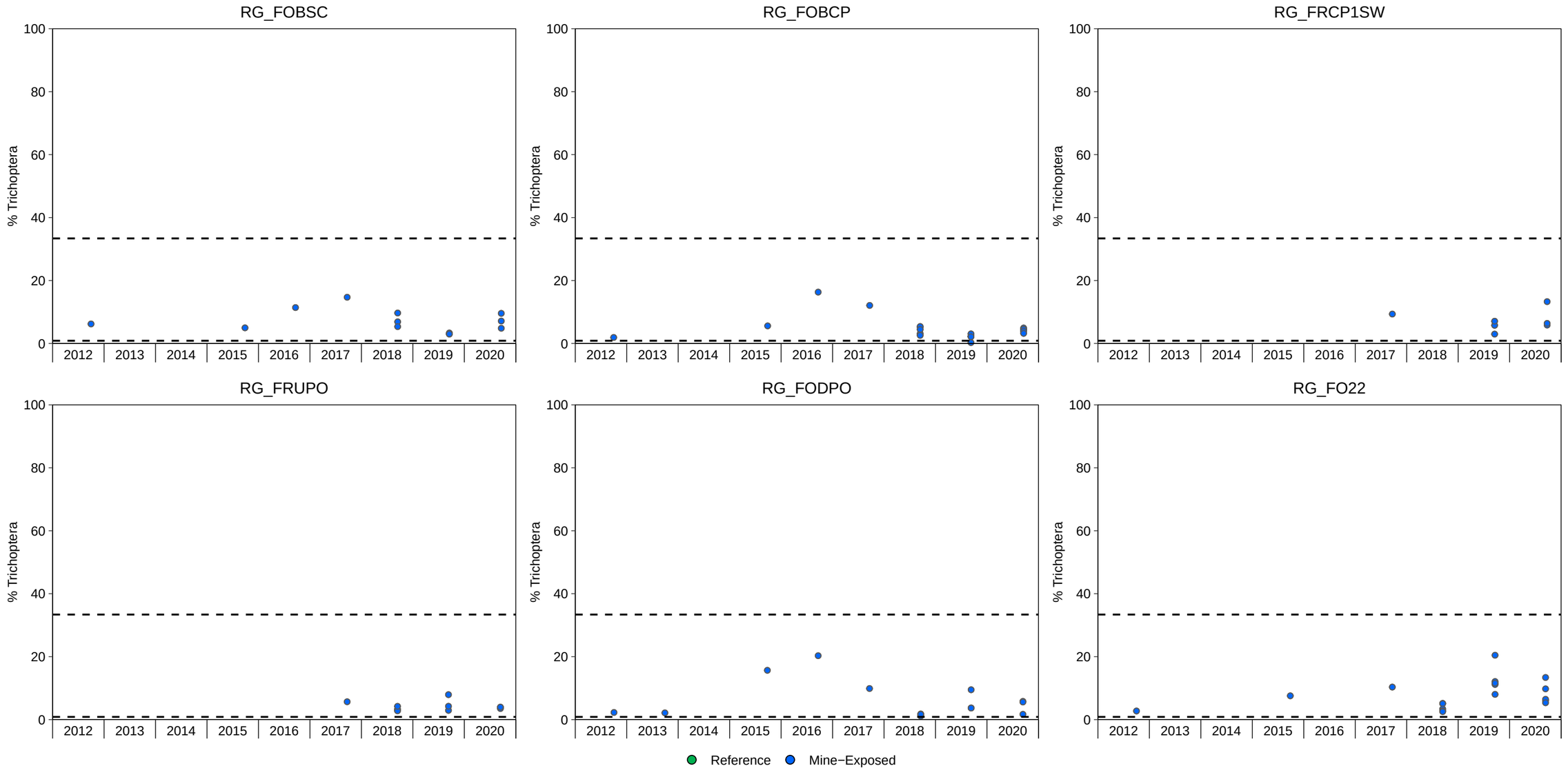
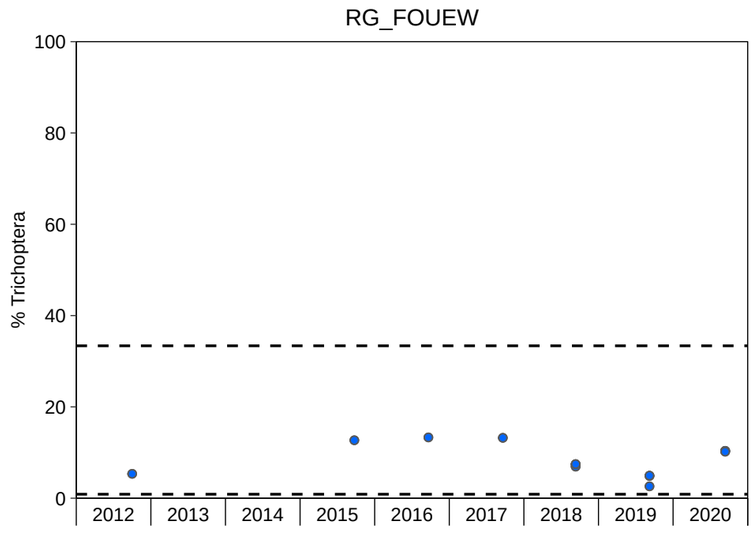


Figure E.21: Benthic Invertebrate % Trichoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.21: Benthic Invertebrate % Trichoptera, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

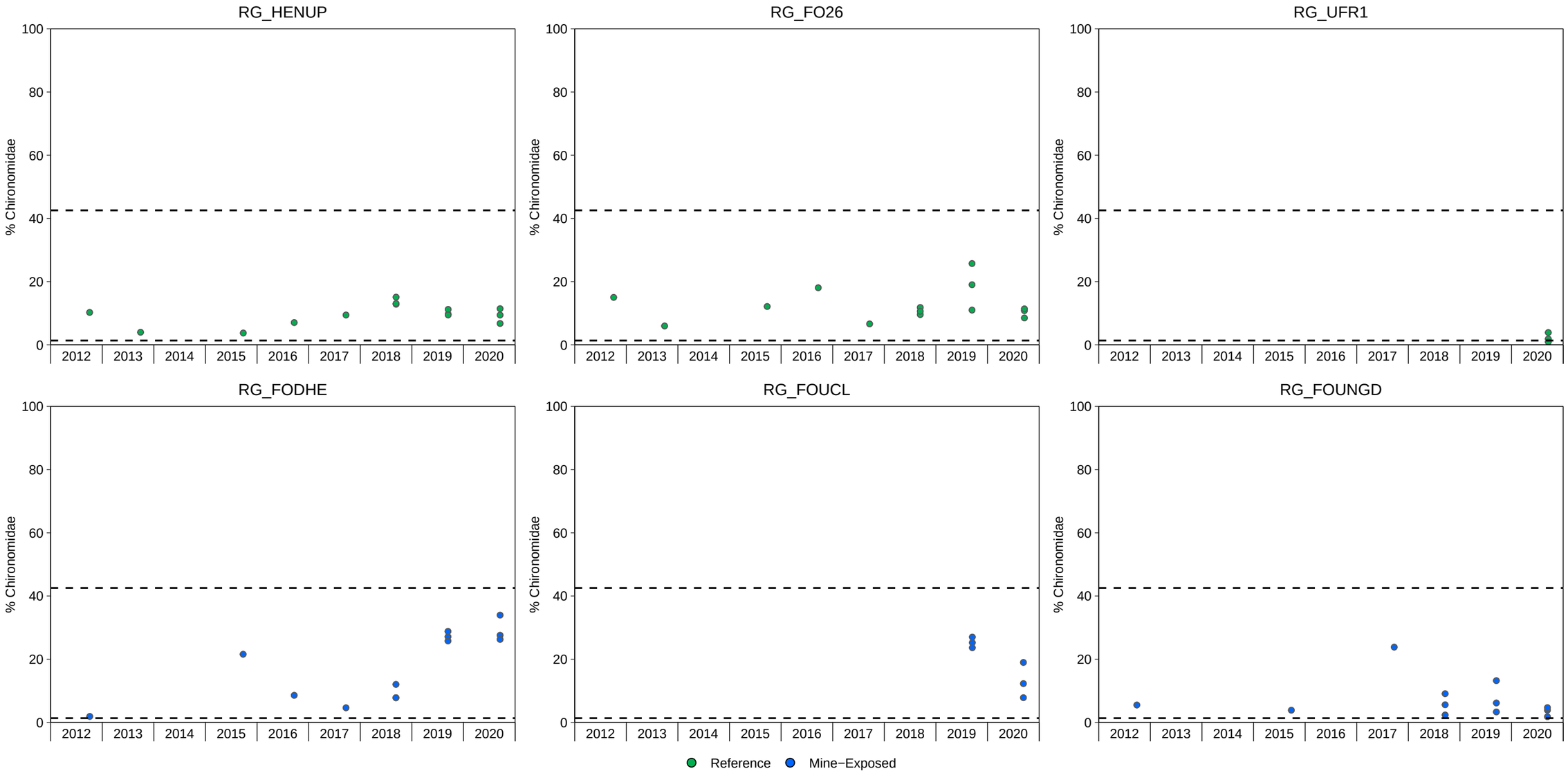


Figure E.22: Benthic Invertebrate % Chironomidae, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

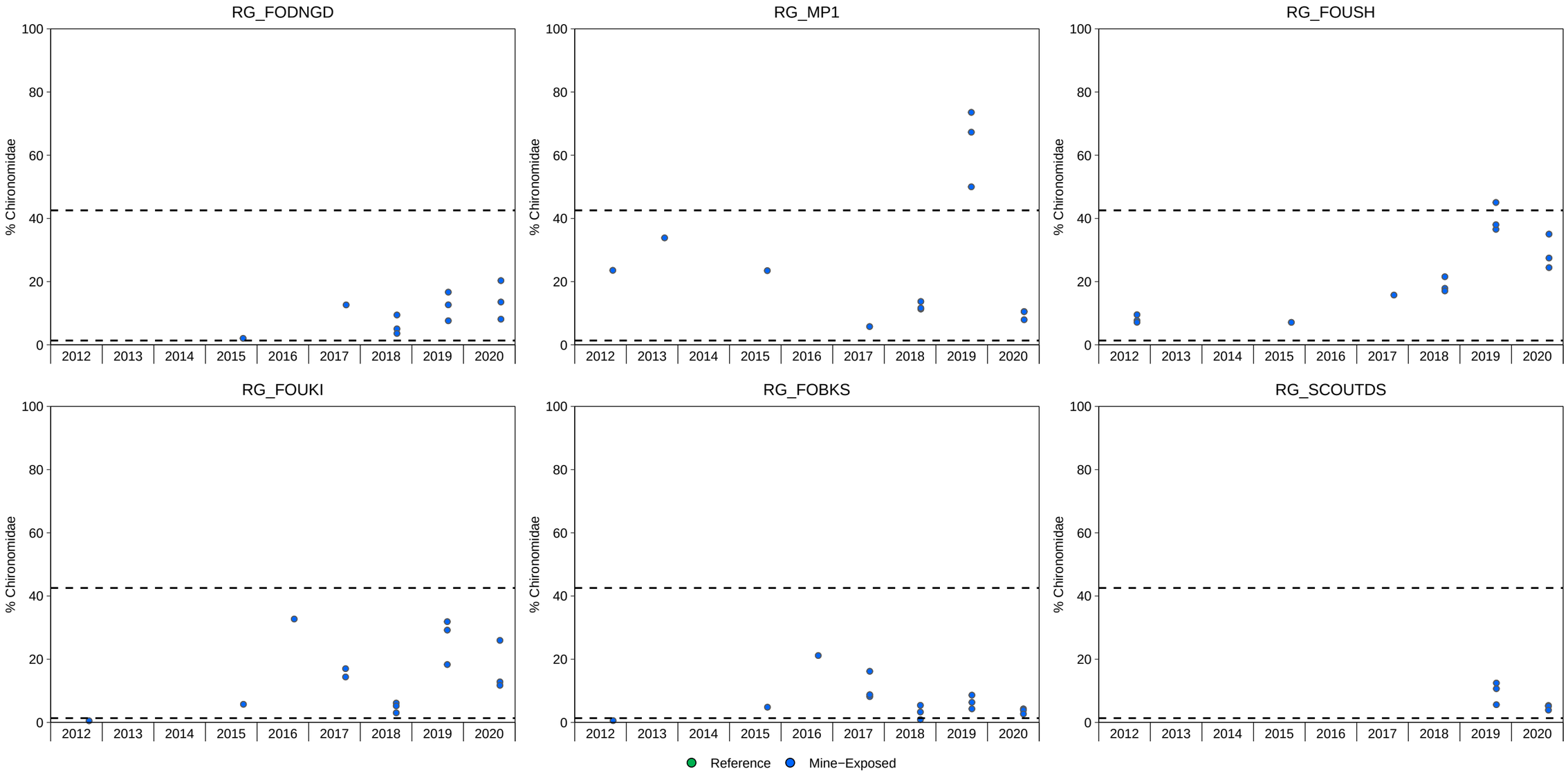


Figure E.22: Benthic Invertebrate % Chironomidae, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

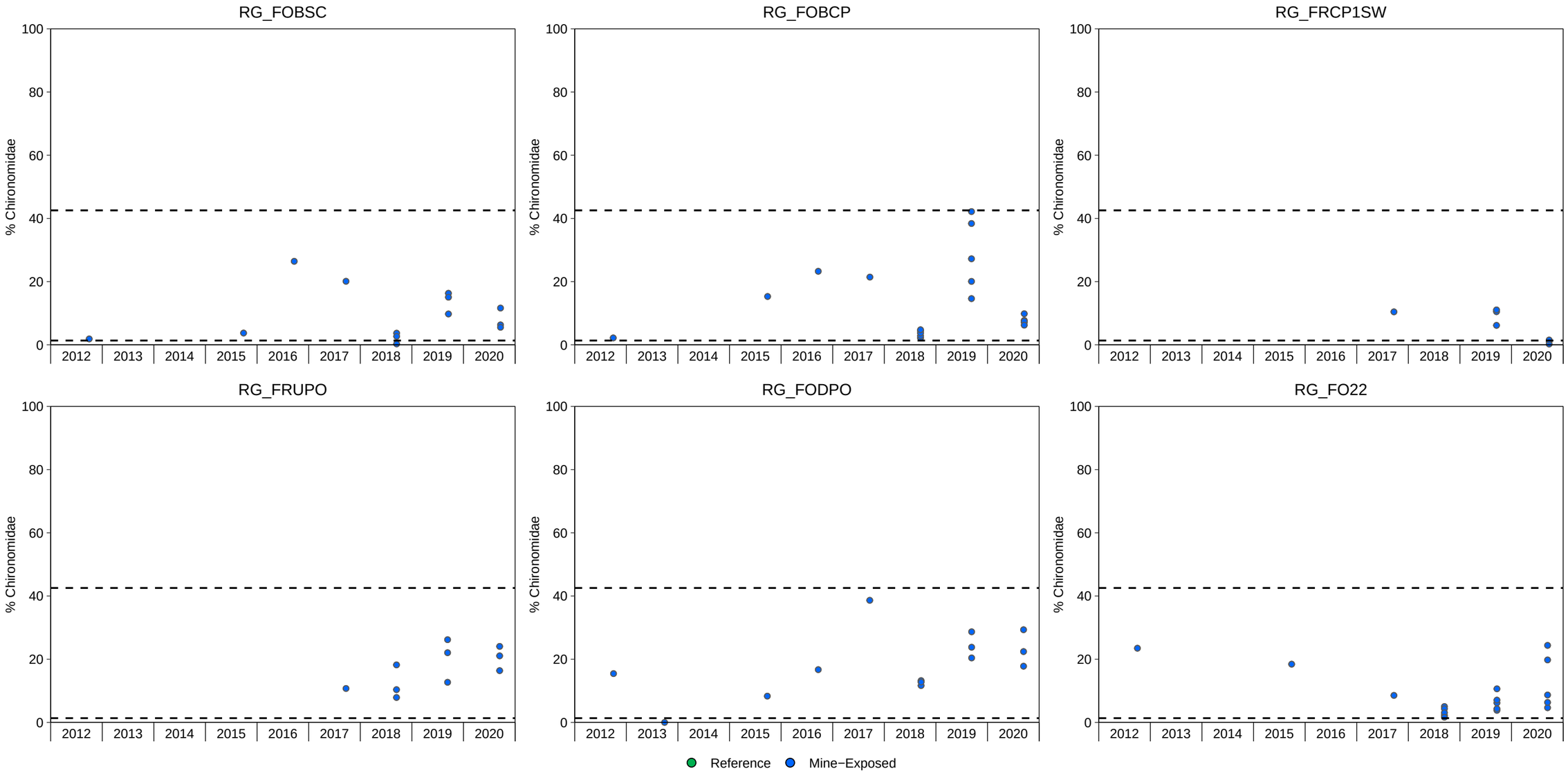
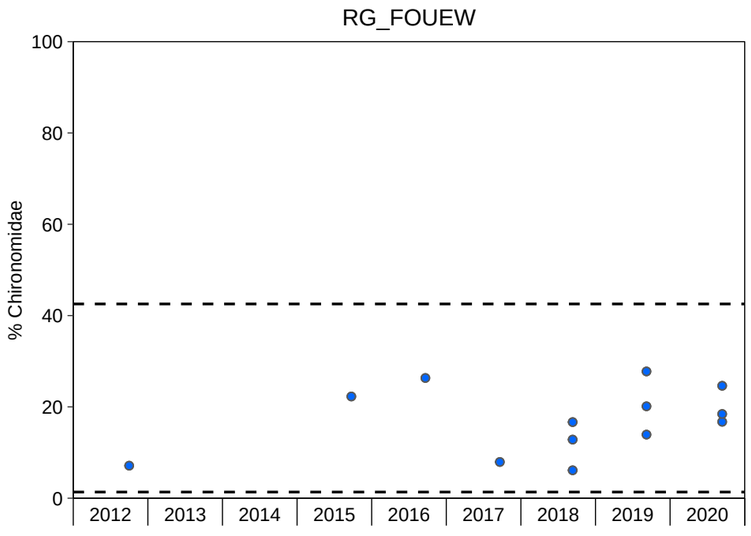


Figure E.22: Benthic Invertebrate % Chironomidae, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.22: Benthic Invertebrate % Chironomidae, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

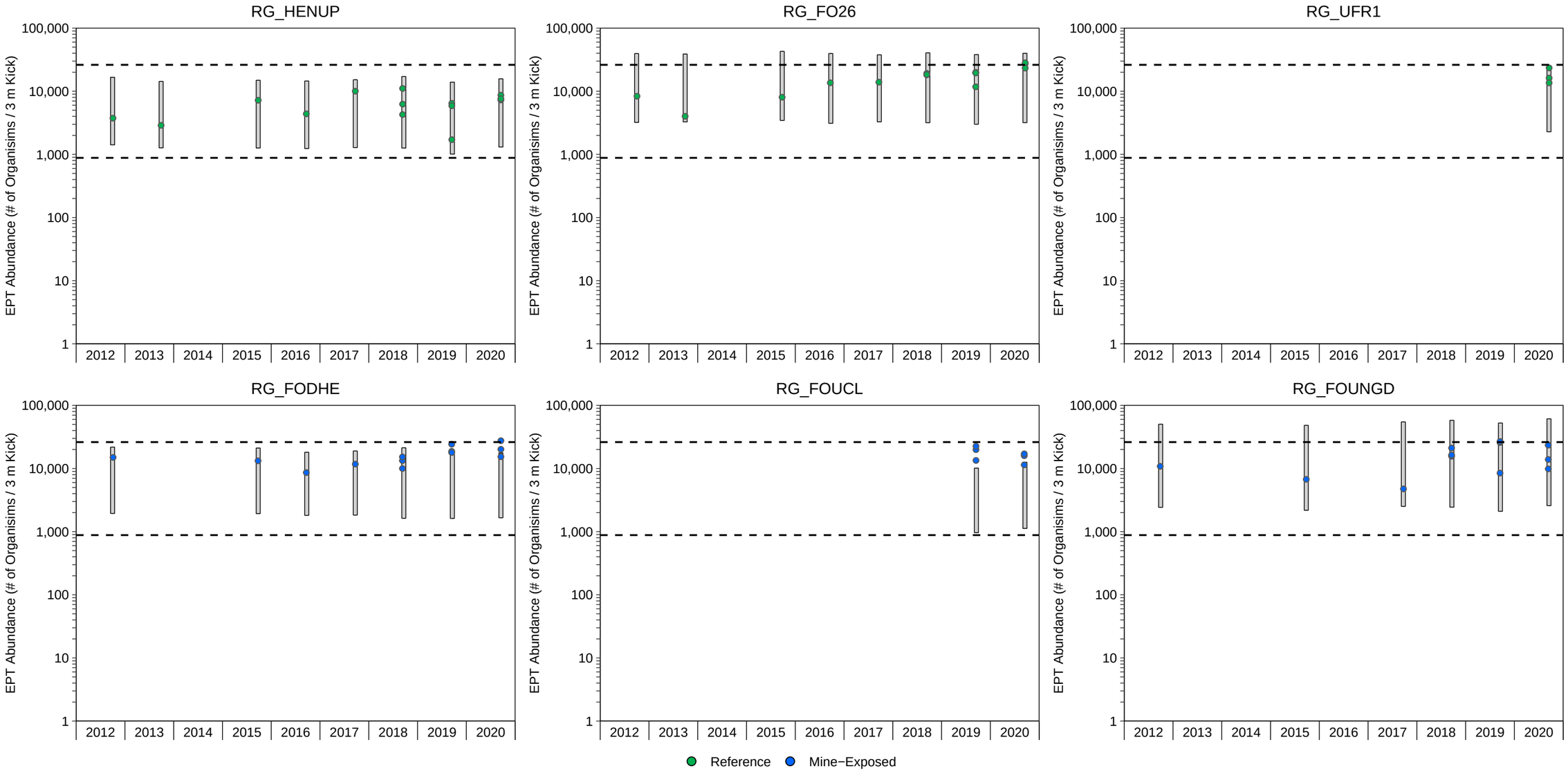


Figure E.23: Benthic Invertebrate EPT Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

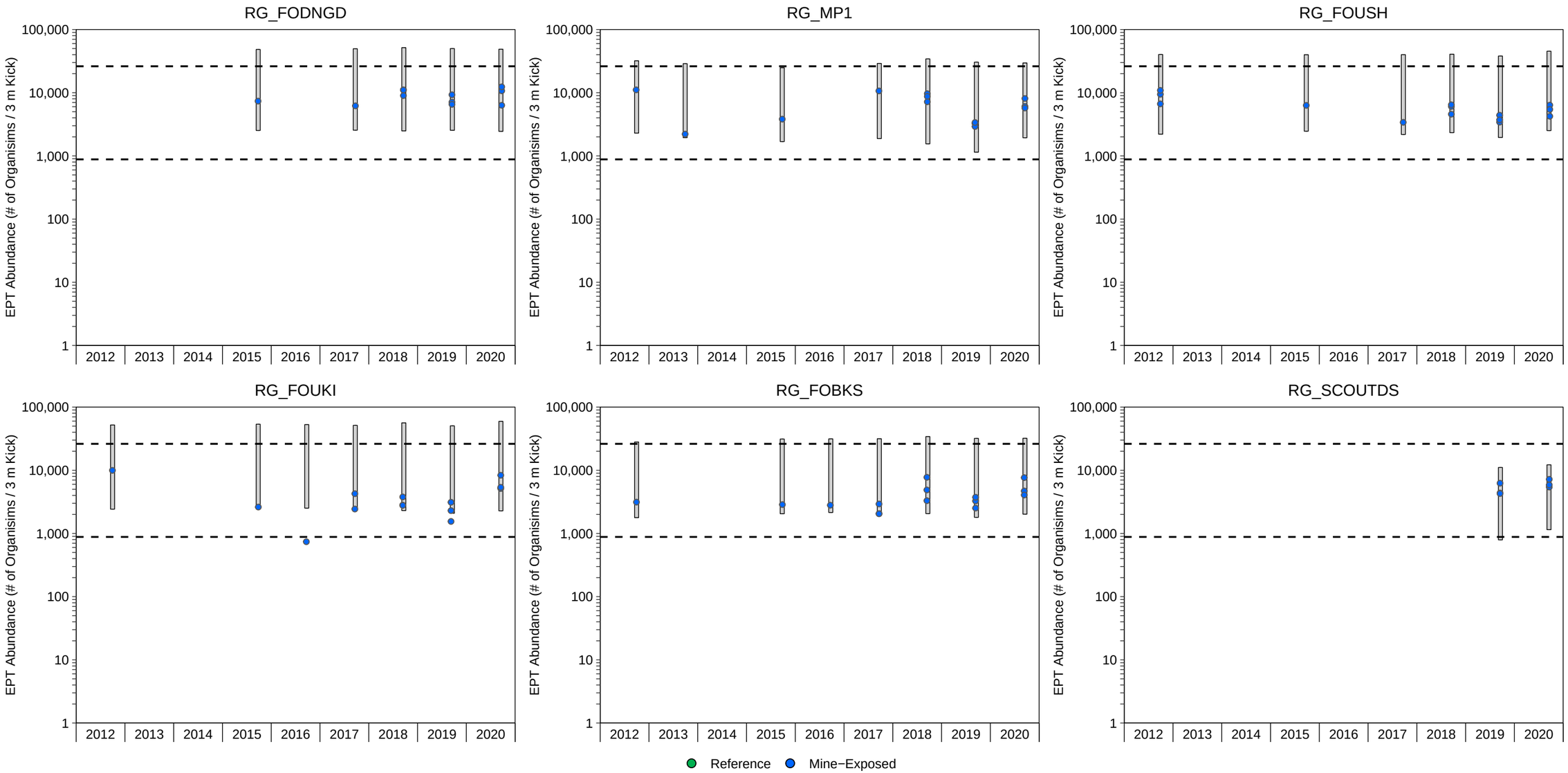


Figure E.23: Benthic Invertebrate EPT Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

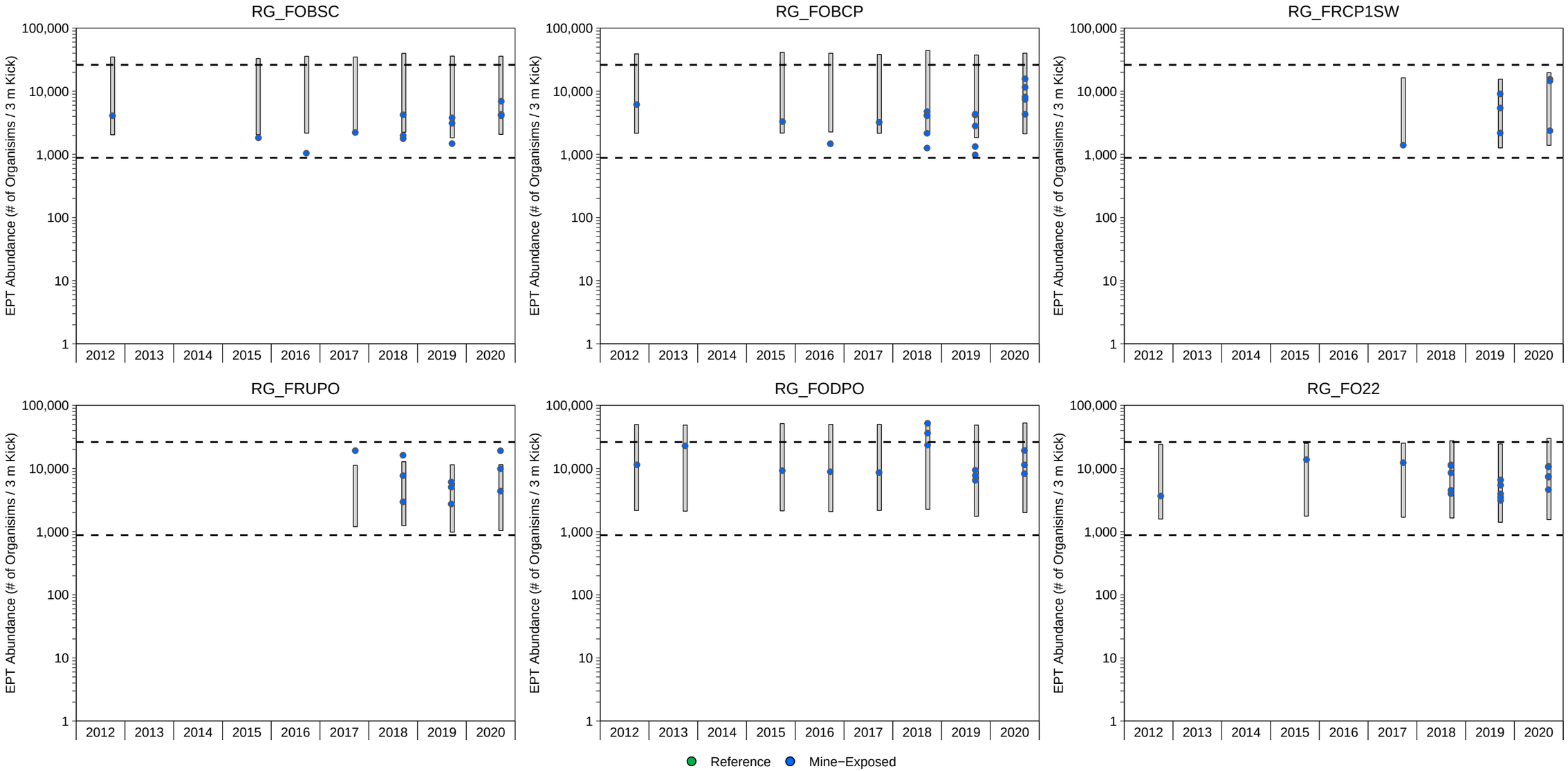
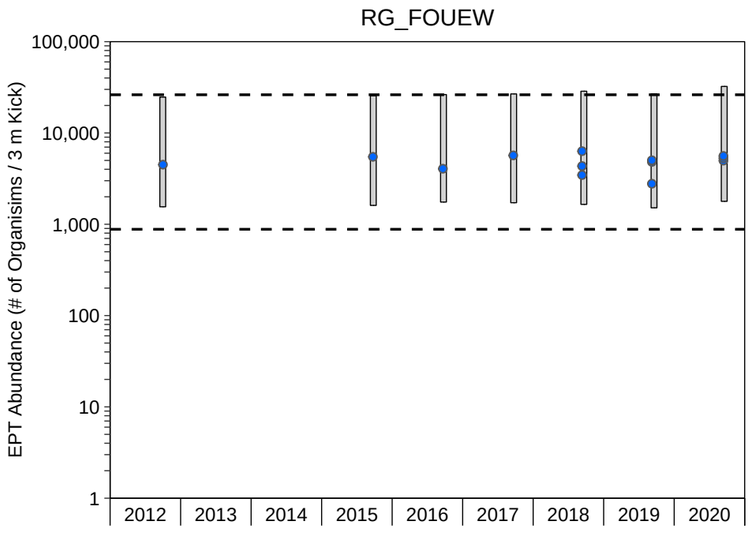


Figure E.23: Benthic Invertebrate EPT Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.23: Benthic Invertebrate EPT Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

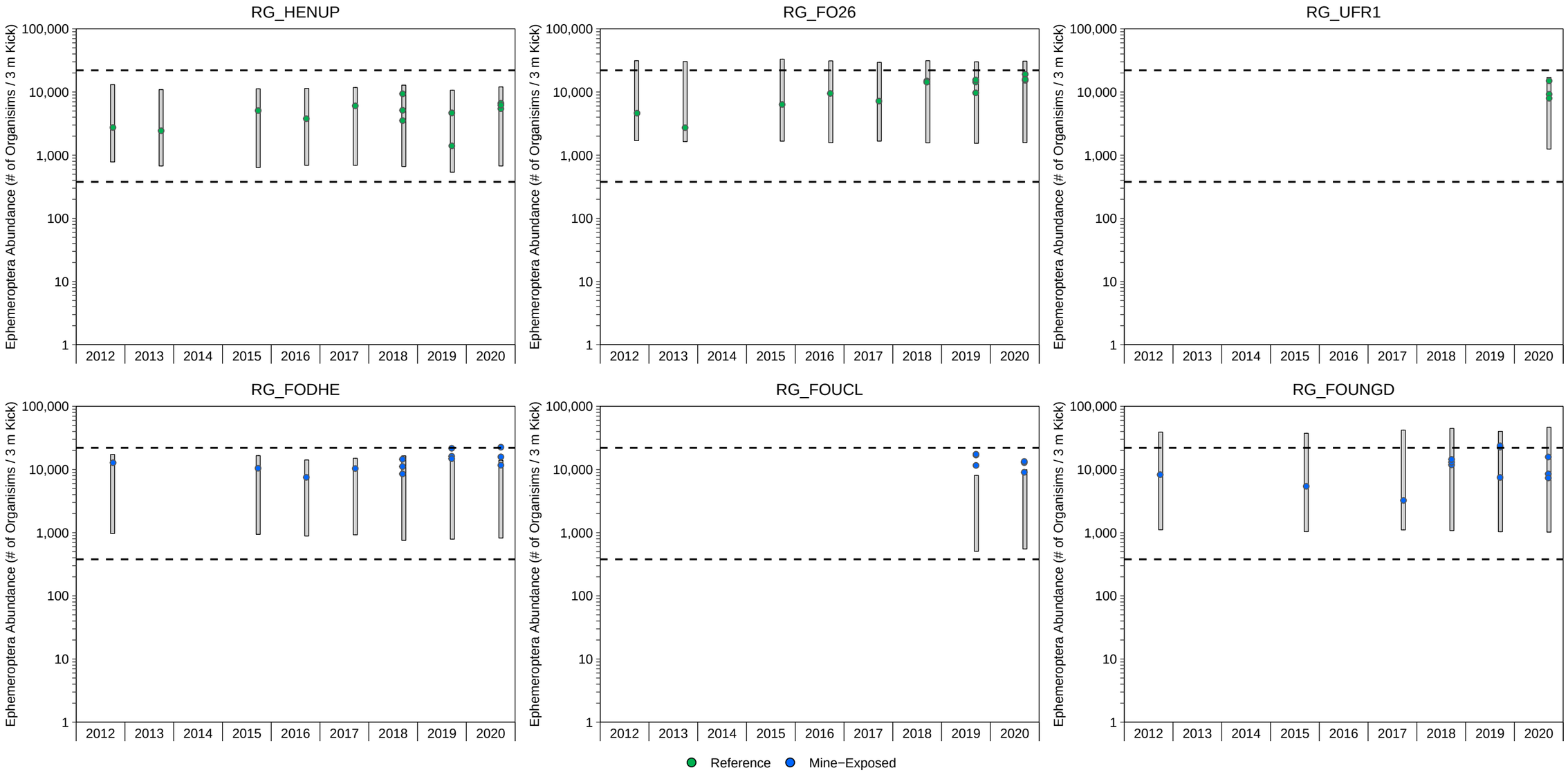


Figure E.24: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

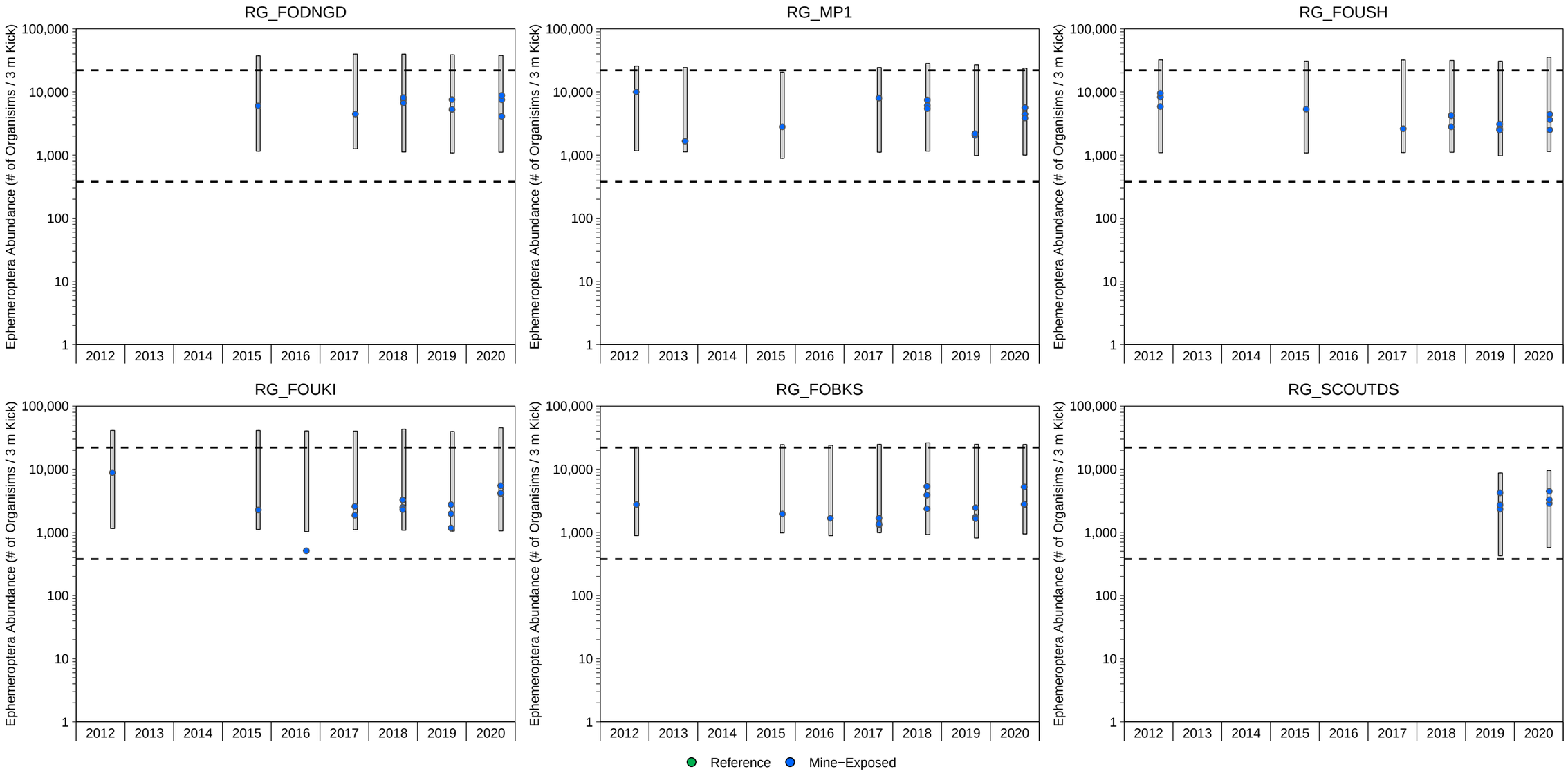


Figure E.24: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

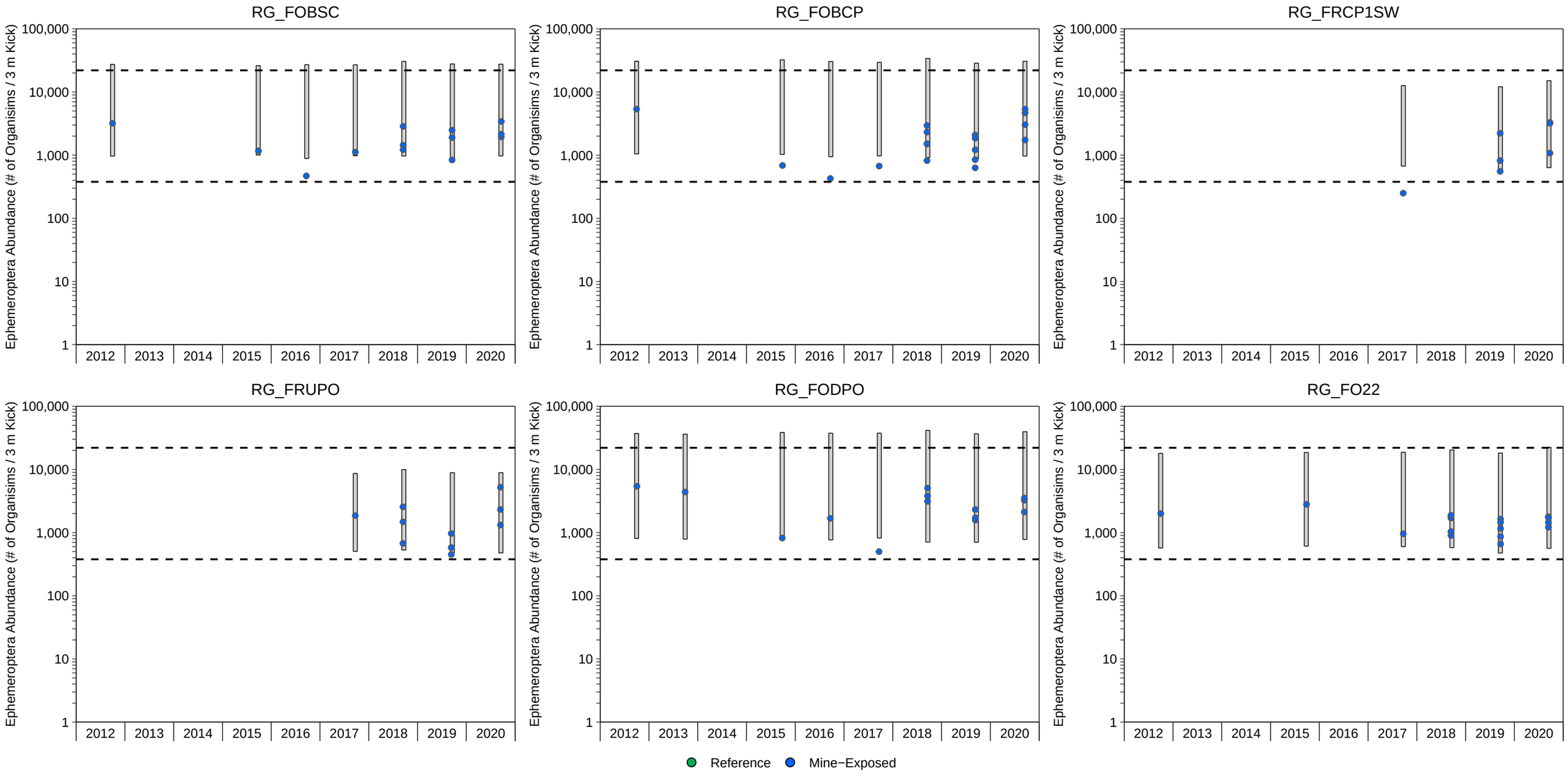
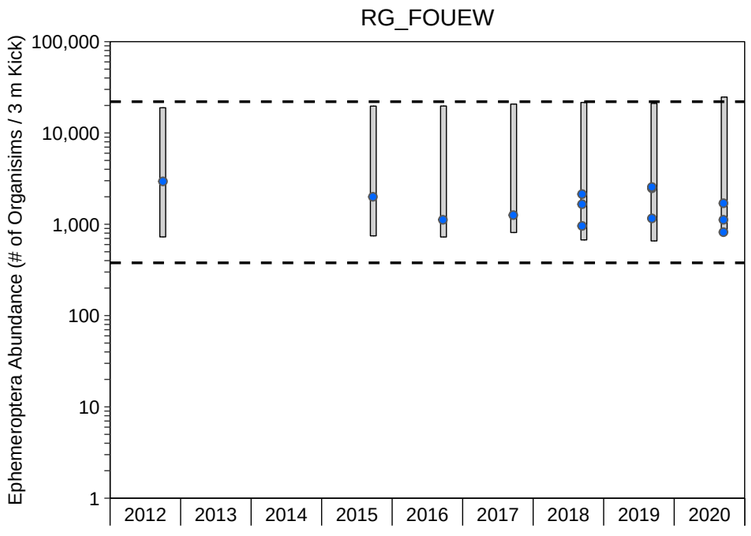


Figure E.24: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.24: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, September 2020

Notes: Site specific normal ranges developed using regression models for the RAEMP (Minnow 2020a) are shown, when applicable, with grey shading (Minnow 2020a). Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

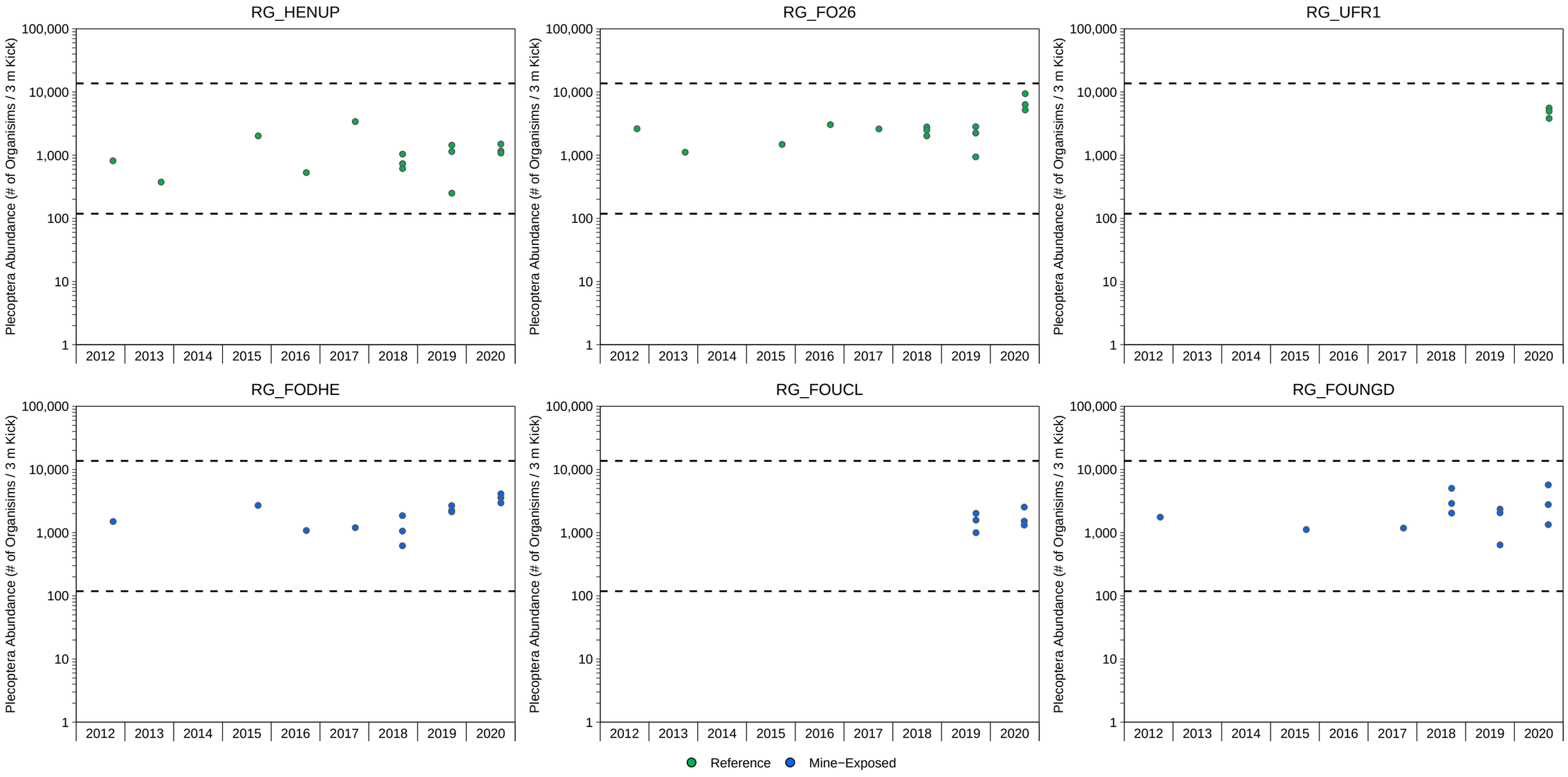


Figure E.25: Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

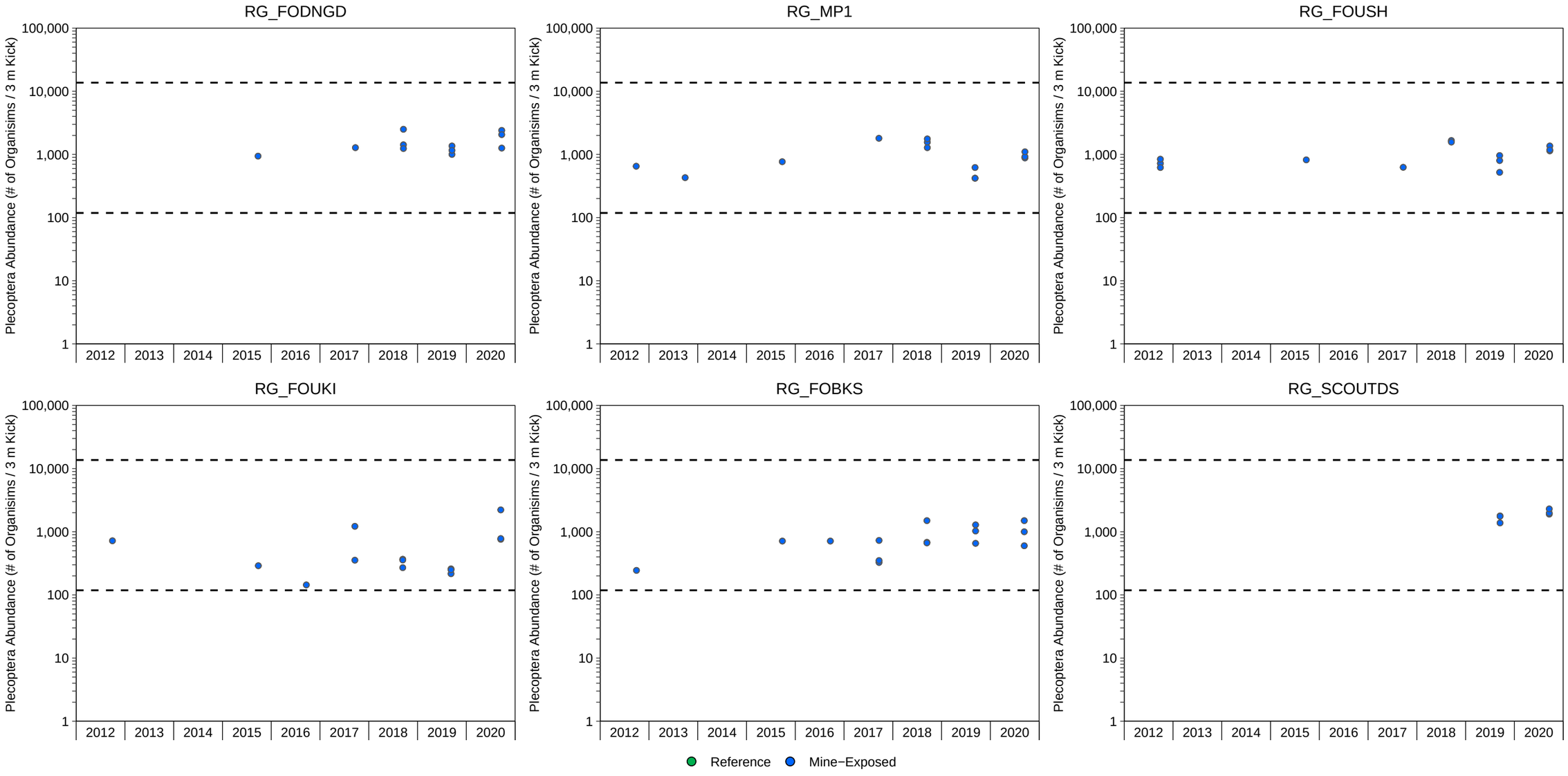


Figure E.25: Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

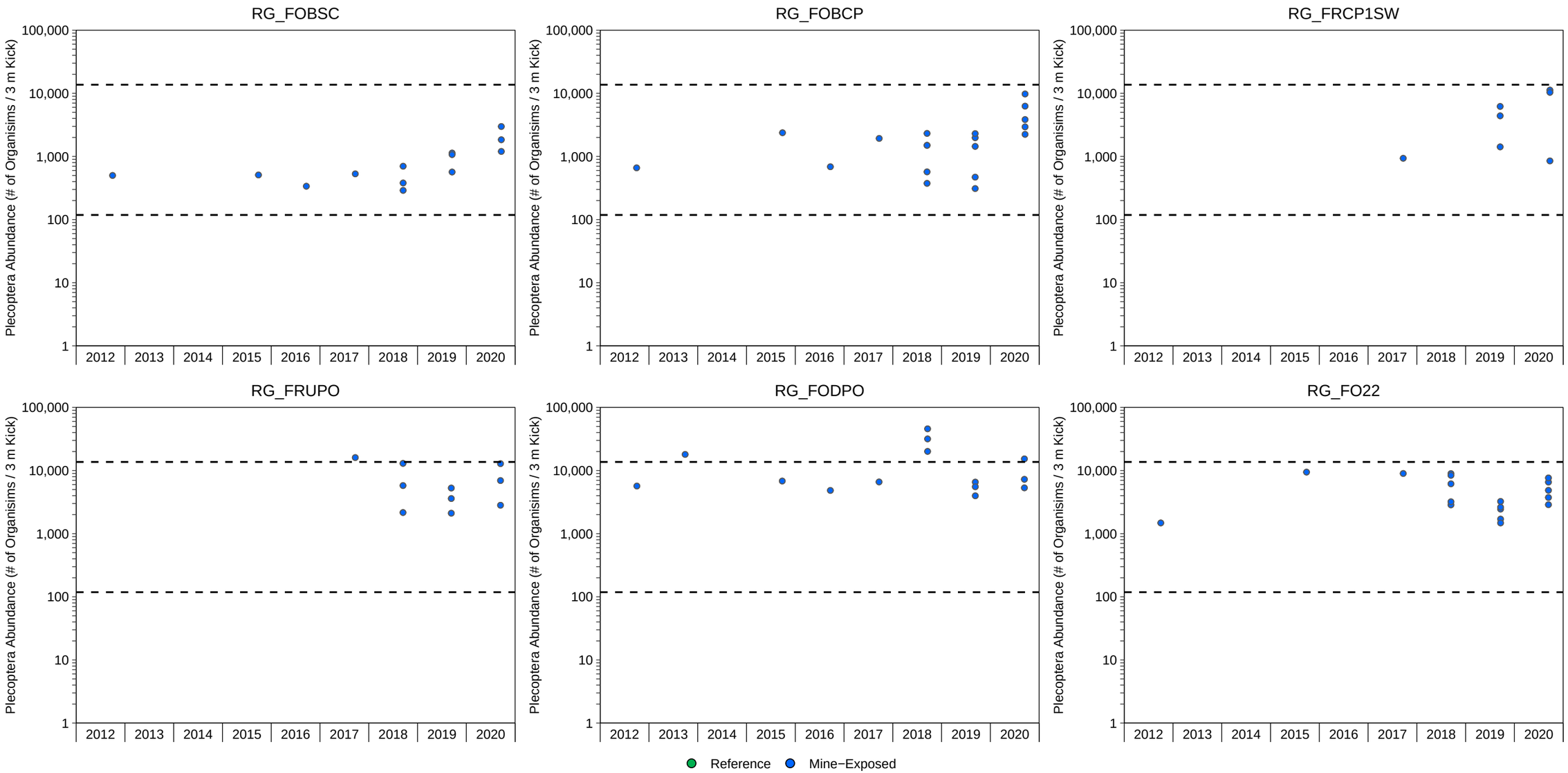
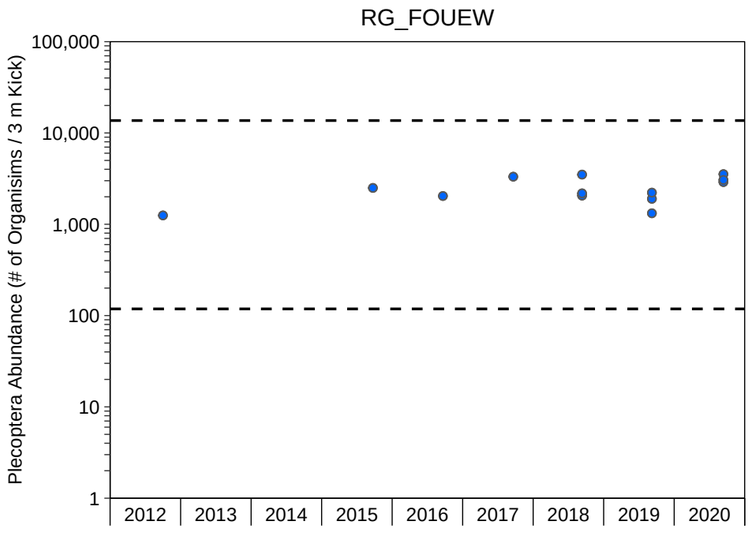


Figure E.25: Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.25: Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

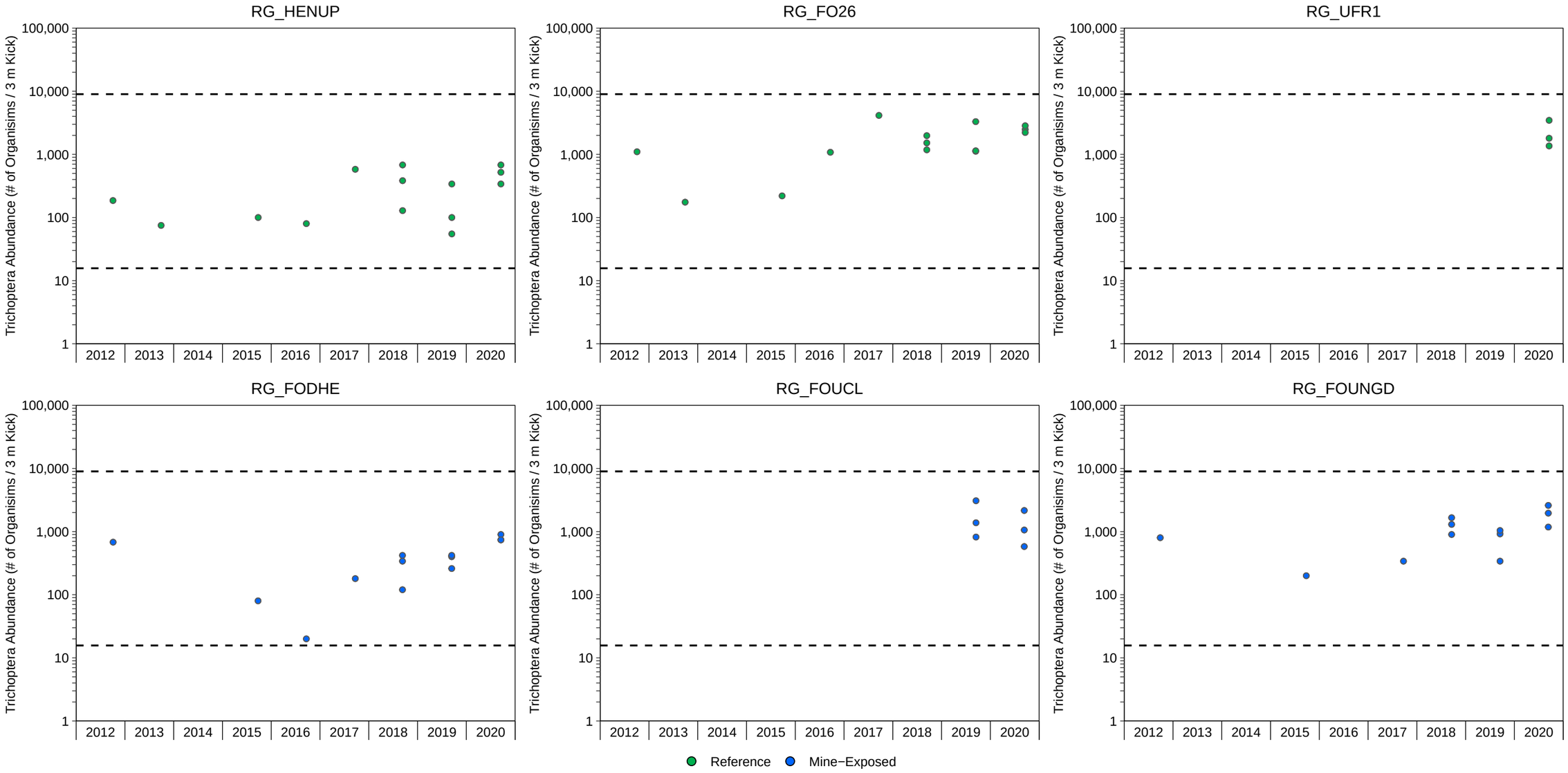


Figure E.26: Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

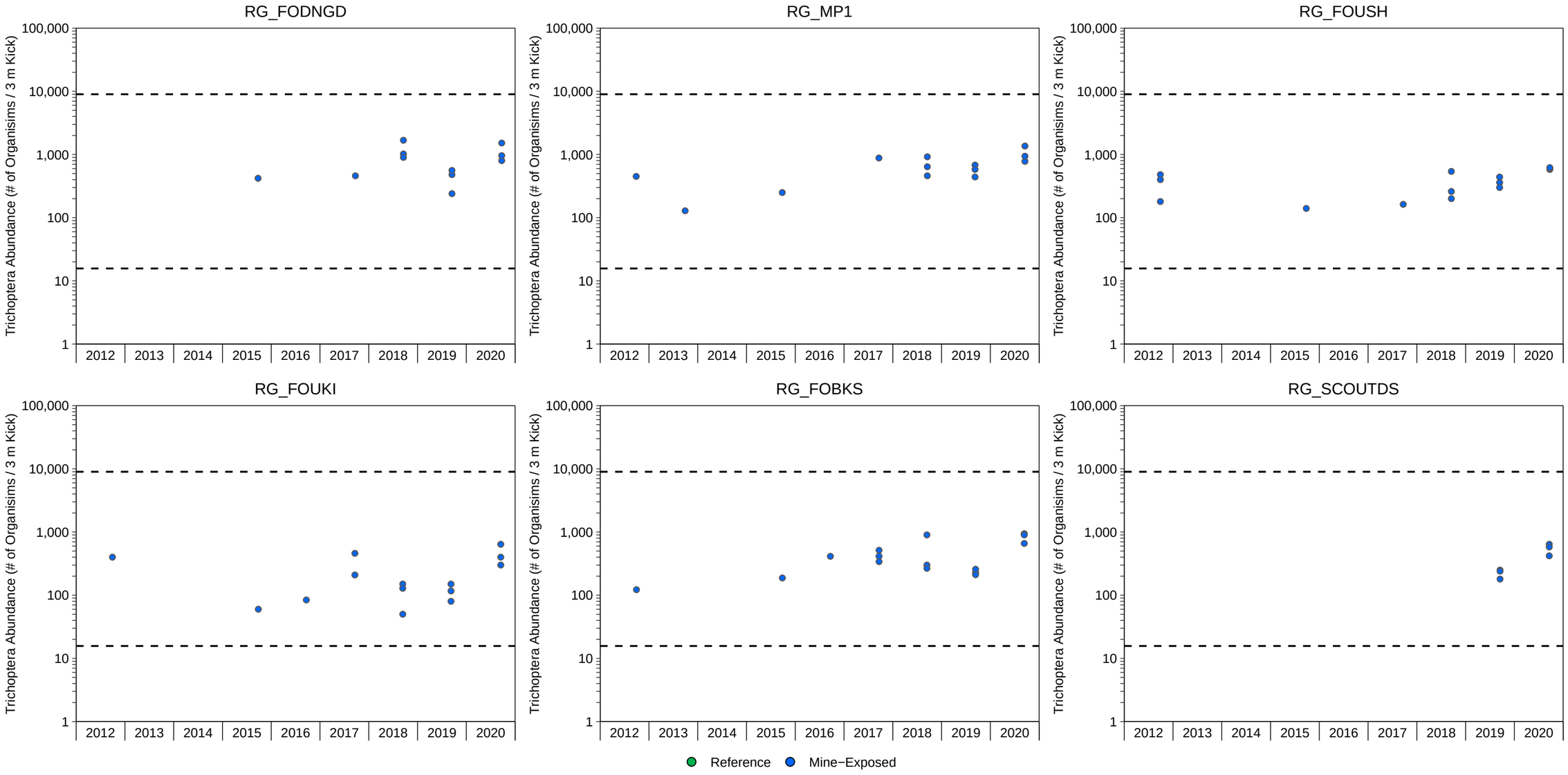


Figure E.26: Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

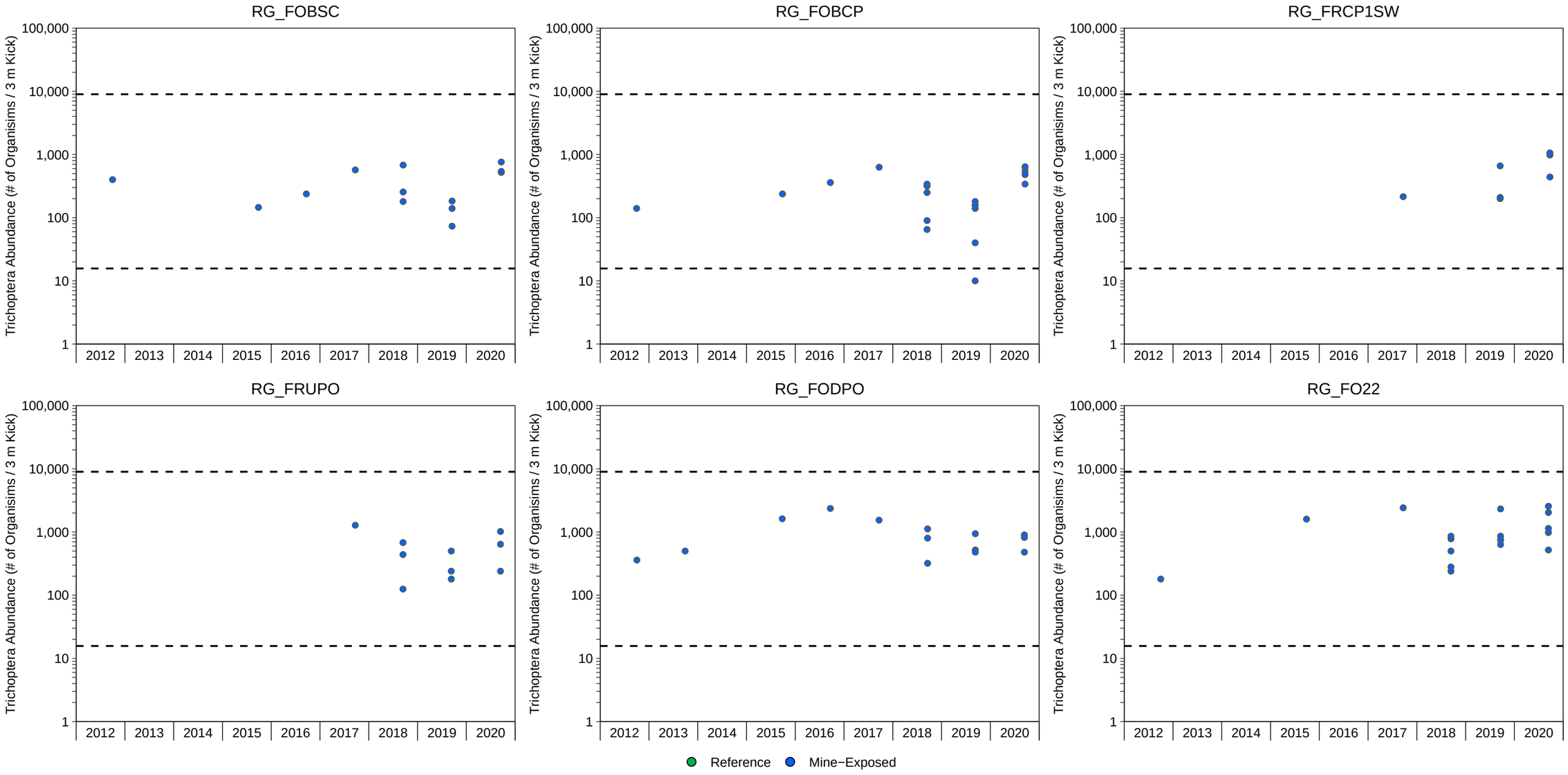
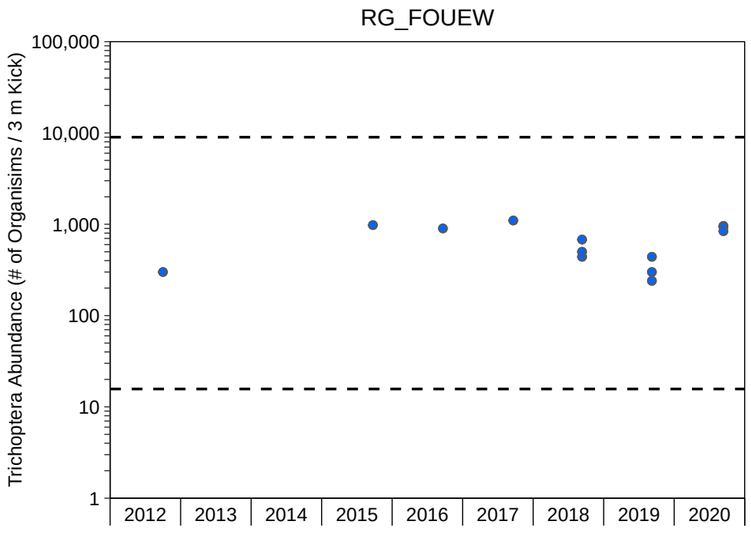


Figure E.26: Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.26: Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

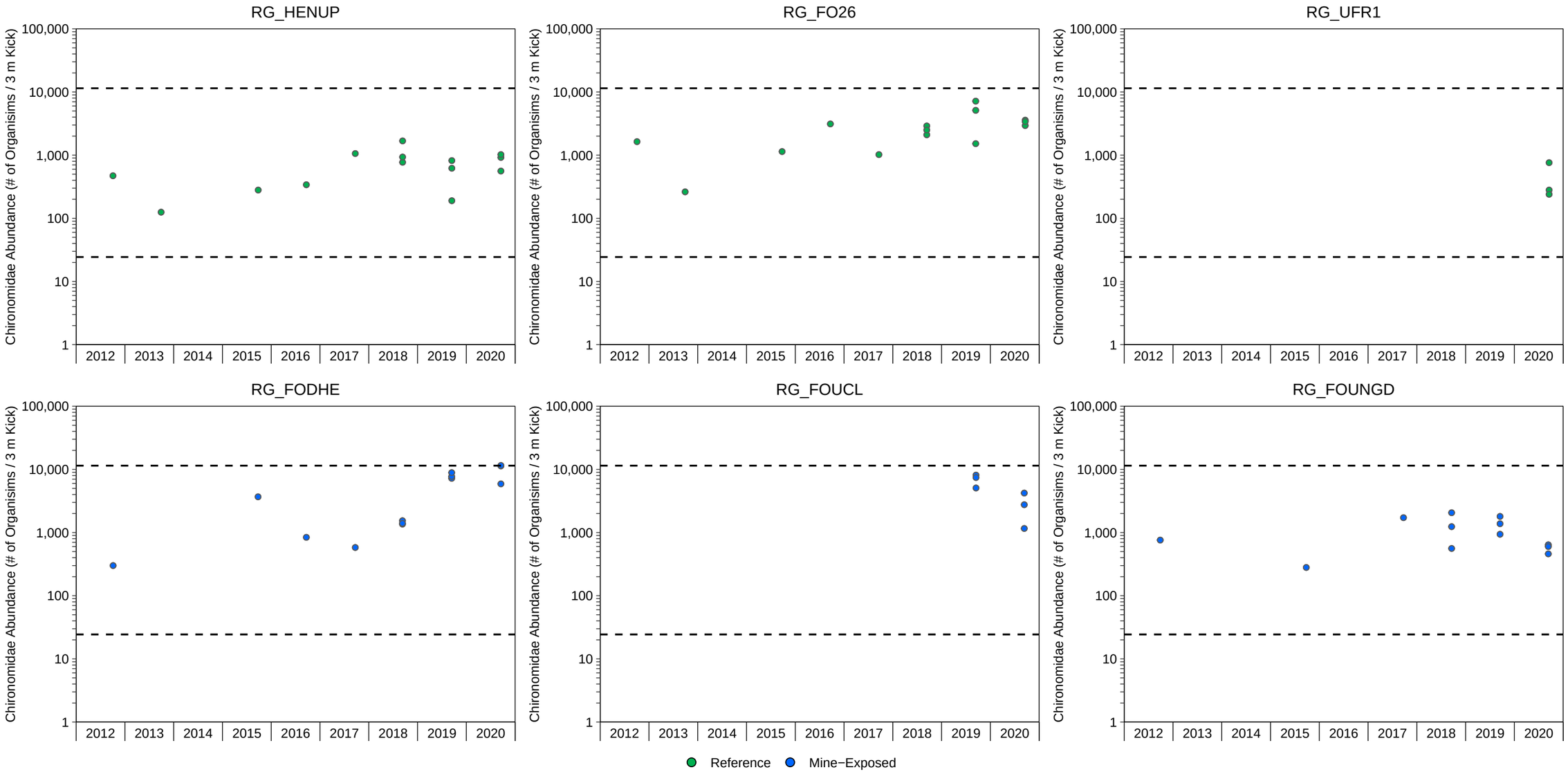


Figure E.27: Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

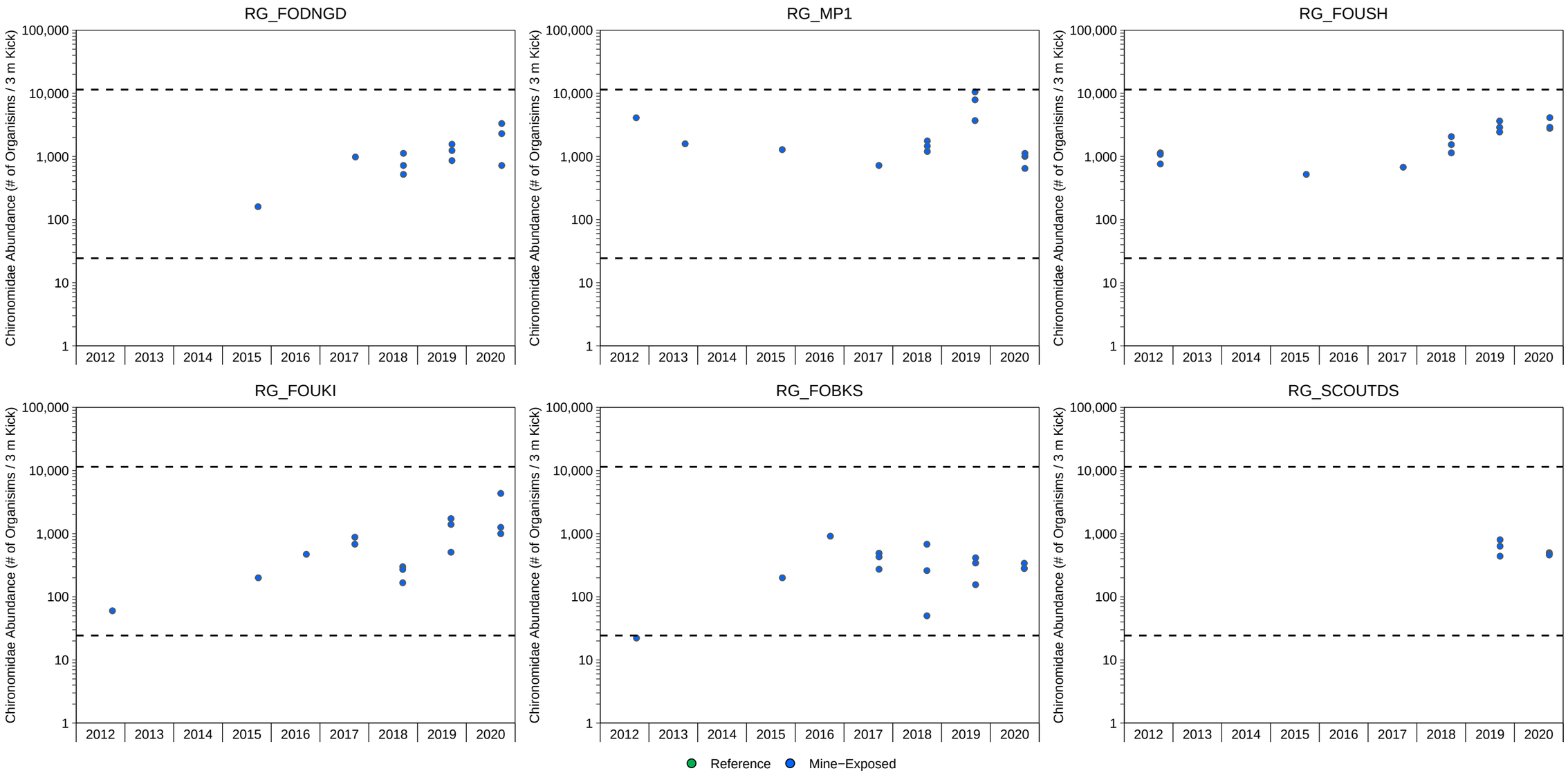


Figure E.27: Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

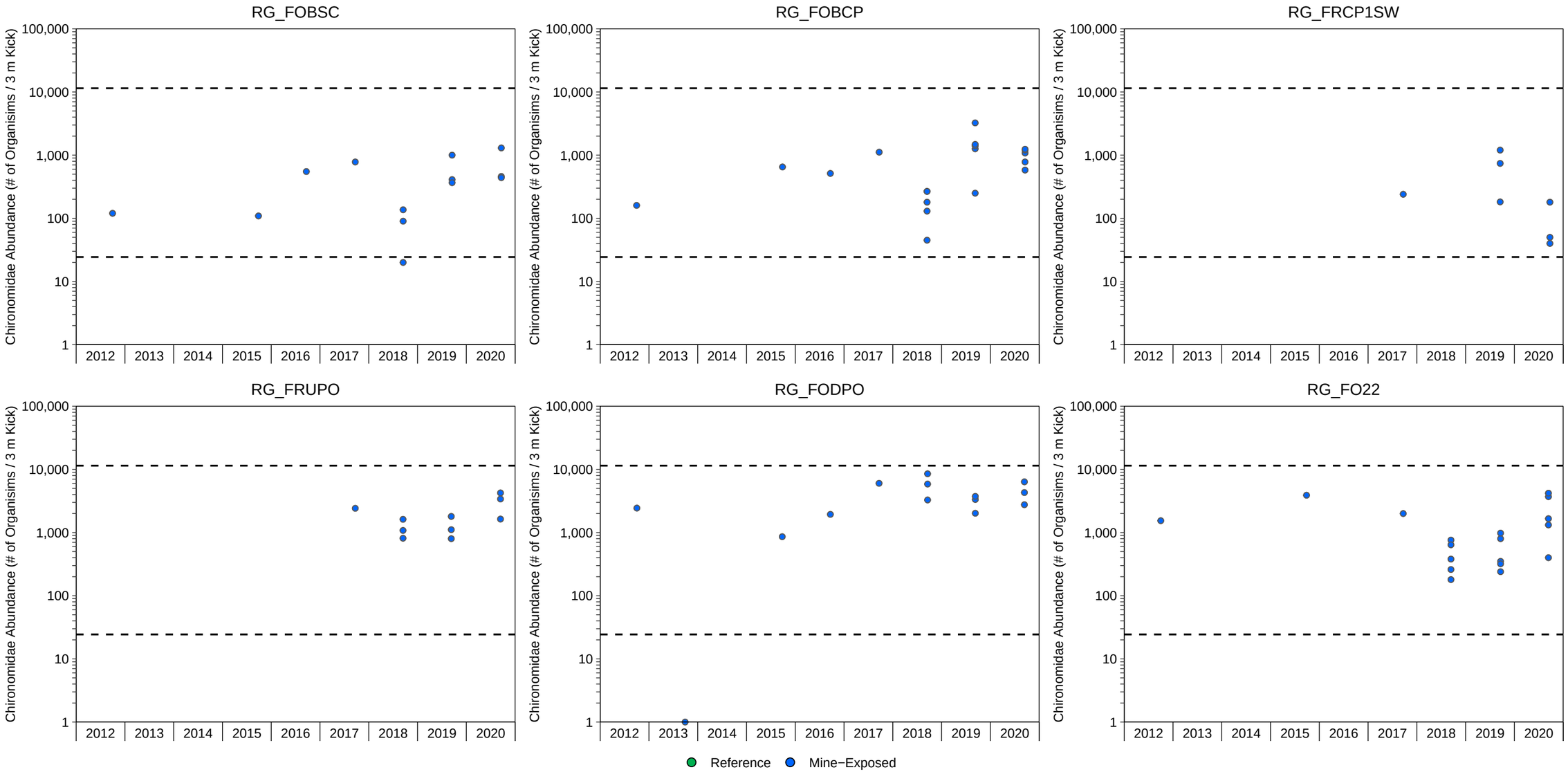
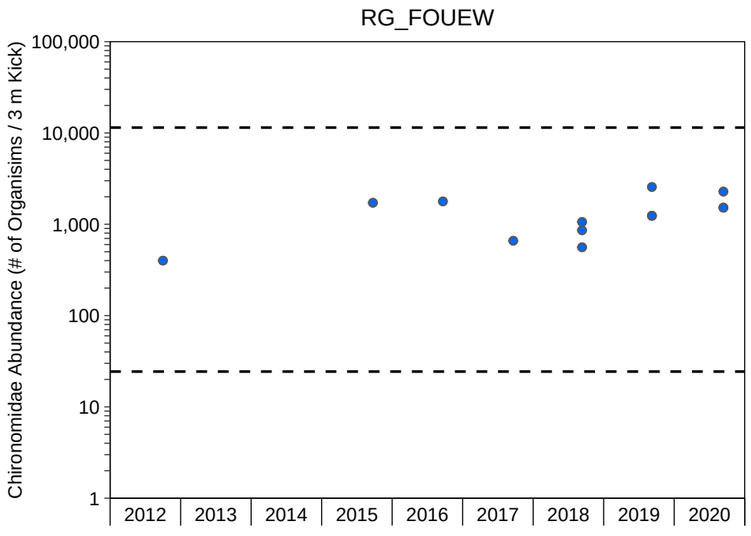


Figure E.27: Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.27: Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

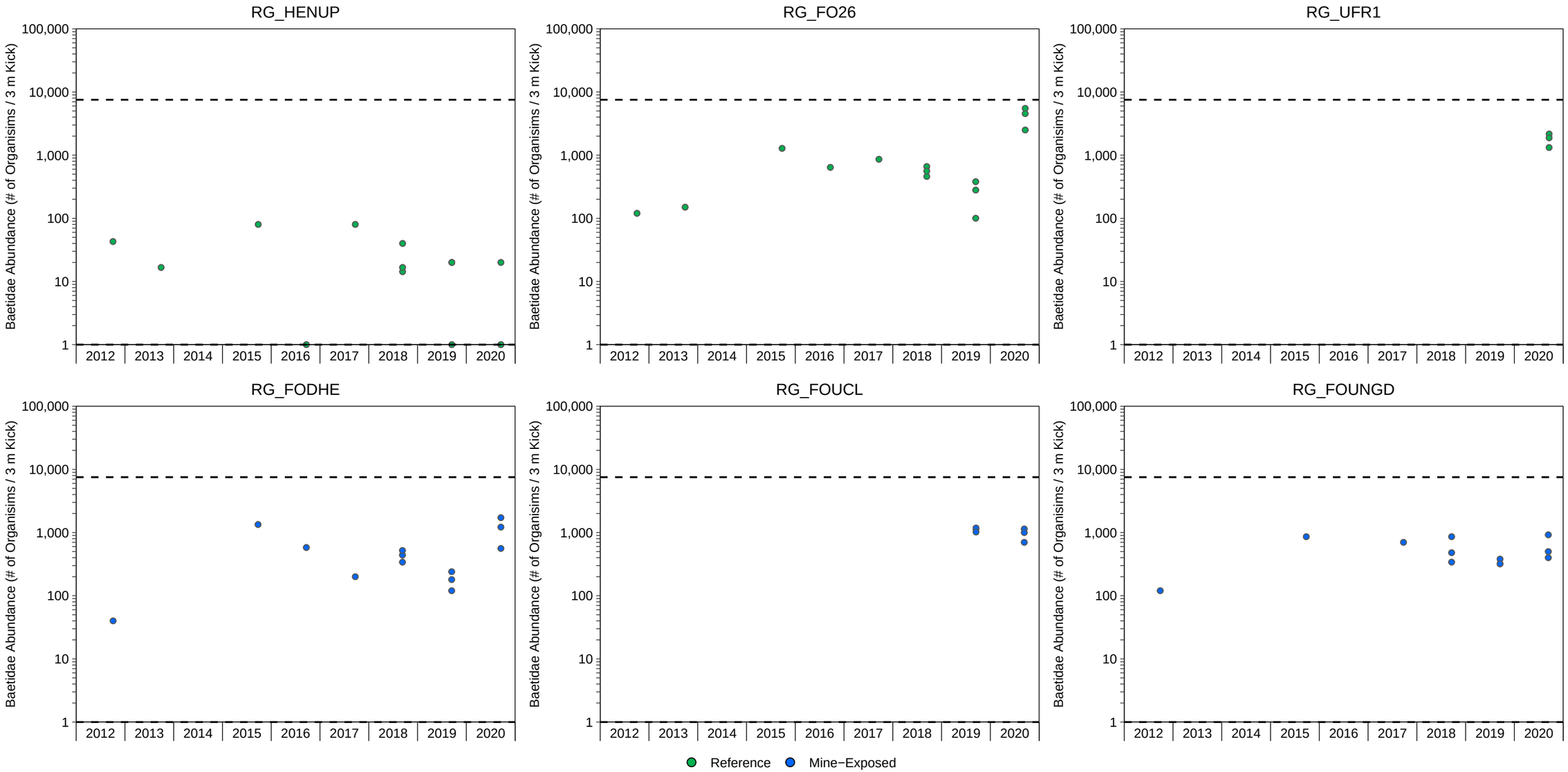


Figure E.28: Benthic Invertebrate Baetidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

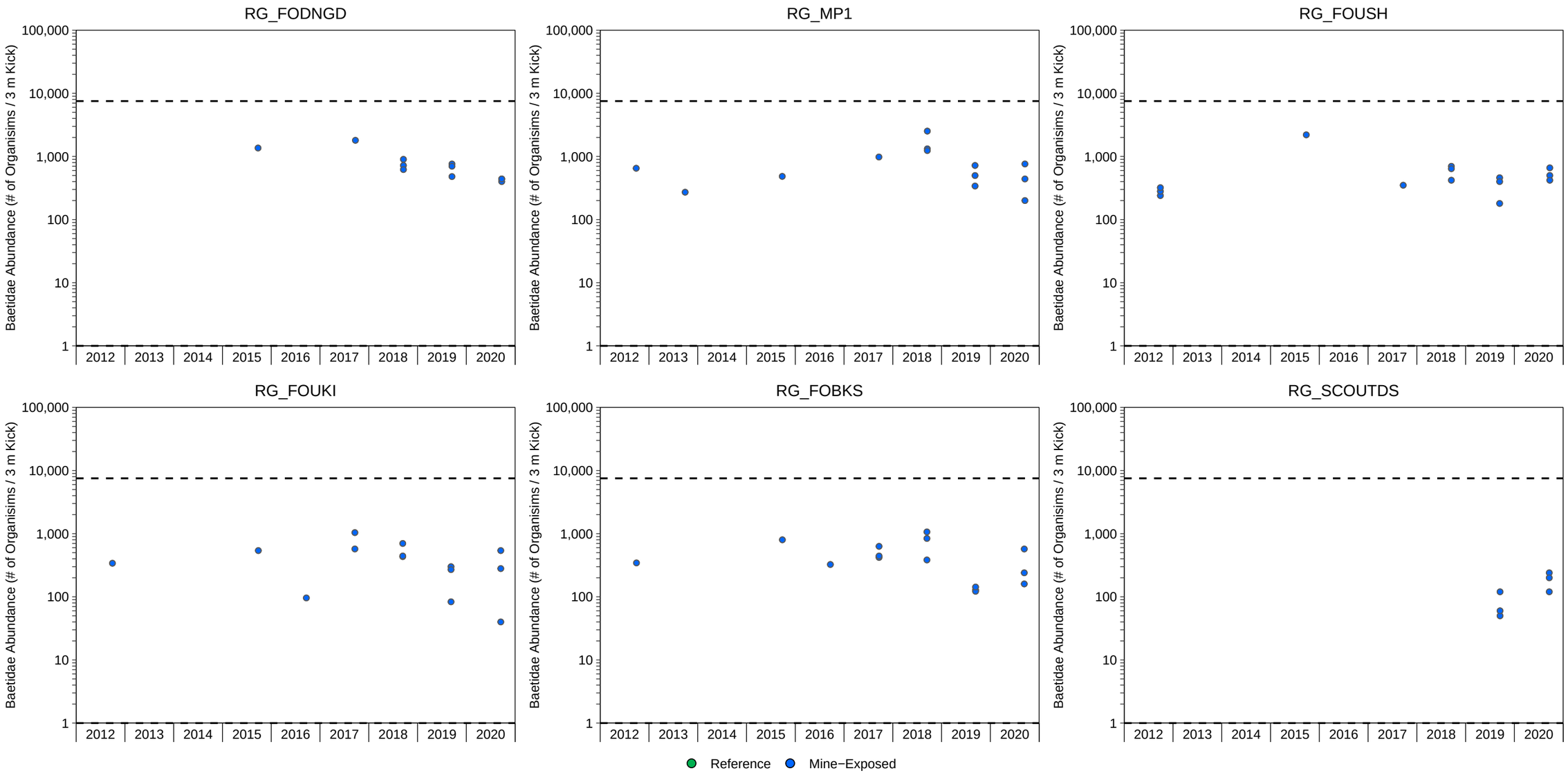


Figure E.28: Benthic Invertebrate Baetidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

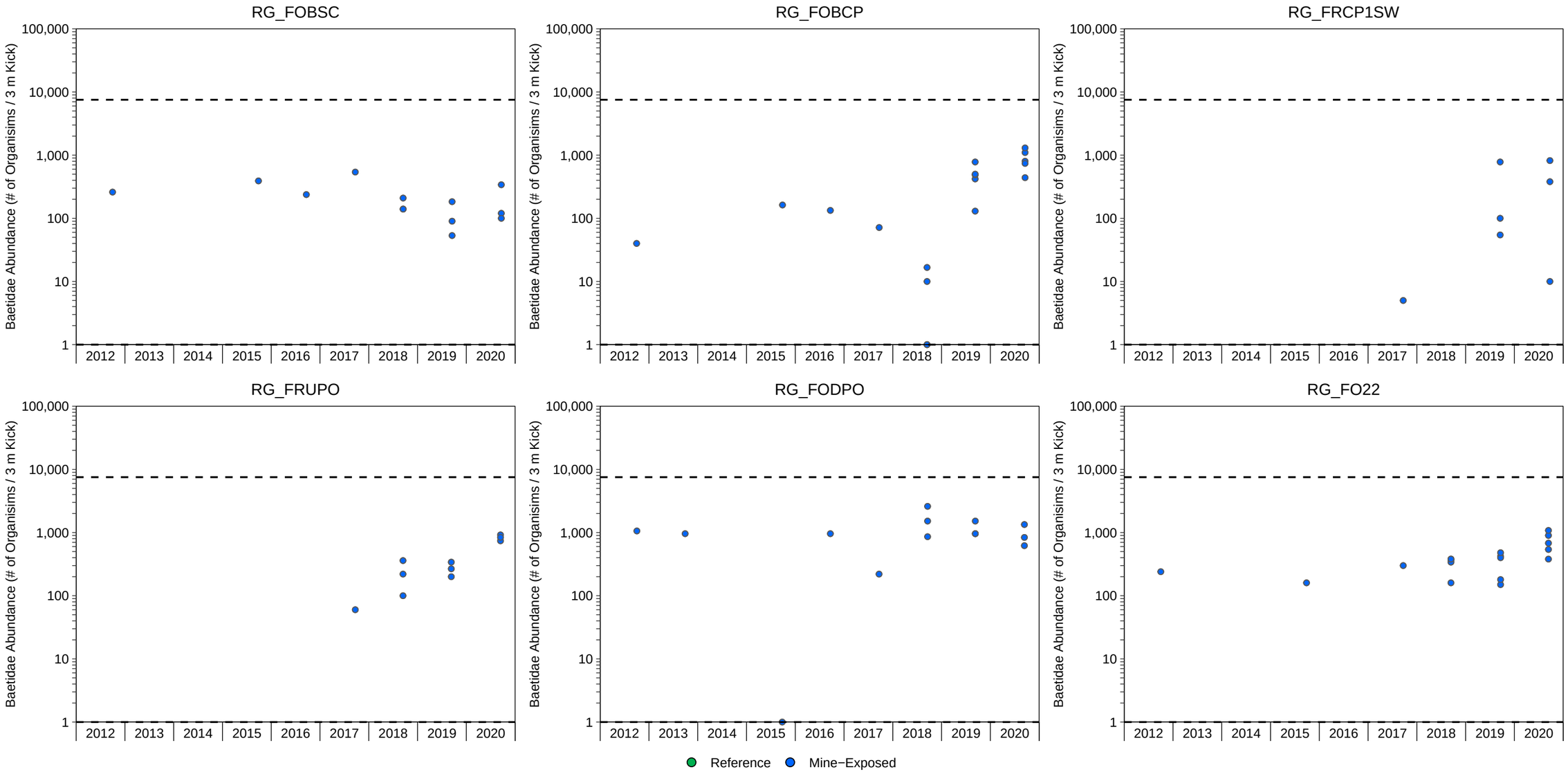
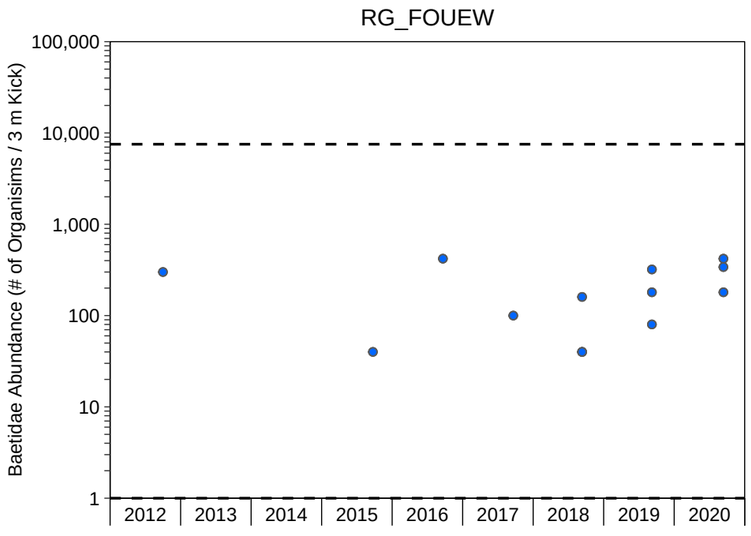


Figure E.28: Benthic Invertebrate Baetidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.28: Benthic Invertebrate Baetidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

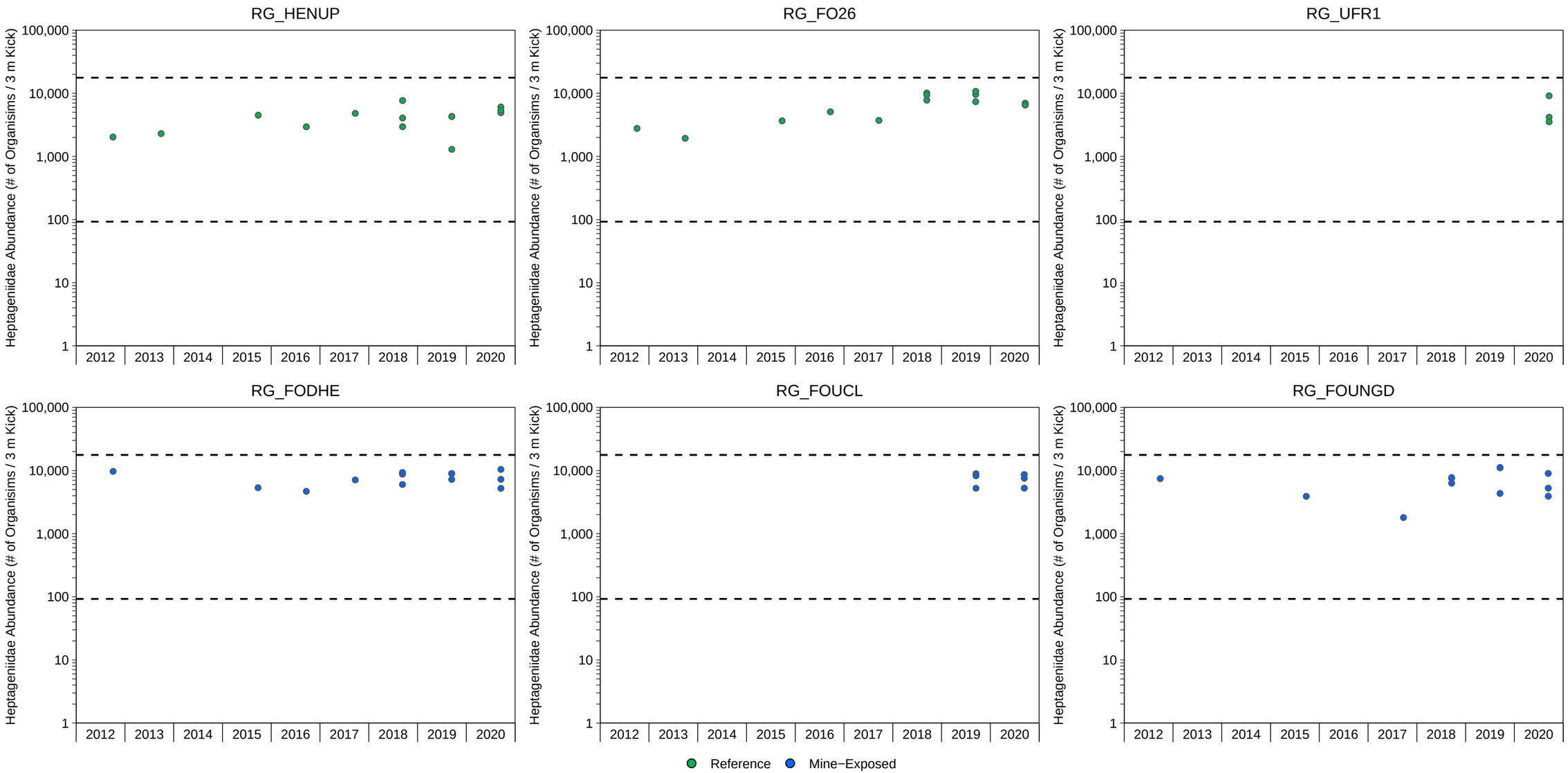


Figure E.29: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

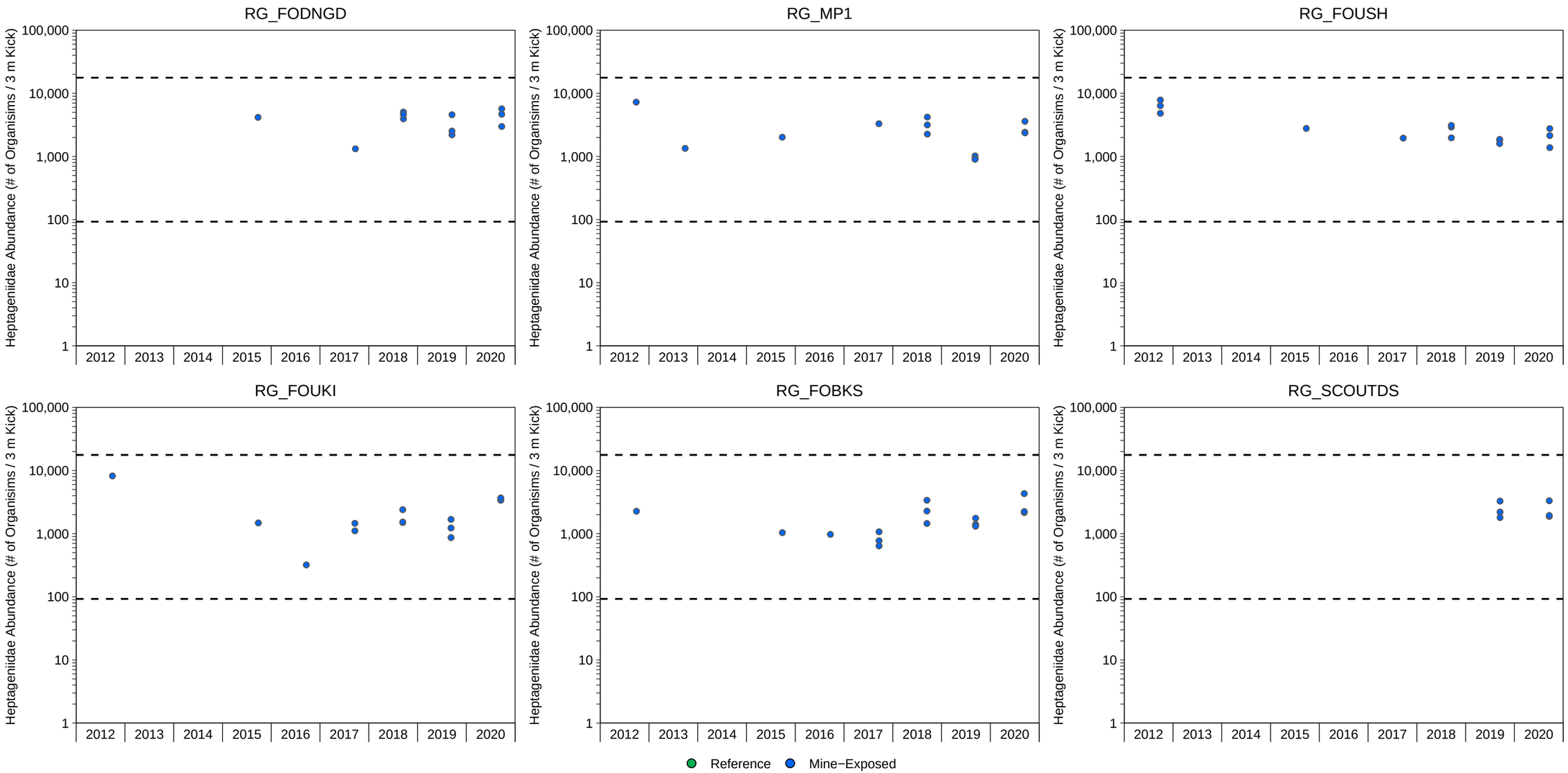


Figure E.29: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

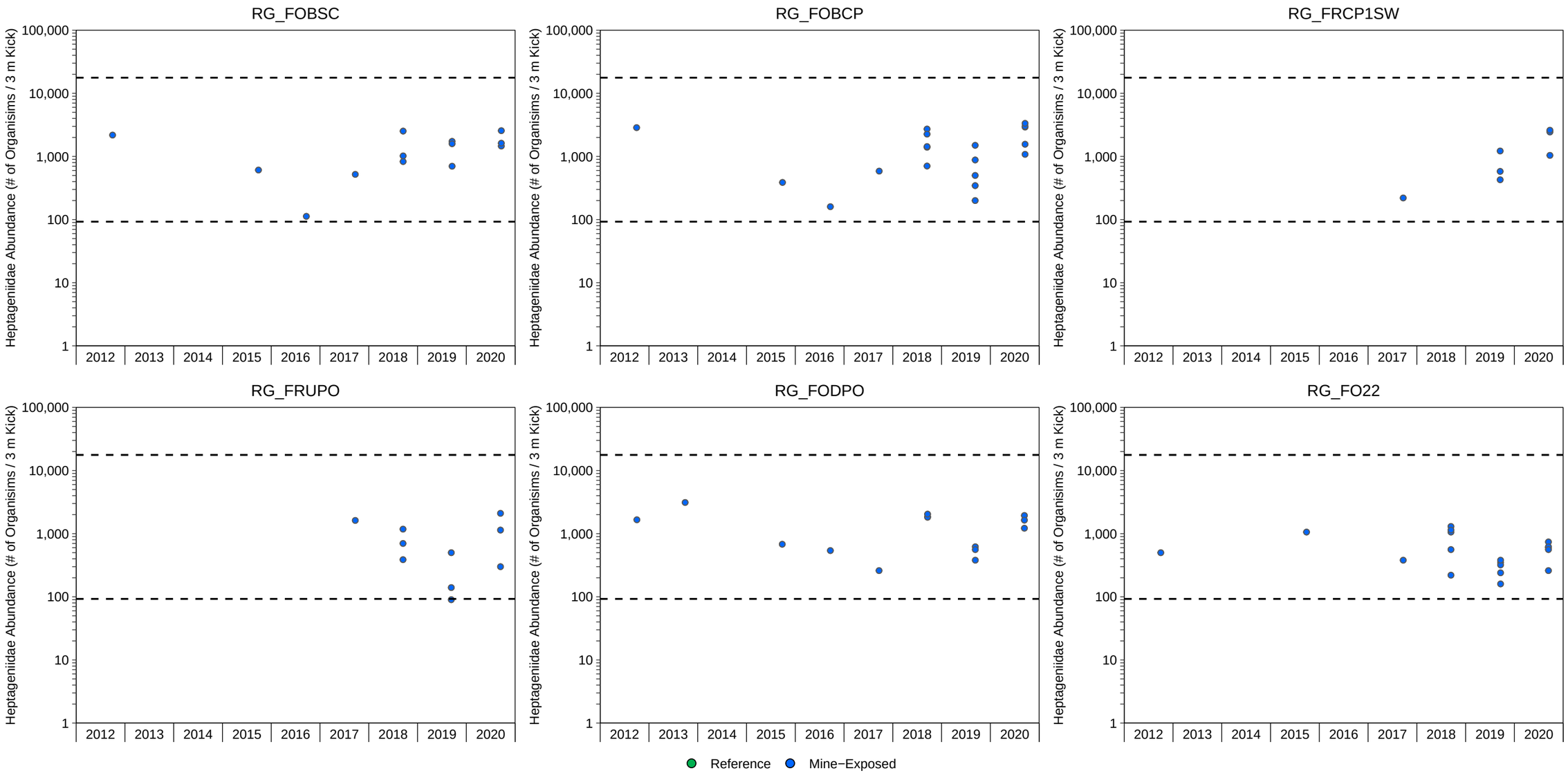


Figure E.29: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

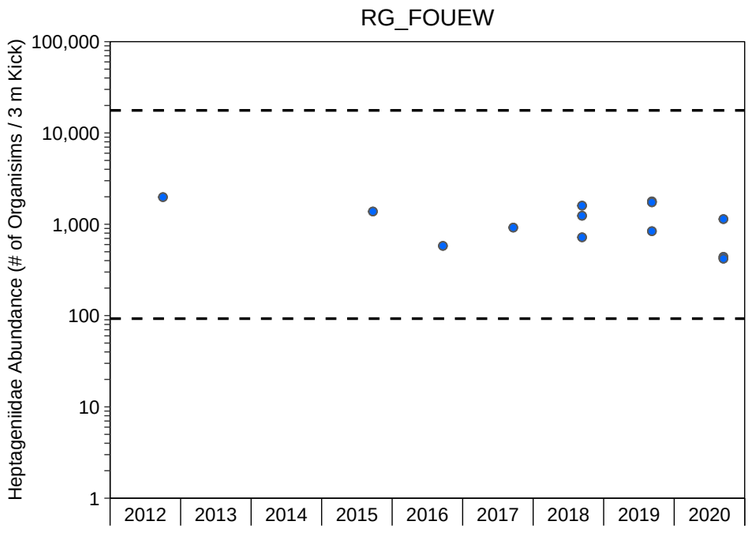


Figure E.29: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

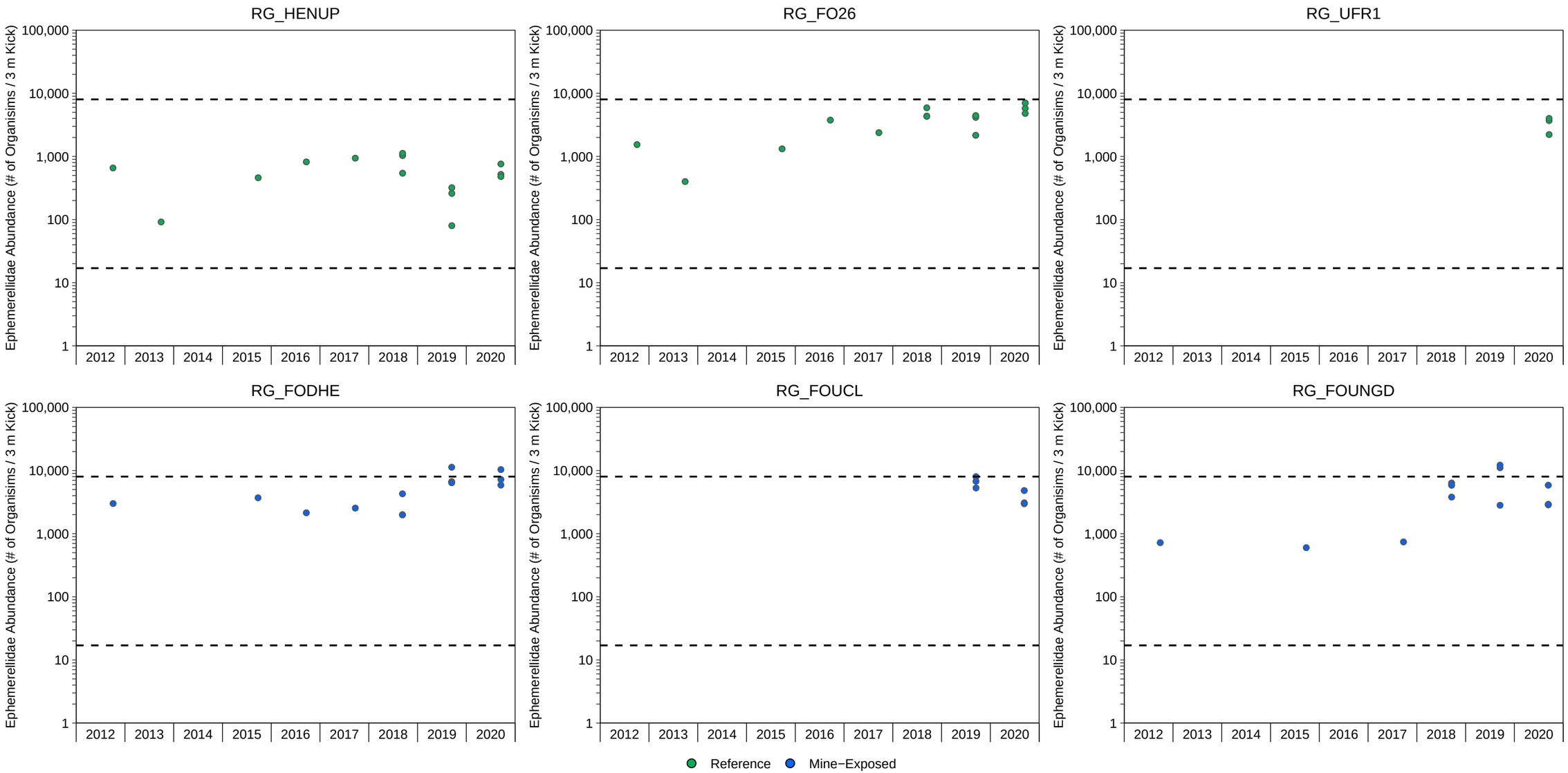


Figure E.30: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

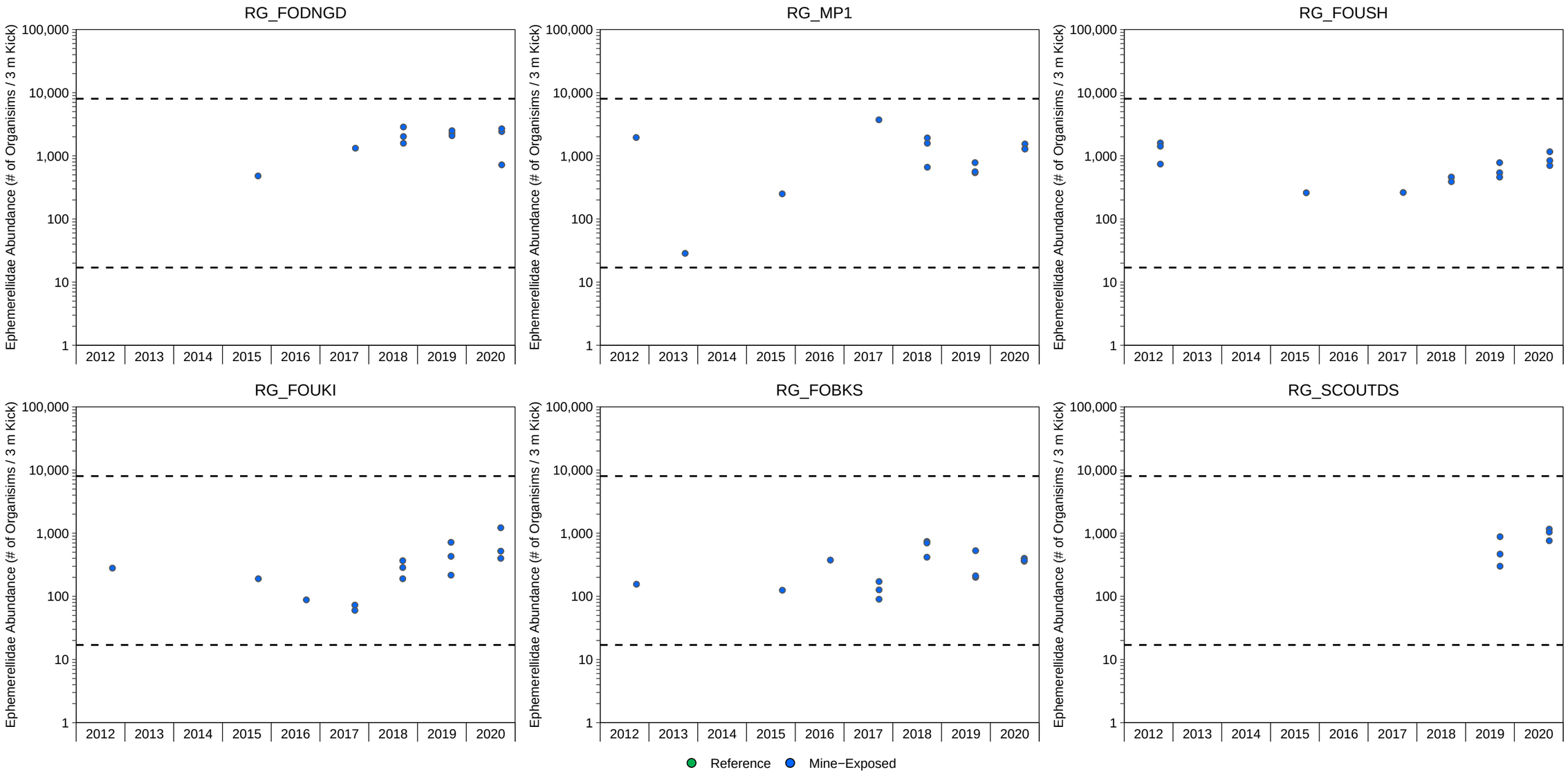


Figure E.30: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

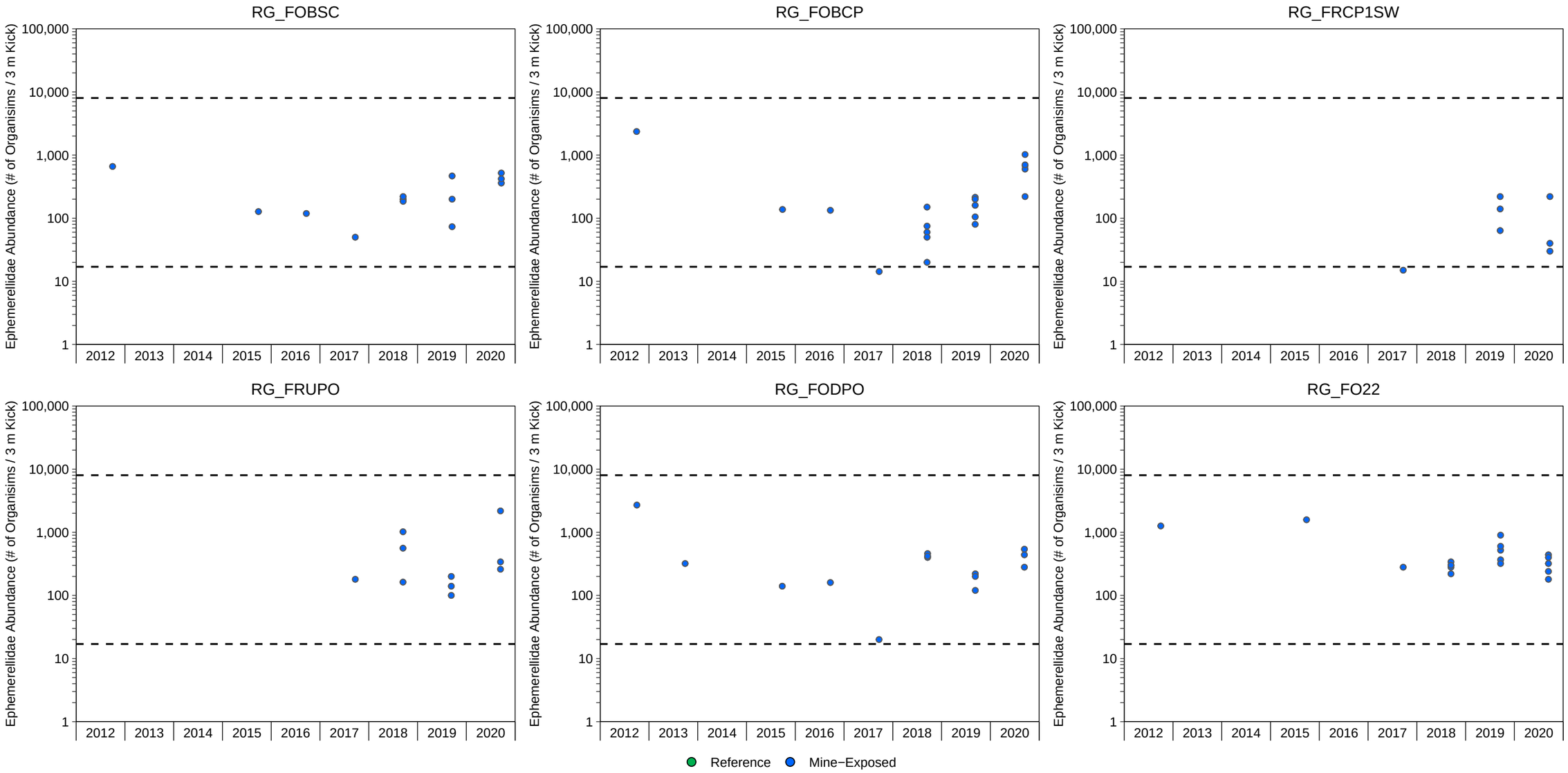
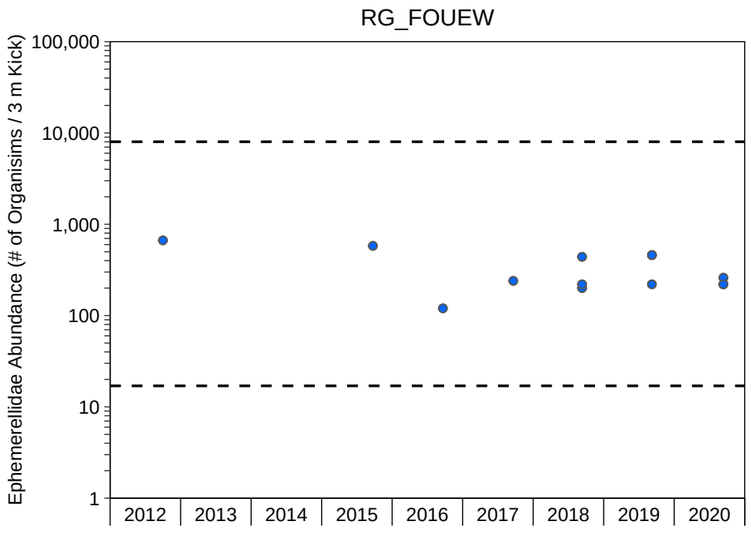


Figure E.30: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.30: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

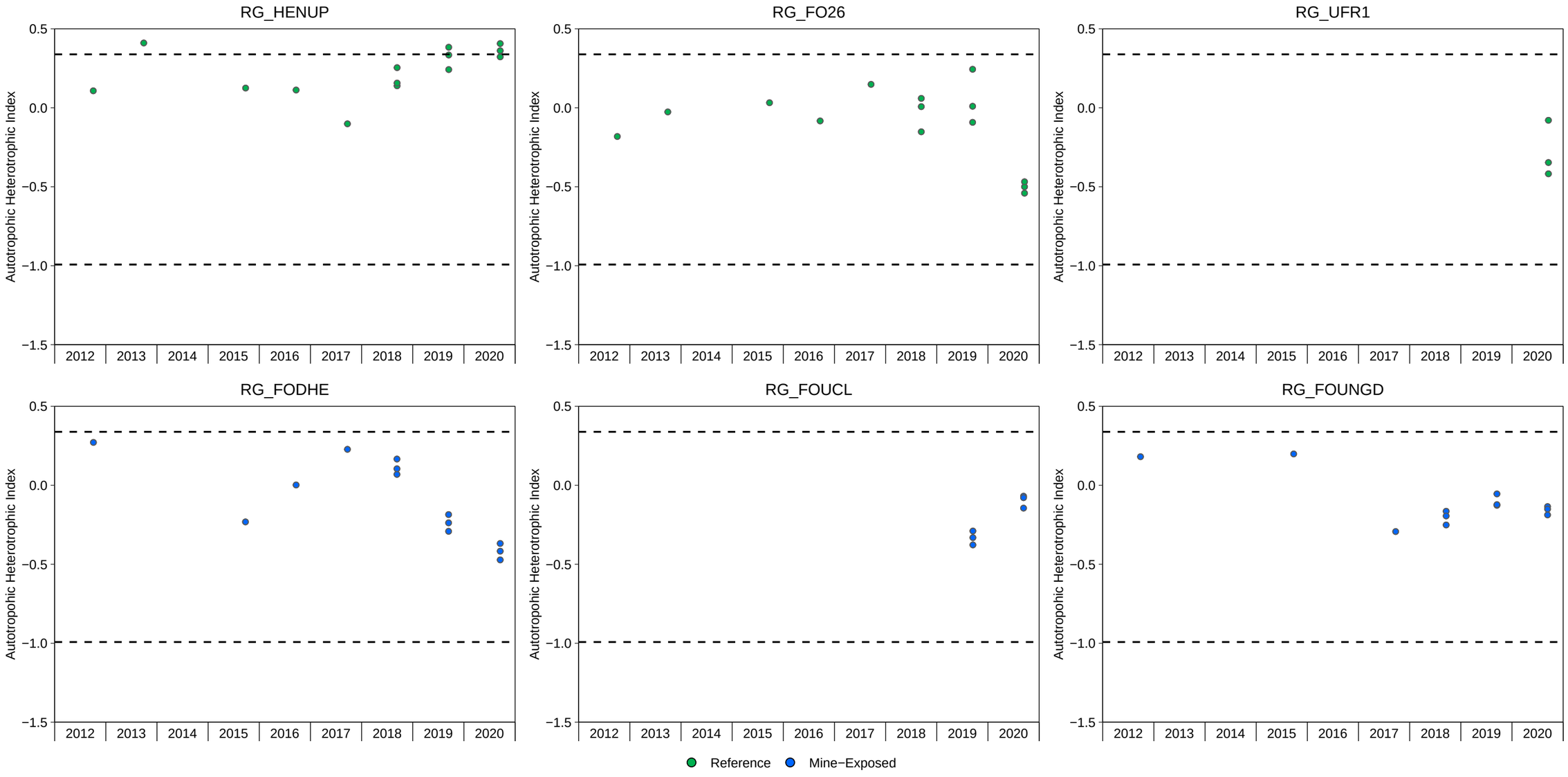


Figure E.31: Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

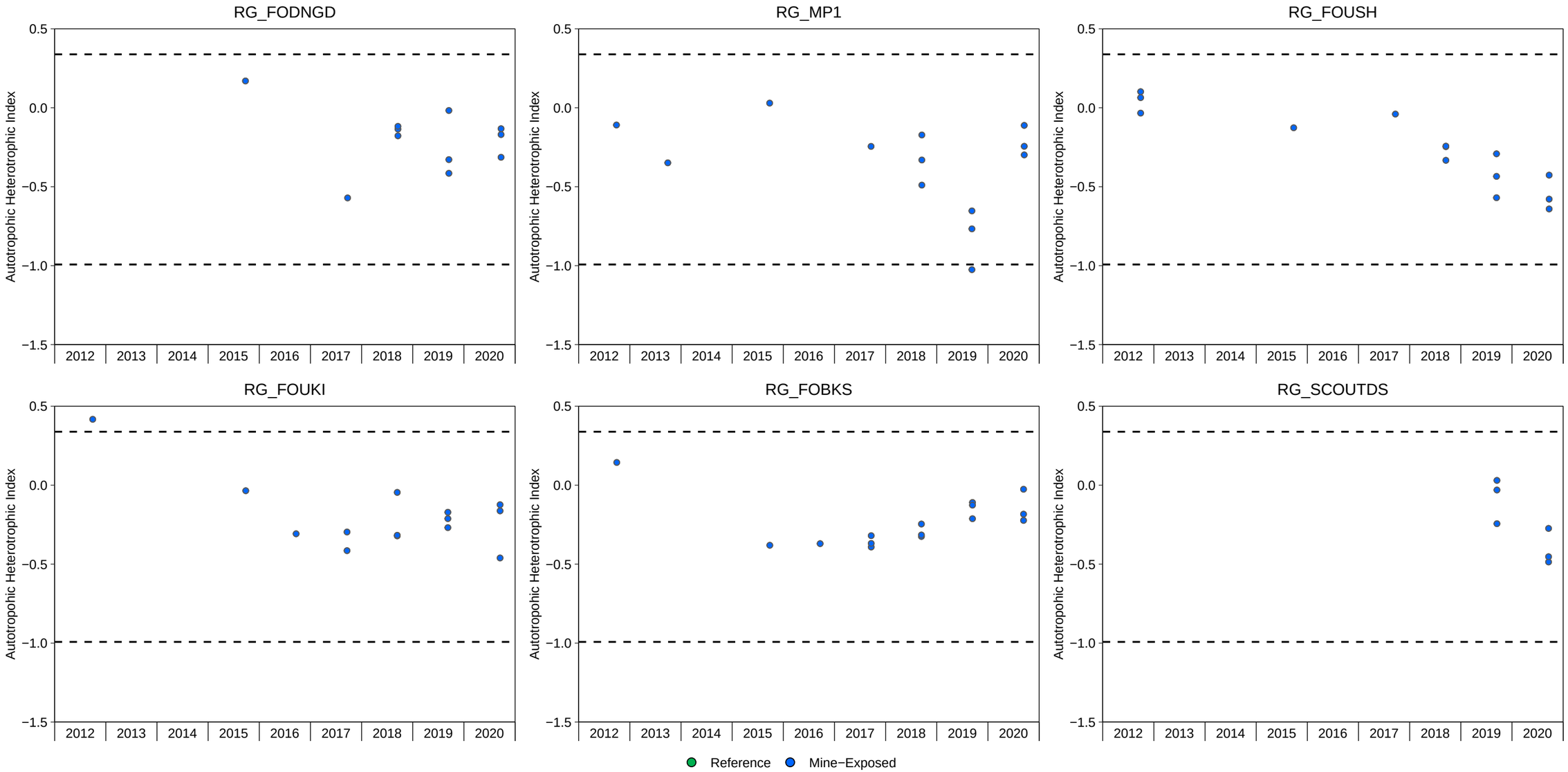


Figure E.31: Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

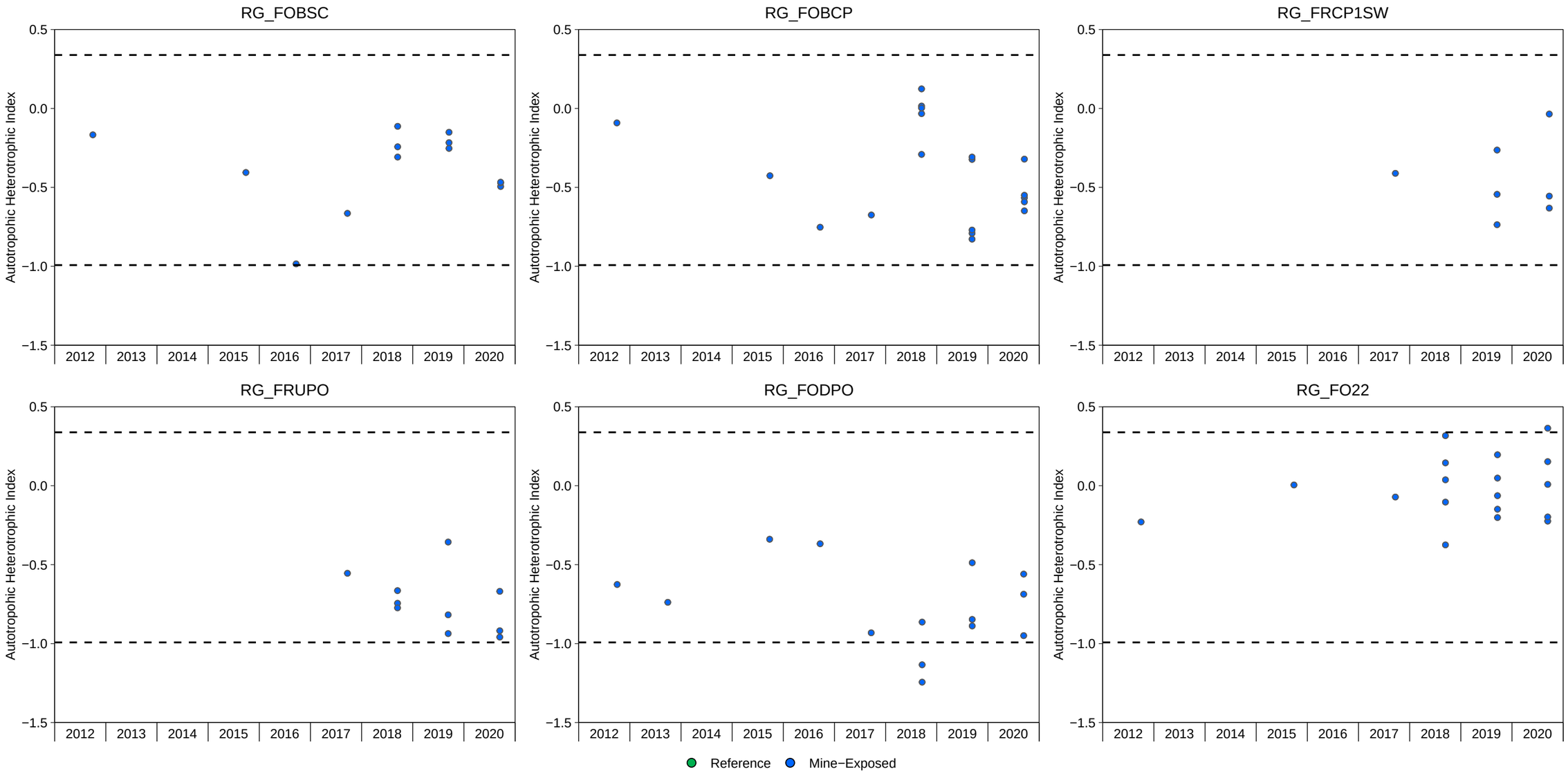
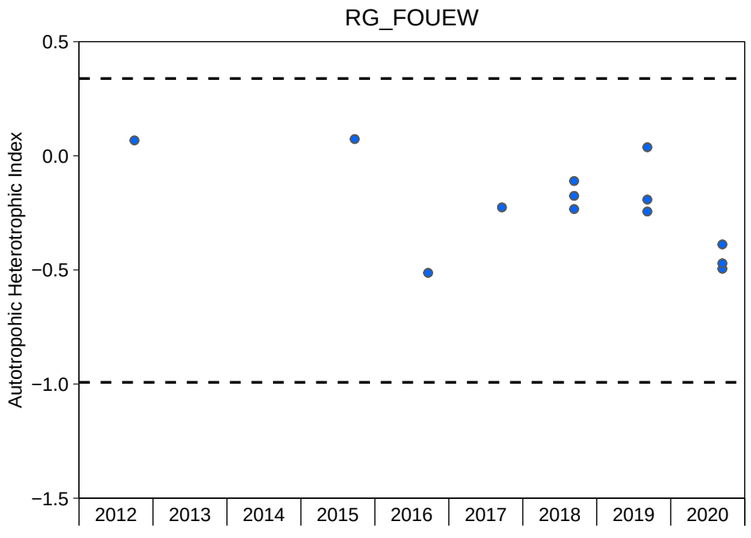


Figure E.31: Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.31: Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

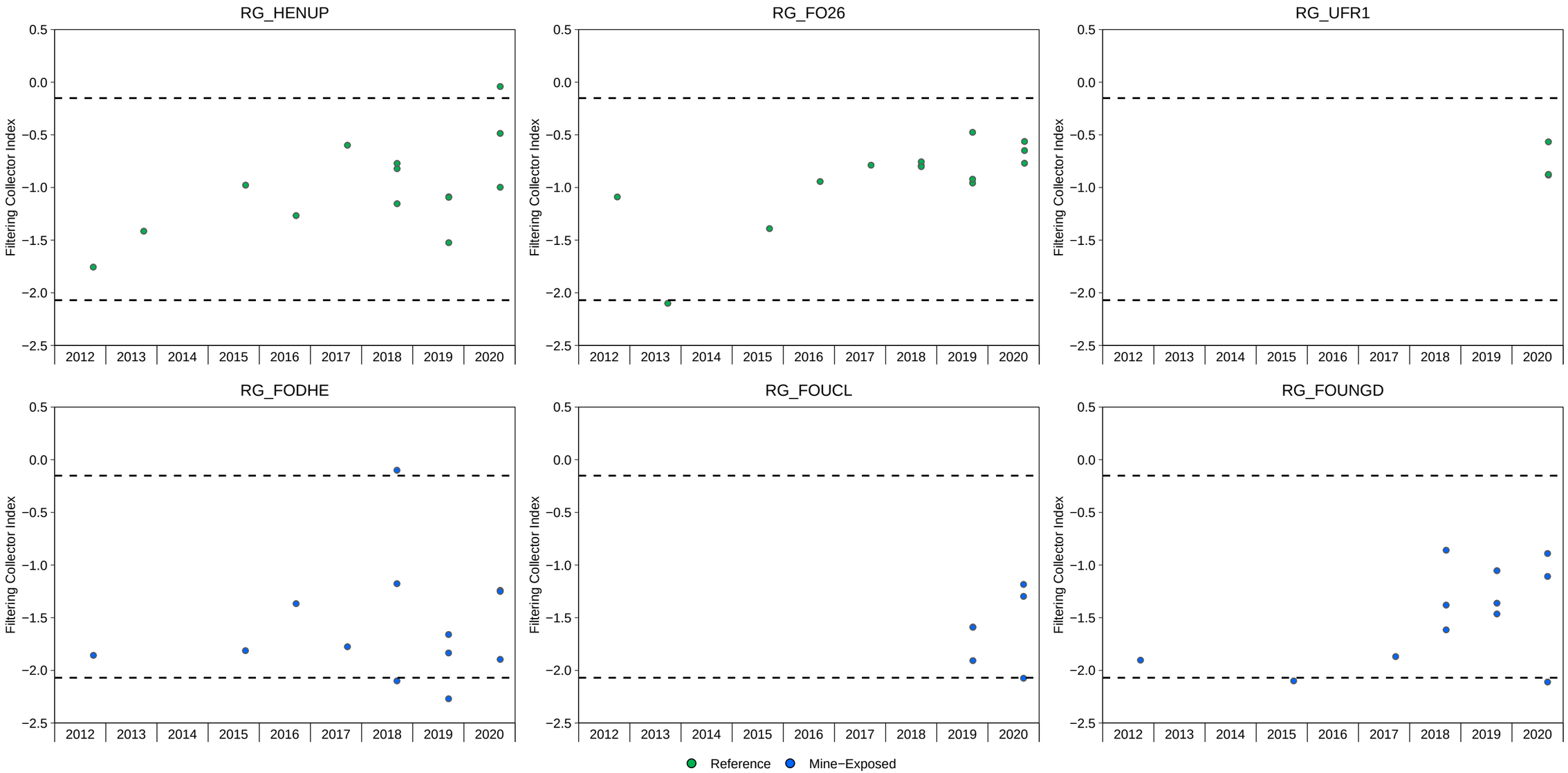


Figure E.32: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

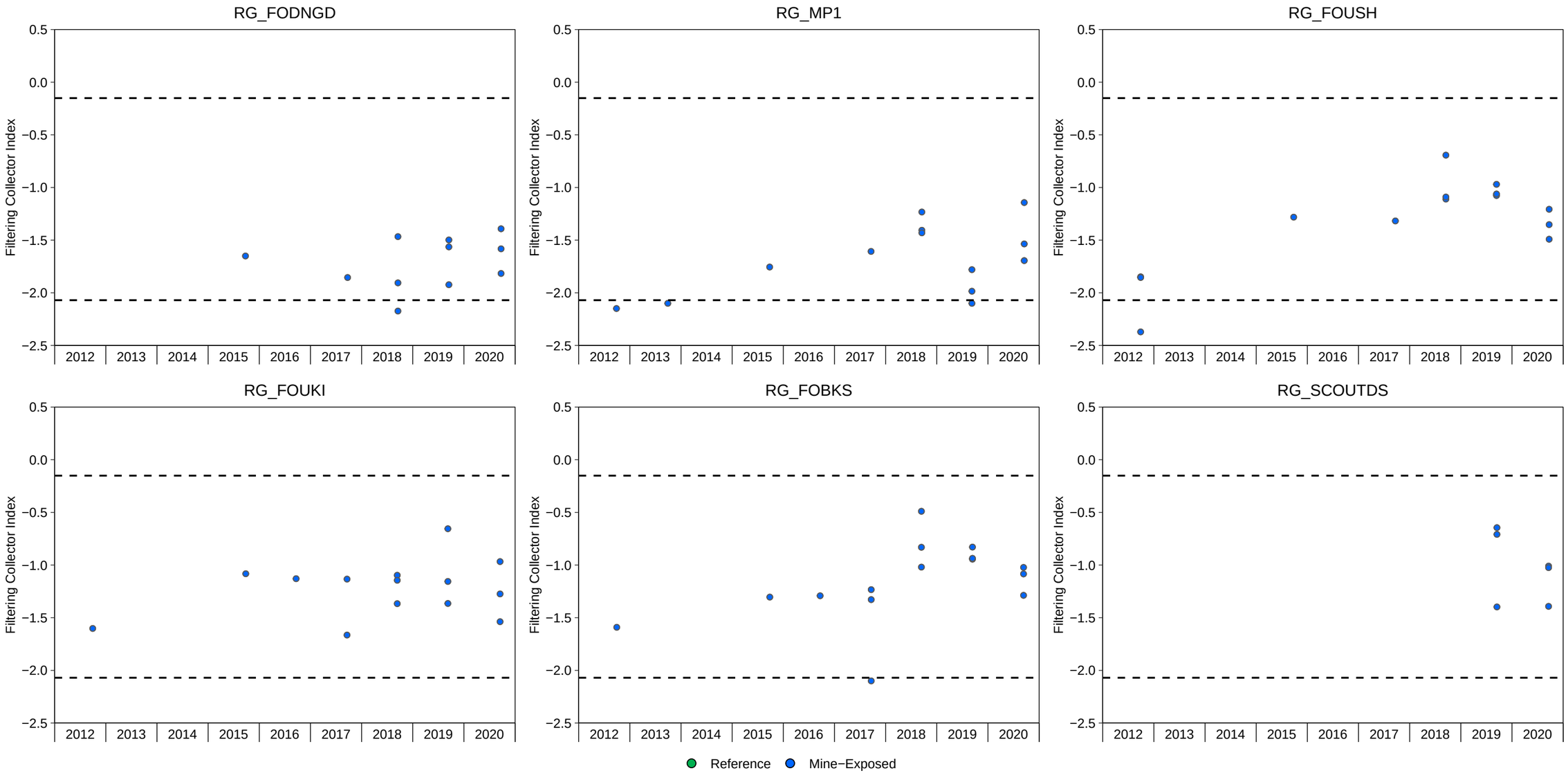


Figure E.32: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

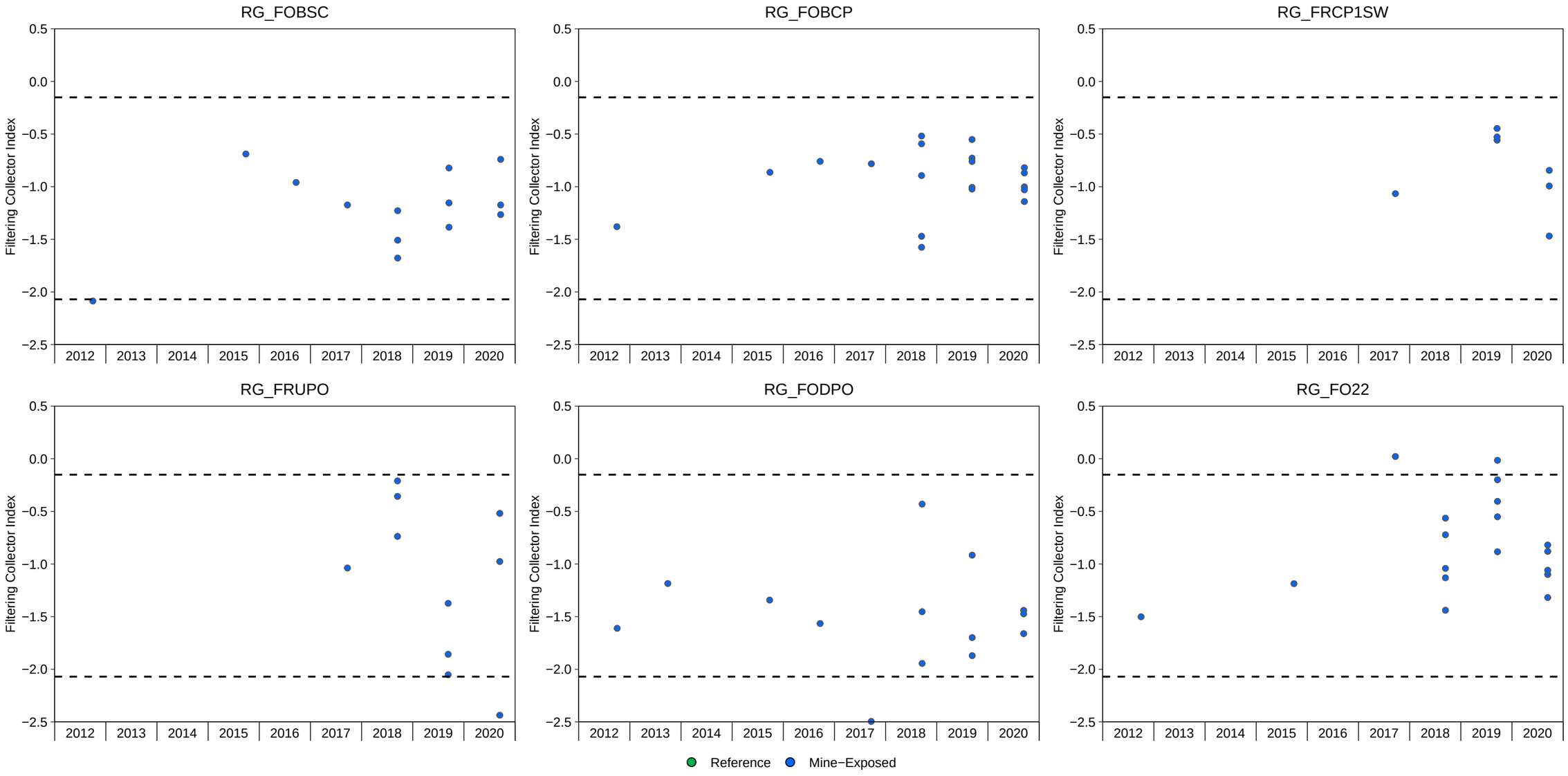


Figure E.32: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

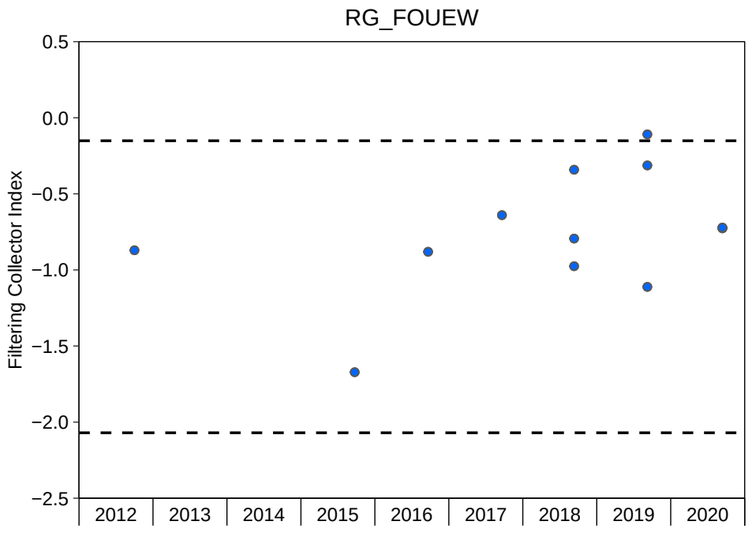


Figure E.32: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

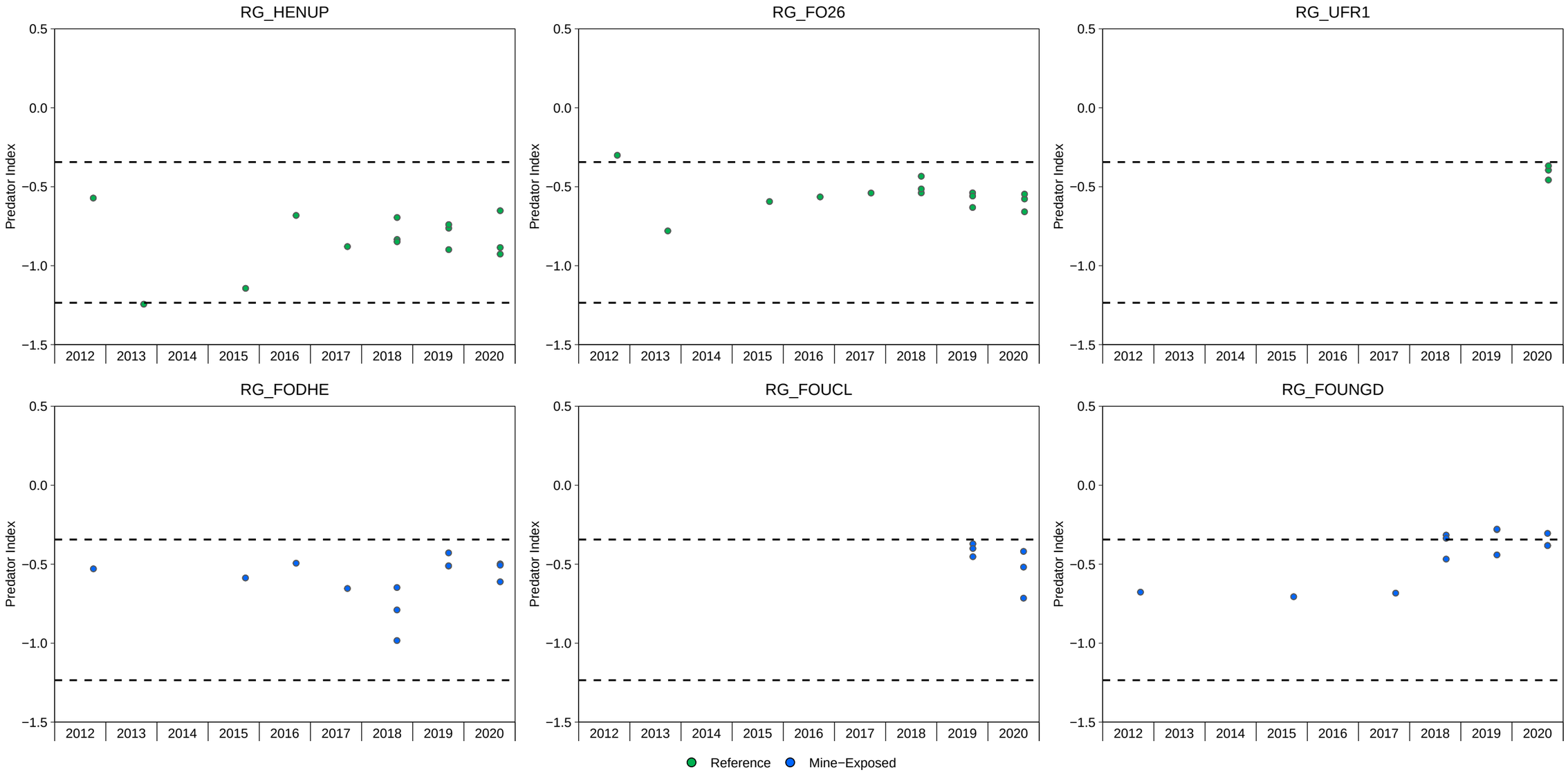


Figure E.33: Benthic Invertebrate Predator Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

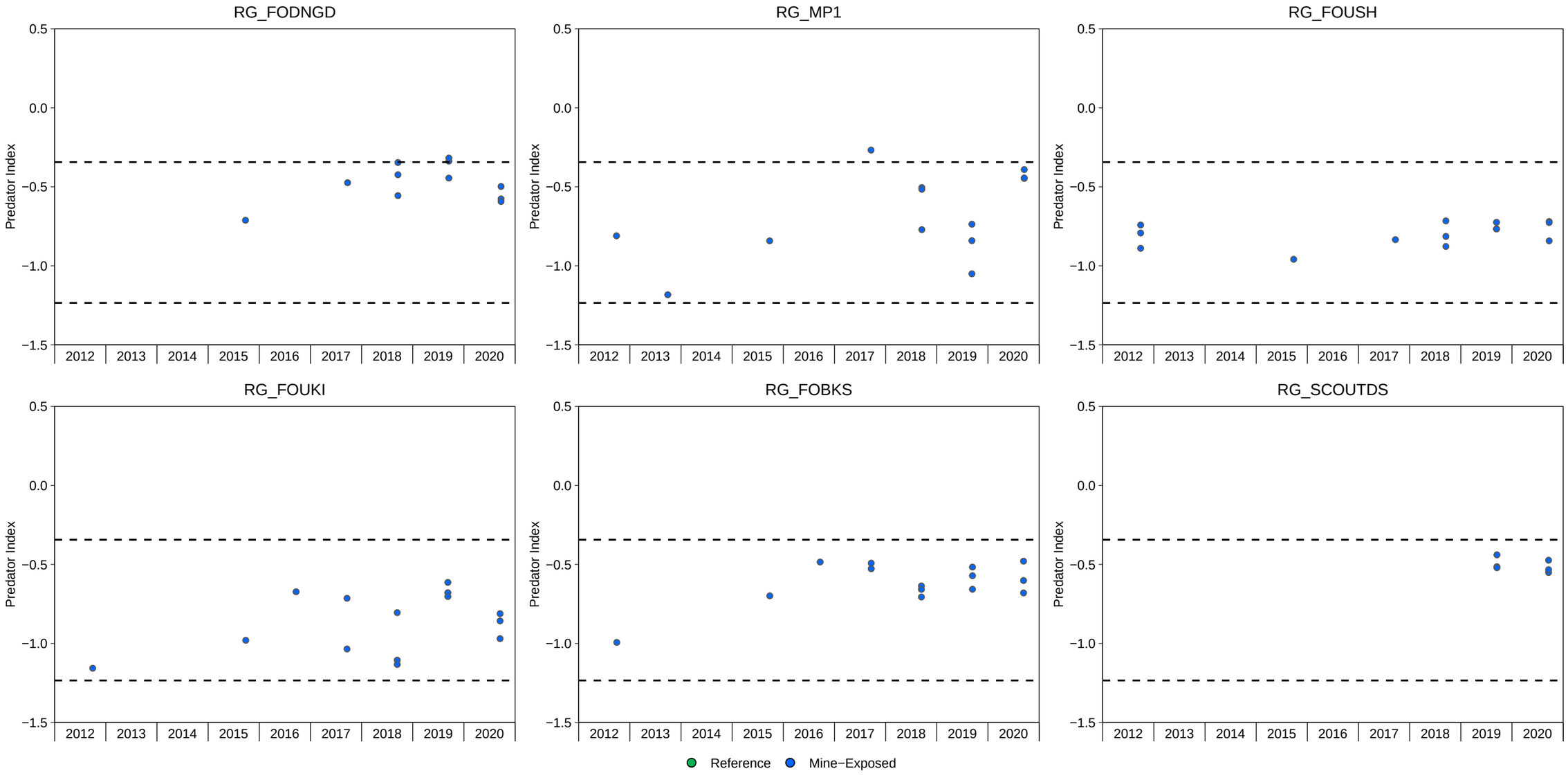


Figure E.33: Benthic Invertebrate Predator Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

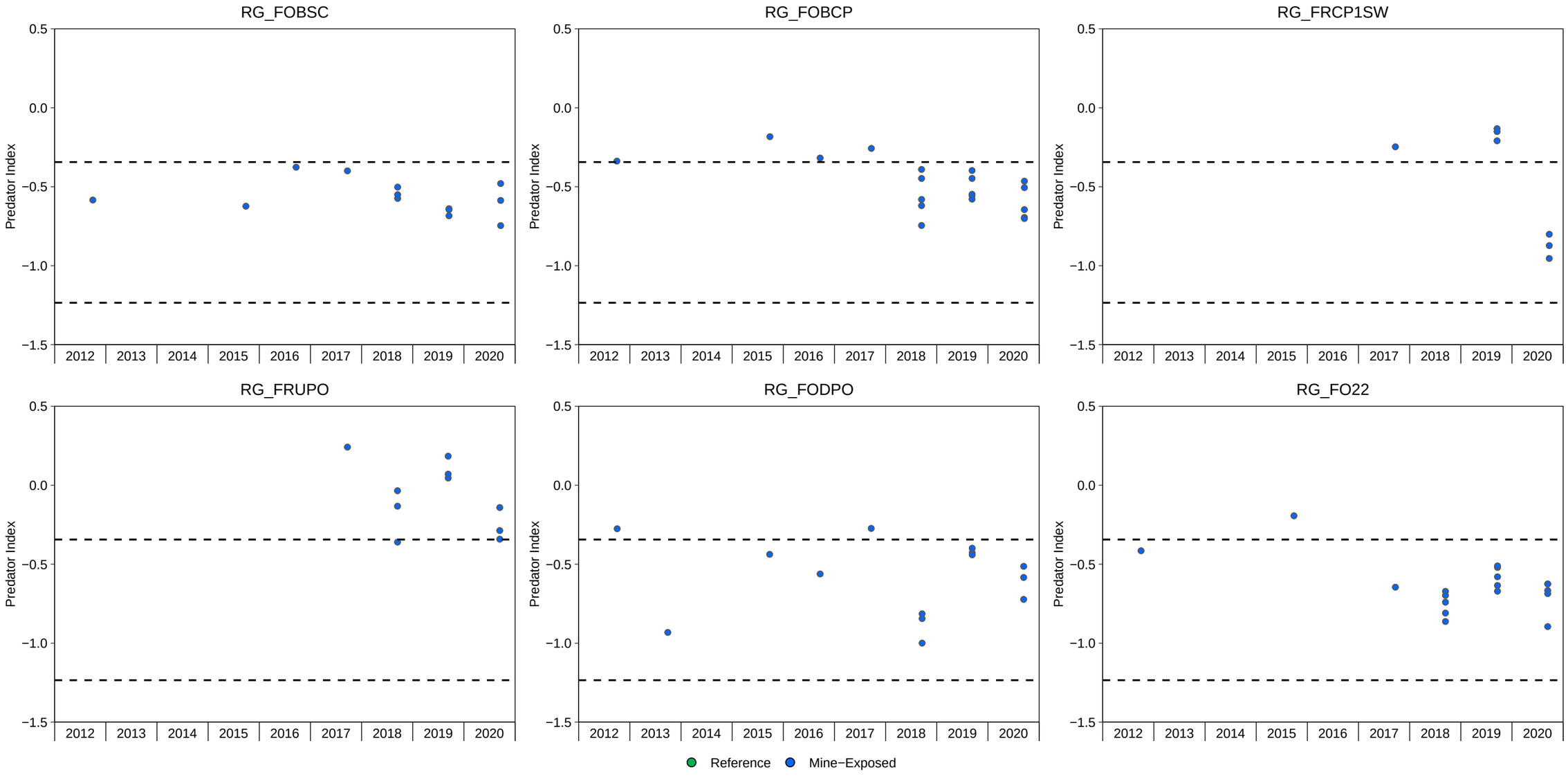


Figure E.33: Benthic Invertebrate Predator Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

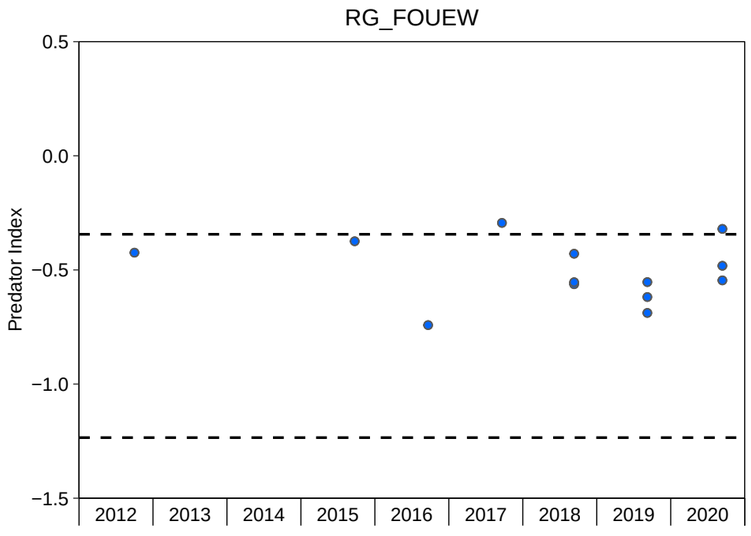


Figure E.33: Benthic Invertebrate Predator Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

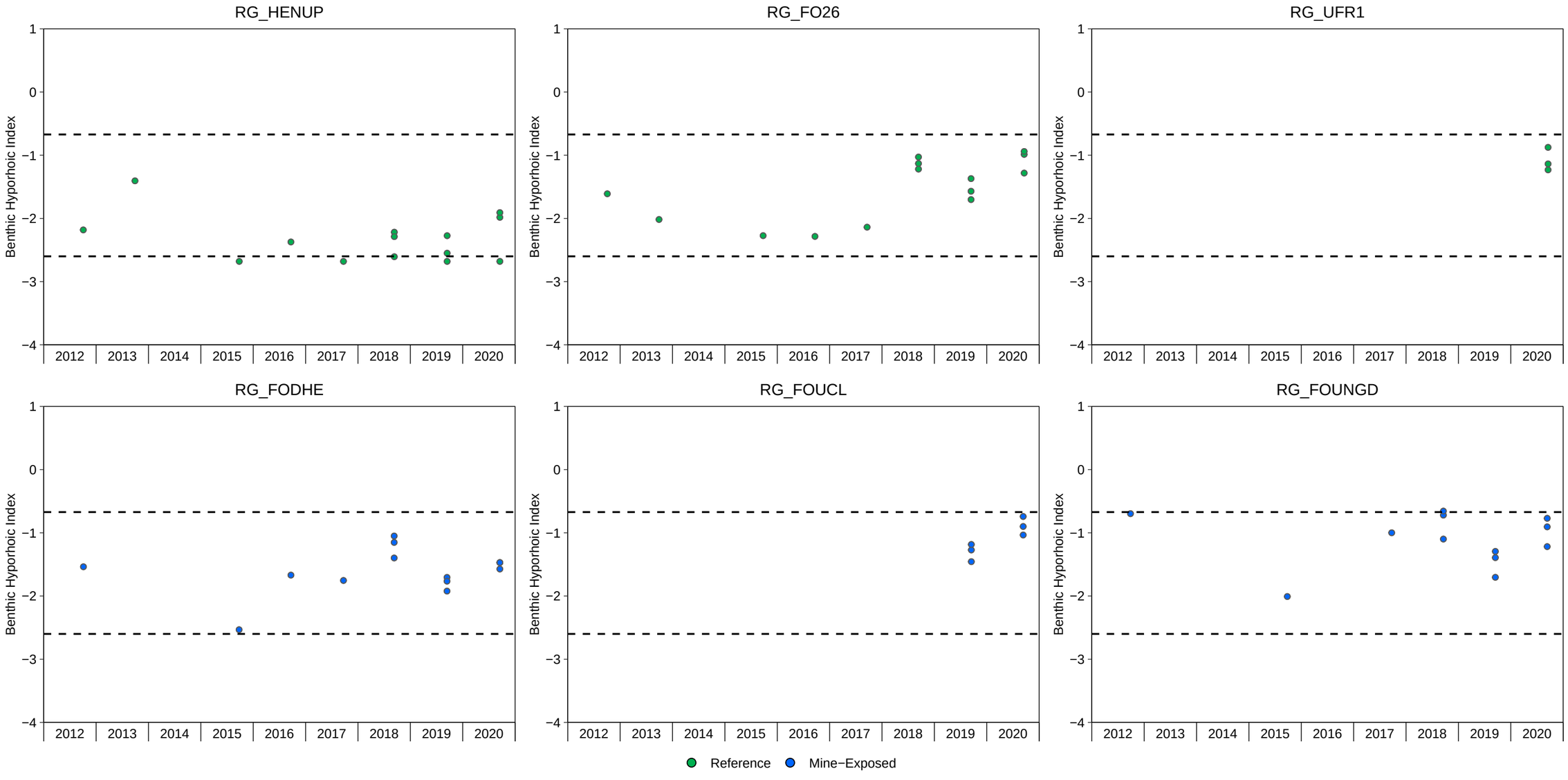


Figure E.34: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

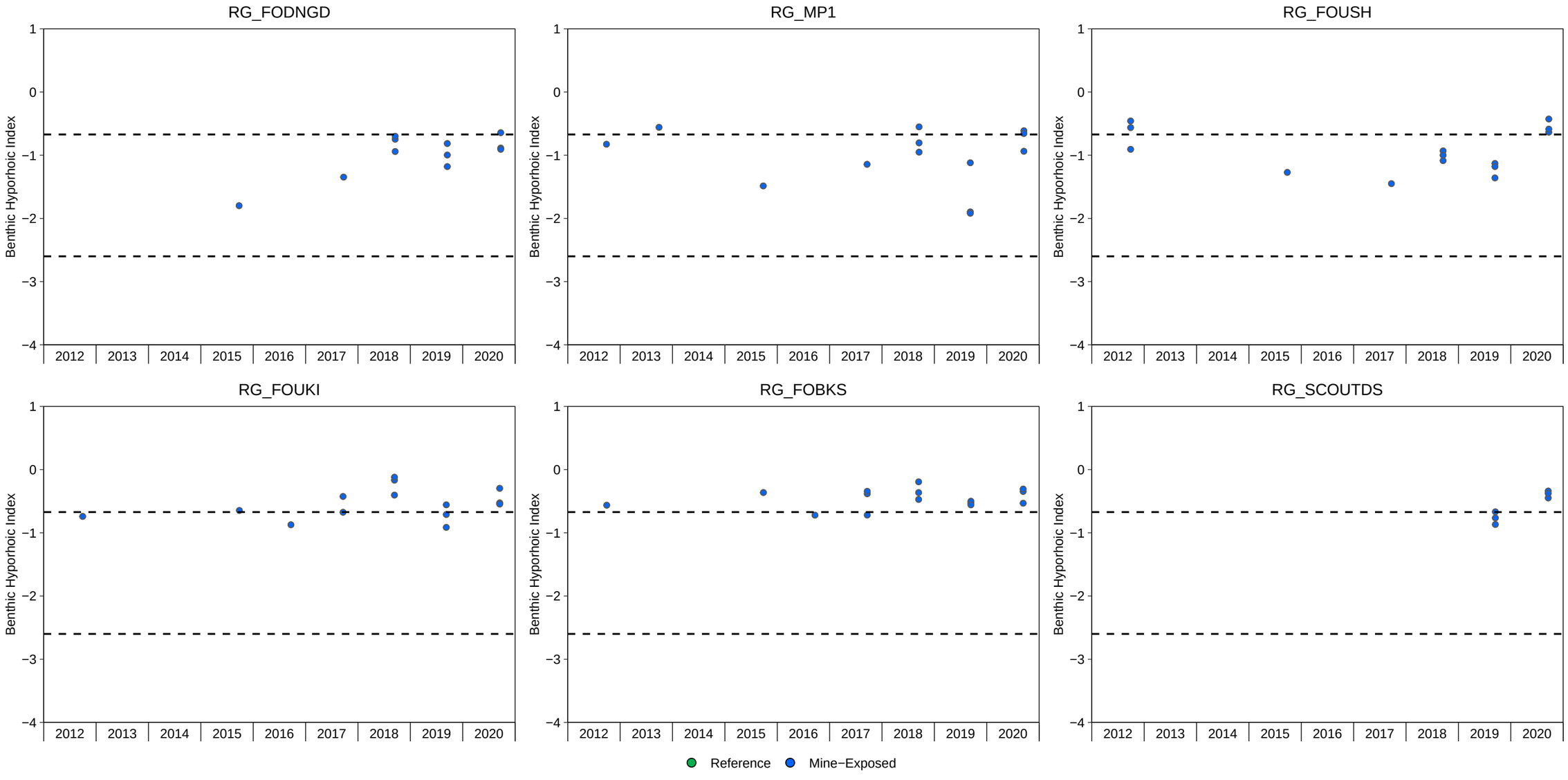


Figure E.34: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

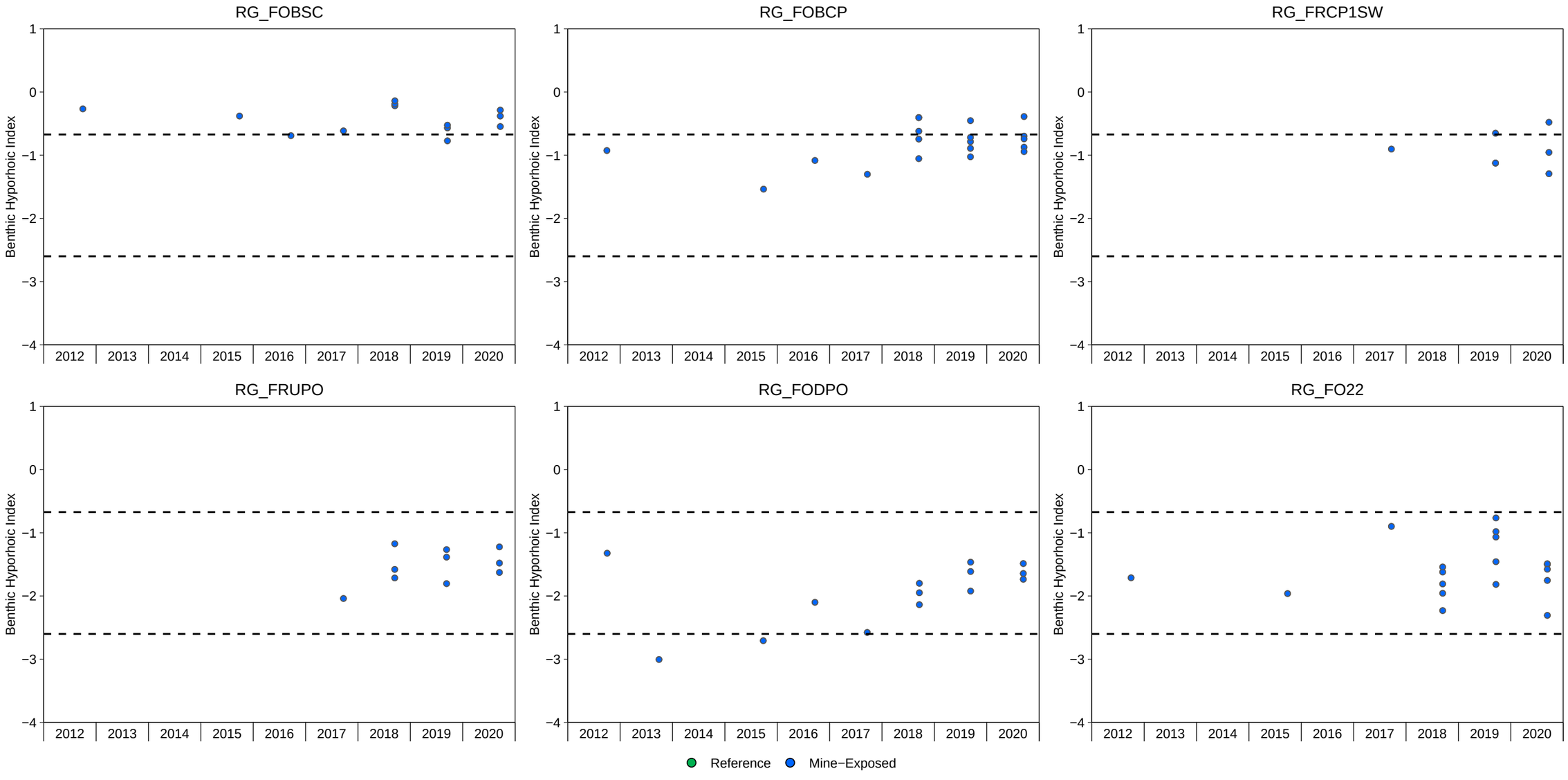
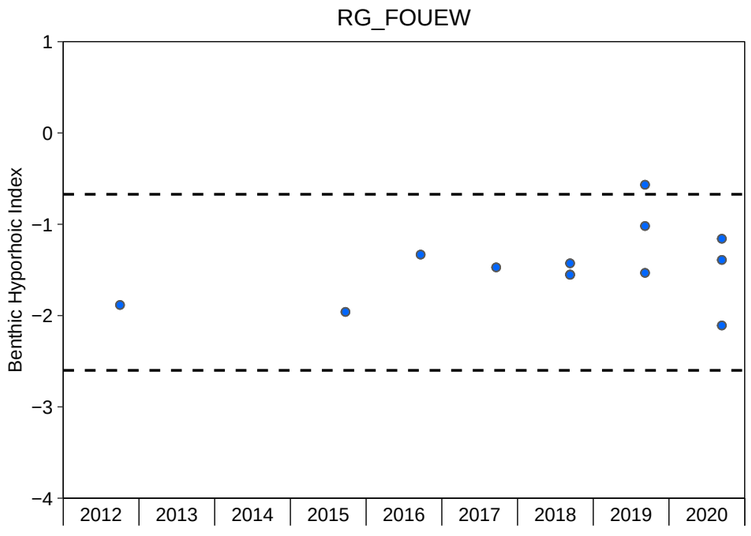


Figure E.34: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.



Reference Mine−Exposed

Figure E.34: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, September 2020

Notes: Regional normal ranges using percentiles of reference areas from 2012 to 2019 are shown as dashed horizontal lines.

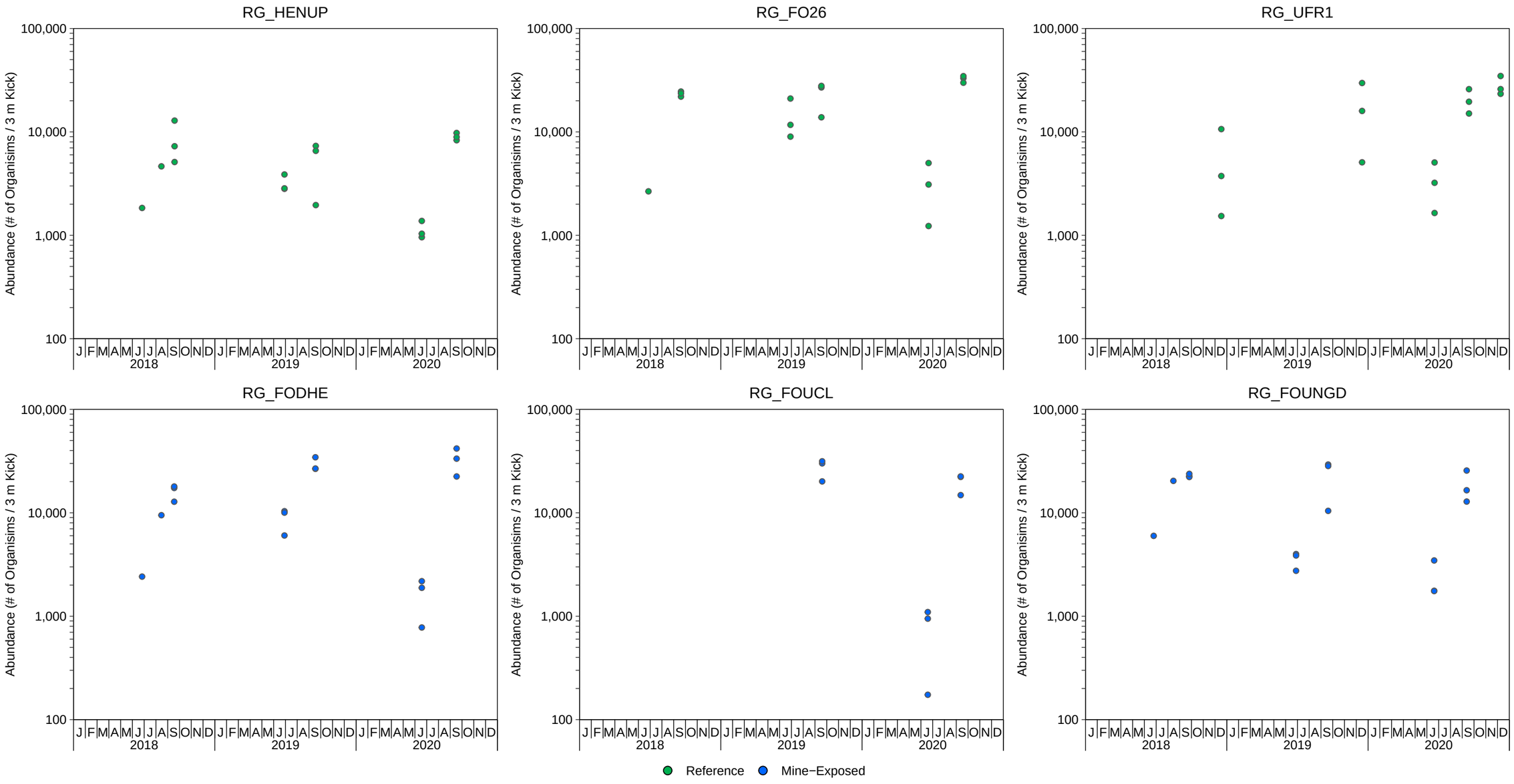


Figure E.35: Benthic Invertebrate Abundance, FRO LAEMP, June 2018 to December 2020

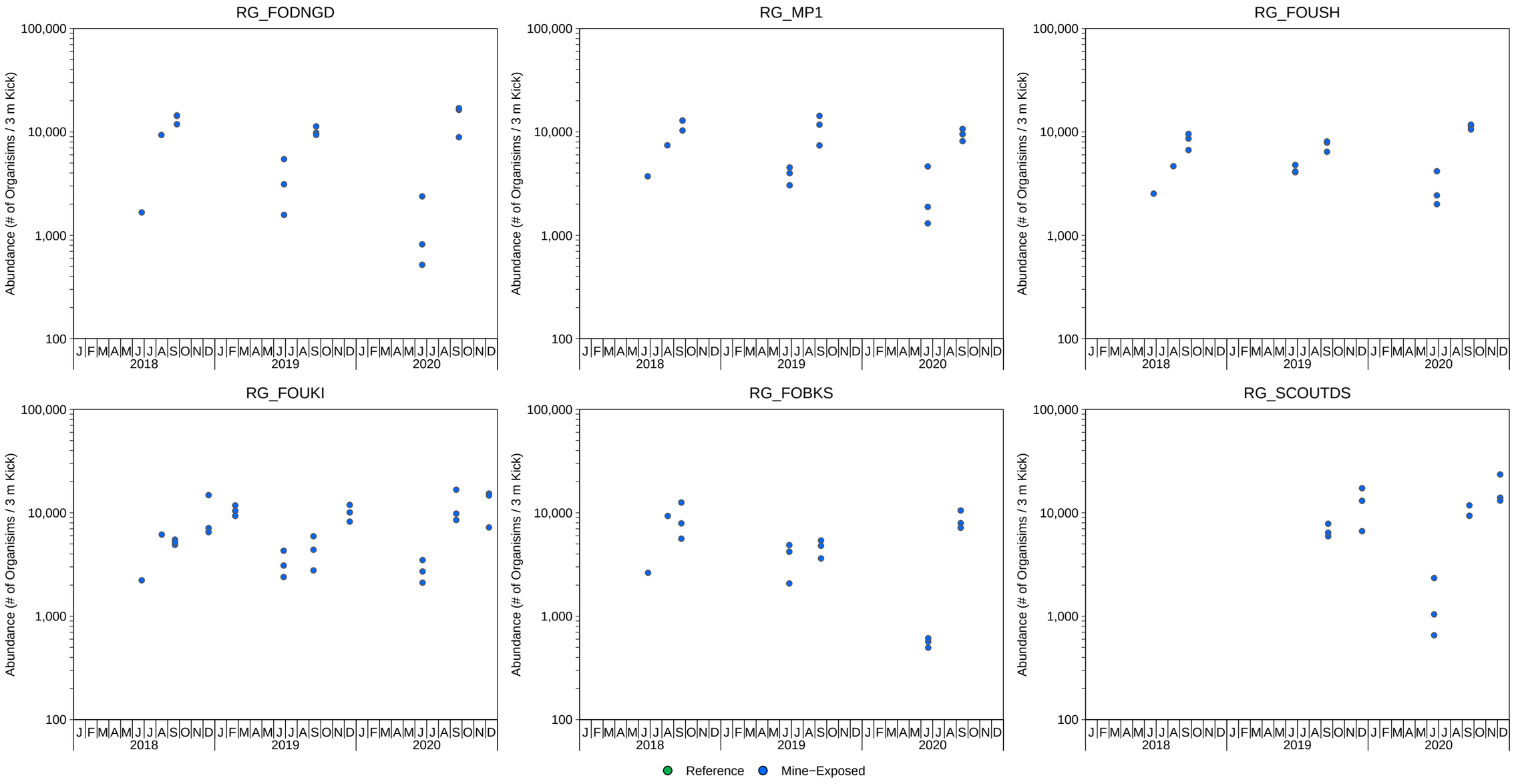


Figure E.35: Benthic Invertebrate Abundance, FRO LAEMP, June 2018 to December 2020

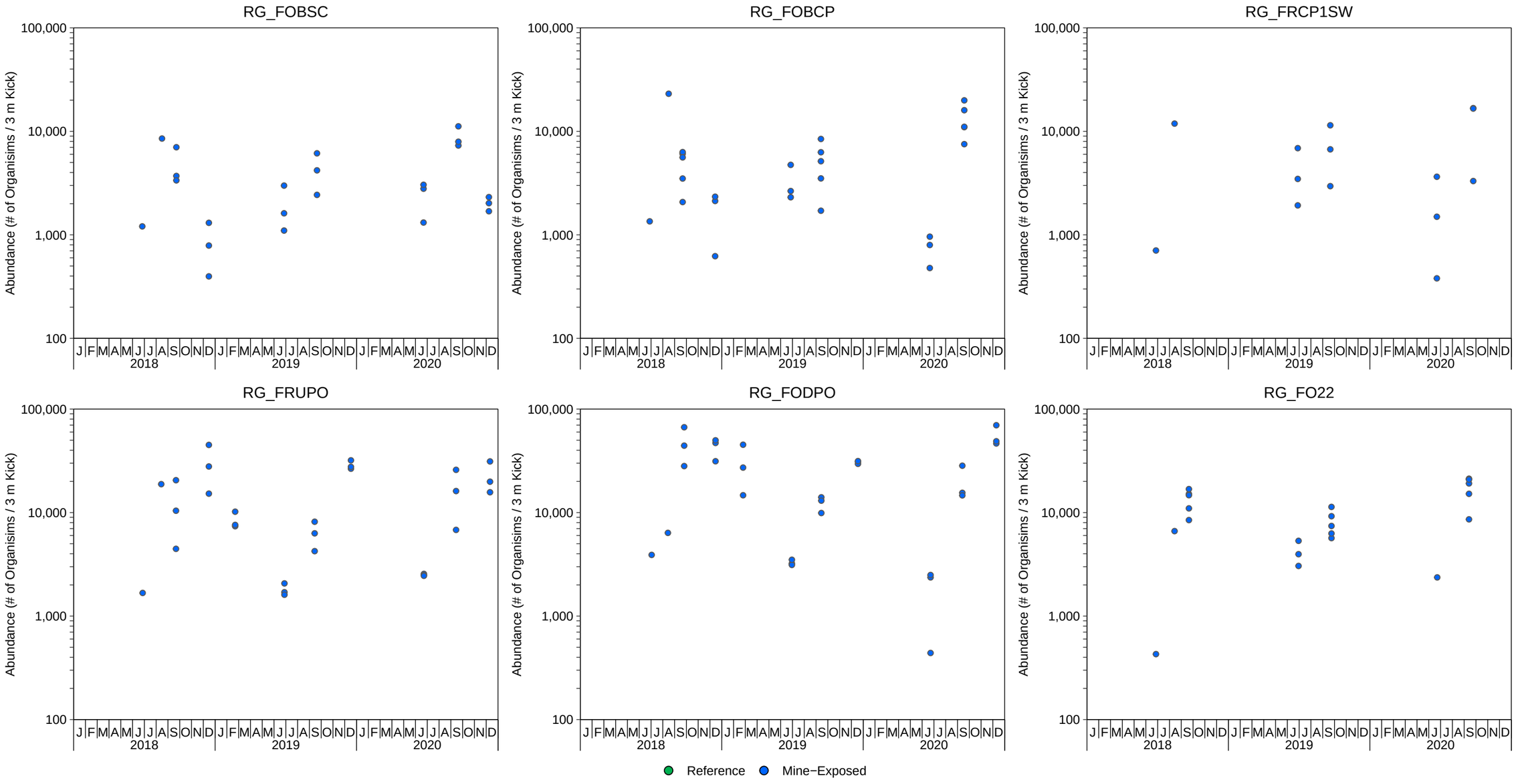
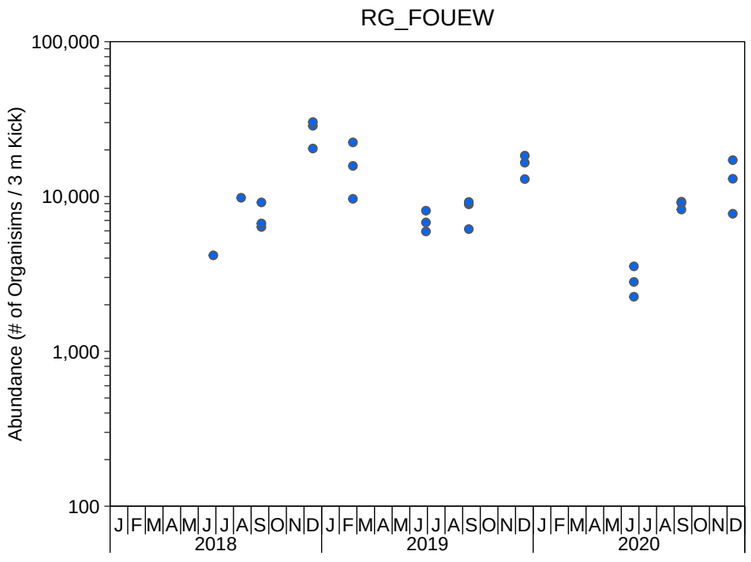


Figure E.35: Benthic Invertebrate Abundance, FRO LAEMP, June 2018 to December 2020



Reference Mine−Exposed

Figure E.35: Benthic Invertebrate Abundance, FRO LAEMP, June 2018 to December 2020

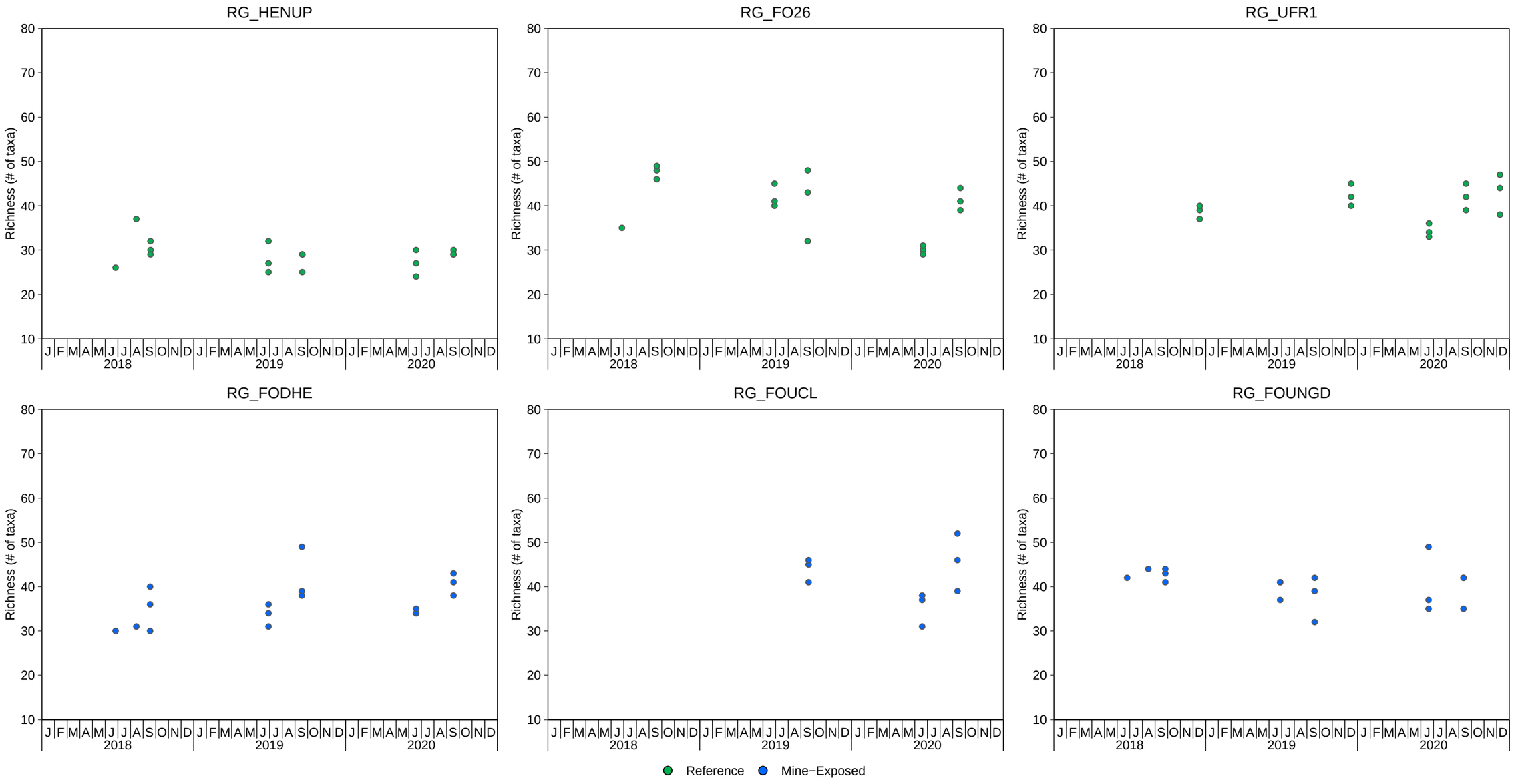


Figure E.36: Benthic Invertebrate Richness, FRO LAEMP, June 2018 to December 2020

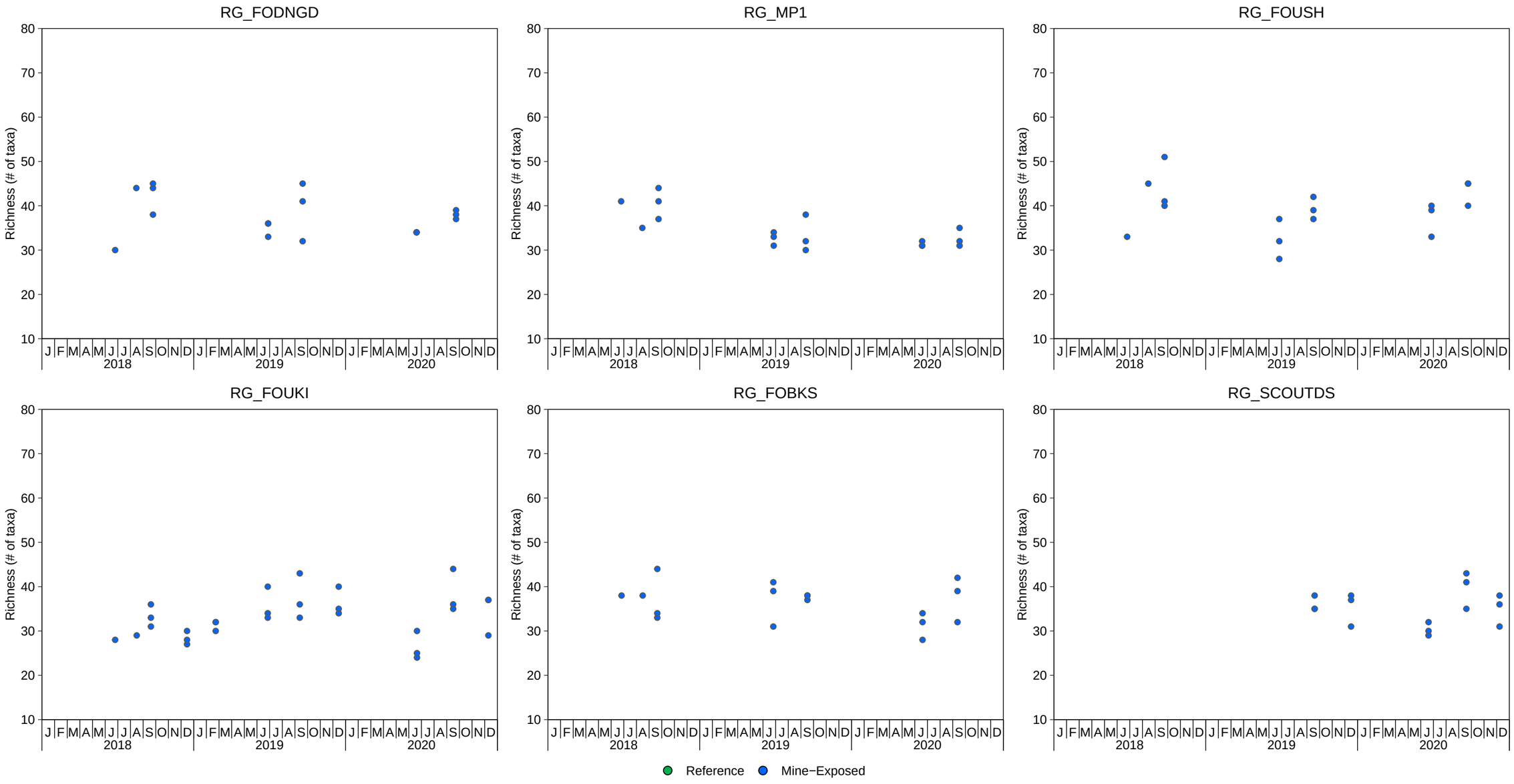


Figure E.36: Benthic Invertebrate Richness, FRO LAEMP, June 2018 to December 2020

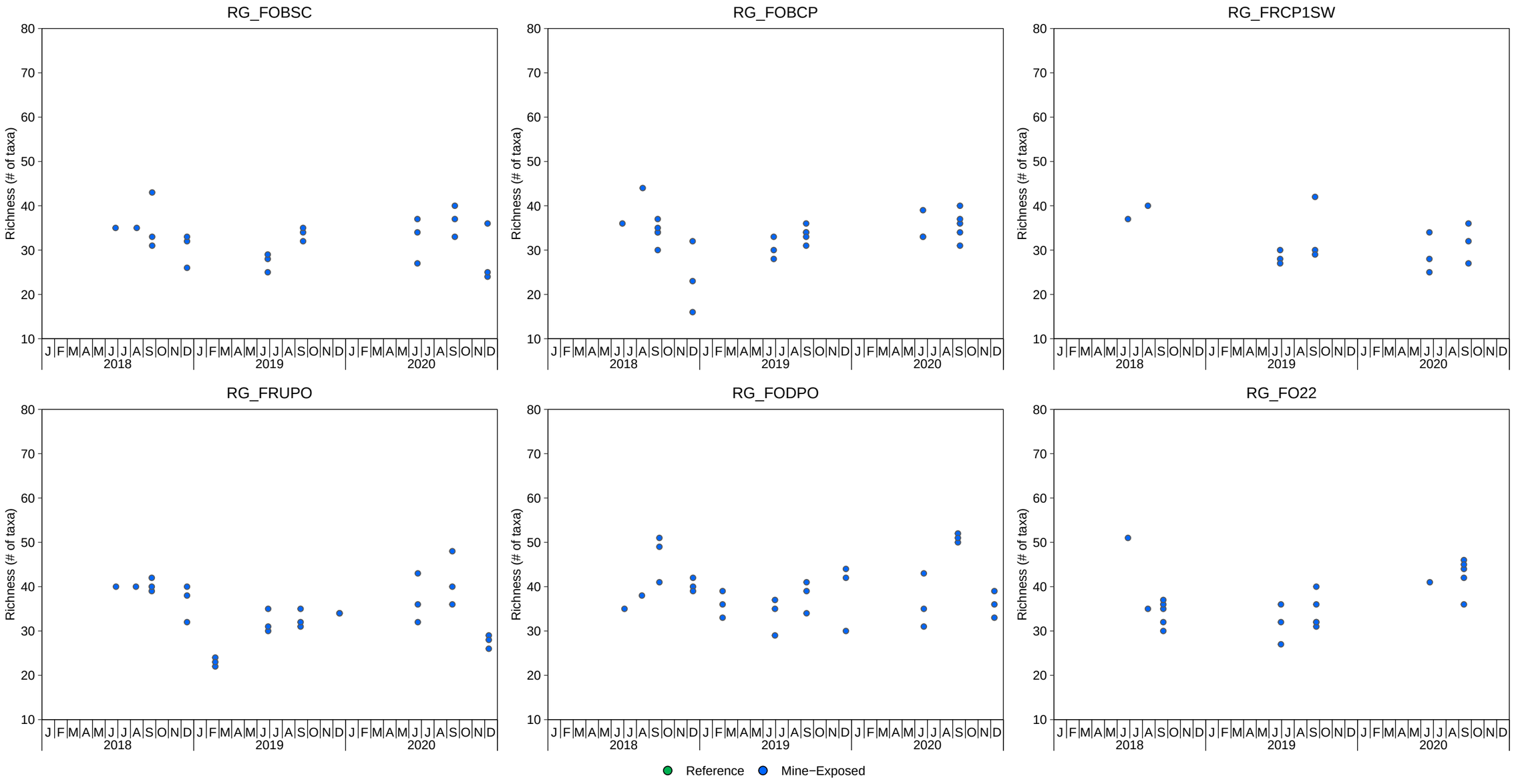


Figure E.36: Benthic Invertebrate Richness, FRO LAEMP, June 2018 to December 2020

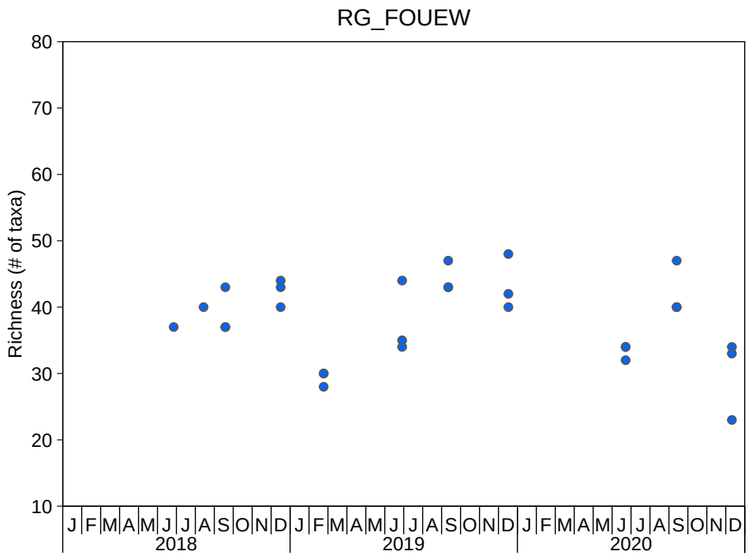


Figure E.36: Benthic Invertebrate Richness, FRO LAEMP, June 2018 to December 2020

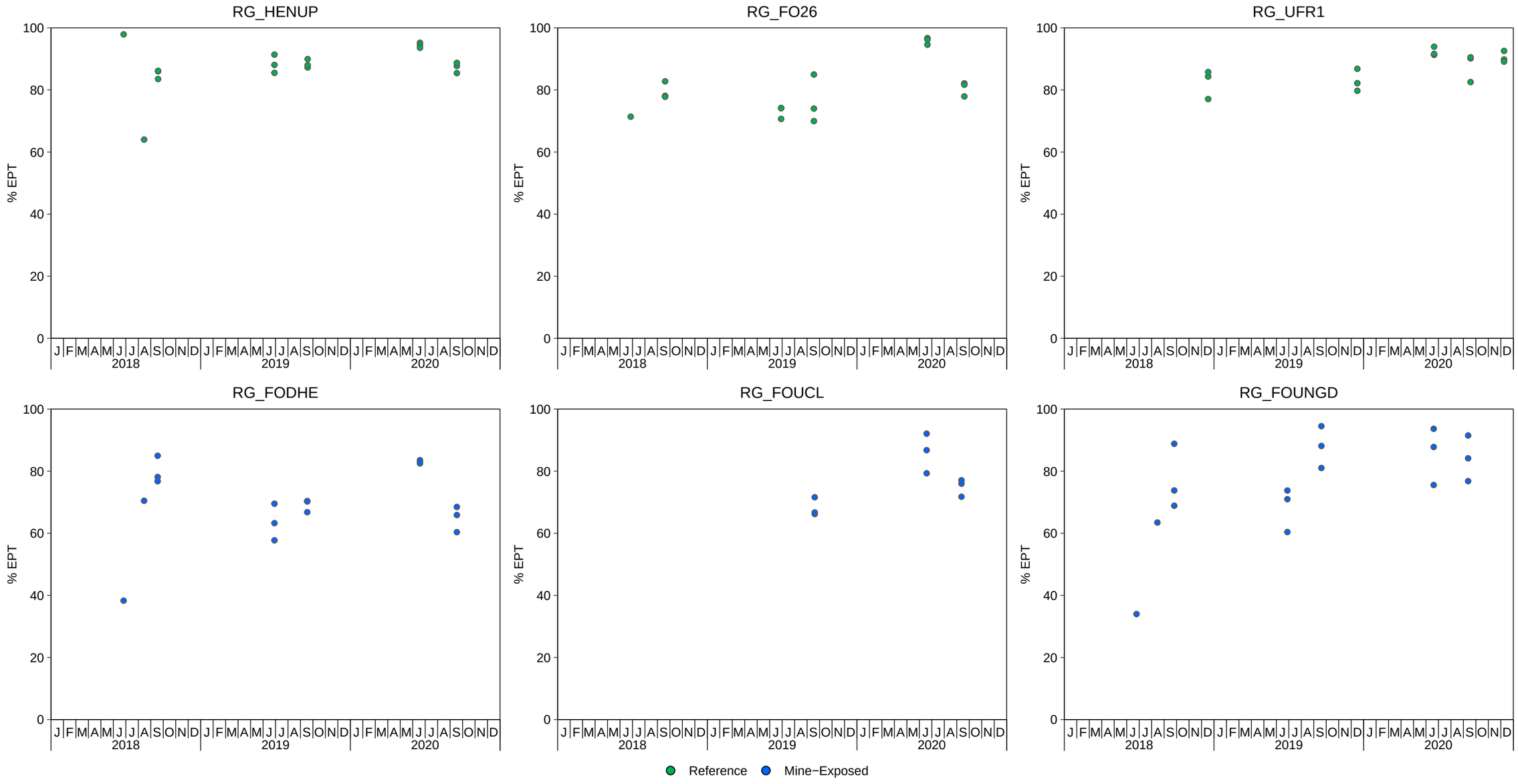


Figure E.37: **Benthic Invertebrate % EPT, FRO LAEMP, June 2018 to December 2020**

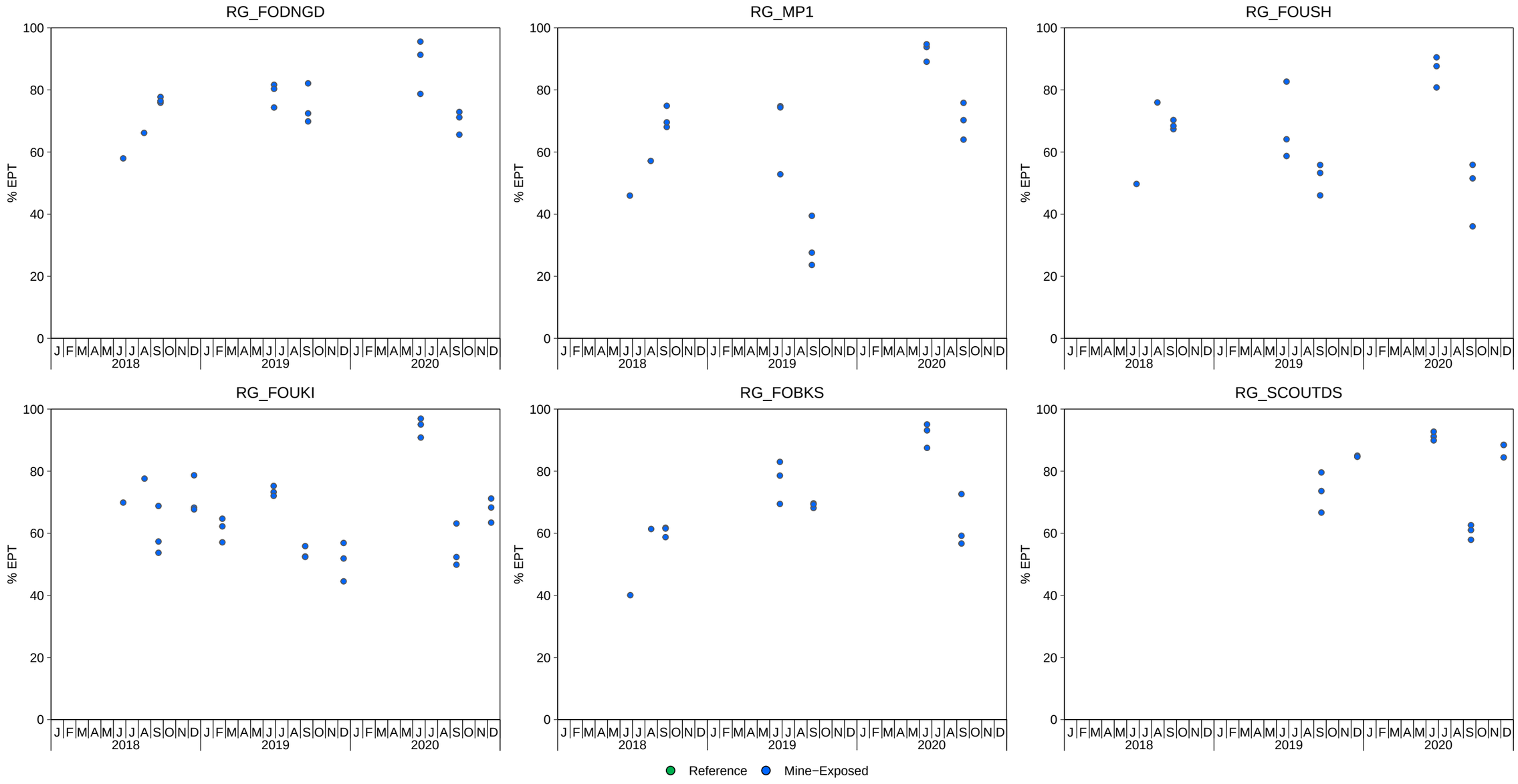


Figure E.37: Benthic Invertebrate % EPT, FRO LAEMP, June 2018 to December 2020

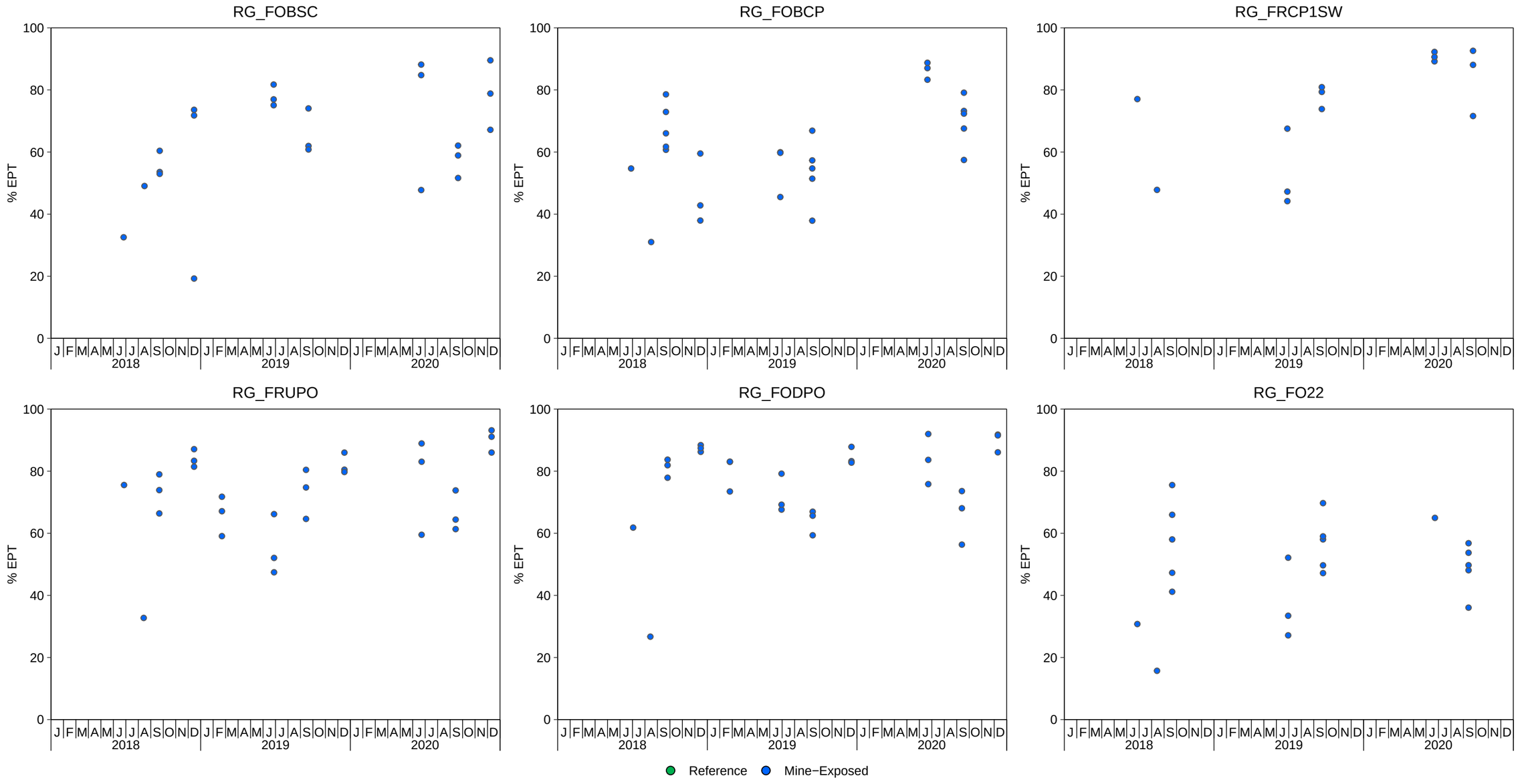


Figure E.37: Benthic Invertebrate % EPT, FRO LAEMP, June 2018 to December 2020

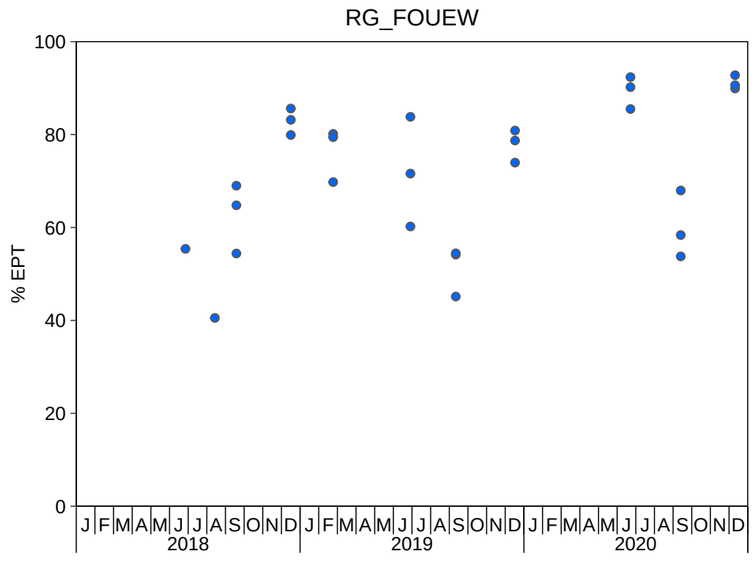


Figure E.37: Benthic Invertebrate % EPT, FRO LAEMP, June 2018 to December 2020

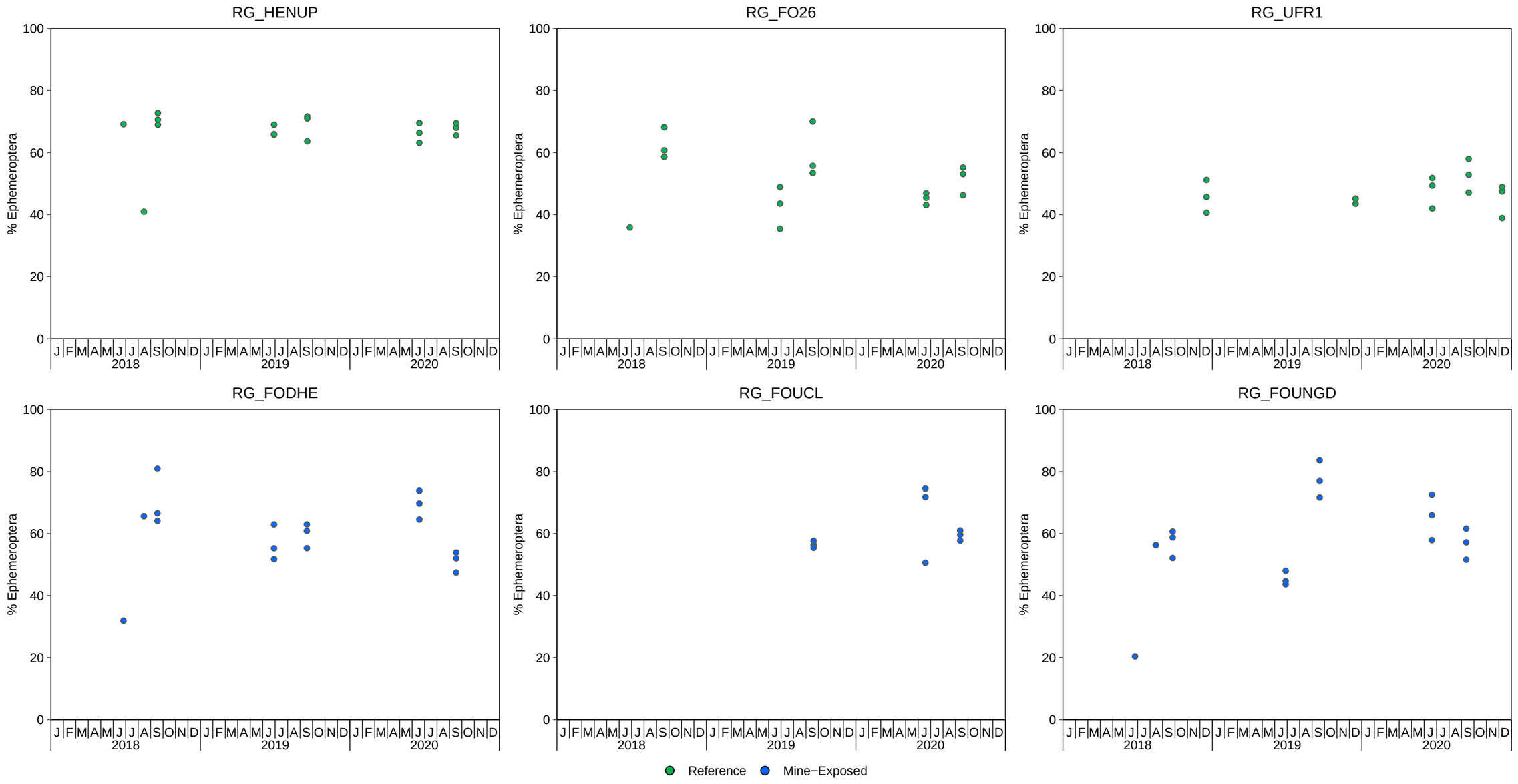


Figure E.38: **Benthic Invertebrate % Ephemeroptera, FRO LAEMP, June 2018 to December 2020**

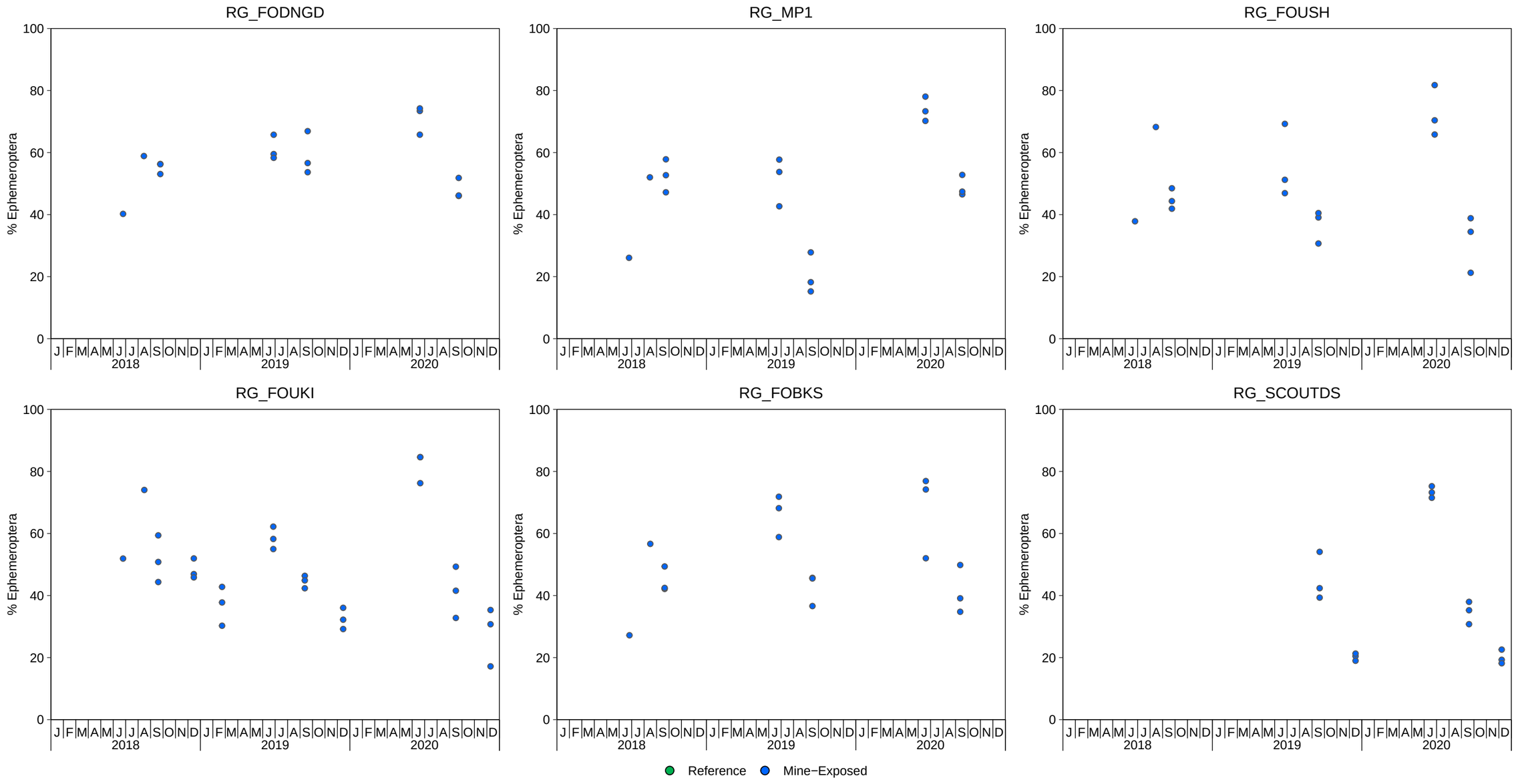


Figure E.38: **Benthic Invertebrate % Ephemeroptera, FRO LAEMP, June 2018 to December 2020**

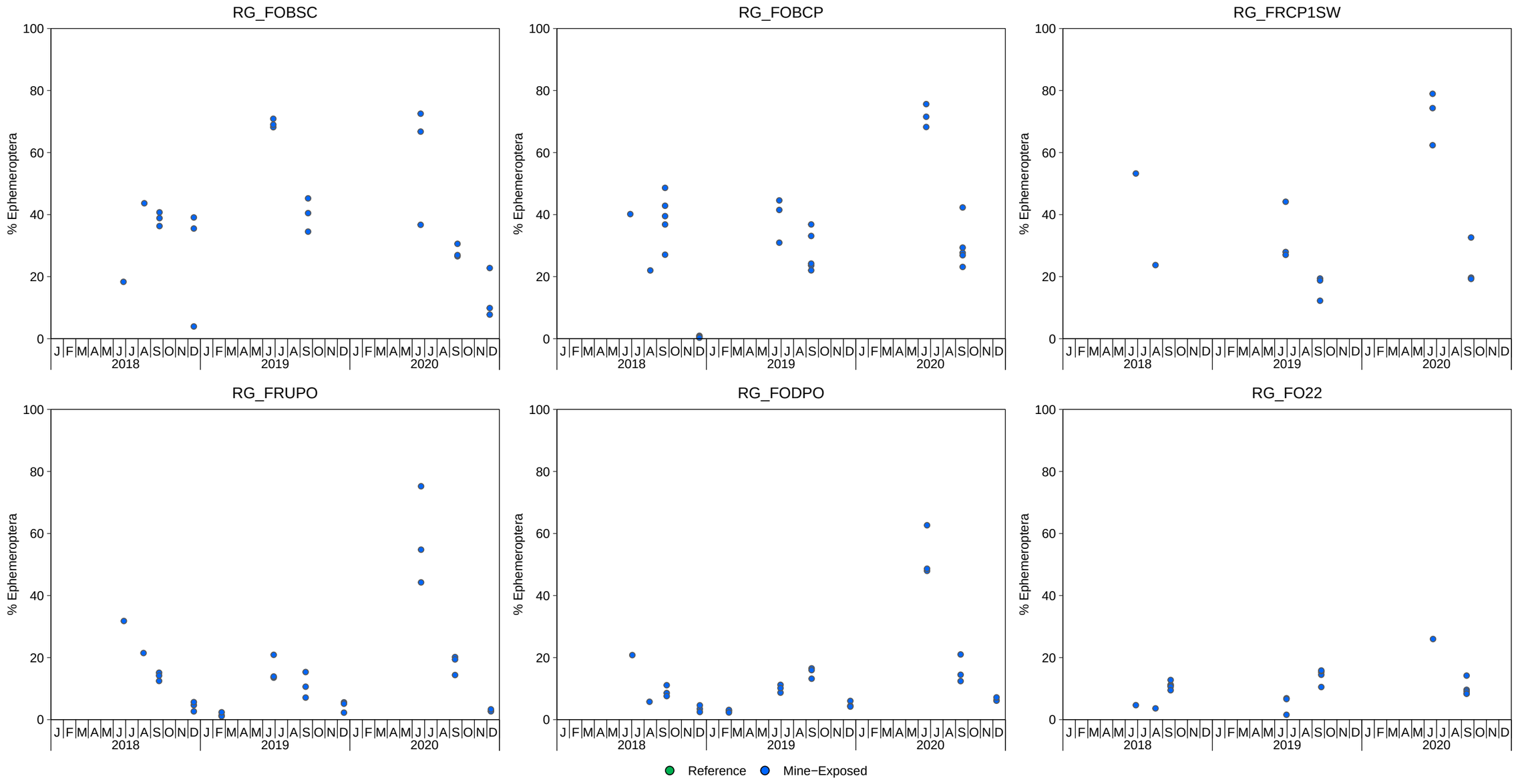


Figure E.38: **Benthic Invertebrate % Ephemeroptera, FRO LAEMP, June 2018 to December 2020**

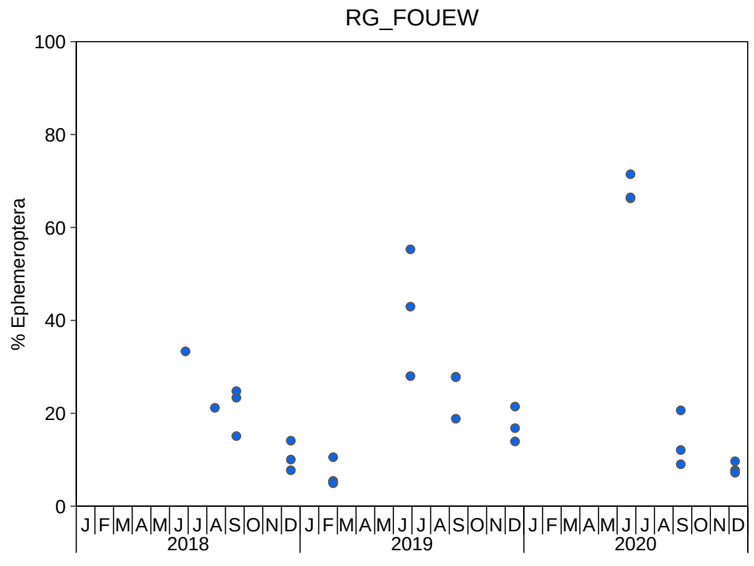


Figure E.38: Benthic Invertebrate % Ephemeroptera, FRO LAEMP, June 2018 to December 2020

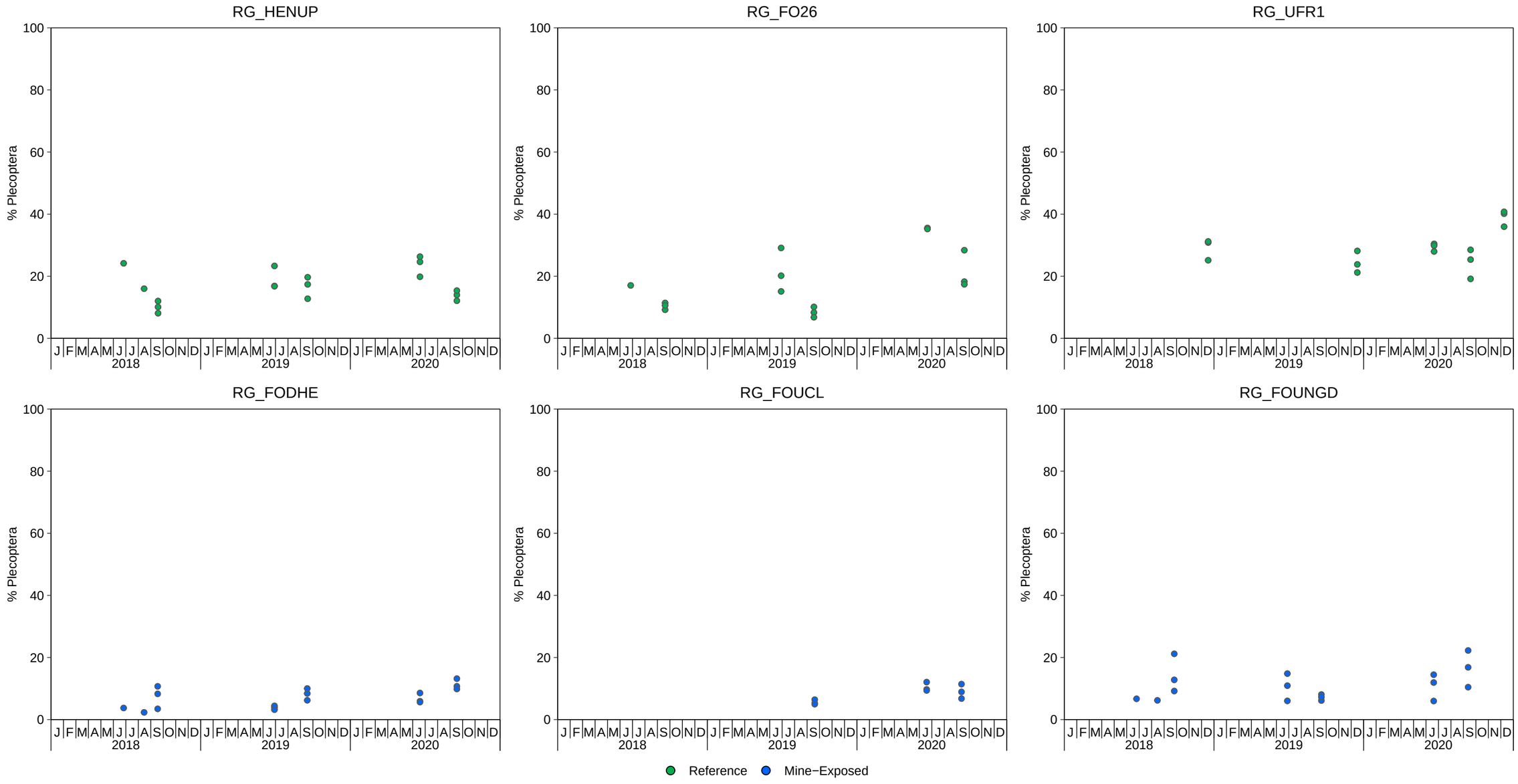


Figure E.39: **Benthic Invertebrate % Plecoptera, FRO LAEMP, June 2018 to December 2020**

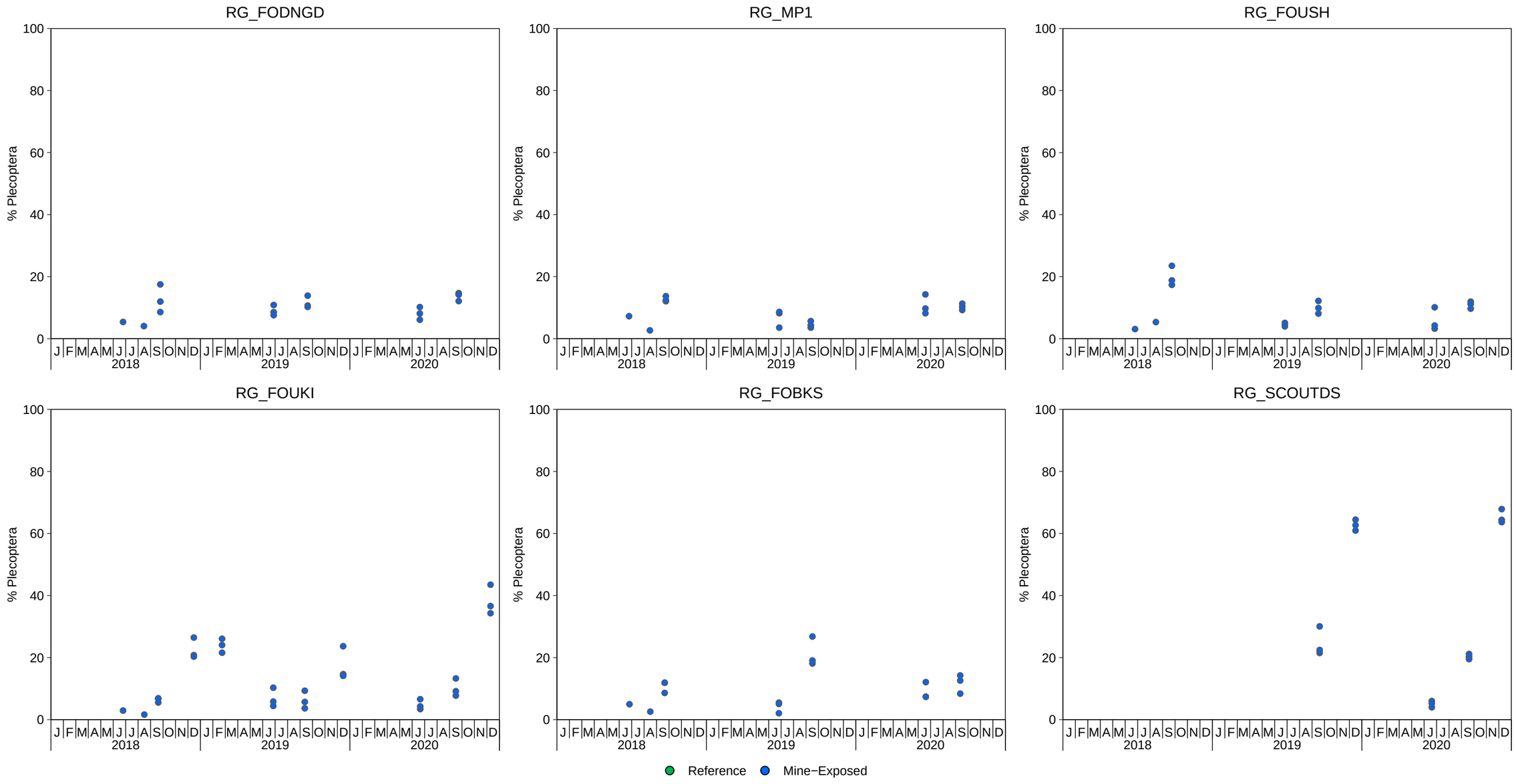


Figure E.39: Benthic Invertebrate % Plecoptera, FRO LAEMP, June 2018 to December 2020

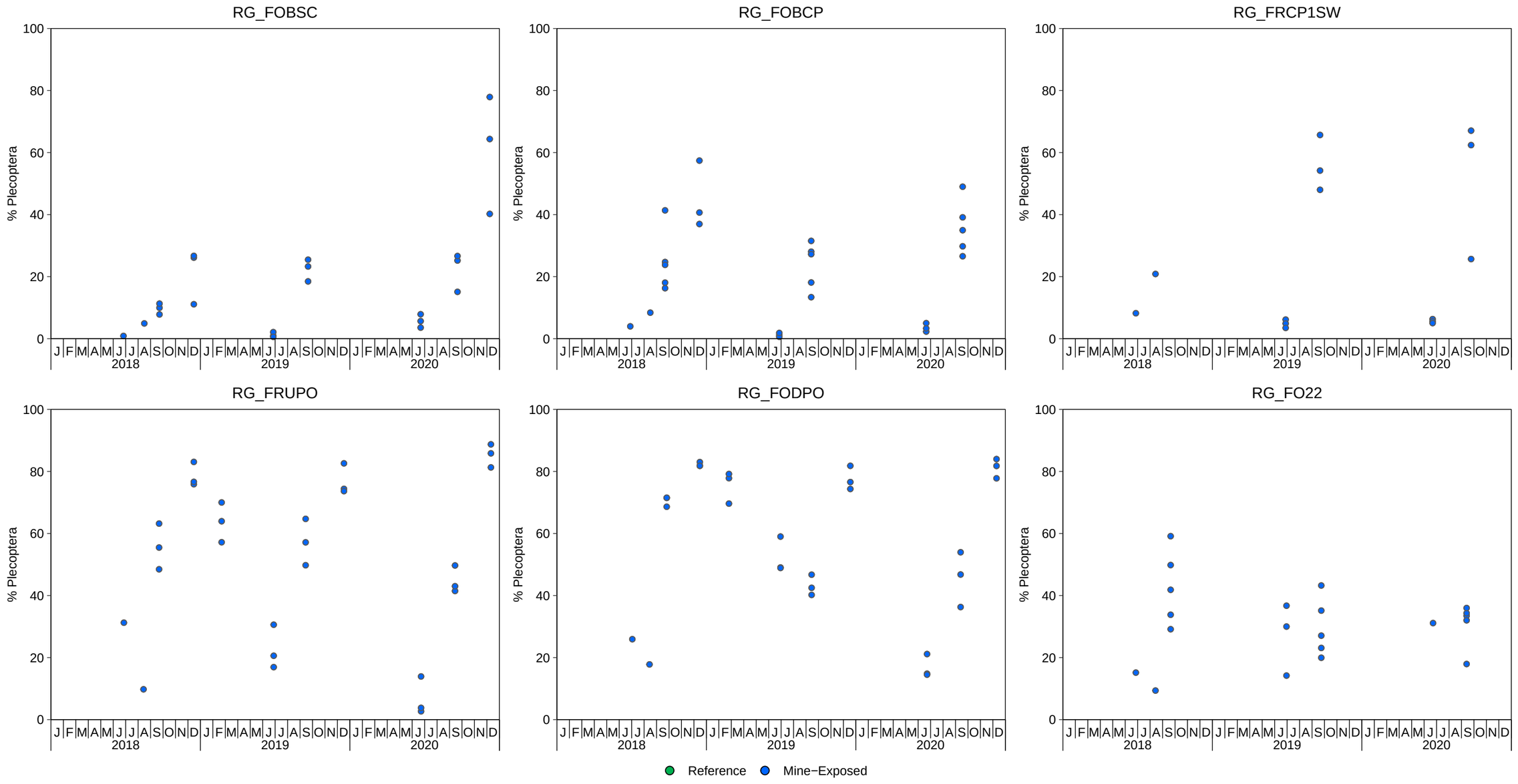


Figure E.39: **Benthic Invertebrate % Plecoptera, FRO LAEMP, June 2018 to December 2020**

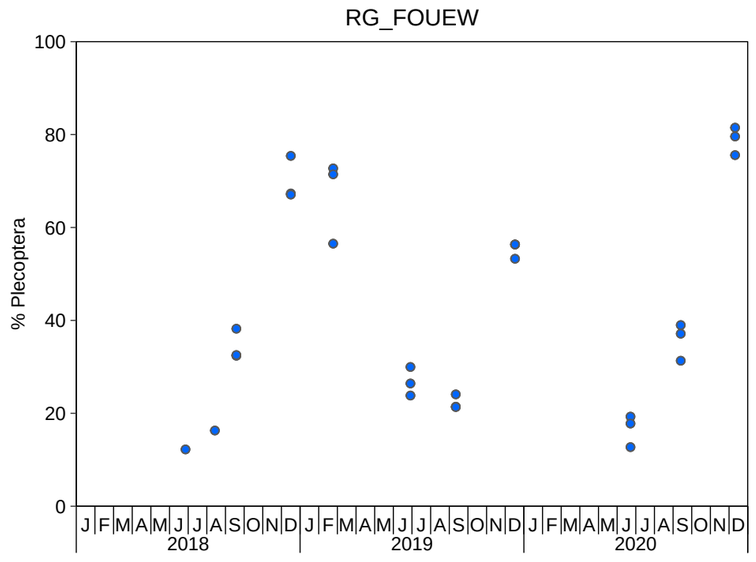


Figure E.39: Benthic Invertebrate % Plecoptera, FRO LAEMP, June 2018 to December 2020

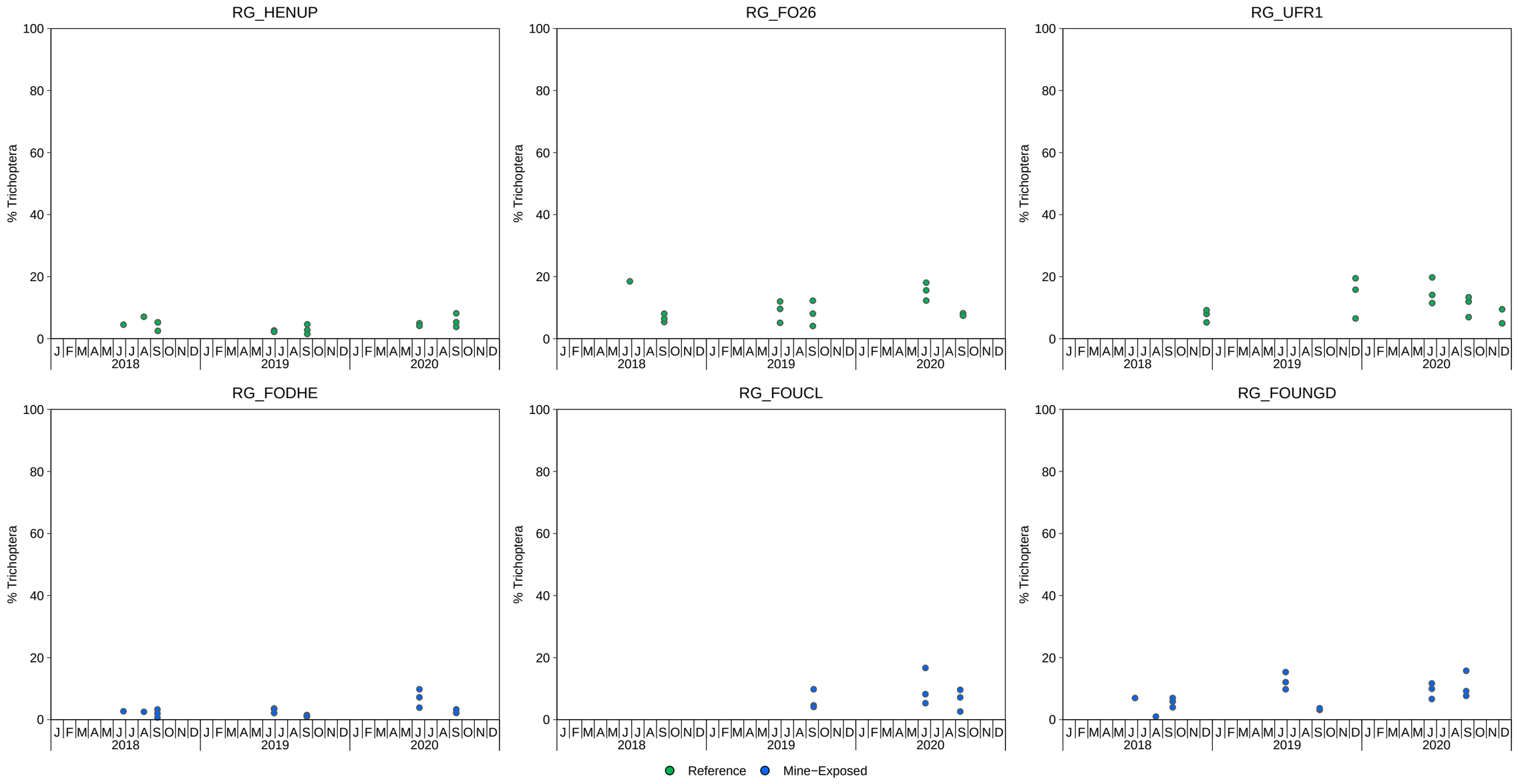


Figure E.40: **Benthic Invertebrate % Trichoptera, FRO LAEMP, June 2018 to December 2020**

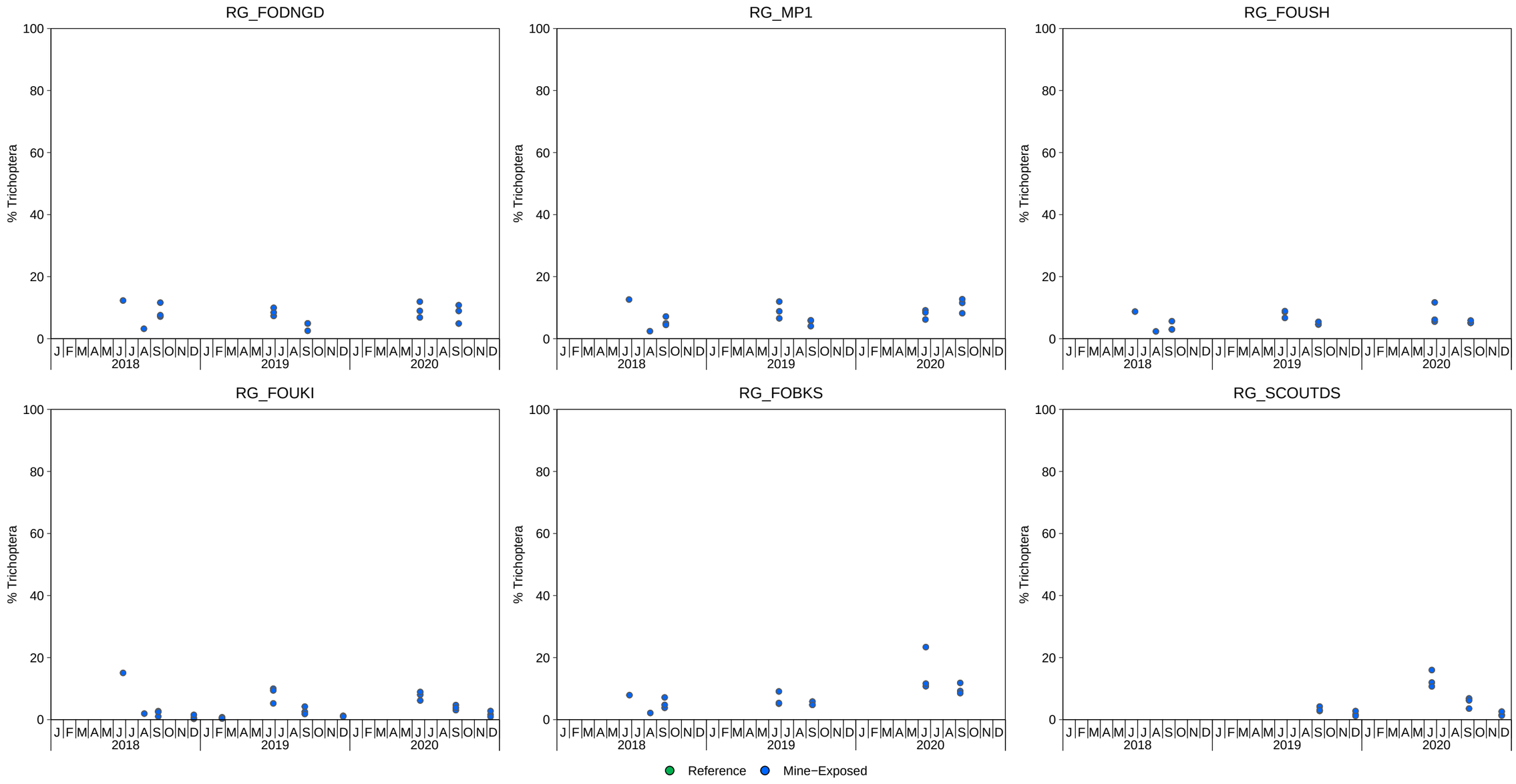


Figure E.40: **Benthic Invertebrate % Trichoptera, FRO LAEMP, June 2018 to December 2020**

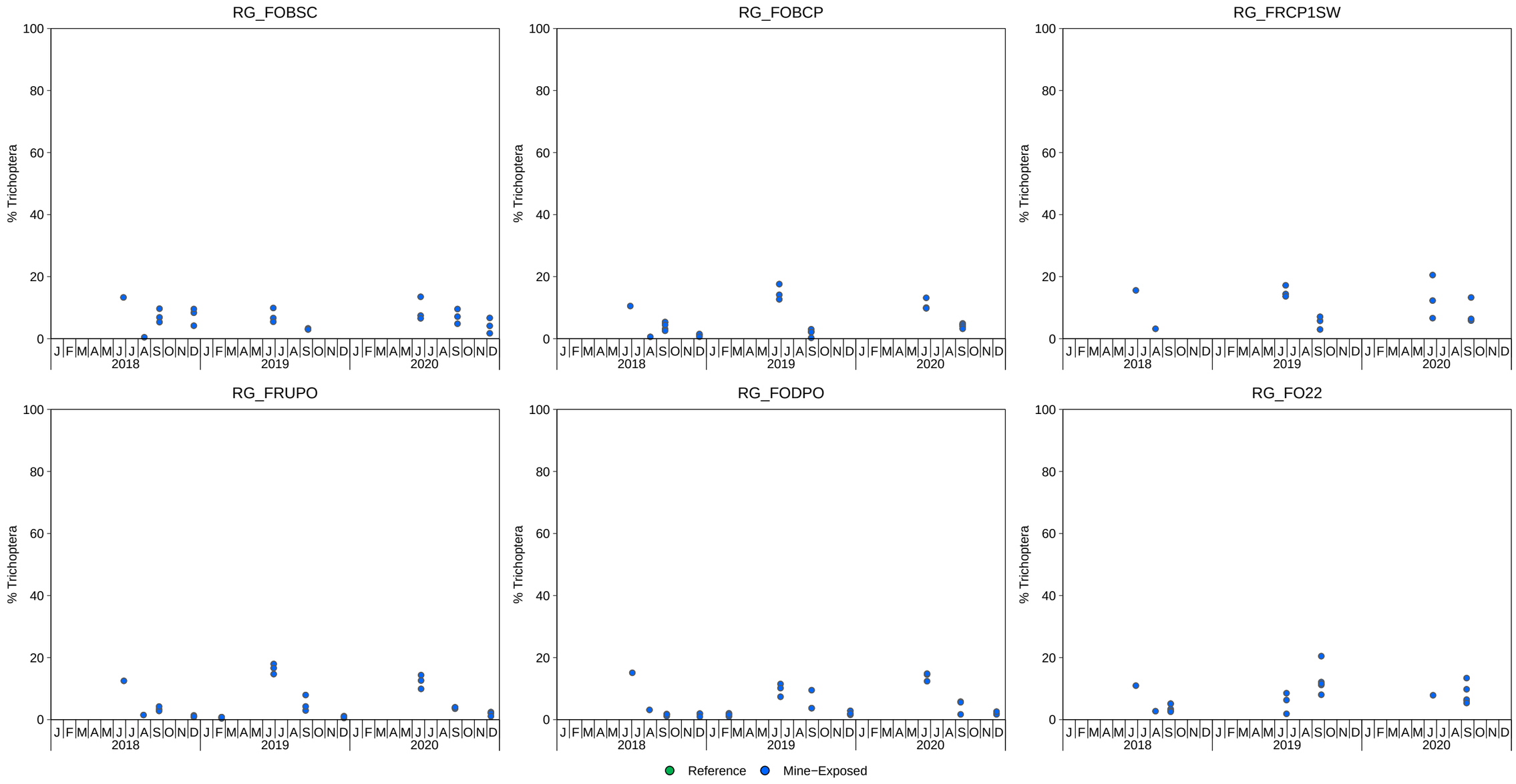
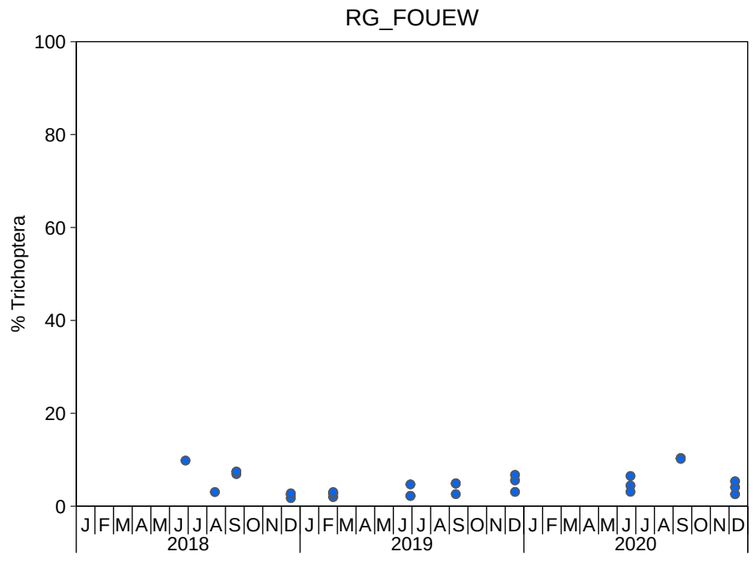


Figure E.40: **Benthic Invertebrate % Trichoptera, FRO LAEMP, June 2018 to December 2020**



Reference Mine−Exposed

Figure E.40: Benthic Invertebrate % Trichoptera, FRO LAEMP, June 2018 to December 2020

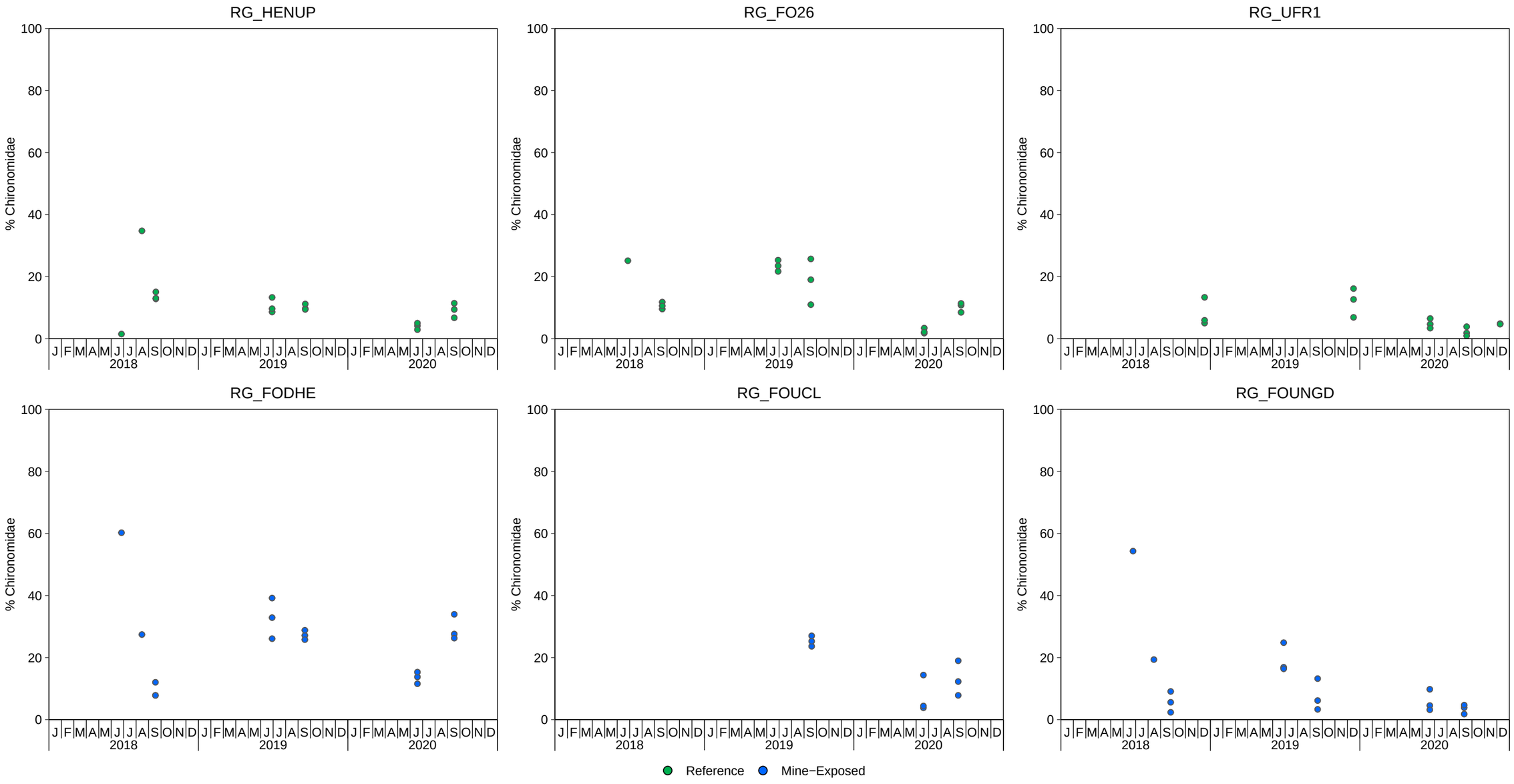


Figure E.41: Benthic Invertebrate % Chironomidae, FRO LAEMP, June 2018 to December 2020

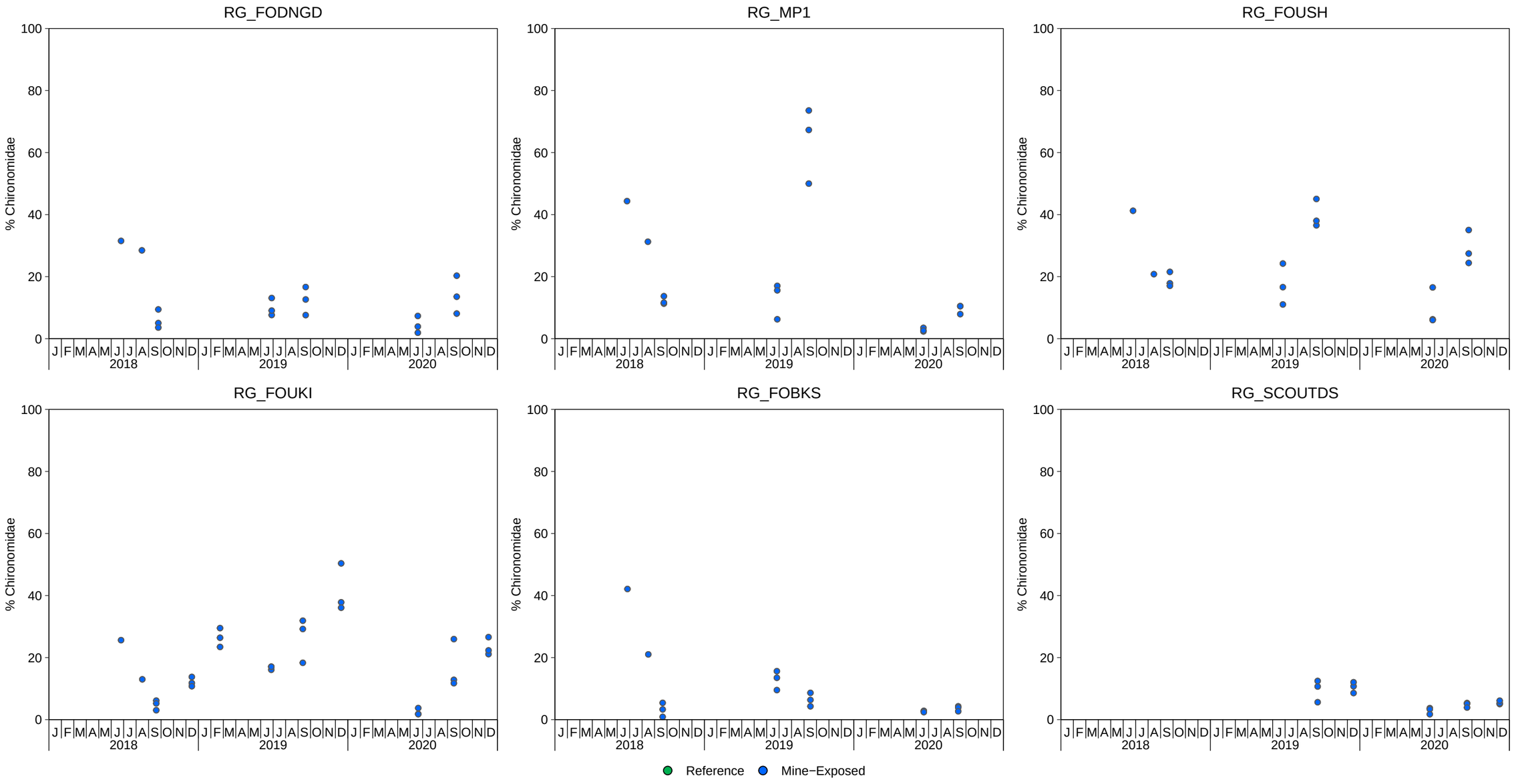


Figure E.41: Benthic Invertebrate % Chironomidae, FRO LAEMP, June 2018 to December 2020

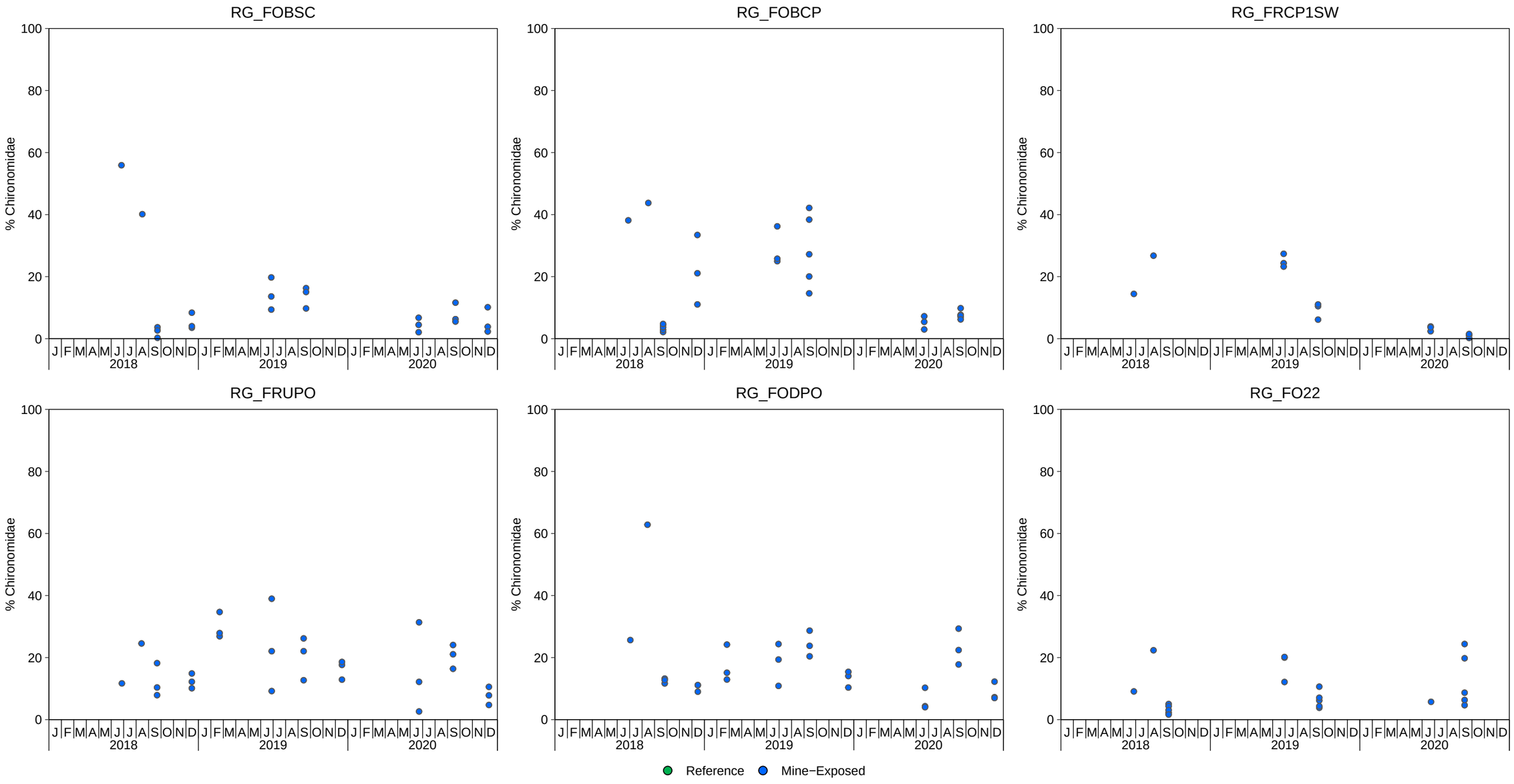


Figure E.41: **Benthic Invertebrate % Chironomidae, FRO LAEMP, June 2018 to December 2020**

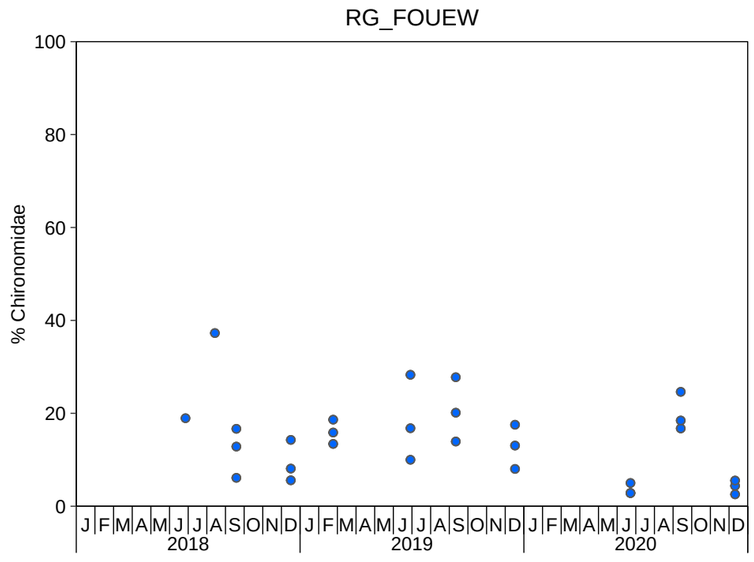


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Figure E.41: Benthic Invertebrate % Chironomidae, FRO LAEMP, June 2018 to December 2020

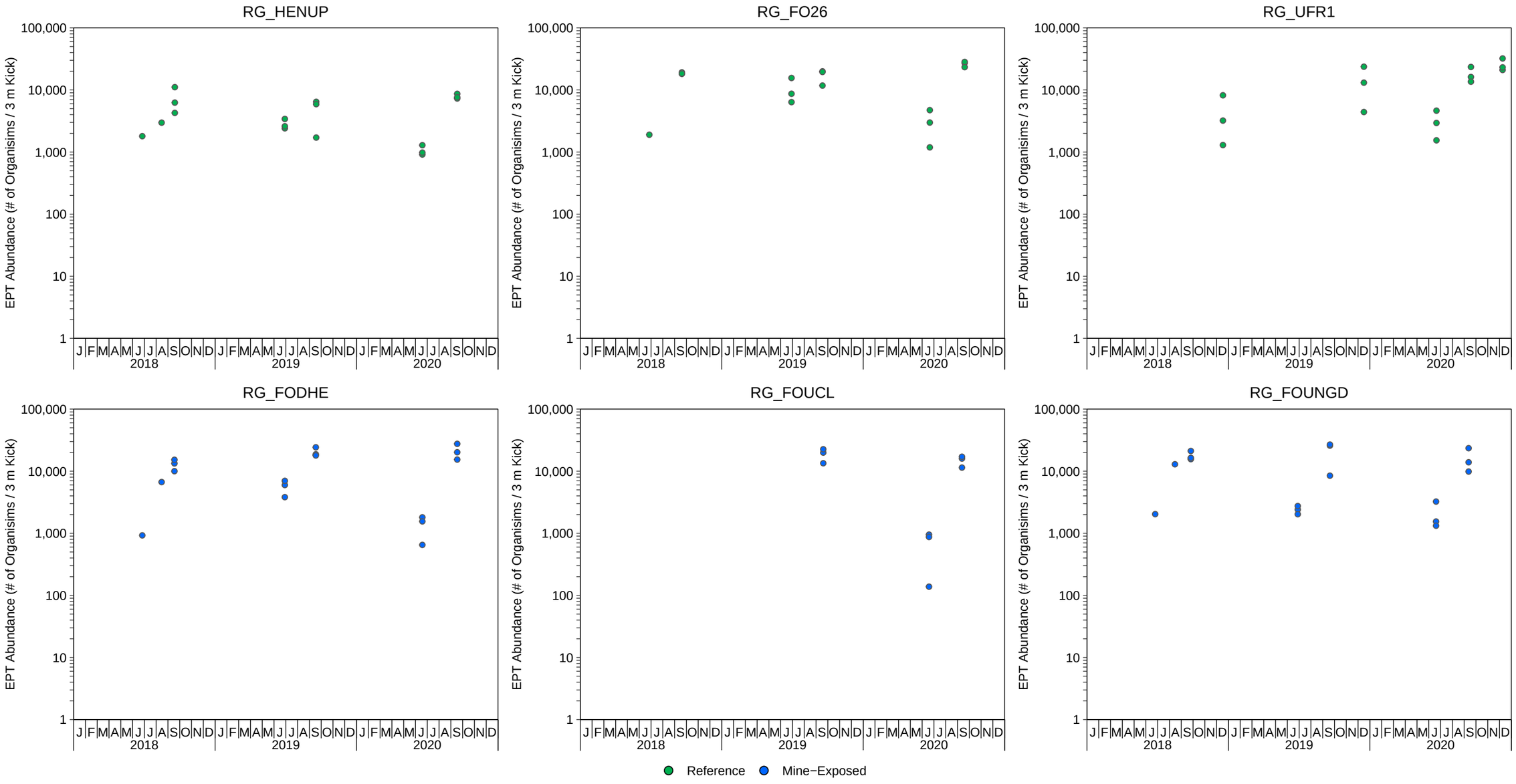

Figure E.42: Benthic Invertebrate EPT Abundance, FRO LAEMP, June 2018 to December 2020

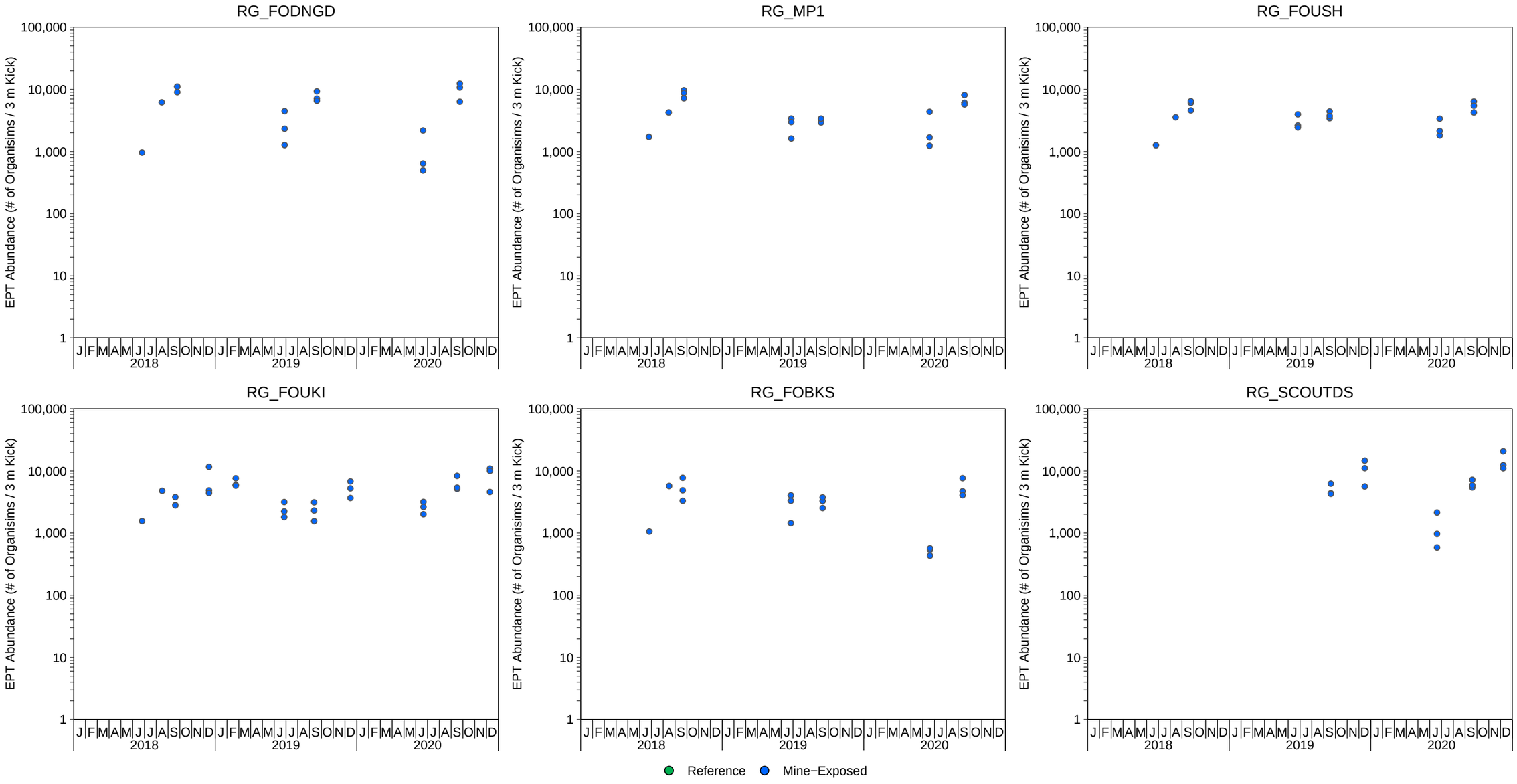

Figure E.42: **Benthic Invertebrate EPT Abundance, FRO LAEMP, June 2018 to December 2020**

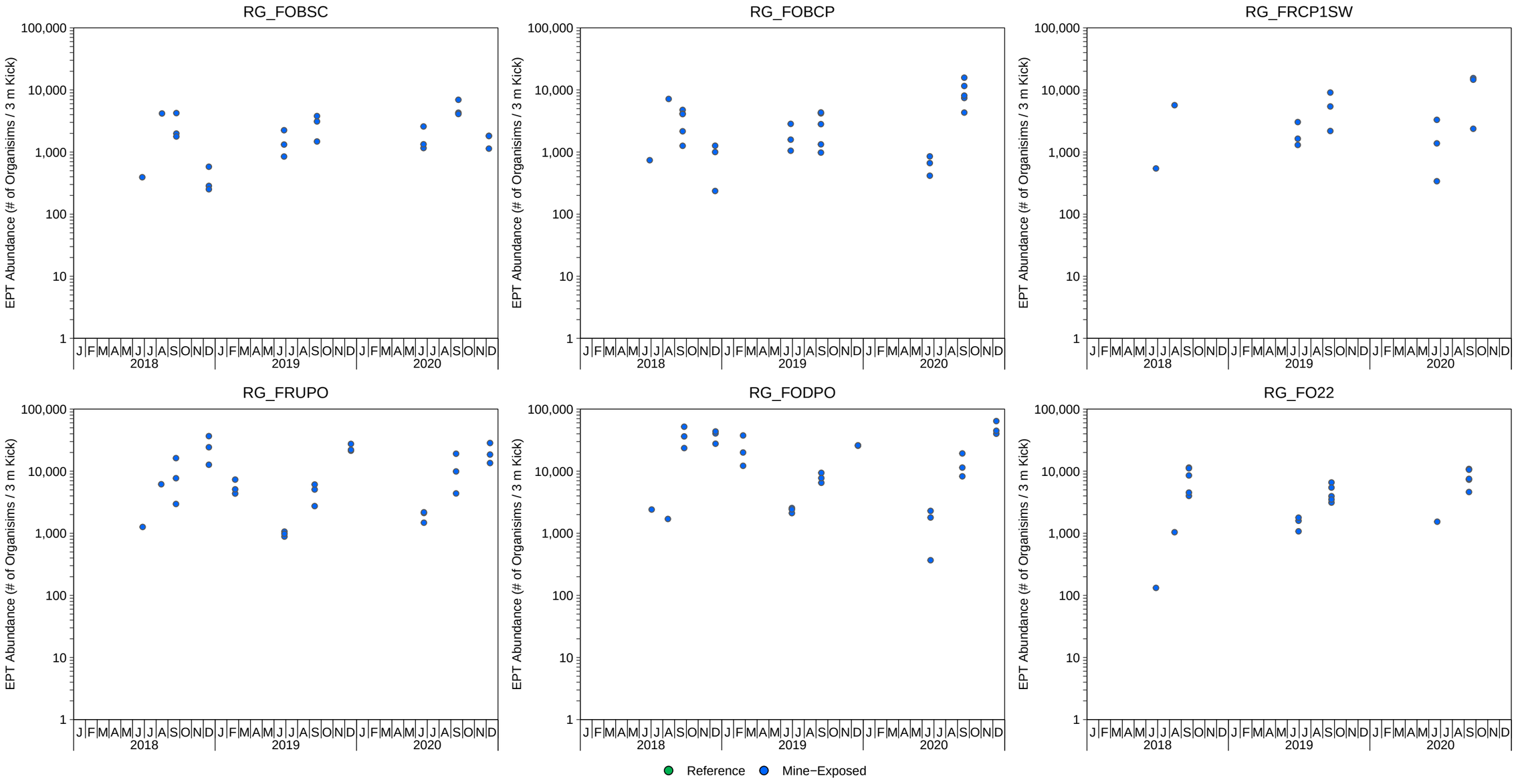

Figure E.42: Benthic Invertebrate EPT Abundance, FRO LAEMP, June 2018 to December 2020

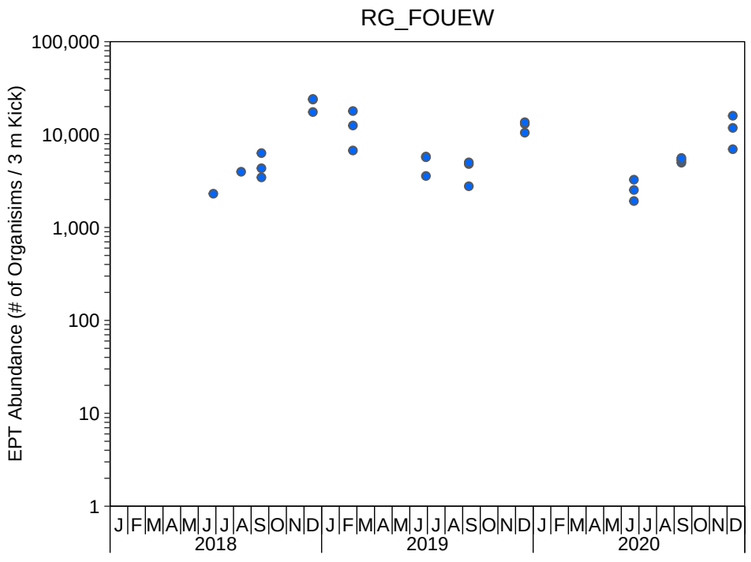

Figure E.42: Benthic Invertebrate EPT Abundance, FRO LAEMP, June 2018 to December 2020

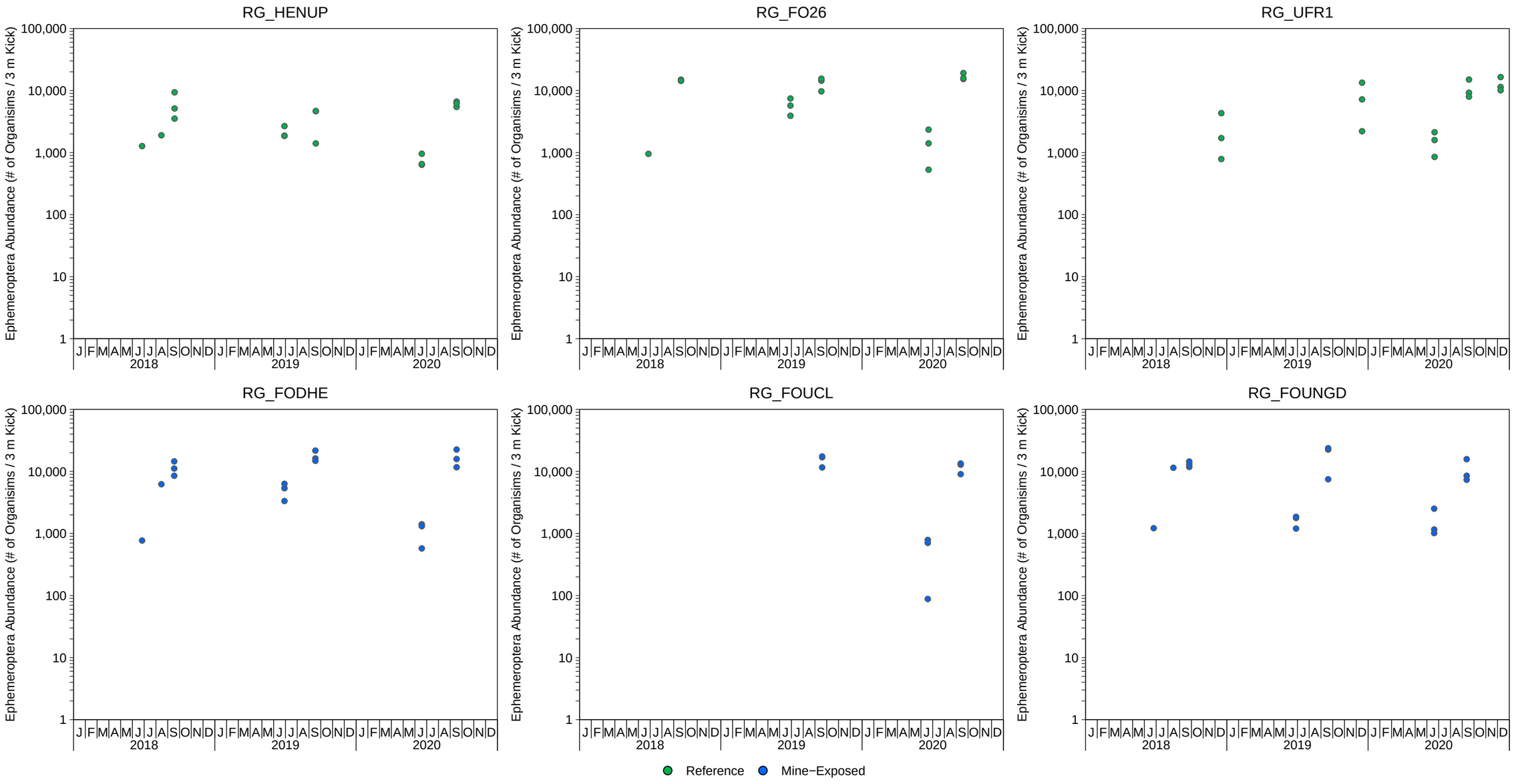

Figure E.43: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, June 2018 to December 2020

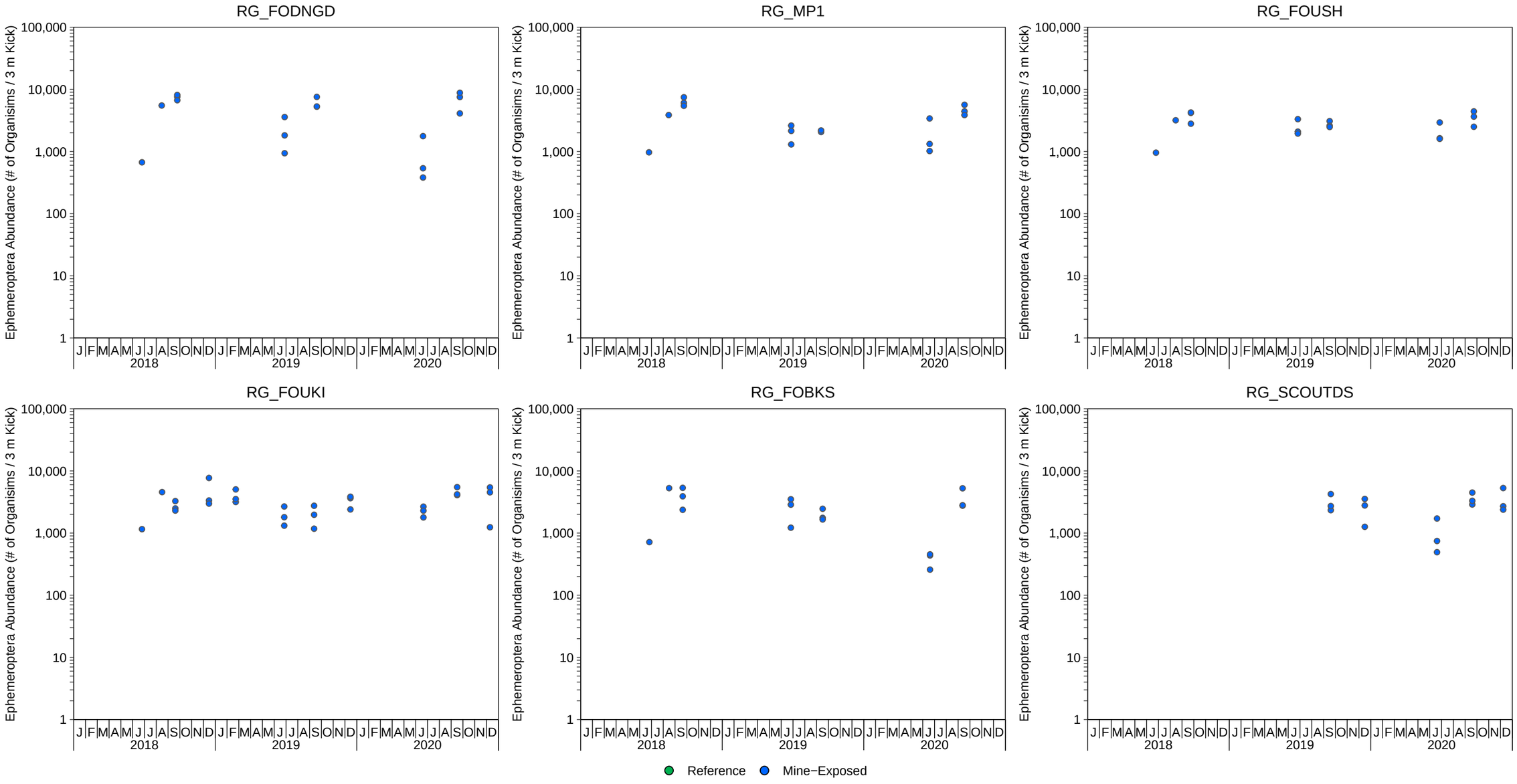

Figure E.43: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, June 2018 to December 2020

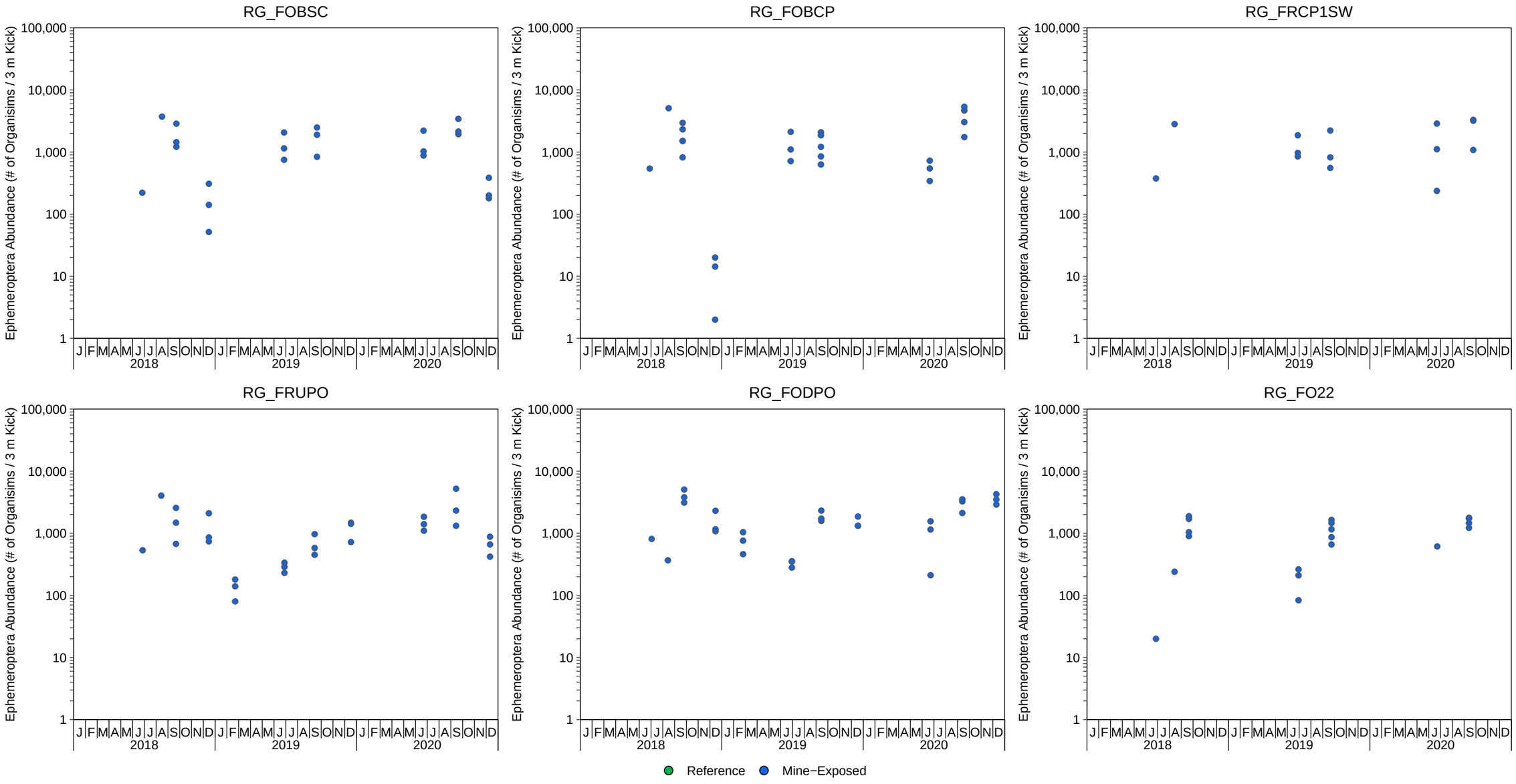

Figure E.43: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, June 2018 to December 2020

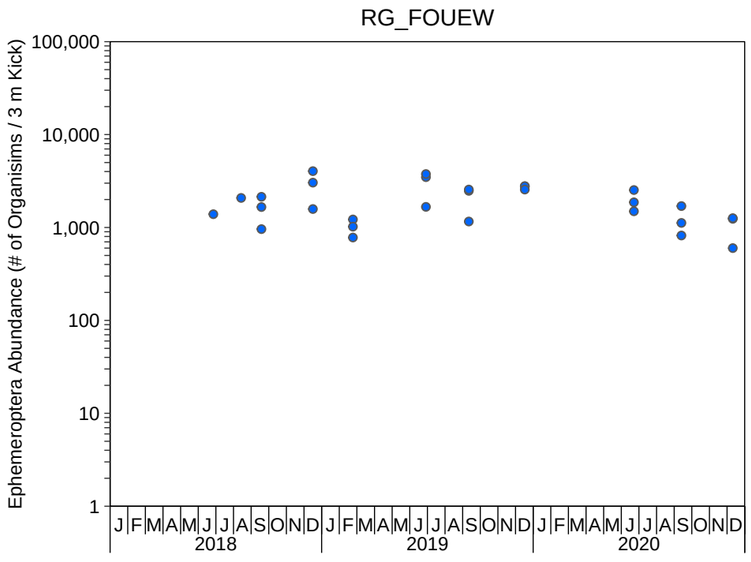

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Figure E.43: Benthic Invertebrate Ephemeroptera Abundance, FRO LAEMP, June 2018 to December 2020

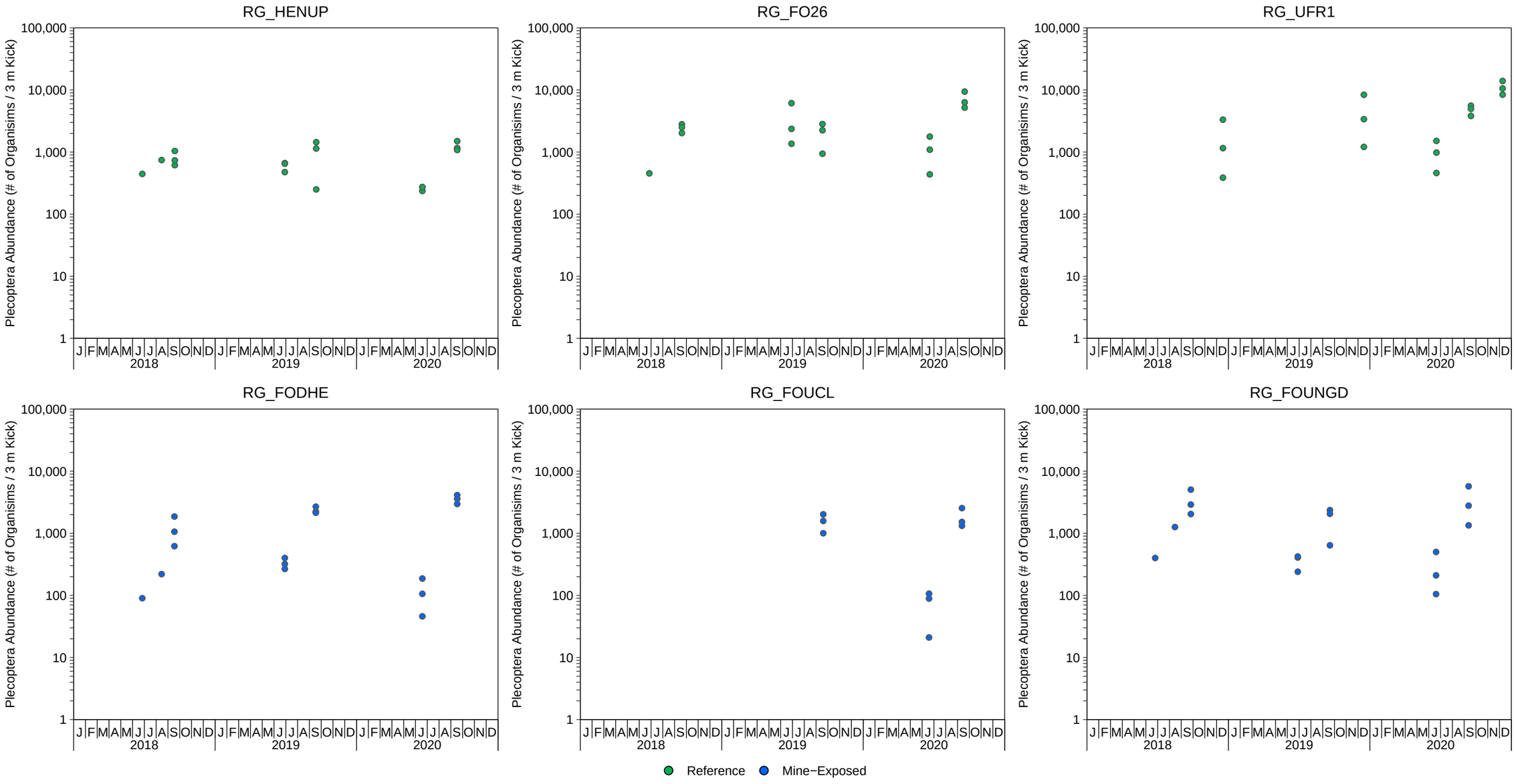

Figure E.44: **Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, June 2018 to December 2020**

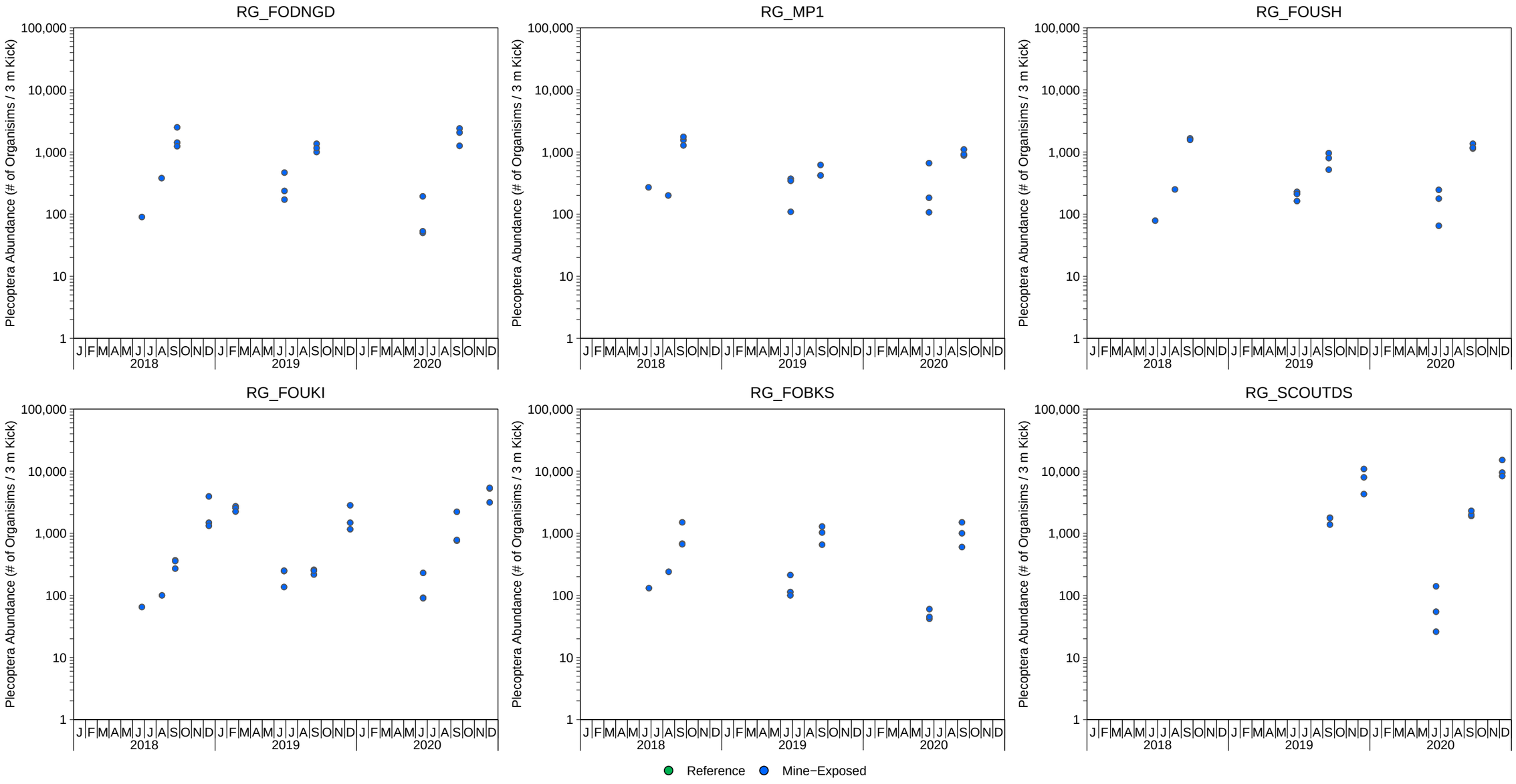

Figure E.44: **Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, June 2018 to December 2020**

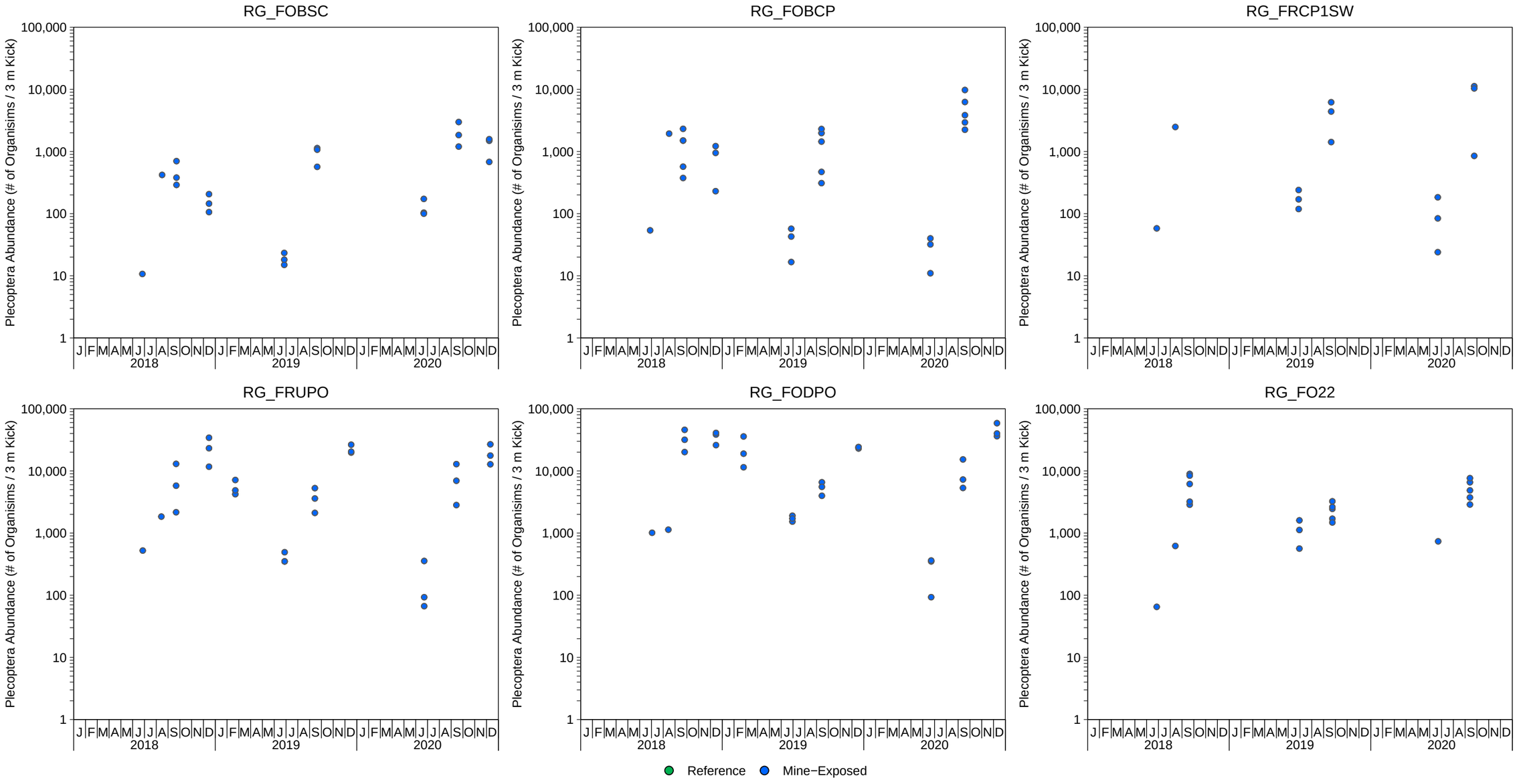

Figure E.44: **Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, June 2018 to December 2020**

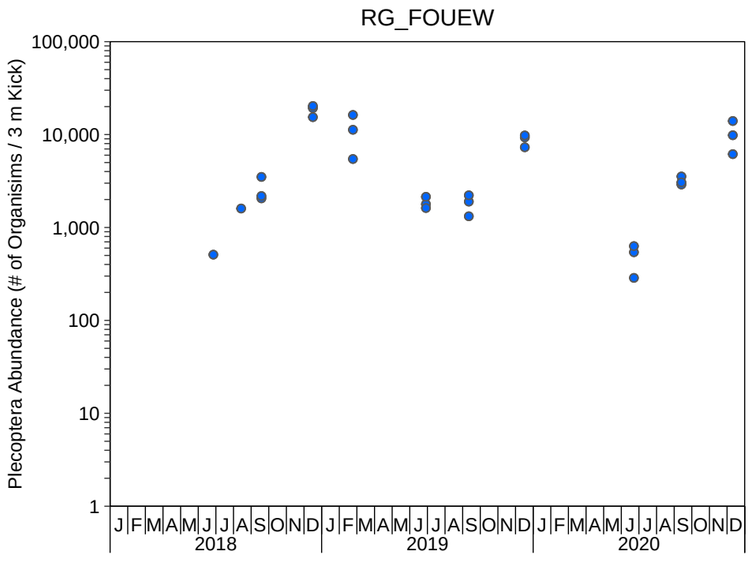

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Figure E.44: Benthic Invertebrate Plecoptera Abundance, FRO LAEMP, June 2018 to December 2020

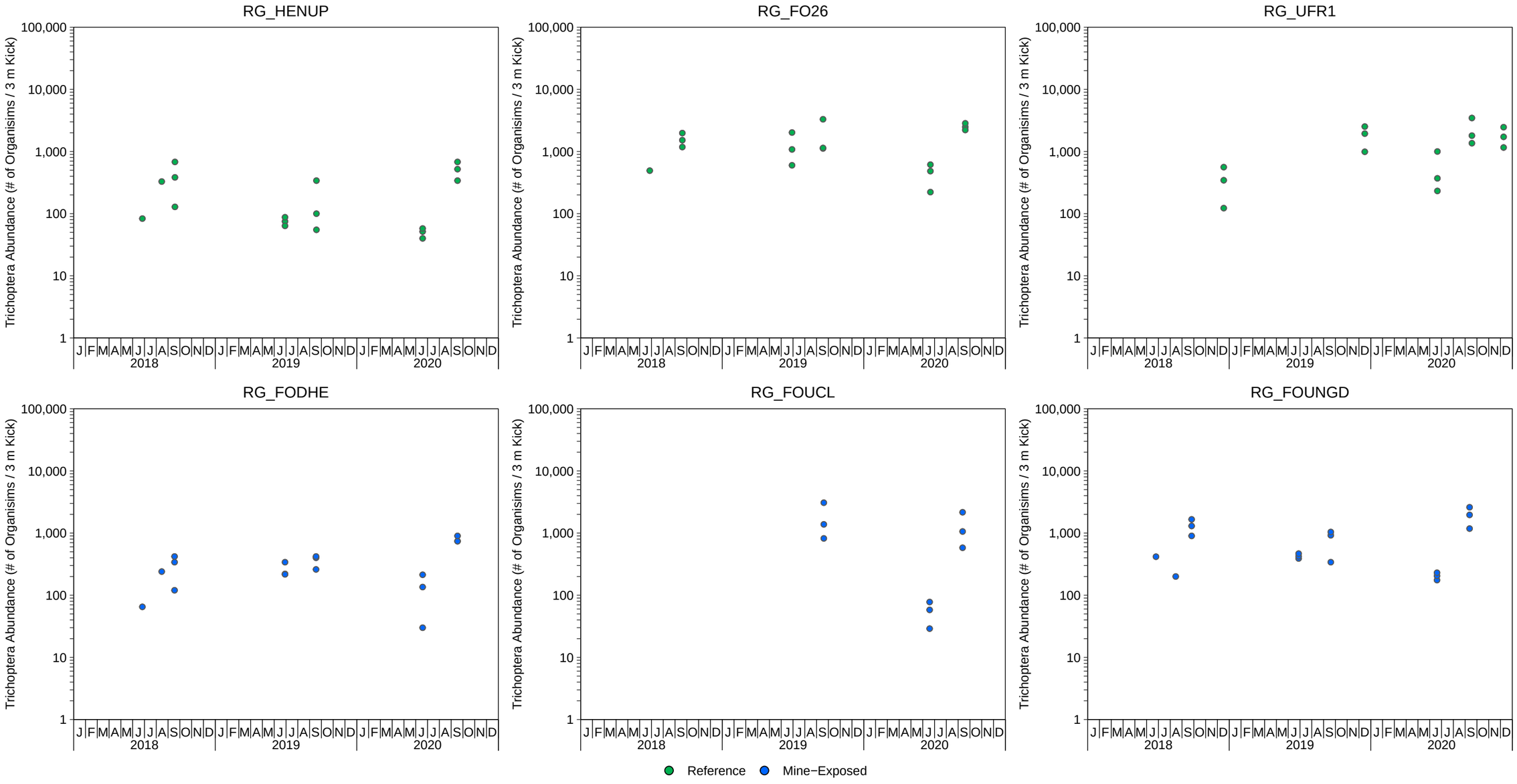
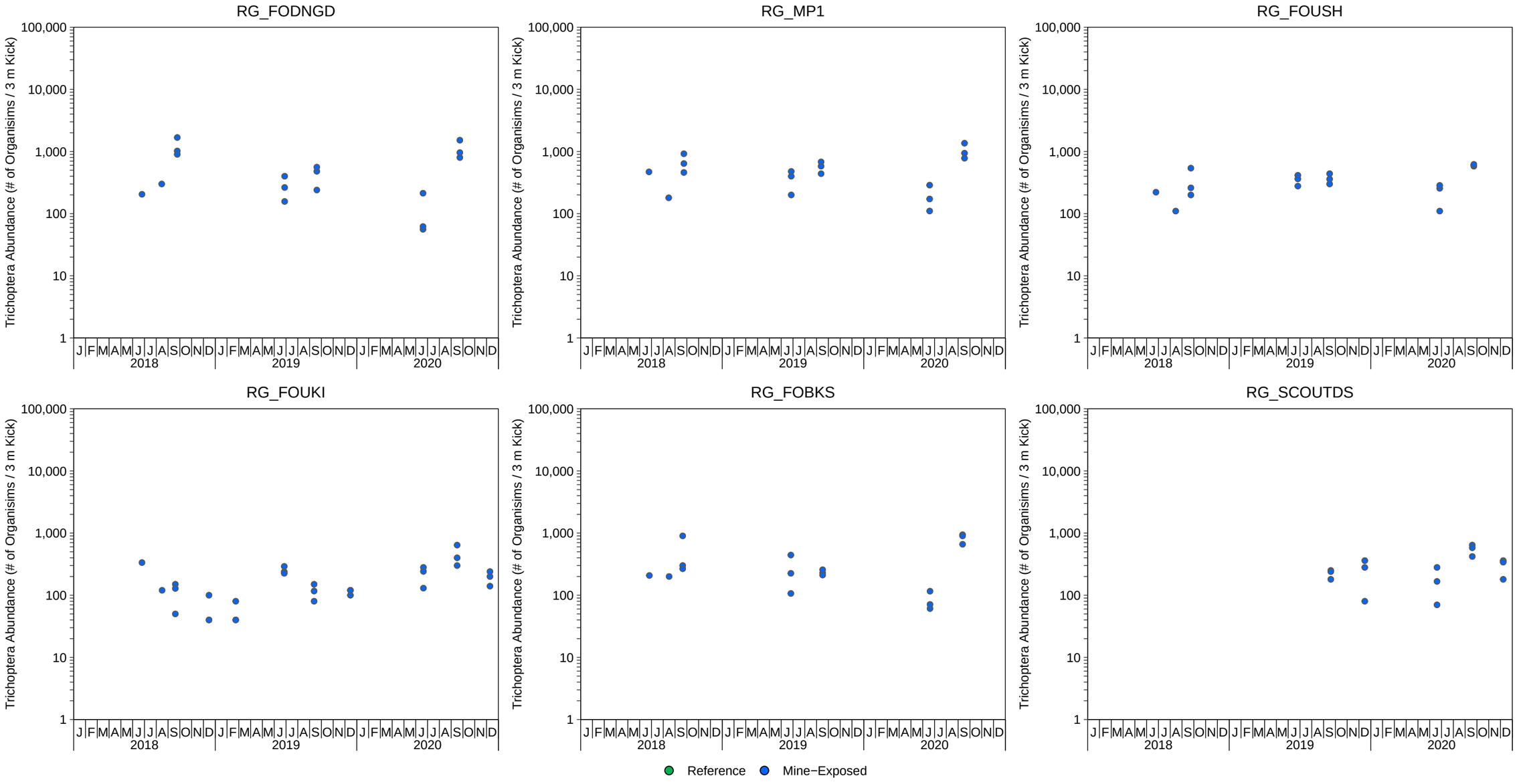


Figure E.45: **Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, June 2018 to December 2020**



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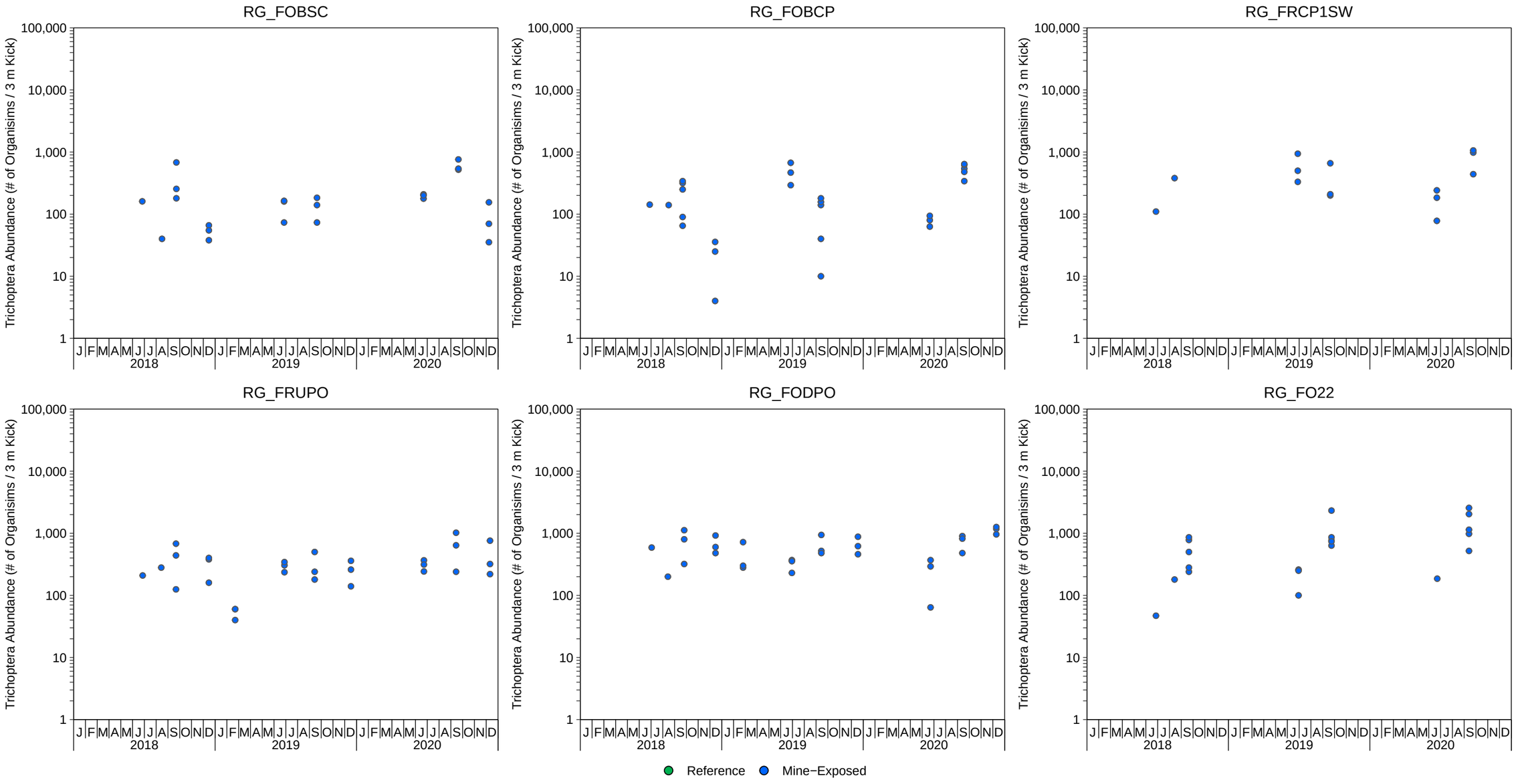

Figure E.45: **Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, June 2018 to December 2020**

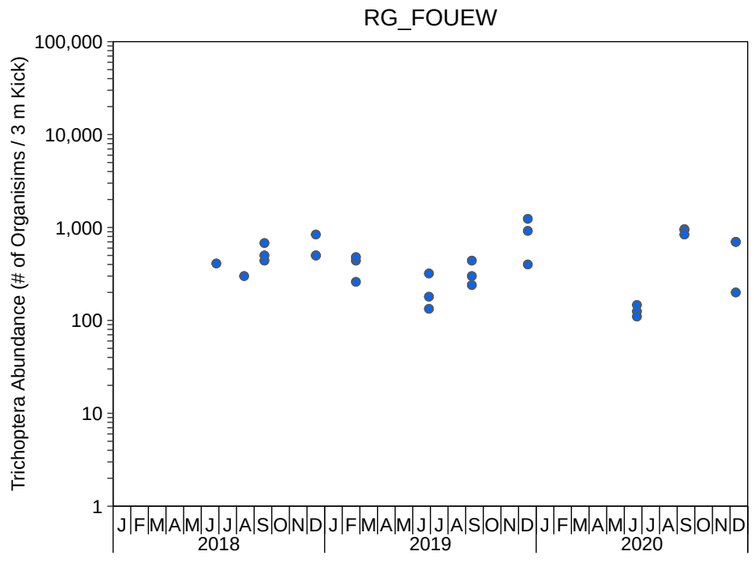

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Figure E.45: Benthic Invertebrate Trichoptera Abundance, FRO LAEMP, June 2018 to December 2020

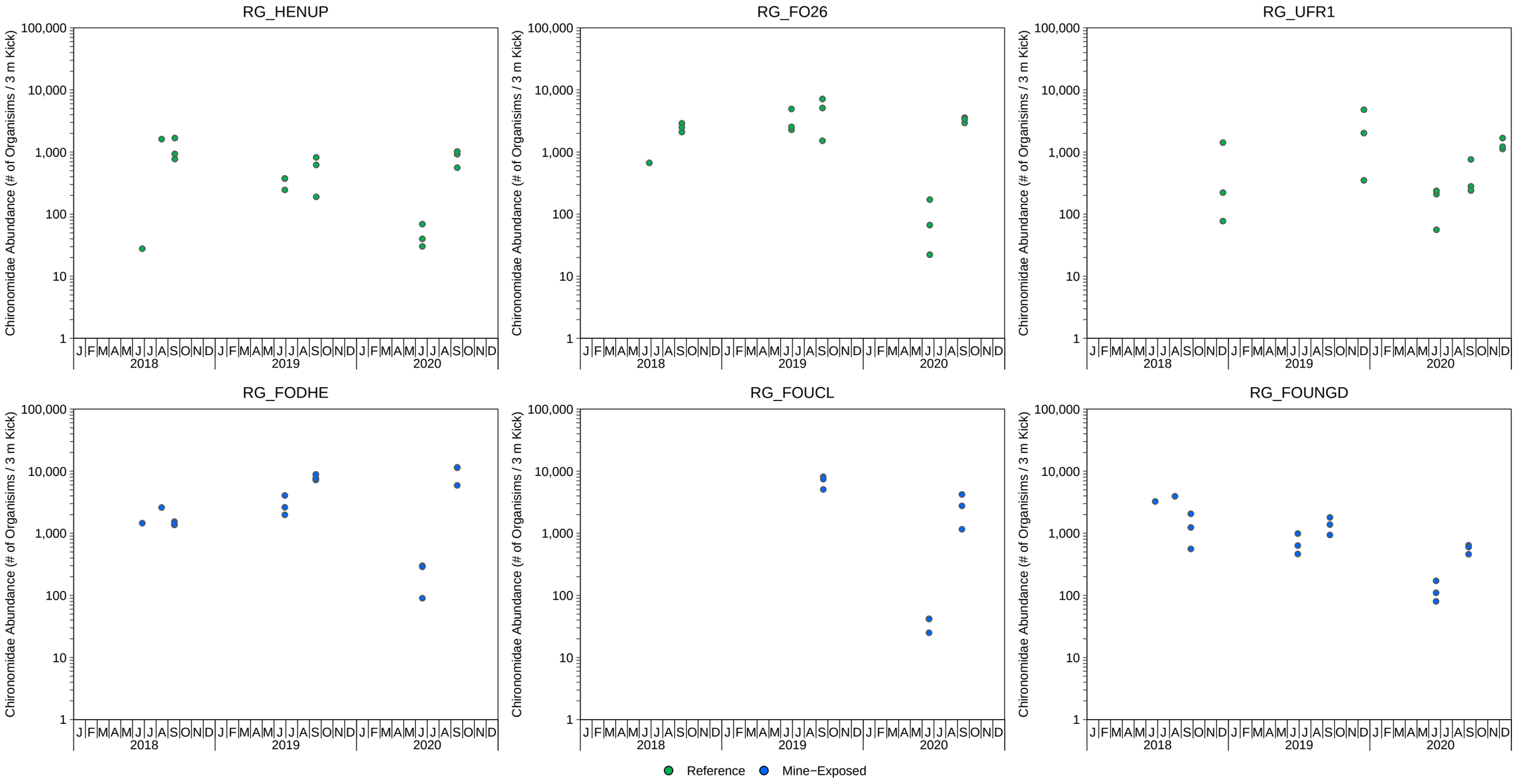

Figure E.46: **Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, June 2018 to December 2020**

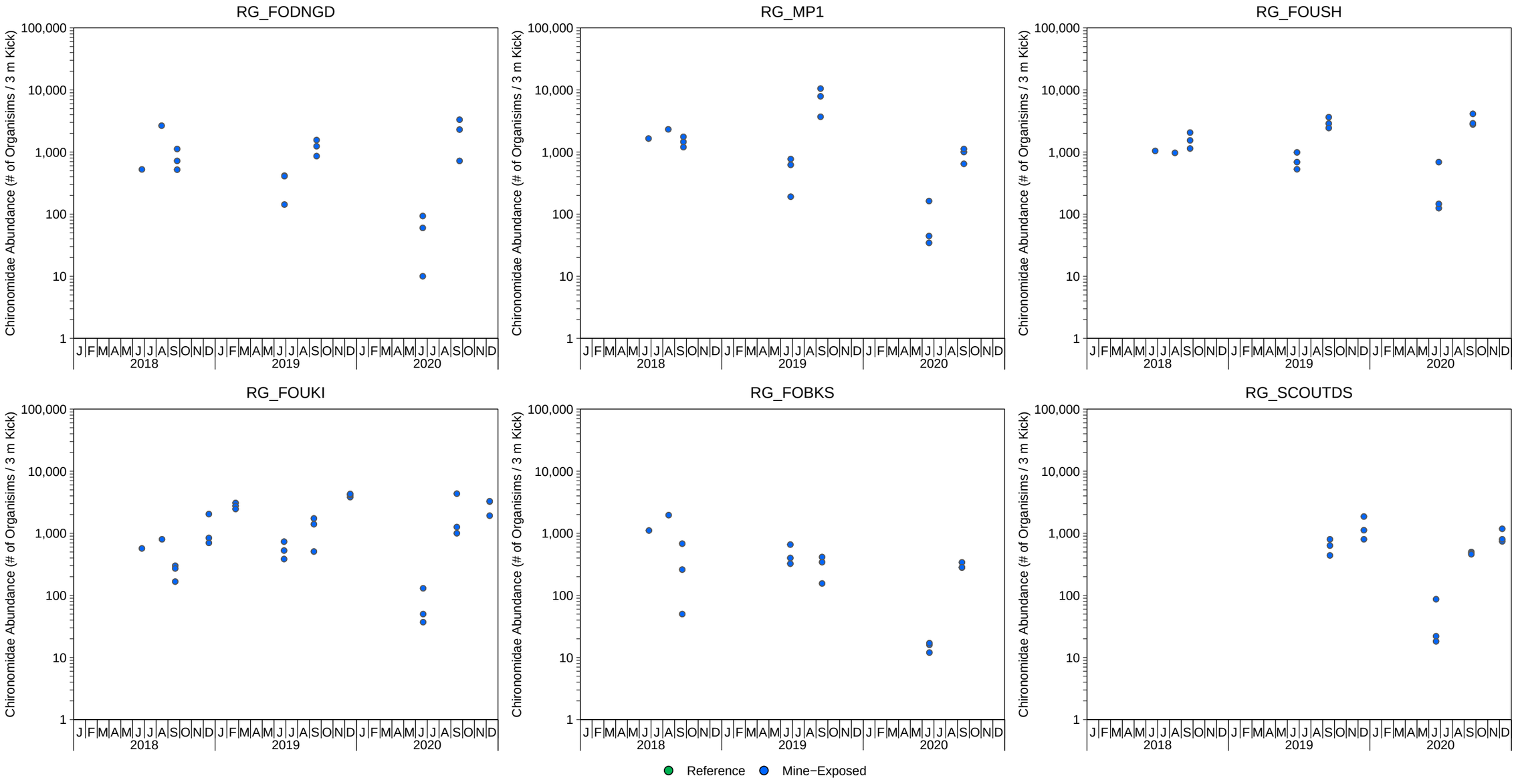

Figure E.46: **Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, June 2018 to December 2020**

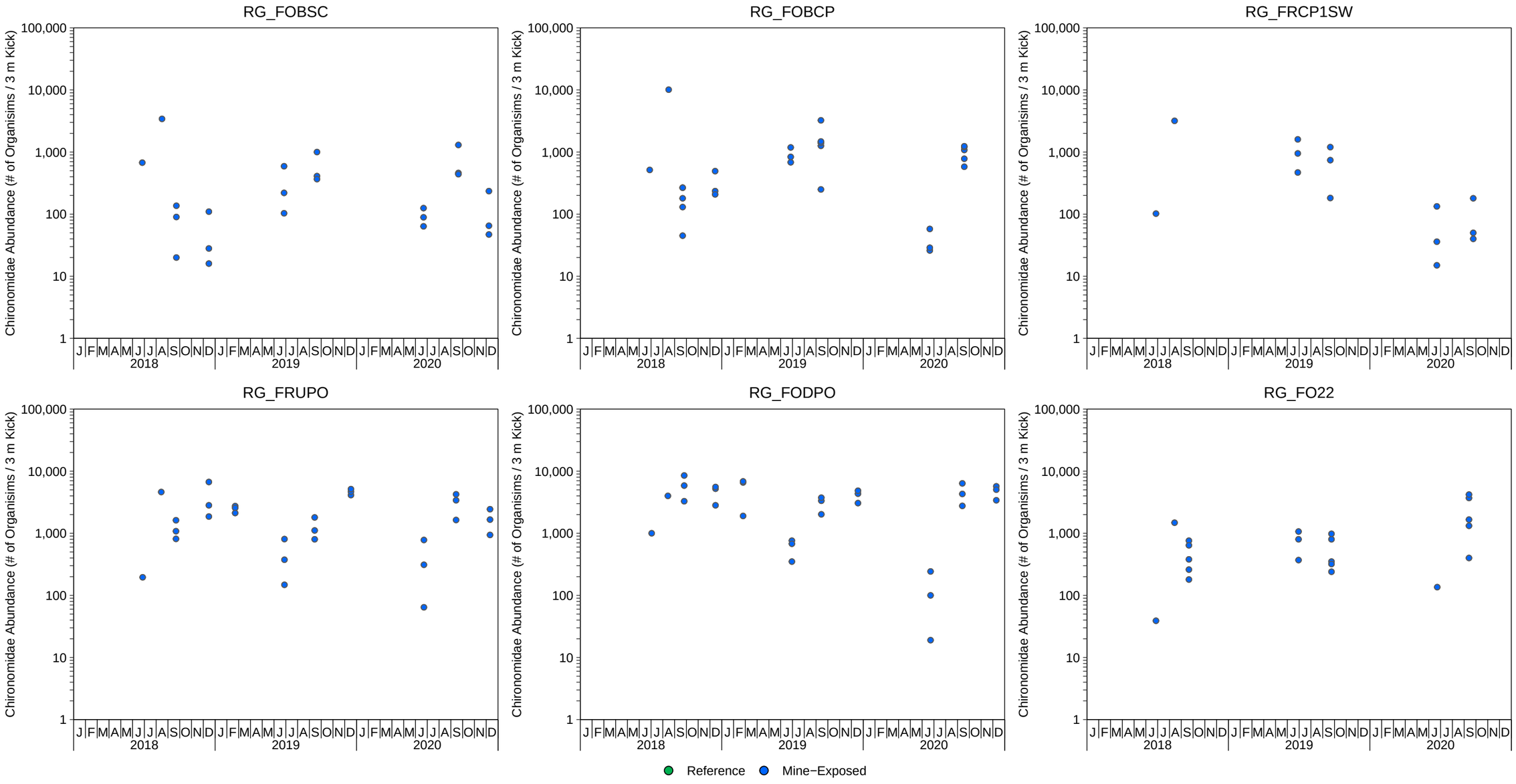

Figure E.46: Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, June 2018 to December 2020

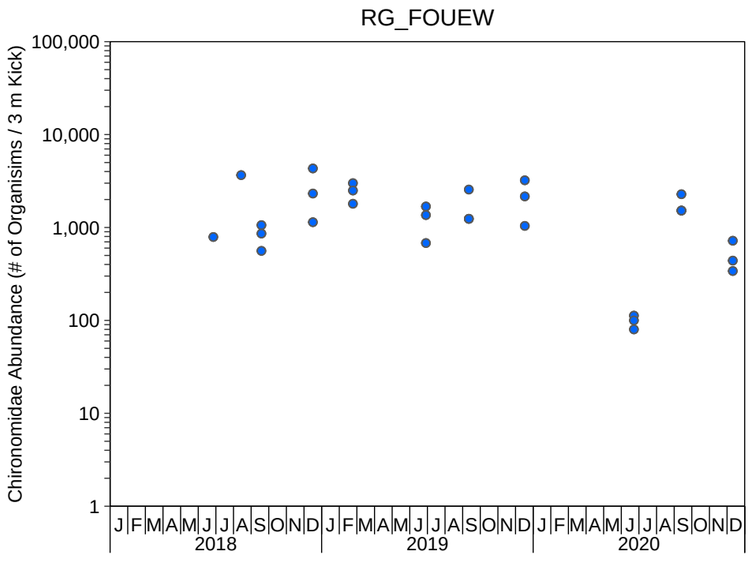

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Figure E.46: Benthic Invertebrate Chironomidae Abundance, FRO LAEMP, June 2018 to December 2020

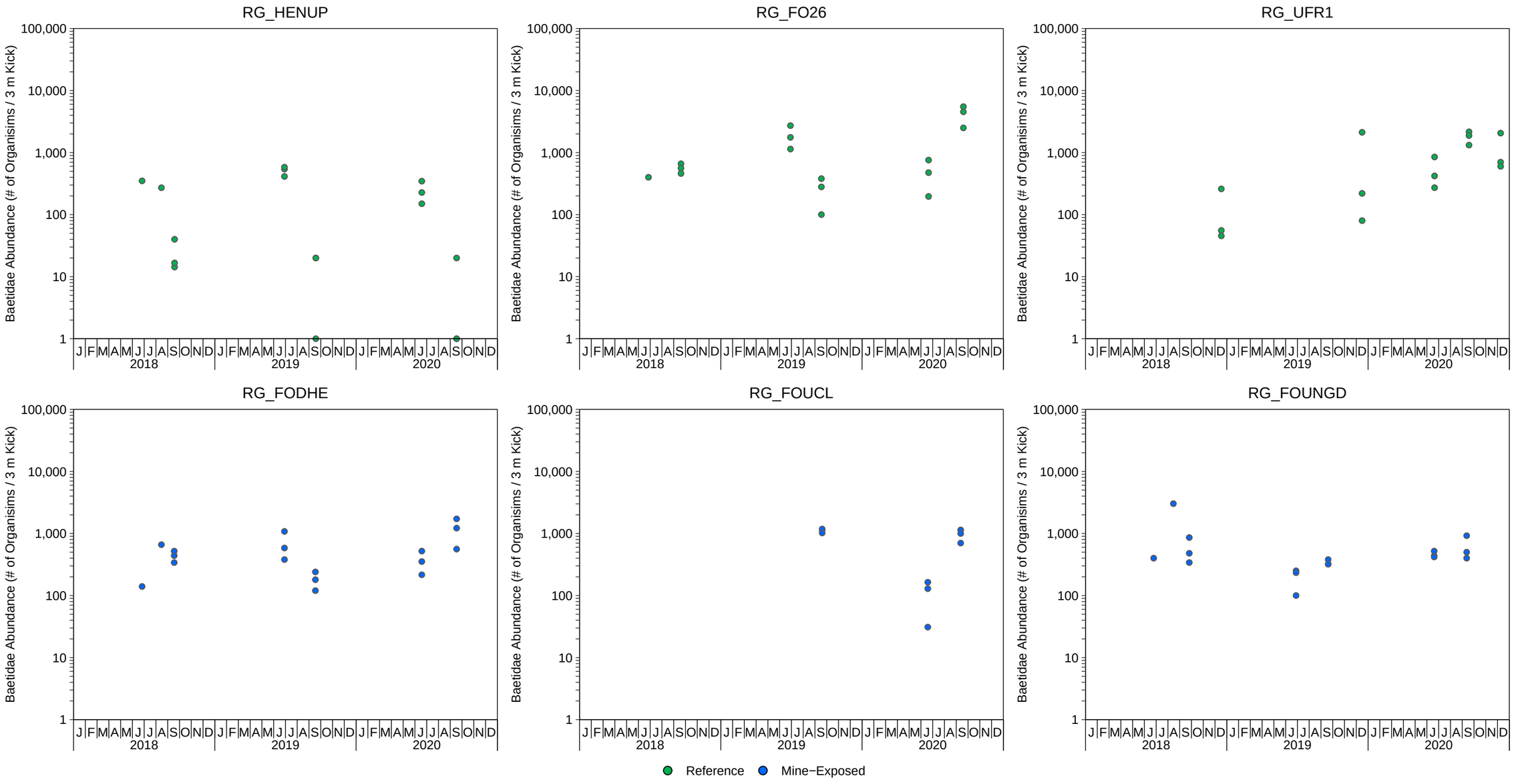

Figure E.47: **Benthic Invertebrate Baetidae Abundance, FRO LAEMP, June 2018 to December 2020**

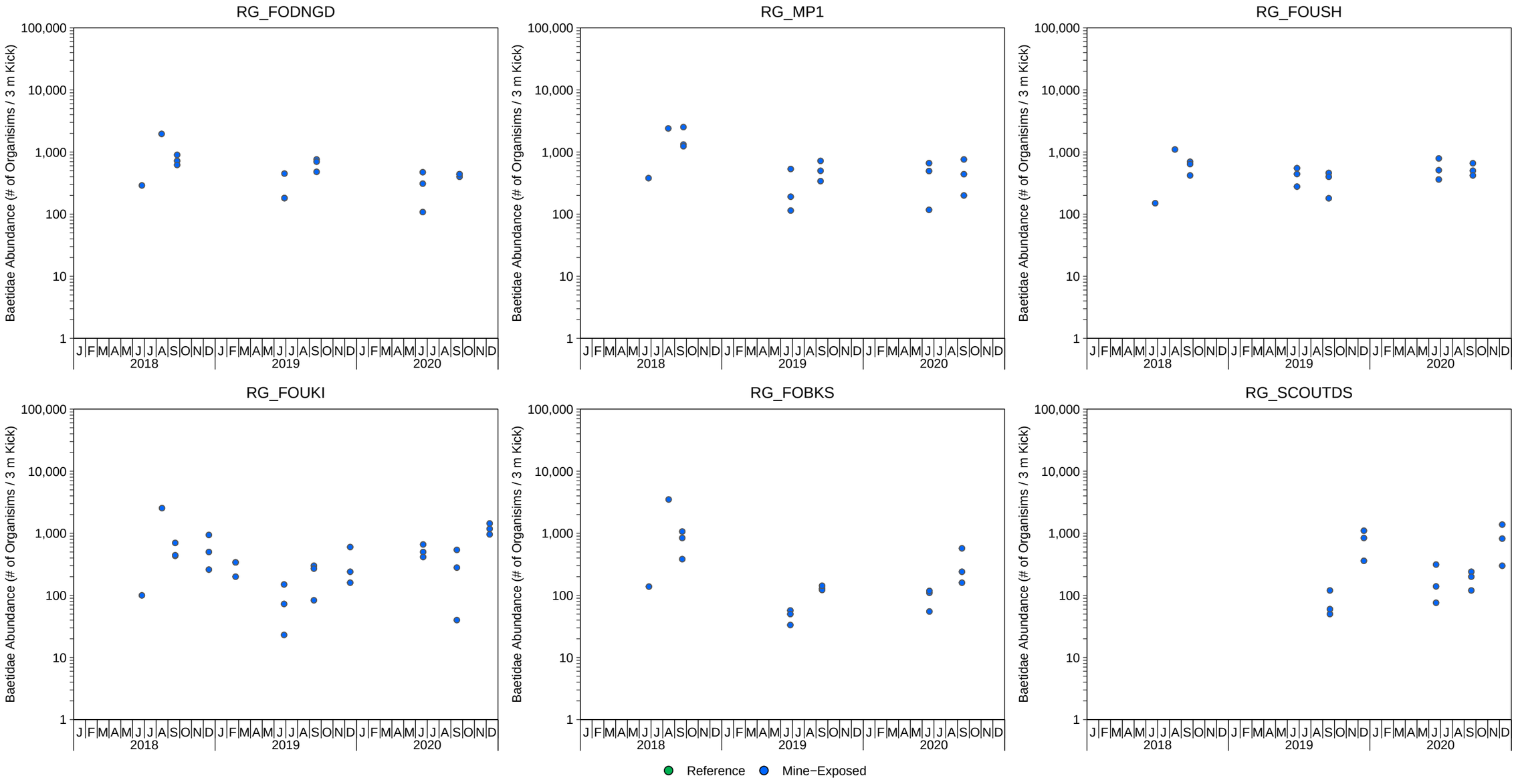

Figure E.47: Benthic Invertebrate Baetidae Abundance, FRO LAEMP, June 2018 to December 2020

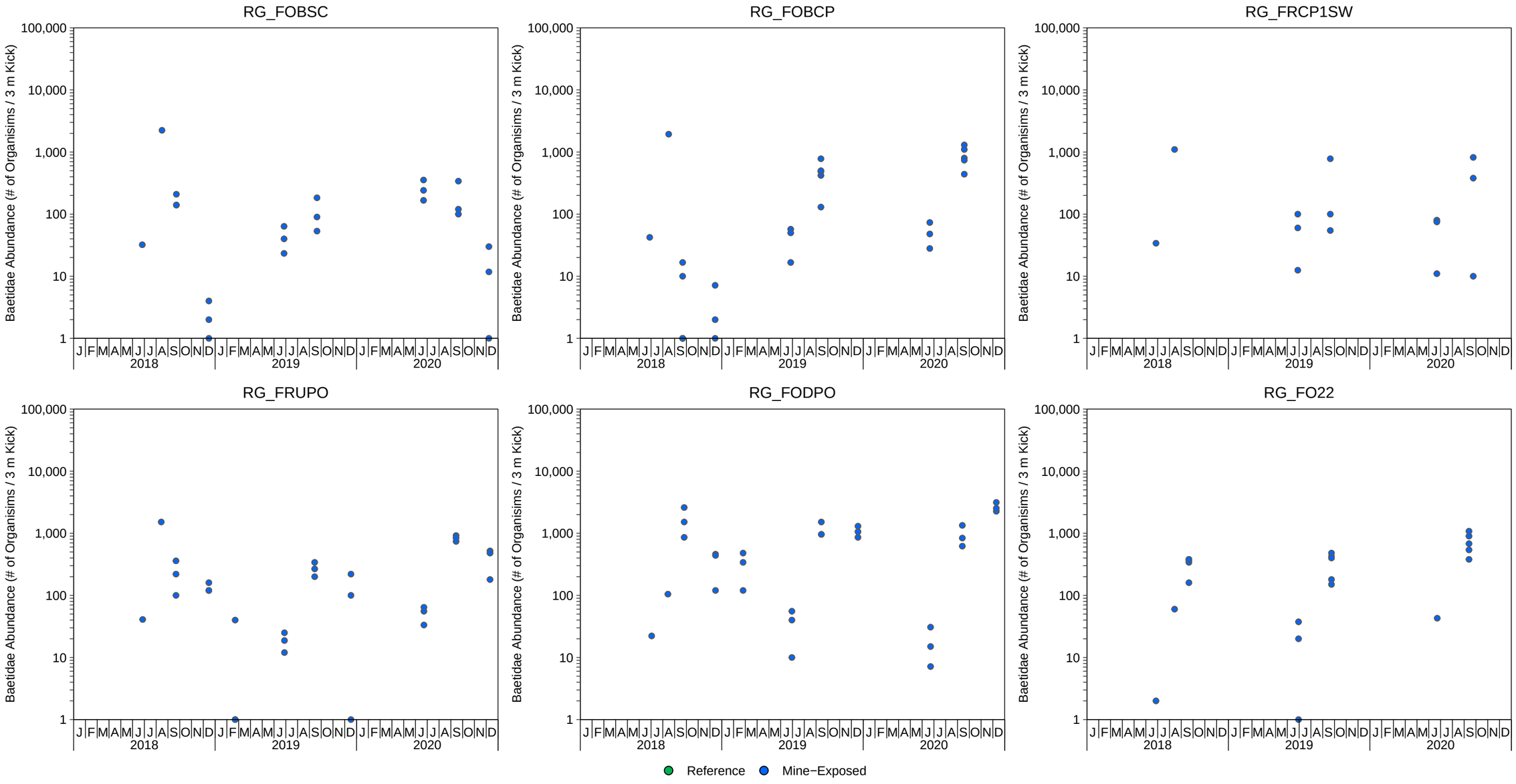

Figure E.47: **Benthic Invertebrate Baetidae Abundance, FRO LAEMP, June 2018 to December 2020**

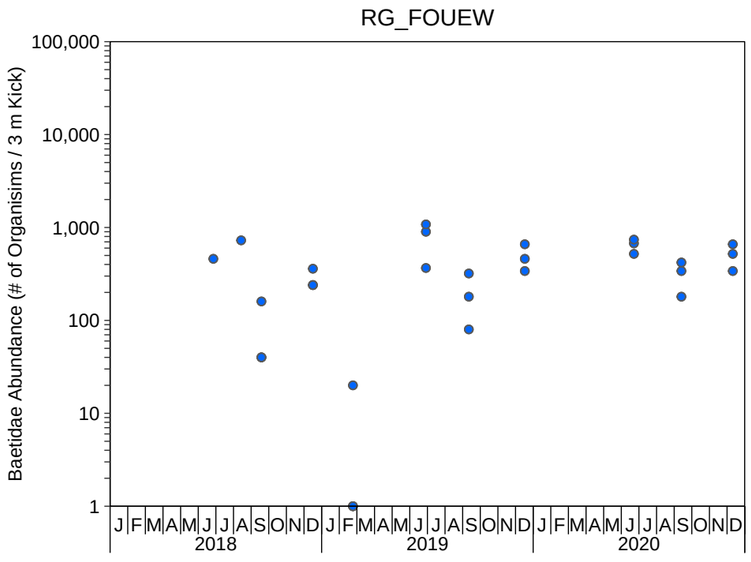

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Figure E.47: Benthic Invertebrate Baetidae Abundance, FRO LAEMP, June 2018 to December 2020

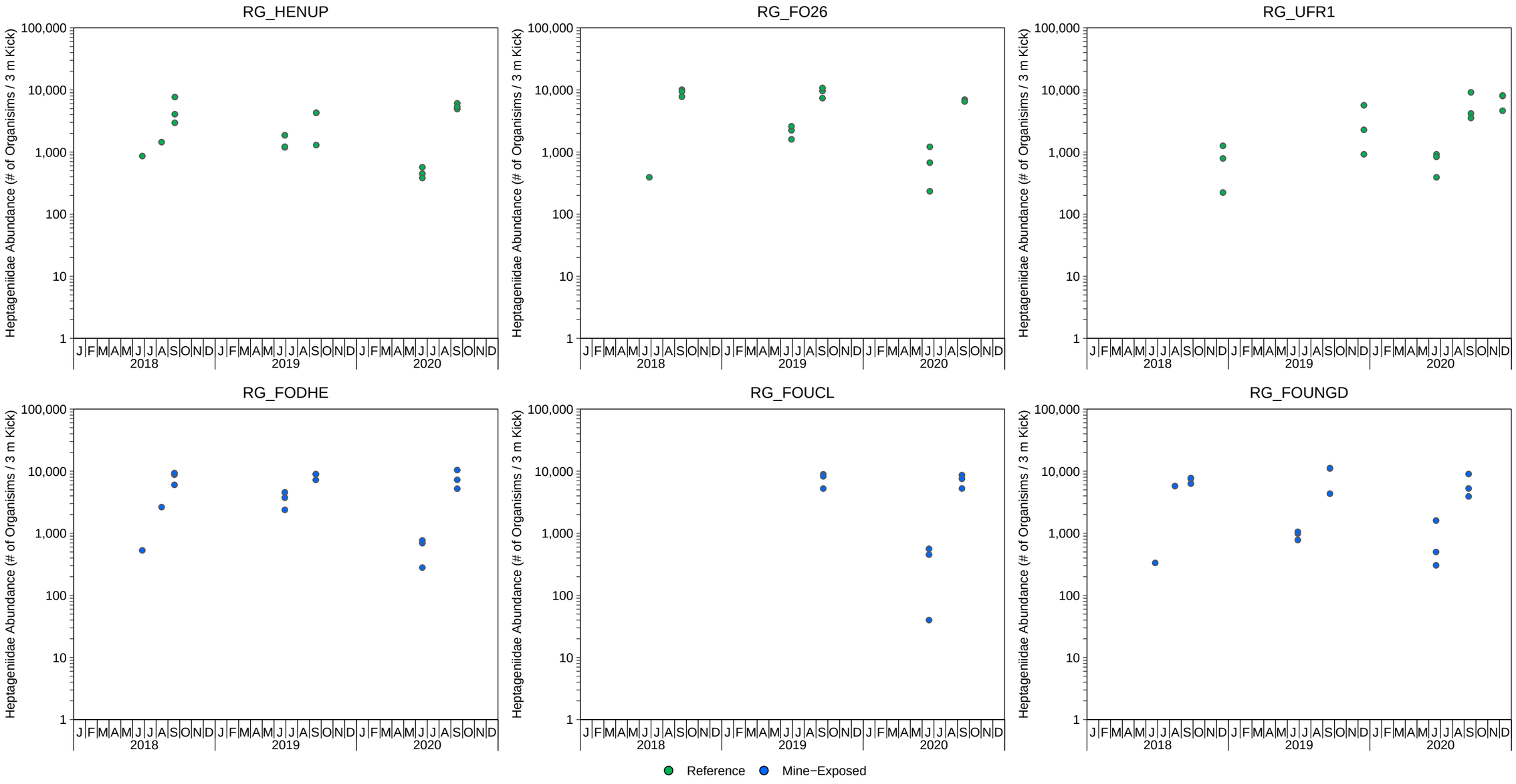

Figure E.48: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, June 2018 to December 2020

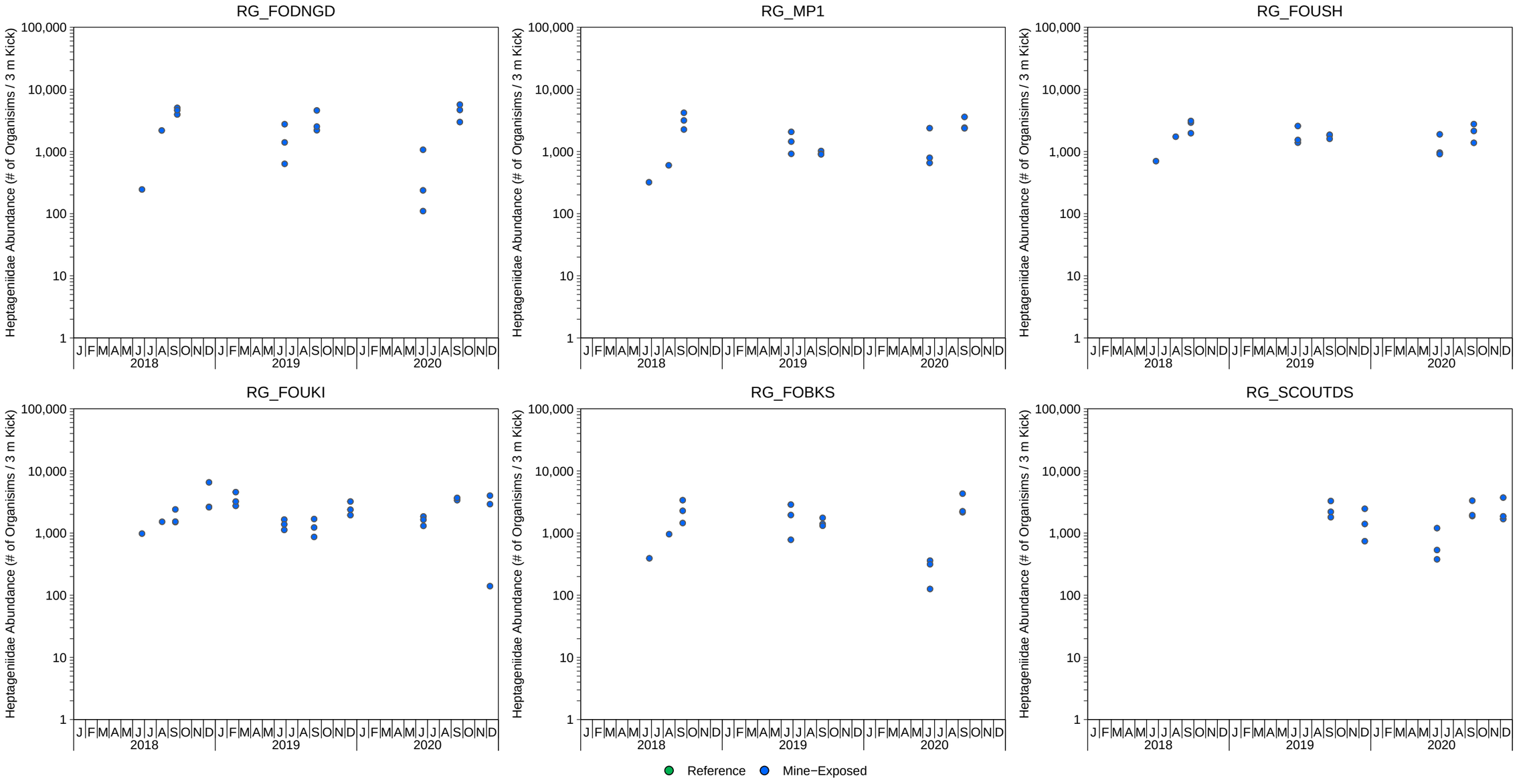

Figure E.48: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, June 2018 to December 2020

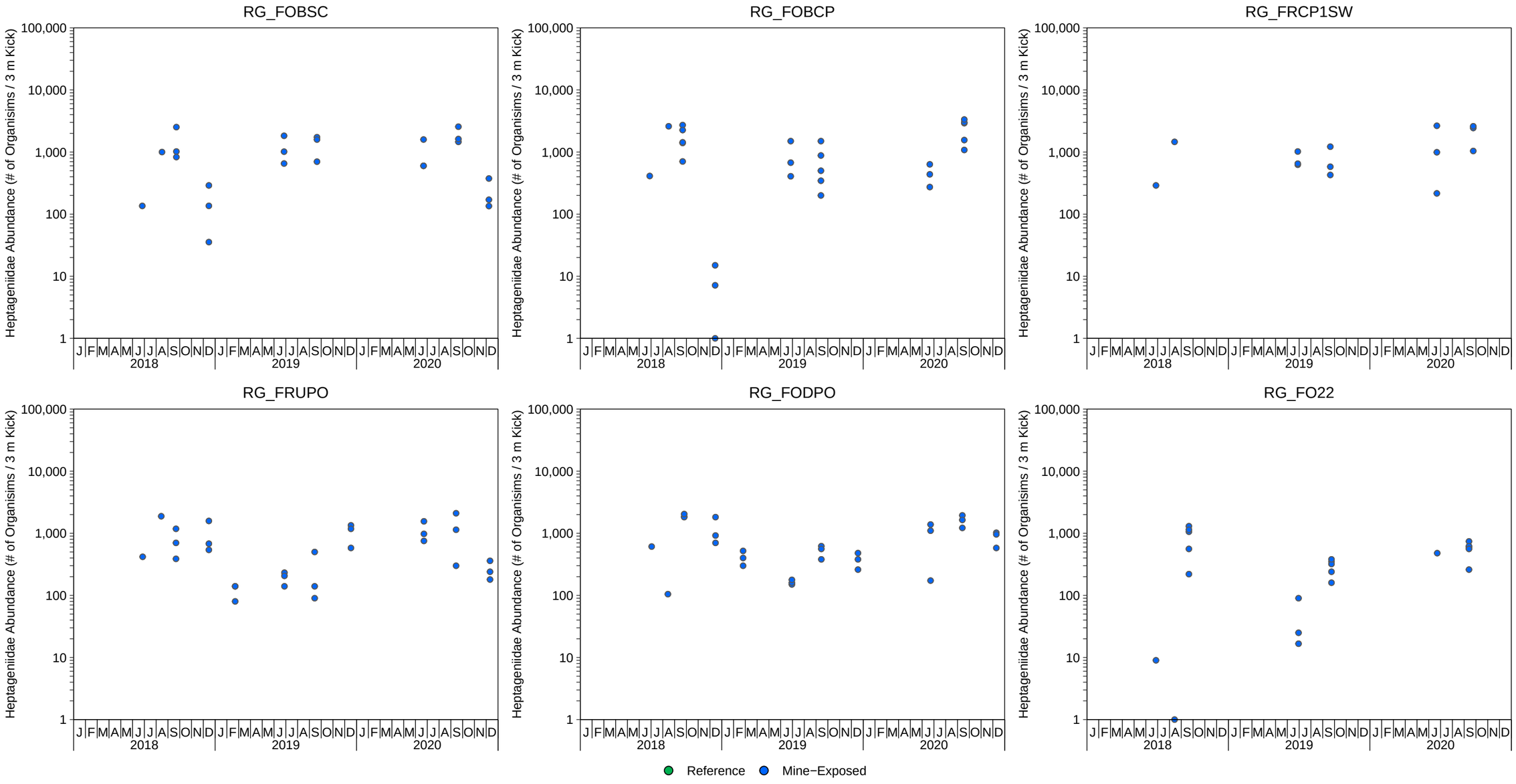

Figure E.48: **Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, June 2018 to December 2020**

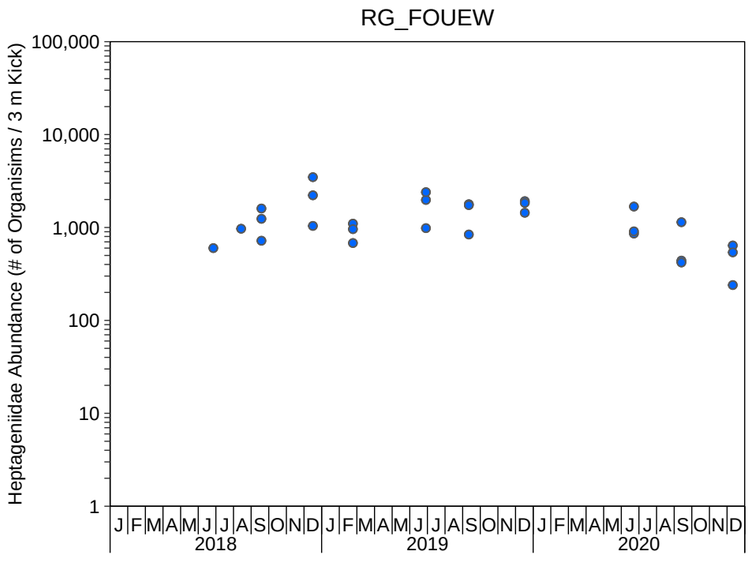

Figure E.48: Benthic Invertebrate Heptageniidae Abundance, FRO LAEMP, June 2018 to December 2020

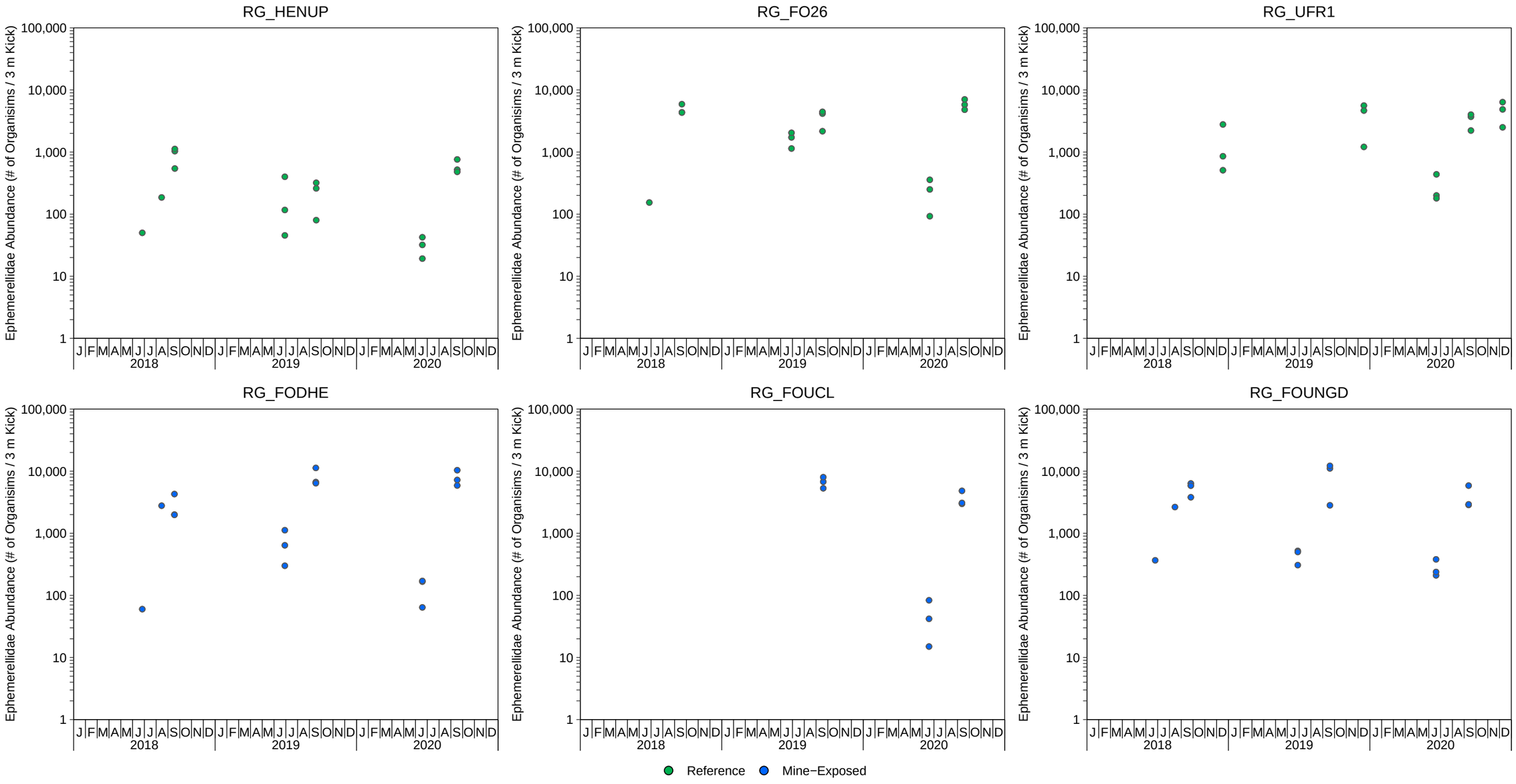

Figure E.49: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, June 2018 to December 2020

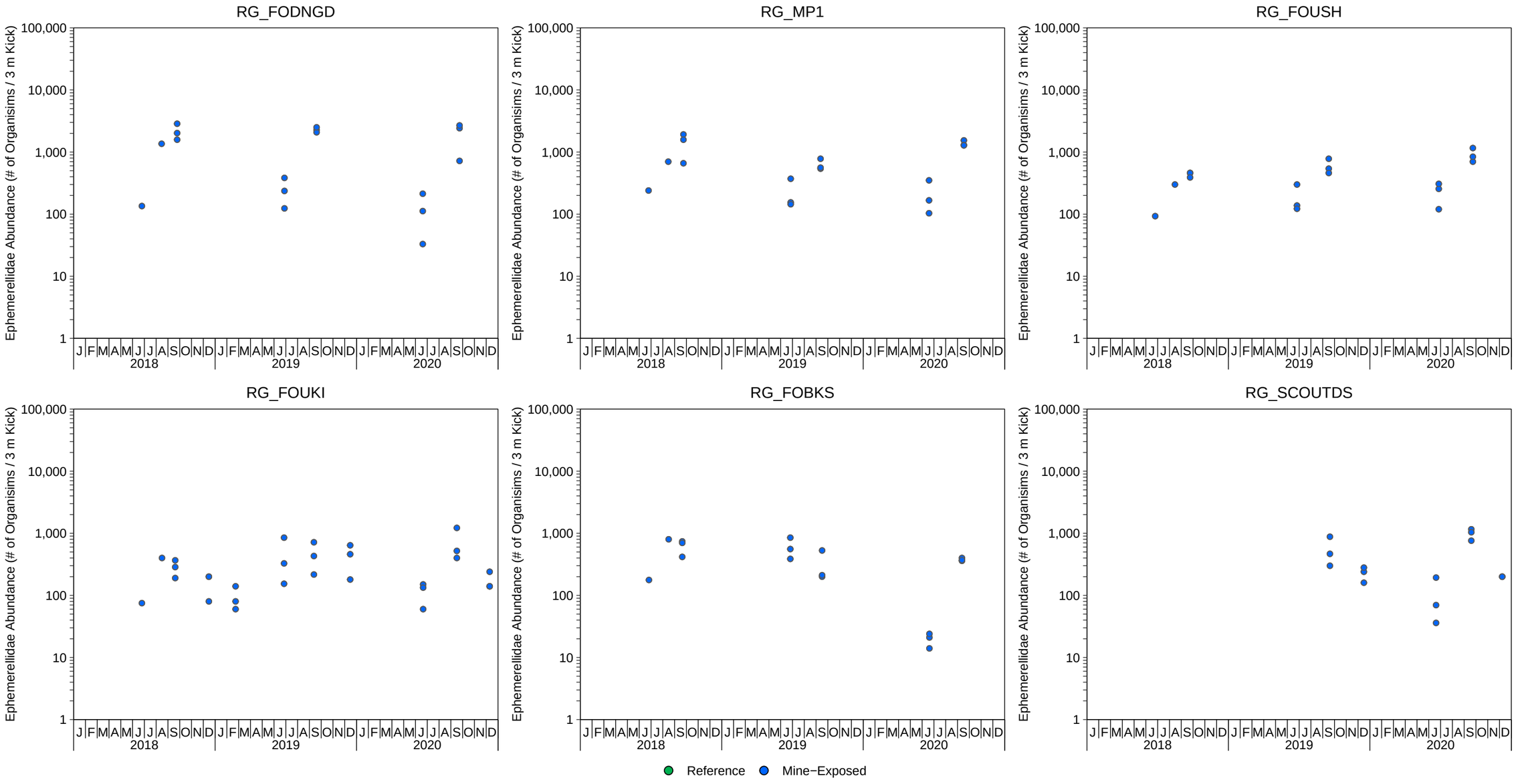

Figure E.49: **Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, June 2018 to December 2020**

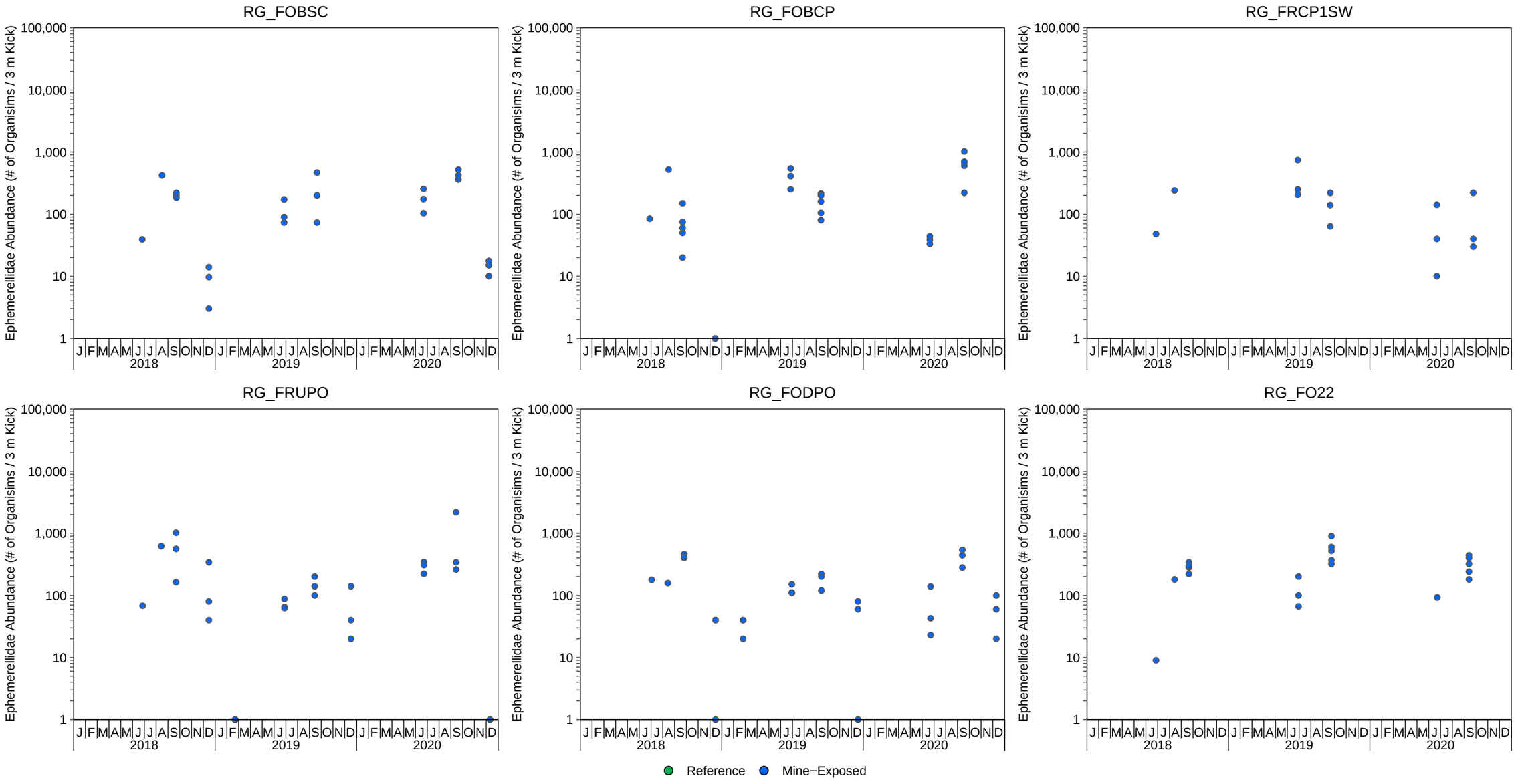

Figure E.49: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, June 2018 to December 2020

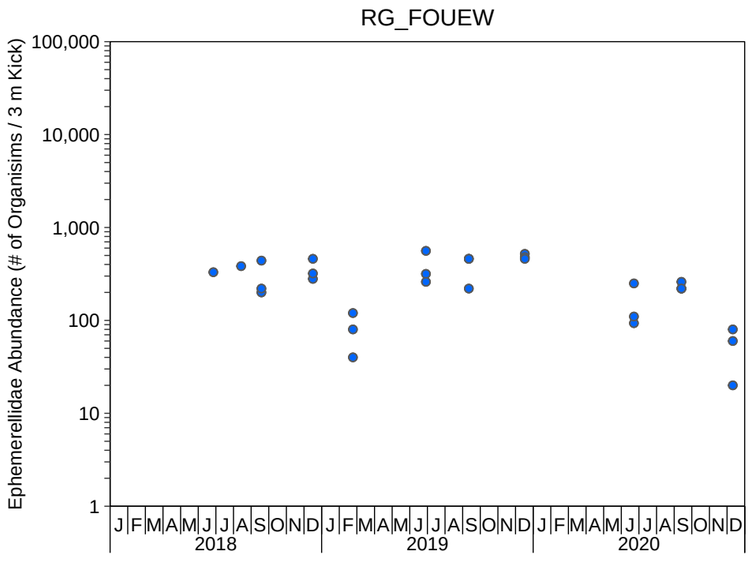

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Figure E.49: Benthic Invertebrate Ephemerellidae Abundance, FRO LAEMP, June 2018 to December 2020

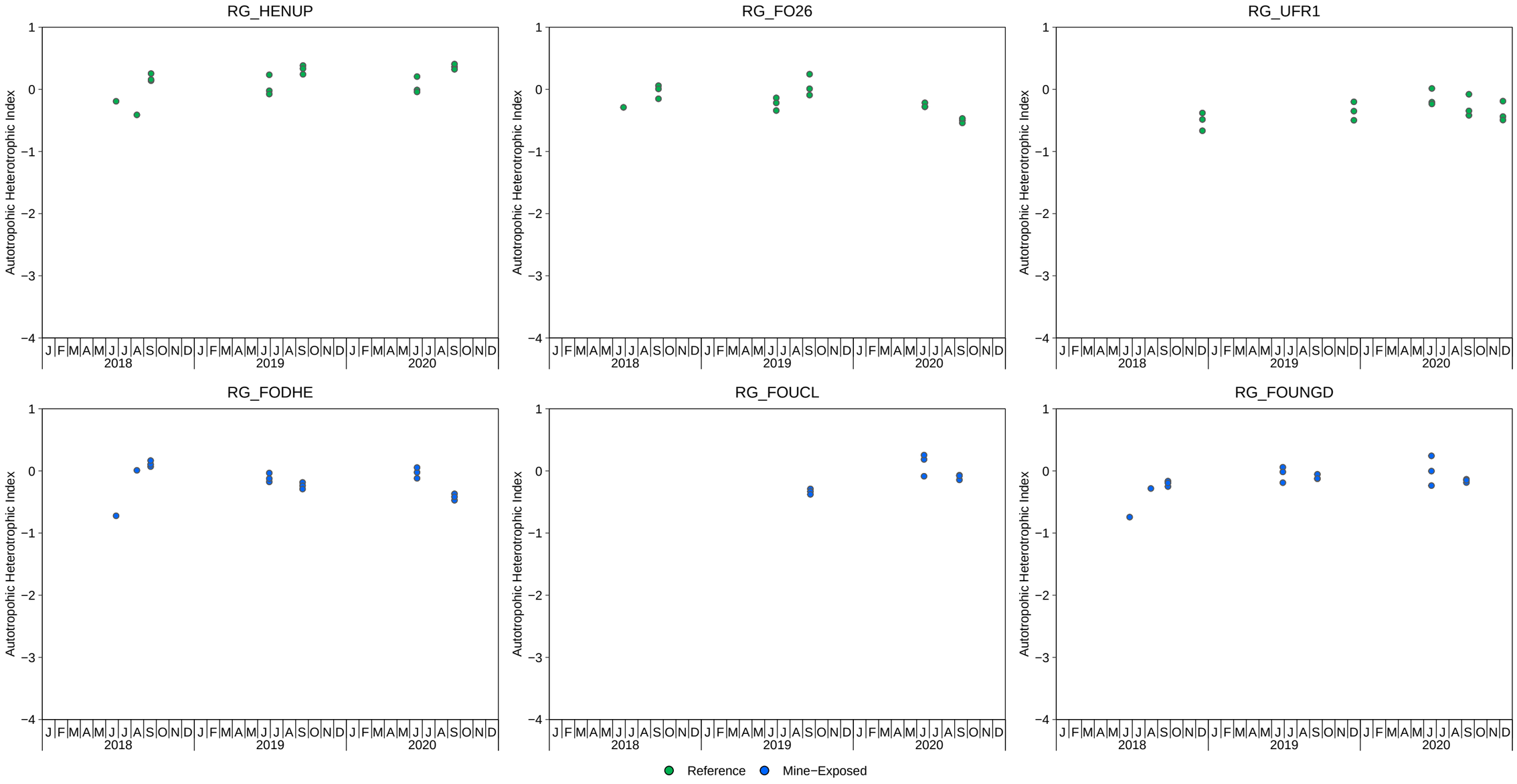


Figure E.50: Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, June 2018 to December 2020

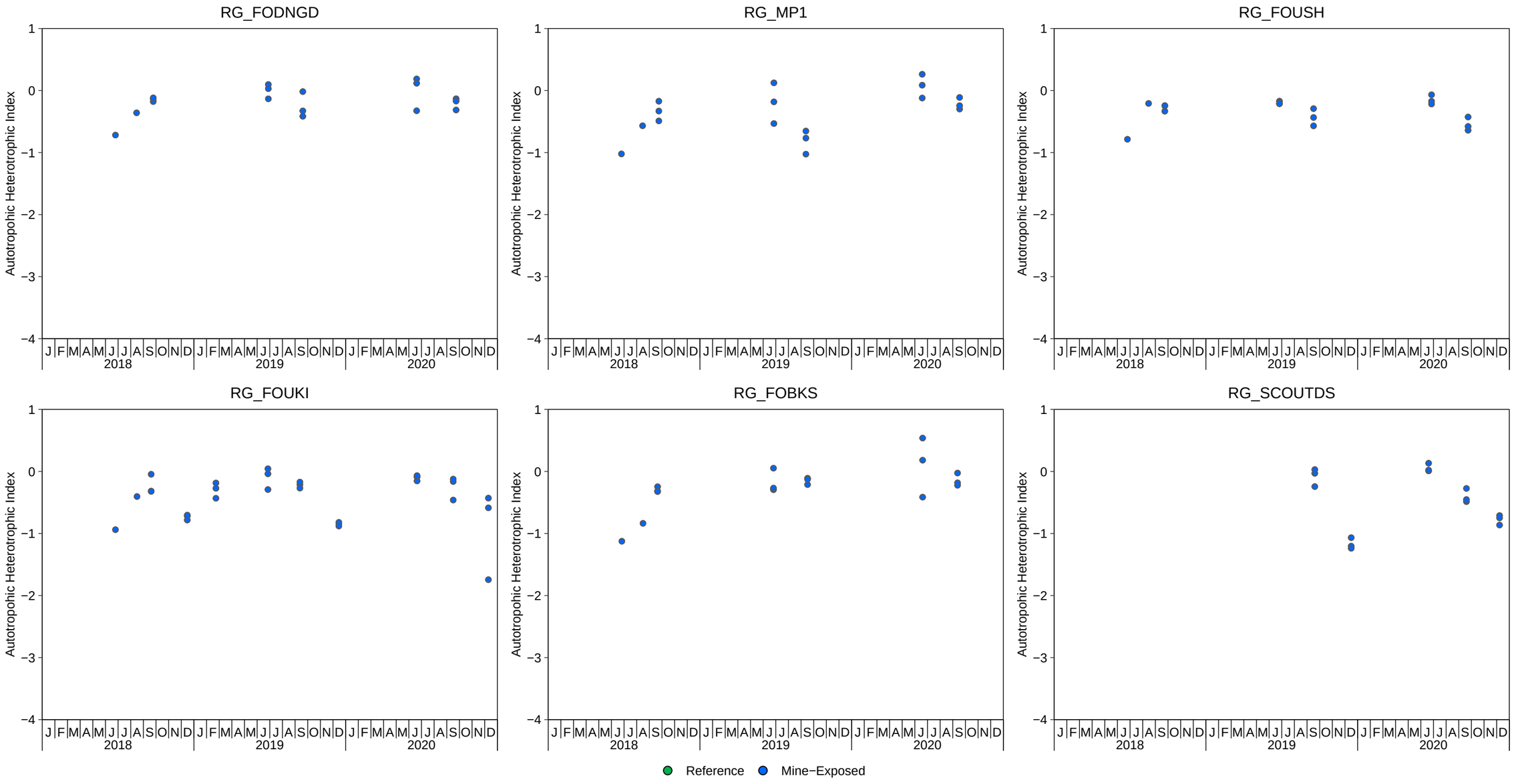


Figure E.50: **Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, June 2018 to December 2020**

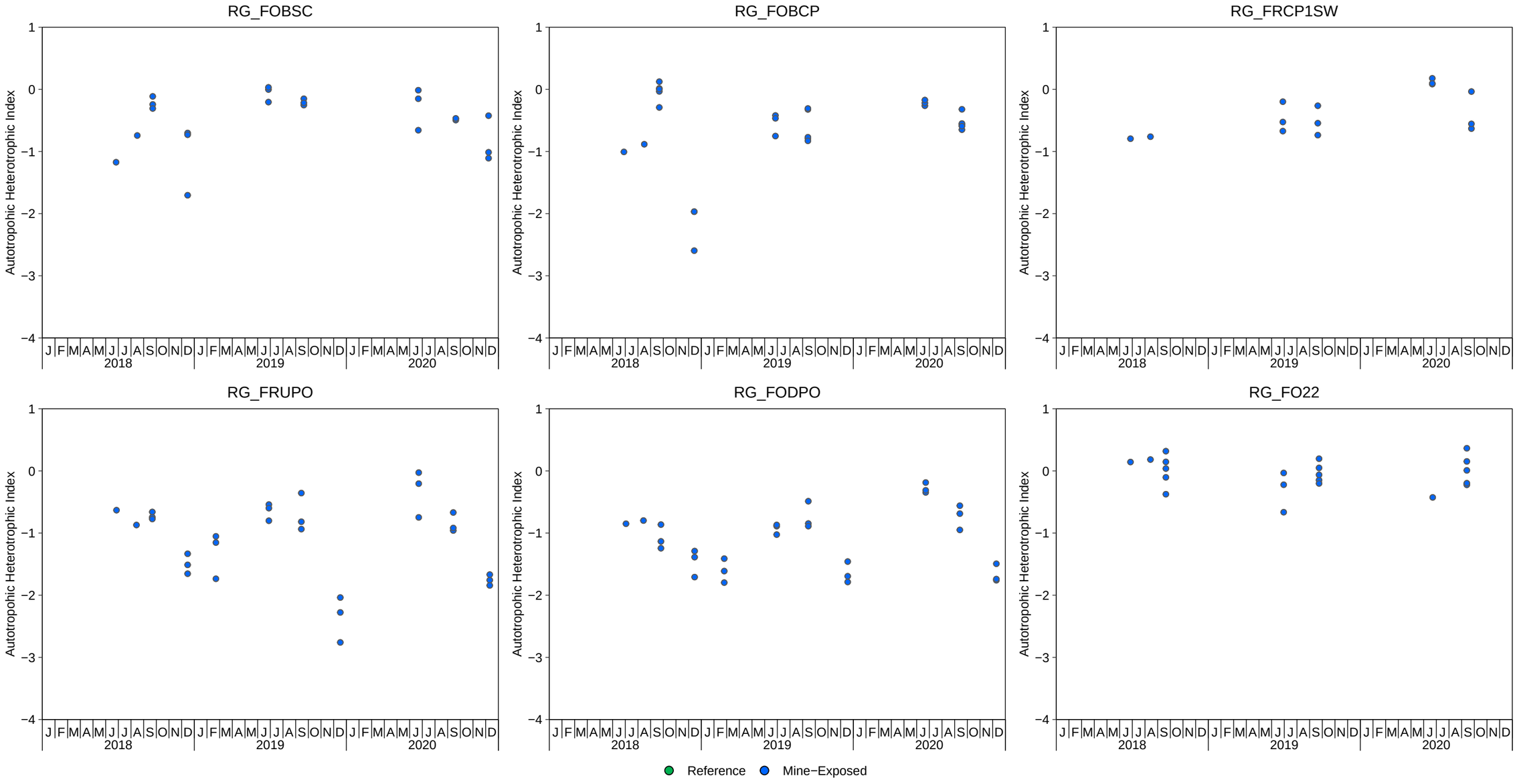
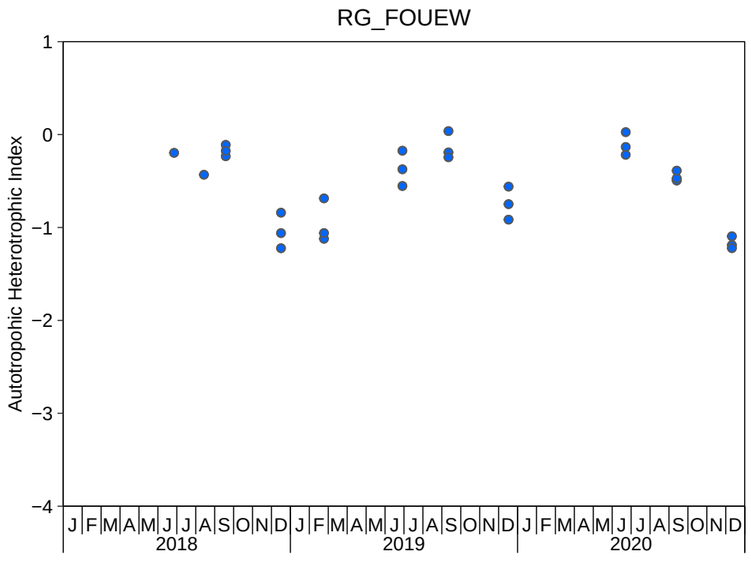


Figure E.50: **Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, June 2018 to December 2020**



Reference Mine−Exposed

Figure E.50: Benthic Invertebrate Autotropohic Heterotrophic Index, FRO LAEMP, June 2018 to December 2020

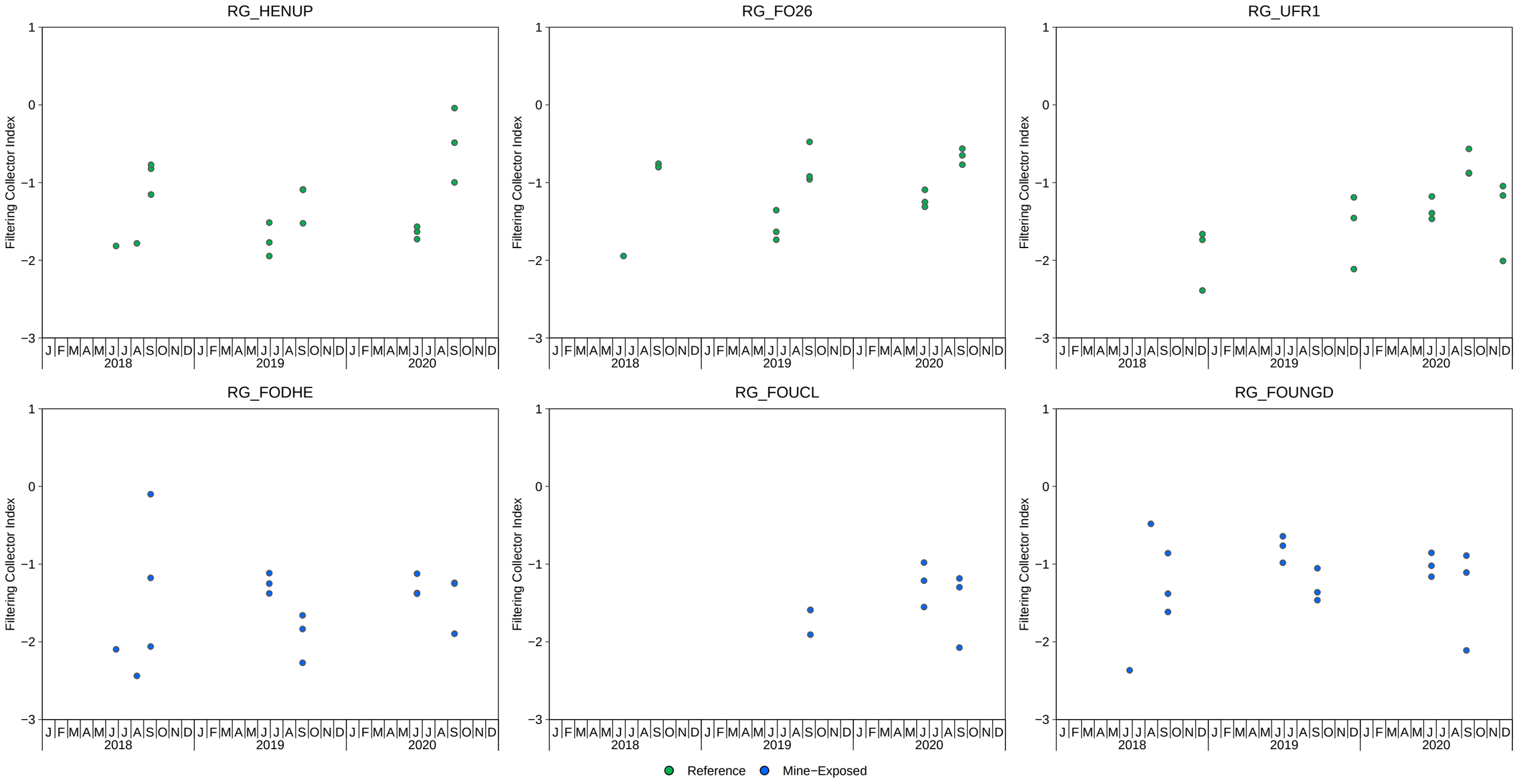


Figure E.51: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, June 2018 to December 2020

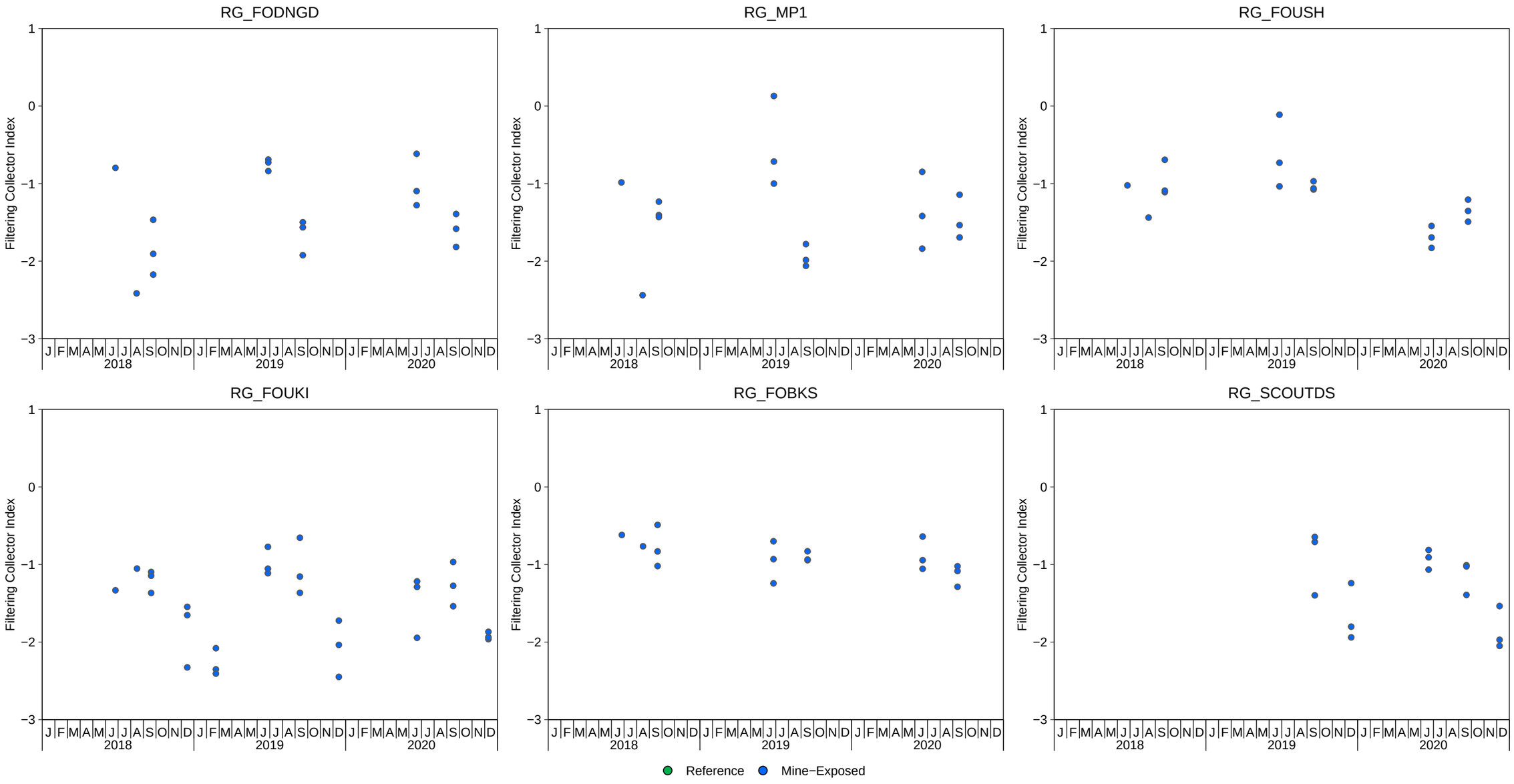


Figure E.51: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, June 2018 to December 2020

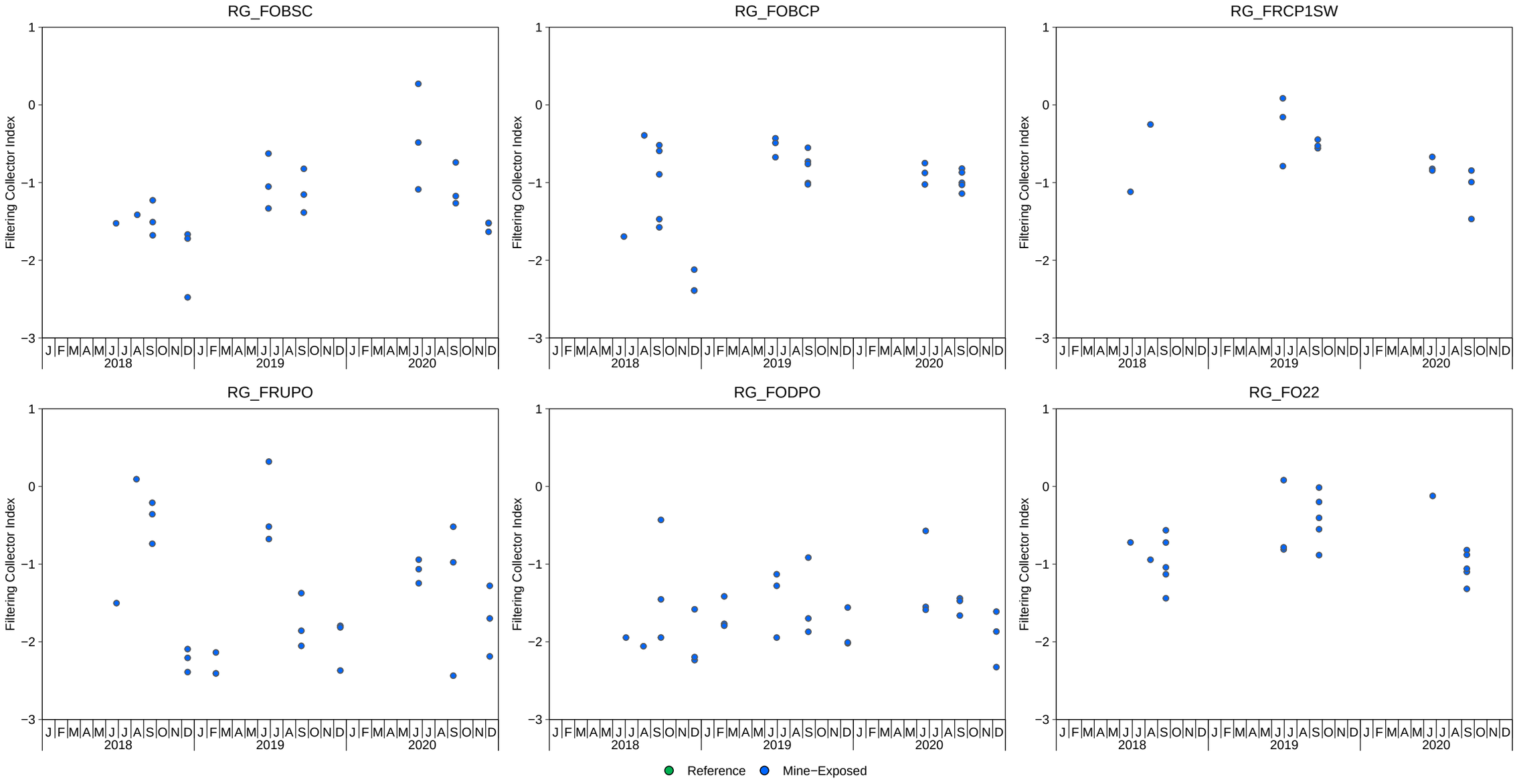
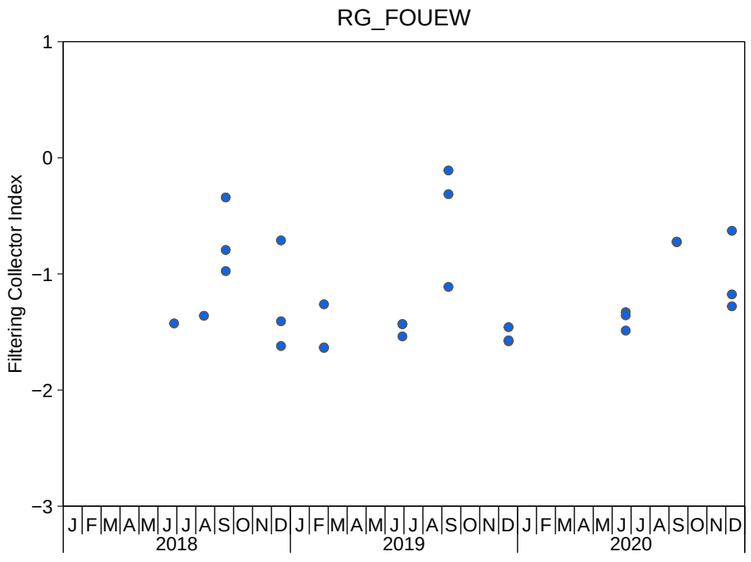


Figure E.51: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, June 2018 to December 2020



Reference Mine−Exposed

Figure E.51: Benthic Invertebrate Filtering Collector Index, FRO LAEMP, June 2018 to December 2020

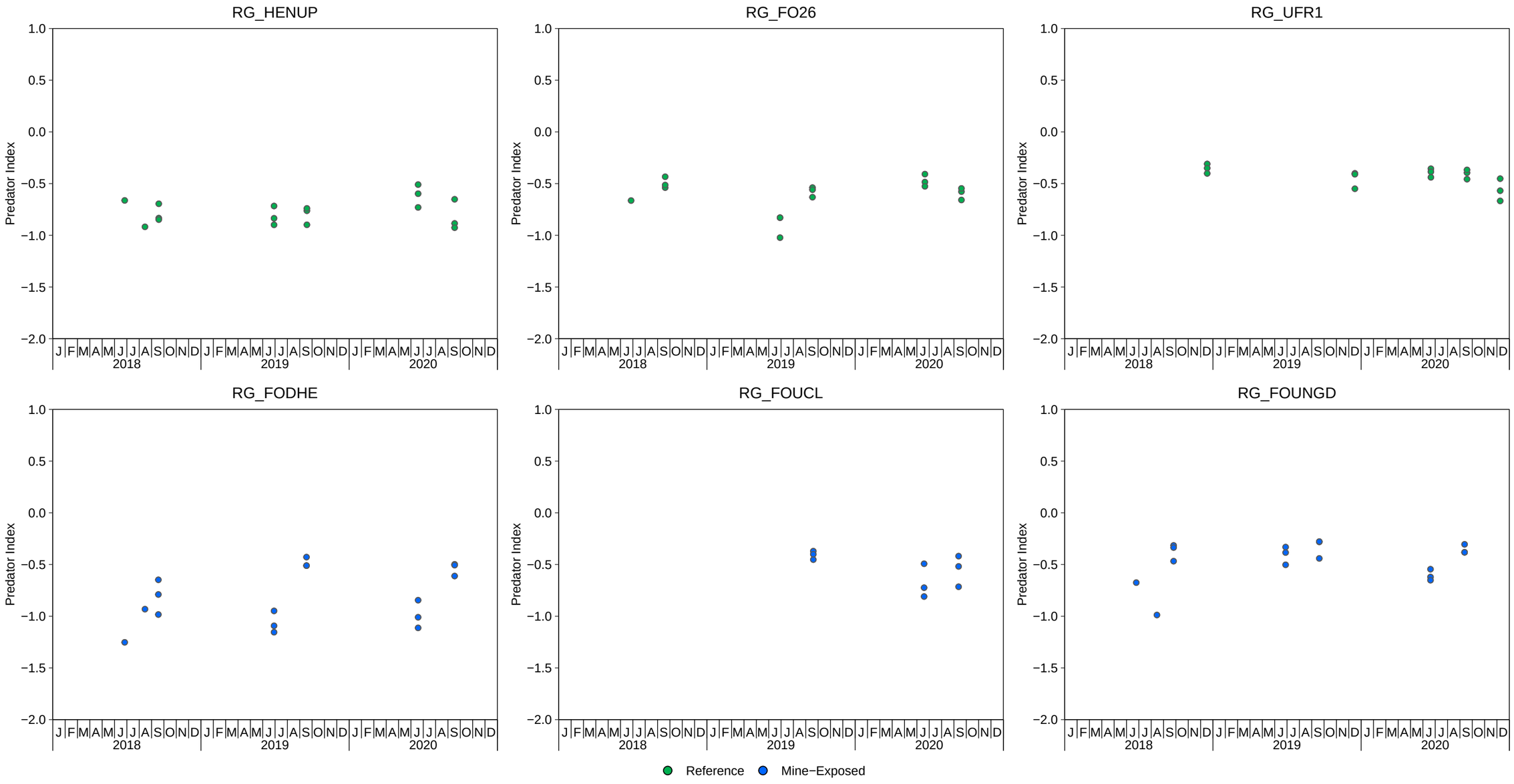


Figure E.52: Benthic Invertebrate Predator Index, FRO LAEMP, June 2018 to December 2020

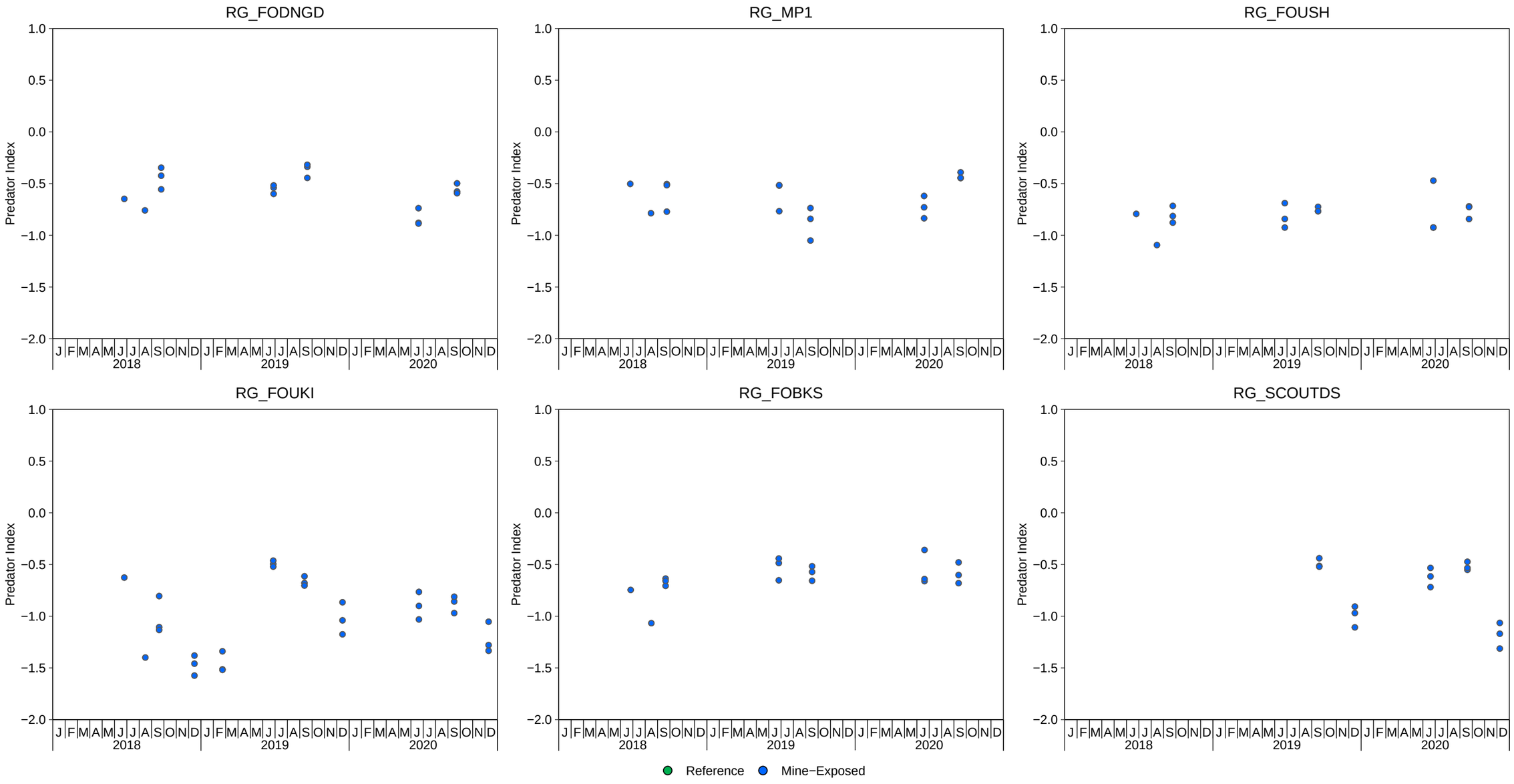


Figure E.52: Benthic Invertebrate Predator Index, FRO LAEMP, June 2018 to December 2020

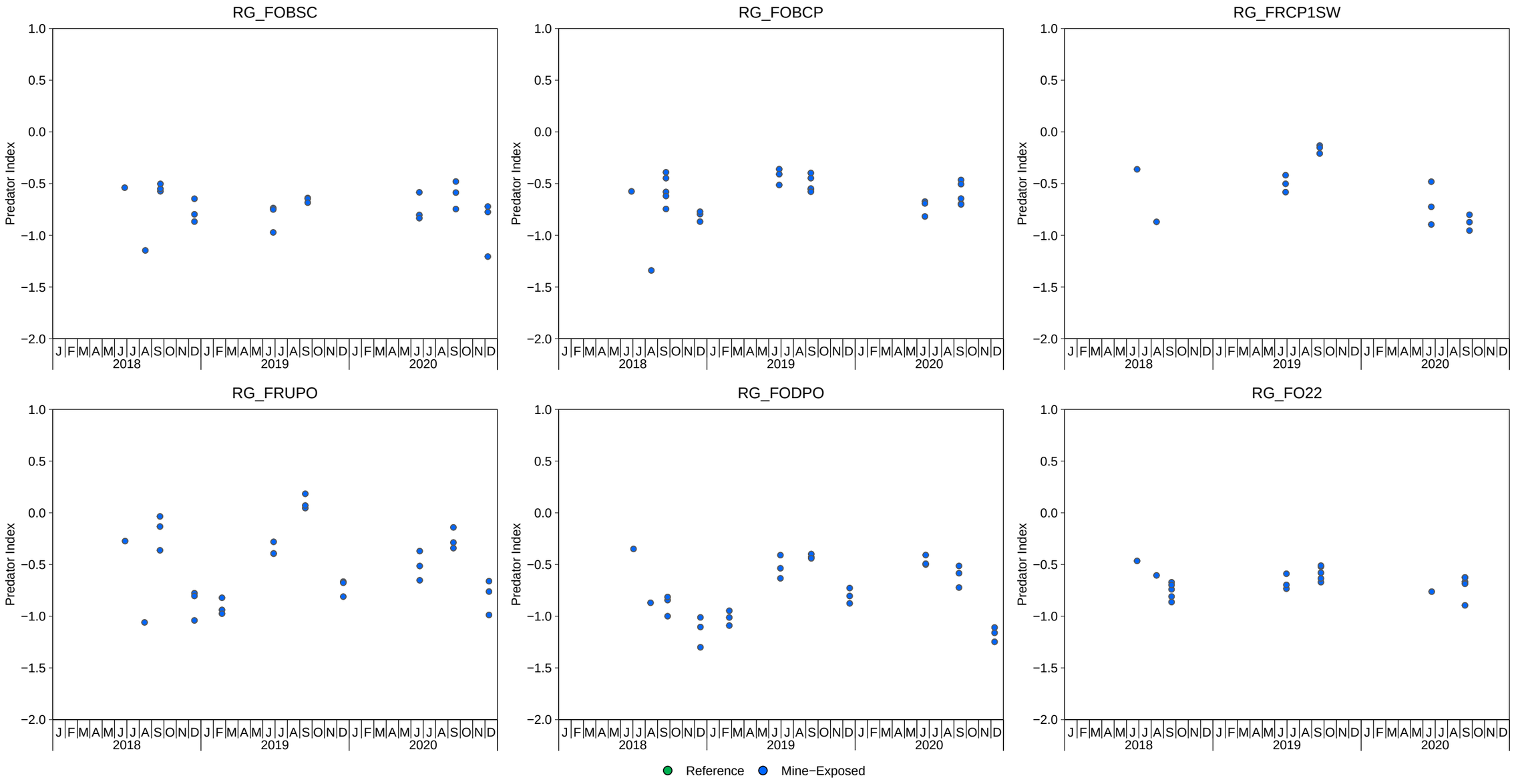


Figure E.52: Benthic Invertebrate Predator Index, FRO LAEMP, June 2018 to December 2020

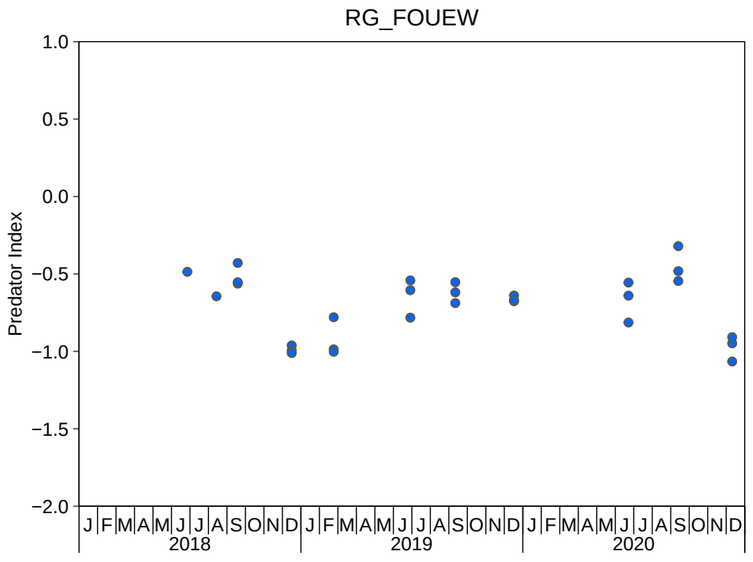


Figure E.52: Benthic Invertebrate Predator Index, FRO LAEMP, June 2018 to December 2020

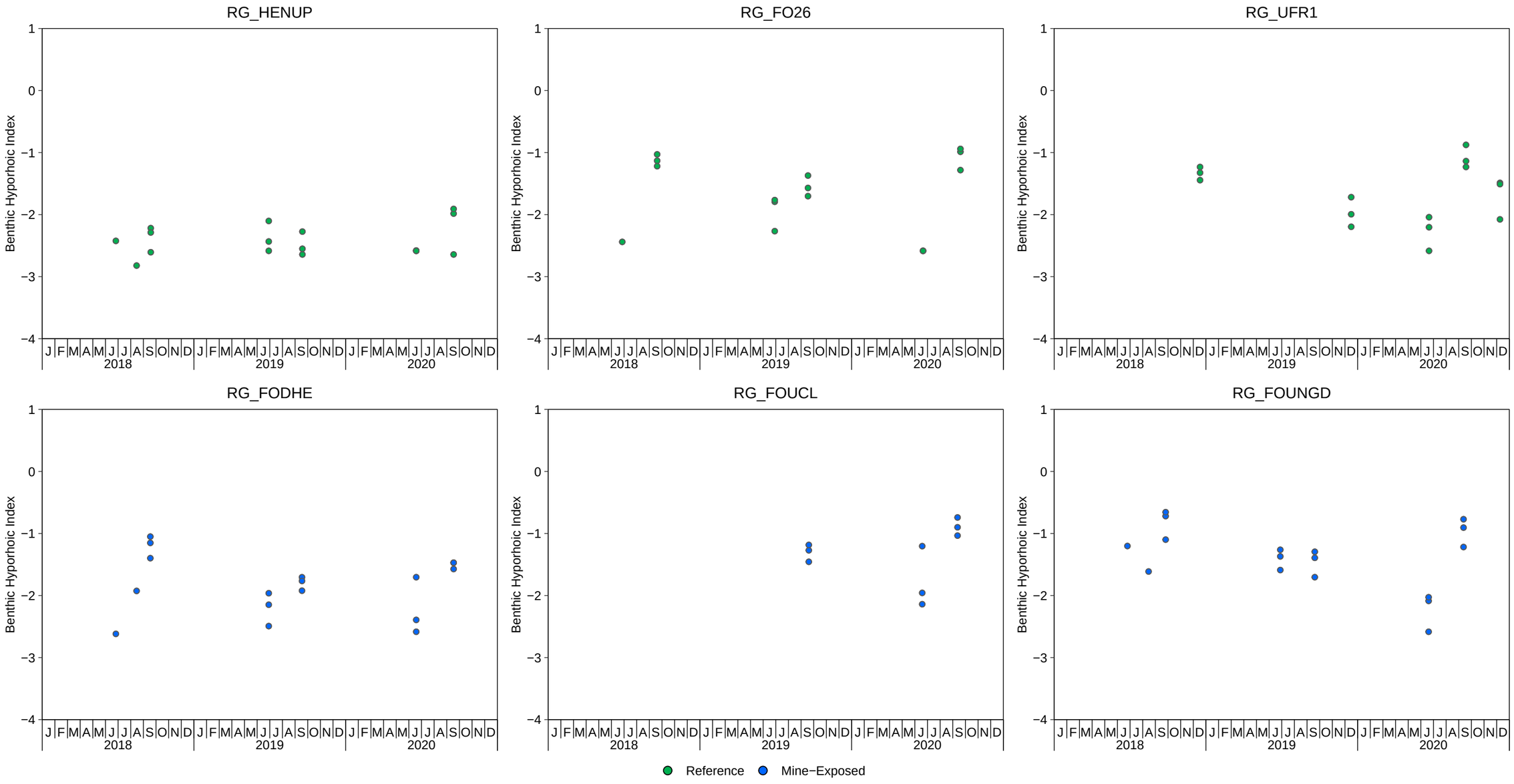


Figure E.53: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, June 2018 to December 2020

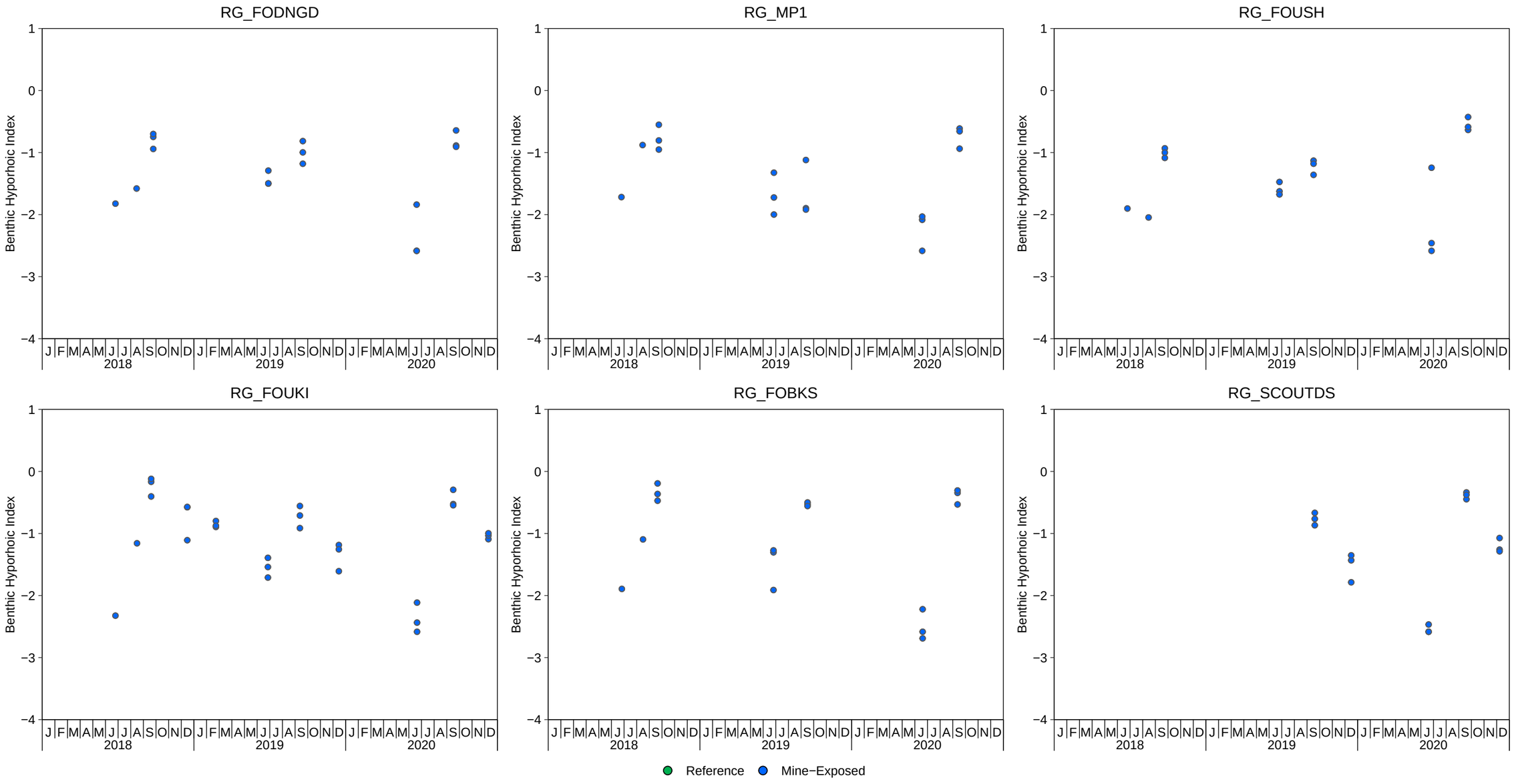


Figure E.53: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, June 2018 to December 2020

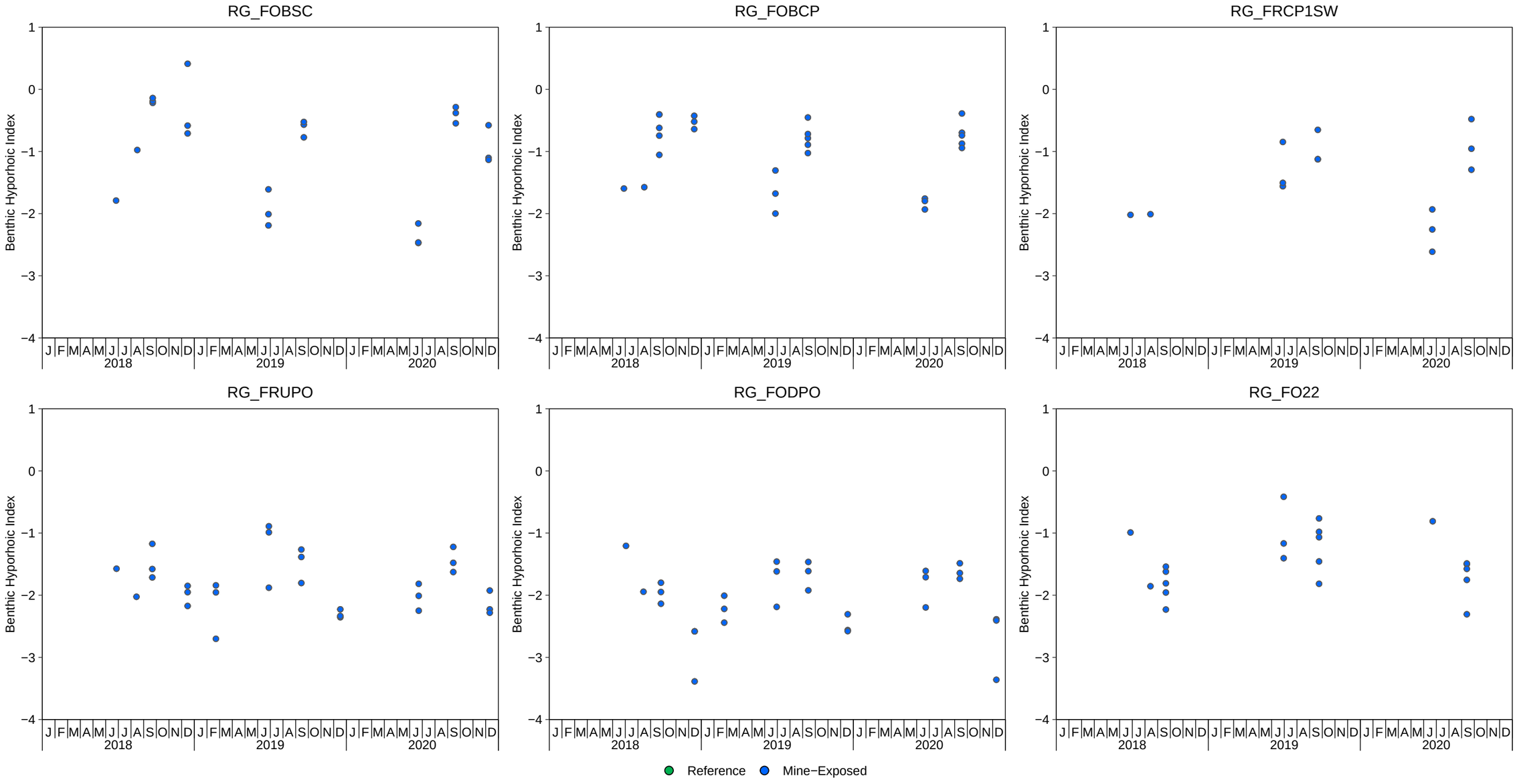


Figure E.53: **Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, June 2018 to December 2020**

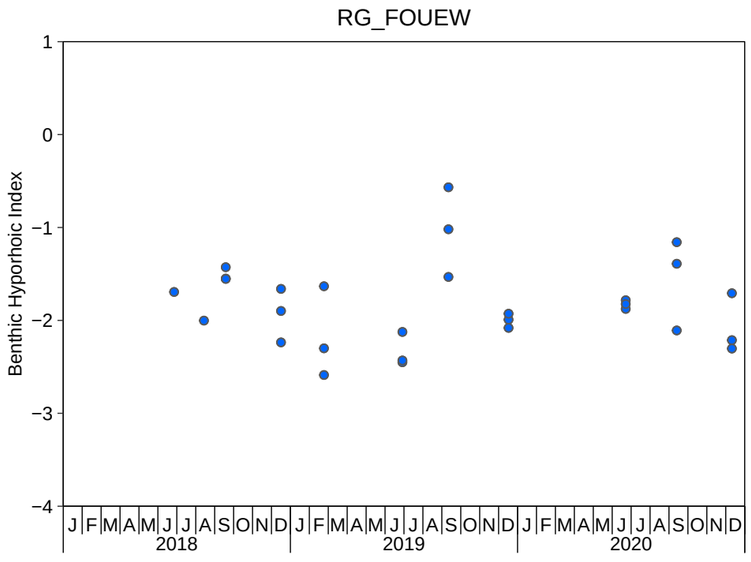


Figure E.53: Benthic Invertebrate Benthic Hyporhoic Index, FRO LAEMP, June 2018 to December 2020

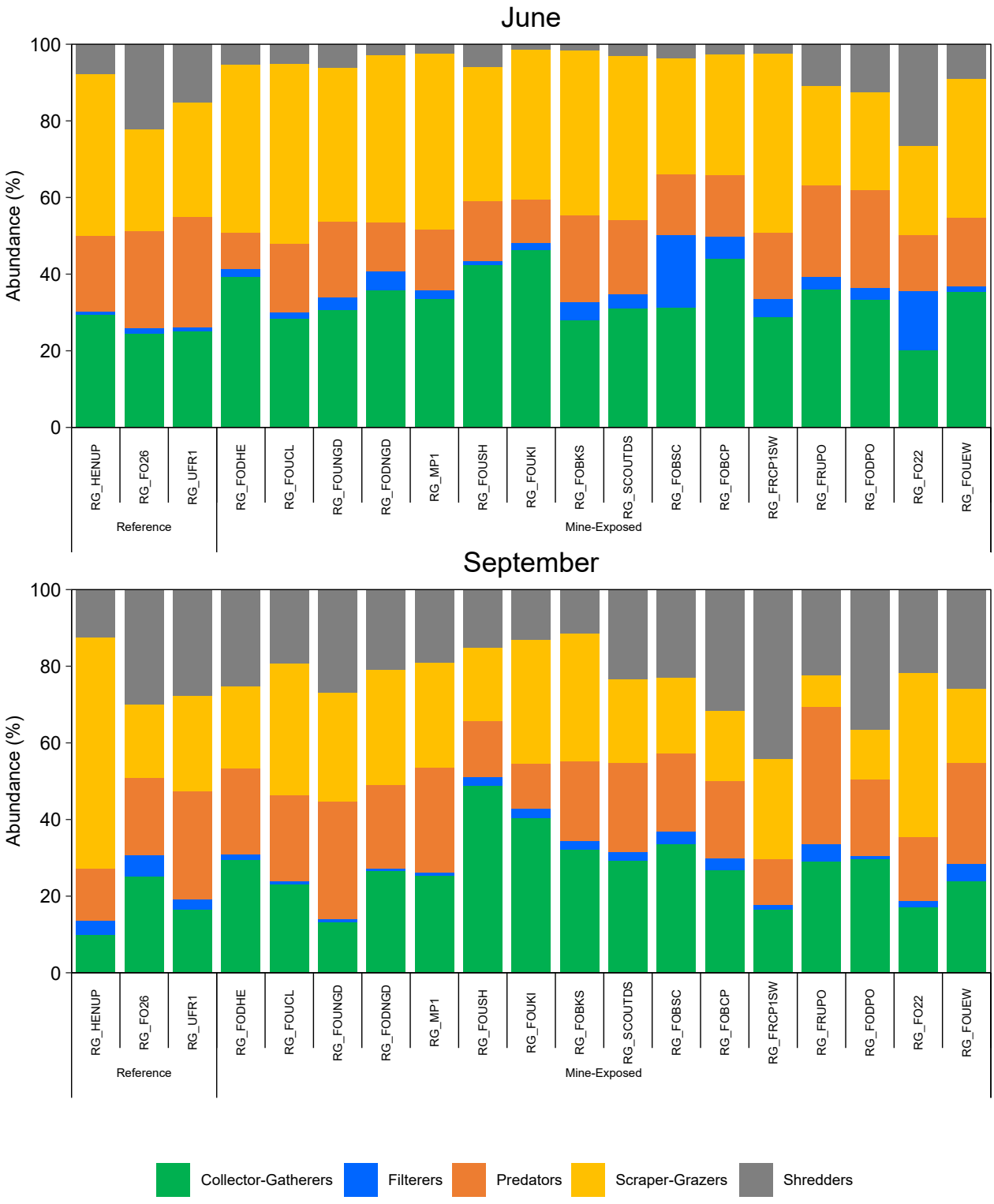


Figure E.54: Benthic Invertebrate Community Feeding Groups Percent Composition, FRO LAEMP, June to December 2020

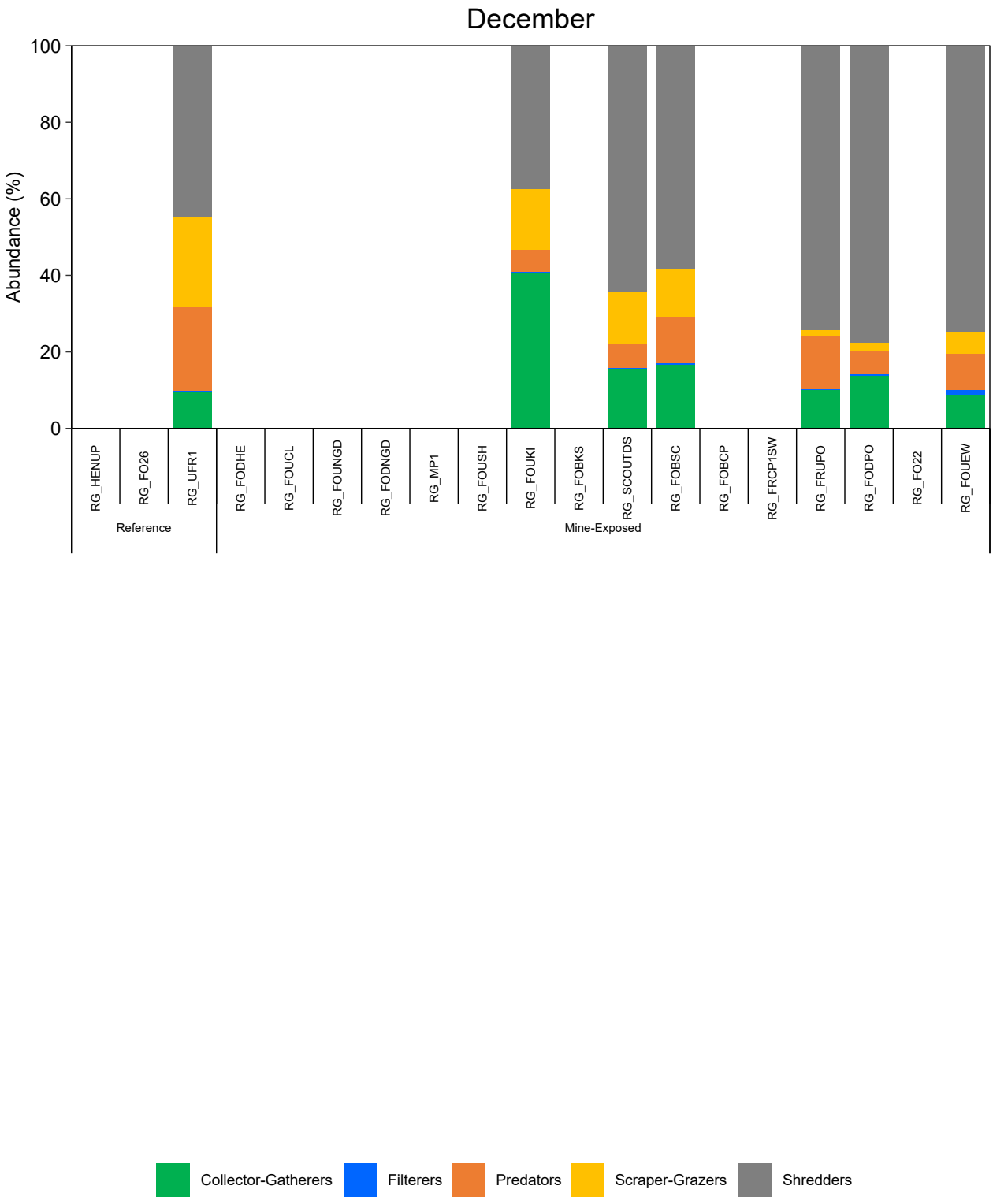


Figure E.54: Benthic Invertebrate Community Feeding Groups Percent Composition, FRO LAEMP, June to December 2020

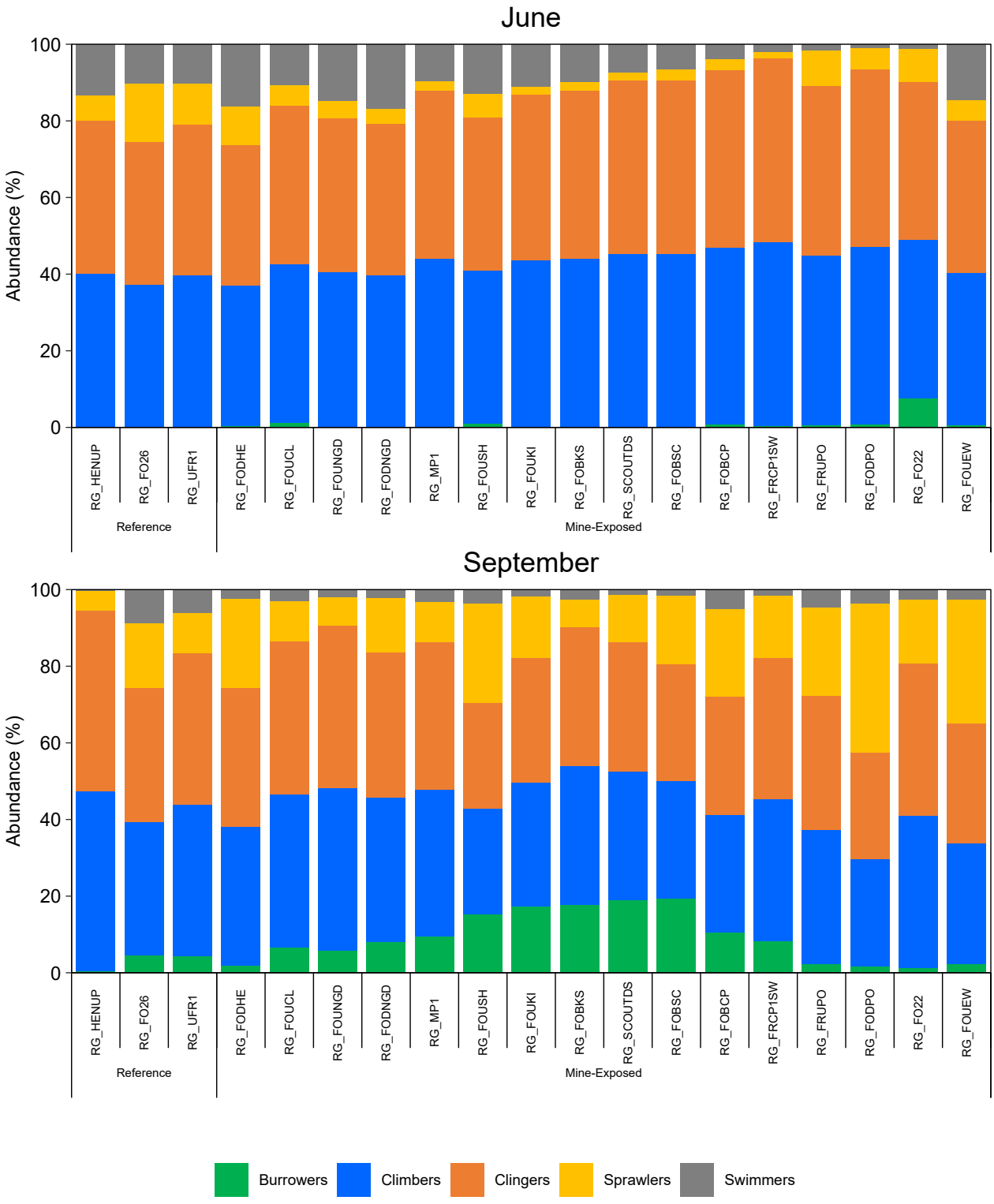


Figure E.55: Benthic Invertebrate Community Habitat Groups Percent Composition, FRO LAEMP, June to December 2020

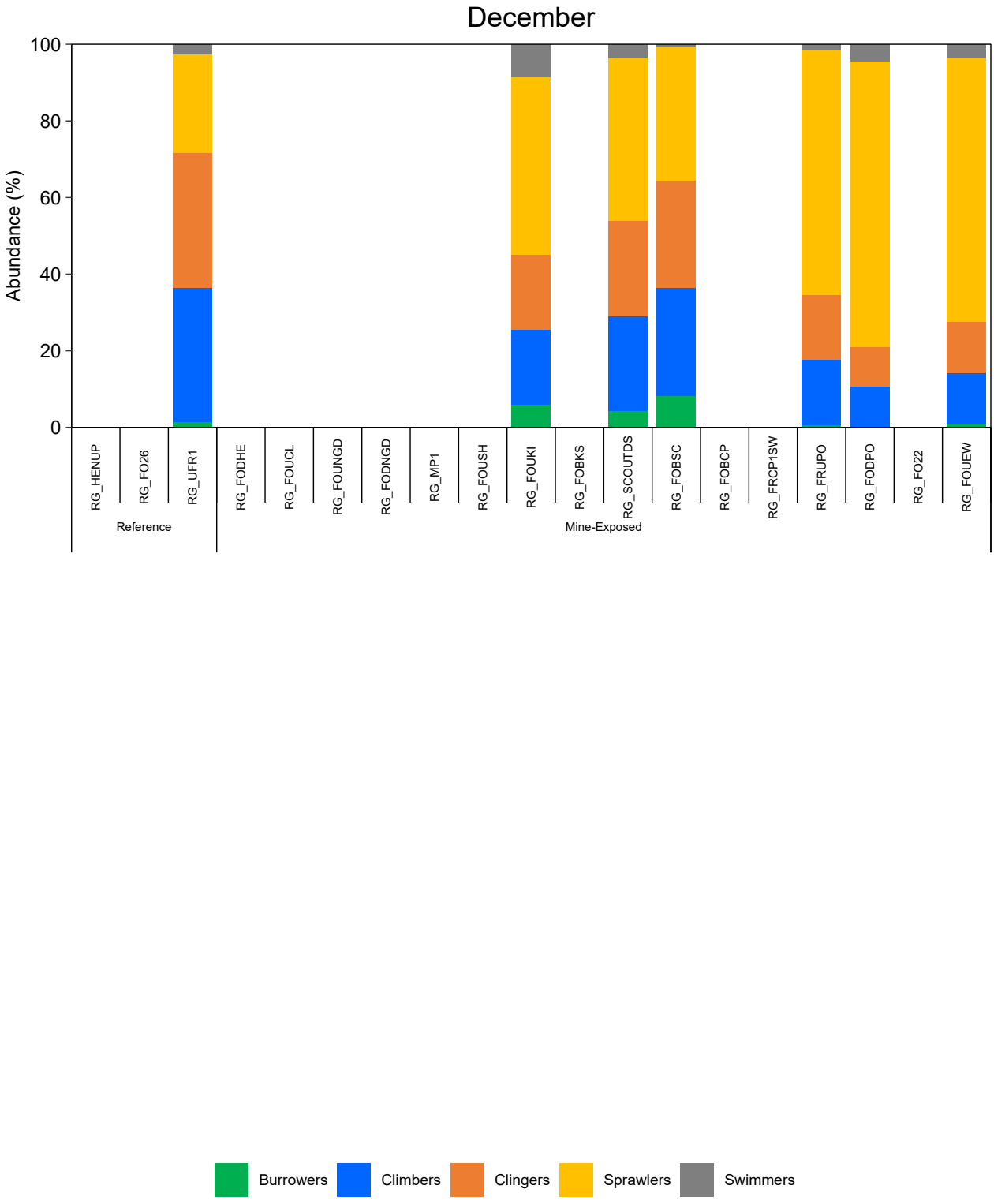


Figure E.55: Benthic Invertebrate Community Habitat Groups Percent Composition, FRO LAEMP, June to December 2020

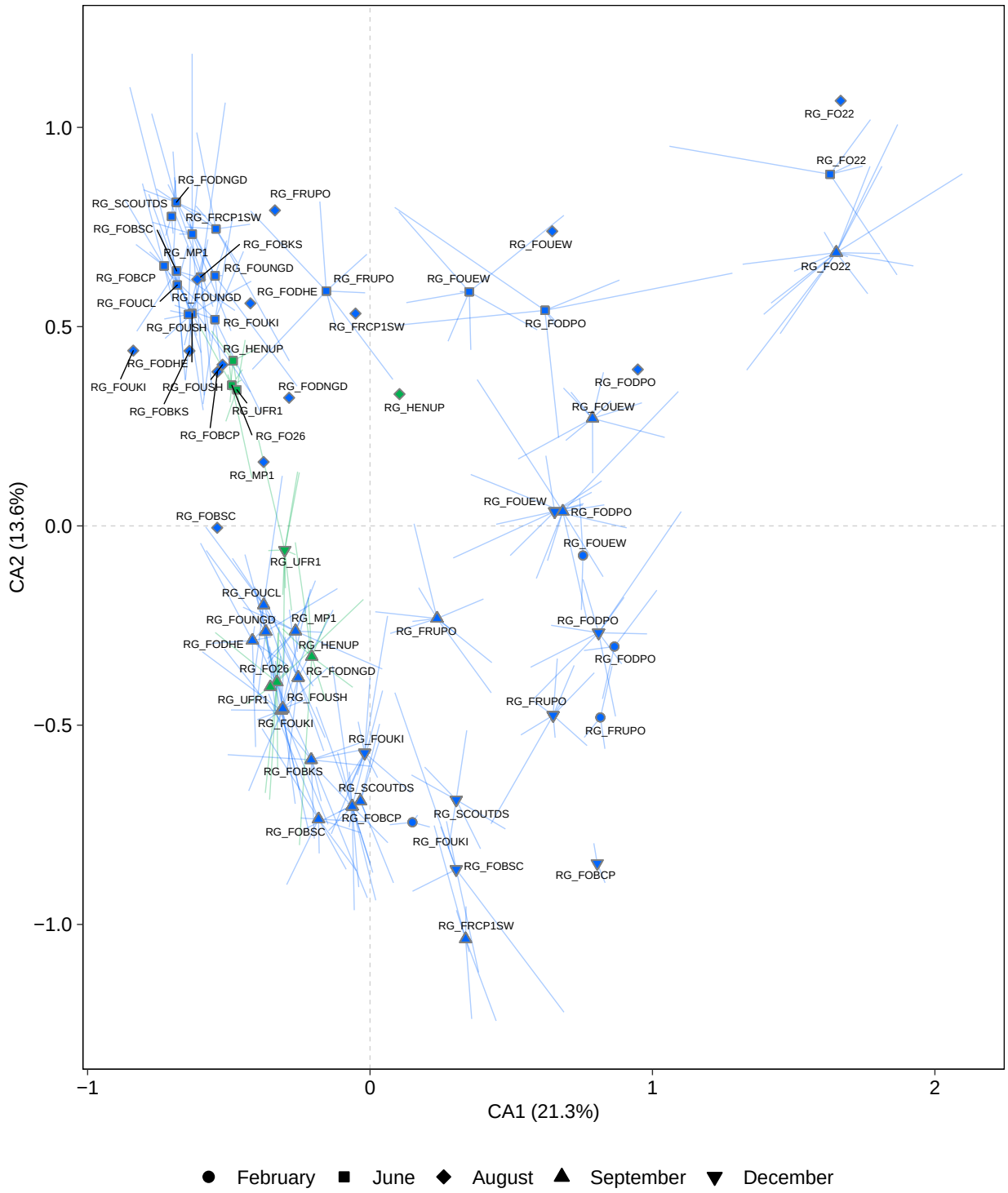


Figure E.56: Benthic Invertebrate Community Family Level Correspondence Analysis, FRO LAEMP, 2018 to 2020

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue.

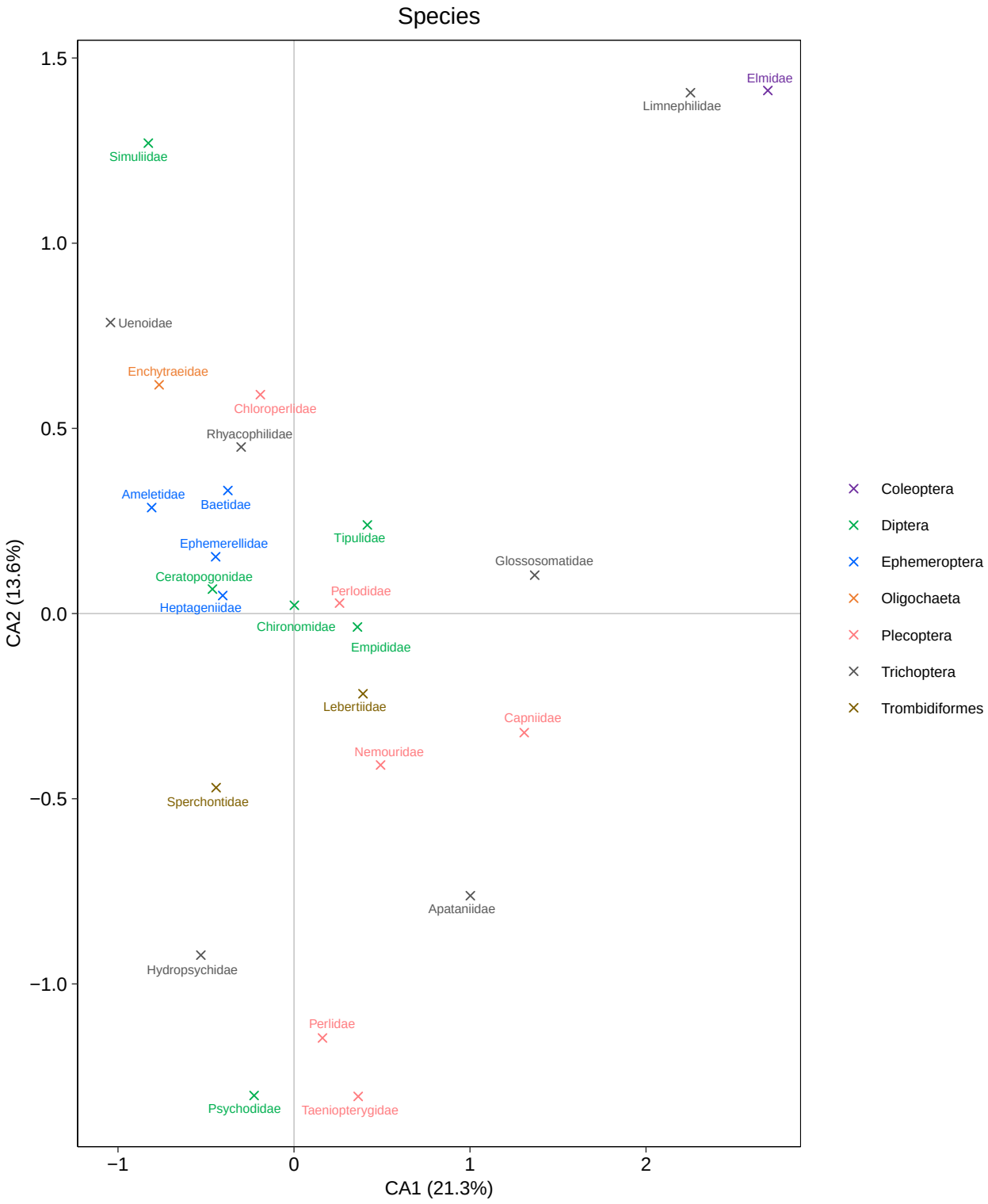


Figure E.57: Benthic Invertebrate Community Family Level Correspondence Analysis, FRO LAEMP, 2018 to 2020

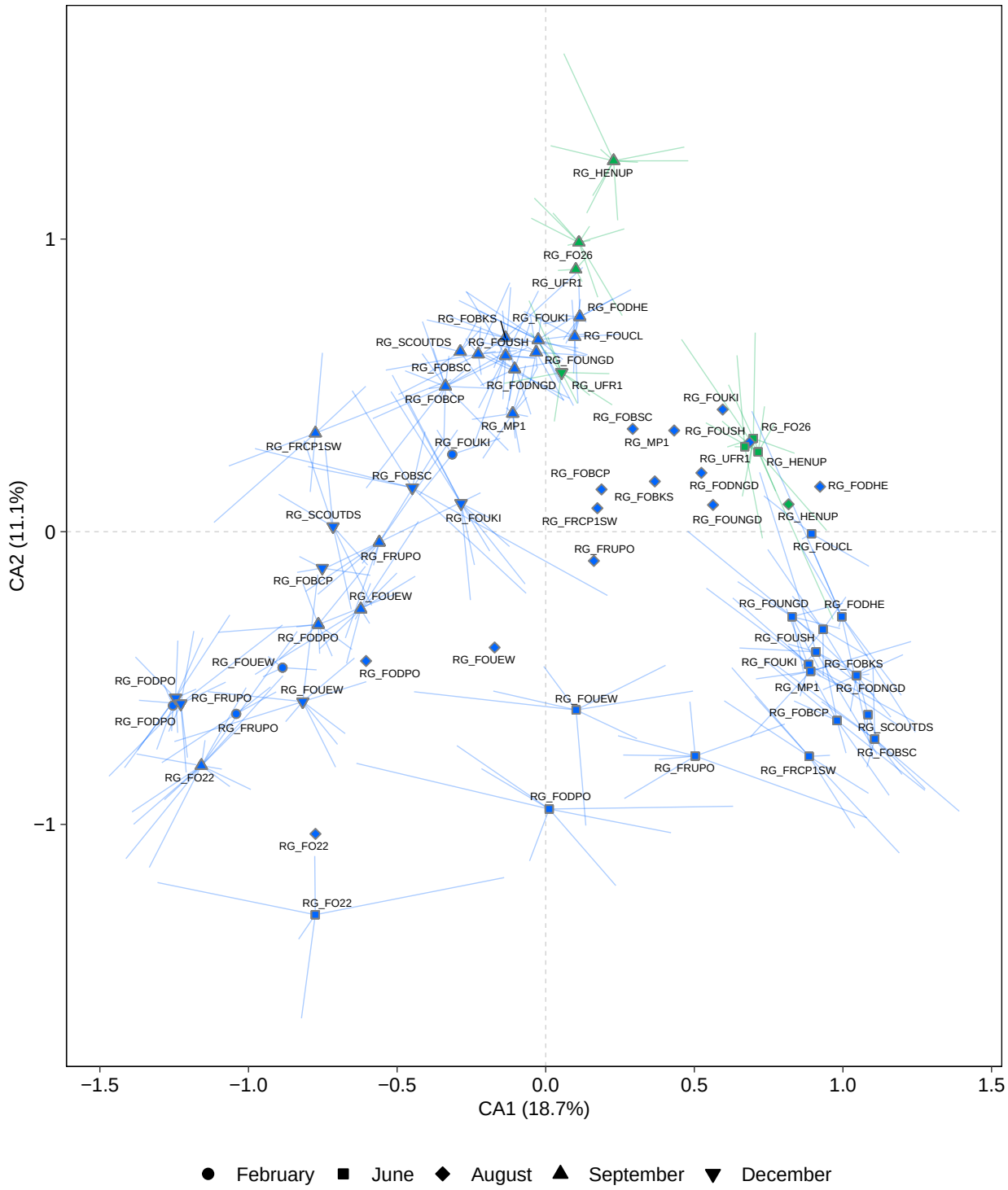


Figure E.58: Benthic Invertebrate Community Lowest-Practical-Level Correspondence Analysis, FRO LAEMP, 2018 to 2020

Notes: Reference areas are shown in green and mine−exposed areas are shown in blue.

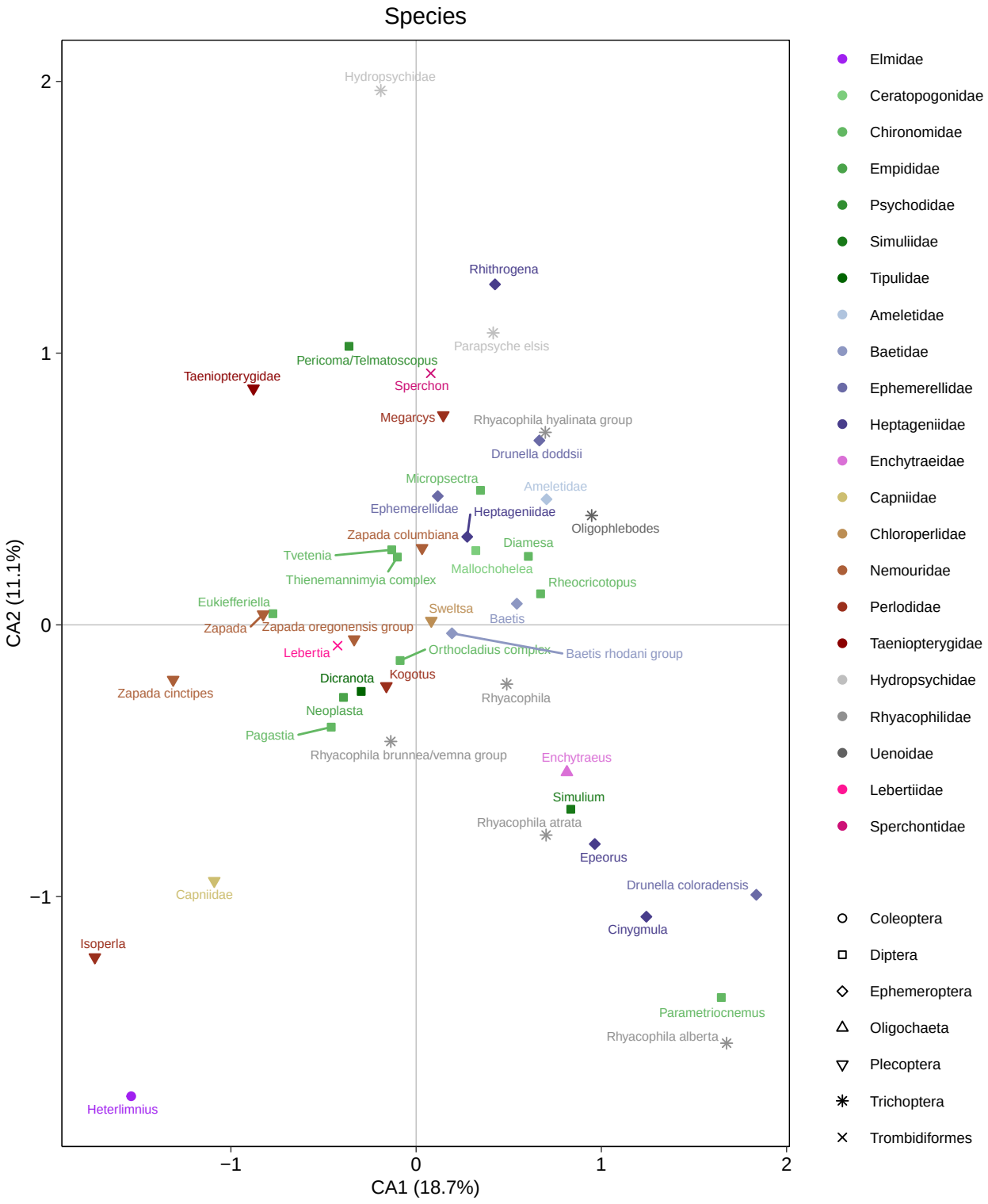


Figure E.59: Benthic Invertebrate Community Lowest-Practical-Level Correspondence Analysis, FRO LAEMP, 2018 to 2020

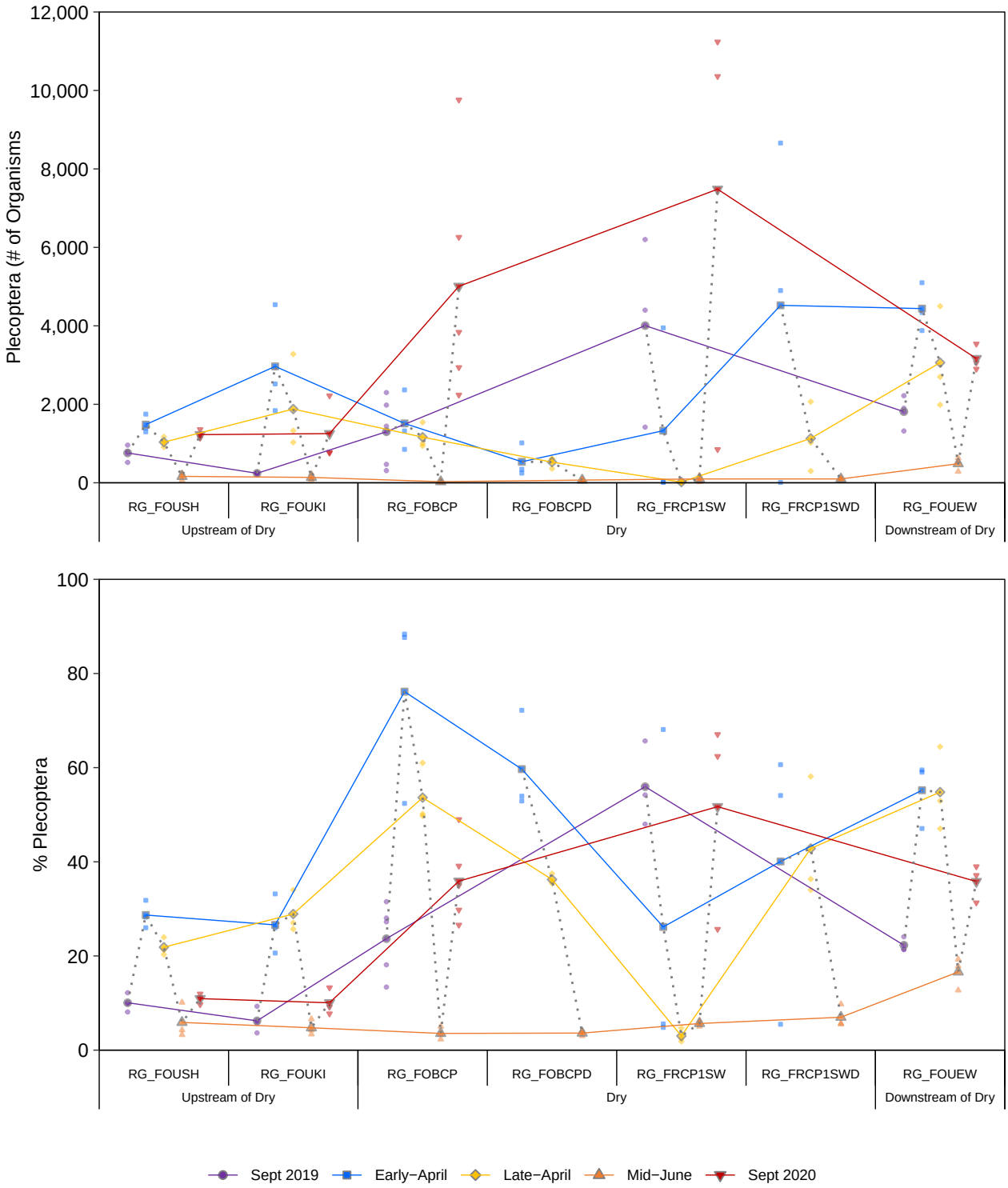


Figure E.60: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

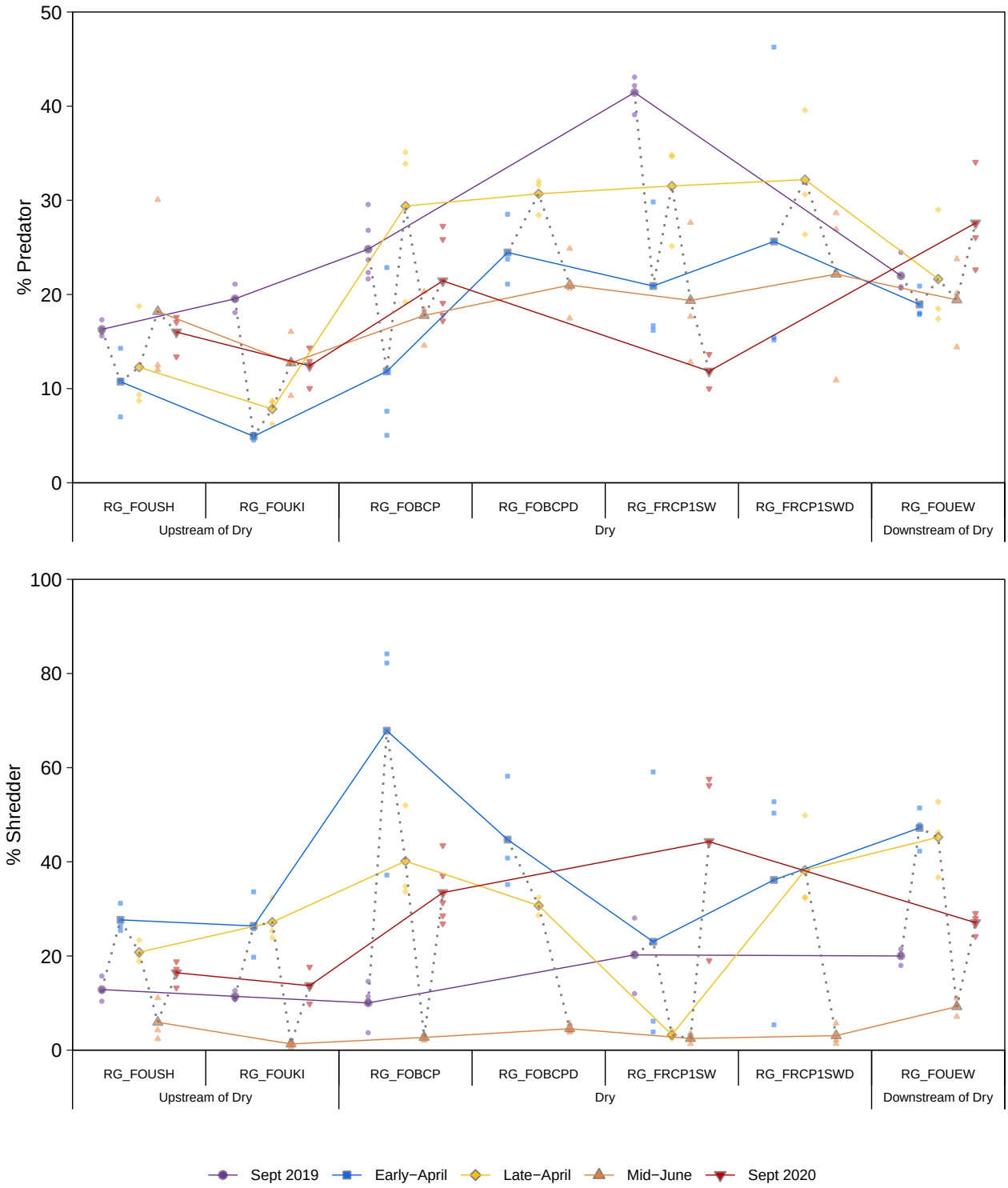


Figure E.61: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

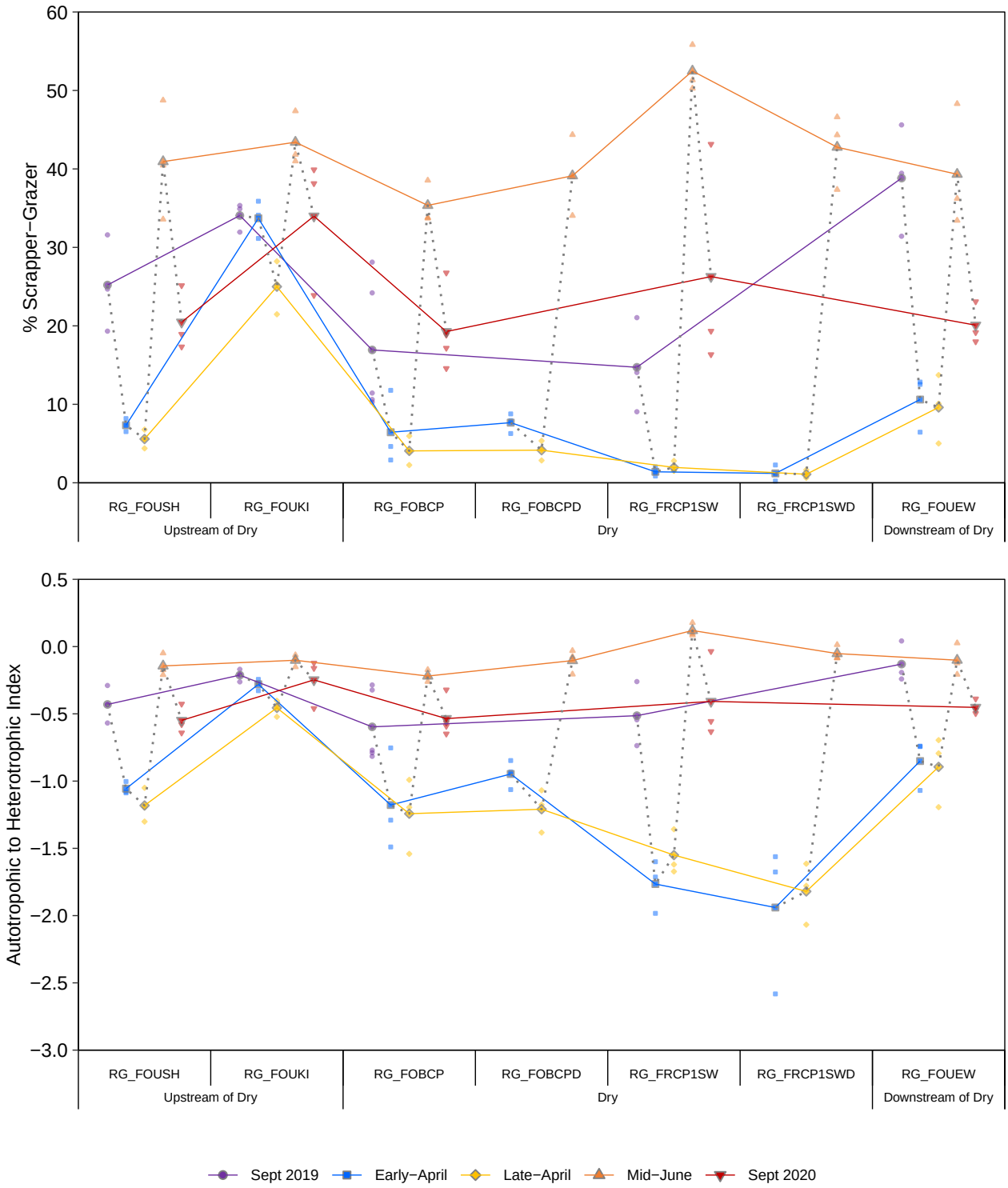


Figure E.62: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

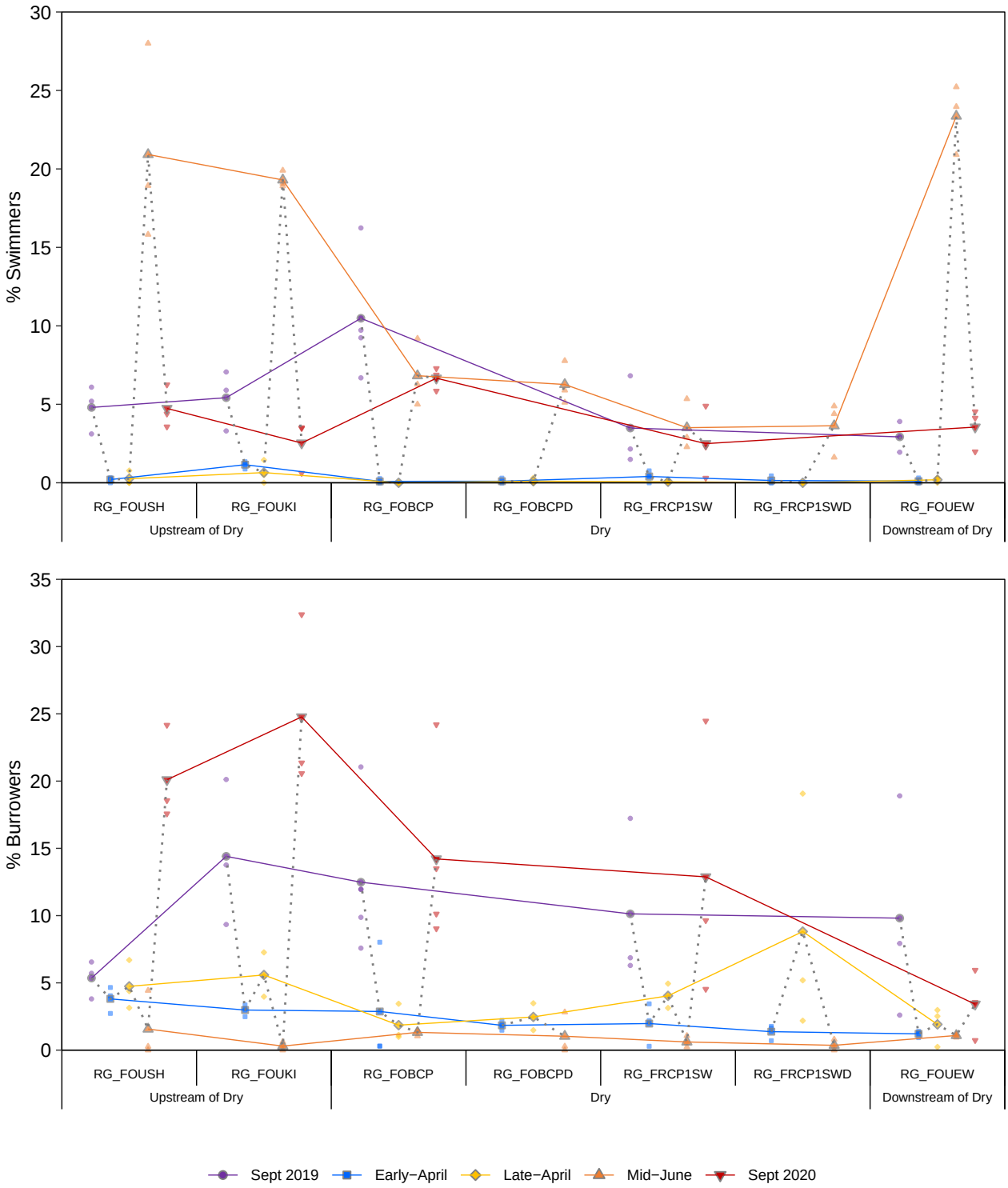


Figure E.63: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

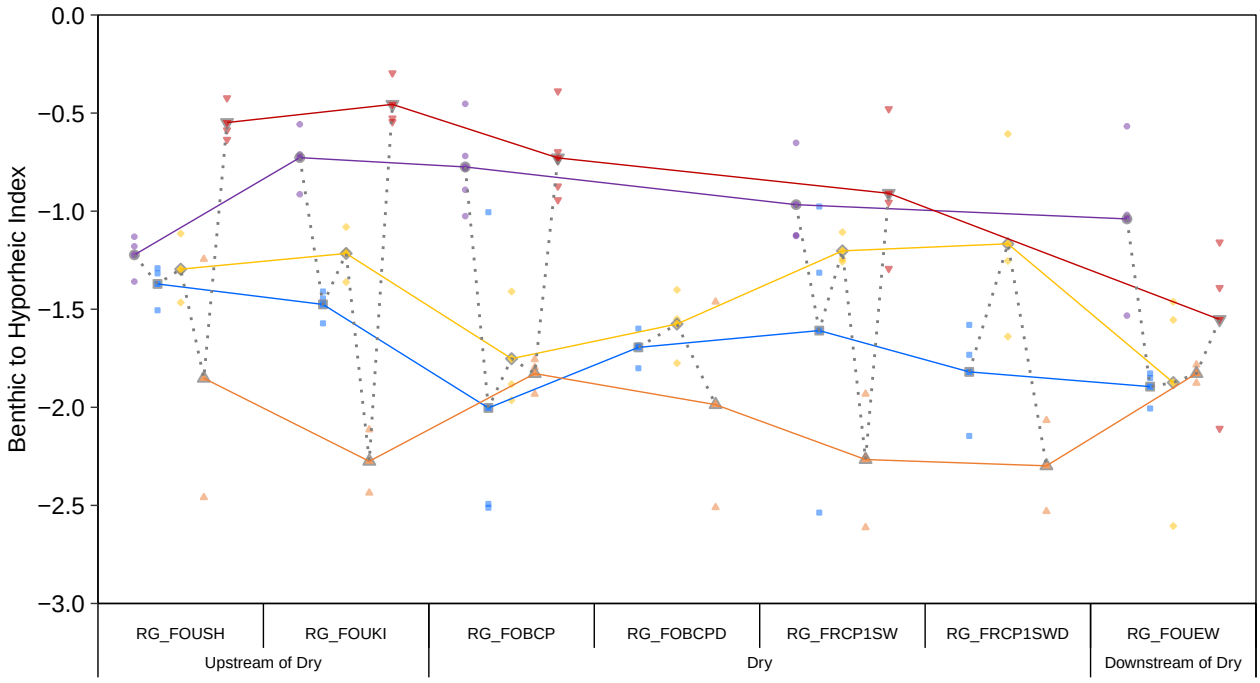


Figure E.64: Benthic Invertebrate Community Endpoints During Recolonization, FRO LAEMP, Septemeber 2019 to September 2020

Notes: Coloured lines connect mean values within time periods across stations. Gray dotted lines connect means of temporal samples within a station.

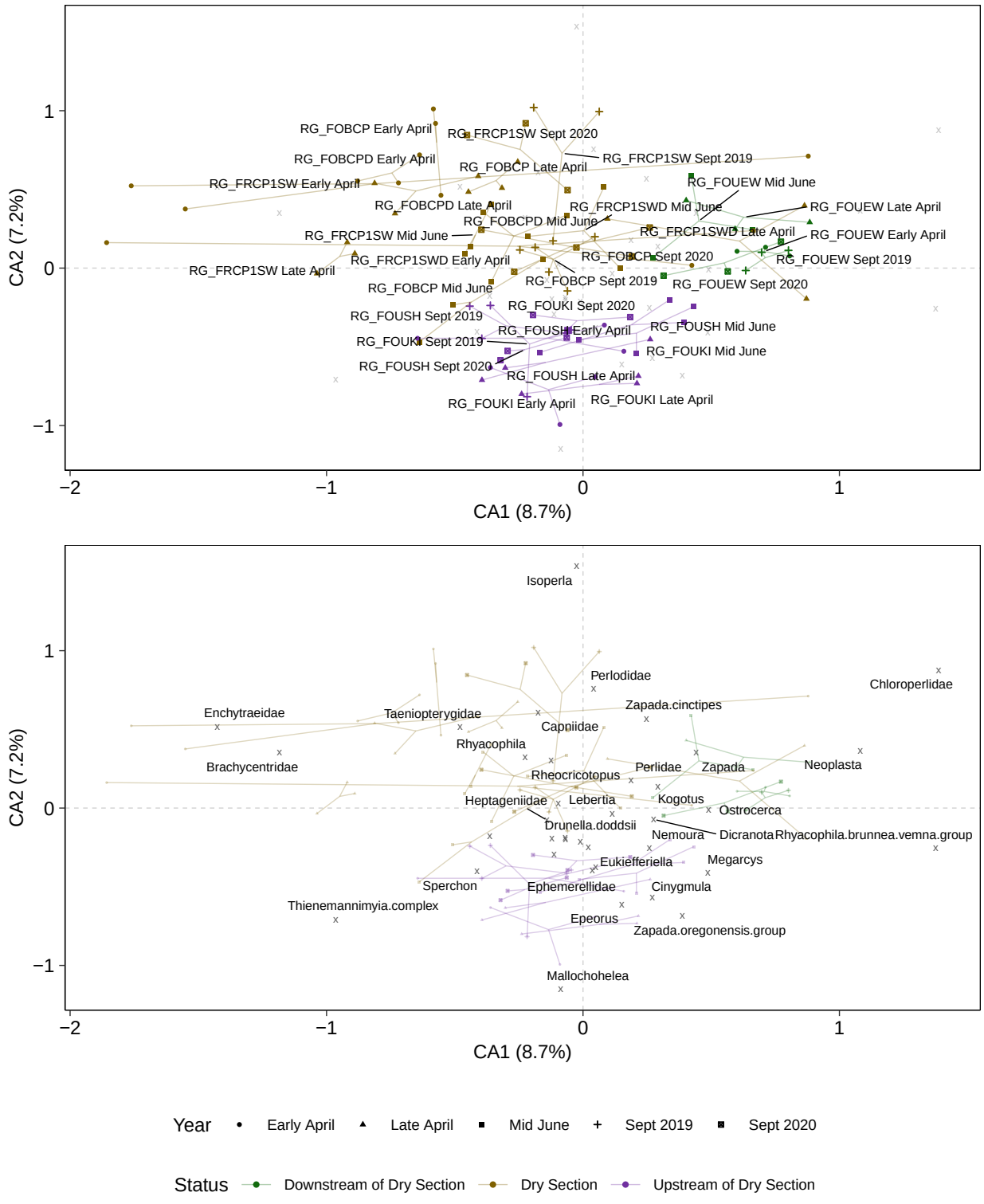


Figure E.65: Scatterplot of Taxa and Station Scores from Partial Correspondence Analysis of Benthic Invertebrate Communities During Recolonization, FRO LAEMP, September 2019 to September 2020

Notes: Taxa were ln(x+1) transformed prior to analysis. Taxa present at fewer than 5% of samples or less than 1% of total abundance were excluded from the analysis. Ordination shows residuals of Constrainied Correspondence Analysis on sampling period which explained 40% of the variation in the Benthic Invertebrate Community. Numbers next to axis labels represent the percent of total variation explained by the axis.

Table E.1: Benthic Invertebrate Traits at the Family Level, FRO LAEMP, 2020

Phylum	Subphylum	Class	Subclass	Order	Suborder	Family	HBI[a]	CEFI[b]		Feeding Preferences[c]	Habitat Preferences[c]
								Velocity (m/s)	Specificity		
Annelida	NA	Clitellata	NA	NA	NA	Enchytraeidae	10	0.25	4	Filterer	-
Annelida	NA	Clitellata	Lumbriculata	Hirudinida	Rhynchobdellida	Glossiphoniidae	8	-	-	Predator	Climber
Annelida	NA	Clitellata	Lumbriculata	Lumbriculida	NA	Lumbriculidae	5	0.37	2	Filterer	Burrower
Annelida	NA	Clitellata	Tubificata	Tubificida	NA	Naididae	8	0.25	4	Filterer | Scraper/Grazer	Burrower
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Sarcoptiformes	Oribatida	Hydrozetidae	-	0.34	4	Gatherer	Climber
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Arrenuridae	-	-	-	Predator	Climber
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Aturidae	-	-	-	Predator	Climber
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Feltriidae	-	-	-	Predator	Climber
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Hydryphantidae	-	0.3	4	Parasite	Swimmer
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Hygrobatidae	-	0.17	4	Predator	Climber
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Lebertiidae	-	0.32	2	Parasite	Swimmer
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Mideopsidae	-	0.17	4	Predator	Swimmer
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Pionidae	-	-	-	Parasite	Climber
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Sperchontidae	-	-	-	Parasite	-
Arthropoda	Chelicerata	Euchelicerata	Arachnida	Trombidiformes	Prostigmata	Torrenticolidae	-	0.3	4	Parasite	Swimmer
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda	Gammaridea	Gammaridae	6	-	-	Predator | Shredder	Swimmer
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Amphipoda	Gammaridea	Hyalellidae	8	0.07	8	Filterer	Swimmer
Arthropoda	Crustacea	Malacostraca	Eumalacostraca	Isopoda	Asellota	Asellidae	8	-	-	Gatherer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Adephaga	Carabidae	4	-	-	Predator	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Adephaga	Dytiscidae	5	-	-	Predator	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Adephaga	Haliplidae	5	-	-	Piercer Herbivore | Predator | Scraper/Grazer	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Curculionidae	5	-	-	Piercer Herbivore	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Elmidae	5	0.29	4	Scraper/Grazer	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Helophoridae	5	-	-	Shredder	Climber
Arthropoda	Hexapoda	Insecta	Pterygota	Coleoptera	Polyphaga	Hydrophilidae	5	-	-	Predator	Swimmer | Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Athericidae	4	0.35	2	Predator	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Dolichopodidae	4	-	-	Predator	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Empididae	6	0.4	2	Predator	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Muscidae	6	-	-	Predator	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Pelecorhynchidae	-	-	-	Predator	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Stratiomyidae	7	-	-	Gatherer	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Syrphidae	10	-	-	Gatherer	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Brachycera	Tabanidae	5	-	-	Predator	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Blephariceridae	0	-	-	Scraper/Grazer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Ceratopogonidae	6	0.21	4	Predator	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Chironomidae	6	0.31	4	Gatherer	Sprawler
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Dixidae	1	-	-	Filterer	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Psychodidae	10	0.37	4	Gatherer	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Simuliidae	5	0.42	2	Filterer	Clinger | Climber
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Tanyderidae	3	-	-	-	Sprawler

Notes: "-" indicates no sample collected, NA not applicable for these taxa.

[a] Hilsenhoff Biotic Index. Higher values indicate higher tolerance to organic pollution - Hilsenhoff, William L. "An improved biotic index of organic stream pollution." The great lakes entomologist 20.1 (1987): 7.

[b] Canadian Ecological Flow Index - Calculated based on velocity preference and specificity (high specificity indicate the organism has a lower tolerance for deviations from preferred velocity) - Peters, Daniel L., et al. "Establishing standards and assessment criteria for ecological instream flow needs in agricultural regions of Canada." Journal of environmental quality 41.1 (2012): 41-51.

[c] Multiple preferences separated by "|". Value modified from USGS Trait Database (https://pubs.usgs.gov/ds/ds187/) and the bio.inf R package Lester L. Yuan (2014). bio.infer: Predict environmental conditions from biological observations. R package version

Table E.1: Benthic Invertebrate Traits at the Family Level, FRO LAEMP, 2020

Phylum	Subphylum	Class	Subclass	Order	Suborder	Family	HBI[a]	CEFI[b]		Feeding Preferences[c]	Habitat Preferences[c]
								Velocity (m/s)	Specificity		
Arthropoda	Hexapoda	Insecta	Pterygota	Diptera	Nematocera	Tipulidae	4	0.39	4	Shredder	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Furcatergalia	Caenidae	6	0.06	8	Gatherer	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Furcatergalia	Ephemerellidae	2	0.42	4	Predator | Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Furcatergalia	Leptohyphidae	4	-	-	Gatherer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Furcatergalia	Leptophlebiidae	4	0.26	4	Gatherer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Pisciforma	Ameletidae	0	0.45	2	Scraper/Grazer | Shredder	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Pisciforma	Baetidae	6	0.43	2	Gatherer	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Pisciforma	Heptageniidae	3	0.48	2	Scraper/Grazer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Ephemeroptera	Pisciforma	Siphlonuridae	4	-	-	Gatherer	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Hemiptera	Heteroptera	Corixidae	5	-	-	Gatherer	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Megaloptera	NA	Sialidae	4	-	-	Predator	Burrower
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Anisoptera	Aeshnidae	5	-	-	Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Odonata	Zygoptera	Coenagrionidae	8	-	-	Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Euholognatha	Capniidae	3	0.4	4	Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Euholognatha	Leuctridae	0	0.38	2	Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Euholognatha	Nemouridae	2	0.44	2	Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Euholognatha	Taeniopterygidae	2	0.5	4	Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Systellognatha	Chloroperlidae	0	0.49	2	Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Systellognatha	Peltoperlidae	0	-	-	Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Systellognatha	Perlidae	3	0.54	2	Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Systellognatha	Perlodidae	2	0.47	4	Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Plecoptera	Systellognatha	Pteronarcyidae	2	-	-	Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Apataniidae	3	0.38	4	Scraper/Grazer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Brachycentridae	2	0.41	4	Filterer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Glossosomatidae	1	0.41	4	Scraper/Grazer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Hydropsychidae	5	0.43	2	Filterer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Hydroptilidae	6	0.27	4	Piercer Herbivore | Scraper/Grazer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Lepidostomatidae	1	0.39	2	Shredder	Climber
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Leptoceridae	4	0.15	4	Shredder	Swimmer
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Limnephilidae	4	0.33	4	Scraper/Grazer | Shredder	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Philopotamidae	4	0.49	2	Filterer	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Phryganeidae	4	-	-	Predator | Shredder	Climber
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Polycentropodidae	6	0.22	4	Filterer | Gatherer | Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Rhyacophilidae	1	0.44	2	Predator	Clinger
Arthropoda	Hexapoda	Insecta	Pterygota	Trichoptera	NA	Uenoidae	3	0.45	4	Scraper/Grazer	Clinger
Mollusca	NA	Bivalvia	Heterodonta	Veneroida	NA	Pisidiidae	6	-	-	Filterer	Burrower
Mollusca	NA	Gastropoda	NA	Basommatophora	NA	Lymnaeidae	6	0.42	2	Scraper/Grazer	Clinger
Mollusca	NA	Gastropoda	NA	Basommatophora	NA	Physidae	8	-	-	Scraper/Grazer	Clinger
Mollusca	NA	Gastropoda	NA	Basommatophora	NA	Planorbidae	6	0.1	4	Scraper/Grazer	Clinger
Mollusca	NA	Gastropoda	NA	Heterostropha	NA	Valvatidae	8	0.18	4	Scraper/Grazer	Clinger
Mollusca	NA	Gastropoda	NA	Neotaenioglossa	NA	Hydrobiidae	8	0.16	4	Scraper/Grazer	Clinger

Notes: "-" indicates no sample collected, NA not applicable for these taxa.

[a] Hilsenhoff Biotic Index. Higher values indicate higher tolerance to organic pollution - Hilsenhoff, William L. "An improved biotic index of organic stream pollution." The great lakes entomologist 20.1 (1987): 7.

[b] Canadian Ecological Flow Index - Calculated based on velocity preference and specificity (high specificity indicate the organism has a lower tolerance for deviations from preferred velocity) - Peters, Daniel L., et al. "Establishing standards and assessment criteria for ecological instream flow needs in agricultural regions of Canada." Journal of environmental quality 41.1 (2012): 41-51.

[c] Multiple preferences separated by "|". Value modified from USGS Trait Database (https://pubs.usgs.gov/ds/ds187/) and the bio.inf R package Lester L. Yuan (2014). bio.infer: Predict environmental conditions from biological observations. R package version

Table E.2: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Reference	RG_HENUP	FR_HC3	2012	18/Sep/12	0.83	18-Sep-12	6.4
				2015	15/Sep/15	1.00	15-Sep-15	3.8
				2016	12/Sep/16	1.10	12-Sep-16	3.8
				2017	15/Sep/17	1.00	15-Sep-17	4.9
				2018	6/Sep/18	1.10	6-Sep-18	3.4
				2018	6/Sep/18	1.10	6-Sep-18	4.1
				2018	6/Sep/18	1.10	6-Sep-18	3.8
				2019	11/Sep/19	1.10	11-Sep-19	5.2
				2019	11/Sep/19	1.10	11-Sep-19	4.6
				2019	11/Sep/19	1.10	11-Sep-19	3.9
				2020	15/Jun/20	0.34	15-Jun-20	5.1
				2020	15/Jun/20	0.34	15-Jun-20	7.5
				2020	15/Jun/20	0.34	15-Jun-20	3.6
				2020	15/Sep/20	1.00	15-Sep-20	6.0
				2020	15/Sep/20	1.00	15-Sep-20	6.9
				2020	15/Sep/20	1.00	15-Sep-20	5.7
		RG_FO26	FR_UFR1	2012	18/Sep/12	0.58	18-Sep-12	4.9
				2012	18/Sep/12	0.58	18-Sep-12	3.6
				2012	18/Sep/12	0.58	18-Sep-12	4.2
				2015	14/Sep/15	0.79	14-Sep-15	4.9
				2016	12/Sep/16	0.68	12-Sep-16	3.5
				2017	12/Sep/17	0.60	12-Sep-17	3.2
				2018	7/Sep/18	0.57	7-Sep-18	3.4
				2018	7/Sep/18	0.57	7-Sep-18	4.1
				2018	7/Sep/18	0.57	7-Sep-18	3.8
				2019	20/Jun/19	0.60	20-Jun-19	3.6
				2019	20/Jun/19	0.60	20-Jun-19	3.4
				2019	20/Jun/19	0.60	20-Jun-19	3.4
				2019	10/Sep/19	0.61	10-Sep-19	3.2
				2019	10/Sep/19	0.61	10-Sep-19	3.1
				2019	10/Sep/19	0.61	10-Sep-19	2.8
				2020	17/Jun/20	0.38	17-Jun-20	4.4
				2020	17/Jun/20	0.38	17-Jun-20	4.0
				2020	17/Jun/20	0.38	17-Jun-20	5.0
				2020	17/Sep/20	0.65	17-Sep-20	3.9
				2020	17/Sep/20	0.65	17-Sep-20	5.0
				2020	17/Sep/20	0.65	17-Sep-20	4.8
		RG_UFR1	FR_UFR1	2018	5/Dec/18	0.73	5-Dec-18	4.1
				2018	5/Dec/18	0.73	5-Dec-18	3.7
				2018	5/Dec/18	0.73	5-Dec-18	4.0
				2019	14/Feb/19	1.00	14-Feb-19	4.9
				2019	14/Feb/19	1.00	14-Feb-19	3.8
				2019	14/Feb/19	1.00	14-Feb-19	5.2
				2019	10/Dec/19	0.82	10-Dec-19	4.2
				2019	10/Dec/19	0.82	10-Dec-19	4.6
				2019	10/Dec/19	0.82	10-Dec-19	4.6
				2020	17/Jun/20	0.44	17-Jun-20	3.8
				2020	17/Jun/20	0.44	17-Jun-20	6.4
				2020	17/Jun/20	0.44	17-Jun-20	5.3
				2020	17/Jun/20	0.44	17-Jun-20	4.1
				2020	17/Jun/20	0.44	17-Jun-20	3.6
				2020	16/Sep/20	0.71	16-Sep-20	6.5
				2020	16/Sep/20	0.71	16-Sep-20	4.9
				2020	16/Sep/20	0.71	16-Sep-20	6.3
				2020	16/Sep/20	0.71	16-Sep-20	5.8

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Reference	RG_UFR1	FR_UFR1	2020	16/Sep/20	0.71	16-Sep-20	4.4
				2020	8/Dec/20	0.88	8-Dec-20	4.7
				2020	8/Dec/20	0.88	8-Dec-20	3.9
				2020	8/Dec/20	0.88	8-Dec-20	3.9
				2020	8/Dec/20	0.88	8-Dec-20	3.5
				2020	8/Dec/20	0.88	8-Dec-20	4.8
	Mine-exposed	RG_FODHE	FR_FR1	2012	19/Sep/12	18.0	19-Sep-12	8.9
				2015	14/Sep/15	9.80	14-Sep-15	6.6
				2017	15/Sep/17	20.0	15-Sep-17	8.1
				2018	5/Sep/18	20.0	5-Sep-18	11.0
				2018	5/Sep/18	20.0	5-Sep-18	12.0
				2018	5/Sep/18	20.0	5-Sep-18	15.0
				2018	5/Dec/18	25.0	5-Dec-18	7.8
				2018	5/Dec/18	25.0	5-Dec-18	7.6
				2018	5/Dec/18	25.0	5-Dec-18	3.8
				2019	12/Feb/19	24.0	12-Feb-19	-
				2019	12/Feb/19	24.0	12-Feb-19	-
				2019	12/Feb/19	24.0	12-Feb-19	-
				2019	20/Jun/19	4.30	20-Jun-19	6.8
				2019	20/Jun/19	4.30	20-Jun-19	6.0
				2019	20/Jun/19	4.30	20-Jun-19	3.9
				2019	10/Sep/19	14.0	10-Sep-19	5.1
				2019	10/Sep/19	14.0	10-Sep-19	5.2
				2019	10/Sep/19	14.0	10-Sep-19	7.0
				2019	10/Dec/19	22.0	10-Dec-19	4.4
				2019	10/Dec/19	22.0	10-Dec-19	5.2
				2019	10/Dec/19	22.0	10-Dec-19	5.2
				2020	15/Jun/20	3.90	15-Jun-20	5.7
				2020	15/Jun/20	3.90	15-Jun-20	5.4
				2020	15/Jun/20	3.90	15-Jun-20	3.3
				2020	15/Sep/20	23.0	15-Sep-20	8.1
				2020	15/Sep/20	23.0	15-Sep-20	8.1
				2020	15/Sep/20	23.0	15-Sep-20	7.5
		RG_FOUCL	RG_FOUCL	2019	12/Sep/19	16.0	12-Sep-19	7.2
				2019	12/Sep/19	16.0	12-Sep-19	5.5
				2019	12/Sep/19	16.0	12-Sep-19	5.8
				2019	9/Dec/19	30.0	9-Dec-19	4.5
				2019	9/Dec/19	30.0	9-Dec-19	4.6
				2019	9/Dec/19	30.0	9-Dec-19	3.4
				2020	15/Jun/20	5.50	15-Jun-20	7.9
				2020	15/Jun/20	5.50	15-Jun-20	5.5
				2020	15/Jun/20	5.50	15-Jun-20	6.6
				2020	10/Sep/20	27.0	10-Sep-20	13.0
				2020	10/Sep/20	27.0	10-Sep-20	10.0
				2020	10/Sep/20	27.0	10-Sep-20	6.7
				2020	8/Dec/20	32.0	8-Dec-20	6.4
				2020	8/Dec/20	32.0	8-Dec-20	5.9
				2020	8/Dec/20	32.0	8-Dec-20	5.8
		RG_FOUNGD	-	2012	12/Sep/12	24.0	12-Sep-12	8.2
				2015	15/Sep/15	24.0	15-Sep-15	7.2
				2017	16/Sep/17	53.0	16-Sep-17	6.5
				2018	13/Sep/18	38.0	13-Sep-18	6.0
				2018	13/Sep/18	38.0	13-Sep-18	7.0
				2018	13/Sep/18	38.0	13-Sep-18	8.0
				2018	5/Dec/18	52.0	5-Dec-18	6.0
				2018	5/Dec/18	52.0	5-Dec-18	6.1
				2018	5/Dec/18	52.0	5-Dec-18	5.0
				2019	12/Feb/19	48.0	12-Feb-19	5.6
				2019	12/Feb/19	48.0	12-Feb-19	5.5
				2019	12/Feb/19	48.0	12-Feb-19	5.7
				2019	19/Jun/19	8.90	19-Jun-19	5.1
				2019	19/Jun/19	8.90	19-Jun-19	4.5
				2019	19/Jun/19	8.90	19-Jun-19	5.1
				2019	12/Sep/19	28.0	12-Sep-19	7.5
				2019	12/Sep/19	28.0	12-Sep-19	6.4

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOUNGD	-	2019	12/Sep/19	28.0	12-Sep-19	6.1
				2019	9/Dec/19	54.0	9-Dec-19	5.1
				2019	9/Dec/19	54.0	9-Dec-19	4.3
				2019	9/Dec/19	54.0	9-Dec-19	4.4
				2020	16/Jun/20	9.30	16-Jun-20	4.5
				2020	16/Jun/20	9.30	16-Jun-20	4.7
				2020	16/Jun/20	9.30	16-Jun-20	4.3
				2020	10/Sep/20	40.0	10-Sep-20	11.0
				2020	10/Sep/20	40.0	10-Sep-20	11.0
				2020	10/Sep/20	40.0	10-Sep-20	9.6
				2020	8/Dec/20	59.0	8-Dec-20	5.1
				2020	8/Dec/20	59.0	8-Dec-20	6.7
				2020	8/Dec/20	59.0	8-Dec-20	6.3
		RG_FODNGD	FR_FRABEC1	2015	14/Sep/15	23.0	14-Sep-15	6.2
				2017	16/Sep/17	54.0	16-Sep-17	5.6
				2018	12/Sep/18	42.0	12-Sep-18	9.0
				2018	12/Sep/18	42.0	12-Sep-18	8.0
				2018	12/Sep/18	42.0	12-Sep-18	8.0
				2018	5/Dec/18	52.0	5-Dec-18	4.7
				2018	5/Dec/18	52.0	5-Dec-18	4.2
				2018	5/Dec/18	52.0	5-Dec-18	7.0
				2019	12/Feb/19	54.0	12-Feb-19	7.2
				2019	12/Feb/19	54.0	12-Feb-19	5.0
				2019	12/Feb/19	54.0	12-Feb-19	8.1
				2019	19/Jun/19	8.60	19-Jun-19	4.1
				2019	19/Jun/19	8.60	19-Jun-19	5.6
				2019	19/Jun/19	8.60	19-Jun-19	4.4
				2019	12/Sep/19	30.0	12-Sep-19	8.0
				2019	12/Sep/19	30.0	12-Sep-19	4.5
				2019	12/Sep/19	30.0	12-Sep-19	7.0
				2019	9/Dec/19	55.0	9-Dec-19	4.9
				2019	9/Dec/19	55.0	9-Dec-19	5.9
				2019	9/Dec/19	55.0	9-Dec-19	5.6
				2020	16/Jun/20	9.90	16-Jun-20	6.3
				2020	16/Jun/20	9.90	16-Jun-20	5.8
				2020	16/Jun/20	9.90	16-Jun-20	2.5
				2020	21/Sep/20	49.0	21-Sep-20	6.9
				2020	21/Sep/20	49.0	21-Sep-20	7.9
				2020	21/Sep/20	49.0	21-Sep-20	9.6
				2020	8/Dec/20	69.0	8-Dec-20	6.0
				2020	8/Dec/20	69.0	8-Dec-20	5.6
				2020	8/Dec/20	69.0	8-Dec-20	5.7
		RG_MP1	FR_MULTIPLATE	2012	18/Sep/12	38.0	18-Sep-12	9.0
				2015	15/Sep/15	23.0	15-Sep-15	5.9
				2017	12/Sep/17	52.0	12-Sep-17	5.6
				2018	11/Sep/18	44.0	11-Sep-18	7.0
				2018	11/Sep/18	44.0	11-Sep-18	8.6
				2018	11/Sep/18	44.0	11-Sep-18	8.0
				2018	6/Dec/18	57.0	6-Dec-18	6.6
				2018	6/Dec/18	57.0	6-Dec-18	6.8
				2018	6/Dec/18	57.0	6-Dec-18	5.3
				2019	13/Feb/19	62.0	13-Feb-19	5.0
				2019	13/Feb/19	62.0	13-Feb-19	4.7
				2019	13/Feb/19	62.0	13-Feb-19	8.4
				2019	18/Jun/19	11.0	18-Jun-19	5.2
				2019	18/Jun/19	11.0	18-Jun-19	6.0
				2019	18/Jun/19	11.0	18-Jun-19	6.1
				2019	5/Sep/19	34.0	5-Sep-19	5.6
				2019	5/Sep/19	34.0	5-Sep-19	7.0
				2019	5/Sep/19	34.0	5-Sep-19	7.3
				2019	9/Dec/19	57.0	9-Dec-19	5.1
				2019	9/Dec/19	57.0	9-Dec-19	6.4
				2019	9/Dec/19	57.0	9-Dec-19	5.8
				2020	15/Jun/20	11.0	15-Jun-20	6.1
				2020	15/Jun/20	11.0	15-Jun-20	6.8

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_MP1	FR_MULTIPLATE	2020	15/Jun/20	11.0	15-Jun-20	6.7
				2020	15/Sep/20	50.0	15-Sep-20	13.0
				2020	15/Sep/20	50.0	15-Sep-20	12.0
				2020	15/Sep/20	50.0	15-Sep-20	9.6
				2020	9/Dec/20	68.0	9-Dec-20	5.7
				2020	9/Dec/20	68.0	9-Dec-20	5.9
				2020	9/Dec/20	68.0	9-Dec-20	6.0
		RG_FOUSH	FR_FRNTP	2012	13/Sep/12	36.0	13-Sep-12	7.6
				2015	15/Sep/15	26.0	15-Sep-15	6.0
				2017	14/Sep/17	48.0	14-Sep-17	6.5
				2018	11/Sep/18	43.0	11-Sep-18	8.0
				2018	11/Sep/18	43.0	11-Sep-18	8.0
				2018	11/Sep/18	43.0	11-Sep-18	9.1
				2018	6/Dec/18	57.0	6-Dec-18	5.5
				2018	6/Dec/18	57.0	6-Dec-18	5.0
				2018	6/Dec/18	57.0	6-Dec-18	5.2
				2019	13/Feb/19	61.0	13-Feb-19	9.6
				2019	13/Feb/19	61.0	13-Feb-19	6.9
				2019	13/Feb/19	61.0	13-Feb-19	6.6
				2019	17/Jun/19	11.0	17-Jun-19	5.9
				2019	17/Jun/19	11.0	17-Jun-19	6.1
				2019	17/Jun/19	11.0	17-Jun-19	4.7
				2019	9/Sep/19	36.0	9-Sep-19	5.6
				2019	9/Sep/19	36.0	9-Sep-19	5.9
				2019	9/Sep/19	36.0	9-Sep-19	6.0
				2019	9/Dec/19	56.0	9-Dec-19	5.8
				2019	9/Dec/19	56.0	9-Dec-19	7.1
				2019	9/Dec/19	56.0	9-Dec-19	5.3
				2020	23/Jun/20	12.0	23-Jun-20	6.3
				2020	23/Jun/20	12.0	23-Jun-20	4.5
				2020	23/Jun/20	12.0	23-Jun-20	7.7
				2020	21/Sep/20	52.0	21-Sep-20	8.1
				2020	21/Sep/20	52.0	21-Sep-20	7.3
				2020	21/Sep/20	52.0	21-Sep-20	11.0
				2020	9/Dec/20	61.0	9-Dec-20	5.8
				2020	9/Dec/20	61.0	9-Dec-20	4.7
				2020	9/Dec/20	61.0	9-Dec-20	5.3
		RG_FOUKI	FR_FR2	2012	14/Sep/12	34.0	14-Sep-12	8.5
				2015	16/Sep/15	23.0	16-Sep-15	5.1
				2016	12/Sep/16	29.0	12-Sep-16	5.2
				2017	12/Sep/17	44.0	12-Sep-17	6.7
				2017	12/Sep/17	44.0	12-Sep-17	6.6
				2017	12/Sep/17	44.0	12-Sep-17	6.8
				2018	6/Mar/18	55.0	6-Mar-18	4.9
				2018	6/Mar/18	55.0	6-Mar-18	5.4
				2018	6/Mar/18	55.0	6-Mar-18	5.0
				2018	7/Sep/18	38.0	7-Sep-18	9.4
				2018	7/Sep/18	38.0	7-Sep-18	10.0
				2018	7/Sep/18	38.0	7-Sep-18	11.0
				2018	4/Dec/18	47.0	4-Dec-18	4.9
				2018	4/Dec/18	47.0	4-Dec-18	5.5
				2018	4/Dec/18	47.0	4-Dec-18	7.2
				2019	12/Feb/19	47.0	12-Feb-19	4.5
				2019	12/Feb/19	47.0	12-Feb-19	4.8
				2019	12/Feb/19	47.0	12-Feb-19	4.7
				2019	18/Jun/19	9.70	18-Jun-19	4.7
				2019	18/Jun/19	9.70	18-Jun-19	4.7
				2019	18/Jun/19	9.70	18-Jun-19	5.0
				2019	5/Sep/19	31.0	5-Sep-19	6.2
				2019	5/Sep/19	31.0	5-Sep-19	8.8
				2019	5/Sep/19	31.0	5/Sep/19	9
				2019	9/Dec/19	52.0	9/Dec/19	4.1
				2019	9/Dec/19	52.0	9/Dec/19	4.4
				2019	9/Dec/19	52.0	9-Dec-19	4.4
				2020	17/Jun/20	16.0	17-Jun-20	6.3

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOUKI	FR_FR2	2020	17/Jun/20	16.0	17-Jun-20	6.8
				2020	17/Jun/20	16.0	17-Jun-20	6.3
				2020	17/Jun/20	16.0	17-Jun-20	4.9
				2020	17/Jun/20	16.0	17-Jun-20	4.8
				2020	14/Sep/20	57.0	14-Sep-20	9.4
				2020	14/Sep/20	57.0	14-Sep-20	9.0
				2020	14/Sep/20	57.0	14-Sep-20	8.5
				2020	14/Sep/20	57.0	14-Sep-20	12.0
				2020	14/Sep/20	57.0	14-Sep-20	11.0
				2020	9/Dec/20	56.0	9-Dec-20	5.6
				2020	9/Dec/20	56.0	9-Dec-20	6.2
				2020	9/Dec/20	56.0	9-Dec-20	4.2
				2020	9/Dec/20	56.0	9-Dec-20	5.6
				2020	9/Dec/20	56.0	9-Dec-20	3.0
		RG_SCOUTDS	RG_SCOUTDS	2019	12/Sep/19	33.0	12-Sep-19	14.0
				2019	12/Sep/19	33.0	12-Sep-19	14.0
				2019	12/Sep/19	33.0	12-Sep-19	10.0
				2019	10/Dec/19	130	10-Dec-19	6.7
				2019	10/Dec/19	130	10-Dec-19	6.8
				2019	10/Dec/19	130	10-Dec-19	7.5
				2020	16/Jun/20	21.0	16-Jun-20	5.2
				2020	16/Jun/20	21.0	16-Jun-20	5.3
				2020	16/Jun/20	21.0	16-Jun-20	4.9
				2020	16/Jun/20	21.0	16-Jun-20	7.2
				2020	16/Jun/20	21.0	16-Jun-20	7.5
				2020	17/Sep/20	120	17-Sep-20	8.5
				2020	17/Sep/20	120	17-Sep-20	8.5
				2020	17/Sep/20	120	17-Sep-20	7.6
				2020	17/Sep/20	120	17-Sep-20	7.1
				2020	17/Sep/20	120	17-Sep-20	8.0
				2020	23/Nov/20	-	23-Nov-20	8.6
				2020	23/Nov/20	-	23-Nov-20	8.7
				2020	23/Nov/20	-	23-Nov-20	9.5
				2020	23/Nov/20	-	23-Nov-20	11.0
				2020	23/Nov/20	-	23-Nov-20	10.0
				2020	7/Dec/20	120	7-Dec-20	4.3
				2020	7/Dec/20	120	7-Dec-20	7.6
				2020	7/Dec/20	120	7-Dec-20	5.3
				2020	7/Dec/20	120	7-Dec-20	5.7
				2020	7/Dec/20	120	7-Dec-20	5.9
		RG_FOBKS	GH_FR3	2012	14/Sep/12	32.0	14-Sep-12	8.8
				2015	16/Sep/15	24.0	16-Sep-15	6.0
				2017	13/Sep/17	45.0	13-Sep-17	5.8
				2017	13/Sep/17	45.0	13-Sep-17	8.2
				2017	13/Sep/17	45.0	13-Sep-17	5.9
				2018	12/Mar/18	53.0	12-Mar-18	5.8
				2018	12/Mar/18	53.0	12-Mar-18	5.1
				2018	12/Mar/18	53.0	12-Mar-18	6.2
				2018	8/Sep/18	36.0	8-Sep-18	11.0
				2018	8/Sep/18	36.0	8-Sep-18	10.0
				2018	8/Sep/18	36.0	8-Sep-18	9.9
				2018	4/Dec/18	49.0	4-Dec-18	3.8
				2018	4/Dec/18	49.0	4-Dec-18	3.8
				2018	4/Dec/18	49.0	4-Dec-18	6.6
				2019	12/Feb/19	47.0	12-Feb-19	-
				2019	12/Feb/19	47.0	12-Feb-19	-
				2019	12/Feb/19	47.0	12-Feb-19	13.0
				2019	17/Jun/19	10.0	17-Jun-19	5.0
				2019	17/Jun/19	10.0	17-Jun-19	3.8
				2019	17/Jun/19	10.0	17-Jun-19	4.0
				2019	9/Sep/19	35.0	9-Sep-19	7.5
				2019	9/Sep/19	35.0	9-Sep-19	7.9
				2019	9/Sep/19	35.0	9-Sep-19	9.5
				2019	10/Dec/19	53.0	10-Dec-19	8.2
				2019	10/Dec/19	53.0	10-Dec-19	7.5

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOBKS	GH_FR3	2019	10/Dec/19	53.0	10-Dec-19	6.2
				2020	16/Jun/20	15.0	16-Jun-20	6.0
				2020	16/Jun/20	15.0	16-Jun-20	4.4
				2020	16/Jun/20	15.0	16-Jun-20	6.6
				2020	16/Jun/20	15.0	16-Jun-20	6.0
				2020	16/Jun/20	15.0	16-Jun-20	5.9
				2020	10/Sep/20	47.0	10-Sep-20	6.6
				2020	10/Sep/20	47.0	10-Sep-20	13.0
				2020	10/Sep/20	47.0	10-Sep-20	11.0
				2020	10/Sep/20	47.0	10-Sep-20	11.0
				2020	10/Sep/20	47.0	10-Sep-20	7.8
				2020	23/Nov/20	-	23-Nov-20	5.9
				2020	23/Nov/20	-	23-Nov-20	4.9
				2020	23/Nov/20	-	23-Nov-20	5.9
				2020	23/Nov/20	-	23-Nov-20	6.4
				2020	23/Nov/20	-	23-Nov-20	5.0
				2020	7/Dec/20	63.0	7-Dec-20	7.0
				2020	7/Dec/20	63.0	7-Dec-20	8.0
				2020	7/Dec/20	63.0	7-Dec-20	5.8
				2020	7/Dec/20	63.0	7-Dec-20	7.6
				2020	7/Dec/20	63.0	7-Dec-20	8.0
		RG_FOBKS	RG_FOBKS	2012	14/Sep/12	32.0	14-Sep-12	8.8
				2015	16/Sep/15	24.0	16-Sep-15	6.0
				2017	13/Sep/17	45.0	13-Sep-17	5.8
				2017	13/Sep/17	45.0	13-Sep-17	8.2
				2017	13/Sep/17	45.0	13-Sep-17	5.9
				2018	12/Mar/18	53.0	12-Mar-18	5.8
				2018	12/Mar/18	53.0	12-Mar-18	5.1
				2018	12/Mar/18	53.0	12-Mar-18	6.2
				2018	8/Sep/18	36.0	8-Sep-18	11.0
				2018	8/Sep/18	36.0	8-Sep-18	10.0
				2018	8/Sep/18	36.0	8-Sep-18	9.9
				2018	4/Dec/18	49.0	4-Dec-18	3.8
				2018	4/Dec/18	49.0	4-Dec-18	3.8
				2018	4/Dec/18	49.0	4-Dec-18	6.6
				2019	12/Feb/19	47.0	12-Feb-19	-
				2019	12/Feb/19	47.0	12-Feb-19	-
				2019	12/Feb/19	47.0	12-Feb-19	13.0
				2019	17/Jun/19	10.0	17-Jun-19	5.0
				2019	17/Jun/19	10.0	17-Jun-19	3.8
				2019	17/Jun/19	10.0	17-Jun-19	4.0
				2019	9/Sep/19	35.0	9-Sep-19	7.5
				2019	9/Sep/19	35.0	9-Sep-19	7.9
				2019	9/Sep/19	35.0	9-Sep-19	9.5
				2019	10/Dec/19	53.0	10-Dec-19	8.2
				2019	10/Dec/19	53.0	10-Dec-19	7.5
				2019	10/Dec/19	53.0	10-Dec-19	6.2
				2020	16/Jun/20	15.0	16-Jun-20	6.0
				2020	16/Jun/20	15.0	16-Jun-20	4.4
				2020	16/Jun/20	15.0	16-Jun-20	6.6
				2020	16/Jun/20	15.0	16-Jun-20	6.0
				2020	16/Jun/20	15.0	16-Jun-20	5.9
				2020	10/Sep/20	47.0	10-Sep-20	6.6
				2020	10/Sep/20	47.0	10-Sep-20	13.0
				2020	10/Sep/20	47.0	10-Sep-20	11.0
				2020	10/Sep/20	47.0	10-Sep-20	11.0
				2020	10/Sep/20	47.0	10-Sep-20	7.8
				2020	23/Nov/20	-	23-Nov-20	5.9
				2020	23/Nov/20	-	23-Nov-20	4.9
				2020	23/Nov/20	-	23-Nov-20	5.9
				2020	23/Nov/20	-	23-Nov-20	6.4
				2020	23/Nov/20	-	23-Nov-20	5.0
				2020	7/Dec/20	63.0	7-Dec-20	7.0
				2020	7/Dec/20	63.0	7-Dec-20	8.0
				2020	7/Dec/20	63.0	7-Dec-20	5.8
				2020	7/Dec/20	63.0	7-Dec-20	7.6
				2020	7/Dec/20	63.0	7-Dec-20	8.0

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOBSC	FR_FR4	2012	15/Sep/12	54.0	15-Sep-12	8.4
				2015	17/Sep/15	34.0	17-Sep-15	7.5
				2017	15/Sep/17	73.0	15-Sep-17	5.0
				2018	10/Sep/18	61.0	10-Sep-18	9.0
				2018	10/Sep/18	61.0	10-Sep-18	9.0
				2018	10/Sep/18	61.0	10-Sep-18	8.2
				2018	4/Dec/18	49.0	4-Dec-18	8.0
				2018	4/Dec/18	49.0	4-Dec-18	9.2
				2018	4/Dec/18	49.0	4-Dec-18	7.6
				2019	18/Jun/19	14.0	18-Jun-19	5.3
				2019	18/Jun/19	14.0	18-Jun-19	5.1
				2019	18/Jun/19	14.0	18-Jun-19	5.7
				2019	13/Sep/19	52.0	13-Sep-19	12.0
				2019	13/Sep/19	52.0	13-Sep-19	12.0
				2019	13/Sep/19	52.0	13-Sep-19	13.0
				2019	10/Dec/19	140	10-Dec-19	9.3
				2019	10/Dec/19	140	10-Dec-19	5.9
				2019	10/Dec/19	140	10-Dec-19	5.6
				2020	18/Jun/20	71.0	18-Jun-20	5.0
				2020	18/Jun/20	71.0	18-Jun-20	5.6
				2020	18/Jun/20	71.0	18-Jun-20	4.9
				2020	18/Jun/20	71.0	18-Jun-20	7.4
				2020	18/Jun/20	71.0	18-Jun-20	4.2
				2020	18/Sep/20	110	18-Sep-20	10.0
				2020	18/Sep/20	110	18-Sep-20	12.0
				2020	18/Sep/20	110	18-Sep-20	8.2
				2020	18/Sep/20	110	18-Sep-20	11.0
				2020	18/Sep/20	110	18-Sep-20	12.0
				2020	23/Nov/20	-	23-Nov-20	8.4
				2020	23/Nov/20	-	23-Nov-20	10.0
				2020	23/Nov/20	-	23-Nov-20	8.3
				2020	23/Nov/20	-	23-Nov-20	7.9
				2020	23/Nov/20	-	23-Nov-20	8.7
				2020	7/Dec/20	120	7-Dec-20	7.3
				2020	7/Dec/20	120	7-Dec-20	8.6
				2020	7/Dec/20	120	7-Dec-20	6.1
				2020	7/Dec/20	120	7-Dec-20	8.1
				2020	7/Dec/20	120	7-Dec-20	9.4
		RG_FOBCP	FR_FRCP1	2012	15/Sep/12	120	15-Sep-12	7.9
				2015	17/Sep/15	64.0	17-Sep-15	7.7
				2016	12/Sep/16	73.0	12-Sep-16	9.7
				2017	14/Sep/17	130	14-Sep-17	6.4
				2018	9/Sep/18	200	9-Sep-18	9.4
				2018	9/Sep/18	200	9-Sep-18	8.0
				2018	9/Sep/18	200	9-Sep-18	10.0
				2018	9/Sep/18	200	9-Sep-18	8.0
				2018	9/Sep/18	200	9-Sep-18	7.9
				2018	3/Dec/18	600	3-Dec-18	39.0
				2018	3/Dec/18	600	3-Dec-18	8.4
				2018	3/Dec/18	600	3-Dec-18	7.0
				2019	18/Jun/19	28.0	18-Jun-19	2.8
				2019	18/Jun/19	28.0	18-Jun-19	5.3
				2019	18/Jun/19	28.0	18-Jun-19	4.4
				2019	6/Sep/19	58.0	6-Sep-19	9.1
				2019	6/Sep/19	58.0	6-Sep-19	8.4
				2019	6/Sep/19	58.0	6-Sep-19	6.3
				2019	6/Sep/19	58.0	6-Sep-19	7.6
				2019	6/Sep/19	58.0	6-Sep-19	7.3
				2019	11/Dec/19	120	11-Dec-19	-
				2019	11/Dec/19	120	11-Dec-19	-
				2019	11/Dec/19	120	11-Dec-19	-
				2020	17/Jun/20	44.0	17-Jun-20	5.3
				2020	17/Jun/20	44.0	17-Jun-20	6.4
				2020	17/Jun/20	44.0	17-Jun-20	5.3
				2020	17/Jun/20	44.0	17-Jun-20	4.9
				2020	17/Jun/20	44.0	17-Jun-20	4.3

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOBCP	FR_FRCP1	2020	16/Sep/20	120	16-Sep-20	11.0
				2020	16/Sep/20	120	16-Sep-20	9.9
				2020	16/Sep/20	120	16-Sep-20	9.9
				2020	16/Sep/20	120	16-Sep-20	11.0
				2020	16/Sep/20	120	16-Sep-20	11.0
				2020	7/Dec/20	130	7-Dec-20	8.9
				2020	7/Dec/20	130	7-Dec-20	6.5
				2020	7/Dec/20	130	7-Dec-20	6.9
				2020	7/Dec/20	130	7-Dec-20	5.8
				2020	7/Dec/20	130	7-Dec-20	4.4
		RG_FRCP1SW	FR_FRCP1SW	2017	14/Sep/17	130	14-Sep-17	7.0
				2019	19/Jun/19	31.0	19-Jun-19	48.0
				2019	19/Jun/19	31.0	19-Jun-19	6.0
				2019	19/Jun/19	31.0	19-Jun-19	7.0
				2019	13/Sep/19	54.0	13-Sep-19	7.7
				2019	13/Sep/19	54.0	13-Sep-19	7.7
				2019	13/Sep/19	54.0	13-Sep-19	7.7
				2019	12/Dec/19	92.0	12-Dec-19	-
				2019	12/Dec/19	92.0	12-Dec-19	-
				2019	12/Dec/19	92.0	12-Dec-19	-
				2020	18/Jun/20	42.0	18-Jun-20	39.0
				2020	18/Jun/20	42.0	18-Jun-20	29.0
				2020	18/Jun/20	42.0	18-Jun-20	100.0
				2020	18/Jun/20	42.0	18-Jun-20	6.7
				2020	18/Jun/20	42.0	18-Jun-20	5.2
				2020	22/Sep/20	110	22-Sep-20	13.0
				2020	22/Sep/20	110	22-Sep-20	16.0
				2020	22/Sep/20	110	22-Sep-20	14.0
				2020	22/Sep/20	110	22-Sep-20	8.2
				2020	22/Sep/20	110	22-Sep-20	7.4
		RG_FRUPO	FR_FRRD	2017	15/Sep/17	99.0	15-Sep-17	7.0
				2018	7/Mar/18	110	7-Mar-18	7.0
				2018	9/Sep/18	82.0	9-Sep-18	8.0
				2018	9/Sep/18	82.0	9-Sep-18	10.0
				2018	9/Sep/18	82.0	9-Sep-18	9.0
				2018	4/Dec/18	69.0	4-Dec-18	5.0
				2018	4/Dec/18	69.0	4-Dec-18	5.0
				2018	4/Dec/18	69.0	4-Dec-18	5.0
				2019	11/Feb/19	91.0	11-Feb-19	5.1
				2019	11/Feb/19	91.0	11-Feb-19	8.0
				2019	11/Feb/19	91.0	11-Feb-19	6.2
				2019	19/Jun/19	39.0	19-Jun-19	8.1
				2019	19/Jun/19	39.0	19-Jun-19	7.6
				2019	19/Jun/19	39.0	19-Jun-19	5.0
				2019	7/Sep/19	66.0	7-Sep-19	6.1
				2019	7/Sep/19	66.0	7-Sep-19	8.1
				2019	7/Sep/19	66.0	7-Sep-19	6.8
				2019	11/Dec/19	100	11-Dec-19	4.6
				2019	11/Dec/19	100	11-Dec-19	3.9
				2019	11/Dec/19	100	11-Dec-19	4.5
				2020	19/Jun/20	47.0	19-Jun-20	4.5
				2020	19/Jun/20	47.0	19-Jun-20	5.7
				2020	19/Jun/20	47.0	19-Jun-20	4.2
				2020	19/Jun/20	47.0	19-Jun-20	7.7
				2020	19/Jun/20	47.0	19-Jun-20	7.4
				2020	12/Sep/20	95.0	12-Sep-20	9.5
				2020	12/Sep/20	95.0	12-Sep-20	9.1
				2020	12/Sep/20	95.0	12-Sep-20	10.0
				2020	12/Sep/20	95.0	12-Sep-20	9.4
				2020	12/Sep/20	95.0	12-Sep-20	10.0
				2020	10/Dec/20	110	10-Dec-20	5.1
				2020	10/Dec/20	110	10-Dec-20	3.6
				2020	10/Dec/20	110	10-Dec-20	5.0
				2020	10/Dec/20	110	10-Dec-20	5.0
				2020	10/Dec/20	110	10-Dec-20	4.9

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FODPO	GH_PC2	2012	17/Sep/12	76.0	17-Sep-12	6.0
				2015	15/Sep/15	68.0	15-Sep-15	7.0
				2017	13/Sep/17	90.0	13-Sep-17	5.0
				2018	7/Mar/18	100	7-Mar-18	4.0
				2018	13/Sep/18	82.0	13-Sep-18	4.0
				2018	13/Sep/18	82.0	13-Sep-18	8.0
				2018	13/Sep/18	82.0	13-Sep-18	5.0
				2018	4/Dec/18	110	4-Dec-18	0.0
				2018	4/Dec/18	110	4-Dec-18	4.0
				2018	4/Dec/18	110	4-Dec-18	5.0
				2019	14/Feb/19	110	14-Feb-19	3.6
				2019	14/Feb/19	110	14-Feb-19	5.0
				2019	14/Feb/19	110	14-Feb-19	8.4
				2019	21/Jun/19	48.0	21-Jun-19	4.7
				2019	21/Jun/19	48.0	21-Jun-19	5.0
				2019	21/Jun/19	48.0	21-Jun-19	5.7
				2019	7/Sep/19	70.0	7-Sep-19	5.4
				2019	7/Sep/19	70.0	7-Sep-19	7.3
				2019	7/Sep/19	70.0	7-Sep-19	5.6
				2019	12/Dec/19	120	12-Dec-19	4.0
				2019	12/Dec/19	120	12-Dec-19	4.0
				2019	12/Dec/19	120	12-Dec-19	3.7
				2020	19/Jun/20	42.0	19-Jun-20	6.2
				2020	19/Jun/20	42.0	19-Jun-20	6.9
				2020	19/Jun/20	42.0	19-Jun-20	5.5
				2020	19/Jun/20	42.0	19-Jun-20	6.7
				2020	19/Jun/20	42.0	19-Jun-20	5.5
				2020	11/Sep/20	85.0	11-Sep-20	9.3
				2020	11/Sep/20	85.0	11-Sep-20	6.7
				2020	11/Sep/20	85.0	11-Sep-20	7.2
				2020	11/Sep/20	85.0	11-Sep-20	7.1
				2020	11/Sep/20	85.0	11-Sep-20	10.0
				2020	9/Dec/20	95.0	9-Dec-20	3.8
				2020	9/Dec/20	95.0	9-Dec-20	3.3
				2020	9/Dec/20	95.0	9-Dec-20	3.1
				2020	9/Dec/20	95.0	9-Dec-20	4.5
				2020	9/Dec/20	95.0	9-Dec-20	4.1
		RG_FO22	FR_FRABCH	2012	16/Sep/12	71.0	16-Sep-12	12.0
				2015	12/Sep/15	68.0	12-Sep-15	7.0
				2017	14/Sep/17	83.0	14-Sep-17	5.0
				2018	12/Mar/18	100	12-Mar-18	7.0
				2018	8/Sep/18	78.0	8-Sep-18	7.0
				2018	8/Sep/18	78.0	8-Sep-18	9.0
				2018	8/Sep/18	78.0	8-Sep-18	7.0
				2018	8/Sep/18	78.0	8-Sep-18	9.0
				2018	8/Sep/18	78.0	8-Sep-18	8.0
				2018	5/Dec/18	94.0	5-Dec-18	3.0
				2018	5/Dec/18	94.0	5-Dec-18	4.0
				2018	5/Dec/18	94.0	5-Dec-18	4.0
				2018	5/Dec/18	94.0	5-Dec-18	6.0
				2019	14/Feb/19	99.0	14-Feb-19	4.9
				2019	14/Feb/19	99.0	14-Feb-19	5.8
				2019	14/Feb/19	99.0	14-Feb-19	5.4
				2019	21/Jun/19	52.0	21-Jun-19	7.5
				2019	21/Jun/19	52.0	21-Jun-19	6.8
				2019	21/Jun/19	52.0	21-Jun-19	10.0
				2019	16/Sep/19	70.0	16-Sep-19	7.1
				2019	16/Sep/19	70.0	16-Sep-19	7.8
				2019	16/Sep/19	70.0	16-Sep-19	7.3
				2019	16/Sep/19	70.0	16-Sep-19	6.7
				2019	16/Sep/19	70.0	16-Sep-19	6.6
				2019	11/Dec/19	88.0	11-Dec-19	4.4
				2019	11/Dec/19	88.0	11-Dec-19	5.4
				2019	11/Dec/19	88.0	11-Dec-19	4.9
				2020	19/Jun/20	43.0	19-Jun-20	6.7
				2020	19/Jun/20	43.0	19-Jun-20	5.5
				2020	19/Jun/20	43.0	19-Jun-20	8.2

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.2: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FO22	FR_FRABCH	2020	11/Sep/20	82.0	11-Sep-20	9.1
				2020	11/Sep/20	82.0	11-Sep-20	8.4
				2020	11/Sep/20	82.0	11-Sep-20	11.0
				2020	11/Sep/20	82.0	11-Sep-20	8.9
				2020	11/Sep/20	82.0	11-Sep-20	10.0
				2020	9/Dec/20	96.0	9-Dec-20	6.1
				2020	9/Dec/20	96.0	9-Dec-20	6.1
				2020	9/Dec/20	96.0	9-Dec-20	7.2
				2020	9/Dec/20	96.0	9-Dec-20	4.0
				2020	9/Dec/20	96.0	9-Dec-20	4.7
		RG_FOUEW	FR_FR5	2012	16/Sep/12	59.0	16-Sep-12	8.3
				2015	13/Sep/15	59.0	13-Sep-15	6.0
				2016	12/Sep/16	53.0	12-Sep-16	6.0
				2017	13/Sep/17	78.0	13-Sep-17	7.0
				2018	7/Mar/18	86.0	7-Mar-18	6.0
				2018	6/Sep/18	71.0	6-Sep-18	8.0
				2018	6/Sep/18	71.0	6-Sep-18	7.0
				2018	6/Sep/18	71.0	6-Sep-18	5.0
				2018	5/Dec/18	87.0	5-Dec-18	5.0
				2018	5/Dec/18	87.0	5-Dec-18	6.0
				2018	5/Dec/18	87.0	5-Dec-18	5.0
				2019	13/Feb/19	95.0	13-Feb-19	4.4
				2019	13/Feb/19	95.0	13-Feb-19	6.0
				2019	13/Feb/19	95.0	13-Feb-19	4.4
				2019	4/Sep/19	61.0	4-Sep-19	7.3
				2019	4/Sep/19	61.0	4-Sep-19	6.9
				2019	4/Sep/19	61.0	4-Sep-19	6.0
				2019	11/Dec/19	73.0	11-Dec-19	4.8
				2019	11/Dec/19	73.0	11-Dec-19	4.4
				2019	11/Dec/19	73.0	11-Dec-19	5.5
				2020	19/Jun/20	36.0	19-Jun-20	6.1
				2020	19/Jun/20	36.0	19-Jun-20	4.5
				2020	19/Jun/20	36.0	19-Jun-20	5.0
				2020	19/Jun/20	36.0	19-Jun-20	5.3
				2020	19/Jun/20	36.0	19-Jun-20	6.7
				2020	11/Sep/20	77.0	11-Sep-20	7.5
				2020	11/Sep/20	77.0	11-Sep-20	7.1
				2020	11/Sep/20	77.0	11-Sep-20	9.7
				2020	11/Sep/20	77.0	11-Sep-20	9.1
				2020	11/Sep/20	77.0	11-Sep-20	9.9
				2020	10/Dec/20	96.0	10-Dec-20	5.8
				2020	10/Dec/20	96.0	10-Dec-20	7.3
				2020	10/Dec/20	96.0	10-Dec-20	4.9
				2020	10/Dec/20	96.0	10-Dec-20	9.1
				2020	10/Dec/20	96.0	10-Dec-20	9.5

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.3: Spatial and Temporal Comparisons of Benthic Invertebrate Tissue Selenium Concentration, FRO LAEMP, September, 2018 to 2020

ANOVA Model[a]				Station		Do concentrations differ among years for each station?[b]			Do concentrations differ among stations within year?[c]								
									RG_HENUP versus Downstream			RG_FO26 versus Downstream			RG_UFR1 versus Downstream		
Trans	Station	Season	Season x Station			2018 vs 2019	2018 vs 2020	2019 vs 2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
log_{10}	<0.001	<0.001	<0.001	Reference	RG_HENUP	19	62	36	nc	nc	nc	nc	nc	nc	nc	nc	nc
					RG_FO26	-19	21	50	-1.4	-33	-27	nc	nc	nc	nc	nc	nc
					RG_UFR1	-	-	-	-	-	-11	-	-	22	nc	nc	nc
				Mine-exposed	RG_FODHE	-55	-37	38	230	26	28	234	88	74	-	-	43
					RG_FOUCL	-	-	56	-	35	55	-	102	110	-	-	73
					RG_FOUNGD	-4.5	51	58	83	46	70	85	119	132	-	-	90
					RG_FODNGD	-24	-3.1	28	119	39	30	122	109	77	-	-	46
					RG_MP1	-16	46	74	106	45	85	109	118	152	-	-	107
					RG_FOUSH	-30	3.8	49	119	29	40	122	93	91	-	-	57
					RG_FOUKI	-21	-2.1	25	166	75	60	169	162	118	-	-	79
					RG_FOBKS	-20	-6.8	16	170	82	55	174	173	111	-	-	74
					RG_SCOUTDS	-	-	-36	-	174	28	-	310	74	-	-	44
					RG_FOBSC	41	21	-15	129	172	71	132	307	132	-	-	91
					RG_FOBCP	-11	22	37	126	69	71	129	154	132	-	-	91
					RG_FRCP1SW	-	-	46	-	70	81	-	154	147	-	-	103
					RG_FRUPO	-19	12	38	125	53	55	129	130	111	-	-	74
					RG_FODPO	8.7	43	32	46	33	29	48	100	75	-	-	44
					RG_FO22	-10	20	20	107	56	53	110	134	108	-	-	71
					RG_FOUEW	4.3	33	28	69	48	39	71	122	89	-	-	55

P-value < 0.05.

P-value for post-hoc paired-wise comparison < 0.05 and MOD > 0.

P-value for post-hoc paired-wise comparison < 0.05 and MOD < 0.

Notes: '"-" = no data; nc = no relevant comparison.

[a] P-values from Analysis of Variance (ANOVA) including the terms Station, Season and Station x Season.

[b] Magnitude of Difference (MOD) was calculated as $(MCT_{year2} - MCT_{year1})/MCT_{year1} * 100$ using the measure of central tendency (geometric mean due to log_{10} transformation; MCT) related to the statistics.

[c] Magnitude of Difference (MOD) was calculated as $(MCT_{Exposure} - MCT_{Reference})/MCT_{Reference} * 100$ using the measure of central tendency (geometric mean due to log10 transformation).

Table E.4: **Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020**

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Reference	RG_HENUP	FR_HC3	2012	18-Sep-12	0.83	18-Sep-12	6.4
				2015	15-Sep-15	1.00	15-Sep-15	3.8
				2016	12-Sep-16	1.10	12-Sep-16	3.8
				2017	15-Sep-17	1.00	15-Sep-17	4.9
				2018	6-Sep-18	1.10	06-Sep-18	3.4
				2018	6-Sep-18	1.10	06-Sep-18	4.1
				2018	6-Sep-18	1.10	06-Sep-18	3.8
				2019	11-Sep-19	1.10	11-Sep-19	5.2
				2019	11-Sep-19	1.10	11-Sep-19	4.6
				2019	11-Sep-19	1.10	11-Sep-19	3.9
				2020	15-Jun-20	0.34	15-Jun-20	5.1
				2020	15-Jun-20	0.34	15-Jun-20	7.5
				2020	15-Jun-20	0.34	15-Jun-20	3.6
				2020	15-Sep-20	1.00	15-Sep-20	6.0
				2020	15-Sep-20	1.00	15-Sep-20	6.9
				2020	15-Sep-20	1.00	15-Sep-20	5.7
		RG_FO26	FR_UFR1	2012	18-Sep-12	0.58	18-Sep-12	4.9
				2012	18-Sep-12	0.58	18-Sep-12	3.6
				2012	18-Sep-12	0.58	18-Sep-12	4.2
				2015	14-Sep-15	0.79	14-Sep-15	4.9
				2016	12-Sep-16	0.68	12-Sep-16	3.5
				2017	12-Sep-17	0.60	12-Sep-17	3.2
				2018	7-Sep-18	0.57	07-Sep-18	3.4
				2018	7-Sep-18	0.57	07-Sep-18	4.1
				2018	7-Sep-18	0.57	07-Sep-18	3.8
				2019	20-Jun-19	0.60	20-Jun-19	3.6
				2019	20-Jun-19	0.60	20-Jun-19	3.4
				2019	20-Jun-19	0.60	20-Jun-19	3.4
				2019	10-Sep-19	0.61	10-Sep-19	3.2
				2019	10-Sep-19	0.61	10-Sep-19	3.1
				2019	10-Sep-19	0.61	10-Sep-19	2.8
				2020	17-Jun-20	0.38	17-Jun-20	4.4
				2020	17-Jun-20	0.38	17-Jun-20	4.0
				2020	17-Jun-20	0.38	17-Jun-20	5.0
				2020	17-Sep-20	0.65	17-Sep-20	3.9
				2020	17-Sep-20	0.65	17-Sep-20	5.0
				2020	17-Sep-20	0.65	17-Sep-20	4.8
		RG_UFR1	FR_UFR1	2018	5-Dec-18	0.73	05-Dec-18	4.1
				2018	5-Dec-18	0.73	05-Dec-18	3.7
				2018	5-Dec-18	0.73	05-Dec-18	4.0
				2019	14-Feb-19	1.00	14-Feb-19	4.9
				2019	14-Feb-19	1.00	14-Feb-19	3.8
				2019	14-Feb-19	1.00	14-Feb-19	5.2
				2019	10-Dec-19	0.82	10-Dec-19	4.2
				2019	10-Dec-19	0.82	10-Dec-19	4.6
				2019	10-Dec-19	0.82	10-Dec-19	4.6
				2020	17-Jun-20	0.44	17-Jun-20	3.8
				2020	17-Jun-20	0.44	17-Jun-20	6.4
				2020	17-Jun-20	0.44	17-Jun-20	5.3
				2020	17-Jun-20	0.44	17-Jun-20	4.1
				2020	17-Jun-20	0.44	17-Jun-20	3.6
				2020	16-Sep-20	0.71	16-Sep-20	6.5
				2020	16-Sep-20	0.71	16-Sep-20	4.9
				2020	16-Sep-20	0.71	16-Sep-20	6.3
				2020	16-Sep-20	0.71	16-Sep-20	5.8

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Reference	RG_UFR1	FR_UFR1	2020	16-Sep-20	0.71	16-Sep-20	4.4
				2020	8-Dec-20	0.88	08-Dec-20	4.7
				2020	8-Dec-20	0.88	08-Dec-20	3.9
				2020	8-Dec-20	0.88	08-Dec-20	3.9
				2020	8-Dec-20	0.88	08-Dec-20	3.5
				2020	8-Dec-20	0.88	08-Dec-20	4.8
	Mine-exposed	RG_FODHE	FR_FR1	2012	19-Sep-12	18.0	19-Sep-12	8.9
				2015	14-Sep-15	9.80	14-Sep-15	6.6
				2017	15-Sep-17	20.0	15-Sep-17	8.1
				2018	5-Sep-18	20.0	05-Sep-18	11.0
				2018	5-Sep-18	20.0	05-Sep-18	12.0
				2018	5-Sep-18	20.0	05-Sep-18	15.0
				2018	5-Dec-18	25.0	05-Dec-18	7.8
				2018	5-Dec-18	25.0	05-Dec-18	7.6
				2018	5-Dec-18	25.0	05-Dec-18	3.8
				2019	12-Feb-19	24.0	12-Feb-19	-
				2019	12-Feb-19	24.0	12-Feb-19	-
				2019	12-Feb-19	24.0	12-Feb-19	-
				2019	20-Jun-19	4.30	20-Jun-19	6.8
				2019	20-Jun-19	4.30	20-Jun-19	6.0
				2019	20-Jun-19	4.30	20-Jun-19	3.9
				2019	10-Sep-19	14.0	10-Sep-19	5.1
				2019	10-Sep-19	14.0	10-Sep-19	5.2
				2019	10-Sep-19	14.0	10-Sep-19	7.0
				2019	10-Dec-19	22.0	10-Dec-19	4.4
				2019	10-Dec-19	22.0	10-Dec-19	5.2
				2019	10-Dec-19	22.0	10-Dec-19	5.2
				2020	15-Jun-20	3.90	15-Jun-20	5.7
				2020	15-Jun-20	3.90	15-Jun-20	5.4
				2020	15-Jun-20	3.90	15-Jun-20	3.3
				2020	15-Sep-20	23.0	15-Sep-20	8.1
				2020	15-Sep-20	23.0	15-Sep-20	8.1
				2020	15-Sep-20	23.0	15-Sep-20	7.5
		RG_FOUCL	RG_FOUCL	2019	12-Sep-19	16.0	12-Sep-19	7.2
				2019	12-Sep-19	16.0	12-Sep-19	5.5
				2019	12-Sep-19	16.0	12-Sep-19	5.8
				2019	9-Dec-19	30.0	09-Dec-19	4.5
				2019	9-Dec-19	30.0	09-Dec-19	4.6
				2019	9-Dec-19	30.0	09-Dec-19	3.4
				2020	15-Jun-20	5.50	15-Jun-20	7.9
				2020	15-Jun-20	5.50	15-Jun-20	5.5
				2020	15-Jun-20	5.50	15-Jun-20	6.6
				2020	10-Sep-20	27.0	10-Sep-20	13.0
				2020	10-Sep-20	27.0	10-Sep-20	10.0
				2020	10-Sep-20	27.0	10-Sep-20	6.7
				2020	8-Dec-20	32.0	08-Dec-20	6.4
				2020	8-Dec-20	32.0	08-Dec-20	5.9
				2020	8-Dec-20	32.0	8-Dec-20	5.8
		RG_FOUNGD	-	2012	12-Sep-12	24.0	12-Sep-12	8.2
				2015	15-Sep-15	24.0	15-Sep-15	7.2
				2017	16-Sep-17	53.0	16-Sep-17	6.5
				2018	13-Sep-18	38.0	13-Sep-18	6.0
				2018	13-Sep-18	38.0	13-Sep-18	7.0
				2018	13-Sep-18	38.0	13-Sep-18	8.0
				2018	5-Dec-18	52.0	05-Dec-18	6.0
				2018	5-Dec-18	52.0	05-Dec-18	6.1
				2018	5-Dec-18	52.0	05-Dec-18	5.0
				2019	12-Feb-19	48.0	12-Feb-19	5.6
				2019	12-Feb-19	48.0	12-Feb-19	5.5
				2019	12-Feb-19	48.0	12-Feb-19	5.7
				2019	19-Jun-19	8.90	19-Jun-19	5.1
				2019	19-Jun-19	8.90	19-Jun-19	4.5
				2019	19-Jun-19	8.90	19-Jun-19	5.1
				2019	12-Sep-19	28.0	12-Sep-19	7.5
				2019	12-Sep-19	28.0	12-Sep-19	6.4

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOUNGD	-	2019	12-Sep-19	28.0	12-Sep-19	6.1
				2019	9-Dec-19	54.0	09-Dec-19	5.1
				2019	9-Dec-19	54.0	09-Dec-19	4.3
				2019	9-Dec-19	54.0	9-Dec-19	4.4
				2020	16-Jun-20	9.30	16-Jun-20	4.5
				2020	16-Jun-20	9.30	16-Jun-20	4.7
				2020	16-Jun-20	9.30	16-Jun-20	4.3
				2020	10-Sep-20	40.0	10-Sep-20	11.0
				2020	10-Sep-20	40.0	10-Sep-20	11.0
				2020	10-Sep-20	40.0	10-Sep-20	9.6
				2020	8-Dec-20	59.0	08-Dec-20	5.1
				2020	8-Dec-20	59.0	08-Dec-20	6.7
				2020	8-Dec-20	59.0	08-Dec-20	6.3
		RG_FODNGD	FR_FRABEC1	2015	14-Sep-15	23.0	14-Sep-15	6.2
				2017	16-Sep-17	54.0	16-Sep-17	5.6
				2018	12-Sep-18	42.0	12-Sep-18	9.0
				2018	12-Sep-18	42.0	12-Sep-18	8.0
				2018	12-Sep-18	42.0	12-Sep-18	8.0
				2018	5-Dec-18	52.0	05-Dec-18	4.7
				2018	5-Dec-18	52.0	05-Dec-18	4.2
				2018	5-Dec-18	52.0	05-Dec-18	7.0
				2019	12-Feb-19	54.0	12-Feb-19	7.2
				2019	12-Feb-19	54.0	12-Feb-19	5.0
				2019	12-Feb-19	54.0	12-Feb-19	8.1
				2019	19-Jun-19	8.60	19-Jun-19	4.1
				2019	19-Jun-19	8.60	19-Jun-19	5.6
				2019	19-Jun-19	8.60	19-Jun-19	4.4
				2019	12-Sep-19	30.0	12-Sep-19	8.0
				2019	12-Sep-19	30.0	12-Sep-19	4.5
				2019	12-Sep-19	30.0	12-Sep-19	7.0
				2019	9-Dec-19	55.0	09-Dec-19	4.9
				2019	9-Dec-19	55.0	09-Dec-19	5.9
				2019	9-Dec-19	55.0	09-Dec-19	5.6
				2020	16-Jun-20	9.90	16-Jun-20	6.3
				2020	16-Jun-20	9.90	16-Jun-20	5.8
				2020	16-Jun-20	9.90	16-Jun-20	2.5
				2020	21-Sep-20	49.0	21-Sep-20	6.9
				2020	21-Sep-20	49.0	21-Sep-20	7.9
				2020	21-Sep-20	49.0	21-Sep-20	9.6
				2020	8-Dec-20	69.0	08-Dec-20	6.0
				2020	8-Dec-20	69.0	08-Dec-20	5.6
				2020	8-Dec-20	69.0	08-Dec-20	5.7
		RG_MP1	FR_MULTIPLATE	2012	18-Sep-12	38.0	18-Sep-12	9.0
				2015	15-Sep-15	23.0	15-Sep-15	5.9
				2017	12-Sep-17	52.0	12-Sep-17	5.6
				2018	11-Sep-18	44.0	11-Sep-18	7.0
				2018	11-Sep-18	44.0	11-Sep-18	8.6
				2018	11-Sep-18	44.0	11-Sep-18	8.0
				2018	6-Dec-18	57.0	06-Dec-18	6.6
				2018	6-Dec-18	57.0	06-Dec-18	6.8
				2018	6-Dec-18	57.0	06-Dec-18	5.3
				2019	13-Feb-19	62.0	13-Feb-19	5.0
				2019	13-Feb-19	62.0	13-Feb-19	4.7
				2019	13-Feb-19	62.0	13-Feb-19	8.4
				2019	18-Jun-19	11.0	18-Jun-19	5.2
				2019	18-Jun-19	11.0	18-Jun-19	6.0
				2019	18-Jun-19	11.0	18-Jun-19	6.1
				2019	5-Sep-19	34.0	5-Sep-19	5.6
				2019	5-Sep-19	34.0	5-Sep-19	7.0
				2019	5-Sep-19	34.0	05-Sep-19	7.3
				2019	9-Dec-19	57.0	09-Dec-19	5.1
				2019	9-Dec-19	57.0	09-Dec-19	6.4
				2019	9-Dec-19	57.0	9-Dec-19	5.8
				2020	15-Jun-20	11.0	15-Jun-20	6.1
				2020	15-Jun-20	11.0	15-Jun-20	6.8

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_MP1	FR_MULTIPLATE	2020	15-Jun-20	11.0	15-Jun-20	6.7
				2020	15-Sep-20	50.0	15-Sep-20	13.0
				2020	15-Sep-20	50.0	15-Sep-20	12.0
				2020	15-Sep-20	50.0	15-Sep-20	9.6
				2020	9-Dec-20	68.0	9-Dec-20	5.7
				2020	9-Dec-20	68.0	9-Dec-20	5.9
				2020	9-Dec-20	68.0	9-Dec-20	6.0
		RG_FOUSH	FR_FRNTP	2012	13-Sep-12	36.0	13-Sep-12	7.6
				2015	15-Sep-15	26.0	15-Sep-15	6.0
				2017	14-Sep-17	48.0	14-Sep-17	6.5
				2018	11-Sep-18	43.0	11-Sep-18	8.0
				2018	11-Sep-18	43.0	11-Sep-18	8.0
				2018	11-Sep-18	43.0	11-Sep-18	9.1
				2018	6-Dec-18	57.0	6-Dec-18	5.5
				2018	6-Dec-18	57.0	6-Dec-18	5.0
				2018	6-Dec-18	57.0	6-Dec-18	5.2
				2019	13-Feb-19	61.0	13-Feb-19	9.6
				2019	13-Feb-19	61.0	13-Feb-19	6.9
				2019	13-Feb-19	61.0	13-Feb-19	6.6
				2019	17-Jun-19	11.0	17-Jun-19	5.9
				2019	17-Jun-19	11.0	17-Jun-19	6.1
				2019	17-Jun-19	11.0	17-Jun-19	4.7
				2019	9-Sep-19	36.0	09-Sep-19	5.6
				2019	9-Sep-19	36.0	09-Sep-19	5.9
				2019	9-Sep-19	36.0	09-Sep-19	6.0
				2019	9-Dec-19	56.0	09-Dec-19	5.8
				2019	9-Dec-19	56.0	09-Dec-19	7.1
				2019	9-Dec-19	56.0	09-Dec-19	5.3
				2020	23-Jun-20	12.0	23-Jun-20	6.3
				2020	23-Jun-20	12.0	23-Jun-20	4.5
				2020	23-Jun-20	12.0	23-Jun-20	7.7
				2020	21-Sep-20	52.0	21-Sep-20	8.1
				2020	21-Sep-20	52.0	21-Sep-20	7.3
				2020	21-Sep-20	52.0	21-Sep-20	11.0
				2020	9-Dec-20	61.0	09-Dec-20	5.8
				2020	9-Dec-20	61.0	09-Dec-20	4.7
				2020	9-Dec-20	61.0	9-Dec-20	5.3
		RG_FOUKI	FR_FR2	2012	14-Sep-12	34.0	14-Sep-12	8.5
				2015	16-Sep-15	23.0	16-Sep-15	5.1
				2016	12-Sep-16	29.0	12-Sep-16	5.2
				2017	12-Sep-17	44.0	12-Sep-17	6.7
				2017	12-Sep-17	44.0	12-Sep-17	6.6
				2017	12-Sep-17	44.0	12-Sep-17	6.8
				2018	6-Mar-18	55.0	6-Mar-18	4.9
				2018	6-Mar-18	55.0	6-Mar-18	5.4
				2018	6-Mar-18	55.0	06-Mar-18	5.0
				2018	7-Sep-18	38.0	07-Sep-18	9.4
				2018	7-Sep-18	38.0	07-Sep-18	10.0
				2018	7-Sep-18	38.0	07-Sep-18	11.0
				2018	4-Dec-18	47.0	04-Dec-18	4.9
				2018	4-Dec-18	47.0	04-Dec-18	5.5
				2018	4-Dec-18	47.0	04-Dec-18	7.2
				2019	12-Feb-19	47.0	12-Feb-19	4.5
				2019	12-Feb-19	47.0	12-Feb-19	4.8
				2019	12-Feb-19	47.0	12-Feb-19	4.7
				2019	18-Jun-19	9.70	18-Jun-19	4.7
				2019	18-Jun-19	9.70	18-Jun-19	4.7
				2019	18-Jun-19	9.70	18-Jun-19	5.0
				2019	5-Sep-19	31.0	05-Sep-19	6.2
				2019	5-Sep-19	31.0	05-Sep-19	8.8
				2019	5-Sep-19	31.0	5-Sep-19	9
				2019	9-Dec-19	52.0	9-Dec-19	4.1
				2019	9-Dec-19	52.0	9-Dec-19	4.4
				2019	9-Dec-19	52.0	09-Dec-19	4.4
				2020	17-Jun-20	16.0	17-Jun-20	6.3

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOUKI	FR_FR2	2020	17-Jun-20	16.0	17-Jun-20	6.8
				2020	17-Jun-20	16.0	17-Jun-20	6.3
				2020	17-Jun-20	16.0	17-Jun-20	4.9
				2020	17-Jun-20	16.0	17-Jun-20	4.8
				2020	14-Sep-20	57.0	14-Sep-20	9.4
				2020	14-Sep-20	57.0	14-Sep-20	9.0
				2020	14-Sep-20	57.0	14-Sep-20	8.5
				2020	14-Sep-20	57.0	14-Sep-20	12.0
				2020	14-Sep-20	57.0	14-Sep-20	11.0
				2020	9-Dec-20	56.0	9-Dec-20	5.6
				2020	9-Dec-20	56.0	9-Dec-20	6.2
				2020	9-Dec-20	56.0	9-Dec-20	4.2
				2020	9-Dec-20	56.0	9-Dec-20	5.6
				2020	9-Dec-20	56.0	9-Dec-20	3.0
		RG_SCOUTDS	RG_SCOUTDS	2019	12-Sep-19	33.0	12-Sep-19	14.0
				2019	12-Sep-19	33.0	12-Sep-19	14.0
				2019	12-Sep-19	33.0	12-Sep-19	10.0
				2019	10-Dec-19	130	10-Dec-19	6.7
				2019	10-Dec-19	130	10-Dec-19	6.8
				2019	10-Dec-19	130	10-Dec-19	7.5
				2020	16-Jun-20	21.0	16-Jun-20	5.2
				2020	16-Jun-20	21.0	16-Jun-20	5.3
				2020	16-Jun-20	21.0	16-Jun-20	4.9
				2020	16-Jun-20	21.0	16-Jun-20	7.2
				2020	16-Jun-20	21.0	16-Jun-20	7.5
				2020	17-Sep-20	120	17-Sep-20	8.5
				2020	17-Sep-20	120	17-Sep-20	8.5
				2020	17-Sep-20	120	17-Sep-20	7.6
				2020	17-Sep-20	120	17-Sep-20	7.1
				2020	17-Sep-20	120	17-Sep-20	8.0
				2020	23-Nov-20	-	23-Nov-20	8.6
				2020	23-Nov-20	-	23-Nov-20	8.7
				2020	23-Nov-20	-	23-Nov-20	9.5
				2020	23-Nov-20	-	23-Nov-20	11.0
				2020	23-Nov-20	-	23-Nov-20	10.0
				2020	7-Dec-20	120	7-Dec-20	4.3
				2020	7-Dec-20	120	7-Dec-20	7.6
				2020	7-Dec-20	120	7-Dec-20	5.3
				2020	7-Dec-20	120	7-Dec-20	5.7
				2020	7-Dec-20	120	7-Dec-20	5.9
		RG_FOBKS	GH_FR3	2012	14-Sep-12	32.0	14-Sep-12	8.8
				2015	16-Sep-15	24.0	16-Sep-15	6.0
				2017	13-Sep-17	45.0	13-Sep-17	5.8
				2017	13-Sep-17	45.0	13-Sep-17	8.2
				2017	13-Sep-17	45.0	13-Sep-17	5.9
				2018	12-Mar-18	53.0	12-Mar-18	5.8
				2018	12-Mar-18	53.0	12-Mar-18	5.1
				2018	12-Mar-18	53.0	12-Mar-18	6.2
				2018	8-Sep-18	36.0	08-Sep-18	11.0
				2018	8-Sep-18	36.0	8-Sep-18	10.0
				2018	8-Sep-18	36.0	8-Sep-18	9.9
				2018	4-Dec-18	49.0	4-Dec-18	3.8
				2018	4-Dec-18	49.0	4-Dec-18	3.8
				2018	4-Dec-18	49.0	4-Dec-18	6.6
				2019	12-Feb-19	47.0	12-Feb-19	-
				2019	12-Feb-19	47.0	12-Feb-19	-
				2019	12-Feb-19	47.0	12-Feb-19	13.0
				2019	17-Jun-19	10.0	17-Jun-19	5.0
				2019	17-Jun-19	10.0	17-Jun-19	3.8
				2019	17-Jun-19	10.0	17-Jun-19	4.0
				2019	9-Sep-19	35.0	9-Sep-19	7.5
				2019	9-Sep-19	35.0	9-Sep-19	7.9
				2019	9-Sep-19	35.0	9-Sep-19	9.5
				2019	10-Dec-19	53.0	10-Dec-19	8.2
				2019	10-Dec-19	53.0	10-Dec-19	7.5

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOBKS	GH_FR3	2019	10-Dec-19	53.0	10-Dec-19	6.2
				2020	16-Jun-20	15.0	16-Jun-20	6.0
				2020	16-Jun-20	15.0	16-Jun-20	4.4
				2020	16-Jun-20	15.0	16-Jun-20	6.6
				2020	16-Jun-20	15.0	16-Jun-20	6.0
				2020	16-Jun-20	15.0	16-Jun-20	5.9
				2020	10-Sep-20	47.0	10-Sep-20	6.6
				2020	10-Sep-20	47.0	10-Sep-20	13.0
				2020	10-Sep-20	47.0	10-Sep-20	11.0
				2020	10-Sep-20	47.0	10-Sep-20	11.0
				2020	10-Sep-20	47.0	10-Sep-20	7.8
				2020	23-Nov-20	-	23-Nov-20	5.9
				2020	23-Nov-20	-	23-Nov-20	4.9
				2020	23-Nov-20	-	23-Nov-20	5.9
				2020	23-Nov-20	-	23-Nov-20	6.4
				2020	23-Nov-20	-	23-Nov-20	5.0
				2020	7-Dec-20	63.0	7-Dec-20	7.0
				2020	7-Dec-20	63.0	7-Dec-20	8.0
				2020	7-Dec-20	63.0	7-Dec-20	5.8
				2020	7-Dec-20	63.0	7-Dec-20	7.6
				2020	7-Dec-20	63.0	7-Dec-20	8.0
		RG_FOBKS	RG_FOBKS	2012	14-Sep-12	32.0	14-Sep-12	8.8
				2015	16-Sep-15	24.0	16-Sep-15	6.0
				2017	13-Sep-17	45.0	13-Sep-17	5.8
				2017	13-Sep-17	45.0	13-Sep-17	8.2
				2017	13-Sep-17	45.0	13-Sep-17	5.9
				2018	12-Mar-18	53.0	12-Mar-18	5.8
				2018	12-Mar-18	53.0	12-Mar-18	5.1
				2018	12-Mar-18	53.0	12-Mar-18	6.2
				2018	8-Sep-18	36.0	8-Sep-18	11.0
				2018	8-Sep-18	36.0	8-Sep-18	10.0
				2018	8-Sep-18	36.0	8-Sep-18	9.9
				2018	4-Dec-18	49.0	4-Dec-18	3.8
				2018	4-Dec-18	49.0	4-Dec-18	3.8
				2018	4-Dec-18	49.0	4-Dec-18	6.6
				2019	12-Feb-19	47.0	12-Feb-19	-
				2019	12-Feb-19	47.0	12-Feb-19	-
				2019	12-Feb-19	47.0	12-Feb-19	13.0
				2019	17-Jun-19	10.0	17-Jun-19	5.0
				2019	17-Jun-19	10.0	17-Jun-19	3.8
				2019	17-Jun-19	10.0	17-Jun-19	4.0
				2019	9-Sep-19	35.0	9-Sep-19	7.5
				2019	9-Sep-19	35.0	9-Sep-19	7.9
				2019	9-Sep-19	35.0	9-Sep-19	9.5
				2019	10-Dec-19	53.0	10-Dec-19	8.2
				2019	10-Dec-19	53.0	10-Dec-19	7.5
				2019	10-Dec-19	53.0	10-Dec-19	6.2
				2020	16-Jun-20	15.0	16-Jun-20	6.0
				2020	16-Jun-20	15.0	16-Jun-20	4.4
				2020	16-Jun-20	15.0	16-Jun-20	6.6
				2020	16-Jun-20	15.0	16-Jun-20	6.0
				2020	16-Jun-20	15.0	16-Jun-20	5.9
				2020	10-Sep-20	47.0	10-Sep-20	6.6
				2020	10-Sep-20	47.0	10-Sep-20	13.0
				2020	10-Sep-20	47.0	10-Sep-20	11.0
				2020	10-Sep-20	47.0	10-Sep-20	11.0
				2020	10-Sep-20	47.0	10-Sep-20	7.8
				2020	23-Nov-20	-	23-Nov-20	5.9
				2020	23-Nov-20	-	23-Nov-20	4.9
				2020	23-Nov-20	-	23-Nov-20	5.9
				2020	23-Nov-20	-	23-Nov-20	6.4
				2020	23-Nov-20	-	23-Nov-20	5.0
				2020	7-Dec-20	63.0	7-Dec-20	7.0
				2020	7-Dec-20	63.0	7-Dec-20	8.0
				2020	7-Dec-20	63.0	7-Dec-20	5.8
				2020	7-Dec-20	63.0	7-Dec-20	7.6
				2020	7-Dec-20	63.0	7-Dec-20	8.0

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOBSC	FR_FR4	2012	15-Sep-12	54.0	15-Sep-12	8.4
				2015	17-Sep-15	34.0	17-Sep-15	7.5
				2017	15-Sep-17	73.0	15-Sep-17	5.0
				2018	10-Sep-18	61.0	10-Sep-18	9.0
				2018	10-Sep-18	61.0	10-Sep-18	9.0
				2018	10-Sep-18	61.0	10-Sep-18	8.2
				2018	4-Dec-18	49.0	4-Dec-18	8.0
				2018	4-Dec-18	49.0	4-Dec-18	9.2
				2018	4-Dec-18	49.0	4-Dec-18	7.6
				2019	18-Jun-19	14.0	18-Jun-19	5.3
				2019	18-Jun-19	14.0	18-Jun-19	5.1
				2019	18-Jun-19	14.0	18-Jun-19	5.7
				2019	13-Sep-19	52.0	13-Sep-19	12.0
				2019	13-Sep-19	52.0	13-Sep-19	12.0
				2019	13-Sep-19	52.0	13-Sep-19	13.0
				2019	10-Dec-19	140	10-Dec-19	9.3
				2019	10-Dec-19	140	10-Dec-19	5.9
				2019	10-Dec-19	140	10-Dec-19	5.6
				2020	18-Jun-20	71.0	18-Jun-20	5.0
				2020	18-Jun-20	71.0	18-Jun-20	5.6
				2020	18-Jun-20	71.0	18-Jun-20	4.9
				2020	18-Jun-20	71.0	18-Jun-20	7.4
				2020	18-Jun-20	71.0	18-Jun-20	4.2
				2020	18-Sep-20	110	18-Sep-20	10.0
				2020	18-Sep-20	110	18-Sep-20	12.0
				2020	18-Sep-20	110	18-Sep-20	8.2
				2020	18-Sep-20	110	18-Sep-20	11.0
				2020	18-Sep-20	110	18-Sep-20	12.0
				2020	23-Nov-20	-	23-Nov-20	8.4
				2020	23-Nov-20	-	23-Nov-20	10.0
				2020	23-Nov-20	-	23-Nov-20	8.3
				2020	23-Nov-20	-	23-Nov-20	7.9
				2020	23-Nov-20	-	23-Nov-20	8.7
				2020	7-Dec-20	120	7-Dec-20	7.3
				2020	7-Dec-20	120	7-Dec-20	8.6
				2020	7-Dec-20	120	7-Dec-20	6.1
				2020	7-Dec-20	120	7-Dec-20	8.1
				2020	7-Dec-20	120	7-Dec-20	9.4
		RG_FOBCP	FR_FRCP1	2012	15-Sep-12	120	15-Sep-12	7.9
				2015	17-Sep-15	64.0	17-Sep-15	7.7
				2016	12-Sep-16	73.0	12-Sep-16	9.7
				2017	14-Sep-17	130	14-Sep-17	6.4
				2018	9-Sep-18	200	9-Sep-18	9.4
				2018	9-Sep-18	200	9-Sep-18	8.0
				2018	9-Sep-18	200	9-Sep-18	10.0
				2018	9-Sep-18	200	9-Sep-18	8.0
				2018	9-Sep-18	200	9-Sep-18	7.9
				2018	3-Dec-18	600	3-Dec-18	39.0
				2018	3-Dec-18	600	3-Dec-18	8.4
				2018	3-Dec-18	600	3-Dec-18	7.0
				2019	18-Jun-19	28.0	18-Jun-19	2.8
				2019	18-Jun-19	28.0	18-Jun-19	5.3
				2019	18-Jun-19	28.0	18-Jun-19	4.4
				2019	6-Sep-19	58.0	6-Sep-19	9.1
				2019	6-Sep-19	58.0	6-Sep-19	8.4
				2019	6-Sep-19	58.0	6-Sep-19	6.3
				2019	6-Sep-19	58.0	6-Sep-19	7.6
				2019	6-Sep-19	58.0	6-Sep-19	7.3
				2019	11-Dec-19	120	11-Dec-19	-
				2019	11-Dec-19	120	11-Dec-19	-
				2019	11-Dec-19	120	11-Dec-19	-
				2020	17-Jun-20	44.0	17-Jun-20	5.3
				2020	17-Jun-20	44.0	17-Jun-20	6.4
				2020	17-Jun-20	44.0	17-Jun-20	5.3
				2020	17-Jun-20	44.0	17-Jun-20	4.9
				2020	17-Jun-20	44.0	17-Jun-20	4.3

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FOBCP	FR_FRCP1	2020	16-Sep-20	120	16-Sep-20	11.0
				2020	16-Sep-20	120	16-Sep-20	9.9
				2020	16-Sep-20	120	16-Sep-20	9.9
				2020	16-Sep-20	120	16-Sep-20	11.0
				2020	16-Sep-20	120	16-Sep-20	11.0
				2020	7-Dec-20	130	7-Dec-20	8.9
				2020	7-Dec-20	130	7-Dec-20	6.5
				2020	7-Dec-20	130	7-Dec-20	6.9
				2020	7-Dec-20	130	7-Dec-20	5.8
				2020	7-Dec-20	130	7-Dec-20	4.4
		RG_FRCP1SW	FR_FRCP1SW	2017	14-Sep-17	130	14-Sep-17	7.0
				2019	19-Jun-19	31.0	19-Jun-19	48.0
				2019	19-Jun-19	31.0	19-Jun-19	6.0
				2019	19-Jun-19	31.0	19-Jun-19	7.0
				2019	13-Sep-19	54.0	13-Sep-19	7.7
				2019	13-Sep-19	54.0	13-Sep-19	7.7
				2019	13-Sep-19	54.0	13-Sep-19	7.7
				2019	12-Dec-19	92.0	12-Dec-19	-
				2019	12-Dec-19	92.0	12-Dec-19	-
				2019	12-Dec-19	92.0	12-Dec-19	-
				2020	18-Jun-20	42.0	18-Jun-20	39.0
				2020	18-Jun-20	42.0	18-Jun-20	29.0
				2020	18-Jun-20	42.0	18-Jun-20	100.0
				2020	18-Jun-20	42.0	18-Jun-20	6.7
				2020	18-Jun-20	42.0	18-Jun-20	5.2
				2020	22-Sep-20	110	22-Sep-20	13.0
				2020	22-Sep-20	110	22-Sep-20	16.0
				2020	22-Sep-20	110	22-Sep-20	14.0
				2020	22-Sep-20	110	22-Sep-20	8.2
				2020	22-Sep-20	110	22-Sep-20	7.4
		RG_FRUPO	FR_FRRD	2017	15-Sep-17	99.0	15-Sep-17	7.0
				2018	7-Mar-18	110	7-Mar-18	7.0
				2018	9-Sep-18	82.0	9-Sep-18	8.0
				2018	9-Sep-18	82.0	9-Sep-18	10.0
				2018	9-Sep-18	82.0	9-Sep-18	9.0
				2018	4-Dec-18	69.0	4-Dec-18	5.0
				2018	4-Dec-18	69.0	4-Dec-18	5.0
				2018	4-Dec-18	69.0	4-Dec-18	5.0
				2019	11-Feb-19	91.0	11-Feb-19	5.1
				2019	11-Feb-19	91.0	11-Feb-19	8.0
				2019	11-Feb-19	91.0	11-Feb-19	6.2
				2019	19-Jun-19	39.0	19-Jun-19	8.1
				2019	19-Jun-19	39.0	19-Jun-19	7.6
				2019	19-Jun-19	39.0	19-Jun-19	5.0
				2019	7-Sep-19	66.0	7-Sep-19	6.1
				2019	7-Sep-19	66.0	7-Sep-19	8.1
				2019	7-Sep-19	66.0	7-Sep-19	6.8
				2019	11-Dec-19	100	11-Dec-19	4.6
				2019	11-Dec-19	100	11-Dec-19	3.9
				2019	11-Dec-19	100	11-Dec-19	4.5
				2020	19-Jun-20	47.0	19-Jun-20	4.5
				2020	19-Jun-20	47.0	19-Jun-20	5.7
				2020	19-Jun-20	47.0	19-Jun-20	4.2
				2020	19-Jun-20	47.0	19-Jun-20	7.7
				2020	19-Jun-20	47.0	19-Jun-20	7.4
				2020	12-Sep-20	95.0	12-Sep-20	9.5
				2020	12-Sep-20	95.0	12-Sep-20	9.1
				2020	12-Sep-20	95.0	12-Sep-20	10.0
				2020	12-Sep-20	95.0	12-Sep-20	9.4
				2020	12-Sep-20	95.0	12-Sep-20	10.0
				2020	10-Dec-20	110	10-Dec-20	5.1
				2020	10-Dec-20	110	10-Dec-20	3.6
				2020	10-Dec-20	110	10-Dec-20	5.0
				2020	10-Dec-20	110	10-Dec-20	5.0
				2020	10-Dec-20	110	10-Dec-20	4.9

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FODPO	GH_PC2	2012	17-Sep-12	76.0	17-Sep-12	6.0
				2015	15-Sep-15	68.0	15-Sep-15	7.0
				2017	13-Sep-17	90.0	13-Sep-17	5.0
				2018	7-Mar-18	100	7-Mar-18	4.0
				2018	13-Sep-18	82.0	13-Sep-18	4.0
				2018	13-Sep-18	82.0	13-Sep-18	8.0
				2018	13-Sep-18	82.0	13-Sep-18	5.0
				2018	4-Dec-18	110	4-Dec-18	0.0
				2018	4-Dec-18	110	4-Dec-18	4.0
				2018	4-Dec-18	110	4-Dec-18	5.0
				2019	14-Feb-19	110	14-Feb-19	3.6
				2019	14-Feb-19	110	14-Feb-19	5.0
				2019	14-Feb-19	110	14-Feb-19	8.4
				2019	21-Jun-19	48.0	21-Jun-19	4.7
				2019	21-Jun-19	48.0	21-Jun-19	5.0
				2019	21-Jun-19	48.0	21-Jun-19	5.7
				2019	7-Sep-19	70.0	7-Sep-19	5.4
				2019	7-Sep-19	70.0	7-Sep-19	7.3
				2019	7-Sep-19	70.0	7-Sep-19	5.6
				2019	12-Dec-19	120	12-Dec-19	4.0
				2019	12-Dec-19	120	12-Dec-19	4.0
				2019	12-Dec-19	120	12-Dec-19	3.7
				2020	19-Jun-20	42.0	19-Jun-20	6.2
				2020	19-Jun-20	42.0	19-Jun-20	6.9
				2020	19-Jun-20	42.0	19-Jun-20	5.5
				2020	19-Jun-20	42.0	19-Jun-20	6.7
				2020	19-Jun-20	42.0	19-Jun-20	5.5
				2020	11-Sep-20	85.0	11-Sep-20	9.3
				2020	11-Sep-20	85.0	11-Sep-20	6.7
				2020	11-Sep-20	85.0	11-Sep-20	7.2
				2020	11-Sep-20	85.0	11-Sep-20	7.1
				2020	11-Sep-20	85.0	11-Sep-20	10.0
				2020	9-Dec-20	95.0	9-Dec-20	3.8
				2020	9-Dec-20	95.0	9-Dec-20	3.3
				2020	9-Dec-20	95.0	9-Dec-20	3.1
				2020	9-Dec-20	95.0	9-Dec-20	4.5
				2020	9-Dec-20	95.0	9-Dec-20	4.1
		RG_FO22	FR_FRABCH	2012	16-Sep-12	71.0	16-Sep-12	12.0
				2015	12-Sep-15	68.0	12-Sep-15	7.0
				2017	14-Sep-17	83.0	14-Sep-17	5.0
				2018	12-Mar-18	100	12-Mar-18	7.0
				2018	8-Sep-18	78.0	8-Sep-18	7.0
				2018	8-Sep-18	78.0	8-Sep-18	9.0
				2018	8-Sep-18	78.0	8-Sep-18	7.0
				2018	8-Sep-18	78.0	8-Sep-18	9.0
				2018	8-Sep-18	78.0	8-Sep-18	8.0
				2018	5-Dec-18	94.0	5-Dec-18	3.0
				2018	5-Dec-18	94.0	5-Dec-18	4.0
				2018	5-Dec-18	94.0	5-Dec-18	4.0
				2018	5-Dec-18	94.0	5-Dec-18	6.0
				2019	14-Feb-19	99.0	14-Feb-19	4.9
				2019	14-Feb-19	99.0	14-Feb-19	5.8
				2019	14-Feb-19	99.0	14-Feb-19	5.4
				2019	21-Jun-19	52.0	21-Jun-19	7.5
				2019	21-Jun-19	52.0	21-Jun-19	6.8
				2019	21-Jun-19	52.0	21-Jun-19	10.0
				2019	16-Sep-19	70.0	16-Sep-19	7.1
				2019	16-Sep-19	70.0	16-Sep-19	7.8
				2019	16-Sep-19	70.0	16-Sep-19	7.3
				2019	16-Sep-19	70.0	16-Sep-19	6.7
				2019	16-Sep-19	70.0	16-Sep-19	6.6
				2019	11-Dec-19	88.0	11-Dec-19	4.4
				2019	11-Dec-19	88.0	11-Dec-19	5.4
				2019	11-Dec-19	88.0	11-Dec-19	4.9
				2020	19-Jun-20	43.0	19-Jun-20	6.7
				2020	19-Jun-20	43.0	19-Jun-20	5.5
				2020	19-Jun-20	43.0	19-Jun-20	8.2

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.4: Paired Tissue and Water Selenium Concentrations for the FRO LAEMP, 2012 to 2020

Watershed	Exposure Status	Minnow Biological Monitoring Area	Associated Teck Water Monitoring Station Code	Year	Total Selenium in Water		Selenium in Tissue	
					Sample Date	µg/L	Sample Date	mg/kg dw
Fording River	Mine-exposed	RG_FO22	FR_FRABCH	2020	11-Sep-20	82.0	11-Sep-20	9.1
				2020	11-Sep-20	82.0	11-Sep-20	8.4
				2020	11-Sep-20	82.0	11-Sep-20	11.0
				2020	11-Sep-20	82.0	11-Sep-20	8.9
				2020	11-Sep-20	82.0	11-Sep-20	10.0
				2020	9-Dec-20	96.0	9-Dec-20	6.1
				2020	9-Dec-20	96.0	9-Dec-20	6.1
				2020	9-Dec-20	96.0	9-Dec-20	7.2
				2020	9-Dec-20	96.0	9-Dec-20	4.0
				2020	9-Dec-20	96.0	9-Dec-20	4.7
		RG_FOUEW	FR_FR5	2012	16-Sep-12	59.0	16-Sep-12	8.3
				2015	13-Sep-15	59.0	13-Sep-15	6.0
				2016	12-Sep-16	53.0	12-Sep-16	6.0
				2017	13-Sep-17	78.0	13-Sep-17	7.0
				2018	7-Mar-18	86.0	7-Mar-18	6.0
				2018	6-Sep-18	71.0	6-Sep-18	8.0
				2018	6-Sep-18	71.0	6-Sep-18	7.0
				2018	6-Sep-18	71.0	6-Sep-18	5.0
				2018	5-Dec-18	87.0	5-Dec-18	5.0
				2018	5-Dec-18	87.0	5-Dec-18	6.0
				2018	5-Dec-18	87.0	5-Dec-18	5.0
				2019	13-Feb-19	95.0	13-Feb-19	4.4
				2019	13-Feb-19	95.0	13-Feb-19	6.0
				2019	13-Feb-19	95.0	13-Feb-19	4.4
				2019	4-Sep-19	61.0	4-Sep-19	7.3
				2019	4-Sep-19	61.0	4-Sep-19	6.9
				2019	4-Sep-19	61.0	4-Sep-19	6.0
				2019	11-Dec-19	73.0	11-Dec-19	4.8
				2019	11-Dec-19	73.0	11-Dec-19	4.4
				2019	11-Dec-19	73.0	11-Dec-19	5.5
				2020	19-Jun-20	36.0	19-Jun-20	6.1
				2020	19-Jun-20	36.0	19-Jun-20	4.5
				2020	19-Jun-20	36.0	19-Jun-20	5.0
				2020	19-Jun-20	36.0	19-Jun-20	5.3
				2020	19-Jun-20	36.0	19-Jun-20	6.7
				2020	11-Sep-20	77.0	11-Sep-20	7.5
				2020	11-Sep-20	77.0	11-Sep-20	7.1
				2020	11-Sep-20	77.0	11-Sep-20	9.7
				2020	11-Sep-20	77.0	11-Sep-20	9.1
				2020	11-Sep-20	77.0	11-Sep-20	9.9
				2020	10-Dec-20	96.0	10-Dec-20	5.8
				2020	10-Dec-20	96.0	10-Dec-20	7.3
				2020	10-Dec-20	96.0	10-Dec-20	4.9
				2020	10-Dec-20	96.0	10-Dec-20	9.1
				2020	10-Dec-20	96.0	10-Dec-20	9.5

Notes: No concurrent water selenium data were available for 2016 tissue samples, so concentrations from the closest sample date from each associated Teck WQ monitoring station was used. No selenium water data was available for MP1 in 2012, so the corresponding data from FR_MULTIPLATE was used for that data point only in 2012. "-" indicates stations where benthic tissue samples were not taken because of frozen conditions. No Novemeber 2020 concurrent water data available.

Table E.5: Biological Monitoring Area Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Year	Status	Area	CA1 (29.0%)	CA2 (11.7%)
2012	Reference	RG_HENUP	0.164	1.00
		RG_FO26	0.407	0.921
	Mine-Exposed	RG_FODHE	0.488	0.724
		RG_FOUNGD	0.483	0.326
		RG_MP1	0.609	0.242
		RG_FOUSH	0.496	0.405
			0.631	-0.0784
			0.567	0.0295
		RG_FOUKI	0.402	0.118
		RG_FOBKS	0.279	-0.0702
		RG_FOBSC	0.571	-0.0817
		RG_FOBCP	0.473	0.0583
		RG_FODPO	-0.442	0.181
		RG_FO22	-1.12	0.249
		RG_FOUEW	-0.647	0.571
2013	Reference	RG_HENUP	0.356	0.776
		RG_FO26	0.251	0.745
	Mine-Exposed	RG_MP1	0.421	-0.135
		RG_FODPO	-0.558	-0.436
2015	Reference	RG_HENUP	0.403	0.858
		RG_FO26	0.207	0.806
	Mine-Exposed	RG_FODHE	0.304	0.460
		RG_FOUNGD	0.327	0.316
		RG_FODNGD	0.144	-0.0782
		RG_MP1	0.108	-0.0238
		RG_FOUSH	0.361	0.139
		RG_FOUKI	0.322	-0.194
		RG_FOBKS	0.366	-0.0594
		RG_FOBSC	0.248	-0.513
		RG_FOBCP	-0.0190	-0.517
		RG_FODPO	-0.637	0.557
		RG_FO22	-1.18	0.286
		RG_FOUEW	-0.645	0.460
2016	Reference	RG_HENUP	0.402	1.12
		RG_FO26	0.361	0.735
	Mine-Exposed	RG_FODHE	0.478	0.278
		RG_FOUKI	0.0818	0.210
		RG_FOBKS	0.320	-0.0157
		RG_FOBSC	0.0446	-0.277
		RG_FOBCP	0.319	-0.183
		RG_FODPO	-0.934	0.406
		RG_FOUEW	-0.707	0.417

Table E.5: Biological Monitoring Area Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Year	Status	Area	CA1 (29.0%)	CA2 (11.7%)
2017	Reference	RG_HENUP	0.278	1.16
		RG_FO26	0.288	0.791
	Mine-Exposed	RG_FODHE	0.580	0.928
		RG_FOUNGD	0.0992	0.255
		RG_FODNGD	0.0136	0.181
		RG_MP1	0.237	-0.114
		RG_FOUSH	0.119	0.105
		RG_FOUKI	0.152	-0.553
			0.326	-0.0493
		RG_FOBKS	0.275	-0.307
			0.0999	-0.390
			0.256	-0.330
		RG_FOBSC	0.197	-0.405
		RG_FOBCP	-0.158	-0.596
		RG_FRCP1SW	-0.257	-0.764
		RG_FRUPO	-0.383	-0.329
		RG_FODPO	-0.974	-0.102
		RG_FO22	-1.68	0.517
		RG_FOUEW	-1.04	0.200
2018	Reference	RG_HENUP	0.283	1.22
			0.310	1.52
			0.507	1.54
		RG_FO26	0.477	0.349
			0.516	0.590
			0.472	0.560
	Mine-Exposed	RG_FODHE	0.511	0.0294
			0.476	-0.497
			0.671	0.321
		RG_FOUNGD	0.411	-0.449
			0.464	-0.0158
			0.375	0.147
		RG_FODNGD	0.375	-0.0232
			0.308	0.0385
			0.350	0.112
		RG_MP1	0.331	-0.166
			0.323	-0.376
			0.311	-0.450
		RG_FOUSH	0.404	-0.211
			0.322	-0.252
			0.308	-0.628
		RG_FOUKI	0.522	-0.669
			0.582	-0.739
			0.465	-0.700

Table E.5: Biological Monitoring Area Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Year	Status	Area	CA1 (29.0%)	CA2 (11.7%)
2018	Mine-Exposed	RG_FOBKS	0.445	-0.928
			0.574	-0.626
			0.350	-0.699
		RG_FOBSC	0.472	-0.739
			0.404	-0.510
			0.443	-0.530
		RG_FOBCP	0.341	-0.427
			0.268	-0.573
			0.278	-0.364
			0.342	-0.495
			0.142	-0.881
		RG_FRUPO	-0.0870	-0.711
			-0.326	-0.776
			-0.205	-0.827
		RG_FODPO	-0.763	-0.218
			-0.573	-0.472
			-0.504	-0.813
		RG_FO22	-1.39	-0.0383
			-1.65	-0.0056
			-1.65	0.0752
			-1.93	0.153
			-1.92	0.165
		RG_FOUEW	-1.08	0.289
			-1.03	0.577
			-0.745	-0.0108
2019	Reference	RG_HENUP	0.336	1.85
			0.233	1.47
			0.333	1.41
		RG_FO26	0.533	0.436
			0.603	0.913
			0.484	0.721
	Mine-Exposed	RG_FODHE	0.495	0.625
			0.464	0.559
			0.561	0.727
		RG_FOUCL	0.465	0.272
			0.392	0.277
			0.535	0.191
		RG_FOUNGD	0.487	0.350
			0.391	0.341
			0.425	0.455
		RG_FODNGD	0.263	0.165
			0.0880	0.0561
			0.368	-0.0669

Table E.5: Biological Monitoring Area Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Year	Status	Area	CA1 (29.0%)	CA2 (11.7%)
2019	Mine-Exposed	RG_MP1	0.187	0.176
			0.389	-0.0716
			0.279	0.0167
		RG_FOUSH	0.128	-0.0039
			0.293	0.325
			0.345	0.0267
		RG_FOUKI	0.270	-0.181
			0.206	-0.554
			0.312	-0.302
		RG_FOBKS	0.221	-0.286
			0.104	-0.165
			0.130	-0.236
		RG_SCOUTDS	0.0903	-0.193
			0.0080	-0.0467
			0.0531	0.100
		RG_FOBSC	0.319	-0.113
			0.313	-0.192
			0.253	-0.243
		RG_FOBCP	0.180	-0.554
			0.199	-0.655
			0.160	-0.409
			0.147	-0.413
			0.172	-0.412
		RG_FRCP1SW	-0.0537	-0.629
			-0.124	-0.430
			0.0203	-0.325
		RG_FRUPO	-0.0895	-0.557
			-0.278	-0.0684
			-0.0538	-0.146
		RG_FODPO	-0.724	-0.341
			-0.923	-0.438
			-0.622	-0.580
		RG_FO22	-1.46	0.349
			-1.50	-0.0075
			-1.67	0.370
			-1.77	0.257
			-1.19	-0.0010
		RG_FOUEW	-0.784	0.133
			-0.987	0.274
			-0.789	0.268
2020	Reference	RG_HENUP	0.419	0.882
			0.249	1.22
			0.387	1.27

Table E.5: Biological Monitoring Area Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Year	Status	Area	CA1 (29.0%)	CA2 (11.7%)
2020	Reference	RG_FO26	0.463	0.529
			0.489	0.288
			0.535	0.303
		RG_UFR1	0.355	0.136
			0.280	0.358
			0.462	0.249
	Mine-Exposed	RG_FODHE	0.418	0.0563
			0.393	0.274
			0.358	0.178
		RG_FOUCL	0.437	0.278
			0.439	0.346
			0.497	0.152
		RG_FOUNGD	0.428	0.103
			0.399	0.513
			0.366	-0.134
		RG_FODNGD	0.441	0.116
			0.224	0.0123
			0.286	0.124
		RG_MP1	0.187	0.0373
			0.134	-0.0742
			0.325	-0.172
		RG_FOUSH	0.383	0.0821
			0.484	-0.279
			0.379	-0.245
		RG_FOUKI	0.439	-0.356
			0.399	-0.284
			0.299	-0.115
		RG_FOBKS	0.256	-0.300
			0.268	-0.472
			0.298	-0.274
		RG_SCOUTDS	0.333	-0.359
			0.113	-0.217
			0.249	-0.387
		RG_FOBSC	0.198	-0.179
			0.326	-0.424
			0.167	-0.352
		RG_FOBCP	0.157	-0.362
			0.120	-0.275
			0.202	-0.408
			0.117	-0.425
			0.148	-0.428
		RG_FRCP1SW	-0.0160	-0.456
			-0.0863	-0.396
			0.0493	-0.642

Table E.5: Biological Monitoring Area Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Year	Status	Area	CA1 (29.0%)	CA2 (11.7%)
2020	Mine-Exposed	RG_FRUPO	-0.343	-0.0656
			-0.0726	-0.698
			-0.0770	-0.574
		RG_FODPO	-0.747	-0.187
			-0.620	-0.468
			-0.701	-0.419
		RG_FO22	-1.59	0.231
			-1.40	0.170
			-1.78	0.140
			-1.49	0.0183
			-2.21	0.340
		RG_FOUEW	-0.854	0.120
			-0.913	-0.303
			-0.728	0.0226

Table E.6: Taxa Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Order	Family	CA1 (29.0%)	CA2 (11.7%)
Coleoptera	Elmidae	-3.06	0.420
Diptera	Ceratopogonidae	0.590	-0.680
	Chironomidae	0.0280	0.144
	Empididae	-0.432	0.0629
	Psychodidae	0.588	-0.620
	Simuliidae	0.0501	-1.67
	Tipulidae	-0.617	-0.226
Ephemeroptera	Ameletidae	0.761	0.728
	Baetidae	0.0784	-0.299
	Ephemerellidae	0.352	0.447
	Heptageniidae	0.364	0.270
Plecoptera	Capniidae	-0.922	-1.05
	Chloroperlidae	0.187	1.60
	Nemouridae	-0.288	-0.0901
	Perlodidae	-0.353	-0.299
	Taeniopterygidae	0.0139	0.130
Trichoptera	Glossosomatidae	-1.32	0.924
	Hydropsychidae	0.657	0.438
	Rhyacophilidae	0.0434	-0.0927
Trombidiformes	Lebertiidae	-0.226	-0.542
	Sperchontidae	0.571	0.516

Table E.7: Taxa Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the FRO LAEMP, September 2012 to September 2020

Order	Family	Taxa	CA1 (20.2%)	CA2 (9.99%)
Clitellata	Enchytraeidae	Enchytraeus	0.111	-1.26
Coleoptera	Elmidae	Heterlimnius	-2.56	1.64
Diptera	Ceratopogonidae	Mallochohelea	0.381	-0.812
	Chironomidae	Diamesa	1.10	0.955
		Eukiefferiella	-0.186	0.0845
		Micropsectra	0.707	0.0960
		Orthocladius complex	-0.163	0.0201
		Pagastia	-0.0116	-0.280
		Tvetenia	-0.00689	-0.396
	Empididae	Neoplasta	-0.672	-0.399
	Psychodidae	Pericoma/Telmatoscopus	0.396	-0.688
	Simuliidae	Simulium	-0.196	-0.813
	Tipulidae	Dicranota	-0.586	0.0289
Ephemeroptera	Ameletidae	Ameletidae	0.861	0.259
	Baetidae	Baetis	0.185	-0.187
		Baetis rhodani group	-0.147	-0.378
	Ephemerellidae	Drunella doddsii	0.741	0.490
		Ephemerellidae	0.463	0.275
	Heptageniidae	Epeorus	0.843	0.174
		Heptageniidae	0.406	0.104
		Rhithrogena	1.30	1.51
Plecoptera	Capniidae	Capniidae	-0.962	-0.526
	Chloroperlidae	Sweltsa	0.364	0.928
	Nemouridae	Zapada	-0.491	0.0407
		Zapada cinctipes	-0.598	-0.678
		Zapada columbiana	0.821	1.44
		Zapada oregonensis group	0.238	0.889
	Perlodidae	Isoperla	-1.75	0.0150
		Kogotus	-0.454	-0.543
		Megarcys	0.486	0.220
		Perlodidae	-0.754	-0.239
	Taeniopterygidae	Taeniopterygidae	0.0676	0.138
Trichoptera	Apataniidae	Apatania	-0.761	-1.00
	Glossosomatidae	Glossosomatidae	-0.797	1.02
	Hydropsychidae	Hydropsychidae	0.889	0.764
		Parapsyche elsis	0.962	0.323
	Limnephilidae	Limnephilidae	-1.99	1.88
	Rhyacophilidae	Rhyacophila	0.141	-0.390
		Rhyacophila brunnea/vemna group	-0.328	0.0593
		Rhyacophila hyalinata group	0.939	0.119
Trombidiformes	Lebertiidae	Lebertia	-0.315	-0.430
	Sperchontidae	Sperchon	0.637	0.219

Table E.8: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, September 2012 to September 2020

Year	Status	Area	CA1 (20.2%)	CA2 (9.99%)
2012	Reference	RG_HENUP	0.763	1.53
		RG_FO26	0.526	1.09
	Mine-Exposed	RG_FODHE	0.851	0.916
		RG_FOUNGD	0.669	0.580
		RG_MP1	0.547	0.0853
		RG_FOUSH	0.636	0.469
			0.701	0.278
			0.507	0.244
		RG_FOUKI	0.678	0.500
		RG_FOBKS	0.539	0.297
		RG_FOBSC	0.496	-0.163
		RG_FOBCP	0.448	0.109
		RG_FODPO	-0.592	0.249
		RG_FO22	-1.08	0.822
		RG_FOUEW	-0.421	1.03
2013	Reference	RG_HENUP	0.975	1.14
		RG_FO26	0.811	0.929
	Mine-Exposed	RG_MP1	0.371	-0.0867
		RG_FODPO	-0.827	0.00994
2015	Reference	RG_HENUP	1.02	1.05
		RG_FO26	0.595	0.709
	Mine-Exposed	RG_FODHE	0.452	0.196
		RG_FOUNGD	0.501	0.340
		RG_FODNGD	0.165	-0.0861
		RG_MP1	0.00507	-0.0574
		RG_FOUSH	0.235	-0.235
		RG_FOUKI	0.330	-0.150
		RG_FOBKS	0.224	-0.402
		RG_FOBSC	0.274	-0.521
		RG_FOBCP	-0.181	-0.571
		RG_FODPO	-0.441	0.546
		RG_FO22	-0.203	0.0946
		RG_FOUEW	-0.148	0.454
2016	Reference	RG_HENUP	1.04	1.27
		RG_FO26	0.851	0.910
	Mine-Exposed	RG_FODHE	0.609	0.227
		RG_FOUKI	0.187	-0.0402
		RG_FOBKS	0.303	-0.183
		RG_FOBSC	-0.0365	-0.555
		RG_FOBCP	0.214	-0.438
		RG_FODPO	-0.682	0.394
		RG_FOUEW	-0.210	0.501

Table E.8: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, September 2012 to September 2020

Year	Status	Area	CA1 (20.2%)	CA2 (9.99%)
2017	Reference	RG_HENUP	1.12	1.54
		RG_FO26	0.674	0.776
	Mine-Exposed	RG_FODHE	0.706	0.337
		RG_FOUNGD	0.0831	-0.215
		RG_FODNGD	0.0454	-0.270
		RG_MP1	0.110	-0.486
		RG_FOUSH	0.237	0.104
		RG_FOUKI	0.0737	-0.361
			0.333	-0.359
		RG_FOBKS	0.158	-0.439
			-0.0106	-0.527
			0.0611	-0.766
		RG_FOBSC	0.123	-0.593
		RG_FOBCP	-0.305	-0.799
		RG_FRCP1SW	-0.536	-1.06
		RG_FRUPO	-0.638	-0.603
		RG_FODPO	-0.937	0.180
		RG_FO22	-1.42	0.685
		RG_FOUEW	-0.866	0.216
2018	Reference	RG_HENUP	0.851	1.02
			1.03	1.30
			1.13	1.32
		RG_FO26	0.586	0.447
			0.649	0.538
			0.673	0.538
	Mine-Exposed	RG_FODHE	0.674	0.150
			0.663	0.178
			0.699	-0.0259
		RG_FOUNGD	0.290	-0.386
			0.407	-0.205
			0.318	-0.143
		RG_FODNGD	0.292	-0.238
			0.253	-0.194
			0.319	-0.257
		RG_MP1	0.231	-0.332
			0.148	-0.456
			0.199	-0.505
		RG_FOUSH	0.198	-0.355
			0.261	-0.329
			0.147	-0.279
		RG_FOUKI	0.519	-0.360
			0.480	-0.551
			0.495	-0.525

Table E.8: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, September 2012 to September 2020

Year	Status	Area	CA1 (20.2%)	CA2 (9.99%)
2018	Mine-Exposed	RG_FOBKS	0.389	-0.602
			0.623	-0.310
			0.197	-0.568
		RG_FOBSC	0.364	-0.574
			0.300	-0.772
			0.304	-0.613
		RG_FOBCP	0.0692	-0.337
			0.158	-0.576
			-0.114	-0.702
			0.0769	-1.03
			-0.264	-0.848
		RG_FRUPO	-0.776	-0.527
			-0.780	-0.357
			-0.746	-0.621
		RG_FODPO	-0.922	-0.115
			-0.924	-0.166
			-0.809	-0.211
		RG_FO22	-1.45	0.541
			-1.76	0.681
			-1.75	0.683
			-1.80	0.691
			-1.86	0.862
		RG_FOUEW	-1.01	0.332
			-0.843	0.543
			-0.837	0.146
2019	Reference	RG_HENUP	1.20	1.47
			0.866	1.19
			0.907	0.928
		RG_FO26	0.463	0.415
			0.916	0.502
			0.810	0.768
	Mine-Exposed	RG_FODHE	0.514	0.246
			0.438	-0.0238
			0.551	0.120
		RG_FOUCL	0.383	-0.0695
			0.261	0.145
			0.598	0.149
		RG_FOUNGD	0.385	-0.149
			0.312	-0.128
			0.402	0.00360
		RG_FODNGD	0.106	-0.257
			0.149	-0.00714
			0.290	-0.336

Table E.8: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, September 2012 to September 2020

Year	Status	Area	CA1 (20.2%)	CA2 (9.99%)
2019	Mine-Exposed	RG_MP1	-0.0793	-0.399
			0.129	-0.324
			0.0774	-0.226
		RG_FOUSH	0.323	0.0406
			0.208	-0.216
			0.297	-0.124
		RG_FOUKI	0.376	-0.272
			0.167	-0.398
			0.341	-0.357
		RG_FOBKS	0.142	-0.454
			0.137	-0.297
			0.170	-0.295
		RG_SCOUTDS	0.222	-0.252
			0.0691	-0.218
			0.0353	-0.171
		RG_FOBSC	0.227	-0.554
			0.261	-0.390
			0.0757	-0.700
		RG_FOBCP	0.0751	-0.486
			-0.0459	-0.521
			-0.199	-0.652
			-0.0993	-0.527
			-0.0596	-0.649
		RG_FRCP1SW	-0.231	-0.592
			-0.643	-0.297
			-0.575	-0.728
		RG_FRUPO	-0.381	-0.700
			-0.490	-0.370
			-0.327	-0.648
		RG_FODPO	-0.699	0.0161
			-0.980	0.0161
			-0.594	-0.0810
		RG_FO22	-1.29	0.636
			-1.41	0.939
			-1.75	1.13
			-1.60	0.998
			-1.19	0.628
		RG_FOUEW	-0.484	0.594
			-0.699	0.375
			-0.617	0.340
2020	Reference	RG_HENUP	1.09	1.06
			0.834	1.02
			0.992	0.948

Table E.8: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, September 2012 to September 2020

Year	Status	Area	CA1 (20.2%)	CA2 (9.99%)
2020	Reference	RG_FO26	0.702	0.722
			0.679	0.517
			0.685	0.489
		RG_UFR1	0.574	0.386
			0.643	0.551
			0.685	0.396
	Mine-Exposed	RG_FODHE	0.603	0.353
			0.484	0.304
			0.578	0.376
		RG_FOUCL	0.368	-0.0000593
			0.416	-0.0697
			0.514	-0.0485
		RG_FOUNGD	0.454	0.123
			0.398	0.189
			0.0810	-0.0772
		RG_FODNGD	0.455	0.142
			0.305	0.0576
			0.292	-0.0264
		RG_MP1	0.189	-0.158
			0.0512	-0.148
			0.288	-0.248
		RG_FOUSH	0.357	-0.148
			0.384	-0.400
			0.489	-0.0159
		RG_FOUKI	0.314	-0.396
			0.315	-0.373
			0.295	-0.179
		RG_FOBKS	0.169	-0.472
			0.133	-0.436
			0.116	-0.410
		RG_SCOUTDS	0.150	-0.594
			0.241	-0.210
			0.0621	-0.479
		RG_FOBSC	-0.0400	-0.482
			0.188	-0.689
			0.0292	-0.488
		RG_FOBCP	-0.0476	-0.476
			0.133	-0.310
			-0.0260	-0.774
			-0.127	-0.666
			-0.0991	-0.494
		RG_FRCP1SW	-0.557	-0.537
			-0.274	-0.532
			-0.380	-1.10

Table E.8: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, September 2012 to September 2020

Year	Status	Area	CA1 (20.2%)	CA2 (9.99%)
2020	Mine-Exposed	RG_FRUPO	-0.601	-0.314
			-0.488	-0.597
			-0.520	-0.436
		RG_FODPO	-0.770	-0.00786
			-0.811	-0.209
			-0.830	-0.176
		RG_FO22	-1.48	1.02
			-1.29	0.531
			-1.75	0.766
			-1.46	0.543
			-1.90	1.10
		RG_FOUEW	-0.632	0.328
			-0.802	0.102
			-0.503	0.408

Table E.9: **Temporal Changes in Benthic Invertebrate Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020**

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.365	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	<0.001	base year	-2.3	-	-0.41	1.4	1.0	2.4	2.2	3.5	ABC	C	-	BC	ABC	ABC	AB	AB	A	ns	ns
Mine-exposed	RG_FODHE	0.031	base year	-	-	0.24	-1.4	-0.70	0.018	2.0	2.4	AB	-	-	AB	B	AB	AB	AB	A	ns	ns
	RG_FOUCL	0.893	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.072	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FODNGD	0.872	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.202	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUSH	0.295	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUKI	0.003	base year	-	-	-3.0	**-4.7**	-2.2	-2.1	-2.6	-0.13	A	-	-	AB	B	AB	AB	AB	A	ns	ns
	RG_FOBKS	0.238	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_SCOUTDS	0.884	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.111	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBCP	0.001	base year	-	-	-1.3	-2.6	-0.84	-1.2	-1.1	1.5	AB	-	-	AB	B	AB	B	B	A	ns	↑
	RG_FRCP1SW	0.056	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.029	-	-	-	-	-	base year	-2.4	**-3.8**	-1.4	-	-	-	-	-	A	AB	B	AB	ns	ns
	RG_FODPO	<0.001	base year	1.3	-	-1.2	-0.92	-0.043	**3.6**	-0.77	0.56	B	AB	-	B	B	B	A	B	B	ns	ns
	RG_FO22	0.023	base year	-	-	3.4	-	3.7	1.8	0.44	2.6	AB	-	-	AB	-	AB	AB	B	A	ns	↑
	RG_FOUEW	0.974	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.10: Temporal Changes in Benthic Invertebrate Richness for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.381	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	0.005	base year	-3.5	-	-2.5	-1.2	-1.4	0.99	-0.59	-0.39	AB	B	-	AB	AB	AB	A	AB	AB	ns	ns
Mine-exposed	RG_FODHE	0.010	base year	-	-	1.3	-0.35	1.6	2.2	**3.8**	**3.6**	B	-	-	AB	B	AB	AB	A	A	ns	ns
	RG_FOUCL	1.000	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.035	base year	-	-	-1.5	-	-1.5	2.2	0.92	1.4	AB	-	-	B	-	B	A	AB	AB	ns	ns
	RG_FODNGD	0.045	-	-	-	base year	-	0.64	**3.6**	2.8	2.6	-	-	-	B	-	AB	A	AB	AB	ns	ns
	RG_MP1	0.002	base year	0.38	-	3.5	-	3.0	**4.7**	2.7	2.6	B	B	-	AB	-	AB	A	AB	AB	ns	ns
	RG_FOUSH	0.002	base year	-	-	0.34	-	2.5	**3.3**	2.3	**3.2**	B	-	-	AB	-	AB	A	AB	A	ns	ns
	RG_FOUKI	0.088	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBKS	0.002	base year	-	-	2.9	3.2	**4.1**	**4.5**	**4.7**	**4.7**	B	-	-	AB	AB	A	A	A	A	ns	ns
	RG_SCOUTDS	0.954	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.049	base year	-	-	2.3	3.1	**4.4**	2.9	2.5	3.3	B	-	-	AB	AB	A	AB	AB	AB	ns	ns
	RG_FOBCP	0.437	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FRCP1SW	0.764	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.133	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	<0.001	base year	-4.0	-	-3.6	-0.52	-2.0	2.0	-0.030	2.8	ABCD	D	-	D	ABCD	CD	AB	BC	A	ns	↑
	RG_FO22	0.019	base year	-	-	1.5	-	3.0	1.2	1.2	3.3	AB	-	-	AB	-	AB	B	B	A	ns	↑
	RG_FOUEW	0.032	base year	-	-	-3.7	-2.8	-1.7	-1.2	0.064	-0.40	AB	-	-	B	AB	AB	AB	A	AB	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.11: Temporal Changes in Benthic Invertebrate EPT Percent for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.790	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	0.551	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
Mine-exposed	RG_FODHE	0.005	base year	-	-	-2.5	-0.99	-0.16	-2.2	**-3.8**	**-4.4**	A	-	-	AB	AB	A	AB	B	B	ns	ns
	RG_FOUCL	0.923	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.102	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FODNGD	0.052	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	<0.001	base year	-2.4	-	0.89	-	3.2	1.0	**-5.0**	0.92	AB	BC	-	AB	-	A	AB	C	AB	ns	↑
	RG_FOUSH	<0.001	base year	-	-	2.0	-	0.98	-0.58	**-3.1**	**-3.7**	A	-	-	A	-	A	AB	BC	C	ns	ns
	RG_FOUKI	0.004	base year	-	-	-1.3	**-4.8**	-2.8	**-3.6**	**-4.5**	**-4.3**	A	-	-	AB	B	AB	B	B	B	ns	ns
	RG_FOBKS	0.294	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_SCOUTDS	0.296	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.501	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBCP	0.002	base year	-	-	-0.96	-2.6	-3.3	-2.4	**-4.5**	-2.1	A	-	-	A	AB	AB	A	B	A	ns	↑
	RG_FRCP1SW	0.068	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.262	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	<0.001	base year	3.8	-	2.5	0.57	-2.5	1.3	-1.3	-0.97	ABC	A	-	AB	ABC	C	AB	C	BC	ns	ns
	RG_FO22	0.337	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUEW	0.008	base year	-	-	-1.3	-3.0	-1.8	-2.6	**-4.3**	-3.0	A	-	-	AB	AB	AB	AB	B	AB	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.12: Temporal Changes in Benthic Invertebrate Ephemeroptera Percent for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.242	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	0.126	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
Mine-exposed	RG_FODHE	0.006	base year	-	-	-2.6	-0.53	0.21	-1.4	-2.9	**-4.2**	A	-	-	AB	A	A	A	AB	B	ns	ns
	RG_FOUCL	0.999	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.002	base year	-	-	2.0	-	-2.4	-0.43	2.4	-0.49	ABC	-	-	AB	-	C	BC	A	BC	ns	↓
	RG_FODNGD	0.012	-	-	-	base year	-	-2.6	-3.0	-2.4	**-4.1**	-	-	-	A	-	AB	AB	AB	B	ns	ns
	RG_MP1	<0.001	base year	-3.7	-	-0.96	-	0.96	-0.76	**-7.0**	-1.3	AB	BC	-	AB	-	A	AB	C	AB	ns	↑
	RG_FOUSH	<0.001	base year	-	-	1.2	-	-0.42	**-2.9**	**-4.4**	**-5.5**	A	-	-	A	-	AB	BC	CD	D	ns	ns
	RG_FOUKI	<0.001	base year	-	-	-1.3	**-6.0**	**-4.5**	-3.3	**-4.4**	**-5.1**	A	-	-	AB	C	BC	ABC	BC	C	ns	ns
	RG_FOBKS	0.003	base year	-	-	-3.3	**-4.8**	**-4.6**	**-3.8**	**-4.1**	**-4.4**	A	-	-	AB	B	B	B	B	B	ns	ns
	RG_SCOUTDS	0.307	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.008	base year	-	-	-1.6	**-5.2**	-3.8	-1.9	-1.6	**-4.0**	A	-	-	AB	B	AB	AB	AB	B	ns	ns
	RG_FOBCP	<0.001	base year	-	-	**-10**	**-9.4**	**-11**	**-5.3**	**-7.4**	**-7.0**	A	-	-	CD	CD	D	B	C	BC	ns	ns
	RG_FRCP1SW	0.058	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.148	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	<0.001	base year	-3.4	-	**-6.9**	**-4.6**	**-9.2**	**-6.4**	**-4.4**	**-4.3**	A	AB	-	BC	B	C	BC	B	B	ns	ns
	RG_FO22	<0.001	base year	-	-	-4.2	-	**-7.9**	**-5.0**	**-3.9**	**-5.4**	A	-	-	ABC	-	C	BC	B	BC	ns	ns
	RG_FOUEW	<0.001	base year	-	-	**-4.9**	**-7.2**	**-7.6**	**-6.1**	**-5.2**	**-8.1**	A	-	-	BC	BC	BC	BC	B	C	ns	↓

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.13: Temporal Changes in Benthic Invertebrate Plecoptera Percent for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.006	base year	-1.6	-	1.6	-1.9	2.1	-2.3	-0.31	-0.99	AB	AB	-	A	AB	A	B	AB	AB	ns	ns
	RG_FO26	<0.001	base year	0.20	-	-1.7	-1.2	-1.4	-3.3	**-4.2**	-0.56	AB	AB	-	ABC	ABC	ABC	BC	C	A	ns	↑
Mine-exposed	RG_FODHE	0.081	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOUCL	0.324	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.005	base year	-	-	0.75	-	0.97	0.24	-2.3	0.83	AB	-	-	AB	-	AB	A	B	A	ns	↑
	RG_FODNGD	0.923	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	<0.001	base year	3.5	-	**5.2**	-	**5.3**	**4.8**	0.69	**4.0**	B	AB	-	A	-	A	A	B	A	ns	↑
	RG_FOUSH	<0.001	base year	-	-	2.5	-	3.5	**4.7**	2.0	2.4	B	-	-	AB	-	AB	A	B	AB	ns	ns
	RG_FOUKI	0.012	base year	-	-	1.2	2.0	3.1	0.15	-0.20	1.9	AB	-	-	AB	AB	A	B	B	AB	ns	ns
	RG_FOBKS	0.001	base year	-	-	4.0	3.9	2.6	2.2	**4.8**	2.4	B	-	-	AB	AB	AB	B	A	AB	ns	ns
	RG_SCOUTDS	0.987	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.002	base year	-	-	3.2	2.9	2.2	0.83	**4.1**	**4.0**	B	-	-	AB	AB	AB	B	A	A	ns	ns
	RG_FOBCP	<0.001	base year	-	-	**7.2**	**4.9**	**5.5**	**3.8**	**3.6**	**5.3**	C	-	-	A	AB	AB	B	B	AB	ns	ns
	RG_FRCP1SW	0.964	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.756	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	0.265	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO22	0.300	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUEW	0.321	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.14: Temporal Changes in Benthic Invertebrate Tricoptera Percent for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.155	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	<0.001	base year	-2.9	-	-4.1	-1.7	**5.0**	-1.5	-0.96	-1.0	B	B	-	B	B	A	B	B	B	ns	ns
Mine-exposed	RG_FODHE	0.091	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOUCL	1.000	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	<0.001	base year	-	-	-1.9	-	-0.59	-0.14	-1.4	2.1	AB	-	-	B	-	AB	AB	B	A	ns	↑
	RG_FODNGD	0.093	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.011	base year	0.12	-	1.3	-	2.6	1.8	1.7	**4.2**	B	B	-	AB	-	AB	AB	AB	A	ns	ns
	RG_FOUSH	0.474	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUKI	0.062	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBKS	0.015	base year	-	-	0.93	3.3	**4.0**	1.3	1.3	3.4	B	-	-	AB	AB	A	B	B	AB	ns	ns
	RG_SCOUTDS	0.784	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	<0.001	base year	-	-	-0.66	2.2	3.3	0.48	-1.8	0.40	AB	-	-	AB	A	A	AB	B	AB	ns	ns
	RG_FOBCP	<0.001	base year	-	-	2.4	**6.6**	**5.2**	1.6	-0.075	1.6	B	-	-	AB	A	A	B	B	B	ns	ns
	RG_FRCP1SW	0.599	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.944	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	<0.001	base year	-0.11	-	**6.1**	**7.5**	4.1	-0.68	2.0	1.3	BC	BC	-	A	A	AB	C	B	BC	ns	ns
	RG_FO22	<0.001	base year	-	-	2.7	-	3.9	0.68	**4.6**	2.9	BC	-	-	ABC	-	ABC	C	A	AB	ns	ns
	RG_FOUEW	0.009	base year	-	-	3.1	3.3	3.3	0.96	-0.74	2.2	AB	-	-	A	A	A	AB	B	A	ns	↑

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.15: Temporal Changes in Benthic Invertebrate Chironomidae Percent for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.459	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	0.213	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
Mine-exposed	RG_FODHE	<0.001	base year	-	-	**4.6**	1.6	0.68	1.8	**5.7**	**6.1**	C	-	-	AB	BC	BC	BC	A	A	ns	ns
	RG_FOUCL	0.029	-	-	-	-	-	-	-	base year	**-2.7**	-	-	-	-	-	-	-	A	B	↓	↓
	RG_FOUNGD	0.003	base year	-	-	-0.41	-	4.1	0.032	0.48	-0.51	AB	-	-	B	-	A	B	B	B	ns	ns
	RG_FODNGD	0.226	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	<0.001	base year	2.1	-	-0.018	-	-4.0	-2.5	**7.2**	-3.1	BC	B	-	BC	-	C	C	A	C	ns	↓
	RG_FOUSH	<0.001	base year	-	-	-0.24	-	1.8	2.4	**6.6**	**4.5**	C	-	-	C	-	BC	BC	A	AB	ns	ns
	RG_FOUKI	<0.001	base year	-	-	1.3	**7.2**	3.6	1.1	**5.9**	**3.8**	C	-	-	BC	A	ABC	C	A	AB	ns	ns
	RG_FOBKS	0.011	base year	-	-	1.1	**4.8**	2.5	0.66	1.5	0.77	B	-	-	AB	A	AB	B	AB	B	ns	ns
	RG_SCOUTDS	0.854	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	<0.001	base year	-	-	0.47	**5.6**	4.2	0.087	2.8	1.5	BC	-	-	BC	A	AB	C	AB	BC	ns	ns
	RG_FOBCP	<0.001	base year	-	-	3.1	**4.8**	**4.5**	0.35	**5.8**	1.3	C	-	-	ABC	A	AB	C	A	BC	ns	↓
	RG_FRCP1SW	0.211	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.313	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	<0.001	base year	-3.7	-	-1.6	0.28	**4.7**	-0.66	1.9	1.7	BCD	D	-	BCD	BCD	A	CD	AB	ABC	ns	ns
	RG_FO22	0.001	base year	-	-	-1.1	-	-3.3	**-4.6**	**-3.8**	-2.4	A	-	-	AB	-	ABC	C	BC	AB	ns	ns
	RG_FOUEW	0.062	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.16: Temporal Changes in Benthic Invertebrate EPT Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.445	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	<0.001	base year	-1.7	-	-0.095	1.4	1.4	2.3	2.0	3.4	AB	B	-	AB	AB	AB	A	A	A	ns	ns
Mine-exposed	RG_FODHE	0.353	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOUCL	0.991	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.037	base year	-	-	-1.2	-	-2.1	1.4	1.6	0.94	AB	-	-	AB	-	B	AB	A	AB	ns	ns
	RG_FODNGD	0.946	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.108	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUSH	0.229	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUKI	0.008	base year	-	-	-3.1	**-5.2**	-2.7	-2.8	-3.4	-1.2	A	-	-	AB	B	AB	AB	AB	A	ns	ns
	RG_FOBKS	0.401	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_SCOUTDS	0.998	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.177	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBCP	<0.001	base year	-	-	-1.4	-2.9	-1.4	-1.6	-2.0	0.91	AB	-	-	AB	B	AB	B	B	A	ns	↑
	RG_FRCP1SW	0.021	-	-	-	-	-	base year	-	2.5	**3.9**	-	-	-	-	-	B	ns	AB	A	ns	ns
	RG_FRUPO	0.020	-	-	-	-	-	base year	-2.6	**-3.9**	-2.0	-	-	-	-	-	A	AB	B	AB	ns	ns
	RG_FODPO	<0.001	base year	2.1	-	-0.59	-0.70	-0.77	**3.7**	-1.0	0.22	B	AB	-	B	B	B	A	B	B	ns	ns
	RG_FO22	0.135	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUEW	0.997	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.17: Temporal Changes in Benthic Invertebrate Ephemeroptera Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.314	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	<0.001	base year	-1.5	-	0.99	2.4	1.4	**4.0**	3.5	**4.5**	BC	C	-	ABC	ABC	ABC	A	AB	A	ns	ns
Mine-exposed	RG_FODHE	0.124	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOUCL	0.912	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	<0.001	base year	-	-	-1.4	-	-2.9	1.7	2.6	0.70	ABC	-	-	BC	-	C	AB	A	AB	ns	ns
	RG_FODNGD	0.854	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.002	base year	**-5.3**	-	-4.0	-	-0.79	-1.6	**-4.7**	-2.6	A	B	-	AB	-	A	A	B	AB	ns	ns
	RG_FOUSH	0.004	base year	-	-	-1.2	-	-3.3	-2.3	**-3.2**	-2.5	A	-	-	AB	-	AB	AB	B	AB	ns	ns
	RG_FOUKI	<0.001	base year	-	-	-4.1	**-7.2**	**-4.1**	**-3.7**	**-4.5**	-2.2	A	-	-	ABC	C	BC	BC	BC	AB	ns	ns
	RG_FOBKS	0.078	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_SCOUTDS	1.000	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.065	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBCP	<0.001	base year	-	-	**-5.0**	**-5.8**	**-5.0**	-3.1	**-3.8**	-1.1	AB	-	-	C	C	C	BC	C	A	ns	↑
	RG_FRCP1SW	0.007	-	-	-	-	-	base year	-	2.5	**4.3**	-	-	-	-	-	B	ns	AB	A	ns	ns
	RG_FRUPO	0.006	-	-	-	-	-	base year	-0.62	-2.2	0.86	-	-	-	-	-	AB	AB	B	A	ns	↑
	RG_FODPO	0.003	base year	-0.63	-	**-4.7**	-3.2	**-5.6**	-0.96	-2.9	-1.8	A	AB	-	BC	ABC	C	A	ABC	AB	ns	ns
	RG_FO22	0.494	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUEW	0.548	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.18: Temporal Changes in Benthic Invertebrate Plecoptera Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.055	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	0.041	base year	-1.7	-	-1.1	0.29	-0.015	-0.16	-0.72	1.9	AB	AB	-	AB	AB	AB	AB	B	A	ns	↑
Mine-exposed	RG_FODHE	0.091	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOUCL	1.000	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.617	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FODNGD	0.947	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.112	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUSH	0.530	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUKI	0.010	base year	-	-	-1.8	-3.2	-0.18	-1.5	-2.1	0.82	AB	-	-	AB	B	AB	AB	B	A	ns	↑
	RG_FOBKS	0.287	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_SCOUTDS	0.999	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.012	base year	-	-	0.035	-0.77	0.11	-0.31	1.1	2.6	AB	-	-	AB	AB	AB	B	AB	A	ns	ns
	RG_FOBCP	<0.001	base year	-	-	2.5	0.078	2.1	0.86	0.80	**3.7**	B	-	-	AB	B	AB	B	B	A	ns	↑
	RG_FRCP1SW	0.130	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.160	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	0.001	base year	2.3	-	0.36	-0.31	0.29	3.3	-0.15	0.76	AB	AB	-	AB	B	AB	A	B	B	ns	ns
	RG_FO22	0.127	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUEW	0.767	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.19: Temporal Changes in Benthic Invertebrate Trichoptera Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.119	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	<0.001	base year	-3.6	-	-3.2	-0.044	3.8	0.84	1.1	2.2	AB	B	-	B	AB	A	A	A	A	ns	ns
Mine-exposed	RG_FODHE	<0.001	base year	-	-	-3.6	**-5.0**	-2.4	-1.8	-1.3	0.33	AB	-	-	BC	C	ABC	ABC	AB	A	ns	ns
	RG_FOUCL	0.973	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.002	base year	-	-	-2.6	-	-1.7	1.1	-0.27	2.1	ABC	-	-	C	-	BC	AB	ABC	A	ns	ns
	RG_FODNGD	0.109	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.027	base year	-2.1	-	-1.1	-	1.4	0.76	0.44	1.7	AB	B	-	AB	-	AB	AB	AB	A	ns	ns
	RG_FOUSH	0.359	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUKI	0.094	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBKS	0.062	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_SCOUTDS	0.496	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.027	base year	-	-	-1.7	-0.92	0.70	-0.37	-1.9	0.80	AB	-	-	AB	AB	AB	AB	B	A	ns	↑
	RG_FOBCP	<0.001	base year	-	-	0.82	1.5	2.6	0.41	-0.76	2.2	AB	-	-	AB	AB	A	AB	B	A	ns	↑
	RG_FRCP1SW	0.340	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.124	-	-	-	-	-	ns	ns	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FODPO	0.047	base year	0.63	-	3.3	**4.4**	3.2	1.3	1.1	1.4	B	AB	-	AB	A	AB	AB	AB	AB	ns	ns
	RG_FO22	0.003	base year	-	-	**4.5**	-	**5.6**	1.7	3.2	**3.9**	C	-	-	AB	-	A	BC	ABC	A	ns	ns
	RG_FOUEW	0.160	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.20: Temporal Changes in Benthic Invertebrate Baetidae Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.253	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FO26	<0.001	base year	0.32	-	**4.5**	2.9	3.6	2.6	0.98	**7.9**	C	BC	-	AB	BC	BC	BC	BC	A	ns	↑
Mine-exposed	RG_FODHE	<0.001	base year	-	-	**6.0**	4.0	2.1	3.4	1.9	**5.4**	B	-	-	A	AB	AB	AB	B	A	ns	↑
	RG_FOUCL	1.000	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	0.199	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FODNGD	0.084	-	-	-	ns	-	ns	ns	ns	ns	-	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_MP1	0.006	base year	-1.7	-	-0.61	-	0.92	2.2	-0.51	-0.88	AB	B	-	AB	-	AB	A	B	B	ns	ns
	RG_FOUSH	0.002	base year	-	-	**4.7**	-	0.41	1.4	0.29	1.2	B	-	-	A	-	AB	AB	B	AB	ns	ns
	RG_FOUKI	0.068	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBKS	0.005	base year	-	-	1.7	-0.11	0.68	1.6	-1.6	-0.30	AB	-	-	AB	AB	AB	A	B	AB	ns	ns
	RG_SCOUTDS	0.779	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.234	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBCP	<0.001	base year	-	-	1.8	1.5	0.66	-2.0	**3.4**	**4.8**	CD	-	-	ABC	ABC	BCD	D	AB	A	ns	ns
	RG_FRCP1SW	0.022	-	-	-	-	-	base year	-	**3.7**	**3.9**	-	-	-	-	-	B	ns	A	A	ns	ns
	RG_FRUPO	0.006	-	-	-	-	-	base year	1.7	2.1	**4.4**	-	-	-	-	-	B	B	AB	A	ns	ns
	RG_FODPO	<0.001	base year	-0.24	-	**-8.0**	-0.24	-3.1	0.95	0.15	-0.37	AB	AB	-	C	AB	B	A	AB	AB	ns	ns
	RG_FO22	0.198	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUEW	0.139	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.21: Temporal Changes in Benthic Invertebrate Ephemerillidae Abundance for Reference and Mine-exposed Areas in the FRO LAEMP, September 2012 to 2020

Status	Area	Year P-value[a]	Q1. Is there a positive or negative change since the base year (b) of monitoring? Magnitude of Difference (MOD)[b] and Significance (bolded) from Base Year (b)[c]									Q2. Is the 2020 September mean greater or less than the September historical means (2012 - 2019) and the previous year (2019)?[c]										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2012	2013	2014	2015	2016	2017	2018	2019	2020	2012-2019	2019
Reference	RG_HENUP	0.019	base year	-3.3	-	-0.72	0.48	0.79	0.60	-2.2	-0.27	AB	B	-	AB	AB	AB	A	B	AB	ns	ns
	RG_FO26	<0.001	base year	-3.0	-	-0.39	2.6	1.2	3.4	2.3	**4.1**	BCD	D	-	CD	ABC	ABCD	AB	ABC	A	ns	ns
Mine-exposed	RG_FODHE	<0.001	base year	-	-	0.66	-0.99	-0.50	-0.42	3.4	3.2	AB	-	-	AB	B	B	B	A	A	ns	ns
	RG_FOUCL	0.155	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOUNGD	<0.001	base year	-	-	-0.38	-	0.059	**5.5**	**6.9**	**4.4**	C	-	-	C	-	C	AB	A	B	ns	↓
	RG_FODNGD	0.037	-	-	-	base year	-	2.2	3.5	**3.7**	3.0	-	-	-	B	-	AB	AB	A	AB	ns	ns
	RG_MP1	<0.001	base year	**-7.2**	-	**-4.4**	-	1.9	-1.1	-2.7	-0.93	AB	D	-	CD	-	A	ABC	BC	ABC	ns	ns
	RG_FOUSH	0.134	ns	-	-	ns	-	ns	ns	ns	ns	ns	-	-	ns	-	ns	ns	ns	ns	ns	ns
	RG_FOUKI	0.003	base year	-	-	-0.63	-1.7	-2.1	-0.040	0.71	1.6	AB	-	-	AB	AB	B	AB	AB	A	ns	ns
	RG_FOBKS	0.030	base year	-	-	-0.31	1.4	-0.30	2.4	0.98	1.4	AB	-	-	AB	AB	B	A	AB	AB	ns	ns
	RG_SCOUTDS	0.688	-	-	-	-	-	-	-	ns	ns	-	-	-	-	-	-	-	ns	ns	ns	ns
	RG_FOBSC	0.098	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns
	RG_FOBCP	<0.001	base year	-	-	**-5.9**	**-5.9**	**-8.3**	**-6.9**	**-5.8**	-3.4	A	-	-	BC	BC	C	C	C	AB	ns	↑
	RG_FRCP1SW	0.475	-	-	-	-	-	ns	-	ns	ns	-	-	-	-	-	ns	ns	ns	ns	ns	ns
	RG_FRUPO	0.033	-	-	-	-	-	base year	1.7	-0.35	2.3	-	-	-	-	-	AB	AB	B	A	ns	↑
	RG_FODPO	<0.001	base year	**-4.9**	-	**-6.3**	**-6.1**	**-8.4**	**-4.4**	**-5.9**	**-4.5**	A	BC	-	BC	BC	C	B	BC	B	ns	ns
	RG_FO22	0.026	base year	-	-	0.58	-	-3.1	-3.1	-2.0	-3.0	AB	-	-	A	-	AB	B	AB	B	ns	ns
	RG_FOUEW	0.435	ns	-	-	ns	ns	ns	ns	ns	ns	ns	-	-	ns	ns	ns	ns	ns	ns	ns	ns

P-value < 0.05.
> 2 SD Increase.
> 3 SD Increase.
> 4 SD Increase.
> 5 SD Increase.
> 2 SD Decrease.
> 3 SD Decrease.
> 4 SD Decrease.
> 5 SD Decrease.
bold Significant increase or decrease from base year (b).
Significantly > than all historical years (or 2019).
Significantly < than all historical years (or 2019).

Notes: "ns" = not significant; "-" insufficient data for comparison.

[a] *Year* p-value from an ANOVA

[b] Magnitude of Difference (MOD) = $[Mean_{given\ year} - Mean_{base\ year}] / SD_{base\ year}$.

[c] Significance among year determined using all pairwise comparisons using Tukey's honestly signifciant differences method. Years that share a letter are not significantly different. Letters assigned such that the mean with highest magnitude is assigned "a".

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
February	Mine-Exposed	RG_FOUKI	2019	0.0699	-0.750
				0.212	-0.756
				0.168	-0.726
		RG_FRUPO	2019	0.857	-0.352
				0.832	-0.559
				0.758	-0.531
		RG_FODPO	2019	0.823	-0.434
				1.02	-0.161
				0.757	-0.313
		RG_FOUEW	2019	0.748	-0.211
				0.771	-0.0805
				0.742	0.0686
June	Reference	RG_HENUP	2018	-0.561	0.489
			2019	-0.486	0.405
				-0.470	0.398
				-0.398	0.446
			2020	-0.508	0.455
				-0.475	0.369
				-0.496	0.338
		RG_FO26	2018	-0.604	0.501
			2019	-0.498	0.401
				-0.418	0.120
				-0.455	0.366
			2020	-0.504	0.380
				-0.452	0.392
				-0.496	0.310
		RG_UFR1	2020	-0.462	0.296
				-0.511	0.262
				-0.442	0.467
	Mine-Exposed	RG_FODHE	2018	-0.618	0.523
			2019	-0.601	0.494
				-0.421	0.614
				-0.697	0.639
			2020	-0.691	0.625
				-0.726	0.471
				-0.654	0.365
		RG_FOUCL	2020	-0.654	0.367
				-0.746	0.743
				-0.646	0.704
		RG_FOUNGD	2018	-0.259	0.351
			2019	-0.660	0.521
				-0.524	0.628
				-0.715	0.857
			2020	-0.638	0.757
				-0.507	0.716
				-0.539	0.562
		RG_FODNGD	2018	-0.698	0.939
			2019	-0.581	0.777
				-0.693	0.875
				-0.556	0.550
			2020	-0.773	1.03
				-0.802	0.844
				-0.697	0.666

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
June	Mine-Exposed	RG_MP1	2018	-0.611	0.857
			2019	-0.630	1.18
				-0.587	0.328
				-0.641	0.774
			2020	-0.492	0.489
				-0.675	0.732
				-0.771	0.762
		RG_FOUSH	2018	-0.582	0.699
			2019	-0.662	0.529
				-0.708	0.540
				-0.729	0.519
			2020	-0.635	0.701
				-0.591	0.291
				-0.598	0.435
		RG_FOUKI	2018	-0.487	0.774
			2019	-0.387	0.285
				-0.591	0.306
				-0.524	0.384
			2020	-0.448	0.689
				-0.692	0.554
				-0.712	0.634
		RG_FOBKS	2018	-0.574	0.719
			2019	-0.566	0.464
				-0.657	0.453
				-0.560	0.348
			2020	-0.628	0.520
				-0.703	0.806
				-0.513	1.06
		RG_SCOUTDS	2020	-0.697	0.734
				-0.688	0.867
				-0.724	0.729
		RG_FOBSC	2018	-0.478	0.541
			2019	-0.614	0.477
				-0.662	0.421
				-0.826	0.488
			2020	-0.580	0.618
				-0.850	1.10
				-0.783	0.832
		RG_FOBCP	2018	-0.424	0.336
			2019	-0.868	0.819
				-0.780	0.688
				-0.698	0.562
			2020	-0.829	0.706
				-0.700	0.597
				-0.806	0.859
		RG_FRCP1SW	2018	-0.470	0.661
			2019	-0.286	0.414
				-0.425	0.757
				-0.614	0.987
			2020	-0.617	0.803
				-0.756	0.845
				-0.654	0.750

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
June	Mine-Exposed	RG_FRUPO	2018	-0.0173	0.585
			2019	-0.0112	0.682
				-0.178	0.814
				0.0809	0.367
			2020	-0.120	0.495
				-0.417	0.393
				-0.423	0.790
		RG_FODPO	2018	0.660	0.511
			2019	1.28	0.634
				0.668	0.221
				0.883	0.617
			2020	0.0874	0.799
				0.659	0.500
				0.0943	0.503
		RG_FO22	2018	1.77	1.02
			2019	1.74	0.903
				1.87	0.630
				1.70	0.907
			2020	1.06	0.953
		RG_FOUEW	2018	0.686	0.779
			2019	0.592	0.492
				0.357	0.442
				0.318	0.588
			2020	0.128	0.560
				0.102	0.788
				0.276	0.463
August	Reference	RG_HENUP	2018	0.104	0.331
	Mine-Exposed	RG_FODHE	2018	-0.424	0.559
		RG_FOUNGD	2018	-0.612	0.619
		RG_FODNGD	2018	-0.287	0.321
		RG_MP1	2018	-0.377	0.160
		RG_FOUSH	2018	-0.522	0.404
		RG_FOUKI	2018	-0.838	0.440
		RG_FOBKS	2018	-0.639	0.439
		RG_FOBSC	2018	-0.541	-0.00469
		RG_FOBCP	2018	-0.540	0.387
		RG_FRCP1SW	2018	-0.0514	0.533
		RG_FRUPO	2018	-0.337	0.792
		RG_FODPO	2018	0.948	0.392
		RG_FO22	2018	1.67	1.07
		RG_FOUEW	2018	0.645	0.739
September	Reference	RG_HENUP	2018	-0.157	-0.439
				-0.221	-0.316
				-0.265	-0.0412
			2019	-0.219	-0.180
				-0.144	-0.219
				-0.230	-0.295
			2020	-0.250	-0.801
				-0.0611	-0.405
				-0.310	-0.258

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
September	Reference	RG_FO26	2018	-0.322	-0.253
				-0.326	-0.268
				-0.317	-0.327
			2019	-0.0233	-0.184
				-0.548	-0.267
				-0.377	-0.264
			2020	-0.327	-0.608
				-0.356	-0.687
				-0.371	-0.670
		RG_UFR1	2020	-0.345	-0.414
				-0.278	-0.352
				-0.436	-0.446
	Mine-Exposed	RG_FODHE	2018	-0.405	-0.555
				-0.600	-0.0433
				-0.561	-0.295
			2019	-0.382	-0.311
				-0.335	-0.226
				-0.409	-0.252
			2020	-0.412	-0.281
				-0.294	-0.348
				-0.350	-0.279
		RG_FOUCL	2019	-0.487	-0.0814
				-0.311	0.125
				-0.582	-0.00258
			2020	-0.265	-0.437
				-0.201	-0.402
				-0.413	-0.394
		RG_FOUNGD	2018	-0.409	-0.152
				-0.400	-0.442
				-0.318	-0.460
			2019	-0.580	-0.0616
				-0.393	-0.164
				-0.443	-0.0718
			2020	-0.334	-0.462
				-0.330	-0.417
				-0.115	-0.157
		RG_FODNGD	2018	-0.289	-0.471
				-0.272	-0.360
				-0.321	-0.286
			2019	-0.285	-0.210
				-0.131	-0.211
				-0.375	-0.176
			2020	-0.294	-0.616
				-0.159	-0.531
				-0.164	-0.564
		RG_MP1	2018	-0.363	-0.333
				-0.450	-0.204
				-0.394	-0.212
			2019	0.0434	-0.359
				-0.257	-0.316
				-0.193	-0.137
			2020	-0.226	-0.200
				-0.170	-0.267
				-0.365	-0.348

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
September	Mine-Exposed	RG_FOUSH	2018	-0.370	-0.491
				-0.335	-0.339
				-0.356	-0.303
			2019	-0.149	-0.356
				-0.229	-0.436
				-0.324	-0.347
			2020	-0.265	-0.697
				-0.430	-0.665
				-0.324	-0.493
		RG_FOUKI	2018	-0.492	-0.462
				-0.594	-0.316
				-0.400	-0.486
			2019	-0.217	-0.286
				-0.211	-0.159
				-0.301	-0.279
			2020	-0.217	-0.768
				-0.250	-0.663
				-0.149	-0.749
		RG_FOBKS	2018	-0.516	-0.309
				-0.504	-0.574
				-0.406	-0.280
			2019	-0.00956	-0.933
				0.00404	-0.603
				-0.0357	-0.563
			2020	-0.173	-0.691
				-0.0366	-0.545
				-0.198	-0.785
		RG_SCOUTDS	2019	0.0830	-0.896
				0.0338	-0.497
				0.0322	-0.542
			2020	-0.230	-0.760
				-0.0107	-0.731
				-0.111	-0.719
		RG_FOBSC	2018	-0.295	-0.900
				-0.359	-0.421
				-0.383	-0.509
			2019	-0.0845	-0.862
				-0.180	-0.822
				-0.0334	-0.770
			2020	-0.0481	-0.865
				-0.245	-0.733
				-0.0128	-0.742

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
September	Mine-Exposed	RG_FOBCP	2018	-0.179	-0.616
				-0.0736	-0.756
				-0.0559	-0.964
				-0.147	-0.765
				0.0632	-0.795
			2019	-0.191	-0.454
				0.0445	-0.413
				-0.0806	-0.695
				-0.115	-0.568
				-0.133	-0.351
			2020	0.00977	-0.870
				-0.0731	-0.617
				-0.0400	-0.906
				0.0009981	-0.847
				0.0203	-0.940
		RG_FRCP1SW	2019	0.227	-0.752
				0.306	-0.964
				0.340	-0.955
			2020	0.360	-1.24
				0.446	-1.24
				0.351	-1.07
		RG_FRUPO	2018	0.172	-0.155
				0.402	-0.183
				0.156	0.00542
			2019	0.429	-0.419
				0.306	-0.271
				0.150	-0.240
			2020	0.431	-0.343
				0.0715	-0.270
				0.0184	-0.216
		RG_FODPO	2018	0.825	-0.127
				0.589	-0.132
				0.356	0.129
			2019	0.830	0.0528
				1.09	0.337
				0.379	0.367
			2020	0.771	-0.244
				0.628	-0.0874
				0.673	0.0288

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
September	Mine-Exposed	RG_FO22	2018	1.32	0.657
				1.76	0.583
				1.61	0.737
				1.81	0.683
				1.77	0.902
			2019	1.45	0.482
				1.69	0.675
				1.87	1.01
				1.81	0.903
				1.39	0.531
			2020	1.50	0.639
				1.33	0.391
				1.92	0.652
				1.42	0.559
				2.10	0.883
		RG_FOUEW	2018	1.04	0.222
				0.963	0.309
				0.685	0.346
			2019	0.853	0.314
				0.827	0.385
				0.693	0.214
			2020	0.711	0.336
				0.789	0.132
				0.524	0.168
December	Reference	RG_UFR1	2018	-0.250	0.134
				-0.300	-0.156
				-0.309	-0.173
			2019	-0.360	-0.0619
				-0.256	0.136
				-0.395	0.215
			2020	-0.264	-0.0722
				-0.307	-0.354
				-0.278	-0.212
	Mine-Exposed	RG_FOUKI	2018	-0.0455	-0.625
				-0.107	-0.672
				-0.137	-0.773
			2019	0.00000747	-0.382
				0.0620	-0.226
				-0.0420	-0.491
			2020	0.0268	-0.632
				-0.0731	-0.657
				0.145	-0.670

Table E.22: Biological Monitoring Area Scores from Correspondence Analysis on Family-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (21.3%)	CA2 (13.6%)
December	Mine-Exposed	RG_SCOUTDS	2019	0.147	-0.625
				0.193	-0.605
				0.343	-0.513
			2020	0.278	-0.810
				0.479	-0.761
				0.391	-0.810
		RG_FOBSC	2018	0.0880	-0.418
				0.150	-0.917
				0.385	-1.12
			2020	0.271	-0.741
				0.250	-0.755
				0.687	-1.22
		RG_FOBCP	2018	0.792	-0.796
				0.832	-0.896
				0.788	-0.848
		RG_FRUPO	2018	0.689	-0.432
				0.580	-0.439
				0.428	-0.747
			2019	0.794	-0.369
				0.723	-0.350
				0.663	-0.333
			2020	0.655	-0.531
				0.534	-0.525
				0.768	-0.551
		RG_FODPO	2018	0.891	-0.346
				0.754	-0.134
				0.869	-0.478
			2019	1.10	0.0359
				0.899	-0.179
				0.981	-0.271
			2020	0.568	-0.355
				0.577	-0.436
				0.641	-0.249
		RG_FOUEW	2018	0.756	0.0558
				0.909	-0.00469
				0.496	-0.0743
			2019	0.820	0.113
				0.623	0.176
				0.447	0.00409
			2020	0.785	0.0843
				0.754	0.0525
				0.294	-0.0805

Table E.23: Taxa Scores from Correspondence Analysis on Family Level Benthic Invertebrate Communities from the Fording River, 2018 to 2020

Order	Family	CA1 (21.3%)	CA2 (13.6%)
-	Enchytraeidae	-0.766	0.618
Coleoptera	Elmidae	2.69	1.41
Diptera	Ceratopogonidae	-0.463	0.0660
	Chironomidae	0.00208	0.0223
	Empididae	0.361	-0.0363
	Psychodidae	-0.227	-1.30
	Simuliidae	-0.828	1.27
	Tipulidae	0.417	0.239
Ephemeroptera	Ameletidae	-0.809	0.286
	Baetidae	-0.376	0.332
	Ephemerellidae	-0.445	0.153
	Heptageniidae	-0.405	0.0486
Plecoptera	Capniidae	1.31	-0.322
	Chloroperlidae	-0.191	0.591
	Nemouridae	0.492	-0.409
	Perlidae	0.162	-1.15
	Perlodidae	0.259	0.0282
	Taeniopterygidae	0.365	-1.30
Trichoptera	Apataniidae	1.00	-0.762
	Glossosomatidae	1.37	0.104
	Hydropsychidae	-0.529	-0.922
	Limnephilidae	2.25	1.41
	Rhyacophilidae	-0.300	0.450
	Uenoidae	-1.04	0.786
Trombidiformes	Lebertiidae	0.392	-0.217
	Sperchontidae	-0.443	-0.470

Table E.24: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (18.7%)	CA2 (11.1%)
February	Mine-Exposed	RG_FOUKI	2019	-0.366	0.348
				-0.425	0.125
				-0.153	0.319
		RG_FRUPO	2019	-1.29	-0.789
				-0.926	-0.531
				-0.907	-0.547
		RG_FODPO	2019	-1.28	-0.523
				-1.26	-0.681
				-1.22	-0.578
		RG_FOUEW	2019	-0.934	-0.426
				-0.771	-0.472
				-0.951	-0.496
June	Reference	RG_HENUP	2018	0.768	0.366
			2019	0.945	0.0045
				0.736	0.428
				0.967	-0.299
			2020	0.457	0.657
				0.594	0.378
				0.539	0.372
		RG_FO26	2018	0.774	0.139
			2019	0.837	0.268
				0.687	0.232
				0.661	0.121
			2020	0.615	0.502
				0.611	0.289
				0.705	0.680
		RG_UFR1	2020	0.636	0.290
				0.644	0.603
				0.729	-0.0226
	Mine-Exposed	RG_FODHE	2018	0.986	-0.325
			2019	1.20	-0.559
				1.10	-0.775
				1.24	-0.685
			2020	0.897	-0.0601
				0.852	-0.0388
				0.693	0.412
		RG_FOUCL	2020	0.862	-0.0252
				1.09	-0.118
				0.734	0.122
		RG_FOUNGD	2018	0.477	0.0017
			2019	0.646	-0.171
				0.867	-0.477
				0.917	-0.464
			2020	0.991	-0.331
				0.901	-0.347
				1.00	-0.244
		RG_FODNGD	2018	0.933	-0.540
			2019	1.02	-0.614
				1.16	-0.633
				0.830	-0.287
			2020	1.09	-0.487
				1.20	-0.420
				1.08	-0.457
		RG_MP1	2018	0.689	-0.702
			2019	0.707	-0.503
				0.809	-0.263
				0.823	-0.492
			2020	0.957	-0.457
				1.02	-0.545
				1.23	-0.375
		RG_FOUSH	2018	0.934	-0.494
			2019	0.883	-0.398
				0.747	-0.0607
				0.830	-0.220
			2020	1.04	-0.518
				1.08	-0.424
				1.01	-0.223

Table E.24: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (18.7%)	CA2 (11.1%)
June	Mine-Exposed	RG_FOUKI	2018	0.856	-0.562
			2019	0.629	-0.226
				0.541	-0.193
				0.925	-0.494
			2020	0.816	-0.390
				1.24	-0.649
				1.19	-0.662
		RG_FOBKS	2018	0.816	-0.384
			2019	0.652	-0.397
				1.10	-0.515
				0.861	-0.459
			2020	0.720	0.203
				1.11	-0.559
				1.11	-0.761
		RG_SCOUTDS	2020	1.08	-0.662
				1.12	-0.725
				1.05	-0.488
		RG_FOBSC	2018	0.772	-0.454
			2019	1.20	-0.829
				0.928	-0.581
				1.39	-0.955
			2020	1.10	-0.456
				1.08	-0.804
				1.28	-0.879
		RG_FOBCP	2018	0.835	-0.578
			2019	0.942	-0.453
				0.907	-0.509
				0.736	-0.437
			2020	1.28	-0.884
				1.01	-0.756
				1.16	-0.901
		RG_FRCP1SW	2018	0.956	-0.764
			2019	0.601	-0.578
				0.703	-0.562
				0.626	-0.465
			2020	1.04	-1.01
				1.19	-1.10
				1.09	-0.894
		RG_FRUPO	2018	0.265	-0.912
			2019	0.243	-0.697
				0.381	-0.778
				0.261	-0.763
			2020	0.485	-0.581
				0.805	-0.657
				1.08	-0.977
		RG_FODPO	2018	-0.0544	-1.12
			2019	-0.637	-0.791
				-0.299	-0.731
				-0.216	-0.810
			2020	0.422	-1.03
				0.236	-1.21
				0.631	-0.938
		RG_FO22	2018	-0.822	-1.66
			2019	-0.777	-1.11
				-1.31	-1.20
				-0.831	-1.39
			2020	-0.140	-1.18
		RG_FOUEW	2018	0.135	-1.00
			2019	-0.443	-0.547
				-0.176	-0.544
				-0.0067	-0.460
			2020	0.403	-0.456
				0.496	-0.544
				0.307	-0.707

Table E.24: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (18.7%)	CA2 (11.1%)
August	Reference	RG_HENUP	2018	0.817	0.0938
	Mine-Exposed	RG_FODHE	2018	0.923	0.154
		RG_FOUNGD	2018	0.563	0.0915
		RG_FODNGD	2018	0.524	0.201
		RG_MP1	2018	0.432	0.346
		RG_FOUSH	2018	0.686	0.305
		RG_FOUKI	2018	0.595	0.418
		RG_FOBKS	2018	0.367	0.172
		RG_FOBSC	2018	0.293	0.351
		RG_FOBCP	2018	0.188	0.144
		RG_FRCP1SW	2018	0.174	0.0804
		RG_FRUPO	2018	0.162	-0.100
		RG_FODPO	2018	-0.604	-0.442
		RG_FO22	2018	-0.775	-1.03
		RG_FOUEW	2018	-0.172	-0.396
September	Reference	RG_HENUP	2018	0.158	1.15
				0.310	1.26
				0.480	1.27
			2019	0.466	1.31
				0.138	1.09
				0.242	1.06
			2020	0.0609	1.63
				0.0166	1.32
				0.184	1.31
		RG_FO26	2018	0.0736	0.979
				0.150	0.995
				0.147	1.04
			2019	0.257	0.739
				0.264	1.03
				0.175	0.801
			2020	-0.0487	1.07
				-0.0383	1.14
				0.0244	1.09
		RG_UFR1	2020	0.0412	0.893
				0.122	0.855
				0.140	0.942
	Mine-Exposed	RG_FODHE	2018	0.111	0.862
				0.225	0.795
				0.287	0.827
			2019	0.0586	0.739
				0.0943	0.660
				0.137	0.716
			2020	0.0676	0.643
				-0.0082	0.710
				0.0595	0.657
		RG_FOUCL	2019	0.0937	0.541
				0.109	0.439
				0.252	0.675
			2020	-0.0730	0.753
				0.0882	0.792
				0.117	0.795
		RG_FOUNGD	2018	-0.0556	0.496
				-0.0515	0.740
				-0.219	0.647
			2019	0.137	0.602
				-0.0303	0.563
				-0.0226	0.626
			2020	-0.0130	0.746
				-0.0926	0.650
				0.0605	0.448
		RG_FODNGD	2018	-0.202	0.603
				-0.220	0.500
				0.0526	0.584
			2019	-0.133	0.402
				-0.122	0.448
				0.0613	0.450
			2020	-0.147	0.694
				-0.0509	0.718
				-0.182	0.608

Table E.24: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (18.7%)	CA2 (11.1%)
September	Mine-Exposed	RG_MP1	2018	-0.0676	0.569
				-0.133	0.424
				-0.102	0.319
			2019	-0.212	0.251
				-0.0596	0.394
				-0.0873	0.271
			2020	-0.0634	0.459
				-0.248	0.384
				-0.0261	0.565
		RG_FOUSH	2018	-0.226	0.423
				-0.144	0.453
				-0.245	0.289
			2019	-0.0375	0.595
				-0.121	0.582
				-0.0358	0.592
			2020	-0.266	0.819
				-0.118	0.835
				-0.0245	0.823
		RG_FOUKI	2018	0.0817	0.727
				0.141	0.604
				0.138	0.676
			2019	0.0577	0.589
				0.0933	0.431
				0.0453	0.509
			2020	-0.223	0.754
				-0.269	0.821
				-0.292	0.790
		RG_FOBKS	2018	0.109	0.627
				0.125	0.903
				-0.0499	0.401
			2019	-0.334	0.741
				-0.143	0.639
				-0.145	0.755
			2020	-0.174	0.560
				-0.206	0.613
				-0.400	0.724
		RG_SCOUTDS	2019	-0.231	0.720
				-0.218	0.693
				-0.207	0.497
			2020	-0.312	0.601
				-0.366	0.635
				-0.391	0.545
		RG_FOBSC	2018	-0.121	0.851
				0.0803	0.456
				-0.0972	0.619
			2019	-0.218	0.703
				-0.168	0.616
				-0.269	0.660
			2020	-0.538	0.552
				-0.217	0.536
				-0.496	0.469
		RG_FOBCP	2018	-0.355	0.453
				-0.325	0.601
				-0.582	0.387
				-0.393	0.489
				-0.604	0.149
			2019	-0.0644	0.627
				-0.172	0.490
				-0.343	0.312
				-0.275	0.549
				-0.126	0.278
			2020	-0.415	0.718
				-0.141	0.610
				-0.379	0.627
				-0.473	0.550
				-0.416	0.608

Table E.24: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (18.7%)	CA2 (11.1%)
September	Mine-Exposed	RG_FRCP1SW	2019	-0.318	0.520
				-1.12	0.0317
				-0.792	0.136
			2020	-1.07	0.225
				-0.751	0.611
				-0.605	0.497
		RG_FRUPO	2018	-0.808	-0.204
				-0.767	-0.214
				-0.674	-0.363
			2019	-0.297	0.348
				-0.345	0.318
				-0.219	0.133
			2020	-0.733	-0.121
				-0.618	-0.108
				-0.579	-0.115
		RG_FODPO	2018	-1.10	-0.344
				-0.896	-0.436
				-0.718	-0.425
			2019	-0.607	-0.118
				-0.652	-0.402
				-0.495	-0.209
			2020	-0.816	-0.178
				-0.839	-0.325
				-0.760	-0.417
		RG_FO22	2018	-1.15	-0.712
				-1.38	-0.759
				-1.39	-0.958
				-1.39	-1.00
				-1.41	-1.12
			2019	-1.01	-0.533
				-0.884	-0.492
				-1.06	-0.871
				-0.992	-0.881
				-0.836	-0.340
			2020	-1.09	-0.811
				-1.02	-0.660
				-1.28	-0.916
				-1.15	-0.795
				-1.33	-1.15
		RG_FOUEW	2018	-0.978	-0.488
				-0.761	-0.400
				-0.670	-0.450
			2019	-0.501	-0.141
				-0.641	-0.300
				-0.589	-0.176
			2020	-0.439	-0.152
				-0.593	-0.314
				-0.428	0.0352
December	Reference	RG_UFR1	2018	0.224	0.433
				0.149	0.466
				-0.140	0.507
			2019	0.0289	0.377
				0.107	0.438
				0.214	0.540
			2020	0.0072	0.666
				-0.0563	0.790
				-0.0508	0.680
	Mine-Exposed	RG_FOUKI	2018	-0.188	-0.0662
				-0.122	-0.0506
				-0.0694	-0.178
			2019	-0.187	0.0463
				-0.253	-0.234
				-0.240	-0.114
			2020	-0.521	0.479
				-0.467	0.453
				-0.516	0.535

Table E.24: Biological Monitoring Area Scores from Correspondence Analysis on Lowest-Practical-Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Season	Status	Area	Year	CA1 (18.7%)	CA2 (11.1%)
December	Mine-Exposed	RG_SCOUTDS	2019	-0.586	-0.252
				-0.599	-0.114
				-0.654	-0.265
			2020	-0.743	0.297
				-0.898	0.128
				-0.813	0.312
		RG_FOBSC	2018	0.208	-0.218
				-0.0659	-0.210
				-0.406	0.342
			2020	-0.799	0.223
				-0.651	0.482
				-0.978	0.284
		RG_FOBCP	2018	-0.590	-0.149
				-0.836	-0.139
				-0.829	-0.0847
		RG_FRUPO	2018	-1.27	-0.683
				-1.08	-0.514
				-0.886	-0.319
			2019	-1.47	-0.835
				-1.21	-0.822
				-1.21	-0.772
			2020	-1.38	-0.428
				-1.18	-0.339
				-1.37	-0.576
		RG_FODPO	2018	-1.24	-0.687
				-1.24	-0.574
				-1.18	-0.538
			2019	-1.31	-0.744
				-1.42	-0.806
				-1.37	-0.746
			2020	-1.06	-0.285
				-1.24	-0.372
				-1.15	-0.362
		RG_FOUEW	2018	-0.875	-0.649
				-0.700	-0.727
				-0.604	-0.513
			2019	-0.707	-0.804
				-0.675	-0.690
				-0.643	-0.432
			2020	-1.25	-0.717
				-1.14	-0.546
				-0.767	-0.146

Table E.25: Taxa Scores from Correspondence Analysis on Lowest Practical Level Benthic Invertebrate Communities from the Fording River, FRO LAEMP, 2018 to 2020

Order	Family	Taxa	CA1 (21.3%)	CA2 (13.6%)
Coleoptera	Elmidae	Heterlimnius	-1.54	-1.73
Diptera	Ceratopogonidae	Mallochohelea	0.322	0.273
	Chironomidae	Diamesa	0.606	0.252
		Eukiefferiella	-0.773	0.0410
		Micropsectra	0.348	0.495
		Orthocladius complex	-0.0864	-0.131
		Pagastia	-0.458	-0.376
		Parametriocnemus	1.65	-1.37
		Rheocricotopus	0.672	0.114
		Thienemannimyia complex	-0.101	0.250
		Tvetenia	-0.132	0.276
	Empididae	Neoplasta	-0.392	-0.267
	Psychodidae	Pericoma/Telmatoscopus	-0.362	1.03
	Simuliidae	Simulium	0.835	-0.679
	Tipulidae	Dicranota	-0.297	-0.245
Ephemeroptera	Ameletidae	Ameletidae	0.704	0.462
	Baetidae	Baetis	0.544	0.0778
		Baetis rhodani group	0.193	-0.0312
	Ephemerellidae	Drunella coloradensis	1.84	-0.993
		Drunella doddsii	0.665	0.679
		Ephemerellidae	0.117	0.474
	Heptageniidae	Cinygmula	1.24	-1.07
		Epeorus	0.965	-0.807
		Heptageniidae	0.276	0.324
		Rhithrogena	0.426	1.25
Oligochaeta	Enchytraeidae	Enchytraeus	0.814	-0.542
Plecoptera	Capniidae	Capniidae	-1.09	-0.942
	Chloroperlidae	Sweltsa	0.0820	0.0150
	Nemouridae	Zapada	-0.826	0.0386
		Zapada cinctipes	-1.31	-0.202
		Zapada columbiana	0.0322	0.283
		Zapada oregonensis group	-0.335	-0.0532
	Perlodidae	Isoperla	-1.73	-1.22
		Kogotus	-0.161	-0.225
		Megarcys	0.147	0.772
	Taeniopterygidae	Taeniopterygidae	-0.878	0.870
Trichoptera	Hydropsychidae	Hydropsychidae	-0.191	1.97
		Parapsyche elsis	0.416	1.07
	Rhyacophilidae	Rhyacophila	0.489	-0.218
		Rhyacophila alberta	1.68	-1.54
		Rhyacophila atrata	0.702	-0.774
		Rhyacophila brunnea/vemna group	-0.137	-0.429
		Rhyacophila hyalinata group	0.698	0.708
	Uenoidae	Oligophlebodes	0.948	0.402
Trombidiformes	Lebertiidae	Lebertia	-0.424	-0.0766
	Sperchontidae	Sperchon	0.0791	0.926

Table E.26: Spatial Comparisons Between Stations within Sampling Periods as Contrasts from two-way ANOVAs of Benthic Invertebrate Community Endpoints During Recolonization following Drying of Fording River, 2019 to 2020

Endpoint	Time Period	Contrast	Upstream of Dry		Dry				Downstream of Dry
			RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
LPL Richness (# Taxa)	Sept 2019	Pairwise	AB	AB	B	-	B	-	A
		MOD vs. RG_FOUKI	0.32	baseline	-0.84	-	-0.71	-	1.1
	Early April	Pairwise	AB	AB	D	BCD	BC	CD	A
		MOD vs. RG_FOUKI	-0.24	baseline	-2.4	-1.2	-0.94	-1.9	0.49
	Late April	Pairwise	AB	ABC	ABC	C	BC	BC	A
		MOD vs. RG_FOUKI	0.16	baseline	-0.55	-1.3	-0.86	-0.85	0.81
	Mid June	Pairwise	A	C	AB	BC	BC	C	AB
		MOD vs. RG_FOUKI	2.4	baseline	1.9	0.96	0.70	-0.33	1.7
	Sept 2020	Pairwise	A	AB	B	-	B	-	A
		MOD vs. RG_FOUKI	0.80	baseline	-0.68	-	-1.3	-	0.75
Abundance (# Organisms)	Sept 2019	Pairwise	A	A	A	-	A	-	A
		MOD vs. RG_FOUKI	0.86	baseline	0.079	-	0.57	-	0.97
	Early April	Pairwise	AB	A	CD	E	DE	BC	A
		MOD vs. RG_FOUKI	-1.1	baseline	-2.6	-4.0	-3.8	-1.9	-0.41
	Late April	Pairwise	AB	A	BC	CD	D	BC	A
		MOD vs. RG_FOUKI	-0.29	baseline	-1.5	-2.1	-3.3	-1.5	-0.12
	Mid June	Pairwise	A	A	B	A	AB	AB	A
		MOD vs. RG_FOUKI	0.0077	baseline	-2.0	-0.56	-1.1	-0.94	0.058
	Sept 2020	Pairwise	A	A	A	-	A	-	A
		MOD vs. RG_FOUKI	0.0051	baseline	0.15	-	-0.21	-	-0.35
EPT (# of Organisms)	Sept 2019	Pairwise	A	A	A	-	A	-	A
		MOD vs. RG_FOUKI	0.70	baseline	0.049	-	0.98	-	0.78
	Early April	Pairwise	BC	A	CD	DE	E	C	AB
		MOD vs. RG_FOUKI	-1.5	baseline	-1.9	-3.2	-4.1	-1.8	-0.27
	Late April	Pairwise	AB	A	AB	B	C	B	A
		MOD vs. RG_FOUKI	-1.0	baseline	-1.1	-1.8	-3.8	-1.4	0.039
	Mid June	Pairwise	A	A	B	AB	AB	AB	A
		MOD vs. RG_FOUKI	-0.11	baseline	-1.8	-0.60	-1.0	-0.82	-0.019
	Sept 2020	Pairwise	A	A	A	-	A	-	A
		MOD vs. RG_FOUKI	-0.20	baseline	0.44	-	0.37	-	-0.19
% EPT	Sept 2019	Pairwise	B	B	B	-	A	-	B
		MOD vs. RG_FOUKI	-0.17	baseline	0.012	-	2.6	-	-0.22
	Early April	Pairwise	D	C	A	AB	D	C	BC
		MOD vs. RG_FOUKI	-2.2	baseline	2.8	1.5	-2.3	-0.35	0.46
	Late April	Pairwise	B	A	A	A	B	A	A
		MOD vs. RG_FOUKI	-2.6	baseline	0.93	0.093	-3.0	-0.11	0.72
	Mid June	Pairwise	B	A	B	B	AB	A	AB
		MOD vs. RG_FOUKI	-1.9	baseline	-1.9	-1.7	-1.1	-0.22	-1.3
	Sept 2020	Pairwise	C	C	B	-	A	-	BC
		MOD vs. RG_FOUKI	-0.69	baseline	1.5	-	3.5	-	0.47

MOD between -1 and -2
MOD between -2 an -3
MOD between -3 and -4
MOD between -4 and -5
MOD < -5
MOD between 1 and 2
MOD between 2 an 3
MOD between 3 and 4
MOD between 4 and 5
MOD > 5

Note: "-" indicates no comparison available. Stations that share a letter (across rows) are not significantly different (p-value > 0.1).

Table E.26: Spatial Comparisons Between Stations within Sampling Periods as Contrasts from two-way ANOVAs of Benthic Invertebrate Community Endpoints During Recolonization following Drying of Fording River, 2019 to 2020

Endpoint	Time Period	Contrast	Upstream of Dry		Dry				Downstream of Dry
			RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
Ephemeroptera (# of Organisms)	Sept 2019	Pairwise	A	A	A	-	A	-	A
		MOD vs. RG_FOUKI	0.51	baseline	-0.58	-	-0.83	-	0.065
	Early April	Pairwise	B	A	C	CD	E	D	B
		MOD vs. RG_FOUKI	-3.4	baseline	-4.9	-5.9	-8.5	-6.4	-2.5
	Late April	Pairwise	B	A	C	CD	E	D	B
		MOD vs. RG_FOUKI	-2.6	baseline	-4.1	-4.8	-7.1	-5.7	-2.0
	Mid June	Pairwise	A	A	B	AB	AB	AB	A
		MOD vs. RG_FOUKI	-0.16	baseline	-2.0	-0.74	-1.2	-1.0	-0.19
	Sept 2020	Pairwise	A	A	A	-	AB	-	B
		MOD vs. RG_FOUKI	-0.38	baseline	-0.31	-	-0.95	-	-1.8
% Ephemeroptera	Sept 2019	Pairwise	A	A	B	-	C	-	B
		MOD vs. RG_FOUKI	-1.1	baseline	-2.4	-	-4.4	-	-2.9
	Early April	Pairwise	B	A	B	B	C	C	B
		MOD vs. RG_FOUKI	-6.4	baseline	-6.7	-6.4	-9.7	-9.6	-5.8
	Late April	Pairwise	BC	A	C	C	D	D	B
		MOD vs. RG_FOUKI	-5.9	baseline	-6.6	-6.8	-8.4	-8.5	-5.0
	Mid June	Pairwise	B	A	B	B	B	B	B
		MOD vs. RG_FOUKI	-1.6	baseline	-1.8	-2.2	-1.7	-1.6	-2.4
	Sept 2020	Pairwise	B	A	B	-	B	-	C
		MOD vs. RG_FOUKI	-1.4	baseline	-1.6	-	-2.6	-	-4.7
Plecoptera (# of Organisms	Sept 2019	Pairwise	BC	C	AB	-	A	-	AB
		MOD vs. RG_FOUKI	1.1	baseline	1.4	-	2.6	-	1.9
	Early April	Pairwise	ABC	AB	ABC	C	D	BC	A
		MOD vs. RG_FOUKI	-0.61	baseline	-0.67	-1.8	-3.2	-1.2	0.46
	Late April	Pairwise	AB	AB	AB	B	C	AB	A
		MOD vs. RG_FOUKI	-0.46	baseline	-0.36	-1.1	-4.4	-0.63	0.55
	Mid June	Pairwise	AB	AB	C	BC	BC	BC	A
		MOD vs. RG_FOUKI	0.13	baseline	-1.6	-0.59	-0.52	-0.23	1.3
	Sept 2020	Pairwise	BC	C	A	-	AB	-	ABC
		MOD vs. RG_FOUKI	0.11	baseline	1.3	-	1.4	-	1.0
% Plecoptera	Sept 2019	Pairwise	C	C	B	-	A	-	B
		MOD vs. RG_FOUKI	0.77	baseline	2.3	-	4.8	-	2.2
	Early April	Pairwise	CD	CD	A	B	D	C	B
		MOD vs. RG_FOUKI	0.19	baseline	4.0	2.4	-0.85	0.59	2.1
	Late April	Pairwise	C	BC	A	ABC	D	AB	A
		MOD vs. RG_FOUKI	-0.61	baseline	1.8	0.57	-3.7	1.0	1.9
	Mid June	Pairwise	B	B	B	B	B	B	A
		MOD vs. RG_FOUKI	0.20	baseline	-0.34	-0.29	0.25	0.51	2.0
	Sept 2020	Pairwise	B	B	A	-	A	-	A
		MOD vs. RG_FOUKI	0.16	baseline	2.6	-	3.7	-	2.6

MOD between -1 and -2
MOD between -2 an -3
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Table E.26: Spatial Comparisons Between Stations within Sampling Periods as Contrasts from two-way ANOVAs of Benthic Invertebrate Community Endpoints During Recolonization following Drying of Fording River, 2019 to 2020

Endpoint	Time Period	Contrast	Upstream of Dry		Dry				Downstream of Dry
			RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
% Predator	Sept 2019	Pairwise	C	BC	B	-	A	-	BC
		MOD vs. RG_FOUKI	-0.59	baseline	0.83	-	3.0	-	0.40
	Early April	Pairwise	B	C	B	A	A	A	A
		MOD vs. RG_FOUKI	1.8	baseline	1.8	4.5	3.9	4.4	3.6
	Late April	Pairwise	C	C	AB	A	A	A	B
		MOD vs. RG_FOUKI	1.1	baseline	4.1	4.3	4.4	4.5	3.0
	Mid June	Pairwise	AB	B	AB	A	AB	A	AB
		MOD vs. RG_FOUKI	0.95	baseline	1.1	1.6	1.3	1.6	1.3
	Sept 2020	Pairwise	BC	C	AB	-	C	-	A
		MOD vs. RG_FOUKI	0.77	baseline	1.7	-	-0.13	-	2.6
% Shredder	Sept 2019	Pairwise	AB	AB	B	-	A	-	A
		MOD vs. RG_FOUKI	0.20	baseline	-0.31	-	1.0	-	1.1
	Early April	Pairwise	CDE	DE	A	BC	E	BCD	B
		MOD vs. RG_FOUKI	0.14	baseline	3.3	1.4	-1.1	0.35	1.6
	Late April	Pairwise	C	BC	AB	ABC	D	AB	A
		MOD vs. RG_FOUKI	-0.59	baseline	1.0	0.30	-3.5	0.87	1.4
	Mid June	Pairwise	AB	C	BC	ABC	BC	BC	A
		MOD vs. RG_FOUKI	1.4	baseline	0.59	1.2	0.48	0.64	2.2
	Sept 2020	Pairwise	BC	C	A	-	A	-	AB
		MOD vs. RG_FOUKI	0.37	baseline	1.9	-	2.7	-	1.4
% Scrapper-Grazer	Sept 2019	Pairwise	B	A	C	-	C	-	A
		MOD vs. RG_FOUKI	-1.4	baseline	-3.1	-	-3.4	-	0.63
	Early April	Pairwise	BC	A	C	BC	D	D	B
		MOD vs. RG_FOUKI	-5.4	baseline	-6.0	-5.3	-8.6	-8.8	-4.4
	Late April	Pairwise	BC	A	CD	CD	DE	E	B
		MOD vs. RG_FOUKI	-4.8	baseline	-5.6	-5.5	-6.8	-7.6	-3.4
	Mid June	Pairwise	B	AB	B	B	A	AB	B
		MOD vs. RG_FOUKI	-0.33	baseline	-1.1	-0.56	1.2	-0.085	-0.55
	Sept 2020	Pairwise	B	A	B	-	AB	-	B
		MOD vs. RG_FOUKI	-2.1	baseline	-2.3	-	-1.3	-	-2.2
Autotrophic to Heterotrophic Index	Sept 2019	Pairwise	BC	AB	C	-	C	-	A
		MOD vs. RG_FOUKI	-1.1	baseline	-1.9	-	-1.5	-	0.41
	Early April	Pairwise	BC	A	C	BC	D	D	B
		MOD vs. RG_FOUKI	-3.9	baseline	-4.5	-3.4	-7.5	-8.4	-2.9
	Late April	Pairwise	C	A	C	C	D	E	B
		MOD vs. RG_FOUKI	-3.7	baseline	-4.0	-3.8	-5.5	-6.9	-2.2
	Mid June	Pairwise	AB	AB	B	AB	A	AB	AB
		MOD vs. RG_FOUKI	-0.21	baseline	-0.59	-0.012	1.1	0.25	0.0026
	Sept 2020	Pairwise	B	A	B	-	AB	-	AB
		MOD vs. RG_FOUKI	-1.5	baseline	-1.5	-	-0.81	-	-1.0

MOD between -1 and -2
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Table E.26: Spatial Comparisons Between Stations within Sampling Periods as Contrasts from two-way ANOVAs of Benthic Invertebrate Community Endpoints During Recolonization following Drying of Fording River, 2019 to 2020

Endpoint	Time Period	Contrast	Upstream of Dry		Dry				Downstream of Dry
			RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
% Swimmers	Sept 2019	Pairwise	BC	B	A	-	CD	-	D
		MOD vs. RG_FOUKI	-0.37	baseline	2.4	-	-1.6	-	-1.8
	Early April	Pairwise	AB	A	B	B	AB	B	B
		MOD vs. RG_FOUKI	-1.4	baseline	-1.6	-1.5	-1.1	-1.5	-1.5
	Late April	Pairwise	A	A	A	A	A	A	A
		MOD vs. RG_FOUKI	-0.55	baseline	-0.96	-0.79	-0.85	-0.96	-0.64
	Mid June	Pairwise	A	A	B	B	C	C	A
		MOD vs. RG_FOUKI	0.32	baseline	-4.5	-4.8	-6.7	-6.6	0.99
	Sept 2020	Pairwise	AB	C	A	-	C	-	BC
		MOD vs. RG_FOUKI	1.9	baseline	3.1	-	-0.17	-	0.97
% Burrowers	Sept 2019	Pairwise	B	A	A	-	AB	-	AB
		MOD vs. RG_FOUKI	-2.1	baseline	-0.37	-	-0.93	-	-1.2
	Early April	Pairwise	A	A	A	A	A	A	A
		MOD vs. RG_FOUKI	0.35	baseline	-0.55	-0.60	-0.63	-0.90	-0.99
	Late April	Pairwise	ABC	AB	C	BC	ABC	A	C
		MOD vs. RG_FOUKI	-0.31	baseline	-1.7	-1.3	-0.55	0.45	-1.7
	Mid June	Pairwise	A	A	A	A	A	A	A
		MOD vs. RG_FOUKI	0.68	baseline	0.78	0.45	0.25	0.043	0.62
	Sept 2020	Pairwise	AB	A	BC	-	C	-	D
		MOD vs. RG_FOUKI	-0.59	baseline	-1.6	-	-2.1	-	-4.5
Benthic to Hyporheic Index	Sept 2019	Pairwise	A	A	A	-	A	-	A
		MOD vs. RG_FOUKI	-1.3	baseline	-0.13	-	-0.65	-	-0.84
	Early April	Pairwise	A	AB	C	ABC	ABC	ABC	BC
		MOD vs. RG_FOUKI	0.28	baseline	-1.4	-0.59	-0.36	-0.93	-1.1
	Late April	Pairwise	AB	A	BC	ABC	A	A	C
		MOD vs. RG_FOUKI	-0.22	baseline	-1.4	-0.97	0.036	0.13	-1.8
	Mid June	Pairwise	AB	B	A	AB	AB	B	A
		MOD vs. RG_FOUKI	0.76	baseline	1.4	0.52	0.26	-0.042	1.4
	Sept 2020	Pairwise	A	A	A	-	A	-	B
		MOD vs. RG_FOUKI	-0.25	baseline	-0.74	-	-1.2	-	-3.0

MOD between -1 and -2
MOD between -2 an -3
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Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Abundance	LPL Richness	% EPT	% Ephemeroptera	% Plecoptera	% Trichoptera	% Chironomidae
2012	September	RG_HENUP	1	4,600	33	81	60	18	4.0	10
		RG_FO26	1	10,900	43	76	42	24	10	15
		RG_FODHE	1	15,820	28	95	81	9.5	4.3	1.9
		RG_FOUNGD	1	13,800	34	79	60	13	5.8	5.5
		RG_MP1	1	17,400	25	64	58	3.7	2.6	24
		RG_FOUSH	1	11,960	34	79	70	6.0	3.3	9.5
			2	9,920	31	67	59	6.2	1.8	7.7
			3	15,140	28	72	63	5.5	3.2	7.1
		RG_FOUKI	1	11,840	27	84	75	6.1	3.4	0.51
		RG_FOBKS	1	3,978	23	79	70	6.1	3.1	0.56
		RG_FOBSC	1	6,440	26	64	50	7.8	6.2	1.9
		RG_FOBCP	1	7,320	28	84	73	9.0	1.9	2.2
		RG_FODPO	1	15,800	38	72	34	36	2.3	15
		RG_FO22	1	6,560	30	56	30	23	2.7	24
		RG_FOUEW	1	5,617	44	80	52	22	5.3	7.1
2013	September	RG_HENUP	1	3,150	27	92	77	12	2.4	4.0
		RG_FO26	1	4,400	30	91	62	25	4.0	6.0
		RG_MP1	1	4,686	26	47	35	9.1	2.7	34
		RG_FODPO	1	23,260	25	98	19	77	2.1	0
2015	September	RG_HENUP	1	7,500	24	96	68	27	1.3	3.7
		RG_FO26	1	9,400	33	86	67	16	2.3	12
		RG_FODHE	1	17,060	32	78	61	16	0.47	22
		RG_FOUNGD	1	7,260	29	93	75	15	2.8	3.9
		RG_FODNGD	1	7,840	29	94	76	12	5.4	2.0
		RG_MP1	1	5,467	36	70	51	14	4.6	24
		RG_FOUSH	1	7,320	32	86	73	11	1.9	7.1
		RG_FOUKI	1	3,490	35	75	65	8.3	1.7	5.7
		RG_FOBKS	1	4,150	31	69	47	17	4.5	4.8
		RG_FOBSC	1	2,927	33	62	40	17	5.0	3.7
		RG_FOBCP	1	4,250	32	78	16	56	5.6	15
		RG_FODPO	1	10,340	26	90	7.9	66	16	8.3
		RG_FO22	1	21,140	35	66	13	45	7.6	18
		RG_FOUEW	1	7,720	30	71	26	32	13	22
2016	September	RG_HENUP	1	4,830	25	91	78	11	1.7	7.0
		RG_FO26	1	17,280	38	79	55	18	6.2	18
		RG_FODHE	1	9,800	27	88	77	11	0.20	8.6
		RG_FOUKI	1	1,440	39	51	36	10	5.8	33
		RG_FOBKS	1	4,312	32	65	39	16	9.6	21
		RG_FOBSC	1	2,081	36	50	22	16	11	26
		RG_FOBCP	1	2,207	34	67	19	31	16	23
		RG_FODPO	1	11,620	36	76	14	42	20	17
		RG_FOUEW	1	6,760	33	60	17	30	13	26
2017	September	RG_HENUP	1	11,240	24	89	54	30	5.2	9.4
		RG_FO26	1	15,420	37	90	47	17	27	6.6
		RG_FODHE	1	12,540	33	94	83	9.6	1.4	4.6
		RG_FOUNGD	1	7,220	29	66	45	16	4.7	24
		RG_FODNGD	1	7,760	31	80	58	16	5.9	13
		RG_MP1	1	12,480	34	86	64	14	7.1	5.8
		RG_FOUSH	1	4,288	40	79	61	15	3.8	16
		RG_FOUKI	1	6,120	37	70	42	20	7.5	14
			3	4,009	35	61	47	8.8	5.2	17
		RG_FOBKS	1	3,347	40	62	39	9.8	12	8.2
			2	3,030	31	68	45	12	11	16
			3	4,886	35	60	34	15	10	8.8
		RG_FOBSC	1	3,880	41	57	29	14	15	20
		RG_FOBCP	1	5,200	38	62	13	37	12	21
		RG_FRCP1SW	1	2,300	38	61	11	41	9.3	10
		RG_FRUPO	1	22,540	37	85	8.3	71	5.7	11
		RG_FODPO	1	15,580	31	56	3.2	42	9.9	39
		RG_FO22	1	23,400	41	53	4.1	38	10	8.5
		RG_FOUEW	1	8,320	37	68	15	40	13	7.9
2018	June	RG_HENUP	1	1,839	26	98	69	24	4.5	1.5
		RG_FO26	1	2,662	35	71	36	17	18	25
		RG_FODHE	1	2,415	30	38	32	3.7	2.7	60
		RG_FOUNGD	1	5,983	42	34	20	6.7	7.0	54
		RG_FODNGD	1	1,665	30	58	40	5.4	12	32
		RG_MP1	1	3,720	41	46	26	7.3	13	44
		RG_FOUSH	1	2,529	33	50	38	3.1	8.8	41
		RG_FOUKI	1	2,225	28	70	52	2.9	15	26
		RG_FOBKS	1	2,631	38	40	27	5.0	7.9	42
		RG_FOBSC	1	1,207	35	32	18	0.89	13	56
		RG_FOBCP	1	1,350	36	55	40	4.0	10	38
		RG_FRCP1SW	1	706	37	77	53	8.2	16	14
		RG_FRUPO	1	1,673	40	76	32	31	12	12
		RG_FODPO	1	3,900	35	62	21	26	15	26
		RG_FO22	1	429	51	31	4.7	15	11	9.1
		RG_FOUEW	1	4,170	37	55	33	12	9.8	19
	August	RG_HENUP	1	4,643	37	64	41	16	7.1	35
		RG_FODHE	1	9,480	31	70	66	2.3	2.5	27
		RG_FOUNGD	1	20,360	44	64	56	6.2	0.98	19
		RG_FODNGD	1	9,340	44	66	59	4.1	3.2	28
		RG_MP1	1	7,420	35	57	52	2.7	2.4	31
		RG_FOUSH	1	4,660	45	76	68	5.4	2.4	21
		RG_FOUKI	1	6,160	29	78	74	1.6	1.9	13
		RG_FOBKS	1	9,320	38	61	57	2.6	2.1	21
		RG_FOBSC	1	8,520	35	49	44	4.9	0.47	40
		RG_FOBCP	1	23,080	44	31	22	8.4	0.61	44
		RG_FRCP1SW	1	11,880	40	48	24	21	3.2	27
		RG_FRUPO	1	18,820	40	33	22	9.8	1.5	24
		RG_FODPO	1	6,367	38	27	5.8	18	3.1	63
		RG_FO22	1	6,620	35	16	3.6	9.4	2.7	22
		RG_FOUEW	1	9,820	40	40	21	16	3.1	37
	September	RG_HENUP	1	5,114	30	84	69	12	2.5	15
			2	7,267	29	86	71	10	5.3	13
			3	12,860	32	86	73	8.1	5.3	13
		RG_FO26	1	24,560	46	78	59	11	8.1	12
			2	21,940	48	83	68	9.2	5.4	9.6
			3	23,600	49	78	61	11	6.4	11
		RG_FODHE	1	12,800	40	78	67	8.3	3.3	12
			2	17,380	36	77	64	11	2.0	7.8
			3	17,960	30	85	81	3.5	0.67	7.8
		RG_FOUNGD	1	22,680	41	69	52	13	4.0	9.1
			2	22,200	43	74	59	9.2	5.9	5.6
			3	23,800	44	89	61	21	7.0	2.4
		RG_FODNGD	1	14,280	44	78	53	18	7.1	5.0
			2	11,860	38	76	56	12	7.6	9.4
			3	14,440	45	76	56	8.6	12	3.6

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	EPT Abundance	Ephemroptera Abundance	Plecoptera Abundance	Trichoptera Abundance
2012	September	RG_HENUP	1	3,743	2,743	814	186
		RG_FO26	1	8,340	4,620	2,620	1,100
		RG_FODHE	1	14,980	12,800	1,500	680
		RG_FOUNGD	1	10,840	8,280	1,760	800
		RG_MP1	1	11,100	10,000	650	450
		RG_FOUSH	1	9,440	8,320	720	400
			2	6,660	5,860	620	180
			3	10,880	9,560	840	480
		RG_FOUKI	1	9,960	8,840	720	400
		RG_FOBKS	1	3,133	2,767	244	122
		RG_FOBSC	1	4,100	3,200	500	400
		RG_FOBCP	1	6,160	5,360	660	140
		RG_FODPO	1	11,460	5,420	5,680	360
		RG_FO22	1	3,660	2,000	1,480	180
		RG_FOUEW	1	4,500	2,950	1,250	300
2013	September	RG_HENUP	1	2,883	2,433	375	75
		RG_FO26	1	4,012	2,725	1,112	175
		RG_MP1	1	2,214	1,657	429	129
		RG_FODPO	1	22,900	4,400	18,000	500
2015	September	RG_HENUP	1	7,200	5,080	2,020	100
		RG_FO26	1	8,040	6,340	1,480	220
		RG_FODHE	1	13,240	10,460	2,700	80
		RG_FOUNGD	1	6,740	5,420	1,120	200
		RG_FODNGD	1	7,360	6,000	940	420
		RG_MP1	1	3,817	2,800	767	250
		RG_FOUSH	1	6,300	5,340	820	140
		RG_FOUKI	1	2,620	2,270	290	60
		RG_FOBKS	1	2,862	1,962	713	188
		RG_FOBSC	1	1,827	1,173	509	145
		RG_FOBCP	1	3,300	688	2,375	238
		RG_FODPO	1	9,260	820	6,820	1,620
		RG_FO22	1	13,840	2,800	9,440	1,600
		RG_FOUEW	1	5,480	2,000	2,500	980
2016	September	RG_HENUP	1	4,390	3,780	530	80
		RG_FO26	1	13,620	9,500	3,040	1,080
		RG_FODHE	1	8,620	7,520	1,080	20
		RG_FOUKI	1	740	512	144	84
		RG_FOBKS	1	2,800	1,675	713	412
		RG_FOBSC	1	1,044	469	338	238
		RG_FOBCP	1	1,473	427	687	360
		RG_FODPO	1	8,880	1,680	4,840	2,360
		RG_FOUEW	1	4,060	1,120	2,040	900
2017	September	RG_HENUP	1	10,020	6,040	3,400	580
		RG_FO26	1	13,920	7,180	2,600	4,140
		RG_FODHE	1	11,740	10,360	1,200	180
		RG_FOUNGD	1	4,760	3,240	1,180	340
		RG_FODNGD	1	6,200	4,460	1,280	460
		RG_MP1	1	10,680	8,000	1,800	880
		RG_FOUSH	1	3,400	2,612	625	162
		RG_FOUKI	1	4,260	2,580	1,220	460
			3	2,436	1,873	355	209
		RG_FOBKS	1	2,060	1,320	327	413
			2	2,050	1,360	350	340
			3	2,929	1,686	729	514
		RG_FOBSC	1	2,220	1,120	530	570
		RG_FOBCP	1	3,229	671	1,929	629
		RG_FRCP1SW	1	1,400	250	935	215
		RG_FRUPO	1	19,180	1,860	16,040	1,280
		RG_FODPO	1	8,640	500	6,600	1,540
		RG_FO22	1	12,360	960	8,980	2,420
		RG_FOUEW	1	5,680	1,260	3,320	1,100
2018	June	RG_HENUP	1	1,800	1,272	444	83
		RG_FO26	1	1,900	954	454	492
		RG_FODHE	1	925	770	90	65
		RG_FOUNGD	1	2,033	1,217	400	417
		RG_FODNGD	1	965	670	90	205
		RG_MP1	1	1,710	970	270	470
		RG_FOUSH	1	1,257	957	79	221
		RG_FOUKI	1	1,555	1,155	65	335
		RG_FOBKS	1	1,054	715	131	208
		RG_FOBSC	1	393	221	11	161
		RG_FOBCP	1	738	542	54	142
		RG_FRCP1SW	1	544	376	58	110
		RG_FRUPO	1	1,264	532	523	209
		RG_FODPO	1	2,411	811	1,011	589
		RG_FO22	1	132	20	65	47
		RG_FOUEW	1	2,310	1,390	510	410
	August	RG_HENUP	1	2,971	1,900	743	329
		RG_FODHE	1	6,680	6,220	220	240
		RG_FOUNGD	1	12,920	11,460	1,260	200
		RG_FODNGD	1	6,180	5,500	380	300
		RG_MP1	1	4,240	3,860	200	180
		RG_FOUSH	1	3,540	3,180	250	110
		RG_FOUKI	1	4,780	4,560	100	120
		RG_FOBKS	1	5,720	5,280	240	200
		RG_FOBSC	1	4,180	3,720	420	40
		RG_FOBCP	1	7,160	5,080	1,940	140
		RG_FRCP1SW	1	5,680	2,820	2,480	380
		RG_FRUPO	1	6,160	4,040	1,840	280
		RG_FODPO	1	1,700	367	1,133	200
		RG_FO22	1	1,040	240	620	180
		RG_FOUEW	1	3,980	2,080	1,600	300
	September	RG_HENUP	1	4,271	3,529	614	129
			2	6,250	5,133	733	383
			3	11,080	9,360	1,040	680
		RG_FO26	1	19,180	14,400	2,800	1,980
			2	18,160	14,960	2,020	1,180
			3	18,360	14,340	2,500	1,520
		RG_FODHE	1	10,000	8,520	1,060	420
			2	13,340	11,140	1,860	340
			3	15,260	14,520	620	120
		RG_FOUNGD	1	15,620	11,820	2,900	900
			2	16,380	13,040	2,040	1,300
			3	21,140	14,440	5,040	1,660
		RG_FODNGD	1	11,100	7,580	2,500	1,020
			2	9,000	6,680	1,420	900
			3	11,040	8,120	1,240	1,680

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Chironomidae Abundance	Baetidae Abundance	Heptageniidae Abundance	Ephemerellidae Abundance
2012	September	RG_HENUP	1	471	43	2,029	657
		RG_FO26	1	1,636	120	2,780	1,540
		RG_FODHE	1	300	40	9,700	3,000
		RG_FOUNGD	1	760	120	7,440	720
		RG_MP1	1	4,100	650	7,250	1,950
		RG_FOUSH	1	1,140	240	6,360	1,600
			2	760	280	4,820	740
			3	1,080	320	7,820	1,420
		RG_FOUKI	1	60	340	8,220	280
		RG_FOBKS	1	22	344	2,267	156
		RG_FOBSC	1	120	260	2,180	660
		RG_FOBCP	1	160	40	2,860	2,360
		RG_FODPO	1	2,440	1,060	1,660	2,700
		RG_FO22	1	1,540	240	500	1,260
		RG_FOUEW	1	400	300	1,983	667
2013	September	RG_HENUP	1	125	17	2,300	92
		RG_FO26	1	262	150	1,938	400
		RG_MP1	1	1,586	271	1,343	29
		RG_FODPO	1	0	960	3,120	320
2015	September	RG_HENUP	1	280	80	4,500	460
		RG_FO26	1	1,140	1,280	3,660	1,320
		RG_FODHE	1	3,680	1,340	5,340	3,700
		RG_FOUNGD	1	280	860	3,900	600
		RG_FODNGD	1	160	1,360	4,160	480
		RG_MP1	1	1,283	483	2,017	250
		RG_FOUSH	1	520	2,200	2,780	260
		RG_FOUKI	1	200	540	1,480	190
		RG_FOBKS	1	200	800	1,038	125
		RG_FOBSC	1	109	391	609	127
		RG_FOBCP	1	650	162	388	138
		RG_FODPO	1	860	0	680	140
		RG_FO22	1	3,897	160	1,060	1,580
		RG_FOUEW	1	1,720	40	1,380	580
2016	September	RG_HENUP	1	340	0	2,950	820
		RG_FO26	1	3,120	640	5,100	3,760
		RG_FODHE	1	840	580	4,680	2,140
		RG_FOUKI	1	471	96	320	88
		RG_FOBKS	1	913	325	975	375
		RG_FOBSC	1	550	238	112	119
		RG_FOBCP	1	513	133	160	133
		RG_FODPO	1	1,940	960	540	160
		RG_FOUEW	1	1,780	420	580	120
2017	September	RG_HENUP	1	1,060	80	4,820	940
		RG_FO26	1	1,020	860	3,720	2,380
		RG_FODHE	1	580	200	7,100	2,540
		RG_FOUNGD	1	1,720	700	1,800	740
		RG_FODNGD	1	980	1,800	1,320	1,320
		RG_MP1	1	720	980	3,300	3,720
		RG_FOUSH	1	675	350	1,950	262
		RG_FOUKI	1	880	1,040	1,460	60
			3	682	573	1,109	73
		RG_FOBKS	1	273	420	773	127
			2	490	630	640	90
			3	429	443	1,071	171
		RG_FOBSC	1	780	540	520	50
		RG_FOBCP	1	1,114	71	586	14
		RG_FRCP1SW	1	240	5.0	220	15
		RG_FRUPO	1	2,420	60	1,620	180
		RG_FODPO	1	6,020	220	260	20
		RG_FO22	1	2,000	300	380	280
		RG_FOUEW	1	660	100	920	240
2018	June	RG_HENUP	1	28	350	861	50
		RG_FO26	1	669	400	392	154
		RG_FODHE	1	1,455	140	530	60
		RG_FOUNGD	1	3,250	400	333	367
		RG_FODNGD	1	525	290	245	135
		RG_MP1	1	1,650	380	320	240
		RG_FOUSH	1	1,043	150	700	93
		RG_FOUKI	1	570	100	980	75
		RG_FOBKS	1	1,108	138	392	177
		RG_FOBSC	1	675	32	136	39
		RG_FOBCP	1	515	42	412	85
		RG_FRCP1SW	1	102	34	290	48
		RG_FRUPO	1	195	41	418	68
		RG_FODPO	1	1,000	22	611	178
		RG_FO22	1	39	2.0	9.0	9.0
		RG_FOUEW	1	790	460	600	330
	August	RG_HENUP	1	1,614	271	1,443	186
		RG_FODHE	1	2,600	660	2,640	2,780
		RG_FOUNGD	1	3,940	3,025	5,750	2,645
		RG_FODNGD	1	2,660	1,960	2,180	1,360
		RG_MP1	1	2,320	2,400	600	700
		RG_FOUSH	1	970	1,100	1,730	300
		RG_FOUKI	1	800	2,540	1,520	400
		RG_FOBKS	1	1,960	3,500	960	800
		RG_FOBSC	1	3,420	2,240	1,000	420
		RG_FOBCP	1	10,100	1,940	2,600	520
		RG_FRCP1SW	1	3,180	1,100	1,460	240
		RG_FRUPO	1	4,620	1,520	1,880	620
		RG_FODPO	1	4,000	105	105	157
		RG_FO22	1	1,480	60	0	180
		RG_FOUEW	1	3,660	727	969	384
	September	RG_HENUP	1	771	14	2,957	543
			2	933	17	4,067	1,033
			3	1,680	40	7,680	1,120
		RG_FO26	1	2,900	660	7,780	5,900
			2	2,099	460	10,100	4,360
			3	2,500	560	9,460	4,320
		RG_FODHE	1	1,540	440	6,020	2,000
			2	1,360	340	8,780	1,980
			3	1,400	520	9,320	4,280
		RG_FOUNGD	1	2,060	480	7,540	3,800
			2	1,240	340	6,300	6,340
			3	560	860	7,740	5,840
		RG_FODNGD	1	720	900	5,040	1,580
			2	1,120	720	3,940	2,020
			3	520	620	4,620	2,860

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Autotrophic to Heterotrophic Index	Filtering Collector Index	Predator Index	Hyporheic to Benthic Index
2012	September	RG_HENUP	1	0.11	-1.8	-0.57	-2.2
		RG_FO26	1	-0.18	-1.1	-0.30	-1.6
		RG_FODHE	1	0.27	-1.9	-0.53	-1.5
		RG_FOUNGD	1	0.18	-1.9	-0.68	-0.70
		RG_MP1	1	-0.11	-2.1	-0.81	-0.83
		RG_FOUSH	1	0.10	-1.8	-0.74	-0.91
			2	-0.034	-1.9	-0.89	-0.46
			3	0.064	-2.4	-0.79	-0.56
		RG_FOUKI	1	0.42	-1.6	-1.2	-0.74
		RG_FOBKS	1	0.14	-1.6	-0.99	-0.56
		RG_FOBSC	1	-0.17	-2.1	-0.58	-0.27
		RG_FOBCP	1	-0.092	-1.4	-0.34	-0.93
		RG_FODPO	1	-0.63	-1.6	-0.28	-1.3
		RG_FO22	1	-0.23	-1.5	-0.41	-1.7
		RG_FOUEW	1	0.067	-0.87	-0.42	-1.9
2013	September	RG_HENUP	1	0.41	-1.4	-1.2	-1.4
		RG_FO26	1	-0.026	-2.2	-0.78	-2.0
		RG_MP1	1	-0.35	-2.2	-1.2	-0.56
		RG_FODPO	1	-0.74	-1.2	-0.93	-3.0
2015	September	RG_HENUP	1	0.12	-0.98	-1.1	-2.7
		RG_FO26	1	0.032	-1.4	-0.59	-2.3
		RG_FODHE	1	-0.23	-1.8	-0.59	-2.5
		RG_FOUNGD	1	0.20	-2.2	-0.71	-2.0
		RG_FODNGD	1	0.17	-1.7	-0.71	-1.8
		RG_MP1	1	0.030	-1.8	-0.84	-1.5
		RG_FOUSH	1	-0.13	-1.3	-0.96	-1.3
		RG_FOUKI	1	-0.035	-1.1	-0.98	-0.65
		RG_FOBKS	1	-0.38	-1.3	-0.70	-0.36
		RG_FOBSC	1	-0.41	-0.69	-0.62	-0.38
		RG_FOBCP	1	-0.43	-0.86	-0.18	-1.5
		RG_FODPO	1	-0.34	-1.3	-0.44	-2.7
		RG_FO22	1	0.0049	-1.2	-0.19	-2.0
		RG_FOUEW	1	0.073	-1.7	-0.37	-2.0
2016	September	RG_HENUP	1	0.11	-1.3	-0.68	-2.4
		RG_FO26	1	-0.083	-0.94	-0.56	-2.3
		RG_FODHE	1	0.0019	-1.4	-0.49	-1.7
		RG_FOUKI	1	-0.31	-1.1	-0.67	-0.87
		RG_FOBKS	1	-0.37	-1.3	-0.48	-0.72
		RG_FOBSC	1	-0.98	-0.96	-0.38	-0.69
		RG_FOBCP	1	-0.75	-0.76	-0.32	-1.1
		RG_FODPO	1	-0.37	-1.6	-0.56	-2.1
		RG_FOUEW	1	-0.51	-0.88	-0.74	-1.3
2017	September	RG_HENUP	1	-0.10	-0.60	-0.88	-2.7
		RG_FO26	1	0.15	-0.79	-0.54	-2.1
		RG_FODHE	1	0.23	-1.8	-0.65	-1.8
		RG_FOUNGD	1	-0.29	-1.9	-0.68	-1.00
		RG_FODNGD	1	-0.57	-1.9	-0.47	-1.3
		RG_MP1	1	-0.24	-1.6	-0.27	-1.1
		RG_FOUSH	1	-0.040	-1.3	-0.83	-1.4
		RG_FOUKI	1	-0.41	-1.1	-0.71	-0.67
			3	-0.30	-1.7	-1.0	-0.42
		RG_FOBKS	1	-0.32	-1.2	-0.53	-0.38
			2	-0.39	-2.2	-0.53	-0.72
			3	-0.37	-1.3	-0.49	-0.34
		RG_FOBSC	1	-0.66	-1.2	-0.40	-0.61
		RG_FOBCP	1	-0.68	-0.78	-0.26	-1.3
		RG_FRCP1SW	1	-0.41	-1.1	-0.25	-0.90
		RG_FRUPO	1	-0.55	-1.0	0.24	-2.0
		RG_FODPO	1	-0.93	-2.5	-0.27	-2.6
		RG_FO22	1	-0.072	0.022	-0.65	-0.90
		RG_FOUEW	1	-0.23	-0.64	-0.29	-1.5
2018	June	RG_HENUP	1	-0.19	-1.8	-0.66	-2.4
		RG_FO26	1	-0.29	-2.2	-0.66	-2.4
		RG_FODHE	1	-0.72	-2.1	-1.3	-2.6
		RG_FOUNGD	1	-0.74	-2.4	-0.68	-1.2
		RG_FODNGD	1	-0.72	-0.80	-0.65	-1.8
		RG_MP1	1	-1.0	-0.98	-0.50	-1.7
		RG_FOUSH	1	-0.79	-1.0	-0.79	-1.9
		RG_FOUKI	1	-0.94	-1.3	-0.63	-2.3
		RG_FOBKS	1	-1.1	-0.62	-0.75	-1.9
		RG_FOBSC	1	-1.2	-1.5	-0.54	-1.8
		RG_FOBCP	1	-1.0	-1.7	-0.58	-1.6
		RG_FRCP1SW	1	-0.79	-1.1	-0.36	-2.0
		RG_FRUPO	1	-0.63	-1.5	-0.27	-1.6
		RG_FODPO	1	-0.85	-2.2	-0.35	-1.2
		RG_FO22	1	0.14	-0.72	-0.47	-0.99
		RG_FOUEW	1	-0.20	-1.4	-0.49	-1.7
	August	RG_HENUP	1	-0.41	-1.8	-0.92	-2.7
		RG_FODHE	1	0.0090	-2.2	-0.93	-1.9
		RG_FOUNGD	1	-0.28	-0.48	-0.99	-1.6
		RG_FODNGD	1	-0.36	-2.4	-0.76	-1.6
		RG_MP1	1	-0.57	-2.2	-0.79	-0.88
		RG_FOUSH	1	-0.21	-1.4	-1.1	-2.0
		RG_FOUKI	1	-0.40	-1.1	-1.4	-1.2
		RG_FOBKS	1	-0.84	-0.77	-1.1	-1.1
		RG_FOBSC	1	-0.74	-1.4	-1.1	-0.98
		RG_FOBCP	1	-0.88	-0.39	-1.3	-1.6
		RG_FRCP1SW	1	-0.76	-0.25	-0.87	-2.0
		RG_FRUPO	1	-0.87	0.093	-1.1	-2.0
		RG_FODPO	1	-0.80	-2.1	-0.87	-1.9
		RG_FO22	1	0.18	-0.94	-0.61	-1.9
		RG_FOUEW	1	-0.43	-1.4	-0.64	-2.0
	September	RG_HENUP	1	0.14	-1.2	-0.83	-2.2
			2	0.16	-0.82	-0.69	-2.6
			3	0.25	-0.77	-0.85	-2.3
		RG_FO26	1	-0.15	-0.79	-0.43	-1.1
			2	0.059	-0.76	-0.54	-1.2
			3	0.0073	-0.80	-0.51	-1.0
		RG_FODHE	1	0.069	-1.2	-0.79	-1.1
			2	0.10	-0.100	-0.98	-1.4
			3	0.17	-2.2	-0.65	-1.2
		RG_FOUNGD	1	-0.16	-0.86	-0.47	-0.72
			2	-0.25	-1.6	-0.32	-0.66
			3	-0.19	-1.4	-0.34	-1.1
		RG_FODNGD	1	-0.13	-1.5	-0.56	-0.75
			2	-0.18	-2.2	-0.42	-0.94
			3	-0.12	-1.9	-0.35	-0.70

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Abundance	LPL Richness	% EPT	% Ephemeroptera	% Plecoptera	% Trichoptera	% Chironomidae
2018	September	RG_MP1	1	12,900	41	75	58	12	5.0	11
			2	12,840	44	68	47	14	7.2	14
			3	10,320	37	70	53	12	4.5	12
		RG_FOUSH	1	8,620	40	70	48	19	3.0	18
			2	9,560	51	67	44	17	5.6	22
			3	6,680	41	68	42	24	3.0	17
		RG_FOUKI	1	5,500	31	69	59	6.7	2.7	3.0
			2	4,900	33	57	51	5.5	1.0	6.1
			3	5,186	36	54	44	6.9	2.5	5.2
		RG_FOBKS	1	7,900	33	62	49	8.6	3.8	3.3
			2	5,617	34	59	42	12	4.7	0.89
			3	12,580	44	62	42	12	7.2	5.4
		RG_FOBSC	1	7,020	31	60	41	10.0	9.7	0.28
			2	3,705	43	54	39	7.8	6.9	3.7
			3	3,360	33	53	36	11	5.4	2.7
		RG_FOBCP	1	6,067	37	79	49	25	5.2	4.4
			2	2,075	34	61	40	18	3.1	2.2
			3	6,300	30	66	37	24	5.4	2.9
			4	3,500	34	62	43	16	2.6	3.7
		RG_FRUPO	1	20,540	42	79	12	63	3.3	7.9
			2	4,462	39	66	15	48	2.8	18
			3	10,420	40	74	14	56	4.2	10
		RG_FODPO	1	28,120	41	84	11	72	1.1	12
			2	44,320	49	82	8.6	72	1.8	13
			3	66,740	51	78	7.6	69	1.7	13
		RG_FO22	1	15,120	35	76	11	59	5.2	5.0
			2	16,860	36	66	11	50	5.1	2.3
			3	14,720	37	58	13	42	3.4	4.3
			4	8,460	32	47	11	34	2.8	3.1
			5	10,980	30	41	9.5	29	2.6	1.6
		RG_FOUEW	1	6,360	37	54	15	32	6.9	17
			2	9,160	43	69	23	38	7.4	6.1
			3	6,700	37	65	25	32	7.5	13
	December	RG_UFR1	1	1,536	39	84	51	25	8.0	5.0
			2	3,744	37	86	46	31	9.2	5.9
			3	10,640	40	77	41	31	5.3	13
		RG_FOUKI	1	14,820	30	79	52	26	0.27	14
			2	7,120	27	68	47	21	0.56	12
			3	6,500	28	68	46	20	1.5	11
		RG_FOBSC	1	788	32	74	39	26	8.4	3.6
			2	397	33	72	36	27	9.6	4.0
			3	1,306	26	19	4.0	11	4.2	8.4
		RG_FOBCP	1	2,125	32	60	0.94	57	1.2	11
			2	2,336	23	43	0.61	41	1.5	21
			3	622	16	38	0.32	37	0.64	33
		RG_FRUPO	1	27,880	38	87	2.7	83	1.4	10
			2	45,040	40	81	4.7	76	0.89	15
			3	15,240	32	83	5.6	77	1.0	12
		RG_FODPO	1	31,320	40	88	3.4	83	1.9	9.0
			2	47,060	42	86	2.5	82	2.0	11
			3	49,880	39	87	4.6	82	0.96	11
		RG_FOUEW	1	20,420	40	86	7.7	75	2.4	5.6
			2	28,640	44	83	14	67	1.7	8.1
			3	30,260	43	80	10	67	2.8	14
2019	February	RG_FOUKI	1	10,440	32	57	30	26	0.77	30
			2	11,780	30	65	43	22	0.34	23
			3	9,320	32	62	38	24	0.43	26
		RG_FRUPO	1	10,200	24	72	1.4	70	0.39	27
			2	7,380	22	59	1.1	57	0.81	35
			3	7,600	23	67	2.4	64	0.79	28
		RG_FODPO	1	27,200	36	74	2.8	70	1.0	24
			2	14,700	33	83	3.1	78	2.0	13
			3	45,240	39	83	2.3	79	1.6	15
		RG_FOUEW	1	22,360	28	80	5.5	73	2.0	13
			2	9,660	30	70	11	56	2.7	19
			3	15,760	30	79	4.9	71	3.0	16
	June	RG_HENUP	1	2,817	32	86	66	17	2.7	13
			2	2,845	25	91	66	23	2.2	8.6
			3	3,875	27	88	69	17	2.3	9.7
		RG_FO26	1	9,000	40	71	44	15	12	25
			2	11,700	41	74	49	20	5.1	22
			3	21,020	45	74	35	29	9.6	24
		RG_FODHE	1	10,360	36	58	52	3.9	2.1	39
			2	6,033	34	63	55	4.4	3.6	33
			3	10,040	31	70	63	3.2	3.4	26
		RG_FOUNGD	1	3,990	37	60	45	6.0	9.8	25
			2	2,750	41	74	44	15	15	17
			3	3,867	41	71	48	11	12	16
		RG_FODNGD	1	5,450	33	82	66	8.6	7.3	7.6
			2	1,576	36	80	60	11	10.0	9.1
			3	3,118	36	74	58	7.6	8.5	13
		RG_MP1	1	3,045	34	53	43	3.6	6.6	6.3
			2	4,529	31	75	58	8.2	8.8	17
			3	3,989	33	74	54	8.6	12	16
		RG_FOUSH	1	4,786	28	83	69	4.8	8.7	11
			2	4,075	32	64	51	4.0	8.9	24
			3	4,144	37	59	47	5.1	6.7	17
		RG_FOUKI	1	2,392	34	75	55	10	10.0	16
			2	4,300	40	73	62	5.8	5.2	17
			3	3,091	33	72	58	4.4	9.4	17
		RG_FOBKS	1	2,073	41	70	59	5.5	5.1	16
			2	4,871	31	83	72	2.1	9.1	14
			3	4,200	39	79	68	5.1	5.4	9.5
		RG_FOBSC	1	1,615	28	82	71	0.93	9.9	14
			2	1,100	29	77	68	2.1	6.7	9.4
			3	2,991	25	75	69	0.61	5.5	20
		RG_FOBCP	1	4,743	28	60	45	1.2	14	25
			2	2,650	30	60	42	0.63	18	26
			3	2,307	33	46	31	1.9	13	36
		RG_FRCP1SW	1	1,925	28	68	44	6.2	17	24
			2	3,470	27	47	28	4.9	14	27
			3	6,880	30	44	27	3.5	14	23
		RG_FRUPO	1	1,700	35	52	14	21	18	22
			2	1,608	30	66	21	31	15	9.2
			3	2,069	31	47	14	17	17	39

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	EPT Abundance	Ephemroptera Abundance	Plecoptera Abundance	Trichoptera Abundance
2018	September	RG_MP1	1	9,660	7,460	1,560	640
			2	8,740	6,060	1,760	920
			3	7,180	5,440	1,280	460
		RG_FOUSH	1	6,060	4,180	1,620	260
			2	6,440	4,240	1,660	540
			3	4,570	2,800	1,570	200
		RG_FOUKI	1	3,783	3,267	367	150
			2	2,810	2,490	270	50
			3	2,786	2,300	357	129
		RG_FOBKS	1	4,880	3,900	680	300
			2	3,300	2,367	667	267
			3	7,740	5,340	1,500	900
		RG_FOBSC	1	4,240	2,860	700	680
			2	1,985	1,440	290	255
			3	1,780	1,220	380	180
		RG_FOBCP	1	4,767	2,950	1,500	317
			2	1,260	820	375	65
			3	4,160	2,320	1,500	340
			4	2,160	1,500	570	90
		RG_FRUPO	1	16,220	2,560	12,980	680
			2	2,962	675	2,162	125
			3	7,700	1,480	5,780	440
		RG_FODPO	1	23,540	3,120	20,100	320
			2	36,300	3,800	31,700	800
			3	51,980	5,060	45,800	1,120
		RG_FO22	1	11,420	1,700	8,940	780
			2	11,120	1,860	8,400	860
			3	8,540	1,880	6,160	500
			4	4,000	900	2,860	240
			5	4,520	1,040	3,200	280
		RG_FOUEW	1	3,460	960	2,060	440
			2	6,320	2,140	3,500	680
			3	4,340	1,660	2,180	500
	December	RG_UFR1	1	1,295	786	386	123
			2	3,211	1,711	1,156	344
			3	8,200	4,320	3,320	560
		RG_FOUKI	1	11,660	7,700	3,920	40
			2	4,860	3,340	1,480	40
			3	4,400	2,980	1,320	100
		RG_FOBSC	1	580	308	206	66
			2	285	141	106	38
			3	252	52	145	55
		RG_FOBCP	1	1,265	20	1,220	25
			2	1,000	14	950	36
			3	236	2.0	230	4.0
		RG_FRUPO	1	24,280	740	23,160	380
			2	36,680	2,100	34,180	400
			3	12,700	860	11,680	160
		RG_FODPO	1	27,680	1,080	26,000	600
			2	40,580	1,160	38,500	920
			3	43,600	2,300	40,820	480
		RG_FOUEW	1	17,480	1,580	15,400	500
			2	23,820	4,040	19,280	500
			3	24,180	3,040	20,300	840
2019	February	RG_FOUKI	1	5,960	3,160	2,720	80
			2	7,620	5,040	2,540	40
			3	5,800	3,520	2,240	40
		RG_FRUPO	1	7,320	140	7,140	40
			2	4,360	80	4,220	60
			3	5,100	180	4,860	60
		RG_FODPO	1	19,980	760	18,940	280
			2	12,200	460	11,440	300
			3	37,580	1,040	35,820	720
		RG_FOUEW	1	17,920	1,220	16,260	440
			2	6,740	1,020	5,460	260
			3	12,520	780	11,260	480
	June	RG_HENUP	1	2,408	1,858	475	75
			2	2,600	1,873	664	64
			3	3,412	2,675	650	88
		RG_FO26	1	6,360	3,920	1,360	1,080
			2	8,680	5,720	2,360	600
			3	15,580	7,440	6,120	2,020
		RG_FODHE	1	5,980	5,360	400	220
			2	3,817	3,333	267	217
			3	6,980	6,320	320	340
		RG_FOUNGD	1	2,410	1,780	240	390
			2	2,029	1,200	407	421
			3	2,744	1,856	422	467
		RG_FODNGD	1	4,450	3,583	467	400
			2	1,267	938	171	157
			3	2,318	1,818	236	264
		RG_MP1	1	1,609	1,300	109	200
			2	3,386	2,614	371	400
			3	2,967	2,144	344	478
		RG_FOUSH	1	3,957	3,314	229	414
			2	2,612	2,088	162	362
			3	2,433	1,944	211	278
		RG_FOUKI	1	1,800	1,315	246	238
			2	3,150	2,675	250	225
			3	2,227	1,800	136	291
		RG_FOBKS	1	1,440	1,220	113	107
			2	4,043	3,500	100	443
			3	3,300	2,862	212	225
		RG_FOBSC	1	1,320	1,145	15	160
			2	847	750	23	73
			3	2,245	2,064	18	164
		RG_FOBCP	1	2,843	2,114	57	671
			2	1,583	1,100	17	467
			3	1,050	714	43	293
		RG_FRCP1SW	1	1,300	850	119	331
			2	1,640	970	170	500
			3	3,040	1,860	240	940
		RG_FRUPO	1	885	230	350	305
			2	1,064	336	492	236
			3	981	288	350	344

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Chironomidae Abundance	Baetidae Abundance	Heptageniidae Abundance	Ephemerellidae Abundance
2018	September	RG_MP1	1	1,460	1,320	4,200	1,920
			2	1,760	1,240	3,160	1,580
			3	1,200	2,520	2,260	660
		RG_FOUSH	1	1,540	698	2,920	460
			2	2,060	640	3,100	460
			3	1,140	420	1,970	390
		RG_FOUKI	1	167	433	2,400	367
			2	300	700	1,500	190
			3	271	443	1,529	286
		RG_FOBKS	1	260	840	2,280	740
			2	50	383	1,450	417
			3	680	1,067	3,380	700
		RG_FOBSC	1	20	140	2,520	200
			2	137	209	1,020	185
			3	90	140	830	220
		RG_FOBCP	1	267	17	2,717	150
			2	45	10	705	75
			3	180	0	2,260	20
			4	130	0	1,400	60
		RG_FRUPO	1	1,620	360	1,180	1,020
			2	813	100	388	162
			3	1,080	220	700	560
		RG_FODPO	1	3,280	860	1,860	400
			2	5,860	1,520	1,820	460
			3	8,520	2,600	2,040	420
		RG_FO22	1	760	360	1,060	280
			2	380	340	1,300	220
			3	640	380	1,140	340
			4	260	380	220	300
			5	180	160	560	300
		RG_FOUEW	1	1,060	40	720	200
			2	560	40	1,600	440
			3	860	160	1,240	220
	December	RG_UFR1	1	77	46	223	509
			2	222	56	789	856
			3	1,420	260	1,260	2,780
		RG_FOUKI	1	2,040	940	6,540	200
			2	840	500	2,640	200
			3	700	260	2,600	80
		RG_FOBSC	1	28	4.0	290	14
			2	16	2.0	136	3.0
			3	110	0	36	9.7
		RG_FOBCP	1	235	0	15	0
			2	493	7.1	7.1	0
			3	208	2.0	0	0
		RG_FRUPO	1	2,820	120	540	80
			2	6,700	160	1,580	340
			3	1,860	120	680	40
		RG_FODPO	1	2,820	120	920	40
			2	5,220	460	700	0
			3	5,560	440	1,820	40
		RG_FOUEW	1	1,140	240	1,040	280
			2	2,320	240	3,480	320
			3	4,320	360	2,220	460
2019	February	RG_FOUKI	1	3,080	340	2,740	60
			2	2,760	340	4,560	140
			3	2,460	200	3,220	80
		RG_FRUPO	1	2,740	0	140	0
			2	2,560	0	80	0
			3	2,120	40	140	0
		RG_FODPO	1	6,580	340	400	20
			2	1,900	120	300	40
			3	6,840	480	520	40
		RG_FOUEW	1	3,000	0	1,100	120
			2	1,800	20	960	40
			3	2,500	0	680	80
	June	RG_HENUP	1	375	542	1,192	117
			2	245	582	1,218	46
			3	375	412	1,862	400
		RG_FO26	1	2,280	1,140	1,600	1,140
			2	2,540	1,760	2,240	1,720
			3	4,940	2,720	2,600	2,040
		RG_FODHE	1	4,060	380	3,740	1,120
			2	1,983	583	2,383	300
			3	2,620	1,080	4,560	640
		RG_FOUNGD	1	990	250	990	520
			2	464	100	779	307
			3	633	233	1,056	500
		RG_FODNGD	1	417	450	2,750	383
			2	143	181	633	124
			3	409	182	1,400	236
		RG_MP1	1	191	191	918	155
			2	771	114	2,071	371
			3	622	533	1,444	144
		RG_FOUSH	1	529	443	2,571	300
			2	987	550	1,388	138
			3	689	278	1,533	122
		RG_FOUKI	1	385	23	1,123	154
			2	733	150	1,650	850
			3	527	73	1,382	327
		RG_FOBKS	1	324	33	780	387
			2	657	57	2,871	557
			3	400	50	1,950	850
		RG_FOBSC	1	220	40	1,015	90
			2	103	23	653	73
			3	591	64	1,827	173
		RG_FOBCP	1	1,186	57	1,500	543
			2	683	17	675	408
			3	836	50	407	250
		RG_FRCP1SW	1	469	12	625	206
			2	950	60	650	250
			3	1,600	100	1,020	740
		RG_FRUPO	1	375	25	140	65
			2	148	12	232	88
			3	806	19	206	62

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Autotrophic to Heterotrophic Index	Filtering Collector Index	Predator Index	Hyporheic to Benthic Index
2018	September	RG_MP1	1	-0.17	-1.4	-0.50	-0.95
			2	-0.33	-1.2	-0.52	-0.80
			3	-0.49	-1.4	-0.77	-0.55
		RG_FOUSH	1	-0.25	-1.1	-0.88	-0.93
			2	-0.24	-1.1	-0.72	-1.1
			3	-0.33	-0.69	-0.81	-1.00
		RG_FOUKI	1	-0.046	-1.1	-1.1	-0.40
			2	-0.32	-1.1	-1.1	-0.17
			3	-0.32	-1.4	-0.81	-0.12
		RG_FOBKS	1	-0.32	-0.49	-0.71	-0.47
			2	-0.25	-1.0	-0.64	-0.19
			3	-0.32	-0.83	-0.66	-0.36
		RG_FOBSC	1	-0.11	-1.5	-0.57	-0.22
			2	-0.24	-1.2	-0.55	-0.19
			3	-0.31	-1.7	-0.50	-0.14
		RG_FOBCP	1	0.12	-0.52	-0.58	-1.1
			2	-0.033	-1.6	-0.45	-0.40
			3	0.015	-1.5	-0.39	-0.62
			4	0.0028	-0.89	-0.75	-0.41
		RG_FRUPO	1	-0.74	-0.21	-0.035	-1.6
			2	-0.66	-0.74	-0.36	-1.2
			3	-0.77	-0.36	-0.13	-1.7
		RG_FODPO	1	-0.86	-1.9	-1.00	-2.1
			2	-1.1	-1.5	-0.84	-1.8
			3	-1.2	-0.43	-0.81	-1.9
		RG_FO22	1	-0.37	-0.72	-0.74	-2.0
			2	-0.10	-1.1	-0.86	-1.6
			3	0.038	-1.4	-0.67	-2.2
			4	0.14	-0.56	-0.70	-1.5
			5	0.32	-1.0	-0.81	-1.8
		RG_FOUEW	1	-0.23	-0.79	-0.56	-1.6
			2	-0.11	-0.34	-0.55	-1.4
			3	-0.18	-0.98	-0.43	-1.6
	December	RG_UFR1	1	-0.48	-2.2	-0.31	-1.3
			2	-0.38	-1.7	-0.35	-1.4
			3	-0.67	-1.7	-0.40	-1.2
		RG_FOUKI	1	-0.72	-2.3	-1.6	-1.1
			2	-0.78	-1.7	-1.4	-0.58
			3	-0.70	-1.5	-1.5	-0.57
		RG_FOBSC	1	-0.70	-1.7	-0.65	-0.71
			2	-0.73	-1.7	-0.80	-0.58
			3	-1.7	-2.5	-0.87	0.41
		RG_FOBCP	1	-2.0	-2.1	-0.87	-0.52
			2	-2.0	-2.2	-0.80	-0.43
			3	-	-2.2	-0.77	-0.64
		RG_FRUPO	1	-1.7	-2.2	-0.78	-2.2
			2	-1.3	-2.2	-0.80	-2.0
			3	-1.5	-2.1	-1.0	-1.9
		RG_FODPO	1	-1.4	-2.2	-1.0	-2.6
			2	-1.7	-1.6	-1.1	-2.6
			3	-1.3	-2.2	-1.3	-3.4
		RG_FOUEW	1	-1.1	-0.71	-0.96	-1.7
			2	-0.84	-1.4	-1.00	-1.9
			3	-1.2	-1.6	-1.0	-2.2
2019	February	RG_FOUKI	1	-0.43	-2.1	-1.3	-0.80
			2	-0.19	-2.4	-1.5	-0.89
			3	-0.27	-2.2	-1.5	-0.87
		RG_FRUPO	1	-1.7	-2.1	-0.82	-2.7
			2	-1.1	-2.2	-0.94	-1.8
			3	-1.2	-2.2	-0.98	-2.0
		RG_FODPO	1	-1.6	-1.8	-1.1	-2.2
			2	-1.4	-1.4	-1.0	-2.0
			3	-1.8	-1.8	-0.95	-2.4
		RG_FOUEW	1	-1.1	-1.6	-0.99	-2.3
			2	-0.69	-1.3	-0.78	-1.6
			3	-1.1	-1.6	-1.0	-2.6
	June	RG_HENUP	1	-0.023	-1.5	-0.84	-2.1
			2	-0.076	-1.8	-0.72	-2.7
			3	0.23	-2.2	-0.90	-2.4
		RG_FO26	1	-0.14	-1.6	-0.83	-1.8
			2	-0.22	-1.4	-0.83	-1.8
			3	-0.34	-1.7	-1.0	-2.3
		RG_FODHE	1	-0.18	-1.4	-0.95	-2.0
			2	-0.12	-1.3	-1.1	-2.5
			3	-0.034	-1.1	-1.2	-2.1
		RG_FOUNGD	1	-0.19	-0.76	-0.50	-1.4
			2	0.059	-0.98	-0.33	-1.6
			3	-0.016	-0.64	-0.38	-1.3
		RG_FODNGD	1	0.030	-0.69	-0.60	-1.5
			2	-0.13	-0.73	-0.54	-1.5
			3	0.097	-0.84	-0.52	-1.3
		RG_MP1	1	-0.53	0.13	-0.77	-1.7
			2	0.12	-1.00	-0.52	-1.3
			3	-0.18	-0.72	-0.52	-2.0
		RG_FOUSH	1	-0.17	-1.0	-0.69	-1.6
			2	-0.21	-0.73	-0.84	-1.5
			3	-0.21	-0.11	-0.92	-1.7
		RG_FOUKI	1	0.043	-1.1	-0.49	-1.5
			2	-0.29	-0.77	-0.52	-1.7
			3	-0.038	-1.1	-0.46	-1.4
		RG_FOBKS	1	-0.29	-0.70	-0.49	-1.3
			2	0.052	-1.2	-0.65	-1.9
			3	-0.27	-0.93	-0.44	-1.3
		RG_FOBSC	1	-0.0027	-1.3	-0.74	-2.0
			2	0.031	-0.63	-0.75	-1.6
			3	-0.20	-1.1	-0.97	-2.2
		RG_FOBCP	1	-0.42	-0.43	-0.51	-2.0
			2	-0.47	-0.49	-0.36	-1.7
			3	-0.75	-0.67	-0.41	-1.3
		RG_FRCP1SW	1	-0.20	-0.79	-0.42	-1.6
			2	-0.53	-0.16	-0.58	-0.85
			3	-0.67	0.085	-0.50	-1.5
		RG_FRUPO	1	-0.54	-0.52	-0.28	-0.89
			2	-0.60	0.32	-0.40	-1.9
			3	-0.80	-0.68	-0.39	-0.99

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Abundance	LPL Richness	% EPT	% Ephemeroptera	% Plecoptera	% Trichoptera	% Chironomidae
2019	June	RG_FODPO	1	3,220	37	79	8.7	59	12	11
			2	3,120	35	68	11	49	7.4	24
			3	3,500	29	69	10	49	10	19
		RG_FO22	1	3,050	36	52	6.9	37	8.5	12
			2	5,333	27	33	1.6	30	1.9	20
			3	3,962	32	27	6.6	14	6.3	20
		RG_FOUEW	1	5,950	35	60	28	30	2.2	28
			2	8,100	44	72	43	26	2.2	17
			3	6,800	34	84	55	24	4.7	10
2019	September	RG_HENUP	1	1,960	29	87	72	13	2.8	9.7
			2	7,320	29	88	64	20	4.6	11
			3	6,560	25	90	71	17	1.5	9.5
		RG_FO26	1	26,920	43	74	53	8.3	12	19
			2	13,840	32	85	70	6.8	8.1	11
			3	27,840	48	70	56	10	4.1	26
		RG_FODHE	1	26,620	38	70	61	8.4	0.98	27
			2	26,800	49	67	55	10	1.5	29
			3	34,440	39	70	63	6.2	1.2	26
		RG_FOUCL	1	30,060	41	66	56	5.3	4.6	27
			2	31,480	45	72	55	6.4	9.8	24
			3	20,120	46	67	58	5.0	4.1	25
		RG_FOUNGD	1	10,440	32	81	72	6.1	3.3	13
			2	29,280	42	88	77	8.1	3.1	6.1
			3	28,360	39	94	84	7.3	3.7	3.3
		RG_FODNGD	1	9,800	45	72	54	14	4.9	13
			2	9,360	41	70	57	11	2.6	17
			3	11,300	32	82	67	10	5.0	7.6
		RG_MP1	1	11,740	30	28	18	3.6	5.8	67
			2	7,400	38	40	28	5.7	5.9	50
			3	14,300	32	24	15	4.3	4.1	74
		RG_FOUSH	1	7,880	42	56	39	12	4.6	36
			2	6,420	39	53	40	8.1	4.7	38
			3	8,080	37	46	31	9.9	5.4	45
		RG_FOUKI	1	5,933	36	52	46	3.7	2.5	29
			2	2,775	33	56	42	9.3	4.2	18
			3	4,390	43	52	45	5.7	1.8	32
		RG_FOBKS	1	4,800	37	68	37	27	4.8	8.6
			2	3,622	38	70	46	18	5.8	4.3
			3	5,400	38	69	46	19	4.8	6.3
		RG_SCOUTDS	1	5,933	38	74	39	30	4.2	11
			2	6,420	35	67	42	22	2.8	12
			3	7,840	35	80	54	22	3.1	5.6
		RG_FOBSC	1	6,133	32	62	40	18	3.0	16
			2	4,200	34	74	45	26	3.3	9.8
			3	2,433	35	61	34	23	3.0	15
		RG_FOBCP	1	6,280	31	67	33	32	2.2	20
			2	1,710	34	57	37	18	2.3	15
			3	5,143	36	55	24	28	3.1	27
			4	8,440	34	51	22	27	2.1	38
			5	3,510	33	38	24	13	0.28	42
		RG_FRCP1SW	1	11,440	42	79	19	54	5.8	10
			2	6,700	30	81	12	66	3.0	11
			3	2,955	29	74	19	48	7.1	6.2
		RG_FRUPO	1	6,300	31	80	15	57	7.9	13
			2	8,160	32	75	7.1	65	2.9	22
			3	4,240	35	65	11	50	4.2	26
		RG_FODPO	1	14,040	39	67	16	47	3.7	24
			2	9,900	34	66	16	40	9.5	20
			3	13,040	41	59	13	42	3.7	29
		RG_FO22	1	5,667	36	70	15	43	11	6.2
			2	6,280	31	50	10	27	12	3.8
			3	11,340	32	58	14	23	20	7.1
			4	7,420	32	47	16	20	12	4.3
			5	9,220	40	59	16	35	8.0	11
		RG_FOUEW	1	6,160	47	45	19	21	4.9	20
			2	8,900	43	54	28	21	4.9	14
			3	9,220	43	54	28	24	2.6	28
	December	RG_UFR1	1	29,700	45	80	45	28	6.5	16
			2	5,080	42	87	44	24	20	6.9
			3	15,940	40	82	45	21	16	13
		RG_FOUKI	1	10,100	40	52	36	15	1.2	38
			2	8,220	35	44	29	14	1.2	50
			3	11,920	34	57	32	24	1.0	36
		RG_SCOUTDS	1	17,300	37	85	20	63	1.6	11
			2	13,060	38	85	21	61	2.8	8.6
			3	6,640	31	85	19	64	1.2	12
		RG_FRUPO	1	31,960	34	86	2.3	83	1.1	13
			2	26,540	34	80	5.6	74	0.53	18
			3	27,640	34	80	5.1	74	0.94	19
		RG_FODPO	1	30,880	44	83	6.0	74	2.8	14
			2	29,580	30	88	4.5	82	1.6	10
			3	31,420	42	83	4.2	77	2.0	15
		RG_FOUEW	1	12,960	40	81	22	56	3.1	8.0
			2	16,540	42	79	17	56	5.6	13
			3	18,360	48	74	14	53	6.8	18
2020	June	RG_HENUP	1	958	24	95	66	25	4.2	4.2
			2	1,036	30	94	63	26	5.0	2.9
			3	1,377	27	94	70	20	4.2	5.0
		RG_FO26	1	5,000	30	95	47	35	12	3.4
			2	1,230	31	97	43	36	18	1.8
			3	3,100	29	96	45	35	16	2.2
		RG_FODHE	1	2,180	34	83	64	8.6	9.8	14
			2	778	34	84	74	5.9	3.9	12
			3	1,882	35	82	70	5.6	7.2	15
		RG_FOUNGD	1	1,760	37	88	66	12	9.9	4.5
			2	1,752	49	76	58	6.0	12	9.8
			3	3,460	35	94	72	14	6.6	3.2
		RG_FODNGD	1	818	34	79	66	6.1	6.8	7.3
			2	519	34	96	73	10	12	1.9
			3	2,380	34	91	74	8.1	9.0	3.9
		RG_MP1	1	4,638	31	94	73	14	6.2	3.5
			2	1,883	32	89	70	9.7	9.1	2.4
			3	1,303	31	95	78	8.2	8.5	2.6
		RG_FOUSH	1	2,000	33	90	82	3.2	5.5	6.2
			2	4,167	39	81	70	4.3	6.1	16
			3	2,431	40	88	66	10	12	6.0

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	EPT Abundance	Ephemroptera Abundance	Plecoptera Abundance	Trichoptera Abundance
2019	June	RG_FODPO	1	2,550	280	1,900	370
			2	2,110	350	1,530	230
			3	2,422	356	1,711	356
		RG_FO22	1	1,590	210	1,120	260
			2	1,783	83	1,600	100
			3	1,075	262	562	250
		RG_FOUEW	1	3,583	1,667	1,783	133
			2	5,800	3,480	2,140	180
			3	5,700	3,760	1,620	320
2019	September	RG_HENUP	1	1,710	1,405	250	55
			2	6,440	4,660	1,440	340
			3	5,900	4,660	1,140	100
		RG_FO26	1	19,920	14,380	2,240	3,300
			2	11,760	9,700	940	1,120
			3	19,480	15,520	2,820	1,140
		RG_FODHE	1	18,700	16,200	2,240	260
			2	17,900	14,820	2,680	400
			3	24,240	21,680	2,140	420
		RG_FOUCL	1	19,900	16,940	1,580	1,380
			2	22,540	17,440	2,020	3,080
			3	13,420	11,600	1,000	820
		RG_FOUNGD	1	8,460	7,480	640	340
			2	25,800	22,520	2,360	920
			3	26,800	23,700	2,060	1,040
		RG_FODNGD	1	7,100	5,260	1,360	480
			2	6,540	5,300	1,000	240
			3	9,280	7,560	1,160	560
		RG_MP1	1	3,240	2,140	420	680
			2	2,920	2,060	420	440
			3	3,380	2,180	620	580
		RG_FOUSH	1	4,400	3,080	960	360
			2	3,420	2,600	520	300
			3	3,720	2,480	800	440
		RG_FOUKI	1	3,117	2,750	217	150
			2	1,550	1,175	258	117
			3	2,300	1,970	250	80
		RG_FOBKS	1	3,271	1,757	1,286	229
			2	2,522	1,656	656	211
			3	3,743	2,457	1,029	257
		RG_SCOUTDS	1	4,367	2,333	1,783	250
			2	4,280	2,720	1,380	180
			3	6,240	4,240	1,760	240
		RG_FOBSC	1	3,800	2,483	1,133	183
			2	3,110	1,900	1,070	140
			3	1,480	840	567	73
		RG_FOBCP	1	4,200	2,080	1,980	140
			2	980	630	310	40
			3	2,814	1,214	1,443	157
			4	4,340	1,860	2,300	180
			5	1,330	850	470	10
		RG_FRCP1SW	1	9,080	2,220	6,200	660
			2	5,420	820	4,400	200
			3	2,182	555	1,418	209
		RG_FRUPO	1	5,067	967	3,600	500
			2	6,100	580	5,280	240
			3	2,740	450	2,110	180
		RG_FODPO	1	9,400	2,320	6,560	520
			2	6,500	1,580	3,980	940
			3	7,740	1,720	5,540	480
		RG_FO22	1	3,950	867	2,450	633
			2	3,120	660	1,700	760
			3	6,580	1,640	2,620	2,320
			4	3,500	1,160	1,480	860
			5	5,440	1,460	3,240	740
		RG_FOUEW	1	2,780	1,160	1,320	300
			2	4,820	2,480	1,900	440
			3	5,020	2,560	2,220	240
	December	RG_UFR1	1	23,680	13,380	8,360	1,940
			2	4,410	2,210	1,210	990
			3	13,100	7,200	3,380	2,520
		RG_FOUKI	1	5,240	3,640	1,480	120
			2	3,660	2,400	1,160	100
			3	6,780	3,840	2,820	120
		RG_SCOUTDS	1	14,660	3,540	10,840	280
			2	11,100	2,780	7,960	360
			3	5,620	1,260	4,280	80
		RG_FRUPO	1	27,480	720	26,400	360
			2	21,360	1,480	19,740	140
			3	22,040	1,420	20,360	260
		RG_FODPO	1	25,700	1,860	22,960	880
			2	25,980	1,320	24,200	460
			3	26,000	1,320	24,060	620
		RG_FOUEW	1	10,480	2,780	7,300	400
			2	13,020	2,780	9,320	920
			3	13,580	2,560	9,780	1,240
2020	June	RG_HENUP	1	912	636	236	40
			2	979	655	273	52
			3	1,288	958	273	58
		RG_FO26	1	4,729	2,343	1,771	614
			2	1,189	530	437	222
			3	2,983	1,408	1,092	483
		RG_FODHE	1	1,807	1,407	187	213
			2	650	574	46	30
			3	1,553	1,312	106	135
		RG_FOUNGD	1	1,545	1,160	210	175
			2	1,324	1,014	105	205
			3	3,240	2,510	500	230
		RG_FODNGD	1	644	538	50	56
			2	496	381	53	62
			3	2,173	1,767	193	213
		RG_MP1	1	4,350	3,400	663	288
			2	1,678	1,322	183	172
			3	1,234	1,017	107	110
		RG_FOUSH	1	1,810	1,635	65	110
			2	3,367	2,933	178	256
			3	2,131	1,600	246	285

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Chironomidae Abundance	Baetidae Abundance	Heptageniidae Abundance	Ephemerellidae Abundance
2019	June	RG_FODPO	1	350	10	150	110
			2	760	40	160	150
			3	678	56	178	111
		RG_FO22	1	370	20	90	100
			2	1,067	0	17	67
			3	800	38	25	200
		RG_FOUEW	1	1,683	367	983	317
			2	1,360	900	1,980	560
			3	680	1,080	2,400	260
2019	September	RG_HENUP	1	190	0	1,295	80
			2	820	20	4,300	260
			3	620	20	4,280	320
		RG_FO26	1	5,120	380	9,600	4,160
			2	1,520	100	7,375	2,164
			3	7,160	280	10,760	4,440
		RG_FODHE	1	7,220	120	8,900	6,680
			2	7,720	240	7,220	6,400
			3	8,880	180	8,980	11,280
		RG_FOUCL	1	8,120	1,140	8,900	6,760
			2	7,440	1,180	8,260	8,000
			3	5,080	1,020	5,240	5,300
		RG_FOUNGD	1	1,380	320	4,340	2,820
			2	1,800	380	11,040	11,080
			3	940	320	11,200	12,180
		RG_FODNGD	1	1,240	760	2,200	2,260
			2	1,560	700	2,520	2,080
			3	860	480	4,580	2,500
		RG_MP1	1	7,900	340	1,020	780
			2	3,700	498	920	540
			3	10,520	720	900	560
		RG_FOUSH	1	2,880	460	1,820	780
			2	2,440	180	1,860	540
			3	3,640	400	1,600	460
		RG_FOUKI	1	1,733	300	1,683	717
			2	508	83	867	217
			3	1,400	270	1,230	430
		RG_FOBKS	1	414	129	1,400	200
			2	156	122	1,311	211
			3	343	143	1,757	529
		RG_SCOUTDS	1	633	50	1,800	467
			2	800	120	2,200	300
			3	440	60	3,280	880
		RG_FOBSC	1	1,000	183	1,733	467
			2	410	90	1,590	200
			3	367	53	700	73
		RG_FOBCP	1	1,260	420	1,500	160
			2	250	130	345	105
			3	1,400	486	500	214
			4	3,240	780	880	200
			5	1,480	500	200	80
		RG_FRCP1SW	1	1,200	780	1,220	220
			2	740	100	580	140
			3	182	54	427	64
		RG_FRUPO	1	800	267	500	200
			2	1,800	340	140	100
			3	1,110	200	90	140
		RG_FODPO	1	3,340	1,520	620	120
			2	2,020	960	380	220
			3	3,740	960	560	200
		RG_FO22	1	350	150	350	367
			2	240	180	160	320
			3	800	420	320	900
			4	320	400	240	520
			5	980	480	380	600
		RG_FOUEW	1	1,240	80	840	220
			2	1,240	180	1,780	460
			3	2,560	320	1,740	460
	December	RG_UFR1	1	4,800	2,120	5,660	5,600
			2	350	80	920	1,210
			3	2,020	220	2,280	4,660
		RG_FOUKI	1	3,820	600	2,380	640
			2	4,140	240	1,940	180
			3	4,300	160	3,220	460
		RG_SCOUTDS	1	1,860	840	2,460	240
			2	1,120	1,100	1,400	280
			3	800	360	740	160
		RG_FRUPO	1	4,120	0	580	140
			2	4,680	100	1,340	40
			3	5,139	220	1,180	20
		RG_FODPO	1	4,340	1,300	480	80
			2	3,060	1,060	260	0
			3	4,840	860	380	60
		RG_FOUEW	1	1,040	340	1,920	520
			2	2,160	460	1,840	480
			3	3,220	660	1,440	460
2020	June	RG_HENUP	1	40	150	448	32
			2	30	227	382	42
			3	69	346	569	19
		RG_FO26	1	171	757	1,214	357
			2	22	196	233	93
			3	67	475	675	250
		RG_FODHE	1	300	520	693	167
			2	90	216	280	64
			3	288	353	765	171
		RG_FOUNGD	1	80	435	500	210
			2	171	419	305	238
			3	110	520	1,600	380
		RG_FODNGD	1	60	310	110	112
			2	10.0	108	237	33
			3	93	473	1,067	213
		RG_MP1	1	162	662	2,375	350
			2	44	494	656	167
			3	34	117	793	103
		RG_FOUSH	1	125	510	960	120
			2	689	789	1,889	256
			3	146	362	908	308

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Autotrophic to Heterotrophic Index	Filtering Collector Index	Predator Index	Hyporheic to Benthic Index
2019	June	RG_FODPO	1	-0.89	-1.1	-0.63	-2.2
			2	-1.0	-2.2	-0.54	-1.6
			3	-0.87	-1.3	-0.41	-1.5
		RG_FO22	1	-0.22	-0.81	-0.73	-1.4
			2	-0.66	0.081	-0.70	-0.42
			3	-0.033	-0.78	-0.59	-1.2
		RG_FOUEW	1	-0.55	-1.5	-0.60	-2.5
			2	-0.37	-1.4	-0.54	-2.1
			3	-0.17	-1.4	-0.78	-2.4
2019	September	RG_HENUP	1	0.38	-1.1	-0.76	-2.3
			2	0.24	-1.1	-0.74	-2.6
			3	0.33	-1.5	-0.90	-2.7
		RG_FO26	1	0.0096	-0.96	-0.54	-1.4
			2	0.24	-0.48	-0.56	-1.7
			3	-0.092	-0.92	-0.63	-1.6
		RG_FODHE	1	-0.19	-1.8	-0.51	-1.9
			2	-0.24	-2.3	-0.51	-1.7
			3	-0.29	-1.7	-0.43	-1.8
		RG_FOUCL	1	-0.29	-1.6	-0.45	-1.3
			2	-0.33	-1.9	-0.37	-1.5
			3	-0.38	-1.6	-0.40	-1.2
		RG_FOUNGD	1	-0.054	-1.4	-0.44	-1.3
			2	-0.13	-1.5	-0.28	-1.4
			3	-0.12	-1.1	-0.28	-1.7
		RG_FODNGD	1	-0.42	-1.6	-0.34	-0.82
			2	-0.33	-1.5	-0.44	-1.00
			3	-0.017	-1.9	-0.32	-1.2
		RG_MP1	1	-0.77	-2.2	-0.84	-1.9
			2	-0.65	-1.8	-0.74	-1.1
			3	-1.0	-2.0	-1.1	-1.9
		RG_FOUSH	1	-0.43	-1.1	-0.72	-1.4
			2	-0.29	-1.1	-0.77	-1.1
			3	-0.57	-0.97	-0.77	-1.2
		RG_FOUKI	1	-0.21	-1.2	-0.68	-0.71
			2	-0.17	-0.66	-0.61	-0.56
			3	-0.27	-1.4	-0.70	-0.91
		RG_FOBKS	1	-0.21	-0.94	-0.66	-0.53
			2	-0.11	-0.83	-0.57	-0.50
			3	-0.13	-0.94	-0.52	-0.56
		RG_SCOUTDS	1	-0.24	-0.71	-0.51	-0.76
			2	-0.031	-0.64	-0.52	-0.67
			3	0.030	-1.4	-0.44	-0.87
		RG_FOBSC	1	-0.25	-1.2	-0.64	-0.57
			2	-0.15	-0.82	-0.65	-0.77
			3	-0.22	-1.4	-0.68	-0.52
		RG_FOBCP	1	-0.32	-0.55	-0.45	-0.89
			2	-0.31	-0.73	-0.56	-0.45
			3	-0.79	-0.76	-0.40	-0.79
			4	-0.77	-1.0	-0.55	-1.0
			5	-0.83	-1.0	-0.58	-0.72
		RG_FRCP1SW	1	-0.54	-0.56	-0.21	-1.1
			2	-0.74	-0.53	-0.13	-1.1
			3	-0.26	-0.45	-0.15	-0.65
		RG_FRUPO	1	-0.36	-1.9	0.046	-1.4
			2	-0.94	-2.1	0.18	-1.8
			3	-0.82	-1.4	0.070	-1.3
		RG_FODPO	1	-0.85	-1.7	-0.43	-1.5
			2	-0.49	-1.9	-0.40	-1.6
			3	-0.89	-0.92	-0.44	-1.9
		RG_FO22	1	-0.15	-0.55	-0.52	-1.5
			2	-0.063	-0.015	-0.67	-0.76
			3	0.049	-0.88	-0.63	-1.8
			4	0.20	-0.20	-0.58	-1.1
			5	-0.20	-0.40	-0.51	-0.98
		RG_FOUEW	1	-0.19	-0.11	-0.69	-0.57
			2	0.037	-0.31	-0.55	-1.0
			3	-0.24	-1.1	-0.62	-1.5
	December	RG_UFR1	1	-0.50	-1.5	-0.55	-2.2
			2	-0.20	-1.2	-0.40	-1.7
			3	-0.35	-2.1	-0.41	-2.0
		RG_FOUKI	1	-0.85	-2.0	-0.87	-1.2
			2	-0.82	-2.4	-1.2	-1.6
			3	-0.88	-1.7	-1.0	-1.3
		RG_SCOUTDS	1	-1.2	-1.9	-1.1	-1.4
			2	-1.2	-1.8	-0.91	-1.4
			3	-1.1	-1.2	-0.97	-1.8
		RG_FRUPO	1	-2.0	-2.4	-0.67	-2.4
			2	-2.8	-1.8	-0.81	-2.3
			3	-2.3	-1.8	-0.68	-2.2
		RG_FODPO	1	-1.5	-2.0	-0.73	-2.6
			2	-1.8	-1.6	-0.88	-2.3
			3	-1.7	-2.0	-0.80	-2.6
		RG_FOUEW	1	-0.56	-1.6	-0.64	-2.1
			2	-0.75	-1.5	-0.68	-2.0
			3	-0.92	-1.6	-0.67	-1.9
2020	June	RG_HENUP	1	0.21	-1.6	-0.60	-2.6
			2	-0.0098	-1.7	-0.51	-2.7
			3	-0.041	-1.6	-0.73	-2.7
		RG_FO26	1	-0.22	-1.3	-0.49	-2.7
			2	-0.28	-1.3	-0.41	-2.7
			3	-0.28	-1.1	-0.53	-2.7
		RG_FODHE	1	-0.12	-1.1	-0.85	-2.7
			2	-0.023	-1.4	-1.1	-1.7
			3	0.054	-1.4	-1.0	-2.4
		RG_FOUNGD	1	-0.0028	-1.0	-0.62	-2.1
			2	-0.24	-0.85	-0.55	-2.0
			3	0.24	-1.2	-0.65	-2.7
		RG_FODNGD	1	-0.33	-0.62	-0.88	-2.7
			2	0.19	-1.3	-0.89	-2.7
			3	0.12	-1.1	-0.74	-1.8
		RG_MP1	1	0.086	-1.8	-0.62	-2.7
			2	-0.12	-0.85	-0.73	-2.1
			3	0.26	-1.4	-0.84	-2.0
		RG_FOUSH	1	-0.068	-1.7	-0.93	-2.7
			2	-0.17	-1.5	-0.92	-2.5
			3	-0.22	-1.8	-0.47	-1.2

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Abundance	LPL Richness	% EPT	% Ephemeroptera	% Plecoptera	% Trichoptera	% Chironomidae
2020	June	RG_FOUKI	1	3,490	30	91	76	6.6	8.0	3.7
			2	2,708	24	97	85	3.4	8.9	1.8
			3	2,110	25	95	85	4.3	6.2	1.8
		RG_FOBKS	1	567	32	95	77	7.4	11	2.8
			2	612	34	93	74	7.4	12	2.8
			3	496	28	88	52	12	23	2.4
		RG_FOBSC	1	1,315	37	88	67	7.9	14	6.8
			2	2,792	34	48	37	3.6	7.5	4.5
			3	3,045	27	85	72	5.7	6.6	2.1
		RG_FOBCP	1	478	39	87	72	2.3	13	5.4
			2	798	33	83	68	5.0	10	7.2
			3	960	33	89	76	3.3	9.8	3.0
		RG_FRCP1SW	1	380	34	89	62	6.3	20	3.9
			2	1,496	25	92	74	5.6	12	2.4
			3	3,642	28	91	79	5.0	6.6	3.7
		RG_FRUPO	1	2,556	36	83	55	14	14	12
			2	2,487	43	60	44	2.7	13	31
			3	2,450	32	89	75	3.8	9.9	2.6
		RG_FODPO	1	440	43	84	48	21	14	4.3
			2	2,364	35	76	49	15	12	10
			3	2,492	31	92	63	14	15	4.0
		RG_FO22	2	2,364	41	65	26	31	7.9	5.7
		RG_FOUEW	1	2,253	32	86	66	13	6.5	5.0
			2	2,808	34	90	66	19	4.5	2.8
			3	3,540	34	92	72	18	3.1	2.8
2020	September	RG_HENUP	1	8,300	29	88	66	14	8.2	6.7
			2	9,760	30	89	68	15	5.3	9.4
			3	8,920	29	85	70	12	3.8	11
		RG_FO26	1	33,120	44	82	46	28	7.5	11
			2	34,600	41	82	55	18	8.2	8.5
			3	29,880	39	78	53	17	7.4	11
		RG_FODHE	1	33,400	41	60	47	11	2.2	34
			2	41,840	43	66	54	9.8	2.2	28
			3	22,460	38	68	52	13	3.3	26
		RG_FOUCL	1	22,240	46	72	58	11	2.6	19
			2	22,480	52	76	60	6.8	9.6	12
			3	14,820	39	77	61	8.9	7.2	7.8
		RG_FOUNGD	1	16,520	42	84	52	17	16	3.9
			2	25,620	42	92	62	22	7.7	1.8
			3	12,840	35	77	57	10	9.2	4.7
		RG_FODNGD	1	16,340	39	66	46	15	4.9	20
			2	8,880	37	71	46	14	11	8.1
			3	16,980	38	73	52	12	9.0	14
		RG_MP1	1	9,500	35	64	46	9.3	8.2	10
			2	8,140	32	70	47	11	12	7.9
			3	10,680	31	76	53	10	13	10
		RG_FOUSH	1	11,380	40	56	39	12	5.1	24
			2	11,760	45	36	21	9.7	5.1	35
			3	10,560	45	52	34	11	5.9	28
		RG_FOUKI	1	9,820	35	52	42	7.7	3.1	13
			2	8,520	36	63	49	9.2	4.7	12
			3	16,720	44	50	33	13	3.8	26
		RG_FOBKS	1	7,940	39	59	35	13	12	4.3
			2	7,160	42	57	39	8.4	9.2	3.9
			3	10,533	32	73	50	14	8.5	2.7
		RG_SCOUTDS	1	9,360	35	58	31	20	6.8	5.3
			2	9,360	41	63	35	21	6.2	5.1
			3	11,800	43	61	38	20	3.6	3.9
		RG_FOBSC	1	7,300	33	59	27	25	7.1	6.3
			2	7,940	40	52	27	15	9.6	5.5
			3	11,180	37	62	31	27	4.8	12
		RG_FOBCP	1	10,980	31	68	28	35	4.9	9.8
			2	11,060	40	73	42	27	4.3	7.1
			3	7,520	34	57	23	30	4.5	7.7
			4	16,000	36	72	29	39	3.9	7.5
			5	19,920	37	79	27	49	3.2	6.2
		RG_FRCP1SW	1	16,760	32	93	20	67	5.8	1.1
			2	16,600	36	88	19	62	6.4	0.24
			3	3,310	27	72	33	26	13	1.5
		RG_FRUPO	1	25,880	40	74	20	50	3.9	16
			2	6,800	36	64	19	42	3.5	24
			3	16,140	48	61	14	43	4.0	21
		RG_FODPO	1	15,520	50	74	21	47	5.8	18
			2	28,360	52	68	12	54	1.7	22
			3	14,660	51	56	14	36	5.6	29
		RG_FO22	1	8,600	36	54	14	34	6.0	4.7
			2	15,180	44	48	9.6	32	6.5	24
			3	19,120	46	57	9.1	34	13	8.7
			4	21,240	45	50	8.4	36	5.4	20
			5	20,860	42	36	8.3	18	9.8	6.3
		RG_FOUEW	1	9,260	47	54	12	31	10	25
			2	9,080	40	58	9.0	39	10	17
			3	8,240	40	68	21	37	10	18
	December	RG_UFR1	1	34,720	44	93	48	40	5.0	4.8
			2	23,360	38	90	49	36	5.0	4.8
			3	25,920	47	89	39	41	9.5	4.7
		RG_FOUKI	1	15,340	37	71	35	34	1.6	21
			2	14,700	37	68	31	37	0.95	22
			3	7,220	29	63	17	44	2.8	27
		RG_SCOUTDS	1	23,480	36	88	23	64	1.5	5.0
			2	14,000	31	88	19	68	1.3	5.3
			3	13,100	38	84	18	64	2.6	6.1
		RG_FRUPO	1	31,200	29	91	2.8	86	2.4	7.8
			2	15,720	28	86	2.7	81	2.0	11
			3	19,880	26	93	3.3	89	1.1	4.7
		RG_FODPO	1	46,540	39	86	6.2	78	2.1	12
			2	69,780	36	92	6.1	84	1.7	7.2
			3	48,840	33	92	7.2	82	2.6	7.0
		RG_FOUEW	1	7,740	23	90	7.8	80	2.6	4.4
			2	17,180	34	93	7.2	82	4.1	2.6
			3	13,020	33	91	9.7	76	5.4	5.5

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	EPT Abundance	Ephemroptera Abundance	Plecoptera Abundance	Trichoptera Abundance
2020	June	RG_FOUKI	1	3,170	2,660	230	280
			2	2,625	2,292	92	242
			3	2,005	1,785	90	130
		RG_FOBKS	1	539	436	42	61
			2	570	454	45	71
			3	434	258	60	116
		RG_FOBSC	1	1,159	878	104	178
			2	1,333	1,025	100	208
			3	2,582	2,209	173	200
		RG_FOBCP	1	416	342	11	63
			2	664	544	40	80
			3	852	726	32	94
		RG_FRCP1SW	1	339	237	24	78
			2	1,380	1,112	84	184
			3	3,300	2,875	183	242
		RG_FRUPO	1	2,122	1,400	356	367
			2	1,480	1,100	67	313
			3	2,179	1,843	93	243
		RG_FODPO	1	368	211	93	64
			2	1,793	1,150	350	293
			3	2,292	1,562	362	369
		RG_FO22	2	1,536	614	736	186
		RG_FOUEW	1	1,927	1,493	287	147
			2	2,533	1,867	542	125
			3	3,270	2,530	630	110
2020	September	RG_HENUP	1	7,280	5,440	1,160	680
			2	8,660	6,640	1,500	520
			3	7,620	6,200	1,080	340
		RG_FO26	1	27,200	15,320	9,400	2,480
			2	28,260	19,100	6,320	2,840
			3	23,280	15,860	5,200	2,220
		RG_FODHE	1	20,160	15,840	3,580	740
			2	27,560	22,540	4,120	900
			3	15,380	11,680	2,960	740
		RG_FOUCL	1	15,960	12,840	2,540	580
			2	17,080	13,400	1,520	2,160
			3	11,420	9,040	1,320	1,060
		RG_FOUNGD	1	13,900	8,520	2,780	2,600
			2	23,440	15,780	5,700	1,960
			3	9,860	7,340	1,340	1,180
		RG_FODNGD	1	10,720	7,520	2,400	800
			2	6,320	4,100	1,260	960
			3	12,380	8,800	2,060	1,520
		RG_MP1	1	6,080	4,420	880	780
			2	5,720	3,860	920	940
			3	8,100	5,640	1,100	1,360
		RG_FOUSH	1	6,360	4,420	1,360	580
			2	4,240	2,500	1,140	600
			3	5,440	3,640	1,180	620
		RG_FOUKI	1	5,140	4,080	760	300
			2	5,380	4,200	780	400
			3	8,340	5,480	2,220	640
		RG_FOBKS	1	4,700	2,760	1,000	940
			2	4,060	2,800	600	660
			3	7,650	5,250	1,500	900
		RG_SCOUTDS	1	5,420	2,880	1,900	640
			2	5,860	3,300	1,980	580
			3	7,200	4,480	2,300	420
		RG_FOBSC	1	4,300	1,940	1,840	520
			2	4,100	2,140	1,200	760
			3	6,940	3,420	2,980	540
		RG_FOBCP	1	7,420	3,040	3,840	540
			2	8,100	4,680	2,940	480
			3	4,320	1,740	2,240	340
			4	11,580	4,700	6,260	620
			5	15,760	5,360	9,760	640
		RG_FRCP1SW	1	15,520	3,300	11,240	980
			2	14,620	3,200	10,360	1,060
			3	2,370	1,080	850	440
		RG_FRUPO	1	19,100	5,220	12,860	1,020
			2	4,380	1,320	2,820	240
			3	9,900	2,320	6,940	640
		RG_FODPO	1	11,420	3,260	7,260	900
			2	19,300	3,520	15,300	480
			3	8,260	2,120	5,320	820
		RG_FO22	1	4,620	1,220	2,880	520
			2	7,300	1,460	4,860	980
			3	10,860	1,740	6,560	2,560
			4	10,560	1,780	7,640	1,140
			5	7,520	1,740	3,740	2,040
		RG_FOUEW	1	4,980	1,120	2,900	960
			2	5,300	820	3,540	940
			3	5,600	1,700	3,060	840
	December	RG_UFR1	1	32,140	16,480	13,940	1,720
			2	20,980	11,420	8,400	1,160
			3	23,100	10,080	10,560	2,460
		RG_FOUKI	1	10,920	5,420	5,260	240
			2	10,040	4,520	5,380	140
			3	4,580	1,240	3,140	200
		RG_SCOUTDS	1	20,780	5,300	15,120	360
			2	12,380	2,700	9,500	180
			3	11,060	2,380	8,340	340
		RG_FRUPO	1	28,420	880	26,780	760
			2	13,520	420	12,780	320
			3	18,520	660	17,640	220
		RG_FODPO	1	40,060	2,900	36,200	960
			2	64,040	4,260	58,600	1,180
			3	44,700	3,500	39,940	1,260
		RG_FOUEW	1	6,960	600	6,160	200
			2	15,940	1,240	14,000	700
			3	11,800	1,260	9,840	700

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Chironomidae Abundance	Baetidae Abundance	Heptageniidae Abundance	Ephemerellidae Abundance
2020	June	RG_FOUKI	1	130	660	1,850	150
			2	50	500	1,642	133
			3	37	415	1,305	60
		RG_FOBKS	1	16	55	360	21
			2	17	110	315	24
			3	12	118	126	14
		RG_FOBSC	1	89	167	600	104
			2	125	242	600	175
			3	64	355	1,591	255
		RG_FOBCP	1	26	28	273	39
			2	58	73	438	33
			3	29	48	634	44
		RG_FRCP1SW	1	15	11	216	10
			2	36	80	992	40
			3	133	75	2,650	142
		RG_FRUPO	1	311	56	978	344
			2	780	33	753	307
			3	64	64	1,557	221
		RG_FODPO	1	19	15	173	23
			2	243	7.1	1,100	43
			3	100	31	1,385	138
		RG_FO22	2	136	43	479	93
		RG_FOUEW	1	113	520	860	93
			2	80	675	908	250
			3	100	740	1,680	110
2020	September	RG_HENUP	1	560	0	4,920	520
			2	920	20	6,080	480
			3	1,020	0	5,380	760
		RG_FO26	1	3,580	2,500	6,980	5,780
			2	2,940	5,500	6,560	7,040
			3	3,400	4,540	6,520	4,800
		RG_FODHE	1	11,340	1,220	7,260	7,220
			2	11,540	1,720	10,420	10,360
			3	5,900	560	5,220	5,880
		RG_FOUCL	1	4,220	1,140	8,640	2,980
			2	2,760	1,000	7,540	4,820
			3	1,160	700	5,260	3,080
		RG_FOUNGD	1	640	400	5,260	2,860
			2	460	920	9,000	5,860
			3	600	500	3,920	2,920
		RG_FODNGD	1	3,320	440	4,660	2,420
			2	720	400	2,980	720
			3	2,300	440	5,680	2,680
		RG_MP1	1	1,000	440	2,420	1,540
			2	646	200	2,360	1,300
			3	1,120	760	3,600	1,280
		RG_FOUSH	1	2,780	500	2,760	1,160
			2	4,120	420	1,380	700
			3	2,900	660	2,140	840
		RG_FOUKI	1	1,260	40	3,620	400
			2	1,000	280	3,380	520
			3	4,340	540	3,680	1,220
		RG_FOBKS	1	340	240	2,160	360
			2	280	160	2,240	400
			3	283	572	4,308	370
		RG_SCOUTDS	1	500	240	1,880	760
			2	480	200	1,940	1,160
			3	460	120	3,320	1,040
		RG_FOBSC	1	460	120	1,460	360
			2	440	100	1,620	420
			3	1,300	340	2,560	520
		RG_FOBCP	1	1,080	800	1,560	680
			2	780	740	2,920	1,020
			3	580	440	1,080	220
			4	1,200	1,100	3,000	600
			5	1,240	1,300	3,340	700
		RG_FRCP1SW	1	180	820	2,440	40
			2	40	380	2,600	220
			3	50	10	1,040	30
		RG_FRUPO	1	4,240	919	2,100	2,180
			2	1,636	740	300	260
			3	3,400	840	1,140	340
		RG_FODPO	1	2,760	837	1,940	440
			2	6,357	1,340	1,640	540
			3	4,300	620	1,220	280
		RG_FO22	1	400	380	600	240
			2	3,700	540	740	180
			3	1,660	680	620	440
			4	4,200	900	560	320
			5	1,320	1,080	260	400
		RG_FOUEW	1	2,280	420	440	260
			2	1,520	180	420	220
			3	1,520	340	1,140	220
	December	RG_UFR1	1	1,680	2,060	8,000	6,360
			2	1,120	700	8,160	2,500
			3	1,220	600	4,620	4,860
		RG_FOUKI	1	3,240	1,180	4,000	240
			2	3,280	1,440	2,920	140
			3	1,920	960	140	140
		RG_SCOUTDS	1	1,180	1,380	3,720	200
			2	740	820	1,680	200
			3	800	300	1,860	200
		RG_FRUPO	1	2,440	520	360	0
			2	1,660	180	240	0
			3	940	480	180	0
		RG_FODPO	1	5,700	2,260	580	60
			2	5,040	3,140	1,020	100
			3	3,399	2,520	960	20
		RG_FOUEW	1	340	340	240	20
			2	440	520	640	80
			3	720	660	540	60

Table E.27: Benthic Invertebrate Community Endpoints, Fording River, FRO LAEMP, 2012 to 2020

Year	Month	Station	Rep	Autotrophic to Heterotrophic Index	Filtering Collector Index	Predator Index	Hyporheic to Benthic Index
2020	June	RG_FOUKI	1	-0.091	-1.2	-0.77	-2.4
			2	-0.068	-2.2	-0.90	-2.1
			3	-0.15	-1.3	-1.0	-2.7
		RG_FOBKS	1	0.54	-1.1	-0.66	-2.2
			2	0.18	-0.94	-0.64	-2.7
			3	-0.41	-0.64	-0.36	-2.7
		RG_FOBSC	1	-0.014	-1.1	-0.58	-2.5
			2	-0.66	0.27	-0.80	-2.2
			3	-0.15	-0.48	-0.83	-2.5
		RG_FOBCP	1	-0.26	-1.0	-0.67	-1.9
			2	-0.22	-0.88	-0.69	-1.8
			3	-0.17	-0.75	-0.82	-1.8
		RG_FRCP1SW	1	0.18	-0.67	-0.48	-2.3
			2	0.085	-0.82	-0.72	-1.9
			3	0.095	-0.85	-0.90	-2.6
		RG_FRUPO	1	-0.027	-1.2	-0.37	-2.2
			2	-0.75	-1.1	-0.51	-1.8
			3	-0.20	-0.94	-0.65	-2.0
		RG_FODPO	1	-0.35	-0.57	-0.41	-1.6
			2	-0.31	-1.6	-0.50	-2.2
			3	-0.19	-1.6	-0.49	-1.7
		RG_FO22	2	-0.43	-0.12	-0.76	-0.81
		RG_FOUEW	1	-0.22	-1.3	-0.64	-1.8
			2	-0.13	-1.4	-0.56	-1.9
			3	0.026	-1.5	-0.81	-1.8
2020	September	RG_HENUP	1	0.36	-0.041	-0.88	-2.0
			2	0.41	-0.49	-0.93	-2.7
			3	0.32	-1.00	-0.65	-1.9
		RG_FO26	1	-0.50	-0.56	-0.58	-1.3
			2	-0.54	-0.65	-0.55	-0.99
			3	-0.47	-0.77	-0.66	-0.94
		RG_FODHE	1	-0.47	-1.2	-0.61	-1.5
			2	-0.37	-1.9	-0.50	-1.5
			3	-0.42	-1.3	-0.51	-1.6
		RG_FOUCL	1	-0.069	-2.1	-0.72	-1.0
			2	-0.14	-1.2	-0.52	-0.90
			3	-0.078	-1.3	-0.42	-0.74
		RG_FOUNGD	1	-0.19	-0.89	-0.38	-0.91
			2	-0.13	-1.1	-0.38	-1.2
			3	-0.15	-2.1	-0.30	-0.77
		RG_FODNGD	1	-0.31	-1.4	-0.58	-0.89
			2	-0.13	-1.6	-0.59	-0.64
			3	-0.17	-1.8	-0.50	-0.91
		RG_MP1	1	-0.30	-1.7	-0.39	-0.61
			2	-0.24	-1.1	-0.45	-0.66
			3	-0.11	-1.5	-0.44	-0.94
		RG_FOUSH	1	-0.43	-1.2	-0.72	-0.64
			2	-0.64	-1.4	-0.84	-0.43
			3	-0.58	-1.5	-0.73	-0.59
		RG_FOUKI	1	-0.16	-1.5	-0.97	-0.30
			2	-0.12	-0.97	-0.86	-0.53
			3	-0.46	-1.3	-0.81	-0.54
		RG_FOBKS	1	-0.22	-1.3	-0.48	-0.35
			2	-0.18	-1.0	-0.60	-0.31
			3	-0.026	-1.1	-0.68	-0.53
		RG_SCOUTDS	1	-0.49	-1.0	-0.55	-0.34
			2	-0.45	-1.0	-0.47	-0.45
			3	-0.27	-1.4	-0.53	-0.38
		RG_FOBSC	1	-0.49	-1.3	-0.59	-0.38
			2	-0.47	-0.74	-0.48	-0.29
			3	-0.47	-1.2	-0.75	-0.55
		RG_FOBCP	1	-0.65	-1.1	-0.46	-0.70
			2	-0.32	-0.82	-0.51	-0.87
			3	-0.57	-0.87	-0.69	-0.39
			4	-0.55	-1.0	-0.70	-0.74
			5	-0.59	-1.0	-0.64	-0.94
		RG_FRCP1SW	1	-0.63	-0.85	-0.80	-1.3
			2	-0.56	-0.99	-0.87	-0.96
			3	-0.035	-1.5	-0.95	-0.48
		RG_FRUPO	1	-0.67	-2.4	-0.14	-1.6
			2	-0.96	-0.98	-0.29	-1.5
			3	-0.92	-0.52	-0.34	-1.2
		RG_FODPO	1	-0.56	-1.7	-0.58	-1.7
			2	-0.95	-1.4	-0.72	-1.6
			3	-0.69	-1.5	-0.51	-1.5
		RG_FO22	1	0.15	-0.82	-0.67	-2.3
			2	-0.22	-1.3	-0.62	-1.5
			3	0.0086	-0.88	-0.69	-1.5
			4	-0.20	-1.1	-0.63	-1.6
			5	0.36	-1.1	-0.90	-1.8
		RG_FOUEW	1	-0.49	-0.72	-0.48	-1.4
			2	-0.47	-0.73	-0.32	-1.2
			3	-0.39	-0.72	-0.55	-2.1
	December	RG_UFR1	1	-0.44	-2.0	-0.57	-2.1
			2	-0.19	-1.2	-0.67	-1.5
			3	-0.49	-1.0	-0.45	-1.5
		RG_FOUKI	1	-0.43	-2.0	-1.3	-1.1
			2	-0.59	-1.9	-1.3	-1.0
			3	-1.7	-1.9	-1.1	-1.00
		RG_SCOUTDS	1	-0.71	-2.0	-1.3	-1.3
			2	-0.86	-2.0	-1.2	-1.3
			3	-0.75	-1.5	-1.1	-1.1
		RG_FRUPO	1	-1.8	-2.2	-0.66	-2.2
			2	-1.7	-1.7	-0.99	-1.9
			3	-1.8	-1.3	-0.76	-2.3
		RG_FODPO	1	-1.8	-1.6	-1.1	-2.4
			2	-1.7	-2.3	-1.2	-2.4
			3	-1.5	-1.9	-1.2	-3.4
		RG_FOUEW	1	-1.1	-0.63	-1.1	-1.7
			2	-1.2	-1.3	-0.95	-2.2
			3	-1.2	-1.2	-0.91	-2.3

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_FO26																				RG_FOBCP									
Replicate	1		2		3		4		5		6		7		8		9		10		1		2		3		4		5	
ROUNDWORMS																														
P. Nemata	120	0.020	40	0.0040	240	0.060	140	0.040	160	0.064	140	0.018	60	0.026	280	0.070	300	0.069	340	0.11	20	0.0010	40	0.017	40	0.038	150	0.055	90	0.015
FLATWORMS																														
P. Platyhelminthes																														
Cl. Turbellaria																														
F. Planariidae	80	0.20	60	0.15	220	0.76	40	0.056	80	0.22	20	0.010	20	0.098	40	0.058	-	-	60	0.070	10	0.017	-	-	10	0.0040	-	-	-	-
ANNELIDS																														
P. Annelida																														
WORMS																														
Cl. Oligochaeta																														
F. Enchytraeidae	-	-	-	-	20	0.010	-	-	-	-	20	0.0060	-	-	20	0.0080	10	0.0050	60	0.030	40	0.0060	270	0.053	110	0.028	330	0.073	110	0.023
F. Lumbricidae	-	-	-	-	40	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS																														
MITES																														
Cl. Arachnida																														
Subcl. Acari imm.																														
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hygrobatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	80	0.016	80	0.044	200	0.15	200	0.084	200	0.092	140	0.070	40	0.012	200	0.086	10	-	80	0.040	570	0.15	600	0.13	140	0.032	600	0.13	830	0.18
F. Trombidiformes	-	-	20	0.0020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																														
Cl. Ostracoda	20	0.0060	120	0.032	120	0.040	20	0.0060	40	0.012	20	0.010	-	-	-	-	-	-	-	-	-	-	10	0.0020	-	-	-	-	-	-
INSECTS																														
Cl. Insecta																														
BEETLES																														
O. Coleoptera																														
F. Dytiscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	0.087	-	-	-	-	-	-	-	-
F. Elmidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAYFLIES																														
O. Ephemeroptera																														
F. Ameletidae	40	0.012	520	0.72	20	0.028	80	0.27	40	0.0080	20	0.018	-	-	-	-	-	-	-	-	40	0.016	-	-	10	0.20	-	-	20	0.0040
F. Baetidae	120	0.27	640	2.0	540	0.93	280	0.50	300	0.62	320	0.068	240	0.30	540	0.23	430	0.18	480	0.77	10	0.069	20	0.0040	60	0.13	20	0.0030	60	0.14
F. Ephemerellidae	3,000	1.0	2,560	1.1	3,500	1.8	1,700	0.79	2,600	1.4	2,040	0.69	2,840	1.2	3,880	1.6	1,610	0.76	2,980	2.0	90	0.034	60	0.081	110	0.10	60	0.078	70	0.066
F. Heptageniidae	8,840	7.2	11,680	7.7	7,540	5.2	5,420	3.6	5,140	3.4	2,860	1.5	4,200	4.5	10,600	5.3	2,450	1.3	6,700	3.4	1,450	0.59	3,440	2.2	980	0.49	3,590	2.0	1,810	1.4
STONEFLIES																														
O. Plecoptera																														
F. Capniidae	80	0.032	20	0.024	-	-	-	-	-	-	-	-	20	0.012	-	-	-	-	-	-	110	0.097	110	0.079	20	0.026	300	0.33	40	0.035
F. Chloroperlidae	1,080	1.5	560	1.4	220	0.18	40	0.084	-	-	40	0.022	120	0.21	360	0.52	80	0.12	200	0.35	20	0.040	50	0.051	40	0.14	30	0.044	10	0.0060
F. Leuctridae	360	0.34	120	0.098	160	0.12	-	-	140	0.076	20	0.030	40	0.042	20	0.020	10	0.0090	300	0.22	-	-	-	-	-	-	-	-	-	-
F. Nemouridae	800	2.0	400	1.2	1,100	5.7	560	1.5	700	2.2	400	0.95	520	0.56	680	1.3	340	0.11	940	1.7	240	0.095	770	0.24	320	0.12	1,280	0.42	500	0.28
F. Perlidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	0.74	20	0.10
F. Perlodidae	100	2.0	80	0.72	320	4.0	120	1.2	100	0.91	120	1.3	240	2.3	360	1.6	110	0.037	200	1.2	10	0.0030	460	3.8	100	0.040	280	0.93	150	0.37
F. Peltoperlidae	100	2.0	80	0.72	320	4.0	120	1.2	100	0.91	120	1.3	240	2.3	360	1.6	110	0.037	200	1.2	10	0.0030	460	3.8	100	0.040	280	0.93	150	0.37
F. Taeniopterygidae	80	0.038	40	0.010	60	0.014	60	0.012	20	0.016	100	0.030	180	0.48	80	0.012	140	0.034	240	0.052	20	0.0040	340	0.079	130	0.027	300	0.074	10	0.0060
CADDISFLIES																														
O. Trichoptera																														
larvae/immature	220	0.018	120	0.0060	260	0.018	220	0.032	440	0.024	180	0.016	60	0.010	120	0.010	60	0.011	160	0.018	20	0.0040	-	-	-	-	-	-	-	-
F. Apataniidae	-	-	20	0.016	60	0.050	-	-	40	0.038	-	-	-	-	-	-	-	-	-	-	260	0.32	20	0.022	10	0.022	30	0.062	20	0.024
F. Brachycentridae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	0.0040	-	-	50	0.0060	10	0.0020
F. Glossosomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	0.014	10	0.013	-	-	10	0.0040	10	0.038	-	-
F. Hydropsychidae	40	0.37	220	0.058	220	2.0	160	0.36	140	0.79	110	2.0	100	0.062	40	0.61	120	0.050	190	1.8	20	0.036	10	0.014	70	0.12	120	0.25	30	1.0
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	100	0.014	120	0.022	-	-	20	0.0040	100	0.032	40	0.0060	-	-	40	0.0060	-	-	10	0.73	-	-	-	-	-	-	-	-	-	-
F. Rhyacophilidae	220	1.0	340	2.0	480	3.4	180	0.68	380	2.1	360	1.5	80	0.41	380	1.5	80	2.0	260	4.0	30	0.22	70	0.32	100	1.4	130	0.86	20	0.19
F. Uenoidae	40	0.0080	20	0.0020	40	0.0080	-	-	80	0.018	20	0.0040	40	0.014	40	0.0040	-	-	20	0.0040	-	-	-	-	-	-	-	-	-	-
TRUE FLIES																														
O. Diptera																														
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.024	-	-	-	-	-	-
F. Ceratopogonidae	40	0.018	-	-	400	0.15	-	-	40	0.034	20	0.012	40	0.040	60	0.040	20	0.018	20	0.044	10	0.0010	10	0.0050	20	0.0090	10	0.0080	10	0.0070
F. Chironomidae	460	0.12	1,320	0.81	2,300	1.9	1,000	1.0	1,820	1.7	2,160	2.5	1,620	1.8	2,200	2.6	2,080	1.9	4,200	4.4	570	0.22	220	0.047	40	0.022	430	0.18	200	0.11
F. Dolichopodidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	40	0.034	20	0.052	-	-	20	0.084	20	0.020	-	-	-	-	40	0.18	40	0.050	40	0.12	10	0.012	60	0.11	70	0.14	20	0.015	40	0.041
F. Muscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	1,880	0.52	2,700	0.89	3,380	1.2	740	0.22	1,620	0.39	1,400	0.40	1,240	0.36	1,140	0.23	440	0.14	2,400	0.92	3,300	1.8	1,810	0.80	1,380	0.67	2,890	0.98	1,780	0.89
F. Sciomyzidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.037	-	-	-	-	-	-	-	-
F. Tipulidae	100	0.044	20	0.010	40	0.018	-	-	20	0.018	20	0.014	20	0.014	60	0.056	40	0.024	20	0.022	60	0.073	60	0.080	80	0.033	30	0.025	50	0.060
CLAMS																														
Cl. Gastropoda																														
F. Lymnaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																														
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0040	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS per sample	17,980		21,900		21,940		11,100		14,340		10,870		11,840		21,280		8,430		20,120		6,970		8,490		3,850		10,750		5,910	
TOTAL NUMBER OF TAXA [a]	25	25	26	26	25	25	20	20	24	24	24	24	21	21	23	23	20	19	24	24	27	27	23	23	23	23	23	23	23	23
TOTAL BIOMASS (g)		17		19		28		11		14		11		13		16		6.8		22		4.0		8.2		3.8		7.3		5.0

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_FOBCP										RG_FOBKS																	
Replicate	6		7		8		9		10		1		2		3		4		5		6		7		8		9		10	
ROUNDWORMS																														
P. Nemata	30	0.0060	70	0.059	40	0.045	20	0.0060	50	0.044	40	0.0060	10	0.017	20	0.0030	70	0.051	30	0.018	40	0.0030	60	0.047	20	0.0020	20	0.012	10	0.0010
FLATWORMS																														
P. Platyhelminthes																														
Cl. Turbellaria																														
F. Planariidae	10	0.0060	10	0.013	-	-	-	-	10	0.032	-	-	-	-	-	-	-	-	-	-	20	0.020	10	0.0080	-	-	-	-	-	-
ANNELIDS																														
P. Annelida																														
WORMS																														
Cl. Oligochaeta																														
F. Enchytraeidae	40	0.0080	30	0.013	50	0.012	10	0.0030	130	0.033	50	0.020	10	0.0030	30	0.0050	10	0.0030	20	0.0050	-	-	-	-	-	-	-	-	20	0.047
F. Lumbricidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS																														
MITES																														
Cl. Arachnida																														
Subcl. Acari imm.																														
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hygrobatidae	-	-	20	0.0020	-	-	-	-	10	0.0070	-	-	10	0.0030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	140	0.038	260	0.068	330	0.069	750	0.17	620	0.12	240	0.051	140	0.037	50	0.017	270	0.053	180	0.036	230	0.037	120	0.024	480	0.12	20	0.0090	90	0.051
F. Trombidiformes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																														
Cl. Ostracoda	-	-	-	-	-	-	-	-	10	0.0030	20	0.0070	30	0.010	-	-	-	-	-	-	10	0.0040	-	-	10	0.0010	-	-	-	-
INSECTS																														
Cl. Insecta																														
BEETLES																														
O. Coleoptera																														
F. Dytiscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Elmidae	-	-	-	-	10	0.0020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0030	-	-	20	0.024	10	0.0030	-	-
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAYFLIES																														
O. Ephemeroptera																														
F. Ameletidae	20	0.012	-	-	-	-	10	0.023	-	-	-	-	-	-	10	0.0020	-	-	10	0.0060	-	-	-	-	20	0.064	-	-	-	-
F. Baetidae	90	0.39	130	0.37	20	0.0050	200	0.96	70	0.30	40	0.14	110	0.36	40	0.11	10	0.0080	70	0.20	60	0.18	20	0.030	30	0.075	10	0.071	20	0.077
F. Ephemerellidae	60	0.055	110	0.16	30	0.064	300	0.19	60	0.071	130	0.070	110	0.014	70	0.090	170	0.082	190	0.10	300	0.076	120	0.038	160	0.20	40	0.034	90	0.75
F. Heptageniidae	1,550	0.78	1,520	0.82	2,710	1.3	2,730	1.3	2,040	0.88	1,050	0.36	1,980	0.64	1,590	0.59	1,030	0.27	1,840	0.73	2,370	0.84	1,820	1.4	1,550	0.51	1,330	1.1	1,860	1.0
STONEFLIES																														
O. Plecoptera																														
F. Capniidae	40	0.047	-	-	80	0.064	30	0.021	10	0.0030	-	-	10	0.012	10	0.019	-	-	10	0.011	20	0.010	-	-	10	0.011	-	-	-	-
F. Chloroperlidae	-	-	10	0.0020	20	0.012	20	0.016	30	0.011	-	-	20	0.031	10	0.071	-	-	20	0.017	-	-	-	-	20	0.0030	-	-	-	-
F. Leuctridae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Nemouridae	510	0.17	210	0.079	760	0.26	1,310	0.58	300	0.10	40	0.035	90	0.082	-	-	50	0.030	120	0.037	90	0.043	70	0.10	30	0.0080	20	0.048	40	0.099
F. Perlidae	-	-	-	-	20	0.72	40	0.17	-	-	-	-	10	0.029	-	-	-	-	20	0.087	10	0.058	-	-	40	0.35	-	-	-	-
F. Perlodidae	80	0.13	50	0.50	170	0.086	280	0.82	290	0.40	70	0.064	100	0.91	20	0.0060	90	0.18	130	0.92	80	0.62	40	0.15	30	0.014	70	0.80	150	2.1
F. Peltoperlidae	80	0.13	50	0.50	170	0.086	280	0.82	290	0.40	70	0.064	100	0.91	20	0.0060	90	0.18	130	0.92	80	0.62	40	0.15	30	0.014	70	0.80	150	2.1
F. Taeniopterygidae	40	0.016	40	0.014	110	0.026	250	0.069	140	0.026	-	-	10	0.0040	-	-	30	0.0050	30	0.0090	40	0.0050	20	0.0040	-	-	10	0.0010	-	-
CADDISFLIES																														
O. Trichoptera																														
larvae/immature	-	-	-	-	10	0.0020	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0020	-	-	-	-
F. Apataniidae	90	0.10	120	0.12	40	0.050	40	0.073	70	0.097	20	0.0080	40	0.020	-	-	10	0.0060	10	0.0070	-	-	-	-	10	0.017	-	-	50	0.015
F. Brachycentridae	-	-	-	-	-	-	80	0.34	30	0.0030	-	-	-	-	-	-	10	0.0020	-	-	-	-	-	-	10	0.0040	-	-	-	-
F. Glossosomatidae	-	-	-	-	20	0.0080	10	0.0010	10	0.13	-	-	-	-	10	0.0040	-	-	20	0.0050	-	-	-	-	-	-	-	-	-	-
F. Hydropsychidae	-	-	-	-	20	0.072	190	5.7	40	0.93	-	-	20	2.2	-	-	20	0.029	60	0.093	10	1.0	20	0.018	-	-	20	0.96	10	1.2
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	-	-	10	0.0020	-	-	10	0.0030	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0010	-	-	10	0.0040	-	-	10	0.0020
F. Rhyacophilidae	20	0.32	20	0.014	70	0.57	130	0.46	120	1.9	10	0.34	30	0.32	30	0.18	70	0.26	80	0.29	100	0.34	150	0.44	120	0.68	130	1.5	130	0.55
F. Uenoidae	-	-	-	-	-	-	10	0.0020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRUE FLIES																														
O. Diptera																														
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Ceratopogonidae	10	0.0050	-	-	10	0.0010	20	0.0060	10	0.0020	-	-	10	0.0080	10	0.0040	-	-	50	0.013	10	0.0040	20	0.013	-	-	-	-	-	-
F. Chironomidae	60	0.068	60	0.056	160	0.074	240	0.086	400	0.15	380	0.16	100	0.055	60	0.096	210	0.051	70	0.043	80	0.088	30	0.018	120	0.12	70	0.034	110	0.073
F. Dolichopodidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	80	0.16	90	0.16	50	0.093	20	0.020	70	0.15	30	0.036	80	0.14	10	0.0090	30	0.050	30	0.056	50	0.065	10	0.019	190	0.36	40	0.053	40	0.059
F. Muscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	2,100	1.2	710	0.17	1,870	0.96	2,860	2.1	2,140	1.2	1,550	0.43	660	0.29	480	0.16	930	0.35	900	0.38	1,190	0.62	890	0.39	980	0.63	410	0.19	730	0.30
F. Sciomyzidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Tipulidae	-	-	30	9.2	50	0.046	50	2.5	40	0.049	50	0.035	20	0.0060	-	-	40	3.7	-	-	50	2.3	20	1.4	10	0.010	-	-	30	0.010
CLAMS																														
Cl. Gastropoda																														
F. Lymnaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																														
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS per sample	4,970		3,530		6,660		9,650		6,700		3,720		3,600		2,450		3,070		3,940		4,790		3,420		3,940		2,220		3,390	
TOTAL NUMBER OF TAXA [a]	19	19	21	21	24	24	27	27	25	25	16	16	23	23	17	17	18	18	22	22	22	22	17	17	23	23	15	15	17	17
TOTAL BIOMASS (g)		3.5		12		4.5		16		6.6		1.8		5.2		1.4		5.1		3.1		6.3		4.0		3.3		4.8		6.3

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_FOBSC																				RG_FOUKI									
Replicate	1		2		3		4		5		6		7		8		9		10		1		2		3		4		5	
ROUNDWORMS																														
P. Nemata	30	0.014	10	0.0020	20	0.0010	10	0.011	10	0.0010	-	-	30	0.024	40	0.011	-	-	10	0.019	30	0.032	-	-	20	0.010	40	0.014	20	0.034
FLATWORMS																														
P. Platyhelminthes																														
Cl. Turbellaria																														
F. Planariidae	-	-	-	-	-	-	-	-	-	-	-	-	40	0.13	10	0.0010	-	-	-	-	20	0.031	-	-	10	0.0040	10	0.012	-	-
ANNELIDS																														
P. Annelida																														
WORMS																														
Cl. Oligochaeta																														
F. Enchytraeidae	400	0.11	80	0.028	100	0.025	30	0.0040	-	-	30	0.0060	-	-	70	0.011	40	0.0060	-	-	40	0.0080	-	-	30	0.010	20	0.034	60	0.030
F. Lumbricidae	-	-	-	-	-	-	-	-	-	-	-	-	20	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS																														
MITES																														
Cl. Arachnida																														
Subcl. Acari imm.																														
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hygrobatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	140	0.027	200	0.052	140	0.030	220	0.049	230	0.042	330	0.073	100	0.024	160	0.030	130	0.023	460	0.12	60	0.019	100	0.025	40	0.0090	210	0.053	40	0.012
F. Trombidiformes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																														
Cl. Ostracoda	40	0.0070	10	0.0010	-	-	20	0.0040	10	0.0010	10	0.0010	10	0.0010	10	0.0020	-	-	20	0.0060	30	0.0080	-	-	60	0.015	70	0.017	40	0.014
INSECTS																														
Cl. Insecta																														
BEETLES																														
O. Coleoptera																														
F. Dytiscidae	-	-	-	-	-	-	-	-	-	-	-	-	10	0.12	-	-	-	-	10	0.13	-	-	-	-	-	-	-	-	-	-
F. Elmidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.019	10	0.015	10	0.0040	-	-	10	0.0010	-	-	-	-
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-
MAYFLIES																														
O. Ephemeroptera																														
F. Ameletidae	10	0.0010	-	-	-	-	-	-	10	0.010	-	-	100	0.36	-	-	-	-	-	-	30	0.0090	-	-	20	0.010	30	0.012	20	0.024
F. Baetidae	10	0.040	20	0.084	-	-	10	0.063	10	0.0010	-	-	-	-	20	0.0050	20	0.0030	-	-	80	0.30	30	0.15	50	0.16	20	0.091	280	1.0
F. Ephemerellidae	50	0.017	20	0.0010	40	0.010	40	0.049	160	0.14	80	0.11	80	0.080	10	0.0010	90	0.033	40	0.012	200	0.037	30	0.047	120	0.056	100	0.064	20	0.0020
F. Heptageniidae	1,760	0.99	1,060	0.51	2,000	1.0	1,050	0.47	2,110	1.2	1,910	0.89	1,500	0.90	1,670	0.78	1,670	0.77	700	0.33	1,930	1.7	960	0.45	1,990	1.4	2,410	1.1	2,860	2.5
STONEFLIES																														
O. Plecoptera																														
F. Capniidae	30	0.037	-	-	30	0.030	10	0.015	10	0.0090	-	-	70	0.041	20	0.016	20	0.011	-	-	90	0.083	20	0.024	-	-	60	0.066	140	0.14
F. Chloroperlidae	-	-	20	0.041	20	0.035	10	0.0020	30	0.0050	10	0.0040	100	1.6	10	0.040	20	0.015	-	-	-	-	-	-	-	-	40	0.19	60	0.29
F. Leuctridae	-	-	-	-	-	-	-	-	10	0.0040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Nemouridae	30	0.0030	10	0.0020	80	0.038	120	0.045	100	0.12	50	0.014	40	0.033	410	0.32	260	0.13	50	0.014	420	0.22	50	0.012	70	0.025	100	0.065	660	0.27
F. Perlidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	0.057	-	-	-	-	-	-	-	-	-	-	-	-
F. Perlodidae	110	1.9	80	0.28	50	0.58	30	0.0090	110	1.7	120	0.81	50	1.5	230	1.4	130	0.33	140	0.45	80	0.035	30	0.51	40	0.018	40	0.67	40	0.014
F. Peltoperlidae	110	1.9	80	0.28	50	0.58	30	0.0090	110	1.7	120	0.81	50	1.5	230	1.4	130	0.33	140	0.45	80	0.035	30	0.51	40	0.018	40	0.67	40	0.014
F. Taeniopterygidae	-	-	-	-	10	0.0020	10	0.0010	60	0.011	10	0.0010	60	0.014	50	0.0070	130	0.025	-	-	80	0.021	-	-	20	0.0030	40	0.0080	60	0.010
CADDISFLIES																														
O. Trichoptera																														
larvae/immature	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0010	-	-	-	-
F. Apataniidae	30	0.013	-	-	10	0.0090	30	0.013	80	0.067	20	0.0070	-	-	-	-	-	-	10	0.0030	-	-	10	0.0060	20	0.011	-	-	-	-
F. Brachycentridae	-	-	20	0.0010	-	-	-	-	10	0.0010	-	-	-	-	30	0.0070	20	0.0010	-	-	30	0.0060	10	0.0020	-	-	20	0.0030	-	-
F. Glossosomatidae	-	-	-	-	-	-	10	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0010	-	-	-	-
F. Hydropsychidae	-	-	-	-	-	-	30	0.061	-	-	-	-	-	-	190	7.7	50	0.11	-	-	90	0.13	10	0.019	-	-	-	-	-	-
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	10	0.0010	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-
F. Rhyacophilidae	30	0.062	30	0.40	40	0.50	40	0.0040	10	0.13	70	0.62	40	0.25	100	0.77	150	0.67	70	1.0	90	0.75	50	0.66	40	0.53	50	0.13	60	0.038
F. Uenoidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0010	10	0.0010	-	-	-	-	10	0.0020	-	-	-	-
TRUE FLIES																														
O. Diptera																														
indeterminate	-	-	-	-	-	-	-	-	10	0.073	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Ceratopogonidae	30	0.0080	10	0.0020	40	0.013	20	0.0080	30	0.017	50	0.016	90	0.042	20	0.0080	20	0.0080	-	-	20	0.0080	10	0.0020	120	0.057	70	0.027	120	0.044
F. Chironomidae	80	0.044	50	0.063	90	0.038	90	0.042	50	0.012	60	0.049	100	0.080	90	0.037	30	0.010	140	0.047	300	0.14	250	0.12	240	0.10	300	0.15	460	0.39
F. Dolichopodidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	10	0.018	10	0.018	30	0.041	30	0.051	30	0.025	30	0.043	60	0.10	-	-	40	0.044	100	0.16	10	0.022	20	0.018	20	0.021	20	0.025	60	0.14
F. Muscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	6,350	4.3	2,230	1.3	2,510	1.9	1,180	0.78	2,410	1.6	1,950	1.3	1,000	0.42	1,340	0.91	1,270	0.68	730	0.59	2,660	1.5	770	0.32	2,730	1.8	3,840	2.6	7,240	6.2
F. Sciomyzidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	-	-	-	-	-	-	-	-	-	-	10	0.0030	-	-	-	-	-	-	-	-	30	0.053	-	-	-	-	10	0.037	20	0.024
F. Tipulidae	40	0.014	-	-	10	0.0040	10	0.0010	30	1.9	10	0.0020	130	42	-	-	-	-	10	0.0010	20	1.7	10	0.026	40	0.015	20	0.058	120	1.2
CLAMS																														
Cl. Gastropoda																														
F. Lymnaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																														
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS per sample	9,190		3,860		5,240		3,010		5,550		4,750		3,630		4,480		4,150		2,540		6,350		2,370		5,720		7,520		12,400	
TOTAL NUMBER OF TAXA [a]	20	20	17	17	18	18	22	22	24	24	18	18	21	21	20	20	22	22	18	18	24	24	17	17	24	24	23	23	21	21
TOTAL BIOMASS (g)		7.6		2.8		4.3		1.7		7.0		4.0		48		12		3.0		3.0		6.8		2.4		4.3		5.5		12

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_FOUKI										RG_FO22																	
Replicate	6		7		8		9		10		1		2		3		4		5		6		7		8		9		10	
ROUNDWORMS																														
P. Nemata	80	0.10	40	0.058	50	0.029	140	0.12	50	0.040	100	0.046	60	0.066	20	0.0030	320	0.048	40	0.019	280	0.020	20	0.0080	40	0.0040	50	0.0080	20	0.0020
FLATWORMS																														
P. Platyhelminthes																														
Cl. Turbellaria																														
F. Planariidae	60	0.21	10	0.072	10	0.016	20	0.028	10	0.0040	20	0.020	20	0.0040	-	-	-	-	20	0.044	-	-	-	-	280	0.38	80	0.11	80	0.13
ANNELIDS																														
P. Annelida																														
WORMS																														
Cl. Oligochaeta																														
F. Enchytraeidae	40	0.0080	10	0.0060	30	0.021	60	0.0040	10	0.0020	80	0.042	-	-	-	-	80	0.0040	10	0.0010	160	0.016	100	0.016	20	0.0060	20	0.0030	20	0.0060
F. Lumbricidae	-	-	-	-	10	0.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.56	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	20	0.0020	-	-	120	0.0040	-	-	440	0.080	80	0.0020	60	0.0060	-	-	-	-
ARTHROPODS																														
MITES																														
Cl. Arachnida																														
Subcl. Acari imm.																														
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hygrobatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	60	0.014	130	0.036	140	0.034	100	0.038	50	0.016	440	0.11	240	0.050	30	0.0050	160	0.012	80	0.0070	560	0.11	560	0.074	80	0.034	260	0.077	-	-
F. Trombidiformes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0.0040	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																														
Cl. Ostracoda	100	0.028	40	0.010	50	0.013	40	0.0080	30	0.0070	40	0.016	-	-	-	-	-	-	10	0.0010	80	0.068	80	0.012	20	0.0060	-	-	-	-
INSECTS																														
Cl. Insecta																														
BEETLES																														
O. Coleoptera																														
F. Dytiscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Elmidae	-	-	-	-	-	-	-	-	-	-	920	1.5	1,400	2.2	2,330	2.9	4,160	4.4	1,360	2.1	5,440	4.8	2,040	2.3	3,340	2.9	1,230	1.3	640	0.46
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAYFLIES																														
O. Ephemeroptera																														
F. Ameletidae	40	0.020	10	0.0040	10	0.0050	220	0.63	10	0.0050	40	0.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Baetidae	80	0.13	110	0.21	30	0.097	20	0.064	10	0.046	20	0.074	100	0.52	80	0.26	240	0.93	220	0.84	360	1.6	100	0.53	640	3.0	80	0.40	40	0.35
F. Ephemerellidae	260	0.11	170	0.086	230	0.079	40	0.046	110	0.041	160	0.37	100	0.14	20	0.012	120	0.52	60	0.10	240	0.092	200	0.17	140	0.36	100	0.20	20	0.026
F. Heptageniidae	3,040	1.5	3,430	1.6	3,170	1.6	3,520	1.7	5,070	2.5	440	0.44	700	0.39	30	0.0030	800	0.24	410	0.23	320	0.084	240	0.066	260	0.074	300	0.30	40	0.010
STONEFLIES																														
O. Plecoptera																														
F. Capniidae	100	0.10	40	0.045	20	0.017	60	0.024	60	0.065	200	0.35	260	0.42	80	0.056	120	0.26	290	0.77	200	0.71	180	0.44	220	0.46	250	0.70	-	-
F. Chloroperlidae	40	0.13	40	0.046	-	-	20	0.12	20	0.026	100	0.078	20	0.042	40	0.044	40	0.048	10	0.0020	-	-	60	0.11	-	-	20	0.028	-	-
F. Leuctridae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Nemouridae	220	0.096	180	0.16	140	0.029	80	0.028	90	0.015	1,120	0.61	580	0.35	20	0.017	2,280	2.1	760	0.31	2,440	0.66	1,340	0.41	1,140	0.75	180	0.088	40	0.0020
F. Perlidae	40	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	0.58	-	-	-	-
F. Perlodidae	80	1.6	30	0.33	110	0.84	20	0.14	70	0.56	110	0.37	900	1.4	400	0.17	840	0.74	1,060	1.3	2,200	2.2	1,240	0.88	1,040	0.71	510	0.28	60	0.052
F. Peltoperlidae	80	1.6	30	0.33	110	0.84	20	0.14	70	0.56	110	0.37	900	1.4	400	0.17	840	0.74	1,060	1.3	2,200	2.2	1,240	0.88	1,040	0.71	510	0.28	60	0.052
F. Taeniopterygidae	60	0.014	50	0.013	20	0.0060	20	0.0080	60	0.010	-	-	200	0.056	30	0.0070	-	-	140	0.032	80	0.016	20	0.0080	80	0.016	30	0.0070	-	-
CADDISFLIES																														
O. Trichoptera																														
larvae/immature	-	-	20	0.0010	80	0.0080	-	-	10	0.0010	-	-	40	0.0040	-	-	80	0.012	10	0.0010	200	0.016	-	-	-	-	10	0.0010	20	0.0020
F. Apataniidae	40	0.022	-	-	10	0.015	-	-	-	-	20	0.012	-	-	-	-	280	0.20	40	0.017	240	0.12	160	0.13	-	-	400	0.25	60	0.046
F. Brachycentridae	-	-	-	-	-	-	-	-	-	-	-	-	40	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Glossosomatidae	-	-	20	0.015	10	0.0060	-	-	-	-	-	-	80	0.078	40	0.0060	320	0.14	390	0.066	40	0.0040	60	0.060	80	0.11	210	0.034	-	-
F. Hydropsychidae	100	0.11	60	2.0	10	0.011	-	-	10	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	20	0.0040	-	-	-	-	-	-	-	-	20	0.0020	120	0.010	20	0.0010	1,440	0.23	260	0.033	680	0.12	320	0.060	160	0.038	210	0.028	20	0.0040
F. Rhyacophilidae	140	1.2	60	0.045	160	0.55	-	-	120	0.60	100	1.2	200	2.0	150	1.3	320	5.5	170	1.3	240	1.2	140	1.8	260	3.6	170	3.1	40	0.75
F. Uenoidae	-	-	-	-	30	0.0060	-	-	-	-	-	-	-	-	-	-	80	0.016	-	-	-	-	-	-	-	-	-	-	-	-
TRUE FLIES																														
O. Diptera																														
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.033	-	-
F. Ceratopogonidae	60	0.016	200	0.093	50	0.021	100	0.016	90	0.035	60	0.052	40	0.016	-	-	120	0.012	-	-	160	0.10	60	0.038	20	0.018	20	0.0060	60	0.032
F. Chironomidae	540	0.44	420	0.23	620	0.21	280	0.066	290	0.13	860	0.36	1,180	0.24	160	0.056	2,960	1.1	1,080	0.40	3,920	2.3	2,440	1.2	3,000	1.6	500	0.29	140	0.056
F. Dolichopodidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	20	0.024	10	0.012	30	0.035	20	0.054	10	0.032	100	0.092	-	-	10	0.0060	200	0.18	10	0.0050	160	0.46	280	0.42	100	0.12	50	0.053	-	-
F. Muscidae	-	-	10	0.017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	4,580	3.2	4,190	2.1	3,960	2.2	5,640	1.8	3,460	2.1	80	0.0080	120	0.060	-	-	80	0.0080	10	0.0010	360	0.072	160	0.030	-	-	-	-	20	0.0060
F. Sciomyzidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	40	0.16	10	0.078	-	-	20	0.13	-	-	-	-	20	0.042	-	-	80	0.17	-	-	-	-	20	0.042	60	0.13	-	-	-	-
F. Tipulidae	80	1.2	80	0.056	80	2.2	60	6.0	20	1.1	80	0.050	80	0.44	10	0.0010	160	0.088	30	5.7	340	15	120	12	40	0.028	120	0.038	20	0.020
CLAMS																														
Cl. Gastropoda																														
F. Lymnaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																														
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	140	0.058	20	0.034	10	0.024	600	0.62	20	0.020	200	0.10	300	0.12	20	0.012	90	0.15	40	0.036
TOTAL NUMBER OF ORGANISMS per sample	9,940		9,370		9,060		10,520		9,670		5,250		6,540		3,480		16,080		6,500		19,380		10,360		11,120		4,920		1,380	
TOTAL NUMBER OF TAXA [a]	26	26	26	26	26	26	21	21	23	23	24	24	25	25	19	19	27	27	25	25	25	25	26	26	25	25	26	26	19	19
TOTAL BIOMASS (g)		12		7.3		8.1		11		8.5		6.2		8.9		4.9		18		13		31		21		15		8.1		2.0

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_FRCP1SW																				RG_FRUPO									
Replicate	1		2		3		4		5		6		7		8		9		10		1		2		3		4		5	
ROUNDWORMS																														
P. Nemata	40	0.0060	30	0.041	40	0.042	30	0.013	200	0.060	150	0.063	250	0.094	140	0.048	60	0.013	60	0.022	40	0.0060	140	0.058	60	0.0060	40	0.035	120	0.054
FLATWORMS																														
P. Platyhelminthes																														
Cl. Turbellaria																														
F. Planariidae	-	-	10	0.0030	10	0.12	-	-	10	0.0080	-	-	20	0.019	10	0.016	40	0.34	60	0.25	10	0.11	20	0.13	-	-	-	-	20	0.0060
ANNELIDS																														
P. Annelida																														
WORMS																														
Cl. Oligochaeta																														
F. Enchytraeidae	-	-	10	0.0020	-	-	80	0.028	10	0.0010	140	0.027	30	0.0050	10	0.0010	20	0.0040	10	0.0010	-	-	20	0.0020	-	-	-	-	-	-
F. Lumbricidae	-	-	10	0.29	-	-	-	-	10	0.047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS																														
MITES																														
Cl. Arachnida																														
Subcl. Acari imm.																														
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hygrobatidae	-	-	-	-	20	0.0020	-	-	10	0.0020	10	0.0070	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	60	0.015	50	0.014	90	0.020	-	-	130	0.035	60	0.016	50	0.0090	80	0.019	80	0.025	830	0.20	380	0.079	1,020	0.24	820	0.18	810	0.19	410	0.096
F. Trombidiformes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																														
Cl. Ostracoda	40	0.0080	60	0.015	20	0.0060	10	0.0020	-	-	-	-	10	0.0040	-	-	50	0.014	10	0.0010	-	-	-	-	-	-	10	0.0010	-	-
INSECTS																														
Cl. Insecta																														
BEETLES																														
O. Coleoptera																														
F. Dytiscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.095	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Elmidae	-	-	-	-	-	-	-	-	-	-	20	0.0030	20	0.0070	-	-	-	-	10	0.025	40	0.022	20	0.012	60	0.12	10	0.0030	-	-
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAYFLIES																														
O. Ephemeroptera																														
F. Ameletidae	-	-	20	0.016	-	-	10	0.012	10	0.13	10	0.023	-	-	10	0.019	-	-	-	-	50	0.73	-	-	-	-	110	1.3	20	0.37
F. Baetidae	-	-	-	-	10	0.032	-	-	10	0.0010	30	0.048	20	0.084	-	-	30	0.056	70	0.11	140	0.40	360	1.2	260	0.71	90	0.25	370	1.1
F. Ephemerellidae	-	-	70	0.10	100	1.3	10	0.040	40	0.0040	-	-	70	0.0070	20	0.0040	50	0.0060	150	0.41	200	0.38	220	0.44	200	0.080	170	0.12	100	0.67
F. Heptageniidae	120	0.85	4,270	3.2	2,050	1.4	370	0.15	1,410	1.3	720	0.40	2,540	1.3	1,250	0.86	3,100	2.2	1,050	0.71	1,000	0.33	1,340	1.5	1,540	1.6	690	0.35	980	1.0
STONEFLIES																														
O. Plecoptera																														
F. Capniidae	240	0.043	440	0.99	250	0.18	70	0.10	320	0.046	190	0.030	60	0.019	70	0.022	140	0.040	20	0.012	380	1.1	280	0.68	360	1.2	140	0.26	190	0.52
F. Chloroperlidae	80	0.034	30	0.095	20	0.0080	10	0.0020	80	0.057	10	0.046	20	0.033	30	0.045	-	-	20	0.0040	30	0.060	80	0.086	40	0.018	20	0.014	-	-
F. Leuctridae	-	-	-	-	-	-	-	-	10	0.0010	-	-	20	0.0020	-	-	-	-	10	0.0020	-	-	-	-	-	-	-	-	-	-
F. Nemouridae	50	0.012	450	0.19	150	0.080	30	0.012	240	0.070	140	0.11	180	0.044	250	0.093	1,430	0.60	1,120	0.60	1,310	0.40	4,100	0.97	1,720	0.55	280	0.049	560	0.20
F. Perlidae	-	-	-	-	-	-	-	-	-	-	-	-	30	0.14	-	-	20	0.0070	-	-	-	-	40	0.084	-	-	-	-	10	0.0020
F. Perlodidae	70	0.27	110	0.14	100	0.070	-	-	30	0.68	40	0.73	220	1.2	90	0.68	210	1.2	1,270	2.3	2,060	1.5	4,340	3.4	4,280	3.2	390	0.31	1,830	1.4
F. Peltoperlidae	70	0.27	110	0.14	100	0.070	-	-	30	0.68	40	0.73	220	1.2	90	0.68	210	1.2	1,270	2.3	2,060	1.5	4,340	3.4	4,280	3.2	390	0.31	1,830	1.4
F. Taeniopterygidae	30	0.0060	40	0.011	10	0.0020	-	-	20	0.0030	10	0.0020	40	0.0080	30	0.0080	200	0.053	340	0.11	20	0.0060	140	0.034	140	0.026	50	0.011	10	0.0010
CADDISFLIES																														
O. Trichoptera																														
larvae/immature	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-	20	0.0030	-	-	20	0.0040	10	0.0010	10	0.0010
F. Apataniidae	860	0.97	610	0.76	540	0.67	410	0.41	540	0.48	400	0.49	560	0.60	470	0.53	1,050	1.2	680	1.8	160	0.16	200	0.15	360	0.36	460	0.33	380	0.36
F. Brachycentridae	-	-	10	0.0010	-	-	-	-	10	0.0010	-	-	-	-	10	0.0010	10	0.24	10	0.0020	-	-	-	-	-	-	-	-	-	-
F. Glossosomatidae	10	0.0030	-	-	-	-	-	-	-	-	-	-	10	0.083	20	0.0020	30	0.012	40	0.0060	-	-	60	0.016	20	-	10	0.0020	20	0.015
F. Hydropsychidae	10	0.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	0.060	10	0.0010	20	-	20	0.0060	-	-	10	0.0020
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0040	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	20	0.0020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	20	0.0070	10	0.0030	-	-	-	-	10	0.0040	-	-	10	0.0030	-	-	10	0.0010	-	-	-	-	-	-	-	-	20	0.0030	20	0.0010
F. Rhyacophilidae	40	0.55	10	0.21	70	0.82	10	0.011	90	0.55	20	0.16	100	0.77	50	0.52	50	0.45	90	1.1	190	3.3	320	3.8	160	1.9	140	1.7	120	3.1
F. Uenoidae	-	-	-	-	-	-	-	-	-	-	-	-	30	0.0050	-	-	-	-	110	0.015	-	-	-	-	-	-	-	-	10	0.018
TRUE FLIES																														
O. Diptera																														
indeterminate	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Ceratopogonidae	70	0.019	-	-	10	0.0020	-	-	40	0.010	10	0.0010	10	0.0020	20	0.0010	50	0.010	100	0.051	20	0.0010	40	0.018	-	-	-	-	-	-
F. Chironomidae	70	0.051	150	0.053	310	0.11	150	0.046	210	0.064	60	0.023	50	0.026	230	0.070	260	0.090	150	0.070	2,870	1.2	4,360	2.1	1,380	1.1	210	0.15	1,370	1.0
F. Dolichopodidae	-	-	-	-	-	-	10	0.0070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	10	0.0060	20	0.037	-	-	10	0.0040	20	0.041	40	0.036	30	0.036	80	0.11	70	0.081	10	0.0090	300	0.54	240	0.33	300	0.47	280	0.37	180	0.31
F. Muscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	2,560	1.4	350	0.19	1,020	0.72	2,200	1.3	2,310	1.1	2,260	1.6	1,730	0.88	2,930	1.7	1,930	1.3	3,790	2.6	260	0.062	380	0.11	440	0.12	170	0.042	130	0.025
F. Sciomyzidae	-	-	-	-	-	-	10	0.026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Tipulidae	130	0.052	30	0.027	200	0.13	90	0.26	160	6.8	90	2.0	100	0.058	160	0.14	60	0.24	20	0.011	100	0.25	70	6.9	-	-	90	3.1	20	0.024
CLAMS																														
Cl. Gastropoda																														
F. Lymnaeidae	-	-	-	-	-	-	-	-	20	0.020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																														
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS per sample	4,510		6,800		5,030		3,540		5,970		4,410		6,220		5,980		8,950		10,090		9,600		17,850		12,240		4,240		6,960	
TOTAL NUMBER OF TAXA [a]	20	20	23	23	20	20	19	19	28	28	21	21	27	27	24	24	24	24	27	27	23	23	24	23	20	19	24	24	23	23
TOTAL BIOMASS (g)		5.2		6.4		5.8		2.5		12		5.8		5.4		5.0		8.1		11		11		23		12		8.6		10

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_FRUPO										RG_HENUP																	
Replicate	6		7		8		9		10		1		2		3		4		5		6		7		8		9		10	
ROUNDWORMS																														
P. Nemata	280	0.20	90	0.027	140	0.20	340	0.13	140	0.032	-	-	20	0.0060	10	0.010	20	0.018	20	0.029	10	0.0010	60	0.019	40	0.0040	-	-	20	0.021
FLATWORMS																														
P. Platyhelminthes																														
Cl. Turbellaria																														
F. Planariidae	-	-	-	-	-	-	-	-	20	-	-	-	-	-	20	0.12	-	-	20	0.0090	10	0.0090	-	-	30	0.30	30	0.014	20	0.16
ANNELIDS																														
P. Annelida																														
WORMS																														
Cl. Oligochaeta																														
F. Enchytraeidae	40	0.0070	10	0.0010	80	0.016	80	0.0020	120	0.012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lumbricidae	-	-	-	-	-	-	10	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS																														
MITES																														
Cl. Arachnida																														
Subcl. Acari imm.																														
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	20	0.0020	-	-	-	-	-	-	10	0.0030	-	-	10	0.0010	-	-	-	-
F. Hygrobatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	270	0.060	170	0.035	140	0.026	620	0.14	800	0.16	-	-	20	0.026	10	0.011	50	0.029	10	0.0020	40	0.020	-	-	30	0.0060	20	0.012	-	-
F. Trombidiformes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																														
Cl. Ostracoda	20	0.0030	-	-	-	-	-	-	-	-	10	0.0010	20	0.0060	-	-	-	-	10	0.0010	10	0.0010	-	-	20	0.0020	40	0.013	-	-
INSECTS																														
Cl. Insecta																														
BEETLES																														
O. Coleoptera																														
F. Dytiscidae	-	-	-	-	-	-	20	0.024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Elmidae	10	0.0010	70	0.050	20	0.022	60	0.068	80	0.028	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.025	-	-
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAYFLIES																														
O. Ephemeroptera																														
F. Ameletidae	-	-	-	-	-	-	-	-	-	-	-	-	2,480	1.2	560	0.58	-	-	70	0.074	20	0.0050	-	-	80	0.028	10	0.14	20	0.0040
F. Baetidae	290	0.86	450	1.4	550	1.3	340	0.86	300	0.80	-	-	-	-	-	-	-	-	10	0.034	-	-	-	-	-	-	10	0.051	90	0.28
F. Ephemerellidae	110	0.33	80	0.68	70	0.12	180	0.040	200	0.33	130	0.20	120	0.012	420	0.034	140	0.29	120	0.013	160	0.014	40	0.0060	180	0.13	290	0.047	-	-
F. Heptageniidae	750	0.95	190	0.74	260	0.79	1,140	0.53	2,460	1.6	2,570	3.1	4,180	2.0	3,480	2.8	3,760	5.1	2,800	3.1	4,520	4.1	2,480	2.8	5,910	6.7	5,190	5.4	5,040	5.2
STONEFLIES																														
O. Plecoptera																														
F. Capniidae	90	0.23	10	0.027	30	0.094	100	0.25	580	1.3	-	-	100	0.050	-	-	20	0.017	100	0.056	130	0.045	40	0.042	10	0.0050	130	0.067	40	0.021
F. Chloroperlidae	-	-	-	-	10	0.0030	100	0.19	100	0.13	300	0.98	1,400	4.2	290	0.85	390	1.2	300	0.89	430	1.3	670	2.3	710	2.2	700	2.7	480	2.3
F. Leuctridae	-	-	-	-	10	-	-	-	-	-	10	0.0050	180	0.12	30	0.024	70	0.069	140	0.096	140	0.12	20	0.010	270	0.18	200	0.14	50	0.036
F. Nemouridae	200	0.12	150	0.069	170	0.028	1,160	0.26	1,180	0.48	40	0.073	20	-	40	0.058	40	0.12	10	0.0020	80	0.20	40	0.088	90	0.42	40	0.21	190	0.75
F. Perlidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Perlodidae	1,370	1.4	1,730	1.5	1,020	0.85	2,200	2.6	2,060	2.0	20	0.49	-	-	10	0.21	70	2.1	10	0.0020	40	1.4	60	2.0	40	0.42	30	1.0	10	0.44
F. Peltoperlidae	1,370	1.4	1,730	1.5	1,020	0.85	2,200	2.6	2,060	2.0	20	0.49	-	-	10	0.21	70	2.1	10	0.0020	40	1.4	60	2.0	40	0.42	30	1.0	10	0.44
F. Taeniopterygidae	110	0.032	20	0.0050	180	0.045	200	0.070	180	0.042	60	0.016	-	-	10	0.0040	90	0.035	-	-	-	-	20	0.0090	50	0.014	20	0.015	100	0.021
CADDISFLIES																														
O. Trichoptera																														
larvae/immature	-	-	-	-	-	-	60	0.0080	20	0.0020	10	0.0010	-	-	10	0.0010	20	0.0020	10	0.0010	40	0.0050	-	-	-	-	-	-	10	0.0010
F. Apataniidae	180	0.14	70	0.063	10	0.0020	60	0.056	320	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0030
F. Brachycentridae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Glossosomatidae	110	0.15	60	0.10	230	0.40	40	1.2	100	0.050	40	0.058	-	-	90	0.15	40	0.15	10	0.0060	30	0.053	130	0.28	90	0.35	230	1.0	280	0.74
F. Hydropsychidae	-	-	10	0.0040	10	-	20	0.0060	-	-	10	0.0010	-	-	20	0.0070	10	0.34	-	-	-	-	20	0.0020	10	0.0010	-	-	10	0.0040
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	-	-	-	-	-	-	-	-	-	-	-	-	20	0.15	10	0.0030	-	-	-	-	-	-	-	-	20	0.0010	20	0.12	10	0.0060
F. Rhyacophilidae	140	2.4	130	2.4	230	3.9	140	3.7	300	5.8	10	0.61	20	0.036	10	0.016	20	0.0020	10	0.12	50	0.043	40	0.064	40	1.1	10	0.018	30	0.41
F. Uenoidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRUE FLIES																														
O. Diptera																														
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Ceratopogonidae	-	-	-	-	10	0.0010	120	0.040	-	-	10	0.0030	20	0.0080	10	0.0060	10	0.0080	-	-	10	0.0010	-	-	20	0.010	20	0.0070	10	0.0020
F. Chironomidae	1,060	0.61	1,400	1.0	1,600	0.90	6,280	3.8	2,760	1.3	100	0.12	880	0.43	240	0.21	300	0.17	370	0.24	2,110	0.47	220	0.14	1,010	0.26	810	0.45	1,050	0.42
F. Dolichopodidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	150	0.25	60	0.11	30	0.049	20	0.39	400	0.61	60	0.14	120	0.47	40	0.12	60	0.26	70	0.27	120	0.41	90	0.29	220	0.74	110	0.41	160	0.59
F. Muscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	110	0.023	100	0.019	60	0.012	560	0.13	540	0.11	-	-	-	-	20	0.0080	20	0.0060	30	0.010	80	0.025	40	0.0060	30	0.0050	100	0.030	300	0.12
F. Sciomyzidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	20	0.036	80	0.20	400	1.5	540	1.4	-	-	-	-	-	-	10	0.094	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Tipulidae	20	0.010	20	0.020	20	0.031	50	6.5	10	5.6	-	-	-	-	10	2.7	-	-	-	-	-	-	10	0.016	-	-	20	1.0	-	-
CLAMS																														
Cl. Gastropoda																														
F. Lymnaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																														
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS per sample	5,360		4,930		5,290		14,680		12,730		3,380		9,640		5,360		5,190		4,140		8,050		4,000		8,940		8,080		7,950	
TOTAL NUMBER OF TAXA [a]	21	21	21	21	24	22	26	26	22	21	16	16	16	15	23	23	19	19	20	20	21	21	17	17	23	23	23	23	22	22
TOTAL BIOMASS (g)		7.8		8.4		10		30		21		5.8		8.7		8.0		10		5.0		8.2		8.2		13		13		12

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

Table E.28: Benthic Invertebrate Density and Biomass from Biomass from Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station	RG_SCOUTDS																			
Replicate	1		2		3		4		5		6		7		8		9		10	
ROUNDWORMS																				
P. Nemata	60	0.022	50	0.029	50	0.029	60	0.021	20	0.022	30	0.024	10	0.0010	30	0.052	-	-	140	0.066
FLATWORMS																				
P. Platyhelminthes																				
Cl. Turbellaria																				
F. Planariidae	30	0.11	10	0.0080	10	0.0040	10	0.032	-	-	-	-	-	-	30	0.073	-	-	20	0.010
ANNELIDS																				
P. Annelida																				
WORMS																				
Cl. Oligochaeta																				
F. Enchytraeidae	30	0.033	40	0.010	10	0.0020	50	0.014	40	0.010	-	-	10	0.0020	-	-	580	0.18	260	0.070
F. Lumbricidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.22	-	-	-	-
F. Naididae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ARTHROPODS																				
MITES																				
Cl. Arachnida																				
Subcl. Acari imm.																				
F. Hydryphantidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Hygrobatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae	100	0.024	160	0.036	-	-	400	0.097	210	0.052	290	0.065	70	0.020	180	0.035	190	0.047	900	0.25
F. Trombidiformes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEED SHRIMPS																				
Cl. Ostracoda	10	0.0020	20	0.0070	10	0.0050	90	0.018	200	0.052	50	0.012	-	-	-	-	-	-	20	0.0040
INSECTS																				
Cl. Insecta																				
BEETLES																				
O. Coleoptera																				
F. Dytiscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Elmidae	-	-	-	-	-	-	10	0.0010	20	0.0070	40	0.045	-	-	10	0.022	-	-	-	-
F. Staphylinidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAYFLIES																				
O. Ephemeroptera																				
F. Ameletidae	-	-	-	-	-	-	-	-	-	-	10	0.23	-	-	-	-	-	-	-	-
F. Baetidae	30	0.066	10	0.055	10	0.0030	20	0.12	-	-	20	0.14	10	0.0010	20	0.014	30	0.059	20	0.040
F. Ephemerellidae	120	0.044	80	0.070	20	0.0030	160	0.023	230	0.034	30	0.0030	50	0.084	140	0.093	70	0.038	340	0.12
F. Heptageniidae	2,330	1.3	1,040	0.62	740	0.49	2,480	1.5	2,410	1.5	2,430	1.3	1,620	0.75	2,000	1.6	2,640	1.5	2,740	1.1
STONEFLIES																				
O. Plecoptera																				
F. Capniidae	20	0.010	20	0.026	-	-	-	-	20	0.016	20	0.024	-	-	30	0.024	30	0.026	40	0.048
F. Chloroperlidae	20	0.053	-	-	10	0.0030	90	0.087	120	0.17	10	0.019	-	-	50	0.036	10	0.011	40	0.034
F. Leuctridae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Nemouridae	620	0.62	110	0.17	150	0.10	310	0.43	330	0.36	130	0.38	100	0.13	310	0.20	240	0.18	360	0.20
F. Perlidae	10	0.043	10	0.020	10	0.22	-	-	-	-	10	0.047	-	-	-	-	-	-	10	0.48
F. Perlodidae	150	1.1	120	1.7	80	1.4	160	0.86	40	0.033	70	0.15	80	0.12	140	0.98	140	1.4	160	0.13
F. Peltoperlidae	150	1.1	120	1.7	80	1.4	160	0.86	40	0.033	70	0.15	80	0.12	140	0.98	140	1.4	160	0.13
F. Taeniopterygidae	90	0.014	-	-	30	0.0050	50	0.011	20	0.0040	10	0.0020	40	0.0080	40	0.0080	90	0.026	-	-
CADDISFLIES																				
O. Trichoptera																				
larvae/immature	10	0.0010	10	0.0010	-	-	10	0.0010	-	-	-	-	-	-	-	-	10	0.0010	-	-
F. Apataniidae	20	0.024	10	0.0070	-	-	70	0.071	70	0.063	10	0.013	10	0.0030	30	0.014	-	-	20	0.016
F. Brachycentridae	30	0.0030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0020	60	0.010
F. Glossosomatidae	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-	-	-	-	-	-	-
F. Hydropsychidae	50	0.13	30	0.82	-	-	10	0.010	-	-	-	-	10	1.9	40	0.10	50	0.12	80	2.4
F. Hydroptilidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Lepidostomatidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae	-	-	-	-	-	-	-	-	-	-	-	-	10	0.0010	-	-	-	-	-	-
F. Rhyacophilidae	120	0.89	60	0.50	100	2.1	100	0.36	100	0.87	70	0.056	50	0.91	40	0.18	60	0.55	200	1.7
F. Uenoidae	10	0.0030	-	-	-	-	20	0.0050	-	-	-	-	-	-	20	0.0040	-	-	-	-
TRUE FLIES																				
O. Diptera																				
indeterminate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Ceratopogonidae	40	0.019	30	0.014	-	-	20	0.0030	30	0.012	90	0.040	20	0.0060	10	0.0020	10	0.0040	60	0.028
F. Chironomidae	100	0.047	80	0.11	60	0.030	50	0.017	100	0.036	60	0.032	80	0.025	50	0.042	300	0.091	600	0.23
F. Dolichopodidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Empididae	60	0.071	20	0.026	10	0.0010	40	0.065	30	0.054	120	0.16	30	0.025	20	0.053	20	0.041	40	0.098
F. Muscidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Psychodidae	2,260	1.2	1,390	0.99	750	0.43	3,450	2.0	3,810	2.8	4,290	3.0	1,270	0.91	3,090	2.2	1,790	1.4	3,340	2.5
F. Sciomyzidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F. Simuliidae	-	-	-	-	-	-	-	-	10	0.050	-	-	-	-	-	-	-	-	-	-
F. Tipulidae	10	2.7	20	0.017	10	0.0020	20	0.042	50	0.96	20	2.5	10	0.0010	20	0.0060	40	0.010	20	0.0040
CLAMS																				
Cl. Gastropoda																				
F. Lymnaeidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cl. Bivalvia																				
F. Pisidiidae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL NUMBER OF ORGANISMS per sample	6,330		3,320		2,070		7,690		7,860		7,830		3,480		6,310		6,340		9,490	
TOTAL NUMBER OF TAXA [a]	26	26	22	22	18	18	25	25	21	21	22	22	19	19	23	23	20	20	23	23
TOTAL BIOMASS (g)		8.5		5.3		4.8		5.8		7.2		8.2		4.9		5.9		5.7		9.6

Note: Data not normalized to area (0.1 m^2).

[a] Bold entries excluded from taxa count.

APPENDIX F
INTEGRATED ANALYSIS

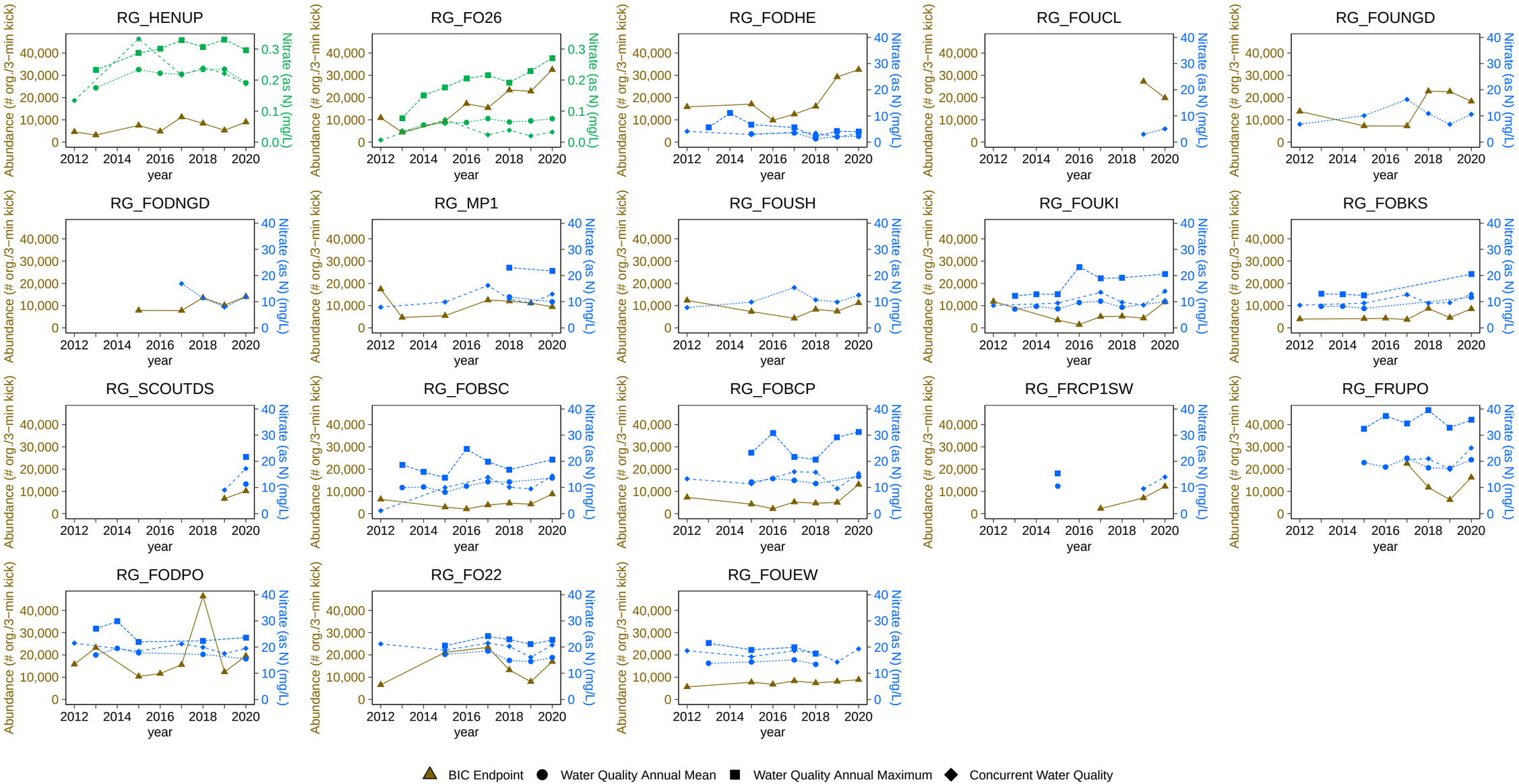

Figure F.1: Temporal Comparisons of Abundance (# org./3−min kick) and Nitrate Concentrations, FRO LAEMP, September 2012 to 2020

Notes: Water chemistry is shown in green for reference areas and blue for mine−exposed areas. Maximum calculated as the maximum monthly mean.

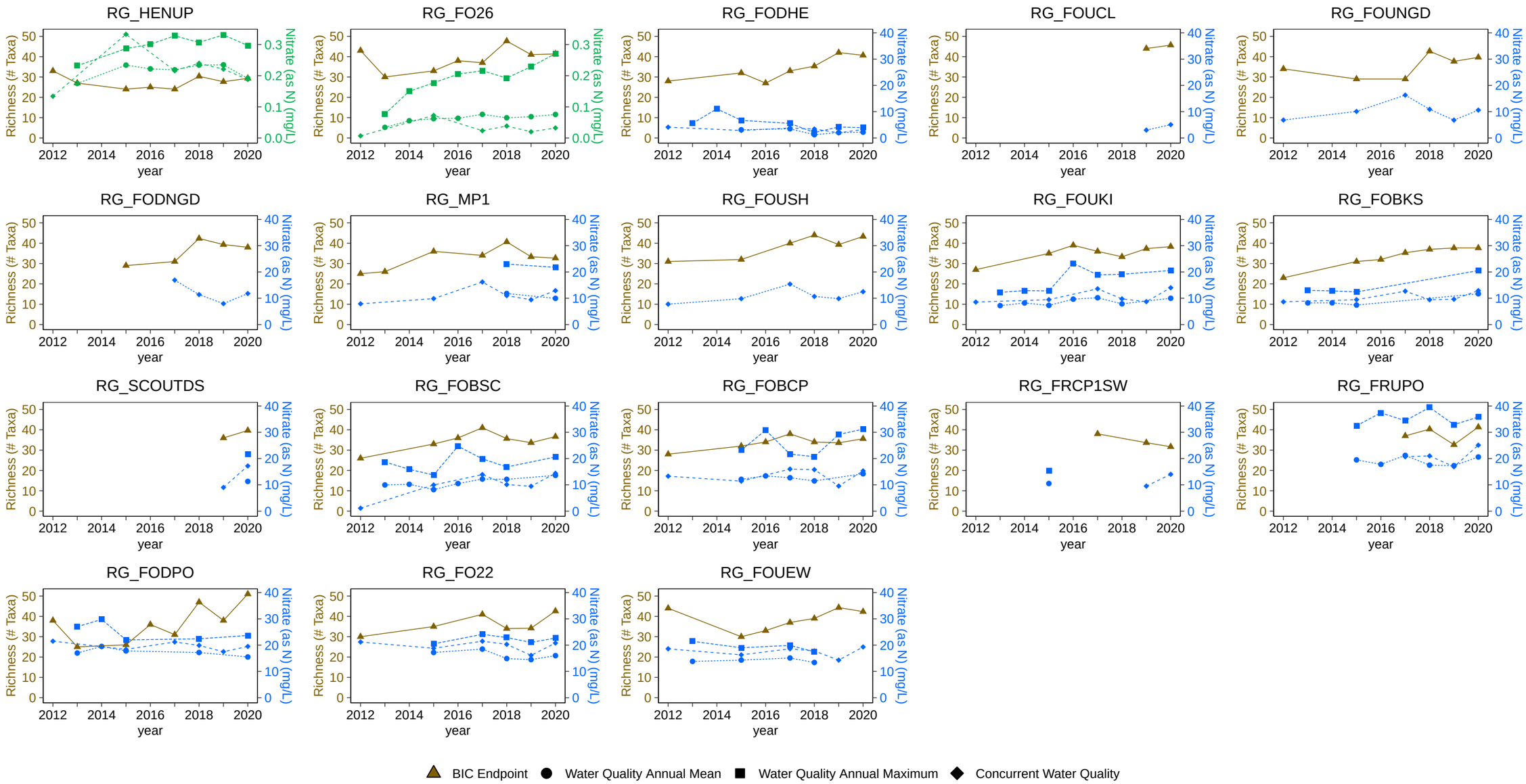

Figure F.2: Temporal Comparisons of Richness (# Taxa) and Nitrate Concentrations, FRO LAEMP, September 2012 to 2020

Notes: Water chemistry is shown in green for reference areas and blue for mine−exposed areas. Maximum calculated as the maximum monthly mean.

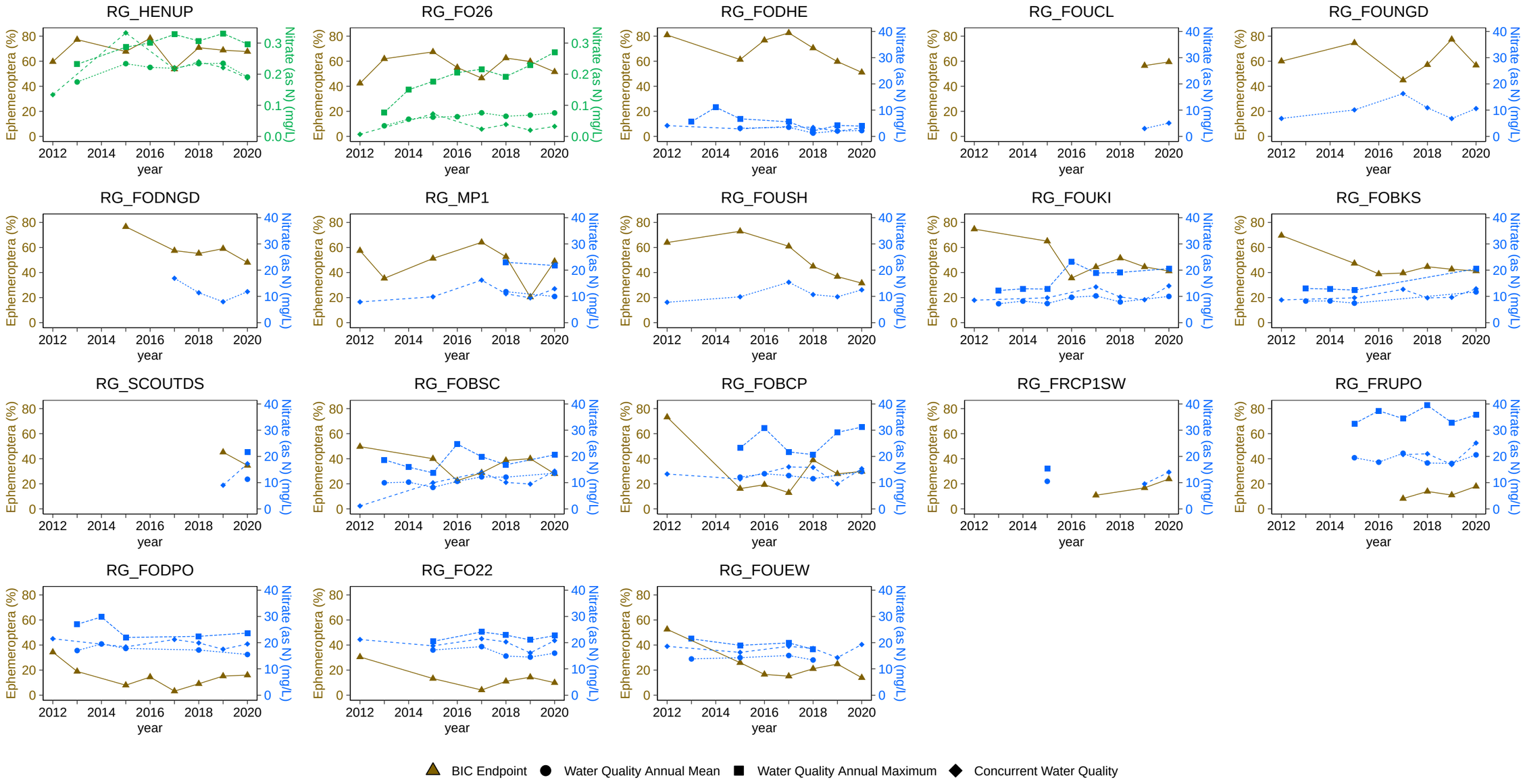

Figure F.3: Temporal Comparisons of Ephemeroptera (%) and Nitrate Concentrations, FRO LAEMP, September 2012 to 2020

Notes: Water chemistry is shown in green for reference areas and blue for mine−exposed areas. Maximum calculated as the maximum monthly mean.

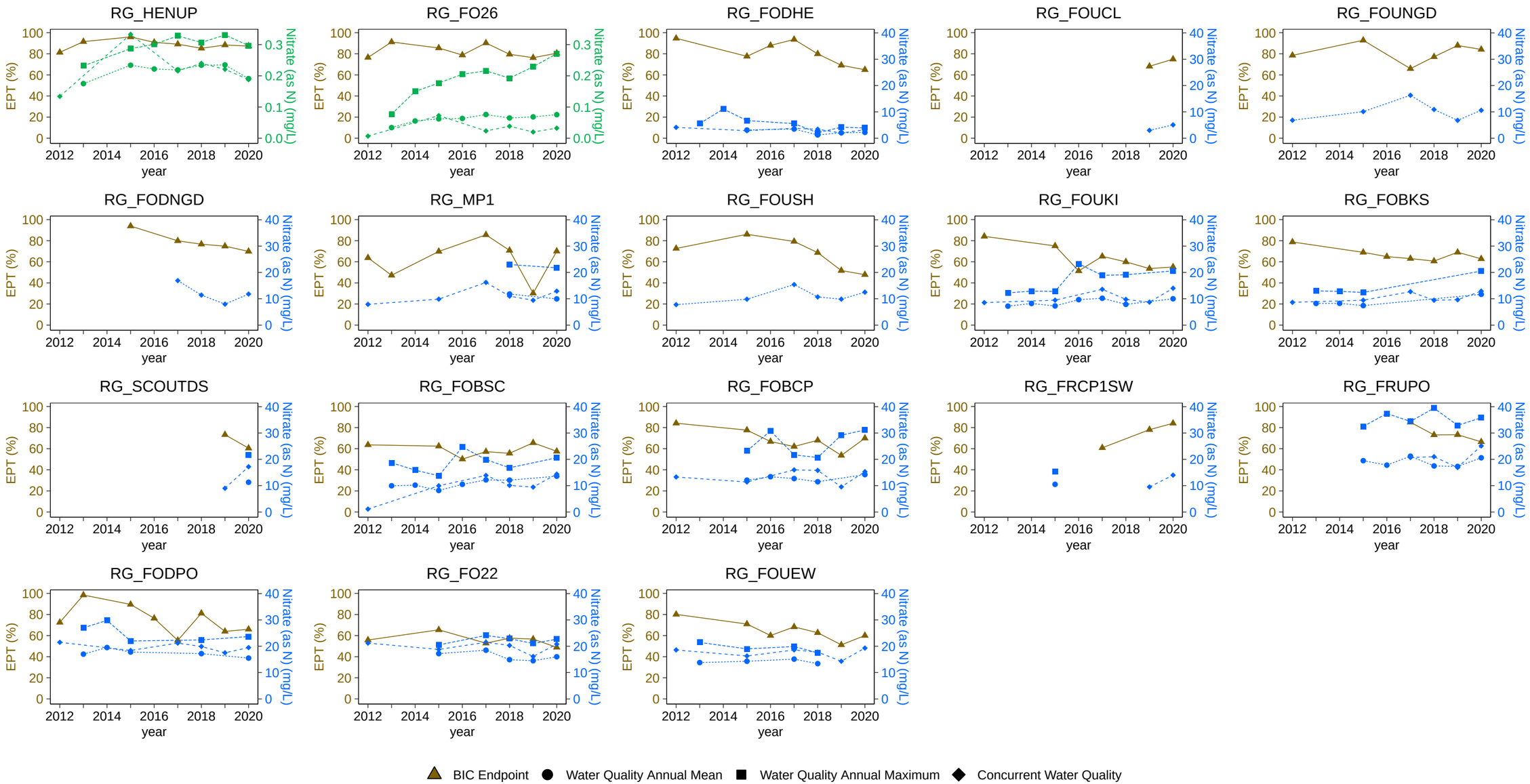

Figure F.4: Temporal Comparisons of EPT (%) and Nitrate Concentrations, FRO LAEMP, September 2012 to 2020

Notes: Water chemistry is shown in green for reference areas and blue for mine−exposed areas. Maximum calculated as the maximum monthly mean.

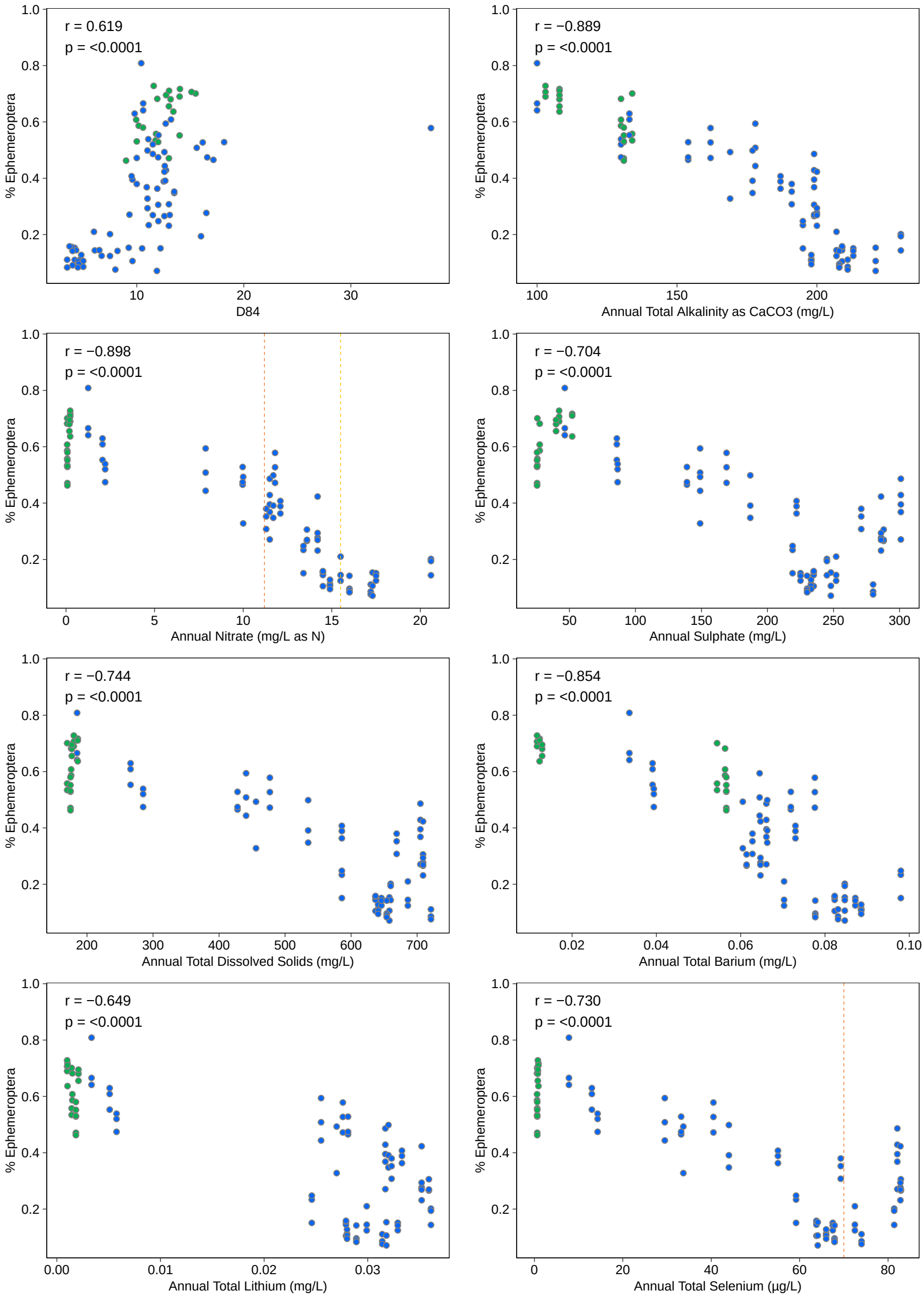

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

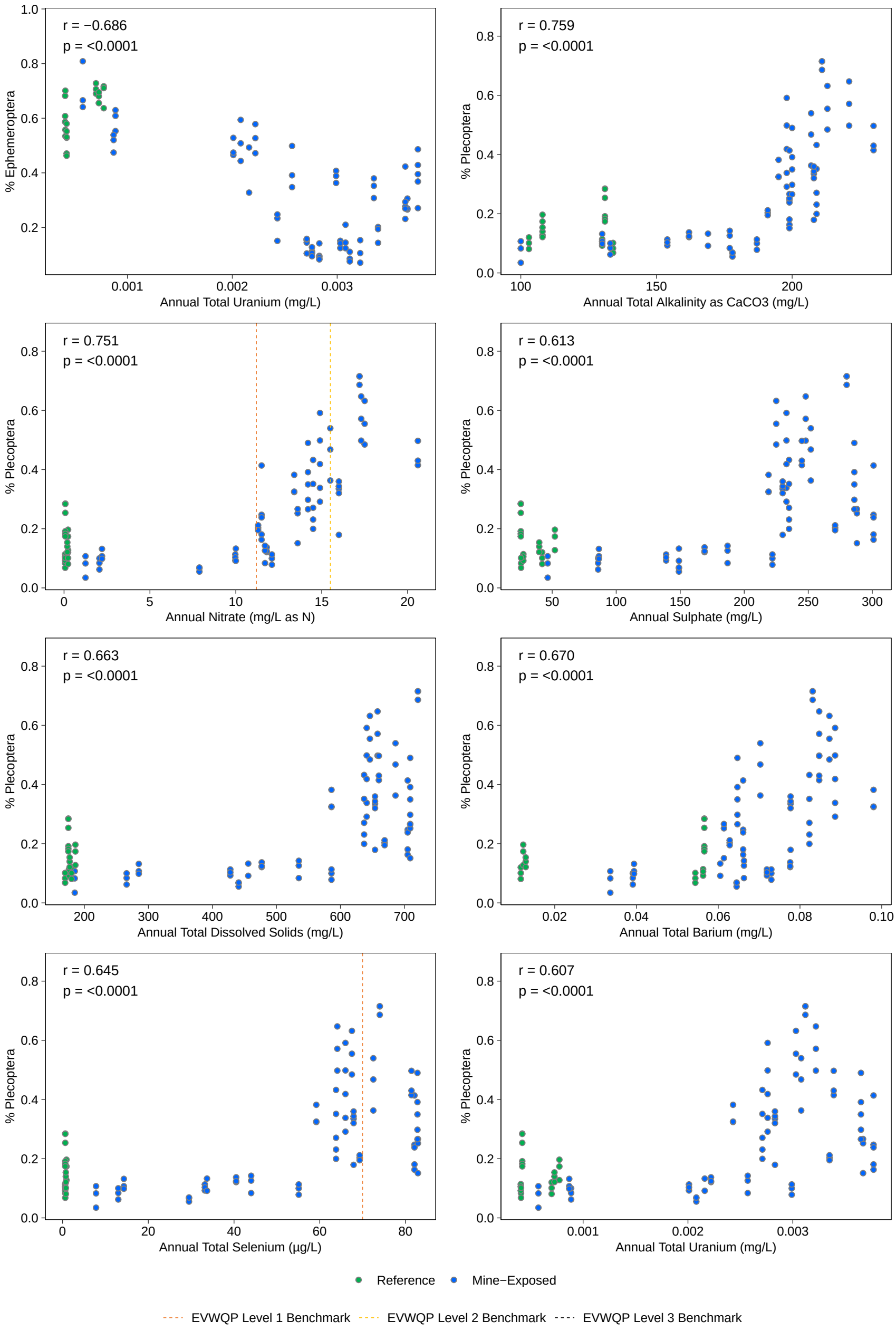

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

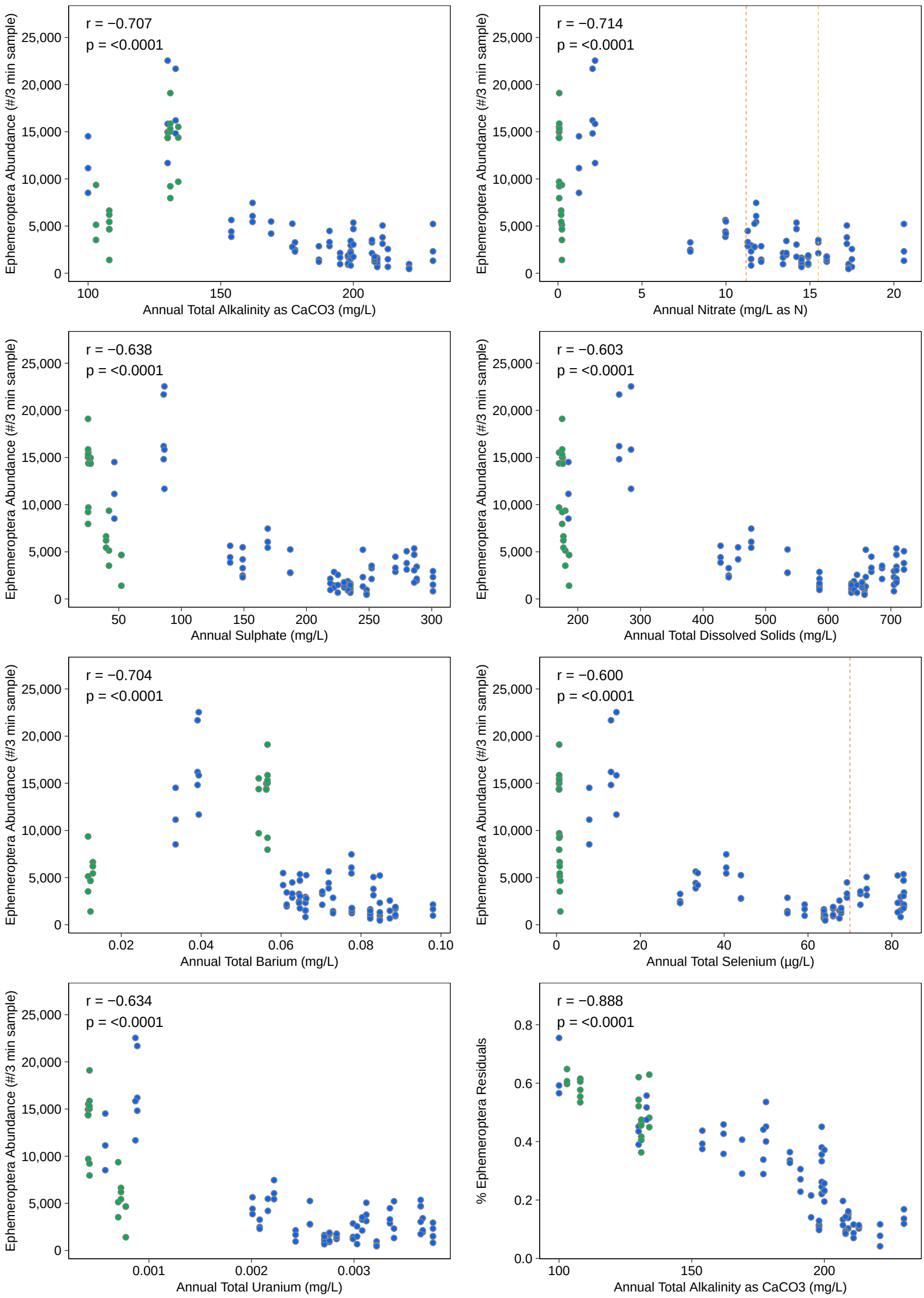

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

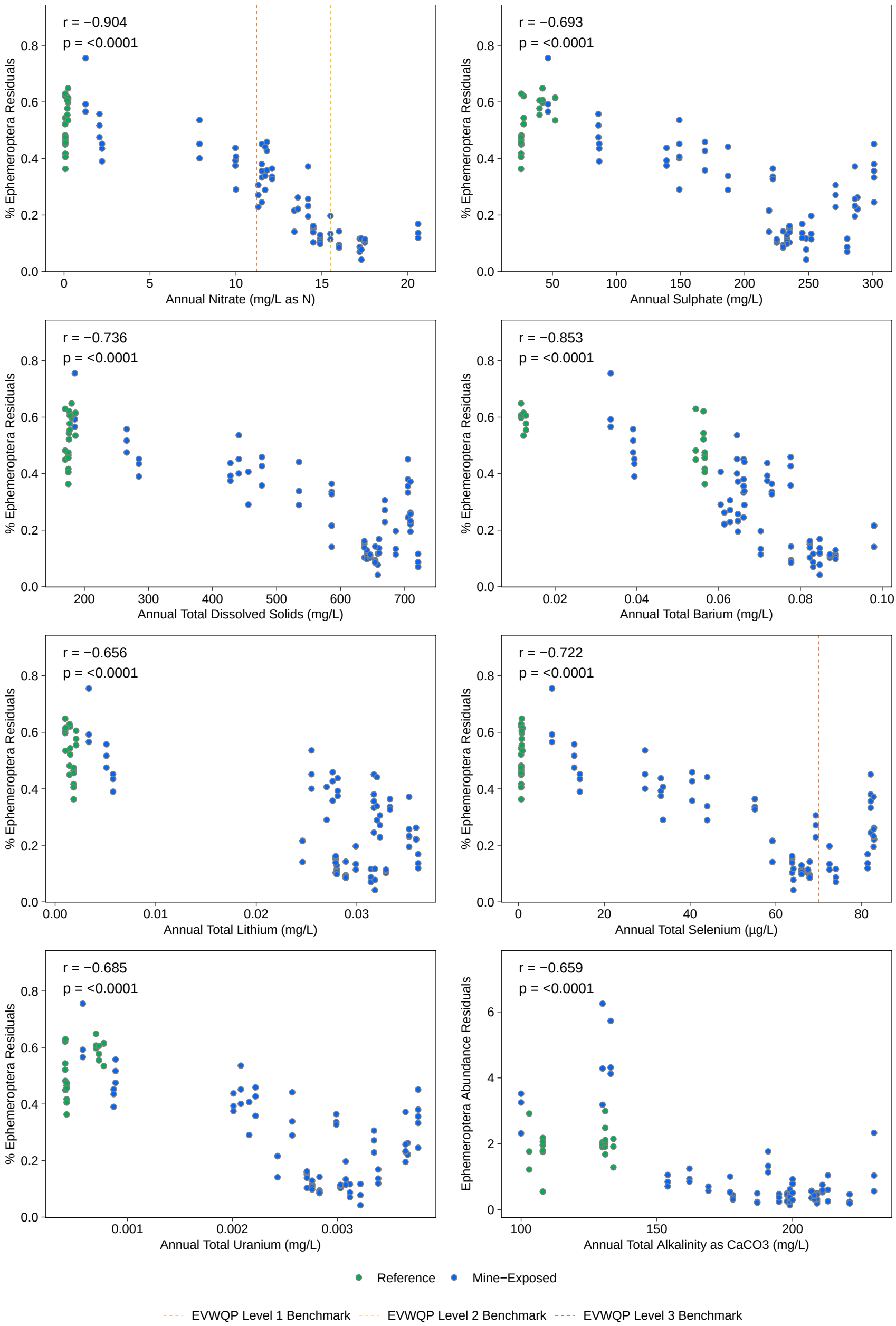

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

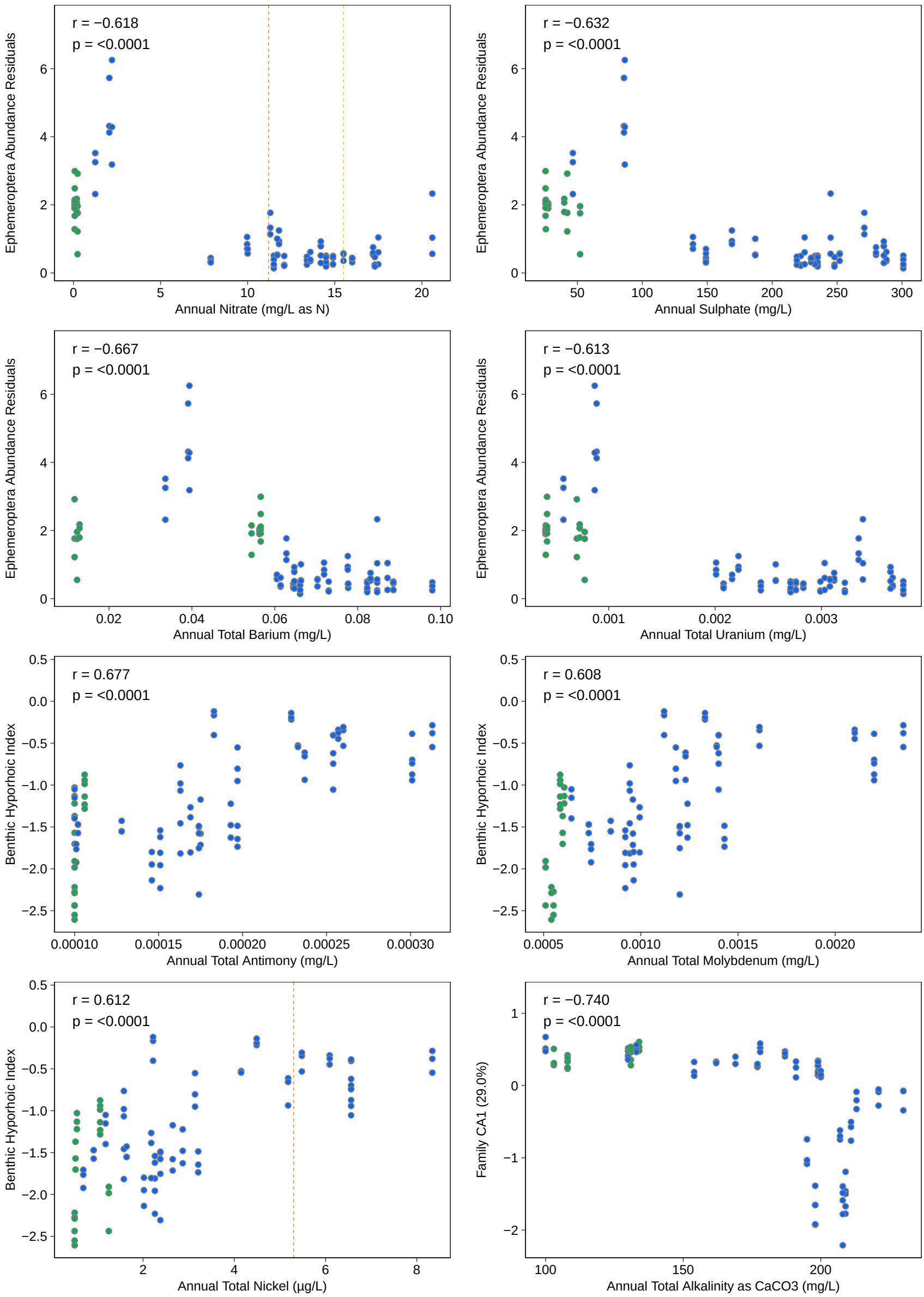

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

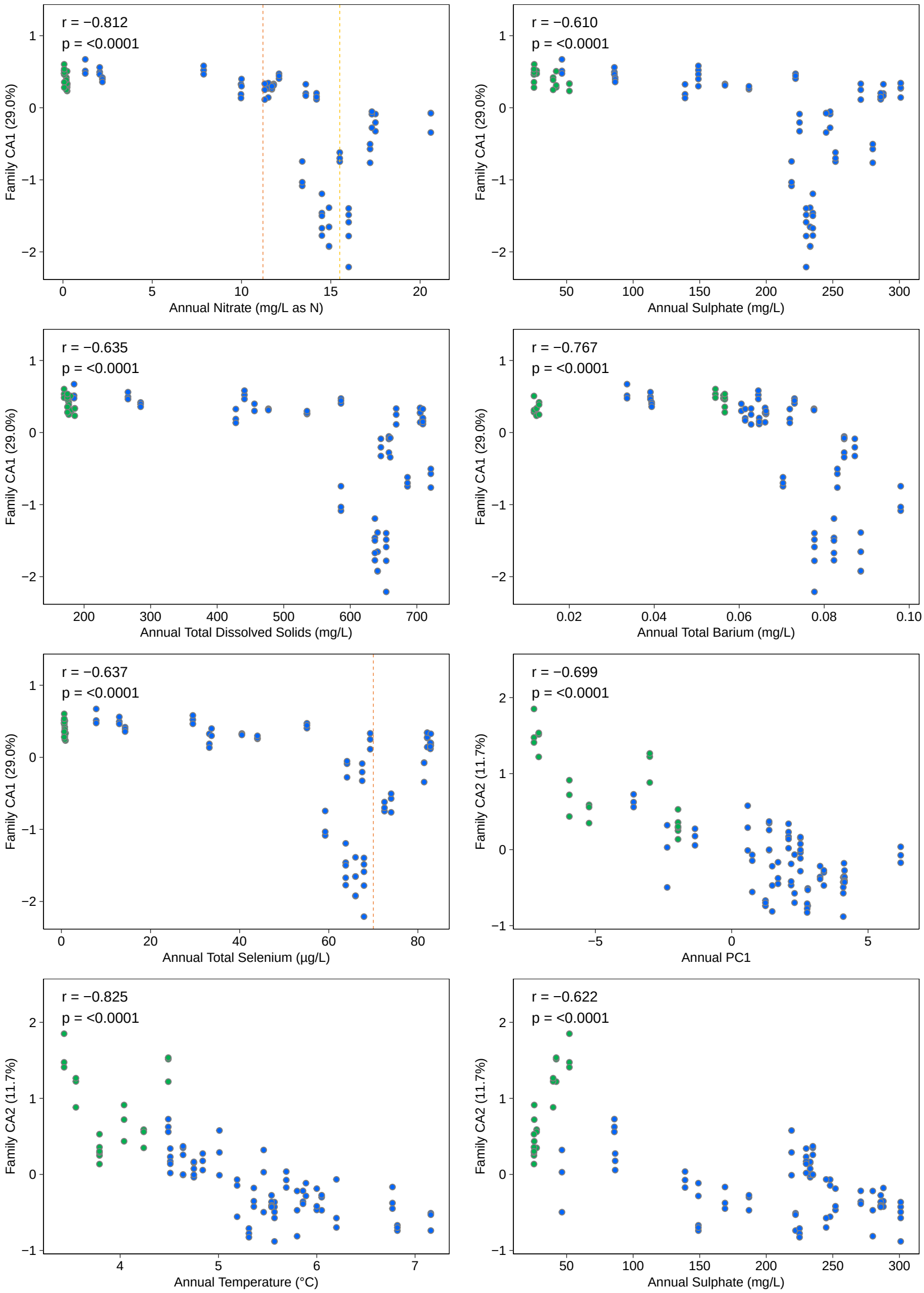

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

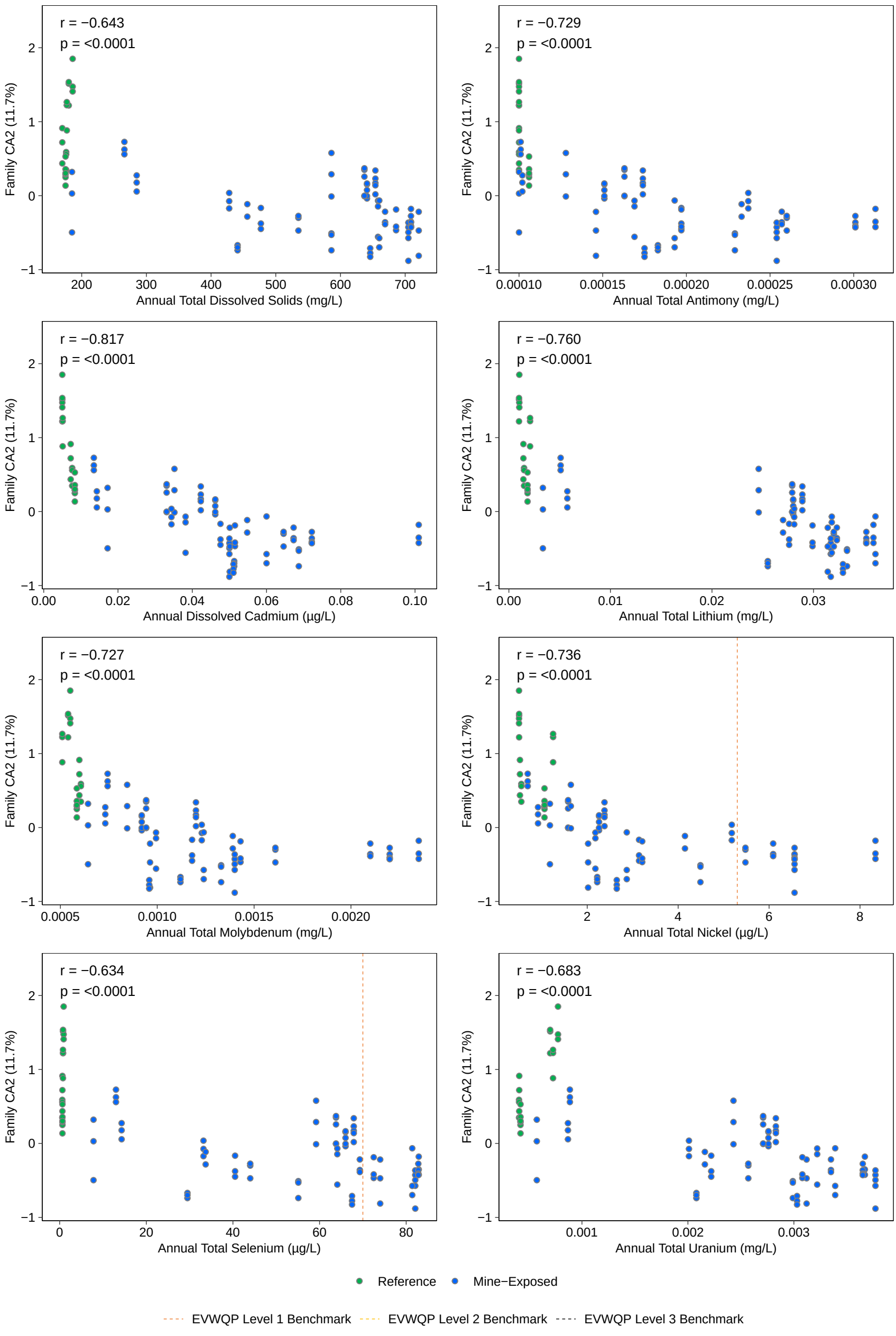

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

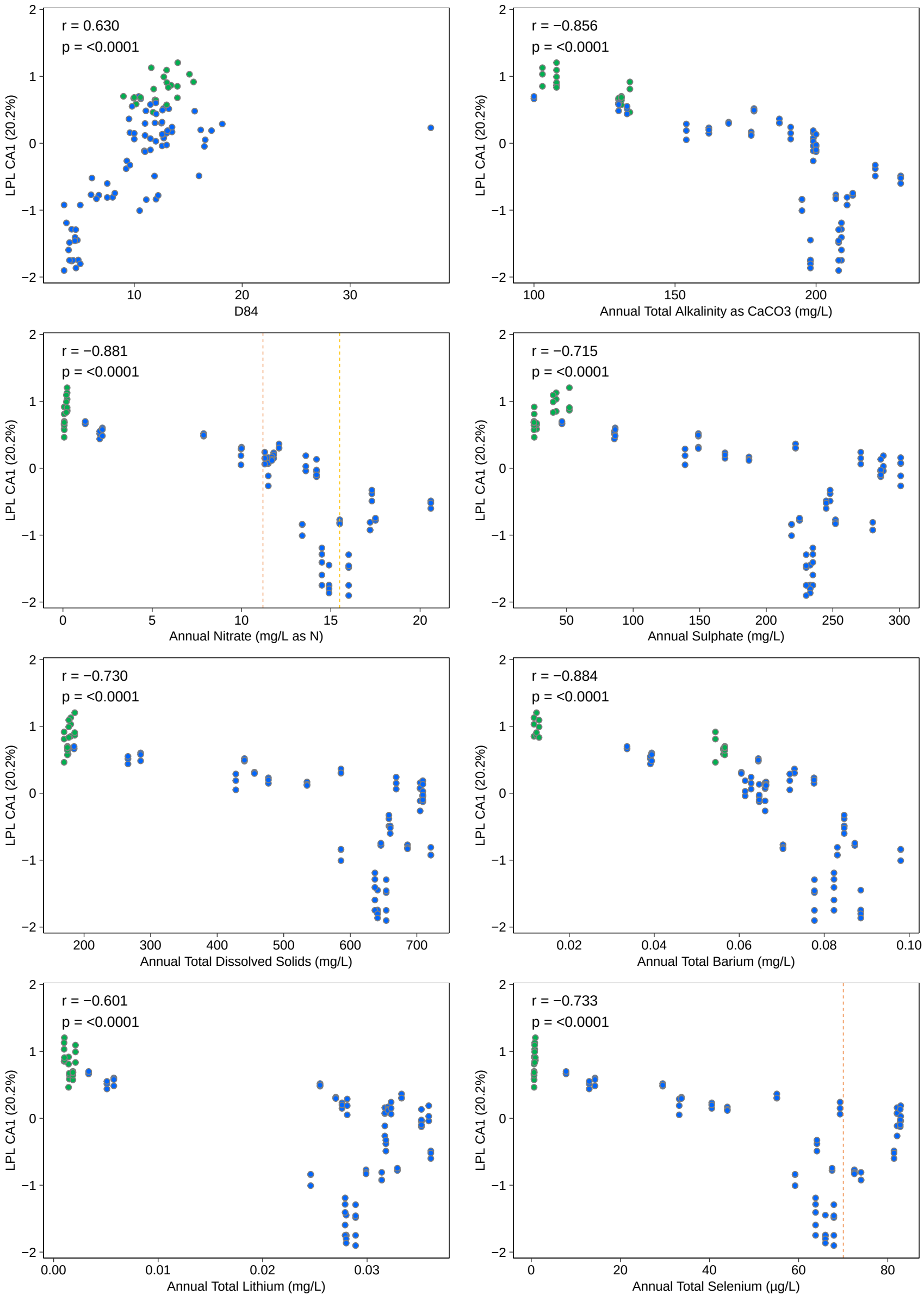

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

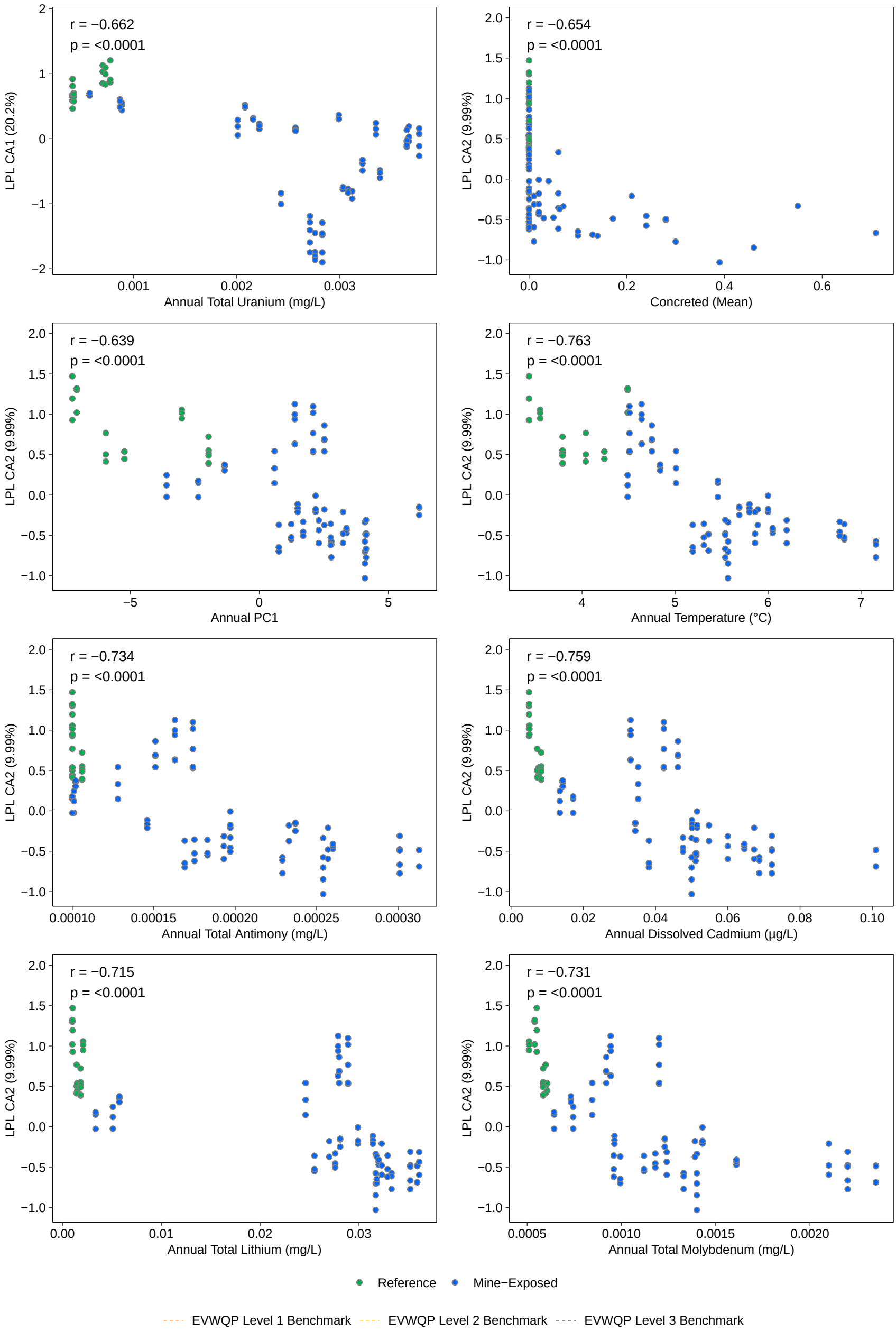

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

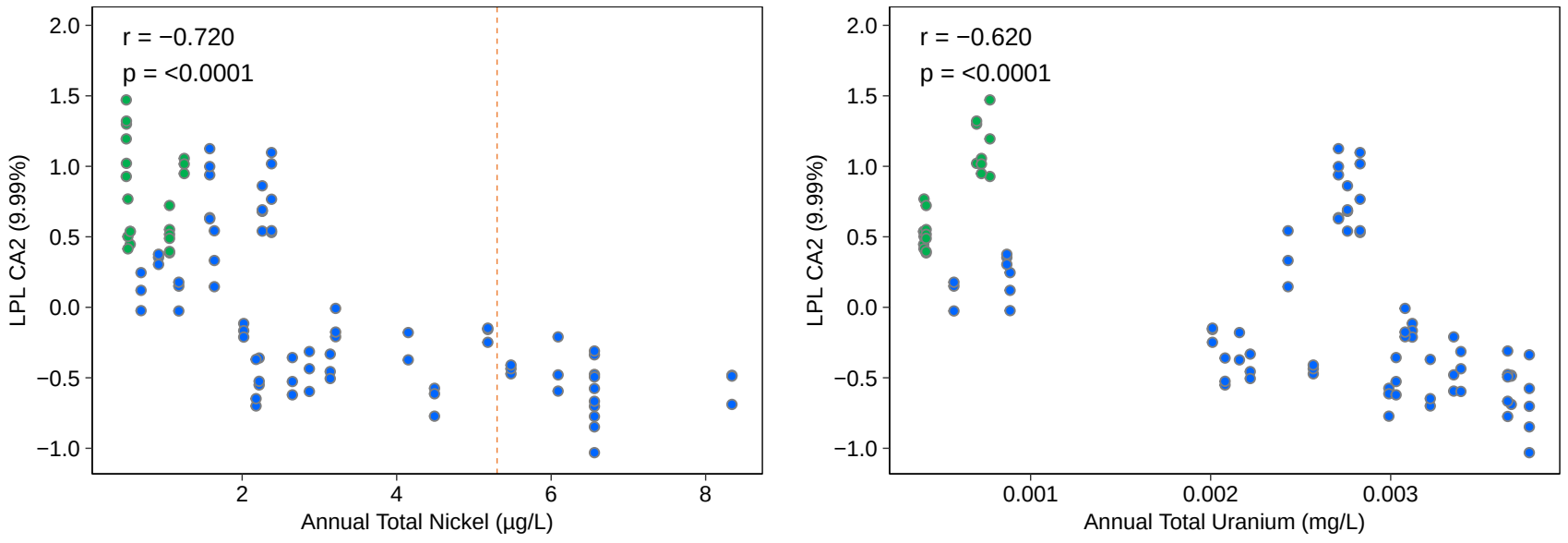

Figure F.5: Scatterplots of Spearman's Correlation Relationships Between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Notes: Only plots with strong correlations (rs = −0.6 or rs = 0.6) are presented. Annual = Averaged mean based on the previous year of water quality sampling (see methods for details). EVWQP benchmarks and screening values were not shown where measured water quality values were below benchmarks and screening values and for constituents that have no benchmarks or screening values (total alkalinity, total antimony, total barium, total lithium, total uranium, and total molybdenum). Endpoint residuals represent the residuals of multiple regression models predicting the expected benthic invertebrate community given habitat at mine−exposed sites (RAEMP 2020a).

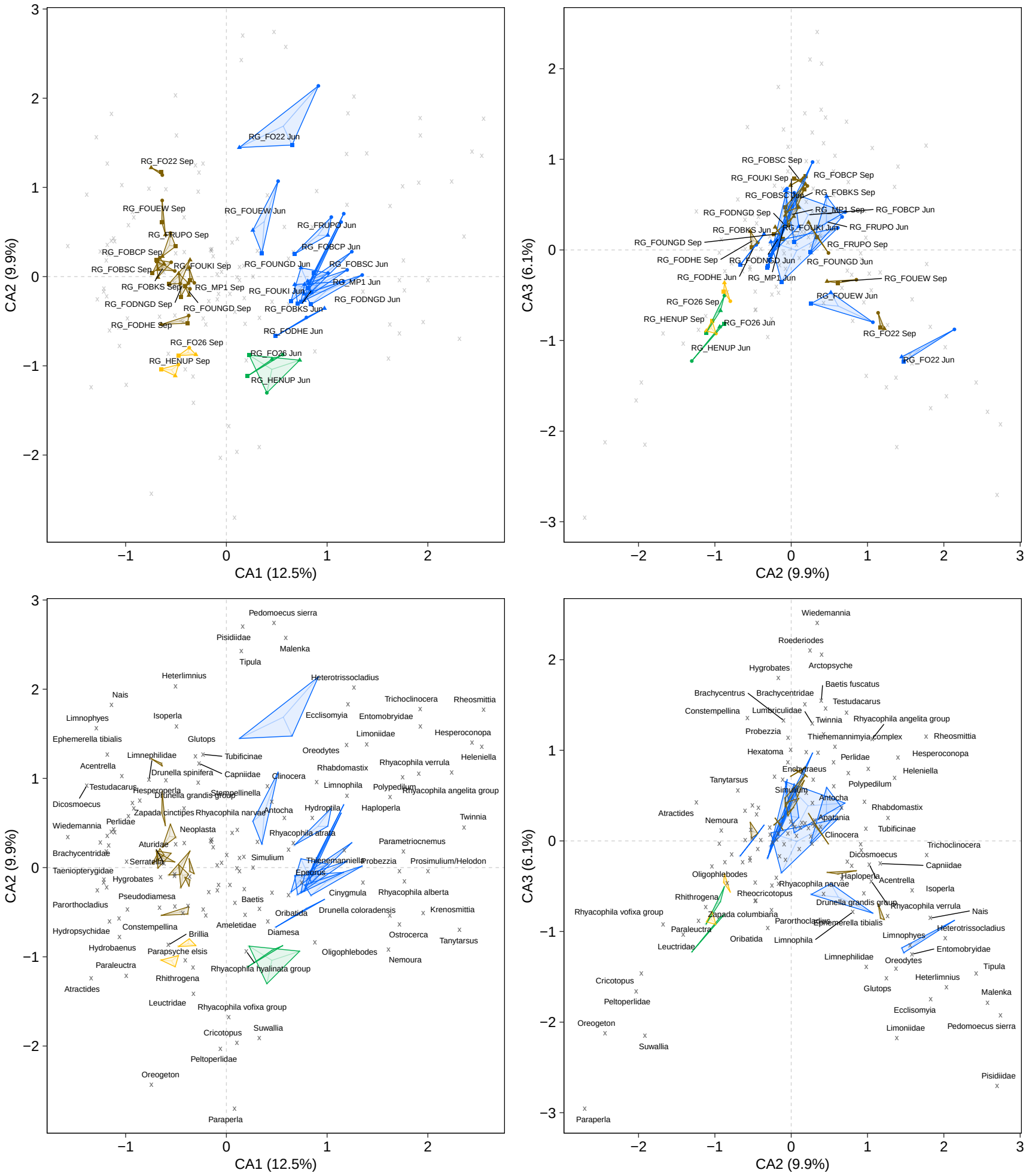

Figure F.6: Correspondence Analysis of Benthic Invertebrate Communities in June and September, FRO LAEMP, 2018 to 2020

Notes: Lowest Practical Level taxon abundances were ln(x+1) transformed prior to analysis. Taxa that made up less than 1% of total abundance or occurred in fewer than 5% of samples were excluded from analysis.

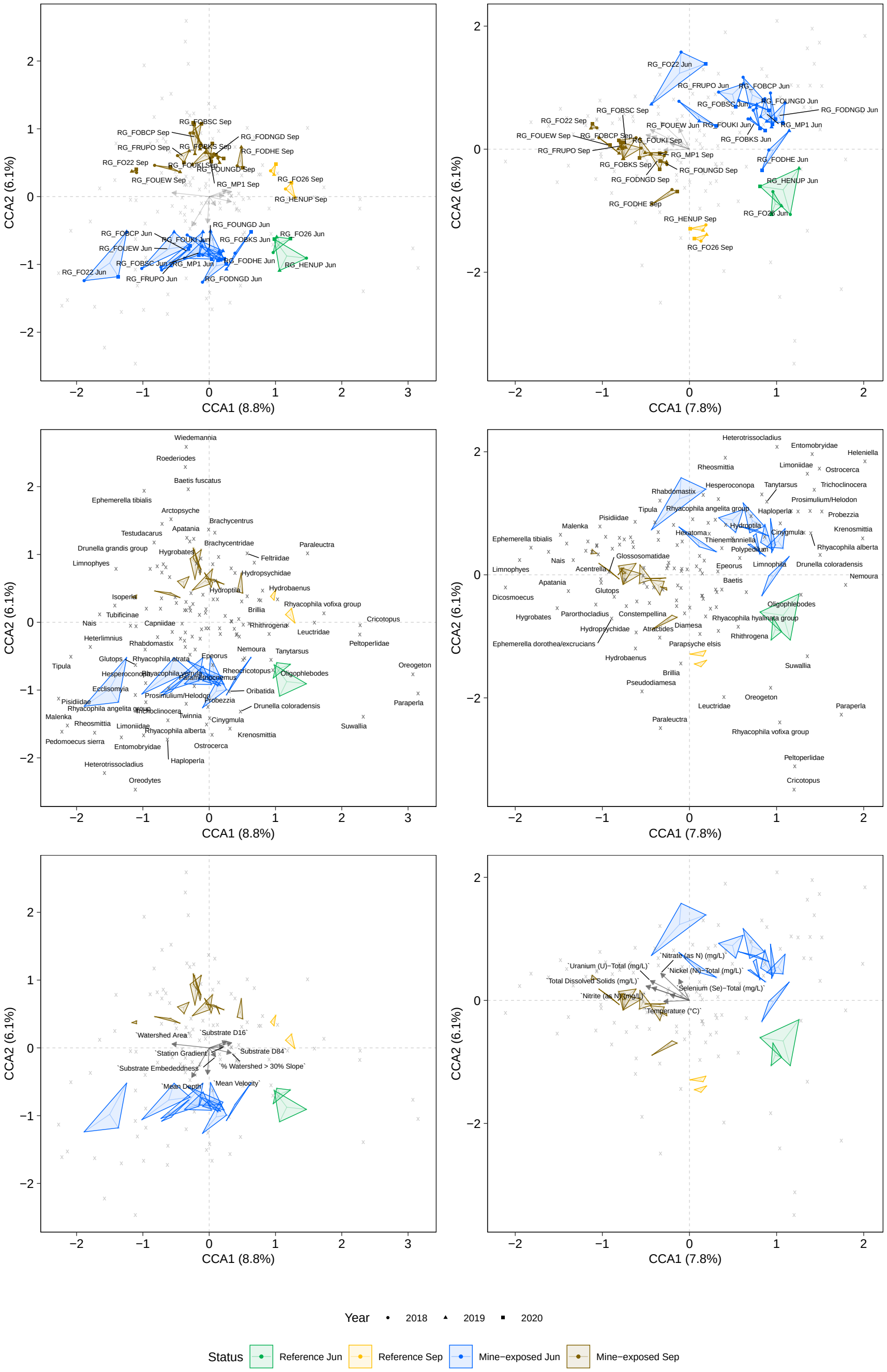

Figure F.7: Canonical Correspondence Analysis of Benthic Invertebrate Communities in June and September Constrained by Habitat and Water Variables, FRO LAEMP, 2018 to 2020

Notes: Lowest Practical Level taxon abundances were ln(x+1) transformed prior to analysis. Taxa that made up less than 1% of total abundance or occurred in fewer than 5% of samples were excluded from analysis. Figures on the left show variation in BIC explained by habitat variables, and figures on the right show variation in benthic invertebrate communities explained by water variables.

Table F.1: Spearman's Correlation Relationships between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, FRO LAEMP, September 2018 to 2020

Parameter	Abundance (# organisms/ 3 min kick)		Richness (# taxa)		% Ephemeroptera		% Plecoptera		% Trichoptera		% EPT		% Chironomidae		Ephemeroptera Abundance (#/3 min sample)		Plecoptera Abundance (#/3 min sample)	
	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value
Calcite Index	-0.116	0.261	0.136	0.186	-0.422	<0.0001	0.290	0.00418	-0.0371	0.720	-0.289	0.00428	-0.0678	0.512	-0.344	0.000604	0.115	0.265
Calcite (%)	-0.0887	0.390	0.140	0.175	-0.453	<0.0001	0.281	0.00562	0.00310	0.976	-0.290	0.00416	-0.0757	0.464	-0.371	0.000196	0.140	0.172
Concreted Score	-0.252	0.0134	0.0443	0.669	-0.204	0.0463	0.244	0.0165	-0.0963	0.351	-0.174	0.0907	0.000798	0.994	-0.223	0.0287	-0.0183	0.860
Embededness (%)	-0.134	0.193	-0.0131	0.899	0.328	0.00109	-0.225	0.0274	0.0294	0.776	0.235	0.0214	-0.126	0.223	0.247	0.0153	-0.304	0.00257
D16	-0.238	0.0198	-0.131	0.203	0.476	<0.0001	-0.429	<0.0001	-0.274	0.00681	0.120	0.243	0.0691	0.504	0.244	0.0167	-0.434	<0.0001
D84	-0.294	0.00369	-0.310	0.00213	0.619	<0.0001	-0.516	<0.0001	-0.0407	0.694	0.260	0.0106	0.0343	0.740	0.320	0.0015	-0.565	<0.0001
Water Velocity (m/s)	0.0991	0.337	0.0678	0.512	-0.0914	0.376	0.137	0.184	0.166	0.106	-0.0689	0.505	0.297	0.00329	-0.00903	0.930	0.179	0.0817
Water Depth (cm)	-0.390	<0.0001	-0.356	0.000371	-0.128	0.213	0.0485	0.639	0.000855	0.993	-0.203	0.0474	-0.0264	0.799	-0.424	<0.0001	-0.190	0.0641
Annual PC1	-0.254	0.0124	-0.0132	0.898	-0.515	<0.0001	0.328	0.00112	0.122	0.236	-0.499	<0.0001	-0.394	<0.0001	-0.434	<0.0001	0.0583	0.573
Annual PC2	-0.199	0.0523	0.0796	0.441	-0.375	0.000168	0.346	0.000555	-0.147	0.154	-0.207	0.0427	0.293	0.00371	-0.397	<0.0001	0.103	0.317
Annual Temperature (°C)	-0.256	0.0119	0.0991	0.337	-0.280	0.00577	0.0377	0.715	-0.156	0.129	-0.405	<0.0001	-0.124	0.229	-0.252	0.0134	-0.165	0.107
Annual Total Alkalinity as CaCO3 (mg/L)	-0.141	0.171	0.165	0.107	-0.889	<0.0001	0.759	<0.0001	0.0338	0.744	-0.456	<0.0001	-0.0296	0.774	-0.707	<0.0001	0.460	<0.0001
Annual Nitrate (mg/L as N)	-0.124	0.230	0.118	0.251	-0.898	<0.0001	0.751	<0.0001	-0.0759	0.462	-0.471	<0.0001	0.0316	0.760	-0.714	<0.0001	0.450	<0.0001
Annual Nitrite (mg/L s N)	-0.157	0.126	0.0634	0.539	-0.341	0.000668	0.0912	0.377	0.0366	0.723	-0.505	<0.0001	-0.189	0.0646	-0.254	0.0124	-0.0633	0.540
Annual Ammonia (mg/L as N)	-0.0104	0.920	-0.0327	0.752	0.0503	0.626	-0.129	0.212	0.221	0.0308	-0.0693	0.502	-0.0784	0.448	0.0608	0.556	-0.118	0.253
Annual Phosphorus (mg/L)	0.212	0.0381	0.0430	0.678	0.102	0.322	-0.0754	0.465	0.147	0.152	0.0894	0.387	-0.308	0.00224	0.243	0.0169	0.0909	0.379
Annual Sulphate (mg/L)	-0.279	0.00589	-0.00866	0.933	-0.704	<0.0001	0.613	<0.0001	-0.117	0.257	-0.461	<0.0001	-0.185	0.0719	-0.638	<0.0001	0.233	0.0223
Annual Total Dissolved Solids (mg/L)	-0.190	0.0635	0.0756	0.464	-0.744	<0.0001	0.663	<0.0001	-0.156	0.128	-0.433	<0.0001	-0.118	0.250	-0.603	<0.0001	0.323	0.00132
Annual Dissolved Aluminum (mg/L)	0.225	0.0272	-0.0398	0.700	0.326	0.00117	-0.455	<0.0001	-0.0962	0.351	0.0206	0.842	-0.234	0.0217	0.378	0.000145	-0.175	0.0877
Annual Total Antimony (mg/L)	-0.326	0.00120	0.0225	0.828	-0.431	<0.0001	0.239	0.0188	0.146	0.155	-0.516	<0.0001	-0.326	0.00120	-0.401	<0.0001	-0.0379	0.714
Annual Total Arsenic (mg/L)	0.207	0.0435	0.0501	0.628	-0.0447	0.665	0.143	0.163	0.0638	0.537	0.0696	0.501	-0.284	0.00501	0.147	0.152	0.231	0.0235
Annual Total Barium (mg/L)	-0.161	0.116	0.132	0.200	-0.854	<0.0001	0.670	<0.0001	0.144	0.160	-0.464	<0.0001	-0.146	0.155	-0.704	<0.0001	0.380	0.000135
Annual Dissolved Cadmium (µg/L)	-0.207	0.0429	0.143	0.165	-0.526	<0.0001	0.319	0.00156	-0.0762	0.461	-0.529	<0.0001	-0.259	0.0107	-0.405	<0.0001	0.0950	0.357
Annual Total Chromium (mg/L)	0.0898	0.384	-0.0371	0.720	0.124	0.228	-0.118	0.250	0.0852	0.409	0.123	0.232	-0.345	0.000574	0.168	0.102	-0.0196	0.850
Annual Total Cobalt (µg/L)	-0.130	0.207	-0.145	0.160	-0.311	0.00203	0.286	0.0048	0.396	<0.0001	-0.164	0.111	-0.351	0.000446	-0.237	0.0202	0.138	0.180
Annual Total Copper (mg/L)	0.256	0.0117	0.0604	0.559	0.0960	0.352	-0.0234	0.821	0.0551	0.594	0.0922	0.371	-0.303	0.00271	0.243	0.0170	0.159	0.122
Annual Total Iron (mg/L)	0.0471	0.648	0.00795	0.939	-0.0677	0.512	0.0395	0.702	0.232	0.0229	-0.0906	0.380	-0.441	<0.0001	0.0443	0.668	0.0898	0.384
Annual Total Lead (mg/L)	0.0668	0.518	-0.0762	0.461	-0.114	0.269	0.109	0.288	0.297	0.00326	-0.0759	0.462	-0.434	<0.0001	-0.0104	0.920	0.128	0.214
Annual Total Lithium (mg/L)	-0.231	0.0234	0.0690	0.504	-0.649	<0.0001	0.497	<0.0001	-0.00132	0.990	-0.475	<0.0001	-0.207	0.0433	-0.533	<0.0001	0.199	0.0521
Annual Total Manganese (mg/L)	-0.0957	0.354	-0.0912	0.377	-0.0621	0.548	-0.0480	0.642	0.255	0.0122	-0.216	0.0342	-0.560	<0.0001	-0.0276	0.790	-0.0578	0.576
Annual Total Molybdenum (mg/L)	-0.238	0.0197	0.119	0.248	-0.481	<0.0001	0.253	0.0130	0.0594	0.566	-0.557	<0.0001	-0.213	0.0374	-0.396	<0.0001	0.0200	0.847
Annual Total Nickel (µg/L)	-0.311	0.00202	0.00532	0.959	-0.449	<0.0001	0.281	0.00549	0.102	0.324	-0.484	<0.0001	-0.351	0.000447	-0.413	<0.0001	-0.0207	0.841
Annual Total Selenium (µg/L)	-0.198	0.0531	0.0587	0.570	-0.730	<0.0001	0.645	<0.0001	-0.122	0.238	-0.470	<0.0001	-0.150	0.144	-0.600	<0.0001	0.313	0.00191
Annual Total Thallium (mg/L)	0.0568	0.583	-0.00867	0.933	0.0127	0.902	0.0296	0.775	0.108	0.293	0.0275	0.790	-0.411	<0.0001	0.136	0.188	0.0509	0.622
Annual Total Uranium (mg/L)	-0.308	0.00227	-0.00705	0.946	-0.686	<0.0001	0.607	<0.0001	-0.121	0.242	-0.446	<0.0001	-0.185	0.0704	-0.634	<0.0001	0.220	0.0310
Annual Total Zinc (mg/L)	-0.0343	0.740	-0.0856	0.407	0.0134	0.897	-0.0170	0.869	0.259	0.0108	-0.110	0.285	-0.347	0.000530	0.104	0.314	-0.0238	0.818

P-value < 0.05/36 (0.05 Bonferroni Corrected for 36 independent comparisons).

$r_s \leq -0.6$ or $r_s \geq 0.6$.

Table F.1: Spearman's Correlation Relationships between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, Fording River, September 2018 to 2020

Parameter	Trichoptera Abundance (#/3 min sample)		EPT Abundance (#/3 min sample)		Chironomidae Abundance (#/3 min sample)		Abundance Residuals		Richness Residuals		% Ephemeroptera Residuals		% EPT Residuals		Ephemeroptera Abundance Residuals	
	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value
Calcite Index	-0.0780	0.450	-0.161	0.117	-0.0680	0.511	-0.327	0.00116	-0.0427	0.680	-0.426	<0.0001	-0.243	0.0168	-0.491	<0.0001
Calcite (%)	-0.0127	0.902	-0.136	0.187	-0.0682	0.509	-0.262	0.00995	-0.0704	0.496	-0.451	<0.0001	-0.261	0.0102	-0.485	<0.0001
Concreted Score	-0.267	0.00855	-0.254	0.0126	-0.100	0.331	-0.360	0.000313	0.0171	0.869	-0.219	0.0324	-0.132	0.201	-0.342	0.000647
Embededness (%)	-0.0952	0.356	-0.0406	0.695	-0.132	0.200	-0.235	0.0211	0.115	0.264	0.315	0.00174	0.296	0.00337	0.143	0.164
D16	-0.384	0.000111	-0.158	0.125	-0.0770	0.456	-0.267	0.00847	0.0376	0.716	0.463	<0.0001	0.156	0.128	0.161	0.118
D84	-0.236	0.0206	-0.180	0.0799	-0.126	0.221	-0.293	0.00378	-0.0224	0.829	0.586	<0.0001	0.375	0.000164	0.270	0.00775
Water Velocity (m/s)	0.231	0.0233	0.0636	0.538	0.221	0.0308	0.191	0.0622	0.0782	0.449	-0.108	0.293	0.0114	0.912	0.118	0.253
Water Depth (cm)	-0.250	0.0140	-0.415	<0.0001	-0.248	0.0149	-0.157	0.125	-0.361	0.000301	-0.136	0.187	-0.220	0.0316	-0.247	0.0153
Annual PC1	-0.0749	0.469	-0.351	0.000456	-0.358	0.000346	-0.371	0.000199	-0.189	0.0659	-0.512	<0.0001	-0.450	<0.0001	-0.502	<0.0001
Annual PC2	-0.266	0.00869	-0.229	0.0250	0.0956	0.354	-0.0774	0.454	0.0662	0.521	-0.385	0.000110	-0.232	0.0228	-0.310	0.00208
Annual Temperature (°C)	-0.264	0.00925	-0.304	0.00260	-0.170	0.0984	-0.349	0.000495	-0.00352	0.973	-0.281	0.00563	-0.349	0.000497	-0.347	0.000541
Annual Total Alkalinity as CaCO3 (mg/L)	-0.0332	0.748	-0.245	0.0159	-0.0555	0.592	-0.103	0.317	-0.0996	0.334	-0.889	<0.0001	-0.463	<0.0001	-0.660	<0.0001
Annual Nitrate (mg/L as N)	-0.113	0.271	-0.232	0.0226	-0.0162	0.876	-0.0351	0.734	-0.104	0.312	-0.906	<0.0001	-0.499	<0.0001	-0.617	<0.0001
Annual Nitrite (mg/L s N)	-0.122	0.238	-0.262	0.00997	-0.167	0.104	-0.291	0.00398	-0.0579	0.575	-0.338	0.000757	-0.445	<0.0001	-0.318	0.00159
Annual Ammonia (mg/L as N)	0.104	0.315	-0.0421	0.683	-0.0364	0.725	-0.188	0.0667	-0.143	0.165	0.0615	0.552	0.0129	0.901	-0.0301	0.771
Annual Phosphorus (mg/L)	0.282	0.00532	0.212	0.0380	-0.0843	0.414	0.0699	0.498	0.00639	0.951	0.112	0.279	0.123	0.234	0.147	0.152
Annual Sulphate (mg/L)	-0.267	0.0085	-0.370	0.000205	-0.236	0.0205	-0.271	0.00754	-0.203	0.0476	-0.695	<0.0001	-0.481	<0.0001	-0.635	<0.0001
Annual Total Dissolved Solids (mg/L)	-0.233	0.0225	-0.284	0.00500	-0.145	0.159	-0.185	0.0717	-0.108	0.293	-0.738	<0.0001	-0.450	<0.0001	-0.596	<0.0001
Annual Dissolved Aluminum (mg/L)	0.0537	0.603	0.203	0.0477	-0.0458	0.658	0.119	0.249	-0.0873	0.398	0.345	0.00058	0.0506	0.624	0.284	0.00506
Annual Total Antimony (mg/L)	-0.108	0.297	-0.415	<0.0001	-0.346	0.000562	-0.452	<0.0001	-0.120	0.245	-0.432	<0.0001	-0.443	<0.0001	-0.500	<0.0001
Annual Total Arsenic (mg/L)	0.204	0.0463	0.207	0.0435	-0.0815	0.430	0.149	0.148	0.0114	0.912	-0.0364	0.725	0.0740	0.474	0.119	0.248
Annual Total Barium (mg/L)	0.0330	0.750	-0.265	0.00903	-0.158	0.124	-0.149	0.147	-0.142	0.166	-0.854	<0.0001	-0.448	<0.0001	-0.666	<0.0001
Annual Dissolved Cadmium (mg/L)	-0.194	0.0588	-0.309	0.00221	-0.240	0.0183	-0.317	0.00166	-0.0285	0.783	-0.522	<0.0001	-0.486	<0.0001	-0.482	<0.0001
Annual Total Chromium (mg/L)	0.140	0.173	0.117	0.254	-0.183	0.0737	0.0207	0.842	-0.0756	0.464	0.132	0.201	0.139	0.177	0.0808	0.434
Annual Total Cobalt (mg/L)	0.196	0.0550	-0.166	0.106	-0.296	0.00345	-0.147	0.154	-0.271	0.00747	-0.314	0.00186	-0.127	0.217	-0.273	0.00707
Annual Total Copper (mg/L)	0.172	0.0938	0.242	0.0175	-0.0740	0.474	0.173	0.0915	-0.00585	0.955	0.107	0.301	0.104	0.313	0.194	0.0584
Annual Total Iron (mg/L)	0.225	0.0275	0.0212	0.838	-0.268	0.00830	-0.0573	0.579	-0.0541	0.601	-0.0618	0.550	-0.0490	0.635	-0.0476	0.645
Annual Total Lead (mg/L)	0.282	0.00541	0.0294	0.776	-0.247	0.0151	0.0107	0.917	-0.179	0.0804	-0.104	0.312	-0.0684	0.508	-0.0454	0.661
Annual Total Lithium (mg/L)	-0.159	0.122	-0.319	0.00154	-0.211	0.0389	-0.214	0.0361	-0.111	0.282	-0.657	<0.0001	-0.456	<0.0001	-0.511	<0.0001
Annual Total Manganese (mg/L)	0.142	0.167	-0.141	0.172	-0.423	<0.0001	-0.161	0.117	-0.179	0.0813	-0.0443	0.668	-0.182	0.0755	-0.124	0.229
Annual Total Molybdenum (mg/L)	-0.118	0.250	-0.346	0.000559	-0.219	0.0323	-0.375	0.000169	-0.0463	0.654	-0.474	<0.0001	-0.495	<0.0001	-0.490	<0.0001
Annual Total Nickel (mg/L)	-0.149	0.147	-0.393	<0.0001	-0.350	0.000474	-0.430	<0.0001	-0.133	0.197	-0.447	<0.0001	-0.429	<0.0001	-0.504	<0.0001
Annual Total Selenium (mg/L)	-0.218	0.0327	-0.300	0.00300	-0.171	0.0963	-0.194	0.0576	-0.125	0.223	-0.724	<0.0001	-0.485	<0.0001	-0.586	<0.0001
Annual Total Thallium (mg/L)	0.124	0.230	0.0617	0.550	-0.239	0.0190	-0.0672	0.516	-0.0283	0.784	0.00652	0.950	0.0760	0.462	0.0194	0.851
Annual Total Uranium (mg/L)	-0.300	0.00296	-0.387	<0.0001	-0.250	0.0142	-0.262	0.0100	-0.175	0.0878	-0.686	<0.0001	-0.464	<0.0001	-0.615	<0.0001
Annual Total Zinc (mg/L)	0.190	0.0642	-0.0481	0.641	-0.245	0.0160	-0.177	0.0852	-0.0844	0.414	0.00611	0.953	-0.0583	0.573	-0.00954	0.927

P-value < 0.05/36 (0.05 Bonferroni Corrected for 36 independent comparisons).

$r_s \leq -0.6$ or $r_s \geq 0.6$.

Table F.1: Spearman's Correlation Relationships between Benthic Invertebrate Community Metrics and Physical and Chemical Parameters, Fording River, September 2018 to 2020

Parameter	Autotropohic Heterotrophic Index		Shredder Index		Filtering Collector Index		Benthic Hyporheic Index		Predator Index		Family CA1 (29.0%)		Family CA2 (11.7%)		LPL CA1 (20.2%)		LPL CA2 (9.99%)	
	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value	r_s	p-value
Calcite Index	-0.269	0.00801	0.111	0.279	-0.0610	0.555	0.263	0.00963	0.127	0.217	-0.271	0.00765	-0.496	<0.0001	-0.470	<0.0001	-0.494	<0.0001
Calcite (%)	-0.191	0.0627	0.229	0.0249	0.0113	0.913	0.156	0.130	0.139	0.177	-0.300	0.00301	-0.399	<0.0001	-0.496	<0.0001	-0.351	0.000447
Concreted Score	-0.393	<0.0001	-0.279	0.00594	-0.230	0.0243	0.388	<0.0001	0.162	0.116	-0.101	0.325	-0.509	<0.0001	-0.193	0.0591	-0.654	<0.0001
Embededness (%)	-0.129	0.212	-0.346	0.000557	-0.0606	0.557	0.432	<0.0001	-0.0353	0.733	0.358	0.000336	-0.269	0.00809	0.357	0.000352	-0.400	<0.0001
D16	-0.0265	0.798	-0.337	0.000801	-0.0337	0.744	0.281	0.00558	0.0685	0.507	0.550	<0.0001	-0.0924	0.371	0.472	<0.0001	-0.322	0.00136
D84	0.0383	0.711	-0.500	<0.0001	-0.108	0.293	0.272	0.00724	0.0778	0.451	0.537	<0.0001	0.0525	0.612	0.630	<0.0001	-0.197	0.0539
Water Velocity (m/s)	-0.0229	0.824	0.0834	0.419	-0.0804	0.436	-0.233	0.0226	0.0581	0.574	-0.241	0.0180	0.291	0.00409	-0.104	0.316	0.259	0.0108
Water Depth (cm)	0.271	0.00748	-0.00119	0.991	-0.0468	0.651	-0.223	0.0293	-0.0428	0.679	-0.372	0.000188	0.150	0.146	-0.243	0.0169	0.306	0.00239
Annual PC1	-0.375	0.000164	-0.169	0.100	-0.117	0.255	0.557	<0.0001	0.176	0.0870	-0.406	<0.0001	-0.699	<0.0001	-0.538	<0.0001	-0.639	<0.0001
Annual PC2	-0.319	0.00151	-0.0683	0.509	-0.251	0.0137	-0.123	0.231	0.0687	0.506	-0.339	0.000732	-0.185	0.0711	-0.331	0.00100	-0.219	0.0318
Annual Temperature (°C)	-0.453	<0.0001	-0.456	<0.0001	-0.372	0.00019	0.587	<0.0001	0.0721	0.485	-0.0853	0.408	-0.825	<0.0001	-0.289	0.00436	-0.763	<0.0001
Annual Total Alkalinity as CaCO3 (mg/L)	-0.492	<0.0001	0.168	0.102	0.0219	0.832	0.0495	0.632	0.235	0.0213	-0.740	<0.0001	-0.556	<0.0001	-0.856	<0.0001	-0.379	0.000141
Annual Nitrate (mg/L as N)	-0.453	<0.0001	0.142	0.169	-0.0918	0.374	-0.0810	0.433	0.130	0.207	-0.812	<0.0001	-0.533	<0.0001	-0.881	<0.0001	-0.309	0.00217
Annual Nitrite (mg/L s N)	-0.301	0.00284	-0.282	0.00531	-0.228	0.0253	0.540	<0.0001	-0.00029	0.998	-0.255	0.0120	-0.589	<0.0001	-0.395	<0.0001	-0.562	<0.0001
Annual Ammonia (mg/L as N)	-0.0403	0.696	-0.115	0.263	-0.0949	0.358	0.396	<0.0001	0.0974	0.345	0.0892	0.388	-0.0285	0.783	0.0119	0.908	-0.175	0.0890
Annual Phosphorus (mg/L)	0.0811	0.432	0.0668	0.518	0.210	0.0400	0.180	0.0789	0.0131	0.899	0.121	0.239	-0.0521	0.614	0.0849	0.411	0.0203	0.845
Annual Sulphate (mg/L)	-0.392	<0.0001	0.0188	0.855	-0.125	0.226	0.226	0.0266	0.0726	0.482	-0.610	<0.0001	-0.622	<0.0001	-0.715	<0.0001	-0.531	<0.0001
Annual Total Dissolved Solids (mg/L)	-0.471	<0.0001	0.0387	0.708	-0.142	0.167	0.174	0.0906	0.0577	0.576	-0.635	<0.0001	-0.643	<0.0001	-0.730	<0.0001	-0.532	<0.0001
Annual Dissolved Aluminum (mg/L)	0.204	0.0464	0.100	0.332	0.00266	0.980	0.181	0.0776	-0.156	0.128	0.404	<0.0001	0.107	0.300	0.258	0.0111	0.0970	0.347
Annual Total Antimony (mg/L)	-0.437	<0.0001	-0.357	0.000361	-0.189	0.0656	0.677	<0.0001	0.191	0.0619	-0.293	0.00378	-0.729	<0.0001	-0.435	<0.0001	-0.734	<0.0001
Annual Total Arsenic (mg/L)	-0.0907	0.380	0.0997	0.334	0.139	0.178	0.128	0.216	0.0438	0.672	-0.0444	0.667	-0.171	0.0953	-0.0349	0.736	-0.0500	0.629
Annual Total Barium (mg/L)	-0.332	0.000946	0.230	0.0242	0.0363	0.725	0.0166	0.873	0.227	0.0260	-0.767	<0.0001	-0.461	<0.0001	-0.884	<0.0001	-0.234	0.0217
Annual Dissolved Cadmium (mg/L)	-0.544	<0.0001	-0.274	0.00694	-0.199	0.0514	0.576	<0.0001	0.0805	0.436	-0.303	0.00268	-0.817	<0.0001	-0.489	<0.0001	-0.759	<0.0001
Annual Total Chromium (mg/L)	0.153	0.137	0.136	0.187	0.213	0.0370	0.105	0.311	-0.00929	0.928	0.161	0.116	-0.0355	0.731	0.104	0.312	0.0716	0.488
Annual Total Cobalt (mg/L)	-0.146	0.155	-0.101	0.325	0.0862	0.404	0.300	0.00296	0.217	0.0340	-0.263	0.00962	-0.202	0.0482	-0.254	0.0126	-0.181	0.0775
Annual Total Copper (mg/L)	0.0885	0.391	0.274	0.00693	0.192	0.0606	0.0992	0.336	0.146	0.156	0.0860	0.405	0.0805	0.436	0.0152	0.884	0.0719	0.486
Annual Total Iron (mg/L)	-0.00861	0.934	0.00397	0.969	0.174	0.0908	0.283	0.00529	0.0769	0.457	-0.0278	0.788	-0.173	0.0912	-0.0603	0.559	-0.0962	0.351
Annual Total Lead (mg/L)	0.0906	0.380	0.183	0.0742	0.314	0.00186	0.182	0.0766	0.0315	0.761	-0.163	0.113	-0.0400	0.698	-0.162	0.115	0.116	0.260
Annual Total Lithium (mg/L)	-0.548	<0.0001	-0.188	0.0671	-0.166	0.107	0.416	<0.0001	0.285	0.00496	-0.465	<0.0001	-0.760	<0.0001	-0.601	<0.0001	-0.715	<0.0001
Annual Total Manganese (mg/L)	0	1.00	-0.136	0.187	0.113	0.272	0.447	<0.0001	0.0124	0.905	0.0111	0.914	-0.251	0.0138	-0.0435	0.674	-0.164	0.111
Annual Total Molybdenum (mg/L)	-0.448	<0.0001	-0.318	0.00160	-0.264	0.00921	0.608	<0.0001	0.153	0.137	-0.315	0.00178	-0.727	<0.0001	-0.487	<0.0001	-0.731	<0.0001
Annual Total Nickel (mg/L)	-0.373	0.000180	-0.299	0.00307	-0.161	0.116	0.612	<0.0001	0.140	0.175	-0.325	0.00121	-0.736	<0.0001	-0.464	<0.0001	-0.720	<0.0001
Annual Total Selenium (mg/L)	-0.443	<0.0001	0.0412	0.691	-0.102	0.322	0.198	0.0537	0.0763	0.460	-0.637	<0.0001	-0.634	<0.0001	-0.733	<0.0001	-0.524	<0.0001
Annual Total Thallium (mg/L)	-0.168	0.102	-0.0779	0.450	0.0740	0.473	0.365	0.000252	0.0654	0.527	0.0939	0.363	-0.318	0.00160	0.0477	0.644	-0.280	0.00573
Annual Total Uranium (mg/L)	-0.449	<0.0001	-0.0748	0.469	-0.149	0.147	0.258	0.0111	0.151	0.141	-0.559	<0.0001	-0.683	<0.0001	-0.662	<0.0001	-0.620	<0.0001
Annual Total Zinc (mg/L)	-0.171	0.0948	-0.129	0.212	0.135	0.189	0.456	<0.0001	0.0849	0.411	0.0279	0.787	-0.249	0.0144	0.0289	0.780	-0.258	0.0111

P-value < 0.05/36 (0.05 Bonferroni Corrected for 36 independent comparisons).

$r_s \leq -0.6$ or $r_s \geq 0.6$.

Table F.2: Significance of Habitat Predictors in Canonical Correspondence Analysis on Benthic Invertebrate Communities, FRO LAEMP, 2020

Parameter	Pseudo-F	Marginal P-Value	Singlular P-Values
Mean Depth	2.1	0.004	0.001
Mean Velocity	2.6	0.001	0.001
Substrate D16	1.6	0.031	0.001
Substrate D84	2.2	0.001	0.001
Substrate Embededdness	1.2	0.177	0.001
% Watershed > 30% Slope	1.4	0.081	0.001
Station Gradient	1.7	0.027	0.001
Watershed Area	4.0	0.001	0.001
Season	5.7	0.001	0.001
Mean Depth:Season	1.3	-	0.106
Mean Velocity:Season	2.1	-	0.001
Substrate D16:Season	1.1	-	0.381
Substrate D84:Season	1.3	-	0.087
Substrate Embededdness:Season	1.5	-	0.014
% Watershed > 30% Slope:Season	1.3	-	0.075
Station Gradient:Season	1.1	-	0.281
Watershed Area:Season	1.7	-	0.010

Indicates P-Value < 0.05.

Notes: Marginal p-values reflect the significance of individual predictors after the inclusion of all other variables. Singular p-values reflect the significance of predictors when added individually to a model with no additional predictors.

Table F.3: Significance of Water Predictors in Canonical Correspondence Analysis on Benthic Invertebrate Communities, FRO LAEMP, 2020

Parameter	Pseudo-F	Marginal P-Value	Singlular P-Values
Nickel (Ni)-Total (mg/L)	2.8	0.001	0.001
Nitrate (as N) (mg/L)	1.6	0.022	0.001
Nitrite (as N) (mg/L)	1.9	0.006	0.001
Selenium (Se)-Total (mg/L)	1.3	0.134	0.013
Total Dissolved Solids (mg/L)	1.7	0.014	0.001
Uranium (U)-Total (mg/L)	1.7	0.023	0.001
Temperature (°C)	1.6	0.021	0.001
Season	4.8	0.001	0.001
Nickel (Ni)-Total (mg/L):Season	1.5	-	0.025
Nitrate (as N) (mg/L):Season	1.8	-	0.006
Nitrite (as N) (mg/L):Season	1.4	-	0.049
Selenium (Se)-Total (mg/L):Season	1.8	-	0.006
Total Dissolved Solids (mg/L):Season	2.0	-	0.001
Uranium (U)-Total (mg/L):Season	1.9	-	0.001
Temperature (°C):Season	1.5	-	0.018

Indicates P-Value < 0.05.

Notes: Marginal p-values reflect the significance of individual predictors after the inclusion of all other variables. Singular p-values reflect the significance of predictors when added individually to a model with no additional predictors. "-" indicates no contrast possible.

Table F.4: Significance of Water Predictors after Accounting for Variation in Habitat using Partial Canonical Correspondence Analysis on Benthic Invertebrate Communities, FRO LAEMP, 2020

Parameter	Pseudo-F	Marginal P-Value	Singlular P-Values
Nickel (Ni)-Total (mg/L)	1.7	0.005	0.011
Season	3.9	0.001	0.001
Nitrate (as N) (mg/L)	1.2	0.135	0.584
Nitrite (as N) (mg/L)	1.9	0.004	0.001
Selenium (Se)-Total (mg/L)	1.4	0.074	0.376
Total Dissolved Solids (mg/L)	1.5	0.014	0.017
Uranium (U)-Total (mg/L)	1.6	0.014	0.016
Temperature (°C)	1.5	0.036	0.007
Nickel (Ni)-Total (mg/L):Season	1.8	-	0.003
Nitrate (as N) (mg/L):Season	1.9	-	0.002
Nitrite (as N) (mg/L):Season	1.5	-	0.015
Selenium (Se)-Total (mg/L):Season	1.9	-	0.002
Total Dissolved Solids (mg/L):Season	1.8	-	0.003
Uranium (U)-Total (mg/L):Season	1.9	-	0.001
Temperature (°C):Season	2.1	-	0.001

Indicates P-Value < 0.05.

Notes: Marginal p-values reflect the significance of individual predictors after the inclusion of all other variables. Singular p-values reflect the significance of predictors when added individually to a model with no additional predictors. "-" indicates no contrast possible.

Table F.5: Significance of Habitat Predictors after Accounting for Variation in Water using Partial Canonical Correspondence Analysis on Benthic Invertebrate Communities, FRO LAEMP, 2020

Parameter	Pseudo-F	Marginal P-Value	Singlular P-Values
Mean Depth	1.4	0.045	0.001
Season	3.9	0.001	0.001
Mean Velocity	2.6	0.001	0.001
Substrate D16	1.6	0.019	0.004
Substrate D84	1.8	0.004	0.001
Substrate Embededdness	1.2	0.202	0.084
% Watershed > 30% Slope	1.3	0.101	0.001
Station Gradient	1.4	0.043	0.001
Watershed Area	1.7	0.009	0.001
Mean Depth:Season	1.1	-	0.253
Mean Velocity:Season	1.6	-	0.005
Substrate D16:Season	1.1	-	0.270
Substrate D84:Season	1.1	-	0.247
Substrate Embededdness:Season	1.3	-	0.061
% Watershed > 30% Slope:Season	1.5	-	0.019
Station Gradient:Season	0.99	-	0.497
Watershed Area:Season	2.1	-	0.001

Indicates P-Value < 0.05.

Notes: Marginal p-values reflect the significance of individual predictors after the inclusion of all other variables. Singular p-values reflect the significance of predictors when added individually to a model with no additional predictors. "-" indicates no contrast possible.

APPENDIX G
HABITAT

Table G.1: Pebble Count at RG_FOUSH for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FOUSH 1		RG_FOUSH 2		RG_FOUSH 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	5.5		4.0		7.5	
2	2.0		11.5		9.0	
3	15.0		7.5		10.0	
4	9.5		19.0		3.5	
5	15.5		1.5		5.0	
6	6.0		12.5		8.5	
7	12.0		5.0		9.0	
8	15.5		12.0		12.5	
9	11.0		1.0		11.0	
10	8.0	25	7.5	25	7.0	0
11	12.5		15.5		1.5	
12	11.5		5.0		3.5	
13	9.0		12.0		15.0	
14	14.0		14.5		17.5	
15	7.5		7.0		6.0	
16	13.5		1.0		12.0	
17	14.5		8.5		11.5	
18	6.0		10.5		3.0	
19	3.5		12.0		9.5	
20	10.0	25	4.5	50	2.5	0
21	5.5		8.5		4.0	
22	1.5		4.0		7.5	
23	1.0		10.5		13.0	
24	9.0		14.5		8.0	
25	11.5		10.5		29.0	
26	1.5		2.0		6.5	
27	15.0		7.0		14.0	
28	10.5		9.0		17.0	
29	8.5		3.5		8.5	
30	4.0	0	6.0	0	14.5	50
31	15.0		12.5		23.0	
32	10.5		5.0		10.0	
33	13.5		7.5		4.5	
34	8.0		1.0		8.0	
35	7.5		8.0		11.5	
36	15.5		11.5		9.0	
37	7.0		14.0		10.5	
38	5.0		8.5		7.0	
39	3.5		13.5		13.0	
40	4.0	75	5.5	50	7.5	50
41	15.5		13.0		11.5	
42	11.0		9.0		20.0	
43	14.0		7.5		15.0	
44	7.5		5.0		8.5	
45	5.0		7.0		9.0	
46	9.5		12.5		12.5	
47	4.5		2.5		4.0	
48	6.0		4.0		2.5	
49	3.0		15.5		6.0	
50	10.5	75	2.5	0	9.0	25
51	15.5		5.0		6.5	
52	11.5		7.5		3.0	
53	2.0		4.5		8.5	
54	7.0		8.5		4.5	
55	8.5		6.0		2.0	
56	15.0		13.5		6.0	
57	11.5		10.5		1.5	
58	4.0		1.0		1.0	
59	6.5		15.5		6.0	
60	2.0	0	6.0	25	4.5	0
61	14.0		1.5		19.0	
62	10.5		8.5		8.0	
63	4.0		2.0		12.5	
64	9.5		6.5		4.5	
65	12.0		11.5		5.0	
66	1.0		1.0		7.0	
67	2.5		5.5		3.5	
68	5.0		14.0		13.5	
69	1.5		10.5		10.5	
70	2.0	0	7.5	25	5.0	25
71	15.5		12.0		18.0	
72	6.0		3.5		6.0	
73	5.5		8.5		13.5	
74	11.5		13.0		2.5	
75	6.0		3.0		5.0	
76	13.0		7.5		6.5	
77	12.0		10.5		8.5	
78	1.5		8.0		4.0	
79	5.5		9.5		9.0	
80	7.0	25	2.5	0	11.5	75
81	11.5		6.5		7.5	
82	7.0		12.0		3.0	
83	8.5		2.0		16.0	
84	13.0		6.5		8.5	
85	5.5		9.5		12.0	
86	4.5		2.5		6.5	
87	5.0		6.5		10.5	
88	9.5		7.0		4.0	
89	11.5		5.0		9.0	
90	10.0	50	3.5	75	15.5	50
91	3.5		15.0		21.0	
92	11.0		8.5		16.0	
93	14.5		2.0		9.5	
94	15.5		12.0		14.5	
95	12.0		15.5		10.0	
96	11.5		7.0		2.5	
97	15.5		10.5		4.0	
98	3.0		9.0		11.5	
99	7.5		3.5		5.5	
100	6.0	0	4.0	0	9.0	0
Minimum	**1.000**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**15.5**	**75.000**	**19.0**	**75.000**	**29.0**	**75.000**
Mean	**8.6**	**27.500**	**7.86**	**25.000**	**9.02**	**27.500**
Standard Dev.	**4.39**	**29.930**	**4.25**	**26.352**	**5.14**	**27.513**
Geometric mear	**7.16**	**-**	**6.41**	**-**	**7.54**	**-**
Median	**8.50**	**25**	**7.50**	**25.000**	**8.50**	**25.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.2: Pebble Count at RG_FOUKI for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FOUKI 1		RG_FOUKI 2		RG_FOUKI 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	9.0		5.5		4.5	
2	8.0		13.0		10.5	
3	6.5		7.5		11.0	
4	4.5		9.5		8.5	
5	14.0		1.0		3.0	
6	4.5		10.5		9.0	
7	2.0		3.5		6.5	
8	3.0		8.5		2.5	
9	12.0		5.0		8.0	
10	13.0	50	9.5	25	9.5	0
11	25.5		3.0		4.0	
12	15.0		4.5		11.5	
13	18.5		12.0		3.0	
14	12.0		5.0		8.0	
15	11.0		1.0		2.5	
16	6.5		14.5		15.0	
17	10.5		6.5		1.0	
18	8.0		5.5		4.0	
19	11.0		2.0		9.0	
20	4.0	0	8.0	0	3.0	25
21	1.0		14.5		15.0	
22	0.5		4.0		3.5	
23	2.5		2.5		7.0	
24	4.0		9.0		15.5	
25	15.0		3.5		2.0	
26	2.0		1.0		9.5	
27	1.5		15.0		7.0	
28	6.0		2.5		11.5	
29	16.0		11.0		2.0	
30	11.5	25	6.5	50	4.0	25
31	6.0		9.5		15.5	
32	8.5		10.0		3.0	
33	7.0		8.5		4.5	
34	3.0		5.5		6.0	
35	12.5		14.5		14.0	
36	9.5		10.0		11.5	
37	16.0		11.5		8.0	
38	7.5		6.0		12.0	
39	2.5		8.5		3.5	
40	3.0	0	4.5	0	5.5	0
41	18.0		10.5		2.5	
42	8.5		12.5		9.0	
43	11.0		1.0		3.0	
44	2.5		7.0		11.5	
45	6.0		12.0		5.0	
46	5.0		9.5		14.5	
47	9.5		8.0		2.0	
48	6.0		4.5		8.0	
49	2.0		11.5		16.5	
50	13.0	25	5.0	25	4.0	0
51	9.5		5.0		10.0	
52	5.0		1.5		2.5	
53	12.5		13.5		14.0	
54	15.0		6.0		10.0	
55	6.5		10.0		1.5	
56	8.0		2.0		8.0	
57	3.5		9.0		3.0	
58	5.0		5.0		9.5	
59	8.5		11.5		12.0	
60	12.0	0	2.0	0	9.0	0
61	4.5		15.0		4.5	
62	8.0		9.0		11.5	
63	7.0		6.5		3.5	
64	6.0		1.5		13.0	
65	7.0		6.0		2.5	
66	9.5		2.0		6.5	
67	10.0		7.5		13.5	
68	6.0		8.5		7.5	
69	8.5		3.5		12.0	
70	22.0	50	10.0	50	9.5	25
71	9.5		11.0		1.0	
72	1.5		6.5		4.5	
73	16.0		8.0		16.0	
74	8.5		6.0		8.5	
75	7.0		16.5		12.5	
76	10.5		7.5		3.0	
77	11.5		5.0		11.5	
78	3.0		7.0		8.0	
79	8.0		8.5		15.0	
80	7.0	75	12.5	75	2.5	0
81	5.5		1.5		3.0	
82	6.0		10.0		14.0	
83	1.5		6.0		2.0	
84	3.0		2.5		5.0	
85	4.0		12.0		12.5	
86	11.0		1.0		10.5	
87	8.5		14.0		6.5	
88	6.0		4.0		9.0	
89	10.0		3.5		3.0	
90	8.5	25	10.5	25	7.0	0
91	9.0		13.5		10.5	
92	16.5		6.5		9.5	
93	7.0		4.5		1.5	
94	11.0		1.0		14.0	
95	5.5		5.5		7.5	
96	12.0		2.5		10.0	
97	8.5		3.0		13.5	
98	7.0		11.5		7.0	
99	5.5		2.5		6.5	
100	1.5	0	9.0	0	10.0	25
Minimum	**0.500**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**25.5**	**75.000**	**16.5**	**75.000**	**16.5**	**25.000**
Mean	**8.2**	**25.000**	**7.23**	**25.000**	**7.79**	**10.000**
Standard Dev.	**4.73**	**26.352**	**4.03**	**26.352**	**4.30**	**12.910**
Geometric mear	**6.70**	**-**	**5.83**	**-**	**6.38**	**-**
Median	**8.00**	**25**	**6.75**	**25.000**	**8.00**	**0.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.3: Pebble Count at RG_FOBCP for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FOBCP 1		RG_FOBCP 2		RG_FOBCP 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	5.5		10.5		7.5	
2	9.0		1.5		6.0	
3	11.0		4.0		5.5	
4	4.5		2.0		16.0	
5	9.5		1.5		14.5	
6	8.5		7.5		3.5	
7	10.5		12.5		6.0	
8	6.5		5.0		10.0	
9	1.0		8.5		8.9	
10	2.5	0	11.5	0	19.0	25
11	8.0		4.0		7.5	
12	10.0		5.5		15.5	
13	9.0		12.0		4.5	
14	7.5		10.0		3.5	
15	12.0		6.5		8.5	
16	3.0		4.0		2.0	
17	10.5		7.5		18.0	
18	4.0		7.0		23.0	
19	8.5		9.5		6.0	
20	5.0	25	13.0	50	4.0	0
21	9.5		10.5		5.0	
22	12.5		6.5		8.5	
23	3.5		14.0		18.0	
24	9.0		11.0		10.5	
25	5.0		5.5		11.5	
26	6.5		3.0		8.0	
27	1.5		13.0		5.0	
28	4.5		10.5		9.0	
29	8.0		4.0		6.5	
30	14.5	75	8.0	25	2.5	0
31	9.0		5.5		4.0	
32	3.0		20.0		2.0	
33	4.0		8.5		2.5	
34	12.5		1.5		3.0	
35	6.0		3.0		4.0	
36	13.0		9.0		1.5	
37	2.5		2.5		3.0	
38	6.5		7.0		1.5	
39	10.0		8.0		7.0	
40	7.0	0	3.0	0	14.0	25
41	12.0		3.5		8.5	
42	4.0		12.0		6.0	
43	6.5		4.0		27.0	
44	5.5		11.5		10.0	
45	8.5		8.0		8.5	
46	4.0		5.5		4.0	
47	15.0		2.0		7.5	
48	2.5		4.5		2.0	
49	4.5		8.5		5.5	
50	13.0	0	10.0	25	13.0	50
51	9.0		11.0		12.0	
52	2.0		10.0		8.5	
53	15.5		6.5		6.0	
54	8.0		11.5		4.5	
55	4.5		8.0		10.5	
56	6.0		3.5		2.0	
57	12.5		8.5		7.0	
58	4.5		10.5		3.5	
59	7.5		6.0		5.5	
60	2.0	0	12.0	0	6.5	25
61	16.0		4.0		8.0	
62	10.5		16.5		13.0	
63	7.5		9.5		11.5	
64	15.5		13.5		9.0	
65	2.5		7.0		8.0	
66	6.0		11.5		15.5	
67	10.0		2.5		4.0	
68	8.5		9.0		6.0	
69	12.0		5.0		5.0	
70	9.0	50	10.5	0	2.5	0
71	13.5		12.0		7.0	
72	4.0		5.0		8.5	
73	6.5		11.0		21.0	
74	3.5		1.5		6.5	
75	11.5		9.5		3.0	
76	8.0		7.5		5.5	
77	6.0		3.0		13.0	
78	2.5		5.5		11.5	
79	7.5		13.0		4.0	
80	4.5	25	9.0	25	9.0	75
81	14.0		14.5		4.0	
82	6.0		10.0		2.5	
83	15.0		11.5		3.0	
84	8.5		3.5		6.0	
85	4.0		12.0		9.0	
86	1.5		6.5		5.5	
87	6.5		2.0		17.0	
88	9.5		4.5		8.5	
89	1.0		1.0		9.0	
90	5.0	0	2.5	0	7.5	0
91	16.5		3.0		10.0	
92	2.5		12.5		9.0	
93	6.0		9.5		6.5	
94	9.0		4.0		3.0	
95	5.5		11.0		4.0	
96	11.0		2.5		2.5	
97	4.5		5.5		4.5	
98	10.5		3.0		1.0	
99	6.0		8.0		10.0	
100	9.5	0.14	1.5	0	7.0	0
Minimum	**1.000**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**16.5**	**75.000**	**20.0**	**50.000**	**27.0**	**75.000**
Mean	**7.6**	**17.514**	**7.49**	**12.500**	**7.75**	**20.000**
Standard Dev.	**3.86**	**26.474**	**3.98**	**17.678**	**4.97**	**25.820**
Geometric mean	**6.45**	**-**	**6.25**	**-**	**6.35**	**-**
Median	**7.50**	**0**	**7.50**	**0.000**	**6.75**	**12.500**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.4: Pebble Count at FOBCPD for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FOBDCP 1		RG_FOBDCPD 2		RG_FOBDCPD 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	4.0		6.5		5.5	
2	6.5		2.0		4.0	
3	8.5		7.0		6.0	
4	3.0		8.5		10.5	
5	4.5		6.0		4.0	
6	9.0		13.0		7.5	
7	4.5		2.0		8.5	
8	8.0		8.0		9.0	
9	5.0		9.5		4.0	
10	7.5	50	3.5	0	5.0	50
11	8.0		8.0		8.5	
12	5.0		12.0		3.0	
13	6.5		5.5		5.5	
14	8.0		4.0		11.0	
15	9.0		9.5		8.5	
16	9.5		7.5		6.5	
17	4.5		4.0		4.5	
18	5.0		3.0		14.0	
19	7.5		6.5		8.0	
20	10.0	25	10.0	25	3.5	25
21	8.8		4.5		15.5	
22	6.0		6.0		6.0	
23	5.5		14.0		8.5	
24	7.0		8.5		5.5	
25	12.0		11.5		10.0	
26	8.5		7.0		4.5	
27	6.0		6.5		8.0	
28	11.0		9.5		2.5	
29	9.0		2.0		8.5	
30	5.0	25	4.5	50	6.0	0
31	14.0		6.0		3.5	
32	8.0		6.5		4.0	
33	9.5		4.5		6.5	
34	4.0		8.0		10.0	
35	5.5		12.5		8.5	
36	0.5		5.0		6.0	
37	3.0		9.0		2.5	
38	6.0		6.5		7.5	
39	4.5		1.5		4.0	
40	10.0	25	3.0	0	5.5	25
41	8.0		6.5		7.0	
42	6.5		7.0		8.5	
43	9.5		13.0		4.5	
44	8.5		8.0		12.0	
45	6.0		9.5		8.0	
46	4.0		10.5		9.5	
47	10.0		2.0		6.0	
48	8.5		4.0		4.0	
49	6.0		8.0		8.5	
50	8.5	0	6.5	25	10.5	0
51	6.0		1.5		7.0	
52	3.0		3.0		4.5	
53	4.5		5.5		3.0	
54	6.5		6.5		9.5	
55	1.5		5.0		10.5	
56	4.5		4.5		6.5	
57	2.0		8.5		8.0	
58	12.0		15.0		4.0	
59	8.5		2.0		11.0	
60	3.5	0	5.5	0	3.5	0
61	3.0		4.0		5.5	
62	2.0		10.5		8.0	
63	10.0		8.5		9.0	
64	6.5		2.5		6.5	
65	11.5		6.0		7.5	
66	14.5		9.0		3.5	
67	7.5		7.5		13.5	
68	7.0		4.5		6.0	
69	8.5		8.0		6.5	
70	3.0	0	2.0	0	7.0	25
71	5.5		6.0		4.5	
72	8.0		9.5		6.0	
73	7.5		11.0		8.5	
74	4.5		5.0		8.0	
75	7.0		8.5		10.5	
76	9.0		13.5		7.5	
77	5.0		4.0		4.0	
78	5.5		1.5		5.5	
79	6.0		6.5		9.5	
80	12.0	50	8.0	25	6.5	0
81	8.5		3.5		4.0	
82	5.0		6.0		7.5	
83	3.5		4.5		9.5	
84	4.0		7.5		8.0	
85	1.0		5.5		12.0	
86	6.5		12.0		6.0	
87	8.5		8.5		3.5	
88	12.0		9.0		5.5	
89	7.0		8.5		6.0	
90	2.5	0	5.0	0	13.5	75
91	2.0		3.5		4.0	
92	5.0		10.0		5.0	
93	1.0		8.0		2.5	
94	9.0		6.5		9.0	
95	7.0		4.5		16.5	
96	3.0		9.5		4.0	
97	4.5		8.5		7.5	
98	4.0		5.0		3.5	
99	9.0		6.0		6.0	
100	4.0	0	8.5	25	8.5	0
Minimum	**0.500**	**0**	**1.50**	**0**	**2.50**	**0**
Maximum	**14.5**	**50.000**	**15.0**	**50.000**	**16.5**	**75.000**
Mean	**6.6**	**17.500**	**6.81**	**15.000**	**7.02**	**20.000**
Standard Dev.	**2.91**	**20.582**	**3.07**	**17.480**	**2.92**	**25.820**
Geometric mean	**5.75**	**-**	**6.02**	**-**	**6.44**	**-**
Median	**6.50**	**13**	**6.50**	**12.500**	**6.50**	**12.500**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.5: Pebble Count at RG_FRCP1SW for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FRCP1SW 1		RG_FRCP1SW 2		RG_FRCP1SW 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	8.5		4.0		6.0	
2	9.0		6.5		5.5	
3	4.0		5.5		1.5	
4	6.5		6.0		2.0	
5	5.5		8.0		14.0	
6	10.0		8.5		6.5	
7	7.0		3.5		6.0	
8	5.0		7.0		11.0	
9	8.0		6.5		4.5	
10	6.5	50	9.5	25	12.0	25
11	8.5		6.0		9.5	
12	13.0		8.5		3.0	
13	7.0		4.5		10.0	
14	8.5		7.0		6.5	
15	3.0		8.0		8.0	
16	10.5		5.0		2.0	
17	3.5		7.5		11.5	
18	5.0		4.0		5.5	
19	4.0		1.5		6.0	
20	2.5	0	6.0	0	13.5	50
21	6.0		6.5		7.0	
22	1.0		1.0		7.5	
23	4.0		3.0		9.0	
24	5.5		9.5		1.5	
25	1.0		7.0		10.5	
26	2.5		4.0		5.0	
27	0.5		10.5		2.0	
28	6.5		7.0		15.5	
29	9.0		8.5		6.5	
30	7.0	50	14.0	75	4.0	25
31	8.5		7.5		8.0	
32	4.0		6.5		12.5	
33	6.0		8.0		7.0	
34	21.0		6.0		2.0	
35	11.0		2.5		6.5	
36	9.5		12.0		5.0	
37	7.5		7.5		14.5	
38	3.0		3.5		1.5	
39	2.5		8.0		5.0	
40	6.0	0	1.5	0	3.5	0
41	4.0		6.5		5.5	
42	2.5		13.0		7.5	
43	15.0		10.5		11.5	
44	4.0		1.0		5.0	
45	9.5		9.5		7.0	
46	12.0		3.0		3.5	
47	6.5		11.5		13.5	
48	6.0		1.5		8.0	
49	9.0		2.0		2.5	
50	11.5	50	5.5	0	5.0	25
51	8.5		14.5		8.0	
52	6.0		11.0		6.5	
53	9.0		8.0		4.5	
54	3.5		7.5		5.5	
55	6.5		12.0		14.0	
56	13.0		10.5		4.0	
57	7.0		9.5		3.5	
58	3.0		3.0		11.5	
59	8.0		5.0		4.0	
60	6.5	0	5.5	25	2.5	0
61	12.0		3.0		1.5	
62	9.0		6.5		12.0	
63	5.0		8.5		3.5	
64	8.0		10.0		10.0	
65	7.0		8.0		1.0	
66	14.5		3.0		5.5	
67	10.0		13.0		6.5	
68	7.5		7.0		3.0	
69	9.5		2.0		4.5	
70	3.0	0	14.5	75	14.0	25
71	7.0		3.0		2.5	
72	3.5		5.5		5.0	
73	5.5		9.5		12.5	
74	9.0		6.0		4.5	
75	6.0		8.5		3.0	
76	8..5		12.0		9.5	
77	4.0		1.5		4.0	
78	3.0		7.0		10.0	
79	2.0		2.5		2.5	
80	11.0	50	4.0	25	6.5	0
81	5.5		2.0		7.0	
82	8.0		15.0		11.5	
83	4.0		11.5		4.0	
84	9.0		5.0		7.5	
85	3.5		3.0		12.0	
86	7.5		4.5		9.0	
87	10.0		7.5		15.5	
88	4.5		9.0		8.0	
89	2.0		10.0		3.5	
90	6.5	75	4.5	0	7.5	0
91	4.5		5.0		10.5	
92	6.0		6.5		7.0	
93	15.0		4.0		9.0	
94	7.0		1.0		2.5	
95	5.5		11.5		7.5	
96	8.0		7.5		5.0	
97	4.5		8.0		12.0	
98	7.0		10.0		8.5	
99	13.0		7.0		13.0	
100	11.0	50	6.5	25	3.5	25
Minimum	**0.500**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**21.0**	**75.000**	**15.0**	**75.000**	**15.5**	**50.000**
Mean	**6.9**	**32.500**	**6.82**	**25.000**	**6.97**	**17.500**
Standard Dev.	**3.51**	**28.988**	**3.40**	**28.868**	**3.77**	**16.874**
Geometric mean	**5.98**	**-**	**5.80**	**-**	**5.87**	**-**
Median	**6.50**	**50**	**6.75**	**25.000**	**6.50**	**25.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.6: Pebble Count at RG_FRCP1SWD for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FRCP1SWD 1		RG_FRCP1SWD 2		RG_FRCP1SWD 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	6.0		4.5		14.0	
2	7.0		7.5		1.5	
3	7.5		7.0		10.5	
4	4.0		8.5		6.5	
5	8.0		6.5		2.0	
6	7.0		4.0		4.0	
7	8.5		9.0		9.5	
8	3.0		8.5		6.5	
9	5.0		6.0		15.5	
10	6.0	50	3.5	75	7.0	0
11	7.5		9.5		4.0	
12	6.0		4.5		14.5	
13	3.5		6.0		1.0	
14	4.0		7.5		8.0	
15	7.0		8.5		6.5	
16	2.0		6.0		2.5	
17	6.5		10.5		4.0	
18	3.0		7.0		3.5	
19	8.0		8.0		1.0	
20	5.0	25	9.5	0	8.5	25
21	2.5		3.5		12.0	
22	3.0		5.5		5.5	
23	1.0		4.0		10.0	
24	6.5		7.5		1.5	
25	2.0		8.5		7.0	
26	5.5		11.0		4.0	
27	8.0		9.0		2.5	
28	3.0		7.0		1.5	
29	2.5		3.0		3.0	
30	1.0	0	8.5	25	7.0	0
31	4.5		4.5		12.0	
32	3.0		6.0		5.5	
33	7.5		8.5		8.0	
34	11.0		2.0		9.5	
35	16.0		5.5		4.5	
36	8.0		9.0		14.0	
37	9.5		13.0		6.0	
38	5.0		11.5		3.5	
39	4.5		6.5		12.5	
40	9.0	50	4.0	25	8.0	0
41	7.0		8.5		2.5	
42	8.0		5.5		9.5	
43	7.0		3.0		16.5	
44	6.5		12.5		3.0	
45	9.5		6.0		6.5	
46	7.0		1.5		6.0	
47	2.0		5.0		9.0	
48	5.5		7.5		2.0	
49	1.5		1.0		4.5	
50	5.0	25	9.5	0	13.0	50
51	4.5		2.5		3.0	
52	1.5		12.5		5.5	
53	2.0		1.0		9.0	
54	1.0		13.0		7.5	
55	6.5		5.0		6.0	
56	1.0		2.5		2.5	
57	1.5		6.0		15.0	
58	8.0		5.0		9.0	
59	9.5		10.0		1.0	
60	7.0	50	7.5	0	5.5	25
61	6.5		15.0		11.5	
62	4.5		2.5		3.0	
63	3.5		5.5		15.0	
64	1.0		12.0		1.5	
65	2.5		16.5		4.5	
66	6.5		7.0		12.5	
67	5.0		13.5		4.0	
68	11.0		5.0		8.0	
69	3.5		7.5		6.5	
70	3.0	0	11.5	0	9.0	25
71	10.0		2.5		11.5	
72	1.0		14.0		2.0	
73	2.5		11.0		5.0	
74	5.0		2.0		16.0	
75	6.5		10.5		1.0	
76	9.0		5.0		6.5	
77	7.0		6.0		11.0	
78	6.5		4.5		14.5	
79	6.0		12.5		12.0	
80	8.0	25	7.0	25	4.0	0
81	7.0		10.0		7.5	
82	3.0		2.0		10.5	
83	4.5		9.0		7.0	
84	6.5		10.5		13.5	
85	1.0		14.5		7.5	
86	5.0		6.0		1.0	
87	4.5		10.5		5.5	
88	11.0		7.0		12.5	
89	8.0		5.0		8.0	
90	7.0	50	3.5	50	10.5	0
91	6.5		6.5		2.0	
92	5.5		10.5		6.5	
93	7.0		8.0		3.5	
94	8.5		14.5		14.0	
95	4.5		11.0		9.5	
96	13.0		6.5		8.5	
97	8.5		12.0		5.0	
98	4.0		9.5		10.5	
99	7.5		6.0		6.0	
100	8.0	0	7.5	0	9.5	0
Minimum	**1.000**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**16.0**	**50.000**	**16.5**	**75.000**	**16.5**	**50.000**
Mean	**5.7**	**27.500**	**7.46**	**20.000**	**7.22**	**12.500**
Standard Dev.	**2.89**	**21.890**	**3.48**	**25.820**	**4.17**	**17.678**
Geometric mean	**4.79**	**-**	**6.51**	**-**	**5.80**	**-**
Median	**6.00**	**25**	**7.00**	**12.500**	**6.50**	**0.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.7: Pebble Count at RG_FOUEW for Recolonization Study, Sampling Event 1, FRO LAEMP, 2020

Rock	RG_FOUEW 1		RG_FOUEW 2		RG_FOUEW 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	8.5		3.0		7.5	
2	16.0		4.5		5.0	
3	4.5		9.0		8.5	
4	3.5		6.5		3.5	
5	9.0		10.5		5.5	
6	7.0		7.5		4.0	
7	8.5		4.0		11.5	
8	6.0		6.0		5.0	
9	14.0		10.5		4.0	
10	11.5	25	8.5	0	6.5	25
11	14.5		6.0		6.0	
12	6.5		5.0		9.5	
13	9.0		7.5		5.5	
14	6.0		8.0		14.0	
15	8.5		2.5		4.5	
16	10.5		1.5		6.0	
17	3.0		9.0		8.0	
18	5.0		6.5		2.5	
19	2.0		8.0		8.5	
20	4.5	0	9.0	25	6.0	0
21	3.0		7.0		1.5	
22	13.0		4.5		10.0	
23	8.5		12.0		11.5	
24	9.0		8.5		3.0	
25	19.5		9.0		6.0	
26	6.5		5.0		9.5	
27	8.0		6.5		8.0	
28	7.0		5.0		4.5	
29	5.0		9.0		2.0	
30	8.5	50	7.5	0	13.0	25
31	9.0		8.5		6.5	
32	2.0		14.0		1.5	
33	3.5		6.0		4.0	
34	12.0		3.5		7.5	
35	7.0		9.0		15.0	
36	8.5		1.0		6.5	
37	15.0		6.5		7.5	
38	10.5		10.0		14.0	
39	8.5		15.0		1.5	
40	10.0	75	6.0	50	7.5	0
41	12.0		8.5		1.0	
42	9.0		12.0		11.5	
43	7.5		5.5		2.0	
44	8.0		8.0		5.5	
45	15.0		6.5		4.0	
46	6.5		10.5		6.5	
47	7.0		3.0		8.0	
48	10.0		6.0		9.5	
49	6.5		4.5		7.5	
50	7.0	50	7.0	25	3.5	25
51	5.0		9.5		13.0	
52	6.5		18.0		8.5	
53	11.5		6.0		6.0	
54	8.0		4.5		6.5	
55	8.5		7.5		9.0	
56	6.5		9.0		11.5	
57	1.5		8.5		8.0	
58	3.0		2.0		3.5	
59	2.0		7.5		4.5	
60	4.0	0	3.0	0	3.0	0
61	3.5		11.5		13.5	
62	6.5		8.0		3.0	
63	3.0		5.5		9.5	
64	8.0		10.5		4.0	
65	14.0		6.0		6.5	
66	7.5		3.5		11.5	
67	8.5		9.0		7.0	
68	6.0		4.0		3.0	
69	5.0		5.5		5.5	
70	7.0	50	7.0	25	8.0	25
71	8.0		9.5		6.0	
72	9.5		13.5		7.5	
73	6.0		5.0		3.0	
74	17.0		3.0		12.5	
75	12.0		12.0		9.5	
76	5.5		8.5		10.0	
77	6.0		7.5		8.5	
78	3.0		8.0		7.5	
79	19.0		6.0		3.0	
80	11.0	50	9.0	50	8.5	50
81	5.5		8.5		1.5	
82	13.0		4.0		7.0	
83	8.0		5.0		12.0	
84	2.0		14.5		6.5	
85	2.5		7.5		11.5	
86	5.0		3.0		7.0	
87	7.0		5.5		10.5	
88	6.5		2.0		6.0	
89	8.5		6.5		3.5	
90	2.5	0	5.0	0	5.0	0
91	4.0		13.5		13.5	
92	7.5		3.0		7.5	
93	7.0		6.5		10.0	
94	4.0		2.5		9.5	
95	3.5		7.0		4.0	
96	5.0		12.5		12.0	
97	9.0		7.5		1.5	
98	12.0		13.0		4.0	
99	9.0		6.0		2.5	
100	3.0	0	1.5	25	5.0	25
Minimum	**1.500**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**19.5**	**75.000**	**18.0**	**50.000**	**15.0**	**50.000**
Mean	**7.7**	**30.000**	**7.21**	**20.000**	**6.92**	**17.500**
Standard Dev.	**3.82**	**28.382**	**3.28**	**19.720**	**3.42**	**16.874**
Geometric mean	**6.72**	**-**	**6.38**	**-**	**5.96**	**-**
Median	**7.00**	**38**	**7.00**	**25.000**	**6.50**	**25.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.8: *In Situ* Water Quality Taken at Recolonization Sampling Areas, Sampling Event #1, FRO LAEMP, 2020

Field Parameters		Mine-Exposed						
		RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
Date		7-Apr-20	7-Apr-20	6-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	08-Apr-20
Station 1	Temperature (°C)	0.6	4.2	3.0	2.8	2.6	-0.1	3.2
	Dissolved Oxygen (mg/L)	13.8	11.08	11.44	11.76	14.92	122.3	11.5
	Dissolved Oxygen (%)	96.6	85.1	85.1	83.2	109.7	17.28	86.8
	Conductivity (µS/cm)	668	739	895	713	586	681	818
	Specific Conductivity (µS/cm)	1,250	1227.0	1,542	1,235	1028	1305	1400
	pH	8.32	8.45	8.49	8.59	8.62	8.62	8.36
	ORP (mV)	210.7	218.3	145.8	62.6	164.3	152.6	243.3
Station 2	Temperature (°C)	0.7	3.9	3.4	2.4	1.0	0.8	3.8
	Dissolved Oxygen (mg/L)	13.89	11.20	11.61	12.07	13.41	124.7	10.82
	Dissolved Oxygen (%)	97.2	85.7	88.6	88.5	94.4	17.74	81.6
	Conductivity (µS/cm)	669	733	899	703	339	732	801.0
	Specific Conductivity (µS/cm)	1,249	1227.0	1,529	1,238	625	1360	1350.0
	pH	8.36	8.46	8.49	8.60	8.60	8.40	8.3
	ORP (mV)	213.8	217.8	159.7	39.5	160.8	154.6	242.6
Station 3	Temperature (°C)	0.7	3.4	3.5	2.0	0.4	1.1	3.5
	Dissolved Oxygen (mg/L)	14.05	11.36	11.46	12.12	16.15	17.48	10.7
	Dissolved Oxygen (%)	92.4	85.3	87.0	88.2	112.2	124.2	81.2
	Conductivity (µS/cm)	670	721.0	898	694	680	754	747.0
	Specific Conductivity (µS/cm)	1,248	1,229.0	1,522	1,238	1282	1371	1263.0
	pH	8.37	8.47	8.51	8.59	8.61	8.34	8.3
	ORP (mV)	214.9	218.1	161.3	-	158.1	156.5	242.0

Table G.9: Kick and Sweep at Recolonization Sampling Areas, Sampling Event 1, FRO LAEMP, 2020

		RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
Station 1	Easting	650875	651834	652871	653049	653373	653803	656264
	Northing	5560973	5559918	5557145	5556606	556200	5556090	5551879
	Date	07-Apr-20	7-Apr-20	06-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	8-Apr-20
	Samplers' Initials	MG	MG	MG	MG	MG	MG	MG
	Number of Jars	1.0	1	1	1	1	1	1
	Total Kick Distance (m)	17	15	16	21	20	22	18
	Full Transect (Yes / No)	y	y	y	y	y	y	y
	Number of Transects	4.0	3.0	3.0	3.0	2.5	3.0	3.0
Station 2	Easting	650859	651855	652927	653124	653493	653866	656323
	Northing	5560900	5559823	5557029	5556539	5556173	555646	5551861
	Date	07-Apr-20	7-Apr-20	06-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	8-Apr-20
	Samplers' Initials	MG	MG	MG	MG	MG	MG	MG
	Number of Jars	1.0	1	1	1	1	1	1
	Total Kick Distance (m)	20	18	18	16	18	18	19
	Full Transect (Yes / No)	y	y	y	y	y	y	y
	Number of Transects	3.0	3.0	4.0	3.0	2.0	2.5	2.0
Station 3	Easting	650863	651871	652924	653147	653590	653881	656361
	Northing	5560822	5559765	5556981	5556440	5556164	5556003	5551881
	Date	07-Apr-20	7-Apr-20	06-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	8-Apr-20
	Samplers' Initials	MG	MG	MG	MG	MG	MG	MG
	Number of Jars	1.0	1	1	1	1	1	1
	Total Kick Distance (m)	17	20	14	20	24	20	24
	Full Transect (Yes / No)	y	y	y	y	y	y	y
	Number of Transects	3.0	2.0	2.5	2.0	2.5	3.0	2.5

Table G.10: Channel Measurements at Recolonization Sampling Areas, Sampling Event #1, FRO LAEMP, 2020

		Replicate		1	2	3	4	5	Mean
Mine-exposed	Apr-20	RG_FOUSH							
		1	Depth (cm)	13	19	20	17	9.5	**15.7**
			Velocity (m/s)	0.610	1.900	1.940	2.530	0.680	**1.532**
		2	Depth (cm)	9.5	15	22	15.5	7.5	**13.9**
			Velocity (m/s)	1.060	2.100	2.760	1.240	1.590	**1.750**
		3	Depth (cm)	9.0	11.5	21.0	27.5	13.0	**16.4**
			Velocity (m/s)	1.200	1.670	2.270	1.480	0.970	**1.518**
		RG_FOUKI							
		1	Depth (cm)	13	19.5	23	20.5	12.5	**17.7**
			Velocity (m/s)	1.480	2.090	2.390	1.860	0.950	**1.754**
		2	Depth (cm)	9.5	16.5	25	14	11.5	**15.3**
			Velocity (m/s)	0.470	1.330	2.500	1.360	0.920	**1.316**
		3	Depth (cm)	10.0	19.5	21.0	16.5	13.0	**16.0**
			Velocity (m/s)	1.430	1.210	3.020	2.150	1.530	**1.868**
		RG_FOBCP							
		1	Depth (cm)	8.5	11	16	17	21	**14.7**
			Velocity (m/s)	0.970	1.480	2.110	2.730	2.560	**1.970**
		2	Depth (cm)	7	15.5	17.5	14	9	**12.6**
			Velocity (m/s)	0.860	1.080	1.480	1.920	1.320	**1.332**
		3	Depth (cm)	8	14.5	16.5	12.5	7.5	**11.8**
			Velocity (m/s)	1.740	1.210	1.370	0.750	1.060	**1.226**
		RG_FOBCPD							
		1	Depth (cm)	9.5	18	21.5	16	11.5	**15.3**
			Velocity (m/s)	1.120	1.580	2.090	1.910	1.430	**1.626**
		2	Depth (cm)	7.5	12	16.5	14.5	10	**12.1**
			Velocity (m/s)	0.940	1.460	1.840	2.770	0.930	**1.588**
		3	Depth (cm)	7	12	19.5	13.5	8	**12.0**
			Velocity (m/s)	0.640	1.080	2.060	1.340	1.230	**1.270**
		RG_FRCP1SW							
		1	Depth (cm)	9.5	12	18.5	16	10.5	**13.3**
			Velocity (m/s)	1.640	2.610	1.240	1.740	1.390	**1.724**
		2	Depth (cm)	8.5	14.5	17	12	7.5	**11.9**
			Velocity (m/s)	0.740	1.590	1.530	1.130	0.910	**1.180**
		3	Depth (cm)	9	15	17.5	16	12.5	**14.0**
			Velocity (m/s)	1.030	1.490	1.960	1.290	2.260	**1.606**
		RG_FRCP1SWD							
		1	Depth (cm)	12	21.5	27	18	9.5	**17.6**
			Velocity (m/s)	1.030	2.100	2.640	1.780	1.320	**1.774**
		2	Depth (cm)	10.5	18	23.5	15	9.5	**15.3**
			Velocity (m/s)	0.800	1.930	2.460	1.850	1.070	**1.622**
		3	Depth (cm)	8	14	15.5	19.5	10.5	**13.5**
			Velocity (m/s)	0.830	1.440	2.140	3.040	1.420	**1.774**
		RG_FOUEW							
		1	Depth (cm)	11.5	20.5	26	16	13.5	**17.5**
			Velocity (m/s)	0.980	2.170	2.550	2.320	1.990	**2.002**
		2	Depth (cm)	8.5	12	17	19.5	18.5	**15.1**
			Velocity (m/s)	0.870	1.450	2.410	2.230	1.970	**1.786**
		3	Depth (cm)	9.5	18	21	26	10.5	**17.0**
			Velocity (m/s)	0.660	1.540	2.780	2.050	1.110	**1.628**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area. Velocity was measured at the bottom of the water column.

Table G.11: Pebble Count at RG_FOUSH for Recolonization Study, Sampling Event 2, FRO LAEMP, 2020

Rock	RG_FOUSH 1		RG_FOUSH 2		RG_FOUSH 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	9.5		11.5		14.5	
2	11.5		10.0		7.0	
3	15.0		12.5		9.5	
4	5.0		9.5		11.5	
5	8.5		6.5		8.0	
6	11.5		3.0		12.0	
7	4.5		13.5		10.5	
8	17.5		8.5		6.0	
9	12.0		10.0		8.5	
10	8.0	25	17.0	75	7.5	0
11	6.0		7.5		9.0	
12	18.5		16.0		10.5	
13	8.5		9.0		5.5	
14	16.0		6.5		13.0	
15	8.0		17.0		16.0	
16	14.0		6.5		8.0	
17	9.5		8.0		9.0	
18	10.5		10.5		4.5	
19	7.0		16.0		7.0	
20	14.5	0	12.5	0	15.0	50
21	17.0		14.5		14.0	
22	9.5		16.0		6.0	
23	12.5		6.0		4.5	
24	10.0		8.0		9.5	
25	11.5		11.5		17.0	
26	6.0		6.5		10.0	
27	11.0		10.0		8.0	
28	5.0		7.0		9.0	
29	12.5		20.5		24.0	
30	14.0	0	13.5	0	6.5	25
31	17.5		10.0		5.0	
32	12.0		14.5		3.5	
33	8.0		6.5		8.5	
34	4.0		11.5		10.0	
35	13.5		14.0		2.0	
36	11.5		8.5		7.5	
37	8.5		12.5		4.5	
38	10.5		6.0		6.5	
39	13.0		18.5		10.5	
40	8.0	50	13.0	25	14.0	75
41	19.0		8.5		12.5	
42	7.0		11.5		5.5	
43	6.0		7.0		7.0	
44	10.5		8.5		16.5	
45	9.5		10.0		8.5	
46	17.5		6.5		2.5	
47	6.5		11.5		5.0	
48	11.5		10.5		3.0	
49	8.5		17.0		4.5	
50	16.0	50	13.5	25	7.0	0
51	12.5		15.0		8.0	
52	7.0		3.5		32.5	
53	15.0		6.0		5.0	
54	11.5		7.5		8.0	
55	5.5		18.5		10.5	
56	11.5		4.0		13.0	
57	10.0		16.5		9.5	
58	12.5		9.5		10.5	
59	13.0		10.5		18.0	
60	12.0	25	19.0	50	11.5	25
61	7.0		16.5		10.0	
62	13.5		6.0		13.0	
63	6.5		7.5		20.0	
64	19.5		8.5		4.5	
65	4.0		20.5		6.5	
66	12.5		7.0		16.0	
67	8.0		3.5		10.0	
68	11.5		10.5		8.5	
69	9.5		9.5		6.0	
70	8.5	25	11.5	0	12.0	50
71	6.0		6.0		9.0	
72	10.0		10.5		14.0	
73	14.0		14.0		9.0	
74	7.5		9.0		12.0	
75	6.0		8.0		9.5	
76	14.0		13.0		6.5	
77	4.5		6.5		17.0	
78	10.0		16.5		10.0	
79	3.5		10.0		12.0	
80	11.5	0	15.5	0	7.0	75
81	12.0		17.0		21.5	
82	18.5		8.5		3.5	
83	6.5		10.5		4.0	
84	8.5		19.5		6.5	
85	11.5		6.0		12.0	
86	16.5		18.0		8.5	
87	13.0		13.5		6.0	
88	6.0		8.0		7.5	
89	13.5		3.5		11.0	
90	10.5	0	12.5	25	10.5	25
91	8.5		6.5		16.5	
92	11.0		19.5		4.5	
93	19.0		10.0		8.5	
94	8.0		8.0		13.0	
95	6.0		19.0		8.0	
96	14.5		14.0		4.5	
97	9.0		7.5		4.0	
98	10.5		3.5		2.0	
99	7.5		12.0		8.5	
100	7.0	0	4.0	0	5.5	0
Minimum	**3.500**	**0**	**3.00**	**0**	**2.00**	**0**
Maximum	**19.5**	**50.000**	**20.5**	**75.000**	**32.5**	**75.000**
Mean	**10.6**	**17.500**	**10.86**	**20.000**	**9.50**	**32.500**
Standard Dev.	**3.87**	**20.582**	**4.45**	**25.820**	**4.89**	**28.988**
Geometric mean	**9.86**	**-**	**9.90**	**-**	**8.39**	**-**
Median	**10.50**	**13**	**10.00**	**12.500**	**8.50**	**25.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.12: Pebble Count at RG_FOUKI for Recolonization Study, Sampling Event 2, FRO LAEMP, 2020

Rock	RG_FOUKI 1		RG_FOUKI 2		RG_FOUKI 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	18.5		6.0		9.0	
2	5.5		15.5		6.0	
3	12.0		10.0		6.5	
4	16.5		11.5		8.5	
5	22.5		10.5		7.0	
6	17.0		14.0		8.0	
7	14.5		9.5		13.5	
8	15.0		14.5		7.5	
9	11.5		12.0		9.0	
10	7.5	25	10.5	25	6.0	0
11	19.0		8.0		7.5	
12	16.5		9.5		14.5	
13	23.0		11.5		9.0	
14	18.0		10.5		6.5	
15	12.5		14.0		12.0	
16	10.0		12.0		7.0	
17	17.5		7.0		11.5	
18	9.0		10.0		15.5	
19	12.5		6.5		11.0	
20	9.0	0	8.0	0	13.5	0
21	10.0		10.5		9.0	
22	6.0		14.0		15.5	
23	12.5		9.0		9.5	
24	15.0		15.5		20.0	
25	7.5		11.0		14.0	
26	16.0		13.0		6.5	
27	8.0		10.5		8.0	
28	14.5		12.0		16.5	
29	5.0		15.5		7.5	
30	8.5	0	4.0	0	13.5	75
31	20.5		11.0		11.5	
32	7.0		14.5		8.0	
33	15.5		9.0		17.0	
34	10.0		5.0		11.0	
35	4.0		10.5		15.0	
36	9.5		13.0		9.0	
37	7.5		8.0		4.5	
38	8.0		12.5		16.0	
39	5.5		4.0		11.0	
40	13.5	75	10.5	25	9.5	0
41	8.5		7.0		17.0	
42	20.0		8.5		8.0	
43	10.0		12.5		15.5	
44	8.5		9.5		9.0	
45	6.0		11.5		8.5	
46	13.0		8.5		10.0	
47	17.0		10.0		14.5	
48	5.5		13.5		8.0	
49	12.5		18.0		13.0	
50	8.0	25	8.5	0	17.5	50
51	19.0		14.5		12.0	
52	4.5		17.5		9.5	
53	13.5		5.5		6.0	
54	6.0		12.0		8.5	
55	16.5		8.0		6.0	
56	3.0		10.5		8.5	
57	16.5		16.5		13.0	
58	21.5		14.0		5.5	
59	15.0		8.0		19.0	
60	18.0	25	9.5	50	7.0	0
61	22.5		16.0		14.5	
62	7.5		5.5		8.0	
63	10.5		11.5		17.5	
64	16.0		6.0		12.5	
65	7.0		10.5		9.5	
66	21.0		8.0		16.5	
67	8.0		12.0		9.0	
68	8.5		9.0		4.0	
69	4.0		5.0		10.0	
70	6.5	0	7.0	25	8.5	25
71	9.0		9.5		6.5	
72	12.5		11.5		19.0	
73	6.5		8.0		13.5	
74	9.5		10.5		14.5	
75	13.0		8.5		8.0	
76	3.5		9.0		6.5	
77	7.0		13.0		4.0	
78	10.0		10.0		7.0	
79	19.0		16.0		20.5	
80	4.5	25	10.5	0	9.5	0
81	5.5		12.5		7.0	
82	17.0		16.0		13.5	
83	19.5		18.5		8.5	
84	7.0		9.5		14.5	
85	4.0		10.0		7.0	
86	10.5		4.0		6.0	
87	8.0		11.0		8.0	
88	3.5		5.5		6.5	
89	9.5		11.5		9.5	
90	4.0	0	13.0	0	6.5	0
91	8.0		9.5		4.5	
92	13.5		6.0		8.5	
93	18.5		8.5		6.5	
94	4.5		16.5		10.5	
95	18.0		10.0		6.0	
96	8.5		15.5		16.0	
97	12.0		12.0		12.5	
98	9.5		17.0		7.0	
99	10.0		6.5		6.0	
100	6.5	0	4.5	0	8.5	25
Minimum	**3.000**	**0**	**4.00**	**0**	**4.00**	**0**
Maximum	**23.0**	**75.000**	**18.5**	**50.000**	**20.5**	**75.000**
Mean	**11.4**	**17.500**	**10.62**	**12.500**	**10.30**	**17.500**
Standard Dev.	**5.29**	**23.717**	**3.40**	**17.678**	**3.99**	**26.484**
Geometric mean	**10.11**	**-**	**10.03**	**-**	**9.57**	**-**
Median	**10.00**	**13**	**10.50**	**0.000**	**9.00**	**0.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.13: Pebble Count at RG_FOBCP for Recolonization Study, Sampling Event 2, FRO LAEMP, 2020

Rock	RG_FOBCP 1		RG_FOBCP 2		RG_FOBCP 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	16.0		8.5		8.0	
2	10.5		22.0		8.5	
3	22.5		4.0		6.0	
4	7.0		7.5		6.0	
5	10.0		6.0		7.5	
6	24.5		12.0		18.0	
7	6.0		16.5		5.5	
8	17.5		3.0		11.0	
9	11.5		11.5		8.0	
10	9.0	25	5.5	0	9.0	50
11	12.5		4.0		5.0	
12	15.0		19.5		7.5	
13	9.5		10.0		9.5	
14	16.0		9.5		5.0	
15	10.5		6.5		6.5	
16	19.0		22.0		10.5	
17	12.0		5.0		6.5	
18	6.5		11.0		7.0	
19	8.0		12.5		10.0	
20	11.5	0	10.5	50	13.0	50
21	20.5		15.0		7.0	
22	11.0		9.5		8.5	
23	4.0		4.0		15.5	
24	9.5		11.5		9.0	
25	16.5		8.0		19.0	
26	5.0		13.5		13.0	
27	5.5		15.0		16.0	
28	17.0		6.0		18.5	
29	9.5		4.0		7.0	
30	12.0	50	11.5	0	11.0	25
31	6.5		15.5		6.0	
32	8.0		14.0		4.5	
33	17.5		10.5		3.0	
34	9.0		7.5		8.5	
35	5.5		9.0		17.0	
36	7.0		8.5		10.5	
37	3.5		13.0		7.0	
38	16.0		5.5		4.5	
39	11.5		12.5		14.0	
40	10.0	0	10.0	25	5.0	50
41	8.0		8.0		9.5	
42	9.5		10.5		4.0	
43	3.5		3.5		6.0	
44	6.0		6.0		10.5	
45	6.5		15.5		11.5	
46	7.5		9.5		9.0	
47	10.0		20.5		3.0	
48	4.0		7.5		6.5	
49	9.0		10.0		9.5	
50	3.0	0	5.5	25	13.0	50
51	10.5		4.0		8.5	
52	23.5		15.5		4.0	
53	6.5		10.5		9.0	
54	19.5		4.5		8.0	
55	6.5		7.0		6.5	
56	5.5		6.5		10.5	
57	15.0		11.5		12.0	
58	9.5		9.0		14.0	
59	4.0		8.0		7.5	
60	13.5	25	16.5	25	4.5	0
61	8.5		10.0		7.0	
62	5.5		14.5		3.5	
63	13.0		6.0		6.0	
64	16.5		7.5		5.5	
65	11.0		12.5		2.0	
66	12.5		3.0		7.0	
67	7.0		17.0		1.5	
68	9.5		5.0		7.0	
69	4.0		7.5		11.5	
70	6.5	0	10.5	75	8.0	25
71	10.0		5.0		6.5	
72	8.0		8.0		9.0	
73	5.5		12.0		8.0	
74	7.5		4.5		7.5	
75	20.5		8.5		4.5	
76	6.0		11.0		10.0	
77	7.0		8.0		3.5	
78	9.5		4.5		2.0	
79	8.5		7.0		5.5	
80	19.0	75	4.5	25	7.5	50
81	4.5		18.0		4.0	
82	21.5		10.0		3.0	
83	11.0		8.5		3.5	
84	7.0		6.0		6.0	
85	8.5		4.5		3.0	
86	15.0		11.5		9.5	
87	7.0		9.0		11.0	
88	10.5		19.5		14.5	
89	6.0		7.5		8.5	
90	13.5	50	12.0	0	24.0	50
91	4.0		9.5		15.0	
92	8.5		4.5		7.5	
93	11.5		20.0		8.0	
94	3.0		13.0		9.5	
95	14.0		10.5		3.5	
96	12.5		6.0		5.0	
97	9.0		9.0		8.0	
98	10.5		5.5		9.0	
99	7.5		11.0		7.5	
100	16.0	0	8.0	0	4.5	50
Minimum	**3.000**	**0**	**3.00**	**0**	**1.50**	**0**
Maximum	**24.5**	**75.000**	**22.0**	**75.000**	**24.0**	**50.000**
Mean	**10.4**	**22.500**	**9.71**	**22.500**	**8.27**	**40.000**
Standard Dev.	**4.98**	**27.513**	**4.49**	**24.861**	**4.07**	**17.480**
Geometric mean	**9.26**	**-**	**8.72**	**-**	**7.33**	**-**
Median	**9.50**	**13**	**9.00**	**25.000**	**7.50**	**50.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.14: Pebble Count at FOBCPD for Recolonization Study, Sampling Event 2, FRO LAMEP, 2020

Rock	RG_FOBDCP 1		RG_FOBDCPD 2		RG_FOBDCPD 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	3.5		4.0		3.5	
2	7.0		6.5		6.5	
3	16.5		3.0		8.0	
4	2.0		7.0		4.5	
5	3.0		8.5		6.0	
6	5.5		9.0		2.0	
7	8.5		2.5		11.5	
8	9.0		6.5		7.0	
9	6.5		5.5		5.5	
10	4.5	25	8.0	25	13.0	50
11	11.0		6.5		11.0	
12	15.5		10.0		5.0	
13	4.0		5.0		6.5	
14	4.5		6.0		8.0	
15	1.5		7.5		9.5	
16	2.0		3.5		3.0	
17	6.0		4.0		4.5	
18	5.5		6.0		2.0	
19	14.5		7.5		2.5	
20	2.5	0	4.0	0	3.5	0
21	13.0		11.5		1.0	
22	16.5		8.0		8.0	
23	7.0		7.0		6.5	
24	8.5		5.5		3.0	
25	8.0		12.0		7.5	
26	3.5		10.5		5.5	
27	6.0		2.0		3.0	
28	9.5		3.5		8.5	
29	7.5		4.0		7.0	
30	5.0	25	5.0	50	12.5	50
31	8.5		7.5		5.5	
32	5.5		3.0		4.0	
33	13.0		2.5		6.5	
34	5.0		1.0		5.5	
35	10.5		6.0		7.0	
36	6.0		11.5		2.0	
37	9.0		4.0		1.5	
38	9.5		5.5		5.0	
39	4.5		7.5		8.0	
40	6.5	50	3.0	0	10.5	50
41	4.0		8.5		6.5	
42	3.5		4.0		12.0	
43	13.5		15.5		4.5	
44	3.0		6.5		6.0	
45	1.5		4.0		8.5	
46	6.5		3.5		10.0	
47	4.0		9.0		3.0	
48	4.5		13.0		6.5	
49	8.0		1.5		3.5	
50	11.0	50	6.0	25	2.0	25
51	6.0		7.5		10.5	
52	3.5		5.5		4.0	
53	2.0		9.0		5.5	
54	2.5		10.5		6.0	
55	4.5		3.0		8.5	
56	7.0		6.5		9.0	
57	12.0		6.0		3.0	
58	1.5		4.5		4.5	
59	3.0		4.5		6.0	
60	8.0	-	8.5	50	6.5	50
61	8.5		11.5		17.0	
62	12.0		6.0		7.0	
63	5.0		3.0		12.0	
64	7.0		2.0		9.5	
65	4.5		3.5		6.5	
66	9.0		5.5		4.0	
67	2.5		8.0		2.0	
68	3.0		7.0		1.5	
69	1.0		4.5		4.0	
70	1.5	0	6.0	0	2.5	0
71	12.0		8.0		3.5	
72	8.0		9.5		6.0	
73	16.0		3.5		2.5	
74	7.5		3.5		3.0	
75	3.0		7.5		7.0	
76	5.5		2.0		4.0	
77	6.5		1.5		8.5	
78	4.0		1.5		6.0	
79	9.5		11.0		5.5	
80	6.0	25	17.5	75	9.0	50
81	3.0		5.0		10.5	
82	7.0		6.5		6.0	
83	18.5		4.0		7.5	
84	6.5		7.0		8.5	
85	10.0		7.5		6.0	
86	8.0		3.0		4.5	
87	4.5		1.0		2.5	
88	5.5		1.5		3.0	
89	3.0		5.5		5.0	
90	9.0	50	5.5	0	6.0	0
91	6.0		10.0		3.5	
92	7.5		4.0		7.0	
93	4.0		3.5		4.5	
94	2.5		8.0		3.5	
95	6.5		6.5		4.0	
96	8.0		11.5		2.5	
97	11.5		2.0		2.0	
98	4.5		3.5		9.0	
99	2.0		6.0		6.0	
100	5.5	0	4.0	0	5.5	50
Minimum	**1.000**	**0**	**1.00**	**0**	**1.00**	**0**
Maximum	**18.5**	**50.000**	**17.5**	**75.000**	**17.0**	**50.000**
Mean	**6.7**	**25.000**	**6.06**	**22.500**	**5.95**	**32.500**
Standard Dev.	**3.83**	**21.651**	**3.18**	**27.513**	**3.00**	**23.717**
Geometric mean	**5.64**	**-**	**5.21**	**-**	**5.19**	**-**
Median	**6.00**	**25**	**6.00**	**12.500**	**6.00**	**50.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.15: Pebble Count at RG_FRCP1SW for Recolonization Study, Sampling Event 2, FRO LAEMP, 2020

Rock	RG_FRCP1SW 1		RG_FRCP1SW 2		RG_FRCP1SW 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	6.0		11.5		7.5	
2	9.5		6.5		9.5	
3	5.0		10.0		3.5	
4	11.5		8.5		8.5	
5	4.5		6.0		12.0	
6	10.5		7.5		6.0	
7	8.5		10.0		10.5	
8	6.0		4.0		8.0	
9	3.5		12.5		4.5	
10	6.5	0	7.0	0	9.5	25
11	12.0		4.5		5.5	
12	4.5		8.5		9.0	
13	9.5		6.5		6.0	
14	5.0		5.0		8.5	
15	8.0		9.0		10.0	
16	7.0		6.0		7.5	
17	5.5		7.5		6.5	
18	14.5		6.0		9.5	
19	10.0		8.0		13.0	
20	9.5	25	9.5	25	9.5	0
21	13.5		10.5		5.5	
22	11.0		6.0		12.5	
23	10.5		12.5		10.0	
24	3.0		8.5		7.5	
25	9.5		11.0		11.5	
26	14.5		7.5		3.0	
27	6.0		12.5		6.0	
28	8.5		8.0		5.5	
29	5.5		5.0		8.0	
30	8.0	0	8.5	0	7.0	0
31	10.5		7.0		4.5	
32	13.5		10.0		9.5	
33	4.5		6.0		7.5	
34	10.0		8.5		3.5	
35	5.5		6.5		6.0	
36	13.0		5.0		12.0	
37	10.5		11.5		8.0	
38	7.5		6.5		9.5	
39	9.5		10.0		6.5	
40	7.0	25	7.5	25	14.0	50
41	13.5		8.0		9.0	
42	9.0		4.5		8.5	
43	5.5		7.5		4.0	
44	12.0		12.0		8.0	
45	10.5		6.5		9.0	
46	7.0		10.5		8.5	
47	9.5		7.0		6.5	
48	13.0		6.0		4.0	
49	10.0		5.5		9.5	
50	9.5	25	9.5	0	6.0	0
51	5.5		7.5		4.5	
52	10.5		5.0		14.5	
53	11.5		9.0		9.5	
54	4.0		6.5		3.5	
55	14.5		7.0		6.0	
56	10.0		4.5		7.5	
57	11.5		13.5		4.0	
58	5.0		11.5		8.0	
59	8.0		6.0		5.5	
60	7.5	0	10.5	50	8.0	0
61	11.5		11.0		5.0	
62	6.0		7.0		10.0	
63	7.5		9.5		6.5	
64	13.5		6.5		10.5	
65	6.5		10.0		4.0	
66	5.0		7.5		6.0	
67	3.5		5.0		11.5	
68	10.5		8.5		5.5	
69	11.5		6.0		12.0	
70	6.0	0	8.0	0	7.5	25
71	10.5		12.5		6.5	
72	9.0		6.0		8.0	
73	5.5		10.0		5.0	
74	12.0		6.0		12.5	
75	3.5		7.5		3.0	
76	6.0		6.5		12.5	
77	13.5		8.5		8.5	
78	7.0		11.0		4.0	
79	8.5		10.5		11.0	
80	12.0	50	7.5	0	8.5	25
81	10.0		10.5		5.5	
82	16.0		5.5		10.5	
83	7.0		8.0		6.0	
84	9.5		11.5		10.5	
85	6.5		6.5		8.0	
86	8.0		9.5		11.0	
87	13.0		5.5		7.5	
88	9.5		7.0		13.5	
89	11.5		10.5		10.0	
90	6.0	0	8.0	0	8.5	0
91	15.5		10.0		6.5	
92	4.5		6.0		8.5	
93	11.5		11.5		5.0	
94	8.0		4.0		9.0	
95	8.5		10.5		7.0	
96	6.5		5.5		10.5	
97	15.5		12.5		4.5	
98	12.0		7.5		11.5	
99	7.0		6.0		6.0	
100	8.5	0	8.0	25	7.0	0
Minimum	**3.000**	**0**	**4.00**	**0**	**3.00**	**0**
Maximum	**16.0**	**50.000**	**13.5**	**50.000**	**14.5**	**50.000**
Mean	**8.9**	**12.500**	**8.10**	**12.500**	**7.91**	**12.500**
Standard Dev.	**3.16**	**17.678**	**2.32**	**17.678**	**2.71**	**17.678**
Geometric mean	**8.30**	**-**	**7.76**	**-**	**7.42**	**-**
Median	**9.00**	**0**	**7.50**	**0.000**	**8.00**	**0.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.16: Pebble Count at RG_FRCP1SWD for Recolonization Study, Sampling Event 2, FRO LAEMP, 2020

Rock	RG_FRCP1SWD 1		RG_FRCP1SWD 2		RG_FRCP1SWD 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	11.5		7.5		14.5	
2	7.0		15.5		11.0	
3	12.0		13.5		4.5	
4	8.0		7.0		12.5	
5	6.5		8.5		16.5	
6	7.0		16.5		5.0	
7	10.0		6.5		6.0	
8	8.0		14.0		3.5	
9	9.5		8.0		11.5	
10	13.0	75	11.5	25	7.5	25
11	14.5		7.5		16.5	
12	6.0		7.0		3.5	
13	8.5		12.0		5.0	
14	10.5		6.0		12.5	
15	11.5		10.5		9.5	
16	9.5		8.0		8.0	
17	10.0		4.5		14.5	
18	7.5		7.5		7.0	
19	8.0		15.0		5.5	
20	9.5	25	5.5	0	12.0	50
21	11.0		13.5		6.5	
22	12.5		6.5		11.5	
23	8.0		9.5		8.5	
24	13.5		15.5		10.5	
25	5.5		8.5		12.0	
26	17.0		13.0		10.5	
27	6.5		8.0		6.0	
28	12.5		14.0		7.5	
29	8.5		12.0		15.5	
30	15.5	25	8.0	25	9.5	0
31	12.0		14.0		8.5	
32	6.5		7.5		16.0	
33	14.5		8.5		6.0	
34	10.0		11.5		8.0	
35	9.5		5.5		4.0	
36	12.5		13.5		10.0	
37	8.0		8.0		5.5	
38	11.0		12.5		6.5	
39	6.0		6.0		9.5	
40	9.0	0	7.0	0	14.0	25
41	11.5		8.0		8.0	
42	9.0		11.5		6.0	
43	13.0		17.5		16.5	
44	6.5		12.5		8.0	
45	18.5		5.5		6.5	
46	7.0		8.0		8.5	
47	12.0		16.5		6.5	
48	8.5		6.5		14.0	
49	11.5		12.0		3.5	
50	10.0	0	9.5	0	8.0	-
51	10.0		6.0		17.0	
52	13.5		5.5		5.5	
53	7.0		16.5		6.0	
54	12.5		8.0		3.0	
55	9.5		9.5		7.5	
56	12.0		11.5		15.5	
57	8.5		9.0		11.0	
58	9.5		7.5		9.0	
59	10.5		12.5		12.5	
60	8.0	0	7.0	0	7.0	0
61	10.5		10.5		16.0	
62	13.0		6.0		12.0	
63	8.5		9.5		11.0	
64	7.0		8.0		13.5	
65	12.5		6.5		7.5	
66	8.5		8.5		14.0	
67	11.5		6.0		6.0	
68	10.0		9.0		11.0	
69	3.5		16.5		8.0	
70	8.0	75	10.0	25	12.5	25
71	11.5		12.5		10.0	
72	5.0		6.5		17.5	
73	12.5		11.5		11.5	
74	8.0		8.0		6.0	
75	7.5		2.0		9.5	
76	9.5		12.0		7.0	
77	10.0		5.5		9.5	
78	6.0		8.5		15.0	
79	8.5		4.0		8.5	
80	4.5	0	14.5	0	11.0	50
81	9.5		9.5		8.0	
82	7.0		6.0		14.0	
83	10.0		8.5		7.5	
84	11.5		6.0		9.0	
85	10.0		10.5		6.5	
86	8.0		4.5		13.5	
87	12.5		11.0		6.0	
88	8.0		8.0		5.5	
89	9.0		13.5		13.5	
90	12.5	75	14.5	75	9.5	-
91	10.5		9.0		10.5	
92	6.5		11.5		8.5	
93	9.0		10.5		9.5	
94	17.0		7.5		6.0	
95	11.5		8.0		8.0	
96	3.0		9.0		11.5	
97	11.0		3.5		6.5	
98	12.0		12.0		14.0	
99	10.5		6.5		9.5	
100	8.5	0	8.5	0	11.5	-
Minimum	**3.000**	**0**	**2.00**	**0**	**3.00**	**0**
Maximum	**18.5**	**75.000**	**17.5**	**75.000**	**17.5**	**50.000**
Mean	**9.8**	**27.500**	**9.49**	**15.000**	**9.58**	**25.000**
Standard Dev.	**2.82**	**34.258**	**3.37**	**24.152**	**3.59**	**20.412**
Geometric mean	**9.37**	**-**	**8.87**	**-**	**8.88**	**-**
Median	**9.50**	**13**	**8.50**	**0.000**	**9.25**	**25.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.17: Pebble Count at RG_FOUEW for Recolonization Study, Sampling Event 2, FRO LAEMP, 2020

Rock	RG_FOUEW 1		RG_FOUEW 2		RG_FOUEW 3	
	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness	Intermediate Axis (cm)	Embeddedness
1	12.0		11.5		8.0	
2	8.5		6.0		11.5	
3	4.0		3.0		7.0	
4	3.5		14.0		17.5	
5	7.0		8.5		13.0	
6	5.0		7.0		8.5	
7	9.5		4.5		11.0	
8	14.0		15.0		6.0	
9	5.0		8.0		7.5	
10	4.0	0	9.0	50	11.0	25
11	9.5		10.5		7.5	
12	4.0		8.0		9.0	
13	7.5		1.5		3.5	
14	3.0		14.5		16.0	
15	4.0		3.0		11.0	
16	12.5		9.5		8.5	
17	9.5		11.0		2.0	
18	6.0		8.5		13.5	
19	3.0		6.0		8.0	
20	11.5	50	2.0	0	8.5	0
21	18.0		14.5		22.0	
22	3.0		9.0		10.5	
23	12.5		5.2		5.0	
24	4.5		4.5		4.5	
25	2.5		7.5		8.5	
26	1.0		4.0		7.5	
27	5.0		2.5		9.0	
28	6.0		6.0		7.0	
29	11.0		12.5		5.5	
30	7.0	25	8.0	25	4.5	25
31	16.0		9.5		5.5	
32	7.5		6.0		9.0	
33	3.0		4.5		8.5	
34	8.5		3.5		10.0	
35	6.5		3.0		4.0	
36	4.0		4.0		10.5	
37	5.5		1.5		6.5	
38	3.5		7.0		9.0	
39	9.0		13.5		8.5	
40	4.0	0	11.0	50	8.0	50
41	7.5		8.0		17.0	
42	10.5		14.5		18.5	
43	8.5		9.0		7.5	
44	3.5		2.0		3.5	
45	1.5		18.5		9.5	
46	3.0		9.5		14.0	
47	4.2		7.0		8.0	
48	6.5		10.0		6.5	
49	3.5		3.0		8.0	
50	5.5	0	6.5	25	10.0	0
51	4.0		5.0		7.5	
52	7.0		12.5		3.0	
53	4.5		1.5		9.5	
54	9.5		5.5		12.5	
55	8.0		4.0		7.5	
56	7.5		3.0		15.0	
57	4.0		9.5		4.5	
58	11.5		3.5		10.5	
59	4.5		7.0		7.0	
60	6.0	25	2.5	0	8.0	25
61	10.0		7.5		11.0	
62	4.0		10.0		21.0	
63	9.0		4.5		5.5	
64	8.5		9.0		15.5	
65	7.0		2.5		3.5	
66	4.0		3.0		2.0	
67	4.5		4.5		2.0	
68	8.5		1.0		8.5	
69	2.0		4.0		9.0	
70	2.5	0	8.0	25	7.5	25
71	7.0		13.5		5.5	
72	3.5		8.0		6.5	
73	4.0		8.5		8.0	
74	2.0		6.5		4.5	
75	8.0		3.0		9.0	
76	3.5		4.5		3.0	
77	11.0		17.5		14.0	
78	10.5		4.0		4.5	
79	5.5		6.5		7.0	
80	8.5	25	7.0	0	6.0	25
81	2.5		3.0		9.5	
82	3.0		3.5		10.5	
83	4.5		6.5		7.5	
84	6.0		12.0		7.5	
85	15.0		11.5		6.0	
86	1.0		9.0		11.0	
87	11.5		5.5		9.0	
88	6.0		5.0		5.0	
89	4.5		4.0		4.5	
90	13.5	75	3.5	0	7.5	75
91	3.0		10.0		9.0	
92	7.5		1.5		5.5	
93	9.0		2.0		13.0	
94	13.0		3.5		7.0	
95	5.0		2.5		8.5	
96	6.5		9.5		9.5	
97	4.5		7.0		4.0	
98	7.0		10.5		8.0	
99	6.0		6.0		8.0	
100	9.5	50	8.5	50	6.5	0
Minimum	**1.000**	**0**	**1.00**	**0**	**2.00**	**0**
Maximum	**18.0**	**75.000**	**18.5**	**50.000**	**22.0**	**75.000**
Mean	**6.6**	**25.000**	**6.98**	**22.500**	**8.50**	**25.000**
Standard Dev.	**3.53**	**26.352**	**3.89**	**21.890**	**3.86**	**23.570**
Geometric mean	**5.72**	**-**	**5.85**	**-**	**7.67**	**-**
Median	**6.00**	**25**	**6.50**	**25.000**	**8.00**	**25.000**
Calcite Index	**-**	**-**	**-**	**-**	**-**	**-**

Table G.18: *In Situ* Water Quality Taken at Recolonization Sampling Areas, Sampling Event 2, FRO LAEMP, 2020

Field Parameters		Mine-Exposed						
		RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
Date		29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20	30-Apr-20	30-Apr-20	28-Apr-20
Station 1	Temperature (°C)	4.3	6.1	6.4	4.8	7.0	5.8	4.9
	Dissolved Oxygen (mg/L)	12.15	11.52	12.31	15.77	11.22	12.2	12.78
	Dissolved Oxygen (%)	94.1	92.3	101.6	122.6	92.6	97.4	100.3
	Conductivity (µS/cm)	488	524	581	550	551	544	557
	Specific Conductivity (µS/cm)	807	819.0	901	898	840	859	904
	pH	8.89	8.89	9.11	9.11	9.12	9.08	8.80
	ORP (mV)	-	-	-	-	-	-	-
Station 2	Temperature (°C)	4.1	6.2	5.9	4.4	7.0	5.8	4.9
	Dissolved Oxygen (mg/L)	12.7	11.88	11.66	15.57	11.42	11.99	12.69
	Dissolved Oxygen (%)	97.6	96.6	93.7	120.4	94.3	96.2	98.8
	Conductivity (µS/cm)	484	522	574	549	552	567	417.8
	Specific Conductivity (µS/cm)	805	815.0	904	904	842	896	697.5
	pH	8.88	8.95	9.08	9.08	9.11	8.99	8.8
	ORP (mV)	-	-	-	-	-	-	-
Station 3	Temperature (°C)	3.7	6.1	4.0	3.0	7.0	5.3	4.7
	Dissolved Oxygen (mg/L)	12.77	11.74	15.86	15.54	11.72	12.05	103.6
	Dissolved Oxygen (%)	97.4	95.1	128.0	117.5	96.9	95.8	13.3
	Conductivity (µS/cm)	476	522.0	573	540	559	571	548.0
	Specific Conductivity (µS/cm)	803	816.0	900	913	851	915	895.0
	pH	8.73	8.99	9.11	9.20	9.12	8.91	8.8
	ORP (mV)	-	-	-	-	-	-	-

Table G.19 Kick and Sweep at Recolonization Sampling Areas, Sampling Event 2, FRO LAEMP, 2020

		RG_FOUSH	RG_FOUKI	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FOUEW
Station 1	Easting	650865	651828	652857	653009	653388	653839	656244
	Northing	5561019	5559935	5557154	5556798	5556194	5556096	5551874
	Date	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20	30-Apr-20	30-Apr-20	28-Apr-20
	Samplers' Initials	MG	MG	MG	MG	MG	MG	MG
	Number of Jars	1.0	1	1	1	1	1	1
	Total Kick Distance (m)	10	15	16	25	22	15	15
	Full Transect (Yes / No)	Y	Y	Y	Y	Y	Y	N
	Number of Transects	2.0	3.0	1.5	2.0	3.0	1.5	3/4
Station 2	Easting	650866	651842	652931	653041	653451	653853	656327
	Northing	5560867	5559844	5557032	5556710	5556177	5556066	5551868
	Date	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20	30-Apr-20	30-Apr-20	28-Apr-20
	Samplers' Initials	MG	MG	MG	MG	MG	MG	MG
	Number of Jars	1.0	1	1	1	1	1	1
	Total Kick Distance (m)	12	16	22	25	22	18	16
	Full Transect (Yes / No)	Y	N	Y	Y	Y	Y	N
	Number of Transects	2.0	3/4	2.0	2.0	2.0	2.0	3/4
Station 3	Easting	650857	651865	652928	653062	653487	653869	656353
	Northing	5560821	5559795	5556973	5556615	5556180	5556011	5551874
	Date	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20	30-Apr-20	30-Apr-20	28-Apr-20
	Samplers' Initials	MG	MG	MG	MG	MG	MG	MG
	Number of Jars	1.0	1	1	1	1	1	1
	Total Kick Distance (m)	18	16	22	20	20	10	18
	Full Transect (Yes / No)	Y	Y	Y	Y	Y	N	Y
	Number of Transects	2.0	2.0	2.0	2.0	1.5	-	2.0

Table G.20 Channel Measurements at Recolonization Sampling Areas, Sampling Event 2, FRO LAEMP, 2020

		Replicate		1	2	3	4	5	Mean
Mine-exposed	Apr-20	RG_FOUSH							
		1	Depth (cm)	16.5	30	23	27.5	15	**22.4**
			Velocity (m/s)	2.280	5.450	5.150	4.270	2.430	**3.916**
		2	Depth (cm)	17	25	37.5	26	16.5	**24.4**
			Velocity (m/s)	1.950	3.430	4.210	4.170	2.120	**3.176**
		3	Depth (cm)	18.0	29.0	34.0	23.0	18.0	**24.4**
			Velocity (m/s)	1.710	5.170	4.040	3.330	3.540	**3.558**
		RG_FOUKI							
		1	Depth (cm)	15.5	33	39.5	28.5	19	**27.1**
			Velocity (m/s)	1.710	4.180	6.470	3.960	1.170	**3.498**
		2	Depth (cm)	18	24.5	30	28	20	**24.1**
			Velocity (m/s)	3.120	3.610	5.260	4.910	2.230	**3.826**
		3	Depth (cm)	17.5	25.0	29.0	21.5	19.0	**22.4**
			Velocity (m/s)	1.890	4.140	4.260	3.400	2.360	**3.210**
		RG_FOBCP							
		1	Depth (cm)	10	18.5	23	21.5	10	**16.6**
			Velocity (m/s)	0.970	2.570	2.440	3.130	1.010	**2.024**
		2	Depth (cm)	13.5	18	22.5	23	17	**18.8**
			Velocity (m/s)	1.840	2.490	2.930	3.770	2.230	**2.652**
		3	Depth (cm)	12	17.5	22.5	19	12	**16.6**
			Velocity (m/s)	1.080	2.620	3.540	3.190	1.960	**2.478**
		RG_FOBCPD							
		1	Depth (cm)	11	16.5	22	26.5	13.5	**17.9**
			Velocity (m/s)	1.040	2.540	2.840	3.600	2.110	**2.426**
		2	Depth (cm)	9	17.5	16	18.5	9.5	**14.1**
			Velocity (m/s)	1.730	2.760	2.270	2.710	1.180	**2.130**
		3	Depth (cm)	10	20.5	26	23	14.5	**18.8**
			Velocity (m/s)	1.150	2.450	3.290	2.880	2.170	**2.388**
		RG_FRCP1SW							
		1	Depth (cm)	13	19	30	23.5	10.5	**19.2**
			Velocity (m/s)	0.900	1.090	1.140	1.210	0.570	**0.982**
		2	Depth (cm)	15	16.5	21.5	20	17	**18.0**
			Velocity (m/s)	0.510	0.720	1.090	0.640	0.710	**0.734**
		3	Depth (cm)	14.5	23.5	31	27	11	**21.4**
			Velocity (m/s)	0.540	0.830	1.150	0.940	0.550	**0.802**
		RG_FRCP1SWD							
		1	Depth (cm)	19	28.5	35	24.5	16.5	**24.7**
			Velocity (m/s)	0.880	0.940	1.270	0.980	0.820	**0.978**
		2	Depth (cm)	15.5	21	28	25.5	17.5	**21.5**
			Velocity (m/s)	1.660	2.520	3.580	3.660	3.050	**2.894**
		3	Depth (cm)	8.5	18	40	22	18.5	**21.4**
			Velocity (m/s)	1.120	2.340	2.710	2.300	1.060	**1.906**
		RG_FOUEW							
		1	Depth (cm)	10.5	19	17.5	18	28.5	**18.7**
			Velocity (m/s)	1.360	1.890	2.310	2.420	4.600	**2.516**
		2	Depth (cm)	15	19.5	28	36.5	27	**25.2**
			Velocity (m/s)	1.060	2.360	3.210	4.470	3.140	**2.848**
		3	Depth (cm)	13	29	33	38	16.5	**25.9**
			Velocity (m/s)	1.490	3.940	4.440	3.620	1.820	**3.062**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area. Velocity was measured at the bottom of the water column.

Table G.21: Calcite and Pebble Count at RG_HENUP, FRO LAEMP, June 2020

RG_HENUP 1			RG_HENUP 2			RG_HENUP 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	9.5	-	1	15.5	-	1	6.0	-
2	4.0	-	2	9.0	-	2	8.5	-
3	18.0	-	3	12.0	-	3	12.0	-
4	5.5	-	4	8.5	-	4	4.5	-
5	10.0	-	5	6.0	-	5	10.5	-
6	8.0	-	6	13.5	-	6	15.0	-
7	11.0	-	7	8.0	-	7	6.0	-
8	16.5	-	8	10.0	-	8	9.5	-
9	14.5	-	9	16.5	-	9	8.5	-
10	10.5	0.00	10	9.0	0.00	10	13.0	0
11	2.0	-	11	12.5	-	11	15.0	-
12	7.5	-	12	4.0	-	12	18.5	-
13	11.0	-	13	8.0	-	13	10.5	-
14	6.5	-	14	9.5	-	14	6.0	-
15	8.0	-	15	16.0	-	15	8.5	-
16	15.0	-	16	7.5	-	16	9.0	-
17	9.5	-	17	14.0	-	17	17.0	-
18	21.5	-	18	8.0	-	18	12.5	-
19	13.0	-	19	6.5	-	19	8.5	-
20	12.0	0.00	20	15.0	0	20	5.5	0.25
21	6.5	-	21	6.0	-	21	9.5	-
22	18.0	-	22	8.5	-	22	4.5	-
23	4.0	-	23	9.5	-	23	13.0	-
24	12.5	-	24	3.0	-	24	8.5	-
25	9.5	-	25	2.5	-	25	2.5	-
26	15.5	-	26	4.0	-	26	3.5	-
27	7.0	-	27	8.5	-	27	5.0	-
28	9.0	-	28	7.5	-	28	3.0	-
29	16.0	-	29	10.5	-	29	1.5	-
30	11.0	0.25	30	9.0	0.00	30	4.0	0
31	13.5	-	31	6.0	-	31	2.0	-
32	3.5	-	32	12.0	-	32	6.5	-
33	9.0	-	33	5.0	-	33	21.0	-
34	7.5	-	34	8.5	-	34	2.0	-
35	17.5	-	35	4.5	-	35	8.5	-
36	11.0	-	36	11.0	-	36	16.0	-
37	5.0	-	37	9.5	-	37	5.0	-
38	7.5	-	38	5.0	-	38	7.5	-
39	3.0	-	39	13.0	-	39	13.0	-
40	1.5	0	40	8.0	0.25	40	9.0	0.25
41	4.5	-	41	15.5	-	41	8.5	-
42	6.0	-	42	9.5	-	42	11.0	-
43	2.0	-	43	6.0	-	43	17.0	-
44	8.5	-	44	7.5	-	44	14.5	-
45	3.5	-	45	12.0	-	45	13.0	-
46	5.5	-	46	11.0	-	46	11.5	-
47	19.0	-	47	4.0	-	47	7.5	-
48	3.0	-	48	1.5	-	48	12.0	-
49	5.0	-	49	5.0	-	49	7.5	-
50	9.0	0	50	3.5	0	50	9.0	0
51	1.5	-	51	6.5	-	51	6.0	-
52	14.5	-	52	14.0	-	52	4.0	-
53	9.0	-	53	9.5	-	53	9.5	-
54	10.0	-	54	11.0	-	54	12.0	-
55	19.0	-	55	4.0	-	55	16.0	-
56	4.0	-	56	17.0	-	56	21.5	-
57	9.0	-	57	8.5	-	57	8.0	-
58	5.5	-	58	21.0	-	58	13.0	-
59	3.5	-	59	13.0	-	59	6.5	-
60	8.0	0	60	15.0	0	60	9.5	0.50
61	10.0	-	61	11.5	-	61	17.0	-
62	7.5	-	62	18.5	-	62	21.0	-
63	4.5	-	63	10.0	-	63	16.5	-
64	13.0	-	64	12.0	-	64	10.0	-
65	8.5	-	65	6.0	-	65	14.0	-
66	10.0	-	66	3.5	-	66	8.0	-
67	7.0	-	67	8.0	-	67	3.5	-
68	4.0	-	68	12.0	-	68	7.5	-
69	8.0	-	69	16.0	-	69	2.0	-
70	15.0	0.25	70	22.0	0.25	70	9.0	0
71	3.0	-	71	6.5	-	71	12.0	-
72	10.5	-	72	11.0	-	72	13.5	-
73	9.0	-	73	13.0	-	73	17.0	-
74	2.5	-	74	14.5	-	74	5.0	-
75	13.0	-	75	7.0	-	75	9.0	-
76	8.0	-	76	2.5	-	76	6.5	-
77	3.5	-	77	13.0	-	77	4.0	-
78	18.5	-	78	4.0	-	78	8.5	-
79	15.0	-	79	1.0	-	79	10.0	-
80	9.0	0.50	80	5.5	0	80	15.0	0
81	5.0	-	81	18.0	-	81	5.0	-
82	8.0	-	82	6.5	-	82	3.5	-
83	13.5	-	83	8.0	-	83	9.5	-
84	4.0	-	84	3.0	-	84	8.0	-
85	6.5	-	85	1.5	-	85	6.5	-
86	10.0	-	86	7.5	-	86	11.0	-
87	0.5	-	87	5.5	-	87	7.0	-
88	4.0	-	88	17.0	-	88	4.0	-
89	8.0	-	89	8.0	-	89	10.5	-
90	10.0	0.25	90	3.5	0.25	90	3.0	0.00
91	1.0	-	91	11.5	-	91	12.0	-
92	3.5	-	92	8.0	-	92	6.5	-
93	7.5	-	93	6.0	-	93	15.0	-
94	6.0	-	94	10.0	-	94	3.5	-
95	2.5	-	95	8.5	-	95	5.0	-
96	11.5	-	96	2.5	-	96	1.0	-
97	9.0	-	97	9.0	-	97	17.0	-
98	7.0	-	98	4.0	-	98	1.0	-
99	5.5	-	99	4.0	-	99	3.5	-
100	8.0	0	100	6.5	0	100	8.5	0
Minimum	**0.5**	**0.0**	**Minimum**	**1.0**	**0.0**	**Minimum**	**1.0**	**0.0**
Maximum	**21.5**	**0.50**	**Maximum**	**22.0**	**0.25**	**Maximum**	**21.5**	**0.50**
Mean	**8.6**	**0.13**	**Mean**	**9.0**	**0.08**	**Mean**	**9.2**	**0.10**
Standard Dev.	**4.7**	**0.18**	**Standard Dev.**	**4.5**	**0.12**	**Standard Dev.**	**4.8**	**0.17**
Geometric mean	**7.2**	**-**	**Geometric mean**	**7.8**	**-**	**Geometric mean**	**7.7**	**-**
Median	**8.0**	**0.0**	**Median**	**8.5**	**0.00**	**Median**	**8.5**	**0.00**

Table G.22: Calcite and Pebble Count at RG_FO26, FRO LAEMP, June 2020

RG_FO26 1			RG_FO26 2			RG_FO26 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	4.5	-	1	15.0	-	1	8.0	-
2	8.0	-	2	6.0	-	2	5.0	-
3	5.5	-	3	5.0	-	3	2.0	-
4	4.0	-	4	12.0	-	4	28.0	-
5	11.0	-	5	8.5	-	5	3.5	-
6	12.0	-	6	6.5	-	6	1.5	-
7	7.5	-	7	4.0	-	7	10.5	-
8	13.0	-	8	3.5	-	8	14.0	-
9	9.0	-	9	7.0	-	9	5.5	-
10	11.5	0.25	10	20.0	0.5	10	5.5	0.25
11	6.5	-	11	9.0	-	11	8.5	-
12	7.5	-	12	8.0	-	12	8.5	-
13	6.0	-	13	7.0	-	13	9.0	-
14	4.5	-	14	18.0	-	14	9.5	-
15	14.0	-	15	4.5	-	15	5.0	-
16	13.0	-	16	13.0	-	16	18.0	-
17	4.5	-	17	7.0	-	17	1.5	-
18	12.0	-	18	8.0	-	18	3.5	-
19	2.0	-	19	4.0	-	19	3.0	-
20	4.5	0	20	5.0	0.00	20	2.5	0.25
21	12.0	-	21	10.5	-	21	4.0	-
22	3.5	-	22	3.0	-	22	7.5	-
23	5.0	-	23	11.0	-	23	3.5	-
24	7.5	-	24	8.5	-	24	12.0	-
25	10.0	-	25	8.0	-	25	6.5	-
26	4.0	-	26	12.0	-	26	12.0	-
27	17.0	-	27	6.0	-	27	2.5	-
28	21.0	-	28	13.0	-	28	11.0	-
29	8.5	-	29	7.5	-	29	9.0	-
30	14.0	0.75	30	4.0	0.5	30	19.0	0.50
31	12.0	-	31	13.0	-	31	5.5	-
32	7.0	-	32	5.0	-	32	4.5	-
33	5.0	-	33	7.5	-	33	16.0	-
34	6.0	-	34	11.0	-	34	6.0	-
35	9.5	-	35	3.5	-	35	9.5	-
36	6.0	-	36	22.0	-	36	11.0	-
37	6.0	-	37	6.0	-	37	5.5	-
38	6.0	-	38	3.5	-	38	5.0	-
39	14.0	-	39	11.0	-	39	12.0	-
40	9.0	0.25	40	8.5	0.25	40	10.0	0.25
41	9.5	-	41	12.0	-	41	8.5	-
42	5.5	-	42	5.0	-	42	10.0	-
43	5.0	-	43	7.5	-	43	7.5	-
44	10.5	-	44	13.0	-	44	3.0	-
45	5.5	-	45	21.0	-	45	9.0	-
46	6.0	-	46	16.0	-	46	5.0	-
47	8.0	-	47	13.5	-	47	2.0	-
48	5.5	-	48	12.0	-	48	12.0	-
49	8.0	-	49	10.5	-	49	5.0	-
50	6.5	0.00	50	11.0	0.75	50	11.5	0.25
51	6.5	-	51	14.0	-	51	6.0	-
52	11.0	-	52	16.0	-	52	7.0	-
53	9.0	-	53	10.5	-	53	8.5	-
54	10.0	-	54	11.0	-	54	3.5	-
55	2.0	-	55	7.0	-	55	2.0	-
56	7.5	-	56	4.0	-	56	5.5	-
57	7.5	-	57	19.0	-	57	6.0	-
58	5.5	-	58	16.0	-	58	12.0	-
59	5.0	-	59	14.0	-	59	5.5	-
60	6.5	0	60	14.5	0.5	60	22.0	0.5
61	15.5	-	61	8.0	-	61	13.0	-
62	2.5	-	62	19.0	-	62	18.0	-
63	5.5	-	63	14.5	-	63	12.0	-
64	3.5	-	64	9.0	-	64	12.5	-
65	7.0	-	65	7.0	-	65	9.0	-
66	5.5	-	66	8.5	-	66	19.0	-
67	9.0	-	67	9.0	-	67	5.0	-
68	6.0	-	68	10.5	-	68	5.5	-
69	6.0	-	69	2.5	-	69	5.5	-
70	9.0	0.25	70	7.0	0.25	70	10.5	0.75
71	3.0	-	71	23.0	-	71	16.5	-
72	6.5	-	72	4.0	-	72	13.0	-
73	14.5	-	73	2.5	-	73	9.0	-
74	10.5	-	74	7.5	-	74	5.5	-
75	8.5	-	75	10.0	-	75	5.5	-
76	14.0	-	76	5.0	-	76	13.0	-
77	5.0	-	77	12.0	-	77	7.0	-
78	10.0	-	78	9.0	-	78	13.5	-
79	7.0	-	79	5.5	-	79	11.5	-
80	7.0	0.25	80	14.0	0.25	80	7.0	0.25
81	3.5	-	81	7.0	-	81	8.0	-
82	6.0	-	82	11.0	-	82	15.0	-
83	4.5	-	83	6.5	-	83	4.0	-
84	10.0	-	84	4.5	-	84	12.0	-
85	8.5	-	85	10.0	-	85	8.0	-
86	11.0	-	86	13.0	-	86	4.0	-
87	9.0	-	87	11.0	-	87	7.0	-
88	9.5	-	88	4.5	-	88	3.5	-
89	6.5	-	89	3.5	-	89	8.0	-
90	11.0	0.25	90	6.5	0.5	90	23.5	0.5
91	10.0	-	91	8.0	-	91	5.0	-
92	4.5	-	92	17.5	-	92	6.0	-
93	12.5	-	93	5.0	-	93	8.0	-
94	4.5	-	94	5.0	-	94	14.0	-
95	8.0	-	95	7.5	-	95	9.0	-
96	5.0	-	96	4.5	-	96	7.0	-
97	4.0	-	97	13.0	-	97	3.5	-
98	14.0	-	98	8.5	-	98	6.0	-
99	6.0	-	99	10.0	-	99	4.0	-
100	7.0	0	100	9.5	0.25	100	18.0	0.25
Minimum	**2.0**	**0.0**	**Minimum**	**2.5**	**0.0**	**Minimum**	**1.5**	**0.3**
Maximum	**21.0**	**0.75**	**Maximum**	**23.0**	**0.75**	**Maximum**	**28.0**	**0.75**
Mean	**7.9**	**0.20**	**Mean**	**9.5**	**0.38**	**Mean**	**8.6**	**0.38**
Sandard Dev.	**3.5**	**0.23**	**Standard Dev.**	**4.7**	**0.21**	**Standard Dev.**	**5.1**	**0.18**
Geometric mean	**7.2**	**-**	**Geometric mean**	**8.4**	**-**	**Geometric mean**	**7.2**	**-**
Median	**7.0**	**0.25**	**Median**	**8.5**	**0.38**	**Median**	**7.8**	**0.3**

Table G.23: Calcite and Pebble Count at RG_UFR1, FRO LAEMP, June 2020

RG_UFR1 1			RG_UFR1 2			RG_UFR1 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	13.0	-	1	5.5	-	1	15.0	-
2	14.0	-	2	5.5	-	2	4.5	-
3	4.0	-	3	8.5	-	3	13.0	-
4	6.0	-	4	10.0	-	4	4.0	-
5	8.0	-	5	17.0	-	5	5.5	-
6	10.0	-	6	6.5	-	6	6.0	-
7	12.5	-	7	13.0	-	7	8.0	-
8	3.5	-	8	6.5	-	8	9.0	-
9	6.0	-	9	12.5	-	9	8.5	-
10	12.5	0.75	10	9.5	0.25	10	8.0	0.5
11	5.5	-	11	6.0	-	11	6.0	-
12	2.0	-	12	3.5	-	12	27.0	-
13	3.5	-	13	6.0	-	13	8.5	-
14	6.0	-	14	7.5	-	14	8.0	-
15	7.0	-	15	3.0	-	15	4.5	-
16	9.0	-	16	13.0	-	16	2.5	-
17	12.5	-	17	12.5	-	17	1.5	-
18	9.5	-	18	9.0	-	18	2.0	-
19	3.0	-	19	3.0	-	19	5.5	-
20	9.0	0.25	20	5.0	0.00	20	19.0	0.75
21	4.5	-	21	5.0	-	21	7.0	-
22	8.0	-	22	3.5	-	22	6.0	-
23	13.5	-	23	14.0	-	23	9.0	-
24	12.0	-	24	2.5	-	24	2.5	-
25	7.5	-	25	7.0	-	25	10.0	-
26	11.0	-	26	9.0	-	26	11.0	-
27	14.0	-	27	5.0	-	27	4.5	-
28	12.0	-	28	13.0	-	28	6.5	-
29	11.5	-	29	13.5	-	29	4.5	-
30	5.5	0.25	30	6.0	0.25	30	4.5	0.25
31	13.0	-	31	8.0	-	31	4.5	-
32	6.0	-	32	9.0	-	32	6.0	-
33	6.5	-	33	4.5	-	33	2.5	-
34	3.0	-	34	3.0	-	34	5.0	-
35	4.5	-	35	7.0	-	35	4.0	-
36	3.0	-	36	4.5	-	36	2.5	-
37	14.0	-	37	3.0	-	37	6.5	-
38	7.0	-	38	5.0	-	38	23.0	-
39	18.5	-	39	8.0	-	39	4.5	-
40	11.0	0.25	40	9.0	0.5	40	4.0	0.25
41	17.5	-	41	4.0	-	41	6.0	-
42	13.0	-	42	3.5	-	42	16.5	-
43	4.0	-	43	3.5	-	43	5.0	-
44	3.0	-	44	4.0	-	44	21.0	-
45	3.5	-	45	5.0	-	45	10.5	-
46	15.0	-	46	15.5	-	46	11.0	-
47	7.0	-	47	8.5	-	47	9.0	-
48	8.0	-	48	9.5	-	48	7.0	-
49	17.0	-	49	2.0	-	49	8.0	-
50	5.5	0.00	50	9.0	0.75	50	10.0	0.25
51	14.0	-	51	6.5	-	51	11.0	-
52	11.0	-	52	3.0	-	52	16.0	-
53	15.0	-	53	6.0	-	53	6.0	-
54	21.5	-	54	9.0	-	54	18.0	-
55	6.0	-	55	7.0	-	55	6.0	-
56	13.0	-	56	8.5	-	56	13.0	-
57	8.5	-	57	5.0	-	57	10.0	-
58	12.0	-	58	15.0	-	58	10.0	-
59	6.0	-	59	8.5	-	59	10.0	-
60	16.5	0.75	60	7.0	0.25	60	10.0	0.5
61	13.0	-	61	2.0	-	61	7.0	-
62	4.0	-	62	3.0	-	62	4.0	-
63	4.5	-	63	2.0	-	63	9.0	-
64	18.5	-	64	7.0	-	64	5.0	-
65	10.0	-	65	20.0	-	65	18.5	-
66	7.0	-	66	3.5	-	66	8.5	-
67	16.0	-	67	10.0	-	67	8.0	-
68	4.5	-	68	9.0	-	68	12.0	-
69	7.0	-	69	3.0	-	69	9.0	-
70	25.0	0.75	70	14.5	0.5	70	3.5	0
71	3.5	-	71	7.0	-	71	8.0	-
72	6.5	-	72	7.0	-	72	8.5	-
73	7.0	-	73	14.0	-	73	9.5	-
74	13.0	-	74	6.0	-	74	7.0	-
75	8.0	-	75	5.5	-	75	13.0	-
76	16.0	-	76	9.0	-	76	6.0	-
77	10.0	-	77	6.0	-	77	9.5	-
78	16.5	-	78	8.0	-	78	5.0	-
79	3.0	-	79	4.5	-	79	9.0	-
80	23.0	0.25	80	9.0	0.75	80	7.0	0.25
81	7.0	-	81	7.5	-	81	6.5	-
82	7.5	-	82	10.5	-	82	14.5	-
83	8.5	-	83	8.0	-	83	7.0	-
84	12.0	-	84	8.0	-	84	10.0	-
85	3.0	-	85	15.0	-	85	39.5	-
86	12.0	-	86	4.0	-	86	13.5	-
87	13.0	-	87	2.5	-	87	10.0	-
88	6.5	-	88	2.0	-	88	6.0	-
89	2.0	-	89	22.5	-	89	3.0	-
90	8.0	0.25	90	9.0	0.75	90	15.0	0.75
91	11.5	-	91	8.0	-	91	9.0	-
92	2.0	-	92	10.0	-	92	10.0	-
93	16.5	-	93	5.0	-	93	3.0	-
94	12.0	-	94	7.0	-	94	12.0	-
95	5.5	-	95	4.5	-	95	2.5	-
96	10.5	-	96	3.5	-	96	15.0	-
97	25.0	-	97	5.0	-	97	12.0	-
98	10.0	-	98	8.0	-	98	11.0	-
99	18.0	-	99	7.0	-	99	7.0	-
100	7.0	0.25	100	2.5	0.00	100	4.5	0.75
Minimum	**2.0**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**1.5**	**0.0**
Maximum	**25.0**	**0.75**	**Maximum**	**22.5**	**0.75**	**Maximum**	**39.5**	**0.75**
Mean	**9.7**	**0.38**	**Mean**	**7.4**	**0.40**	**Mean**	**8.9**	**0.43**
Sandard Dev.	**5.2**	**0.27**	**Standard Dev.**	**4.0**	**0.29**	**Standard Dev.**	**5.6**	**0.26**
Geometric mean	**8.3**	**-**	**Geometric mean**	**6.4**	**-**	**Geometric mean**	**7.5**	**-**
Median	**8.8**	**0.25**	**Median**	**7.0**	**0.38**	**Median**	**8.0**	**0.4**

Table G.24: Calcite and Pebble Count at RG_FODHE, FRO LAEMP, June 2020

RG_FODHE 1			RG_FODHE 2			RG_FODHE 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	14.0	-	1	8.0	-	1	10.5	-
2	9.5	-	2	12.5	-	2	8.0	-
3	3.5	-	3	6.5	-	3	9.5	-
4	13.0	-	4	9.0	-	4	6.0	-
5	11.5	-	5	5.5	-	5	2.0	-
6	5.0	-	6	13.5	-	6	3.5	-
7	16.5	-	7	4.5	-	7	7.0	-
8	12.5	-	8	7.0	-	8	11.5	-
9	14.0	-	9	3.0	-	9	9.0	-
10	10.5	0.75	10	12.5	0	10	10.0	0.5
11	6.0	-	11	14.0	-	11	6.5	-
12	15.0	-	12	4.0	-	12	9.5	-
13	12.0	-	13	8.5	-	13	6.0	-
14	6.5	-	14	10.0	-	14	11.0	-
15	8.5	-	15	12.0	-	15	8.0	-
16	13.0	-	16	16.0	-	16	14.5	-
17	11.5	-	17	6.5	-	17	16.0	-
18	16.5	-	18	13.0	-	18	8.0	-
19	12.0	-	19	8.0	-	19	3.5	-
20	5.5	0	20	6.5	0.25	20	5.5	0
21	11.5	-	21	14.0	-	21	8.5	-
22	14.5	-	22	9.5	-	22	13.0	-
23	5.5	-	23	6.0	-	23	10.0	-
24	12.0	-	24	7.5	-	24	6.0	-
25	10.5	-	25	12.0	-	25	8.0	-
26	13.0	-	26	3.0	-	26	9.5	-
27	8.5	-	27	7.0	-	27	6.5	-
28	10.0	-	28	4.0	-	28	8.5	-
29	13.0	-	29	9.0	-	29	19.0	-
30	8.5	0.25	30	13.0	0.00	30	10.0	0.5
31	9.5	-	31	4.5	-	31	13.5	-
32	7.0	-	32	15.5	-	32	21.0	-
33	12.0	-	33	8.5	-	33	12.0	-
34	8.5	-	34	5.5	-	34	6.5	-
35	10.0	-	35	9.0	-	35	8.5	-
36	7.0	-	36	8.0	-	36	10.0	-
37	11.0	-	37	2.0	-	37	9.0	-
38	16.0	-	38	7.5	-	38	5.0	-
39	10.5	-	39	11.0	-	39	11.5	-
40	6.5	0.25	40	9.0	0	40	9.5	0.5
41	9.5	-	41	9.0	-	41	12.5	-
42	18.5	-	42	17.0	-	42	10.0	-
43	11.0	-	43	10.5	-	43	8.0	-
44	9.0	-	44	6.0	-	44	3.5	-
45	6.5	-	45	11.0	-	45	6.0	-
46	7.0	-	46	8.0	-	46	7.5	-
47	12.0	-	47	9.5	-	47	10.5	-
48	8.0	-	48	10.5	-	48	13.0	-
49	6.0	-	49	4.0	-	49	5.5	-
50	8.5	0	50	5.5	0.25	50	7.0	0
51	2.5	-	51	10.0	-	51	4.0	-
52	11.5	-	52	8.5	-	52	9.5	-
53	13.0	-	53	11.5	-	53	5.5	-
54	7.5	-	54	7.0	-	54	8.0	-
55	10.0	-	55	9.5	-	55	7.5	-
56	12.5	-	56	6.0	-	56	13.0	-
57	8.0	-	57	3.5	-	57	25.0	-
58	8.0	-	58	2.0	-	58	7.0	-
59	10.0	-	59	6.5	-	59	10.0	-
60	9.0	0	60	4.0	0	60	17.5	0.50
61	6.0	-	61	11.0	-	61	5.5	-
62	10.5	-	62	3.0	-	62	4.5	-
63	8.5	-	63	12.0	-	63	15.0	-
64	11.0	-	64	7.5	-	64	12.0	-
65	6.0	-	65	10.5	-	65	7.0	-
66	10.5	-	66	5.0	-	66	16.0	-
67	12.5	-	67	13.5	-	67	7.0	-
68	16.0	-	68	8.0	-	68	10.0	-
69	8.0	-	69	8.0	-	69	6.5	-
70	14.5	0.00	70	9.0	0.50	70	11.0	0
71	9.5	-	71	3.5	-	71	5.0	-
72	4.0	-	72	8.0	-	72	8.0	-
73	6.5	-	73	21.5	-	73	12.0	-
74	8.5	-	74	15.5	-	74	11.0	-
75	11.0	-	75	16.0	-	75	18.5	-
76	12.0	-	76	10.5	-	76	6.5	-
77	9.0	-	77	4.5	-	77	11.0	-
78	6.5	-	78	7.0	-	78	7.0	-
79	10.0	-	79	8.5	-	79	4.5	-
80	11.5	0.25	80	10.5	0.75	80	13.0	0.00
81	7.0	-	81	9.5	-	81	9.0	-
82	12.0	-	82	8.5	-	82	10.5	-
83	15.5	-	83	12.5	-	83	8.5	-
84	8.0	-	84	17.0	-	84	8.0	-
85	6.0	-	85	11.0	-	85	11.5	-
86	4.0	-	86	19.0	-	86	5.5	-
87	7.5	-	87	6.0	-	87	3.0	-
88	10.0	-	88	3.5	-	88	8.5	-
89	9.5	-	89	7.5	-	89	9.0	-
90	11.5	0	90	4.0	0	90	6.0	0
91	4.0	-	91	14.0	-	91	1.5	-
92	6.5	-	92	6.0	-	92	4.5	-
93	11.5	-	93	8.5	-	93	14.0	-
94	7.5	-	94	12.0	-	94	7.0	-
95	16.5	-	95	7.5	-	95	9.5	-
96	5.5	-	96	9.0	-	96	4.5	-
97	9.0	-	97	9.5	-	97	8.0	-
98	10.0	-	98	8.0	-	98	7.0	-
99	8.5	-	99	10.0	-	99	13.0	-
100	16.0	0	100	15.5	0.25	100	10.0	0.3
Minimum	**2.5**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**1.5**	**0.0**
Maximum	**18.5**	**0.75**	**Maximum**	**21.5**	**0.8**	**Maximum**	**25.0**	**0.5**
Mean	**9.9**	**0.15**	**Mean**	**9.0**	**0.20**	**Mean**	**9.1**	**0.23**
Standard Dev.	**3.3**	**0.24**	**Standard Dev.**	**3.9**	**0.26**	**Standard Dev.**	**4.0**	**0.25**
Geometric mean	**9.3**	**-**	**Geometric mean**	**8.1**	**-**	**Geometric mean**	**8.3**	**-**
Median	**10.0**	**0.00**	**Median**	**8.5**	**0.13**	**Median**	**8.5**	**0.13**

Table G.25: Calcite and Pebble Count at RG_FOUCL, FRO LAEMP, June 2020

RG_FOUCL 1			RG_FOUCL 2			RG_FOUCL 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	4.5	-	1	7.0	-	1	5.0	-
2	2.0	-	2	3.5	-	2	4.0	-
3	12.0	-	3	4.0	-	3	2.0	-
4	2.0	-	4	7.5	-	4	2.0	-
5	1.0	-	5	3.0	-	5	11.0	-
6	7.0	-	6	2.0	-	6	1.5	-
7	1.0	-	7	3.5	-	7	3.5	-
8	1.5	-	8	6.0	-	8	1.5	-
9	3.5	-	9	7.0	-	9	4.0	-
10	5.0	0.00	10	2.0	0.5	10	12.5	0.25
11	2.5	-	11	1.5	-	11	4.0	-
12	3.0	-	12	3.0	-	12	3.5	-
13	5.0	-	13	7.5	-	13	8.0	-
14	3.0	-	14	4.0	-	14	6.0	-
15	7.0	-	15	2.5	-	15	1.5	-
16	9.5	-	16	1.0	-	16	9.0	-
17	9.0	-	17	3.5	-	17	1.0	-
18	10.0	-	18	7.5	-	18	3.5	-
19	SAND	-	19	4.0	-	19	7.0	-
20	2.5	0	20	4.5	0	20	6.0	0.25
21	2.0	-	21	4.5	-	21	9.0	-
22	1.0	-	22	8.0	-	22	11.0	-
23	0.5	-	23	2.5	-	23	6.5	-
24	7.0	-	24	3.5	-	24	4.0	-
25	8.0	-	25	6.5	-	25	2.5	-
26	5.0	-	26	4.0	-	26	3.0	-
27	8.0	-	27	2.0	-	27	4.0	-
28	2.5	-	28	4.0	-	28	4.5	-
29	2.5	-	29	3.5	-	29	5.0	-
30	15.0	0.75	30	8.5	0.50	30	6.5	0
31	8.0	-	31	4.0	-	31	6.5	-
32	7.0	-	32	4.0	-	32	2.5	-
33	15.0	-	33	3.5	-	33	4.0	-
34	5.0	-	34	2.5	-	34	1.5	-
35	4.0	-	35	5.0	-	35	3.0	-
36	7.5	-	36	8.5	-	36	1.0	-
37	14.0	-	37	5.5	-	37	16.0	-
38	3.0	-	38	7.0	-	38	5.0	-
39	7.0	-	39	7.5	-	39	4.0	-
40	8.5	0.25	40	7.0	0.5	40	8.0	0.25
41	10.0	-	41	8.0	-	41	5.0	-
42	3.0	-	42	11.0	-	42	2.0	-
43	2.0	-	43	3.0	-	43	2.5	-
44	4.0	-	44	8.0	-	44	10.0	-
45	5.5	-	45	4.5	-	45	9.5	-
46	11.0	-	46	3.5	-	46	7.0	-
47	5.0	-	47	4.5	-	47	3.0	-
48	7.0	-	48	4.0	-	48	14.0	-
49	11.0	-	49	5.0	-	49	3.0	-
50	9.0	0	50	5.0	0	50	9.5	0.5
51	8.0	-	51	3.0	-	51	4.0	-
52	14.0	-	52	7.5	-	52	3.0	-
53	15.5	-	53	11.5	-	53	8.5	-
54	7.0	-	54	4.0	-	54	4.0	-
55	7.0	-	55	3.0	-	55	3.0	-
56	5.5	-	56	2.0	-	56	5.5	-
57	11.0	-	57	8.5	-	57	8.0	-
58	5.0	-	58	5.5	-	58	5.0	-
59	4.5	-	59	3.0	-	59	2.5	-
60	3.5	0	60	1.5	0	60	2.0	0.50
61	4.0	-	61	3.5	-	61	4.5	-
62	17.0	-	62	2.0	-	62	9.0	-
63	6.5	-	63	3.0	-	63	6.5	-
64	4.5	-	64	2.0	-	64	3.0	-
65	8.0	-	65	11.0	-	65	4.0	-
66	11.0	-	66	6.5	-	66	3.0	-
67	5.0	-	67	3.0	-	67	2.5	-
68	9.5	-	68	4.0	-	68	17.0	-
69	6.0	-	69	4.5	-	69	8.0	-
70	7.0	0.25	70	2.5	0.00	70	4.0	0
71	6.0	-	71	3.0	-	71	1.5	-
72	3.5	-	72	4.0	-	72	3.0	-
73	11.0	-	73	2.5	-	73	1.5	-
74	9.0	-	74	5.0	-	74	7.0	-
75	3.0	-	75	3.5	-	75	9.5	-
76	4.5	-	76	5.5	-	76	11.0	-
77	6.5	-	77	2.5	-	77	3.0	-
78	10.0	-	78	1.5	-	78	2.5	-
79	5.5	-	79	10.0	-	79	5.0	-
80	4.5	0.00	80	3.0	0	80	10.0	0.25
81	8.0	-	81	3.0	-	81	2.0	-
82	4.0	-	82	SAND	-	82	1.5	-
83	5.5	-	83	2.0	-	83	5.0	-
84	4.0	-	84	1.5	-	84	4.0	-
85	11.0	-	85	1.5	-	85	9.0	-
86	7.0	-	86	2.0	-	86	1.5	-
87	3.5	-	87	3.5	-	87	3.5	-
88	SAND	-	88	3.0	-	88	3.5	-
89	7.0	-	89	2.5	-	89	4.0	-
90	10.5	0.25	90	2.5	0	90	1.0	0
91	4.0	-	91	13.0	-	91	5.5	-
92	1.0	-	92	3.0	-	92	4.0	-
93	6.0	-	93	3.0	-	93	5.5	-
94	7.0	-	94	3.5	-	94	4.5	-
95	7.5	-	95	3.0	-	95	7.0	-
96	7.5	-	96	3.5	-	96	9.5	-
97	8.0	-	97	4.0	-	97	8.0	-
98	6.5	-	98	7.0	-	98	5.5	-
99	7.0	-	99	4.0	-	99	3.5	-
100	7.5	0.5	100	5.5	0	100	5.5	0.0
Minimum	**0.5**	**0.0**	**Minimum**	**1.0**	**.**	**Minimum**	**1.0**	**0.0**
Maximum	**17.0**	**0.75**	**Maximum**	**13.0**	**0.5**	**Maximum**	**17.0**	**0.5**
Mean	**6.5**	**0.20**	**Mean**	**4.5**	**0.15**	**Mean**	**5.2**	**0.20**
Standard Dev.	**3.5**	**0.26**	**Standard Dev.**	**2.5**	**0.24**	**Standard Dev.**	**3.3**	**0.20**
Geometric mean	**5.4**	**-**	**Geometric mean**	**3.9**	**-**	**Geometric mean**	**4.3**	**-**
Median	**6.5**	**0.13**	**Median**	**4.0**	**0.00**	**Median**	**4.0**	**0.25**

Table G.26: Calcite and Pebble Count at RG_FOUNGD, FRO LAEMP, June 2020

RG_FOUNGD 1			RG_FOUNGD 2			RG_FOUNGD 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	8.5	-	1	11.0	-	1	9.5	-
2	11.5	-	2	5.0	-	2	6.0	-
3	6.0	-	3	9.5	-	3	12.5	-
4	2.5	-	4	6.0	-	4	8.0	-
5	5.0	-	5	8.0	-	5	8.5	-
6	7.5	-	6	12.5	-	6	16.0	-
7	4.5	-	7	5.0	-	7	10.5	-
8	6.0	-	8	8.0	-	8	7.0	-
9	7.5	-	9	10.0	-	9	5.5	-
10	5.0	0	10	5.5	0	10	9.0	0.25
11	7.0	-	11	7.5	-	11	10.0	-
12	9.5	-	12	6.0	-	12	13.5	-
13	5.0	-	13	4.5	-	13	8.0	-
14	10.0	-	14	8.0	-	14	5.5	-
15	11.5	-	15	3.5	-	15	11.0	-
16	13.0	-	16	10.5	-	16	8.5	-
17	8.0	-	17	11.0	-	17	15.0	-
18	9.5	-	18	9.0	-	18	9.5	-
19	7.5	-	19	3.5	-	19	11.0	-
20	12.0	0.25	20	10.5	0.50	20	6.0	0
21	5.5	-	21	9.0	-	21	3.5	-
22	13.0	-	22	7.0	-	22	7.0	-
23	4.5	-	23	11.0	-	23	9.0	-
24	3.0	-	24	4.5	-	24	5.5	-
25	9.5	-	25	16.5	-	25	11.0	-
26	10.0	-	26	4.0	-	26	2.5	-
27	12.0	-	27	5.0	-	27	10.0	-
28	7.5	-	28	7.5	-	28	6.5	-
29	11.0	-	29	6.0	-	29	4.5	-
30	8.0	0.25	30	8.0	-	30	7.0	0.5
31	5.0	-	31	6.5	-	31	5.0	-
32	8.0	-	32	4.5	-	32	3.0	-
33	6.5	-	33	8.0	-	33	9.5	-
34	13.0	-	34	7.5	-	34	16.5	-
35	15.0	-	35	9.0	-	35	6.0	-
36	6.0	-	36	3.0	-	36	4.0	-
37	13.5	-	37	5.5	-	37	9.5	-
38	3.5	-	38	1.5	-	38	8.0	-
39	1.5	-	39	7.0	-	39	4.5	-
40	4.0	0.5	40	4.5	0	40	13.0	0.5
41	10.5	-	41	8.0	-	41	6.5	-
42	16.0	-	42	13.0	-	42	10.0	-
43	6.5	-	43	0.5	-	43	7.5	-
44	10.0	-	44	6.5	-	44	23.0	-
45	7.0	-	45	9.5	-	45	9.0	-
46	6.0	-	46	6.0	-	46	8.0	-
47	10.5	-	47	7.0	-	47	14.0	-
48	12.0	-	48	8.0	-	48	6.5	-
49	9.5	-	49	4.0	-	49	7.5	-
50	14.5	0.5	50	5.0	0	50	6.5	0
51	11.0	-	51	4.5	-	51	14.0	-
52	7.0	-	52	14.0	-	52	10.5	-
53	9.5	-	53	6.0	-	53	21.5	-
54	10.0	-	54	9.5	-	54	7.0	-
55	20.5	-	55	8.0	-	55	8.5	-
56	9.5	-	56	6.0	-	56	9.0	-
57	12.0	-	57	11.5	-	57	15.5	-
58	3.0	-	58	7.0	-	58	6.5	-
59	6.5	-	59	5.0	-	59	8.0	-
60	5.0	0	60	7.5	0	60	7.0	0
61	8.0	-	61	4.0	-	61	2.5	-
62	12.5	-	62	3.0	-	62	4.0	-
63	1.5	-	63	9.5	-	63	9.0	-
64	7.5	-	64	10.0	-	64	5.5	-
65	3.0	-	65	6.5	-	65	6.5	-
66	5.0	-	66	5.0	-	66	3.0	-
67	9.5	-	67	6.0	-	67	8.0	-
68	2.5	-	68	8.5	-	68	5.0	-
69	11.0	-	69	4.5	-	69	4.5	-
70	5.5	0	70	13.0	0.25	70	7.0	0.25
71	4.0	-	71	5.5	-	71	12.5	-
72	8.0	-	72	6.5	-	72	3.0	-
73	8.0	-	73	7.5	-	73	11.0	-
74	12.5	-	74	10.0	-	74	9.5	-
75	7.0	-	75	3.0	-	75	6.0	-
76	7.5	-	76	8.5	-	76	12.5	-
77	7.0	-	77	5.5	-	77	11.0	-
78	9.5	-	78	6.5	-	78	5.0	-
79	12.0	-	79	6.0	-	79	6.5	-
80	4.5	0.5	80	10.0	0.5	80	5.5	0
81	9.0	-	81	11.5	-	81	3.5	-
82	10.0	-	82	8.5	-	82	8.0	-
83	13.0	-	83	5.0	-	83	4.0	-
84	8.5	-	84	3.0	-	84	1.0	-
85	11.0	-	85	6.5	-	85	7.0	-
86	5.5	-	86	12.0	-	86	12.5	-
87	8.5	-	87	4.5	-	87	9.5	-
88	10.0	-	88	3.0	-	88	8.0	-
89	12.0	-	89	9.0	-	89	17.0	-
90	9.5	0	90	5.5	0.25	90	8.0	0
91	6.0	-	91	8.5	-	91	13.0	-
92	8.0	-	92	3.5	-	92	15.5	-
93	13.0	-	93	16.0	-	93	7.0	-
94	6.5	-	94	8.0	-	94	11.0	-
95	3.0	-	95	7.0	-	95	5.5	-
96	7.0	-	96	4.5	-	96	6.0	-
97	7.5	-	97	8.0	-	97	8.0	-
98	10.0	-	98	11.0	-	98	16.0	-
99	9.0	-	99	6.5	-	99	10.0	-
100	5.5	0	100	7.0	0.00	100	6.5	0.25
Minimum	**1.5**	**0.0**	**Minimum**	**0.5**	**0.0**	**Minimum**	**1.0**	**0.0**
Maximum	**20.5**	**0.50**	**Maximum**	**16.5**	**0.50**	**Maximum**	**23.0**	**0.50**
Mean	**8.3**	**0.20**	**Mean**	**7.2**	**0.17**	**Mean**	**8.6**	**0.18**
Standard Dev.	**3.4**	**0.23**	**Standard Dev.**	**3.0**	**0.22**	**Standard Dev.**	**4.0**	**0.21**
Geometric mean	**7.5**	**-**	**Geometric mean**	**6.6**	**-**	**Geometric mean**	**7.7**	**-**
Median	**8.0**	**0.13**	**Median**	**7.0**	**0.00**	**Median**	**8.0**	**0.13**

Table G.27: Calcite and Pebble Count at RG_FODNGD, FRO LAEMP, June 2020

RG_FODNGD 1			RG_FODNGD 2			RG_FODNGD 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	7.5	-	1	11.5	-	1	11.0	-
2	12.5	-	2	8.0	-	2	9.5	-
3	6.0	-	3	7.5	-	3	6.5	-
4	8.0	-	4	3.0	-	4	5.0	-
5	7.0	-	5	12.0	-	5	9.0	-
6	9.5	-	6	4.5	-	6	7.0	-
7	5.5	-	7	7.0	-	7	10.5	-
8	7.5	-	8	9.5	-	8	6.5	-
9	6.0	-	9	13.0	-	9	8.5	-
10	8.0	0	10	6.0	0.0	10	-	
11	4.5	-	11	7.5	-	11	12.0	-
12	5.5	-	12	5.0	-	12	5.5	-
13	3.0	-	13	10.0	-	13	9.0	-
14	9.0	-	14	7.5	-	14	6.0	-
15	10.5	-	15	8.0	-	15	5.0	-
16	13.0	-	16	6.5	-	16	12.5	-
17	1.5	-	17	12.5	-	17	6.5	-
18	6.5	-	18	20.0	-	18	7.0	-
19	7.0	-	19	11.0	-	19	5.0	-
20	10.0	0.25	20	8.5	0.75	20	-	
21	5.5	-	21	12.5	-	21	13.0	-
22	8.0	-	22	10.0	-	22	7.0	-
23	9.5	-	23	4.5	-	23	6.0	-
24	13.5	-	24	2.5	-	24	3.5	-
25	10.0	-	25	6.0	-	25	10.5	-
26	8.0	-	26	12.0	-	26	8.0	-
27	11.5	-	27	9.0	-	27	5.0	-
28	4.0	-	28	6.5	-	28	7.5	-
29	5.5	-	29	5.5	-	29	13.5	-
30	11.5	0.8	30	4.5	0	30	-	
31	8.0	-	31	6.0	-	31	11.0	-
32	6.0	-	32	7.5	-	32	9.0	-
33	10.0	-	33	12.0	-	33	10.5	-
34	8.5	-	34	8.0	-	34	7.5	-
35	10.5	-	35	3.5	-	35	10.0	-
36	6.0	-	36	9.0	-	36	4.0	-
37	9.0	-	37	7.5	-	37	8.0	-
38	4.0	-	38	6.5	-	38	12.0	-
39	6.5	-	39	3.0	-	39	8.5	-
40	8.5	0.25	40	8.5	0	40	-	
41	12.0	-	41	7.5	-	41	16.5	-
42	3.5	-	42	14.0	-	42	9.0	-
43	16.5	-	43	16.5	-	43	7.0	-
44	8.0	-	44	8.0	-	44	7.0	-
45	7.0	-	45	12.5	-	45	11.5	-
46	9.5	-	46	4.5	-	46	8.5	-
47	4.0	-	47	2.0	-	47	6.0	-
48	7.5	-	48	6.5	-	48	4.5	-
49	10.0	-	49	4.0	-	49	11.0	-
50	5.5	0.3	50	9.5	0.25	50	-	
51	5.0	-	51	7.5	-	51	8.5	-
52	10.5	-	52	9.0	-	52	6.0	-
53	9.0	-	53	10.5	-	53	8.0	-
54	2.5	-	54	4.5	-	54	11.0	-
55	7.0	-	55	6.0	-	55	4.5	-
56	8.5	-	56	10.5	-	56	8.0	-
57	9.0	-	57	5.0	-	57	9.0	-
58	3.5	-	58	4.0	-	58	10.5	-
59	5.5	-	59	8.5	-	59	7.5	-
60	8.5	0	60	7.5	0.3	60	-	
61	10.0	-	61	12.5	-	61	9.5	-
62	7.5	-	62	11.0	-	62	6.5	-
63	3.0	-	63	9.0	-	63	5.5	-
64	18.5	-	64	5.5	-	64	10.0	-
65	8.0	-	65	6.5	-	65	6.0	-
66	6.5	-	66	13.0	-	66	7.5	-
67	11.0	-	67	7.0	-	67	10.0	-
68	8.5	-	68	9.5	-	68	7.5	-
69	6.0	-	69	8.0	-	69	11.0	-
70	9.0	0.75	70	4.5	0	70	-	
71	4.0	-	71	9.5	-	71	6.5	-
72	17.0	-	72	4.0	-	72	8.0	-
73	6.5	-	73	3.5	-	73	14.5	-
74	5.5	-	74	14.5	-	74	10.0	-
75	9.0	-	75	19.0	-	75	8.0	-
76	11.5	-	76	3.0	-	76	7.0	-
77	6.5	-	77	4.0	-	77	9.5	-
78	7.0	-	78	9.0	-	78	12.0	-
79	9.5	-	79	11.0	-	79	3.5	-
80	9.0	0.5	80	7.0	0.25	80	-	
81	10.5	-	81	16.5	-	81	10.0	-
82	4.5	-	82	6.0	-	82	8.5	-
83	7.5	-	83	7.5	-	83	6.5	-
84	2.0	-	84	5.0	-	84	3.0	-
85	8.0	-	85	13.0	-	85	11.5	-
86	4.5	-	86	8.0	-	86	9.0	-
87	10.0	-	87	6.5	-	87	5.5	-
88	7.5	-	88	7.0	-	88	8.0	-
89	4.0	-	89	10.5	-	89	9.5	-
90	5.0	0.0	90	5.5	0.25	90	-	
91	10.5	-	91	7.0	-	91	11.5	-
92	12.0	-	92	10.0	-	92	8.0	-
93	6.5	-	93	7.5	-	93	7.5	-
94	16.5	-	94	9.0	-	94	10.5	-
95	9.5	-	95	6.5	-	95	4.0	-
96	3.5	-	96	6.0	-	96	12.0	-
97	7.0	-	97	13.5	-	97	5.5	-
98	4.0	-	98	5.0	-	98	11.0	-
99	5.5	-	99	3.0	-	99	9.5	-
100	12.5	0.25	100	7.5	0	100	-	
Minimum	**1.5**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**3.0**	**0.0**
Maximum	**18.5**	**0.8**	**Maximum**	**20.0**	**0.8**	**Maximum**	**16.5**	**0.0**
Mean	**7.9**	**0.30**	**Mean**	**8.1**	**0.18**	**Mean**	**8.4**	**#DIV/0!**
Standard Dev.	**3.2**	**0.28**	**Standard Dev.**	**3.6**	**0.24**	**Standard Dev.**	**2.7**	**#DIV/0!**
Geometric mean	**7.2**	**-**	**Geometric mean**	**7.4**	**-**	**Geometric mean**	**7.9**	**-**
Median	**7.8**	**0.25**	**Median**	**7.5**	**0.13**	**Median**	**8.0**	**#NUM!**

Table G.28: Calcite and Pebble Count at RG_MP1, FRO LAEMP, June 2020

RG_MP1 1			RG_MP1 2			RG_MP1 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	sand	-	1	8.0	-	1	15.0	-
2	4.5	-	2	14.0	-	2	3.5	-
3	10.0	-	3	3.0	-	3	4.0	-
4	7.5	-	4	11.5	-	4	6.0	-
5	4.5	-	5	16.0	-	5	7.5	-
6	9.5	-	6	3.5	-	6	14.0	-
7	47.0	-	7	11.5	-	7	8.0	-
8	24.0	-	8	2.5	-	8	4.0	-
9	34.0	-	9	2.5	-	9	3.0	-
10	18.0	0.75	10	17.5	0	10	2.5	0
11	20.0	-	11	8.0	-	11	3.0	-
12	12.5	-	12	14.5	-	12	4.5	-
13	15.0	-	13	22.0	-	13	2.0	-
14	24.0	-	14	11.0	-	14	6.5	-
15	11.5	-	15	6.0	-	15	6.5	-
16	8.5	-	16	7.0	-	16	3.0	-
17	24.5	-	17	17.0	-	17	3.0	-
18	18.0	-	18	6.5	-	18	2.5	-
19	13.0	-	19	4.5	-	19	6.0	-
20	22.0	100	20	2.5	0.00	20	8.5	0
21	18.0	-	21	5.5	-	21	3.5	-
22	17.5	-	22	11.0	-	22	7.5	-
23	10.5	-	23	7.0	-	23	9.0	-
24	15.5	-	24	1.0	-	24	3.0	-
25	28.5	-	25	10.0	-	25	7.0	-
26	7.0	-	26	4.0	-	26	3.5	-
27	9.0	-	27	1.5	-	27	2.0	-
28	24.0	-	28	1.0	-	28	1.0	-
29	7.0	-	29	0.5	-	29	6.0	-
30	7.0	0	30	5.0	0.25	30	6.0	0.25
31	19.0	-	31	2.5	-	31	6.5	-
32	6.0	-	32	11.0	-	32	8.0	-
33	17.0	-	33	33.0	-	33	12.0	-
34	21.0	-	34	8.0	-	34	8.0	-
35	14.0	-	35	6.5	-	35	5.0	-
36	19.0	-	36	1.0	-	36	4.0	-
37	22.0	-	37	34.0	-	37	5.5	-
38	46.0	-	38	26.5	-	38	10.0	-
39	11.0	-	39	6.0	-	39	6.0	-
40	45.0	0	40	14.0	0.5	40	6.0	0
41	6.5	-	41	3.0	-	41	sand	-
42	11.0	-	42	5.5	-	42	4.5	-
43	7.0	-	43	5.0	-	43	2.5	-
44	11.0	-	44	9.0	-	44	3.0	-
45	12.0	-	45	4.5	-	45	4.5	-
46	3.5	-	46	10.0	-	46	2.5	-
47	13.0	-	47	4.5	-	47	6.5	-
48	10.0	-	48	4.0	-	48	6.0	-
49	13.0	-	49	10.5	-	49	10.0	-
50	6.0	0.5	50	8.0	0.25	50	6.0	0
51	12.5	-	51	23.0	-	51	2.5	-
52	sand	-	52	15.0	-	52	3.0	-
53	8.0	-	53	12.5	-	53	5.5	-
54	9.5	-	54	6.0	-	54	7.0	-
55	22.5	-	55	6.0	-	55	5.5	-
56	11.0	-	56	6.0	-	56	4.5	-
57	9.5	-	57	1.5	-	57	5.0	-
58	21.0	-	58	6.0	-	58	5.5	-
59	8.5	-	59	4.0	-	59	11.0	-
60	8.0	0.25	60	15.0	0.75	60	9.0	0.25
61	8.0	-	61	1.5	-	61	14.0	-
62	5.5	-	62	4.5	-	62	6.5	-
63	15.0	-	63	8.0	-	63	7.0	-
64	9.0	-	64	2.5	-	64	4.0	-
65	13.0	-	65	1.0	-	65	3.0	-
66	7.5	-	66	5.5	-	66	6.5	-
67	12.0	-	67	4.0	-	67	11.0	-
68	14.0	-	68	12.0	-	68	6.5	-
69	9.0	-	69	26.5	-	69	3.5	-
70	17.0	0.50	70	20.0	0.25	70	5.5	0
71	9.5	-	71	22.0	-	71	5.5	-
72	10.0	-	72	14.0	-	72	1.5	-
73	6.0	-	73	11.5	-	73	4.0	-
74	14.0	-	74	6.0	-	74	7.0	-
75	17.0	-	75	2.5	-	75	1.5	-
76	23.0	-	76	4.0	-	76	5.0	-
77	11.0	-	77	8.0	-	77	4.0	-
78	14.0	-	78	9.5	-	78	3.5	-
79	9.0	-	79	31.0	-	79	4.5	-
80	8.0	0.00	80	4.0	0	80	9.0	0.25
81	9.5	-	81	2.0	-	81	2.0	-
82	6.0	-	82	3.5	-	82	6.0	-
83	16.0	-	83	29.0	-	83	8.0	-
84	14.0	-	84	13.0	-	84	4.0	-
85	12.0	-	85	3.0	-	85	3.5	-
86	8.5	-	86	12.5	-	86	5.0	-
87	14.0	-	87	2.0	-	87	5.0	-
88	6.0	-	88	7.5	-	88	10.0	-
89	2.5	-	89	24.5	-	89	8.0	-
90	10.0	0.00	90	185.0	0.75	90	7.0	0.75
91	7.5	-	91	16.0	-	91	7.0	-
92	12.0	-	92	27.0	-	92	6.5	-
93	13.0	-	93	25.0	-	93	6.0	-
94	25.0	-	94	5.0	-	94	4.5	-
95	13.0	-	95	4.5	-	95	4.5	-
96	6.0	-	96	8.5	-	96	5.0	-
97	28.5	-	97	11.0	-	97	6.0	-
98	6.5	-	98	2.5	-	98	27.0	-
99	11.0	-	99	2.0	-	99	6.5	-
100	10.0	0.5	100	4.0	0	100	4.0	0.25
Minimum	**2.5**	**0.0**	**Minimum**	**0.5**	**0.0**	**Minimum**	**1.0**	**0.0**
Maximum	**47.0**	**100.00**	**Maximum**	**185.0**	**0.75**	**Maximum**	**27.0**	**0.75**
Mean	**13.9**	**10.25**	**Mean**	**11.2**	**0.28**	**Mean**	**5.9**	**0.18**
Standard Dev.	**8.4**	**31.54**	**Standard Dev.**	**19.3**	**0.30**	**Standard Dev.**	**3.5**	**0.24**
Geometric mean	**11.9**	**-**	**Geometric mean**	**6.8**	**-**	**Geometric mean**	**5.1**	**-**
Median	**11.8**	**0.38**	**Median**	**6.8**	**0.3**	**Median**	**5.5**	**0.13**

Table G.29: Calcite and Pebble Count at RG_FOUSH, FRO LAEMP, June 2020

RG_FOUSH 1			RG_FOUSH 2			RG_FOUSH 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	10.0	-	1	9.5	-	1	11.5	-
2	12.5	-	2	13.5	-	2	6.0	-
3	11.0	-	3	15.0	-	3	17.0	-
4	7.5	-	4	8.0	-	4	10.5	-
5	12.0	-	5	8.0	-	5	4.5	-
6	8.0	-	6	9.5	-	6	7.0	-
7	9.5	-	7	3.5	-	7	6.5	-
8	5.0	-	8	11.0	-	8	8.0	-
9	5.5	-	9	14.0	-	9	5.5	-
10	14.5	0.25	10	7.5	0.5	10	10.0	0.5
11	18.0	-	11	11.0	-	11	11.0	-
12	9.5	-	12	9.5	-	12	11.5	-
13	7.0	-	13	8.0	-	13	13.0	-
14	12.0	-	14	8.5	-	14	22.5	-
15	10.0	-	15	10.5	-	15	19.0	-
16	9.0	-	16	6.0	-	16	12.5	-
17	7.5	-	17	11.0	-	17	8.0	-
18	16.0	-	18	9.0	-	18	6.5	-
19	14.5	-	19	16.0	-	19	7.0	-
20	11.5	0.25	20	13.0	0.25	20	12.0	0.25
21	8.0	-	21	9.0	-	21	9.0	-
22	10.0	-	22	12.5	-	22	9.5	-
23	7.5	-	23	10.5	-	23	10.0	-
24	9.0	-	24	9.0	-	24	16.5	-
25	15.5	-	25	8.0	-	25	14.0	-
26	9.5	-	26	6.0	-	26	5.0	-
27	8.0	-	27	7.5	-	27	4.5	-
28	8.0	-	28	9.0	-	28	7.0	-
29	4.5	-	29	8.0	-	29	8.5	-
30	7.0	0.00	30	7.5	0.00	30	10.5	0.25
31	8.5	-	31	13.0	-	31	13.0	-
32	8.0	-	32	8.0	-	32	11.5	-
33	6.0	-	33	4.5	-	33	11.0	-
34	3.5	-	34	3.0	-	34	12.5	-
35	9.0	-	35	10.0	-	35	6.0	-
36	6.0	-	36	9.5	-	36	8.5	-
37	9.5	-	37	22.0	-	37	9.0	-
38	10.0	-	38	11.5	-	38	8.0	-
39	8.0	-	39	8.0	-	39	16.0	-
40	5.5	0	40	17.0	0.25	40	8.0	0.25
41	12.0	-	41	12.0	-	41	10.0	-
42	10.5	-	42	10.5	-	42	6.0	-
43	16.0	-	43	14.5	-	43	7.5	-
44	8.5	-	44	6.0	-	44	23.0	-
45	14.0	-	45	10.0	-	45	8.0	-
46	10.0	-	46	8.5	-	46	7.5	-
47	9.0	-	47	8.0	-	47	9.0	-
48	9.5	-	48	5.5	-	48	12.5	-
49	10.0	-	49	11.0	-	49	7.0	-
50	12.5	0.25	50	13.5	0	50	6.5	0.00
51	11.0	-	51	10.0	-	51	15.5	-
52	9.5	-	52	18.5	-	52	9.0	-
53	12.5	-	53	5.5	-	53	10.0	-
54	10.0	-	54	7.0	-	54	5.5	-
55	26.0	-	55	9.5	-	55	3.0	-
56	13.0	-	56	12.0	-	56	8.5	-
57	10.5	-	57	15.5	-	57	10.5	-
58	6.0	-	58	6.5	-	58	11.0	-
59	9.5	-	59	8.0	-	59	9.5	-
60	13.0	0	60	7.0	0.5	60	12.0	0.25
61	18.0	-	61	16.0	-	61	8.5	-
62	10.5	-	62	14.5	-	62	5.5	-
63	9.0	-	63	4.5	-	63	9.0	-
64	5.0	-	64	9.0	-	64	12.0	-
65	8.5	-	65	9.5	-	65	7.5	-
66	4.5	-	66	7.0	-	66	18.5	-
67	8.0	-	67	11.5	-	67	9.0	-
68	7.5	-	68	15.0	-	68	7.5	-
69	11.0	-	69	28.5	-	69	4.5	-
70	17.0	0.5	70	14.0	0.25	70	10.0	0
71	11.0	-	71	13.0	-	71	13.0	-
72	9.0	-	72	8.0	-	72	8.0	-
73	9.5	-	73	9.5	-	73	9.5	-
74	5.0	-	74	9.0	-	74	7.0	-
75	12.0	-	75	10.0	-	75	10.5	-
76	10.5	-	76	17.0	-	76	14.5	-
77	8.0	-	77	9.5	-	77	9.0	-
78	10.0	-	78	8.0	-	78	10.0	-
79	14.0	-	79	4.0	-	79	6.5	-
80	10.5	0.5	80	13.5	0	80	8.5	0.5
81	7.0	-	81	9.5	-	81	9.0	-
82	11.0	-	82	8.0	-	82	7.0	-
83	9.5	-	83	15.5	-	83	15.5	-
84	10.0	-	84	7.5	-	84	5.0	-
85	12.0	-	85	4.0	-	85	6.5	-
86	8.5	-	86	10.0	-	86	7.0	-
87	13.0	-	87	13.0	-	87	17.0	-
88	21.0	-	88	7.0	-	88	8.0	-
89	8.5	-	89	9.5	-	89	8.5	-
90	10.0	0.25	90	10.5	0.25	90	13.0	0.5
91	11.5	-	91	13.0	-	91	10.0	-
92	6.5	-	92	15.5	-	92	7.5	-
93	11.0	-	93	9.5	-	93	7.0	-
94	5.0	-	94	7.0	-	94	9.0	-
95	9.5	-	95	8.0	-	95	14.5	-
96	9.0	-	96	11.5	-	96	8.5	-
97	15.0	-	97	8.0	-	97	11.0	-
98	8.0	-	98	13.0	-	98	6.0	-
99	10.0	-	99	7.0	-	99	7.5	-
100	12.5	0.25	100	6.0	0.00	100	11.5	0.25
Minimum	**3.5**	**0.0**	**Minimum**	**3.0**	**0.0**	**Minimum**	**3.0**	**0.0**
Maximum	**26.0**	**0.50**	**Maximum**	**28.5**	**0.50**	**Maximum**	**23.0**	**0.50**
Mean	**10.1**	**0.23**	**Mean**	**10.2**	**0.20**	**Mean**	**9.8**	**0.28**
Standard Dev.	**3.6**	**0.18**	**Standard Dev.**	**3.9**	**0.20**	**Standard Dev.**	**3.7**	**0.18**
Geometric mean	**9.6**	**-**	**Geometric mean**	**9.5**	**-**	**Geometric mean**	**9.1**	**-**
Median	**9.5**	**0.25**	**Median**	**9.5**	**0.25**	**Median**	**9.0**	**0.25**

Table G.30: Calcite and Pebble Count at RG_FOUKI, FRO LAEMP, June 2020

RG_FOUKI 1			RG_FOUKI 2			RG_FOUKI 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	9.0	-	1	17.0	-	1	15.0	-
2	11.0	-	2	6.5	-	2	17.0	-
3	9.0	-	3	10.0	-	3	17.5	-
4	6.0	-	4	4.0	-	4	6.0	-
5	12.0	-	5	2.5	-	5	3.5	-
6	9.0	-	6	4.5	-	6	8.0	-
7	3.5	-	7	3.0	-	7	13.0	-
8	3.0	-	8	20.0	-	8	12.0	-
9	6.5	-	9	7.0	-	9	13.0	-
10	14.0	0.25	10	9.5	0.75	10	9.5	0.25
11	11.0	-	11	13.0	-	11	11.0	-
12	7.0	-	12	8.0	-	12	12.0	-
13	5.5	-	13	8.0	-	13	9.5	-
14	3.5	-	14	12.0	-	14	7.0	-
15	11.0	-	15	21.0	-	15	11.0	-
16	4.0	-	16	23.5	-	16	11.5	-
17	5.5	-	17	5.0	-	17	4.5	-
18	23.5	-	18	9.5	-	18	12.0	-
19	11.0	-	19	14.0	-	19	8.5	-
20	18.0	0.75	20	10.5	0.75	20	7.5	0
21	5.5	-	21	7.0	-	21	10.0	-
22	9.0	-	22	4.5	-	22	7.5	-
23	3.0	-	23	8.0	-	23	11.0	-
24	3.0	-	24	6.0	-	24	7.5	-
25	8.0	-	25	7.0	-	25	14.0	-
26	19.0	-	26	3.5	-	26	19.0	-
27	4.0	-	27	8.0	-	27	21.5	-
28	9.0	-	28	5.0	-	28	7.0	-
29	10.5	-	29	6.5	-	29	14.0	-
30	11.5	0.25	30	12.5	0.75	30	11.0	0.75
31	12.5	-	31	8.5	-	31	5.0	-
32	12.5	-	32	8.0	-	32	13.0	-
33	7.5	-	33	4.0	-	33	12.5	-
34	2.0	-	34	7.0	-	34	11.0	-
35	1.0	-	35	6.0	-	35	19.5	-
36	9.0	-	36	5.5	-	36	7.5	-
37	7.0	-	37	15.0	-	37	8.5	-
38	13.0	-	38	12.0	-	38	8.5	-
39	14.0	-	39	16.0	-	39	10.0	-
40	7.0	0.25	40	5.5	0.25	40	16.0	100
41	9.5	-	41	3.5	-	41	5.0	-
42	7.0	-	42	7.5	-	42	18.0	-
43	10.0	-	43	9.0	-	43	11.0	-
44	7.5	-	44	11.5	-	44	7.5	-
45	9.5	-	45	8.0	-	45	5.0	-
46	8.5	-	46	13.5	-	46	17.0	-
47	9.0	-	47	12.5	-	47	12.5	-
48	8.5	-	48	4.0	-	48	9.0	-
49	5.0	-	49	6.0	-	49	11.0	-
50	11.0	0.00	50	10.5	0.75	50	11.0	0.00
51	7.5	-	51	6.5	-	51	7.0	-
52	7.0	-	52	16.0	-	52	16.0	-
53	7.0	-	53	9.5	-	53	13.5	-
54	9.0	-	54	5.5	-	54	16.0	-
55	10.5	-	55	16.5	-	55	14.0	-
56	8.0	-	56	4.5	-	56	9.0	-
57	9.5	-	57	1.0	-	57	7.0	-
58	7.0	-	58	12.5	-	58	9.0	-
59	4.0	-	59	8.0	-	59	19.0	-
60	7.0	0.25	60	2.0	0	60	15.0	0.5
61	27.5	-	61	4.0	-	61	18.0	-
62	9.0	-	62	2.5	-	62	13.0	-
63	9.0	-	63	17.0	-	63	5.5	-
64	10.0	-	64	12.0	-	64	12.0	-
65	15.0	-	65	8.5	-	65	7.0	-
66	6.5	-	66	3.0	-	66	8.5	-
67	4.0	-	67	6.0	-	67	5.5	-
68	10.5	-	68	2.5	-	68	9.5	-
69	5.0	-	69	6.5	-	69	12.0	-
70	3.5	0.25	70	10.0	0.5	70	5.0	0
71	9.5	-	71	7.0	-	71	6.0	-
72	7.0	-	72	9.5	-	72	7.0	-
73	7.5	-	73	6.0	-	73	11.5	-
74	18.0	-	74	10.0	-	74	8.0	-
75	12.0	-	75	36.5	-	75	19.0	-
76	26.5	-	76	2.0	-	76	18.0	-
77	10.0	-	77	4.0	-	77	19.0	-
78	8.0	-	78	3.5	-	78	3.5	-
79	11.0	-	79	1.5	-	79	12.0	-
80	24.0	0	80	6.0	0.25	80	10.0	0.5
81	3.0	-	81	5.5	-	81	6.0	-
82	3.5	-	82	9.0	-	82	8.5	-
83	15.0	-	83	20.0	-	83	12.0	-
84	8.5	-	84	7.0	-	84	6.0	-
85	5.0	-	85	3.5	-	85	9.0	-
86	6.5	-	86	4.5	-	86	9.0	-
87	7.5	-	87	7.0	-	87	9.0	-
88	8.5	-	88	19.5	-	88	7.5	-
89	3.5	-	89	12.0	-	89	8.0	-
90	9.0	0.25	90	6.0	0	90	17.0	0.3
91	5.0	-	91	16.0	-	91	11.5	-
92	16.0	-	92	9.0	-	92	8.5	-
93	5.5	-	93	12.5	-	93	16.0	-
94	7.0	-	94	9.0	-	94	12.0	-
95	8.5	-	95	26.0	-	95	10.0	-
96	8.0	-	96	28.0	-	96	14.5	-
97	25.0	-	97	10.5	-	97	8.5	-
98	8.5	-	98	7.0	-	98	4.0	-
99	3.0	-	99	7.0	-	99	5.5	-
100	11.5	0.5	100	5.0	100	100	12.0	0.75
Minimum	**1.0**	**0.0**	**Minimum**	**1.0**	**0.0**	**Minimum**	**3.5**	**0.0**
Maximum	**27.5**	**0.75**	**Maximum**	**36.5**	**100.00**	**Maximum**	**21.5**	**100.00**
Mean	**9.1**	**0.28**	**Mean**	**9.1**	**10.40**	**Mean**	**10.8**	**10.30**
Standard Dev.	**5.1**	**0.22**	**Standard Dev.**	**6.0**	**31.48**	**Standard Dev.**	**4.2**	**31.52**
Geometric mean	**7.9**	**-**	**Geometric mean**	**7.5**	**-**	**Geometric mean**	**10.0**	**-**
Median	**8.5**	**0.25**	**Median**	**7.8**	**0.6**	**Median**	**10.5**	**0.38**

Table G.31: Calcite and Pebble Count at RG_FOBKS, FRO LAEMP, June 2020

RG_FOBKS 1			RG_FOBKS 2			RG_FOBKS 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
	4.0	-	1	7.5	-	1	5.5	-
2	1.5	-	2	6.0	-	2	6.5	-
3	1.0	-	3	9.0	-	3	3.5	-
4	3.0	-	4	2.0	-	4	5.0	-
5	7.0	-	5	6.5	-	5	9.0	-
6	12.5		6	7.0	-	6	9.0	-
7	7.5	-	7	1.0	-	7	17.0	-
8	5.5	-	8	3.5	-	8	8.5	-
9	5.5	-	9	3.0	-	9	7.0	-
10	4.0	0	10	4.0	0.25	10	9.0	0.25
11	11.0	-	11	2.0	-	11	5.5	-
12	2.0	-	12	3.0	-	12	12.5	-
13	11.0	-	13	15.5	-	13	10.5	-
14	8.5	-	14	4.5	-	14	6.5	-
15	14.0	-	15	8.5	-	15	12.0	-
16	5.0	-	16	10.5	-	16	4.0	-
17	6.5	-	17	3.0	-	17	3.5	-
18	12.0	-	18	10.5	-	18	4.5	-
19	7.0	-	19	2.0	-	19	14.0	-
20	19.0	0.25	20	18.5	0.75	20	12.0	0.5
21	sand	-	21	4.0	0	21	5.5	-
22	22.0	-	22	1.5	-	22	3.0	-
23	3.0	-	23	11.0	-	23	12.0	-
24	3.0	-	24	5.0	-	24	3.5	-
25	10.5	-	25	15.0	-	25	3.0	-
26	13.5	-	26	2.0	-	26	2.0	-
27	5.5	-	27	7.0	-	27	13.5	-
28	6.5	-	28	10.5	-	28	12.0	-
29	37.5	-	29	8.5	-	29	17.0	-
30	12.5	0.75	30	4.5	0	30	10.0	0.25
31	6.0	-	31	3.5	-	31	5.5	-
32	12.0	-	32	6.0	-	32	10.0	-
33	2.0	-	33	9.0	-	33	20.0	-
34	1.5	-	34	3.5	-	34	9.0	-
35	11.0	-	35	13.5	-	35	8.5	-
36	1.5	-	36	15.0	-	36	6.5	-
37	11.5	-	37	4.5	-	37	8.0	-
38	3.0	-	38	9.0	-	38	1.5	-
39	5.0	-	39	8.5	-	39	1.0	-
40	4.5	0.25	40	10.0	0.25	40	5.5	0.25
41	2.5	-	41	9.0	-	41	2.0	-
42	2.0	-	42	18.5	-	42	8.0	-
43	8.5	-	43	8.0	-	43	7.0	-
44	8.0	-	44	5.5	-	44	8.5	-
45	8.0	-	45	4.5	-	45	7.0	-
46	5.0	-	46	10.0	-	46	6.0	-
47	19.0	-	47	16.0	-	47	4.0	-
48	4.0	-	48	10.0	-	48	3.5	-
49	2.0	-	49	3.5	-	49	14.0	-
50	12.0	0.25	50	10.5	0.25	50	4.5	0.25
51	1.5	-	51	4.5	-	51	15.0	-
52	3.0	-	52	13.5	-	52	8.0	-
53	6.5	-	53	3.5	-	53	5.0	-
54	4.0	-	54	8.0	-	54	2.0	-
55	6.0	-	55	10.0	-	55	2.5	-
56	11.0	-	56	9.0	-	56	4.0	-
57	8.0	-	57	3.5	-	57	11.0	-
58	21.0	-	58	6.0	-	58	15.0	-
59	8.0	-	59	8.5	-	59	8.0	-
60	9.0	0.75	60	6.0	0.5	60	6.5	0
61	4.0	-	61	5.5	-	61	5.0	-
62	3.5	-	62	11.0	-	62	11.0	-
63	1.5	-	63	6.5	-	63	2.0	-
64	10.0	-	64	3.5	-	64	14.0	-
65	13.0	-	65	10.0	-	65	4.0	-
66	7.5	-	66	10.0	-	66	7.0	-
67	3.5	-	67	4.0	-	67	9.0	-
68	4.5	-	68	3.5	-	68	11.0	-
69	21.0	-	69	7.0	-	69	3.5	-
70	12.0	0.25	70	7.0	0	70	10.0	0.5
71	14.0	-	71	6.5	-	71	8.0	-
72	6.0	-	72	16.5	-	72	10.0	-
73	10.0	-	73	9.0	-	73	12.0	-
74	3.5	-	74	7.0	-	74	27.0	-
75	2.0	-	75	7.0	-	75	10.0	-
76	8.5	-	76	6.5	-	76	5.5	-
77	5.5	-	77	16.0	-	77	7.0	-
78	5.5	-	78	15.0	-	78	10.0	-
79	13.5	-	79	3.0	-	79	9.5	-
80	10.5	0.25	80	13.0	0.5	80	12.0	0.75
81	17.0	-	81	9.0	-	81	11.0	-
82	3.0	-	82	11.0	-	82	6.0	-
83	13.5	-	83	6.0	-	83	4.5	-
84	3.0	-	84	10.5	-	84	7.0	-
85	1.0	-	85	5.5	-	85	4.5	-
86	9.0	-	86	14.0	-	86	6.0	-
87	9.5	-	87	12.0	-	87	12.5	-
88	8.0	-	88	7.5	-	88	13.0	-
89	17.0	-	89	4.5	-	89	19.5	-
90	15.0	0.75	90	17.5	0.75	90	7.0	0
91	5.5	-	91	15.0	-	91	12.5	-
92	19.0	-	92	3.5	-	92	7.0	-
93	3.5	-	93	8.0	-	93	7.5	-
94	2.5	-	94	6.5	-	94	9.0	-
95	19.0	-	95	5.5	-	95	8.0	-
96	10.5	-	96	15.5	-	96	5.5	-
97	3.0	-	97	3.5	-	97	9.0	-
98	2.0	-	98	4.0	-	98	3.5	-
99	20.5	-	99	5.0	-	99	10.0	-
100	11.5	0.75	100	8.0	0	100	5.0	0.25
Minimum	**1.0**	**0.0**	**Minimum**	**1.0**	**0.0**	**Minimum**	**1.0**	**0.0**
Maximum	**37.5**	**0.75**	**Maximum**	**19**	**0.75**	**Maximum**	**27.0**	**0.75**
Mean	**8.3**	**0.43**	**Mean**	**7.9**	**0.30**	**Mean**	**8.2**	**0.30**
Standard Dev.	**6.1**	**0.29**	**Standard Dev.**	**4.3**	**0.29**	**Standard Dev.**	**4.4**	**0.23**
Geometric mean	**6.3**	**-**	**Geometric mean**	**6.7**	**-**	**Geometric mean**	**7.0**	**-**
Median	**7.0**	**0.3**	**Median**	**7.0**	**0.3**	**Median**	**7.8**	**0.3**

Table G.32: Calcite and Pebble Count at RG_SCOUTDS, FRO LAEMP, June 2020

RG_SCOUTDS 1			RG_SCOUTDS 2			RG_SCOUTDS 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	10.5	-	1	14.0	-	1	6.0	-
2	14.0	-	2	8.0	-	2	8.0	-
3	6.0	-	3	16.0	-	3	9.5	-
4	5.0	-	4	14.0	-	4	4.5	-
5	4.0	-	5	9.5	-	5	7.0	-
6	15.0	-	6	5.0	-	6	9.0	-
7	6.5	-	7	4.5	-	7	13.5	-
8	12.5	-	8	11.5	-	8	13.0	-
9	9.0	-	9	3.5	-	9	13.0	-
10	14.5	0.5	10	10.5	0.5	10	4.0	0
11	9.0	-	11	15.5	-	11	8.0	-
12	4.5	-	12	6.5	-	12	12.0	-
13	6.0	-	13	4.0	-	13	7.0	-
14	3.5	-	14	3.5	-	14	6.0	-
15	13.0	-	15	6.5	-	15	7.5	-
16	6.5	-	16	5.5	-	16	11.0	-
17	10.5	-	17	3.5	-	17	10.0	-
18	7.5	-	18	5.0	-	18	4.5	-
19	14.0	-	19	10.0	-	19	13.0	-
20	10.0	0.25	20	2.5	0	20	10.0	0
21	6.0	-	21	11.0	-	21	12.5	-
22	4.5	-	22	6.5	-	22	12.5	-
23	8.0	-	23	6.0	-	23	9.0	-
24	9.5	-	24	4.5	-	24	11.5	-
25	11.0	-	25	2.0	-	25	10.0	-
26	10.0	-	26	3.5	-	26	3.5	-
27	6.5	-	27	3.0	-	27	4.5	-
28	8.0	-	28	11.0	-	28	2.5	-
29	8.5	-	29	6.5	-	29	8.0	-
30	11.5	0.75	30	7.5	0	30	12.0	0.25
31	4.5	-	31	6.5	-	31	5.0	-
32	6.0	-	32	4.0	-	32	6.5	-
33	10.0	-	33	11.0	-	33	5.0	-
34	13.5	-	34	3.5	-	34	11.5	-
35	4.0	-	35	14.0	-	35	5.5	-
36	3.0	-	36	12.5	-	36	4.5	-
37	2.5	-	37	14.0	-	37	8.0	-
38	11.5	-	38	3.0	-	38	12.5	-
39	6.0	-	39	7.0	-	39	7.5	-
40	8.0	0	40	8.0	0.25	40	10.0	0.25
41	8.5	-	41	8.0	-	41	5.0	-
42	6.0	-	42	6.5	-	42	5.0	-
43	9.5	-	43	7.5	-	43	13.0	-
44	12.0	-	44	8.5	-	44	5.0	-
45	9.5	-	45	11.0	-	45	13.0	-
46	10.5	-	46	85.5	-	46	20.0	-
47	7.5	-	47	3.0	-	47	4.0	-
48	8.0	-	48	6.5	-	48	5.5	-
49	3.5	-	49	8.0	-	49	6.0	-
50	22.0	0.5	50	3.5	0	50	9.0	0.75
51	9.5	-	51	4.0	-	51	13.5	-
52	11.0	-	52	8.0	-	52	10.0	-
53	9.5	-	53	7.5	-	53	5.0	-
54	6.5	-	54	8.0	-	54	7.0	-
55	6.0	-	55	11.0	-	55	5.0	-
56	10.0	-	56	6.5	-	56	6.5	-
57	7.5	-	57	4.0	-	57	8.0	-
58	11.0	-	58	9.0	-	58	7.0	-
59	13.0	-	59	20.0	-	59	6.5	-
60	13.0	0.25	60	6.0	0.25	60	8.0	0.25
61	7.0	-	61	12.0	-	61	8.0	-
62	8.0	-	62	14.5	-	62	6.5	-
63	4.0	-	63	11.0	-	63	15.0	-
64	17.0	-	64	6.5	-	64	13.0	-
65	3.5	-	65	3.5	-	65	8.5	-
66	12.5	-	66	5.0	-	66	8.0	-
67	2.5	-	67	10.0	-	67	8.5	-
68	7.5	-	68	13.0	-	68	5.5	-
69	31.5	-	69	12.0	-	69	5.0	-
70	6.5	0.25	70	4.0	0	70	6.0	0.25
71	15.5	-	71	9.0	-	71	8.0	-
72	10.0	-	72	7.0	-	72	7.0	-
73	6.5	-	73	6.0	-	73	8.0	-
74	9.0	-	74	5.0	-	74	11.5	-
75	8.5	-	75	6.5	-	75	8.0	-
76	6.5	-	76	7.0	-	76	6.5	-
77	12.0	-	77	14.0	-	77	9.0	-
78	13.0	-	78	7.0	-	78	10.0	-
79	16.5	-	79	9.0	-	79	7.5	-
80	3.5	0.25	80	8.0	0.5	80	8.0	0
81	11.0	-	81	8.0	-	81	12.0	-
82	6.0	-	82	7.0	-	82	8.0	-
83	3.5	-	83	7.0	-	83	14.0	-
84	8.5	-	84	3.5	-	84	8.0	-
85	7.5	-	85	9.5	-	85	14.0	-
86	9.0	-	86	6.0	-	86	6.5	-
87	14.0	-	87	5.5	-	87	10.0	-
88	10.0	-	88	8.0	-	88	19.5	-
89	17.5	-	89	12.0	-	89	7.5	-
90	13.0	0.25	90	8.0	0.25	90	8.0	0.25
91	7.0	-	91	6.0	-	91	12.0	-
92	12.0	-	92	17.0	-	92	14.0	-
93	9.0	-	93	6.0	-	93	3.0	-
94	13.5	-	94	10.0	-	94	8.0	-
95	8.0	-	95	11.0	-	95	10.0	-
96	10.0	-	96	8.0	-	96	6.0	-
97	7.0	-	97	11.5	-	97	9.0	-
98	2.0	-	98	4.0	-	98	6.0	-
99	12.5	-	99	3.5	-	99	11.0	-
100	6.0	0.5	100	30.0	0.75	100	10.0	0.25
Minimum	**2.0**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**2.5**	**0.0**
Maximum	**31.5**	**0.75**	**Maximum**	**86**	**0.75**	**Maximum**	**20.0**	**0.75**
Mean	**9.2**	**0.35**	**Mean**	**8.9**	**0.25**	**Mean**	**8.6**	**0.23**
Standard Dev.	**4.4**	**0.21**	**Standard Dev.**	**8.8**	**0.26**	**Standard Dev.**	**3.4**	**0.22**
Geometric mean	**8.2**	**-**	**Geometric mean**	**7.3**	**-**	**Geometric mean**	**8.0**	**-**
Median	**8.8**	**0.3**	**Median**	**7.3**	**0.3**	**Median**	**8.0**	**0.3**

Table G.33: Calcite and Pebble Count at RG_FOBSC, FRO LAEMP, June 2020

RG_FOBSC 1			RG_FOBSC 2			RG_FOBSC 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	7.0	-	1	7.0	-	1	5.5	-
2	9.5	-	2	10.5	-	2	4.5	-
3	5.0	-	3	3.0	-	3	7.0	-
4	3.5	-	4	8.5	-	4	11.0	-
5	12.0	-	5	6.0	-	5	3.5	-
6	7.5	-	6	5.5	-	6	2.0	-
7	10.0	-	7	9.0	-	7	17.0	-
8	1.0	-	8	11.0	-	8	5.0	-
9	9.0	-	9	4.0	-	9	8.0	-
10	6.5	0.25	10	15.0	0.5	10	6.5	0.00
11	6.5	-	11	9.5	-	11	19.5	-
12	4.0	-	12	7.0	-	12	10.0	-
13	4.0	-	13	7.5	-	13	6.0	-
14	5.5	-	14	11.0	-	14	9.5	-
15	6.0	-	15	13.5	-	15	8.0	-
16	17.5	-	16	18.0	-	16	4.0	-
17	10.0	-	17	10.0	-	17	2.5	-
18	4.5	-	18	6.0	-	18	7.0	-
19	6.0	-	19	2.0	-	19	8.5	-
20	12.0	0.25	20	7.0	0	20	7.0	0
21	9.5	-	21	4.5	-	21	9.5	-
22	6.0	-	22	10.5	-	22	11.0	-
23	6.5	-	23	13.5	-	23	6.5	-
24	28.0	-	24	9.0	-	24	6.0	-
25	12.5	-	25	8.5	-	25	16.5	-
26	10.0	-	26	12.0	-	26	7.5	-
27	13.0	-	27	9.0	-	27	5.0	-
28	11.5	-	28	6.5	-	28	4.0	-
29	8.0	-	29	6.0	-	29	9.5	-
30	-		30	11.5	0	30	6.0	0.25
31	4.5	-	31	5.5	-	31	4.5	-
32	7.0	-	32	3.5	-	32	6.0	-
33	7.5	-	33	11.0	-	33	8.5	-
34	9.0	-	34	22.5	-	34	10.5	-
35	8.0	-	35	4.5	-	35	6.5	-
36	8.5	-	36	17.0	-	36	5.5	-
37	15.5	-	37	5.5	-	37	8.0	-
38	6.5	-	38	9.0	-	38	14.0	-
39	7.0	-	39	4.5	-	39	3.5	-
40	9.0	0.0	40	13.0	0.25	40	2.5	0
41	10.0	-	41	9.5	-	41	24.5	-
42	5.5	-	42	6.0	-	42	11.0	-
43	7.0	-	43	11.0	-	43	15.0	-
44	8.5	-	44	10.5	-	44	7.0	-
45	7.0	-	45	5.0	-	45	4.5	-
46	11.0	-	46	7.0	-	46	8.5	-
47	6.5	-	47	8.5	-	47	12.0	-
48	13.0	-	48	18.0	-	48	10.5	-
49	6.0	-	49	12.0	-	49	2.0	-
50	7.5	0	50	10.5	0.75	50	10.5	0.25
51	8.0	-	51	7.0	-	51	11.0	-
52	11.0	-	52	19.0	-	52	7.5	-
53	11.5	-	53	10.0	-	53	12.0	-
54	5.0	-	54	9.5	-	54	9.0	-
55	5.0	-	55	11.0	-	55	6.0	-
56	6.5	-	56	2.5	-	56	6.5	-
57	1.5	-	57	5.0	-	57	5.0	-
58	3.0	-	58	3.5	-	58	11.0	-
59	8.5	-	59	7.0	-	59	8.5	-
60	6.0	0.50	60	10.5	0.50	60	7.0	0.25
61	6.5	-	61	7.5	-	61	8.0	-
62	9.0	-	62	8.5	-	62	3.5	-
63	10.5	-	63	6.0	-	63	5.0	-
64	17.0	-	64	6.0	-	64	6.5	-
65	12.5	-	65	6.5	-	65	7.0	-
66	6.0	-	66	4.0	-	66	5.0	-
67	4.5	-	67	16.5	-	67	5.0	-
68	11.0	-	68	10.0	-	68	7.0	-
69	8.5	-	69	9.5	-	69	8.0	-
70	9.5	0	70	12.5	0.75	70	17.0	0.25
71	6.5	-	71	10.0	-	71	4.5	-
72	11.0	-	72	7.0	-	72	8.0	-
73	11.5	-	73	19.0	-	73	7.0	-
74	9.5	-	74	18.0	-	74	13.0	-
75	2.0	-	75	6.5	-	75	11.5	-
76	7.5	-	76	13.0	-	76	9.0	-
77	8.0	-	77	6.5	-	77	5.5	-
78	5.5	-	78	7.5	-	78	6.5	-
79	8.0	-	79	9.0	-	79	7.0	-
80	9.0	0.5	80	3.5	0	80	8.5	0
81	6.5	-	81	6.0	-	81	6.0	-
82	24.0	-	82	4.5	-	82	10.0	-
83	8.0	-	83	7.5	-	83	6.5	-
84	8.5	-	84	4.0	-	84	8.5	-
85	15.5	-	85	12.0	-	85	5.5	-
86	8.0	-	86	10.0	-	86	7.0	-
87	13.0	-	87	5.5	-	87	4.0	-
88	7.5	-	88	7.0	-	88	2.5	-
89	6.0	-	89	2.0	-	89	19.0	-
90	9.0	0	90	5.0	0.00	90	13.5	0.25
91	8.0	-	91	4.5	-	91	4.0	-
92	19.0	-	92	6.0	-	92	6.5	-
93	7.0	-	93	9.5	-	93	9.0	-
94	8.5	-	94	5.5	-	94	7.0	-
95	3.0	-	95	9.0	-	95	11.0	-
96	4.5	-	96	4.0	-	96	3.5	-
97	1.0	-	97	5.0	-	97	6.0	-
98	9.5	-	98	6.0	-	98	5.5	-
99	11.0	-	99	8.5	-	99	9.5	-
100	14.0	0.25	100	8.0	0.25	100	15.0	0.25
Minimum	**1.0**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**2.0**	**0.0**
Maximum	**28.0**	**0.5**	**Maximum**	**22.5**	**0.75**	**Maximum**	**24.5**	**0.25**
Mean	**8.6**	**0.19**	**Mean**	**8.6**	**0.30**	**Mean**	**8.0**	**0.15**
Standard Dev.	**4.2**	**0.21**	**Standard Dev.**	**4.1**	**0.31**	**Standard Dev.**	**4.0**	**0.13**
Geometric mean	**7.6**	**-**	**Geometric mean**	**7.7**	**-**	**Geometric mean**	**7.2**	**-**
Median	**8.0**	**0.25**	**Median**	**7.8**	**0.25**	**Median**	**7.0**	**0.25**

Table G.34: Calcite and Pebble Count at RG_FOBCP, FRO LAEMP, June 2020

RG_FOBCP 1			RG_FOBCP 2			RG_FOBCP 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	6.5	-	1	8.5	-	1	7.0	-
2	7.0	-	2	3.0	-	2	10.0	-
3	9.5	-	3	6.5	-	3	9.5	-
4	7.5	-	4	10.5	-	4	7.0	-
5	11.0	-	5	14.0	-	5	8.0	-
6	14.5	-	6	6.5	-	6	8.0	-
7	10.5	-	7	4.5	-	7	10.0	-
8	7.0	-	8	10.0	-	8	7.5	-
9	8.0	-	9	9.0	-	9	4.5	-
10	7.0	0.25	10	5.5	0	10	7.5	0.00
11	11.0	-	11	7.0	-	11	11.5	-
12	6.5	-	12	7.0	-	12	7.5	-
13	4.5	-	13	6.5	-	13	3.0	-
14	3.0	-	14	3.0	-	14	4.5	-
15	1.5	-	15	2.5	-	15	10.0	-
16	22.0	-	16	8.0	-	16	9.5	-
17	5.5	-	17	7.5	-	17	8.0	-
18	8.0	-	18	6.0	-	18	10.5	-
19	8.0	-	19	8.5	-	19	3.5	-
20	6.0	0.25	20	9.5	0.25	20	8.0	0.25
21	15.5	-	21	13.0	-	21	7.0	-
22	6.5	-	22	7.0	-	22	6.5	-
23	9.5	-	23	12.5	-	23	4.0	-
24	8.0	-	24	8.0	-	24	4.0	-
25	6.0	-	25	8.5	-	25	8.5	-
26	4.5	-	26	9.5	-	26	6.0	-
27	9.0	-	27	6.0	-	27	12.0	-
28	10.5	-	28	4.0	-	28	8.0	-
29	4.0	-	29	5.5	-	29	5.0	-
30	8.5	0	30	8.0	0.5	30	14.0	0.25
31	6.5	-	31	11.5	-	31	5.5	-
32	11.5	-	32	6.5	-	32	6.0	-
33	10.0	-	33	8.0	-	33	8.0	-
34	8.0	-	34	3.5	-	34	4.5	-
35	11.0	-	35	2.0	-	35	16.5	-
36	7.5	-	36	7.0	-	36	15.0	-
37	8.0	-	37	10.5	-	37	9.5	-
38	11.5	-	38	11.0	-	38	18.0	-
39	5.0	-	39	8.0	-	39	9.0	-
40	6.0	0	40	14.0	0.25	40	8.0	0.5
41	12.0	-	41	13.5	-	41	7.5	-
42	7.0	-	42	17.0	-	42	6.0	-
43	5.0	-	43	8.0	-	43	17.0	-
44	6.0	-	44	3.5	-	44	11.0	-
45	8.0	-	45	4.0	-	45	9.0	-
46	8.5	-	46	5.5	-	46	7.5	-
47	13.5	-	47	4.5	-	47	9.0	-
48	5.5	-	48	8.5	-	48	11.0	-
49	4.5	-	49	9.0	-	49	8.0	-
50	10.5	0.75	50	13.0	0.25	50	8.5	0.5
51	14.0	-	51	6.5	-	51	9.5	-
52	6.5	-	52	14.5	-	52	10.0	-
53	19.0	-	53	8.5	-	53	5.5	-
54	9.5	-	54	4.5	-	54	9.0	-
55	11.0	-	55	2.0	-	55	7.0	-
56	6.5	-	56	1.5	-	56	5.5	-
57	9.0	-	57	2.5	-	57	8.5	-
58	8.0	-	58	7.5	-	58	6.0	-
59	8.5	-	59	4.5	-	59	7.5	-
60	6.5	0	60	6.5	0.25	60	7.5	0.25
61	4.5	-	61	8.0	-	61	13.0	-
62	3.0	-	62	16.0	-	62	8.0	-
63	2.5	-	63	7.0	-	63	2.5	-
64	6.0	-	64	6.5	-	64	7.0	-
65	9.0	-	65	9.0	-	65	4.0	-
66	7.0	-	66	8.5	-	66	12.0	-
67	7.5	-	67	9.5	-	67	4.5	-
68	15.5	-	68	11.0	-	68	9.0	-
69	4.5	-	69	7.5	-	69	13.5	-
70	7.0	0.25	70	8.0	0.5	70	6.0	0
71	12.0	-	71	5.0	-	71	7.0	-
72	4.0	-	72	6.5	-	72	11.5	-
73	7.0	-	73	8.0	-	73	21.0	-
74	11.0	-	74	3.5	-	74	4.0	-
75	6.5	-	75	5.5	-	75	6.5	-
76	12.5	-	76	6.0	-	76	12.0	-
77	1.5	-	77	12.0	-	77	8.0	-
78	5.5	-	78	4.5	-	78	7.0	-
79	9.0	-	79	7.0	-	79	11.0	-
80	11.5	0.75	80	10.0	0.25	80	4.0	0.5
81	10.5	-	81	6.0	-	81	8.5	-
82	6.0	-	82	10.0	-	82	7.0	-
83	8.5	-	83	9.5	-	83	11.5	-
84	4.0	-	84	8.0	-	84	10.0	-
85	4.5	-	85	6.5	-	85	4.5	-
86	7.0	-	86	4.0	-	86	5.0	-
87	6.0	-	87	10.5	-	87	6.0	-
88	9.5	-	88	8.0	-	88	5.0	-
89	5.5	-	89	4.5	-	89	8.5	-
90	6.5	0	90	9.5	0	90	11.0	0
91	5.0	-	91	4.5	-	91	6.5	-
92	11.5	-	92	7.0	-	92	9.0	-
93	21.5	-	93	19.0	-	93	14.5	-
94	4.5	-	94	6.5	-	94	8.0	-
95	7.5	-	95	6.0	-	95	5.5	-
96	8.5	-	96	4.5	-	96	3.0	-
97	6.0	-	97	2.0	-	97	8.5	-
98	6.0	-	98	6.0	-	98	4.0	-
99	5.0	-	99	4.5	-	99	15.5	-
100	8.5	0	100	8.0	0.25	100	5.5	0.25
Minimum	**1.5**	**0.0**	**Minimum**	**1.5**	**0.0**	**Minimum**	**2.5**	**0.0**
Maximum	**22.0**	**0.75**	**Maximum**	**19.0**	**0.50**	**Maximum**	**21.0**	**0.50**
Mean	**8.1**	**0.23**	**Mean**	**7.6**	**0.25**	**Mean**	**8.3**	**0.25**
Standard Dev.	**3.7**	**0.30**	**Standard Dev.**	**3.4**	**0.17**	**Standard Dev.**	**3.4**	**0.20**
Geometric mean	**7.3**	**-**	**Geometric mean**	**6.8**	**-**	**Geometric mean**	**7.6**	**-**
Median	**7.5**	**0.1**	**Median**	**7.0**	**0.3**	**Median**	**8.0**	**0.25**

Table G.35: Calcite and Pebble Count at RG_FOBCPD, FRO LAEMP, June 2020

RG_FOBCPD 1			RG_FOBCPD 2			RG_FOBCPD 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	6.0	-	1	6.0	-	1	8.0	-
2	3.5	-	2	10.5	-	2	5.0	-
3	8.0	-	3	3.5	-	3	2.5	-
4	7.5	-	4	10.0	-	4	3.0	-
5	11.0	-	5	9.0	-	5	8.5	-
6	6.0	-	6	17.0	-	6	10.0	-
7	6.5	-	7	7.5	-	7	11.5	-
8	4.0	-	8	8.0	-	8	11.0	-
9	9.0	-	9	4.0	-	9	6.0	-
10	7.0	0.25	10	8.0	0.25	10	16.0	0.25
11	6.0	-	11	10.0	-	11	10.5	-
12	8.0	-	12	11.5	-	12	13.0	-
13	9.5	-	13	5.5	-	13	14.5	-
14	5.5	-	14	4.0	-	14	9.5	-
15	6.5	-	15	7.0	-	15	7.0	-
16	13.5	-	16	7.0	-	16	5.0	-
17	9.0	-	17	5.0	-	17	5.5	-
18	4.5	-	18	4.0	-	18	3.0	-
19	7.0	-	19	6.5	-	19	5.5	-
20	11.0	0	20	6.5	0.5	20	8.5	0
21	5.5	-	21	9.0	-	21	10.0	-
22	7.5	-	22	11.0	-	22	8.0	-
23	9.5	-	23	14.5	-	23	8.0	-
24	6.5	-	24	10.0	-	24	4.0	-
25	5.5	-	25	3.0	-	25	6.5	-
26	4.0	-	26	8.0	-	26	4.5	-
27	2.5	-	27	5.0	-	27	2.0	-
28	1.0	-	28	3.5	-	28	9.0	-
29	6.0	-	29	6.5	-	29	5.0	-
30	9.0	0	30	8.5	0	30	9.0	0.25
31	5.0	-	31	10.0	-	31	9.5	-
32	8.5	-	32	9.0	-	32	5.5	-
33	9.0	-	33	6.5	-	33	4.0	-
34	17.0	-	34	5.0	-	34	7.0	-
35	5.0	-	35	6.0	-	35	8.0	-
36	6.5	-	36	15.5	-	36	7.0	-
37	6.0	-	37	8.0	-	37	3.0	-
38	8.5	-	38	6.5	-	38	6.0	-
39	10.0	-	39	7.0	-	39	16.0	-
40	10.5	0.75	40	8.5	0.75	40	6.5	0.25
41	11.0	-	41	11.0	-	41	5.0	-
42	7.0	-	42	9.5	-	42	6.0	-
43	4.0	-	43	7.0	-	43	5.5	-
44	3.5	-	44	8.0	-	44	14.5	-
45	6.5	-	45	6.5	-	45	7.5	-
46	4.0	-	46	5.0	-	46	7.0	-
47	9.0	-	47	3.5	-	47	9.0	-
48	7.5	-	48	2.0	-	48	5.5	-
49	4.0	-	49	4.0	-	49	7.0	-
50	8.5	0.25	50	4.5	0.00	50	5.0	0
51	9.5	-	51	8.0	-	51	6.5	-
52	13.0	-	52	9.5	-	52	3.0	-
53	6.5	-	53	6.5	-	53	1.5	-
54	8.0	-	54	5.0	-	54	2.5	-
55	7.5	-	55	5.5	-	55	1.0	-
56	4.5	-	56	7.0	-	56	3.5	-
57	6.0	-	57	12.0	-	57	5.0	-
58	6.5	-	58	7.5	-	58	4.5	-
59	9.0	-	59	19.0	-	59	7.0	-
60	8.0	0.25	60	11.5	0.00	60	10.0	0.50
61	6.0	-	61	6.5	-	61	5.5	-
62	17.0	-	62	10.5	-	62	8.0	-
63	3.5	-	63	13.0	-	63	9.5	-
64	4.5	-	64	22.0	-	64	8.5	-
65	6.0	-	65	12.5	-	65	7.0	-
66	9.0	-	66	8.5	-	66	18.0	-
67	3.0	-	67	16.0	-	67	9.5	-
68	1.5	-	68	7.0	-	68	8.0	-
69	2.0	-	69	8.5	-	69	9.0	-
70	8.0	0	70	7.5	0	70	5.0	-
71	10.0	-	71	11.0	-	71	7.0	-
72	3.5	-	72	7.0	-	72	7.5	-
73	8.0	-	73	11.5	-	73	4.5	-
74	8.0	-	74	9.0	-	74	8.5	-
75	9.0	-	75	5.0	-	75	4.0	-
76	7.5	-	76	8.5	-	76	9.0	-
77	5.5	-	77	6.0	-	77	4.5	-
78	3.0	-	78	7.5	-	78	13.0	-
79	4.5	-	79	7.0	-	79	6.0	-
80	6.0	0.25	80	8.0	0.25	80	9.0	0.25
81	8.0	-	81	6.5	-	81	9.5	-
82	8.5	-	82	4.0	-	82	6.0	-
83	7.5	-	83	5.5	-	83	5.0	-
84	11.5	-	84	3.0	-	84	6.5	-
85	10.0	-	85	2.0	-	85	5.5	-
86	5.5	-	86	6.0	-	86	9.5	-
87	6.0	-	87	4.0	-	87	6.5	-
88	11.5	-	88	4.5	-	88	8.0	-
89	5.5	-	89	6.0	-	89	11.0	-
90	4.0	0	90	12.0	0.25	90	9.5	0.75
91	8.0	-	91	10.0	-	91	12.0	-
92	10.5	-	92	13.5	-	92	10.5	-
93	2.0	-	93	9.5	-	93	4.0	-
94	4.5	-	94	11.0	-	94	3.0	-
95	6.0	-	95	6.0	-	95	9.5	-
96	5.5	-	96	6.5	-	96	22.0	-
97	6.5	-	97	8.0	-	97	10.5	-
98	8.5	-	98	9.5	-	98	9.0	-
99	9.0	-	99	17.5	-	99	14.0	-
100	6.0	0.25	100	6.0	0.5	100	11.5	0
Minimum	**1.0**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**1.0**	**0.0**
Maximum	**17.0**	**0.75**	**Maximum**	**22.0**	**0.75**	**Maximum**	**22.0**	**0.75**
Mean		**0.20**	**Mean**	**8.1**	**0.25**	**Mean**	**7.6**	**0.25**
Standard Dev.	**2.9**	**0.23**	**Standard Dev.**	**3.6**	**0.26**	**Standard Dev.**	**3.6**	**0.25**
Geometric mean	**6.4**	**-**	**Geometric mean**	**7.3**	**-**	**Geometric mean**	**6.8**	**-**
Median	**6.5**	**0.3**	**Median**	**7.5**	**0.3**	**Median**	**7.0**	**0.25**

Table G.36: Calcite and Pebble Count at RG_FRCP1SW1, FRO LAEMP, June 2020

RG_FRCP1SW 1			RG_FRCP1SW 2			RG_FRCP1SW 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	4.5	-	1	3.0	-	1	10.0	-
2	7.0	-	2	2.5	-	2	7.0	-
3	6.0	-	3	2.0	-	3	6.5	-
4	3.5	-	4	1.5	-	4	8.0	-
5	1.0	-	5	7.0	-	5	3.0	-
6	3.0	-	6	6.5	-	6	6.0	-
7	7.0	-	7	2.0	-	7	5.5	-
8	2.0	-	8	2.5	-	8	2.5	-
9	1.0	-	9	11.0	-	9	15.0	-
10	1.0	0	10	5.0	0	10	6.5	0
11	2.0	-	11	3.5	-	11	7.0	-
12	1.5	-	12	1.5	-	12	3.0	-
13	2.0	-	13	1.5	-	13	7.0	-
14	1.0	-	14	2.5	-	14	5.0	-
15	4.0	-	15	3.5	-	15	2.0	-
16	6.5	-	16	3.5	-	16	4.5	-
17	7.0	-	17	1.5	-	17	3.0	-
18	3.5	-	18	4.0	-	18	11.0	-
19	4.0	-	19	7.0	-	19	9.0	-
20	3.0	0.00	20	5.0	0.3	20	5.0	0.25
21	4.0	-	21	9.0	-	21	8.0	-
22	6.0	-	22	11.0	-	22	3.0	-
23	1.5	-	23	3.5	-	23	3.5	-
24	1.0	-	24	6.0	-	24	3.0	-
25	2.0	-	25	4.0	-	25	11.0	-
26	4.0	-	26	5.5	-	26	12.0	-
27	2.0	-	27	3.0	-	27	2.0	-
28	1.5	-	28	4.5	-	28	3.5	-
29	7.0	-	29	4.0	-	29	5.0	-
30	5.0	0.25	30	5.5	0.25	30	2.0	0.00
31	2.5	-	31	3.5	-	31	4.0	-
32	2.0	-	32	1.5	-	32	2.0	-
33	2.0	-	33	2.0	-	33	2.0	-
34	sand	-	34	3.0	-	34	4.0	-
35	3.0	-	35	2.5	-	35	9.0	-
36	3.0	-	36	5.5	-	36	9.0	-
37	3.5	-	37	1.0	-	37	4.5	-
38	4.0	-	38	5.5	-	38	3.0	-
39	1.5	-	39	2.5	-	39	4.0	-
40	2.5	0	40	7.0	0.75	40	7.0	0
41	4.0	-	41	2.5	-	41	8.0	-
42	3.0	-	42	3.0	-	42	10.0	-
43	1.5	-	43	1.5	-	43	11.0	-
44	4.5	-	44	2.0	-	44	4.5	-
45	2.5	-	45	1.5	-	45	3.0	-
46	2.5	-	46	4.0	-	46	4.0	-
47	3.0	-	47	3.0	-	47	6.0	-
48	4.0	-	48	3.0	-	48	3.5	-
49	3.0	-	49	2.5	-	49	3.5	-
50	3.5	0	50	9.5	0.50	50	7.5	0.25
51	2.0	-	51	1.0	-	51	10.0	-
52	3.0	-	52	3.5	-	52	8.0	-
53	2.0	-	53	2.0	-	53	2.0	-
54	1.0	-	54	1.5	-	54	3.5	-
55	1.5	-	55	2.0	-	55	5.0	-
56	5.0	-	56	10.5	-	56	3.5	-
57	3.0	-	57	2.5	-	57	1.5	-
58	1.5	-	58	1.0	-	58	5.5	-
59	2.0	-	59	0.5	-	59	18.0	-
60	1.0	0.00	60	8.0	0.5	60	9.0	0.0
61	4.0	-	61	1.0	-	61	4.5	-
62	2.0	-	62	2.5	-	62	3.0	-
63	1.5	-	63	3.0	-	63	7.0	-
64	2.5	-	64	4.0	-	64	8.5	-
65	4.0	-	65	3.5	-	65	3.0	-
66	2.5	-	66	11.0	-	66	6.0	-
67	2.5	-	67	5.0	-	67	5.0	-
68	2.0	-	68	3.5	-	68	6.5	-
69	2.5	-	69	2.5	-	69	5.0	-
70	3.0	0.00	70	3.0	0	70	1.5	0.0
71	2.0	-	71	1.0	-	71	9.0	-
72	5.5	-	72	1.0	-	72	4.0	-
73	5.0	-	73	1.5	-	73	4.0	-
74	3.5	-	74	sand	-	74	1.5	-
75	1.0	-	75	11.0	-	75	8.0	-
76	5.5	-	76	1.5	-	76	5.0	-
77	7.0	-	77	2.0	-	77	4.0	-
78	4.0	-	78	2.0	-	78	4.5	-
79	3.0	-	79	3.0	-	79	15.0	-
80	5.0	0.00	80	2.5	0	80	11.0	0.00
81	2.5	-	81	5.0	-	81	3.0	-
82	11.0	-	82	5.5	-	82	3.0	-
83	1.5	-	83	4.0	-	83	4.0	-
84	1.5	-	84	2.0	-	84	9.0	-
85	3.0	-	85	4.0	-	85	4.0	-
86	7.0	-	86	2.0	-	86	13.0	-
87	4.0	-	87	2.0	-	87	11.0	-
88	6.0	-	88	5.5	-	88	7.0	-
89	5.0	-	89	7.5	-	89	3.0	-
90	7.0	0.3	90	3.0	0	90	5.0	0.3
91	6.0	-	91	1.0	-	91	3.0	-
92	2.5	-	92	7.5	-	92	2.5	-
93	1.5	-	93	7.5	-	93	4.5	-
94	3.5	-	94	5.0	-	94	7.0	-
95	4.0	-	95	2.5	-	95	5.5	-
96	6.5	-	96	2.0	-	96	5.0	-
97	6.5	-	97	1.5	-	97	5.0	-
98	8.0	-	98	2.0	-	98	4.0	-
99	4.0	-	99	3.0	-	99	3.0	-
100	5.0	0.25	100	2.5	0.00	100	4.0	0
Minimum	**1.0**	**0.0**	**Minimum**	**0.5**	**0.0**	**Minimum**	**1.5**	**0.0**
Maximum	**11.0**	**0.3**	**Maximum**	**11.0**	**0.8**	**Maximum**	**18.0**	**0.25**
Mean	**3.5**	**0.08**	**Mean**	**3.7**	**0.23**	**Mean**	**5.8**	**0.08**
Standard Dev.	**2.0**	**0.12**	**Standard Dev.**	**2.5**	**0.28**	**Standard Dev.**	**3.3**	**0.12**
Geometric mean	**3.0**	**-**	**Geometric mean**	**3.0**	**-**	**Geometric mean**	**5.0**	**-**
Median	**3.0**	**0.00**	**Median**	**3.0**	**0.13**	**Median**	**5.0**	**0.00**

Table G.37: Calcite and Pebble Count at RG_FRCP1SWD, FRO LAEMP, June 2020

RG_FRCP1SWD 1			RG_FRCP1SWD 2			RG_FRCP1SWD 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	4.5	-	1	6.5	-	1	4.0	-
2	4.0	-	2	7.0	-	2	5.0	-
3	9.5	-	3	5.5	-	3	4.0	-
4	5.5	-	4	9.0	-	4	2.5	-
5	4.0	-	5	4.5	-	5	6.5	-
6	7.0	-	6	2.5	-	6	3.0	-
7	3.0	-	7	6.0	-	7	4.0	-
8	5.0	-	8	1.0	-	8	4.5	-
9	6.0	-	9	6.0	-	9	6.0	-
10	7.5	0.25	10	5.5	0.25	10	5.0	0
11	6.0	-	11	5.0	-	11	4.0	-
12	5.0	-	12	4.5	-	12	3.5	-
13	7.0	-	13	2.0	-	13	4.0	-
14	4.5	-	14	1.5	-	14	3.0	-
15	6.0	-	15	8.0	-	15	1.0	-
16	sand	-	16	5.0	-	16	4.0	-
17	7.0	-	17	3.5	-	17	4.5	-
18	3.5	-	18	2.0	-	18	7.0	-
19	6.0	-	19	3.0	-	19	4.5	-
20	5.0	0.00	20	2.0	0.3	20	5.0	0.00
21	5.0	-	21	4.0	-	21	4.0	-
22	5.5	-	22	4.5	-	22	7.0	-
23	5.5	-	23	2.0	-	23	2.0	-
24	7.0	-	24	1.5	-	24	1.5	-
25	6.0	-	25	2.0	-	25	3.5	-
26	4.5	-	26	3.5	-	26	2.5	-
27	11.0	-	27	9.0	-	27	4.0	-
28	2.5	-	28	4.0	-	28	4.5	-
29	4.5	-	29	1.0	-	29	2.5	-
30	4.0	0.25	30	5.0	0.25	30	6.5	0.25
31	4.0	-	31	8.0	-	31	1.5	-
32	3.5	-	32	2.0	-	32	2.0	-
33	6.0	-	33	5.0	-	33	2.0	-
34	5.0	-	34	3.0	-	34	3.5	-
35	2.0	-	35	3.0	-	35	2.0	-
36	5.0	-	36	2.5	-	36	7.0	-
37	5.5	-	37	1.0	-	37	3.0	-
38	7.0	-	38	5.0	-	38	3.0	-
39	3.0	-	39	6.0	-	39	2.0	-
40	7.0	0.25	40	7.0	0	40	4.0	0
41	3.0	-	41	4.5	-	41	1.5	-
42	5.0	-	42	6.0	-	42	7.0	-
43	10.0	-	43	3.0	-	43	3.0	-
44	6.0	-	44	4.0	-	44	1.5	-
45	6.0	-	45	1.0	-	45	2.5	-
46	10.0	-	46	4.5	-	46	6.0	-
47	9.0	-	47	2.0	-	47	7.5	-
48	5.0	-	48	sand	-	48	3.5	-
49	6.0	-	49	4.5	-	49	2.5	-
50	7.0	0.25	50	11.5	0.25	50	2.0	0
51	4.5	-	51	3.5	-	51	2.5	-
52	7.0	-	52	2.0	-	52	5.5	-
53	7.0	-	53	1.5	-	53	2.0	-
54	6.0	-	54	4.0	-	54	1.5	-
55	2.0	-	55	1.5	-	55	3.0	-
56	3.5	-	56	3.0	-	56	4.0	-
57	5.0	-	57	4.0	-	57	2.5	-
58	4.5	-	58	3.5	-	58	3.5	-
59	4.5	-	59	2.5	-	59	2.0	-
60	5.0	0.25	60	3.0	0	60	2.0	0.3
61	6.0	-	61	3.0	-	61	4.0	-
62	3.0	-	62	2.5	-	62	6.5	-
63	4.5	-	63	4.5	-	63	1.0	-
64	4.0	-	64	3.0	-	64	0.5	-
65	3.0	-	65	4.0	-	65	3.0	-
66	5.0	-	66	3.5	-	66	4.5	-
67	6.0	-	67	3.0	-	67	5.0	-
68	6.0	-	68	3.5	-	68	2.5	-
69	3.0	-	69	4.5	-	69	4.0	-
70	12.0	0.25	70	5.5	0	70	2.0	0.0
71	3.0	-	71	11.0	-	71	2.5	-
72	9.0	-	72	6.0	-	72	1.0	-
73	11.0	-	73	8.0	-	73	4.0	-
74	8.5	-	74	8.5	-	74	6.0	-
75	8.0	-	75	6.0	-	75	5.5	-
76	6.0	-	76	7.0	-	76	4.5	-
77	7.0	-	77	7.5	-	77	7.0	-
78	7.0	-	78	2.5	-	78	2.0	-
79	6.5	-	79	4.0	-	79	4.5	-
80	6.0	0.50	80	2.5	0	80	5.0	0.50
81	6.5	-	81	2.0	-	81	5.0	-
82	6.5	-	82	7.0	-	82	4.0	-
83	2.0	-	83	6.0	-	83	3.5	-
84	4.0	-	84	4.0	-	84	2.5	-
85	6.0	-	85	2.5	-	85	5.0	-
86	3.0	-	86	1.5	-	86	2.5	-
87	sand	-	87	11.0	-	87	2.5	-
88	3.5	-	88	4.5	-	88	4.5	-
89	8.5	-	89	5.0	-	89	3.5	-
90	4.5	0.0	90	7.0	0	90	5.5	0.3
91	7.0	-	91	4.0	-	91	2.0	-
92	7.5	-	92	8.5	-	92	5.5	-
93	4.0	-	93	6.0	-	93	4.5	-
94	8.5	-	94	3.0	-	94	2.5	-
95	sand	-	95	7.5	-	95	2.0	-
96	3.0	-	96	5.0	-	96	1.0	-
97	8.0	-	97	6.0	-	97	2.5	-
98	6.0	-	98	4.0	-	98	4.0	-
99	5.0	-	99	4.0	-	99	6.0	-
100	5.5	0.25	100	6.0	0.00	100	3.5	0.25
Minimum	**2.0**	**0.0**	**Minimum**	**1.0**	**0.0**	**Minimum**	**0.5**	**0.0**
Maximum	**12.0**	**0.5**	**Maximum**	**11.5**	**0.3**	**Maximum**	**7.5**	**0.5**
Mean	**5.7**	**0.23**	**Mean**	**4.5**	**0.10**	**Mean**	**3.7**	**0.15**
Standard Dev.	**2.1**	**0.14**	**Standard Dev.**	**2.3**	**0.13**	**Standard Dev.**	**1.7**	**0.17**
Geometric mean	**5.3**	**-**	**Geometric mean**	**3.9**	**-**	**Geometric mean**	**3.2**	**-**
Median	**5.5**	**0.25**	**Median**	**4.0**	**0.00**	**Median**	**3.5**	**0.13**

Table G.38: Table F.23 Calcite and Pebble Count at RG_FRUPO, FRO LAEMP, June 2020

RG_FRUPO 1			RG_FRUPO 2			RG_FRUPO 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	5.5	-	1	7.0	-	1	11.5	-
2	7.0	-	2	8.5	-	2	8.5	-
3	10.5	-	3	12.0	-	3	10.0	-
4	4.0	-	4	7.5	-	4	9.0	-
5	5.0	-	5	6.0	-	5	8.0	-
6	6.5	-	6	12.5	-	6	6.5	-
7	6.0	-	7	7.5	-	7	9.5	-
8	3.5	-	8	9.0	-	8	4.5	-
9	14.0	-	9	10.0	-	9	6.0	-
10	4.5	0	10	11.0	0.5	10	11.0	0.25
11	7.0	-	11	3.5	-	11	5.0	-
12	7.5	-	12	4.0	-	12	14.5	-
13	6.0	-	13	9.5	-	13	11.0	-
14	9.0	-	14	6.0	-	14	9.5	-
15	10.5	-	15	5.5	-	15	10.0	-
16	11.5	-	16	14.0	-	16	1.5	-
17	8.0	-	17	11.5	-	17	13.0	-
18	5.5	-	18	8.0	-	18	5.5	-
19	4.0	-	19	12.0	-	19	4.0	-
20	8.0	0.25	20	11.0	0.25	20	11.5	0.25
21	7.0	-	21	5.0	-	21	14.0	-
22	8.0	-	22	6.5	-	22	17.5	-
23	3.5	-	23	6.0	-	23	3.0	-
24	9.0	-	24	9.0	-	24	5.5	-
25	8.5	-	25	7.5	-	25	12.0	-
26	4.5	-	26	13.0	-	26	10.5	-
27	5.0	-	27	2.5	-	27	4.5	-
28	13.0	-	28	4.0	-	28	8.0	-
29	15.5	-	29	14.0	-	29	7.0	-
30	11.0	0.25	30	5.0	0	30	6.5	0.00
31	11.5	-	31	8.0	-	31	7.5	-
32	9.0	-	32	9.0	-	32	8.0	-
33	10.0	-	33	4.5	-	33	2.5	-
34	7.0	-	34	17.5	-	34	5.0	-
35	8.5	-	35	6.0	-	35	10.5	-
36	6.0	-	36	9.5	-	36	8.5	-
37	3.5	-	37	10.5	-	37	9.0	-
38	13.5	-	38	13.0	-	38	9.5	-
39	10.0	-	39	7.5	-	39	12.0	-
40	15.0	0.50	40	9.0	0.00	40	8.0	0.75
41	9.5	-	41	9.5	-	41	11.0	-
42	6.5	-	42	9.0	-	42	8.0	-
43	10.5	-	43	16.0	-	43	7.0	-
44	13.0	-	44	28.5	-	44	7.5	-
45	9.0	-	45	12.5	-	45	6.0	-
46	4.0	-	46	4.5	-	46	2.5	-
47	5.5	-	47	5.5	-	47	1.5	-
48	8.0	-	48	8.0	-	48	1.0	-
49	17.5	-	49	10.5	-	49	3.0	-
50	5.0	0.25	50	13.0	0.25	50	7.0	0.25
51	13.0	-	51	4.5	-	51	7.0	-
52	10.0	-	52	7.0	-	52	9.0	-
53	7.0	-	53	11.0	-	53	11.0	-
54	7.5	-	54	5.0	-	54	12.5	-
55	6.0	-	55	6.5	-	55	8.0	-
56	10.0	-	56	6.0	-	56	8.0	-
57	8.5	-	57	3.0	-	57	10.0	-
58	12.0	-	58	14.5	-	58	6.5	-
59	7.0	-	59	9.5	-	59	6.0	-
60	8.0	0.25	60	5.5	0	60	7.5	0
61	6.5	-	61	8.0	-	61	5.5	-
62	8.0	-	62	12.5	-	62	4.0	-
63	3.5	-	63	14.5	-	63	4.5	-
64	4.0	-	64	11.0	-	64	7.0	-
65	7.5	-	65	8.5	-	65	8.5	-
66	10.5	-	66	6.0	-	66	5.5	-
67	10.0	-	67	5.5	-	67	4.0	-
68	9.0	-	68	6.0	-	68	9.0	-
69	15.5	-	69	8.5	-	69	5.0	-
70	9.5	0.50	70	10.5	0.25	70	9.0	0
71	7.0	-	71	9.0	-	71	11.0	-
72	9.0	-	72	7.0	-	72	8.0	-
73	9.5	-	73	9.0	-	73	6.5	-
74	1.5	-	74	8.0	-	74	4.0	-
75	3.0	-	75	13.0	-	75	10.0	-
76	2.5	-	76	15.0	-	76	8.5	-
77	4.0	-	77	12.5	-	77	11.0	-
78	6.0	-	78	8.5	-	78	4.5	-
79	10.5	-	79	7.0	-	79	6.0	-
80	7.5	0.75	80	12.5	0.25	80	9.0	0
81	11.0	-	81	10.0	-	81	10.0	-
82	13.5	-	82	3.5	-	82	7.0	-
83	5.0	-	83	19.0	-	83	7.5	-
84	10.0	-	84	23.5	-	84	9.0	-
85	8.5	-	85	15.5	-	85	6.0	-
86	8.0	-	86	7.0	-	86	4.5	-
87	7.0	-	87	5.5	-	87	16.5	-
88	6.5	-	88	5.0	-	88	12.0	-
89	9.0	-	89	7.0	-	89	7.5	-
90	4.0	0	90	18.0	0.5	90	6.0	0.25
91	11.0	-	91	4.5	-	91	3.0	-
92	19.0	-	92	6.0	-	92	8.0	-
93	22.5	-	93	6.5	-	93	10.5	-
94	4.5	-	94	8.0	-	94	2.5	-
95	7.0	-	95	5.0	-	95	7.5	-
96	7.0	-	96	8.0	-	96	11.0	-
97	5.5	-	97	4.5	-	97	6.5	-
98	8.5	-	98	9.5	-	98	7.0	-
99	7.0	-	99	8.0	-	99	14.0	-
100	9.5	0.75	100	11.5	0.25	100	7.5	0.25
Minimum	**1.5**	**0.0**	**Minimum**	**2.5**	**0.0**	**Minimum**	**1.00**	**0.0**
Maximum	**22.5**	**0.75**	**Maximum**	**28.5**	**0.50**	**Maximum**	**17.5**	**0.75**
Mean	**8.3**	**0.35**	**Mean**	**9.1**	**0.23**	**Mean**	**7.8**	**0.20**
Standard Dev.	**3.6**	**0.27**	**Standard Dev.**	**4.3**	**0.18**	**Standard Dev.**	**3.2**	**0.23**
Geometric mean	**7.5**	**-**	**Geometric mean**	**8.2**	**-**	**Geometric mean**	**7.0**	**-**
Median	**8.0**	**0.25**	**Median**	**8.3**	**0.25**	**Median**	**7.8**	**0.25**

Table G.39: Calcite and Pebble Count at RG_FODPO, FRO LAEMP, June 2020

RG_FODPO 1			RG_FODPO 2			RG_FODPO 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	6.0	-	1	3.0	-	1	5.0	-
2	3.5	-	2	4.0	-	2	4.5	-
3	4.5	-	3	3.5	-	3	6.0	-
4	4.0	-	4	2.0	-	4	8.0	-
5	6.5	-	5	1.5	-	5	9.5	-
6	8.0	-	6	8.0	-	6	7.5	-
7	2.0	-	7	6.0	-	7	8.0	-
8	1.5	-	8	4.5	-	8	7.0	-
9	2.5	-	9	5.0	-	9	6.5	-
10	6.0	0.25	10	7.0	0.00	10	3.5	0
11	3.5	-	11	5.5	-	11	4.0	-
12	1.5	-	12	3.0	-	12	6.5	-
13	2.0	-	13	5.0	-	13	8.0	-
14	2.5	-	14	3.5	-	14	9.5	-
15	4.0	-	15	6.0	-	15	11.0	-
16	7.0	-	16	2.0	-	16	5.5	-
17	4.5	-	17	2.5	-	17	3.0	-
18	4.0	-	18	4.0	-	18	6.0	-
19	5.5	-	19	3.5	-	19	9.5	-
20	7.0	0.5	20	8.0	0.25	20	4.0	0.25
21	4.5	-	21	4.5	-	21	3.0	-
22	3.5	-	22	0.5	-	22	6.5	-
23	5.5	-	23	3.0	-	23	2.0	-
24	4.0	-	24	4.5	-	24	4.0	-
25	1.5	-	25	6.0	-	25	4.5	-
26	1.0	-	26	4.5	-	26	5.0	-
27	1.0	-	27	4.5	-	27	sand	-
28	0.5	-	28	3.0	-	28	2.0	-
29	3.0	-	29	1.5	-	29	4.5	-
30	4.0	full	30	4.0	0.25	30	5.0	0.5
31	5.5	-	31	6.0	-	31	5.5	-
32	7.0	-	32	7.5	-	32	11.0	-
33	8.5	-	33	2.5	-	33	8.5	-
34	8.0	-	34	2.0	-	34	3.0	-
35	3.5	-	35	3.0	-	35	4.5	-
36	6.0	-	36	4.0	-	36	3.0	-
37	6.5	-	37	3.0	-	37	6.0	-
38	4.5	-	38	3.5	-	38	4.5	-
39	3.0	-	39	5.0	-	39	4.0	-
40	5.5	0.25	40	6.5	0.25	40	sand	100.00
41	2.0	-	41	7.0	-	41	5.5	-
42	5.5	-	42	4.5	-	42	4.0	-
43	6.5	-	43	4.5	-	43	4.0	-
44	7.0	-	44	5.0	-	44	6.5	-
45	4.0	-	45	3.5	-	45	4.5	-
46	3.5	-	46	3.5	-	46	4.0	-
47	2.0	-	47	2.0	-	47	5.0	-
48	3.5	-	48	8.0	-	48	6.5	-
49	4.0	-	49	5.0	-	49	4.0	-
50	3.5	0	50	4.5	0	50	4.5	0.5
51	2.5	-	51	6.5	-	51	sand	-
52	6.5	-	52	3.0	-	52	4.5	-
53	4.5	-	53	2.5	-	53	6.0	-
54	3.0	-	54	3.5	-	54	3.5	-
55	5.0	-	55	5.0	-	55	5.5	-
56	4.0	-	56	5.5	-	56	4.0	-
57	5.5	-	57	4.0	-	57	8.5	-
58	7.0	-	58	4.5	-	58	3.0	-
59	3.0	-	59	5.0	-	59	1.5	-
60	3.0	0	60	8.5	0.25	60	4.0	0.25
61	5.5	-	61	4.0	-	61	2.0	-
62	8.0	-	62	5.0	-	62	5.5	-
63	3.5	-	63	5.5	-	63	8.5	-
64	1.5	-	64	4.0	-	64	3.0	-
65	1.0	-	65	6.0	-	65	4.5	-
66	0.5	-	66	2.5	-	66	sand	-
67	2.0	-	67	3.0	-	67	6.0	-
68	2.0	-	68	2.5	-	68	4.0	-
69	4.0	-	69	2.0	-	69	4.5	-
70	5.0	0.25	70	5.5	0	70	5.0	0.00
71	4.5	-	71	1.0	-	71	6.5	-
72	4.0	-	72	1.5	-	72	sand	-
73	6.0	-	73	1.0	-	73	4.0	-
74	5.5	-	74	0.5	-	74	2.5	-
75	6.0	-	75	4.0	-	75	6.0	-
76	4.5	-	76	5.0	-	76	5.5	-
77	4.0	-	77	4.0	-	77	1.0	-
78	3.5	-	78	4.5	-	78	4.0	-
79	5.5	-	79	3.5	-	79	6.5	-
80	2.5	0	80	6.0	0	80	sand	100
81	7.0	-	81	6.5	-	81	7.0	-
82	3.5	-	82	3.0	-	82	5.0	-
83	0.5	-	83	3.5	-	83	9.5	-
84	1.0	-	84	2.5	-	84	4.0	-
85	0.5	-	85	4.5	-	85	2.5	-
86	sand	-	86	4.0	-	86	4.5	-
87	sand	-	87	5.0	-	87	6.5	-
88	4.0	-	88	3.0	-	88	4.0	-
89	6.0	-	89	7.0	-	89	4.0	-
90	4.0	0.00	90	7.5	0	90	4.5	0.25
91	2.5	-	91	sand	-	91	2.5	-
92	4.0	-	92	sand	-	92	1.0	-
93	4.5	-	93	1.0	-	93	6.0	-
94	3.0	-	94	1.5	-	94	5.5	-
95	5.5	-	95	4.0	-	95	4.5	-
96	7.0	-	96	5.5	-	96	3.5	-
97	5.0	-	97	4.5	-	97	5.0	-
98	5.5	-	98	2.0	-	98	7.0	-
99	5.0	-	99	2.5	-	99	4.5	-
100	6.0	0	100	5.0	0	100	8.0	0.00
Minimum	**0.5**	**0.0**	**Minimum**	**0.5**	**0.0**	**Minimum**	**1.0**	**0.0**
Maximum	**8.5**	**0.50**	**Maximum**	**8.5**	**0.25**	**Maximum**	**11.0**	**100.00**
Mean	**4.2**	**0.14**	**Mean**	**4.1**	**0.10**	**Mean**	**5.2**	**20.18**
Standard Dev.	**1.9**	**0.18**	**Standard Dev.**	**1.8**	**0.13**	**Standard Dev.**	**2.1**	**42.07**
Geometric mean	**3.6**	**-**	**Geometric mean**	**3.7**	**-**	**Geometric mean**	**4.7**	**-**
Median	**4.0**	**0.0**	**Median**	**4.0**	**0.0**	**Median**	**4.5**	**0.3**

Table G.40: Calcite and Pebble Count at RG_FO22, FRO LAEMP, June 2020

RG_FO22 1			RG_FO22 2			RG_FO22 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1		-	1	1.0	-	1		-
2		-	2	1.0	-	2		-
3		-	3	2.0	-	3		-
4		-	4	0.5	-	4		-
5		-	5	0.5	-	5		-
6		-	6	2.0	-	6		-
7		-	7	1.0	-	7		-
8		-	8	2.0	-	8		-
9		-	9	2.0	-	9		-
10			10	1.5	0	10		
11		-	11	2.0	-	11		-
12		-	12	1.0	-	12		-
13		-	13	4.0	-	13		-
14		-	14	1.5	-	14		-
15		-	15	3.0	-	15		-
16		-	16	2.0	-	16		-
17		-	17	1.0	-	17		-
18		-	18	2.5	-	18		-
19		-	19	2.5	-	19		-
20			20	1.5	0	20		
21		-	21	3.0	-	21		-
22		-	22	2.0	-	22		-
23		-	23	1.0	-	23		-
24		-	24	1.5	-	24		-
25		-	25	2.0	-	25		-
26		-	26	3.0	-	26		-
27		-	27	2.0	-	27		-
28		-	28	1.0	-	28		-
29		-	29	1.5	-	29		-
30			30	1.5	0.25	30		
31		-	31	4.0	-	31		-
32		-	32	2.0	-	32		-
33		-	33	3.0	-	33		-
34		-	34	1.5	-	34		-
35		-	35	0.5	-	35		-
36		-	36	sand	-	36		-
37		-	37	1.5	-	37		-
38		-	38	1.0	-	38		-
39		-	39	3.0	-	39		-
40			40	2.0	0	40		
41		-	41	2.5	-	41		-
42		-	42	1.0	-	42		-
43		-	43	3.5	-	43		-
44		-	44	1.5	-	44		-
45		-	45	1.0	-	45		-
46		-	46	1.5	-	46		-
47		-	47	0.5	-	47		-
48		-	48	1.5	-	48		-
49		-	49	0.5	-	49		-
50			50	3.0	0.5	50		
51		-	51	2.5	-	51		-
52		-	52	2.0	-	52		-
53		-	53	2.0	-	53		-
54		-	54	1.0	-	54		-
55		-	55	3.0	-	55		-
56		-	56	3.0	-	56		-
57		-	57	4.0	-	57		-
58		-	58	2.0	-	58		-
59		-	59	2.0	-	59		-
60			60	1.0	0.00	60		
61		-	61	1.5	-	61		-
62		-	62	1.5	-	62		-
63		-	63	3.0	-	63		-
64		-	64	1.0	-	64		-
65		-	65	sand	-	65		-
66		-	66	2.5	-	66		-
67		-	67	0.5	-	67		-
68		-	68	0.5	-	68		-
69		-	69	1.0	-	69		-
70			70	0.5	0	70		
71		-	71	2.5	-	71		-
72		-	72	sand	-	72		-
73		-	73	2.5	-	73		-
74		-	74	2.5	-	74		-
75		-	75	1.5	-	75		-
76		-	76	1.5	-	76		-
77		-	77	2.5	-	77		-
78		-	78	1.0	-	78		-
79		-	79	1.0	-	79		-
80			80	sand	-	80		
81		-	81	2.0	-	81		-
82		-	82	2.0	-	82		-
83		-	83	2.0	-	83		-
84		-	84	2.5	-	84		-
85		-	85	sand	-	85		-
86		-	86	1.5	-	86		-
87		-	87	sand	-	87		-
88		-	88	sand	-	88		-
89		-	89	2.5	-	89		-
90			90	2.0	0	90		
91		-	91	0.5	-	91		-
92		-	92	0.5	-	92		-
93		-	93	0.5	-	93		-
94		-	94	1.0	-	94		-
95		-	95	1.5	-	95		-
96		-	96	1.5	-	96		-
97		-	97	2.0	-	97		-
98		-	98	1.0	-	98		-
99		-	99	0.5	-	99		-
100			100	0.5	0.25	100		
Minimum	**0.0**	**0.0**	**Minimum**	**0.5**	**0.0**	**Minimum**	**0.0**	**0.0**
Maximum	**0.0**	**0.00**	**Maximum**	**4.0**	**0.50**	**Maximum**	**0.0**	**0.00**
Mean	**#DIV/0!**	**#DIV/0!**	**Mean**	**1.7**	**0.11**	**Mean**	**#DIV/0!**	**#DIV/0!**
Standard Dev.	**#DIV/0!**	**#DIV/0!**	**Standard Dev.**	**0.9**	**0.18**	**Standard Dev.**	**#DIV/0!**	**#DIV/0!**
Geometric mean	**#NUM!**	**-**	**Geometric mean**	**1.5**	**-**	**Geometric mean**	**#NUM!**	**-**
Median	**#NUM!**	**#NUM!**	**Median**	**1.5**	**0.0**	**Median**	**#NUM!**	**#NUM!**

Table G.41: Calcite and Pebble Count at RG_FOUEW, FRO LAEMP, June 2020

RG_FOUEW 1			RG_FOUEW 2			RG_FOUEW 3		
Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness	Rock	Intermediate Axis (cm)	Embeddedness
1	9.0	-	1	7.0	-	1	5.5	-
2	8.0	-	2	2.5	-	2	2.5	-
3	9.5	-	3	11.5	-	3	3.0	-
4	6.0	-	4	4.5	-	4	2.0	-
5	5.5	-	5	6.0	-	5	3.5	-
6	10.0	-	6	3.0	-	6	5.0	-
7	2.5	-	7	18.0	-	7	2.5	-
8	1.0	-	8	4.5	-	8	4.0	-
9	4.5	-	9	15.0	-	9	3.0	-
10	6.5	0.5	10	17.0	0.5	10	8.0	0.00
11	9.0	-	11	5.0	-	11	4.0	-
12	5.0	-	12	5.5	-	12	5.0	-
13	5.0	-	13	11.0	-	13	5.5	-
14	3.5	-	14	10.0	-	14	3.0	-
15	3.5	-	15	3.5	-	15	2.0	-
16	4.0	-	16	7.0	-	16	5.5	-
17	7.0	-	17	6.0	-	17	3.5	-
18	4.5	-	18	9.0	-	18	2.0	-
19	4.5	-	19	7.0	-	19	2.0	-
20	7.5	0.25	20	11.0	0.25	20	4.0	0.00
21	5.0	-	21	4.0	-	21	5.5	-
22	15.5	-	22	9.5	-	22	4.0	-
23	9.5	-	23	4.5	-	23	5.0	-
24	11.0	-	24	11.0	-	24	3.0	-
25	9.0	-	25	7.0	-	25	3.0	-
26	11.0	-	26	4.0	-	26	3.5	-
27	8.0	-	27	21.0	-	27	9.0	-
28	4.0	-	28	12.0	-	28	10.0	-
29	5.0	-	29	9.0	-	29	3.0	-
30	16.0	0.25	30	5.0	0	30	3.0	0
31	7.5	-	31	2.5	-	31	1.5	-
32	15.0	-	32	15.0	-	32	2.0	-
33	2.5	-	33	6.0	-	33	4.5	-
34	3.0	-	34	11.0	-	34	4.5	-
35	5.5	-	35	3.0	-	35	4.0	-
36	16.0	-	36	6.0	-	36	2.0	-
37	7.0	-	37	8.0	-	37	1.0	-
38	3.5	-	38	4.0	-	38	4.5	-
39	2.5	-	39	12.0	-	39	7.0	-
40	11.5	0	40	12.0	0.75	40	3.5	0
41	19.5	-	41	7.0	-	41	3.0	-
42	12.5	-	42	5.5	-	42	1.0	-
43	20.0	-	43	6.0	-	43	3.5	-
44	9.0	-	44	6.0	-	44	2.5	-
45	9.0	-	45	11.0	-	45	2.0	-
46	4.0	-	46	8.0	-	46	2.0	-
47	9.5	-	47	9.5	-	47	2.0	-
48	4.0	-	48	13.0	-	48	7.0	-
49	2.5	-	49	15.0	-	49	8.0	-
50	7.5	0	50	10.5	0.25	50	4.0	0
51	10.0	-	51	6.0	-	51	2.0	-
52	3.5	-	52	9.0	-	52	3.0	-
53	2.0	-	53	5.0	-	53	2.5	-
54	2.0	-	54	3.5	-	54	3.0	-
55	1.0	-	55	2.0	-	55	2.0	-
56	3.5	-	56	5.0	-	56	2.5	-
57	2.5	-	57	11.0	-	57	1.5	-
58	3.5	-	58	6.0	-	58	3.0	-
59	14.0	-	59	11.5	-	59	1.0	-
60	14.0	0.5	60	8.5	0.50	60	3.0	0
61	9.0	-	61	12.0	-	61	1.0	-
62	12.0	-	62	9.0	-	62	6.5	-
63	9.0	-	63	3.0	-	63	5.0	-
64	4.0	-	64	4.0	-	64	2.5	-
65	3.0	-	65	2.5	-	65	3.0	-
66	9.5	-	66	7.0	-	66	2.0	-
67	10.5	-	67	4.0	-	67	4.5	-
68	2.0	-	68	6.0	-	68	12.0	-
69	2.0	-	69	4.0	-	69	9.5	-
70	3.5	0.00	70	9.0	0.5	70	14.0	0
71	11.5	-	71	2.5	-	71	7.0	-
72	11.5	-	72	10.0	-	72	7.0	-
73	11.0	-	73	8.0	-	73	5.5	-
74	2.0	-	74	7.0	-	74	12.0	-
75	6.5	-	75	4.5	-	75	11.5	-
76	9.0	-	76	8.5	-	76	7.5	-
77	7.0	-	77	5.5	-	77	7.0	-
78	4.5	-	78	sand	-	78	4.5	-
79	7.0	-	79	8.0	-	79	4.5	-
80	4.5	0	80	5.5	0.5	80	6.5	0
81	5.0	-	81	6.0	-	81	10.0	-
82	4.0	-	82	7.0	-	82	9.5	-
83	2.0	-	83	7.0	-	83	3.5	-
84	1.5	-	84	sand	-	84	5.5	-
85	1.0	-	85	5.5	-	85	2.0	-
86	3.0	-	86	fines	-	86	2.0	-
87	4.0	-	87	2.5	-	87	1.0	-
88	9.0	-	88	4.0	-	88	2.5	-
89	10.0	-	89	11.5	-	89	5.5	-
90	9.5	0.50	90	4.0	0.00	90	14.5	0
91	15.0	-	91	3.5	-	91	6.0	-
92	8.0	-	92	10.0	-	92	8.5	-
93	9.0	-	93	7.0	-	93	10.0	-
94	3.0	-	94	sand	-	94	8.0	-
95	16.5	-	95	3.0	-	95	5.5	-
96	6.0	-	96	4.0	-	96	4.5	-
97	4.5	-	97	11.5	-	97	6.0	-
98	8.0	-	98	3.0	-	98	1.0	-
99	3.5	-	99	3.5	-	99	0.5	-
100	8.0	0.00	100	2.5	0	100	12.5	0
Minimum	**1.0**	**0.0**	**Minimum**	**2.0**	**0.0**	**Minimum**	**0.5**	**0.0**
Maximum	**20.0**	**0.50**	**Maximum**	**21.0**	**0.75**	**Maximum**	**14.5**	**0.00**
Mean	**7.1**	**0.20**	**Mean**	**7.3**	**0.33**	**Mean**	**4.7**	**0.00**
Standard Dev.	**4.3**	**0.23**	**Standard Dev.**	**3.9**	**0.26**	**Standard Dev.**	**3.1**	**0.00**
Geometric mean	**5.8**	**-**	**Geometric mean**	**6.4**	**-**	**Geometric mean**	**3.8**	**-**
Median	**6.5**	**0.13**	**Median**	**6.5**	**0.38**	**Median**	**4.0**	**0.00**

Table G.42: In Situ Water Quality Taken at Biological Monitoring Areas, June 2020

Field Parameters		Reference			Mine-Exposed								
		RG_FO26	RG_HENUP	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD	RG_MP1	RG_FOUSH	RG_FOUKI	RG_FOBKS	RG_SCOUTDS
Date		17-Jun-20	15-Jun-20	17-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20	15-Jun-20	-	17-Jun-20	16-Jun-20	16-Jun-20
Station 1	Temperature (°C)	3.4	3.3	4.6	5.4	5.6	5.7	5.0	6.2	-	6.9	6.8	6.5
	Dissolved Oxygen (mg/L)	11.31	11.72	11.39	11.53	10.83	10.55	10.74	10.38	-	10.49	10.55	10.11
	Dissolved Oxygen (%)	85	87.7	88.6	91.4	86.3	84.1	84.2	83.8	-	86.3	86.7	82.3
	Conductivity (µS/cm)	135	114	139	156	181	202	201	215	-	272	263	283
	Specific Conductivity (µS/cm)	229	195	228	249	287	319	325.6	335	-	415	401	438
	pH	8.37	7.78	8.53	8.01	8.28	7.88	7.9	8.31	-	8.50	8.48	8.00
	ORP (mV)	-	-	-	-	-	-	-	-	-	-	-	-
Station 2	Temperature (°C)	3.4	3.5	4.4	5.9	4.9	6.0	4.7	6.5	-	6.9	6.6	6.9
	Dissolved Oxygen (mg/L)	11.37	11.63	11.05	11.02	10.64	10.42	10.89	10.49	-	10.49	10.65	10.01
	Dissolved Oxygen (%)	83.7	87.8	86.2	88.5	83.3	83.7	84.6	85.4	-	86.1	86.9	82.5
	Conductivity (µS/cm)	134	115	138	156	173	201	200	218	-	272	260	286
	Specific Conductivity (µS/cm)	228	195	228	245	280	316	326	337	-	416	400	436
	pH	8.39	7.89	8.54	8.02	8.30	7.9	7.82	8.31	-	8.47	8.46	8.02
	ORP (mV)	-	-	-	-	-	-	-	-	-	-	-	-
Station 3	Temperature (°C)	3.2	3.3	4.1	6.4	4.7	6.1	4.1	6.5	-	7.0	5.8	6.5
	Dissolved Oxygen (mg/L)	11.21	11.75	11.16	11.13	10.73	10.37	11.11	10.38	-	10.48	11.02	10.25
	Dissolved Oxygen (%)	84.1	88.2	84.3	89.7	83.6	83.7	85.7	84.6	-	86.5	88.1	83.5
	Conductivity (µS/cm)	134	114	127	157	172	207	214	220	-	273	252	280
	Specific Conductivity (µS/cm)	229	195.1	228.3	244	281	324	356.7	340	-	416	398	433
	pH	8.44	7.88	8.49	8.02	8.16	7.87	7.77	8.30	-	8.46	8.41	7.98
	ORP (mV)	-	-	-	-	-	-	-	-	-	-	-	-

Table G.42: In Situ Water Quality Taken at Biological Monitoring Areas, June 2020

Field Parameters		Mine-Exposed								
		RG_FOBSC	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Date		18-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
Station 1	Temperature (°C)	5.0	6.4	6.3	6.4	7.3	5.7	7.1	-	6.0
	Dissolved Oxygen (mg/L)	12.26	11.18	11.65	10.99	10.48	10.37	10.46	-	10.82
	Dissolved Oxygen (%)	96.1	90.9	94.4	89.3	87.1	83.0	86.9	-	87.1
	Conductivity (µS/cm)	530	393	358	400	414	416	417	-	384
	Specific Conductivity (µS/cm)	852	610	557	620	626	658	634	-	602
	pH	7.61	7.80	7.85	8.41	8.35	7.69	7.79	-	8.42
	ORP (mV)	-	-	-	-	-	-	-	-	-
Station 2	Temperature (°C)	5.5	6.3	6.1	6.1	7.2	5.3	7.0	4.9	6.8
	Dissolved Oxygen (mg/L)	12.02	11.26	11.62	10.93	10.28	10.88	10.42	10.66	10.62
	Dissolved Oxygen (%)	96.4	91.5	93.8	88.3	87.5	86	86.1	81.5	84.8
	Conductivity (µS/cm)	502	392	379	395	384	389	414	400	380
	Specific Conductivity (µS/cm)	802	609	593	617	590	624	631.6	650	601
	pH	7.75	7.81	7.86	8.41	8.37	7.72	8.06	8.22	8.40
	ORP (mV)	-	-	-	-	-	-	-	-	-
Station 3	Temperature (°C)	5.8	6.3	5.5	5.3	6.8	4.9	6.7	-	5.3
	Dissolved Oxygen (mg/L)	11.96	11.2	11.8	10.89	10.57	10.84	10.47	-	10.89
	Dissolved Oxygen (%)	95.6	90.9	93.9	86.1	86.8	84.4	85.6	-	86.0
	Conductivity (µS/cm)	458	388	373	387	417	385	410	-	375
	Specific Conductivity (µS/cm)	720	603	594	621	638	624	629.5	-	602
	pH	7.71	7.83	7.81	8.29	8.32	7.68	7.75	-	8.32
	ORP (mV)	-	-	-	-	-	-	-	-	-

Table G.43: Kick and Sweep at Reference and Mine-exposed Areas, FRO LAEMP, June 2020

		RG_FO26	RG_HENUP	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD	RG_MP1
Station 1	Easting	653050	655498	651340	651435	650831	650897	650913	651134
	Northing	5556922	5567562	5566812	5565510	5564509	5563641	5563189	5562415
	Date	17-Jun-20	15-Jun-20	17-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20	15-Jun-20
	Samplers' Initials	PeS	MG	PeS	MG	MW	MG	MG	PeS
	Number of Jars	2	1	1	-	2	1	1	1
	Total Kick Distance (m)	20	-	14	-	15	18	22	12
	Full Transect (Yes / No)	yes	yes	yes	-	no	no	no	no
	Number of Transects	2.0	-	2.0	-	0.3	0.75	0.5	0.25
Station 2	Easting	653049	655462	651374	651382	650789	0.650885	650962	651209
	Northing	5569596	5567553	5566760	5565486	5564448	5563612	5563162	5562477
	Date	17-Jun-20	15-Jun-20	17-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20	15-Jun-20
	Samplers' Initials	MW	MG	MW	MG	MW	MG	MG	PeS
	Number of Jars	2	1	2	1	2	-	1	1
	Total Kick Distance (m)	15	-	10	24	8	26	20	15
	Full Transect (Yes / No)	yes	yes	yes	yes	no	yes	no	no
	Number of Transects	1.0	3.0	2.0	2.0	0.3	2.5	0.5	0.25
Station 3	Easting	653039	655437	651406	651364	650786	650865	651043	651272
	Northing	5569551	5567550	5566747	5565464	5564417	5563580	5563180	5562514
	Date	17-Jun-20	15-Jun-20	17-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20	15-Jun-20
	Samplers' Initials	MW	MG	CM	MG	PeS	MG	MG	PeS
	Number of Jars	2	1	2	1	2	1	1	3
	Total Kick Distance (m)	12	24	15	26	7	-	18	15
	Full Transect (Yes / No)	yes	yes	yes	no	no	-	no	no
	Number of Transects	1	3.0	4.5	-	0.25	-	0.50	0.5

Table G.43: Kick and Sweep at Reference and Mine-exposed Areas, FRO LAEMP, June 2020

		RG_FOUSH	RG_FOUKI	RG_FOBKS	RG_SCOUTDS	RG_FOBSC	RG_FOBCP	RG_FOBCPD	RG_FRCP1SW
Station 1	Easting	-	651856	652044	652283	652318	652853	653011	653296
	Northing	-	5559819	5558760	5558517	5558218	5557154	5556794	5556269
	Date	-	17-Jun-20	16-Jun-20	16-Jun-20	18-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20
	Samplers' Initials	-	PeS	PeS	PeS	MG	MG	MG	MW
	Number of Jars	-	1	3	1	1	1	1	2
	Total Kick Distance (m)	-	9	12	14	12	18	-	15
	Full Transect (Yes / No)	-	no	no	no	no	no	no	no
	Number of Transects	-	0.3	0.3	0.3	-	-	-	2.0
Station 2	Easting	-	651838	652063	652293	652359	652913	653032	653331
	Northing	-	5559860	5558674	5558501	5558178	5557107	5556719	5556204
	Date	-	17-Jun-20	16-Jun-20	16-Jun-20	18-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20
	Samplers' Initials	-	MW	MW	MG	MG	MG	MG	PeS
	Number of Jars	-	1	2	1	1	1	1	2
	Total Kick Distance (m)	-	12	15	30	16	16	24	13
	Full Transect (Yes / No)	-	no	no	no	no	no	yes	no
	Number of Transects	-	0.3	0.3	0.5	-	-	1.5	0.5
Station 3	Easting	-	651836	652076	652309	652431	652929	653071	653377
	Northing	-	5559907	5558644	5558450	5558089	5557039	5556620	5556195
	Date	-	17-Jun-20	16-Jun-20	16-Jun-20	18-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20
	Samplers' Initials	-	CM	MW	PeS	MG	MG	MG	MW
	Number of Jars	-	1	2	-	1	1	1	1
	Total Kick Distance (m)	-	13	10	7	22	18	18	15
	Full Transect (Yes / No)	-	no	no	no	no	no	no	no
	Number of Transects	-	0.3	0.3	0.3	-	-	0.75	0.50

Table G.43: Kick and Sweep at Reference and Mine-exposed Areas, FRO LAEMP, June 2020

		RG_FRCP1SWD	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Station 1	Easting	653808	653898	653852	-	656006
	Northing	5556088	5555927	5555062	-	5551814
	Date	18-Jun-20	19-Jun-20	19-Jun-20	-	19-Jun-20
	Samplers' Initials	MW	MG	MG	-	MW
	Number of Jars	-	1	-	-	2
	Total Kick Distance (m)	18	15	20	-	12
	Full Transect (Yes / No)	yes	no	no	-	no
	Number of Transects	3.0	-	-	-	0.2
Station 2	Easting	653858	653906	653879	654767	656326
	Northing	5556057	5555892	5555078	5553631	5551867
	Date	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
	Samplers' Initials	PeS	MG	MG	PeS	PeS
	Number of Jars	2	1	1	1	1
	Total Kick Distance (m)	12	14	18	10	15
	Full Transect (Yes / No)	no	no	no	-	no
	Number of Transects	0.3	-	-	0.3	0.3
Station 3	Easting	653876	653867	653892	-	656368
	Northing	5556029	5555849	5555079	-	5551894
	Date	18-Jun-20	19-Jun-20	19-Jun-20	-	19-Jun-20
	Samplers' Initials	MW	MG	MG	-	MW
	Number of Jars	2	1	1	-	2
	Total Kick Distance (m)	15	18	12	-	15
	Full Transect (Yes / No)	no	no	no	-	no
	Number of Transects	0.50	-	-	-	0.2

Table G.44: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed Areas, FRO LAEMP, June 2020

	Replicate		1	2	3	4	5	Mean
Reference	RG_HENUP							
	1	Depth (cm)	13	21.5	27	25	16	**20.5**
		Velocity (m/s)	0.205	0.776	1.474	0.945	0.172	**0.714**
	2	Depth (cm)	15.5	23	32	29.5	14	**22.8**
		Velocity (m/s)	0.141	0.939	1.394	0.955	0.341	**0.754**
	3	Depth (cm)	13.5	29	44.5	34	16.5	**27.5**
		Velocity (m/s)	0.080	0.812	1.358	0.612	0.194	**0.611**
	RG_FO26							
	1	Depth (cm)	25	22	28	21	18	**22.8**
		Velocity (m/s)	1.079	1.045	0.986	0.832	0.748	**0.938**
	2	Depth (cm)	18	25	20	38	43	**28.8**
		Velocity (m/s)	0.597	0.313	0.997	1.108	1.184	**0.840**
	3	Depth (cm)	25.5	41	53	52.5	26.5	**39.7**
		Velocity (m/s)	0.817	0.950	1.112	1.368	1.030	**1.055**
	RG_UFR1							
	1	Depth (cm)	25	28	35	44	39.5	**34.3**
		Velocity (m/s)	0.436	0.616	0.495	1.444	0.955	**0.789**
	2	Depth (cm)	23	30	42	25	24.5	**28.9**
		Velocity (m/s)	1.199	1.085	1.106	1.252	1.161	**1.161**
	3	Depth (cm)	29	36	35	38	26	**32.8**
		Velocity (m/s)	0.599	0.918	0.947	1.417	1.155	**1.007**
Mine-exposed	RG_FODHE							
	1	Depth (cm)	16.5	25.5	34	28	13.5	**23.5**
		Velocity (m/s)	0.304	0.558	1.173	0.828	0.252	**0.623**
	2	Depth (cm)	10	15.5	29	21.5	14	**18.0**
		Velocity (m/s)	0.328	0.509	1.376	1.125	0.323	**0.732**
	3	Depth (cm)	13.5	22	34.5	21	15	**21.2**
		Velocity (m/s)	0.207	0.438	1.304	0.670	0.430	**0.610**
	RG_FOUCL							
	1	Depth (cm)	27.5	31.5	45	44.5	43	**38.3**
		Velocity (m/s)	0.326	0.574	0.632	0.901	1.126	**0.712**
	2	Depth (cm)	22	32	38.5	32	25.5	**30**
		Velocity (m/s)	0.725	0.971	1.042	0.854	0.960	**0.910**
	3	Depth (cm)	25	30	43	57	51	**41.2**
		Velocity (m/s)	0.421	0.490	0.842	0.840	1.092	**0.737**
	RG_FOUNGD							
	1	Depth (cm)	13.5	20	36.5	41	21	**26.4**
		Velocity (m/s)	0.393	0.824	1.516	1.375	0.658	**0.953**
	2	Depth (cm)	12.5	24	36	39	21.5	**26.6**
		Velocity (m/s)	0.419	0.975	1.256	1.379	0.738	**0.953**
	3	Depth (cm)	12.5	19	26.5	39	17	**22.8**
		Velocity (m/s)	0.672	1.181	1.454	1.638	0.594	**1.108**
	RG_FODNGD							
	1	Depth (cm)	18	29.5	36	29	18.5	**26.2**
		Velocity (m/s)	0.657	1.225	1.443	1.118	0.573	**1.0032**
	2	Depth (cm)	23	42	43.5	36	26	**34.1**
		Velocity (m/s)	0.642	1.086	1.527	1.329	0.673	**1.051**
	3	Depth (cm)	12.5	19	42	29.5	14.5	**23.5**
		Velocity (m/s)	0.356	0.733	1.675	1.105	0.387	**0.851**
	RG_MP1							
	1	Depth (cm)	26	36	49	51	56	**43.6**
		Velocity (m/s)	0.595	0.787	0.796	0.671	0.894	**0.749**
	2	Depth (cm)	31	46	55	45	39	**43.2**
		Velocity (m/s)	0.771	0.680	0.635	0.481	0.559	**0.625**
	3	Depth (cm)	29	34	33	36	37	**33.8**
		Velocity (m/s)	1.149	1.034	1.182	1.146	1.250	**1.152**
	RG_FOUSH							
	1	Depth (cm)	-	-	-	-	-	**-**
		Velocity (m/s)	-	-	-	-	-	**-**
	2	Depth (cm)	-	-	-	-	-	**-**
		Velocity (m/s)	-	-	-	-	-	**-**
	3	Depth (cm)	-	-	-	-	-	**-**
		Velocity (m/s)	-	-	-	-	-	**-**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area.
Velocity was measured at the bottom of the water column, " - " indicates no data available.

Table G.44: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed Areas, FRO LAEMP, June 2020

	Replicate		1	2	3	4	5	Mean
Mine-exposed	**RG_FOUKI**							
	1	Depth (cm)	40	50	60.5	34.5	47.5	**46.5**
		Velocity (m/s)	0.790	1.051	1.195	0.646	0.809	**0.898**
	2	Depth (cm)	26	38	44	43	33	**36.8**
		Velocity (m/s)	0.612	0.973	1.000	0.947	0.771	**0.861**
	3	Depth (cm)	38	30	31	30	39	**33.6**
		Velocity (m/s)	0.869	0.672	0.523	0.501	0.979	**0.709**
	RG_FOBKS							
	1	Depth (cm)	40	43	48	38	43	**42.4**
		Velocity (m/s)	0.833	1.080	1.060	0.911	0.850	**0.947**
	2	Depth (cm)	26	33	44	35	35	**34.6**
		Velocity (m/s)	0.821	0.814	0.978	0.344	0.890	**0.769**
	3	Depth (cm)	29	27	27	27	32	**28.4**
		Velocity (m/s)	0.805	1.083	0.869	0.901	1.094	**0.950**
	RG_SCOUTDS							
	1	Depth (cm)	34	48	43	25	24	**34.8**
		Velocity (m/s)	0.442	0.653	0.611	0.697	0.459	**0.572**
	2	Depth (cm)	56	44	48	38.5	47	**46.7**
		Velocity (m/s)	1.100	1.151	1.146	1.013	1.331	**1.148**
	3	Depth (cm)	36	22	41	28	41	**33.6**
		Velocity (m/s)	0.239	0.164	0.688	0.634	0.941	**0.533**
	RG_FOBSC							
	1	Depth (cm)	11.5	19.5	28	54	29	**28.4**
		Velocity (m/s)	0.633	0.617	1.095	1.356	0.902	**0.921**
	2	Depth (cm)	15	22.5	28	44	23	**26.5**
		Velocity (m/s)	0.508	0.716	1.310	1.627	0.688	**0.970**
	3	Depth (cm)	20.5	28	29.5	34.5	23	**27.1**
		Velocity (m/s)	0.372	0.772	1.261	1.512	0.981	**0.980**
	RG_FOBCP							
	1	Depth (cm)	22	37	38.5	33.5	24.5	**31.1**
		Velocity (m/s)	0.696	1.086	1.278	1.445	0.948	**1.091**
	2	Depth (cm)	23	34.5	44	38.5	22	**32.4**
		Velocity (m/s)	0.842	1.553	1.703	1.545	0.913	**1.311**
	3	Depth (cm)	16.5	27	52.5	36	22.5	**30.9**
		Velocity (m/s)	1.063	1.409	1.718	1.338	0.675	**1.241**
	RG_FOBCPD							
	1	Depth (cm)	13	16.5	22	36.5	17	**21.0**
		Velocity (m/s)	0.416	1.003	1.170	1.458	1.024	**1.014**
	2	Depth (cm)	17.5	37	41	46	21.5	**32.6**
		Velocity (m/s)	0.452	0.719	1.249	1.384	0.841	**0.929**
	3	Depth (cm)	11	19	31	39.5	16.5	**23.3**
		Velocity (m/s)	0.341	0.629	1.068	1.378	0.557	**0.795**
	FRCP1SW							
	1	Depth (cm)	35.5	36.5	30	34.5	40	**35.3**
		Velocity (m/s)	1.02	0.77	0.69	1.04	1.16	**0.936**
	2	Depth (cm)	22	21	17	20	30	**22**
		Velocity (m/s)	0.54	0.6	0.7	0.78	1.07	**0.738**
	3	Depth (cm)	26	31	24	23	23.5	**25.5**
		Velocity (m/s)	1.16	1.51	0.36	0.580	0.73	**0.868**
	FRCP1SWD							
	1	Depth (cm)	34	27	17	28	27	**26.6**
		Velocity (m/s)	0.96	0.7	0.95	0.84	0.6	**0.81**
	2	Depth (cm)	49	50	49	45	52	**49**
		Velocity (m/s)	0.62	0.77	0.89	0.88	1.12	**0.856**
	3	Depth (cm)	30	37	48	52	37	**40.8**
		Velocity (m/s)	0.55	0.5	1.06	1.100	0.6	**0.762**
	RG_FRUPO							
	1	Depth (cm)	13.5	31	37.5	47	21	**30.0**
		Velocity (m/s)	0.740	0.854	1.014	1.429	0.792	**0.966**
	2	Depth (cm)	15	37.5	38	26.5	19.5	**27.3**
		Velocity (m/s)	0.340	0.769	1.231	1.588	0.711	**0.928**
	3	Depth (cm)	13.5	37	41	32	21.5	**29.0**
		Velocity (m/s)	0.845	1.081	1.592	1.684	1.243	**1.289**
	RG_FODPO							
	1	Depth (cm)	15	31.5	42	49	28	**33.1**
		Velocity (m/s)	0.529	1.004	1.366	1.583	0.762	**1.049**
	2	Depth (cm)	53	47	41.5	38	30	**41.9**
		Velocity (m/s)	0.782	1.169	1.225	1.429	1.264	**1.174**
	3	Depth (cm)	42	38.5	34	43.5	51	**41.8**
		Velocity (m/s)	0.362	1.019	1.279	1.371	1.516	**1.109**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area.
Velocity was measured at the bottom of the water column, " - " indicates no data available.

Table G.44: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed Areas, FRO LAEMP, June 2020

	Replicate		1	2	3	4	5	Mean
Mine-exposed	RG_FO22							
	1	Depth (cm)	-	-	-	-	-	**-**
		Velocity (m/s)	-	-	-	-	-	**-**
	2	Depth (cm)	53	72	68.5	61	71	**65.1**
		Velocity (m/s)	0.410	0.990	0.930	0.970	0.780	**0.816**
	3	Depth (cm)	-	-	-	-	-	**-**
		Velocity (m/s)	-	-	-	-	-	**-**
	RG_FOUEW							
	1	Depth (cm)	32	29	30.5	32	28	**30.3**
		Velocity (m/s)	0.600	1.300	0.990	0.450	0.350	**0.738**
	2	Depth (cm)	41.5	44	62	64	61.5	**54.6**
		Velocity (m/s)	0.770	1.250	0.550	0.640	0.320	**0.706**
	3	Depth (cm)	21	37	38	50	35	**36.2**
		Velocity (m/s)	0.880	0.950	0.750	0.990	1.250	**0.964**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area.
Velocity was measured at the bottom of the water column, " - " indicates no data available.

Table G.45: Habitat Information at Reference and Mine-exposed Areas, FRO LAEMP, June 2020

Station ID		Reference			Mine-exposed			
		RG_HENUP	RG_FO26	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD
Waterbody		Fording	Fording	Fording	Fording	Fording	Fording	Fording
Date Sampled		15-Jun-20	17-Jun-20	17-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20	16-Jun-20
Zone 11 UTMs - E		655437	653039	651340	651364	650831	650865	651043
Zone 11 UTMs - N		5567550	5569551	5566812	5565464	5564509	5563580	5563180
Elevation (m)		1,786	1,800	1,700	1,695		1,659	
Samplers' Initials		MS, MG	PeS, MW, CM	MW, CM, PeS	MS, MG	PeS, MW	MS, MG	MS, MG
Habitat Characteristics								
Site Access Description		Haul road, forest road, ~300 m walk in	Mine road north past Henretta Pit, ~300 m down ravine		Mine road just south of UFRI	Adjacent to road by Clode Ponds	walk up from RG_FODNGD	left off LVA rd; first right, follow GPS and turn right off road down hill into landing
Surrounding Land Use		forest, mining	forest	forest, logging, mining	mining	forest, logging, mining	mining	mining
Anthropogenic Influences								
Length of Reach Assessed (m)		30	100	100	100	100		
Station #1	**Channel Measurements**							
	Bankfull Width (m)	27	41	18	59.0	42.0	27.0	23.0
	Wetted Width (m)	8	18	11	27	18	14.0	13.0
Station #2	**Channel Measurements**							
	Bankfull Width (m)	22	25	21	75.0	23.0	20.0	15.0
	Wetted Width (m)	12	10	15	41	22	13.0	13.0
Station #3	**Channel Measurements**							
	Bankfull Width (m)	32	29	26	91.0	34.0	19.0	31.0
	Wetted Width (m)	8	14	11	72	32	17.0	28.0

Table G.45: Habitat Information at Reference and Mine-exposed Areas, FRO LAEMP, June 2020

Station ID		Mine-exposed						
		RG_MP1	RG_FOUSH	RG_FOUKI	RG_FOBKS	RG_SCOUTDS	RG_FOBSC	RG_FOBCP
Waterbody		Fording	Fording	Fording	Fording	Fording	Fording	Fording
Date Sampled		15-Jun-20		17-Jun-20	16-Jun-20	16-Jun-20	18-Jun-20	17-Jun-20
Zone 11 UTMs - E		651272		651863	652080	652309	652431	652929
Zone 11 UTMs - N		5562514		5559810	5558655	5558450	5558089	5557039
Elevation (m)		1,623			1,600		1,586	
Samplers' Initials		PeS, MW		MW, MC, PeS	MW, PeS		MS, MG	MS, MG
Habitat Characteristics								
Site Access Description		off main haul road	Walk ~300 m down from road entrance	first gate left before AWTF	upstream switf creek bridge	from Swift Creek bridge	road below Swift Pit (swift RAZ 1) ~150m hike to site	turn off fording river road on to greenhouse road, drive down ~300 m walk
Surrounding Land Use		mining		logging, mining	foerst, logging	logging, mining	forest, mining	forest, logging, mining
Anthropogenic Influences								mine
Length of Reach Assessed (m)		100		100	100	100		50
Station #1	**Channel Measurements**							
	Bankfull Width (m)	19		31	22.0	50.0	33.0	35.0
	Wetted Width (m)	18		13	16.0	17.0	17.0	21.0
Station #2	**Channel Measurements**							
	Bankfull Width (m)	17		30	21.0	78.0	34.0	19.0
	Wetted Width (m)	16		18	16.0	25.0	13.0	18.0
Station #3	**Channel Measurements**							
	Bankfull Width (m)	21.5		35	21.0	42.0	42.0	27.0
	Wetted Width (m)	21		21	16.0	13.5	18.0	13.0

Table G.45: Habitat Information at Reference and Mine-exposed Areas, FRO LAEMP, June 2020

Station ID		Mine-exposed						
		RG_FOBCPD	RG_FRCP1SW	RG_FRCP1SWD	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Waterbody		Fording	Fording	Fording	Fording	Fording	Fording	Fording
Date Sampled		18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
Zone 11 UTMs - E		653071	653377	653855	653894	653892	654767	656363
Zone 11 UTMs - N		5556620	5556195	5556051	5555975	5555079	5553631	5551884
Elevation (m)		1,585	1,574		1,581	-		1,552
Samplers' Initials		MS, MG	PeS, MW	MW, PeS	MS, MG	MS, MG	MW, PeS	PeS, MW
Habitat Characteristics								
Site Access Description		walk from RG_FOBCP ~400 m	Walked ~600 m through woods from FRUPO		access dirt road from Fording River Rd heating south, ~150 m walking downhill	-	Road access from Fording Road, then ~250 m hike in	By gun range
Surrounding Land Use		forest, logging, mining	forest, logging	forest, logging	forest, mining	forest, logging	forest, logging	forest, gun range
Anthropogenic Influences					Parallel to road			
Length of Reach Assessed (m)			100	100	50m		100	100
Station #1	**Channel Measurements**							
	Bankfull Width (m)	30.0	19.0	18.0	13	21		19.0
	Wetted Width (m)	22.0	17.0	15.0	9.0	20		17.0
Station #2	**Channel Measurements**							
	Bankfull Width (m)	41.0	17.0	19.0	19	18	19.0	25.0
	Wetted Width (m)	18.0	16.0	14.0	14.0	18	15.0	23.0
Station #3	**Channel Measurements**							
	Bankfull Width (m)	39.0	26.0	17.0	23	17		31.0
	Wetted Width (m)	22.0	21.0	13.0	18.0	15		24.0

Table G.46: Calcite and Pebble Count at RG_HENUP, FRO LAEMP, September 2020

Rock	RG_HENUP 1				RG_HENUP 2				RG_HENUP 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	13.0	-	0	0	8.5	-	0	0	5.5	-
2	0	0	14.0	-	0	0	6.0	-	0	0	7.0	-
3	0	0	8.0	-	0	0	6.0	-	0	0	4.5	-
4	0	0	8.0	-	0	0	3.5	-	0	0	4.5	-
5	0	0	5.0	-	0	0	8.0	-	0	0	9.5	-
6	0	0	8.5	-	0	0	11.0	-	0	0	1.5	-
7	0	0	10.0	-	0	0	8.5	-	0	0	11.5	-
8	0	0	14.0	-	0	0	10.0	-	0	0	gravel	-
9	0	0	7.0	-	0	0	7.0	-	0	0	7.0	-
10	0	0	7.0	0.00	0	0	13.0	0.00	0	0	14.0	0
11	0	0	3.5	-	0	0	2.5	-	0	0	5.0	-
12	0	0	3.5	-	0	0	2.0	-	0	0	6.0	-
13	0	0	6.0	-	0	0	26.0	-	0	0	4.5	-
14	0	0	11.0	-	0	1	6.5	-	0	0	11.5	-
15	0	0	8.0	-	0	0	27.0	-	0	0	22.0	-
16	0	0	9.0	-	0	0	13.0	-	0	0	6.0	-
17	0	0	8.0	-	0	0	4.0	-	0	0	4.5	-
18	0	0	5.0	-	0	0	10.0	-	0	0	5.0	-
19	0	0	17.0	-	0	0	7.0	-	0	0	14.0	-
20	0	0	13.0	0.00	0	0	5.0	0.25	0	0	10.0	0
21	0	0	3.0	-	0	0	4.0	-	0	0	10.0	-
22	0	0	7.0	-	0	0	7.5	-	0	0	11.0	-
23	0	0	5.5	-	0	0	14.0	-	0	0	19.0	-
24	0	0	12.0	-	0	0	9.0	-	0	0	7.0	-
25	0	0	9.0	-	0	1	21.0	-	0	0	8.0	-
26	0	0	8.0	-	0	0	7.0	-	0	0	6.0	-
27	0	0	8.5	-	0	0	5.0	-	0	0	6.0	-
28	0	0	15.5	-	0	0	30.0	-	0	0	6.0	-
29	0	0	2.5	-	0	0	10.0	-	0	1	15.0	-
30	0	0	6.5	0.25	0	0	14.5	0.50	0	0	11.0	0.25
31	0	0	9.0	-	0	0	7.0	-	0	0	18.0	-
32	0	0	5.0	-	0	0	8.5	-	0	0	7.0	-
33	0	0	7.0	-	0	0	6.0	-	0	0	9.0	-
34	0	0	5.5	-	0	0	3.0	-	0	0	7.0	-
35	0	0	10.0	-	0	0	8.0	-	0	0	6.0	-
36	0	0	6.5	-	0	0	8.0	-	0	0	8.5	-
37	0	0	9.5	-	0	0	7.5	-	0	0	7.5	-
38	0	0	7.0	-	0	0	6.0	-	0	0	4.5	-
39	0	0	14.5	-	0	0	6.0	-	0	0	7.5	-
40	0	0	9.5	0.25	0	0	19.0	0.5	0	0	6.0	0
41	0	0	9.0	-	0	0	11.0	-	0	0	10.5	-
42	0	0	7.0	-	0	0	25.0	-	0	0	18.0	-
43	0	0	5.0	-	0	0	3.0	-	0	0	7.0	-
44	0	0	9.5	-	0	0	7.0	-	0	0	7.5	-
45	0	0	5.0	-	0	0	6.0	-	0	0	17.0	-
46	0	0	4.5	-	0	0	19.0	-	0	0	5.0	-
47	0	0	6.5	-	0	0	14.5	-	0	0	21.0	-
48	0	0	14.5	-	0	0	9.0	-	0	0	6.0	-
49	0	0	11.0	-	0	0	10.0	-	0	0	10.0	-
50	0	0	8.5	0.25	0	0	12.0	0.25	0	0	3.5	0.25
51	0	0	gravel	-	0	0	8.0	-	0	0	8.0	-
52	0	0	3.0	-	0	0	19.0	-	0	0	7.5	-
53	0	0	2.0	-	0	0	4.5	-	0	0	15.0	-
54	0	0	4.0	-	0	0	4.0	-	0	0	7.5	-
55	0	0	8.0	-	0	0	17.0	-	0	0	gravel	-
56	0	0	45.0	-	0	0	11.0	-	0	0	4.0	-
57	0	0	7.0	-	0	0	11.0	-	0	0	10.5	-
58	0	0	12.0	-	0	0	5.0	-	0	0	5.0	-
59	0	0	9.0	-	0	0	5.5	-	0	0	18.0	-
60	0	0	5.5	0.25	0	0	10.0	0.25	0	0	3.0	0.00
61	0	0	14.0	-	0	0	7.5	-	0	0	10.5	-
62	0	0	4.0	-	0	0	6.0	-	0	0	10.0	-
63	0	0	8.0	-	0	0	4.5	-	0	0	7.0	-
64	0	0	16.0	-	0	0	7.0	-	0	0	8.0	-
65	0	0	7.0	-	0	0	4.0	-	0	0	5.0	-
66	0	0	5.5	-	0	0	12.0	-	0	0	5.0	-
67	0	0	10.0	-	0	0	11.0	-	0	0	8.0	-
68	0	0	8.5	-	0	0	4.0	-	0	0	22.0	-
69	0	0	10.0	-	0	1	5.0	-	0	0	10.0	-
70	0	0	13.0	0	0	0	6.5	0.25	0	0	5.0	0.25
71	0	0	6.5	-	0	0	6.5	-	0	0	15.5	-
72	0	0	7.0	-	0	0	25.0	-	0	0	6.0	-
73	0	0	5.0	-	0	0	9.0	-	0	0	9.0	-
74	0	0	9.0	-	0	0	5.0	-	0	0	8.0	-
75	0	0	13.0	-	0	0	7.0	-	0	0	17.0	-
76	0	0	10.0	-	0	0	30.0	-	0	0	8.0	-
77	0	0	9.0	-	0	0	2.5	-	0	0	5.0	-
78	0	0	3.0	-	0	0	7.0	-	0	0	8.5	-
79	0	0	4.0	-	0	0	9.0	-	0	0	5.0	-
80	0	0	8.0	0.25	0	0	17.0	0.25	0	0	12.5	0.75
81	0	0	18.5	-	0	0	4.0	-	0	0	5.5	-
82	0	0	10.5	-	0	0	5.0	-	0	0	3.5	-
83	0	0	8.5	-	0	0	21.0	-	0	0	6.0	-
84	0	0	5.0	-	0	0	5.0	-	0	0	11.5	-
85	0	0	12.0	-	0	0	6.5	-	0	0	8.5	-
86	0	0	6.0	-	0	0	9.5	-	0	0	5.5	-
87	0	0	5.5	-	0	0	9.0	-	0	0	5.5	-
88	0	0	4.5	-	0	0	3.0	-	0	0	10.0	-
89	0	0	23.0	-	0	0	10.0	-	0	0	12.0	-
90	0	0	9.5	0.25	0	0	8.5	0.25	0	0	8.0	0.00
91	0	0	gravel	-	0	0	13.0	-	0	0	18.0	-
92	0	0	11.5	-	0	0	2.0	-	0	0	16.0	-
93	0	0	4.0	-	0	0	11.5	-	0	0	8.0	-
94	0	0	19.0	-	0	0	10.0	-	0	0	8.5	-
95	0	0	9.0	-	0	0	13.0	-	0	0	8.5	-
96	0	0	4.5	-	0	0	7.0	-	0	0	10.5	-
97	0	0	8.5	-	0	0	10.0	-	0	0	9.0	-
98	0	0	13.0	-	0	0	9.0	-	0	0	4.0	-
99	0	0	8.5	-	0	0	5.5	-	0	0	6.5	-
100	0	0	7.0	0	0	0	10.5	0.5	0	0	8.5	0.25
Minimum	**0**	**0**	**2.00**	**0**	**0**	**0**	**2.00**	**0**	**0**	**0**	**1.50**	**0**
Maximum	**0**	**0**	**45.0**	**0.250**	**0**	**1.00**	**30.0**	**0.500**	**0**	**1.00**	**22.0**	**0.750**
Mean	**0**	**0**	**8.9**	**0.150**	**0**	**0**	**9.56**	**0.300**	**0**	**0**	**8.94**	**0.175**
Standard Dev.	**0**	**0**	**5.36**	**0.129**	**0**	**0.171**	**6.10**	**0.158**	**0**	**0.100**	**4.49**	**0.237**
Geometric mean	**-**	**-**	**7.84**	**-**	**-**	**-**	**8.04**	**-**	**-**	**-**	**7.97**	**-**
Median	**0**	**0**	**8.00**	**0**	**0**	**0**	**8.00**	**0.250**	**0**	**0**	**8.00**	**0.125**
Calcite Index	**0**		**-**	**-**	**0**		**-**	**-**	**0**		**-**	**-**

Table G.47: Calcite and Pebble Count at RG_FO26, FRO LAEMP, September 2020

Rock	RG_FO26 1				RG_FO26 2				RG_FO26 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	4.0	-	0	0	6.5	-	0	0	6.5	-
2	0	0	5.0	-	0	0	4.5	-	0	1	7.5	-
3	0	0	7.0	-	0	0	4.5	-	0	1	7.0	-
4	0	0	7.0	-	0	0	12.0	-	0	0	4.0	-
5	0	0	3.0	-	0	0	20.0	-	0	0	25.5	-
6	0	0	5.5	-	0	0	6.0	-	0	0	5.0	-
7	0	0	13.0	-	0	0	6.0	-	0	0	10.0	-
8	0	0	8.5	-	0	0	2.0	-	0	0	3.0	-
9	0	0	6.0	-	0	0	15.5	-	0	0	5.0	-
10	0	0	4.5	0.00	0	0	8.0	0.25	0	0	6.5	0.25
11	0	0	7.0	-	0	0	6.5	-	0	0	12.5	-
12	0	0	3.0	-	0	0	6.5	-	0	0	9.0	-
13	0	0	6.0	-	0	0	7.0	-	0	0	5.0	-
14	0	0	11.0	-	0	1	11.0	-	0	0	5.0	-
15	0	0	4.5	-	0	0	1.5	-	0	0	10.5	-
16	0	0	3.0	-	0	0	3.5	-	0	0	4.0	-
17	0	0	5.0	-	0	0	8.0	-	0	0	gravel	-
18	0	0	2.5	-	0	0	16.0	-	0	0	10.0	-
19	0	0	4.0	-	0	0	6.0	-	0	0	2.0	-
20	0	0	6.0	0	0	0	15.5	0.25	0	0	5.5	0.25
21	0	0	5.0	-	0	0	3.5	-	0	0	23.0	-
22	0	0	4.5	-	0	0	2.0	-	0	0	4.0	-
23	0	0	5.5	-	0	0	8.5	-	0	0	9.5	-
24	0	0	2.0	-	0	0	9.0	-	0	0	7.0	-
25	0	0	4.0	-	0	0	6.5	-	0	1	5.0	-
26	0	0	14.0	-	0	0	12.5	-	0	0	8.5	-
27	0	0	12.0	-	0	0	2.5	-	0	1	11.0	-
28	0	0	4.5	-	0	0	6.0	-	0	0	6.5	-
29	0	0	4.0	-	0	0	11.0	-	0	0	6.0	-
30	0	0	4.5	0.00	0	0	6.5	0	0	0	7.0	0.25
31	0	0	7.0	-	0	0	6.0	-	0	0	6.0	-
32	0	0	6.0	-	0	0	6.5	-	0	0	6.0	-
33	0	0	6.0	-	0	0	4.5	-	0	1	7.5	-
34	0	0	6.0	-	0	0	4.0	-	0	0	11.0	-
35	0	0	5.0	-	0	0	8.0	-	0	0	7.0	-
36	0	0	7.0	-	0	0	4.5	-	0	0	8.5	-
37	0	0	3.0	-	0	0	4.0	-	0	0	19.0	-
38	0	0	13.0	-	0	0	10.0	-	0	0	13.0	-
39	0	0	9.0	-	0	0	7.0	-	0	0	11.0	-
40	0	0	3.0	0.25	0	0	4.0	0	0	0	8.5	0.25
41	0	0	10.0	-	0	0	6.0	-	0	0	7.5	-
42	0	0	9.0	-	0	0	17.0	-	0	0	10.5	-
43	0	0	7.0	-	0	0	3.5	-	0	0	3.0	-
44	0	0	6.0	-	0	0	4.0	-	0	0	4.5	-
45	0	0	8.0	-	0	0	11.5	-	0	0	gravel	-
46	0	0	gravel	-	0	0	8.0	-	0	0	5.0	-
47	0	0	11.5	-	0	0	9.0	-	0	1	6.0	-
48	0	0	9.0	-	0	0	13.0	-	0	0	8.5	-
49	0	0	3.0	-	0	1	10.5	-	0	1	7.0	-
50	0	0	6.0	0.25	0	0	3.5	0	0	0	9.0	0.5
51	0	0	10.0	-	0	0	11.0	-	0	0	7.0	-
52	0	0	4.5	-	0	0	8.0	-	0	0	9.0	-
53	0	0	11.0	-	0	0	8.0	-	0	0	8.0	-
54	0	0	7.5	-	0	1	7.0	-	0	0	9.0	-
55	0	1	8.0	-	0	0	4.5	-	0	0	4.5	-
56	0	0	9.0	-	0	0	8.5	-	0	0	8.0	-
57	0	0	5.0	-	0	0	10.0	-	0	0	4.0	-
58	0	0	12.0	-	0	0	16.5	-	0	0	6.0	-
59	0	0	8.0	-	0	0	6.5	-	0	0	4.0	-
60	0	0	11.0	0.25	0	0	3.5	0	0	0	7.5	0
61	0	0	11.0	-	0	0	20.0	-	0	0	6.0	-
62	0	0	5.5	-	0	0	2.0	-	0	0	gravel	-
63	0	0	2.5	-	0	0	15.0	-	0	0	5.0	-
64	0	0	5.0	-	0	0	6.0	-	0	0	9.0	-
65	0	0	4.0	-	0	0	5.5	-	0	0	6.0	-
66	0	0	2.0	-	0	0	15.0	-	0	0	5.0	-
67	0	0	8.5	-	0	0	4.5	-	0	0	4.0	-
68	0	0	8.5	-	0	0	10.0	-	0	0	gravel	-
69	0	0	3.0	-	0	0	13.5	-	0	0	3.0	-
70	0	0	5.5	0	0	0	2.5	0	0	0	12.0	0.75
71	0	0	4.0	-	0	0	4.0	-	0	0	7.0	-
72	0	0	4.0	-	0	0	6.5	-	0	0	3.0	-
73	0	0	8.0	-	0	0	9.0	-	0	0	7.0	-
74	0	0	7.0	-	0	0	15.5	-	0	0	8.0	-
75	0	0	6.0	-	0	0	8.0	-	0	0	15.5	-
76	0	0	6.0	-	0	0	4.5	-	0	0	2.0	-
77	0	0	6.0	-	0	0	20.0	-	0	0	4.5	-
78	0	0	3.5	-	0	0	15.5	-	0	0	6.0	-
79	0	0	8.5	-	0	0	14.0	-	0	0	6.5	-
80	0	0	6.0	0	0	0	2.0	0	0	0	5.0	0.25
81	0	0	2.5	-	0	0	2.0	-	0	0	7.0	-
82	0	0	8.0	-	0	0	8.5	-	0	0	9.0	-
83	0	0	5.0	-	0	0	15.0	-	0	0	26.0	-
84	0	0	4.5	-	0	0	3.0	-	0	0	7.5	-
85	0	0	6.0	-	0	0	7.0	-	0	0	2.5	-
86	0	0	1.5	-	0	0	11.0	-	0	0	5.5	-
87	0	0	7.0	-	0	0	14.5	-	0	0	14.0	-
88	0	0	6.5	-	0	0	14.0	-	0	0	12.5	-
89	0	0	4.0	-	0	0	4.5	-	0	0	6.0	-
90	0	0	6.0	0.25	0	0	8.0	0.25	0	0	4.0	0
91	0	0	6.0	-	0	0	7.5	-	0	0	8.0	-
92	0	0	6.0	-	0	0	6.0	-	0	1	6.5	-
93	0	0	8.0	-	0	0	6.0	-	0	0	6.0	-
94	0	0	4.5	-	0	0	6.5	-	0	0	4.0	-
95	0	0	4.0	-	0	0	3.0	-	0	0	4.0	-
96	0	0	3.5	-	0	0	19.5	-	0	1	7.5	-
97	0	0	12.0	-	0	0	13.0	-	0	0	5.0	-
98	0	0	4.0	-	0	0	7.5	-	0	0	5.5	-
99	0	0	4.0	-	0	0	3.0	-	0	1	5.5	-
100	0	0	10.0	0.5	0	0	4.0	0.25	0	0	6.5	0.75
Minimum	**0**	**0**	**1.50**	**0**	**0**	**0**	**1.500**	**0**	**0**	**0**	**2.000**	**0**
Maximum	**0**	**1.00**	**14.0**	**0.500**	**0.00**	**1.00**	**20.0**	**0.250**	**0**	**1.00**	**26.0**	**0.750**
Mean	**0**	**0.010**	**6.30**	**0.150**	**0**	**0.0300**	**8.19**	**0.100**	**0**	**0.100**	**7.54**	**0.325**
Sandard Dev.	**0**	**0.100**	**2.80**	**0.175**	**0.000**	**0.171**	**4.68**	**0.129**	**0**	**0.302**	**4.29**	**0.265**
Geometric mean	**-**	**-**	**5.69**	**-**	**-**	**-**	**6.90**	**-**	**-**	**-**	**6.67**	**-**
Median	**0**	**0.00**	**6.00**	**0**	**0**	**0.00**	**7.00**	**0**	**0**	**0.00**	**6.50**	**0**
Calcite Index	**0.010**		**-**	**-**	**0.030**		**-**	**-**	**0.100**		**-**	**-**

Table G.48: Calcite and Pebble Count at RG_UFR1, FRO LAEMP, September 2020

Rock	RG_UFR1 1				RG_UFR1 2				RG_UFR1 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	7.0	-	0	0	17.0	-	0	0	13.0	-
2	0	0	6.5	-	0	0	5.5	-	0	0	5.0	-
3	0	0	20.5	-	0	0	13.5	-	0	0	4.0	-
4	0	0	5.0	-	0	0	6.0	-	0	0	5.5	-
5	0	0	14.0	-	0	0	3.5	-	0	0	3.5	-
6	0	0	5.0	-	0	0	7.0	-	0	0	5.5	-
7	0	0	6.5	-	0	0	12.0	-	0	0	22.0	-
8	0	0	5.5	-	0	0	3.0	-	0	0	4.5	-
9	0	0	3.5	-	0	0	gravel	-	0	0	3.0	-
10	0	0	11.0	0.00	0	0	8.5	0.25	0	0	27.0	0.5
11	0	0	22.5	-	0	0	16.5	-	0	0	13.0	-
12	0	0	8.0	-	0	0	7.0	-	0	0	5.5	-
13	0	0	4.0	-	0	0	gravel	-	0	0	6.5	-
14	0	0	3.5	-	0	1	17.0	-	0	0	6.0	-
15	0	0	11.0	-	0	0	5.0	-	0	0	7.0	-
16	0	0	6.0	-	0	0	2.0	-	0	0	6.5	-
17	0	0	9.0	-	0	0	8.0	-	0	0	12.5	-
18	0	0	9.5	-	0	0	11.0	-	0	1	9.0	-
19	0	0	9.0	-	0	0	13.0	-	0	0	11.5	-
20	0	0	16.5	0.25	0	0	12.0	0.00	0	0	3.5	0.5
21	0	0	10.0	-	0	0	9.0	-	0	0	7.0	-
22	0	0	9.0	-	0	0	10.5	-	0	0	7.5	-
23	0	0	7.0	-	0	0	9.0	-	0	0	12.5	-
24	0	0	2.5	-	0	0	7.5	-	0	0	8.0	-
25	0	0	13.0	-	0	0	7.0	-	0	0	9.5	-
26	0	0	14.5	-	0	0	16.0	-	0	0	2.0	-
27	0	0	4.0	-	0	0	5.0	-	0	0	9.0	-
28	0	0	7.0	-	0	0	6.0	-	0	0	18.0	-
29	0	0	20.0	-	0	0	7.0	-	0	0	4.5	-
30	0	0	9.0	0.00	0	0	9.0	0.25	0	0	11.5	0.25
31	0	0	6.0	-	0	0	11.0	-	0	0	7.0	-
32	0	1	12.0	-	0	0	3.5	-	0	0	9.0	-
33	0	0	9.0	-	0	0	6.0	-	0	0	13.0	-
34	0	0	6.0	-	0	0	5.5	-	0	0	4.5	-
35	0	0	5.5	-	0	0	6.0	-	0	0	26.0	-
36	0	0	12.0	-	0	0	23.0	-	0	0	9.5	-
37	0	0	10.0	-	0	0	5.0	-	0	0	10.5	-
38	0	0	4.5	-	0	0	5.0	-	0	0	9.0	-
39	0	0	5.0	-	0	0	13.0	-	0	0	12.0	-
40	0	0	7.0	0.25	0	0	8.0	0.5	0	0	5.5	0.25
41	0	0	15.0	-	0	0	9.5	-	0	0	10.0	-
42	0	0	8.0	-	0	0	19.0	-	0	0	6.5	-
43	0	0	5.0	-	0	0	6.0	-	0	0	gravel	-
44	0	0	4.0	-	0	0	7.0	-	0	0	1.5	-
45	0	0	15.0	-	0	0	11.0	-	0	0	5.0	-
46	0	0	13.5	-	0	0	5.5	-	0	0	8.0	-
47	0	0	7.0	-	0	0	12.0	-	0	0	11.0	-
48	0	0	7.0	-	0	0	5.5	-	0	0	4.5	-
49	0	0	8.5	-	0	1	gravel	-	0	0	8.0	-
50	0	0	6.0	0.25	0	0	6.0	0	0	0	11.0	0.25
51	0	0	9.5	-	0	0	4.0	-	0	0	7.5	-
52	0	0	13.0	-	0	0	4.0	-	0	1	7.5	-
53	0	0	11.0	-	0	0	gravel	-	0	0	8.0	-
54	0	0	2.5	-	0	1	8.0	-	0	0	9.0	-
55	0	0	12.0	-	0	0	2.0	-	0	0	8.5	-
56	0	0	4.0	-	0	0	5.0	-	0	0	8.0	-
57	0	0	8.5	-	0	0	12.0	-	0	0	9.0	-
58	0	1	17.0	-	0	0	5.5	-	0	0	10.0	-
59	0	0	6.0	-	0	0	8.0	-	0	0	6.0	-
60	0	0	8.0	0.25	0	0	5.5	0.25	0	0	6.5	0
61	0	0	9.0	-	0	0	13.0	-	0	0	6.0	-
62	0	0	14.0	-	0	0	9.5	-	0	0	6.0	-
63	0	0	9.5	-	0	0	10.0	-	0	0	2.0	-
64	0	0	7.0	-	0	0	gravel	-	0	0	4.5	-
65	0	0	20.0	-	0	0	9.0	-	0	0	gravel	-
66	0	0	15.0	-	0	0	7.5	-	0	0	4.0	-
67	0	0	8.5	-	0	0	17.0	-	0	0	5.0	-
68	0	0	2.0	-	0	0	5.0	-	0	0	1.5	-
69	0	0	4.5	-	0	0	3.5	-	0	0	5.5	-
70	0	0	8.5	0.75	0	0	15.0	0.5	0	0	5.0	0.25
71	0	0	7.5	-	0	0	11.0	-	0	0	6.5	-
72	0	0	11.0	-	0	0	5.0	-	0	0	4.0	-
73	0	0	6.5	-	0	0	4.5	-	0	0	7.5	-
74	0	0	12.0	-	0	0	2.0	-	0	0	18.0	-
75	0	0	11.0	-	0	0	7.0	-	0	0	5.0	-
76	0	0	8.0	-	0	0	11.5	-	0	0	12.0	-
77	0	0	5.0	-	0	0	3.5	-	0	0	8.5	-
78	0	0	9.0	-	0	0	8.0	-	0	0	4.0	-
79	0	0	6.0	-	0	0	1.5	-	0	0	10.0	-
80	0	0	7.0	0.5	0	0	8.0	0.25	0	0	5.5	0.5
81	0	0	12.0	-	0	0	3.5	-	0	1	6.0	-
82	0	0	5.0	-	0	0	4.0	-	0	0	7.0	-
83	0	0	12.0	-	0	0	6.0	-	0	1	9.5	-
84	0	0	10.5	-	0	0	6.0	-	0	0	7.0	-
85	0	0	10.0	-	0	0	5.5	-	0	0	8.5	-
86	0	0	11.0	-	0	0	4.0	-	0	0	9.0	-
87	0	0	10.5	-	0	0	5.0	-	0	0	gravel	-
88	0	0	3.5	-	0	0	8.0	-	0	0	4.5	-
89	0	0	12.5	-	0	0	7.0	-	0	0	3.5	-
90	0	0	10.0	0.25	0	0	6.0	0.25	0	1	10.0	0.5
91	0	0	8.0	-	0	0	4.0	-	0	0	3.0	-
92	0	0	15.0	-	0	0	15.5	-	0	0	5.0	-
93	0	0	15.0	-	0	0	4.0	-	0	0	4.5	-
94	0	0	8.5	-	0	0	5.0	-	0	0	gravel	-
95	0	0	4.5	-	0	0	12.5	-	0	0	6.0	-
96	0	0	6.0	-	0	0	11.5	-	0	0	4.5	-
97	0	0	5.5	-	0	0	5.0	-	0	0	6.0	-
98	0	0	11.0	-	0	0	6.0	-	0	0	10.5	-
99	0	0	2.5	-	0	0	8.0	-	0	0	3.0	-
100	0	0	5.5	0	0	0	5.0	0.00	0	0	8.0	0.25
Minimum	**0**	**0**	**2.00**	**0**	**0**	**0**	**1.500**	**0**	**0**	**0**	**1.500**	**0**
Maximum	**0**	**1.00**	**22.5**	**0.750**	**0.00**	**1.00**	**23.0**	**0.500**	**0**	**1.00**	**27.0**	**0.500**
Mean	**0**	**0.020**	**8.97**	**0.250**	**0**	**0.0300**	**7.98**	**0.225**	**0**	**0.050**	**7.82**	**0.325**
Sandard Dev.	**0**	**0.141**	**4.25**	**0.236**	**0.000**	**0.171**	**4.22**	**0.184**	**0**	**0.219**	**4.47**	**0.169**
Geometric mean	**-**	**-**	**7.99**	**-**	**-**	**-**	**6.97**	**-**	**-**	**-**	**6.81**	**-**
Median	**0**	**0.00**	**8.50**	**0**	**0**	**0.00**	**7.00**	**0**	**0**	**0.00**	**7.00**	**0**
Calcite Index	**0.020**		**-**	**-**	**0.030**		**-**	**-**	**0.050**		**-**	**-**

Table G.49: Calcite and Pebble Count at RG_FODHE, FRO LAEMP, September 2020

Rock	RG_FODHE 1				RG_FODHE 2				RG_FODHE 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	8.5		0	1	4.5		0	1	14.5	
2	0	1	9.5		0	1	7		0	1	10.0	
3	0	1	4.5		0	1	10		0	1	13.0	
4	0	1	5.0		0	1	6.5		0	0	8.0	
5	0	1	10.5		0	1	5		0	0	7.0	
6	0	1	8.5		0	0	3		0	1	5.0	
7	0	1	9.0		0	1	14		0	0	7.0	
8	0	1	11.0		0	1	4.5		0	0	4.5	
9	0	1	8.5		0	1	7		0	1	11.5	
10	0	1	19.5	0	0	1	7.5	0.25	0	1	7.5	0
11	0	1	12.0		0	1	9.5		0	1	7.0	
12	0	1	11.5		0	1	21.5		0	1	6.0	
13	0	1	11.0		0	1	11		0	0	3.5	
14	0	1	15.0		0	1	7.5		0	1	9.5	
15	0	1	13.5		0	1	8		0	0	10.5	
16	0	1	7.0		0	1	7.5		0	0	9.0	
17	0	1	8.5		0	1	25.5		0	0	4.0	
18	0	1	5.0		0	1	7		0	1	5.0	
19	0	0	2.5		0	1	5.5		0	1	9.0	
20	0	1	12.0	0.5	0	1	7	0	0	1	5.0	0
21	0	1	6.0		0	1	8		0	0	6.0	
22	0	1	11.0		0	1	3.5		0	1	8.5	
23	0	0	7.5		0	1	7		0	1	12.0	
24	0	1	16.0		0	1	3		0	1	9.0	
25	0	0	9.0		0	1	6		0	1	7.5	
26	0	1	7.5		0	1	8.5		0	0	6.0	
27	0	1	9.0		0	1	6.5		0	1	9.0	
28	0	1	7.0		0	1	8		0	1	6.5	
29	0	1	14.5		0	1	13.5		0	1	9.0	
30	0	0	8.5	0	0	0	3	0	0	0	6.0	0.25
31	0	0	8.0		0	1	9		0	0	8.0	
32	0	1	10.5		0	0	4		0	1	7.0	
33	0	0	2.0		0	1	5.5		0	1	8.5	
34	0	0	3.5		0	1	7		0	1	11.0	
35	0	0	2.5		0	1	9		0	1	4.5	
36	0	0	3.0		0	1	8		0	1	15.0	
37	0	1	4.5		0	1	8.5		0	0	2.0	
38	0	0	9.0		0	1	6		0	0	4.5	
39	0	1	9.5		0	1	15		0	1	7.5	
40	0	1	4.0	0	0	1	13	0	0	0	5.0	0
41	0	1	16.0		0	1	11.5		0	0	6.0	
42	0	0	4.0		0	1	5		0	1	17.5	
43	0	1	5.0		0	1	6.5		0	0	7.0	
44	0	0	3.5		0	0	5.5		0	0	7.0	
45	0	1	18.5		0	1	6		0	1	18.5	
46	0	1	10.0		0	1	7.5		0	1	8.5	
47	0	1	10.5		0	1	7		0	1	6.5	
48	0	1	11.0		0	1	9		0	1	6.0	
49	0	1	12.5		0	1	10.5		0	1	8.5	
50	0	1	11.5	0	0	1	8	0.5	0	1	23.5	0.5
51	0	1	17.5		0	1	13.5		0	1	5.5	
52	0	1	7.5		0	0	1.5		0	0	3.5	
53	0	1	12.0		0	0	3		0	1	11.0	
54	0	1	8.0		0	0	2		0	1	7.5	
55	0	0	8.5		0	1	9.5		0	1	6.0	
56	0	1	9.0		0	1	6		0	1	13.0	
57	0	1	9.0		0	1	22		0	1	5.0	
58	0	1	10.5		0	1	9		0	1	7.0	
59	0	1	7.5		0	1	7		0	0	6.0	
60	0	1	14.0	0.5	0	1	3.5	0	0	1	9.5	0
61	0	1	20.0		0	0	4		0	0	3.5	
62	0	1	9.5		0	1	5.5		0	1	14.5	
63	0	1	12.5		0	1	9		0	1	11.0	
64	0	1	7.0		0	1	6.5		0	1	15.5	
65	0	1	5.5		0	1	8.5		0	0	11.5	
66	0	1	7.5		0	1	6		0	0	1.5	
67	0	1	12.0		0	0	1.5		0	0	6.0	
68	0	1	8.5		0	1	4		0	1	4.5	
69	0	1	9.0		0	1	5.5		0	0	6.5	
70	0	1	10.5	0.25	0	1	9.5	0.25	0	0	7.0	0.25
71	0	1	7.0		0	1	8		0	1	8.0	
72	0	1	21.5		0	1	6		0	1	5.5	
73	0	1	10.5		0	1	12.5		0	1	19.0	
74	0	1	9.0		0	1	5		0	1	15.0	
75	0	1	9.5		0	1	4.5		0	0	5.0	
76	0	1	6.0		0	1	8.5		0	1	13.5	
77	0	1	5.5		0	1	7.5		0	0	3.5	
78	0	1	8.0		0	1	2		0	0	0.5	
79	0	0	2.0		0	1	3		0	1	8.0	
80	0	0	1.5	0	0	1	12	0.25	0	1	10.0	0
81	0	1	9.5		0	1	6.5		0	0	1.5	
82	0	1	10.0		0	1	7		0	0	5.0	
83	0	1	7.5		0	1	17.5		0	1	7.5	
84	0	1	9.5		0	1	8.5		0	1	8.5	
85	0	1	8.5		0	0	3		0	0	8.0	
86	0	1	9.0		0	1	5		0	1	6.5	
87	0	1	6.5		0	1	17.5		0	1	8.0	
88	0	1	8.5		0	1	13		0	1	9.0	
89	0	1	6.5		0	1	9		0	0	3.5	
90	0	1	8.5	0.25	0	1	6	0	0	1	5.0	0
91	0	1	17.0		0	0	8		0	1	4.5	
92	0	1	9.0		0	1	8.5		0	1	12.5	
93	0	1	7.0		0	1	7		0	1	13.0	
94	0	1	4.5		0	1	8		0	1	6.0	
95	0	0	3.5		0	1	12.5		0	1	5.0	
96	0	1	8.5		0	1	11		0	1	11.5	
97	0	1	6.0		0	1	5.5		0	1	7.0	
98	0	1	5.0		0	1	6		0	1	7.0	
99	0	0	4.0		0	0	2.5		0	1	5.5	
100	0	1	8.0	0	0	1	16.5	0	0	1	5.5	0.25
Minimum	**0**	**0**	**1.50**	**0**	**0**	**0**	**1.500**	**0**	**0**	**0**	**0.500**	**0**
Maximum	**0**	**1.00**	**21.5**	**0.500**	**0.00**	**1.00**	**25.5**	**0.500**	**0**	**1.00**	**23.5**	**1**
Mean	**0**	**0.830**	**8.90**	**0.150**	**0**	**0.8800**	**7.9**	**0.125**	**0**	**0.670**	**8.02**	**0**
Standard Dev.	**0**	**0.378**	**4.02**	**0.211**	**0.000**	**0.327**	**4.30**	**0.177**	**0**	**0.473**	**3.96**	**0**
Geometric mean	**-**	**-**	**7.95**	**-**	**-**	**-**	**6.90**	**-**	**-**	**-**	**7.05**	**-**
Median	**0**	**1**	**8.50**	**0**	**0**	**1**	**7.00**	**0**	**0**	**1**	**7.00**	**0**
Calcite Index	**0.830**		**-**	**-**	**0.880**		**-**	**-**	**0.670**		**-**	**-**

Table G.50: Calcite and Pebble Count at RG_FOUCL, FRO LAEMP, September 2020

Rock	RG_FOUCL 1				RG_FOUCL 2				RG_FOUCL 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	8.0		0	0	4.0		0	0	8.5	
2	0	0	2.5		0	0	7.0		0	0	9.0	
3	0	1	5.5		0	0	7.5		0	0	4.5	
4	0	1	5.0		0	0	4.5		0	0	14.0	
5	0	1	6.0		0	0	7.5		0	0	10.5	
6	0	1	5.5		0	0	6.5		0	0	2.5	
7	0	1	7.5		0	0	2.5		0	0	5.5	
8	0	1	7.0		0	0	2.0		0	0	8.0	
9	0	1	8.0		0	0	5.0		0	0	7.0	
10	0	1	6.0	0	0	0	6.5	0.25	0	0	4.5	0
11	0	1	6.5		0	0	7.0		0	0	12.0	
12	0	1	3.5		0	0	8.0		0	0	12.0	
13	0	1	9.0		0	0	11.5		0	0	5.5	
14	0	1	7.0		0	0	8.5		0	0	9.0	
15	0	1	7.5		0	0	7.0		0	0	3.5	
16	0	1	5.5		0	0	9.0		0	0	3.0	
17	0	1	7.0		0	0	9.0		0	0	4.5	
18	0	1	4.5		0	0	5.0		0	0	6.5	
19	0	1	4.0		0	0	6.0		0	0	4.0	
20	0	1	7.5	0	0	0	3.0	0	0	0	4.5	0
21	0	0	6.5		0	0	5.0		0	0	5.0	
22	0	0	6.0		0	0	7.5		0	0	5.0	
23	0	1	10.0		0	0	5.5		0	0	8.0	
24	0	0	4.5		0	0	5.0		0	0	3.5	
25	0	0	7.0		0	0	9.5		0	0	4.0	
26	0	0	10.0		0	0	8.5		0	0	6.5	
27	0	1	8.0		0	0	8.5		0	0	9.0	
28	0	0	6.0		0	0	6.0		0	0	5.5	
29	0	0	6.0		0	0	8.0		0	0	10.0	
30	0	0	5.0	0	0	0	4.5	0	0	0	5.5	0
31	0	0	4.5		0	0	5.0		0	0	9.0	
32	0	0	5.0		0	0	6.5		0	0	3.0	
33	0	0	5.0		0	0	4.5		0	0	3.5	
34	0	0	3.5		0	0	3.5		0	0	8.5	
35	0	0	4.5		0	0	6.5		0	0	3.5	
36	0	0	9.0		0	0	5.0		0	0	5.5	
37	0	0	3.5		0	0	4.5		0	0	7.0	
38	0	1	7.0		0	0	6.5		0	0	7.0	
39	0	1	7.5		0	0	11.0		0	0	6.5	
40	0	1	10.0	0	0	0	10.0	0.25	0	0	3.5	0
41	0	0	3.5		0	0	7.0		0	0	6.0	
42	0	1	10.5		0	0	7.5		0	0	6.5	
43	0	0	7.0		0	0	5.5		0	0	3.5	
44	0	1	5.0		0	0	3.0		0	0	6.5	
45	0	1	9.0		0	0	6.5		0	0	5.5	
46	0	1	8.5		0	0	6.5		0	0	6.0	
47	0	1	6.0		0	0	8.5		0	0	6.5	
48	0	1	7.5		0	0	5.5		0	0	6.5	
49	0	0	9.5		0	0	7.0		0	0	4.0	
50	0	0	2.0	0	0	0	9.5	0	0	0	3.5	0.25
51	0	0	7.0		0	0	8.5		0	0	4.5	
52	0	1	6.5		0	0	6.5		0	0	1.5	
53	0	1	3.5		0	0	6.0		0	0	5.5	
54	0	1	5.5		0	0	5.0		0	0	5.5	
55	0	1	12.0		0	0	5.0		0	0	8.5	
56	0	1	3.0		0	0	10.5		0	0	3.5	
57	0	1	5.0		0	0	4.0		0	0	4.5	
58	0	1	5.0		0	0	6.0		0	0	7.0	
59	0	1	8.0		0	0	3.0		0	0	4.5	
60	0	1	5.0	0	0	0	5.5	0	0	0	7.5	0
61	0	1	11.0		0	0	6.5		0	0	8.0	
62	0	1	21.0		0	0	13.0		0	0	7.5	
63	0	1	13.0		0	0	9.5		0	0	4.0	
64	0	1	5.0		0	0	4.0		0	0	6.5	
65	0	0	4.0		0	0	4.5		0	0	5.5	
66	0	1	5.0		0	0	9.0		0	0	4.5	
67	0	0	2.5		0	0	8.5		0	0	4.0	
68	0	1	5.0		0	0	7.0		0	0	4.0	
69	0	0	4.0		0	0	4.5		0	0	3.0	
70	0	0	5.5	0	0	0	4.5	0	0	0	5.0	0
71	0	1	6.0		0	0	8.0		0	0	3.0	
72	0	0	3.5		0	0	5.5		0	0	8.0	
73	0	1	7.0		0	0	4.5		0	0	17.0	
74	0	1	7.0		0	0	6.5		0	0	9.0	
75	0	1	16.0		0	0	6.5		0	0	2.0	
76	0	0	11.5		0	0	5.5		0	0	3.5	
77	0	0	3.5		0	0	7.5		0	0	9.0	
78	0	0	2.5		0	0	9.0		0	0	8.0	
79	0	0	5.0		0	0	9.5		0	0	6.0	
80	0	0	11.0	0	0	0	8.0	0	0	0	3.5	0.25
81	0	0	3.5		0	0	6.5		0	0	3.5	
82	0	0	5.0		0	0	5.0		0	0	14.0	
83	0	0	10.0		0	0	5.5		0	0	3.0	
84	0	0	6.0		0	0	4.5		0	0	9.5	
85	0	0	3.5		0	0	5.5		0	0	6.0	
86	0	0	2.5		0	0	4.0		0	0	3.5	
87	0	1	15.5		0	0	4.0		0	0	14.0	
88	0	0	10.0		0	0	3.5		0	0	6.0	
89	0	1	8.5		0	0	6.0		0	0	7.5	
90	0	1	6.5	0	0	0	3.5	0	0	0	5.0	0
91	0	1	8.0		0	0	4.0		0	0	7.5	
92	0	0	3.0		0	0	3.5		0	0	5.0	
93	0	1	6.0		0	0	4.0		0	0	12.5	
94	0	1	7.0		0	0	5.5		0	0	7.0	
95	0	1	7.0		0	0	7.5		0	0	9.0	
96	0	0	5.0		0	0	9.5		0	0	9.5	
97	0	1	6.5		0	0	5.0		0	0	9.5	
98	0	1	6.5		0	0	5.5		0	0	6.0	
99	0	1	5.5		0	0	4.5		0	0	8.0	
100	0	1	9.5	0	0	0	4.5	0	0	0	4.5	0
Minimum	**0.0**	**0.0**	**2.0**	**0**	**0.0**	**0.0**	**2.0**	**0**	**0.0**	**0.0**	**1.5**	**0**
Maximum	**0.0**	**1.0**	**21.0**	**0**	**0.0**	**0.0**	**13.0**	**0.25**	**0.0**	**0.0**	**17.0**	**0.25**
Mean	**0.0**	**0.6**	**6.6**	**0.0**	**0.0**	**0.0**	**6.3**	**0.1**	**0.0**	**0.0**	**6.4**	**0.1**
Standard Dev.	**0.0**	**0.5**	**3.1**	**0.0**	**0.0**	**0.0**	**2.1**	**0.1**	**0.0**	**0.0**	**2.9**	**0.1**
Geometric mean	**-**	**-**	**6.1**	**-**	**-**	**-**	**5.9**	**-**	**-**	**-**	**5.8**	**-**
Median	**0.0**	**1.0**	**6.0**	**0**	**0.0**	**0.0**	**6.0**	**0**	**0.0**	**0.0**	**6.0**	**0**
Calcite Index	**0.6**		**-**	**-**	**0.0**		**-**	**-**	**0.0**		**-**	**-**

Table G.51: Calcite and Pebble Count at RG_FOUNGD, FRO LAEMP, September 2020

Rock	RG_FOUNGD 1				RG_FOUNGD 2				RG_FOUNGD 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	7.0		0	0	5.0		0	0	4.0	
2	0	1	5.0		0	0	2.5		0	0	6.5	
3	0	0	4.0		0	0	3.5		0	0	4.5	
4	0	0	5.5		0	0	3.0		0	0	5.5	
5	0	0	6.5		0	1	6.0		0	0	7.0	
6	0	0	5.5		0	0	6.0		0	0	5.0	
7	0	0	5.0		0	0	1.0		0	1	5.0	
8	0	0	6.0		0	0	2.0		0	1	5.0	
9	0	0	6.5		0	0	5.0		0	0	6.0	
10	0	0	7.5	0	0	0	4.5	0.00	0	0	5.5	0
11	0	1	5.0		0	0	5.0		0	0	6.0	
12	0	0	4.0		0	0	4.0		0	1	6.0	
13	0	0	5.5		0	0	2.0		0	0	4.0	
14	0	0	3.5		0	0	6.5		0	0	5.0	
15	0	0	8.0		0	0	7.0		0	0	6.0	
16	0	0	9.0		0	0	5.5		0	0	7.0	
17	0	0	5.5		0	0	4.5		0	0	4.0	
18	0	0	3.5		0	0	4.0		0	0	5.5	
19	0	0	6.5		0	0	2.5		0	0	4.5	
20	0	0	4.0	0	0	0	5.0	0	0	0	7.0	0.5
21	0	0	5.5		0	0	7.5		0	0	11.0	
22	0	0	4.0		0	0	1.5		0	0	6.5	
23	0	0	4.5		0	0	2.0		0	1	8.0	
24	0	0	3.5		0	0	2.0		0	0	9.5	
25	0	0	4.5		0	0	2.0		0	0	7.0	
26	0	0	7.5		0	0	4.0		0	0	3.0	
27	0	0	4.5		0	0	4.5		0	0	3.5	
28	0	0	7.5		0	0	5.0		0	1	5.5	
29	0	0	3.5		0	0	3.0		0	0	6.0	
30	0	0	2.0	0	0	0	5.0	0	0	0	4.5	0.00
31	0	0	4.0		0	0	2.5		0	0	5.0	
32	0	0	8.0		0	0	3.0		0	0	6.0	
33	0	0	4.5		0	0	4.5		0	0	6.0	
34	0	0	3.5		0	0	3.0		0	1	5.5	
35	0	0	5.0		0	0	4.5		0	1	3.5	
36	0	0	3.5		0	0	6.5		0	0	6.5	
37	0	0	5.0		0	0	1.0		0	0	7.5	
38	0	0	3.0		0	0	2.0		0	0	4.0	
39	0	0	11.0		0	0	7.0		0	1	9.0	
40	0	0	11.5	0.00	0	0	4.0	0	0	0	8.5	0.5
41	0	0	7.0		0	0	7.5		0	0	4.0	
42	0	0	6.5		0	0	5.0		0	0	6.5	
43	0	0	9.5		0	0	6.0		0	0	6.5	
44	0	1	4.0		0	1	5.0		0	1	8.0	
45	0	0	4.0		0	0	4.0		0	0	7.0	
46	0	0	5.5		0	0	5.0		0	0	8.0	
47	0	1	7.0		0	0	4.0		0	0	4.0	
48	0	0	5.5		0	0	7.0		0	0	7.0	
49	0	1	6.5		0	0	7.5		0	0	5.5	
50	0	0	6.0	0.00	0	0	3.5	0	0	0	4.0	0
51	0	0	5.5		0	0	5.5		0	0	8.0	
52	0	0	4.0		0	0	4.0		0	1	6.0	
53	0	0	5.5		0	0	6.5		0	0	4.5	
54	0	0	4.5		0	0	2.0		0	0	5.0	
55	0	0	5.0		0	0	2.0		0	0	6.0	
56	0	0	4.5		0	0	7.0		0	0	5.0	
57	0	0	3.5		0	1	8.0		0	0	4.5	
58	0	1	8.5		0	0	5.5		0	0	5.0	
59	0	0	8.5		0	0	5.5		0	0	4.0	
60	0	0	6.0	0.00	0	0	2.0	0.00	0	0	5.0	0.00
61	0	0	8.0		0	0	7.0		0	0	4.5	
62	0	0	7.5		0	0	5.0		0	0	7.0	
63	0	0	5.5		0	0	5.5		0	0	6.0	
64	0	0	7.0		0	0	3.5		0	0	5.5	
65	0	0	8.5		0	0	6.0		0	0	7.0	
66	0	0	8.0		0	0	0.5		0	1	8.0	
67	0	0	6.0		0	0	5.0		0	0	5.0	
68	0	0	6.0		0	0	6.0		0	0	4.5	
69	0	0	4.5		0	0	6.0		0	0	5.5	
70	0	0	6.0	0	0	0	6.5	0	0	0	7.0	0.25
71	0	0	6.0		0	0	4.5		0	0	6.0	
72	0	0	7.0		0	0	4.0		0	0	6.5	
73	0	0	6.5		0	0	6.5		0	0	6.0	
74	0	0	5.5		0	0	6.0		0	0	5.5	
75	0	1	7.0		0	0	4.0		0	0	9.5	
76	0	0	4.0		0	0	6.0		0	0	7.5	
77	0	0	4.5		0	0	6.0		0	0	9.0	
78	0	0	3.5		0	0	2.5		0	0	4.5	
79	0	0	5.5		0	0	0.5		0	0	4.0	
80	0	0	4.5	0	0	0	5.5	0.00	0	0	5.5	0
81	0	0	5.0		0	0	4.0		0	0	4.5	
82	0	0	5.0		0	0	3.5		0	0	6.0	
83	0	0	4.5		0	0	4.0		0	0	5.5	
84	0	0	6.0		0	0	3.5		0	0	6.0	
85	0	0	4.5		0	0	6.5		0	1	5.0	
86	0	0	10.5		0	0	1.0		0	0	6.0	
87	0	0	13.0		0	0	9.0		0	0	5.0	
88	0	0	6.5		0	0	7.0		0	0	5.0	
89	0	0	3.5		0	0	4.0		0	0	3.5	
90	0	0	6.0	0	0	0	2.0	0	0	0	5.5	0
91	0	0	6.5		0	0	5.5		0	0	3.5	
92	0	0	5.5		0	0	2.5		0	1	5.0	
93	0	0	5.0		0	0	9.0		0	0	5.0	
94	0	1	6.5		0	0	4.5		0	0	7.0	
95	0	0	7.5		0	0	4.0		0	0	3.5	
96	0	0	3.5		0	0	6.0		0	0	4.0	
97	0	0	4.5		0	0	5.0		0	0	5.0	
98	0	0	7.5		0	0	4.0		0	0	4.5	
99	0	0	4.0		0	0	6.0		0	0	5.0	
100	0	1	4.5	0	0	1	6.5	0	0	0	6.0	0
Minimum	**0**	**0**	**2.00**	**0**	**0**	**0**	**0.50**	**0.000**	**0**	**0**	**3.000**	**0.000**
Maximum	**0.00**	**1.00**	**13.0**	**0.000**	**0.00**	**1.00**	**9.0**	**0.000**	**0.00**	**1.00**	**11.0**	**0.50**
Mean	**0.0000**	**0.100**	**5.77**	**0.000**	**0.0000**	**0.040**	**4.56**	**0.000**	**0.0000**	**0.130**	**5.73**	**0.125**
Standard Dev.	**0.000**	**0.302**	**1.92**	**0.000**	**0.000**	**0.197**	**1.90**	**0.000**	**0.000**	**0.338**	**1.51**	**0.212**
Geometric mean	**-**	**-**	**5.48**	**-**	**-**	**-**	**4.03**	**-**	**-**	**-**	**5.55**	**-**
Median	**0**	**0**	**5.50**	**0.000**	**0**	**0.00**	**4.50**	**0.000**	**0**	**0**	**5.50**	**0.000**
Calcite Index	**0.100**		**-**	**-**	**0.040**		**-**	**-**	**0.130**		**-**	**-**

Table G.52: Calcite and Pebble Count at RG_FODNGD, FRO LAEMP, September 2020

Rock	RG_FODNGD 1				RG_FODNGD 2				RG_FODNGD 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	4.0		0	1	5.5		0	1	8.5	
2	0	1	5.0		0	1	9.5		0	0	1.0	
3	0	1	4.0		0	1	8.0		0	1	8.0	
4	0	1	7.5		0	1	6.0		0	1	7.0	
5	0	0	11.0		0	1	7.0		0	1	8.0	
6	0	1	10.0		0	1	7.0		0	1	10.5	
7	0	1	12.0		0	1	6.5		0	1	15.0	
8	0	1	8.0		0	1	10.0		0	0	1.0	
9	0	-	11.5		0	1	9.0		0	1	6.5	
10	0	1	6.0	0.25	0	1	6.5	0.25	0	1	18.0	0.5
11	0	1	7.0		0	0	4.0		0	1	11.0	
12	0	1	9.0		0	1	7.0		0	1	30.0	
13	0	1	7.0		0	1	7.0		0	1	10.5	
14	0	1	12.0		0	1	6.5		0	1	6.0	
15	0	1	2.0		0	1	13.0		0	1	12.5	
16	0	0	3.5		0	1	7.5		0	0	5.5	
17	0	0	5.0		0	1	10.5		0	1	5.0	
18	0	0	4.5		0	0	7.0		0	1	8.0	
19	0	1	7.0		0	1	6.5		0	1	7.5	
20	0	1	11.5	0.25	0	1	7.5	0.50	0	1	9.0	0.25
21	0	1	7.0		0	1	4.0		0	1	14.0	
22	0	1	7.0		0	1	9.5		0	1	13.0	
23	0	1	13.5		0	1	10.5		0	1	12.5	
24	0	1	11.0		0	1	15.0		0	0	4.5	
25	0	1	8.5		0	0	6.0		0	0	6.5	
26	0	1	10.0		0	1	5.0		0	0	10.0	
27	1	1	13.0		0	1	4.5		0	1	6.5	
28	0	1	13.0		0	1	6.5		0	1	8.5	
29	0	1	3.0		0	0	5.5		0	1	5.0	
30	2	1	10.5	0.50	0	1	4.0	0.25	0	1	12.0	0.25
31	0	1	11.0		0	1	12.0		0	0	8.0	
32	0	1	6.5		0	1	6.0		0	1	6.0	
33	2	1	17.0		0	1	10.0		0	1	16.0	
34	0	0	2.0		0	1	9.0		0	1	6.5	
35	1	1	7.0		0	1	6.5		0	1	8.0	
36	0	1	10.0		0	1	6.0		0	1	5.5	
37	1	1	12.5		0	1	4.0		0	1	10.0	
38	0	1	7.5		0	1	12.0		0	1	15.0	
39	0	1	6.5		0	1	11.0		0	1	14.0	
40	0	1	9.0	0.25	0	1	13.5	0.25	0	1	8.5	0
41	0	1	5.0		0	1	13.0		0	1	6.0	
42	0	1	10.5		0	1	10.0		0	1	4.5	
43	0	1	12.0		0	1	6.0		0	1	11.0	
44	0	1	8.0		0	0	5.0		0	1	6.5	
45	0	1	4.0		0	1	3.5		0	1	23.0	
46	0	1	2.0		0	1	4.0		0	1	9.5	
47	0	1	12.0		0	1	7.0		0	1	9.0	
48	0	0	2.0		0	1	6.0		0	1	4.0	
49	0	1	12.0		0	1	13.0		0	1	9.5	
50	1	1	9.5	0.50	0	1	5.5	0.25	0	0	3.0	0.25
51	0	1	6.0		0	1	16.0		0	1	7.0	
52	0	1	11.0		0	1	3.5		0	1	6.0	
53	0	1	7.5		0	1	16.0		0	1	8.0	
54	0	1	10.0		0	0	7.5		0	1	10.0	
55	0	1	5.0		0	0	2.5		0	1	5.5	
56	0	1	13.0		0	1	4.0		0	1	5.0	
57	0	1	9.0		0	0	2.5		0	1	7.0	
58	0	0	2.5		0	1	12.0		0	1	12.5	
59	0	0	2.0		0	1	6.0		0	1	6.5	
60	0	0	3.0	0	0	1	3.5	0.00	0	1	7.5	0.5
61	0	0	5.0		0	1	10.0		0	1	6.5	
62	0	1	4.5		0	1	3.0		0	0	3.5	
63	0	1	7.0		0	1	8.0		0	1	6.0	
64	0	1	6.0		0	1	5.0		0	1	8.0	
65	0	1	9.0		0	1	14.0		0	1	13.5	
66	1	1	7.0		0	1	15.5		0	0	5.0	
67	1	1	9.5		0	1	5.0		0	0	5.0	
68	0	1	5.0		0	1	6.5		0	1	11.0	
69	0	1	7.0		0	1	7.5		0	1	6.0	
70	1	1	9.5	0.5	0	1	3.0	0	0	0	5.0	0.00
71	0	1	5.5		0	1	26.0		0	1	11.5	
72	0	1	10.0		0	1	3.0		0	1	8.0	
73	0	1	6.0		0	1	7.0		0	1	7.0	
74	0	1	7.5		0	1	6.5		0	1	8.0	
75	0	1	4.5		0	1	12.0		0	1	10.5	
76	0	0	5.0		0	1	5.0		0	1	6.5	
77	0	1	16.0		0	1	10.5		0	1	11.0	
78	0	1	9.0		0	1	16.0		0	1	13.5	
79	0	1	22.5		0	1	7.5		0	1	4.5	
80	1	1	8.5	0.5	0	1	9.0	0.5	0	1	10.5	0.25
81	0	1	9.0		0	1	15.0		0	0	6.5	
82	0	1	4.5		0	1	14.5		0	0	5.0	
83	0	1	10.5		0	1	6.0		0	0	5.5	
84	0	1	8.0		0	1	11.5		0	1	7.0	
85	1	1	7.5		0	1	8.0		0	1	10.0	
86	0	1	7.0		0	1	15.0		0	1	5.5	
87	0	1	9.0		0	1	9.5		0	1	11.5	
88	0	1	4.0		0	1	5.5		0	1	17.0	
89	0	1	22.0		0	1	5.0		0	0	0.5	
90	0	0	3.5	0	0	1	8.5	0.75	0	1	13.0	0
91	0	1	3.0		0	1	15.0		0	0	4.5	
92	0	1	2.0		0	1	6.0		0	1	7.0	
93	0	1	6.5		0	1	7.0		0	0	3.0	
94	0	1	1.0		0	1	11.0		0	0	3.5	
95	0	1	13.0		0	1	12.0		0	1	8.0	
96	1	1	13.5		0	1	17.0		0	1	8.5	
97	0	1	11.0		0	1	6.5		0	1	8.0	
98	1	1	6.0		0	1	7.5		0	1	11.0	
99	0	1	6.5		0	1	10.0		0	0	6.5	
100	0	1	7.0	0.25	0	1	9.0	0	0	1	6.0	0.25
Minimum	**0**	**0**	**1.00**	**0.000**	**0**	**0**	**2.50**	**0.000**	**0**	**0**	**0.50**	**0**
Maximum	**2**	**1.00**	**22.5**	**0.500**	**0.00**	**1.00**	**26.0**	**0.750**	**0**	**1.00**	**30.0**	**0.500**
Mean	**0**	**0.879**	**7.98**	**0.300**	**0**	**0.920**	**8.38**	**0.275**	**0**	**0.800**	**8.48**	**0.225**
Standard Dev.	**0**	**0.328**	**3.98**	**0.197**	**0.000**	**0.273**	**4.05**	**0.249**	**0**	**0.402**	**4.34**	**0.184**
Geometric mean	**-**	**-**	**6.93**	**-**	**-**	**-**	**7.50**	**-**	**-**	**-**	**7.40**	**-**
Median	**0**	**1**	**7.50**	**0.250**	**0**	**1**	**7.00**	**0.250**	**0**	**1**	**8.00**	**0.250**
Calcite Index	**1.029**		**-**	**-**	**0.920**		**-**	**-**	**0.800**		**-**	**-**

Table G.53: Calcite and Pebble Count at RG_MP1, FRO LAEMP, September 2020

Rock	RG_MP1 1				RG_MP1 2				RG_MP1 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	10.0		0	1	10.5		0	1	9.5	
2	0	1	6.5		0	1	8.0		0	0	3.5	
3	0	1	7.5		0	1	13.0		0	1	9.5	
4	0	1	23.5		0	1	24.5		0	1	4.5	
5	0	1	4.5		0	1	8.5		0	1	4.5	
6	0	1	5.5		0	1	36.5		0	0	3.0	
7	0	0	5.5		0	1	16.0		0	1	28.0	
8	0	1	38.5		0	1	4.5		0	0	3.5	
9	0	0	5.0		0	1	7.0		0	1	7.0	
10	0	1	15.5	0.5	0	1	7.0	0.50	0	1	3.5	0.25
11	0	1	7.0		0	1	10.5		0	0	19.0	
12	0	1	44.5		0	1	8.0		0	1	9.5	
13	0	1	15.0		0	1	17.0		0	1	23.0	
14	0	1	17.0		0	1	15.5		0	1	6.5	
15	0	1	9.0		0	1	9.0		0	0	4.5	
16	0	1	15.5		0	1	8.0		0	0	2.0	
17	0	1	7.0		0	1	9.0		0	0	3.5	
18	0	1	6.5		0	1	5.5		0	1	16.5	
19	0	1	7.5		0	1	11.0		0	1	3.0	
20	0	1	4.0	0	0	1	7.5	0	0	1	2.5	0
21	0	0	3.5		0	1	4.0		0	0	4.0	
22	0	1	2.0		0	1	19.5		0	0	2.0	
23	0	1	1.5		0	1	3.5		0	1	26.0	
24	0	0	2.5		0	1	22.0		0	1	5.0	
25	0	0	4.5		0	1	8.5		0	1	9.5	
26	0	1	9.0		0	1	8.5		0	1	5.5	
27	0	1	3.5		0	1	44.0		0	0	4.5	
28	0	1	7.5		0	1	21.0		0	1	8.0	
29	0	1	18.0		0	0	2.5		0	0	5.5	
30	0	1	36.0	0.75	0	0	1.5	0	0	0	2.5	0
31	0	1	9.5		0	1	10.0		0	0	3.5	
32	0	1	9.5		0	1	2.5		0	1	24.0	
33	0	0	3.0		0	1	9.5		0	0	1.5	
34	0	0	4.5		0	1	8.5		0	1	13.5	
35	0	1	3.5		0	1	7.0		0	1	30.0	
36	0	0	4.0		0	1	14.0		0	1	5.5	
37	0	1	15.0		0	1	16.5		0	1	7.0	
38	0	1	8.5		0	1	6.5		0	1	23.5	
39	0	1	23.5		0	1	12.0		0	1	9.0	
40	0	1	11.0	0.75	0	1	10.5	0	0	1	18.0	0.75
41	0	1	8.5		0	1	16.0		0	1	4.5	
42	0	0	2.0		0	1	6.5		0	1	2.0	
43	0	0	3.0		0	1	15.0		0	1	6.0	
44	0	1	6.5		0	1	9.5		0	1	25.0	
45	0	1	5.0		0	1	3.5		0	1	15.0	
46	0	1	27.5		0	1	13.0		0	1	6.5	
47	0	1	9.0		0	1	4.5		0	0	4.0	
48	0	1	7.5		0	1	9.0		0	1	4.5	
49	0	1	6.5		0	1	5.0		0	1	4.0	
50	0	1	13.0	0	0	1	6.5	0.25	0	1	6.0	0.5
51	0	0	0.5		0	1	3.5		0	1	10.5	
52	0	1	8.0		0	1	11.0		0	1	14.0	
53	0	1	10.5		0	1	13.0		0	1	7.0	
54	0	1	25.5		0	1	7.0		0	1	10.5	
55	0	1	6.0		0	1	11.0		0	1	21.0	
56	0	1	8.5		0	1	11.0		0	1	8.0	
57	0	0	6.5		0	1	36.0		0	1	8.5	
58	0	1	18.0		0	1	9.0		0	1	37.0	
59	0	1	11.0		0	1	17.5		0	1	11.5	
60	0	1	9.5	0.5	0	1	9.5	0.25	0	1	26.0	0.75
61	0	1	5.0		0	1	14.0		0	0	0.5	
62	0	1	8.0		0	1	6.5		0	0	1.5	
63	0	1	10.5		0	1	28.5		0	1	6.5	
64	0	1	14.0		0	0	3.0		0	1	6.5	
65	0	1	7.0		0	0	2.0		0	1	8.0	
66	0	1	7.0		0	1	16.5		0	0	2.0	
67	0	1	9.5		0	1	7.0		0	1	7.0	
68	0	1	10.0		0	1	12.5		0	1	36.0	
69	0	1	51.0		0	1	10.5		0	0	5.0	
70	0	0	2.5	0	0	1	10.0	0.5	0	0	2.5	0
71	0	1	8.5		0	1	23.0		0	1	10.0	
72	0	1	5.5		0	1	8.5		0	1	7.5	
73	0	1	6.0		0	1	14.5		0	1	5.0	
74	0	1	7.5		0	1	18.0		0	1	8.0	
75	0	0	3.0		0	1	12.0		0	1	3.5	
76	0	1	19.0		0	1	4.5		0	1	22.0	
77	0	0	4.0		0	1	5.0		0	0	2.5	
78	0	0	2.5		0	1	11.0		0	1	7.5	
79	0	1	18.0		0	1	5.0		0	1	6.5	
80	0	1	8.5	0.25	0	0	4.0	0	0	1	5.0	0.25
81	0	1	26.0		0	0	6.5		0	0	0.5	
82	0	1	8.5		0	0	3.0		0	0	1.5	
83	0	1	4.0		0	1	4.5		0	0	3.0	
84	0	1	4.0		0	0	5.5		0	0	2.5	
85	0	1	7.5		0	1	7.0		0	0	4.5	
86	0	1	9.5		0	1	11.5		0	1	39.5	
87	0	1	17.0		0	1	7.5		0	0	5.0	
88	0	1	19.0		0	1	23.5		0	1	17.5	
89	0	1	15.0		0	1	12.0		0	0	3.5	
90	0	1	19.0	0.5	0	1	8.0	0	0	1	47.0	0.75
91	0	1	53.0		0	1	17.0		0	1	2.5	
92	0	0	2.5		0	1	13.0		0	1	7.5	
93	0	0	3.0		0	1	21.0		0	1	4.5	
94	0	1	16.0		0	1	10.0		0	1	22.0	
95	0	1	12.0		0	1	16.0		0	1	6.5	
96	0	0	3.5		0	1	11.5		0	1	14.0	
97	0	1	9.0		0	1	24.0		0	1	7.0	
98	0	1	10.5		0	1	12.5		0	1	9.5	
99	0	0	4.5		0	1	6.5		0	1	11.0	
100	0	0	8.0	0	0	1	13.0	0	0	1	7.5	0.5
Minimum	**0**	**0**	**0.50**	**0**	**0**	**0**	**1.50**	**0**	**0**	**0**	**0.50**	**0**
Maximum	**0**	**1.00**	**53.0**	**0.750**	**0**	**1.00**	**44.0**	**0.500**	**0**	**1.00**	**47.0**	**0.750**
Mean	**0**	**0.790**	**10.9**	**0.325**	**0**	**0.920**	**11.4**	**0.150**	**0**	**0.720**	**9.8**	**0.375**
Standard Dev.	**0**	**0.409**	**9.8**	**0.313**	**0**	**0.273**	**7.4**	**0.211**	**0**	**0.451**	**9.3**	**0.317**
Geometric mean	**-**	**-**	**8.0**	**-**	**-**	**-**	**9.4**	**-**	**-**	**-**	**6.7**	**-**
Median	**0**	**1**	**8.00**	**0**	**0**	**1.00**	**9.8**	**0**	**0**	**1.00**	**6.5**	**0**
Calcite Index	**0.790**		**-**	**-**	**0.920**		**-**	**-**	**0.720**		**-**	**-**

Table G.54: Calcite and Pebble Count at RG_FOUSH, FRO LAEMP, September 2020

Rock	RG_FOUSH 1				RG_FOUSH 2				RG_FOUSH 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	9.0		0	1	18.0		0	1	7.0	
2	0	1	9.0		0	1	7.0		0	1	7.5	
3	0	1	11.0		0	1	12.5		0	1	3.0	
4	0	1	4.0		0	1	11.0		0	1	7.0	
5	0	1	10.0		0	0	8.5		0	1	12.0	
6	0	0	3.5		0	1	5.5		0	1	8.5	
7	0	1	6.5		0	1	8.5		0	1	7.0	
8	0	1	8.0		0	1	9.0		0	1	8.5	
9	0	1	5.0		0	0	9.0		0	1	5.0	
10	0	1	23.0	0	0	1	10.5	0.5	0	1	11.0	0.00
11	0	1	14.0		0	1	7.0		0	1	8.0	
12	0	1	9.5		0	0	4.0		0	1	16.5	
13	0	1	18.0		0	1	12.0		0	1	13.0	
14	0	1	7.5		0	1	10.5		0	1	10.5	
15	0	1	5.5		0	1	11.0		0	1	13.0	
16	0	1	10.5		0	1	11.0		0	0	9.0	
17	1	1	13.0		0	1	15.5		0	0	2.5	
18	1	1	16.0		0	1	4.0		0	1	6.5	
19	1	1	12.5		0	0	9.5		0	1	6.0	
20	0	1	8.5	0.25	0	1	10.0	0.25	0	1	12.0	0
21	0	1	7.5		0	1	10.0		0	0	0.5	
22	0	1	9.0		0	1	4.5		0	0	4.0	
23	0	1	5.0		0	1	8.0		0	1	6.0	
24	0	1	21.0		0	1	20.0		0	1	8.5	
25	0	0	3.0		0	0	6.0		0	1	21.0	
26	0	1	6.0		0	1	7.5		0	0	5.0	
27	0	1	6.5		0	1	10.5		0	1	6.0	
28	0	1	7.0		0	1	9.5		0	1	6.0	
29	0	1	4.0		0	0	7.5		0	1	5.5	
30	0	1	4.5	0	0	1	13.0	0.25	0	1	8.0	0.25
31	0	1	9.0		0	1	23.0		0	0	11.0	
32	0	1	5.5		0	0	7.0		0	1	9.0	
33	0	1	7.0		0	1	16.0		0	1	13.0	
34	0	1	4.0		0	1	8.5		0	1	6.0	
35	1	1	13.0		0	0	7.0		0	1	9.5	
36	1	1	18.5		0	1	11.0		0	1	11.0	
37	0	1	6.0		0	1	9.0		0	1	7.0	
38	1	1	8.5		0	1	13.0		0	1	14.0	
39	0	1	7.0		0	0	9.0		0	1	7.5	
40	0	1	12.0	0.25	0	0	2.5	0	0	1	9.5	0.25
41	0	1	9.0		0	0	8.0		0	1	11.0	
42	0	1	12.5		0	1	4.5		0	1	8.0	
43	0	1	8.0		0	1	22.0		0	1	8.0	
44	0	1	7.0		0	1	6.0		0	1	4.0	
45	0	1	8.5		0	1	12.0		0	1	10.0	
46	0	1	4.5		0	1	3.5		0	1	13.0	
47	0	1	16.5		0	0	7.0		0	0	5.5	
48	0	1	6.0		0	1	13.5		0	1	10.0	
49	0	1	7.5		0	1	6.0		0	1	5.0	
50	0	1	14.0	0.5	0	1	6.5	0.25	0	1	9.5	0
51	0	1	10.5		0	1	17.0		0	1	7.5	
52	0	0	2.0		0	1	14.5		0	1	6.5	
53	0	1	3.5		0	1	8.5		0	1	4.0	
54	0	0	1.5		0	1	8.5		0	1	20.0	
55	0	1	7.0		0	1	12.0		0	1	9.5	
56	0	1	8.0		0	1	14.0		0	1	8.0	
57	0	1	4.0		0	1	10.5		0	1	9.5	
58	0	1	7.5		0	1	11.0		0	0	3.0	
59	0	1	6.5		0	1	17.0		0	1	10.5	
60	0	1	6.0	0	0	1	8.0	0	0	1	7.5	0.5
61	0	1	14.0		0	0	7.5		0	1	13.0	
62	0	1	28.0		0	1	10.0		0	1	10.0	
63	0	1	10.5		0	1	6.5		0	0	11.5	
64	0	1	6.0		0	0	6.0		0	1	7.0	
65	0	1	10.5		0	1	15.0		0	1	9.0	
66	0	1	9.5		0	1	8.5		0	1	11.0	
67	0	1	7.0		0	1	5.5		0	1	7.5	
68	0	1	10.0		0	0	8.0		0	1	6.0	
69	0	1	7.0		0	1	14.5		0	1	9.0	
70	0	1	8.0	0.25	0	1	9.5	0.5	0	0	5.0	0.25
71	0	1	11.0		0	0	12.5		0	1	5.0	
72	0	0	4.5		0	1	11.0		0	1	9.0	
73	0	0	1.0		0	1	18.5		0	1	10.0	
74	1	1	18.5		0	1	6.5		0	1	15.5	
75	1	1	11.0		0	1	7.5		0	1	5.5	
76	1	1	9.0		0	1	6.0		0	1	8.0	
77	0	1	13.0		0	1	15.5		0	0	4.0	
78	0	1	8.0		0	1	12.0		0	1	8.5	
79	0	1	8.5		0	1	8.0		0	1	6.5	
80	0	1	3.5	0	0	0	10.5	0.5	0	1	7.0	0
81	0	0	4.5		0	1	4.5		0	1	8.0	
82	0	1	18.0		0	1	12.5		0	1	9.5	
83	0	1	11.5		1	1	10.5		0	1	13.5	
84	0	1	18.5		0	0	9.0		0	1	10.5	
85	0	1	6.5		1	1	9.5		0	1	10.5	
86	0	1	14.0		0	1	7.0		0	1	9.0	
87	0	1	9.5		1	1	8.0		0	1	7.0	
88	0	1	5.0		0	0	10.5		0	1	10.0	
89	0	0	3.5		1	1	17.5		0	1	5.5	
90	1	1	9.0	0.5	0	1	12.5	0.5	0	1	6.5	0.5
91	1	1	4.5		0	0	4.5		0	1	14.0	
92	1	1	7.0		1	1	11.0		0	1	6.5	
93	1	1	11.0		0	1	11.5		0	1	8.0	
94	0	1	11.5		1	1	7.5		0	0	10.0	
95	0	1	7.0		0	1	21.0		0	1	8.5	
96	1	1	9.5		2	1	18.0		0	1	2.0	
97	0	1	9.0		0	0	5.0		0	1	6.5	
98	0	0	5.0		1	1	4.5		0	1	7.0	
99	0	1	6.5		0	1	13.0		0	1	12.0	
100	0	1	10.5	0	1	1	5.0	0.5	0	1	8.5	0.25
Minimum	**0**	**0**	**1.00**	**0**	**0**	**0.00**	**2.50**	**0**	**0**	**0**	**0.50**	**0**
Maximum	**1.00**	**1.00**	**28.0**	**0.500**	**2.00**	**1.00**	**23.0**	**0.500**	**0.00**	**1.00**	**21.0**	**0.500**
Mean	**0.140**	**0.91**	**9.0**	**0.175**	**0**	**0.79**	**10.1**	**0.325**	**0.000**	**0.88**	**8.5**	**0.200**
Standard Dev.	**0.349**	**0.288**	**4.72**	**0.206**	**0.333**	**0**	**4.28**	**0.206**	**0.000**	**0.327**	**3.44**	**0.197**
Geometric mean	**-**	**-**	**7.83**	**-**	**-**	**-**	**9.22**	**-**	**-**	**-**	**7.75**	**-**
Median	**0**	**1.00**	**8.00**	**0**	**0**	**1.00**	**9.50**	**0.375**	**0**	**1.00**	**8.0**	**0**
Calcite Index	**1.05**		**-**	**-**	**0.89**		**-**	**-**	**0.88**		**-**	**-**

Table G.55: Calcite and Pebble Count at RG_FOUKI, FRO LAEMP, September 2020

Rock	RG_FOUKI 1				RG_FOUKI 2				RG_FOUKI 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	14.0		0	0	7.0		0	0	11.0	
2	0	0	14.0		0	1	8.0		0	0	6.0	
3	0	0	9.5		0	0	6.0		0	1	7.0	
4	0	1	8.0		0	1	7.5		0	0	3.5	
5	0	0	7.0		0	1	9.0		0	1	7.0	
6	0	1	5.0		0	0	5.5		0	0	8.5	
7	0	1	6.0		0	1	6.0		0	1	8.0	
8	0	0	3.0		0	0	7.0		0	1	0.5	
9	0	0	6.0		0	0	3.0		0	1	5.0	
10	0	1	15.5	0.5	0	0	12.0	0	0	0	3.0	0.25
11	0	0	6.0		0	0	3.5		0	1	20.0	
12	0	0	8.0		0	0	6.5		0	1	11.5	
13	0	0	4.5		0	0	4.5		0	1	9.5	
14	0	0	3.0		0	0	5.0		0	1	8.0	
15	0	0	6.0		0	0	gravel		1	1	4.0	
16	0	0	3.0		0	0	3.5		0	1	11.5	
17	0	0	5.0		0	1	8.5		0	0	8.0	
18	0	1	20.0		0	0	7.0		0	1	6.0	
19	0	0	7.0		0	1	9.0		0	1	7.0	
20	0	1	8.0	0	0	0	7.5	0.5	0	0	9.0	0.5
21	0	1	14.0		0	1	13.0		0	1	4.5	
22	0	1	8.0		0	0	6.5		0	1	14.0	
23	0	0	5.0		0	0	9.0		0	1	7.0	
24	0	0	3.0		0	1	8.0		0	1	7.0	
25	0	1	9.0		0	1	6.5		0	0	6.5	
26	0	1	12.0		0	1	6.5		0	1	13.5	
27	0	1	6.5		0	0	8.5		0	1	5.0	
28	0	0	6.0		0	0	8.5		0	1	6.0	
29	0	1	14.0		0	0	8.5		0	1	11.0	
30	0	0	9.0	0.5	0	1	8.5	0	0	1	12.5	0.25
31	0	1	18.0		0	1	8.0		0	1	8.0	
32	0	1	9.0		0	1	12.5		0	1	5.0	
33	0	1	6.0		0	1	15.0		0	1	14.5	
34	0	1	19.0		0	1	10.5		0	1	8.0	
35	0	1	5.0		0	0	7.5		0	1	12.0	
36	0	0	8.0		0	0	9.5		0	1	6.0	
37	0	0	8.0		0	1	9.0		0	1	9.0	
38	0	1	8.0		0	0	5.0		0	1	5.0	
39	0	0	5.0		0	1	12.0		0	0	9.5	
40	0	0	7.0	0	0	0	7.0	0.25	0	1	8.0	0
41	0	1	18.0		0	1	8.0		0	1	7.0	
42	0	0	5.5		0	1	15.0		0	1	6.5	
43	0	0	6.0		0	1	13.5		0	0	7.0	
44	0	0	9.0		0	1	8.5		0	1	10.0	
45	0	1	6.0		0	0	6.0		0	1	8.0	
46	0	1	9.0		0	1	12.5		0	1	9.0	
47	0	0	6.0		0	0	7.5		0	1	7.0	
48	0	1	14.0		0	1	8.0		0	1	12.0	
49	0	0	3.0		0	0	4.5		0	1	7.0	
50	0	1	13.5	0.25	0	0	12.5	0.25	0	1	15.0	0.25
51	0	0	4.0		0	1	14.5		0	1	11.0	
52	0	1	12.0		0	1	boulder		0	1	11.0	
53	0	1	8.0		0	1	14.5		0	1	9.0	
54	0	0	5.0		0	1	12.5		0	0	4.0	
55	0	1	9.0		0	1	30.0		0	1	5.5	
56	0	1	9.0		0	0	6.5		0	1	8.0	
57	0	1	26.0		0	1	12.0		0	1	3.5	
58	0	1	10.0		0	0	5.0		0	1	2.0	
59	0	1	9.5		0	-	gravel		0	1	9.0	
60	0	1	6.0	0	0	1	15.0	0	0	0	2.5	0
61	0	0	7.5		0	0	4.5		0	1	10.0	
62	0	1	9.0		0	1	8.0		0	1	19.0	
63	0	1	8.0		0	1	10.5		0	1	8.5	
64	0	0	12.0		0	0	5.5		0	1	9.0	
65	0	0	5.0		0	0	6.0		0	1	7.5	
66	0	0	5.0		0	0	3.0		0	1	7.0	
67	0	0	11.5		0	0	3.5		0	1	11.0	
68	0	0	5.0		0	0	5.0		0	1	5.0	
69	0	0	6.0		0	1	15.5		0	1	9.5	
70	0	0	9.0	0.25	0	1	6.0	0	0	1	7.0	0.25
71	0	1	9.5		0	1	7.5		0	1	7.5	
72	0	1	10.0		0	1	29.5		0	1	9.0	
73	0	0	3.0		0	0	7.5		0	1	4.0	
74	0	0	13.0		0	0	8.0		0	1	7.5	
75	0	0	6.0		0	0	23.0		0	1	11.0	
76	0	1	9.0		0	0	11.5		0	1	8.0	
77	0	0	7.0		0	0	19.0		0	1	8.5	
78	0	0	3.0		0	1	7.5		0	1	6.0	
79	0	1	9.0		0	1	10.0		0	1	14.0	
80	0	1	19.0	0.25	0	1	8.0	0.25	0	1	9.0	0.25
81	0	1	8.0		0	1	9.5		0	1	8.0	
82	0	1	22.0		0	1	19.5		0	1	3.0	
83	0	1	10.0		0	0	5.5		0	1	18.5	
84	0	1	4.5		0	1	11.5		1	1	10.0	
85	0	0	8.0		0	0	7.0		0	1	4.0	
86	0	0	14.0		0	0	7.0		0	1	7.5	
87	0	1	9.0		0	0	8.0		0	1	7.0	
88	0	0	7.5		0	1	10.0		0	1	10.0	
89	0	0	5.0		0	1	2.5		0	1	8.5	
90	0	0	10.0	0	0	0	6.0	0.00	0	1	11.0	0.50
91	0	0	6.0		0	1	8.0		0	1	5.5	
92	0	0	7.5		0	1	9.0		0	0	3.5	
93	0	0	5.0		0	0	6.0		0	0	6.0	
94	0	1	11.5		0	0	7.0		0	0	4.5	
95	0	0	6.0		0	0	5.0		0	1	9.0	
96	0	1	5.0		0	1	19.5		0	0	6.5	
97	0	1	16.0		0	0	5.5		0	1	8.0	
98	0	0	5.0		0	1	11.0		0	1	18.0	
99	0	1	10.0		0	1	10.0		0	1	8.0	
100	0	1	7.0	0.25	0	1	16.0	0.25	0	1	9.0	0.25
Minimum	**0**	**0**	**3.00**	**0**	**0**	**0.00**	**2.50**	**0**	**0**	**0**	**0.500**	**0**
Maximum	**0**	**1.00**	**26.0**	**0.500**	**0**	**1.00**	**30.0**	**0.500**	**1.00**	**1.00**	**20.0**	**0.500**
Mean	**0**	**0.490**	**8.70**	**0.200**	**0**	**0.505**	**9.2**	**0.150**	**0.0200**	**0.840**	**8.2**	**0.250**
Standard Dev.	**0**	**0.502**	**4.45**	**0.197**	**0**	**0.503**	**4.91**	**0.175**	**0.141**	**0.368**	**3.57**	**0.167**
Geometric mean	**-**	**-**	**7.75**	**-**	**-**	**-**	**8.23**	**-**	**-**	**-**	**7.41**	**-**
Median	**0**	**0**	**8.00**	**0.250**	**0**	**1.00**	**8.00**	**0.125**	**0**	**1**	**8.0**	**0.250**
Calcite Index	**0.490**		**-**	**-**	**0.505**		**-**	**-**	**0.860**		**-**	**-**

Table G.56: Calcite and Pebble Count at RG_FOBKS, FRO LAEMP, September 2020

Rock	RG_FOBKS 1				RG_FOBKS 2				RG_FOBKS 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	3.5		0	1	5.5		0	1	11.5	
2	0	1	11.0		0	0	4.0		0	0	3.5	
3	0	1	13.5		0	1	6.5		0	0	7.0	
4	0	1	9.5		0	1	20.0		0	0	4.0	
5	0	0	7.5		0	1	10.0		0	0	3.5	
6	0	0	4.0		0	1	9.5		0	0	3.0	
7	0	1	9.5		0	1	6.5		0	0	2.5	
8	0	1	14.0		0	0	6.0		0	1	10.5	
9	0	1	12.5		0	0	9.0		0	1	7.5	
10	0	1	10.0	0.5	0	1	7.5	0.5	0	1	11.0	0.5
11	0	1	20.5		0	1	7.5		0	0	9.5	
12	0	1	8.0		0	0	3.5		0	0	8.5	
13	0	1	9.5		0	0	3.0		0	0	11.0	
14	0	0	3.5		0	1	9.5		0	1	17.5	
15	0	1	4.0		0	1	11.0		0	1	9.5	
16	0	0	2.5		0	0	1.5		0	1	10.0	
17	0	0	2.5		0	1	9.0		0	0	4.0	
18	0	0	3.5		0	0	4.0		0	0	8.5	
19	0	0	2.0		0	1	5.5		0	1	16.0	
20	0	1	7.0	0.25	0	1	10.0	0.25	0	1	9.0	0.75
21	0	1	11.0		0	0	5.0		0	0	4.0	
22	0	1	12.0		0	0	4.0		0	1	16.0	
23	0	0	15.5		0	1	8.0		0	1	7.5	
24	0	1	19.0		0	0	5.0		0	1	15.5	
25	0	1	13.5		0	0	4.0		0	1	12.0	
26	0	1	19.0		0	0	5.0		0	0	5.0	
27	0	1	5.5		0	1	7.5		0	1	4.5	
28	0	0	9.0		0	1	14.0		0	0	3.5	
29	0	0	2.5		0	1	18.0		0	0	10.0	
30	0	0	12.0	0	0	1	9.5	0.25	0	1	8.5	0.25
31	0	1	9.0		0	1	8.0		0	1	5.5	
32	0	1	12.5		0	1	9.0		0	1	10.5	
33	0	1	4.5		0	0	7.0		0	1	13.0	
34	0	1	11.0		0	0	6.5		0	1	6.0	
35	0	1	21.0		0	1	7.0		0	0	4.5	
36	0	0	3.5		0	0	6.0		0	1	4.5	
37	0	0	2.5		0	0	4.0		0	1	6.5	
38	0	0	4.0		0	1	15.5		0	1	16.0	
39	0	0	5.0		0	1	10.5		0	1	9.5	
40	0	0	2.5	0	0	1	14.0	0.5	0	1	6.5	0.5
41	0	0	7.5		0	0	4.5		0	0	5.5	
42	0	1	17.0		0	0	2.0		0	1	15.0	
43	0	1	11.0		0	1	9.5		0	1	5.5	
44	0	0	6.5		0	1	7.0		0	1	11.0	
45	0	1	9.0		0	0	4.0		0	1	6.0	
46	0	1	16.0		0	1	10.0		0	1	8.5	
47	0	0	4.5		0	1	14.5		0	1	9.0	
48	0	0	8.0		0	1	11.0		0	1	12.5	
49	0	0	3.0		0	1	11.5		0	1	5.5	
50	0	1	7.5	0.5	0	0	7.0	0	0	0	4.5	0.5
51	0	1	8.0		0	1	13.5		0	0	4.0	
52	0	1	5.5		0	1	14.5		0	0	1.5	
53	0	0	1.5		0	0	3.0		0	0	1.0	
54	0	0	3.0		0	1	14.0		0	1	2.0	
55	0	1	6.0		0	1	7.0		0	1	2.0	
56	0	0	4.0		0	0	5.0		0	1	4.5	
57	0	0	4.5		0	1	9.0		0	1	3.5	
58	0	0	6.0		0	1	9.5		0	1	11.5	
59	0	1	4.5		0	1	8.5		0	0	4.5	
60	0	1	8.0	0.5	2	1	10.5	0.25	2	1	11.0	0
61	0	1	17.5		0	0	4.0		0	1	8.0	
62	0	0	3.0		0	0	8.0		0	1	7.5	
63	0	1	5.5		0	0	5.0		0	0	3.0	
64	0	0	4.5		0	0	5.5		0	1	3.5	
65	0	1	15.0		0	0	9.5		0	0	2.5	
66	0	0	4.5		0	1	7.5		0	0	11.5	
67	0	0	4.0		0	0	2.0		0	1	3.0	
68	0	1	10.0		0	1	9.0		0	0	1.5	
69	0	0	5.5		0	1	12.0		0	0	3.5	
70	0	1	7.0	0.5	0	1	14.5	0.5	0	0	5.5	0
71	0	1	14.5		0	1	10.5		0	1	8.5	
72	0	1	18.0		0	1	15.5		0	0	3.5	
73	0	0	3.5		0	0	6.0		0	0	3.0	
74	0	0	5.5		0	1	9.0		0	1	3.5	
75	0	0	2.5		0	0	5.5		0	1	12.0	
76	0	0	4.0		0	0	sand		0	1	11.0	
77	0	0	3.0		0	1	16.0		0	0	4.5	
78	0	0	1.0		0	1	13.5		0	1	5.5	
79	0	0	2.5		0	1	11.0		0	0	7.5	
80	0	0	3.0	0.00	0	1	11.5	0.25	0	1	13.5	0.5
81	0	1	15.5		0	0	7.5		0	0	6.5	
82	0	1	8.5		0	1	16.5		0	0	1.5	
83	0	1	12.0		0	1	5.0		0	0	2.0	
84	0	1	9.0		0	1	7.0		0	0	5.5	
85	0	1	4.5		0	1	14.0		0	0	1.5	
86	0	1	15.0		0	1	15.0		0	0	4.0	
87	0	1	7.5		0	1	12.0		0	0	7.5	
88	0	1	11.0		0	0	12.5		0	1	5.0	
89	0	0	3.0		0	1	7.5		0	0	2.5	
90	0	0	3.5	0	0	0	6.0	0	0	1	5.0	0.25
91	0	0	4.5		0	0	2.5		0	0	2.5	
92	0	0	6.0		0	0	10.0		0	0	2.5	
93	0	1	12.5		0	0	3.5		0	0	1.0	
94	0	1	8.5		0	1	9.0		0	1	17.5	
95	0	1	14.0		0	0	4.5		0	1	9.0	
96	0	1	12.0		0	1	8.0		0	1	11.0	
97	0	0	7.5		0	0	3.5		0	1	8.0	
98	0	1	7.0		0	0	6.0		0	1	10.5	
99	0	1	4.5		0	1	9.5		0	0	2.5	
100	0	1	11.5	0.5	0	1	10.5	0	0	0	3.0	0
Minimum	**0**	**0**	**1.000**	**0**	**0**	**0**	**1.500**	**0**	**0**	**0**	**1.00**	**0**
Maximum	**0.00**	**1.00**	**21.0**	**0.500**	**2.00**	**1.00**	**20.0**	**0.500**	**2.00**	**1.00**	**17.5**	**0.750**
Mean	**0.0000**	**0.550**	**8.05**	**0.275**	**0.0200**	**0.600**	**8.46**	**0.250**	**0.0200**	**0.550**	**6.96**	**0.325**
Standard Dev.	**0.000**	**0.500**	**4.89**	**0.249**	**0.200**	**0.492**	**3.94**	**0.204**	**0.200**	**0.500**	**4.15**	**0.265**
Geometric mean	**-**	**-**	**6.61**	**-**	**-**	**-**	**7.50**	**-**	**-**	**-**	**5.69**	**-**
Median	**0**	**1.00**	**7.25**	**0.375**	**0**	**1.00**	**8.00**	**0**	**0**	**1.00**	**5.75**	**0.375**
Calcite Index	**0.550**		**-**	**-**	**0.620**		**-**	**-**	**0.570**		**-**	**-**

Table G.57: Calcite and Pebble Count at RG_SCOUTDS, FRO LAEMP, September 2020

Rock	RG_SCOUTDS 1				RG_SCOUTDS 2				RG_SCOUTDS 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	5.0		0	1	7.5		0	0	8.0	
2	0	0	5.5		0	1	11.0		0	0	7.0	
3	0	1	9.0		0	1	8.0		0	0	3.5	
4	0	0	3.0		0	1	15.0		0	0	6.0	
5	0	1	10.0		0	1	5.5		0	0	4.5	
6	0	0	4.5		0	0	5.0		0	1	3.0	
7	0	0	2.0		0	1	10.5		0	1	9.0	
8	0	0	1.5		0	1	16.5		0	0	3.5	
9	0	1	6.0		0	0	12.0		0	1	6.5	
10	0	1	9.5	0.25	0	1	13.5	0.5	0	1	9.0	0.00
11	0	1	7.5		0	1	21.0		0	0	3.0	
12	0	0	8.5		0	1	14.0		0	0	2.5	
13	0	1	15.5		0	1	6.0		0	0	5.0	
14	0	1	11.5		0	1	11.0		0	0	6.0	
15	0	1	8.0		0	1	10.0		0	0	4.5	
16	0	0	4.0		0	0	3.5		0	1	9.5	
17	0	1	6.5		0	1	14.0		0	0	4.5	
18	0	0	4.5		0	0	7.0		0	0	3.0	
19	0	1	8.5		0	1	6.0		0	0	7.5	
20	0	0	9.5	0.5	0	1	18.5	0.5	0	1	19.5	0.75
21	0	1	12.0		0	1	8.5		0	1	5.5	
22	0	1	5.5		0	1	11.0		0	1	6.5	
23	0	1	13.5		0	1	12.0		0	1	6.0	
24	0	1	8.5		0	1	14.5		0	1	9.0	
25	0	1	7.0		0	1	4.5		0	1	11.0	
26	0	1	7.5		0	0	2.0		0	0	4.0	
27	0	0	5.5		0	0	2.5		0	0	7.0	
28	0	0	3.0		0	1	8.0		0	1	13.0	
29	0	0	4.0		0	1	6.0		0	1	8.0	
30	0	0	8.5	0.25	0	0	3.0	0	0	1	9.5	0.25
31	0	1	13.5		0	1	1.0		0	1	15.0	
32	0	1	17.0		0	1	6.5		0	1	9.0	
33	0	1	15.5		0	1	13.0		0	1	5.5	
34	0	1	11.5		0	1	4.5		0	1	6.0	
35	0	0	10.0		0	1	7.0		0	0	5.5	
36	0	1	12.0		0	1	6.5		0	1	4.0	
37	0	1	8.0		0	1	10.5		0	0	10.0	
38	0	1	10.5		0	1	6.0		0	1	4.5	
39	0	1	10.0		0	1	10.0		0	0	7.0	
40	0	1	4.0	0	0	1	7.5	0.5	0	1	6.0	0
41	0	1	15.0		0	1	12.5		0	1	13.0	
42	0	1	9.0		0	0	4.0		0	1	9.0	
43	0	1	7.5		0	0	3.5		0	0	3.5	
44	0	1	13.0		0	0	1.0		0	1	10.5	
45	0	1	7.5		0	0	8.0		0	0	4.5	
46	0	1	5.0		0	0	4.0		0	1	12.5	
47	0	1	5.0		0	0	3.5		0	1	9.5	
48	0	1	22.0		0	0	3.0		0	1	7.0	
49	1	1	9.5		0	0	2.0		0	1	6.5	
50	0	1	8.5	0.5	0	1	18.5	0.25	0	1	11.5	0.5
51	0	1	8.5		0	1	11.0		0	0	5.0	
52	0	1	7.0		0	1	9.5		0	0	2.5	
53	0	1	5.5		0	1	13.0		0	0	1.0	
54	0	1	7.5		0	0	8.5		0	0	7.0	
55	0	1	14.5		0	1	15.0		0	1	11.5	
56	0	1	13.0		0	1	5.5		0	1	6.0	
57	0	1	12.5		0	1	9.0		0	0	4.5	
58	0	1	4.5		0	1	16.5		0	0	3.0	
59	0	1	4.5		0	1	6.0		0	1	8.0	
60	0	1	8.5	0.75	0	1	11.0	0.25	0	0	8.5	0
61	0	1	7.0		0	1	12.0		0	0	3.5	
62	0	1	5.0		0	1	7.5		0	0	5.0	
63	0	0	3.5		0	1	5.0		0	1	5.5	
64	0	1	16.0		0	0	2.5		0	0	7.5	
65	0	0	1.5		0	1	10.0		0	0	12.0	
66	0	1	10.5		0	1	13.5		0	1	10.0	
67	0	1	7.5		0	0	10.0		0	0	4.0	
68	0	1	11.0		0	1	19.0		0	0	7.5	
69	0	0	1.5		0	1	12.5		0	0	8.5	
70	0	1	10.0	0.25	1	1	8.5	0.75	0	1	5.5	0
71	0	0	0.5		0	1	8.5		0	1	4.5	
72	0	1	14.5		0	1	15.0		0	0	3.5	
73	0	1	11.0		0	1	10.0		0	1	5.0	
74	0	0	7.5		0	1	4.5		0	1	4.0	
75	0	1	9.5		0	0	8.0		0	1	6.5	
76	0	1	7.5		0	1	16.5		0	0	4.0	
77	0	0	5.0		0	1	14.0		0	0	5.5	
78	0	1	6.5		0	1	11.5		0	0	4.5	
79	0	1	8.0		0	1	10.0		0	1	8.0	
80	0	0	7.5	0	0	1	8.0	0.5	0	0	4.5	0
81	0	0	9.0		0	1	6.5		0	1	10.0	
82	0	1	15.0		0	1	12.0		0	1	7.5	
83	0	1	9.5		0	1	8.0		0	1	12.5	
84	0	1	5.5		0	1	11.5		0	0	5.5	
85	0	0	5.0		0	1	7.5		0	0	5.0	
86	0	0	6.0		0	1	11.0		0	1	7.0	
87	0	0	2.5		0	1	16.0		0	1	8.0	
88	0	1	4.0		0	0	5.5		0	0	4.5	
89	0	0	3.5		0	0	5.0		0	0	6.0	
90	0	1	14.5	0.5	0	0	7.0	0	0	0	7.0	0.00
91	0	0	1.0		0	1	10.5		0	1	10.0	
92	0	1	13.0		0	1	13.0		0	1	11.5	
93	0	1	8.5		0	1	6.0		0	1	9.0	
94	0	1	19.0		0	1	4.5		0	1	6.0	
95	0	0	7.0		0	1	7.5		0	0	4.5	
96	0	0	9.0		0	1	7.0		0	1	12.5	
97	0	1	12.0		0	1	8.5		0	1	7.5	
98	0	1	8.5		0	1	5.0		0	0	6.5	
99	0	1	25.0		0	1	6.0		0	1	7.5	
100	0	1	6.0	0.5	0	1	4.5	0	0	1	10.5	0.25
Minimum	**0**	**0**	**0.50**	**0**	**0**	**0**	**1.00**	**0**	**0**	**0**	**1.00**	**0**
Maximum	**1**	**1**	**25.0**	**0.750**	**1**	**1.00**	**21.0**	**0.750**	**0**	**1.00**	**19.5**	**0.750**
Mean	**0**	**1**	**8.50**	**0.350**	**0**	**0.7800**	**8.94**	**0.3250**	**0**	**0.5300**	**6.99**	**0.175**
Standard Dev.	**0**	**0**	**4.46**	**0.242**	**0**	**0.4163**	**4.38**	**0.265**	**0**	**0.502**	**3.11**	**0.265**
Geometric mean	**-**	**-**	**7.20**	**-**	**-**	**-**	**7.72**	**-**	**-**	**-**	**6.33**	**-**
Median	**0**	**1**	**8.00**	**0**	**0**	**1**	**8.25**	**0**	**0**	**1**	**6.50**	**0**
Calcite Index	**1**		**-**	**-**	**0.7900**		**-**	**-**	**0.5300**		**-**	**-**

Table F.58: Calcite and Pebble Count at RG_FOBSC, FRO LAEMP, September 2020

Rock	RG_FOBSC 1				RG_FOBSC 2				RG_FOBSC 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	6.5		0	1	8.0		0	1	7.5	
2	0	0	6.0		0	1	8.5		0	1	8.5	
3	0	1	9.0		0	0	4.0		0	1	8.0	
4	0	1	7.0		0	1	7.0		0	1	8.0	
5	0	1	10.0		0	1	6.0		0	1	11.0	
6	0	1	6.0		0	1	9.0		0	1	7.5	
7	0	1	6.0		0	0	3.0		0	1	8.0	
8	0	1	15.0		0	1	6.5		0	1	16.0	
9	0	1	15.5		0	1	8.0		0	1	8.0	
10	0	1	9.5	0.00	0	1	6.0	0.25	0	1	9.5	0.25
11	0	0	0.5		0	1	5.5		0	1	5.0	
12	0	0	1.5		0	1	7.5		0	0	4.5	
13	0	0	4.5		0	0	4.0		0	0	6.0	
14	0	1	12.5		0	1	9.0		0	1	6.5	
15	0	1	10.0		1	1	7.5		0	1	7.0	
16	0	1	12.5		0	1	4.0		0	1	13.0	
17	0	1	6.0		0	1	5.5		0	0	4.5	
18	0	1	12.0		0	1	11.5		0	0	4.0	
19	0	1	7.0		0	1	7.0		0	1	17.0	
20	0	1	11.0	0.5	0	1	9.5	0.25	0	1	15.5	0.25
21	0	1	11.5		0	1	16.0		0	1	9.0	
22	0	0	3.0		0	0	4.5		0	0	6.0	
23	0	0	1.5		0	1	10.0		0	1	10.0	
24	0	0	1.5		0	1	9.5		0	1	8.5	
25	0	1	5.5		0	1	6.0		0	1	11.0	
26	0	1	6.5		0	0	2.0		0	1	5.5	
27	0	1	10.5		0	0	1.5		0	0	3.0	
28	0	1	10.0		0	1	10.5		0	0	2.5	
29	1	1	7.5		0	1	17.0		0	0	4.0	
30	0	1	7.0	0.25	0	1	6.0	0.00	0	0	3.5	0
31	1	1	8.5		0	1	7.0		0	1	18.0	
32	1	1	6.0		0	1	9.0		0	1	6.5	
33	0	1	6.0		0	1	5.5		0	1	9.0	
34	0	0	8.5		0	0	4.0		0	1	8.0	
35	0	0	7.0		1	1	13.5		0	1	14.0	
36	0	0	3.5		1	1	17.5		0	1	11.0	
37	0	0	10.0		0	1	24.0		0	0	6.0	
38	0	1	5.5		0	1	10.0		0	0	4.5	
39	0	1	6.5		0	1	9.0		0	1	8.0	
40	0	1	17.0	0.25	0	1	9.5	0.5	0	1	14.0	0.5
41	0	1	15.0		0	1	5.5		0	0	5.5	
42	0	0	5.5		0	1	16.5		0	1	7.0	
43	0	0	5.5		0	1	13.0		0	1	6.5	
44	0	0	3.5		0	0	3.5		0	1	6.0	
45	0	1	13.0		0	0	2.5		0	0	5.5	
46	0	0	3.0		0	0	4.0		0	1	7.0	
47	0	1	12.0		0	0	3.0		0	1	10.0	
48	0	1	9.0		0	1	6.0		0	1	9.0	
49	0	1	10.5		0	0	3.0		0	1	10.5	
50	0	0	4.5	0.5	0	1	9.0	0.25	0	0	2.5	0.00
51	0	1	23.0		1	1	10.5		0	1	12.0	
52	0	1	9.5		1	1	5.5		0	1	8.0	
53	0	1	8.5		0	1	11.0		0	0	4.0	
54	0	1	14.5		0	1	6.0		0	1	5.5	
55	0	1	9.0		0	1	5.0		0	1	6.0	
56	0	1	12.0		0	1	8.5		0	1	6.0	
57	0	1	11.0		0	1	19.0		0	1	10.0	
58	0	1	15.5		0	1	5.5		0	0	4.5	
59	0	0	4.0		1	1	16.0		0	1	6.5	
60	0	1	6.0	0.25	0	1	11.0	0	0	1	12.5	0.75
61	0	0	7.5		0	1	5.0		-	1	21.5	
62	0	1	15.0		0	1	7.0		1	1	14.5	
63	0	0	4.0		0	0	4.0		1	1	9.0	
64	0	1	3.5		0	0	1.5		2	1	8.5	
65	0	1	9.0		0	0	1.0		1	1	9.0	
66	0	0	4.0		0	1	18.5		2	1	11.0	
67	0	1	7.0		0	1	4.5		2	1	8.0	
68	0	1	11.0		0	1	6.5		1	1	17.0	
69	0	0	0.5		0	1	4.0		2	1	11.0	
70	0	0	6.0	0.00	0	0	1.5	0	2	1	18.0	0.5
71	0	1	11.5		0	0	3.5		2	1	5.5	
72	0	1	7.5		0	0	1.0		0	1	11.0	
73	0	0	2.0		0	1	16.0		0	1	9.5	
74	0	0	4.5		0	1	13.0		0	1	12.0	
75	0	0	6.5		0	1	11.5		0	1	7.0	
76	0	0	4.5		0	1	8.0		0	1	9.5	
77	0	0	4.0		0	1	9.5		0	1	10.0	
78	0	0	12.5		0	1	8.0		0	1	6.0	
79	0	0	3.5		0	1	29.0		0	0	5.0	
80	0	1	12.5	0	0	1	15.5	0.75	0	0	7.5	0.25
81	0	0	6.0		0	1	16.0		0	1	4.0	
82	0	0	13.0		0	1	8.5		0	1	8.0	
83	0	1	25.0		0	1	11.0		0	0	3.5	
84	0	1	11.0		1	1	7.5		0	1	4.0	
85	0	1	8.0		1	1	7.0		0	1	15.5	
86	0	1	11.5		1	1	6.0		0	1	7.0	
87	0	1	15.0		1	1	12.0		0	0	3.0	
88	0	0	12.5		2	1	13.5		0	0	4.5	
89	0	1	13.0		1	1	19.5		0	1	5.0	
90	0	1	10.0	0.25	0	1	6.0	0.25	0	0	2.5	0.00
91	0	1	6.5		0	1	8.5		0	1	10.5	
92	0	1	8.0		0	0	7.5		0	1	7.5	
93	0	0	9.0		0	0	4.5		0	1	9.0	
94	0	1	5.5		0	1	23.5		0	1	11.5	
95	0	0	7.0		0	0	5.5		0	1	8.0	
96	0	1	13.5		0	1	7.0		0	1	14.5	
97	0	1	17.5		0	1	10.5		0	0	3.5	
98	0	1	11.5		0	1	13.0		0	1	8.0	
99	0	0	13.0		0	1	6.0		0	1	7.5	
100	0	1	10.5	0.5	0	0	3.0	0	1	1	17.0	0.5
Minimum	**0**	**0**	**0.500**	**0**	**0**	**0**	**1.00**	**0**	**0**	**0**	**2.50**	**0**
Maximum	**1**	**1.00**	**25.0**	**0.500**	**2**	**1.00**	**29.0**	**0.750**	**2.00**	**1.00**	**21.5**	**0.750**
Mean	**0**	**0.640**	**8.69**	**0.250**	**0**	**0.780**	**8.58**	**0.225**	**0.1717**	**0.770**	**8.46**	**0.300**
Standard Dev.	**0**	**0.482**	**4.50**	**0.204**	**0**	**0.416**	**5.28**	**0.249**	**0.516**	**0.423**	**3.98**	**0.258**
Geometric mean	**-**	**-**	**7.32**	**-**	**-**	**-**	**7.07**	**-**	**-**	**-**	**7.58**	**-**
Median	**0**	**1**	**8.25**	**0**	**0**	**1**	**7.50**	**0**	**0**	**1**	**8.00**	**0.250**
Calcite Index	**0.670**		**-**	**-**	**0.910**		**-**	**-**	**0.942**		**-**	**-**

Table G.59: Calcite and Pebble Count at RG_FOBCP, FRO LAEMP, September 2020

Rock	RG_FOBCP 1				RG_FOBCP 2				RG_FOBCP 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	9.5		0	0	7.5		0	1	9.5	
2	0	1	7.0		0	1	6.5		0	1	8.5	
3	0	1	16.0		0	1	10.0		0	1	8.0	
4	0	1	6.5		0	1	8.5		0	1	4.5	
5	0	1	12.0		0	1	4.0		0	1	5.0	
6	0	1	10.5		0	1	17.0		0	1	11.0	
7	0	1	9.0		0	1	4.5		0	0	4.0	
8	0	1	3.5		0	0	3.5		0	0	4.0	
9	0	0	3.0		0	1	12.0		0	1	5.5	
10	0	1	10.0	0.25	0	1	8.0	0.25	0	1	9.0	0
11	0	1	5.5		0	1	22.0		0	1	7.5	
12	0	1	6.0		0	1	13.5		0	0	3.0	
13	0	1	22.0		0	0	12.0		0	1	6.5	
14	0	1	15.5		0	1	13.0		0	1	9.0	
15	0	1	4.0		0	1	10.5		0	0	4.5	
16	0	1	8.5		0	0	0.5		0	1	16.0	
17	0	1	13.0		0	1	4.0		0	0	8.5	
18	0	1	9.0		0	0	3.0		0	1	14.0	
19	0	1	9.5		0	0	2.5		0	0	4.5	
20	0	1	11.0	0	0	0	2.0	0	0	1	14.5	0.25
21	0	1	9.0		1	1	12.5		0	1	9.0	
22	0	1	11.0		1	1	9.5		0	1	9.0	
23	0	1	10.0		0	1	9.5		0	1	3.5	
24	0	1	6.0		0	1	9.0		0	1	10.0	
25	0	1	13.0		0	1	10.0		0	1	4.0	
26	0	1	7.5		0	1	13.5		1	1	13.5	
27	0	1	5.5		0	1	14.0		1	1	7.5	
28	0	1	4.5		0	1	6.5		1	1	6.5	
29	0	0	0.5		0	1	8.5		1	1	7.0	
30	0	0	5.5	0	0	1	7.0	0.5	0	1	5.5	0.00
31	0	1	8.0		0	1	10.5		0	1	5.0	
32	0	1	13.5		0	1	10.0		0	1	10.5	
33	0	0	10.5		0	1	6.5		1	1	5.5	
34	0	0	9.0		0	1	4.5		1	1	11.0	
35	0	1	8.5		0	0	3.0		0	1	6.0	
36	0	1	11.0		0	0	4.0		1	1	13.5	
37	0	1	22.5		0	0	3.5		1	1	9.0	
38	0	0	9.0		0	0	1.0		1	1	7.0	
39	0	1	17.0		0	1	12.5		1	1	8.0	
40	0	1	5.5	0	0	1	8.5	0.25	1	1	13.0	0.25
41	0	0	10.5		0	1	11.0		0	1	6.5	
42	0	1	12.5		0	1	7.5		0	0	2.0	
43	0	1	16.0		0	1	16.0		0	1	12.5	
44	0	1	14.0		0	1	13.5		0	1	21.0	
45	0	1	17.0		0	0	12.0		0	0	11.0	
46	0	1	13.0		0	0	8.5		0	0	6.0	
47	0	1	20.0		0	1	9.0		0	1	6.5	
48	0	0	4.5		0	1	12.0		0	1	8.0	
49	0	1	12.5		0	1	9.0		0	1	7.5	
50	0	1	11.5	0	0	1	13.5	0.75	0	1	11.5	0.75
51	0	0	10.5		0	1	19.5		0	1	8.5	
52	0	1	14.0		0	1	7.0		0	1	5.0	
53	0	1	16.0		0	1	11.0		0	1	4.5	
54	0	1	8.5		0	1	8.0		0	1	6.0	
55	0	1	9.0		0	0	3.5		0	1	15.0	
56	0	0	12.0		0	1	5.5		0	1	9.0	
57	0	1	20.0		0	1	7.0		1	1	11.0	
58	0	1	3.0	.	0	1	5.0		0	1	10.5	
59	0	1	0.5		0	1	8.5		0	1	14.0	
60	0	1	18.0	0.5	0	1	15.0	0.5	2	1	14.5	0.5
61	0	1	9.0		0	1	7.5		1	1	13.0	
62	0	1	19.5		0	1	12.0		1	1	9.0	
63	0	1	23.0		0	1	12.0		1	1	5.5	
64	0	1	9.5		0	1	14.0		1	1	7.0	
65	0	1	18.0		0	1	6.5		2	1	15.0	
66	0	1	19.5		0	1	4.5		0	1	9.0	
67	0	1	20.5		0	1	5.5		1	1	12.5	
68	0	1	16.5		0	1	6.5		1	1	10.5	
69	0	1	8.0		0	1	4.5		1	1	4.0	
70	0	1	7.0	0.25	0	1	4.0	0	1	1	7.0	0.25
71	0	1	6.5		0	1	5.5		1	1	4.5	
72	0	1	9.0		0	1	8.5		0	1	5.0	
73	0	1	4.0		0	0	2.0		0	0	1.5	
74	0	1	7.5		0	1	15.0		1	1	4.0	
75	0	1	16.5		0	0	1.0		0	1	7.5	
76	0	1	8.5		0	1	4.0		0	1	8.0	
77	0	1	16.0		0	1	12.0		0	1	14.0	
78	0	1	9.0		0	1	8.0		0	1	12.0	
79	0	0	9.0		0	1	17.0		0	1	21.5	
80	0	1	13.5	0.25	0	1	11.5	0.25	0	0	6.0	0
81	0	1	6.5		0	0	5.0		0	1	5.5	
82	0	1	5.5		0	1	9.0		0	1	3.5	
83	0	1	9.5		0	1	11.5		0	1	7.5	
84	0	1	5.5		0	1	4.5		0	1	11.5	
85	1	1	19.0		0	1	4.5		0	1	5.5	
86	1	1	5.5		0	1	4.0		1	1	7.0	
87	1	1	10.0		0	1	6.5		1	1	13.5	
88	1	1	9.5		0	1	14.0		0	1	7.0	
89	0	1	13.0		0	1	3.5		0	1	3.0	
90	0	1	10.5	0.25	0	0	3.0	0	1	1	14.0	0.5
91	0	1	20.0		0	1	5.0		0	1	10.0	
92	0	1	11.0		0	1	3.0		0	1	9.0	
93	0	1	21.5		0	1	8.0		0	1	5.5	
94	0	0	5.5		0	1	10.0		0	1	9.5	
95	0	0	9.0		0	0	2.5		0	1	16.5	
96	1	1	8.5		0	1	9.5		0	1	2.5	
97	0	1	13.0		0	1	2.5		0	0	1.5	
98	0	1	7.0		0	1	11.5		0	0	1.5	
99	0	1	5.0		0	1	13.0		0	0	0.5	
100	0	1	8.5	0.25	0	0	9.0	0.50	1	1	9.0	0.25
Minimum	**0**	**0**	**0.50**	**0**	**0**	**0**	**0.500**	**0**	**0**	**0**	**0.50**	**0**
Maximum	**1.00**	**1.00**	**23.0**	**0.500**	**1.00**	**1.00**	**22.0**	**0.750**	**2.00**	**1.00**	**21.5**	**0.750**
Mean	**0.050**	**0.870**	**10.7**	**0.175**	**0.020**	**0.800**	**8.32**	**0.300**	**0.300**	**0.860**	**8.32**	**0.275**
Standard Dev.	**0.219**	**0.338**	**5.14**	**0.169**	**0.141**	**0.402**	**4.38**	**0.258**	**0.503**	**0.349**	**4.14**	**0.249**
Geometric mean	**-**	**-**	**9.28**	**-**	**-**	**-**	**6.96**	**-**	**-**	**-**	**7.16**	**-**
Median	**0**	**1.00**	**9.50**	**0.250**	**0**	**1.000**	**8.25**	**0.250**	**0**	**1.00**	**7.75**	**0.250**
Calcite Index	**0.920**		**-**	**-**	**0.820**		**-**	**-**	**1.16**		**-**	**-**

Table G.59: Calcite and Pebble Count at RG_FOBCP, FRO LAEMP, September 2020

Rock	RG_FOBCP 1				RG_FOBCP 1			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	5.5		0	0	10.0	
2	0	0	3.5		0	0	7.5	
3	1	1	10.0		0	1	6.0	
4	1	1	6.0		0	1	10.5	
5	1	1	5.5		0	1	3.0	
6	1	1	11.0		0	1	10.5	
7	0	1	7.0		0	1	8.0	
8	0	1	7.5		0	1	10.0	
9	0	1	5.0		0	1	15.5	
10	0	1	5.5	0.5	0	1	9.0	0.5
11	0	1	8.0		0	1	9.5	
12	0	1	7.0		0	1	6.5	
13	0	0	4.5		0	0	4.0	
14	1	1	6.0		0	0	4.0	
15	1	1	20.0		0	0	2.5	
16	2	1	12.0		0	1	8.5	
17	2	1	11.5		0	1	7.0	
18	2	1	7.0		0	0	1.5	
19	1	1	7.5		0	1	20.0	
20	1	1	10.0	0.25	1	1	5.0	0.5
21	2	1	4.5		0	1	5.5	
22	2	1	8.0		1	1	9.5	
23	1	1	6.5		2	1	3.5	
24	1	1	3.0		1	1	6.5	
25	2	1	8.5		0	1	3.5	
26	2	1	8.5		0	1	6.0	
27	1	1	9.0		1	1	11.5	
28	2	1	9.5		1	1	7.0	
29	2	1	8.0		0	0	7.5	
30	2	1	7.5	0.75	0	1	11.0	0
31	2	1	6.5		0	1	9.0	
32	2	1	11.0		0	1	3.5	
33	2	1	15.5		0	1	6.0	
34	1	1	9.5		0	1	4.5	
35	2	1	14.0		0	1	5.0	
36	1	1	8.0		0	1	8.0	
37	1	1	7.5		0	1	8.5	
38	1	1	8.0		0	1	5.0	
39	1	1	8.0		0	1	13.5	
40	2	1	19.0	0.75	0	1	7.5	0.25
41	0	1	4.0		0	1	11.5	
42	1	1	2.5		0	1	9.5	
43	1	1	6.0		0	1	7.0	
44	1	1	5.5		0	0	2.0	
45	2	1	8.5		0	1	3.0	
46	1	1	12.5		0	1	14.0	
47	2	1	8.0		0	0	9.6	
48	1	1	3.0		0	0	7.0	
49	2	1	10.0		0	0	6.0	
50	1	1	11.0	0.5	0	1	17.0	0
51	1	1	6.0		0	1	17.0	
52	1	1	7.5		0	1	8.0	
53	1	1	6.0		0	1	9.0	
54	0	0	5.5		0	0	10.0	
55	0	1	12.0		0	1	9.5	
56	0	1	7.0		0	1	11.0	
57	0	1	7.0		0	1	9.0	
58	0	1	3.0	.	0	1	11.5	.
59	0	1	4.5		0	1	6.0	
60	0	1	4.0	0	0	1	7.0	0
61	0	1	8.5		0	1	8.0	
62	0	1	7.0		0	1	4.5	
63	1	1	16.5		0	1	5.5	
64	1	1	11.0		0	1	15.0	
65	1	1	9.0		0	1	5.0	
66	1	1	10.5		0	0	1.5	
67	0	1	13.5		0	1	9.5	
68	0	1	3.0		1	1	4.0	
69	0	1	2.5		0	1	8.0	
70	0	1	5.0	0	0	1	7.0	0.25
71	0	1	13.0		0	1	3.5	
72	0	1	4.5		0	1	6.5	
73	0	1	10.0		0	1	10.0	
74	0	1	5.5		0	1	6.0	
75	0	1	9.5		0	1	7.5	
76	0	1	4.5		0	1	12.0	
77	0	1	11.0		0	1	8.5	
78	0	1	10.0		0	1	6.5	
79	0	1	5.0		0	1	4.0	
80	0	1	12.5	0	0	1	6.0	0.5
81	0	1	6.0		0	1	5.0	
82	0	1	5.5		1	1	5.5	
83	0	1	7.0		1	1	9.0	
84	0	1	6.5		2	1	11.5	
85	0	1	19.0		0	1	4.5	
86	0	1	6.5		2	1	9.0	
87	0	1	8.0		1	1	9.5	
88	1	1	8.5		1	1	6.0	
89	1	1	7.0		1	1	8.0	
90	2	1	11.0	0.25	0	1	6.5	0.50
91	1	1	5.5		2	1	18.0	
92	1	1	10.5		0	1	7.0	
93	0	1	7.0		1	1	14.0	
94	0	1	9.0		2	1	12.5	
95	0	1	7.0		1	1	7.5	
96	0	1	5.0		1	1	12.0	
97	0	1	10.0		1	1	6.5	
98	0	1	4.0		2	1	17.0	
99	0	1	6.5		0	1	10.0	
100	0	1	8.0	0	1	1	10.0	0.25
Minimum	**0**	**0**	**2.50**	**0**	**0**	**0**	**1.50**	**0**
Maximum	**2.00**	**1.00**	**20.0**	**0.750**	**2.00**	**1.00**	**20.0**	**0.500**
Mean	**0.710**	**0.970**	**8.0**	**0.300**	**0.280**	**0.870**	**8.1**	**0.275**
Standard Dev.	**0.769**	**0.171**	**3.50**	**0.307**	**0.570**	**0.338**	**3.72**	**0.219**
Geometric mean	**-**	**-**	**7.33**	**-**	**-**	**-**	**7.26**	**-**
Median	**1.00**	**7.50**	**0.250**	**0**	**1.00**	**7.50**	**0.250**	**0.25**
Calcite Index		**-**	**-**	**1.150**		**-**	**-**	

Table G.60: Calcite and Pebble Count at RG_FRCP1SW1, FRO LAEMP, September 2020

Rock	RG_FRCP1SW 1				RG_FRCP1SW 2				RG_FRCP1SW 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	3.0		0	0	5.0		0	0	2.5	
2	0	0	9.0		0	0	4.0		0	0	2.0	
3	0	0	6.0		0	1	5.0		0	0	4.5	
4	0	0	3.0		0	0	7.0		0	1	3.0	
5	0	0	5.0		0	0	10.0		0	0	3.5	
6	0	0	5.0		0	0	8.5		0	1	4.5	
7	0	0	5.5		0	0	5.5		0	1	8.0	
8	0	0	5.0		0	1	8.5		0	0	4.5	
9	0	0	4.5		0	0	7.0		0	1	6.0	
10	0	1	6.0	0.25	0	0	4.0	0	0	1	6.0	0.25
11	0	0	6.0		0	0	1.0		0	0	4.0	
12	0	1	8.5		0	0	6.0		0	0	4.5	
13	0	0	6.0		0	1	8.0		0	1	11.0	
14	0	0	5.5		0	0	4.5		0	0	2.0	
15	0	0	0.5		0	1	8.0		0	0	2.5	
16	0	0	6.0		0	1	7.0		0	1	4.0	
17	0	1	6.0		0	0	4.0		0	1	3.0	
18	0	0	6.5		0	0	3.5		0	0	4.0	
19	0	0	3.0		0	0	4.0		0	1	6.0	
20	0	0	4.5	0.00	0	0	6.0	0.00	0	1	9.0	0.25
21	0	0	3.0		0	1	6.5		0	1	3.5	
22	0	0	5.5		0	0	7.0		0	1	4.0	
23	0	0	4.0		0	1	6.0		0	0	3.0	
24	0	0	5.0		0	0	4.5		0	0	10.0	
25	0	0	4.5		0	1	8.5		0	1	4.5	
26	0	0	5.0		0	1	12.5		0	0	6.5	
27	0	0	1.5		0	0	7.0		0	1	4.0	
28	0	0	3.0		0	0	2.5		0	1	3.5	
29	0	0	5.0		0	0	5.0		0	1	5.0	
30	0	0	6.0	0	0	1	6.5	0	0	1	6.5	0
31	0	0	5.0		0	0	6.0		0	1	4.5	
32	0	0	4.5		0	1	7.0		0	1	8.0	
33	0	0	6.0		0	0	7.0		0	0	3.0	
34	0	0	5.5		0	1	2.0		0	0	3.0	
35	0	1	7.0		0	1	8.0		0	1	3.5	
36	0	0	4.0		0	1	7.0		0	0	3.5	
37	0	1	8.0		0	1	7.0		0	0	4.0	
38	0	1	9.0		0	0	6.0		0	1	13.0	
39	0	0	5.5		0	0	4.0		0	0	3.0	
40	0	0	6.0	0	0	1	7.5	0.5	0	1	4.0	0.5
41	0	0	4.5		0	1	7.0		0	1	4.5	
42	0	0	2.0		0	1	5.0		0	1	8.0	
43	0	0	4.5		0	0	6.0		0	1	2.0	
44	0	0	7.5		0	0	10.0		0	1	3.0	
45	0	0	3.5		0	1	6.0		0	1	1.5	
46	0	0	4.5		0	1	6.5		0	0	4.5	
47	0	0	5.0		0	1	2.5		0	0	2.0	
48	0	0	2.5		0	0	4.5		0	1	3.0	
49	0	0	6.0		0	1	7.5		0	0	3.5	
50	0	0	4.5	0	0	1	5.0	0.25	0	1	8.0	0.25
51	0	0	4.0		0	1	3.5		0	0	2.0	
52	0	0	2.5		0	0	6.0		0	1	6.5	
53	0	0	3.5		0	1	7.0		0	1	4.0	
54	0	0	3.5		0	0	0.5		0	1	9.0	
55	0	0	4.0		0	1	3.5		0	1	5.0	
56	0	1	8.0		0	1	6.0		0	0	4.0	
57	0	0	3.0		0	1	7.5		0	1	7.0	
58	0	0	5.0		0	1	3.5		0	0	5.5	
59	0	1	5.5		0	1	8.0		0	0	8.0	
60	0	0	4.0	0	0	0	5.5	0	0	1	6.0	0.5
61	0	1	5.0		0	1	10.0		0	0	3.0	
62	0	0	2.0		0	1	4.5		0	1	9.5	
63	0	0	2.0		0	1	4.0		0	0	4.0	
64	0	0	2.5		0	1	4.0		0	1	5.5	
65	0	0	5.0		0	0	4.0		0	0	3.5	
66	0	1	7.0		0	1	8.0		0	0	6.0	
67	0	0	7.5		0	1	4.0		0	0	5.5	
68	0	0	6.5		0	0	9.0		0	1	6.0	
69	0	0	1.0		0	0	7.5		0	1	7.5	
70	0	1	6.5	0	0	1	5.0	0.25	0	0	6.0	0
71	0	0	5.5		0	0	3.0		0	1	6.0	
72	0	0	7.5		0	0	5.0		0	1	7.5	
73	0	1	5.5		0	0	5.0		0	1	4.0	
74	0	0	2.5		0	0	6.5		0	0	2.0	
75	0	1	10.0		0	1	8.0		0	1	1.5	
76	0	0	6.0		0	0	8.5		0	0	2.5	
77	0	0	7.0		0	1	8.0		0	0	2.0	
78	0	0	5.0		0	1	10.0		0	1	3.0	
79	0	0	7.0		0	0	5.5		0	1	5.0	
80	0	0	5.0	0.00	0	1	5.0	0.25	0	1	4.0	0
81	0	0	4.5		0	1	5.0		0	0	3.5	
82	0	0	6.0		0	1	6.0		0	0	5.5	
83	0	0	3.5		0	1	9.5		0	1	5.5	
84	0	0	8.0		0	1	9.0		0	1	10.0	
85	0	0	1.0		0	0	6.5		0	1	12.0	
86	0	0	8.0		0	0	4.0		0	0	6.5	
87	0	1	8.0		0	0	4.0		0	1	7.0	
88	0	1	10.0		0	0	5.0		0	1	6.5	
89	0	0	3.5		0	1	6.5		0	0	3.0	
90	0	0	3.5	0	0	1	9.0	0	0	1	7.0	0
91	0	0	6.5		0	1	6.5		0	0	6.0	
92	0	0	5.5		0	0	3.5		0	0	4.0	
93	0	0	1.5		0	0	8.5		0	0	6.0	
94	0	0	5.0		0	0	5.0		0	1	10.0	
95	0	1	6.0		0	0	11.0		0	0	6.0	
96	0	0	5.0		0	1	5.0		0	1	3.0	
97	0	0	3.5		0	1	3.0		0	1	4.5	
98	0	1	5.5		0	1	6.0		0	0	1.5	
99	0	0	4.5		0	1	6.5		0	0	5.0	
100	0	1	8.0	0.5	0	1	3.5	0	0	1	7.0	0.50
Minimum	**0**	**0**	**0.50**	**0**	**0**	**0**	**0.500**	**0**	**0**	**0**	**1.50**	**0**
Maximum	**0**	**1.00**	**10.0**	**0.500**	**0**	**1.00**	**12.5**	**0.500**	**0**	**1.00**	**13.0**	**0.500**
Mean	**0**	**0.180**	**5.08**	**0.075**	**0**	**0.530**	**6.03**	**0.125**	**0**	**0.560**	**5.05**	**0.225**
Standard Dev.	**0**	**0.386**	**1.97**	**0.169**	**0**	**0.502**	**2.18**	**0.177**	**0**	**0.499**	**2.41**	**0.219**
Geometric mean	**-**	**-**	**4.60**	**-**	**-**	**-**	**5.54**	**-**	**-**	**-**	**4.52**	**-**
Median	**0**	**0**	**5.00**	**0.000**	**0**	**1**	**6.00**	**0**	**0**	**1.00**	**4.50**	**0**
Calcite Index	**0.180**		**-**	**-**	**0.530**		**-**	**-**	**0.560**		**-**	**-**

Table G.61: Calcite and Pebble Count at RG_FRUPO, FRO LAEMP, September 2020

Rock	RG_FRUPO 3				RG_FRUPO 2				RG_FRUPO 1			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	7.0		0	0	5.0		0	0	7.5	
2	0	0	5.0		0	0	4.0		0	0	7.0	
3	0	0	6.5		0	0	7.5		0	0	5.0	
4	0	0	5.5		0	0	13.0		0	0	7.5	
5	0	1	4.5		0	0	9.5		0	0	10.0	
6	0	0	4.0		0	0	3.0		0	0	5.0	
7	0	0	5.5		0	0	16.0		0	0	4.5	
8	0	0	4.0		0	0	20.0		0	0	7.5	
9	0	0	4.0		0	0	16.0		0	0	6.0	
10	0	0	6.0	0.00	0	0	10.5	0.25	0	0	3.5	0.25
11	0	0	3.5		0	0	12.0		0	0	7.0	
12	0	0	4.5		0	1	8.0		0	0	3.0	
13	0	0	5.0		0	0	16.0		0	0	5.5	
14	0	1	5.0		0	0	19.5		0	0	6.0	
15	0	1	5.0		0	0	10.5		0	0	6.0	
16	0	0	5.0		0	0	14.0		0	0	5.0	
17	0	1	3.5		0	0	24.0		0	0	7.0	
18	0	1	6.0		0	0	16.0		0	0	6.0	
19	0	0	8.0		0	0	10.0		0	0	6.5	
20	0	0	5.0	0.25	0	0	12.0	0.75	0	0	4.0	0
21	0	1	5.5		0	0	26.5		0	0	4.5	
22	0	0	4.0		0	0	10.5		0	0	4.5	
23	0	0	3.0		0	0	13.0		0	0	6.0	
24	0	0	4.5		0	0	11.0		0	0	5.0	
25	0	0	6.0		0	1	10.5		0	0	4.0	
26	0	0	6.0		0	1	11.0		0	0	3.0	
27	0	0	5.5		0	0	11.0		0	0	4.0	
28	0	0	6.5		0	1	15.0		0	0	7.5	
29	0	0	2.5		0	1	7.0		0	1	5.5	
30	0	0	5.0	0	0	1	12.5	0.25	0	1	6.5	0
31	0	0	5.5		0	0	20.0		0	0	3.0	
32	0	0	4.0		0	0	11.0		0	0	5.0	
33	0	0	6.0		0	1	17.0		0	0	5.0	
34	0	0	5.0		0	0	19.0		0	1	5.0	
35	0	1	12.5		0	0	7.5		0	1	7.0	
36	0	0	5.5		0	0	10.0		0	0	6.0	
37	0	0	6.5		0	0	12.0		0	0	5.0	
38	0	0	3.0		0	0	14.5		0	0	4.5	
39	0	0	5.0		0	0	2.0		0	0	7.5	
40	0	0	3.5	0.00	0	0	5.5	0.5	0	1	6.5	0
41	0	0	4.0		0	0	4.5		0	0	6.0	
42	0	0	4.0		0	0	16.0		0	1	8.0	
43	0	0	2.5		0	0	13.0		0	0	6.0	
44	0	0	4.0		0	0	8.5		0	1	7.0	
45	0	0	3.0		0	0	6.5		0	0	5.0	
46	0	0	3.0		0	0	3.5		0	0	7.0	
47	0	0	2.0		0	0	5.0		0	0	5.0	
48	0	0	5.0		0	0	10.5		0	0	5.0	
49	0	0	4.0		0	0	13.0		0	0	4.0	
50	0	0	6.5	0	0	0	5.5	0.25	0	0	5.5	0
51	0	0	3.5		0	1	6.5		0	0	3.5	
52	0	0	3.5		0	0	15.0		0	0	2.5	
53	0	0	3.0		0	0	3.5		0	0	4.0	
54	0	0	7.0		0	0	11.5		0	0	2.0	
55	0	0	6.5		0	0	20.5		0	1	5.0	
56	0	0	6.0		0	0	4.0		0	1	7.0	
57	0	0	5.0		0	0	14.0		0	0	5.0	
58	0	0	5.0		0	0	15.0		1	0	7.0	
59	0	0	3.0		0	0	13.0		0	1	9.0	
60	0	0	4.0	0.25	0	0	4.5	0	0	0	6.5	0.25
61	0	0	5.0		0	0	7.5		0	0	6.0	
62	0	1	5.0		0	0	14.0		0	0	6.0	
63	0	1	4.0		0	0	7.5		0	0	9.0	
64	0	0	5.0		0	0	4.5		0	0	7.0	
65	0	0	6.0		0	0	24.0		0	0	5.0	
66	0	0	3.5		0	0	7.5		0	0	6.5	
67	0	0	4.0		0	0	4.5		0	0	4.0	
68	0	0	3.5		0	0	12.0		0	0	6.0	
69	0	0	4.5		0	1	6.0		0	0	6.0	
70	0	0	3.0	0	0	1	7.0	0.25	0	1	7.5	0
71	0	0	2.0		0	0	7.5		0	0	3.5	
72	0	0	7.0		0	0	13.0		0	0	9.5	
73	0	0	6.5		0	0	3.5		0	0	6.5	
74	0	0	4.5		0	0	11.0		0	0	5.0	
75	0	0	4.0		0	0	8.0		0	0	7.0	
76	0	0	5.5		0	0	4.0		0	0	6.0	
77	0	0	7.5		0	0	6.0		0	0	6.5	
78	0	0	6.0		0	0	5.0		0	0	8.0	
79	0	0	6.0		0	0	6.0		0	0	10.0	
80	0	0	1.5	0	0	0	4.0	0.25	0	0	5.0	0.25
81	0	0	2.0		0	0	18.0		0	0	6.0	
82	0	0	6.5		0	0	11.0		0	0	7.5	
83	0	0	6.5		0	1	9.0		0	0	9.0	
84	0	1	6.0		0	0	3.5		0	1	6.5	
85	0	0	5.0		0	0	3.0		0	0	7.0	
86	0	0	6.0		0	0	8.5		0	0	10.5	
87	0	0	4.0		0	0	14.0		0	1	5.5	
88	0	0	5.5		0	0	11.0		0	0	6.5	
89	0	0	8.5		0	0	12.0		0	0	9.0	
90	0	0	4.0	0.25	0	0	10.0	0.5	0	0	5.5	0
91	0	0	5.0		0	0	25.0		0	0	5.0	
92	0	0	4.0		0	0	8.0		0	0	8.0	
93	0	0	4.0		0	0	13.0		0	0	3.5	
94	0	0	5.0		0	0	12.5		0	0	5.5	
95	0	0	5.0		0	0	10.5		0	0	6.0	
96	0	0	6.0		0	0	21.5		0	1	9.0	
97	0	0	4.0		0	0	9.0		0	0	6.0	
98	0	0	6.0		0	0	4.5		0	0	5.5	
99	0	0	6.0		0	0	2.0		0	0	7.0	
100	0	0	7.0	0	0	0	10.0	0	0	1	7.0	0
Minimum	**0**	**0**	**1.50**	**0**	**0**	**0**	**2.00**	**0**	**0**	**0.00**	**2.000**	**0**
Maximum	**0.00**	**1.00**	**12.5**	**0.250**	**0.00**	**1.00**	**26.5**	**0.750**	**1.00**	**1.00**	**10.5**	**0.250**
Mean	**0.000**	**0.100**	**4.92**	**0.075**	**0.0000**	**0.110**	**10.65**	**0.300**	**0.010**	**0.15**	**6.00**	**0.0750**
Standard Dev.	**0.000**	**0.302**	**1.58**	**0.121**	**0.000**	**0.314**	**5.48**	**0.230**	**0.100**	**0**	**1.70**	**0.121**
Geometric mean	**-**	**-**	**4.67**	**-**	**-**	**-**	**9.20**	**-**	**-**	**-**	**5.75**	**-**
Median	**0**	**0.00**	**5.00**	**0.000**	**0**	**0.00**	**10.50**	**0**	**0**	**0.00**	**6.00**	**0**
Calcite Index	**0.100**		**-**	**-**	**0.110**		**-**	**-**	**0.16**		**-**	**-**

Table G.62: Calcite and Pebble Count at RG_FODPO, FRO LAEMP, September 2020

Rock	RG_FODPO 1				RG_FODPO 2				RG_FODPO 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	4.0		0	1	7.0		0	1	5.5	
2	0	1	2.5		1	1	5.5		0	1	4.0	
3	0	1	4.5		0	1	6.5		0	1	5.5	
4	0	0	2.0		0	1	6.0		0	1	6.0	
5	0	1	2.5		0	0	3.5		0	1	1.5	
6	0	1	5.5		1	1	6.5		0	1	1.5	
7	0	0	2.5		0	1	8.5		0	1	4.5	
8	0	1	4.5		0	0	3.0		0	0	2.0	
9	0	1	3.0		0	1	4.5		0	0	0.5	
10	0	1	5.0	0.25	0	1	4.0	0.25	0	1	3.0	0
11	0	1	2.0		0	1	5.5		0	1	4.0	
12	0	1	5.0		0	1	4.0		0	1	6.0	
13	0	0	3.5		0	1	3.5		0	1	4.0	
14	0	1	3.0		0	0	2.0		0	1	3.5	
15	0	1	6.5		0	1	5.0		0	1	3.5	
16	0	1	2.5		1	1	6.5		0	0	1.0	
17	0	0	1.0		1	1	6.0		0	0	0.5	
18	0	1	5.5		1	1	6.5		0	0	2.5	
19	0	1	3.0		1	1	4.5		0	0	0.5	
20	0	1	5.5	0	0	1	6.0	0.5	0	1	4.0	0
21	0	1	6.5		0	1	6.0		0	1	4.5	
22	0	0	1.0		0	1	5.0		0	0	3.5	
23	0	0	0.5		0	1	3.5		0	1	4.5	
24	0	0	1.5		0	1	5.0		0	1	7.0	
25	0	0	1.5		0	0	2.5		0	1	6.5	
26	0	0	2.0		0	1	5.5		0	0	2.0	
27	0	1	2.5		0	0	1.0		0	1	1.5	
28	0	1	3.5		0	1	6.5		0	1	4.0	
29	0	1	7.5		0	1	5.0		0	1	2.5	
30	0	1	3.0	0	0	1	6.0	0.25	0	1	5.5	0
31	0	1	3.5		0	1	3.0		0	1	3.0	
32	0	1	2.0		0	1	5.5		0	1	4.5	
33	0	1	11.0		1	1	7.5		0	0	1.0	
34	0	1	5.0		0	1	6.5		0	1	4.0	
35	0	0	3.5		0	1	7.0		0	1	4.0	
36	1	1	6.0		0	0	3.5		0	1	2.5	
37	0	1	7.5		0	0	2.5		0	1	2.5	
38	0	0	8.0		1	1	6.5		0	1	1.5	
39	0	0	7.0		1	1	7.0		0	1	7.5	
40	0	1	3.5	0	0	1	5.5	0.25	0	1	5.5	0.25
41	0	1	2.5		0	1	3.0		0	1	4.5	
42	0	1	3.0		1	1	5.5		0	1	4.5	
43	0	1	1.5		1	1	8.0		0	1	4.5	
44	0	1	0.5		0	0	4.5		0	1	3.5	
45	0	1	3.0		0	0	1.5		0	0	3.0	
46	0	0	1.5		0	0	2.0		0	1	5.5	
47	0	1	3.0		0	0	1.0		0	1	2.0	
48	0	1	2.0		0	0	2.5		0	1	2.0	
49	0	1	6.0		0	1	8.5		0	1	8.0	
50	0	1	6.0	0.75	0	0	1.0	0	0	1	2.0	0.25
51	0	1	0.5		0	1	3.5		0	1	5.5	
52	0	1	5.5		0	0	2.5		0	1	6.0	
53	0	1	3.0		0	0	4.0		1	1	6.5	
54	0	1	6.5		0	1	5.5		1	1	4.0	
55	0	1	4.0		1	1	6.0		0	1	4.0	
56	0	1	4.5		1	1	11.0		0	1	8.0	
57	0	1	3.0		1	1	8.5		0	1	3.0	
58	0	1	4.0		0	1	4.0		0	1	3.5	
59	0	1	4.5		1	1	6.0		0	1	1.5	
60	0	0	2.5	0	0	1	8.0	0	1	1	8.0	0.25
61	0	1	6.5		1	1	7.5		0	1	5.0	
62	1	1	5.5		0	1	4.0		0	1	9.0	
63	0	1	7.0		1	1	6.5		0	1	8.5	
64	0	1	4.5		0	1	7.5		0	1	5.0	
65	0	1	4.0		1	1	8.0		0	1	6.0	
66	0	0	2.0		0	1	5.5		0	1	3.5	
67	0	1	5.5		1	1	6.0		0	1	6.0	
68	0	1	5.0		0	1	4.0		0	1	7.0	
69	0	1	4.5		0	1	3.0		1	1	9.5	
70	0	1	3.5	0.25	0	1	9.0	0.25	0	1	5.5	0.5
71	0	1	10.0		0	1	7.5		0	1	6.0	
72	0	1	3.0		0	1	7.0		0	1	3.5	
73	0	1	7.0		0	1	5.5		0	1	6.0	
74	0	1	3.5		0	1	8.0		0	1	7.5	
75	0	1	3.5		0	1	3.5		0	1	6.5	
76	0	1	4.5		0	1	8.5		0	1	4.0	
77	0	1	5.5		0	1	4.0		0	1	4.5	
78	0	1	5.0		0	1	4.5		0	1	2.0	
79	0	1	4.5		0	0	2.0		0	1	3.5	
80	0	1	4.5	0	1	1	7.0	0.25	0	1	3.5	0.25
81	0	1	6.0		0	1	9.0		0	1	4.0	
82	0	1	2.5		0	1	6.0		0	1	7.5	
83	0	1	3.0		0	1	2.5		0	1	6.0	
84	0	1	3.5		0	1	7.0		0	1	6.5	
85	0	1	6.0		0	1	3.0		0	1	7.0	
86	0	1	6.0		0	1	7.5		0	1	3.5	
87	0	1	4.5		0	1	6.0		0	0	2.0	
88	0	1	6.5		0	1	9.5		0	0	3.5	
89	0	1	4.0		0	1	3.0		0	1	4.5	
90	0	1	3.5	0.25	0	1	4.0	0	0	1	4.5	0
91	0	1	2.0		0	1	6.5		0	0	3.0	
92	0	1	5.5		0	1	9.5		0	0	3.5	
93	0	1	3.5		0	1	8.0		0	0	1.5	
94	0	1	4.5		0	1	3.0		0	1	4.5	
95	0	0	3.5		1	1	5.5		0	1	9.0	
96	0	0	2.5		0	1	3.0		0	1	4.0	
97	0	0	1.0		0	1	5.5		1	1	5.5	
98	0	1	5.5		0	1	5.0		1	1	6.0	
99	0	1	4.5		0	1	6.0		0	1	3.0	
100	0	1	2.0	0	0	1	7.5	0	0	1	4.5	0
Minimum	**0**	**0**	**0.500**	**0**	**0**	**0**	**1.000**	**0**	**0**	**0**	**0.500**	**0**
Maximum	**1.00**	**1.00**	**11.0**	**0.750**	**1.00**	**1.00**	**11.0**	**0.500**	**1.00**	**1.00**	**9.5**	**0.50**
Mean	**0.0200**	**0.820**	**4.06**	**0.150**	**0.2100**	**0.840**	**5.37**	**0.175**	**0.0600**	**0.850**	**4.36**	**0.150**
Standard Dev.	**0.141**	**0.386**	**1.99**	**0.242**	**0.409**	**0.368**	**2.15**	**0.169**	**0.239**	**0.359**	**2.06**	**0.175**
Geometric mean	**-**	**-**	**3.51**	**-**	**-**	**-**	**4.85**	**-**	**-**	**-**	**3.76**	**-**
Median	**0**	**1**	**3.75**	**0**	**0**	**1.00**	**5.50**	**0.250**	**0**	**1.00**	**4.00**	**0.125**
Calcite Index	**0.840**		**-**	**-**	**1.050**		**-**	**-**	**0.910**		**-**	**-**

Table G.63: Calcite and Pebble Count at RG_FO22, FRO LAEMP, September 2020

Rock	RG_FO22 1				RG_FO22 2				RG_FO22 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	0	4		0	1	4		0	1	3.5	
2	0	0	4.5		0	0	3		0	1	4.0	
3	0	0	2.5		0	1	3		0	1	1.0	
4	0	1	3		0	1	5		0	0	3.5	
5	0	0	3.5		0	0	1.5		0	0	1.5	
6	0	1	2.5		0	0	2.5		0	0	1.0	
7	0	0	2.5		0	1	3.5		0	0	1.0	
8	0	0	2		0	1	3		0	0	1.0	
9	0	0	5		0	0	2		0	1	1.5	
10	0	1	2	0	0	1	3	0	0	1	2.0	0
11	0	0	1.5		0	1	3		0	1	3.0	
12	0	1	4		0	0	0.5		0	1	5.0	
13	0	0	4.5		0	0	2.5		0	-	sand	
14	0	0	3		0	0	1.5		0	1	3.0	
15	0	1	1		0	1	7.5		0	1	3.5	
16	0	1	1		0	1	4		0	0	2.0	
17	0	0	3		0	0	3		0	1	5.0	
18	0	0	3.5		0	1	3.5		0	0	2.0	
19	0	0	4		0	1	3.5		0	1	1.0	
20	0	1	4	0	0	0	3	0	0	1	2.0	0
21	0	0	2.5		0	0	4		0	1	3.0	
22	0	-	sand		0	1	5.5		0	1	1.5	
23	0	1	1.5		0	1	2.5		0	0	2.0	
24	0	0	2		0	1	4		0	1	3.5	
25	0	1	4		0	1	6.5		0	0	0.5	
26	0	0	3		0	1	3		0	0	4.5	
27	0	1	2		0	1	3.5		0	1	2.5	
28	0	-	sand		0	1	5.5		0	1	4.0	
29	0	1	4		0	1	2.5		0	1	2.5	
30	0	1	5	0	0	1	2.5	0.25	0	0	4.0	0
31	0	1	3.5		0	1	3		0	1	1.5	
32	0	1	4.5		0	1	5		0	1	2.0	
33	0	0	3.5		0	1	2		0	1	2.5	
34	0	0	5		0	1	3.5		0	1	3.0	
35	0	0	4		0	1	2.5		0	1	3.5	
36	0	1	3		0	1	6.5		0	1	4.0	
37	0	0	2		0	1	2		0	1	2.5	
38	0	0	4		0	1	1		0	1	2.0	
39	0	1	3		0	1	2		0	1	3.5	
40	0	1	4	0	0	1	6	0	0	0	3.0	0
41	0	0	3		0	1	3		0	1	3.0	
42	0	1	4		0	1	10		0	0	3.0	
43	0	0	4		0	1	1.5		0	0	3.5	
44	0	0	2.5		0	1	2.5		0	1	3.0	
45	0	0	3		0	1	3.5		0	1	2.5	
46	0	0	1.5		0	0	3		0	1	3.0	
47	0	0	3.5		0	0	2		0	1	0.5	
48	0	0	6		0	1	3.5		0	1	6.0	
49	0	1	6		0	1	3.5		0	1	3.5	
50	0	0	4	0	0	1	4	0.25	0	1	3.0	0
51	0	0	3.5		0	1	2		0	1	1.5	
52	0	1	2.5		0	1	3		0	1	3.5	
53	0	1	1.5		0	1	3		0	-	sand	
54	0	0	2		0	1	3		0	1	3.5	
55	0	1	3.5		0	1	2.5		0	1	3.0	
56	0	0	2.5		0	0	2		0	1	5.0	
57	0	0	3		0	1	7		0	0	4.0	
58	0	0	1.5		0	1	4.5		0	1	3.0	
59	0	0	2		0	1	4.5		0	1	2.5	
60	0	1	4	0.25	0	-	5	0	0	1	4.5	0
61	0	0	4		0	1	2.5		0	1	3.5	
62	0	1	3		0	1	4.5		0	1	3.0	
63	0	1	3		0	0	1		0	0	1.5	
64	0	0	2		0	1	5		0	1	3.0	
65	0	1	3.5		0	1	4.5		0	0	2.0	
66	0	1	3.5		0	0	4		0	0	3.0	
67	0	1	4		0	1	2.5		0	1	2.5	
68	0	0	1		0	0	4		0	1	4.0	
69	0	1	3		0	1	4		0	0	3.0	
70	0	0	5	0	0	1	4	0.5	0	1	3.0	0.25
71	0	1	6.5		0	1	6		0	1	2.5	
72	0	0	4.5		0	1	4		0	0	4.0	
73	0	0	2		0	1	4.5		0	1	4.0	
74	0	1	5		0	1	3		0	1	3.5	
75	0	0	3		0	1	5		0	1	6.0	
76	0	1	2.5		0	1	4.5		0	0	1.5	
77	0	0	4		0	1	5		0	1	3.0	
78	0	0	4		0	1	4		0	1	3.0	
79	0	0	2		0	0	3		0	0	2.5	
80	0	0	3	0	0	1	4	0.25	0	1	2.5	0
81	0	0	3		0	1	4		0	-	sand	
82	0	0	2		0	1	4.5		0	1	4.0	
83	0	1	3.5		0	1	2.5		0	0	2.0	
84	0	0	2.5		0	1	4		0	1	4.0	
85	0	0	3.5		0	1	2		0	0	1.0	
86	0	1	4		0	1	4		0	1	5.0	
87	0	1	3		0	1	5		0	0	2.5	
88	0	1	2		0	1	3.5		0	0	3.0	
89	0	0	2.5		0	1	2.5		0	1	3.0	
90	0	1	2	0	0	0	1.5	0	0	1	4.5	0
91	0	0	4.5		0	1	4		0	0	3.0	
92	0	0	2		0	0	1.5		0	1	3.5	
93	0	0	1.5		0	1	4		0	1	3.0	
94	0	1	4.5		0	1	3		0	1	4.0	
95	0	1	3		0	1	3.5		0	1	6.0	
96	0	0	3		0	1	4.5		0	1	5.0	
97	0	1	4		0	1	3.5		0	1	2.0	
98	0	0	2		0	0	3		0	1	4.5	
99	0	1	2		0	1	3		0	1	4.0	
100	0	0	2.5	0	0	1	2.5	0.25	0	-	2.5	0
Minimum	**0**	**0**	**1.000**	**0**	**0**	**0**	**0.500**	**0**	**0**	**0**	**0.500**	**0**
Maximum	**0**	**1.00**	**6.50**	**0**	**0**	**1.00**	**10.0**	**0.500**	**0**	**1.00**	**6.00**	**0.250**
Mean	**0**	**0.418**	**3.17**	**0**	**0**	**0.798**	**3.54**	**0.150**	**0**	**0.719**	**3.00**	**0.025**
Standard Dev.	**0**	**0.496**	**1.14**	**0**	**0**	**0.404**	**1.47**	**0.175**	**0**	**0.452**	**1.19**	**0.079**
Geometric mean	**-**	**-**	**2.95**	**-**	**-**	**-**	**3.23**	**-**	**-**	**-**	**2.72**	**-**
Median	**0**	**0.00**	**3.00**	**0**	**0**	**1.00**	**3.50**	**0**	**0**	**1.00**	**3.00**	**0**
Calcite Index	**0.418**		**-**	**-**	**0.798**		**-**	**-**	**0.719**		**-**	**-**

Table G.63: Calcite and Pebble Count at RG_FO22, FRO LAEMP, September 2020

Rock	RG_FO22 4				RG_FO22 5			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	5.5		0	1	4.0	
2	0	1	3.0		0	1	2.0	
3	0	1	2.5		0	1	2.5	
4	0	1	4.5		0	-	5.0	
5	0	1	3.5		0	1	2.0	
6	0	1	4.5		0	1	3.5	
7	0	1	4.0		0	1	3.5	
8	0	1	7.0		0	0	1.5	
9	0	1	5.0		0	-	5.0	
10	0	1	4.0	0.25	0	0	2.5	0
11	0	1	5.0		0	1	2.5	
12	0	1	4.0		0	1	1.5	
13	0	1	5.0		0	1	2.0	
14	0	1	2.5		0	1	3.0	
15	0	1	5.5		0	1	2.5	
16	0	1	6.0		0	0	1.0	
17	0	1	6.5		0	1	2.5	
18	0	1	2.5		0	1	2.0	
19	0	1	5.0		0	1	2.5	
20	0	1	3.5	0	0	1	1.5	0
21	0	1	4.5		0	0	1.0	
22	0	1	3.0		0	1	1.5	
23	0	0	2.0		0	-	5.0	
24	0	1	2.5		0	1	2.0	
25	0	1	2.5		0	1	2.0	
26	0	1	3.0		0	1	3.5	
27	0	1	2.5		0	1	2.5	
28	0	1	3.0		0	1	2.0	
29	0	1	1.5		0	0	0.5	
30	0	0	1.5	0	0	-	5.0	0
31	0	1	3.0		0	0	2.0	
32	0	1	2.5		0	0	1.0	
33	0	1	3.5		0	1	3.0	
34	0	0	3.0		0	1	2.5	
35	0	1	3.0		0	1	3.0	
36	0	1	1.5		0	1	2.5	
37	0	1	3.5		0	1	2.0	
38	0	1	4.0		0	1	1.0	
39	0	1	2.5		0	1	2.0	
40	0	1	3.5	0	0	0	4.0	0
41	0	1	3.0		0	-	5.0	
42	0	1	2.5		0	1	4.0	
43	0	1	2.5		0	1	2.5	
44	0	1	5.0		0	1	1.5	
45	0	1	3.0		0	1	2.0	
46	0	1	3.0		0	0	3.0	
47	0	1	2.5		0	1	2.0	
48	0	1	2.0		0	1	2.5	
49	0	1	5.0		0	1	1.0	
50	0	1	2.5	0	0	1	3.0	0
51	0	1	2.0		0	1	3.5	
52	0	1	3.5		0	1	2.0	
53	0	1	4.0		0	0	3.0	
54	0	1	4.0		0	1	3.0	
55	0	1	2.5		0	0	0.5	
56	0	1	1.5		0	0	0.5	
57	0	1	2.0		0	1	2.0	
58	0	1	3.0		0	0	1.5	
59	0	0	2.0		0	0	0.5	
60	0	1	2.5	0	0	1	2.0	0
61	0	1	3.0		0	0	1.5	
62	0	1	3.0		0	1	3.0	
63	0	0	sand		0	1	2.0	
64	0	1	2.0		0	1	4.5	
65	0	1	2.5		0	1	2.5	
66	0	1	4.0		0	1	1.0	
67	0	0	3.0		0	1	2.0	
68	0	1	2.0		0	1	2.0	
69	0	1	3.5		0	1	1.5	
70	0	1	3.0	0	0	0	1.5	0
71	0	1	3.0		0	0	2.5	
72	0	1	3.0		0	1	1.5	
73	0	1	4.0		0	1	2.0	
74	0	0	1.5		0	1	3.5	
75	0	1	1.5		0	0	2.0	
76	0	0	2.0		0	0	1.5	
77	0	1	2.5		0	0	2.5	
78	0	1	4.0		0	0	2.0	
79	0	1	1.0		0	1	4.5	
80	0	0	0.5	0	0	1	3.0	0
81	0	1	2.5		0	1	3.0	
82	0	1	3.5		0	0	2.0	
83	0	1	4.0		0	0	2.0	
84	0	1	3.0		0	1	4.0	
85	0	1	2.0		0	0	0.5	
86	0	1	6.5		0	1	2.0	
87	0	1	2.0		0	-	5.0	
88	0	1	3.0		0	1	3.5	
89	0	1	1.5		0	-	5.0	
90	0	1	3.0	0.25	0	1	3.0	0
91	0	1	2.5		0	1	1.5	
92	0	1	5.0		0	0	1.0	
93	0	1	2.5		0	0	1.0	
94	0	1	3.5		0	0	3.5	
95	0	1	4.5		0	0	2.0	
96	0	1	4.0		0	0	3.5	
97	0	1	2.0		0	0	2.5	
98	0	1	2.5		0	1	3.0	
99	0	1	4.5		0	1	3.0	
100	0	1	2.0	0	0	1	1.5	0
Minimum	**0**	**0**	**0.500**	**0**	**0**	**0**	**0.500**	**0**
Maximum	**0**	**1.00**	**7.00**	**0**	**0**	**1.00**	**5.00**	**0.000**
Mean	**0**	**0.910**	**3.19**	**0**	**0**	**0.677**	**2.45**	**0.000**
Standard Dev.	**0**	**0.288**	**1.25**	**0**	**0**	**0.470**	**1.14**	**0.000**
Geometric mean	**-**	**-**	**2.95**	**-**	**-**	**-**	**2.16**	**-**
Median	**0**	**1.00**	**3.00**	**0**	**0**	**1.00**	**2.00**	**0**
Calcite Index	**0.910**		**-**	**-**	**0.677**		**-**	**-**

Table G.64: Calcite and Pebble Count at RG_FOUEW, FRO LAEMP, September 2020

Rock	RG_FOUEW 1				RG_FOUEW 2				RG_FOUEW 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	0	1	7.5		0	1	10.5		0	1	8.0	
2	1	1	10.5		0	1	7.5		0	0	6.5	
3	1	1	12.5		1	0	3.0		0	0	8.5	
4	0	1	7.0		0	1	8.5		0	1	14.5	
5	0	1	8.0		0	1	9.0		0	1	10.0	
6	1	1	12.0		0	1	9.0		0	1	24.0	
7	0	1	8.0		0	1	10.5		0	1	15.5	
8	1	1	9.5		0	1	6.0		0	1	12.0	
9	1	1	6.0		1	1	13.5		0	1	11.5	
10	1	1	13.5	0.25	0	1	13.0	0.25	0	1	12.5	0.25
11	1	1	7.5		0	1	7.0		0	1	15.5	
12	1	1	8.0		0	1	10.0		0	1	16.0	
13	1	1	7.5		0	1	5.5		0	1	10.5	
14	1	1	13.5		0	1	4.0		0	1	7.0	
15	1	1	10.5		0	1	8.5		0	1	17.5	
16	0	1	8.5		0	1	7.0		0	1	10.5	
17	0	1	12.5		0	0	3.0		0	1	10.0	
18	2	1	11.0		0	1	9.0		0	1	11.0	
19	2	1	13.0		0	1	8.0		0	1	8.5	
20	2	1	9.0	0.5	0	1	9.5	0.25	0	1	12.5	0.25
21	1	1	8.5		0	1	8.5		0	0	7.5	
22	1	1	11.5		1	1	8.0		0	1	21.0	
23	1	1	13.0		1	1	14.0		0	0	12.5	
24	0	1	8.5		0	1	4.0		0	1	16.0	
25	1	1	10.5		0	1	6.5		0	0	6.5	
26	1	1	7.5		0	1	8.0		0	0	6.0	
27	2	1	11.5		0	1	13.0		0	0	11.0	
28	1	1	10.5		1	1	10.0		0	1	9.0	
29	0	1	13.5		0	1	15.0		0	1	14.0	
30	1	1	13.5	0.5	0	1	7.5	0	0	0	10.0	0
31	1	1	8.0		0	1	8.0		0	1	7.5	
32	1	1	6.0		0	1	8.5		0	1	11.0	
33	1	1	9.0		0	1	13.0		0	1	9.0	
34	0	1	5.0		0	1	7.0		0	1	6.5	
35	1	1	12.0		0	1	8.5		0	0	4.0	
36	1	1	5.5		1	1	11.0		0	1	9.5	
37	1	1	9.5		0	1	13.5		0	1	14.0	
38	1	1	12.0		0	0	2.5		0	1	11.0	
39	0	1	9.0		0	1	15.0		0	1	11.0	
40	0	1	13.5	0	0	1	12.5	0	0	1	10.5	0
41	1	1	10.5		0	1	8.5		0	1	7.0	
42	1	1	9.0		0	1	10.5		0	1	8.0	
43	1	1	5.5		0	1	6.0		0	1	8.0	
44	1	1	8.5		0	0	4.5		0	1	13.5	
45	1	1	10.5		0	1	10.5		0	1	10.0	
46	1	1	7.0		0	1	9.0		0	1	23.0	
47	1	1	5.5		0	1	6.0		0	1	12.0	
48	1	1	5.0		0	1	18.0		0	0	5.5	
49	1	1	7.5		1	1	9.0		0	1	3.0	
50	1	1	7.0	0.25	0	1	10.0	0	0	0	8.0	0.25
51	1	1	8.5		0	1	12.0		0	1	15.0	
52	1	1	5.5		0	1	8.5		0	1	9.0	
53	2	1	11.0		0	1	6.5		0	0	9.0	
54	1	1	8.0		0	1	7.0		0	1	10.0	
55	0	1	10.5		0	0	4.0		0	1	12.5	
56	1	1	9.5		0	1	11.0		0	0	7.0	
57	1	1	11.5		0	1	8.0		0	1	7.5	
58	0	1	9.5		0	1	10.5		0	1	10.0	
59	1	1	12.5		0	1	8.5		0	1	12.0	
60	1	1	9.0	0.75	0	1	10.5	0.25	0	1	4.0	0
61	1	1	7.5		0	1	7.0		0	1	28.0	
62	0	1	7.5		0	1	8.0		0	1	7.0	
63	0	1	7.0		0	0	4.5		0	1	8.0	
64	0	1	5.5		0	1	7.0		0	1	11.5	
65	0	1	3.5		0	1	9.0		0	1	13.5	
66	0	1	2.0		0	1	8.5		0	1	9.0	
67	0	1	3.0		0	1	14.0		0	1	7.0	
68	0	0	1.5		0	1	6.0		0	1	7.5	
69	0	0	1.0		1	1	10.5		0	1	8.0	
70	0	1	5.0	0.5	0	1	3.5	0	0	1	6.5	0.5
71	1	1	8.0		1	1	10.0		0	1	11.0	
72	1	1	7.0		0	1	4.5		0	1	6.5	
73	1	1	7.5		0	1	10.0		0	1	10.0	
74	1	1	9.0		0	1	8.0		0	1	14.0	
75	1	1	9.5		0	1	6.5		0	1	13.0	
76	1	1	8.0		0	1	5.5		0	1	14.5	
77	2	1	9.5		0	0	2.0		0	1	13.0	
78	2	1	15.0		0	1	7.5		0	1	10.0	
79	1	1	7.5		0	1	8.0		0	1	8.5	
80	1	1	6.5	0.5	0	1	13.0	0	0	1	12.5	0.25
81	1	1	14.5		0	1	15.5		0	1	14.0	
82	1	1	10.0		0	1	9.5		0	1	19.0	
83	1	1	9.5		0	1	17.0		0	0	1.0	
84	0	1	6.5		1	1	10.0		0	1	13.0	
85	0	1	5.0		0	1	4.5		0	1	11.0	
86	1	1	6.0		0	1	8.0		0	1	8.0	
87	0	1	9.5		0	1	7.5		0	1	12.5	
88	0	1	3.5		0	1	15.0		0	1	14.5	
89	1	1	7.0		0	1	9.0		0	1	9.0	
90	1	1	7.0	0.25	0	1	8.0	0	0	1	13.0	0.25
91	0	1	8.5		0	1	7.5		0	1	10.5	
92	0	1	20.0		0	1	6.0		0	1	9.5	
93	1	1	14.5		0	1	10.5		0	1	19.0	
94	0	1	15.5		0	1	8.0		0	0	5.0	
95	1	1	8.0		0	1	4.0		0	1	8.5	
96	1	1	4.5		0	1	10.5		0	1	6.5	
97	1	1	9.0		1	1	9.0		0	1	6.5	
98	0	1	10.5		1	1	5.0		0	1	5.0	
99	1	1	9.0		0	1	10.5		0	0	3.0	
100	1	1	9.5	0.5	0	1	10.5	0.25	0	1	14.0	0
Minimum	**0**	**0**	**1.000**	**0**	**0**	**0**	**2.00**	**0**	**0**	**0**	**1.00**	**0**
Maximum	**2.00**	**1.00**	**20.0**	**0.750**	**1.00**	**1.00**	**18.0**	**0.250**	**0.00**	**1.00**	**28.0**	**0.500**
Mean	**0.770**	**0.980**	**8.8**	**0.400**	**0**	**0.93**	**8.73**	**0.100**	**0.000**	**0.840**	**10.65**	**0.175**
Standard Dev.	**0.566**	**0.141**	**3.19**	**0.211**	**0.327**	**0.256**	**3.23**	**0.129**	**0.000**	**0.368**	**4.43**	**0.169**
Geometric mean	**-**	**-**	**8.13**	**-**	**-**	**-**	**8.08**	**-**	**-**	**-**	**9.71**	**-**
Median	**1**	**1.00**	**8.50**	**1**	**0**	**1.00**	**8.50**	**0.000**	**0**	**1.00**	**10.00**	**0.250**
Calcite Index	**1.750**		**-**	**-**	**1.05**		**-**	**-**	**0.84**		**-**	**-**

Table G.65: In Situ Water Quality Taken at Biological Monitoring Areas, September 2020

Field Parameters		Reference			Mine-Exposed						
		RG_HENUP	RG_FO26	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD	RG_MP1	RG_FOUSH	RG_FOUKI
Date											
Station 1	Temperature (°C)	7.9	8.5	5.7	8.3	9.2	11.7	10.7	11.2	9.8	9.5
	Dissolved Oxygen (mg/L)	10.54	9.91	10.63	10.04	-	-	10.23	9.39	10.47	9.67
	Dissolved Oxygen (%)	89	84.7	85.1	85.5	-	-	92.4	85.3	92.4	84.9
	Conductivity (µS/cm)	178	207	193	359	430	558	552	578	603	602
	Specific Conductivity (µS/cm)	264	302	305	528	615	746	759	786	850	855
	pH	8.64	8.63	8.65	8.52	7.90	8.05	8.41	8.35	8.23	8.41
	ORP (mV)										
Station 2	Temperature (°C)	6.0	7.1	5.8	7.6	8.5	11.9	11.0	10.8	9.5	9.4
	Dissolved Oxygen (mg/L)	10.74	10.21	10.53	10.22	-	-	10.52	9.48	10.62	9.35
	Dissolved Oxygen (%)	86.3	84.4	84.4	85.6	-	-	95.5	85.7	93.1	81.8
	Conductivity (µS/cm)	170	200	193	352	422	560	564	568	598	599
	Specific Conductivity (µS/cm)	266	303	304	528	616	747	770	779	851	854
	pH	8.72	8.72	8.69	8.50	7.98	7.93	8.25	8.38	8.16	8.40
	ORP (mV)										
Station 3	Temperature (°C)	5.3	5.9	5.9	7.0	7.7	11.6	10.5	10.2	8.8	8.7
	Dissolved Oxygen (mg/L)	10.92	10.36	10.73	10.21	-	-	10.06	9.58	10.82	9.85
	Dissolved Oxygen (%)	86.2	83.4	86.1	84.3	-	-	91.0	85.6	93.2	84.8
	Conductivity (µS/cm)	166	193	193	346	412	554	564	565	521	595
	Specific Conductivity (µS/cm)	266	304	303.5	527	615	745	779	786	755	865
	pH	8.75	8.69	8.74	8.46	7.90	8.05	8.30	8.36	8.00	8.35
	ORP (mV)	-	-	-	-	-	-	-	-	-	-
Station 4	Temperature (°C)	-	-	-	-	-	-	-	-	-	-
	Dissolved Oxygen (mg/L)	-	-	-	-	-	-	-	-	-	-
	Dissolved Oxygen (%)	-	-	-	-	-	-	-	-	-	-
	Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-
	Specific Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-
	pH	-	-	-	-	-	-	-	-	-	-
	ORP (mV)	-	-	-	-	-	-	-	-	-	-
Station 5	Temperature (°C)	-	-	-	-	-	-	-	-	-	-
	Dissolved Oxygen (mg/L)	-	-	-	-	-	-	-	-	-	-
	Dissolved Oxygen (%)	-	-	-	-	-	-	-	-	-	-
	Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-
	Specific Conductivity (µS/cm)	-	-	-	-	-	-	-	-	-	-
	pH	-	-	-	-	-	-	-	-	-	-
	ORP (mV)	-	-	-	-	-	-	-	-	-	-

Note: " - " indicates no data available

Table G.65: In Situ Water Quality Taken at Biological Monitoring Areas, September 2020

Field Parameters		Mine-Exposed								
		RG_FOBKS	RG_SCOUTDS	RG_FOBSC	RG_FOBCP	RG_FRCP1SW	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Date										
Station 1	Temperature (°C)	15.1	11.4	11.2	10.9	10.1	8.0	8.1	7.8	5.8
	Dissolved Oxygen (mg/L)	9.43	9.97	8.85	10.62	9.78	10.63	9.89	10.04	11.02
	Dissolved Oxygen (%)	94.2	88.9	81.0	96.0	86.9	89.9	84	84.2	88.3
	Conductivity (µS/cm)	661	789	871	845	413	780	722	739	649
	Specific Conductivity (µS/cm)	816	1205	1183	1,157	577	1156	1,066	1,101	1024
	pH	8.54	7.87	8.49	8.78	8.41	7.83	7.99	8.15	8.30
	ORP (mV)									
Station 2	Temperature (°C)	12.1	10.0	9.6	9.4	9.0	7.5	8.1	7.0	5.7
	Dissolved Oxygen (mg/L)	10.56	10.01	9.19	10.9	10.02	10.2	9.59	10.13	10.64
	Dissolved Oxygen (%)	99.1	89.4	80.9	95.5	86.9	85.6	81.4	83.8	84.9
	Conductivity (µS/cm)	617	858	830	816	820	771	722	724	640
	Specific Conductivity (µS/cm)	819	1202	1177	1,162	1181	1,157	1066.0	1,102	1013
	pH	8.51	7.69	8.27	8.71	8.72	7.97	8.00	8.06	8.27
	ORP (mV)									
Station 3	Temperature (°C)	7.9	7.8	7.7	8.8	7.0	5.8	8.0	5.9	5.7
	Dissolved Oxygen (mg/L)	9.98	10.48	9.39	10.75	10.38	9.38	9.57	9.94	10.61
	Dissolved Oxygen (%)	94.2	88.4	79.2	93.0	85.9	75.6	80.9	80.0	84.5
	Conductivity (µS/cm)	545	759	779	803	780	735	718	699	638
	Specific Conductivity (µS/cm)	808	1131	1164	1,162	1189	1,160	1066.0	1,101	1013
	pH	8.43	8.37	8.53	8.78	8.37	7.95	8.06	8.11	8.25
	ORP (mV)	-	-	-	-	-	-	-	-	-
Station 4	Temperature (°C)	-	-	-	7.7	-	-	-	5.6	-
	Dissolved Oxygen (mg/L)	-	-	-	11.04	-	-	-	9.48	-
	Dissolved Oxygen (%)	-	-	-	93.0	-	-	-	76.0	-
	Conductivity (µS/cm)	-	-	-	780	-	-	-	693	-
	Specific Conductivity (µS/cm)	-	-	-	1,165	-	-	-	1,102	-
	pH	-	-	-	8.67	-	-	-	8.16	-
	ORP (mV)	-	-	-		-	-	-		-
Station 5	Temperature (°C)	-	-	-	6.6	-	-	-	5.3	-
	Dissolved Oxygen (mg/L)	-	-	-	10.83	-	-	-	9.78	-
	Dissolved Oxygen (%)	-	-	-	88.9	-	-	-	78.9	-
	Conductivity (µS/cm)	-	-	-	758	-	-	-	688	-
	Specific Conductivity (µS/cm)	-	-	-	1,169	-	-	-	1,101	-
	pH	-	-	-	8.60	-	-	-	8.15	-
	ORP (mV)	-	-	-		-	-	-		-

Note: " - " indicates no data available

Table G.66: Kick and Sweep at Reference and Mine-exposed Areas, FRO LAEMP, September 2020

		RG_HENUP	RG_FO26	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD	RG_MP1	RG_FOUSH	RG_FOUKI
Station 1	Easting	655835	653044	651387	651432	650770	650866	650892	651180	650869	651828
	Northing	5567700	5569640	5566743	5565524	5564395	5563580	5563174	5562454	5560994	5559937
	Date	15-Sep-20	17-Sep-20	16-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	21-Sep-20	15-Sep-20	21-Sep-20	14-Sep-20
	Samplers' Initials	PES	PES	EH	MG	PES	PES	PES	MG	MG, PES	MG
	Number of Jars	1	1	1	2	1	1	1	1	1	1
	Total Kick Distance (m)	11	14	15	26	18	14	24	21	19	20
	Full Transect (Yes / No)	Y	N	Y	Y	Y	N	Y	Y	Y	Y
	Number of Transects	2.5	5.0	2.0	6.0	1.3	-	1.5	2.0	1.5	3.0
Station 2	Easting	655764	653046	651347	651384	650776	650868	650955	651137	650858	651835
	Northing	5567703	5569600	5566810	5565491	5564356	5563549	5563164	5562402	5560906	5559879
	Date	15-Sep-20	17-Sep-20	16-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	21-Sep-20	15-Sep-20	21-Sep-20	14-Sep-20
	Samplers' Initials	PES	EH	EH	MG	PES	PES	PES	MG	MG, PES	MG
	Number of Jars	1	1	1	2	1	1	1	1	1	1
	Total Kick Distance (m)	15	15	20	22	18	12	18	22	16	20
	Full Transect (Yes / No)	Y	Y	Y	Y	N	N	Y	Y	Y	Y
	Number of Transects	1.5	3.0	4.0	7.0	-	-	1.5	2.0	1.5	2.5
Station 3	Easting	655718	653037	651344	651313	650764	650861	651019	651116	650850	651877
	Northing	5567668	5569552	5566854	5565423	5564326	5563516	5563188	5562352	5560855	5559760
	Date	15-Sep-20	17-Sep-20	16-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	21-Sep-20	15-Sep-20	21-Sep-20	14-Sep-20
	Samplers' Initials	PES	PES	PES	MG	PES	PES	PES	MG	MG, PES	MG
	Number of Jars	1	1	1	2	1	1	1	1	1	1
	Total Kick Distance (m)	14	10	13	20	18	20	17	26	14	24
	Full Transect (Yes / No)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
	Number of Transects	3.5	2.0	0.5	5.0	3.5	6.0	1.5	1.5	1.0	1.5
Station 4	Easting			-	-	-	-	-	-	-	-
	Northing			-	-	-	-	-	-	-	-
	Date			-	-	-	-	-	-	-	-
	Samplers' Initials			-	-	-	-	-	-	-	-
	Number of Jars			-	-	-	-	-	-	-	-
	Total Kick Distance (m)			-	-	-	-	-	-	-	-
	Full Transect (Yes / No)			-	-	-	-	-	-	-	-
	Number of Transects			-	-	-	-	-	-	-	-
Station 5	Easting			-	-	-	-	-	-	-	-
	Northing			-	-	-	-	-	-	-	-
	Date			-	-	-	-	-	-	-	-
	Samplers' Initials			-	-	-	-	-	-	-	-
	Number of Jars			-	-	-	-	-	-	-	-
	Total Kick Distance (m)			-	-	-	-	-	-	-	-
	Full Transect (Yes / No)			-	-	-	-	-	-	-	-
	Number of Transects			-	-	-	-	-	-	-	-

Note: " - " indicates no data avialable

Table G.66: Kick and Sweep at Reference and Mine-exposed Areas, FRO LAEMP, September 2020

		RG_FOBKS	RG_SCOUTDS	RG_FOBSC	RG_FOBCP	RG_FRCP1SW	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Station 1	Easting	652044	652277	652295	652869	653304	653888	653789	654783	656265
	Northing	5558766	5558528	5558274	5557140	5556251	5555954	5555051	5553739	5551873
	Date	10-Sep-20	17-Sep-20	18-Sep-20	16-Sep-20	22-Sep-20	12-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20
	Samplers' Initials	MG	MG	MG	MG	PES	PES	MG	EH	MG
	Number of Jars	1	1	1	1	1	1	1	2	1
	Total Kick Distance (m)	24	20	22	25	15	18	26	15	22
	Full Transect (Yes / No)	Y	Y	Y	Y	Y	N	Y	N	Y
	Number of Transects	2.5	2.5	2.00	3.5	2.5	0.5	3.0	0.5	2.0
Station 2	Easting	652038	652317	652336	652919	653373	653891	653854	654782	656317
	Northing	5558739	5558462	5558188	5557086	5556218	5555954	5555050	5553693	5551875
	Date	10-Sep-20	17-Sep-20	18-Sep-20	16-Sep-20	22-Sep-20	12-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20
	Samplers' Initials	MG	MG	MG	MG	PES	PES	MG	PES	MG
	Number of Jars	1	1	1	1	1	1	1	2	1
	Total Kick Distance (m)	28	22	25	26	12	12	26	18	26
	Full Transect (Yes / No)	Y	Y	Y	Y	Y	N	Y	N	Y
	Number of Transects	2.5	3.0	2.5	2.5	5.0	0.5	3.0	0.8	2.0
Station 3	Easting	652034	652299	652418	652923	653447	653858	653899	654768	656366
	Northing	5558714	5558422	5558084	5557028	5556165	5555847	5555075	5553637	5551886
	Date	10-Sep-20	17-Sep-20	18-Sep-20	16-Sep-20	22-Sep-20	12-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20
	Samplers' Initials	MG	MG	MG	MG	PES	PES	MG	PES	MG
	Number of Jars	1	1	1	1	1	1	1	1	1
	Total Kick Distance (m)	30	23	26	25	12	9	25	15	30
	Full Transect (Yes / No)	Y	Y	Y	Y	Y	N	Y	N	Y
	Number of Transects	2.0	2.5	1.5	2.5	1.25	0.25	3.0	-	2.0
Station 4	Easting	-	-	-	652926	-	-	-	654794	-
	Northing	-	-	-	5556974	-	-	-	5553610	-
	Date	-	-	-	16-Sep-20	-	-	-	11-Sep-20	-
	Samplers' Initials	-	-	-	MG	-	-	-	PES	-
	Number of Jars	-	-	-	1	-	-	-	2	-
	Total Kick Distance (m)	-	-	-	22	-	-	-	17	-
	Full Transect (Yes / No)	-	-	-	y	-	-	-	n	-
	Number of Transects	-	-	-	3.0	-	-	-	-	-
Station 5	Easting	-	-	-	652984	-	-	-	654838	-
	Northing	-	-	-	5556882	-	-	-	5553598	-
	Date	-	-	-	16-Sep-20	-	-	-	16-Sep-20	-
	Samplers' Initials	-	-	-	MG	-	-	-	EH	-
	Number of Jars	-	-	-	1	-	-	-	2	-
	Total Kick Distance (m)	-	-	-	24	-	-	-	12	-
	Full Transect (Yes / No)	-	-	-	Y	-	-	-	n	-
	Number of Transects	-	-	-	4.0	-	-	-	4.0	-

Note: " - " indicates no data avialable

Table G.67: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed Areas, FRO LAEMP, September 2020

	Replicate		1	2	3	4	5	Mean
Reference	RG_HENUP							
	1	Depth (cm)	23.0	15.0	20.0	20.5	17.0	**19.1**
		Velocity (m/s)	0.551	0.360	0.520	0.190	0.410	**0.406**
	2	Depth (cm)	14.0	20.0	19.0	18.0	18.0	**17.8**
		Velocity (m/s)	0.670	0.350	0.350	0.410	0.600	**0.476**
	3	Depth (cm)	12.0	21.0	24.0	24.0	11.0	**18.4**
		Velocity (m/s)	0.370	0.690	0.520	0.580	0.130	**0.458**
	RG_FO26							
	1	Depth (cm)	13.0	9.0	11.5	11.0	10.0	**10.9**
		Velocity (m/s)	0.375	0.189	0.408	0.436	0.523	**0.386**
	2	Depth (cm)	6.5	11.0	12.5	15.5	9.0	**10.9**
		Velocity (m/s)	0.435	0.406	0.681	0.539	0.145	**0.441**
	3	Depth (cm)	12.0	16.0	13.0	18.5	14.0	**14.7**
		Velocity (m/s)	0.343	0.481	0.108	0.534	0.398	**0.373**
	RG_UFR1							
	1	Depth (cm)	11.5	11.0	21.0	17.0	19.0	**15.9**
		Velocity (m/s)	0.297	0.579	0.610	0.752	0.332	**0.514**
	2	Depth (cm)	19.0	17.0	18.5	20.0	17.0	**18.3**
		Velocity (m/s)	0.340	0.340	0.210	0.630	0.700	**0.444**
	3	Depth (cm)	18.5	14.0	15.5	17.5	15.0	**16.1**
		Velocity (m/s)	0.226	0.573	0.276	0.224	0.480	**0.356**
Mine-exposed	RG_FODHE							
	1	Depth (cm)	10.0	15.5	26.0	16.5	17.0	**17.0**
		Velocity (m/s)	0.467	0.554	0.878	1.003	0.456	**0.672**
	2	Depth (cm)	13.0	17.5	26.5	24.0	20.5	**20.3**
		Velocity (m/s)	0.102	0.578	0.837	0.337	0.647	**0.500**
	3	Depth (cm)	15.5	17.0	21.0	20.0	13.5	**17.4**
		Velocity (m/s)	0.304	0.929	0.723	0.841	0.087	**0.577**
	RG_FOUCL							
	1	Depth (cm)	11.0	13.0	10.5	10.0	12.5	**11.4**
		Velocity (m/s)	0.620	0.580	0.150	0.120	0.300	**0.354**
	2	Depth (cm)	18.5	19.0	20.0	23.5	13.0	**18.8**
		Velocity (m/s)	0.530	0.230	0.370	0.380	0.300	**0.362**
	3	Depth (cm)	11.0	9.5	11.5	10.0	15.0	**11.4**
		Velocity (m/s)	0.690	0.750	0.340	0.210	0.650	**0.528**
	RG_FOUNGD							
	1	Depth (cm)	9.0	9.0	7.5	6.5	7.0	**7.8**
		Velocity (m/s)	0.490	0.280	0.330	0.500	0.490	**0.418**
	2	Depth (cm)	6.5	7.5	9.0	6.5	7.0	**7.3**
		Velocity (m/s)	0.530	0.440	0.340	0.830	0.520	**0.532**
	3	Depth (cm)	7.5	14.5	9.5	13.0	18.5	**12.6**
		Velocity (m/s)	0.260	0.520	0.400	0.320	0.380	**0.376**
	RG_FODNGD							
	1	Depth (cm)	10.5	14.0	16.5	10.0	15.5	**13.3**
		Velocity (m/s)	0.518	0.504	0.618	0.757	0.447	**0.5688**
	2	Depth (cm)	17.5	15.0	27.0	30.0	19.0	**21.7**
		Velocity (m/s)	0.355	0.486	0.446	0.511	0.389	**0.437**
	3	Depth (cm)	15.5	21.0	22.5	14.5	17.5	**18.2**
		Velocity (m/s)	0.546	0.632	0.437	0.456	0.276	**0.469**
	RG_MP1							
	1	Depth (cm)	28.5	39.5	29.0	23.5	23.0	**28.7**
		Velocity (m/s)	0.193	0.423	0.883	0.547	0.542	**0.518**
	2	Depth (cm)	20.0	25.5	30.5	25.0	26.0	**25.4**
		Velocity (m/s)	0.429	0.394	0.689	0.364	0.616	**0.498**
	3	Depth (cm)	15.5	16.5	26.0	29.5	28.5	**23.2**
		Velocity (m/s)	0.545	0.855	0.766	0.581	0.600	**0.669**
	RG_FOUSH							
	1	Depth (cm)	20.5	16.0	20.0	26.0	13.5	**19.2**
		Velocity (m/s)	0.340	0.481	0.250	0.505	0.190	**0.353**
	2	Depth (cm)	11.5	11.0	13.5	14.5	18.0	**13.7**
		Velocity (m/s)	0.224	0.527	0.387	0.640	0.298	**0.415**
	3	Depth (cm)	12.0	9.0	8.5	17.5	14.0	**12.2**
		Velocity (m/s)	0.995	0.336	0.898	0.343	0.444	**0.603**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area.
Velocity was measured at the bottom of the water column.

Table G.67: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed Areas, FRO LAEMP, September 2020

	Replicate		1	2	3	4	5	Mean
Mine-exposed	**RG_FOUKI**							
	1	Depth (cm)	22.0	24.0	26.0	25.0	25.0	**24.4**
		Velocity (m/s)	0.360	0.840	0.780	0.710	0.620	**0.662**
	2	Depth (cm)	16.5	31.0	31.5	25.0	13.5	**23.5**
		Velocity (m/s)	0.400	0.800	0.960	1.130	0.260	**0.710**
	3	Depth (cm)	20.5	21.0	11.0	12.0	12.5	**15.4**
		Velocity (m/s)	0.690	0.370	0.280	0.640	0.310	**0.458**
	RG_FOBKS							
	1	Depth (cm)	16.5	20.5	24.5	23.5	14.0	**19.8**
		Velocity (m/s)	0.240	0.231	0.393	0.714	0.160	**0.348**
	2	Depth (cm)	17.0	21.5	18.5	19.5	12.5	**17.8**
		Velocity (m/s)	0.159	0.494	0.326	0.422	0.135	**0.307**
	3	Depth (cm)	9.5	16.5	18.0	21.5	16.0	**16.3**
		Velocity (m/s)	0.222	0.348	0.427	0.661	0.281	**0.388**
	RG_SCOUTDS							
	1	Depth (cm)	18.5	21.0	23.5	18.0	15.5	**19.3**
		Velocity (m/s)	0.316	0.527	0.641	0.642	0.792	**0.584**
	2	Depth (cm)	20.5	22.0	15.0	18.0	30.5	**21.2**
		Velocity (m/s)	0.380	0.546	0.500	0.414	0.832	**0.534**
	3	Depth (cm)	12.5	15.0	17.5	19.0	27.5	**18.3**
		Velocity (m/s)	0.335	0.301	0.501	0.567	0.727	**0.486**
	RG_FOBSC							
	1	Depth (cm)	11.5	14.5	21.0	13.0	10.5	**14.1**
		Velocity (m/s)	0.177	0.318	0.970	0.643	0.293	**0.480**
	2	Depth (cm)	10.5	16.0	20.5	21.0	12.5	**16.1**
		Velocity (m/s)	0.316	0.269	0.945	0.552	0.291	**0.475**
	3	Depth (cm)	9.5	14.5	19.0	23.0	12.0	**15.6**
		Velocity (m/s)	0.048	0.325	0.453	0.647	0.388	**0.372**
	RG_FOBCP							
	1	Depth (cm)	12.5	14.0	19.5	26.5	20.5	**18.6**
		Velocity (m/s)	0.293	0.241	0.374	0.504	0.450	**0.372**
	2	Depth (cm)	13.0	16.0	17.5	19.0	17.0	**16.5**
		Velocity (m/s)	0.277	0.307	0.405	0.436	0.215	**0.328**
	3	Depth (cm)	11.0	14.5	19.0	20.0	13.0	**15.5**
		Velocity (m/s)	0.215	0.377	0.480	0.602	0.226	**0.380**
	4	Depth (cm)	12.0	16.0	15.5	12.5	10.0	**13.200**
		Velocity (m/s)	0.373	0.424	0.480	0.538	0.284	**0.420**
	5	Depth (cm)	11.5	15.0	17.0	10.5	11.5	**13.1**
		Velocity (m/s)	0.320	0.783	0.800	0.132	0.574	**0.522**
	FRCP1SW							
	1	Depth (cm)	9.5	11.5	6.5	7.0	10.0	**8.9**
		Velocity (m/s)	0.496	1.094	0.566	0.499	0.35	**0.601**
	2	Depth (cm)	7.5	10.5	8.0	8.0	11.5	**9.1**
		Velocity (m/s)	0.472	0.71	1.178	0.197	0.583	**0.628**
	3	Depth (cm)	6.5	7.5	9.5	10.0	5.5	**7.8**
		Velocity (m/s)	0.242	0.332	0.39	0.418	0.217	**0.3198**
	RG_FRUPO							
	1	Depth (cm)	21.0	21.0	17.0	19.0	18.0	**19.2**
		Velocity (m/s)	0.700	0.730	0.710	0.510	0.530	**0.636**
	2	Depth (cm)	26.0	23.0	12.5	25.0	27.0	**22.7**
		Velocity (m/s)	0.470	0.480	0.620	0.750	0.780	**0.620**
	3	Depth (cm)	21.5	23.5	23.5	10.0	11.5	**18.0**
		Velocity (m/s)	0.900	0.850	0.740	0.300	0.550	**0.668**
	RG_FODPO							**#DIV/0!**
	1	Depth (cm)	16.5	30.0	33.5	17.0	7.5	**20.9**
		Velocity (m/s)	0.642	0.824	0.756	0.483	0.230	**0.587**
	2	Depth (cm)	9.0	11.5	27.5	8.5	7.0	**12.7**
		Velocity (m/s)	0.316	0.786	0.611	0.701	0.472	**0.577**
	3	Depth (cm)	7.5	15.0	22.0	30.5	23.5	**19.7**
		Velocity (m/s)	0.203	0.554	0.628	0.707	0.428	**0.504**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area.
Velocity was measured at the bottom of the water column.

Table G.67: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed Areas, FRO LAEMP, September 2020

			Replicate	1	2	3	4	5	Mean
Mine-exposed	RG_FO22								
	1	Depth (cm)		12.0	22.0	24.0	24.0	20.0	**20.4**
		Velocity (m/s)		0.660	0.790	0.530	0.830	0.520	**0.666**
	2	Depth (cm)		31.0	33.0	22.5	21.5	39.0	**29.4**
		Velocity (m/s)		0.780	1.110	0.790	0.610	0.850	**0.828**
	3	Depth (cm)		17.0	23.0	22.0	21.0	18.5	**20.3**
		Velocity (m/s)		0.820	0.520	0.630	0.460	0.400	**0.566**
	4	Depth (cm)		14.5	15.5	13.5	9.5	11.0	**12.800**
		Velocity (m/s)		0.510	0.700	0.700	0.520	0.520	**0.590**
	5	Depth (cm)		17.5	21.5	16.5	18.5	20.0	**18.8**
		Velocity (m/s)		0.500	0.340	0.330	0.720	0.680	**0.514**
	RG_FOUEW								
	1	Depth (cm)		14	24	28.5	36	31.5	**26.8**
		Velocity (m/s)		0.426	0.499	0.681	0.817	0.394	**0.563**
	2	Depth (cm)		11	22.5	41.5	32	20.5	**25.5**
		Velocity (m/s)		0.289	0.384	0.513	0.442	0.620	**0.450**
	3	Depth (cm)		12	19.5	22	23.5	17.5	**18.9**
		Velocity (m/s)		0.144	0.455	0.332	0.433	0.277	**0.328**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area.
Velocity was measured at the bottom of the water column.

Table G.68: Habitat Information at Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station ID		Reference			Mine-exposed			
		RG_HENUP	RG_FO26	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD
Waterbody		Fording	Fording	Fording	Fording	Fording	Fording	Fording
Date Sampled		15-Sep-20	17-Sep-20	16-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	21-Sep-20
Zone 11 UTMs - E		655718	653037	651387	651312	650764	650861	651022
Zone 11 UTMs - N		5567668	5569552	5566743	5565422	5564326	5563516	5563190
Elevation (m)		1,770	2,039	1,734	1,691	1,677	1,684	1,654
Samplers' Initials		PES/CAP/EH	PES/EH/CAP	PES/EH/CAP	MG/AW/MW	CAP/PES	CAP/PES	MG/PES/MW
Habitat Characteristics								
Site Access Description		Drive down road south side of Henretta Creek, park on road and walk	Drive on road north until parallel with site on map, hike west down hill, follow flags	drive down road North of Henretta and go past mine off gate	above Clode Ponds, u/s of haul bridge	walk from access road across field	walk down big hill from equipment storage area along road	off haul road, right of FR, switch back, hike 300 meters
Surrounding Land Use								
Anthropogenic Influences		None	none	logging	mining, logging	mining	mining	mining, logging
Length of Reach Assessed (m)			30	50	100	30	50	100
Station #1	**Channel Measurements**							
	Bankfull Width (m)	16.1	23.3	12.5	-	25.0	15.5	12.2
	Wetted Width (m)	8.6	9.6	5.9	-	16.5	10.5	10.1
Station #2	**Channel Measurements**							
	Bankfull Width (m)	8.7	16.6	14.3	-	17.5	9.4	12.4
	Wetted Width (m)	6.2	6.2	5.2	-	11	8.7	10.9
Station #3	**Channel Measurements**							
	Bankfull Width (m)	9.4	22.9	10.2	-	12.2	11.2	19.5
	Wetted Width (m)	6.9	6.1	5.85	-	11.2	4.5	11.0

Table G.68: Habitat Information at Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station ID		Mine-exposed						
		RG_MP1	RG_FOUSH	RG_FOUKI	RG_FOBKS	RG_SCOUTDS	RG_FOBSC	RG_FOBCP
Waterbody		Fording	Fording	Fording	Fording	Fording	Fording	Fording
Date Sampled		15-Sep-20	21-Sep-20	14-Sep-20	10-Sep-20	17-Sep-20	18-Sep-20	16-Sep-20
Zone 11 UTMs - E		651120	650848	651878	652036	652296	652418	652976
Zone 11 UTMs - N		5562350	5560856	5559760	5558715	5558428	5558084	5556886
Elevation (m)		1,643			1,606	1,592	1,586	1,570
Samplers' Initials		MG/MW/AW	MG/PES/MW	MG/AW/MW	MG/AW/MW	MG/AW/MW	MG/AW/MW	MG/AW/MW
Habitat Characteristics								
Site Access Description		off of main haul road. 500 meters u/s of enviro building	park at chemical plant, walk 350 meters d/s	u/s of swift bridge	u/s swift creek bridge	d/s of swift bridge	d/s of swift bridge	walk to site 350 m d/s from Teck w/s location (Greenhouse)
Surrounding Land Use								
Anthropogenic Influences		mining	mining, logging		mining, logging	mining, logging	mining, forestry	mining, logging
Length of Reach Assessed (m)		100	100	100	100	100	100	100
Station #1	**Channel Measurements**							
	Bankfull Width (m)	-	18.9	-	-	-	-	-
	Wetted Width (m)	-	11.6	-	-	-	-	-
Station #2	**Channel Measurements**							
	Bankfull Width (m)	-	21.9	-	-	-	-	-
	Wetted Width (m)	-	11.8	-	-	-	-	-
Station #3	**Channel Measurements**							
	Bankfull Width (m)	-	31	-	-	-	-	-
	Wetted Width (m)	-	10.2	-	-	-	-	-

Table G.68: Habitat Information at Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station ID		Mine-exposed				
		RG_FRCP1SW	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Waterbody		Fording	Fording	Fording	Fording	Fording
Date Sampled		22-Sep-20	12-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20
Zone 11 UTMs - E		653444	653858	653899	654838	656370
Zone 11 UTMs - N		5556175	5555847	5555078	5553598	5551885
Elevation (m)		1,571	1,576	1,577	1,556	1,565
Samplers' Initials		MG/PES/MW	PES/CAP	MG/AW/MW	PES/EH/CAP	MG/AW/MW
Habitat Characteristics						
Site Access Description		hike 200m from Swift road	switch back road off highway, walk down bank	off of Fording road, walk through field ~650 m	long hike through field and woods	200 m from gun range gate
Surrounding Land Use						
Anthropogenic Influences		mining, logging	logging	mining, logging	logging	mining, forestry, hunting/gun range
Length of Reach Assessed (m)		100	50	100	30	100
Station #1	**Channel Measurements**					
	Bankfull Width (m)	13.4	9.3	-	19.8	-
	Wetted Width (m)	9.5	7.5	-	19.8	-
Station #2	**Channel Measurements**					
	Bankfull Width (m)	22.5	17.6	-	16.8	-
	Wetted Width (m)	8.9	11.9	-	9.1	-
Station #3	**Channel Measurements**					
	Bankfull Width (m)	17.8	13.4	-	21.4	-
	Wetted Width (m)	13.8	12.1	-	17.0	-

Table G.69: Hess Sample Collection from Fording River, September 2020

Area	Replicate	Date	Time	Associated K&S Sample	Sample ID	Easting	Northing	Depth (cm)	Flow (m/s)
RG_HENUP	10	15-Sep-20	9:30	-	RG_HENUP_HESS-10_2020-09-15	655723	5567680	26.0	0.116
	9	15-Sep-20	9:50	-	RG_HENUP_HESS-9_2020-09-15	655724	5567677	23.0	0.261
	8	15-Sep-20	10:15	-	RG_HENUP_HESS-8_2020-09-15	655732	5567685	16.0	0.120
	7	15-Sep-20	10:50	-	RG_HENUP_HESS-7_2020-09-15	655740	5567694	21.0	0.251
	6	15-Sep-20	11:10	-	RG_HENUP_HESS-6_2020-09-15	655740	5567694	17.0	0.140
	5	15-Sep-20	11:30	-	RG_HENUP_HESS-5_2020-09-15	655776	5567700	14.0	0.230
	4	15-Sep-20	11:44	-	RG_HENUP_HESS-4_2020-09-15	655776	5567700	15.0	0.350
	3	15-Sep-20	12:50	-	RG_HENUP_HESS-3_2020-09-15	655815	5567710	19.0	0.260
	2	15-Sep-20	13:00	-	RG_HENUP_HESS-2_2020-09-15	655849	5567697	20.0	0.210
	1	15-Sep-20	13:15	-	RG_HENUP_HESS-1_2020-09-15	655891	5567732	13.0	0.260
RG_FO26	10	17-Sep-20	9:30	3	RG_F026_HESS-10_2020-09-17	653035	5569564	21.5	0.314
	9	17-Sep-20	10:00	3	RG_F026_HESS-9_2020-09-17	653035	5569564	14.0	0.257
	8	17-Sep-20	10:15	3	RG_F026_HESS-8_2020-09-17	653040	5569569	19.0	0.099
	7	17-Sep-20	11:00	2	RG_F026_HESS-7_2020-09-17	653045	5569577	14.0	0.249
	6	17-Sep-20	11:20	2	RG_F026_HESS-6_2020-09-17	653041	5569582	18.5	0.224
	5	17-Sep-20	11:45	2	RG_F026_HESS-5_2020-09-17	653045	5569584	17.5	0.302
	4	17-Sep-20	11:55	2	RG_F026_HESS-4_2020-09-17	653048	5569594	18.0	0.211
	3	17-Sep-20	12:30	1	RG_F026_HESS-3_2020-09-17	653046	5569620	22.0	0.240
	2	17-Sep-20	12:50	1	RG_F026_HESS-2_2020-09-17	653046	5569620	26.0	0.267
	1	17-Sep-20	13:15	1	RG_F026_HESS-1_2020-09-17	653037	5569652	14.5	0.270
RG_FOUKI	1	14-Sep-20	12:20	3	RG_FOUKI_HESS-1_2020-09-14	651860	5559767	21.0	0.380
	2	14-Sep-20	12:15	3	RG_FOUKI_HESS-2_2020-09-14	651869	5559760	16.0	0.440
	3	14-Sep-20	12:35	3	RG_FOUKI_HESS-3_2020-09-14	651866	5559769	14.0	0.170
	4	14-Sep-20	12:40	3	RG_FOUKI_HESS-4_2020-09-14	651860	5559770	22.0	0.390
	5	14-Sep-20	13:00	2	RG_FOUKI_HESS-5_2020-09-14	651828	5559873	23.5	0.380
	6	14-Sep-20	13:10	2	RG_FOUKI_HESS-6_2020-09-14	651829	5559874	24.5	0.320
	7	14-Sep-20	13:15	2	RG_FOUKI_HESS-7_2020-09-14	651828	5559874	20.0	0.370
	8	14-Sep-20	13:20	1	RG_FOUKI_HESS-8_2020-09-14	651817	5559945	24.0	0.309
	9	14-Sep-20	13:30	1	RG_FOUKI_HESS-9_2020-09-14	651814	5559956	26.0	0.265
	10	14-Sep-20	13:40	1	RG_FOUKI_HESS-10_2020-09-14	651814	5559944	21.0	0.317
RG_FOBKS	1	10-Sep-20	9:30	3	RG_FOBKS_HESS-1_2020-09-10	652041	5558723	19.5	0.224
	2	10-Sep-20	9:45	3	RG_FOBKS_HESS-2_2020-09-10	652042	5558719	23.0	0.176
	3	10-Sep-20	10:00	3	RG_FOBKS_HESS-3_2020-09-10	652045	5558716	24.5	0.248
	4	10-Sep-20	13:40	2	RG_FOBKS_HESS-4_2020-09-10	652034	5558745	19.0	0.242
	5	10-Sep-20	13:55	2	RG_FOBKS_HESS-5_2020-09-10	652036	5558754	22.5	0.284
	6	10-Sep-20	14:10	2	RG_FOBKS_HESS-6_2020-09-10	652039	5558750	22.0	0.172
	7	10-Sep-20	14:25	2	RG_FOBKS_HESS-7_2020-09-10	652044	5558750	19.5	0.281
	8	10-Sep-20	14:50	1	RG_FOBKS_HESS-8_2020-09-10	652037	5558756	22.5	0.197
	9	10-Sep-20	15:20	1	RG_FOBKS_HESS-9_2020-09-10	652040	5558766	21.5	0.284
	10	10-Sep-20	15:40	1	RG_FOBKS_HESS-10_2020-09-10	652038	5558773	24.5	0.243
RG_SCOUTDS	1	17-Sep-20	9:45	3	RG_SCOUTDS_HESS-1_2020-09-17	652305	5558423	20.5	0.401
	2	17-Sep-20	10:05	3	RG_SCOUTDS_HESS-2_2020-09-17	652303	5558426	19.0	0.370
	3	17-Sep-20	10:20	3	RG_SCOUTDS_HESS-3_2020-09-17	652301	5558428	18.5	0.294
	4	17-Sep-20	11:30	2	RG_SCOUTDS_HESS-4_2020-09-17	652319	5558463	19.5	0.380
	5	17-Sep-20	11:50	2	RG_SCOUTDS_HESS-5_2020-09-17	652320	5558465	24.5	0.226
	6	17-Sep-20	12:15	2	RG_SCOUTDS_HESS-6_2020-09-17	652317	5558451	21.5	0.233
	7	17-Sep-20	13:00	1	RG_SCOUTDS_HESS-7_2020-09-17	652365	5558530	26.0	0.368
	8	17-Sep-20	13:15	1	RG_SCOUTDS_HESS-8_2020-09-17	652263	5558530	19.0	0.319
	9	17-Sep-20	13:30	1	RG_SCOUTDS_HESS-9_2020-09-17	652275	5558524	18.5	0.260
	10	17-Sep-20	14:00	1	RG_SCOUTDS_HESS-10_2020-09-17	652265	5558533	20.0	0.255
RG_FOBSC	1	18-Sep-20	9:45	3	RG_FOBSC_HESS-1_2020-09-18	652414	5558098	23.0	0.230
	2	18-Sep-20	10:00	3	RG_FOBSC_HESS-2_2020-09-18	652418	5558095	22.5	0.304
	3	18-Sep-20	10:20	3	RG_FOBSC_HESS-3_2020-09-18	652426	5558093	17.5	0.320
	4	18-Sep-20	11:10	2	RG_FOBSC_HESS-4_2020-09-18	652334	5558173	20.5	0.240
	5	18-Sep-20	11:30	2	RG_FOBSC_HESS-5_2020-09-18	652331	5558191	16.5	0.290
	6	18-Sep-20	12:00	2	RG_FOBSC_HESS-6_2020-09-18	652326	5558194	18.0	0.331
	7	18-Sep-20	13:10	1	RG_FOBSC_HESS-7_2020-09-18	652301	5558261	18.5	0.273
	8	18-Sep-20	13:25	1	RG_FOBSC_HESS-8_2020-09-18	652280	5558273	16.5	0.308
	9	18-Sep-20	13:40	1	RG_FOBSC_HESS-9_2020-09-18	652278	5558275	18.0	0.290
	10	18-Sep-20	14:10	1	RG_FOBSC_HESS-10_2020-09-18	652298	5558269	22.0	0.261
RG_FOBCP	1	16-Sep-20	9:40	5	RG_FOBCP_HESS-1_2020-09-16	652976	5556872	21.5	0.190
	2	16-Sep-20	9:55	5	RG_FOBCP_HESS-2_2020-09-16	652967	5556887	19.0	0.373
	3	16-Sep-20	10:40	4	RG_FOBCP_HESS-3_2020-09-16	652929	5556971	20.5	0.380
	4	16-Sep-20	10:55	4	RG_FOBCP_HESS-4_2020-09-16	652928	5556973	18.0	0.250
	5	16-Sep-20	12:00	3	RG_FOBCP_HESS-5_2020-09-16	652922	5557029	17.5	0.248
	6	16-Sep-20	12:25	3	RG_FOBCP_HESS-6_2020-09-16	652922	5557047	22.0	0.369
	7	16-Sep-20	13:00	2	RG_FOBCP_HESS-7_2020-09-16	652919	5557086	16.5	0.377
	8	16-Sep-20	13:30	2	RG_FOBCP_HESS-8_2020-09-16	652919	5557081	20.0	0.325
	9	16-Sep-20	15:00	1	RG_FOBCP_HESS-9_2020-09-16	652879	5557149	16.5	0.329
	10	16-Sep-20	15:20	1	RG_FOBCP_HESS-10_2020-09-16	652865	5557148	17.5	0.223
RG_FRCP1SW	1	22-Sep-20	10:10	3	RG_FRCP1SW_HESS-1_2020-09-22	653517	5556172	17.0	0.302
	2	22-Sep-20	11:00	3	RG_FRCP1SW_HESS-2_2020-09-22	653514	5556180	24.0	0.172
	3	22-Sep-20	11:30	3	RG_FRCP1SW_HESS-3_2020-09-22	653551	5556174	21.0	0.151
	4	22-Sep-20	12:10	3	RG_FRCP1SW_HESS-4_2020-09-22	653428	5556187	23.5	0.101
	5	22-Sep-20	12:35	2	RG_FRCP1SW_HESS-5_2020-09-22	653383	5556207	26.0	0.209
	6	22-Sep-20	12:55	2	RG_FRCP1SW_HESS-6_2020-09-22	653368	5556212	19.5	0.218
	7	22-Sep-20	13:20	2	RG_FRCP1SW_HESS-7_2020-09-22	653355	5556215	22.5	0.361
	8	22-Sep-20	13:50	1	RG_FRCP1SW_HESS-8_2020-09-22	653304	5556219	19.5	0.115
	9	22-Sep-20	-	1	RG_FRCP1SW_HESS-9_2020-09-22	653301	5556229	20.5	0.253
	10	22-Sep-20	-	1	RG_FRCP1SW_HESS-10_2020-09-22	653300	5556249	19.0	0.331
RG_FRUPO	1	12-Sep-20	-	1	RG_FRUPO_HESS-1_2020-09-12	-	-	23.0	0.310
	2	12-Sep-20	-	1	RG_FRUPO_HESS-2_2020-09-12	-	-	14.5	0.310
	3	12-Sep-20	-	1	RG_FRUPO_HESS-3_2020-09-12	-	-	17.0	0.390
	4	12-Sep-20	-	1	RG_FRUPO_HESS-4_2020-09-12	-	-	26.5	0.270
	5	12-Sep-20	-	2	RG_FRUPO_HESS-5_2020-09-12	-	-	21.0	0.400
	6	12-Sep-20	-	2	RG_FRUPO_HESS-6_2020-09-12	-	-	16.5	0.600
	7	12-Sep-20	-	2	RG_FRUPO_HESS-7_2020-09-12	-	-	14.0	0.480
	8	12-Sep-20	-	3	RG_FRUPO_HESS-8_2020-09-12	-	-	16.5	0.250
	9	12-Sep-20	-	3	RG_FRUPO_HESS-9_2020-09-12	-	-	16.0	0.290
	10	12-Sep-20	-	3	RG_FRUPO_HESS-10_2020-09-12	-	-	15.5	0.220

Table G.70: Streamside and Instream Vegetation at Reference and Mine-exposed Areas, FRO LAEMP, September 2020

Station ID	Reference			Mine-exposed						
	RG_HENUP	RG_FO26	RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD	RG_MP1	RG_FOUSH	RG_FOUKI
Canopy Coverage (%)	0	0	1-25%	0%	1-25%	0%	1-25%	-	0%	0%
Streamside Vegetation	-	Ferns/grass, shrubs, coniferous trees	ferns/grass, shrubs, coniferous trees	ferns/grass	-	ferns/grass, coniferous trees	ferns/grass	-	ferns/grass	ferns/grass
Macrophyte Coverage (%)	0%	0%	0%	0%	0%	0%	0%	-	0%	0%
Periphyton Coverage Score (1-5)	3	3	1	3	1	1	2	-	2	2
Station ID	**Mine-exposed**									
	RG_FOBKS	RG_SCOUTDS	RG_FOBSC	RG_FOBCP	RG_FRCP1SW	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW	
Canopy Coverage (%)	1-25%	0%	0%	0%	0	1-25%	1-25%	1-25%	1-25%	
Streamside Vegetation	ferns/grass	-	ferns/grass	ferns/grass	-	ferns/grass, coniferous trees	ferns/grass	ferns/grass, coniferous trees	ferns/grass	
Macrophyte Coverage (%)	0%	0%	0%	0%	0%	0%	0%	0	0%	
Periphyton Coverage Score (1-5)	1	2	2	-	1	3	2	1	2	

Notes: "-" indicates no data recorded. Periphyton coverage scores are as follows: 1 - Rocks not slippery, no obvious colour (<0.5mm thick), 2 - Rocks slightly slippery, yellow-brown to light green in colour (0.5-1mm thick), 3 - Rocks have noticeble slippery feel, patches of thicker green to brown algae (1-5mm thick), 4 - Rocks are very slippery, numerous clumps (5-20mm thick), 5 - Rocks mostly obscurred by algae mat, may have long strands (>20mm thick).

1 - Rocks not slippery, no obvious colour (<0.5mm thick)

2 - Rocks slightly slippery, yellow-brown to light green in colour (0.5-1mm thick)

3 - Rocks have noticeble slippery feel, patches of thicker green to brown algae (1-5mm thick)

4 - Rocks are very slippery, numerous clumps (5-20mm thick)

5 - Rocks mostly obscurred by algae mat, may have long strands (>20mm thick)

"-" indicates no data recorded.

Table G.71: Periphyton-Calcite Tissue Samples

Date (dd-MMM-yy): 17-Sep-20 Station Identifier: RG_FO26

Ref / Exp: Ref Waterbody: Fording River

PERIPHYTON COVERAGE

1 - Rocks not slippery, no obvious colour (<0.5mm thick)

2 - Rocks slightly slippery, yellow-brown to light green colour (0.5-1mm thick)

3 - Rocks have noticeable slippery feel, patches of thicker green to brown algae (1-5mm thick)

4 - Rocks are very slippery, numerous clumps (5-20mm thick)

5 - Rocks mostly obscured by algae mat, may have long strands (>20mm thick)

Rep #	Easting	Northing	Periphyton Score	Observations
1	653044	5569640	3/4	
2	653046	5569600	3	calcite present
3	653034	5569557	3	

Table G.72: Pebble Count at RG_UFR1, FRO LAEMP, December 2020

Rock	RG_UFR1-1				RG_UFR1-2				RG_UFR1-3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	-	-	13.0		-	-	11.0		-	-	5.0	
2	-	-	14.0		-	-	7.5		-	-	6.0	
3	-	-	6.0		-	-	6.0		-	-	7.0	
4	-	-	6.5		-	-	8.0		-	-	5.5	
5	-	-	10.0		-	-	4.5		-	-	17.0	
6	-	-	8.5		-	-	12.0		-	-	5.5	
7	-	-	2.0		-	-	7.0		-	-	3.5	
8	-	-	5.0		-	-	7.5		-	-	3.0	
9	-	-	8.0		-	-	5.0		-	-	6.0	
10	-	-	5.0	0.00	-	-	6.0	0.25	-	-	4.0	0
11	-	-	7.0		-	-	3.0		-	-	3.0	
12	-	-	8.0		-	-	11.5		-	-	9.0	
13	-	-	5.0		-	-	5.5		-	-	3.0	
14	-	-	11.0		-	-	8.0		-	-	5.0	
15	-	-	12.5		-	-	7.0		-	-	7.0	
16	-	-	5.0		-	-	17.0		-	-	7.0	
17	-	-	7.0		-	-	8.0		-	-	10.0	
18	-	-	3.0		-	-	10.0		-	-	6.5	
19	-	-	7.0		-	-	5.0		-	-	12.0	
20	-	-	6.0	0	-	-	6.5	0.5	-	-	5.5	0.25
21	-	-	9.5		-	-	sand		-	-	4.0	
22	-	-	7.0		-	-	4.0		-	-	8.0	
23	-	-	5.0		-	-	5.0		-	-	6.0	
24	-	-	7.5		-	-	7.5		-	-	1.0	
25	-	-	7.0		-	-	9.5		-	-	3.0	
26	-	-	3.0		-	-	4.5		-	-	sand	
27	-	-	3.0		-	-	6.5		-	-	8.0	
28	-	-	11.5		-	-	9.0		-	-	2.5	
29	-	-	7.0		-	-	18.0		-	-	16.0	
30	-	-	7.0	0.50	-	-	5.5	0.50	-	-	10.0	0
31	-	-	9.0		-	-	6.0		-	-	sand	
32	-	-	4.0		-	-	8.5		-	-	6.5	
33	-	-	3.0		-	-	7.0		-	-	20.0	
34	-	-	2.5		-	-	10.5		-	-	4.0	
35	-	-	4.0		-	-	2.5		-	-	3.0	
36	-	-	7.5		-	-	5.5		-	-	4.5	
37	-	-	10.0		-	-	10.5		-	-	13.0	
38	-	-	14.0		-	-	4.0		-	-	4.5	
39	-	-	7.0		-	-	2.0		-	-	4.0	
40	-	-	12.0	0.75	-	-	2.5	0	-	-	-	0.25
41	-	-	7.0		-	-	6.0		-	-	13.0	
42	-	-	9.0		-	-	8.0		-	-	13.0	
43	-	-	16.0		-	-	8.5		-	-	12.0	
44	-	-	3.5		-	-	6.0		-	-	11.5	
45	-	-	6.5		-	-	1.5		-	-	6.0	
46	-	-	9.0		-	-	13.0		-	-	sand	
47	-	-	7.0		-	-	8.0		-	-	13.0	
48	-	-	3.5		-	-	6.0		-	-	7.0	
49	-	-	5.0		-	-	7.0		-	-	5.5	
50	-	-	2.5	0	-	-	sand	0	-	-	4.0	0.25
51	-	-	6.0		-	-	5.5		-	-	5.5	
52	-	-	5.5		-	-	5.0		-	-	3.5	
53	-	-	7.5		-	-	4.0		-	-	15.0	
54	-	-	2.5		-	-	18.0		-	-	23.0	
55	-	-	4.0		-	-	12.0		-	-	18.0	
56	-	-	10.0		-	-	10.0		-	-	9.0	
57	-	-	9.0		-	-	13.0		-	-	3.5	
58	-	-	10.0		-	-	7.5		-	-	4.5	
59	-	-	9.5		-	-	13.5		-	-	6.5	
60	-	-	5.5	0.25	-	-	22.0	0.75	-	-	4.5	0
61	-	-	3.0		-	-	4.5		-	-	4.0	
62	-	-	5.5		-	-	11.5		-	-	15.0	
63	-	-	2.5		-	-	13.0		-	-	6.0	
64	-	-	5.0		-	-	4.0		-	-	5.0	
65	-	-	5.5		-	-	7.0		-	-	4.0	
66	-	-	5.5		-	-	7.5		-	-	sand	
67	-	-	6.5		-	-	4.0		-	-	5.5	
68	-	-	7.5		-	-	8.0		-	-	8.0	
69	-	-	17.5		-	-	3.0		-	-	18.0	
70	-	-	7.5	0.75	-	-	3.0	0.25	-	-	5.5	0.5
71	-	-	7.0		-	-	4.5		-	-	2.5	
72	-	-	4.0		-	-	6.0		-	-	5.0	
73	-	-	2.5		-	-	5.5		-	-	10.0	
74	-	-	3.0		-	-	4.0		-	-	17.0	
75	-	-	11.0		-	-	10.0		-	-	4.0	
76	-	-	4.0		-	-	6.5		-	-	9.0	
77	-	-	4.0		-	-	9.0		-	-	19.0	
78	-	-	2.5		-	-	12.0		-	-	5.0	
79	-	-	5.0		-	-	8.0		-	-	9.0	
80	-	-	9.0	0.00	-	-	4.5	0.5	-	-	9.0	0
81	-	-	6.5		-	-	10.5		-	-	15.0	
82	-	-	7.5		-	-	8.5		-	-	3.0	
83	-	-	20.0		-	-	11.0		-	-	6.0	
84	-	-	4.0		-	-	10.0		-	-	7.5	
85	-	-	2.5		-	-	3.5		-	-	8.0	
86	-	-	3.0		-	-	2.0		-	-	5.0	
87	-	-	11.5		-	-	7.0		-	-	9.5	
88	-	-	5.0		-	-	3.0		-	-	6.5	
89	-	-	5.0		-	-	7.5		-	-	15.0	
90	-	-	13.0	0.25	-	-	4.5	0.25	-	-	11.0	0.25
91	-	-	10.0		-	-	4.0		-	-	13.0	
92	-	-	4.5		-	-	12.0		-	-	3.5	
93	-	-	2.5		-	-	5.5		-	-	3.5	
94	-	-	8.0		-	-	4.0		-	-	5.0	
95	-	-	12.5		-	-	16.5		-	-	8.0	
96	-	-	5.0		-	-	6.0		-	-	4.0	
97	-	-	3.5		-	-	7.5		-	-	2.0	
98	-	-	6.0		-	-	5.0		-	-	5.0	
99	-	-	4.5		-	-	14.0		-	-	sand	
100	-	-	6.5	0.5	-	-	5.0	0.25	-	-	7.0	0
Minimum	**-**	**-**	**2.00**	**0**	**-**	**-**	**1.50**	**0**	**-**	**-**	**1.00**	**0**
Maximum	**-**	**-**	**20.0**	**0.750**	**-**	**-**	**22.0**	**0.750**	**-**	**-**	**23.0**	**0.500**
Mean	**-**	**-**	**6.9**	**0.300**	**-**	**-**	**7.57**	**0.325**	**-**	**-**	**7.71**	**0.150**
Standard Dev.	**-**	**-**	**3.54**	**0.307**	**-**	**-**	**3.87**	**0.237**	**-**	**-**	**4.69**	**0.175**
Geometric mean	**-**	**-**	**6.05**	**-**	**-**	**-**	**6.67**	**-**	**-**	**-**	**6.50**	**-**
Median	**-**	**-**	**6.50**	**0**	**-**	**-**	**7.00**	**0.250**	**-**	**-**	**6.00**	**0.125**
Calcite Index	**-**		**-**	**-**	**-**		**-**	**-**	**-**		**-**	**-**

Table G.73: Pebble Count at RG_SCOUTDS, FRO LAEMP, December 2019

Rock	RG_SCOUTDS 3				RG_SCOUTDS 2				RG_SCOUTDS 1			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	-	-	4.3		-	-	11.2		-	-	19.8	
2	-	-	1.5		-	-	6.5		-	-	7.6	
3	-	-	5.2		-	-	6.2		-	-	8.9	
4	-	-	6.6		-	-	3.1		-	-	5.0	
5	-	-	13.2		-	-	10.5		-	-	8.4	
6	-	-	15.2		-	-	9.0		-	-	7.6	
7	-	-	4.6		-	-	8.6		-	-	8.7	
8	-	-	3.8		-	-	7.4		-	-	5.0	
9	-	-	12.9		-	-	8.2		-	-	11.5	
10	-	-	12.5	0	-	-	4.3	0	-	-	8.1	0.00
11	-	-	7.2		-	-	10.5		-	-	5.6	
12	-	-	14.3		-	-	12.1		-	-	5.5	
13	-	-	11.1		-	-	9.2		-	-	7.0	
14	-	-	15.6		-	-	14.3		-	-	9.0	
15	-	-	5.6		-	-	7.5		-	-	10.4	
16	-	-	6.9		-	-	6.6		-	-	6.4	
17	-	-	13.4		-	-	10.2		-	-	4.9	
18	-	-	11.8		-	-	7.0		-	-	8.2	
19	-	-	2.6		-	-	9.5		-	-	8.6	
20	-	-	12.1	0	-	-	7.6	0	-	-	8.3	0
21	-	-	4.9		-	-	6.1		-	-	6.1	
22	-	-	3.2		-	-	10.1		-	-	5.1	
23	-	-	4.0		-	-	5.4		-	-	7.0	
24	-	-	6.8		-	-	7.2		-	-	4.9	
25	-	-	11.2		-	-	13.0		-	-	6.0	
26	-	-	7.8		-	-	5.5		-	-	4.5	
27	-	-	5.9		-	-	6.0		-	-	5.3	
28	-	-	6.5		-	-	8.4		-	-	8.0	
29	-	-	11.0		-	-	5.4		-	-	8.6	
30	-	-	9.5	0.25	-	-	9.0	0	-	-	5.0	0.25
31	-	-	6.0		-	-	6.3		-	-	4.8	
32	-	-	7.0		-	-	7.6		-	-	5.6	
33	-	-	8.2		-	-	11.7		-	-	5.9	
34	-	-	8.6		-	-	16.5		-	-	12.2	
35	-	-	18.0		-	-	10.2		-	-	13.5	
36	-	-	6.1		-	-	6.7		-	-	10.6	
37	-	-	7.2		-	-	10.7		-	-	3.2	
38	-	-	18.3		-	-	11.8		-	-	3.4	
39	-	-	7.0		-	-	9.2		-	-	12.0	
40	-	-	8.2	0.25	-	-	5.1	0	-	-	4.8	0.25
41	-	-	14.0		-	-	6.7		-	-	2.6	
42	-	-	7.0		-	-	10.4		-	-	9.0	
43	-	-	5.5		-	-	5.9		-	-	18.0	
44	-	-	3.2		-	-	7.8		-	-	11.6	
45	-	-	6.5		-	-	6.2		-	-	12.2	
46	-	-	8.3		-	-	6.5		-	-	10.7	
47	-	-	7.0		-	-	7.4		-	-	10.0	
48	-	-	10.2		-	-	8.4		-	-	6.2	
49	-	-	9.0		-	-	7.9		-	-	13.5	
50	-	-	7.3	0.5	-	-	5.0	0	-	-	5.9	0
51	-	-	11.5		-	-	6.2		-	-	6.1	
52	-	-	11.1		-	-	4.9		-	-	7.8	
53	-	-	9.2		-	-	3.1		-	-	9.0	
54	-	-	8.9		-	-	6.7		-	-	10.5	
55	-	-	11.0		-	-	8.0		-	-	6.6	
56	-	-	7.6		-	-	7.5		-	-	7.7	
57	-	-	5.0		-	-	5.9		-	-	12.5	
58	-	-	6.1		-	-	5.5		-	-	8.6	
59	-	-	6.8		-	-	6.8		-	-	9.2	
60	-	-	5.9	0	-	-	5.3	0.25	-	-	7.1	0.25
61	-	-	8.0		-	-	2.0		-	-	14.5	
62	-	-	4.0		-	-	5.4		-	-	3.6	
63	-	-	6.1		-	-	8.4		-	-	4.0	
64	-	-	7.5		-	-	5.0		-	-	6.9	
65	-	-	6.3		-	-	14.3		-	-	8.3	
66	-	-	5.7		-	-	6.6		-	-	5.6	
67	-	-	7.5		-	-	7.1		-	-	7.8	
68	-	-	7.4		-	-	3.6		-	-	8.2	
69	-	-	6.4		-	-	8.8		-	-	15.0	
70	-	-	4.3	0	-	-	4.9	0.25	-	-	11.0	0.25
71	-	-	7.2		-	-	6.0		-	-	17.6	
72	-	-	13.1		-	-	4.5		-	-	12.0	
73	-	-	6.0		-	-	3.9		-	-	6.9	
74	-	-	9.5		-	-	7.5		-	-	9.5	
75	-	-	5.4		-	-	3.7		-	-	8.4	
76	-	-	10.6		-	-	4.5		-	-	7.5	
77	-	-	21.0		-	-	3.8		-	-	6.5	
78	-	-	8.2		-	-	8.9		-	-	4.2	
79	-	-	6.4		-	-	4.9		-	-	8.3	
80	-	-	8.7	0	-	-	8.0	0	-	-	8.5	0
81	-	-	5.1		-	-	8.6		-	-	7.6	
82	-	-	9.2		-	-	7.5		-	-	4.2	
83	-	-	4.4		-	-	5.4		-	-	4.8	
84	-	-	10.0		-	-	4.2		-	-	8.3	
85	-	-	9.2		-	-	11.7		-	-	14.0	
86	-	-	7.4		-	-	7.5		-	-	9.5	
87	-	-	8.7		-	-	8.7		-	-	12.4	
88	-	-	sand		-	-	8.3		-	-	11.2	
89	-	-	2.2		-	-	10.0		-	-	16.5	
90	-	-	3.2	0	-	-	4.3	0.75	-	-	4.8	0.00
91	-	-	11.4		-	-	8.5		-	-	8.5	
92	-	-	5.6		-	-	12.1		-	-	7.9	
93	-	-	8.6		-	-	4.3		-	-	9.4	
94	-	-	6.6		-	-	8.4		-	-	7.2	
95	-	-	5.4		-	-	5.2		-	-	7.5	
96	-	-	7.3		-	-	4.8		-	-	6.0	
97	-	-	6.6		-	-	4.8		-	-	13.8	
98	-	-	2.5		-	-	5.0		-	-	8.0	
99	-	-	8.9		-	-	6.4		-	-	7.5	
100	-	-	3.6	0.25	-	-	6.6	0.5	-	-	4.1	0
Minimum	**-**	**-**	**1.50**	**0**	**-**	**-**	**2.00**	**0**	**-**	**-**	**2.60**	**0**
Maximum	**-**	**-**	**21.0**	**0.500**	**-**	**-**	**16.5**	**0.750**	**-**	**-**	**19.8**	**0.250**
Mean	**-**	**-**	**8.00**	**0.125**	**-**	**-**	**7.38**	**0.1750**	**-**	**-**	**8.33**	**0.100**
Standard Dev.	**-**	**-**	**3.60**	**0.177**	**-**	**-**	**2.68**	**0.265**	**-**	**-**	**3.40**	**0.129**
Geometric mean	**-**	**-**	**7.23**	**-**	**-**	**-**	**6.91**	**-**	**-**	**-**	**7.70**	**-**
Median	**-**	**-**	**7.20**	**0**	**-**	**-**	**7.05**	**0**	**-**	**-**	**7.95**	**0**
Calcite Index	**-**		**-**	**-**	**-**		**-**	**-**	**-**		**-**	**-**

Table G.74: Pebble Count at RG_FRUPO, FRO LAEMP, December 2019

Rock	RG_FRUPO 1				RG_FRUPO 2				RG_FRUPO 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	-	-	7.0		-	-	32.0		-	-	6.0	
2	-	-	6.5		-	-	31.5		-	-	5.0	
3	-	-	10.0		-	-	14.0		-	-	6.0	
4	-	-	6.0		-	-	12.0		-	-	8.0	
5	-	-	7.0		-	-	6.0		-	-	5.5	
6	-	-	9.5		-	-	15.0		-	-	5.0	
7	-	-	6.5		-	-	4.5		-	-	8.0	
8	-	-	9.0		-	-	11.0		-	-	6.0	
9	-	-	7.0		-	-	sand		-	-	6.0	
10	-	-	7.5	0.25	-	-	8.0	0.25	-	-	5.5	0.25
11	-	-	5.5		-	-	13.0		-	-	8.0	
12	-	-	6.5		-	-	7.5		-	-	4.5	
13	-	-	8.5		-	-	12.0		-	-	3.0	
14	-	-	7.0		-	-	8.5		-	-	3.5	
15	-	-	13.0		-	-	6.5		-	-	2.0	
16	-	-	8.0		-	-	4.5		-	-	1.0	
17	-	-	9.0		-	-	10.0		-	-	3.0	
18	-	-	10.0		-	-	4.0		-	-	4.0	
19	-	-	7.5		-	-	7.5		-	-	8.0	
20	-	-	7.0	0	-	-	7.0	0	-	-	2.5	0
21	-	-	6.0		-	-	2.0		-	-	4.5	
22	-	-	7.0		-	-	9.5		-	-	8.5	
23	-	-	5.5		-	-	10.5		-	-	5.5	
24	-	-	9.0		-	-	6.5		-	-	5.5	
25	-	-	6.5		-	-	9.0		-	-	7.0	
26	-	-	5.5		-	-	7.5		-	-	8.0	
27	-	-	9.0		-	-	4.0		-	-	7.0	
28	-	-	7.5		-	-	8.0		-	-	5.5	
29	-	-	5.0		-	-	9.0		-	-	3.5	
30	-	-	10.0	0	-	-	9.5	0.25	-	-	5.0	0.25
31	-	-	6.5		-	-	11.5		-	-	2.0	
32	-	-	9.5		-	-	11.5		-	-	6.0	
33	-	-	5.5		-	-	13.0		-	-	5.0	
34	-	-	7.0		-	-	18.0		-	-	5.0	
35	-	-	8.5		-	-	24.5		-	-	sand	
36	-	-	6.5		-	-	11.0		-	-	8.5	
37	-	-	8.5		-	-	9.0		-	-	5.5	
38	-	-	8.0		-	-	15.0		-	-	6.5	
39	-	-	11.0		-	-	7.5		-	-	7.0	
40	-	-	7.5	0.25	-	-	11.0	0.5	-	-	1.5	0
41	-	-	8.0		-	-	5.0		-	-	7.0	
42	-	-	9.5		-	-	9.0		-	-	3.0	
43	-	-	7.0		-	-	16.0		-	-	5.5	
44	-	-	7.0		-	-	6.5		-	-	4.0	
45	-	-	10.0		-	-	16.0		-	-	6.0	
46	-	-	7.0		-	-	5.5		-	-	6.5	
47	-	-	6.0		-	-	18.5		-	-	3.5	
48	-	-	10.0		-	-	8.0		-	-	5.0	
49	-	-	9.5		-	-	4.5		-	-	7.5	
50	-	-	6.5	0.25	-	-	12.0	0.25	-	-	7.0	0.25
51	-	-	10.0		-	-	5.0		-	-	3.5	
52	-	-	8.0		-	-	8.5		-	-	3.0	
53	-	-	8.0		-	-	8.0		-	-	4.5	
54	-	-	10.0		-	-	11.5		-	-	5.5	
55	-	-	8.5		-	-	9.0		-	-	4.0	
56	-	-	11.5		-	-	6.0		-	-	1.0	
57	-	-	6.0		-	-	sand		-	-	5.5	
58	-	-	9.0		-	-	13.0		-	-	6.5	
59	-	-	8.0		-	-	12.0		-	-	15.0	
60	-	-	3.0	0	-	-	8.5	0	-	-	7.0	0
61	-	-	11.0		-	-	9.5		-	-	3.0	
62	-	-	18.0		-	-	16.0		-	-	4.5	
63	-	-	5.0		-	-	7.0		-	-	5.5	
64	-	-	13.5		-	-	9.5		-	-	6.0	
65	-	-	9.5		-	-	16.5		-	-	6.5	
66	-	-	8.0		-	-	10.0		-	-	10.0	
67	-	-	9.5		-	-	sand		-	-	4.5	
68	-	-	7.0		-	-	12.0		-	-	2.0	
69	-	-	10.0		-	-	10.5		-	-	5.0	
70	-	-	sand	0	-	-	6.5	0	-	-	7.0	0.25
71	-	-	6.5		-	-	6.0		-	-	7.5	
72	-	-	11.5		-	-	15.5		-	-	2.0	
73	-	-	8.5		-	-	2.0		-	-	5.5	
74	-	-	1.5		-	-	1.5		-	-	4.0	
75	-	-	5.0		-	-	13.0		-	-	3.0	
76	-	-	1.0		-	-	10.5		-	-	4.0	
77	-	-	10.0		-	-	2.0		-	-	3.5	
78	-	-	4.0		-	-	4.0		-	-	6.0	
79	-	-	3.0		-	-	10.0		-	-	6.5	
80	-	-	6.0	0	-	-	7.5	0.00	-	-	7.5	0.5
81	-	-	6.5		-	-	0.5		-	-	4.5	
82	-	-	10.0		-	-	4.0		-	-	6.0	
83	-	-	4.5		-	-	sand		-	-	6.5	
84	-	-	5.0		-	-	5.0		-	-	3.5	
85	-	-	9.0		-	-	2.0		-	-	1.0	
86	-	-	3.0		-	-	7.0		-	-	5.5	
87	-	-	5.5		-	-	2.5		-	-	6.5	
88	-	-	6.5		-	-	1.5		-	-	3.5	
89	-	-	12.0		-	-	9.0		-	-	6.0	
90	-	-	10.0	0.25	-	-	10.0	0.75	-	-	4.0	0
91	-	-	5.5		-	-	7.5		-	-	4.0	
92	-	-	9.0		-	-	16.0		-	-	5.5	
93	-	-	8.0		-	-	6.0		-	-	2.0	
94	-	-	9.0		-	-	3.0		-	-	5.5	
95	-	-	6.5		-	-	6.5		-	-	8.0	
96	-	-	7.0		-	-	9.5		-	-	5.0	
97	-	-	9.0		-	-	6.0		-	-	4.5	
98	-	-	12.0		-	-	5.0		-	-	3.0	
99	-	-	9.0		-	-	6.5		-	-	6.0	
100	-	-	9.0	0	-	-	8.0	0	-	-	3.5	0
Minimum	**-**	**-**	**1.00**	**0**	**-**	**-**	**0.50**	**0**	**-**	**-**	**1.000**	**0**
Maximum	**-**	**-**	**18.0**	**0.250**	**-**	**-**	**32.0**	**0.750**	**-**	**-**	**15.0**	**0.500**
Mean	**-**	**-**	**7.82**	**0.100**	**-**	**-**	**9.27**	**0.200**	**-**	**-**	**5.21**	**0.1500**
Standard Dev.	**-**	**-**	**2.52**	**0.129**	**-**	**-**	**5.42**	**0.258**	**-**	**-**	**2.12**	**0.175**
Geometric mean	**-**	**-**	**7.33**	**-**	**-**	**-**	**7.75**	**-**	**-**	**-**	**4.72**	**-**
Median	**-**	**-**	**8.00**	**0.000**	**-**	**-**	**8.50**	**0**	**-**	**-**	**5.50**	**0**
Calcite Index	**-**		**-**	**-**	**-**		**-**	**-**	**-**		**-**	**-**

Table G.75: Pebble Count at RG_FODPO, FRO LAEMP, December 2019

Rock	RG_FODPO 2				RG_FODPO 1				RG_FODPO 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	-	-	5.5		-	-	5.5		-	-	8.5	
2	-	-	4.5		-	-	4.5		-	-	5.5	
3	-	-	1.0		-	-	3.0		-	-	1.5	
4	-	-	4.0		-	-	7.5		-	-	2.5	
5	-	-	3.5		-	-	2.0		-	-	3.0	
6	-	-	6.0		-	-	2.0		-	-	3.5	
7	-	-	1.0		-	-	5.5		-	-	3.5	
8	-	-	2.0		-	-	3.5		-	-	3.5	
9	-	-	1.5		-	-	7.0		-	-	2.0	
10	-	-	4.0	0	-	-	4.5	0	-	-	2.0	0
11	-	-	6.0		-	-	6.5		-	-	2.5	
12	-	-	7.5		-	-	5.0		-	-	3.0	
13	-	-	6.5		-	-	4.0		-	-	1.5	
14	-	-	1.0		-	-	3.0		-	-	7.0	
15	-	-	7.0		-	-	3.5		-	-	3.5	
16	-	-	3.5		-	-	5.5		-	-	2.0	
17	-	-	2.5		-	-	5.0		-	-	2.0	
18	-	-	3.0		-	-	4.5		-	-	1.5	
19	-	-	5.0		-	-	2.0		-	-	3.0	
20	-	-	5.0	0.25	-	-	9.0	0.25	-	-	3.5	0.5
21	-	-	3.0		-	-	3.0		-	-	5.5	
22	-	-	2.5		-	-	1.5		-	-	5.0	
23	-	-	1.0		-	-	4.0		-	-	3.0	
24	-	-	1.5		-	-	2.0		-	-	3.5	
25	-	-	3.0		-	-	3.5		-	-	4.0	
26	-	-	8.0		-	-	3.5		-	-	2.0	
27	-	-	3.5		-	-	4.0		-	-	1.0	
28	-	-	4.0		-	-	1.0		-	-	1.5	
29	-	-	2.5		-	-	2.5		-	-	2.0	
30	-	-	3.0	0	-	-	5.0	0.25	-	-	1.5	0
31	-	-	3.5		-	-	5.0		-	-	1.0	
32	-	-	5.0		-	-	7.0		-	-	4.0	
33	-	-	7.5		-	-	4.0		-	-	5.5	
34	-	-	5.0		-	-	3.0		-	-	2.0	
35	-	-	1.5		-	-	3.5		-	-	2.5	
36	-	-	3.0		-	-	3.0		-	-	2.0	
37	-	-	4.0		-	-	2.0		-	-	3.0	
38	-	-	2.0		-	-	1.0		-	-	2.0	
39	-	-	3.5		-	-	4.5		-	-	4.0	
40	-	-	1.0	0	-	-	2.5	0	-	-	6.5	0.5
41	-	-	2.5		-	-	3.5		-	-	2.0	
42	-	-	6.5		-	-	6.5		-	-	3.0	
43	-	-	4.0		-	-	7.0		-	-	2.5	
44	-	-	3.5		-	-	3.5		-	-	2.5	
45	-	-	3.5		-	-	5.0		-	-	2.0	
46	-	-	3.0		-	-	7.5		-	-	0.5	
47	-	-	3.0		-	-	8.0		-	-	1.0	
48	-	-	2.5		-	-	6.5		-	-	1.5	
49	-	-	4.0		-	-	1.0		-	-	3.0	
50	-	-	1.0	0	-	-	3.5	0	-	-	4.5	0.25
51	-	-	3.5		-	-	7.0		-	-	2.5	
52	-	-	1.5		-	-	8.5		-	-	1.0	
53	-	-	1.0		-	-	3.0		-	-	2.0	
54	-	-	5.0		-	-	2.5		-	-	1.5	
55	-	-	6.0		-	-	4.0		-	-	1.5	
56	-	-	5.0		-	-	5.0		-	-	1.0	
57	-	-	2.0		-	-	2.5		-	-	2.0	
58	-	-	2.5		-	-	3.0		-	-	8.0	
59	-	-	3.0		-	-	0.5		-	-	9.5	
60	-	-	5.0	0.25	-	-	6.0	0.25	-	-	4.0	0.75
61	-	-	2.5		-	-	2.0		-	-	1.5	
62	-	-	3.0		-	-	2.5		-	-	2.5	
63	-	-	4.0		-	-	1.0		-	-	3.0	
64	-	-	3.5		-	-	2.0		-	-	1.5	
65	-	-	1.5		-	-	3.5		-	-	4.0	
66	-	-	4.5		-	-	1.5		-	-	1.5	
67	-	-	4.0		-	-	1.5		-	-	3.0	
68	-	-	3.5		-	-	0.5		-	-	6.5	
69	-	-	1.0		-	-	4.5		-	-	9.0	
70	-	-	5.0	0.5	-	-	8.0	0.5	-	-	6.5	0.25
71	-	-	6.0		-	-	6.0		-	-	6.0	
72	-	-	3.0		-	-	3.0		-	-	8.0	
73	-	-	3.0		-	-	1.0		-	-	4.5	
74	-	-	4.5		-	-	5.0		-	-	2.5	
75	-	-	2.5		-	-	4.5		-	-	4.0	
76	-	-	4.0		-	-	3.5		-	-	2.5	
77	-	-	1.5		-	-	2.0		-	-	4.0	
78	-	-	3.5		-	-	3.0		-	-	7.0	
79	-	-	5.5		-	-	1.5		-	-	2.5	
80	-	-	5.0	0.25	-	-	1.5	0	-	-	2.0	0
81	-	-	1.5		-	-	9.5		-	-	3.0	
82	-	-	2.0		-	-	3.0		-	-	2.0	
83	-	-	4.0		-	-	2.5		-	-	2.0	
84	-	-	4.5		-	-	2.0		-	-	1.5	
85	-	-	7.0		-	-	2.5		-	-	5.0	
86	-	-	5.5		-	-	1.0		-	-	7.5	
87	-	-	10.0		-	-	1.0		-	-	4.0	
88	-	-	4.5		-	-	9.5		-	-	3.0	
89	-	-	5.5		-	-	9.0		-	-	4.0	
90	-	-	4.0	0.25	-	-	7.0	0.5	-	-	4.5	0.25
91	-	-	4.5		-	-	3.5		-	-	3.5	
92	-	-	2.5		-	-	7.5		-	-	4.5	
93	-	-	3.0		-	-	5.0		-	-	1.5	
94	-	-	1.5		-	-	4.0		-	-	1.0	
95	-	-	2.0		-	-	5.5		-	-	2.0	
96	-	-	10.0		-	-	3.0		-	-	7.0	
97	-	-	6.5		-	-	7.0		-	-	6.5	
98	-	-	8.5		-	-	4.5		-	-	2.5	
99	-	-	6.0		-	-	3.0		-	-	3.5	
100	-	-	4.5	0.5	-	-	4.0	0.25	-	-	4.0	0.5
Minimum	**-**	**-**	**1.000**	**0**	**-**	**-**	**0.500**	**0**	**-**	**-**	**0.500**	**0**
Maximum	**-**	**-**	**10.0**	**0.500**	**-**	**-**	**9.5**	**0.500**	**-**	**-**	**9.5**	**0.75**
Mean	**-**	**-**	**3.85**	**0.200**	**-**	**-**	**4.05**	**0.200**	**-**	**-**	**3.37**	**0.300**
Standard Dev.	**-**	**-**	**1.97**	**0.197**	**-**	**-**	**2.21**	**0.197**	**-**	**-**	**2.01**	**0.258**
Geometric mean	**-**	**-**	**3.33**	**-**	**-**	**-**	**3.40**	**-**	**-**	**-**	**2.85**	**-**
Median	**-**	**-**	**3.50**	**0**	**-**	**-**	**3.50**	**0.250**	**-**	**-**	**3.00**	**0.250**
Calcite Index	**-**		**-**	**-**	**-**		**-**	**-**	**-**		**-**	**-**

Table G.76: Pebble Count at RG_FOUEW, FRO LAEMP, December 2019

Rock	RG_FOUEW 1				RG_FOUEW 2				RG_FOUEW 3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	-	-	3.0		-	-	7.5		-	-	14.0	
2	-	-	5.0		-	-	11.0		-	-	7.5	
3	-	-	2.0		-	-	8.0		-	-	8.5	
4	-	-	3.5		-	-	17.0		-	-	4.0	
5	-	-	7.5		-	-	4.5		-	-	5.0	
6	-	-	6.5		-	-	6.5		-	-	3.5	
7	-	-	3.0		-	-	5.0		-	-	5.0	
8	-	-	7.0		-	-	8.5		-	-	8.0	
9	-	-	4.0		-	-	7.5		-	-	13.5	
10	-	-	1.5	0	-	-	6.5	0.25	-	-	11.0	0.75
11	-	-	5.0		-	-	13.0		-	-	7.0	
12	-	-	5.5		-	-	8.0		-	-	14.0	
13	-	-	4.5		-	-	7.5		-	-	8.0	
14	-	-	1.5		-	-	10.0		-	-	6.5	
15	-	-	6.5		-	-	11.0		-	-	12.0	
16	-	-	9.0		-	-	9.0		-	-	3.5	
17	-	-	4.0		-	-	13.5		-	-	11.0	
18	-	-	11.0		-	-	5.5		-	-	16.5	
19	-	-	7.0		-	-	9.0		-	-	9.0	
20	-	-	8.0	0	-	-	4.0	0	-	-	15.0	0.5
21	-	-	11.0		-	-	5.5		-	-	18.0	
22	-	-	4.5		-	-	5.0		-	-	6.5	
23	-	-	11.0		-	-	12.0		-	-	11.5	
24	-	-	6.0		-	-	7.5		-	-	7.0	
25	-	-	9.5		-	-	10.0		-	-	8.0	
26	-	-	8.5		-	-	5.5		-	-	16.0	
27	-	-	7.5		-	-	6.0		-	-	11.5	
28	-	-	2.5		-	-	10.5		-	-	9.0	
29	-	-	10.0		-	-	16.0		-	-	14.0	
30	-	-	5.0	0	-	-	6.5	0	-	-	13.0	0.25
31	-	-	7.5		-	-	19.5		-	-	9.5	
32	-	-	6.5		-	-	9.0		-	-	6.0	
33	-	-	6.0		-	-	10.0		-	-	4.0	
34	-	-	3.0		-	-	7.0		-	-	9.0	
35	-	-	6.0		-	-	5.5		-	-	8.5	
36	-	-	6.5		-	-	4.0		-	-	11.0	
37	-	-	10.0		-	-	14.0		-	-	6.5	
38	-	-	4.5		-	-	11.0		-	-	19.0	
39	-	-	8.0		-	-	15.5		-	-	6.0	
40	-	-	6.5	0	-	-	6.0	0.5	-	-	13.5	0.5
41	-	-	7.0		-	-	7.5		-	-	10.0	
42	-	-	7.0		-	-	1.5		-	-	13.0	
43	-	-	8.5		-	-	4.0		-	-	3.5	
44	-	-	11.0		-	-	15.0		-	-	7.0	
45	-	-	8.0		-	-	13.5		-	-	12.0	
46	-	-	9.5		-	-	14.0		-	-	9.5	
47	-	-	11.5		-	-	13.0		-	-	6.0	
48	-	-	6.5		-	-	9.0		-	-	15.0	
49	-	-	12.0		-	-	1.5		-	-	16.5	
50	-	-	13.0	0.25	-	-	6.5	0.5	-	-	25.0	0.25
51	-	-	20.0		-	-	8.0		-	-	10.5	
52	-	-	4.5		-	-	15.5		-	-	11.0	
53	-	-	9.5		-	-	8.5		-	-	2.5	
54	-	-	10.5		-	-	14.0		-	-	11.0	
55	-	-	6.0		-	-	13.5		-	-	8.5	
56	-	-	9.5		-	-	6.0		-	-	10.5	
57	-	-	11.0		-	-	6.5		-	-	15.0	
58	-	-	9.0		-	-	7.5		-	-	9.0	
59	-	-	4.0		-	-	3.0		-	-	12.5	
60	-	-	15.5	0.25	-	-	4.0	0.25	-	-	12.0	0.25
61	-	-	4.0		-	-	3.5		-	-	13.0	
62	-	-	7.5		-	-	2.0		-	-	6.0	
63	-	-	6.5		-	-	10.0		-	-	1.5	
64	-	-	10.0		-	-	3.0		-	-	17.5	
65	-	-	9.5		-	-	4.0		-	-	4.0	
66	-	-	7.0		-	-	4.5		-	-	12.0	
67	-	-	2.0		-	-	6.0		-	-	3.5	
68	-	-	10.5		-	-	5.5		-	-	14.0	
69	-	-	1.0		-	-	2.5		-	-	12.0	
70	-	-	8.0	0.25	-	-	6.5	0.25	-	-	10.5	0.5
71	-	-	8.5		-	-	3.0		-	-	14.5	
72	-	-	5.5		-	-	4.0		-	-	7.0	
73	-	-	3.5		-	-	11.0		-	-	8.0	
74	-	-	4.5		-	-	4.5		-	-	11.5	
75	-	-	7.0		-	-	17.0		-	-	12.0	
76	-	-	6.5		-	-	9.0		-	-	23.0	
77	-	-	9.0		-	-	5.5		-	-	9.5	
78	-	-	12.0		-	-	8.5		-	-	6.5	
79	-	-	6.0		-	-	11.0		-	-	9.0	
80	-	-	4.5	0.25	-	-	16.0	0.25	-	-	11.0	0.25
81	-	-	2.5		-	-	12.0		-	-	6.5	
82	-	-	5.0		-	-	9.0		-	-	11.5	
83	-	-	6.0		-	-	11.0		-	-	4.5	
84	-	-	0.5		-	-	10.5		-	-	5.5	
85	-	-	3.0		-	-	7.5		-	-	28.0	
86	-	-	10.5		-	-	8.0		-	-	9.0	
87	-	-	8.0		-	-	4.5		-	-	7.0	
88	-	-	11.0		-	-	14.0		-	-	12.5	
89	-	-	13.0		-	-	3.0		-	-	11.0	
90	-	-	10.0	0.25	-	-	3.0	0.5	-	-	14.5	0.25
91	-	-	8.5		-	-	3.5		-	-	5.5	
92	-	-	3.5		-	-	6.5		-	-	9.5	
93	-	-	6.0		-	-	10.0		-	-	11.5	
94	-	-	9.0		-	-	15.0		-	-	16.0	
95	-	-	3.0		-	-	14.0		-	-	3.0	
96	-	-	9.5		-	-	11.5		-	-	9.0	
97	-	-	8.5		-	-	9.5		-	-	8.5	
98	-	-	7.0		-	-	9.0		-	-	16.5	
99	-	-	3.5		-	-	3.0		-	-	10.0	
100	-	-	6.0	0.5	-	-	15.5	0.75	-	-	8.0	0.25
Minimum	**-**	**-**	**0.500**	**0**	**-**	**-**	**1.50**	**0**	**-**	**-**	**1.50**	**0**
Maximum	**-**	**-**	**20.0**	**0.500**	**-**	**-**	**19.5**	**0.750**	**-**	**-**	**28.0**	**0.750**
Mean	**-**	**-**	**7.1**	**0.175**	**-**	**-**	**8.48**	**0.325**	**-**	**-**	**10.24**	**0.375**
Standard Dev.	**-**	**-**	**3.31**	**0.169**	**-**	**-**	**4.15**	**0.237**	**-**	**-**	**4.70**	**0.177**
Geometric mean	**-**	**-**	**6.15**	**-**	**-**	**-**	**7.39**	**-**	**-**	**-**	**9.14**	**-**
Median	**-**	**-**	**7.00**	**0**	**-**	**-**	**8.00**	**0.250**	**-**	**-**	**9.75**	**0.250**
Calcite Index	**-**		**-**	**-**	**-**		**-**	**-**	**-**		**-**	**-**

Table G.77: Pebble Count at RG_FOBSC, FRO LAEMP, December 2020

Rock	RG_FOBSC-1				RG_FOBSC-2				RG_FOBSC-3			
	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness	Concreted Status	Calcite Presence	Intermediate Axis (cm)	Embeddedness
1	-	-	6.0		-	-	13.0		-	-	5.0	
2	-	-	8.0		-	-	7.0		-	-	3.0	
3	-	-	19.5		-	-	9.5		-	-	5.0	
4	-	-	5.0		-	-	9.0		-	-	5.5	
5	-	-	3.0		-	-	8.0		-	-	4.0	
6	-	-	7.5		-	-	5.5		-	-	8.5	
7	-	-	5.0		-	-	3.0		-	-	8.0	
8	-	-	4.0		-	-	5.0		-	-	6.0	
9	-	-	3.5		-	-	18.0		-	-	5.0	
10	-	-	7.5	0.50	-	-	8.0	0.00	-	-	5.0	0
11	-	-	6.0		-	-	11.0		-	-	7.0	
12	-	-	8.5		-	-	6.5		-	-	6.5	
13	-	-	4.5		-	-	6.0		-	-	5.5	
14	-	-	3.5		-	-	13.5		-	-	3.0	
15	-	-	11.5		-	-	6.0		-	-	3.0	
16	-	-	7.5		-	-	2.5		-	-	3.5	
17	-	-	3.5		-	-	1.5		-	-	4.0	
18	-	-	2.5		-	-	2.5		-	-	1.0	
19	-	-	3.0		-	-	sand		-	-	6.0	
20	-	-	12.5	0.5	-	-	3.5	0.25	-	-	4.0	0
21	-	-	11.0		-	-	13.0		-	-	3.5	
22	-	-	6.0		-	-	6.0		-	-	4.0	
23	-	-	6.0		-	-	6.5		-	-	4.0	
24	-	-	9.0		-	-	8.0		-	-	4.5	
25	-	-	18.5		-	-	10.0		-	-	4.0	
26	-	-	7.5		-	-	5.0		-	-	9.0	
27	-	-	8.5		-	-	3.0		-	-	8.5	
28	-	-	9.0		-	-	4.0		-	-	11.0	
29	-	-	3.0		-	-	6.0		-	-	8.0	
30	-	-	9.0	0.25	-	-	4.0	0.00	-	-	4.0	0.25
31	-	-	7.0		-	-	16.0		-	-	5.0	
32	-	-	7.0		-	-	7.0		-	-	4.0	
33	-	-	8.0		-	-	9.0		-	-	1.5	
34	-	-	8.0		-	-	8.0		-	-	3.0	
35	-	-	6.5		-	-	7.0		-	-	6.0	
36	-	-	4.5		-	-	7.5		-	-	13.0	
37	-	-	4.5		-	-	10.0		-	-	6.5	
38	-	-	9.0		-	-	5.0		-	-	5.0	
39	-	-	6.5		-	-	7.0		-	-	7.5	
40	-	-	12.0	0.5	-	-	5.0	0.25	-	-	3.5	0.25
41	-	-	8.0		-	-	10.0		-	-	4.5	
42	-	-	6.5		-	-	5.0		-	-	5.5	
43	-	-	6.0		-	-	4.0		-	-	4.0	
44	-	-	8.0		-	-	7.5		-	-	9.5	
45	-	-	18.0		-	-	11.0		-	-	5.0	
46	-	-	7.5		-	-	2.0		-	-	3.0	
47	-	-	7.0		-	-	24.0		-	-	8.0	
48	-	-	10.5		-	-	9.5		-	-	4.0	
49	-	-	2.5		-	-	5.0		-	-	14.0	
50	-	-	3.5	0.25	-	-	5.5	0	-	-	11.0	0.5
51	-	-	3.5		-	-	17.0		-	-	4.5	
52	-	-	6.5		-	-	2.5		-	-	7.0	
53	-	-	3.5		-	-	11.0		-	-	6.0	
54	-	-	6.0		-	-	3.0		-	-	8.5	
55	-	-	3.0		-	-	3.0		-	-	10.5	
56	-	-	7.0		-	-	3.5		-	-	8.0	
57	-	-	8.0		-	-	11.0		-	-	6.0	
58	-	-	8.5		-	-	7.5		-	-	3.5	
59	-	-	6.0		-	-	1.5		-	-	3.5	
60	-	-	2.5	0	-	-	8.0	0	-	-	8.0	0
61	-	-	4.0		-	-	8.5		-	-	6.0	
62	-	-	1.0		-	-	9.0		-	-	9.0	
63	-	-	3.5		-	-	5.0		-	-	4.5	
64	-	-	8.0		-	-	11.0		-	-	3.5	
65	-	-	6.5		-	-	10.0		-	-	11.0	
66	-	-	7.5		-	-	5.5		-	-	4.0	
67	-	-	4.5		-	-	16.0		-	-	6.0	
68	-	-	10.0		-	-	5.0		-	-	9.0	
69	-	-	2.5		-	-	6.5		-	-	10.0	
70	-	-	8.0	0.5	-	-	10.5	0.5	-	-	12.5	0.25
71	-	-	9.0		-	-	5.0		-	-	2.5	
72	-	-	2.0		-	-	13.0		-	-	5.0	
73	-	-	7.0		-	-	sand		-	-	6.0	
74	-	-	10.0		-	-	1.5		-	-	11.0	
75	-	-	7.0		-	-	7.5		-	-	1.5	
76	-	-	9.0		-	-	12.0		-	-	4.0	
77	-	-	1.5		-	-	22.0		-	-	3.5	
78	-	-	1.0		-	-	9.0		-	-	2.0	
79	-	-	4.0		-	-	3.5		-	-	5.0	
80	-	-	9.0	0.25	-	-	5.0	0.25	-	-	3.5	0
81	-	-	7.0		-	-	10.0				3.5	
82	-	-	3.0		-	-	13.0		-	-	4.5	
83	-	-	7.5		-	-	4.0		-	-	11.0	
84	-	-	9.0		-	-	10.0		-	-	3.5	
85	-	-	2.5		-	-	18.0		-	-	5.0	
86	-	-	15.5		-	-	16.0		-	-	3.5	
87	-	-	7.0		-	-	7.0		-	-	4.5	
88	-	-	6.5		-	-	8.0		-	-	10.5	
89	-	-	6.5		-	-	4.5		-	-	5.5	
90	-	-	8.0	0	-	-	6.0	0	-	-	6.5	0.25
91	-	-	3.5		-	-	18.0		-	-	8.5	
92	-	-	3.5		-	-	4.0		-	-	5.0	
93	-	-	28.0		-	-	6.5		-	-	2.5	
94	-	-	6.0		-	-	19.0		-	-	7.0	
95	-	-	6.5		-	-	5.0		-	-	3.5	
96	-	-	4.5		-	-	14.0		-	-	3.0	
97	-	-	8.0		-	-	3.0		-	-	6.0	
98	-	-	10.5		-	-	8.5		-	-	1.5	
99	-	-	6.5		-	-	11.0		-	-	8.0	
100	-	-	6.5	0	-	-	3.5	0.00	-	-	5.0	0
Minimum	**-**	**-**	**1.00**	**0**	**-**	**-**	**1.50**	**0**	**-**	**-**	**1.00**	**0**
Maximum	**-**	**-**	**28.0**	**0.500**	**-**	**-**	**24.0**	**0.500**	**-**	**-**	**14.0**	**0.500**
Mean	**-**	**-**	**7.0**	**0.275**	**-**	**-**	**8.08**	**0.125**	**-**	**-**	**5.76**	**0.150**
Standard Dev.	**-**	**-**	**4.02**	**0.219**	**-**	**-**	**4.68**	**0.177**	**-**	**-**	**2.76**	**0.175**
Geometric mean	**-**	**-**	**5.98**	**-**	**-**	**-**	**6.83**	**-**	**-**	**-**	**5.12**	**-**
Median	**-**	**-**	**6.50**	**0**	**-**	**-**	**7.00**	**0.000**	**-**	**-**	**5.00**	**0.125**
Calcite Index	**-**		**-**	**-**	**-**		**-**	**-**	**-**		**-**	**-**

Table G.78: In Situ Water Quality Taken at Biological Monitoring Areas, December 2020

Field Parameters		Reference	Mine-Exposed						
		RG_UFR1	RG_FODHE	RG_FOUCL	RG_FOUNGD	RG_FODNGD	RG_MP1	RG_FOUSH	RG_FOUKI	RG_SCOUTDS
Date		8-Dec-20	-	8-Dec-20	8-Dec-20	8-Dec-20	9-Dec-20	9-Dec-20	9-Dec-20	7-Dec-20
Station 1	Temperature (°C)	0.0	-	2.2	2.5	2.2	1.8	1.7	1.3	0.0
	Dissolved Oxygen (mg/L)	11.32	-	8.79	7.80	9.06	9.08	9.49	10	9.92
	Dissolved Oxygen (%)	77.6	-	64	57.3	66	65.4	68.3	71.3	68.2
	Conductivity (µS/cm)	232.3	-	372.2	495	529	540.0	572.0	558	700
	Specific Conductivity (µS/cm)	444.4	-	660.3	869	939	964.0	1032.0	1023.0	1341
	pH	8.69	-	8.13	8.00	8.24	8.26	8.40	8.48	8.53
	ORP (mV)	-	-	-	-	-	-	-	-	-
Station 2	Temperature (°C)	0.0	-	-	-	-	-	-	1.2	0.0
	Dissolved Oxygen (mg/L)	11.34	-	-	-	-	-	-	9.60	9.83
	Dissolved Oxygen (%)	77.8	-	-	-	-	-	-	88.5	67.4
	Conductivity (µS/cm)	234.5	-	-	-	-	-	-	556	699
	Specific Conductivity (µS/cm)	448.5	-	-	-	-	-	-	1020.0	1338
	pH	8.67	-	-	-	-	-	-	8.51	8.53
	ORP (mV)	-	-	-	-	-	-	-	-	-
Station 3	Temperature (°C)	0.0	-	-	-	-	-	-	1.3	0.0
	Dissolved Oxygen (mg/L)	11.26	-	-	-	-	-	-	9.81	9.84
	Dissolved Oxygen (%)	77	-	-	-	-	-	-	69.7	67.5
	Conductivity (µS/cm)	234.6	-	-	-	-	-	-	558.0	707
	Specific Conductivity (µS/cm)	449.2	-	-	-	-	-	-	1,020.0	1,353
	pH	8.7	-	-	-	-	-	-	8.51	8.50
	ORP (mV)	-	-	-	-	-	-	-	-	-

Note: "-" indicates no available data.

Table G.78: In Situ Water Quality Taken at Biological Monitoring Areas, December 2020

Field Parameters		Mine-Exposed							
		RG_FOBKS	RG_FOBSC	RG_FOBCP	FRCP1SW	RG_FRUPO	RG_FODPO	RG_FO22	RG_FOUEW
Date		7-Dec-20	7-Dec-20	7-Dec-20	-	10-Dec-20	9-Dec-20	9-Dec-20	10-Dec-20
Station 1	Temperature (°C)	-0.1	0.0	-	-	5.4	4.0	-	1.9
	Dissolved Oxygen (mg/L)	10.33	11.32	-	-	8.98	8.71	-	9.03
	Dissolved Oxygen (%)	70.1	77.9	-	-	71.5	66.8	-	65.6
	Conductivity (µS/cm)	548	896	-	-	1067	890	-	646
	Specific Conductivity (µS/cm)	1052	1717	-	-	1105	1,488	-	1057
	pH	8.23	8.55	-	-	8.19	8.11	-	8.36
	ORP (mV)	-	-	-	-	-	-	-	-
Station 2	Temperature (°C)	-0.1	0.0	-	-	5.3	3.9	-	1.9
	Dissolved Oxygen (mg/L)	10.22	11.45	-	-	8.91	8.84	-	9.04
	Dissolved Oxygen (%)	70.2	78.5	-	-	70.7	69.6	-	65.2
	Conductivity (µS/cm)	465	896	-	-	1053	823	-	628
	Specific Conductivity (µS/cm)	893	1719	-	-	1,691	1495	-	1122
	pH	8.45	8.53	-	-	8.22	8.14	-	8.34
	ORP (mV)	-	-	-	-	-	-	-	-
Station 3	Temperature (°C)	-	0.0	0.0	-	5.2	4.1	2.7	1.8
	Dissolved Oxygen (mg/L)	-	11.59	11.79	-	8.84	8.84	10.07	9.32
	Dissolved Oxygen (%)	-	79.7	81.1	-	69.9	66.2	74.4	67.4
	Conductivity (µS/cm)	-	907	954	-	1065	897	860	656
	Specific Conductivity (µS/cm)	-	1737	1,159	-	1,697	1493	1,500	1178
	pH	-	8.51	8.62	-	8.21	8.11	8.44	8.36
	ORP (mV)	-	-	-	-	-	-	-	-

Note: "-" indicates no available data.

Table G.79: Kick and Sweep at Reference and Mine-exposed Areas, FRO LAEMP, December 2020

Station Information		RG_UFR1	RG_FOUKI	RG_SCOUTDS	RG_FRUPO	RG_FODPO	RG_FOUEW	RG_FOBSC
Station 1	Easting	651330	651840	652314	653891	653847	656348	652286
	Northing	5566865	5559848	5558454	5555952	5555039	5551857	5558277
	Date	8-Dec-20	9-Dec-20	7-Dec-20	10-Dec-20	9-Dec-20	10-Dec-20	7-Dec-20
	Samplers' Initials	JV	MG	AM	PS	PS	AM	PS
	Number of Jars	1	1	1	1	-	1	1
	Total Kick Distance (m)	12	18	20	18	16	18	12
	Full Transect (Yes / No)	no	yes	yes	yes	yes	yes	no
	Number of Transects	5.0	4.0	4.0	4.5	1.5	1.5	0.3
Station 2	Easting	651331	651838	652305	653897	653888	656320	652347
	Northing	5566842	5559899	5558505	5555883	5555073	5551857	5558179
	Date	8-Dec-20	9-Dec-20	7-Dec-20	10-Dec-20	9-Dec-20	10-Dec-20	7-Dec-20
	Samplers' Initials	JV	MG	AM	PS	PS	AM	PS
	Number of Jars	1	1	1	1	1	1	1
	Total Kick Distance (m)	10	18	16.0	8.0	16	16	14
	Full Transect (Yes / No)	no	yes	yes	yes	yes	yes	no
	Number of Transects	4.0	4.0	5.00	2.0	1.5	1.5	0.3
Station 3	Easting	651388	651821	652271	653864	653924	656260	652428
	Northing	5566757	5559946	5558522	5555850	5555007	5551870	5558074
	Date	8-Dec-20	9-Dec-20	7-Dec-20	10-Dec-20	9-Dec-20	10-Dec-20	7-Dec-20
	Samplers' Initials	PeS	MG	AM	PS	PS	AM	PS
	Number of Jars	1	1	1	1	2	1	-
	Total Kick Distance (m)	8	20	18	12	15	12	12
	Full Transect (Yes / No)	no	yes	yes	no	yes	yes	no
	Number of Transects	4.0	4.0	4.0	4.0	3.5	2.0	0.3

Table G.80: Channel Depth and Velocity at Kick and Sweep Sampling Locations in Reference and Mine-exposed areas, Fording River December, 2020

Reference			A	B	C	D	E	Mean
Replicate	RG_UFR1							
	1	Depth (cm)	13	19	21.5	16	9.5	**15.8**
		Velocity (m/s)	0.245	0.546	0.517	0.560	0.981	**0.570**
	2	Depth (cm)	17	20	16	24	21	**19.6**
		Velocity (m/s)	0.395	0.438	0.618	0.321	0.199	**0.394**
	3	Depth (cm)	19.5	18	22	29	31	**23.9**
		Velocity (m/s)	0.393	0.594	0.618	0.465	0.430	**0.500**
Mine Exposed								
Replicate	RG_FOUKI							
	1	Depth (cm)	9.5	23.5	27	19	13.5	**18.5**
		Velocity (m/s)	0.319	0.585	1.126	0.305	0.132	**0.493**
	2	Depth (cm)	10.5	15.5	25	14	17.5	**16.5**
		Velocity (m/s)	0.182	0.549	0.870	1.243	0.824	**0.734**
	3	Depth (cm)	19.5	26.0	24.0	26.0	14.5	**22.0**
		Velocity (m/s)	0.569	0.691	0.667	0.889	0.183	**0.600**
	RG_SCOUTDS							
	1	Depth (cm)	15.5	27.0	13.0	21.5	16.5	**18.7**
		Velocity (m/s)	0.292	0.548	0.916	0.639	0.491	**0.577**
	2	Depth (cm)	13.0	17.5	23.0	20.5	16.0	**18.0**
		Velocity (m/s)	0.434	0.382	0.511	0.974	0.320	**0.524**
	3	Depth (cm)	19.0	23.5	28.0	22.5	11.5	**20.9**
		Velocity (m/s)	0.327	0.618	0.733	0.421	0.388	**0.497**
	RG_FRUPO							
	1	Depth (cm)	7	9	13	15	10	**10.8**
		Velocity (m/s)	0.187	0.546	0.674	0.277	0.555	**0.448**
	2	Depth (cm)	13	19	22	14	10	**15.6**
		Velocity (m/s)	0.287	0.418	0.528	0.352	0.227	**0.362**
	3	Depth (cm)	6	13	4	7	9	**7.8**
		Velocity (m/s)	0.145	0.315	0.278	0.155	0.241	**0.227**
	RG_FODPO							
	1	Depth (cm)	8	20	28	12	10	**15.6**
		Velocity (m/s)	0.510	0.776	0.962	0.520	0.523	**0.658**
	2	Depth (cm)	11	13	12	11	8	**11**
		Velocity (m/s)	0.269	0.378	0.730	0.494	0.279	**0.430**
	3	Depth (cm)	21	28	18	9.00	6	**16.4**
		Velocity (m/s)	0.539	0.577	0.850	0.189	0.232	**0.477**
	RG_FOUEW							
	1	Depth (cm)	18	31	29.5	18	12	**21.7**
		Velocity (m/s)	0.313	0.182	0.517	0.432	0.365	**0.362**
	2	Depth (cm)	10.5	16	18.5	24	28.5	**19.5**
		Velocity (m/s)	0.210	0.686	0.532	0.591	0.434	**0.491**
	3	Depth (cm)	10	17.5	27.5	24	31	**22.0**
		Velocity (m/s)	0.383	0.479	0.742	0.570	0.524	**0.540**
	FOBSC							
	1	Depth (cm)	42	44	42	44	44	**43.2**
		Velocity (m/s)	0.025	0.554	0.450	0.563	0.571	**0.433**
	2	Depth (cm)	50	48	51	47	35	**46.2**
		Velocity (m/s)	0.332	0.440	0.246	0.450	0.156	**0.325**
	3	Depth (cm)	46	44	38	34	33	**39.0**
		Velocity (m/s)	0.276	0.334	0.374	0.173	0.656	**0.363**
	FOBKS							
	1	Depth (cm)	38.5	36	41	32.5	30	**35.6**
		Velocity (m/s)	0.392	0.440	0.423	0.372	0.152	**0.356**
	2	Depth (cm)	36.5	31.5	27	32	29	**31.2**
		Velocity (m/s)	0.363	0.106	0.165	0.583	0.213	**0.286**
	3	Depth (cm)	-	-	-	-	-	**-**
		Velocity (m/s)	-	-	-	-	-	**-**

Notes: Velocity measurements were taken at five randomly chosen locations throughout the kick sample area. Velocity was measured at the bottom of the water column.

APPENDIX H
BIOLOGICAL
TRIGGERS

APPENDIX H BIOLOGICAL TRIGGERS

H1 INTRODUCTION

H1.1 Background

Biological triggers for potential monitoring and management action are required as part of Teck's Adaptive Management Plan (AMP; Teck 2018). Generally, triggers are intended as a simple way to identify potential unexpected monitoring results that may require management action. Additionally, information provided from the analysis of biological triggers may lead to responses under the AMP response framework if necessary, and as such would be reported in the annual AMP report. Draft biological triggers were developed in the 2018 AMP (Teck 2018) under Management Question 5 for three measurement endpoints:

- Percent EPT (% EPT; Ephemeroptera, Plecoptera, and Trichoptera) – based on travelling kick samples (CABIN protocol), generally three replicates per location per sampling event.
- Benthic invertebrate tissue selenium (BIT Se) – generally several replicates collected per location per sampling event, where each replicate is a composite sample of invertebrates.
- Westslope cutthroat trout muscle tissue selenium (WCT Se) – generally 8 replicates collected per location per sampling event, where each replicate corresponds to a sample from a single fish[1].

These three endpoints are evaluated (where data are available) in other sections of the Local Aquatic Effects Monitoring Program (LAEMP) and the Regional Aquatic Effects Monitoring Program (RAEMP) reports, and therefore there is some degree of redundancy in the analysis of biological triggers. Data collected during the RAEMP is incorporated into the aquatic data integration tool (ADIT), which together is used to characterize the state of the aquatic environment. Biological trigger analyses are not identical to the evaluations in the LAEMP, RAEMP and, by extension, the ADIT, and are expected to be complementary to these other analyses. The methods applied for biological trigger analyses in this report reflect refinements made in consultation with the EMC since the draft triggers were developed in the 2018 AMP (Teck 2018). The triggers were reported (i.e., implemented) for the first time in the 2020 LCO LAEMP (Minnow 2021), and will be evaluated and reported in all LAEMP reports

[1] Fish tissue monitoring was excluded from the 2020 FRO LAEMP monitoring program in an effort to help reduce the potential for sampling stress on westslope cutthroat trout populations in related to FRO LAEMP monitoring activities.

and the RAEMP moving forward. Through future iterative biological trigger evaluations, the process and/or biological triggers may be adjusted over time.

H2 METHODS

H2.1 Overview

As outlined in Section H1.1, analyses for biological triggers are meant to be complementary to other analyses conducted in the LAEMPs and RAEMP. For the 2020 FRO LAEMP, biological trigger analyses only included two of the three measurement endpoints (%EPT and BIT Se) since fish tissue sampling is not part of the FRO LAEMP.

For the purpose of application of the biological triggers, expectations for the endpoints evaluated (both the %EPT and BIT Se for the 2020 FRO LAEMP) were based on projected water quality, not on measured water quality. Thus, the triggers should detect biological results that were unexpected, regardless of whether those results are due to unexpected water quality or due to unexpected relationships between water quality and biological endpoints. Biological triggers were therefore only applied at locations where water quality projections were available[2]. Specifically, six of the mine-exposed areas (RG_FODHE, RG_FOUKI, RG_FOBSC, RG_FOBCP, RG_FODPO, and RG_FO22) and one reference area (RG_FO26) included in the FRO LAEMP were evaluated for biological trigger events. Data for other areas studied under the FRO LAEMP (RG_HENUP, RG_UFR1, RG_FOUCL, RG_FOUNGD, RG_FODNGD, RG_MP1, RG_FOUSH, RG_FOBKS, RG_SCOUTDS, RG_FRCP1SW, RG_FRUPO, RG_FOUEW) were not available to be evaluated relative to biological triggers but were assessed elsewhere as part of the main FRO LAEMP report.

Methodological details are discussed for each of the biological trigger metrics below.

H2.2 Percent EPT

Data for percent EPT were compared to:

- Normal range: The lower limit of habitat-adjusted normal range (2.5th percentile).
- Expectations: The %EPT corresponding to the predicted ADIT score. The predicted ADIT scores correspond to potential effects on benthic invertebrate community (BIC) endpoints, based on relationships between water quality projections (for nitrate,

[2] Biological triggers have not been developed for lentic habitats, because water quality projections are not generally available for lentic locations. For two of the three endpoints (BIT Se and WCT Se; %EPT not relevant in lentic areas), if projections become available for lentic habitats then triggers could be developed in future, using the available lentic bioaccumulation model from water to invertebrates (updated in 2020), and the invertebrate to fish bioaccumulation model (which should be applicable to both lotic and lentic habitats).

sulphate and cadmium)[3] and invertebrate toxicity endpoints originally developed for the EVWQP (Teck 2014). A predicted ADIT score of 3 corresponds to 50% or greater effects to reproduction of the water flea *Ceriodaphnia dubia*, 2 corresponds to 20 to 50% effects, 1 corresponds to 10 to 20% effects, and 0 corresponds to effect levels of 10% or less. Predicted %EPT values are then converted into a value against which the measured %EPT values can be compared as follows: An ADIT score of 0 corresponds to expected %EPT ≥ the 10th percentile of the habitat-adjusted normal range; an ADIT score of 1 corresponds to expected %EPT between the 10th percentile and the 2.5th percentile of the habitat-adjusted normal range (and is therefore identical in application to the lower limit of normal range); an ADIT score of 2 corresponds to expected %EPT between the 2.5th percentile and half of the 2.5th percentile of the habitat-adjusted normal range; finally, an ADIT score of 3 corresponds to expected %EPT ≤ half of the 2.5th percentile and ≥ 0. Individual replicate habitat-adjusted normal ranges were used at each location for establishing the %EPT limits associated with each ADIT score. In summary, this component of the biological trigger for %EPT asks whether the measured ADIT score – calculated based on measured %EPT relative to normal ranges – is greater than the ADIT score that was predicted based on water quality projections.

Benthic invertebrate community data for %EPT collected in the fall (September) for the 2020 FRO LAEMP were included in the biological trigger analysis.

H2.3 Benthic Invertebrate Tissue Selenium (BIT Se)

Data for BIT Se were compared to:

- Normal range: The upper limit of regional normal range (97.5th percentile).
- Expectations: The upper limit of the 95% prediction interval based on the water to BIT bioaccumulation model. The model was originally developed in the EVWQP (Golder 2014) was updated (Golder 2020) and the updated best fit relationship is $log_{10}[Se]_{inv} = 0.720 + 0.071 \times log_{10}[Se]_{aq}$. Prediction intervals were estimated for BIT Se for individual replicates, taking into account that the data points for the original model were based on geometric means rather than individual replicates (Azimuth 2021, In Preparation).

[3] Notes: (a) Selenium not included because selenium effects on BIC endpoints were not expected. (b) Projections were based on the highest maximum monthly mean across all flow scenarios (low, average, high).

Benthic invertebrate tissue selenium data from sampling events completed throughout 2020 for the FRO LAEMP (June, September, and December) were included in the biological trigger analysis although normal range information is based on fall (September) information.

Although effects benchmarks are not part of the trigger, they are relevant for interpreting potential significance and responses. Consequently, the level 1, 2 and 3 benchmarks for the most sensitive receptor (juvenile fish via dietary exposure) are included in plots (11, 18 and 26 mg/kg respectively).

H3 RESULTS

H3.1 Percent EPT

Individual replicates for %EPT for each of the six mine-exposed areas (RG_FODHE, RG_FOUKI, RG_FOBSC, RG_FOBCP, RG_FODPO, and RG_FO22) as well as one reference area (RG_FO26) were each assessed against their respective biological trigger for the September sampling period (Appendix Table H.1 and Appendix Figure H.1). Each mine-exposed area (RG_FODHE [3 of 3 replicates], RG_FOUKI [3 of 3 replicates], RG_FOBSC [3 of 3 replicates], RG_FOBCP [4 of 5 replicates], RG_FODPO [5 of 5 replicates] and RG_FO22 [5 of 5 replicates] had % EPT results that were lower than the biological trigger value .

The biological monitoring area associated with the FRO Compliance Point (RG_FOBCP) was the only mine-exposed area where a %EPT replicate was greater than the lower 2.5th percentile prediction limit of the biological trigger (Appendix Table H.1; Appendix Figure H.1). It was also the area that deviated least from the habitat-adjusted normal range and 2.5th percentile prediction limit (Appendix Table H.1; Appendix Figure H.1). The new Compliance Point in 2021 (RG_FO22) deviated most from the habitat-adjusted normal range and 2.5th percentile prediction limit (Appendix Table H.1; Appendix Figure H.1), while the other mine-exposed areas (RG_FODHE, RG_FOUKI, RG_FOBSC, and RG_FODPO) all had %EPT that deviated similarly from the habitat-adjusted normal range and 2.5th percentile prediction limit (Appendix Table H.1; Appendix Figure H.1). The reference area RG_FO26 had %EPT that was within both the habitat-adjusted normal range and the 2.5th percentile prediction limit.

H3.2 Benthic Invertebrate Tissue Selenium (BIT Se)

Benthic invertebrate tissue selenium concentrations for each mine-exposed and reference area were assessed against their respective biological trigger for individual replicate samples from each of the three sampling events (June, September, and December; Appendix Table H.2 and Appendix Figure H.2). There were no replicates at any of the mine-exposed areas that exceeded biological trigger for tissue selenium concentrations (above the 97.5th percentile of normal range and above the 95% prediction interval; Appendix Table H.2 and Appendix Figure H.2).

H4 SUMMARY

Except for one replicate at RG_FOBCP, all mine-exposed areas had replicates that exceeded the %EPT biological trigger. Percent EPT for these mine-exposed areas in 2020 were similar to results from previous FRO LAEMP reports which evaluated multiple benthic invertebrate community metrics (Minnow and Lotic 2018; Minnow and Lotic 2019, 2020) and were classified as 'unexpected' compared to water quality projections in the RAEMP (Minnow 2020). The effect to %EPT was believed to be a combination of both water quality stressors and habitat variables, which have been shown to vary in a similar way to each other throughout the study area, thus making it difficult to ascertain their individual influence on BIC structure. As discussed above, the biological trigger for benthic invertebrate tissue selenium concentrations was not exceeded for any of the mine exposed areas and therefore did not require further investigation.

As discussed in the main report, biological triggers are consistent with the findings of the FRO LAEMP. Current biological triggers were sufficient to identify monitoring areas where biological responses are occurring, based on the integrated assessment conducted in the LAEMP, and no additional triggers are recommended at this time. Uncertainty, however, remains around the cause of the observed %EPT response noted above. In an effort to resolve uncertainty around the combined and individual effects of water quality, habitat, and other mine-related stressors on benthic invertebrate communities in lotic areas in the Elk River watershed, Minnow is developing a predictive model for benthic invertebrate community endpoints, as discussed with the EMC in February 2021. Uncertainties are expected to be reduced through this modelling effort, and additional monitoring or potential management responses will continue to be assessed through the adaptive management process.

H5 REFERENCES

Azimuth (Azimuth Consulting Group Inc). 2021 (In Prep). Development of biological triggers for the Elk Valley Adaptive Management Plan.

Golder (Golder Associates). 2014. Benchmark Derivation Report for Selenium. Annex E of the Elk Valley Water Quality Plan. Prepared for Teck Coal Limited. July.

Golder. 2020. Updates to the lotic and lentic statistical bioaccumulation models for selenium in the Elk Valley. Technical memorandum to Teck Coal Limited, 27 November 2020.

Minnow (Minnow Environmental Inc). 2020. Regional Aquatic Effects Monitoring Program (RAEMP) Report, 2017 to 2019.

Minnow and Lotic (Lotic Environmental). 2018. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) Report, 2017. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #177202.0022.

Minnow and Lotic. 2019. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) 2018 Report, 2018. Prepared for Teck Coal Limited, Sparwood, British Columbia. May 2019. Project #197202.0022.

Minnow and Lotic. 2020. Fording River Operations Local Aquatic Effects Monitoring Program (LAEMP) 2019 Report. Prepared for Teck Coal Limited, Sparwood, British Columbia. May. Project #197202.0004.

Teck (Teck Coal Limited). 2014. Elk Valley Water Quality Plan. Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.

Teck. 2018. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. December 21, 2018.

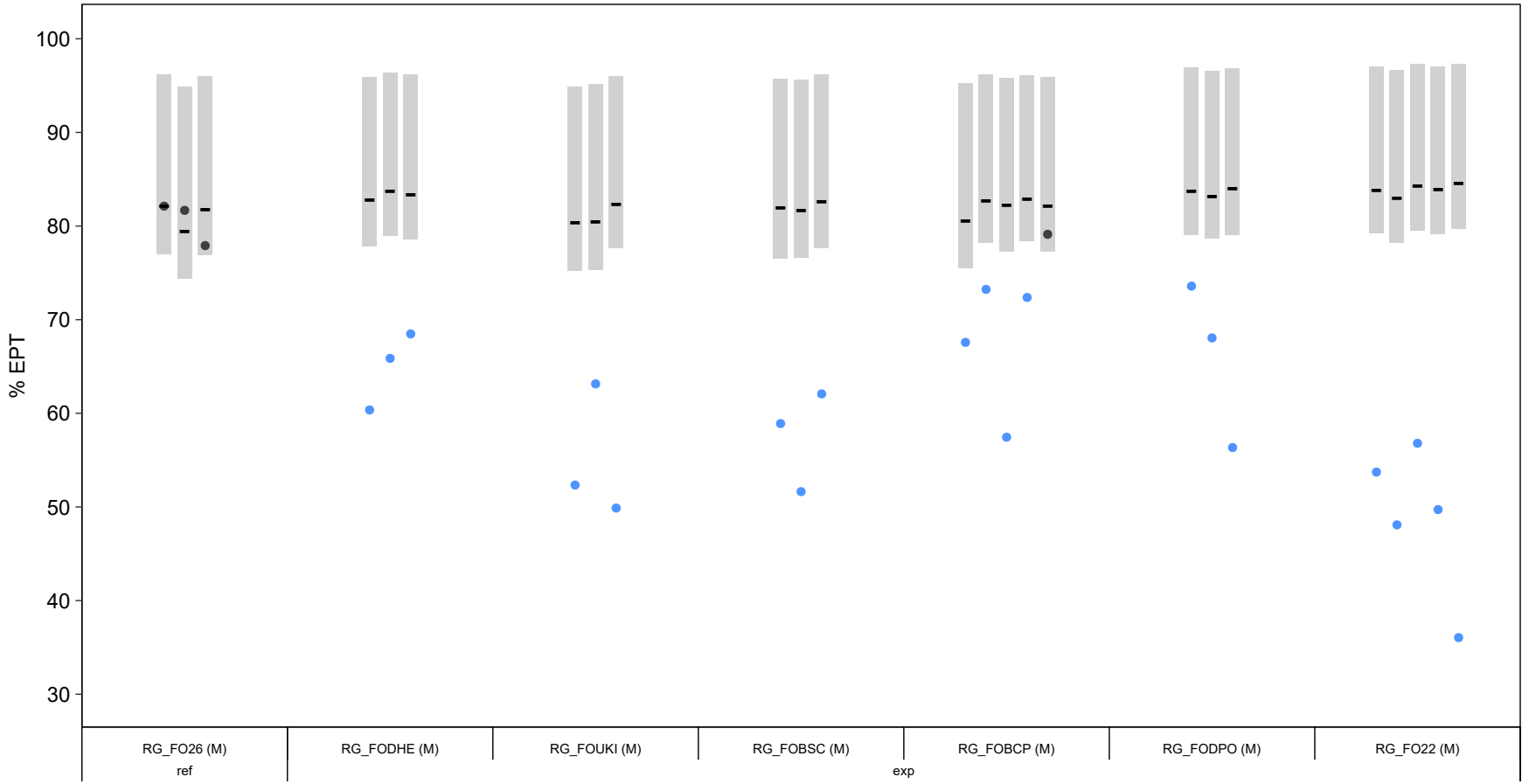

Figure H.1: % EPT Compared to Predicted Values, FRO LAEMP, 2020

Notes: Black bars indicate the lower limit of the predicted ADIT score for the location. Blue dots represent values exceeding the trigger (below 2.5th percentile of NR and below lower limit of predicted ADIT score). Gray shading represents the habitat-adjusted normal range for each replicate. T = Tributary, M = Mainstem.

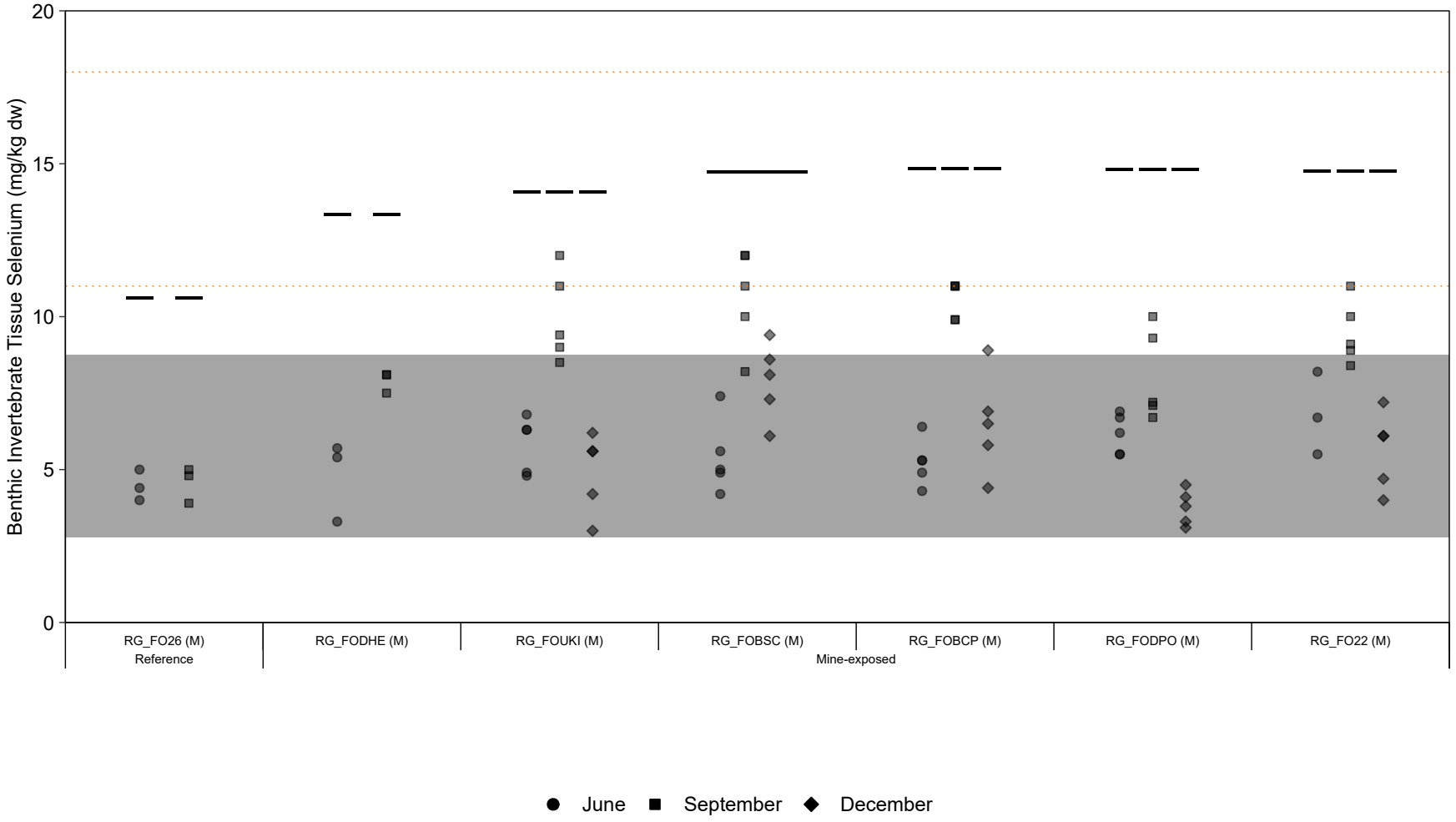

Figure H.2: Selenium Concentrations in Benthic Invertebrate Composite-Taxa Samples from Fording River Compared to Predicted Values, FRO LAEMP, 2020

Notes: Black bars indicate the upper 95th prediction interval of the bioaccumulation model. Blue dots represent values exceeding the trigger (above the 97.5th percentile of normal range and above upper 95% prediction interval). Dotted lines indicate EVWQP benchmarks (11, 18, and 26 mg/kg respectively) for juvenile fish (Level 3 are beyond the plot range and not shown). Gray shading represents the reference area normal range defined as the 2.5th and 97.5th percentiles of the distribution of reference area data (pooled 1996 to 2019 data) reported in the RAEMP. T = Tributary, M = Mainstem.

Table H.1: Biological trigger analysis for %EPT in the Fording River, FRO LAEMP, September 2020

Waterbody		Area	Stream Type	Replicate	Reported Value	ADIT Value [a]	Lower 2.5th Percentile of the Habitat Adjusted Normal Range
Fording River	Reference	RG_FO26	M	1	82.1	82.2	77.0
		RG_FO26	M	2	81.7	79.5	74.4
		RG_FO26	M	3	77.9	81.8	76.9
	Mine-Exposed	RG_FODHE	M	1	60.4	82.8	77.9
		RG_FODHE	M	2	65.9	83.8	79.0
		RG_FODHE	M	3	68.5	83.4	78.5
		RG_FOUKI	M	1	52.3	80.4	75.3
		RG_FOUKI	M	2	63.1	80.5	75.3
		RG_FOUKI	M	3	49.9	82.3	77.7
		RG_FOBSC	M	1	58.9	82.0	76.5
		RG_FOBSC	M	2	51.6	81.7	76.6
		RG_FOBSC	M	3	62.1	82.6	77.6
		RG_FOBCP	M	1	67.6	80.6	75.5
		RG_FOBCP	M	2	73.2	82.7	78.2
		RG_FOBCP	M	3	57.4	82.2	77.3
		RG_FOBCP	M	4	72.4	82.9	78.4
		RG_FOBCP	M	5	79.1	82.2	77.3
		RG_FODPO	M	1	73.6	83.7	79.0
		RG_FODPO	M	2	68.1	83.2	78.6
		RG_FODPO	M	3	56.3	84.0	79.0
		RG_FO22	M	1	53.7	83.8	79.2
		RG_FO22	M	2	48.1	83.0	78.2
		RG_FO22	M	3	56.8	84.3	79.5
		RG_FO22	M	4	49.7	84.0	79.1
		RG_FO22	M	5	36.0	84.6	79.7

Shaded cells signify individual replicates that were associated with a biological trigger (i.e. lower than both the ADIT value [as based on predicted water quality] and the lower 2.5th percentile of habitat-adjusted normal range).

Notes: M= Mainstem and T = Tributary.

[a] All CMO areas evaluated had an ADIT score of 0, which corresponds to the 80% lower limit of the expected %EPT (as based on water quality projections).

Table H.2: Biological Trigger Analysis for Selenium Concentrations in Benthic Invertebrate Tissue in Fording River, FRO LAEMP, 2020

Waterbody		Stream Type	Area	Date	Replicate	Predicted Selenium Water Concentration (mg/L)	Benthic Invertebrate Selenium Tissue		
							Upper 95% Prediction Limit (mg/kg dw)	Upper 97.5th Percentile of Normal Range (mg/kg dw)	Reported Concentration (mg/kg dw)
Fording River	Reference	M	RG_FO26	17-Jun-20	1	1.1	10.6	8.7	4.4
		M	RG_FO26	17-Jun-20	2	1.1	10.6	8.7	4.0
		M	RG_FO26	17-Jun-20	3	1.1	10.6	8.7	5.0
		M	RG_FO26	17-Sep-20	1	1.1	10.6	8.7	3.9
		M	RG_FO26	17-Sep-20	2	1.1	10.6	8.7	5.0
		M	RG_FO26	17-Sep-20	3	1.1	10.6	8.7	4.8
	Mine-Exposed	M	RG_FODHE	15-Jun-20	1	26.2	13.3	8.7	5.7
		M	RG_FODHE	15-Jun-20	2	26.2	13.3	8.7	5.4
		M	RG_FODHE	15-Jun-20	3	26.2	13.3	8.7	3.3
		M	RG_FODHE	15-Sep-20	1	26.2	13.3	8.7	8.1
		M	RG_FODHE	15-Sep-20	2	26.2	13.3	8.7	8.1
		M	RG_FODHE	15-Sep-20	3	26.2	13.3	8.7	7.5
		M	RG_FOUKI	17-Jun-20	1	55.6	14.1	8.7	6.3
		M	RG_FOUKI	17-Jun-20	2	55.6	14.1	8.7	6.8
		M	RG_FOUKI	17-Jun-20	3	55.6	14.1	8.7	6.3
		M	RG_FOUKI	17-Jun-20	4	55.6	14.1	8.7	4.9
		M	RG_FOUKI	17-Jun-20	5	55.6	14.1	8.7	4.8
		M	RG_FOUKI	14-Sep-20	1	55.6	14.1	8.7	9.4
		M	RG_FOUKI	14-Sep-20	2	55.6	14.1	8.7	9.0
		M	RG_FOUKI	14-Sep-20	3	55.6	14.1	8.7	8.5
		M	RG_FOUKI	14-Sep-20	4	55.6	14.1	8.7	12.0
		M	RG_FOUKI	14-Sep-20	5	55.6	14.1	8.7	11.0
		M	RG_FOUKI	9-Dec-20	1	55.6	14.1	8.7	5.6
		M	RG_FOUKI	9-Dec-20	2	55.6	14.1	8.7	6.2
		M	RG_FOUKI	9-Dec-20	3	55.6	14.1	8.7	4.2
		M	RG_FOUKI	9-Dec-20	4	55.6	14.1	8.7	5.6
		M	RG_FOUKI	9-Dec-20	5	55.6	14.1	8.7	3.0
		M	RG_FOBSC	18-Jun-20	1	104.5	14.7	8.7	5.0
		M	RG_FOBSC	18-Jun-20	2	104.5	14.7	8.7	5.6
		M	RG_FOBSC	18-Jun-20	3	104.5	14.7	8.7	4.9
		M	RG_FOBSC	18-Jun-20	4	104.5	14.7	8.7	7.4
		M	RG_FOBSC	18-Jun-20	5	104.5	14.7	8.7	4.2
		M	RG_FOBSC	18-Sep-20	1	104.5	14.7	8.7	10.0
		M	RG_FOBSC	18-Sep-20	2	104.5	14.7	8.7	12.0
		M	RG_FOBSC	18-Sep-20	3	104.5	14.7	8.7	8.2
		M	RG_FOBSC	18-Sep-20	4	104.5	14.7	8.7	11.0
		M	RG_FOBSC	18-Sep-20	5	104.5	14.7	8.7	12.0
		M	RG_FOBSC	7-Dec-20	1	104.5	14.7	8.7	7.3
		M	RG_FOBSC	7-Dec-20	2	104.5	14.7	8.7	8.6
		M	RG_FOBSC	7-Dec-20	3	104.5	14.7	8.7	6.1
		M	RG_FOBSC	7-Dec-20	4	104.5	14.7	8.7	8.1
		M	RG_FOBSC	7-Dec-20	5	104.5	14.7	8.7	9.4
		M	RG_FOBSC	23-Nov-20	1	104.5	14.7	8.7	8.4
		M	RG_FOBSC	23-Nov-20	2	104.5	14.7	8.7	10.0
		M	RG_FOBSC	23-Nov-20	3	104.5	14.7	8.7	8.3
		M	RG_FOBSC	23-Nov-20	4	104.5	14.7	8.7	7.9
		M	RG_FOBSC	23-Nov-20	5	104.5	14.7	8.7	8.7
		M	RG_FOBCP	17-Jun-20	1	116.7	14.8	8.7	5.3
		M	RG_FOBCP	17-Jun-20	2	116.7	14.8	8.7	6.4
		M	RG_FOBCP	17-Jun-20	3	116.7	14.8	8.7	5.3
		M	RG_FOBCP	17-Jun-20	4	116.7	14.8	8.7	4.9
		M	RG_FOBCP	17-Jun-20	5	116.7	14.8	8.7	4.3
		M	RG_FOBCP	16-Sep-20	1	116.7	14.8	8.7	11.0
		M	RG_FOBCP	16-Sep-20	2	116.7	14.8	8.7	9.9
		M	RG_FOBCP	16-Sep-20	3	116.7	14.8	8.7	9.9
		M	RG_FOBCP	16-Sep-20	4	116.7	14.8	8.7	11.0
		M	RG_FOBCP	16-Sep-20	5	116.7	14.8	8.7	11.0
		M	RG_FOBCP	7-Dec-20	1	116.7	14.8	8.7	8.9
		M	RG_FOBCP	7-Dec-20	2	116.7	14.8	8.7	6.5
		M	RG_FOBCP	7-Dec-20	3	116.7	14.8	8.7	6.9
		M	RG_FOBCP	7-Dec-20	4	116.7	14.8	8.7	5.8
		M	RG_FOBCP	7-Dec-20	5	116.7	14.8	8.7	4.4
		M	RG_FODPO	19-Jun-20	1	112.8	14.8	8.7	6.2
		M	RG_FODPO	19-Jun-20	2	112.8	14.8	8.7	6.9
		M	RG_FODPO	19-Jun-20	3	112.8	14.8	8.7	5.5
		M	RG_FODPO	19-Jun-20	4	112.8	14.8	8.7	6.7
		M	RG_FODPO	19-Jun-20	5	112.8	14.8	8.7	5.5
		M	RG_FODPO	11-Sep-20	1	112.8	14.8	8.7	9.3
		M	RG_FODPO	11-Sep-20	2	112.8	14.8	8.7	6.7
		M	RG_FODPO	11-Sep-20	3	112.8	14.8	8.7	7.2
		M	RG_FODPO	11-Sep-20	4	112.8	14.8	8.7	7.1
		M	RG_FODPO	11-Sep-20	5	112.8	14.8	8.7	10.0
		M	RG_FODPO	9-Dec-20	1	112.8	14.8	8.7	3.8
		M	RG_FODPO	9-Dec-20	2	112.8	14.8	8.7	3.3
		M	RG_FODPO	9-Dec-20	3	112.8	14.8	8.7	3.1
		M	RG_FODPO	9-Dec-20	4	112.8	14.8	8.7	4.5
		M	RG_FODPO	9-Dec-20	5	112.8	14.8	8.7	4.1
		M	RG_FO22	19-Jun-20	1	108.4	14.8	8.7	6.7
		M	RG_FO22	19-Jun-20	2	108.4	14.8	8.7	5.5
		M	RG_FO22	19-Jun-20	3	108.4	14.8	8.7	8.2
		M	RG_FO22	11-Sep-20	1	108.4	14.8	8.7	9.1
		M	RG_FO22	11-Sep-20	2	108.4	14.8	8.7	8.4
		M	RG_FO22	11-Sep-20	3	108.4	14.8	8.7	11.0
		M	RG_FO22	11-Sep-20	4	108.4	14.8	8.7	8.9
		M	RG_FO22	11-Sep-20	5	108.4	14.8	8.7	10.0
		M	RG_FO22	9-Dec-20	1	108.4	14.8	8.7	6.1
		M	RG_FO22	9-Dec-20	2	108.4	14.8	8.7	6.1
		M	RG_FO22	9-Dec-20	3	108.4	14.8	8.7	7.2
		M	RG_FO22	9-Dec-20	4	108.4	14.8	8.7	4.0
		M	RG_FO22	9-Dec-20	5	108.4	14.8	8.7	4.7

Shaded cells signify those individual replicates that were associated with a biological trigger (i.e. higher than both the upper 95% prediction limit [as based on predicted water quality] and the upper 97.5th percentile of normal range).

Notes: M= Mainstem; T = Tributary; dw = dry weight.

APPENDIX I
REFERENCE AREA COMPARISONS

APPENDIX I REGIONAL SCALE DATA ANALYSES

I.1 REFERENCE AREA COMPARISONS

To elucidate potential differences among FRO LAEMP reference areas that have been sampled in different seasons, a reference area comparison study was conducted. This study was necessary because in previous years two reference areas (RG_HENUP and RG_FO26) have been sampled during summer sampling campaigns (June, August, and September), while RG_UFR1 was sampled during winter campaigns (December and February). Sampling at RG_UFR1 was conducted in the winter because RG_HENUP and RG_FO26 were not accessible due to a lack of road maintenance and avalanche risk. Since the FRO AWTF-S commissioning study may span multiple seasons, it was important to understand if there are differences of composite-taxa benthic invertebrate tissue (BIT) selenium concentrations at reference areas accessible through the different seasons. Benthic invertebrate community (BIC) comparisons were also explored through the reference area comparison study to further support the FRO AWTF-S commissioning study, and to understand potential differences among reference areas for the FRO LAEMP generally.

Sampling was conducted at all three reference areas (RG_HENUP, RG_FO26, and RG_UFR1) in June and September 2020 (Appendix Table I.1). During each sampling campaign one water quality and selenium speciation sample and three benthic invertebrate community (BIC) samples were taken at each biological monitoring area. Additionally, replicates of three composite-taxa BIT samples were taken at both RG_HENUP and FO26, while replicates of five were taken at RG_UFR1[1]. All samples were sent to laboratories for analysis, as outlined in the Methods section of this report.

The reference area comparisons study was used to determine if there were differences in BIC and/or composite-taxa BIT selenium concentrations among reference areas. Correspondence analysis (CA) of benthic invertebrate communities identified to the lowest practical level (LPL) was conducted to group the reference areas by biological monitoring area and by taxa (Appendix Figure I.1). CA axis 1 (CA1) and CA axis 2 (CA2) accounted for 14% and 7.9% of the variability in the community, respectively. All three reference areas were closely aligned on CA1; however, RG_HENUP separated from RG_UFR1 and RG_ FO26 along CA2. The taxa driving the separation of CA2 in the negative direction were from genus *Oreogeton* and *Eukiefferiella* (both in order Diptera); however, separation of reference areas in the CA was not extensive, suggesting BIC communities at the reference areas are similar.

[1] Five replicates were required as per the FRO LAEMP study design update (Minnow 2021) to support the FRO AWTF-S commissioning study plan.

Benthic invertebrate community endpoints (abundance, richness, relative and total abundance of Ephemeroptera, Plecoptera, and Trichoptera, combined EPT, and key Ephemeroptera taxa) and feeding group indices and habitat preference indices (Burrower, Clinger, Collector-Gatherer, Filterer, Sprawler), as well as composite-taxa BIT selenium concentrations from June and September were plotted for each reference area (Appendix Figure I.2). The composite-taxa BIT selenium concentrations and BIC endpoints and feeding/habitat indices were also analyzed by two-way ANOVA (Factors: station, season, and station x season; Section 2.5.2) to identify temporal and spatial differences among the reference areas (Appendix Table I.2). Most of the BIC endpoints and feeding/habitat indices were not significantly different when comparing RG_FO26 and RG_UFR1 in June and September; however, they were consistently higher at both RG_FO26 and RG_UFR1 compared to RG_HENUP (Appendix Figure I.2 and Appendix Table I.2). Exceptions included % EPT and % Collector-Gatherer, which were generally similar among reference areas and seasons, and % Ephemeroptera and % Clinger, which were generally higher at RG_HENUP compared to both RG_FO26 and RG_UFR1 (Appendix Table I.2). Composite-taxa BIT selenium concentrations were not significantly different among any of the three reference areas and were not different in September compared to June (Appendix Figure I.2 and Appendix Table I.2).

Overall, RG_UFR1, the reference area that is sampled in winter months when RG_FO26 and RG_HENUP are inaccessible, was not significantly different than RG_FO26 for most BIC metrics; however, RG_UFR1 and RG_FO26 were both significantly higher than RG_HENUP for the metrics that were assessed (Appendix Figure I.2 and Appendix Table I.2). The differences in BIC metrics at RG_HENUP compared to RG_FO26 and RG_UFR1 can be attributed to differences of habitats, and is supported by the lower habitat-based site-specific normal range[2] for RG_HENUP compared to RG_FO26 (Section 3.4.3; Figures 3.7 to 3.16); the water quality was similar among all three reference areas (Section 3.1.1; Appendix Table B.1; Appendix Figures B.1 to B.18[3]). Although most BIC metric values were significantly lower at RG_HENUP compared to RG_FO26 and RG_UFR1, all the reference areas were within their respective site-specific normal ranges and normal ranges associated with the Elk Valley in general (Section 3.4.3; Figures 3.7 to 3.16). These results support the use of all three reference areas in the FRO LAEMP data, provided that the context surrounding habitat differences be brought into the interpretations. It is expected that RG_HENUP and RG_FO26

[2] Site-specific normal ranges were determined using habitat-based regression models.

[3] FR_HC3 is the routine water quality monitoring station associated with RG_HENUP. FR_UFR1 is the routine water quality monitoring station associated with RG_FO26 and RG_UFR1 as they are both along the same stretch of the Fording River considered to be reference (i.e., unimpacted by mining).

will continue to be sampled when access is possible (i.e., when snow cover is absent or minimal), but RG_UFR1 will continue to be used as a reference area in the winter. .

Benthic invertebrate tissue selenium concentrations were not significantly different among reference areas in both June and September 2020 (Appendix Figure I.2 and Appendix Table I.2), suggesting selenium water chemistry were similar at each area (Section 3.4.2; Figure 3.6). Indeed, the water chemistry at the reference areas was similar in 2020 and in previous years (reference WQ screening table and water quality plots by station). Determining that composite-taxa BIT selenium concentrations were similar among reference areas was important in the event that interseason reference area comparisons are required for the FRO AWTF-S commissioning study or in future FRO LAEMPs.

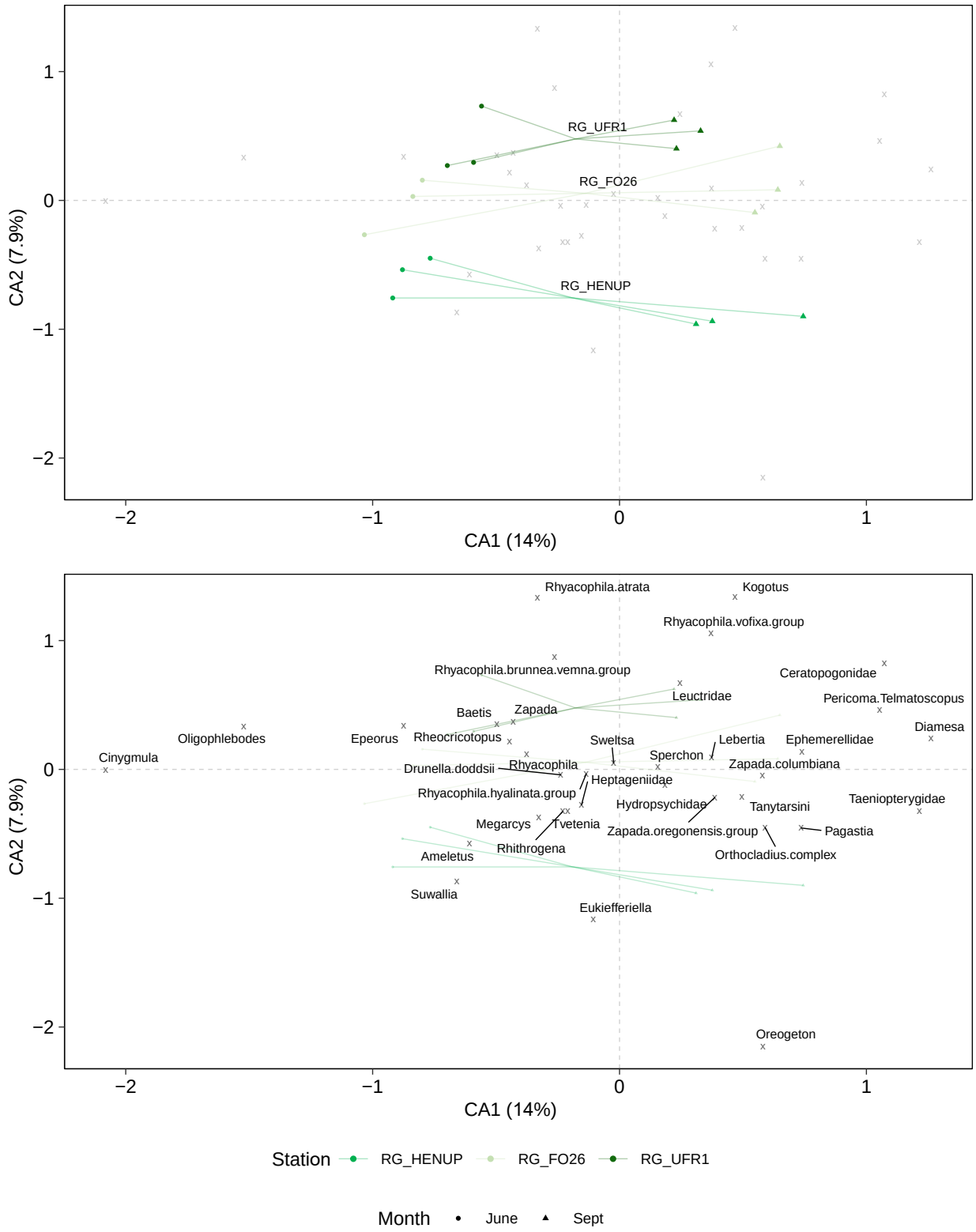

Figure I.1: Scatterplot of Taxa and Station Scores from Correspondence Analysis of Benthic Invertebrate Communities at the Lowest Practical Level, FRO LAEMP, 2020

Notes: Taxa present at fewer than 5% of samples or less than 1% of total abundance were excluded from the analysis. Numbers next to axis labels represent the percent of total variation explained by the axis.

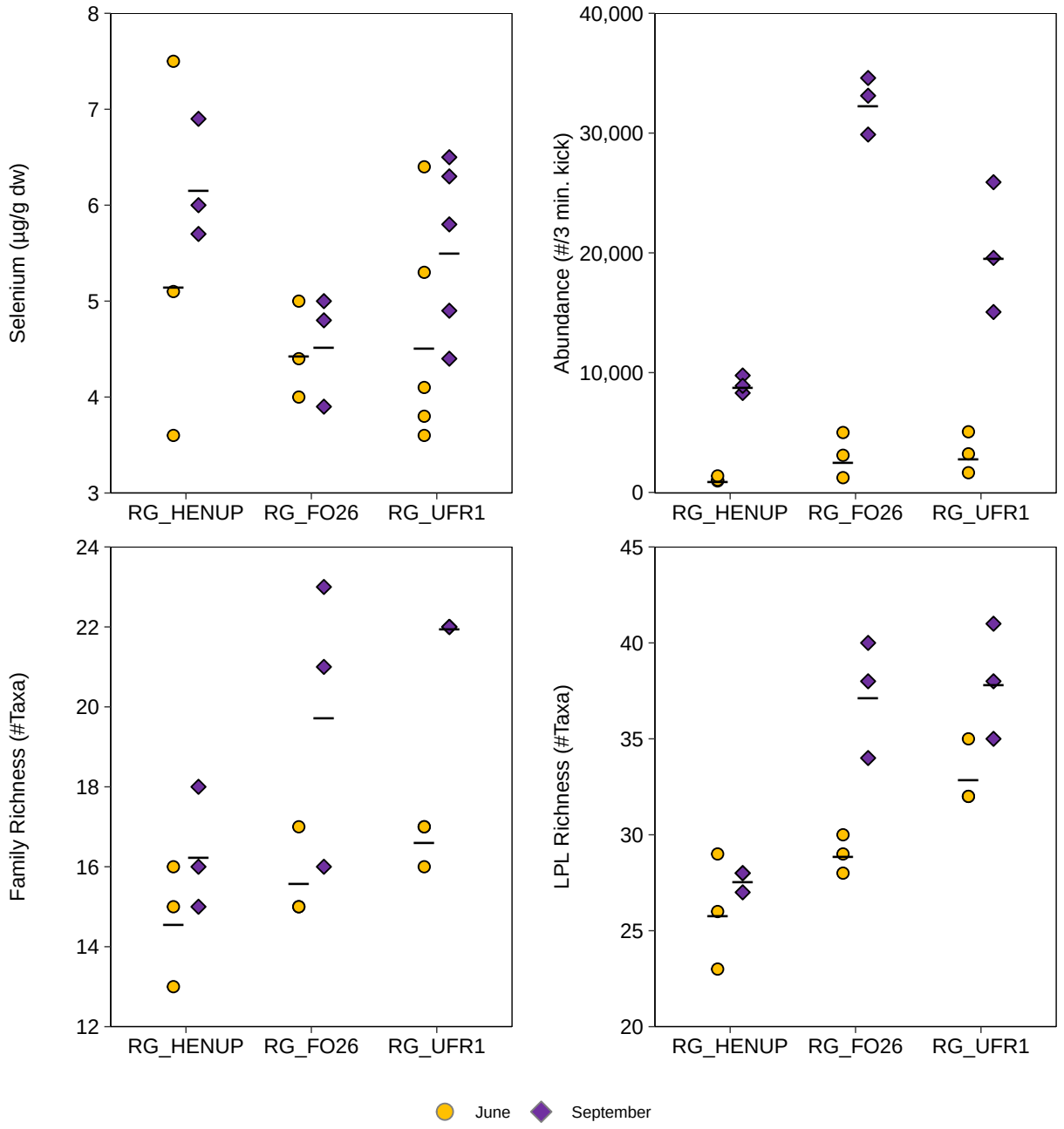

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

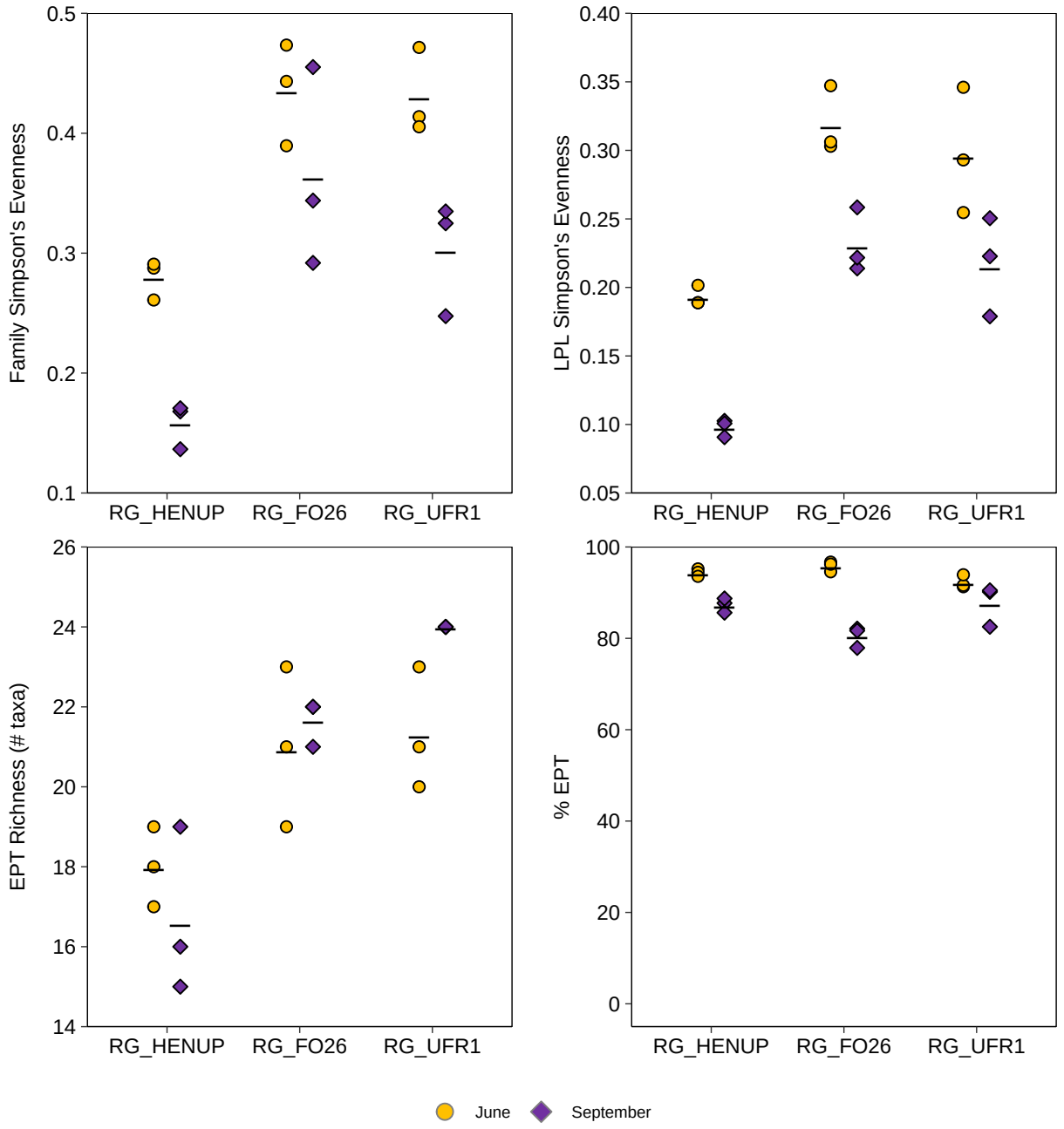

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

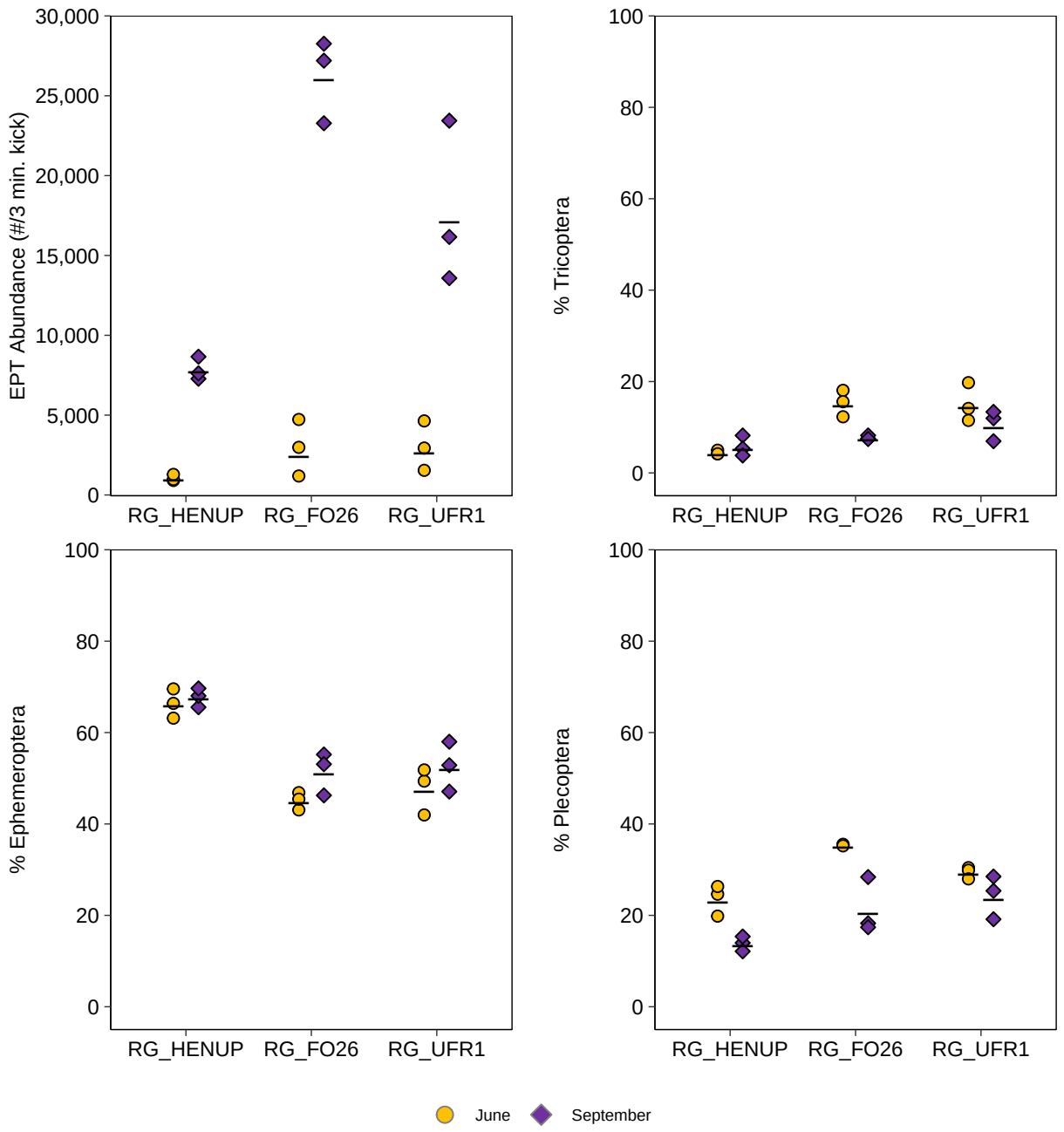

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

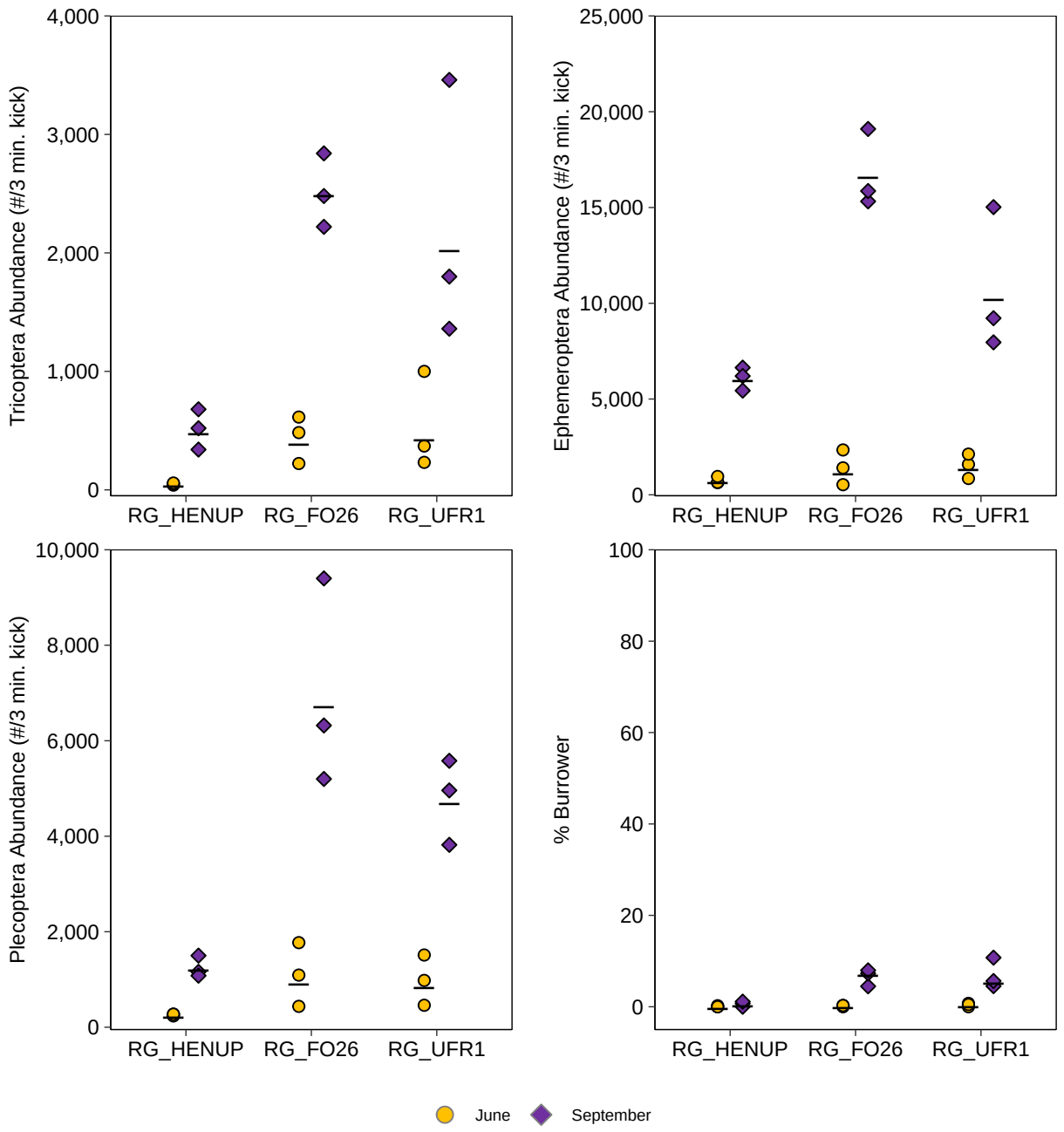

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

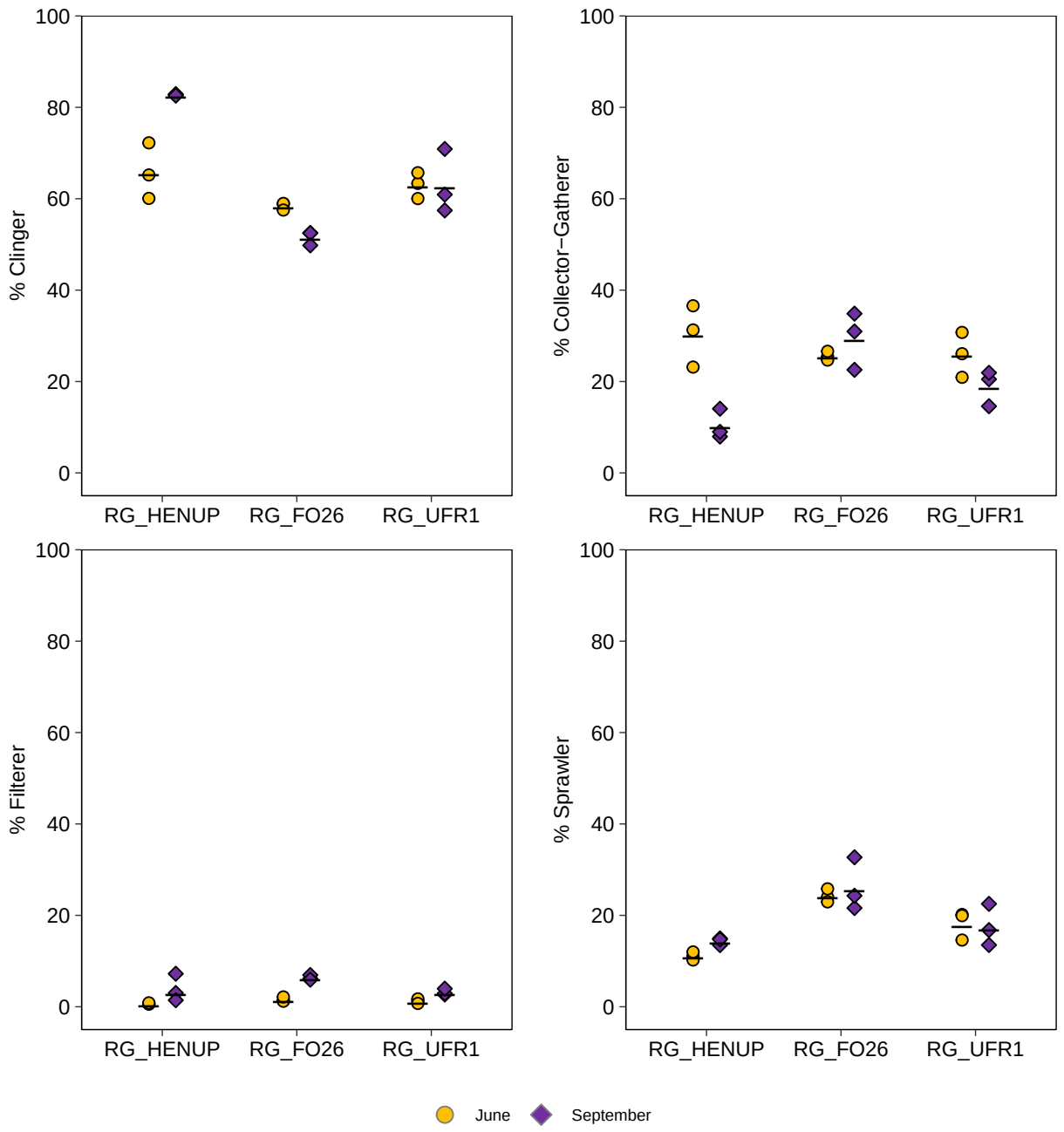

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

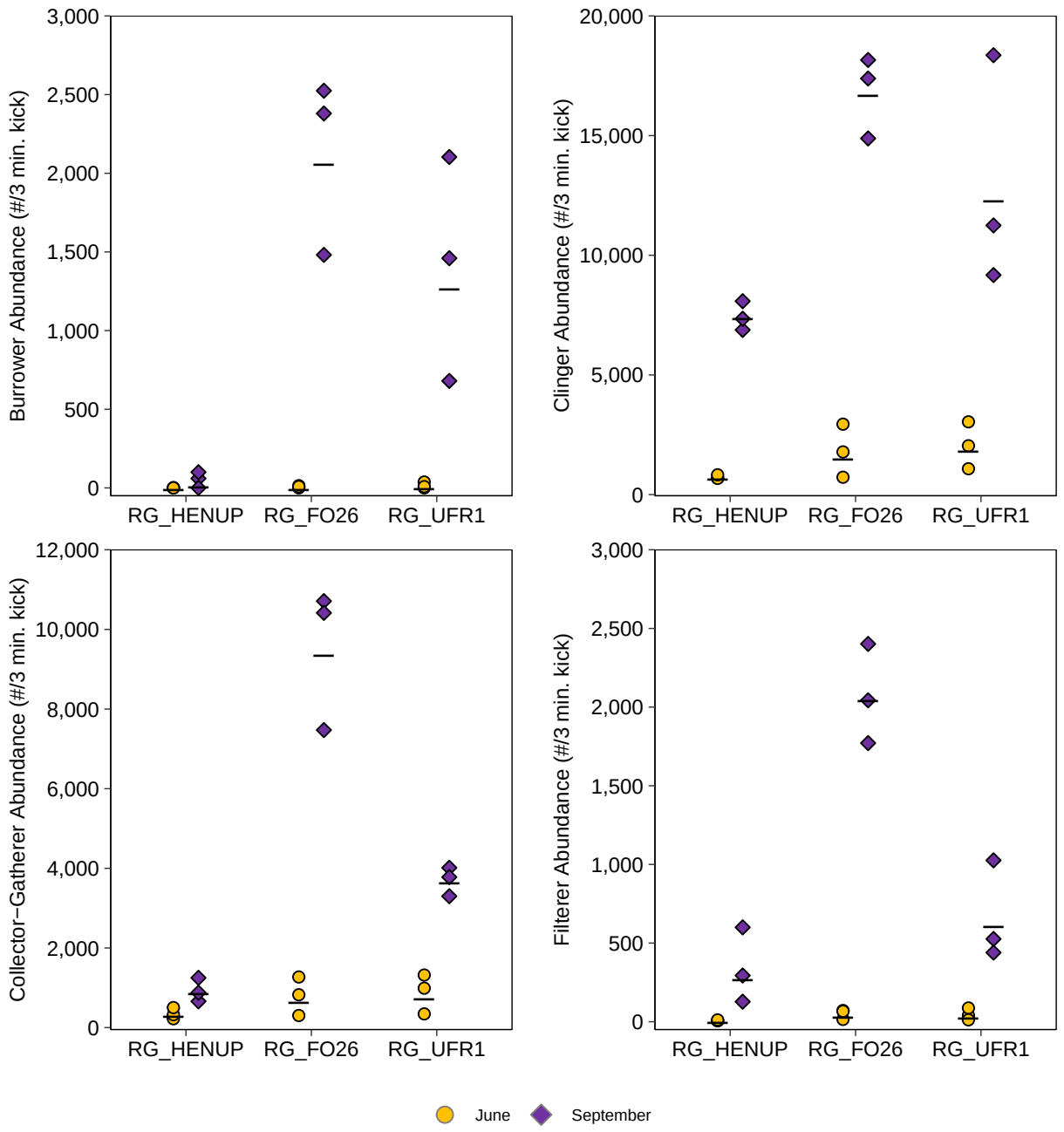

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

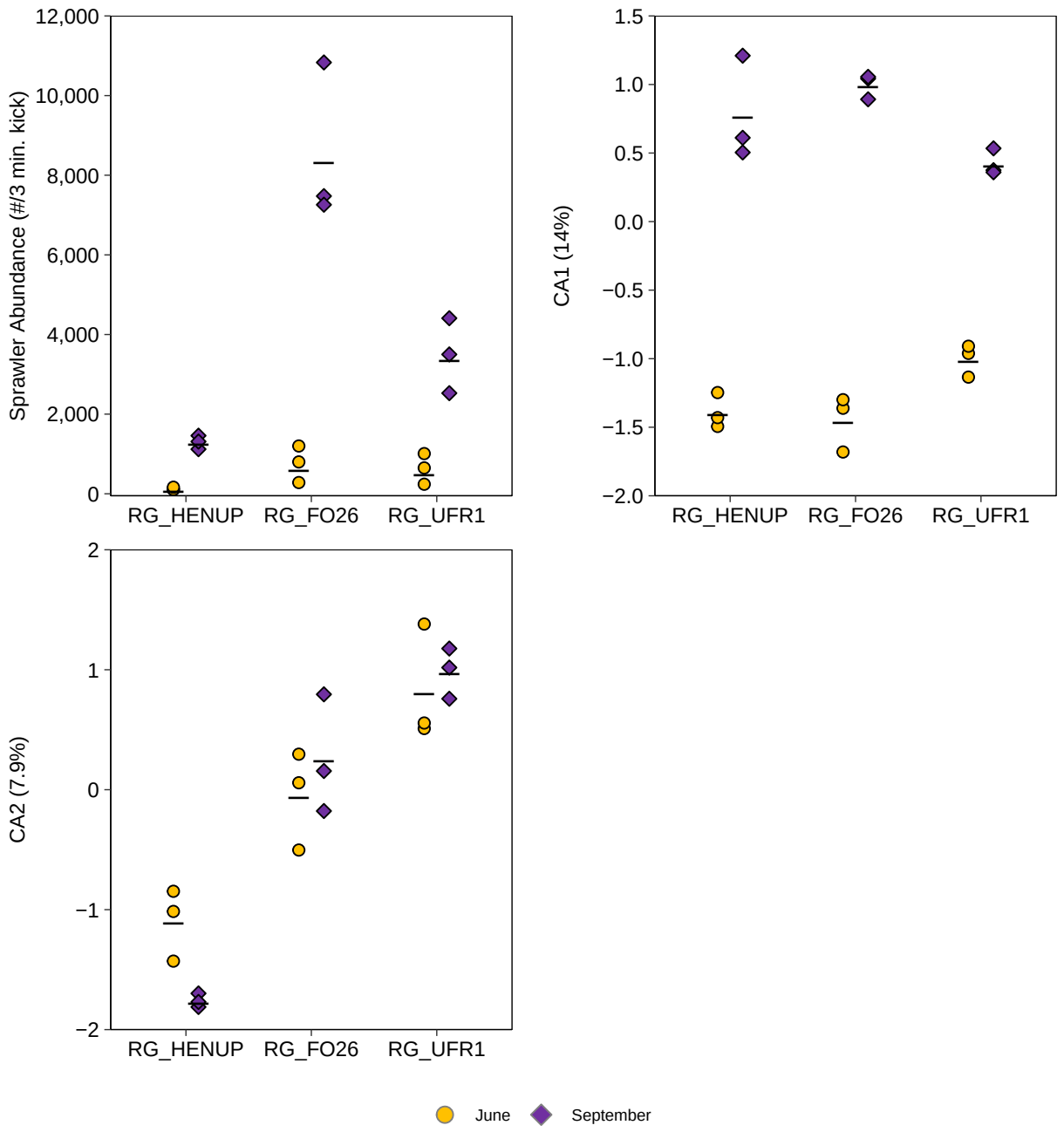

Figure I.2: Scatterplots of Benthic Invertebrate Community Metrics and Tissue Selenium, FRO LAEMP, 2020

Notes: Bars indicate measures of central tendency.

Table I.1: Summary of Reference Areas Sampled for FRO LAEMP, Summer 2020

Biological Monitoring Area (Associated Teck Water Station)		Area Description	Biological Monitoring Area UTM Coordinates		Water Quality				Benthic Invertebrates			
									Kick and Sweep			
					Water Chemistry		Selenium		Community (# of samples)		Composite-taxon Selenium (# of samples)	
			Easting	Northing	June	Sept	June	Sept	June	Sept	June	Sept
Reference	RG_HENUP (FR_HC3)	Henretta Creek u/s all mine operations	655771	5567710	1	1	1	1	3	3	3	3
	RG_FO26 (FR_UFR1)	Fording River u/s Henretta (u/s all mines)	655965	5552879	1	1	1	1	3	3	3	3
	RG_UFR1 (FR_UFR1)	Fording River u/s Henretta at Teck WQ station	651376	5566758	1	1	1	1	3	3	5	5

Notes: '-' indicates sample that is not a part of the sampling design.

Table I.2: **Statistical Comparison Among Reference Stations in FRO LAEMP, 2020**

ANOVA Model[a]						Seasonal Post-hoc[b]: Difference of September and June			Spatial Post-hoc					
									RG_FO26 versus RG_HENUP		RG_FO26 versus RG_UFR1		RG_HENUP versus RG_UFR1	
Group	Parameter	Trans	Station	Season	Station x Season	RG_HENUP	RG_FO26	RG_UFR1	June	Sept	June	Sept	June	Sept
Tissue Chemistry	Selenium (µg/g dw)	log10	0.198	0.110	0.699		0.63		-1.1		-0.50		0.58	
Benthic Endpoints	Abundance (#/3 min. kick)	log10	<0.001	<0.001	0.423		5.4		2.7		0.49		-2.2	
	Family Richness (#Taxa)	log10	0.009	<0.001	0.356		2.0		1.3		-0.84		-2.1	
	LPL Richness (#Taxa)	log10	<0.001	0.001	0.123		2.1		2.9		-1.0		-3.9	
	Family Simpson's Evenness	none	<0.001	<0.001	0.538		-2.3		3.9		0.71		-3.2	
	LPL Simpson's Evenness	log10	<0.001	<0.001	0.024	-6.1	-2.9	-2.8	4.5	7.7	0.66	0.61	-3.8	-7.1
	EPT Richness (# taxa)	log10	<0.001	0.546	0.103		0.30		2.6		-0.74		-3.3	
	% EPT	none	0.167	<0.001	0.004	-3.0	-6.6	-2.0	0.62	-2.9	1.5	-3.1	0.92	-0.17
	EPT Abundance (#/3 min. kick)	log10	<0.001	<0.001	0.565		5.2		2.7		0.43		-2.2	
	% Tricoptera	log10	<0.001	0.045	0.032	0.85	-2.6	-1.4	4.8	1.3	0.10	-1.2	-4.7	-2.5
	% Ephemeroptera	log10	<0.001	0.038	0.484		1.1		-4.2		-0.47		3.8	
	% Plecoptera	log10	0.001	<0.001	0.162		-2.6		2.6		0.13		-2.5	
	Tricoptera Abundance (#/3 min. kick)	log10	<0.001	<0.001	0.360		4.1		4.1		0.13		-4.0	
	Ephemeroptera Abundance (#/3 min. kick)	log10	0.015	<0.001	0.371		5.6		1.9		0.39		-1.5	
	Plecoptera Abundance (#/3 min. kick)	log10	<0.001	<0.001	0.689		4.2		3.6		0.52		-3.1	
	% Burrower	rank	0.020	<0.001	0.385		4.8		2.5		-0.28		-2.8	
	% Clinger	log10	<0.001	0.263	0.001	3.7	-2.0	-0.039	-1.9	-7.6	-1.2	-3.2	0.66	4.4
	% Collector-Gatherer	none	0.059	0.005	0.003	-4.2	0.81	-1.5	-1.0	4.0	-0.071	2.2	0.93	-1.8
	% Filterer	log10	0.017	<0.001	0.516		3.2		1.8		1.2		-0.65	-0.65
	% Sprawler	log10	<0.001	0.258	0.286		0.55		4.0		2.1		-2.0	
	Burrower Abundance (#/3 min. kick)	log10(x+1)	0.008	<0.001	0.141		3.1		2.1		0.064		-2.0	
	Clinger Abundance (#/3 min. kick)	log10	0.005	<0.001	0.515		5.6		2.0		0.15		-1.9	
	Collector-Gatherer Abundance (#/3 min. kick)	log10	<0.001	<0.001	0.035	2.1	5.5	3.3	1.5	4.9	-0.24	2.0	-1.8	-3.0
	Filterer Abundance (#/3 min. kick)	log10	0.001	<0.001	0.426		5.1		2.7		1.0		-1.7	
	Sprawler Abundance (#/3 min. kick)	log10	<0.001	<0.001	0.414		4.8		3.8		1.2		-2.6	
	CA1 (14%)	none	0.754	<0.001	0.002	11	12	7.2	-0.29	1.1	-2.3	2.9	-2.0	1.8
	CA2 (7.9%)	none	<0.001	0.723	0.080	-1.8	0.85	0.46	2.9	5.6	-2.4	-2.0	-5.3	-7.6

P-value < 0.1.

P-value for post-hoc comparison < 0.1 and MOD > 0.

P-value for post-hoc comparison < 0.1 and MOD < 0.

[a] P-values from Analysis of Variance (ANOVA) including the terms Station, Season and Station x Season

[b] Magnitude of Difference (MOD) was calculated as $(MCT_{September} - MCT_{June})/SD_{June}$ using the measure of central tendency related to the statistics. MCT stands for measure of central tendency.

[c] Magnitude of Difference (MOD) was calculated as $(MCT_{stationA} - MCT_{stationB})/SD_{stationB}$ using the measure of central tendency related to the statistics. MCT stands for measure of central tendency.

APPENDIX J
LAB REPORTS

APPENDIX J

LABORATORY REPORTS

WATER

WATER CHEMISTRY

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 08-APR-20
Report Date: 16-APR-20 16:23 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2435543

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435543-1	L2435543-2	L2435543-3	L2435543-4	L2435543-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	07-APR-20	07-APR-20	06-APR-20	07-APR-20	07-APR-20
	Sampled Time	08:30	11:00	14:30	13:30	11:30
	Client ID	RG_FOUSH_WS_2020-04-07_0830	RG_FOUKI_WS_2020-04-07_1100	RG_FOBCP_WS_2020-04-06_1430	RG_TRIP_WS_2020-04-07_1330	RG_RIVER_WS_2020-04-07_1130
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	981	975	1220	<2.0	975
	Hardness (as CaCO3) (mg/L)	592	597	786	<0.50	587
	pH (pH)	8.34	8.33	8.23	4.93	8.33
	ORP (mV)	392	399	411	390	416
	Total Suspended Solids (mg/L)	2.3	2.3	17.3	<1.0	2.3
	Total Dissolved Solids (mg/L)	825 DLHC	761 DLHC	1040 DLHC	<10	812 DLHC
	Turbidity (NTU)	0.66	0.67	1.54	<0.10	0.50
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.9	1.7	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	187	202	209	<1.0	198
	Alkalinity, Carbonate (as CaCO3) (mg/L)	7.0	6.0	<1.0	<1.0	8.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	194	208	209	<1.0	206
	Ammonia as N (mg/L)	0.0267	0.0128	0.0311	0.0175 RRV	0.0172
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLHC	<0.050	<0.050
	Chloride (Cl) (mg/L)	1.25	1.62	<2.5 DLHC	<0.50	1.88
	Fluoride (F) (mg/L)	0.153	0.159	0.16 DLHC	<0.020	0.174
	Ion Balance (%)	102	102	101	0.0	101
	Nitrate (as N) (mg/L)	21.1	19.7	22.4 DLHC	<0.0050	19.9
	Nitrite (as N) (mg/L)	0.0128	0.0129	0.0214 DLHC	<0.0010	0.0114
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI	<0.050 TKNI	<0.050	<0.050 TKNI
	Orthophosphate-Dissolved (as P) (mg/L)	0.0013	<0.0010	0.0015	<0.0010	0.0014
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	302	299	475 DLHC	<0.30	300
	Anion Sum (meq/L)	11.7	11.8	15.7	<0.10	11.8
	Cation Sum (meq/L)	12.0	12.1	15.9	<0.10	11.9
	Cation - Anion Balance (%)	1.2	1.1	0.7	0.0	0.4
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.10	0.92	1.00		1.17
	Total Organic Carbon (mg/L)	0.97	0.98	1.02	<0.50	1.23
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	0.00034	0.00030	0.00036	<0.00010	0.00030
	Arsenic (As)-Total (mg/L)	0.00012	0.00010	0.00013	<0.00010	0.00011
	Barium (Ba)-Total (mg/L)	0.0998	0.0976	0.0813	<0.00010	0.0974
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.011	0.010	<0.010	0.011
	Cadmium (Cd)-Total (ug/L)	0.0622	0.0674	0.0500	<0.0050	0.0762

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435543-6				
	Description	WS				
	Sampled Date	07-APR-20				
	Sampled Time	13:00				
	Client ID	RG_FBLANK_WS_2020-04-07_1300				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	<2.0				
	Hardness (as CaCO3) (mg/L)	<0.50				
	pH (pH)	5.24				
	ORP (mV)	418				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	<10				
	Turbidity (NTU)	<0.10				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.3				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	<1.0				
	Ammonia as N (mg/L)	0.0051 RRV				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	<0.020				
	Ion Balance (%)	0.0				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Total Kjeldahl Nitrogen (mg/L)	<0.050				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total (mg/L)	<0.0020				
	Sulfate (SO4) (mg/L)	<0.30				
	Anion Sum (meq/L)	<0.10				
	Cation Sum (meq/L)	<0.10				
	Cation - Anion Balance (%)	0.0				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)	<0.50				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	<0.00010				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (ug/L)	<0.0050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2435543-1 WS 07-APR-20 08:30 RG_FOUSH_WS_2020-04-07_0830	L2435543-2 WS 07-APR-20 11:00 RG_FOUKI_WS_2020-04-07_1100	L2435543-3 WS 06-APR-20 14:30 RG_FOBCP_WS_2020-04-06_1430	L2435543-4 WS 07-APR-20 13:30 RG_TRIP_WS_2020-04-07_1330	L2435543-5 WS 07-APR-20 11:30 RG_RIVER_WS_2020-04-07_1130
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	130	130	156	<0.050	129
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	0.12	0.12	<0.10	0.11
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.051	0.031	0.022	<0.010	0.029
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0604	0.0579	0.0578	<0.0010	0.0587
	Magnesium (Mg)-Total (mg/L)	59.5	59.5	88.2	<0.10	59.9
	Manganese (Mn)-Total (mg/L)	0.0202	0.0148	0.00854	<0.00010	0.0150
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00196	0.00178	0.00219	<0.000050	0.00179
	Nickel (Ni)-Total (mg/L)	0.00608	0.00502	0.00884	<0.00050	0.00479
	Potassium (K)-Total (mg/L)	2.19	2.26	2.57	<0.050	2.26
	Selenium (Se)-Total (ug/L)	66.1	59.9	119	<0.050	61.4
	Silicon (Si)-Total (mg/L)	1.77	1.75	1.79	<0.10	1.78
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	2.23	2.47	2.38	<0.050	2.50
	Strontium (Sr)-Total (mg/L)	0.210	0.208	0.202	<0.00020	0.208
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00394	0.00384	0.00529	<0.000010	0.00396
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0067	<0.0030	0.0076		0.0074 DTC
	Antimony (Sb)-Dissolved (mg/L)	0.00029	0.00027	0.00032		0.00026
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.101	0.0988	0.0844		0.0967
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.0619	0.0621	0.0517		0.0715
	Calcium (Ca)-Dissolved (mg/L)	141	140	168	<0.050	138
	Chromium (Cr)-Dissolved (mg/L)	0.00010	<0.00010	0.00010		0.00012
	Cobalt (Co)-Dissolved (ug/L)	0.11	0.11	0.12		0.12

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435543-6				
	Description	WS				
	Sampled Date	07-APR-20				
	Sampled Time	13:00				
	Client ID	RG_FBLANK_WS_2020-04-07_1300				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.00010				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Potassium (K)-Total (mg/L)	<0.050				
	Selenium (Se)-Total (ug/L)	<0.050				
	Silicon (Si)-Total (mg/L)	<0.10				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	<0.050				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.00010				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050				
	Calcium (Ca)-Dissolved (mg/L)	<0.050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2435543-1 WS 07-APR-20 08:30 RG_FOUSH_WS_2020-04-07_0830	L2435543-2 WS 07-APR-20 11:00 RG_FOUKI_WS_2020-04-07_1100	L2435543-3 WS 06-APR-20 14:30 RG_FOBCP_WS_2020-04-06_1430	L2435543-4 WS 07-APR-20 13:30 RG_TRIP_WS_2020-04-07_1330	L2435543-5 WS 07-APR-20 11:30 RG_RIVER_WS_2020-04-07_1130
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.074 DTC	0.029	0.035		0.057 DTC
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000363 DTC		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0622	0.0603	0.0616		0.0592
	Magnesium (Mg)-Dissolved (mg/L)	58.3	60.3	88.7	<0.0050	59.2
	Manganese (Mn)-Dissolved (mg/L)	0.0223	0.0150	0.00960		0.0171
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00181	0.00169	0.00204		0.00161
	Nickel (Ni)-Dissolved (mg/L)	0.00604	0.00472	0.00862		0.00477
	Potassium (K)-Dissolved (mg/L)	2.32	2.39	2.80	<0.050	2.43
	Selenium (Se)-Dissolved (ug/L)	67.0	61.4	121		61.8
	Silicon (Si)-Dissolved (mg/L)	1.74	1.73	1.80		1.77
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	2.31	2.49	2.48	<0.050	2.57
	Strontium (Sr)-Dissolved (mg/L)	0.214	0.212	0.208		0.199
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	0.000011		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00387	0.00394	0.00510		0.00375
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0026	0.0019	0.0024		0.0025

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435543-6				
	Description	WS				
	Sampled Date	07-APR-20				
	Sampled Time	13:00				
	Client ID	RG_FBLANK_WS_2020-04-07_1300				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.00010				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Potassium (K)-Dissolved (mg/L)	<0.050				
	Selenium (Se)-Dissolved (ug/L)	<0.050				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				
	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)-Dissolved	DUP-H	L2435543-1, -3, -5
Duplicate	Copper (Cu)-Dissolved	DUP-H	L2435543-1, -3, -5
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2435543-1, -3, -5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2435543-1, -3, -5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2435543-1, -3, -5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2435543-1, -2, -3, -5, -6
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2435543-1, -3, -5
Matrix Spike	Barium (Ba)-Total	MS-B	L2435543-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Total	MS-B	L2435543-1, -2, -3, -4, -5, -6
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2435543-1, -2, -3, -4, -5, -6
Matrix Spike	Strontium (Sr)-Total	MS-B	L2435543-1, -2, -3, -4, -5, -6
Matrix Spike	Phosphorus (P)-Total	MS-B	L2435543-1, -2, -3, -4, -5, -6

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

Reference Information

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5055570								
WG3306530-17 LCS								
Acidity (as CaCO3)			95.0		%		85-115	09-APR-20
WG3306530-20 LCS								
Acidity (as CaCO3)			99.7		%		85-115	09-APR-20
WG3306530-16 MB								
Acidity (as CaCO3)			1.5		mg/L		2	09-APR-20
WG3306530-19 MB								
Acidity (as CaCO3)			1.5		mg/L		2	09-APR-20
ALK-MAN-CL	**Water**							
Batch R5055576								
WG3306533-17 LCS								
Alkalinity, Total (as CaCO3)			102.1		%		85-115	09-APR-20
WG3306533-16 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	09-APR-20
BE-D-L-CCMS-VA	**Water**							
Batch R5056121								
WG3306644-2 LCS								
Beryllium (Be)-Dissolved			96.6		%		80-120	13-APR-20
WG3306644-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	13-APR-20
BE-T-L-CCMS-VA	**Water**							
Batch R5056071								
WG3306693-2 LCS								
Beryllium (Be)-Total			95.6		%		80-120	13-APR-20
WG3306693-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	13-APR-20
BR-L-IC-N-CL	**Water**							
Batch R5055644								
WG3306618-10 LCS								
Bromide (Br)			93.8		%		85-115	09-APR-20
WG3306618-14 LCS								
Bromide (Br)			96.6		%		85-115	09-APR-20
WG3306618-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	09-APR-20
WG3306618-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	09-APR-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5055829								
WG3306857-2 LCS								
Dissolved Organic Carbon			103.2		%		80-120	12-APR-20
WG3306857-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	12-APR-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5055829								
WG3306857-2 LCS								
Total Organic Carbon			104.5		%		80-120	12-APR-20
WG3306857-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	12-APR-20
CL-IC-N-CL	**Water**							
Batch R5055644								
WG3306618-10 LCS								
Chloride (Cl)			101.5		%		90-110	09-APR-20
WG3306618-14 LCS								
Chloride (Cl)			100.9		%		90-110	09-APR-20
WG3306618-13 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-APR-20
WG3306618-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	09-APR-20
EC-L-PCT-CL	**Water**							
Batch R5055576								
WG3306533-17 LCS								
Conductivity (@ 25C)			96.1		%		90-110	09-APR-20
WG3306533-16 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	09-APR-20
F-IC-N-CL	**Water**							
Batch R5055644								
WG3306618-10 LCS								
Fluoride (F)			96.0		%		90-110	09-APR-20
WG3306618-14 LCS								
Fluoride (F)			92.8		%		90-110	09-APR-20
WG3306618-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-APR-20
WG3306618-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-APR-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5055669								
WG3306404-6 LCS								
Mercury (Hg)-Dissolved			97.2		%		80-120	11-APR-20
WG3306404-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	11-APR-20
HG-T-U-CVAF-VA	**Water**							
Batch R5056498								
WG3307580-2 LCS								
Mercury (Hg)-Total			104.4		%		80-120	14-APR-20
WG3307580-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	14-APR-20
MET-D-CCMS-CL	**Water**							
Batch R5056027								
WG3307021-6 LCS		**TMRM**						
Calcium (Ca)-Dissolved			104.1		%		80-120	13-APR-20
Magnesium (Mg)-Dissolved			102.3		%		80-120	13-APR-20
Potassium (K)-Dissolved			104.1		%		80-120	13-APR-20
Sodium (Na)-Dissolved			97.7		%		80-120	13-APR-20
WG3307021-5 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	13-APR-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	13-APR-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	13-APR-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	13-APR-20
MET-D-CCMS-VA	**Water**							
Batch R5056121								
WG3306644-2 LCS								
Aluminum (Al)-Dissolved			96.2		%		80-120	13-APR-20
Antimony (Sb)-Dissolved			93.2		%		80-120	13-APR-20
Arsenic (As)-Dissolved			95.7		%		80-120	13-APR-20
Barium (Ba)-Dissolved			99.3		%		80-120	13-APR-20
Bismuth (Bi)-Dissolved			99.9		%		80-120	13-APR-20
Boron (B)-Dissolved			91.0		%		80-120	13-APR-20
Cadmium (Cd)-Dissolved			95.1		%		80-120	13-APR-20
Calcium (Ca)-Dissolved			98.0		%		80-120	13-APR-20
Chromium (Cr)-Dissolved			94.2		%		80-120	13-APR-20
Cobalt (Co)-Dissolved			95.4		%		80-120	13-APR-20
Copper (Cu)-Dissolved			94.2		%		80-120	13-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5056121								
WG3306644-2 LCS								
Iron (Fe)-Dissolved			92.1		%		80-120	13-APR-20
Lead (Pb)-Dissolved			97.3		%		80-120	13-APR-20
Lithium (Li)-Dissolved			98.3		%		80-120	13-APR-20
Magnesium (Mg)-Dissolved			97.4		%		80-120	13-APR-20
Manganese (Mn)-Dissolved			99.0		%		80-120	13-APR-20
Molybdenum (Mo)-Dissolved			95.2		%		80-120	13-APR-20
Nickel (Ni)-Dissolved			94.0		%		80-120	13-APR-20
Potassium (K)-Dissolved			99.6		%		80-120	13-APR-20
Selenium (Se)-Dissolved			95.9		%		80-120	13-APR-20
Silicon (Si)-Dissolved			100.2		%		60-140	13-APR-20
Silver (Ag)-Dissolved			93.9		%		80-120	13-APR-20
Sodium (Na)-Dissolved			99.6		%		80-120	13-APR-20
Strontium (Sr)-Dissolved			94.6		%		80-120	13-APR-20
Thallium (Tl)-Dissolved			103.1		%		80-120	13-APR-20
Tin (Sn)-Dissolved			88.5		%		80-120	13-APR-20
Titanium (Ti)-Dissolved			97.0		%		80-120	13-APR-20
Uranium (U)-Dissolved			98.9		%		80-120	13-APR-20
Vanadium (V)-Dissolved			95.7		%		80-120	13-APR-20
Zinc (Zn)-Dissolved			91.7		%		80-120	13-APR-20
WG3306644-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	13-APR-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	13-APR-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	13-APR-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	13-APR-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	13-APR-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	13-APR-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	13-APR-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	13-APR-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	13-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5056121								
WG3306644-1 MB		**NP**						
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	13-APR-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	13-APR-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	13-APR-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	13-APR-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	13-APR-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	13-APR-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	13-APR-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	13-APR-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	13-APR-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	13-APR-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	13-APR-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	13-APR-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	13-APR-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	13-APR-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	13-APR-20
Batch R5057114								
WG3307835-6 LCS								
Aluminum (Al)-Dissolved			97.4		%		80-120	15-APR-20
Antimony (Sb)-Dissolved			98.3		%		80-120	15-APR-20
Arsenic (As)-Dissolved			96.1		%		80-120	15-APR-20
Barium (Ba)-Dissolved			96.4		%		80-120	15-APR-20
Bismuth (Bi)-Dissolved			96.4		%		80-120	15-APR-20
Boron (B)-Dissolved			98.8		%		80-120	15-APR-20
Cadmium (Cd)-Dissolved			106.8		%		80-120	15-APR-20
Calcium (Ca)-Dissolved			102.6		%		80-120	15-APR-20
Chromium (Cr)-Dissolved			98.6		%		80-120	15-APR-20
Cobalt (Co)-Dissolved			97.1		%		80-120	15-APR-20
Copper (Cu)-Dissolved			97.7		%		80-120	15-APR-20
Iron (Fe)-Dissolved			99.0		%		80-120	15-APR-20
Lead (Pb)-Dissolved			94.0		%		80-120	15-APR-20
Lithium (Li)-Dissolved			104.9		%		80-120	15-APR-20
Magnesium (Mg)-Dissolved			97.5		%		80-120	15-APR-20
Manganese (Mn)-Dissolved			98.1		%		80-120	15-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5057114								
WG3307835-6 LCS								
Molybdenum (Mo)-Dissolved			91.4		%		80-120	15-APR-20
Nickel (Ni)-Dissolved			97.5		%		80-120	15-APR-20
Potassium (K)-Dissolved			93.5		%		80-120	15-APR-20
Selenium (Se)-Dissolved			104.4		%		80-120	15-APR-20
Silicon (Si)-Dissolved			110.7		%		60-140	15-APR-20
Silver (Ag)-Dissolved			88.9		%		80-120	15-APR-20
Sodium (Na)-Dissolved			104.5		%		80-120	15-APR-20
Strontium (Sr)-Dissolved			102.1		%		80-120	15-APR-20
Thallium (Tl)-Dissolved			98.8		%		80-120	15-APR-20
Tin (Sn)-Dissolved			94.8		%		80-120	15-APR-20
Titanium (Ti)-Dissolved			95.5		%		80-120	15-APR-20
Uranium (U)-Dissolved			93.6		%		80-120	15-APR-20
Vanadium (V)-Dissolved			100.6		%		80-120	15-APR-20
Zinc (Zn)-Dissolved			95.6		%		80-120	15-APR-20
WG3307835-5 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	15-APR-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	15-APR-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	15-APR-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	15-APR-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	15-APR-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	15-APR-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-APR-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	15-APR-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5057114								
WG3307835-5 MB		**NP**						
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	15-APR-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	15-APR-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	15-APR-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	15-APR-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	15-APR-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	15-APR-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	15-APR-20
MET-T-CCMS-VA	**Water**							
Batch R5056071								
WG3306693-2 LCS								
Aluminum (Al)-Total			99.9		%		80-120	13-APR-20
Antimony (Sb)-Total			105.1		%		80-120	13-APR-20
Arsenic (As)-Total			97.9		%		80-120	13-APR-20
Barium (Ba)-Total			95.0		%		80-120	13-APR-20
Bismuth (Bi)-Total			101.3		%		80-120	13-APR-20
Boron (B)-Total			90.3		%		80-120	13-APR-20
Cadmium (Cd)-Total			100.6		%		80-120	13-APR-20
Calcium (Ca)-Total			96.2		%		80-120	13-APR-20
Chromium (Cr)-Total			96.5		%		80-120	13-APR-20
Cobalt (Co)-Total			96.2		%		80-120	13-APR-20
Copper (Cu)-Total			96.1		%		80-120	13-APR-20
Iron (Fe)-Total			97.1		%		80-120	13-APR-20
Lead (Pb)-Total			101.7		%		80-120	13-APR-20
Lithium (Li)-Total			95.4		%		80-120	13-APR-20
Magnesium (Mg)-Total			102.6		%		80-120	13-APR-20
Manganese (Mn)-Total			99.6		%		80-120	13-APR-20
Molybdenum (Mo)-Total			104.3		%		80-120	13-APR-20
Nickel (Ni)-Total			97.0		%		80-120	13-APR-20
Potassium (K)-Total			101.1		%		80-120	13-APR-20
Selenium (Se)-Total			98.7		%		80-120	13-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5056071								
WG3306693-2 LCS								
Silicon (Si)-Total			97.2		%		80-120	13-APR-20
Silver (Ag)-Total			97.9		%		80-120	13-APR-20
Sodium (Na)-Total			100.5		%		80-120	13-APR-20
Strontium (Sr)-Total			100.5		%		80-120	13-APR-20
Thallium (Tl)-Total			102.4		%		80-120	13-APR-20
Tin (Sn)-Total			100.7		%		80-120	13-APR-20
Titanium (Ti)-Total			96.3		%		80-120	13-APR-20
Uranium (U)-Total			98.7		%		80-120	13-APR-20
Vanadium (V)-Total			98.5		%		80-120	13-APR-20
Zinc (Zn)-Total			96.9		%		80-120	13-APR-20
WG3306693-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	13-APR-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	13-APR-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	13-APR-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	13-APR-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	13-APR-20
Boron (B)-Total			<0.010		mg/L		0.01	13-APR-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	13-APR-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	13-APR-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	13-APR-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	13-APR-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	13-APR-20
Iron (Fe)-Total			<0.010		mg/L		0.01	13-APR-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	13-APR-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	13-APR-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	13-APR-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	13-APR-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	13-APR-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	13-APR-20
Potassium (K)-Total			<0.050		mg/L		0.05	13-APR-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	13-APR-20
Silicon (Si)-Total			<0.10		mg/L		0.1	13-APR-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	13-APR-20
Sodium (Na)-Total			<0.050		mg/L		0.05	13-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5056071								
WG3306693-1 MB								
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	13-APR-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	13-APR-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	13-APR-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	13-APR-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	13-APR-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	13-APR-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	13-APR-20
NH3-L-F-CL	**Water**							
Batch R5055989								
WG3306273-18 LCS								
Ammonia as N			97.2		%		85-115	09-APR-20
WG3306273-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	09-APR-20
NO2-L-IC-N-CL	**Water**							
Batch R5055644								
WG3306618-10 LCS								
Nitrite (as N)			98.2		%		90-110	09-APR-20
WG3306618-14 LCS								
Nitrite (as N)			93.9		%		90-110	09-APR-20
WG3306618-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	09-APR-20
WG3306618-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	09-APR-20
NO3-L-IC-N-CL	**Water**							
Batch R5055644								
WG3306618-10 LCS								
Nitrate (as N)			108.1		%		90-110	09-APR-20
WG3306618-14 LCS								
Nitrate (as N)			108.2		%		90-110	09-APR-20
WG3306618-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	09-APR-20
WG3306618-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	09-APR-20
ORP-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5057538								
WG3308899-1 CRM		**CL-ORP**						
ORP			226		mV		210-230	16-APR-20
WG3308899-9 CRM		**CL-ORP**						
ORP			230		mV		210-230	16-APR-20
WG3308899-2 DUP		**L2435543-6**						
ORP		418	424	J	mV	5.6	15	16-APR-20
P-T-L-COL-CL	**Water**							
Batch R5057242								
WG3308113-10 LCS								
Phosphorus (P)-Total			108.2		%		80-120	15-APR-20
WG3308113-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	15-APR-20
PH-CL	**Water**							
Batch R5055576								
WG3306533-17 LCS								
pH			6.98		pH		6.9-7.1	09-APR-20
PO4-DO-L-COL-CL	**Water**							
Batch R5055813								
WG3306055-14 LCS								
Orthophosphate-Dissolved (as P)			112.5		%		80-120	09-APR-20
WG3306055-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	09-APR-20
SO4-IC-N-CL	**Water**							
Batch R5055644								
WG3306618-10 LCS								
Sulfate (SO4)			108.6		%		90-110	09-APR-20
WG3306618-14 LCS								
Sulfate (SO4)			108.2		%		90-110	09-APR-20
WG3306618-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-APR-20
WG3306618-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-APR-20
SOLIDS-TDS-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5056553								
WG3306833-11 LCS								
Total Dissolved Solids			101.0		%		85-115	13-APR-20
WG3306833-10 MB								
Total Dissolved Solids			<10		mg/L		10	13-APR-20
TKN-L-F-CL	**Water**							
Batch R5057129								
WG3308414-10 LCS								
Total Kjeldahl Nitrogen			107.3		%		75-125	15-APR-20
WG3308414-18 LCS								
Total Kjeldahl Nitrogen			103.3		%		75-125	16-APR-20
WG3308414-2 LCS								
Total Kjeldahl Nitrogen			104.0		%		75-125	15-APR-20
WG3308414-6 LCS								
Total Kjeldahl Nitrogen			103.0		%		75-125	15-APR-20
WG3308414-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	15-APR-20
WG3308414-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-APR-20
WG3308414-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	15-APR-20
WG3308414-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	15-APR-20
TSS-L-CL	**Water**							
Batch R5056555								
WG3306866-14 LCS								
Total Suspended Solids			93.6		%		85-115	13-APR-20
WG3306866-13 MB								
Total Suspended Solids			<1.0		mg/L		1	13-APR-20
TURBIDITY-CL	**Water**							
Batch R5055488								
WG3306083-8 LCS								
Turbidity			102.0		%		85-115	09-APR-20
WG3306083-7 MB								
Turbidity			<0.10		NTU		0.1	09-APR-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	07-APR-20 08:30	16-APR-20 15:01	0.25	222	hours	EHTR-FM
	2	07-APR-20 11:00	16-APR-20 15:01	0.25	220	hours	EHTR-FM
	3	06-APR-20 14:30	16-APR-20 15:01	0.25	240	hours	EHTR-FM
	4	07-APR-20 13:30	16-APR-20 15:01	0.25	217	hours	EHTR-FM
	5	07-APR-20 11:30	16-APR-20 15:01	0.25	220	hours	EHTR-FM
	6	07-APR-20 13:00	16-APR-20 15:01	0.25	218	hours	EHTR-FM
pH							
	1	07-APR-20 08:30	09-APR-20 12:00	0.25	52	hours	EHTR-FM
	2	07-APR-20 11:00	09-APR-20 12:00	0.25	49	hours	EHTR-FM
	3	06-APR-20 14:30	09-APR-20 12:00	0.25	70	hours	EHTR-FM
	4	07-APR-20 13:30	09-APR-20 12:00	0.25	47	hours	EHTR-FM
	5	07-APR-20 11:30	09-APR-20 12:00	0.25	48	hours	EHTR-FM
	6	07-APR-20 13:00	09-APR-20 12:00	0.25	47	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2435543 were received on 08-APR-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP 20-09

TURNAROUND TIME:

PROJECT/CLIENT INFO

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Project Manager	Cait Good
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	Excel	PDF	EDD
cait.good@teck.com			

L2435543-COFC

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FOUSH_WS_2020-04-07_0830	RG_FOUSH	WS	No	4/7/2020	8:30	G	7	X	X	X	X	X	X	X
RG_FOUKI_WS_2020-04-07_1100	RG_FOUKI	WS	No	4/7/2020	11:00	G	7	X	X	X	X	X	X	X
RG_FOBCP_WS_2020-04-06_1430	RG_FOBCP	WS	No	4/6/2020	14:30	G	7	X	X	X	X	X	X	X
RG_TRIP_WS_2020-04-07_1330	RG_TRIP	WS	No	4/7/2020	13:30	G	4	X		X	X		X	
RG_RIVER_WS_2020-04-07_1130	RG_RIVER	WS	No	4/7/2020	11:30	G	7	X	X	X	X	X	X	X
RG_FBLANK_WS_2020-04-07_1300	RG_FBLANK	WS	No	4/7/2020	13:00	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION

DATE/TIME

ACCEPTED BY/AFFILIATION

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default) x

Priority (2-3 business days) - 50% surcharge

Sampler's Name	Maddy Stokes	Mobile #	647-522-0672

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 09-APR-20
Report Date: 17-APR-20 14:58 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2435904

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435904-1	L2435904-2			
	Description	WS	WS			
	Sampled Date	08-APR-20	08-APR-20			
	Sampled Time	11:20	13:00			
	Client ID	RG_FOBCPD_WS_2020-04-08_1120	RG_FOUEW_WS_2020-04-08_1300			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1200	1110			
	Hardness (as CaCO3) (mg/L)	740	672			
	pH (pH)	8.15	8.24			
	ORP (mV)	415	429			
	Total Suspended Solids (mg/L)	6.9	<1.0			
	Total Dissolved Solids (mg/L)	1010 DLHC	926 DLHC			
	Turbidity (NTU)	1.81	0.31			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.0	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	219	244			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	219	244			
	Ammonia as N (mg/L)	0.0099	0.0069			
	Bromide (Br) (mg/L)	<0.25 DLHC	<0.25 DLHC			
	Chloride (Cl) (mg/L)	<2.5 DLHC	2.6 DLHC			
	Fluoride (F) (mg/L)	0.17 DLHC	0.14 DLHC			
	Ion Balance (%)	101	97.8			
	Nitrate (as N) (mg/L)	20.3 DLHC	23.6 DLHC			
	Nitrite (as N) (mg/L)	<0.0050 DLHC	<0.0050 DLHC			
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0015			
	Phosphorus (P)-Total (mg/L)	0.0088	<0.0020			
	Sulfate (SO4) (mg/L)	431 DLHC	349 DLHC			
	Anion Sum (meq/L)	14.8	13.9			
	Cation Sum (meq/L)	14.9	13.6			
	Cation - Anion Balance (%)	0.5	-1.1			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.97	<0.50			
	Total Organic Carbon (mg/L)	0.89	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0378	0.0111			
	Antimony (Sb)-Total (mg/L)	0.00032	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00011	<0.00010			
	Barium (Ba)-Total (mg/L)	0.0765	0.0943			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.011	0.011			
	Cadmium (Cd)-Total (ug/L)	0.0858	0.0362			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435904-1	L2435904-2			
	Description	WS	WS			
	Sampled Date	08-APR-20	08-APR-20			
	Sampled Time	11:20	13:00			
	Client ID	RG_FOBCPD_WS_2020-04-08_1120	RG_FOUEW_WS_2020-04-08_1300			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	168	158			
	Chromium (Cr)-Total (mg/L)	0.00020	0.00017			
	Cobalt (Co)-Total (ug/L)	0.16	0.13			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	0.093	0.022			
	Lead (Pb)-Total (mg/L)	0.000065	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0580	0.0358			
	Magnesium (Mg)-Total (mg/L)	82.2	67.4			
	Manganese (Mn)-Total (mg/L)	0.0166	0.00520			
	Mercury (Hg)-Total (ug/L)	0.00071	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.00185	0.000578			
	Nickel (Ni)-Total (mg/L)	0.00909	<0.00050			
	Potassium (K)-Total (mg/L)	2.29	1.61			
	Selenium (Se)-Total (ug/L)	107	91.3			
	Silicon (Si)-Total (mg/L)	2.13	2.44			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.38	2.87			
	Strontium (Sr)-Total (mg/L)	0.195	0.189			
	Thallium (Tl)-Total (mg/L)	0.000014	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00510	0.00324			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	0.0035	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	0.00030	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.0803	0.105			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	0.0573	0.0295			
	Calcium (Ca)-Dissolved (mg/L)	157	154			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	0.11	0.13			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2435904-1	L2435904-2			
	Description	WS	WS			
	Sampled Date	08-APR-20	08-APR-20			
	Sampled Time	11:20	13:00			
	Client ID	RG_FOBCPD_WS_2020-04-08_1120	RG_FOUEW_WS_2020-04-08_1300			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00026	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0563	0.0339			
	Magnesium (Mg)-Dissolved (mg/L)	84.6	69.7			
	Manganese (Mn)-Dissolved (mg/L)	0.0106	0.00514			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00200	0.000587			
	Nickel (Ni)-Dissolved (mg/L)	0.00856	<0.00050			
	Potassium (K)-Dissolved (mg/L)	2.36	1.70			
	Selenium (Se)-Dissolved (ug/L)	114	95.9			
	Silicon (Si)-Dissolved (mg/L)	1.79	2.18			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.21	2.77			
	Strontium (Sr)-Dissolved (mg/L)	0.179	0.180			
	Thallium (Tl)-Dissolved (mg/L)	0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00479	0.00309			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0025	<0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2435904-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2435904-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2435904-1, -2
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2435904-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2435904-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2435904-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2435904-1, -2
Matrix Spike	Iron (Fe)-Total	MS-B	L2435904-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2435904-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2435904-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2435904-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2435904-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5056704								
WG3307914-5 LCS								
Acidity (as CaCO3)			99.5		%		85-115	12-APR-20
WG3307914-4 MB								
Acidity (as CaCO3)			1.2		mg/L		2	12-APR-20
ALK-MAN-CL	**Water**							
Batch R5057210								
WG3308514-2 LCS								
Alkalinity, Total (as CaCO3)			102.2		%		85-115	15-APR-20
WG3308514-1 MB								
Alkalinity, Total (as CaCO3)			1.0		mg/L		1	15-APR-20
BE-D-L-CCMS-VA	**Water**							
Batch R5057411								
WG3307943-2 LCS								
Beryllium (Be)-Dissolved			92.4		%		80-120	15-APR-20
WG3307943-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	15-APR-20
BE-T-L-CCMS-VA	**Water**							
Batch R5057114								
WG3308217-2 LCS								
Beryllium (Be)-Total			100.9		%		80-120	15-APR-20
WG3308217-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	15-APR-20
BR-L-IC-N-CL	**Water**							
Batch R5055902								
WG3306907-6 LCS								
Bromide (Br)			104.4		%		85-115	11-APR-20
WG3306907-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	11-APR-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5055852								
WG3306865-14 LCS								
Dissolved Organic Carbon			98.8		%		80-120	12-APR-20
WG3306865-13 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	12-APR-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5055852								
WG3306865-14 LCS								
Total Organic Carbon			92.6		%		80-120	12-APR-20
WG3306865-13 MB								
Total Organic Carbon			<0.50		mg/L		0.5	12-APR-20
CL-IC-N-CL	**Water**							
Batch R5055902								
WG3306907-6 LCS								
Chloride (Cl)			99.3		%		90-110	11-APR-20
WG3306907-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	11-APR-20
EC-L-PCT-CL	**Water**							
Batch R5057210								
WG3308514-2 LCS								
Conductivity (@ 25C)			99.3		%		90-110	15-APR-20
WG3308514-1 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	15-APR-20
F-IC-N-CL	**Water**							
Batch R5055902								
WG3306907-6 LCS								
Fluoride (F)			102.2		%		90-110	11-APR-20
WG3306907-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	11-APR-20
HG-D-CVAA-VA	**Water**							
Batch R5056714								
WG3307857-6 LCS								
Mercury (Hg)-Dissolved			98.8		%		80-120	15-APR-20
WG3307857-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	15-APR-20
WG3307857-8 MS		**L2435904-1**						
Mercury (Hg)-Dissolved			98.8		%		70-130	15-APR-20
HG-T-U-CVAF-VA	**Water**							
Batch R5057422								
WG3308801-2 LCS								
Mercury (Hg)-Total			96.2		%		80-120	16-APR-20
WG3308801-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	16-APR-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5057411								
WG3307943-2 LCS								
Aluminum (Al)-Dissolved			99.4		%		80-120	15-APR-20
Antimony (Sb)-Dissolved			98.3		%		80-120	15-APR-20
Arsenic (As)-Dissolved			99.1		%		80-120	15-APR-20
Barium (Ba)-Dissolved			99.1		%		80-120	15-APR-20
Bismuth (Bi)-Dissolved			94.9		%		80-120	15-APR-20
Boron (B)-Dissolved			85.1		%		80-120	15-APR-20
Cadmium (Cd)-Dissolved			97.9		%		80-120	15-APR-20
Calcium (Ca)-Dissolved			96.3		%		80-120	15-APR-20
Chromium (Cr)-Dissolved			101.1		%		80-120	15-APR-20
Cobalt (Co)-Dissolved			99.3		%		80-120	15-APR-20
Copper (Cu)-Dissolved			99.5		%		80-120	15-APR-20
Iron (Fe)-Dissolved			92.5		%		80-120	15-APR-20
Lead (Pb)-Dissolved			96.7		%		80-120	15-APR-20
Lithium (Li)-Dissolved			91.9		%		80-120	15-APR-20
Magnesium (Mg)-Dissolved			101.7		%		80-120	15-APR-20
Manganese (Mn)-Dissolved			103.6		%		80-120	15-APR-20
Molybdenum (Mo)-Dissolved			97.1		%		80-120	15-APR-20
Nickel (Ni)-Dissolved			99.4		%		80-120	15-APR-20
Potassium (K)-Dissolved			98.0		%		80-120	15-APR-20
Selenium (Se)-Dissolved			98.3		%		80-120	15-APR-20
Silicon (Si)-Dissolved			99.4		%		60-140	15-APR-20
Silver (Ag)-Dissolved			91.3		%		80-120	15-APR-20
Sodium (Na)-Dissolved			97.4		%		80-120	15-APR-20
Strontium (Sr)-Dissolved			89.0		%		80-120	15-APR-20
Thallium (Tl)-Dissolved			95.3		%		80-120	15-APR-20
Tin (Sn)-Dissolved			96.6		%		80-120	15-APR-20
Titanium (Ti)-Dissolved			102.1		%		80-120	15-APR-20
Uranium (U)-Dissolved			91.9		%		80-120	15-APR-20
Vanadium (V)-Dissolved			102.8		%		80-120	15-APR-20
Zinc (Zn)-Dissolved			104.3		%		80-120	15-APR-20
WG3307943-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	15-APR-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5057411								
WG3307943-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	15-APR-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	15-APR-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	15-APR-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	15-APR-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	15-APR-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-APR-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	15-APR-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	15-APR-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	15-APR-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-APR-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	15-APR-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	15-APR-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	15-APR-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	15-APR-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	15-APR-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	15-APR-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	15-APR-20
MET-T-CCMS-VA	**Water**							
Batch R5057114								
WG3308217-2 LCS								
Aluminum (Al)-Total			95.5		%		80-120	15-APR-20
Antimony (Sb)-Total			103.4		%		80-120	15-APR-20
Arsenic (As)-Total			95.6		%		80-120	15-APR-20
Barium (Ba)-Total			93.4		%		80-120	15-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5057114								
WG3308217-2 LCS								
Bismuth (Bi)-Total			96.3		%		80-120	15-APR-20
Boron (B)-Total			95.1		%		80-120	15-APR-20
Cadmium (Cd)-Total			104.9		%		80-120	15-APR-20
Calcium (Ca)-Total			103.5		%		80-120	15-APR-20
Chromium (Cr)-Total			97.8		%		80-120	15-APR-20
Cobalt (Co)-Total			96.8		%		80-120	15-APR-20
Copper (Cu)-Total			97.0		%		80-120	15-APR-20
Iron (Fe)-Total			97.9		%		80-120	15-APR-20
Lead (Pb)-Total			93.5		%		80-120	15-APR-20
Lithium (Li)-Total			99.3		%		80-120	15-APR-20
Magnesium (Mg)-Total			97.4		%		80-120	15-APR-20
Manganese (Mn)-Total			96.4		%		80-120	15-APR-20
Molybdenum (Mo)-Total			94.5		%		80-120	15-APR-20
Nickel (Ni)-Total			96.5		%		80-120	15-APR-20
Potassium (K)-Total			93.2		%		80-120	15-APR-20
Selenium (Se)-Total			98.7		%		80-120	15-APR-20
Silicon (Si)-Total			104.0		%		80-120	15-APR-20
Silver (Ag)-Total			91.0		%		80-120	15-APR-20
Sodium (Na)-Total			102.2		%		80-120	15-APR-20
Strontium (Sr)-Total			96.5		%		80-120	15-APR-20
Thallium (Tl)-Total			99.1		%		80-120	15-APR-20
Tin (Sn)-Total			95.5		%		80-120	15-APR-20
Titanium (Ti)-Total			95.7		%		80-120	15-APR-20
Uranium (U)-Total			94.2		%		80-120	15-APR-20
Vanadium (V)-Total			99.6		%		80-120	15-APR-20
Zinc (Zn)-Total			94.1		%		80-120	15-APR-20
WG3308217-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	15-APR-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	15-APR-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	15-APR-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	15-APR-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	15-APR-20
Boron (B)-Total			<0.010		mg/L		0.01	15-APR-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	15-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5057114								
WG3308217-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	15-APR-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	15-APR-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	15-APR-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	15-APR-20
Iron (Fe)-Total			<0.010		mg/L		0.01	15-APR-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	15-APR-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	15-APR-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	15-APR-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	15-APR-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	15-APR-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	15-APR-20
Potassium (K)-Total			<0.050		mg/L		0.05	15-APR-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	15-APR-20
Silicon (Si)-Total			<0.10		mg/L		0.1	15-APR-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	15-APR-20
Sodium (Na)-Total			<0.050		mg/L		0.05	15-APR-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	15-APR-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	15-APR-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	15-APR-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	15-APR-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	15-APR-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	15-APR-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	15-APR-20
NH3-L-F-CL	**Water**							
Batch R5056826								
WG3307634-6 LCS								
Ammonia as N			103.0		%		85-115	14-APR-20
WG3307634-5 MB								
Ammonia as N			<0.0050		mg/L		0.005	14-APR-20
NO2-L-IC-N-CL	**Water**							
Batch R5055902								
WG3306907-6 LCS								
Nitrite (as N)			101.5		%		90-110	11-APR-20
WG3306907-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	11-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5055902								
WG3306907-6 LCS								
Nitrate (as N)			101.4		%		90-110	11-APR-20
WG3306907-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	11-APR-20
ORP-CL	**Water**							
Batch R5057931								
WG3309453-7 CRM		**CL-ORP**						
ORP			225		mV		210-230	17-APR-20
P-T-L-COL-CL	**Water**							
Batch R5057242								
WG3308113-22 LCS								
Phosphorus (P)-Total			111.0		%		80-120	15-APR-20
WG3308113-21 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	15-APR-20
PH-CL	**Water**							
Batch R5057210								
WG3308514-2 LCS								
pH			6.98		pH		6.9-7.1	15-APR-20
PO4-DO-L-COL-CL	**Water**							
Batch R5055809								
WG3306550-6 LCS								
Orthophosphate-Dissolved (as P)			108.6		%		80-120	11-APR-20
WG3306550-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	11-APR-20
SO4-IC-N-CL	**Water**							
Batch R5055902								
WG3306907-6 LCS								
Sulfate (SO4)			100.6		%		90-110	11-APR-20
WG3306907-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	11-APR-20
SOLIDS-TDS-CL	**Water**							
Batch R5057563								
WG3307918-8 LCS								
Total Dissolved Solids			105.2		%		85-115	15-APR-20
WG3307918-7 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5057563								
WG3307918-7 MB								
Total Dissolved Solids			<10		mg/L		10	15-APR-20
TKN-L-F-CL	**Water**							
Batch R5057605								
WG3308882-10 LCS								
Total Kjeldahl Nitrogen			101.1		%		75-125	16-APR-20
WG3308882-14 LCS								
Total Kjeldahl Nitrogen			99.2		%		75-125	16-APR-20
WG3308882-18 LCS								
Total Kjeldahl Nitrogen			100.8		%		75-125	16-APR-20
WG3308882-2 LCS								
Total Kjeldahl Nitrogen			104.5		%		75-125	16-APR-20
WG3308882-6 LCS								
Total Kjeldahl Nitrogen			103.6		%		75-125	16-APR-20
WG3308882-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-APR-20
WG3308882-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-APR-20
WG3308882-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-APR-20
WG3308882-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-APR-20
WG3308882-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-APR-20
TSS-L-CL	**Water**							
Batch R5057545								
WG3307920-11 LCS								
Total Suspended Solids			95.1		%		85-115	15-APR-20
WG3307920-10 MB								
Total Suspended Solids			<1.0		mg/L		1	15-APR-20
TURBIDITY-CL	**Water**							
Batch R5055676								
WG3306648-5 LCS								
Turbidity			103.0		%		85-115	11-APR-20
WG3306648-4 MB								
Turbidity			<0.10		NTU		0.1	11-APR-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	08-APR-20 11:20	17-APR-20 13:40	0.25	218	hours	EHTR-FM
	2	08-APR-20 13:00	17-APR-20 13:40	0.25	217	hours	EHTR-FM
pH							
	1	08-APR-20 11:20	15-APR-20 10:00	0.25	167	hours	EHTR-FM
	2	08-APR-20 13:00	15-APR-20 10:00	0.25	165	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2435904 were received on 09-APR-20 09:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP 20-09

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

Excel | PDF | EDD

SAMPLE DETAILS

L2435904-COFC

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.
RG_FOBCPD_WS_2020-04-08_1120	RG FOBCPD	WS	No	4/8/2020	11:20	G	7
RG_FOUEW_WS_2020-04-08_1300	RG FOUEW	WS	No	4/8/2020	13:00	G	7

ANALYSIS REQUESTED

Sample ID	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
	N	F	N	N	F	N	F
		H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FOBCPD_WS_2020-04-08_1120	X	X	X	X	X	X	X
RG_FOUEW_WS_2020-04-08_1300	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO: 689999

RELINQUISHED BY/AFFILIATION | DATE/TIME | ACCEPTED BY/AFFILIATION

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default) x

Priority (2-3 business days) - 50% surcharge

Sampler's Name: Maddy Stokes | Mobile #: 647-522-0672

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 17-APR-20
Report Date: 03-MAY-20 16:21 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2437977

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Comments: 3-MAY-20: TSS was analyzed passed recommended hold time for Sample-1.

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2437977-1	L2437977-2	L2437977-3		
	Description	WS	WS	WS		
	Sampled Date	15-APR-20	16-APR-20	16-APR-20		
	Sampled Time	11:30	12:00	10:00		
	Client ID	RG_FOBCPD_WS_2020-04-15_1130	RG_FRCP1SW_WS_2020-04-16_1200	RG_FRCP1SWD_WS_2020-04-16_1000		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	945	974	997		
	Hardness (as CaCO3) (mg/L)	576	586	605		
	pH (pH)	8.42	8.43	8.42		
	ORP (mV)	370	376	429		
	Total Suspended Solids (mg/L)	3.9	5.1	4.0		
	Total Dissolved Solids (mg/L)	772 DLHC	874 DLHC	838 DLHC		
	Turbidity (NTU)	5.83	5.23	5.63		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	181	183	195		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	11.0	11.0	10.4		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	192	194	205		
	Ammonia, Total (as N) (mg/L)	0.0142	0.0299	0.0119		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	1.22	1.27	1.27		
	Fluoride (F) (mg/L)	0.155	0.147	0.149		
	Ion Balance (%)	97.3	96.5	96.9		
	Nitrate (as N) (mg/L)	16.2	16.7	16.5		
	Nitrite (as N) (mg/L)	0.0145	0.0160	0.0128		
	Total Kjeldahl Nitrogen (mg/L)	<0.050 RRV	<0.050 RRV	<0.050		
	Orthophosphate-Dissolved (as P) (mg/L)	0.0019	0.0015	0.0015		
	Phosphorus (P)-Total (mg/L)	0.0034	0.0052	<0.0020		
	Sulfate (SO4) (mg/L)	333	344	350		
	Anion Sum (meq/L)	12.0	12.3	12.6		
	Cation Sum (meq/L)	11.7	11.8	12.2		
	Cation - Anion Balance (%)	-1.4	-1.8	-1.6		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.68	1.66	1.72		
	Total Organic Carbon (mg/L)	2.03	2.60	1.72		
Total Metals	Aluminum (Al)-Total (mg/L)	0.135	0.121	0.122		
	Antimony (Sb)-Total (mg/L)	0.00038	0.00036	0.00036		
	Arsenic (As)-Total (mg/L)	0.00020	0.00020	0.00019		
	Barium (Ba)-Total (mg/L)	0.0848	0.0862	0.0863		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	0.010	0.010	0.011		
	Cadmium (Cd)-Total (ug/L)	0.0878	0.0882	0.0941		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2437977-1	L2437977-2	L2437977-3		
	Description	WS	WS	WS		
	Sampled Date	15-APR-20	16-APR-20	16-APR-20		
	Sampled Time	11:30	12:00	10:00		
	Client ID	RG_FOBCPD_WS_2020-04-15_1130	RG_FRCP1SW_WS_2020-04-16_1200	RG_FRCP1SWD_WS_2020-04-16_1000		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	132	143	138		
	Chromium (Cr)-Total (mg/L)	0.00035	0.00029	0.00028		
	Cobalt (Co)-Total (ug/L)	0.32	0.30	0.25		
	Copper (Cu)-Total (mg/L)	0.00051	0.00055	<0.00050		
	Iron (Fe)-Total (mg/L)	0.109	0.129	0.098		
	Lead (Pb)-Total (mg/L)	0.000120	0.000101	0.000089		
	Lithium (Li)-Total (mg/L)	0.0403	0.0454	0.0448		
	Magnesium (Mg)-Total (mg/L)	66.7	69.9	71.3		
	Manganese (Mn)-Total (mg/L)	0.0134	0.0150	0.0140		
	Mercury (Hg)-Total (ug/L)	0.00153	0.00132	0.00125		
	Molybdenum (Mo)-Total (mg/L)	0.00229	0.00221	0.00218		
	Nickel (Ni)-Total (mg/L)	0.00967	0.00989	0.0101		
	Potassium (K)-Total (mg/L)	2.24	2.26	2.28		
	Selenium (Se)-Total (ug/L)	89.4	93.7	98.1		
	Silicon (Si)-Total (mg/L)	2.09	2.03	2.12		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	1.88	1.99	1.96		
	Strontium (Sr)-Total (mg/L)	0.166	0.171	0.173		
	Thallium (Tl)-Total (mg/L)	0.000017	0.000015	0.000014		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00368	0.00381	0.00390		
	Vanadium (V)-Total (mg/L)	0.00103	0.00094	0.00093		
	Zinc (Zn)-Total (mg/L)	0.0051	0.0048	0.0053		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00035	0.00035	0.00034		
	Arsenic (As)-Dissolved (mg/L)	0.00015	0.00013	0.00014		
	Barium (Ba)-Dissolved (mg/L)	0.0835	0.0834	0.0877		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0825	0.0850	0.0757		
	Calcium (Ca)-Dissolved (mg/L)	127	127	132		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	0.23	0.22	0.22		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2437977-1	L2437977-2	L2437977-3		
	Description	WS	WS	WS		
	Sampled Date	15-APR-20	16-APR-20	16-APR-20		
	Sampled Time	11:30	12:00	10:00		
	Client ID	RG_FOBCPD_WS_2020-04-15_1130	RG_FRCP1SW_WS_2020-04-16_1200	RG_FRCP1SWD_WS_2020-04-16_1000		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00040	0.00033	0.00035		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0418	0.0446	0.0436		
	Magnesium (Mg)-Dissolved (mg/L)	62.7	65.5	67.0		
	Manganese (Mn)-Dissolved (mg/L)	0.00951	0.00899	0.0111		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00210	0.00198	0.00205		
	Nickel (Ni)-Dissolved (mg/L)	0.00922	0.00903	0.00966		
	Potassium (K)-Dissolved (mg/L)	2.37	2.33	2.39		
	Selenium (Se)-Dissolved (ug/L)	89.0	96.6	96.1		
	Silicon (Si)-Dissolved (mg/L)	1.73	1.71	1.74		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	1.83	1.88	1.92		
	Strontium (Sr)-Dissolved (mg/L)	0.154	0.156	0.160		
	Thallium (Tl)-Dissolved (mg/L)	0.000012	0.000012	0.000011		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00390	0.00406	0.00405		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0029	0.0026	0.0033		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2437977-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2437977-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2437977-1, -2, -3
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2437977-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2437977-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2437977-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2437977-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2437977-1, -2, -3
Matrix Spike	Selenium (Se)-Total	MS-B	L2437977-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2437977-1, -2, -3
Matrix Spike	Ammonia, Total (as N)	MS-B	L2437977-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

Reference Information

CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA	Water	Total Mercury in Water by CVAFS (Ultra)	EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-F-ED	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Reference Information

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-ED	Water	TKN (as N) by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5058144								
WG3309738-14 LCS								
Acidity (as CaCO3)			97.4		%		85-115	17-APR-20
WG3309738-13 MB								
Acidity (as CaCO3)			1.2		mg/L		2	17-APR-20
ALK-MAN-CL	**Water**							
Batch R5058303								
WG3309876-14 LCS								
Alkalinity, Total (as CaCO3)			101.1		%		85-115	18-APR-20
WG3309876-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-APR-20
BE-D-L-CCMS-VA	**Water**							
Batch R5061583								
WG3311216-2 LCS								
Beryllium (Be)-Dissolved			100.2		%		80-120	23-APR-20
WG3311216-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	23-APR-20
WG3311216-4 MS		**L2437977-1**						
Beryllium (Be)-Dissolved			94.7		%		70-130	23-APR-20
BE-T-L-CCMS-VA	**Water**							
Batch R5058770								
WG3310403-3 DUP		**L2437977-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	20-APR-20
WG3310403-2 LCS								
Beryllium (Be)-Total			96.4		%		80-120	20-APR-20
WG3310403-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	20-APR-20
WG3310403-4 MS		**L2437977-2**						
Beryllium (Be)-Total			97.4		%		70-130	20-APR-20
BR-L-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-10 LCS								
Bromide (Br)			100.0		%		85-115	18-APR-20
WG3310060-14 LCS								
Bromide (Br)			99.3		%		85-115	18-APR-20
WG3310060-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	18-APR-20
WG3310060-9 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	18-APR-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5061656								
WG3312395-2 LCS								
Dissolved Organic Carbon			88.1		%		80-120	22-APR-20
WG3312395-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-APR-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5061656								
WG3312395-2 LCS								
Total Organic Carbon			90.8		%		80-120	22-APR-20
WG3312395-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-APR-20
CL-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-10 LCS								
Chloride (Cl)			98.7		%		90-110	18-APR-20
WG3310060-14 LCS								
Chloride (Cl)			102.3		%		90-110	18-APR-20
WG3310060-13 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-APR-20
WG3310060-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-APR-20
EC-L-PCT-CL	**Water**							
Batch R5058303								
WG3309876-14 LCS								
Conductivity (@ 25C)			101.2		%		90-110	18-APR-20
WG3309876-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	18-APR-20
F-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-10 LCS								
Fluoride (F)			98.7		%		90-110	18-APR-20
WG3310060-14 LCS								
Fluoride (F)			100.2		%		90-110	18-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-APR-20
WG3310060-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-APR-20
HG-D-CVAA-VA	**Water**							
Batch R5058650								
WG3309899-10 LCS								
Mercury (Hg)-Dissolved			111.6		%		80-120	20-APR-20
WG3309899-9 MB								
Mercury (Hg)-Dissolved			<0.000005		mg/L		0.000005	20-APR-20
HG-T-U-CVAF-VA	**Water**							
Batch R5061057								
WG3311509-2 LCS								
Mercury (Hg)-Total			94.6		%		80-120	22-APR-20
WG3311509-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	22-APR-20
MET-D-CCMS-VA	**Water**							
Batch R5061583								
WG3311216-2 LCS								
Aluminum (Al)-Dissolved			100.3		%		80-120	23-APR-20
Antimony (Sb)-Dissolved			94.5		%		80-120	23-APR-20
Arsenic (As)-Dissolved			98.8		%		80-120	23-APR-20
Barium (Ba)-Dissolved			100.5		%		80-120	23-APR-20
Bismuth (Bi)-Dissolved			95.2		%		80-120	23-APR-20
Boron (B)-Dissolved			94.1		%		80-120	23-APR-20
Cadmium (Cd)-Dissolved			98.8		%		80-120	23-APR-20
Calcium (Ca)-Dissolved			100.3		%		80-120	23-APR-20
Chromium (Cr)-Dissolved			101.3		%		80-120	23-APR-20
Cobalt (Co)-Dissolved			99.6		%		80-120	23-APR-20
Copper (Cu)-Dissolved			98.7		%		80-120	23-APR-20
Iron (Fe)-Dissolved			102.4		%		80-120	23-APR-20
Lead (Pb)-Dissolved			96.0		%		80-120	23-APR-20
Lithium (Li)-Dissolved			100.8		%		80-120	23-APR-20
Magnesium (Mg)-Dissolved			102.9		%		80-120	23-APR-20
Manganese (Mn)-Dissolved			101.6		%		80-120	23-APR-20
Molybdenum (Mo)-Dissolved			96.1		%		80-120	23-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5061583								
WG3311216-2 LCS								
Nickel (Ni)-Dissolved			99.8		%		80-120	23-APR-20
Potassium (K)-Dissolved			106.0		%		80-120	23-APR-20
Selenium (Se)-Dissolved			96.5		%		80-120	23-APR-20
Silicon (Si)-Dissolved			99.4		%		60-140	23-APR-20
Silver (Ag)-Dissolved			97.1		%		80-120	23-APR-20
Sodium (Na)-Dissolved			99.9		%		80-120	23-APR-20
Strontium (Sr)-Dissolved			97.7		%		80-120	23-APR-20
Thallium (Tl)-Dissolved			98.2		%		80-120	23-APR-20
Tin (Sn)-Dissolved			98.2		%		80-120	23-APR-20
Titanium (Ti)-Dissolved			94.0		%		80-120	23-APR-20
Uranium (U)-Dissolved			94.6		%		80-120	23-APR-20
Vanadium (V)-Dissolved			99.6		%		80-120	23-APR-20
Zinc (Zn)-Dissolved			95.0		%		80-120	23-APR-20
WG3311216-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	23-APR-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	23-APR-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	23-APR-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	23-APR-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	23-APR-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	23-APR-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	23-APR-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	23-APR-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	23-APR-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	23-APR-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	23-APR-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	23-APR-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	23-APR-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	23-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5061583								
WG3311216-1 MB		**NP**						
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	23-APR-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	23-APR-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	23-APR-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	23-APR-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	23-APR-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	23-APR-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	23-APR-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	23-APR-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	23-APR-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	23-APR-20
WG3311216-4 MS		**L2437977-1**						
Aluminum (Al)-Dissolved			98.2		%		70-130	23-APR-20
Antimony (Sb)-Dissolved			98.2		%		70-130	23-APR-20
Arsenic (As)-Dissolved			100.7		%		70-130	23-APR-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	23-APR-20
Bismuth (Bi)-Dissolved			87.6		%		70-130	23-APR-20
Boron (B)-Dissolved			92.9		%		70-130	23-APR-20
Cadmium (Cd)-Dissolved			101.7		%		70-130	23-APR-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	23-APR-20
Chromium (Cr)-Dissolved			99.8		%		70-130	23-APR-20
Cobalt (Co)-Dissolved			94.2		%		70-130	23-APR-20
Copper (Cu)-Dissolved			91.9		%		70-130	23-APR-20
Iron (Fe)-Dissolved			98.1		%		70-130	23-APR-20
Lead (Pb)-Dissolved			91.4		%		70-130	23-APR-20
Lithium (Li)-Dissolved			90.1		%		70-130	23-APR-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	23-APR-20
Manganese (Mn)-Dissolved			94.6		%		70-130	23-APR-20
Molybdenum (Mo)-Dissolved			99.3		%		70-130	23-APR-20
Nickel (Ni)-Dissolved			92.7		%		70-130	23-APR-20
Potassium (K)-Dissolved			93.4		%		70-130	23-APR-20
Selenium (Se)-Dissolved			N/A	MS-B	%		-	23-APR-20
Silicon (Si)-Dissolved			93.0		%		70-130	23-APR-20
Silver (Ag)-Dissolved			96.4		%		70-130	23-APR-20
Sodium (Na)-Dissolved			92.7		%		70-130	23-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5061583								
WG3311216-4 MS		**L2437977-1**						
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	23-APR-20
Thallium (Tl)-Dissolved			94.0		%		70-130	23-APR-20
Tin (Sn)-Dissolved			99.7		%		70-130	23-APR-20
Titanium (Ti)-Dissolved			95.7		%		70-130	23-APR-20
Uranium (U)-Dissolved			93.9		%		70-130	23-APR-20
Vanadium (V)-Dissolved			99.7		%		70-130	23-APR-20
Zinc (Zn)-Dissolved			91.2		%		70-130	23-APR-20
MET-T-CCMS-VA	**Water**							
Batch R5058770								
WG3310403-3 DUP		**L2437977-1**						
Aluminum (Al)-Total		0.135	0.139		mg/L	2.6	20	20-APR-20
Antimony (Sb)-Total		0.00038	0.00043		mg/L	13	20	20-APR-20
Arsenic (As)-Total		0.00020	0.00020		mg/L	2.2	20	20-APR-20
Barium (Ba)-Total		0.0848	0.0861		mg/L	1.5	20	20-APR-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-APR-20
Boron (B)-Total		0.010	0.012		mg/L	11	20	20-APR-20
Cadmium (Cd)-Total		0.0000878	0.0000910		mg/L	3.6	20	20-APR-20
Calcium (Ca)-Total		132	150		mg/L	12	20	20-APR-20
Chromium (Cr)-Total		0.00035	0.00035		mg/L	1.7	20	20-APR-20
Cobalt (Co)-Total		0.00032	0.00030		mg/L	4.3	20	20-APR-20
Copper (Cu)-Total		0.00051	0.00055		mg/L	6.8	20	20-APR-20
Iron (Fe)-Total		0.109	0.108		mg/L	0.6	20	20-APR-20
Lead (Pb)-Total		0.000120	0.000138		mg/L	14	20	20-APR-20
Lithium (Li)-Total		0.0403	0.0470		mg/L	15	20	20-APR-20
Magnesium (Mg)-Total		66.7	64.8		mg/L	3.0	20	20-APR-20
Manganese (Mn)-Total		0.0134	0.0134		mg/L	0.6	20	20-APR-20
Molybdenum (Mo)-Total		0.00229	0.00253		mg/L	9.8	20	20-APR-20
Nickel (Ni)-Total		0.00967	0.00971		mg/L	0.4	20	20-APR-20
Potassium (K)-Total		2.24	2.20		mg/L	2.0	20	20-APR-20
Selenium (Se)-Total		0.0894	0.0903		mg/L	1.0	20	20-APR-20
Silicon (Si)-Total		2.09	2.13		mg/L	2.1	20	20-APR-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-APR-20
Sodium (Na)-Total		1.88	1.88		mg/L	0.2	20	20-APR-20
Strontium (Sr)-Total		0.166	0.190		mg/L	13	20	20-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5058770								
WG3310403-3 DUP		**L2437977-1**						
Thallium (Tl)-Total		0.000017	0.000020		mg/L	18	20	20-APR-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-APR-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-APR-20
Uranium (U)-Total		0.00368	0.00426		mg/L	15	20	20-APR-20
Vanadium (V)-Total		0.00103	0.00103		mg/L	0.3	20	20-APR-20
Zinc (Zn)-Total		0.0051	0.0051		mg/L	0.2	20	20-APR-20
WG3310403-2 LCS								
Aluminum (Al)-Total			97.1		%		80-120	20-APR-20
Antimony (Sb)-Total			101.4		%		80-120	20-APR-20
Arsenic (As)-Total			97.8		%		80-120	20-APR-20
Barium (Ba)-Total			104.5		%		80-120	20-APR-20
Bismuth (Bi)-Total			98.3		%		80-120	20-APR-20
Boron (B)-Total			93.5		%		80-120	20-APR-20
Cadmium (Cd)-Total			96.4		%		80-120	20-APR-20
Calcium (Ca)-Total			99.6		%		80-120	20-APR-20
Chromium (Cr)-Total			101.9		%		80-120	20-APR-20
Cobalt (Co)-Total			99.9		%		80-120	20-APR-20
Copper (Cu)-Total			99.96		%		80-120	20-APR-20
Iron (Fe)-Total			99.1		%		80-120	20-APR-20
Lead (Pb)-Total			95.2		%		80-120	20-APR-20
Lithium (Li)-Total			91.2		%		80-120	20-APR-20
Magnesium (Mg)-Total			98.9		%		80-120	20-APR-20
Manganese (Mn)-Total			99.6		%		80-120	20-APR-20
Molybdenum (Mo)-Total			101.3		%		80-120	20-APR-20
Nickel (Ni)-Total			99.3		%		80-120	20-APR-20
Potassium (K)-Total			100.7		%		80-120	20-APR-20
Selenium (Se)-Total			95.5		%		80-120	20-APR-20
Silicon (Si)-Total			99.9		%		80-120	20-APR-20
Silver (Ag)-Total			93.5		%		80-120	20-APR-20
Sodium (Na)-Total			105.3		%		80-120	20-APR-20
Strontium (Sr)-Total			96.9		%		80-120	20-APR-20
Thallium (Tl)-Total			99.0		%		80-120	20-APR-20
Tin (Sn)-Total			94.6		%		80-120	20-APR-20
Titanium (Ti)-Total			100.8		%		80-120	20-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5058770								
WG3310403-2 LCS								
Uranium (U)-Total			89.0		%		80-120	20-APR-20
Vanadium (V)-Total			101.0		%		80-120	20-APR-20
Zinc (Zn)-Total			99.9		%		80-120	20-APR-20
WG3310403-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	20-APR-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	20-APR-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	20-APR-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	20-APR-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	20-APR-20
Boron (B)-Total			<0.010		mg/L		0.01	20-APR-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	20-APR-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	20-APR-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	20-APR-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	20-APR-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	20-APR-20
Iron (Fe)-Total			<0.010		mg/L		0.01	20-APR-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	20-APR-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	20-APR-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	20-APR-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	20-APR-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	20-APR-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	20-APR-20
Potassium (K)-Total			<0.050		mg/L		0.05	20-APR-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	20-APR-20
Silicon (Si)-Total			<0.10		mg/L		0.1	20-APR-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	20-APR-20
Sodium (Na)-Total			<0.050		mg/L		0.05	20-APR-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	20-APR-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	20-APR-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	20-APR-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	20-APR-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	20-APR-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	20-APR-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	20-APR-20
WG3310403-4 MS		**L2437977-2**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5058770								
WG3310403-4 MS		**L2437977-2**						
Aluminum (Al)-Total			104.2		%		70-130	20-APR-20
Antimony (Sb)-Total			92.1		%		70-130	20-APR-20
Arsenic (As)-Total			99.3		%		70-130	20-APR-20
Barium (Ba)-Total			N/A	MS-B	%		-	20-APR-20
Bismuth (Bi)-Total			82.9		%		70-130	20-APR-20
Boron (B)-Total			100.1		%		70-130	20-APR-20
Cadmium (Cd)-Total			94.7		%		70-130	20-APR-20
Calcium (Ca)-Total			N/A	MS-B	%		-	20-APR-20
Chromium (Cr)-Total			97.2		%		70-130	20-APR-20
Cobalt (Co)-Total			93.5		%		70-130	20-APR-20
Copper (Cu)-Total			90.1		%		70-130	20-APR-20
Iron (Fe)-Total			94.5		%		70-130	20-APR-20
Lead (Pb)-Total			85.4		%		70-130	20-APR-20
Lithium (Li)-Total			91.2		%		70-130	20-APR-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	20-APR-20
Manganese (Mn)-Total			90.0		%		70-130	20-APR-20
Molybdenum (Mo)-Total			99.7		%		70-130	20-APR-20
Nickel (Ni)-Total			90.4		%		70-130	20-APR-20
Potassium (K)-Total			92.6		%		70-130	20-APR-20
Selenium (Se)-Total			N/A	MS-B	%		-	20-APR-20
Silicon (Si)-Total			92.9		%		70-130	20-APR-20
Silver (Ag)-Total			89.3		%		70-130	20-APR-20
Sodium (Na)-Total			98.4		%		70-130	20-APR-20
Strontium (Sr)-Total			N/A	MS-B	%		-	20-APR-20
Thallium (Tl)-Total			85.8		%		70-130	20-APR-20
Tin (Sn)-Total			92.7		%		70-130	20-APR-20
Titanium (Ti)-Total			103.6		%		70-130	20-APR-20
Uranium (U)-Total			85.0		%		70-130	20-APR-20
Vanadium (V)-Total			97.7		%		70-130	20-APR-20
Zinc (Zn)-Total			94.5		%		70-130	20-APR-20
NH3-F-ED	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-ED	**Water**							
Batch R5061673								
WG3312450-10 LCS								
Ammonia, Total (as N)			108.0		%		85-115	24-APR-20
WG3312450-9 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	24-APR-20
NO2-L-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-10 LCS								
Nitrite (as N)			100.3		%		90-110	18-APR-20
WG3310060-14 LCS								
Nitrite (as N)			99.96		%		90-110	18-APR-20
WG3310060-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-APR-20
WG3310060-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-APR-20
NO3-L-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-10 LCS								
Nitrate (as N)			101.5		%		90-110	18-APR-20
WG3310060-14 LCS								
Nitrate (as N)			102.9		%		90-110	18-APR-20
WG3310060-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-APR-20
WG3310060-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-APR-20
ORP-CL	**Water**							
Batch R5061760								
WG3312590-5 CRM		**CL-ORP**						
ORP			224		mV		210-230	23-APR-20
P-T-L-COL-CL	**Water**							
Batch R5061601								
WG3312339-14 LCS								
Phosphorus (P)-Total			104.4		%		80-120	23-APR-20
WG3312339-13 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	23-APR-20
PH-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-CL	**Water**							
Batch R5058303								
WG3309876-14 LCS								
pH			7.00		pH		6.9-7.1	18-APR-20
PO4-DO-L-COL-CL	**Water**							
Batch R5058629								
WG3309841-30 LCS								
Orthophosphate-Dissolved (as P)			106.9		%		80-120	18-APR-20
WG3309841-29 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-APR-20
SO4-IC-N-CL	**Water**							
Batch R5058478								
WG3310060-10 LCS								
Sulfate (SO4)			100.9		%		90-110	18-APR-20
WG3310060-14 LCS								
Sulfate (SO4)			107.5		%		90-110	18-APR-20
WG3310060-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-APR-20
WG3310060-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-APR-20
SOLIDS-TDS-CL	**Water**							
Batch R5061819								
WG3311428-14 LCS								
Total Dissolved Solids			103.0		%		85-115	22-APR-20
WG3311428-13 MB								
Total Dissolved Solids			<10		mg/L		10	22-APR-20
Batch R5063880								
WG3312273-5 LCS								
Total Dissolved Solids			97.5		%		85-115	23-APR-20
WG3312273-4 MB								
Total Dissolved Solids			<10		mg/L		10	23-APR-20
TKN-L-F-ED	**Water**							
Batch R5070405								
WG3315426-2 LCS								
Total Kjeldahl Nitrogen			100		%		75-125	30-APR-20
WG3315426-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	30-APR-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-ED	**Water**							
Batch R5072782								
WG3316763-2 LCS								
Total Kjeldahl Nitrogen			103		%		75-125	01-MAY-20
WG3316763-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	01-MAY-20
TSS-L-CL	**Water**							
Batch R5061754								
WG3312270-5 LCS								
Total Suspended Solids			89.5		%		85-115	23-APR-20
WG3312270-4 MB								
Total Suspended Solids			<1.0		mg/L		1	23-APR-20
TURBIDITY-CL	**Water**							
Batch R5058447								
WG3309854-11 LCS								
Turbidity			104.0		%		85-115	18-APR-20
WG3309854-10 MB								
Turbidity			<0.10		NTU		0.1	18-APR-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	15-APR-20 11:30	23-APR-20 17:59	0.25	198	hours	EHTR-FM
	2	16-APR-20 12:00	23-APR-20 17:59	0.25	174	hours	EHTR-FM
	3	16-APR-20 10:00	23-APR-20 17:59	0.25	176	hours	EHTR-FM
Total Suspended Solids							
	1	15-APR-20 11:30	23-APR-20 07:00	7	8	days	EHT
pH							
	1	15-APR-20 11:30	18-APR-20 14:00	0.25	74	hours	EHTR-FM
	2	16-APR-20 12:00	18-APR-20 14:00	0.25	50	hours	EHTR-FM
	3	16-APR-20 10:00	18-APR-20 14:00	0.25	52	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2437977 were received on 17-APR-20 10:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP 20-09

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

Excel | PDF | EDD

SAMPLE DETAILS

L2437977-COFC

ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FOBCPD_WS_2020-04-15_1130	RG FOBCPD	WS	No	4/15/2020	11:30	G	7	X	X	X	X	X	X	X
RG_FRCP1SW_WS_2020-04-16_1200	RG FRCP1SW	WS	No	4/16/2020	12:00	G	7	X	X	X	X	X	X	X
RG_FRCP1SWD_WS_2020-04-16_1000	RG FRCP1SWD	WS	No	4/16/2020	10:00	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO: 689999

RELINQUISHED BY/AFFILIATION

DATE/TIME

ACCEPTED BY/AFFILIATION

hk 4/17 1030

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default) x
Priority (2-3 business days) - 50% surcharge
Emergency (1 Business Day) - 100% surcharge
For Emergency <1 Day, ASAP or Weekend - Contact ALS

Sampler's Name	Maddy Stokes	Mobile #	647-522-0672
Sampler's Signature	MS	Date/Time	April 16, 2020

4 °C

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 30-APR-20
Report Date: 12-MAY-20 09:34 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2442109

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Comments: Samples L2442109-1 to -8 expired for TSS analysis.

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442109-1	L2442109-2	L2442109-3	L2442109-4	L2442109-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	28-APR-20	28-APR-20	28-APR-20	28-APR-20	28-APR-20
	Sampled Time	10:30	12:00	11:50	11:50	11:50
	Client ID	RG_FOBCPD_WS_2020-04-28_1030	RG_FOBCP_WS_2020-04-28_1200	RG_RIVER_WS_2020-04-28_1150	RG_TRIP_WS_2020-04-28_1150	RG_FBLANK_WS_2020-04-28_1150
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	861	856	858	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)	508	517	516	<0.50	<0.50
	pH (pH)	8.49	8.51	8.51	5.50	5.45
	ORP (mV)	284	336	307	424	418
	Total Suspended Solids (mg/L)	6.5	7.5	4.8	<1.0	<1.0
	Total Dissolved Solids (mg/L)	656	661	635	<10	<10
	Turbidity (NTU)	4.44	4.43	4.26	<0.10	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	1.4	1.4
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	166	171	168	<1.0	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	11.4	12.8	12.4	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	177	183	180	<1.0	<1.0
	Ammonia as N (mg/L)	0.0076	0.0114	0.0092	0.0284 RRV	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.70	0.72	0.74	<0.50	<0.50
	Fluoride (F) (mg/L)	0.149	0.150	0.149	<0.020	<0.020
	Ion Balance (%)	100	101	102	0.0	0.0
	Nitrate (as N) (mg/L)	16.3	16.2	16.2	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	0.0197	0.0222	0.0218	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.25 TKNI	<0.050 TKNI	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0012	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0077	0.0066	0.0070	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	265	264	263	<0.30	<0.30
	Anion Sum (meq/L)	10.2	10.3	10.3	<0.10	<0.10
	Cation Sum (meq/L)	10.3	10.4	10.4	<0.10	<0.10
	Cation - Anion Balance (%)	0.1	0.5	0.8	0.0	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.97	2.50	2.24		<0.50
	Total Organic Carbon (mg/L)	2.30	2.49	2.27	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.113	0.0855	0.0903	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	0.00043	0.00046	0.00042	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00017	0.00078	0.00019	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.0609	0.0599	0.0611	<0.00010	<0.00010
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.162	0.153	0.160	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442109-6	L2442109-7	L2442109-8		
	Description	WS	WS	WS		
	Sampled Date	28-APR-20	28-APR-20	28-APR-20		
	Sampled Time	15:00	10:30	13:00		
	Client ID	RG_FOUEW_WS_2020-04-28_1500	RG_FOUSH_WS_2020-04-29_1030	RG_FOUKI_WS_2020-04-29_1300		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	836	754	769		
	Hardness (as CaCO3) (mg/L)	498	442	475		
	pH (pH)	8.48	8.47	8.49		
	ORP (mV)	440	310	306		
	Total Suspended Solids (mg/L)	3.6	7.6	6.7		
	Total Dissolved Solids (mg/L)	655	534	607		
	Turbidity (NTU)	2.39	7.50	5.88		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	182	159	166		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	13.0	9.4	11.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	195	168	177		
	Ammonia as N (mg/L)	0.0077	0.0268	0.0227		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	1.41	<0.50	0.67		
	Fluoride (F) (mg/L)	0.145	0.134	0.153		
	Ion Balance (%)	100	105	103		
	Nitrate (as N) (mg/L)	14.9	14.7	16.1		
	Nitrite (as N) (mg/L)	0.0117	0.0178	0.0217		
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI	<0.25 TKNI		
	Orthophosphate-Dissolved (as P) (mg/L)	0.0016	0.0031	0.0023		
	Phosphorus (P)-Total (mg/L)	0.0047	0.0086	0.0053		
	Sulfate (SO4) (mg/L)	243	196	220		
	Anion Sum (meq/L)	10.1	8.48	9.29		
	Cation Sum (meq/L)	10.1	8.95	9.61		
	Cation - Anion Balance (%)	0.1	2.7	1.7		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.30	1.90	1.95		
	Total Organic Carbon (mg/L)	1.39	2.24	2.21		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0694	0.0986	0.0802		
	Antimony (Sb)-Total (mg/L)	0.00027	0.00043	0.00043		
	Arsenic (As)-Total (mg/L)	0.00017	0.00018	0.00021		
	Barium (Ba)-Total (mg/L)	0.0792	0.0649	0.0692		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Total (ug/L)	0.0779	0.166	0.160		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442109-1	L2442109-2	L2442109-3	L2442109-4	L2442109-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	28-APR-20	28-APR-20	28-APR-20	28-APR-20	28-APR-20
	Sampled Time	10:30	12:00	11:50	11:50	11:50
	Client ID	RG_FOBCPD_WS_2020-04-28_1030	RG_FOBCP_WS_2020-04-28_1200	RG_RIVER_WS_2020-04-28_1150	RG_TRIP_WS_2020-04-28_1150	RG_FBLANK_WS_2020-04-28_1150
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	112	110	114	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)	0.00065	0.00025	0.00024	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	1.01	0.54	0.58	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	0.00065	0.00065	0.00062	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.075	0.070	0.071	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	0.000099	0.000088	0.000079	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0291	0.0285	0.0296	<0.0010	<0.0010
	Magnesium (Mg)-Total (mg/L)	54.7	53.0	54.4	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	0.0107	0.0108	0.0108	<0.00010	<0.00010
	Mercury (Hg)-Total (ug/L)	0.00140	0.00173	0.00141	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00321	0.00289	0.00296	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.0166	0.0138	0.0144	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	2.18	2.12	2.19	<0.050	<0.050
	Selenium (Se)-Total (ug/L)	78.9	78.1	81.2	<0.050	<0.050
	Silicon (Si)-Total (mg/L)	1.88	1.80	1.82	<0.10	<0.10
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.44	1.43	1.44	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.147	0.140	0.141	<0.00020	<0.00020
	Thallium (Tl)-Total (mg/L)	0.000016	0.000022	0.000019	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00348	0.00338	0.00351	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.00082	0.00072	0.00072	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0091	0.0089	0.0076	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0057	0.0058	0.0055		<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00040	0.00039	0.00039		<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00017	0.00016	0.00016		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0643	0.0636	0.0641		<0.00010
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.135	0.132	0.129		<0.0050
	Calcium (Ca)-Dissolved (mg/L)	113	113	117	<0.050	<0.050
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Cobalt (Co)-Dissolved (ug/L)	0.47	0.50	0.47		<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442109-6	L2442109-7	L2442109-8		
	Description	WS	WS	WS		
	Sampled Date	28-APR-20	28-APR-20	28-APR-20		
	Sampled Time	15:00	10:30	13:00		
	Client ID	RG_FOUEW_WS_2020-04-28_1500	RG_FOUSH_WS_2020-04-29_1030	RG_FOUKI_WS_2020-04-29_1300		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	114	101	105		
	Chromium (Cr)-Total (mg/L)	0.00018	0.00026	0.00027		
	Cobalt (Co)-Total (ug/L)	0.26	0.65	0.64		
	Copper (Cu)-Total (mg/L)	0.00052	0.00067	0.00062		
	Iron (Fe)-Total (mg/L)	0.090	0.089	0.077		
	Lead (Pb)-Total (mg/L)	0.000095	0.000118	0.000105		
	Lithium (Li)-Total (mg/L)	0.0249	0.0275	0.0286		
	Magnesium (Mg)-Total (mg/L)	52.1	44.2	47.2		
	Manganese (Mn)-Total (mg/L)	0.0106	0.0117	0.0113		
	Mercury (Hg)-Total (ug/L)	0.00102	0.00170	0.00162		
	Molybdenum (Mo)-Total (mg/L)	0.00168	0.00212	0.00236		
	Nickel (Ni)-Total (mg/L)	0.00606	0.0146	0.0140		
	Potassium (K)-Total (mg/L)	1.75	1.96	2.17		
	Selenium (Se)-Total (ug/L)	70.9	60.7	61.6		
	Silicon (Si)-Total (mg/L)	2.13	1.99	1.91		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	2.05	1.27	1.43		
	Strontium (Sr)-Total (mg/L)	0.146	0.147	0.147		
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000019	0.000021		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00288	0.00298	0.00320		
	Vanadium (V)-Total (mg/L)	0.00053	0.00084	0.00079		
	Zinc (Zn)-Total (mg/L)	0.0053	0.0088	0.0076		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	0.0056	0.0067		
	Antimony (Sb)-Dissolved (mg/L)	0.00020	0.00038	0.00040		
	Arsenic (As)-Dissolved (mg/L)	0.00010	0.00017	0.00015		
	Barium (Ba)-Dissolved (mg/L)	0.0835	0.0750	0.0689		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0583	0.130	0.135		
	Calcium (Ca)-Dissolved (mg/L)	112	102	111		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	0.19	0.58	0.59		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2442109-1	L2442109-2	L2442109-3	L2442109-4	L2442109-5
Description	WS	WS	WS	WS	WS
Sampled Date	28-APR-20	28-APR-20	28-APR-20	28-APR-20	28-APR-20
Sampled Time	10:30	12:00	11:50	11:50	11:50
Client ID	RG_FOBCPD_WS_2020-04-28_1030	RG_FOBCP_WS_2020-04-28_1200	RG_RIVER_WS_2020-04-28_1150	RG_TRIP_WS_2020-04-28_1150	RG_FBLANK_WS_2020-04-28_1150
Grouping / **Analyte**					
WATER					
Dissolved Metals Copper (Cu)-Dissolved (mg/L)	0.00046	0.00043	0.00043		<0.00020
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0317	0.0321	0.0320		<0.0010
Magnesium (Mg)-Dissolved (mg/L)	54.9	56.7	54.5	<0.0050	<0.10
Manganese (Mn)-Dissolved (mg/L)	0.00753	0.00721	0.00730		<0.00010
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00269	0.00287	0.00283		<0.000050
Nickel (Ni)-Dissolved (mg/L)	0.0132	0.0135	0.0134		<0.00050
Potassium (K)-Dissolved (mg/L)	2.03	2.08	2.06	<0.050	<0.050
Selenium (Se)-Dissolved (ug/L)	80.2	81.4	78.3		<0.050
Silicon (Si)-Dissolved (mg/L)	1.71	1.64	1.64		<0.050
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
Sodium (Na)-Dissolved (mg/L)	1.35	1.39	1.36	<0.050	<0.050
Strontium (Sr)-Dissolved (mg/L)	0.138	0.139	0.142		<0.00020
Thallium (Tl)-Dissolved (mg/L)	0.000016	0.000017	0.000013		<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
Uranium (U)-Dissolved (mg/L)	0.00348	0.00337	0.00342		<0.000010
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0066	0.0054	0.0054		<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442109-6	L2442109-7	L2442109-8		
	Description	WS	WS	WS		
	Sampled Date	28-APR-20	28-APR-20	28-APR-20		
	Sampled Time	15:00	10:30	13:00		
	Client ID	RG_FOUEW_WS_2020-04-28_1500	RG_FOUSH_WS_2020-04-29_1030	RG_FOUKI_WS_2020-04-29_1300		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00024	0.00044	0.00045		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0273	0.0304	0.0313		
	Magnesium (Mg)-Dissolved (mg/L)	53.0	45.6	48.1		
	Manganese (Mn)-Dissolved (mg/L)	0.00625	0.00848	0.00895		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00148	0.00201	0.00213		
	Nickel (Ni)-Dissolved (mg/L)	0.00531	0.0136	0.0132		
	Potassium (K)-Dissolved (mg/L)	1.67	1.93	2.10		
	Selenium (Se)-Dissolved (ug/L)	67.5	59.2	62.6		
	Silicon (Si)-Dissolved (mg/L)	1.89	1.75	1.80		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	1.91	1.25	1.39		
	Strontium (Sr)-Dissolved (mg/L)	0.142	0.135	0.142		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000016	0.000014		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00282	0.00292	0.00305		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0025	0.0069	0.0063		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2442109-4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2442109-4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2442109-1, -2, -3, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2442109-1, -2, -3, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2442109-1, -2, -3, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2442109-1, -2, -3, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2442109-1, -2, -3, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2442109-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2442109-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2442109-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2442109-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2442109-1, -2, -3, -4, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

Reference Information

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5070437								
WG3316191-14 LCS								
Acidity (as CaCO3)			97.0		%		85-115	30-APR-20
WG3316191-13 MB								
Acidity (as CaCO3)			1.5		mg/L		2	30-APR-20
ALK-MAN-CL	**Water**							
Batch R5072857								
WG3316798-11 LCS								
Alkalinity, Total (as CaCO3)			100.2		%		85-115	01-MAY-20
WG3316798-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	30-APR-20
BE-D-L-CCMS-VA	**Water**							
Batch R5079908								
WG3318988-2 LCS								
Beryllium (Be)-Dissolved			98.6		%		80-120	07-MAY-20
WG3318988-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	07-MAY-20
BE-T-L-CCMS-VA	**Water**							
Batch R5078439								
WG3317931-2 LCS								
Beryllium (Be)-Total			95.3		%		80-120	05-MAY-20
WG3317931-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	05-MAY-20
BR-L-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-3 DUP		**L2442109-5**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	01-MAY-20
WG3316802-2 LCS								
Bromide (Br)			98.6		%		85-115	01-MAY-20
WG3316802-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	01-MAY-20
WG3316802-4 MS		**L2442109-5**						
Bromide (Br)			104.7		%		75-125	01-MAY-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5075198								
WG3317531-6 LCS								
Dissolved Organic Carbon			107.1		%		80-120	04-MAY-20
WG3317531-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5075198								
WG3317531-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	04-MAY-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5075198								
WG3317531-6 LCS								
Total Organic Carbon			109.8		%		80-120	04-MAY-20
WG3317531-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	04-MAY-20
CL-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-3 DUP		**L2442109-5**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	01-MAY-20
WG3316802-2 LCS								
Chloride (Cl)			102.7		%		90-110	01-MAY-20
WG3316802-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	01-MAY-20
WG3316802-4 MS		**L2442109-5**						
Chloride (Cl)			112.7		%		75-125	01-MAY-20
EC-L-PCT-CL	**Water**							
Batch R5072857								
WG3316798-11 LCS								
Conductivity (@ 25C)			101.4		%		90-110	01-MAY-20
WG3316798-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	30-APR-20
F-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-3 DUP		**L2442109-5**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	01-MAY-20
WG3316802-2 LCS								
Fluoride (F)			97.4		%		90-110	01-MAY-20
WG3316802-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	01-MAY-20
WG3316802-4 MS		**L2442109-5**						
Fluoride (F)			100.4		%		75-125	01-MAY-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5075748								
WG3317744-6 LCS								
Mercury (Hg)-Dissolved			100.1		%		80-120	05-MAY-20
WG3317744-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	05-MAY-20
HG-T-U-CVAF-VA	**Water**							
Batch R5076259								
WG3318158-6 DUP		**L2442109-1**						
Mercury (Hg)-Total		0.00140	0.00138		ug/L	1.4	20	05-MAY-20
WG3318158-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	05-MAY-20
WG3318158-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	05-MAY-20
WG3318158-4 MS		**L2442109-5**						
Mercury (Hg)-Total			83.8		%		70-130	05-MAY-20
MET-D-CCMS-CL	**Water**							
Batch R5075734								
WG3317471-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			97.2		%		80-120	04-MAY-20
Magnesium (Mg)-Dissolved			110.8		%		80-120	04-MAY-20
Potassium (K)-Dissolved			100.4		%		80-120	04-MAY-20
Sodium (Na)-Dissolved			99.7		%		80-120	04-MAY-20
WG3317471-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	04-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	04-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	04-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	04-MAY-20
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318988-2 LCS								
Aluminum (Al)-Dissolved			109.0		%		80-120	07-MAY-20
Antimony (Sb)-Dissolved			91.3		%		80-120	07-MAY-20
Arsenic (As)-Dissolved			99.8		%		80-120	07-MAY-20
Barium (Ba)-Dissolved			99.7		%		80-120	07-MAY-20
Bismuth (Bi)-Dissolved			109.5		%		80-120	07-MAY-20
Boron (B)-Dissolved			91.0		%		80-120	07-MAY-20
Cadmium (Cd)-Dissolved			98.4		%		80-120	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318988-2 LCS								
Calcium (Ca)-Dissolved			98.0		%		80-120	07-MAY-20
Chromium (Cr)-Dissolved			103.1		%		80-120	07-MAY-20
Cobalt (Co)-Dissolved			100.1		%		80-120	07-MAY-20
Copper (Cu)-Dissolved			100.6		%		80-120	07-MAY-20
Iron (Fe)-Dissolved			93.9		%		80-120	07-MAY-20
Lead (Pb)-Dissolved			95.8		%		80-120	07-MAY-20
Lithium (Li)-Dissolved			99.3		%		80-120	07-MAY-20
Magnesium (Mg)-Dissolved			99.5		%		80-120	07-MAY-20
Manganese (Mn)-Dissolved			103.0		%		80-120	07-MAY-20
Molybdenum (Mo)-Dissolved			96.6		%		80-120	07-MAY-20
Nickel (Ni)-Dissolved			101.9		%		80-120	07-MAY-20
Potassium (K)-Dissolved			97.1		%		80-120	07-MAY-20
Selenium (Se)-Dissolved			94.9		%		80-120	07-MAY-20
Silicon (Si)-Dissolved			102.5		%		60-140	07-MAY-20
Silver (Ag)-Dissolved			94.5		%		80-120	07-MAY-20
Sodium (Na)-Dissolved			109.0		%		80-120	07-MAY-20
Strontium (Sr)-Dissolved			95.9		%		80-120	07-MAY-20
Thallium (Tl)-Dissolved			99.8		%		80-120	07-MAY-20
Tin (Sn)-Dissolved			94.7		%		80-120	07-MAY-20
Titanium (Ti)-Dissolved			98.6		%		80-120	07-MAY-20
Uranium (U)-Dissolved			103.2		%		80-120	07-MAY-20
Vanadium (V)-Dissolved			101.6		%		80-120	07-MAY-20
Zinc (Zn)-Dissolved			98.1		%		80-120	07-MAY-20
WG3318988-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	07-MAY-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	07-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318988-1 MB		**NP**						
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	07-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	07-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	07-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	07-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	07-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	07-MAY-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	07-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
MET-T-CCMS-VA	**Water**							
Batch R5078439								
WG3317931-2 LCS								
Aluminum (Al)-Total			106.0		%		80-120	05-MAY-20
Antimony (Sb)-Total			104.8		%		80-120	05-MAY-20
Arsenic (As)-Total			100.4		%		80-120	05-MAY-20
Barium (Ba)-Total			95.4		%		80-120	05-MAY-20
Bismuth (Bi)-Total			104.9		%		80-120	05-MAY-20
Boron (B)-Total			88.3		%		80-120	05-MAY-20
Cadmium (Cd)-Total			102.0		%		80-120	05-MAY-20
Calcium (Ca)-Total			97.4		%		80-120	05-MAY-20
Chromium (Cr)-Total			100.3		%		80-120	05-MAY-20
Cobalt (Co)-Total			102.3		%		80-120	05-MAY-20
Copper (Cu)-Total			101.1		%		80-120	05-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5078439								
WG3317931-2 LCS								
Iron (Fe)-Total			97.5		%		80-120	05-MAY-20
Lead (Pb)-Total			102.4		%		80-120	05-MAY-20
Lithium (Li)-Total			92.2		%		80-120	05-MAY-20
Magnesium (Mg)-Total			101.7		%		80-120	05-MAY-20
Manganese (Mn)-Total			105.2		%		80-120	05-MAY-20
Molybdenum (Mo)-Total			108.3		%		80-120	05-MAY-20
Nickel (Ni)-Total			104.1		%		80-120	05-MAY-20
Potassium (K)-Total			104.1		%		80-120	05-MAY-20
Selenium (Se)-Total			99.4		%		80-120	05-MAY-20
Silicon (Si)-Total			101.4		%		80-120	05-MAY-20
Silver (Ag)-Total			105.6		%		80-120	05-MAY-20
Sodium (Na)-Total			109.4		%		80-120	05-MAY-20
Strontium (Sr)-Total			109.3		%		80-120	05-MAY-20
Thallium (Tl)-Total			104.1		%		80-120	05-MAY-20
Tin (Sn)-Total			101.2		%		80-120	05-MAY-20
Titanium (Ti)-Total			92.2		%		80-120	05-MAY-20
Uranium (U)-Total			103.4		%		80-120	05-MAY-20
Vanadium (V)-Total			102.0		%		80-120	05-MAY-20
Zinc (Zn)-Total			102.6		%		80-120	05-MAY-20
WG3317931-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	05-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	05-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	05-MAY-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	05-MAY-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	05-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	05-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	05-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	05-MAY-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	05-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5078439								
WG3317931-1 MB								
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	05-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	05-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	05-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	05-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	05-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	05-MAY-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	05-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	05-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	05-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	05-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	05-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	05-MAY-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	05-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	05-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	05-MAY-20
NH3-L-F-CL	**Water**							
Batch R5079535								
WG3318852-15 DUP		**L2442109-3**						
Ammonia as N		0.0092	0.0095		mg/L	3.2	20	06-MAY-20
WG3318852-14 LCS								
Ammonia as N			104.8		%		85-115	06-MAY-20
WG3318852-18 LCS								
Ammonia as N			102.6		%		85-115	06-MAY-20
WG3318852-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	06-MAY-20
WG3318852-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	06-MAY-20
WG3318852-16 MS		**L2442109-3**						
Ammonia as N			118.3		%		75-125	06-MAY-20
NO2-L-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-3 DUP		**L2442109-5**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-MAY-20
WG3316802-2 LCS								
Nitrite (as N)			103.3		%		90-110	01-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	01-MAY-20
WG3316802-4 MS		**L2442109-5**						
Nitrite (as N)			103.0		%		75-125	01-MAY-20
NO3-L-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-3 DUP		**L2442109-5**						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	01-MAY-20
WG3316802-2 LCS								
Nitrate (as N)			101.0		%		90-110	01-MAY-20
WG3316802-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	01-MAY-20
WG3316802-4 MS		**L2442109-5**						
Nitrate (as N)			103.2		%		75-125	01-MAY-20
ORP-CL	**Water**							
Batch R5078862								
WG3319006-3 CRM		**CL-ORP**						
ORP			228		mV		210-230	06-MAY-20
P-T-L-COL-CL	**Water**							
Batch R5078337								
WG3318528-26 LCS								
Phosphorus (P)-Total			102.7		%		80-120	06-MAY-20
WG3318528-25 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	06-MAY-20
PH-CL	**Water**							
Batch R5072857								
WG3316798-11 LCS								
pH			6.98		pH		6.9-7.1	01-MAY-20
PO4-DO-L-COL-CL	**Water**							
Batch R5070563								
WG3315823-27 DUP		**L2442109-4**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-APR-20
WG3315823-26 LCS								
Orthophosphate-Dissolved (as P)			117.0		%		80-120	30-APR-20
WG3315823-25 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL	**Water**							
Batch R5070563								
WG3315823-25 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	30-APR-20
WG3315823-28 MS		**L2442109-4**						
Orthophosphate-Dissolved (as P)			95.1		%		70-130	30-APR-20
SO4-IC-N-CL	**Water**							
Batch R5072896								
WG3316802-3 DUP		**L2442109-5**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	01-MAY-20
WG3316802-2 LCS								
Sulfate (SO4)			102.9		%		90-110	01-MAY-20
WG3316802-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	01-MAY-20
WG3316802-4 MS		**L2442109-5**						
Sulfate (SO4)			117.2		%		75-125	01-MAY-20
SOLIDS-TDS-CL	**Water**							
Batch R5075900								
WG3317134-10 LCS								
Total Dissolved Solids			99.1		%		85-115	04-MAY-20
WG3317134-8 LCS								
Total Dissolved Solids			100.9		%		85-115	04-MAY-20
WG3317134-7 MB								
Total Dissolved Solids			<10		mg/L		10	04-MAY-20
WG3317134-9 MB								
Total Dissolved Solids			<10		mg/L		10	04-MAY-20
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-11 DUP		**L2442109-5**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	08-MAY-20
WG3320325-10 LCS								
Total Kjeldahl Nitrogen			89.0		%		75-125	08-MAY-20
WG3320325-14 LCS								
Total Kjeldahl Nitrogen			90.1		%		75-125	08-MAY-20
WG3320325-18 LCS								
Total Kjeldahl Nitrogen			90.8		%		75-125	08-MAY-20
WG3320325-2 LCS								
Total Kjeldahl Nitrogen			92.9		%		75-125	08-MAY-20
WG3320325-22 LCS								
Total Kjeldahl Nitrogen			89.8		%		75-125	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-26 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	08-MAY-20
WG3320325-6 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	08-MAY-20
WG3320325-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-21 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-25 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-12 MS		**L2442109-5**						
Total Kjeldahl Nitrogen			97.9		%		70-130	08-MAY-20
TSS-L-CL	**Water**							
Batch R5078487								
WG3318455-2 LCS								
Total Suspended Solids			95.6		%		85-115	06-MAY-20
WG3318455-1 MB								
Total Suspended Solids			<1.0		mg/L		1	06-MAY-20
TURBIDITY-CL	**Water**							
Batch R5071139								
WG3316415-18 DUP		**L2442109-7**						
Turbidity		7.50	7.57		NTU	0.9	15	01-MAY-20
WG3316415-14 LCS								
Turbidity			103.0		%		85-115	01-MAY-20
WG3316415-17 LCS								
Turbidity			103.0		%		85-115	01-MAY-20
WG3316415-13 MB								
Turbidity			<0.10		NTU		0.1	01-MAY-20
WG3316415-16 MB								
Turbidity			<0.10		NTU		0.1	01-MAY-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	28-APR-20 10:30	06-MAY-20 11:15	0.25	193	hours	EHTR-FM
	2	28-APR-20 12:00	06-MAY-20 11:15	0.25	191	hours	EHTR-FM
	3	28-APR-20 11:50	06-MAY-20 11:15	0.25	192	hours	EHTR-FM
	4	28-APR-20 11:50	06-MAY-20 11:15	0.25	192	hours	EHTR-FM
	5	28-APR-20 11:50	06-MAY-20 11:15	0.25	192	hours	EHTR-FM
	6	28-APR-20 15:00	06-MAY-20 11:15	0.25	188	hours	EHTR-FM
	7	28-APR-20 10:30	06-MAY-20 11:15	0.25	193	hours	EHTR-FM
	8	28-APR-20 13:00	06-MAY-20 11:15	0.25	190	hours	EHTR-FM
Total Suspended Solids							
	1	28-APR-20 10:30	06-MAY-20 07:30	7	8	days	EHT
	2	28-APR-20 12:00	06-MAY-20 07:30	7	8	days	EHT
	3	28-APR-20 11:50	06-MAY-20 07:30	7	8	days	EHT
	4	28-APR-20 11:50	06-MAY-20 07:30	7	8	days	EHT
	5	28-APR-20 11:50	06-MAY-20 07:30	7	8	days	EHT
	6	28-APR-20 15:00	06-MAY-20 07:30	7	8	days	EHT
	7	28-APR-20 10:30	06-MAY-20 07:30	7	8	days	EHT
	8	28-APR-20 13:00	06-MAY-20 07:30	7	8	days	EHT
pH							
	1	28-APR-20 10:30	01-MAY-20 13:00	0.25	74	hours	EHTR-FM
	2	28-APR-20 12:00	01-MAY-20 13:00	0.25	73	hours	EHTR-FM
	3	28-APR-20 11:50	01-MAY-20 13:00	0.25	73	hours	EHTR-FM
	4	28-APR-20 11:50	01-MAY-20 13:00	0.25	73	hours	EHTR-FM
	5	28-APR-20 11:50	01-MAY-20 13:00	0.25	73	hours	EHTR-FM
	6	28-APR-20 15:00	01-MAY-20 13:00	0.25	70	hours	EHTR-FM
	7	28-APR-20 10:30	01-MAY-20 13:00	0.25	74	hours	EHTR-FM
	8	28-APR-20 13:00	01-MAY-20 13:00	0.25	72	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2442109 were received on 30-APR-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP 20-09** | TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
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Excel | PDF | EDD

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carlie.meyer@teck.com
jackmarr@mincnow.ca

SAMPLE DETAILS

L2442109-COFC

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.
RG_FOBCPD_WS_2020-04-28_1030	RG_FOBCPD	WS	No	4/28/2020	10:30	G	7
RG_FOBCP_WS_2020-04-28_1200	RG_FOBCP	WS	No	4/28/2020	12:00	G	7
RG_RIVER_WS_2020-04-28_1150	RG_RIVER	WS	No	4/28/2020	11:50	G	7
RG_TRIP_WS_2020-04-28_1150	RG_TRIP	WS	No	4/28/2020	11:50	G	4
RG_FBLANK_WS_2020-04-28_1150	RG_FBLANK	WS	No	4/28/2020	11:50	G	7
RG_FOUEW_WS_2020-04-28_1500	RG_FOUEW	WS	No	4/28/2020	15:00	G	7
RG_FOUSH_WS_2020-04-29_1030	RG_FOUSH	WS	No	4/29/2020	10:30	G	7
RG_FOUKI_WS_2020-04-29_1300	RG_FOUKI	WS	No	4/29/2020	13:00	G	7

ANALYSIS REQUESTED

Filtered (F) Field, (L) Lab, (FL) Field & Lab, (N) None

	N	F	N	N	F	N	F
PRESERV.		H2SO4	H2SO4		HCL	HNO3	HNO3
ANALYSIS	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
RG_FOBCPD_WS_2020-04-28_1030	X	X	X	X	X	X	X
RG_FOBCP_WS_2020-04-28_1200	X	X	X	X	X	X	X
RG_RIVER_WS_2020-04-28_1150	X	X	X	X	X	X	X
RG_TRIP_WS_2020-04-28_1150	X		X	X		X	
RG_FBLANK_WS_2020-04-28_1150	X	X	X	X	X	X	X
RG_FOUEW_WS_2020-04-28_1500	X	X	X	X	X	X	X
RG_FOUSH_WS_2020-04-29_1030	X	X	X	X	X	X	X
RG_FOUKI_WS_2020-04-29_1300	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO: 689999

RELINQUISHED BY/AFFILIATION | DATE/TIME | ACCEPTED BY/AFFILIATION

4/30 9:18

OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Maddy Stokes	Mobile #	647-522-0672
Sampler's Signature	MS	Date/Time	April 29, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 01-MAY-20
Report Date: 11-MAY-20 16:56 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2442701

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442701-1	L2442701-2			
	Description	WS	WS			
	Sampled Date	30-APR-20	30-APR-20			
	Sampled Time	09:30	11:30			
	Client ID	RG_FRCP1SWD_WS_2020-04-30_0930	RG_FRCP1SW_WS_2020-04-30_1130			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	845	792			
	Hardness (as CaCO3) (mg/L)	537	501			
	pH (pH)	8.35	8.46			
	ORP (mV)	328	294			
	Total Suspended Solids (mg/L)	7.9	9.6			
	Total Dissolved Solids (mg/L)	673 DLHC	618 DLHC			
	Turbidity (NTU)	8.04	9.20			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.6	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	183	167			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	7.0	11.6			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	190	179			
	Ammonia as N (mg/L)	0.0101	0.0123			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	1.05	0.73			
	Fluoride (F) (mg/L)	0.156	0.162			
	Ion Balance (%)	104	104			
	Nitrate (as N) (mg/L)	16.6	15.0			
	Nitrite (as N) (mg/L)	0.0173	0.0177			
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	0.0013			
	Phosphorus (P)-Total (mg/L)	0.0037	0.0062			
	Sulfate (SO4) (mg/L)	260	243			
	Anion Sum (meq/L)	10.4	9.73			
	Cation Sum (meq/L)	10.8	10.1			
	Cation - Anion Balance (%)	1.9	1.9			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.02	2.54			
	Total Organic Carbon (mg/L)	2.45	2.84			
Total Metals	Aluminum (Al)-Total (mg/L)	0.148	0.150			
	Antimony (Sb)-Total (mg/L)	0.00036	0.00039			
	Arsenic (As)-Total (mg/L)	0.00020	0.00022			
	Barium (Ba)-Total (mg/L)	0.0677	0.0618			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (ug/L)	0.129	0.146			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442701-1	L2442701-2			
	Description	WS	WS			
	Sampled Date	30-APR-20	30-APR-20			
	Sampled Time	09:30	11:30			
	Client ID	RG_FRCP1SWD_WS_2020-04-30_0930	RG_FRCP1SW_WS_2020-04-30_1130			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	121	114			
	Chromium (Cr)-Total (mg/L)	0.00034	0.00031			
	Cobalt (Co)-Total (ug/L)	0.46	0.51			
	Copper (Cu)-Total (mg/L)	0.00063	0.00065			
	Iron (Fe)-Total (mg/L)	0.125	0.118			
	Lead (Pb)-Total (mg/L)	0.000163	0.000146			
	Lithium (Li)-Total (mg/L)	0.0319	0.0302			
	Magnesium (Mg)-Total (mg/L)	51.2	48.0			
	Manganese (Mn)-Total (mg/L)	0.00957	0.0110			
	Mercury (Hg)-Total (ug/L)	0.00192	0.00210			
	Molybdenum (Mo)-Total (mg/L)	0.00227	0.00247			
	Nickel (Ni)-Total (mg/L)	0.0112	0.0125			
	Potassium (K)-Total (mg/L)	2.06	2.00			
	Selenium (Se)-Total (ug/L)	75.3	70.5			
	Silicon (Si)-Total (mg/L)	1.92	1.83			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	1.52	1.28			
	Strontium (Sr)-Total (mg/L)	0.140	0.139			
	Thallium (Tl)-Total (mg/L)	0.000023	0.000022			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00338	0.00288			
	Vanadium (V)-Total (mg/L)	0.00106	0.00107			
	Zinc (Zn)-Total (mg/L)	0.0069	0.0077			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0048	0.0060			
	Antimony (Sb)-Dissolved (mg/L)	0.00033	0.00036			
	Arsenic (As)-Dissolved (mg/L)	0.00013	0.00019			
	Barium (Ba)-Dissolved (mg/L)	0.0690	0.0638			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (ug/L)	0.105	0.118			
	Calcium (Ca)-Dissolved (mg/L)	118	111			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	0.39	0.44			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2442701-1	L2442701-2			
	Description	WS	WS			
	Sampled Date	30-APR-20	30-APR-20			
	Sampled Time	09:30	11:30			
	Client ID	RG_FRCP1SWD_WS_2020-04-30_0930	RG_FRCP1SW_WS_2020-04-30_1130			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00041	0.00045			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0316	0.0292			
	Magnesium (Mg)-Dissolved (mg/L)	58.9	54.6			
	Manganese (Mn)-Dissolved (mg/L)	0.00550	0.00569			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00225	0.00249			
	Nickel (Ni)-Dissolved (mg/L)	0.0115	0.0130			
	Potassium (K)-Dissolved (mg/L)	2.09	2.09			
	Selenium (Se)-Dissolved (ug/L)	79.5	73.0			
	Silicon (Si)-Dissolved (mg/L)	1.64	1.54			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	1.61	1.37			
	Strontium (Sr)-Dissolved (mg/L)	0.144	0.131			
	Thallium (Tl)-Dissolved (mg/L)	0.000013	0.000014			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00322	0.00298			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	0.0040	0.0041			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Copper (Cu)-Total	DUP-H,J	L2442701-1, -2
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L2442701-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2442701-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2442701-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2442701-1, -2
Matrix Spike	Selenium (Se)-Total	MS-B	L2442701-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2442701-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The

Reference Information

carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

Reference Information

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5073316								
WG3316958-3 DUP		**L2442701-2**						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	02-MAY-20
WG3316958-2 LCS								
Acidity (as CaCO3)			103.8		%		85-115	02-MAY-20
WG3316958-1 MB								
Acidity (as CaCO3)			1.2		mg/L		2	02-MAY-20
ALK-MAN-CL	**Water**							
Batch R5073319								
WG3316959-11 LCS								
Alkalinity, Total (as CaCO3)			101.2		%		85-115	02-MAY-20
WG3316959-8 LCS								
Alkalinity, Total (as CaCO3)			103.1		%		85-115	02-MAY-20
WG3316959-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	02-MAY-20
WG3316959-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	02-MAY-20
BE-D-L-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-2 LCS								
Beryllium (Be)-Dissolved			98.2		%		80-120	07-MAY-20
WG3318995-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	07-MAY-20
BE-T-L-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Beryllium (Be)-Total			102.5		%		80-120	07-MAY-20
WG3318226-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	07-MAY-20
BR-L-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-2 LCS								
Bromide (Br)			94.6		%		85-115	02-MAY-20
WG3316969-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	02-MAY-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5080258								
WG3319957-6 LCS								
Dissolved Organic Carbon			100.7		%		80-120	07-MAY-20
WG3319957-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-MAY-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5080258								
WG3319957-6 LCS								
Total Organic Carbon			105.0		%		80-120	07-MAY-20
WG3319957-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-MAY-20
CL-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-2 LCS								
Chloride (Cl)			102.5		%		90-110	02-MAY-20
WG3316969-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-MAY-20
EC-L-PCT-CL	**Water**							
Batch R5073319								
WG3316959-11 LCS								
Conductivity (@ 25C)			96.6		%		90-110	02-MAY-20
WG3316959-8 LCS								
Conductivity (@ 25C)			95.0		%		90-110	02-MAY-20
WG3316959-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	02-MAY-20
WG3316959-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	02-MAY-20
F-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-2 LCS								
Fluoride (F)			102.1		%		90-110	02-MAY-20
WG3316969-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-MAY-20
HG-D-CVAA-VA	**Water**							
Batch R5075748								
WG3317744-18 LCS								
Mercury (Hg)-Dissolved			100.1		%		80-120	05-MAY-20
WG3317744-17 MB		**NP**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5075748								
WG3317744-17 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	05-MAY-20
HG-T-U-CVAF-VA	**Water**							
Batch R5076259								
WG3318158-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	05-MAY-20
WG3318158-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	05-MAY-20
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-2 LCS								
Aluminum (Al)-Dissolved			105.9		%		80-120	07-MAY-20
Antimony (Sb)-Dissolved			90.4		%		80-120	07-MAY-20
Arsenic (As)-Dissolved			99.4		%		80-120	07-MAY-20
Barium (Ba)-Dissolved			101.2		%		80-120	07-MAY-20
Bismuth (Bi)-Dissolved			104.2		%		80-120	07-MAY-20
Boron (B)-Dissolved			88.1		%		80-120	07-MAY-20
Cadmium (Cd)-Dissolved			100.2		%		80-120	07-MAY-20
Calcium (Ca)-Dissolved			96.6		%		80-120	07-MAY-20
Chromium (Cr)-Dissolved			105.2		%		80-120	07-MAY-20
Cobalt (Co)-Dissolved			101.8		%		80-120	07-MAY-20
Copper (Cu)-Dissolved			100.7		%		80-120	07-MAY-20
Iron (Fe)-Dissolved			92.3		%		80-120	07-MAY-20
Lead (Pb)-Dissolved			94.8		%		80-120	07-MAY-20
Lithium (Li)-Dissolved			98.5		%		80-120	07-MAY-20
Magnesium (Mg)-Dissolved			101.4		%		80-120	07-MAY-20
Manganese (Mn)-Dissolved			102.8		%		80-120	07-MAY-20
Molybdenum (Mo)-Dissolved			93.6		%		80-120	07-MAY-20
Nickel (Ni)-Dissolved			102.1		%		80-120	07-MAY-20
Potassium (K)-Dissolved			99.5		%		80-120	07-MAY-20
Selenium (Se)-Dissolved			94.4		%		80-120	07-MAY-20
Silicon (Si)-Dissolved			97.2		%		60-140	07-MAY-20
Silver (Ag)-Dissolved			94.4		%		80-120	07-MAY-20
Sodium (Na)-Dissolved			107.2		%		80-120	07-MAY-20
Strontium (Sr)-Dissolved			95.4		%		80-120	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-2 LCS								
Thallium (Tl)-Dissolved			99.3		%		80-120	07-MAY-20
Tin (Sn)-Dissolved			92.5		%		80-120	07-MAY-20
Titanium (Ti)-Dissolved			102.4		%		80-120	07-MAY-20
Uranium (U)-Dissolved			98.8		%		80-120	07-MAY-20
Vanadium (V)-Dissolved			103.7		%		80-120	07-MAY-20
Zinc (Zn)-Dissolved			98.1		%		80-120	07-MAY-20
WG3318995-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	07-MAY-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	07-MAY-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	07-MAY-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	07-MAY-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	07-MAY-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	07-MAY-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	07-MAY-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	07-MAY-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	07-MAY-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	07-MAY-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5079908								
WG3318995-1 MB		**NP**						
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	07-MAY-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	07-MAY-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	07-MAY-20
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Aluminum (Al)-Total			97.1		%		80-120	07-MAY-20
Antimony (Sb)-Total			103.5		%		80-120	07-MAY-20
Arsenic (As)-Total			98.8		%		80-120	07-MAY-20
Barium (Ba)-Total			100.9		%		80-120	07-MAY-20
Bismuth (Bi)-Total			107.6		%		80-120	07-MAY-20
Boron (B)-Total			97.2		%		80-120	07-MAY-20
Cadmium (Cd)-Total			98.8		%		80-120	07-MAY-20
Calcium (Ca)-Total			105.7		%		80-120	07-MAY-20
Chromium (Cr)-Total			99.0		%		80-120	07-MAY-20
Cobalt (Co)-Total			99.5		%		80-120	07-MAY-20
Copper (Cu)-Total			98.3		%		80-120	07-MAY-20
Iron (Fe)-Total			96.4		%		80-120	07-MAY-20
Lead (Pb)-Total			107.4		%		80-120	07-MAY-20
Lithium (Li)-Total			106.1		%		80-120	07-MAY-20
Magnesium (Mg)-Total			98.1		%		80-120	07-MAY-20
Manganese (Mn)-Total			98.4		%		80-120	07-MAY-20
Molybdenum (Mo)-Total			104.5		%		80-120	07-MAY-20
Nickel (Ni)-Total			99.0		%		80-120	07-MAY-20
Potassium (K)-Total			104.1		%		80-120	07-MAY-20
Selenium (Se)-Total			103.2		%		80-120	07-MAY-20
Silicon (Si)-Total			103.3		%		80-120	07-MAY-20
Silver (Ag)-Total			103.4		%		80-120	07-MAY-20
Sodium (Na)-Total			102.3		%		80-120	07-MAY-20
Strontium (Sr)-Total			104.5		%		80-120	07-MAY-20
Thallium (Tl)-Total			108.1		%		80-120	07-MAY-20
Tin (Sn)-Total			102.2		%		80-120	07-MAY-20
Titanium (Ti)-Total			99.5		%		80-120	07-MAY-20
Uranium (U)-Total			100.6		%		80-120	07-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5079557								
WG3318226-2 LCS								
Vanadium (V)-Total			101.5		%		80-120	07-MAY-20
Zinc (Zn)-Total			101.9		%		80-120	07-MAY-20
WG3318226-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	07-MAY-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Boron (B)-Total			<0.010		mg/L		0.01	07-MAY-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	07-MAY-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	07-MAY-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Iron (Fe)-Total			<0.010		mg/L		0.01	07-MAY-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	07-MAY-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	07-MAY-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Potassium (K)-Total			<0.050		mg/L		0.05	07-MAY-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	07-MAY-20
Silicon (Si)-Total			<0.10		mg/L		0.1	07-MAY-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Sodium (Na)-Total			<0.050		mg/L		0.05	07-MAY-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	07-MAY-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	07-MAY-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	07-MAY-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	07-MAY-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	07-MAY-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-MAY-20
NH3-L-F-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5080203								
WG3319590-18 LCS								
Ammonia as N			100.4		%		85-115	08-MAY-20
WG3319590-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	08-MAY-20
NO2-L-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-2 LCS								
Nitrite (as N)			99.9		%		90-110	02-MAY-20
WG3316969-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	02-MAY-20
NO3-L-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-2 LCS								
Nitrate (as N)			102.9		%		90-110	02-MAY-20
WG3316969-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	02-MAY-20
ORP-CL	**Water**							
Batch R5078862								
WG3319006-13 CRM		**CL-ORP**						
ORP			220		mV		210-230	06-MAY-20
P-T-L-COL-CL	**Water**							
Batch R5079530								
WG3319282-22 LCS								
Phosphorus (P)-Total			103.5		%		80-120	07-MAY-20
WG3319282-21 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	07-MAY-20
PH-CL	**Water**							
Batch R5073319								
WG3316959-11 LCS								
pH			6.98		pH		6.9-7.1	02-MAY-20
WG3316959-8 LCS								
pH			6.99		pH		6.9-7.1	02-MAY-20
PO4-DO-L-COL-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL	**Water**							
Batch R5073876								
WG3316889-14 LCS								
Orthophosphate-Dissolved (as P)			104.2		%		80-120	02-MAY-20
WG3316889-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	02-MAY-20
SO4-IC-N-CL	**Water**							
Batch R5073340								
WG3316969-2 LCS								
Sulfate (SO4)			106.2		%		90-110	02-MAY-20
WG3316969-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-MAY-20
SOLIDS-TDS-CL	**Water**							
Batch R5079905								
WG3318423-12 DUP		**L2442701-2**						
Total Dissolved Solids		618	606		mg/L	2.0	20	06-MAY-20
WG3318423-11 LCS								
Total Dissolved Solids			101.9		%		85-115	06-MAY-20
WG3318423-8 LCS								
Total Dissolved Solids			100.3		%		85-115	06-MAY-20
WG3318423-10 MB								
Total Dissolved Solids			<10		mg/L		10	06-MAY-20
WG3318423-7 MB								
Total Dissolved Solids			<10		mg/L		10	06-MAY-20
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-10 LCS								
Total Kjeldahl Nitrogen			89.0		%		75-125	08-MAY-20
WG3320325-14 LCS								
Total Kjeldahl Nitrogen			90.1		%		75-125	08-MAY-20
WG3320325-18 LCS								
Total Kjeldahl Nitrogen			90.8		%		75-125	08-MAY-20
WG3320325-2 LCS								
Total Kjeldahl Nitrogen			92.9		%		75-125	08-MAY-20
WG3320325-22 LCS								
Total Kjeldahl Nitrogen			89.8		%		75-125	08-MAY-20
WG3320325-26 LCS								
Total Kjeldahl Nitrogen			94.6		%		75-125	08-MAY-20
WG3320325-6 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	08-MAY-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5080434								
WG3320325-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-21 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-25 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
WG3320325-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	08-MAY-20
TSS-L-CL	**Water**							
Batch R5080454								
WG3319188-4 LCS								
Total Suspended Solids			110.9		%		85-115	07-MAY-20
WG3319188-3 MB								
Total Suspended Solids			<1.0		mg/L		1	07-MAY-20
TURBIDITY-CL	**Water**							
Batch R5073116								
WG3316918-20 LCS								
Turbidity			104.0		%		85-115	02-MAY-20
WG3316918-19 MB								
Turbidity			<0.10		NTU		0.1	02-MAY-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	30-APR-20 09:30	06-MAY-20 19:00	0.25	154	hours	EHTR-FM
	2	30-APR-20 11:30	06-MAY-20 19:00	0.25	151	hours	EHTR-FM
pH							
	1	30-APR-20 09:30	02-MAY-20 13:00	0.25	52	hours	EHTR-FM
	2	30-APR-20 11:30	02-MAY-20 13:00	0.25	49	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2442701 were received on 01-MAY-20 08:45.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP 20-09

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

Excel | PDF | EDD

SAMPLE DETAILS

L2442701-COFC

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.
RG_FRCP1SWD_WS_2020-04-30_0930	RG_FRCP1SWD	WS	No	4/30/2020	9:30	G	7
RG_FRCP1SW_WS_2020-04-30_1130	RG_FRCP1SWD	WS	No	4/30/2020	11:30	G	7

ANALYSIS REQUESTED

Bottle #	Preservative	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
		N	F	N	N	F	V	F
			H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FRCP1SWD_WS_2020-04-30_0930		X	X	X	X	X	X	X
RG_FRCP1SW_WS_2020-04-30_1130		X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO: 689999

RELINQUISHED BY/AFFILIATION

DATE/TIME

ACCEPTED BY/AFFILIATION

5/1 8:45

NEW BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Maddy Stokes	Mobile #	647-522-0672
Sampler's Signature	MS	Date/Time	April 30, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 17-JUN-20
Report Date: 25-JUN-20 17:19 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2462043

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Comments: Turbidity expired on samples L2462043-1 to -4.

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2462043-1	L2462043-2	L2462043-3	L2462043-4	L2462043-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	15-JUN-20	15-JUN-20	15-JUN-20	15-JUN-20	16-JUN-20
	Sampled Time	11:00	13:30	11:00	15:00	10:30
	Client ID	RG_HENUP_WS_2020-06-15_1100	RG_FODHE_WS_2020-06-15_1330	RG_FOUCL_WS_2020-06-15_1100	RG_MP1_WS_2020-06-15_1500	RG_FOBKS_WS_2020-06-16_1030
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	196	249	270	321	381
	Hardness (as CaCO3) (mg/L)	106	131	142	169	200
	pH (pH)	8.18	8.24	8.23	8.25	8.31
	ORP (mV)	486	403	493	261	320
	Total Suspended Solids (mg/L)	3.6	8.9	12.8	21.0	12.9
	Total Dissolved Solids (mg/L)	127 DLHC	166 DLHC	192 DLHC	227 DLHC	264 DLHC
	Turbidity (NTU)	1.35	3.41	5.91	7.40	2.41
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	96.1	108	114	119	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	135
	Alkalinity, Total (as CaCO3) (mg/L)	96.1	108	114	119	135
	Ammonia as N (mg/L)	0.0169	0.0253	0.0114	0.0291	0.0430
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.146	0.126	0.126	0.124	0.138
	Ion Balance (%)	97.6	95.2	94.0	95.0	93.7
	Nitrate (as N) (mg/L)	0.164	0.771	1.18	2.99	4.14
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0010	0.0028	0.0096
	Total Kjeldahl Nitrogen (mg/L)	<0.050	0.239	0.308	0.217 TKNI	0.278 TKNI
	Orthophosphate-Dissolved (as P) (mg/L)	0.0018	0.0032	0.0041	0.0050	0.0044
	Phosphorus (P)-Total (mg/L)	0.0040	0.0158	0.0160	0.0155	0.0041
	Sulfate (SO4) (mg/L)	12.2	26.7	32.9	48.5	63.3
	Anion Sum (meq/L)	2.19	2.78	3.06	3.60	4.32
	Cation Sum (meq/L)	2.14	2.64	2.87	3.42	4.05
	Cation - Anion Balance (%)	-1.2	-2.4	-3.1	-2.6	-3.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.57	1.28	1.46	1.58	1.59
	Total Organic Carbon (mg/L)	0.57	1.42	1.68	1.76	1.71
Total Metals	Aluminum (Al)-Total (mg/L)	0.0260	0.0815	0.0844	0.0758	0.0650
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00013	0.00020
	Arsenic (As)-Total (mg/L)	0.00011	0.00016	0.00016	0.00017	0.00015
	Barium (Ba)-Total (mg/L)	0.00773	0.0268	0.0312	0.0355	0.0407
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0062	0.0307	0.0268	0.0418	0.0454

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2462043-6	L2462043-7	L2462043-8		
	Description	WS	WS	WS		
	Sampled Date	16-JUN-20	16-JUN-20	16-JUN-20		
	Sampled Time	08:30	12:00	12:00		
	Client ID	RG_FODNGD_WS_2020-06-16_0830	RG_FOUNGD_WS_2020-06-06_1200	RG_SCOUTDS_WS_2020-06-16_1200		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	325	320	432		
	Hardness (as CaCO3) (mg/L)	170	172	219		
	pH (pH)	8.26	8.25	8.33		
	ORP (mV)	293	449	330		
	Total Suspended Solids (mg/L)	8.2	5.2	10.3		
	Total Dissolved Solids (mg/L)	223 DLHC	213 DLHC	314 DLHC		
	Turbidity (NTU)	2.73	2.06	3.41		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	122	121	<1.0		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	138		
	Alkalinity, Total (as CaCO3) (mg/L)	122	121	138		
	Ammonia as N (mg/L)	0.0067	0.0124	0.0360		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50		
	Fluoride (F) (mg/L)	0.132	0.134	0.139		
	Ion Balance (%)	94.5	96.7	91.6		
	Nitrate (as N) (mg/L)	2.54	2.35	4.52		
	Nitrite (as N) (mg/L)	0.0022	0.0020	0.0092		
	Total Kjeldahl Nitrogen (mg/L)	0.278	0.277	0.342 TKNI		
	Orthophosphate-Dissolved (as P) (mg/L)	0.0030	0.0034	0.0041		
	Phosphorus (P)-Total (mg/L)	0.0067	0.0082	0.0147		
	Sulfate (SO4) (mg/L)	49.3	48.0	84.7		
	Anion Sum (meq/L)	3.64	3.59	4.85		
	Cation Sum (meq/L)	3.44	3.47	4.44		
	Cation - Anion Balance (%)	-2.8	-1.7	-4.4		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.51	1.41	1.71		
	Total Organic Carbon (mg/L)	1.55	1.53	1.74		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0743	0.0674	0.116		
	Antimony (Sb)-Total (mg/L)	0.00011	<0.00010	0.00022		
	Arsenic (As)-Total (mg/L)	0.00015	0.00014	0.00018		
	Barium (Ba)-Total (mg/L)	0.0348	0.0352	0.0412		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Total (ug/L)	0.0312	0.0261	0.0606		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2462043-1	L2462043-2	L2462043-3	L2462043-4	L2462043-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	15-JUN-20	15-JUN-20	15-JUN-20	15-JUN-20	16-JUN-20
	Sampled Time	11:00	13:30	11:00	15:00	10:30
	Client ID	RG_HENUP_WS_2020-06-15_1100	RG_FODHE_WS_2020-06-15_1330	RG_FOUCL_WS_2020-06-15_1100	RG_MP1_WS_2020-06-15_1500	RG_FOBKS_WS_2020-06-16_1030
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	33.4	38.4	41.7	45.4	51.8
	Chromium (Cr)-Total (mg/L)	0.00015	0.00023	0.00022	0.00021	0.00021
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	0.11	0.14
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.019	0.081	0.077	0.081	0.087
	Lead (Pb)-Total (mg/L)	<0.000050	0.000099	0.000093	0.000101	0.000085
	Lithium (Li)-Total (mg/L)	<0.0010	0.0028	0.0034	0.0075	0.0109
	Magnesium (Mg)-Total (mg/L)	5.93	10.6	11.3	14.4	18.4
	Manganese (Mn)-Total (mg/L)	0.00111	0.00839	0.00798	0.00915	0.00752
	Mercury (Hg)-Total (ug/L)	0.00059	0.00172	0.00172	0.00147	0.00151
	Molybdenum (Mo)-Total (mg/L)	0.000399	0.000560	0.000608	0.000758	0.00121
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00063	0.00099	0.00220	0.00252
	Potassium (K)-Total (mg/L)	0.172	0.405	0.450	0.651	0.960
	Selenium (Se)-Total (ug/L)	0.342	3.90	5.54	11.2	14.6
	Silicon (Si)-Total (mg/L)	1.06	1.66	1.69	1.74	1.80
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.205	0.434	0.454	0.575	0.719
	Strontium (Sr)-Total (mg/L)	0.0626	0.0657	0.0664	0.0729	0.0801
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000432	0.000490	0.000563	0.000778	0.00106
	Vanadium (V)-Total (mg/L)	<0.00050	0.00052	0.00052	0.00057	0.00053
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0032	<0.0030	0.0034	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00012	0.00019
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00014	<0.00010	0.00011	0.00012
	Barium (Ba)-Dissolved (mg/L)	0.00818	0.0268	0.0309	0.0343	0.0401
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050	0.0077	0.0140	0.0263	0.0310
	Calcium (Ca)-Dissolved (mg/L)	33.2	35.2	38.0	43.4	49.1
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2462043-6	L2462043-7	L2462043-8		
	Description	WS	WS	WS		
	Sampled Date	16-JUN-20	16-JUN-20	16-JUN-20		
	Sampled Time	08:30	12:00	12:00		
	Client ID	RG_FODNGD_WS_2020-06-16_0830	RG_FOUNGD_WS_2020-06-06_1200	RG_SCOUTDS_WS_2020-06-16_1200		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	44.3	43.2	54.3		
	Chromium (Cr)-Total (mg/L)	0.00022	0.00015	0.00031		
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	0.16		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	0.085	0.069	0.160		
	Lead (Pb)-Total (mg/L)	0.000073	0.000058	0.000144		
	Lithium (Li)-Total (mg/L)	0.0083	0.0077	0.0122		
	Magnesium (Mg)-Total (mg/L)	14.5	14.5	22.6		
	Manganese (Mn)-Total (mg/L)	0.00536	0.00460	0.0101		
	Mercury (Hg)-Total (ug/L)	0.00179	0.00124	0.00469		
	Molybdenum (Mo)-Total (mg/L)	0.000753	0.000704	0.00142		
	Nickel (Ni)-Total (mg/L)	0.00164	0.00152	0.00312		
	Potassium (K)-Total (mg/L)	0.620	0.600	1.05		
	Selenium (Se)-Total (ug/L)	9.86	9.33	20.8		
	Silicon (Si)-Total (mg/L)	1.72	1.73	1.89		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	0.581	0.567	0.787		
	Strontium (Sr)-Total (mg/L)	0.0775	0.0758	0.0824		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.000814	0.000817	0.00128		
	Vanadium (V)-Total (mg/L)	0.00053	<0.00050	0.00072		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0035		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00020		
	Arsenic (As)-Dissolved (mg/L)	0.00011	0.00012	0.00014		
	Barium (Ba)-Dissolved (mg/L)	0.0357	0.0350	0.0405		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0143	0.0193	0.0560		
	Calcium (Ca)-Dissolved (mg/L)	43.4	45.1	50.6		
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2462043-1	L2462043-2	L2462043-3	L2462043-4	L2462043-5
Description	WS	WS	WS	WS	WS
Sampled Date	15-JUN-20	15-JUN-20	15-JUN-20	15-JUN-20	16-JUN-20
Sampled Time	11:00	13:30	11:00	15:00	10:30
Client ID	RG_HENUP_WS_2020-06-15_1100	RG_FODHE_WS_2020-06-15_1330	RG_FOUCL_WS_2020-06-15_1100	RG_MP1_WS_2020-06-15_1500	RG_FOBKS_WS_2020-06-16_1030
Grouping / **Analyte**					
WATER					
Dissolved Metals Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00021	0.00025	0.00028
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0010	0.0025	0.0031	0.0072	0.0102
Magnesium (Mg)-Dissolved (mg/L)	5.69	10.4	11.5	14.7	18.7
Manganese (Mn)-Dissolved (mg/L)	0.00019	0.00131	0.00104	0.00118	0.00198
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000362	0.000563	0.000571	0.000785	0.00114
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	0.00081	0.00192	0.00237
Potassium (K)-Dissolved (mg/L)	0.174	0.389	0.446	0.657	0.989
Selenium (Se)-Dissolved (ug/L)	0.421	4.23	5.65	12.1	14.7
Silicon (Si)-Dissolved (mg/L)	1.03	1.46	1.58	1.59	1.67
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.217	0.451	0.475	0.586	0.752
Strontium (Sr)-Dissolved (mg/L)	0.0593	0.0643	0.0633	0.0679	0.0762
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	0.000418	0.000451	0.000530	0.000774	0.00102
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0148 DTC	<0.0010	<0.0010	0.0014	0.0014

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2462043-6	L2462043-7	L2462043-8		
	Description	WS	WS	WS		
	Sampled Date	16-JUN-20	16-JUN-20	16-JUN-20		
	Sampled Time	08:30	12:00	12:00		
	Client ID	RG_FODNGD_WS_2020-06-16_0830	RG_FOUNGD_WS_2020-06-06_1200	RG_SCOUTDS_WS_2020-06-16_1200		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00021	<0.00020	0.00032		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0079	0.0076	0.0111		
	Magnesium (Mg)-Dissolved (mg/L)	15.0	14.4	22.5		
	Manganese (Mn)-Dissolved (mg/L)	0.00092	0.00097	0.00221		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000737	0.000695	0.00137		
	Nickel (Ni)-Dissolved (mg/L)	0.00148	0.00138	0.00286		
	Potassium (K)-Dissolved (mg/L)	0.623	0.589	1.04		
	Selenium (Se)-Dissolved (ug/L)	10.3	9.23	21.6		
	Silicon (Si)-Dissolved (mg/L)	1.59	1.56	1.65		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	0.607	0.579	0.791		
	Strontium (Sr)-Dissolved (mg/L)	0.0744	0.0729	0.0789		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000818	0.000768	0.00127		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0010	0.0011	0.0021		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Calcium (Ca)-Total	B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L2462043-1
Matrix Spike	Arsenic (As)-Dissolved	MS-B	L2462043-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2462043-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2462043-1, -2, -3, -4, -5, -6, -7, -8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by

Reference Information

subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5131755								
WG3349638-2 LCS								
Acidity (as CaCO3)			102.8		%		85-115	24-JUN-20
WG3349638-1 MB								
Acidity (as CaCO3)			1.3		mg/L		2	24-JUN-20
ALK-MAN-CL	**Water**							
Batch R5125761								
WG3345630-14 LCS								
Alkalinity, Total (as CaCO3)			98.3		%		85-115	18-JUN-20
WG3345630-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-JUN-20
BE-D-L-CCMS-VA	**Water**							
Batch R5126982								
WG3345142-2 LCS								
Beryllium (Be)-Dissolved			99.0		%		80-120	19-JUN-20
WG3345142-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	19-JUN-20
BE-T-L-CCMS-VA	**Water**							
Batch R5126982								
WG3345394-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	19-JUN-20
BR-L-IC-N-CL	**Water**							
Batch R5126428								
WG3346417-10 LCS								
Bromide (Br)			104.1		%		85-115	18-JUN-20
WG3346417-6 LCS								
Bromide (Br)			109.2		%		85-115	18-JUN-20
WG3346417-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	18-JUN-20
WG3346417-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	18-JUN-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5130957								
WG3348738-2 LCS								
Dissolved Organic Carbon			89.5		%		80-120	23-JUN-20
WG3348738-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	23-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5130957								
WG3348738-2 LCS								
Total Organic Carbon			94.0		%		80-120	23-JUN-20
WG3348738-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	23-JUN-20
CL-IC-N-CL	**Water**							
Batch R5126428								
WG3346417-10 LCS								
Chloride (Cl)			106.4		%		90-110	18-JUN-20
WG3346417-6 LCS								
Chloride (Cl)			106.7		%		90-110	18-JUN-20
WG3346417-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUN-20
WG3346417-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-JUN-20
EC-L-PCT-CL	**Water**							
Batch R5125761								
WG3345630-14 LCS								
Conductivity (@ 25C)			101.3		%		90-110	18-JUN-20
WG3345630-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	18-JUN-20
F-IC-N-CL	**Water**							
Batch R5126428								
WG3346417-10 LCS								
Fluoride (F)			99.1		%		90-110	18-JUN-20
WG3346417-6 LCS								
Fluoride (F)			99.98		%		90-110	18-JUN-20
WG3346417-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUN-20
WG3346417-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-JUN-20
HG-D-CVAA-VA	**Water**							
Batch R5127110								
WG3347480-2 LCS								
Mercury (Hg)-Dissolved			100.3		%		80-120	22-JUN-20
WG3347480-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	22-JUN-20
HG-T-U-CVAF-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5126317								
WG3346173-2 LCS								
Mercury (Hg)-Total			98.4		%		80-120	19-JUN-20
WG3346173-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	19-JUN-20
Batch R5126325								
WG3346181-2 LCS								
Mercury (Hg)-Total			96.6		%		80-120	19-JUN-20
WG3346181-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	19-JUN-20
MET-D-CCMS-VA	**Water**							
Batch R5126982								
WG3345142-2 LCS								
Aluminum (Al)-Dissolved			103.8		%		80-120	19-JUN-20
Antimony (Sb)-Dissolved			94.5		%		80-120	19-JUN-20
Arsenic (As)-Dissolved			101.3		%		80-120	19-JUN-20
Barium (Ba)-Dissolved			102.6		%		80-120	19-JUN-20
Bismuth (Bi)-Dissolved			92.7		%		80-120	19-JUN-20
Boron (B)-Dissolved			93.2		%		80-120	19-JUN-20
Cadmium (Cd)-Dissolved			102.3		%		80-120	19-JUN-20
Calcium (Ca)-Dissolved			96.5		%		80-120	19-JUN-20
Chromium (Cr)-Dissolved			98.7		%		80-120	19-JUN-20
Cobalt (Co)-Dissolved			99.7		%		80-120	19-JUN-20
Copper (Cu)-Dissolved			98.3		%		80-120	19-JUN-20
Iron (Fe)-Dissolved			100.8		%		80-120	19-JUN-20
Lead (Pb)-Dissolved			98.8		%		80-120	19-JUN-20
Lithium (Li)-Dissolved			97.3		%		80-120	19-JUN-20
Magnesium (Mg)-Dissolved			96.8		%		80-120	19-JUN-20
Manganese (Mn)-Dissolved			103.1		%		80-120	19-JUN-20
Molybdenum (Mo)-Dissolved			99.1		%		80-120	19-JUN-20
Nickel (Ni)-Dissolved			100.9		%		80-120	19-JUN-20
Potassium (K)-Dissolved			100.2		%		80-120	19-JUN-20
Selenium (Se)-Dissolved			100.5		%		80-120	19-JUN-20
Silicon (Si)-Dissolved			97.8		%		60-140	19-JUN-20
Silver (Ag)-Dissolved			96.5		%		80-120	19-JUN-20
Sodium (Na)-Dissolved			102.8		%		80-120	19-JUN-20
Strontium (Sr)-Dissolved			99.99		%		80-120	19-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5126982								
WG3345142-2 LCS								
Thallium (Tl)-Dissolved			98.0		%		80-120	19-JUN-20
Tin (Sn)-Dissolved			99.3		%		80-120	19-JUN-20
Titanium (Ti)-Dissolved			96.4		%		80-120	19-JUN-20
Uranium (U)-Dissolved			100.6		%		80-120	19-JUN-20
Vanadium (V)-Dissolved			101.0		%		80-120	19-JUN-20
Zinc (Zn)-Dissolved			100.7		%		80-120	19-JUN-20
WG3345142-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-JUN-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	19-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	19-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-JUN-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5126982								
WG3345142-1 MB		**NP**						
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-JUN-20
Batch R5127638								
WG3347402-2 LCS								
Aluminum (Al)-Dissolved			102.5		%		80-120	22-JUN-20
Antimony (Sb)-Dissolved			95.9		%		80-120	22-JUN-20
Arsenic (As)-Dissolved			100.4		%		80-120	22-JUN-20
Barium (Ba)-Dissolved			103.2		%		80-120	22-JUN-20
Bismuth (Bi)-Dissolved			109.0		%		80-120	22-JUN-20
Boron (B)-Dissolved			91.8		%		80-120	22-JUN-20
Cadmium (Cd)-Dissolved			101.0		%		80-120	22-JUN-20
Calcium (Ca)-Dissolved			96.3		%		80-120	22-JUN-20
Chromium (Cr)-Dissolved			99.99		%		80-120	22-JUN-20
Cobalt (Co)-Dissolved			101.9		%		80-120	22-JUN-20
Copper (Cu)-Dissolved			99.0		%		80-120	22-JUN-20
Iron (Fe)-Dissolved			96.1		%		80-120	22-JUN-20
Lead (Pb)-Dissolved			106.5		%		80-120	22-JUN-20
Lithium (Li)-Dissolved			90.8		%		80-120	22-JUN-20
Magnesium (Mg)-Dissolved			98.3		%		80-120	22-JUN-20
Manganese (Mn)-Dissolved			107.2		%		80-120	22-JUN-20
Molybdenum (Mo)-Dissolved			97.5		%		80-120	22-JUN-20
Nickel (Ni)-Dissolved			101.2		%		80-120	22-JUN-20
Potassium (K)-Dissolved			100.5		%		80-120	22-JUN-20
Selenium (Se)-Dissolved			108.2		%		80-120	22-JUN-20
Silicon (Si)-Dissolved			103.9		%		60-140	22-JUN-20
Silver (Ag)-Dissolved			101.1		%		80-120	22-JUN-20
Sodium (Na)-Dissolved			106.9		%		80-120	22-JUN-20
Strontium (Sr)-Dissolved			100.9		%		80-120	22-JUN-20
Thallium (Tl)-Dissolved			104.0		%		80-120	22-JUN-20
Tin (Sn)-Dissolved			94.9		%		80-120	22-JUN-20
Titanium (Ti)-Dissolved			89.2		%		80-120	22-JUN-20
Uranium (U)-Dissolved			104.2		%		80-120	22-JUN-20
Vanadium (V)-Dissolved			101.4		%		80-120	22-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5127638								
WG3347402-2 LCS								
Zinc (Zn)-Dissolved			101.5		%		80-120	22-JUN-20
WG3347402-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-JUN-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	22-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-JUN-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-JUN-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-JUN-20
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5126982								
WG3345394-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	19-JUN-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	19-JUN-20
Boron (B)-Total			<0.010		mg/L		0.01	19-JUN-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	19-JUN-20
Calcium (Ca)-Total			0.060	B	mg/L		0.05	19-JUN-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	19-JUN-20
Iron (Fe)-Total			<0.010		mg/L		0.01	19-JUN-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	19-JUN-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	19-JUN-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	19-JUN-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	19-JUN-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	19-JUN-20
Potassium (K)-Total			<0.050		mg/L		0.05	19-JUN-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	19-JUN-20
Silicon (Si)-Total			<0.10		mg/L		0.1	19-JUN-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	19-JUN-20
Sodium (Na)-Total			<0.050		mg/L		0.05	19-JUN-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	19-JUN-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	19-JUN-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	19-JUN-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	19-JUN-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	19-JUN-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	19-JUN-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	19-JUN-20
NH3-L-F-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5131101								
WG3348304-31 DUP		**L2462043-8**						
Ammonia as N		0.0360	0.0381		mg/L	5.7	20	23-JUN-20
WG3348304-26 LCS								
Ammonia as N			108.3		%		85-115	23-JUN-20
WG3348304-30 LCS								
Ammonia as N			114.4		%		85-115	23-JUN-20
WG3348304-25 MB								
Ammonia as N			<0.0050		mg/L		0.005	23-JUN-20
WG3348304-29 MB								
Ammonia as N			<0.0050		mg/L		0.005	23-JUN-20
WG3348304-32 MS		**L2462043-8**						
Ammonia as N			114.0		%		75-125	23-JUN-20
NO2-L-IC-N-CL	**Water**							
Batch R5126428								
WG3346417-10 LCS								
Nitrite (as N)			107.7		%		90-110	18-JUN-20
WG3346417-6 LCS								
Nitrite (as N)			108.3		%		90-110	18-JUN-20
WG3346417-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUN-20
WG3346417-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-JUN-20
NO3-L-IC-N-CL	**Water**							
Batch R5126428								
WG3346417-10 LCS								
Nitrate (as N)			105.5		%		90-110	18-JUN-20
WG3346417-6 LCS								
Nitrate (as N)			105.6		%		90-110	18-JUN-20
WG3346417-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUN-20
WG3346417-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-JUN-20
ORP-CL	**Water**							
Batch R5130158								
WG3348322-7 CRM		**CL-ORP**						
ORP			229		mV		210-230	23-JUN-20
P-T-L-COL-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	**Water**							
Batch R5130976								
WG3348305-22 LCS								
Phosphorus (P)-Total			107.9		%		80-120	23-JUN-20
WG3348305-26 LCS								
Phosphorus (P)-Total			110.2		%		80-120	23-JUN-20
WG3348305-21 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	23-JUN-20
WG3348305-25 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	23-JUN-20
PH-CL	**Water**							
Batch R5125761								
WG3345630-14 LCS								
pH			6.98		pH		6.9-7.1	18-JUN-20
PO4-DO-L-COL-CL	**Water**							
Batch R5123801								
WG3344343-22 LCS								
Orthophosphate-Dissolved (as P)			107.1		%		80-120	17-JUN-20
WG3344343-26 LCS								
Orthophosphate-Dissolved (as P)			107.9		%		80-120	17-JUN-20
WG3344343-21 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-JUN-20
WG3344343-25 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-JUN-20
SO4-IC-N-CL	**Water**							
Batch R5126428								
WG3346417-10 LCS								
Sulfate (SO4)			106.0		%		90-110	18-JUN-20
WG3346417-6 LCS								
Sulfate (SO4)			106.3		%		90-110	18-JUN-20
WG3346417-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-JUN-20
WG3346417-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-JUN-20
SOLIDS-TDS-CL	**Water**							
Batch R5130436								
WG3346907-15 DUP		**L2462043-6**						
Total Dissolved Solids		223	221		mg/L	0.7	20	22-JUN-20
WG3346907-11 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5130436								
WG3346907-11 LCS								
Total Dissolved Solids			99.9		%		85-115	22-JUN-20
WG3346907-14 LCS								
Total Dissolved Solids			102.3		%		85-115	22-JUN-20
WG3346907-10 MB								
Total Dissolved Solids			<10		mg/L		10	22-JUN-20
WG3346907-13 MB								
Total Dissolved Solids			<10		mg/L		10	22-JUN-20
TKN-L-F-CL	**Water**							
Batch R5130358								
WG3348291-12 LCS								
Total Kjeldahl Nitrogen			83.4		%		75-125	22-JUN-20
WG3348291-16 LCS								
Total Kjeldahl Nitrogen			85.4		%		75-125	22-JUN-20
WG3348291-19 LCS								
Total Kjeldahl Nitrogen			85.4		%		75-125	22-JUN-20
WG3348291-2 LCS								
Total Kjeldahl Nitrogen			84.9		%		75-125	22-JUN-20
WG3348291-5 LCS								
Total Kjeldahl Nitrogen			85.5		%		75-125	22-JUN-20
WG3348291-8 LCS								
Total Kjeldahl Nitrogen			85.8		%		75-125	22-JUN-20
WG3348291-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUN-20
WG3348291-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUN-20
WG3348291-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUN-20
WG3348291-18 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUN-20
WG3348291-4 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUN-20
WG3348291-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	22-JUN-20
TSS-L-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	**Water**							
Batch R5130340								
WG3346905-10 LCS								
Total Suspended Solids			112.6		%		85-115	22-JUN-20
WG3346905-8 LCS								
Total Suspended Solids			90.8		%		85-115	22-JUN-20
WG3346905-7 MB								
Total Suspended Solids			<1.0		mg/L		1	22-JUN-20
WG3346905-9 MB								
Total Suspended Solids			<1.0		mg/L		1	22-JUN-20
TURBIDITY-CL	**Water**							
Batch R5126388								
WG3346114-3 DUP		**L2462043-3**						
Turbidity		5.91	5.84		NTU	1.2	15	19-JUN-20
WG3346114-2 LCS								
Turbidity			99.0		%		85-115	19-JUN-20
WG3346114-1 MB								
Turbidity			<0.10		NTU		0.1	19-JUN-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	15-JUN-20 11:00	23-JUN-20 12:00	0.25	193	hours	EHTR-FM
	2	15-JUN-20 13:30	23-JUN-20 12:00	0.25	191	hours	EHTR-FM
	3	15-JUN-20 11:00	23-JUN-20 12:00	0.25	193	hours	EHTR-FM
	4	15-JUN-20 15:00	23-JUN-20 12:00	0.25	189	hours	EHTR-FM
	5	16-JUN-20 10:30	23-JUN-20 12:00	0.25	169	hours	EHTR-FM
	6	16-JUN-20 08:30	23-JUN-20 12:00	0.25	172	hours	EHTR-FM
	7	16-JUN-20 12:00	23-JUN-20 12:00	0.25	168	hours	EHTR-FM
	8	16-JUN-20 12:00	23-JUN-20 12:00	0.25	168	hours	EHTR-FM
Turbidity							
	1	15-JUN-20 11:00	19-JUN-20 07:00	3	4	days	EHT
	2	15-JUN-20 13:30	19-JUN-20 07:00	3	4	days	EHT
	3	15-JUN-20 11:00	19-JUN-20 07:00	3	4	days	EHT
	4	15-JUN-20 15:00	19-JUN-20 07:00	3	4	days	EHT
pH							
	1	15-JUN-20 11:00	18-JUN-20 09:00	0.25	70	hours	EHTR-FM
	2	15-JUN-20 13:30	18-JUN-20 09:00	0.25	67	hours	EHTR-FM
	3	15-JUN-20 11:00	18-JUN-20 09:00	0.25	70	hours	EHTR-FM
	4	15-JUN-20 15:00	18-JUN-20 09:00	0.25	66	hours	EHTR-FM
	5	16-JUN-20 10:30	18-JUN-20 09:00	0.25	47	hours	EHTR-FM
	6	16-JUN-20 08:30	18-JUN-20 09:00	0.25	48	hours	EHTR-FM
	7	16-JUN-20 12:00	18-JUN-20 09:00	0.25	45	hours	EHTR-FM
	8	16-JUN-20 12:00	18-JUN-20 09:00	0.25	45	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2462043 were received on 17-JUN-20 08:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP 20-09

TURNAROUND TIME:

PROJECT/CLIENT INFO

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LABORATORY

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Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	X	X	X
teckcoal@elementsonline.com	X		X
jings@minnow.ca	X	X	X
carlie.meyer@teck.com	X	X	X
pschnurr@minnow.ca	X	X	X

SAMPLE DETAILS

L2462043-COFC

ANALYSIS REQUESTED

Filtered (F), Fixed (F), Lab (L), Field (F), Lab (N), None (R)

								N	F	N	N	F	N	F				
									H2SO4	H2SO4		HCL	HNO3	HNO3				
Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA				
RG_HENUP_WS_2020-06-15_1100	RG_HENUP	WS	No	6/15/2020	11:00	G	7	X	X	X	X	X	X	X				
RG_FODHE_WS_2020-06-15_1330	RG_FODHE	WS	No	6/15/2020	13:30	G	7	X	X	X	X	X	X	X				
RG_FOUCL_WS_2020-06-15_1100	RG_FOUCL	WS	No	6/15/2020	11:00	G	7	X	X	X	X	X	X	X				
RG_MP1_WS_2020-06-15_1500	RG_MP1	WS	No	6/15/2020	15:00	G	7	X	X	X	X	X	X	X				
RG_FOBKS_WS_2020-06-16_1030	RG_FOBKS	WS	No	6/16/2020	10:30	G	7	X	X	X	X	X	X	X				
RG_FODNGD_WS_2020-06-16_0830	RG_FODNGD	WS	No	6/16/2020	8:30	G	7	X	X	X	X	X	X	X				
RG_FOUNGD_WS_2020-06-06_1200	RG_FOUNGD	WS	No	6/16/2020	12:00	G	7	X	X	X	X	X	X	X				
RG_SCOUTDS_WS_2020-06-16_1200	RG_SCOUTDS	WS	No	6/16/2020	12:00	G	7	X	X	X	X	X	X	X				

Excel	PDF	EDD

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO: 689099

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	17/06 2:53		902

NB OF BOTTLES RETURNED/DESCRIPTION	
Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name		**Peter Schnurr**		**Mobile #**	**647-967-9403**
Sampler's Signature		**PS**		**Date/Time**	**June 16, 2020**

L2462043-COFC

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 19-JUN-20
Report Date: 30-JUN-20 17:35 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2463454

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2463454-1	L2463454-2	L2463454-3	L2463454-4	L2463454-5
Description	WS	WS	WS	WS	WS
Sampled Date	17-JUN-20	17-JUN-20	17-JUN-20	17-JUN-20	18-JUN-20
Sampled Time	15:00	13:00	13:00	09:00	14:00
Client ID	RG_FOUKI_WS_2020-06-17_1500	RG_UFR1_WS_2020-06-17_1300	RG_FOBCP_WS_2020-06-17_1300	RG_FO26_WS_2020-06-17_0900	RG_FOBSC_WS_2020-06-18_1400
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (@ 25C) (uS/cm)	394	216	592	214	796
Hardness (as CaCO3) (mg/L)	218	118	346	118	464
pH (pH)	8.35	8.30	8.36	8.27	8.38
ORP (mV)	424	466	448	502	320
Total Suspended Solids (mg/L)	7.3	5.1	7.2	3.4	<1.0
Total Dissolved Solids (mg/L)	274 DLHC	135 DLHC	412 DLHC	143 DLHC	583 DLHC
Turbidity (NTU)	2.81	1.88	1.85	1.17	1.04
Anions and Nutrients					
Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Bicarbonate (as CaCO3) (mg/L)	137	<1.0	<1.0	115	<1.0
Alkalinity, Carbonate (as CaCO3) (mg/L)	6.4	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	119	183	<1.0	239
Alkalinity, Total (as CaCO3) (mg/L)	143	119	183	115	239
Ammonia as N (mg/L)	0.0239	0.0146	0.0133	0.0193	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F) (mg/L)	0.204	0.131	0.182	0.116	0.195
Ion Balance (%)	94.3	92.0	102	94.7	99.9
Nitrate (as N) (mg/L)	4.35	0.0215 HTD	10.1 HTD	0.0437 HTD	17.9 HTD
Nitrite (as N) (mg/L)	0.0081	<0.0010 HTD	0.0123 HTD	<0.0010 HTD	0.0054 HTD
Total Kjeldahl Nitrogen (mg/L)	0.218 TKNI	0.069 TKNI	<0.050 TKNI	0.212 TKNI	<0.050 TKNI
Orthophosphate-Dissolved (as P) (mg/L)	0.0023	0.0043 RRV	0.0017	0.0045	<0.0010
Phosphorus (P)-Total (mg/L)	0.0086	0.0025 RRV	0.0057	0.0090	0.0334
Sulfate (SO4) (mg/L)	71.6	10.3	120	10.4	163
Anion Sum (meq/L)	4.68	2.60	6.88	2.52	9.45
Cation Sum (meq/L)	4.41	2.39	7.03	2.39	9.44
Cation - Anion Balance (%)	-2.9	-4.2	1.1	-2.7	0.0
Organic / Inorganic Carbon					
Dissolved Organic Carbon (mg/L)	1.66	1.88	1.36	1.66	0.87
Total Organic Carbon (mg/L)	1.55	1.83	1.33	1.54	0.94
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0724	0.0564	0.0603	0.0291	0.0171
Antimony (Sb)-Total (mg/L)	0.00017	<0.00010	0.00031	<0.00010	0.00055
Arsenic (As)-Total (mg/L)	0.00017	0.00013	0.00015	0.00011	<0.00010
Barium (Ba)-Total (mg/L)	0.0449	0.0432	0.0446	0.0307	0.0393
Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.016
Cadmium (Cd)-Total (ug/L)	0.0452	0.0159	0.128	0.0110	0.329

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2463454-6	L2463454-7	L2463454-8	L2463454-9	
	Description	WS	WS	WS	WS	
	Sampled Date	18-JUN-20	18-JUN-20	18-JUN-20	18-JUN-20	
	Sampled Time	09:00	09:00	09:00	09:00	
	Client ID	RG_RIVER_WS_2020-06-18_0900	RG_FOBCPD_WS_2020-06-18_0900	RG_FBLANK_WS_2020-06-18_0900	RG_TRIP_WS_2020-06-18_0900	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	580	578	<2.0	<2.0	
	Hardness (as CaCO3) (mg/L)	317	330	<0.50		
	pH (pH)	8.38	8.37	5.58	5.48	
	ORP (mV)	260	298	273	454	
	Total Suspended Solids (mg/L)	4.3	4.6	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	402 DLHC	430 DLHC	<10	<10	
	Turbidity (NTU)	1.45	1.74	<0.10	<0.10	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.0	1.3	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	184	185	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	184	185	<1.0	<1.0	
	Ammonia as N (mg/L)	0.0178	0.0118	0.0187 RRV	0.0504 RRV	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Fluoride (F) (mg/L)	0.185	0.198	<0.020	<0.020	
	Ion Balance (%)	93.4	97.7	0.0	0.0	
	Nitrate (as N) (mg/L)	9.79 HTD	9.57 HTD	<0.0050 HTD	<0.0050 HTD	
	Nitrite (as N) (mg/L)	0.0070 HTD	0.0077 HTD	<0.0010 HTD	<0.0010 HTD	
	Total Kjeldahl Nitrogen (mg/L)	0.254 TKNI	0.196 TKNI	<0.050	<0.050	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0016	0.0013	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0063	0.0072	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	120	119	<0.30	<0.30	
	Anion Sum (meq/L)	6.90	6.85	<0.10	<0.10	
	Cation Sum (meq/L)	6.44	6.70	<0.10	<0.10	
	Cation - Anion Balance (%)	-3.4	-1.1	0.0	0.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.18	1.37	<0.50		
	Total Organic Carbon (mg/L)	1.37	1.31	<0.50	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0374	0.0340	<0.0030	<0.0030	
	Antimony (Sb)-Total (mg/L)	0.00030	0.00028	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00011	0.00011	<0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.0433	0.0418	<0.00010	<0.00010	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.108	0.106	<0.0050	<0.0050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2463454-1 WS 17-JUN-20 15:00 RG_FOUKI_WS_2020-06-17_1500	L2463454-2 WS 17-JUN-20 13:00 RG_UFR1_WS_20 20-06-17_1300	L2463454-3 WS 17-JUN-20 13:00 RG_FOBCP_WS_2020-06-17_1300	L2463454-4 WS 17-JUN-20 09:00 RG_FO26_WS_20 20-06-17_0900	L2463454-5 WS 18-JUN-20 14:00 RG_FOBSC_WS_2020-06-18_1400
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	55.1	35.8	80.4	34.2	108
	Chromium (Cr)-Total (mg/L)	0.00022	0.00019	0.00017	0.00015	0.00016
	Cobalt (Co)-Total (ug/L)	0.12	<0.10	0.13	<0.10	0.14
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.096	0.051	0.072	0.024	0.019
	Lead (Pb)-Total (mg/L)	0.000075	0.000059	0.000069	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0119	0.0013	0.0268	0.0011	0.0453
	Magnesium (Mg)-Total (mg/L)	21.4	9.27	36.4	9.11	49.1
	Manganese (Mn)-Total (mg/L)	0.00666	0.00465	0.00747	0.00279	0.00256
	Mercury (Hg)-Total (ug/L)	0.00108	0.00131	0.00089	0.00102	0.00055
	Molybdenum (Mo)-Total (mg/L)	0.00107	0.000535	0.00188	0.000558	0.00308
	Nickel (Ni)-Total (mg/L)	0.00252	<0.00050	0.00452	<0.00050	0.00952
	Potassium (K)-Total (mg/L)	0.943	0.354	1.58	0.327	2.47
	Selenium (Se)-Total (ug/L)	16.1	0.445	43.9	0.384	70.7
	Silicon (Si)-Total (mg/L)	1.90	2.03	1.88	1.99	1.69
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.711	0.518	1.41	0.496	2.24
	Strontium (Sr)-Total (mg/L)	0.0867	0.0660	0.0975	0.0663	0.109
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000014
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00108	0.000296	0.00222	0.000315	0.00373
	Vanadium (V)-Total (mg/L)	0.00052	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0052	<0.0030	0.0094
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0030	0.0033	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00016	<0.00010	0.00029	<0.00010	0.00056
	Arsenic (As)-Dissolved (mg/L)	0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0399	0.0398	0.0444	0.0321	0.0416
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.016
	Cadmium (Cd)-Dissolved (ug/L)	0.0377	0.0069	0.108	0.0065	0.309
	Calcium (Ca)-Dissolved (mg/L)	54.7	32.3	81.4	32.7	107
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00013	<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	0.11

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2463454-6	L2463454-7	L2463454-8	L2463454-9	
Description	WS	WS	WS	WS	
Sampled Date	18-JUN-20	18-JUN-20	18-JUN-20	18-JUN-20	
Sampled Time	09:00	09:00	09:00	09:00	
Client ID	RG_RIVER_WS_2020-06-18_0900	RG_FOBCPD_WS_2020-06-18_0900	RG_FBLANK_WS_2020-06-18_0900	RG_TRIP_WS_2020-06-18_0900	
Grouping / **Analyte**					
WATER					
Total Metals					
Calcium (Ca)-Total (mg/L)	78.1	74.7	<0.050	<0.050	
Chromium (Cr)-Total (mg/L)	0.00022	0.00015	<0.00010	<0.00010	
Cobalt (Co)-Total (ug/L)	0.11	<0.10	<0.10	<0.10	
Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Iron (Fe)-Total (mg/L)	0.043	0.042	<0.010	<0.010	
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000068 RRV	<0.000050	
Lithium (Li)-Total (mg/L)	0.0248	0.0238	<0.0010	<0.0010	
Magnesium (Mg)-Total (mg/L)	33.9	33.9	<0.10	<0.10	
Manganese (Mn)-Total (mg/L)	0.00451	0.00470	<0.00010	<0.00010	
Mercury (Hg)-Total (ug/L)	0.00087	0.00090	<0.00050	<0.00050	
Molybdenum (Mo)-Total (mg/L)	0.00191	0.00182	<0.000050	<0.000050	
Nickel (Ni)-Total (mg/L)	0.00401	0.00390	<0.00050	<0.00050	
Potassium (K)-Total (mg/L)	1.50	1.48	<0.050	<0.050	
Selenium (Se)-Total (ug/L)	40.4	39.6	<0.050	<0.050	
Silicon (Si)-Total (mg/L)	1.81	1.78	<0.10	<0.10	
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)-Total (mg/L)	1.32	1.31	<0.050	<0.050	
Strontium (Sr)-Total (mg/L)	0.0951	0.0924	<0.00020	<0.00020	
Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
Uranium (U)-Total (mg/L)	0.00211	0.00212	<0.000010	<0.000010	
Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Zinc (Zn)-Total (mg/L)	0.0038	0.0044	<0.0030	<0.0030	
Dissolved Metals					
Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	
Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
Antimony (Sb)-Dissolved (mg/L)	0.00028	0.00028	<0.00010		
Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
Barium (Ba)-Dissolved (mg/L)	0.0440	0.0447	<0.00010		
Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
Cadmium (Cd)-Dissolved (ug/L)	0.0912	0.104	<0.0050		
Calcium (Ca)-Dissolved (mg/L)	73.2	75.7	<0.050	<0.050	
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2463454-1	L2463454-2	L2463454-3	L2463454-4	L2463454-5
Description	WS	WS	WS	WS	WS
Sampled Date	17-JUN-20	17-JUN-20	17-JUN-20	17-JUN-20	18-JUN-20
Sampled Time	15:00	13:00	13:00	09:00	14:00
Client ID	RG_FOUKI_WS_2020-06-17_1500	RG_UFR1_WS_2020-06-17_1300	RG_FOBCP_WS_2020-06-17_1300	RG_FO26_WS_2020-06-17_0900	RG_FOBSC_WS_2020-06-18_1400
Grouping / **Analyte**					
WATER					
Dissolved Metals Copper (Cu)-Dissolved (mg/L)	0.00028	0.00029	0.00025	<0.00020	0.00032
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0118	0.0013	0.0275	0.0013	0.0479
Magnesium (Mg)-Dissolved (mg/L)	19.7	9.05	34.7	8.82	47.7
Manganese (Mn)-Dissolved (mg/L)	0.00237	0.00024	0.00160	0.00020	0.00141
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00102	0.000601	0.00202	0.000559	0.00306
Nickel (Ni)-Dissolved (mg/L)	0.00230	<0.00050	0.00438	<0.00050	0.00950
Potassium (K)-Dissolved (mg/L)	1.00	0.369	1.72	0.339	2.71
Selenium (Se)-Dissolved (ug/L)	15.1	0.388	44.8	0.391	74.8
Silicon (Si)-Dissolved (mg/L)	1.78	2.04	1.79	1.96	1.70
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	0.726	0.542	1.54	0.523	2.43
Strontium (Sr)-Dissolved (mg/L)	0.0864	0.0669	0.0996	0.0673	0.114
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000011
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	0.00103	0.000293	0.00228	0.000329	0.00382
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0015	<0.0010	0.0041	<0.0010	0.0094

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2463454-6	L2463454-7	L2463454-8	L2463454-9	
Description	WS	WS	WS	WS	
Sampled Date	18-JUN-20	18-JUN-20	18-JUN-20	18-JUN-20	
Sampled Time	09:00	09:00	09:00	09:00	
Client ID	RG_RIVER_WS_2020-06-18_0900	RG_FOBCPD_WS_2020-06-18_0900	RG_FBLANK_WS_2020-06-18_0900	RG_TRIP_WS_2020-06-18_0900	
Grouping / **Analyte**					
WATER					
Dissolved Metals					
Copper (Cu)-Dissolved (mg/L)	0.00021	0.00025	<0.00020		
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
Lithium (Li)-Dissolved (mg/L)	0.0238	0.0248	<0.0010		
Magnesium (Mg)-Dissolved (mg/L)	32.7	34.2	<0.10	<0.0050	
Manganese (Mn)-Dissolved (mg/L)	0.00144	0.00144	<0.00010		
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
Molybdenum (Mo)-Dissolved (mg/L)	0.00188	0.00192	<0.000050		
Nickel (Ni)-Dissolved (mg/L)	0.00386	0.00400	<0.00050		
Potassium (K)-Dissolved (mg/L)	1.60	1.67	<0.050	<0.050	
Selenium (Se)-Dissolved (ug/L)	41.1	42.4	<0.050		
Silicon (Si)-Dissolved (mg/L)	1.74	1.80	<0.050		
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
Sodium (Na)-Dissolved (mg/L)	1.39	1.44	<0.050	<0.050	
Strontium (Sr)-Dissolved (mg/L)	0.0960	0.0958	<0.00020		
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
Uranium (U)-Dissolved (mg/L)	0.00227	0.00219	<0.000010		
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
Zinc (Zn)-Dissolved (mg/L)	0.0033	0.0035	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Copper (Cu)-Total	B	L2463454-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2463454-8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2463454-8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2463454-8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2463454-8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2463454-8
Matrix Spike	Barium (Ba)-Total	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L2463454-8
Matrix Spike	Calcium (Ca)-Total	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2463454-8
Matrix Spike	Copper (Cu)-Total	MS-B	L2463454-8
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2463454-8
Matrix Spike	Sodium (Na)-Total	MS-B	L2463454-8
Matrix Spike	Strontium (Sr)-Total	MS-B	L2463454-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2463454-8

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon

Reference Information

and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

Reference Information

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

FRO LAEMP 20-09

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5128580								
WG3347790-11 LCS								
Acidity (as CaCO3)			105.9		%		85-115	21-JUN-20
WG3347790-8 LCS								
Acidity (as CaCO3)			98.7		%		85-115	21-JUN-20
WG3347790-10 MB								
Acidity (as CaCO3)			1.3		mg/L		2	21-JUN-20
WG3347790-7 MB								
Acidity (as CaCO3)			1.8		mg/L		2	21-JUN-20
ALK-MAN-CL	**Water**							
Batch R5127876								
WG3347484-17 LCS								
Alkalinity, Total (as CaCO3)			101.5		%		85-115	21-JUN-20
WG3347484-16 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-JUN-20
BE-D-L-CCMS-VA	**Water**							
Batch R5133746								
WG3347290-3 DUP		**L2463454-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	26-JUN-20
WG3347290-2 LCS								
Beryllium (Be)-Dissolved			92.3		%		80-120	26-JUN-20
WG3347290-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	26-JUN-20
WG3347290-4 MS		**L2463454-2**						
Beryllium (Be)-Dissolved			97.1		%		70-130	26-JUN-20
BE-T-L-CCMS-VA	**Water**							
Batch R5131551								
WG3347438-2 LCS								
Beryllium (Be)-Total			93.8		%		80-120	24-JUN-20
WG3347438-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	24-JUN-20
BR-L-IC-N-CL	**Water**							
Batch R5128877								
WG3347960-10 LCS								
Bromide (Br)			99.1		%		85-115	22-JUN-20
WG3347960-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	22-JUN-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5135315								
WG3351691-10 LCS								
Dissolved Organic Carbon			88.9		%		80-120	27-JUN-20
WG3351691-6 LCS								
Dissolved Organic Carbon			88.3		%		80-120	27-JUN-20
WG3351691-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	27-JUN-20
WG3351691-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	27-JUN-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5135315								
WG3351691-10 LCS								
Total Organic Carbon			88.2		%		80-120	27-JUN-20
WG3351691-6 LCS								
Total Organic Carbon			91.9		%		80-120	27-JUN-20
WG3351691-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	27-JUN-20
WG3351691-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	27-JUN-20
CL-IC-N-CL	**Water**							
Batch R5128877								
WG3347960-10 LCS								
Chloride (Cl)			102.4		%		90-110	22-JUN-20
WG3347960-9 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUN-20
EC-L-PCT-CL	**Water**							
Batch R5127876								
WG3347484-17 LCS								
Conductivity (@ 25C)			98.6		%		90-110	21-JUN-20
WG3347484-16 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	21-JUN-20
F-IC-N-CL	**Water**							
Batch R5128877								
WG3347960-10 LCS								
Fluoride (F)			99.2		%		90-110	22-JUN-20
WG3347960-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	22-JUN-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5131746								
WG3349555-7 DUP		**L2463454-8**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	25-JUN-20
WG3349555-2 LCS								
Mercury (Hg)-Dissolved			100.0		%		80-120	25-JUN-20
WG3349555-6 LCS								
Mercury (Hg)-Dissolved			100.3		%		80-120	25-JUN-20
WG3349555-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	25-JUN-20
WG3349555-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	25-JUN-20
HG-T-U-CVAF-VA	**Water**							
Batch R5127462								
WG3347246-2 LCS								
Mercury (Hg)-Total			96.8		%		80-120	22-JUN-20
WG3347246-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	22-JUN-20
MET-D-CCMS-CL	**Water**							
Batch R5131409								
WG3349219-7 DUP		**L2463454-9**						
Calcium (Ca)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-JUN-20
Magnesium (Mg)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	24-JUN-20
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-JUN-20
Sodium (Na)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-JUN-20
WG3349219-6 LCS		**TMRM**						
Calcium (Ca)-Dissolved			105.9		%		80-120	24-JUN-20
Magnesium (Mg)-Dissolved			95.4		%		80-120	24-JUN-20
Potassium (K)-Dissolved			95.7		%		80-120	24-JUN-20
Sodium (Na)-Dissolved			89.7		%		80-120	24-JUN-20
WG3349219-5 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	24-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-JUN-20
WG3349219-8 MS		**L2463454-9**						
Calcium (Ca)-Dissolved			94.2		%		70-130	24-JUN-20
Magnesium (Mg)-Dissolved			93.6		%		70-130	24-JUN-20
Potassium (K)-Dissolved			100.1		%		70-130	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5131409								
WG3349219-8 MS		**L2463454-9**						
Sodium (Na)-Dissolved			93.9		%		70-130	24-JUN-20
MET-D-CCMS-VA	**Water**							
Batch R5133746								
WG3347290-3 DUP		**L2463454-1**						
Aluminum (Al)-Dissolved		0.0030	<0.0030	RPD-NA	mg/L	N/A	20	26-JUN-20
Antimony (Sb)-Dissolved		0.00016	0.00016		mg/L	1.5	20	26-JUN-20
Arsenic (As)-Dissolved		0.00010	0.00011		mg/L	8.6	20	26-JUN-20
Barium (Ba)-Dissolved		0.0399	0.0419		mg/L	5.0	20	26-JUN-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	26-JUN-20
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	26-JUN-20
Cadmium (Cd)-Dissolved		0.0000377	0.0000344		mg/L	9.2	20	26-JUN-20
Calcium (Ca)-Dissolved		54.7	52.0		mg/L	5.1	20	26-JUN-20
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-JUN-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-JUN-20
Copper (Cu)-Dissolved		0.00028	0.00030		mg/L	7.7	20	26-JUN-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	26-JUN-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	26-JUN-20
Lithium (Li)-Dissolved		0.0118	0.0116		mg/L	2.3	20	26-JUN-20
Magnesium (Mg)-Dissolved		19.7	19.9		mg/L	1.1	20	26-JUN-20
Manganese (Mn)-Dissolved		0.00237	0.00244		mg/L	2.8	20	26-JUN-20
Molybdenum (Mo)-Dissolved		0.00102	0.00100		mg/L	1.8	20	26-JUN-20
Nickel (Ni)-Dissolved		0.00230	0.00240		mg/L	4.5	20	26-JUN-20
Potassium (K)-Dissolved		1.00	1.02		mg/L	1.9	20	26-JUN-20
Selenium (Se)-Dissolved		0.0151	0.0152		mg/L	0.7	20	26-JUN-20
Silicon (Si)-Dissolved		1.78	1.69		mg/L	5.1	20	26-JUN-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-JUN-20
Sodium (Na)-Dissolved		0.726	0.739		mg/L	1.8	20	26-JUN-20
Strontium (Sr)-Dissolved		0.0864	0.0863		mg/L	0.1	20	26-JUN-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	26-JUN-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	26-JUN-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	26-JUN-20
Uranium (U)-Dissolved		0.00103	0.00105		mg/L	1.7	20	26-JUN-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5133746								
WG3347290-3 DUP		**L2463454-1**						
Zinc (Zn)-Dissolved		0.0015	0.0016		mg/L	11	20	26-JUN-20
WG3347290-2 LCS								
Aluminum (Al)-Dissolved			100.1		%		80-120	26-JUN-20
Antimony (Sb)-Dissolved			98.6		%		80-120	26-JUN-20
Arsenic (As)-Dissolved			98.7		%		80-120	26-JUN-20
Barium (Ba)-Dissolved			104.7		%		80-120	26-JUN-20
Bismuth (Bi)-Dissolved			98.9		%		80-120	26-JUN-20
Boron (B)-Dissolved			96.4		%		80-120	26-JUN-20
Cadmium (Cd)-Dissolved			100.4		%		80-120	26-JUN-20
Calcium (Ca)-Dissolved			99.9		%		80-120	26-JUN-20
Chromium (Cr)-Dissolved			97.1		%		80-120	26-JUN-20
Cobalt (Co)-Dissolved			98.8		%		80-120	26-JUN-20
Copper (Cu)-Dissolved			100.2		%		80-120	26-JUN-20
Iron (Fe)-Dissolved			99.2		%		80-120	26-JUN-20
Lead (Pb)-Dissolved			99.9		%		80-120	26-JUN-20
Lithium (Li)-Dissolved			98.7		%		80-120	26-JUN-20
Magnesium (Mg)-Dissolved			99.9		%		80-120	26-JUN-20
Manganese (Mn)-Dissolved			97.7		%		80-120	26-JUN-20
Molybdenum (Mo)-Dissolved			99.6		%		80-120	26-JUN-20
Nickel (Ni)-Dissolved			99.6		%		80-120	26-JUN-20
Potassium (K)-Dissolved			107.0		%		80-120	26-JUN-20
Selenium (Se)-Dissolved			96.2		%		80-120	26-JUN-20
Silicon (Si)-Dissolved			101.7		%		60-140	26-JUN-20
Silver (Ag)-Dissolved			100.5		%		80-120	26-JUN-20
Sodium (Na)-Dissolved			101.9		%		80-120	26-JUN-20
Strontium (Sr)-Dissolved			103.3		%		80-120	26-JUN-20
Thallium (Tl)-Dissolved			101.9		%		80-120	26-JUN-20
Tin (Sn)-Dissolved			97.9		%		80-120	26-JUN-20
Titanium (Ti)-Dissolved			99.6		%		80-120	26-JUN-20
Uranium (U)-Dissolved			95.9		%		80-120	26-JUN-20
Vanadium (V)-Dissolved			101.6		%		80-120	26-JUN-20
Zinc (Zn)-Dissolved			100.1		%		80-120	26-JUN-20
WG3347290-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5133746								
WG3347290-1 MB		**NP**						
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	26-JUN-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	26-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	26-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	26-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	26-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	26-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	26-JUN-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	26-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
WG3347290-4 MS		**L2463454-2**						
Aluminum (Al)-Dissolved			101.1		%		70-130	26-JUN-20
Antimony (Sb)-Dissolved			103.5		%		70-130	26-JUN-20
Arsenic (As)-Dissolved			100.3		%		70-130	26-JUN-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	26-JUN-20
Bismuth (Bi)-Dissolved			93.5		%		70-130	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5133746								
WG3347290-4 MS		**L2463454-2**						
Boron (B)-Dissolved			101.5		%		70-130	26-JUN-20
Cadmium (Cd)-Dissolved			100.2		%		70-130	26-JUN-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	26-JUN-20
Chromium (Cr)-Dissolved			98.0		%		70-130	26-JUN-20
Cobalt (Co)-Dissolved			98.4		%		70-130	26-JUN-20
Copper (Cu)-Dissolved			96.6		%		70-130	26-JUN-20
Iron (Fe)-Dissolved			99.1		%		70-130	26-JUN-20
Lead (Pb)-Dissolved			98.5		%		70-130	26-JUN-20
Lithium (Li)-Dissolved			104.5		%		70-130	26-JUN-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	26-JUN-20
Manganese (Mn)-Dissolved			95.8		%		70-130	26-JUN-20
Molybdenum (Mo)-Dissolved			98.6		%		70-130	26-JUN-20
Nickel (Ni)-Dissolved			98.1		%		70-130	26-JUN-20
Potassium (K)-Dissolved			107.3		%		70-130	26-JUN-20
Selenium (Se)-Dissolved			101.4		%		70-130	26-JUN-20
Silicon (Si)-Dissolved			94.4		%		70-130	26-JUN-20
Silver (Ag)-Dissolved			100.6		%		70-130	26-JUN-20
Sodium (Na)-Dissolved			102.5		%		70-130	26-JUN-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	26-JUN-20
Thallium (Tl)-Dissolved			100.7		%		70-130	26-JUN-20
Tin (Sn)-Dissolved			99.8		%		70-130	26-JUN-20
Titanium (Ti)-Dissolved			104.6		%		70-130	26-JUN-20
Uranium (U)-Dissolved			96.3		%		70-130	26-JUN-20
Vanadium (V)-Dissolved			102.2		%		70-130	26-JUN-20
Zinc (Zn)-Dissolved			101.4		%		70-130	26-JUN-20
Batch R5134736								
WG3350946-2 LCS								
Aluminum (Al)-Dissolved			98.3		%		80-120	26-JUN-20
Antimony (Sb)-Dissolved			93.3		%		80-120	26-JUN-20
Arsenic (As)-Dissolved			97.5		%		80-120	26-JUN-20
Barium (Ba)-Dissolved			101.8		%		80-120	26-JUN-20
Bismuth (Bi)-Dissolved			105.2		%		80-120	26-JUN-20
Boron (B)-Dissolved			95.1		%		80-120	26-JUN-20
Cadmium (Cd)-Dissolved			96.8		%		80-120	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5134736								
WG3350946-2 LCS								
Calcium (Ca)-Dissolved			96.5		%		80-120	26-JUN-20
Chromium (Cr)-Dissolved			95.5		%		80-120	26-JUN-20
Cobalt (Co)-Dissolved			96.2		%		80-120	26-JUN-20
Copper (Cu)-Dissolved			95.6		%		80-120	26-JUN-20
Iron (Fe)-Dissolved			94.5		%		80-120	26-JUN-20
Lead (Pb)-Dissolved			97.9		%		80-120	26-JUN-20
Lithium (Li)-Dissolved			93.6		%		80-120	26-JUN-20
Magnesium (Mg)-Dissolved			98.3		%		80-120	26-JUN-20
Manganese (Mn)-Dissolved			98.9		%		80-120	26-JUN-20
Molybdenum (Mo)-Dissolved			98.9		%		80-120	26-JUN-20
Nickel (Ni)-Dissolved			96.0		%		80-120	26-JUN-20
Potassium (K)-Dissolved			96.5		%		80-120	26-JUN-20
Selenium (Se)-Dissolved			102.1		%		80-120	26-JUN-20
Silicon (Si)-Dissolved			101.9		%		60-140	26-JUN-20
Silver (Ag)-Dissolved			99.5		%		80-120	26-JUN-20
Sodium (Na)-Dissolved			101.9		%		80-120	26-JUN-20
Strontium (Sr)-Dissolved			99.4		%		80-120	26-JUN-20
Thallium (Tl)-Dissolved			99.0		%		80-120	26-JUN-20
Tin (Sn)-Dissolved			99.9		%		80-120	26-JUN-20
Titanium (Ti)-Dissolved			94.7		%		80-120	26-JUN-20
Uranium (U)-Dissolved			97.9		%		80-120	26-JUN-20
Vanadium (V)-Dissolved			97.8		%		80-120	26-JUN-20
Zinc (Zn)-Dissolved			97.4		%		80-120	26-JUN-20
WG3350946-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	26-JUN-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	26-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5134736								
WG3350946-1 MB		**NP**						
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	26-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	26-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	26-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	26-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	26-JUN-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	26-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3347438-2 LCS								
Aluminum (Al)-Total			99.8		%		80-120	24-JUN-20
Antimony (Sb)-Total			111.9		%		80-120	24-JUN-20
Arsenic (As)-Total			96.7		%		80-120	24-JUN-20
Barium (Ba)-Total			96.3		%		80-120	24-JUN-20
Bismuth (Bi)-Total			103.5		%		80-120	24-JUN-20
Boron (B)-Total			89.2		%		80-120	24-JUN-20
Cadmium (Cd)-Total			97.2		%		80-120	24-JUN-20
Calcium (Ca)-Total			94.1		%		80-120	24-JUN-20
Chromium (Cr)-Total			98.7		%		80-120	24-JUN-20
Cobalt (Co)-Total			97.4		%		80-120	24-JUN-20
Copper (Cu)-Total			94.4		%		80-120	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3347438-2 LCS								
Iron (Fe)-Total			94.6		%		80-120	24-JUN-20
Lead (Pb)-Total			94.2		%		80-120	24-JUN-20
Lithium (Li)-Total			92.8		%		80-120	24-JUN-20
Magnesium (Mg)-Total			99.7		%		80-120	24-JUN-20
Manganese (Mn)-Total			102.9		%		80-120	24-JUN-20
Molybdenum (Mo)-Total			93.2		%		80-120	24-JUN-20
Nickel (Ni)-Total			97.7		%		80-120	24-JUN-20
Potassium (K)-Total			100.5		%		80-120	24-JUN-20
Selenium (Se)-Total			92.4		%		80-120	24-JUN-20
Silicon (Si)-Total			98.8		%		80-120	24-JUN-20
Silver (Ag)-Total			96.6		%		80-120	24-JUN-20
Sodium (Na)-Total			97.9		%		80-120	24-JUN-20
Strontium (Sr)-Total			90.4		%		80-120	24-JUN-20
Thallium (Tl)-Total			93.0		%		80-120	24-JUN-20
Tin (Sn)-Total			98.2		%		80-120	24-JUN-20
Titanium (Ti)-Total			93.3		%		80-120	24-JUN-20
Uranium (U)-Total			91.2		%		80-120	24-JUN-20
Vanadium (V)-Total			98.3		%		80-120	24-JUN-20
Zinc (Zn)-Total			92.8		%		80-120	24-JUN-20
WG3347438-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	24-JUN-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Boron (B)-Total			<0.010		mg/L		0.01	24-JUN-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	24-JUN-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUN-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Copper (Cu)-Total			0.00073	B	mg/L		0.0005	24-JUN-20
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUN-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3347438-1 MB								
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUN-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUN-20
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUN-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Silicon (Si)-Total			<0.10		mg/L		0.1	24-JUN-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	24-JUN-20
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUN-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	24-JUN-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-JUN-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-JUN-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-JUN-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-JUN-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUN-20
Batch R5132037								
WG3349565-2 LCS								
Aluminum (Al)-Total			98.3		%		80-120	25-JUN-20
Antimony (Sb)-Total			107.0		%		80-120	25-JUN-20
Arsenic (As)-Total			97.3		%		80-120	25-JUN-20
Barium (Ba)-Total			100.4		%		80-120	25-JUN-20
Bismuth (Bi)-Total			97.4		%		80-120	25-JUN-20
Boron (B)-Total			101.8		%		80-120	25-JUN-20
Cadmium (Cd)-Total			97.1		%		80-120	25-JUN-20
Calcium (Ca)-Total			104.7		%		80-120	25-JUN-20
Chromium (Cr)-Total			98.0		%		80-120	25-JUN-20
Cobalt (Co)-Total			97.0		%		80-120	25-JUN-20
Copper (Cu)-Total			97.1		%		80-120	25-JUN-20
Iron (Fe)-Total			103.7		%		80-120	25-JUN-20
Lead (Pb)-Total			100.8		%		80-120	25-JUN-20
Lithium (Li)-Total			103.0		%		80-120	25-JUN-20
Magnesium (Mg)-Total			99.9		%		80-120	25-JUN-20
Manganese (Mn)-Total			99.6		%		80-120	25-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5132037								
WG3349565-2 LCS								
Molybdenum (Mo)-Total			105.0		%		80-120	25-JUN-20
Nickel (Ni)-Total			95.4		%		80-120	25-JUN-20
Potassium (K)-Total			95.3		%		80-120	25-JUN-20
Selenium (Se)-Total			97.1		%		80-120	25-JUN-20
Silicon (Si)-Total			100.9		%		80-120	25-JUN-20
Silver (Ag)-Total			101.5		%		80-120	25-JUN-20
Sodium (Na)-Total			102.8		%		80-120	25-JUN-20
Strontium (Sr)-Total			106.8		%		80-120	25-JUN-20
Thallium (Tl)-Total			98.5		%		80-120	25-JUN-20
Tin (Sn)-Total			98.1		%		80-120	25-JUN-20
Titanium (Ti)-Total			99.98		%		80-120	25-JUN-20
Uranium (U)-Total			109.3		%		80-120	25-JUN-20
Vanadium (V)-Total			98.9		%		80-120	25-JUN-20
Zinc (Zn)-Total			96.2		%		80-120	25-JUN-20
WG3349565-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	25-JUN-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	25-JUN-20
Boron (B)-Total			<0.010		mg/L		0.01	25-JUN-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	25-JUN-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	25-JUN-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	25-JUN-20
Iron (Fe)-Total			<0.010		mg/L		0.01	25-JUN-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	25-JUN-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	25-JUN-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	25-JUN-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	25-JUN-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	25-JUN-20
Potassium (K)-Total			<0.050		mg/L		0.05	25-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5132037								
WG3349565-1 MB								
Selenium (Se)-Total			<0.000050		mg/L		0.00005	25-JUN-20
Silicon (Si)-Total			<0.10		mg/L		0.1	25-JUN-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	25-JUN-20
Sodium (Na)-Total			<0.050		mg/L		0.05	25-JUN-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	25-JUN-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	25-JUN-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	25-JUN-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	25-JUN-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	25-JUN-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	25-JUN-20
NH3-L-F-CL	**Water**							
Batch R5133849								
WG3350243-55 DUP		**L2463454-2**						
Ammonia as N		0.0146	0.0154		mg/L	5.3	20	25-JUN-20
WG3350243-54 LCS								
Ammonia as N			111.2		%		85-115	25-JUN-20
WG3350243-58 LCS								
Ammonia as N			107.2		%		85-115	25-JUN-20
WG3350243-53 MB								
Ammonia as N			<0.0050		mg/L		0.005	25-JUN-20
WG3350243-57 MB								
Ammonia as N			<0.0050		mg/L		0.005	25-JUN-20
WG3350243-56 MS		**L2463454-2**						
Ammonia as N			121.9		%		75-125	25-JUN-20
NO2-L-IC-N-CL	**Water**							
Batch R5128877								
WG3347960-10 LCS								
Nitrite (as N)			102.3		%		90-110	22-JUN-20
WG3347960-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	22-JUN-20
NO3-L-IC-N-CL	**Water**							
Batch R5128877								
WG3347960-10 LCS								
Nitrate (as N)			102.6		%		90-110	22-JUN-20
WG3347960-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	22-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5134706								
WG3351121-3 CRM		**CL-ORP**						
ORP			226		mV		210-230	26-JUN-20
P-T-L-COL-CL	**Water**							
Batch R5132093								
WG3349944-10 LCS								
Phosphorus (P)-Total			93.6		%		80-120	25-JUN-20
WG3349944-14 LCS								
Phosphorus (P)-Total			92.6		%		80-120	25-JUN-20
WG3349944-13 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	25-JUN-20
WG3349944-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	25-JUN-20
PH-CL	**Water**							
Batch R5127876								
WG3347484-17 LCS								
pH			6.99		pH		6.9-7.1	21-JUN-20
PO4-DO-L-COL-CL	**Water**							
Batch R5126394								
WG3346133-28 LCS								
Orthophosphate-Dissolved (as P)			102.3		%		80-120	19-JUN-20
WG3346133-7 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	19-JUN-20
SO4-IC-N-CL	**Water**							
Batch R5128877								
WG3347960-10 LCS								
Sulfate (SO4)			108.3		%		90-110	22-JUN-20
WG3347960-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUN-20
SOLIDS-TDS-CL	**Water**							
Batch R5132417								
WG3348705-14 LCS								
Total Dissolved Solids			97.5		%		85-115	24-JUN-20
WG3348705-13 MB								
Total Dissolved Solids			<10		mg/L		10	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5134916								
WG3349649-9 DUP		**L2463454-7**						
Total Dissolved Solids		430	415		mg/L	3.4	20	25-JUN-20
WG3349649-5 LCS								
Total Dissolved Solids			101.6		%		85-115	25-JUN-20
WG3349649-8 LCS								
Total Dissolved Solids			98.2		%		85-115	25-JUN-20
WG3349649-4 MB								
Total Dissolved Solids			<10		mg/L		10	25-JUN-20
WG3349649-7 MB								
Total Dissolved Solids			<10		mg/L		10	25-JUN-20
TKN-L-F-CL	**Water**							
Batch R5132677								
WG3350385-10 LCS								
Total Kjeldahl Nitrogen			88.1		%		75-125	25-JUN-20
WG3350385-12 LCS								
Total Kjeldahl Nitrogen			84.8		%		75-125	25-JUN-20
WG3350385-14 LCS								
Total Kjeldahl Nitrogen			85.3		%		75-125	25-JUN-20
WG3350385-16 LCS								
Total Kjeldahl Nitrogen			90.6		%		75-125	25-JUN-20
WG3350385-2 LCS								
Total Kjeldahl Nitrogen			91.4		%		75-125	25-JUN-20
WG3350385-4 LCS								
Total Kjeldahl Nitrogen			89.6		%		75-125	25-JUN-20
WG3350385-6 LCS								
Total Kjeldahl Nitrogen			89.6		%		75-125	25-JUN-20
WG3350385-8 LCS								
Total Kjeldahl Nitrogen			89.9		%		75-125	25-JUN-20
WG3350385-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-5 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5132677								
WG3350385-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
WG3350385-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-JUN-20
TSS-L-CL	**Water**							
Batch R5132283								
WG3348295-10 LCS								
Total Suspended Solids			104.7		%		85-115	24-JUN-20
WG3348295-9 MB								
Total Suspended Solids			<1.0		mg/L		1	24-JUN-20
Batch R5134840								
WG3349651-4 LCS								
Total Suspended Solids			105.7		%		85-115	25-JUN-20
WG3349651-3 MB								
Total Suspended Solids			<1.0		mg/L		1	25-JUN-20
TURBIDITY-CL	**Water**							
Batch R5126643								
WG3346594-21 DUP		**L2463454-9**						
Turbidity		<0.10	<0.10	RPD-NA	NTU	N/A	15	20-JUN-20
WG3346594-17 LCS								
Turbidity			99.5		%		85-115	20-JUN-20
WG3346594-20 LCS								
Turbidity			97.0		%		85-115	20-JUN-20
WG3346594-16 MB								
Turbidity			<0.10		NTU		0.1	20-JUN-20
WG3346594-19 MB								
Turbidity			<0.10		NTU		0.1	20-JUN-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	17-JUN-20 15:00	26-JUN-20 08:30	0.25	210	hours	EHTR-FM
	2	17-JUN-20 13:00	26-JUN-20 08:30	0.25	211	hours	EHTR-FM
	3	17-JUN-20 13:00	26-JUN-20 08:30	0.25	211	hours	EHTR-FM
	4	17-JUN-20 09:00	26-JUN-20 08:30	0.25	216	hours	EHTR-FM
	5	18-JUN-20 14:00	26-JUN-20 08:30	0.25	186	hours	EHTR-FM
	6	18-JUN-20 09:00	26-JUN-20 08:30	0.25	192	hours	EHTR-FM
	7	18-JUN-20 09:00	26-JUN-20 08:30	0.25	192	hours	EHTR-FM
	8	18-JUN-20 09:00	26-JUN-20 08:30	0.25	192	hours	EHTR-FM
	9	18-JUN-20 09:00	26-JUN-20 08:30	0.25	192	hours	EHTR-FM
pH							
	1	17-JUN-20 15:00	21-JUN-20 14:00	0.25	95	hours	EHTR-FM
	2	17-JUN-20 13:00	21-JUN-20 14:00	0.25	97	hours	EHTR-FM
	3	17-JUN-20 13:00	21-JUN-20 14:00	0.25	97	hours	EHTR-FM
	4	17-JUN-20 09:00	21-JUN-20 14:00	0.25	101	hours	EHTR-FM
	5	18-JUN-20 14:00	21-JUN-20 14:00	0.25	72	hours	EHTR-FM
	6	18-JUN-20 09:00	21-JUN-20 14:00	0.25	77	hours	EHTR-FM
	7	18-JUN-20 09:00	21-JUN-20 14:00	0.25	77	hours	EHTR-FM
	8	18-JUN-20 09:00	21-JUN-20 14:00	0.25	77	hours	EHTR-FM
	9	18-JUN-20 09:00	21-JUN-20 14:00	0.25	77	hours	EHTR-FM
Anions and Nutrients							
Nitrate in Water by IC (Low Level)							
	2	17-JUN-20 13:00	22-JUN-20 08:01	3	5	days	EHT
	3	17-JUN-20 13:00	22-JUN-20 08:01	3	5	days	EHT
	4	17-JUN-20 09:00	22-JUN-20 08:01	3	5	days	EHT
	5	18-JUN-20 14:00	22-JUN-20 08:01	3	4	days	EHT
	6	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
	7	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
	8	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
	9	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
Nitrite in Water by IC (Low Level)							
	2	17-JUN-20 13:00	22-JUN-20 08:01	3	5	days	EHT
	3	17-JUN-20 13:00	22-JUN-20 08:01	3	5	days	EHT
	4	17-JUN-20 09:00	22-JUN-20 08:01	3	5	days	EHT
	5	18-JUN-20 14:00	22-JUN-20 08:01	3	4	days	EHT
	6	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
	7	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
	8	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT
	9	18-JUN-20 09:00	22-JUN-20 08:01	3	4	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2463454 were received on 19-JUN-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

Quality Control Report

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP 20-09**

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY INFO

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jtipp@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
jpchinuri@minnow.ca	x	x	x

L2463454-COFC

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FOUK1_WS_2020-06-17_1500	RG_FOUK1	WS	No	6/17/2020	15:00	G	7	X	X	X	X	X	X	X
RG_UFR1_WS_2020-06-17_1300	RG_UFR1	WS	No	6/17/2020	13:00	G	7	X	X	X	X	X	X	X
RG_FOBCP_WS_2020-06-17_1300	RG_FOBCP	WS	No	6/17/2020	13:00	G	7	X	X	X	X	X	X	X
RG_FO26_WS_2020-06-17_0900	RG_FO26	WS	No	6/17/2020	9:00	G	7	X	X	X	X	X	X	X
RG_FOBSC_WS_2020-06-18_1400	RG_FOBSC	WS	No	6/18/2020	14:00	G	7	X	X	X	X	X	X	X
RG_RIVER_WS_2020-06-18_0900	RG_RIVER	WS	No	6/18/2020	9:00	G	7	X	X	X	X	X	X	X
RG_FOBCPD_WS_2020-06-18_0900	RG_FOBCPD	WS	No	6/18/2020	9:00	G	7	X	X	X	X	X	X	X
RG_FBLANK_WS_2020-06-18_0900	RG_FBLANK	WS	No	6/18/2020	9:00	G	7	X	X	X	X	X	X	X
RG_TRIP_WS_2020-06-18_0900	RG_TRIP	WS	No	6/18/2020	9:00	G	4	X		X	X		X	

PO: 689999				100 - 6/19/20

NB OF BOTTLES RETURNED/DESCRIPTION					
Regular (default)	x	Sampler's Name	Peter Schnurr	Mobile #	647-967-9403
Priority (2-3 business days) - 50% surcharge		Sampler's Signature	PS	Date/Time	June 18, 2020
Emergency (1 Business Day) - 100% surcharge					
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

L2463454-COFC

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 20-JUN-20
Report Date: 04-JUL-20 11:41 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2463657

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2463657-1	L2463657-2	L2463657-3	L2463657-4	L2463657-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	18-JUN-20	18-JUN-20	19-JUN-20	19-JUN-20	19-JUN-20
	Sampled Time	15:00	13:00	13:00	09:00	14:00
	Client ID	RG_FRCP1SW_WS_2020-06-18_0830	RG_FRCP1SWD_WS_2020-06-18_1200	RG_FODPO_WS_2020-06-19_1200	RG_FO22_WS_2020-06-19_0830	RG_FRUPO_WS_2020-06-19_0900
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	600	614	620	614	648
	Hardness (as CaCO3) (mg/L)	331	309	327	322	343
	pH (pH)	8.43	8.43	8.39	8.42	8.42
	ORP (mV)	483	508	290	257	456
	Total Suspended Solids (mg/L)	5.0	6.1	9.4	12.9	5.9
	Total Dissolved Solids (mg/L)	391 DLHC	428 DLHC	494 DLHC	439 DLHC	499 DLHC
	Turbidity (NTU)	1.99	2.12	3.74	3.76	2.61
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.4	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	160	<1.0	<1.0	164	170
	Alkalinity, Carbonate (as CaCO3) (mg/L)	11.2	<1.0	<1.0	11.4	12.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	184	179	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	171	184	179	175	182
	Ammonia as N (mg/L)	0.0250	0.0238	0.0275	0.0298	0.0147
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	0.52	0.59
	Fluoride (F) (mg/L)	0.149	0.142	0.142	0.138	0.136
	Ion Balance (%)	102	88.2	92.1	92.4	92.9
	Nitrate (as N) (mg/L)	9.75	10.7	10.8	10.8	12.5
	Nitrite (as N) (mg/L)	0.0060	0.0070	0.0062	0.0044	0.0051
	Total Kjeldahl Nitrogen (mg/L)	<0.25 TKNI	<0.25 TKNI	<0.050 TKNI	<0.25 TKNI	<0.050 TKNI
	Orthophosphate-Dissolved (as P) (mg/L)	0.0013	0.0010	0.0014	0.0014	0.0011
	Phosphorus (P)-Total (mg/L)	0.0104	0.0085	0.0145	0.0192	0.0096
	Sulfate (SO4) (mg/L)	119	128	136	133	141
	Anion Sum (meq/L)	6.59	7.12	7.19	7.07	7.49
	Cation Sum (meq/L)	6.71	6.28	6.62	6.53	6.95
	Cation - Anion Balance (%)	0.9	-6.3	-4.1	-4.0	-3.7
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.73	1.61	1.53	1.66	0.58
	Total Organic Carbon (mg/L)	1.89	1.80	1.74	2.29	0.89
Total Metals	Aluminum (Al)-Total (mg/L)	0.0564	0.0590	0.0679	0.125	0.0872
	Antimony (Sb)-Total (mg/L)	0.00029	0.00027	0.00022	0.00022	0.00022
	Arsenic (As)-Total (mg/L)	0.00011	0.00012	0.00012	0.00014	0.00015
	Barium (Ba)-Total (mg/L)	0.0405	0.0495	0.0469	0.0492	0.0501
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.107	0.0994	0.0800	0.0946	0.0918

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2463657-6	L2463657-7	L2463657-8	L2463657-9	
	Description	WS	WS	WS	WS	
	Sampled Date	19-JUN-20	19-JUN-20	19-JUN-20	19-JUN-20	
	Sampled Time	09:00	09:00	09:00	09:00	
	Client ID	RG_RIVER_WS_2020-06-19_1130	RG_FOUEW_WS_2020-06-19_1130	RG_FBLANK_WS_2020-06-18_1130	RG_TRIP_WS_2020-06-18_1130	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	569	569	<2.0	<2.0	
	Hardness (as CaCO3) (mg/L)	303	301	<0.50	<0.50	
	pH (pH)	8.42	8.42	5.48	5.45	
	ORP (mV)	305	326	375	310	
	Total Suspended Solids (mg/L)	10.7	8.9	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	435 DLHC	406 DLHC	<10	<10	
	Turbidity (NTU)	3.76	3.20	<0.10	<0.10	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.2	1.3	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	167	171	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	167	171	<1.0	<1.0	
	Ammonia as N (mg/L)	0.0316	0.0194	0.0127 RRV	0.0877 RRV	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Fluoride (F) (mg/L)	0.135	0.135	<0.020	<0.020	
	Ion Balance (%)	95.0	93.3	0.0	0.0	
	Nitrate (as N) (mg/L)	9.29	9.34	<0.0050	<0.0050	
	Nitrite (as N) (mg/L)	0.0055	0.0041	<0.0010 HTD	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.25 TKNI	<0.050	<0.050	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0016	0.0014	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0150	0.0114	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	117	118	<0.30	<0.30	
	Anion Sum (meq/L)	6.46	6.55	<0.10	<0.10	
	Cation Sum (meq/L)	6.14	6.11	<0.10	<0.10	
	Cation - Anion Balance (%)	-2.6	-3.4	0.0	0.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	2.04	1.67	<0.50		
	Total Organic Carbon (mg/L)	1.88	1.58	<0.50	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.127	0.106	<0.0030	<0.0030	
	Antimony (Sb)-Total (mg/L)	0.00020	0.00020	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	0.00015	0.00015	<0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.0594	0.0564	<0.00010	<0.00010	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.0703	0.0638	<0.0050	<0.0050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2463657-1 WS 18-JUN-20 15:00 RG_FRCP1SW_WS_2020-06-18_0830	L2463657-2 WS 18-JUN-20 13:00 RG_FRCP1SWD_WS_2020-06-18_1200	L2463657-3 WS 19-JUN-20 13:00 RG_FODPO_WS_2020-06-19_1200	L2463657-4 WS 19-JUN-20 09:00 RG_FO22_WS_2020-06-19_0830	L2463657-5 WS 19-JUN-20 14:00 RG_FRUPO_WS_2020-06-19_0900
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	76.3	79.7	77.6	77.8	82.9
	Chromium (Cr)-Total (mg/L)	0.00016	0.00018	0.00021	0.00028	0.00025
	Cobalt (Co)-Total (ug/L)	0.11	0.11	0.12	0.15	0.11
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.069	0.068	0.083	0.157	0.102
	Lead (Pb)-Total (mg/L)	0.000066	0.000066	0.000089	0.000130	0.000092
	Lithium (Li)-Total (mg/L)	0.0246	0.0254	0.0219	0.0221	0.0244
	Magnesium (Mg)-Total (mg/L)	32.3	35.6	35.0	34.2	38.3
	Manganese (Mn)-Total (mg/L)	0.00540	0.00580	0.00760	0.00954	0.00697
	Mercury (Hg)-Total (ug/L)	0.00113	0.00121	0.00124	0.00167	0.00100
	Molybdenum (Mo)-Total (mg/L)	0.00184	0.00180	0.00138	0.00142	0.00144
	Nickel (Ni)-Total (mg/L)	0.00394	0.00373	0.00287	0.00282	0.00281
	Potassium (K)-Total (mg/L)	1.40	1.54	1.38	1.37	1.52
	Selenium (Se)-Total (ug/L)	42.3	43.4	42.4	43.1	47.2
	Silicon (Si)-Total (mg/L)	1.78	1.77	1.76	1.89	1.80
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.28	1.37	1.29	1.32	1.45
	Strontium (Sr)-Total (mg/L)	0.0936	0.0951	0.0930	0.0956	0.0988
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00211	0.00215	0.00199	0.00204	0.00212
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	0.00068	0.00052
	Zinc (Zn)-Total (mg/L)	0.0039	0.0036	0.0030	0.0036	0.0034
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	0.0040	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00032	0.00029	0.00023	0.00024	0.00024
	Arsenic (As)-Dissolved (mg/L)	0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0411	0.0441	0.0480	0.0487	0.0517
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.0978	0.0854	0.0575	0.0635	0.0724
	Calcium (Ca)-Dissolved (mg/L)	78.0	69.1	74.6	74.4	78.2
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2463657-6	L2463657-7	L2463657-8	L2463657-9	
	Description	WS	WS	WS	WS	
	Sampled Date	19-JUN-20	19-JUN-20	19-JUN-20	19-JUN-20	
	Sampled Time	09:00	09:00	09:00	09:00	
	Client ID	RG_RIVER_WS_2020-06-19_1130	RG_FOUEW_WS_2020-06-19_1130	RG_FBLANK_WS_2020-06-18_1130	RG_TRIP_WS_2020-06-18_1130	
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	74.7	73.5	<0.050	<0.050	
	Chromium (Cr)-Total (mg/L)	0.00026	0.00027	<0.00010	<0.00010	
	Cobalt (Co)-Total (ug/L)	0.12	0.12	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	0.144	0.118	<0.010	<0.010	
	Lead (Pb)-Total (mg/L)	0.000123	0.000102	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0204	0.0204	<0.0010	<0.0010	
	Magnesium (Mg)-Total (mg/L)	32.9	32.7	<0.10	<0.10	
	Manganese (Mn)-Total (mg/L)	0.00882	0.00765	<0.00010	<0.00010	
	Mercury (Hg)-Total (ug/L)	0.00145	0.00130	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.00128	0.00126	<0.000050	<0.000050	
	Nickel (Ni)-Total (mg/L)	0.00243	0.00237	<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)	1.28	1.26	<0.050	<0.050	
	Selenium (Se)-Total (ug/L)	36.7	36.4	<0.050	<0.050	
	Silicon (Si)-Total (mg/L)	1.93	1.99	<0.10	<0.10	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	1.27	1.25	<0.050	<0.050	
	Strontium (Sr)-Total (mg/L)	0.0923	0.0919	<0.00020	<0.00020	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00181	0.00180	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	0.00061	0.00058	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	0.0031	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00021	0.00020	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0517	0.0560	<0.00010		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	0.0555	0.0486	<0.0050		
	Calcium (Ca)-Dissolved (mg/L)	70.3	69.7	<0.050	<0.050	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2463657-1	L2463657-2	L2463657-3	L2463657-4	L2463657-5
Description	WS	WS	WS	WS	WS
Sampled Date	18-JUN-20	18-JUN-20	19-JUN-20	19-JUN-20	19-JUN-20
Sampled Time	15:00	13:00	13:00	09:00	14:00
Client ID	RG_FRCP1SW_WS_2020-06-18_0830	RG_FRCP1SWD_WS_2020-06-18_1200	RG_FODPO_WS_2020-06-19_1200	RG_FO22_WS_2020-06-19_0830	RG_FRUPO_WS_2020-06-19_0900
Grouping **Analyte**					
WATER					
Dissolved Metals Copper (Cu)-Dissolved (mg/L)	0.00023	0.00027	<0.00020	0.00020	0.00021
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0258	0.0229	0.0221	0.0217	0.0220
Magnesium (Mg)-Dissolved (mg/L)	33.0	33.1	34.0	33.1	35.9
Manganese (Mn)-Dissolved (mg/L)	0.00142	0.00157	0.00119	0.00234	0.00114
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00188	0.00168	0.00150	0.00145	0.00148
Nickel (Ni)-Dissolved (mg/L)	0.00374	0.00344	0.00257	0.00251	0.00253
Potassium (K)-Dissolved (mg/L)	1.53	1.53	1.44	1.40	1.49
Selenium (Se)-Dissolved (ug/L)	41.9	44.2	45.9	43.8	51.4
Silicon (Si)-Dissolved (mg/L)	1.73	1.60	1.69	1.63	1.62
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	1.41	1.43	1.40	1.42	1.52
Strontium (Sr)-Dissolved (mg/L)	0.0995	0.0885	0.0969	0.0990	0.101
Thallium (Tl)-Dissolved (mg/L)	0.000011	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	0.00250	0.00217	0.00228	0.00222	0.00239
Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Zinc (Zn)-Dissolved (mg/L)	0.0031	0.0030	0.0022	0.0024	0.0025

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2463657-6	L2463657-7	L2463657-8	L2463657-9	
	Description	WS	WS	WS	WS	
	Sampled Date	19-JUN-20	19-JUN-20	19-JUN-20	19-JUN-20	
	Sampled Time	09:00	09:00	09:00	09:00	
	Client ID	RG_RIVER_WS_2020-06-19_1130	RG_FOUEW_WS_2020-06-19_1130	RG_FBLANK_WS_2020-06-18_1130	RG_TRIP_WS_2020-06-18_1130	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0186	0.0180	<0.0010		
	Magnesium (Mg)-Dissolved (mg/L)	30.9	30.9	<0.10	<0.0050	
	Manganese (Mn)-Dissolved (mg/L)	0.00191	0.00178	<0.00010		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00135	0.00132	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	0.00212	0.00204	<0.00050		
	Potassium (K)-Dissolved (mg/L)	1.27	1.24	<0.050	<0.050	
	Selenium (Se)-Dissolved (ug/L)	40.3	39.6	<0.050		
	Silicon (Si)-Dissolved (mg/L)	1.70	1.72	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	1.36	1.35	<0.050	<0.050	
	Strontium (Sr)-Dissolved (mg/L)	0.0949	0.0956	<0.00020		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00198	0.00201	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0020	0.0016	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Lithium (Li)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Total	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Selenium (Se)-Total	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2463657-1, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

Reference Information

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5132986								
WG3350566-2 LCS								
Acidity (as CaCO3)			106.0		%		85-115	25-JUN-20
WG3350566-1 MB								
Acidity (as CaCO3)			1.3		mg/L		2	25-JUN-20
ALK-MAN-CL	**Water**							
Batch R5131703								
WG3349635-11 LCS								
Alkalinity, Total (as CaCO3)			98.7		%		85-115	24-JUN-20
WG3349635-8 LCS								
Alkalinity, Total (as CaCO3)			100.5		%		85-115	24-JUN-20
WG3349635-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	24-JUN-20
WG3349635-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	24-JUN-20
BE-D-L-CCMS-VA	**Water**							
Batch R5134137								
WG3348583-2 LCS								
Beryllium (Be)-Dissolved			100.6		%		80-120	25-JUN-20
WG3348583-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	25-JUN-20
BE-T-L-CCMS-VA	**Water**							
Batch R5131551								
WG3348533-3 DUP		**L2463657-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	24-JUN-20
WG3348533-2 LCS								
Beryllium (Be)-Total			96.4		%		80-120	24-JUN-20
WG3348533-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	24-JUN-20
WG3348533-4 MS		**L2463657-2**						
Beryllium (Be)-Total			95.3		%		70-130	24-JUN-20
BR-L-IC-N-CL	**Water**							
Batch R5129763								
WG3348142-14 LCS								
Bromide (Br)			109.5		%		85-115	20-JUN-20
WG3348142-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	20-JUN-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5138756								
WG3353094-2 LCS								
Dissolved Organic Carbon			89.0		%		80-120	29-JUN-20
WG3353094-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-JUN-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5138756								
WG3353094-2 LCS								
Total Organic Carbon			91.1		%		80-120	29-JUN-20
WG3353094-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	29-JUN-20
CL-IC-N-CL	**Water**							
Batch R5129763								
WG3348142-14 LCS								
Chloride (Cl)			105.6		%		90-110	20-JUN-20
WG3348142-13 MB								
Chloride (Cl)			<0.50		mg/L		0.5	20-JUN-20
EC-L-PCT-CL	**Water**							
Batch R5131703								
WG3349635-11 LCS								
Conductivity (@ 25C)			97.5		%		90-110	24-JUN-20
WG3349635-8 LCS								
Conductivity (@ 25C)			95.4		%		90-110	24-JUN-20
WG3349635-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	24-JUN-20
WG3349635-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	24-JUN-20
F-IC-N-CL	**Water**							
Batch R5129763								
WG3348142-14 LCS								
Fluoride (F)			97.8		%		90-110	20-JUN-20
WG3348142-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-JUN-20
HG-D-CVAA-VA	**Water**							
Batch R5135011								
WG3351348-2 LCS								
Mercury (Hg)-Dissolved			98.5		%		80-120	27-JUN-20
WG3351348-1 MB		**NP**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5135011								
WG3351348-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	27-JUN-20
HG-T-U-CVAF-VA	**Water**							
Batch R5132705								
WG3350416-2 LCS								
Mercury (Hg)-Total			106.8		%		80-120	25-JUN-20
WG3350416-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	25-JUN-20
WG3350416-4 MS		**L2463657-8**						
Mercury (Hg)-Total			107.1		%		70-130	25-JUN-20
MET-D-CCMS-CL	**Water**							
Batch R5134710								
WG3351096-16 LCS		**TMRM**						
Calcium (Ca)-Dissolved			102.6		%		80-120	26-JUN-20
Magnesium (Mg)-Dissolved			112.2		%		80-120	26-JUN-20
Potassium (K)-Dissolved			105.6		%		80-120	26-JUN-20
Sodium (Na)-Dissolved			105.7		%		80-120	26-JUN-20
WG3351096-15 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	26-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
MET-D-CCMS-VA	**Water**							
Batch R5134137								
WG3348583-2 LCS								
Aluminum (Al)-Dissolved			109.9		%		80-120	25-JUN-20
Antimony (Sb)-Dissolved			106.7		%		80-120	25-JUN-20
Arsenic (As)-Dissolved			101.1		%		80-120	25-JUN-20
Barium (Ba)-Dissolved			104.9		%		80-120	25-JUN-20
Bismuth (Bi)-Dissolved			103.0		%		80-120	25-JUN-20
Boron (B)-Dissolved			96.7		%		80-120	25-JUN-20
Cadmium (Cd)-Dissolved			102.7		%		80-120	25-JUN-20
Calcium (Ca)-Dissolved			97.6		%		80-120	25-JUN-20
Chromium (Cr)-Dissolved			104.1		%		80-120	25-JUN-20
Cobalt (Co)-Dissolved			102.4		%		80-120	25-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5134137								
WG3348583-2 LCS								
Copper (Cu)-Dissolved			101.5		%		80-120	25-JUN-20
Iron (Fe)-Dissolved			107.0		%		80-120	25-JUN-20
Lead (Pb)-Dissolved			100.0		%		80-120	25-JUN-20
Lithium (Li)-Dissolved			104.7		%		80-120	25-JUN-20
Magnesium (Mg)-Dissolved			104.0		%		80-120	25-JUN-20
Manganese (Mn)-Dissolved			103.1		%		80-120	25-JUN-20
Molybdenum (Mo)-Dissolved			97.0		%		80-120	25-JUN-20
Nickel (Ni)-Dissolved			101.1		%		80-120	25-JUN-20
Potassium (K)-Dissolved			105.5		%		80-120	25-JUN-20
Selenium (Se)-Dissolved			99.7		%		80-120	25-JUN-20
Silicon (Si)-Dissolved			101.5		%		60-140	25-JUN-20
Silver (Ag)-Dissolved			106.8		%		80-120	25-JUN-20
Sodium (Na)-Dissolved			110.9		%		80-120	25-JUN-20
Strontium (Sr)-Dissolved			99.0		%		80-120	25-JUN-20
Thallium (Tl)-Dissolved			104.4		%		80-120	25-JUN-20
Tin (Sn)-Dissolved			106.2		%		80-120	25-JUN-20
Titanium (Ti)-Dissolved			101.9		%		80-120	25-JUN-20
Uranium (U)-Dissolved			101.6		%		80-120	25-JUN-20
Vanadium (V)-Dissolved			106.2		%		80-120	25-JUN-20
Zinc (Zn)-Dissolved			99.6		%		80-120	25-JUN-20
WG3348583-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	25-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	25-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	25-JUN-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	25-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	25-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	25-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	25-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	25-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5134137								
WG3348583-1 MB		**NP**						
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	25-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	25-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	25-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	25-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	25-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	25-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	25-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	25-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	25-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	25-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	25-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	25-JUN-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	25-JUN-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	25-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	25-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	25-JUN-20
Batch R5134736								
WG3351069-2 LCS								
Aluminum (Al)-Dissolved			96.5		%		80-120	26-JUN-20
Antimony (Sb)-Dissolved			91.9		%		80-120	26-JUN-20
Arsenic (As)-Dissolved			90.8		%		80-120	26-JUN-20
Barium (Ba)-Dissolved			93.3		%		80-120	26-JUN-20
Bismuth (Bi)-Dissolved			94.5		%		80-120	26-JUN-20
Boron (B)-Dissolved			91.8		%		80-120	26-JUN-20
Cadmium (Cd)-Dissolved			95.8		%		80-120	26-JUN-20
Calcium (Ca)-Dissolved			95.1		%		80-120	26-JUN-20
Chromium (Cr)-Dissolved			89.2		%		80-120	26-JUN-20
Cobalt (Co)-Dissolved			91.0		%		80-120	26-JUN-20
Copper (Cu)-Dissolved			91.8		%		80-120	26-JUN-20
Iron (Fe)-Dissolved			87.6		%		80-120	26-JUN-20
Lead (Pb)-Dissolved			92.3		%		80-120	26-JUN-20
Lithium (Li)-Dissolved			93.2		%		80-120	26-JUN-20
Magnesium (Mg)-Dissolved			95.4		%		80-120	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch	**R5134736**							
WG3351069-2	**LCS**							
Manganese (Mn)-Dissolved			88.7		%		80-120	26-JUN-20
Molybdenum (Mo)-Dissolved			97.9		%		80-120	26-JUN-20
Nickel (Ni)-Dissolved			91.3		%		80-120	26-JUN-20
Potassium (K)-Dissolved			93.9		%		80-120	26-JUN-20
Selenium (Se)-Dissolved			97.8		%		80-120	26-JUN-20
Silicon (Si)-Dissolved			97.9		%		60-140	26-JUN-20
Silver (Ag)-Dissolved			100.2		%		80-120	26-JUN-20
Sodium (Na)-Dissolved			98.0		%		80-120	26-JUN-20
Strontium (Sr)-Dissolved			96.9		%		80-120	26-JUN-20
Thallium (Tl)-Dissolved			94.3		%		80-120	26-JUN-20
Tin (Sn)-Dissolved			95.9		%		80-120	26-JUN-20
Titanium (Ti)-Dissolved			88.0		%		80-120	26-JUN-20
Uranium (U)-Dissolved			87.6		%		80-120	26-JUN-20
Vanadium (V)-Dissolved			94.2		%		80-120	26-JUN-20
Zinc (Zn)-Dissolved			94.4		%		80-120	26-JUN-20
WG3351069-1	**MB**	**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	26-JUN-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	26-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	26-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	26-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	26-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5134736								
WG3351069-1 MB		**NP**						
Potassium (K)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	26-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	26-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	26-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	26-JUN-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	26-JUN-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	26-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	26-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-JUN-20
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3348533-3 DUP		**L2463657-1**						
Aluminum (Al)-Total		0.0564	0.0496		mg/L	13	20	24-JUN-20
Antimony (Sb)-Total		0.00029	0.00026		mg/L	8.2	20	24-JUN-20
Arsenic (As)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	24-JUN-20
Barium (Ba)-Total		0.0405	0.0415		mg/L	2.6	20	24-JUN-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-JUN-20
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-JUN-20
Cadmium (Cd)-Total		0.000107	0.000106		mg/L	1.2	20	24-JUN-20
Calcium (Ca)-Total		76.3	69.5		mg/L	9.4	20	24-JUN-20
Chromium (Cr)-Total		0.00016	0.00017		mg/L	9.8	20	24-JUN-20
Cobalt (Co)-Total		0.00011	0.00010		mg/L	3.9	20	24-JUN-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-JUN-20
Iron (Fe)-Total		0.069	0.058		mg/L	18	20	24-JUN-20
Lead (Pb)-Total		0.000066	0.000058		mg/L	13	20	24-JUN-20
Lithium (Li)-Total		0.0246	0.0221		mg/L	10	20	24-JUN-20
Magnesium (Mg)-Total		32.3	32.6		mg/L	0.8	20	24-JUN-20
Manganese (Mn)-Total		0.00540	0.00534		mg/L	1.2	20	24-JUN-20
Molybdenum (Mo)-Total		0.00184	0.00164		mg/L	12	20	24-JUN-20
Nickel (Ni)-Total		0.00394	0.00377		mg/L	4.6	20	24-JUN-20
Potassium (K)-Total		1.40	1.43		mg/L	1.7	20	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3348533-3 DUP		**L2463657-1**						
Selenium (Se)-Total		0.0423	0.0398		mg/L	6.2	20	24-JUN-20
Silicon (Si)-Total		1.78	1.66		mg/L	7.2	20	24-JUN-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-JUN-20
Sodium (Na)-Total		1.28	1.27		mg/L	0.0	20	24-JUN-20
Strontium (Sr)-Total		0.0936	0.0841		mg/L	11	20	24-JUN-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-JUN-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-JUN-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-JUN-20
Uranium (U)-Total		0.00211	0.00200		mg/L	5.0	20	24-JUN-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-JUN-20
Zinc (Zn)-Total		0.0039	0.0038		mg/L	2.5	20	24-JUN-20
WG3348533-2 LCS								
Aluminum (Al)-Total			106.1		%		80-120	24-JUN-20
Antimony (Sb)-Total			111.5		%		80-120	24-JUN-20
Arsenic (As)-Total			99.3		%		80-120	24-JUN-20
Barium (Ba)-Total			103.4		%		80-120	24-JUN-20
Bismuth (Bi)-Total			104.9		%		80-120	24-JUN-20
Boron (B)-Total			92.8		%		80-120	24-JUN-20
Cadmium (Cd)-Total			100.2		%		80-120	24-JUN-20
Calcium (Ca)-Total			97.2		%		80-120	24-JUN-20
Chromium (Cr)-Total			99.0		%		80-120	24-JUN-20
Cobalt (Co)-Total			101.5		%		80-120	24-JUN-20
Copper (Cu)-Total			98.7		%		80-120	24-JUN-20
Iron (Fe)-Total			97.9		%		80-120	24-JUN-20
Lead (Pb)-Total			97.9		%		80-120	24-JUN-20
Lithium (Li)-Total			96.6		%		80-120	24-JUN-20
Magnesium (Mg)-Total			102.1		%		80-120	24-JUN-20
Manganese (Mn)-Total			101.9		%		80-120	24-JUN-20
Molybdenum (Mo)-Total			96.5		%		80-120	24-JUN-20
Nickel (Ni)-Total			99.4		%		80-120	24-JUN-20
Potassium (K)-Total			101.0		%		80-120	24-JUN-20
Selenium (Se)-Total			98.7		%		80-120	24-JUN-20
Silicon (Si)-Total			101.9		%		80-120	24-JUN-20
Silver (Ag)-Total			97.4		%		80-120	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3348533-2 LCS								
Sodium (Na)-Total			100.4		%		80-120	24-JUN-20
Strontium (Sr)-Total			92.8		%		80-120	24-JUN-20
Thallium (Tl)-Total			99.8		%		80-120	24-JUN-20
Tin (Sn)-Total			100.5		%		80-120	24-JUN-20
Titanium (Ti)-Total			93.6		%		80-120	24-JUN-20
Uranium (U)-Total			93.0		%		80-120	24-JUN-20
Vanadium (V)-Total			102.4		%		80-120	24-JUN-20
Zinc (Zn)-Total			100.8		%		80-120	24-JUN-20
WG3348533-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	24-JUN-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Boron (B)-Total			<0.010		mg/L		0.01	24-JUN-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	24-JUN-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-JUN-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-JUN-20
Iron (Fe)-Total			<0.010		mg/L		0.01	24-JUN-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-JUN-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-JUN-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-JUN-20
Potassium (K)-Total			<0.050		mg/L		0.05	24-JUN-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-JUN-20
Silicon (Si)-Total			<0.10		mg/L		0.1	24-JUN-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	24-JUN-20
Sodium (Na)-Total			<0.050		mg/L		0.05	24-JUN-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	24-JUN-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3348533-1 MB								
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-JUN-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-JUN-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-JUN-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-JUN-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-JUN-20
WG3348533-4 MS		**L2463657-2**						
Aluminum (Al)-Total			91.3		%		70-130	24-JUN-20
Antimony (Sb)-Total			98.1		%		70-130	24-JUN-20
Arsenic (As)-Total			96.3		%		70-130	24-JUN-20
Barium (Ba)-Total			N/A	MS-B	%		-	24-JUN-20
Bismuth (Bi)-Total			87.8		%		70-130	24-JUN-20
Boron (B)-Total			97.4		%		70-130	24-JUN-20
Cadmium (Cd)-Total			97.1		%		70-130	24-JUN-20
Calcium (Ca)-Total			N/A	MS-B	%		-	24-JUN-20
Chromium (Cr)-Total			94.7		%		70-130	24-JUN-20
Cobalt (Co)-Total			92.7		%		70-130	24-JUN-20
Copper (Cu)-Total			90.2		%		70-130	24-JUN-20
Iron (Fe)-Total			94.7		%		70-130	24-JUN-20
Lead (Pb)-Total			89.5		%		70-130	24-JUN-20
Lithium (Li)-Total			101.2		%		70-130	24-JUN-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	24-JUN-20
Manganese (Mn)-Total			91.9		%		70-130	24-JUN-20
Molybdenum (Mo)-Total			96.7		%		70-130	24-JUN-20
Nickel (Ni)-Total			91.1		%		70-130	24-JUN-20
Potassium (K)-Total			94.8		%		70-130	24-JUN-20
Selenium (Se)-Total			N/A	MS-B	%		-	24-JUN-20
Silicon (Si)-Total			91.3		%		70-130	24-JUN-20
Silver (Ag)-Total			95.0		%		70-130	24-JUN-20
Sodium (Na)-Total			91.2		%		70-130	24-JUN-20
Strontium (Sr)-Total			N/A	MS-B	%		-	24-JUN-20
Thallium (Tl)-Total			87.5		%		70-130	24-JUN-20
Tin (Sn)-Total			98.2		%		70-130	24-JUN-20
Titanium (Ti)-Total			92.1		%		70-130	24-JUN-20
Uranium (U)-Total			90.0		%		70-130	24-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5131551								
WG3348533-4 MS		**L2463657-2**						
Vanadium (V)-Total			98.1		%		70-130	24-JUN-20
Zinc (Zn)-Total			90.6		%		70-130	24-JUN-20
NH3-L-F-CL	**Water**							
Batch R5134606								
WG3350831-19 DUP		**L2463657-6**						
Ammonia as N		0.0316	0.0348		mg/L	9.6	20	26-JUN-20
WG3350831-14 LCS								
Ammonia as N			109.1		%		85-115	26-JUN-20
WG3350831-18 LCS								
Ammonia as N			100.1		%		85-115	26-JUN-20
WG3350831-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	26-JUN-20
WG3350831-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	26-JUN-20
WG3350831-20 MS		**L2463657-6**						
Ammonia as N			113.0		%		75-125	26-JUN-20
NO2-L-IC-N-CL	**Water**							
Batch R5129763								
WG3348142-14 LCS								
Nitrite (as N)			108.3		%		90-110	20-JUN-20
WG3348142-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	20-JUN-20
NO3-L-IC-N-CL	**Water**							
Batch R5129763								
WG3348142-14 LCS								
Nitrate (as N)			105.0		%		90-110	20-JUN-20
WG3348142-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	20-JUN-20
ORP-CL	**Water**							
Batch R5135891								
WG3352319-18 CRM		**CL-ORP**						
ORP			227		mV		210-230	29-JUN-20
P-T-L-COL-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-CL	**Water**							
Batch R5133396								
WG3350660-6 LCS								
Phosphorus (P)-Total			89.5		%		80-120	26-JUN-20
WG3350660-5 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	26-JUN-20
PH-CL	**Water**							
Batch R5131703								
WG3349635-11 LCS								
pH			6.99		pH		6.9-7.1	24-JUN-20
WG3349635-8 LCS								
pH			6.99		pH		6.9-7.1	24-JUN-20
PO4-DO-L-COL-CL	**Water**							
Batch R5126881								
WG3346591-3 DUP		**L2463657-9**						
Orthophosphate-Dissolved (as P)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	20-JUN-20
WG3346591-2 LCS								
Orthophosphate-Dissolved (as P)			97.6		%		80-120	20-JUN-20
WG3346591-1 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	20-JUN-20
WG3346591-4 MS		**L2463657-9**						
Orthophosphate-Dissolved (as P)			105.6		%		70-130	20-JUN-20
SO4-IC-N-CL	**Water**							
Batch R5129763								
WG3348142-14 LCS								
Sulfate (SO4)			106.0		%		90-110	20-JUN-20
WG3348142-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-JUN-20
SOLIDS-TDS-CL	**Water**							
Batch R5134916								
WG3349649-17 LCS								
Total Dissolved Solids			101.4		%		85-115	25-JUN-20
WG3349649-16 MB								
Total Dissolved Solids			<10		mg/L		10	25-JUN-20
TKN-L-F-CL	**Water**							
Batch R5136101								
WG3352453-9 DUP		**L2463657-8**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	29-JUN-20
WG3352453-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5136101								
WG3352453-2 LCS								
Total Kjeldahl Nitrogen			87.8		%		75-125	29-JUN-20
WG3352453-4 LCS								
Total Kjeldahl Nitrogen			84.8		%		75-125	29-JUN-20
WG3352453-8 LCS								
Total Kjeldahl Nitrogen			89.0		%		75-125	29-JUN-20
WG3352453-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-JUN-20
WG3352453-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-JUN-20
WG3352453-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	29-JUN-20
WG3352453-10 MS		**L2463657-8**						
Total Kjeldahl Nitrogen			120.0		%		70-130	29-JUN-20
TSS-L-CL	**Water**							
Batch R5134840								
WG3349651-10 LCS								
Total Suspended Solids			91.7		%		85-115	25-JUN-20
WG3349651-8 LCS								
Total Suspended Solids			89.8		%		85-115	25-JUN-20
WG3349651-7 MB								
Total Suspended Solids			<1.0		mg/L		1	25-JUN-20
WG3349651-9 MB								
Total Suspended Solids			<1.0		mg/L		1	25-JUN-20
TURBIDITY-CL	**Water**							
Batch R5126647								
WG3346643-2 LCS								
Turbidity			100.5		%		85-115	20-JUN-20
WG3346643-5 LCS								
Turbidity			101.0		%		85-115	20-JUN-20
WG3346643-1 MB								
Turbidity			<0.10		NTU		0.1	20-JUN-20
WG3346643-4 MB								
Turbidity			<0.10		NTU		0.1	20-JUN-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	18-JUN-20 15:00	29-JUN-20 07:00	0.25	256	hours	EHTR-FM
	2	18-JUN-20 13:00	29-JUN-20 07:00	0.25	258	hours	EHTR-FM
	3	19-JUN-20 13:00	29-JUN-20 07:00	0.25	234	hours	EHTR-FM
	4	19-JUN-20 09:00	29-JUN-20 07:00	0.25	238	hours	EHTR-FM
	5	19-JUN-20 14:00	29-JUN-20 07:00	0.25	233	hours	EHTR-FM
	6	19-JUN-20 09:00	29-JUN-20 07:00	0.25	238	hours	EHTR-FM
	7	19-JUN-20 09:00	29-JUN-20 07:00	0.25	238	hours	EHTR-FM
	8	19-JUN-20 09:00	29-JUN-20 07:00	0.25	238	hours	EHTR-FM
	9	19-JUN-20 09:00	29-JUN-20 07:00	0.25	238	hours	EHTR-FM
pH							
	1	18-JUN-20 15:00	24-JUN-20 13:00	0.25	142	hours	EHTR-FM
	2	18-JUN-20 13:00	24-JUN-20 13:00	0.25	144	hours	EHTR-FM
	3	19-JUN-20 13:00	24-JUN-20 13:00	0.25	120	hours	EHTR-FM
	4	19-JUN-20 09:00	24-JUN-20 13:00	0.25	124	hours	EHTR-FM
	5	19-JUN-20 14:00	24-JUN-20 13:00	0.25	119	hours	EHTR-FM
	6	19-JUN-20 09:00	24-JUN-20 13:00	0.25	124	hours	EHTR-FM
	7	19-JUN-20 09:00	24-JUN-20 13:00	0.25	124	hours	EHTR-FM
	8	19-JUN-20 09:00	24-JUN-20 13:00	0.25	124	hours	EHTR-FM
	9	19-JUN-20 09:00	24-JUN-20 13:00	0.25	124	hours	EHTR-FM
Anions and Nutrients							
Nitrite in Water by IC (Low Level)							
	8	19-JUN-20 09:00	27-JUN-20 08:00	3	8	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2463657 were received on 20-JUN-20 10:15.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

Page 1 of 1

COC ID: **FRO LAEMP 20-09**

TURNAROUND TIME:

PROJECT/CLIENT INFO				LABORATORY			
Facility Name / Job#	REP			Lab Name	ALS Calgary		
Project Manager	Cait Good			Lab Contact	Lyudmyla Shvets		
Email	cait.good@teck.com			Email	lyudmyla.shvets@alsglobal.com		
Address	421 Pine Avenue			Address	2559 29 Street NE		
City	Sparwood	Province	BC	City	Calgary	Province	AB
Postal Code	V0B 2G0	Country	Canada	Postal Code	T1Y 7B5	Country	Canada
Phone Number	250-425-8202			Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	X	X	X
teckcoal@equisonline.com	X		
jlaga@minnow.ca	X	X	X
carlie.meyer@teck.com	X	X	X
jschnurr@minnow.ca	X		

L2463657-COFC

SAMPLE DETAILS

ANALYSIS REQUESTED

	Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	PRESERVATIVE						
									N	F	N	N	F	N	F
										H2SO4	H2SO4		HCL	HNO3	HNO3
									TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
1	RG_FRCP1SW_WS_2020-06-18_0830	RG_FRCP1SW	WS	No	6/18/2020	15:00	G	7	X	X	X	X	X	X	X
2	RG_FRCP1SWD_WS_2020-06-18_1200	RG_FRCP1SWD	WS	No	6/18/2020	13:00	G	7	X	X	X	X	X	X	X
3	RG_FODPO_WS_2020-06-19_1200	RG_FODPO	WS	No	6/19/2020	13:00	G	7	X	X	X	X	X	X	X
4	RG_FO22_WS_2020-06-19_0830	RG_FO22	WS	No	6/19/2020	9:00	G	7	X	X	X	X	X	X	X
5	RG_FRUPO_WS_2020-06-19_0900	RG_FRUPO	WS	No	6/19/2020	14:00	G	7	X	X	X	X	X	X	X
6	RG_RIVER_WS_2020-06-19_1130	RG_RIVER	WS	No	6/19/2020	9:00	G	7	X	X	X	X	X	X	X
7	RG_FOUEW_WS_2020-06-19_1130	RG_FOUEW	WS	No	6/19/2020	9:00	G	7	X	X	X	X	X	X	X
8	RG_FBLANK_WS_2020-06-18_1130	RG_FBLANK	WS	No	6/19/2020	9:00	G	7	X	X	X	X	X	X	X
4	RG_TRIP_WS_2020-06-18_1130	RG_TRIP	WS	No	6/19/2020	9:00	G	4	X		X	X		X	

6/20

10

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 24-JUN-20
Report Date: 03-JUL-20 11:15 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2465597

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2465597-1				
	Description	WS				
	Sampled Date	23-JUN-20				
	Sampled Time	09:00				
	Client ID	RG_FOUSH_WS_2020-06-23_0900				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	320				
	Hardness (as CaCO3) (mg/L)	180				
	pH (pH)	8.18				
	ORP (mV)	410				
	Total Suspended Solids (mg/L)	4.3				
	Total Dissolved Solids (mg/L)	208 DLHC				
	Turbidity (NTU)	2.28				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	118				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	118				
	Ammonia as N (mg/L)	0.0142				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.185				
	Ion Balance (%)	98.6				
	Nitrate (as N) (mg/L)	3.04				
	Nitrite (as N) (mg/L)	0.0024				
	Total Kjeldahl Nitrogen (mg/L)	0.335				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0010				
	Phosphorus (P)-Total (mg/L)	0.0041				
	Sulfate (SO4) (mg/L)	53.6				
	Anion Sum (meq/L)	3.70				
	Cation Sum (meq/L)	3.64				
	Cation - Anion Balance (%)	-0.7				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.83				
	Total Organic Carbon (mg/L)	0.80				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0306				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	0.00012				
	Barium (Ba)-Total (mg/L)	0.0318				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (ug/L)	0.0306				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2465597-1				
	Description	WS				
	Sampled Date	23-JUN-20				
	Sampled Time	09:00				
	Client ID	RG_FOUSH_WS_2020-06-23_0900				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	43.1				
	Chromium (Cr)-Total (mg/L)	0.00015				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.034				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0086				
	Magnesium (Mg)-Total (mg/L)	15.5				
	Manganese (Mn)-Total (mg/L)	0.00338				
	Mercury (Hg)-Total (ug/L)	0.00073				
	Molybdenum (Mo)-Total (mg/L)	0.000768				
	Nickel (Ni)-Total (mg/L)	0.00168				
	Potassium (K)-Total (mg/L)	0.668				
	Selenium (Se)-Total (ug/L)	11.9				
	Silicon (Si)-Total (mg/L)	1.55				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	0.539				
	Strontium (Sr)-Total (mg/L)	0.0695				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.000818				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	0.00012				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	0.0305				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (ug/L)	0.0257				
	Calcium (Ca)-Dissolved (mg/L)	46.0				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2465597-1				
	Description	WS				
	Sampled Date	23-JUN-20				
	Sampled Time	09:00				
	Client ID	RG_FOUSH_WS_2020-06-23_0900				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0084				
	Magnesium (Mg)-Dissolved (mg/L)	15.9				
	Manganese (Mn)-Dissolved (mg/L)	0.00102				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000814				
	Nickel (Ni)-Dissolved (mg/L)	0.00162				
	Potassium (K)-Dissolved (mg/L)	0.659				
	Selenium (Se)-Dissolved (ug/L)	12.6				
	Silicon (Si)-Dissolved (mg/L)	1.48				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	0.547				
	Strontium (Sr)-Dissolved (mg/L)	0.0771				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.000844				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0014				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Nitrate (as N)	MS-B	L2465597-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL	Water	Electrical Conductivity (EC)	APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

Reference Information

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA	Water	Total Mercury in Water by CVAFS (Ultra)	EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL	Water	Ammonia, Total (as N)	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions)

Reference Information

should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5135983								
WG3352322-2 LCS								
Acidity (as CaCO3)			95.9		%		85-115	28-JUN-20
WG3352322-1 MB								
Acidity (as CaCO3)			1.3		mg/L		2	28-JUN-20
ALK-MAN-CL	**Water**							
Batch R5135039								
WG3351402-14 LCS								
Alkalinity, Total (as CaCO3)			99.8		%		85-115	26-JUN-20
WG3351402-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	26-JUN-20
BE-D-L-CCMS-VA	**Water**							
Batch R5135679								
WG3351600-2 LCS								
Beryllium (Be)-Dissolved			103.0		%		80-120	28-JUN-20
WG3351600-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	28-JUN-20
BE-T-L-CCMS-VA	**Water**							
Batch R5136280								
WG3351679-2 LCS								
Beryllium (Be)-Total			96.8		%		80-120	29-JUN-20
WG3351679-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	29-JUN-20
BR-L-IC-N-CL	**Water**							
Batch R5133748								
WG3350777-7 DUP		**L2465597-1**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	25-JUN-20
WG3350777-6 LCS								
Bromide (Br)			106.7		%		85-115	25-JUN-20
WG3350777-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	25-JUN-20
WG3350777-8 MS		**L2465597-1**						
Bromide (Br)			111.3		%		75-125	25-JUN-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5139581								
WG3354044-14 LCS								
Dissolved Organic Carbon			103.2		%		80-120	30-JUN-20
WG3354044-13 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5139581								
WG3354044-13 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	30-JUN-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5139581								
WG3354044-14 LCS								
Total Organic Carbon			99.3		%		80-120	30-JUN-20
WG3354044-13 MB								
Total Organic Carbon			<0.50		mg/L		0.5	30-JUN-20
CL-IC-N-CL	**Water**							
Batch R5133748								
WG3350777-7 DUP		**L2465597-1**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	25-JUN-20
WG3350777-6 LCS								
Chloride (Cl)			98.9		%		90-110	25-JUN-20
WG3350777-5 MB								
Chloride (Cl)			<0.50		mg/L		0.5	25-JUN-20
WG3350777-8 MS		**L2465597-1**						
Chloride (Cl)			107.2		%		75-125	25-JUN-20
EC-L-PCT-CL	**Water**							
Batch R5135039								
WG3351402-14 LCS								
Conductivity (@ 25C)			101.4		%		90-110	26-JUN-20
WG3351402-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	26-JUN-20
F-IC-N-CL	**Water**							
Batch R5133748								
WG3350777-7 DUP		**L2465597-1**						
Fluoride (F)		0.185	0.184		mg/L	0.4	20	25-JUN-20
WG3350777-6 LCS								
Fluoride (F)			101.7		%		90-110	25-JUN-20
WG3350777-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	25-JUN-20
WG3350777-8 MS		**L2465597-1**						
Fluoride (F)			109.1		%		75-125	25-JUN-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5137300								
WG3352545-6 LCS								
Mercury (Hg)-Dissolved			107.6		%		80-120	30-JUN-20
WG3352545-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	30-JUN-20
HG-T-U-CVAF-VA	**Water**							
Batch R5135390								
WG3351730-2 LCS								
Mercury (Hg)-Total			96.6		%		80-120	28-JUN-20
WG3351730-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	28-JUN-20
MET-D-CCMS-VA	**Water**							
Batch R5135679								
WG3351600-2 LCS								
Aluminum (Al)-Dissolved			110.9		%		80-120	28-JUN-20
Antimony (Sb)-Dissolved			100.4		%		80-120	28-JUN-20
Arsenic (As)-Dissolved			106.5		%		80-120	28-JUN-20
Barium (Ba)-Dissolved			107.0		%		80-120	28-JUN-20
Bismuth (Bi)-Dissolved			108.0		%		80-120	28-JUN-20
Boron (B)-Dissolved			105.7		%		80-120	28-JUN-20
Cadmium (Cd)-Dissolved			105.1		%		80-120	28-JUN-20
Calcium (Ca)-Dissolved			109.0		%		80-120	28-JUN-20
Chromium (Cr)-Dissolved			106.7		%		80-120	28-JUN-20
Cobalt (Co)-Dissolved			108.1		%		80-120	28-JUN-20
Copper (Cu)-Dissolved			104.3		%		80-120	28-JUN-20
Iron (Fe)-Dissolved			103.6		%		80-120	28-JUN-20
Lead (Pb)-Dissolved			106.4		%		80-120	28-JUN-20
Lithium (Li)-Dissolved			111.4		%		80-120	28-JUN-20
Magnesium (Mg)-Dissolved			110.6		%		80-120	28-JUN-20
Manganese (Mn)-Dissolved			110.1		%		80-120	28-JUN-20
Molybdenum (Mo)-Dissolved			103.4		%		80-120	28-JUN-20
Nickel (Ni)-Dissolved			107.4		%		80-120	28-JUN-20
Potassium (K)-Dissolved			108.8		%		80-120	28-JUN-20
Selenium (Se)-Dissolved			103.1		%		80-120	28-JUN-20
Silicon (Si)-Dissolved			111.9		%		60-140	28-JUN-20
Silver (Ag)-Dissolved			101.7		%		80-120	28-JUN-20
Sodium (Na)-Dissolved			109.7		%		80-120	28-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5135679								
WG3351600-2 LCS								
Strontium (Sr)-Dissolved			106.8		%		80-120	28-JUN-20
Thallium (Tl)-Dissolved			106.6		%		80-120	28-JUN-20
Tin (Sn)-Dissolved			105.8		%		80-120	28-JUN-20
Titanium (Ti)-Dissolved			108.2		%		80-120	28-JUN-20
Uranium (U)-Dissolved			106.1		%		80-120	28-JUN-20
Vanadium (V)-Dissolved			105.8		%		80-120	28-JUN-20
Zinc (Zn)-Dissolved			107.4		%		80-120	28-JUN-20
WG3351600-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-JUN-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-JUN-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	28-JUN-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-JUN-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-JUN-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-JUN-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	28-JUN-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-JUN-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-JUN-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-JUN-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-JUN-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-JUN-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5135679								
WG3351600-1 MB		**NP**						
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-JUN-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-JUN-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-JUN-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-JUN-20
MET-T-CCMS-VA	**Water**							
Batch R5136280								
WG3351679-2 LCS								
Aluminum (Al)-Total			107.3		%		80-120	29-JUN-20
Antimony (Sb)-Total			104.0		%		80-120	29-JUN-20
Arsenic (As)-Total			100.2		%		80-120	29-JUN-20
Barium (Ba)-Total			103.5		%		80-120	29-JUN-20
Bismuth (Bi)-Total			109.3		%		80-120	29-JUN-20
Boron (B)-Total			99.96		%		80-120	29-JUN-20
Cadmium (Cd)-Total			106.4		%		80-120	29-JUN-20
Calcium (Ca)-Total			100.7		%		80-120	29-JUN-20
Chromium (Cr)-Total			101.8		%		80-120	29-JUN-20
Cobalt (Co)-Total			99.4		%		80-120	29-JUN-20
Copper (Cu)-Total			98.2		%		80-120	29-JUN-20
Iron (Fe)-Total			106.7		%		80-120	29-JUN-20
Lead (Pb)-Total			109.5		%		80-120	29-JUN-20
Lithium (Li)-Total			101.2		%		80-120	29-JUN-20
Magnesium (Mg)-Total			107.4		%		80-120	29-JUN-20
Manganese (Mn)-Total			101.8		%		80-120	29-JUN-20
Molybdenum (Mo)-Total			99.9		%		80-120	29-JUN-20
Nickel (Ni)-Total			99.5		%		80-120	29-JUN-20
Potassium (K)-Total			105.6		%		80-120	29-JUN-20
Selenium (Se)-Total			105.6		%		80-120	29-JUN-20
Silicon (Si)-Total			106.9		%		80-120	29-JUN-20
Silver (Ag)-Total			104.8		%		80-120	29-JUN-20
Sodium (Na)-Total			111.0		%		80-120	29-JUN-20
Strontium (Sr)-Total			102.0		%		80-120	29-JUN-20
Thallium (Tl)-Total			108.2		%		80-120	29-JUN-20
Tin (Sn)-Total			100.9		%		80-120	29-JUN-20
Titanium (Ti)-Total			99.0		%		80-120	29-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5136280								
WG3351679-2 LCS								
Uranium (U)-Total			95.9		%		80-120	29-JUN-20
Vanadium (V)-Total			101.9		%		80-120	29-JUN-20
Zinc (Zn)-Total			107.7		%		80-120	29-JUN-20
WG3351679-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	29-JUN-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	29-JUN-20
Boron (B)-Total			<0.010		mg/L		0.01	29-JUN-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	29-JUN-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	29-JUN-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	29-JUN-20
Iron (Fe)-Total			<0.010		mg/L		0.01	29-JUN-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	29-JUN-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	29-JUN-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	29-JUN-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	29-JUN-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	29-JUN-20
Potassium (K)-Total			<0.050		mg/L		0.05	29-JUN-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	29-JUN-20
Silicon (Si)-Total			<0.10		mg/L		0.1	29-JUN-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	29-JUN-20
Sodium (Na)-Total			<0.050		mg/L		0.05	29-JUN-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	29-JUN-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	29-JUN-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	29-JUN-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	29-JUN-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	29-JUN-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	29-JUN-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	29-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5138278								
WG3353165-10 LCS								
Ammonia as N			106.5		%		85-115	30-JUN-20
WG3353165-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	30-JUN-20
NO2-L-IC-N-CL	**Water**							
Batch R5133748								
WG3350777-7 DUP		**L2465597-1**						
Nitrite (as N)		0.0024	0.0031	J	mg/L	0.0007	0.002	25-JUN-20
WG3350777-6 LCS								
Nitrite (as N)			102.4		%		90-110	25-JUN-20
WG3350777-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	25-JUN-20
WG3350777-8 MS		**L2465597-1**						
Nitrite (as N)			111.6		%		75-125	25-JUN-20
NO3-L-IC-N-CL	**Water**							
Batch R5133748								
WG3350777-7 DUP		**L2465597-1**						
Nitrate (as N)		3.04	3.03		mg/L	0.2	20	25-JUN-20
WG3350777-6 LCS								
Nitrate (as N)			101.6		%		90-110	25-JUN-20
WG3350777-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	25-JUN-20
WG3350777-8 MS		**L2465597-1**						
Nitrate (as N)			N/A	MS-B	%		-	25-JUN-20
ORP-CL	**Water**							
Batch R5138917								
WG3353358-7 CRM		**CL-ORP**						
ORP			225		mV		210-230	30-JUN-20
P-T-L-COL-CL	**Water**							
Batch R5135813								
WG3352229-18 LCS								
Phosphorus (P)-Total			104.4		%		80-120	29-JUN-20
WG3352229-17 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	29-JUN-20
PH-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-CL	**Water**							
Batch R5135039								
WG3351402-14 LCS								
pH			6.98		pH		6.9-7.1	26-JUN-20
PO4-DO-L-COL-CL	**Water**							
Batch R5131580								
WG3349216-22 LCS								
Orthophosphate-Dissolved (as P)			106.8		%		80-120	24-JUN-20
WG3349216-21 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	24-JUN-20
SO4-IC-N-CL	**Water**							
Batch R5133748								
WG3350777-7 DUP		**L2465597-1**						
Sulfate (SO4)		53.6	53.5		mg/L	0.2	20	25-JUN-20
WG3350777-6 LCS								
Sulfate (SO4)			102.7		%		90-110	25-JUN-20
WG3350777-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	25-JUN-20
WG3350777-8 MS		**L2465597-1**						
Sulfate (SO4)			109.8		%		75-125	25-JUN-20
SOLIDS-TDS-CL	**Water**							
Batch R5136336								
WG3351667-11 LCS								
Total Dissolved Solids			102.6		%		85-115	28-JUN-20
WG3351667-10 MB								
Total Dissolved Solids			<10		mg/L		10	28-JUN-20
TKN-L-F-CL	**Water**							
Batch R5139864								
WG3354492-2 LCS								
Total Kjeldahl Nitrogen			91.1		%		75-125	02-JUL-20
WG3354492-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	02-JUL-20
TSS-L-CL	**Water**							
Batch R5136243								
WG3351668-8 LCS								
Total Suspended Solids			88.5		%		85-115	28-JUN-20
WG3351668-7 MB								
Total Suspended Solids			<1.0		mg/L		1	28-JUN-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5134437								
WG3350255-12 DUP		**L2465597-1**						
Turbidity		2.28	2.55		NTU	11	15	25-JUN-20
WG3350255-11 LCS								
Turbidity			99.5		%		85-115	25-JUN-20
WG3350255-10 MB								
Turbidity			<0.10		NTU		0.1	25-JUN-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	23-JUN-20 09:00	30-JUN-20 11:00	0.25	170	hours	EHTR-FM
pH							
	1	23-JUN-20 09:00	26-JUN-20 12:00	0.25	75	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2465597 were received on 24-JUN-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP 20-09**

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	X	X	X
teckcoal@equisonline.com			
jlng@minnow.ca	X	X	
carlie.meyer@teck.com	X	X	X
pschnarr@minnow.ca			

L2465597-COFC

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
	PRESERVATIVE							N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FOUSH_WS_2020-06-23_0900	RG_FOUSH	WS	No	6/23/2020	9:00	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

PO: 689999

RELINQUISHED BY/AFFILIATION

DATE/TIME

ACCEPTED BY/AFFILIATION

NB OF BOTTLES RETURNED/DESCRIPTION					
Regular (default) x	Sampler's Name		Peter Schnurr	Mobile #	647-967-9403
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge	Sampler's Signature	PS		Date/Time	June 23, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

L2465597-COFC

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 12-SEP-20
Report Date: 21-SEP-20 16:27 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2502320

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2502320-1 WS 10-SEP-20 08:40 RG_FOBKS_WS_LAEMP_FRO_2020-09_NP	L2502320-2 WS 10-SEP-20 08:59 RG_RIVER1_WS_LAEMP_FRO_2020-09_NP	L2502320-3 WS 10-SEP-20 09:12 RG_FBLANK1_WS_LAEMP_FRO_2020-09_NP	L2502320-4 WS 10-SEP-20 09:15 RG_TRIP1_WS_LAEMP_FRO_2020-09_NP	L2502320-5 WS 10-SEP-20 09:15 RG_FOUCL_WS_LAEMP_FRO_2020-09_NP
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	756	776	<2.0	<2.0	562
	Hardness (as CaCO3) (mg/L)	457	453	<0.50		331
	pH (pH)	8.25	8.27	4.85	4.82	8.14
	ORP (mV)	522	495	406	533	468
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	587 DLHC	581 DLHC	<10	<10	398 DLHC
	Turbidity (NTU)	0.34	0.37	<0.10	<0.10	0.28
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.5	1.5	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	193	194	<1.0	<1.0	165
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	193	194	<1.0	<1.0	165
	Ammonia as N (mg/L)	0.0055	<0.0050	0.0151 RRV	<0.0050	0.0618
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	1.11	1.12	<0.10	<0.10	0.24
	Fluoride (F) (mg/L)	0.196	0.198	<0.020	<0.020	0.189
	Ion Balance (%)	99.3	98.2	0.0	0.0	100
	Nitrate (as N) (mg/L)	12.9	12.9	<0.0050	<0.0050	5.07
	Nitrite (as N) (mg/L)	0.0060	0.0065	<0.0010	<0.0010	0.0028
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI	<0.050	<0.050	<0.050 TKNI
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	0.0016
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	216	216	<0.30	<0.30	143
	Anion Sum (meq/L)	9.31	9.34	<0.10	<0.10	6.66
	Cation Sum (meq/L)	9.25	9.17	<0.10	<0.10	6.68
	Cation - Anion Balance (%)	-0.3	-0.9	0.0	0.0	0.1
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50	<0.50		<0.50
	Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0049	0.0051	<0.0030	<0.0030	0.0063
	Antimony (Sb)-Total (mg/L)	0.00024	0.00023	<0.00010	<0.00010	0.00011
	Arsenic (As)-Total (mg/L)	0.00010	0.00011	<0.00010	<0.00010	0.00012
	Barium (Ba)-Total (mg/L)	0.0857	0.0858	<0.00010	<0.00010	0.0883
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.011	0.011	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0511	0.0437	<0.0050	<0.0050	0.0165

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502320-6	L2502320-7	L2502320-8	L2502320-9	
	Description	WS	WS	WS	WS	
	Sampled Date	10-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	
	Sampled Time	13:20	09:20	13:25	09:00	
	Client ID	RG_FOUNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUEW_WS_LAEMP_FRO_2020-09_NP	RG_FODPO_WS_LAEMP_FRO_2020-09_NP	RG_FO22_WS_LAEMP_FRO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	681	959	1010	1000	
	Hardness (as CaCO3) (mg/L)	399	586	629	629	
	pH (pH)	8.18	8.27	8.24	8.26	
	ORP (mV)	429	499	439	504	
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	492 DLHC	738 DLHC	797 DLHC	779 DLHC	
	Turbidity (NTU)	0.14	0.29	0.10	0.37	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	173	240	234	246	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	173	240	234	246	
	Ammonia as N (mg/L)	0.0100	0.0249	<0.0050	0.0053	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	0.36	1.37	1.37	1.40	
	Fluoride (F) (mg/L)	0.194	0.154	0.164	0.151	
	Ion Balance (%)	100	101	103	104	
	Nitrate (as N) (mg/L)	10.6	19.3	19.5	20.8	
	Nitrite (as N) (mg/L)	0.0072	0.0048	0.0061	0.0037	
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI	<0.25 TKNI	<0.25 TKNI	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0013	<0.0010	0.0017	0.0013	
	Phosphorus (P)-Total (mg/L)	0.0098	<0.0020	0.0035	<0.0020	
	Sulfate (SO4) (mg/L)	182	263	301	281	
	Anion Sum (meq/L)	8.04	11.7	12.4	12.3	
	Cation Sum (meq/L)	8.07	11.9	12.7	12.7	
	Cation - Anion Balance (%)	0.2	0.6	1.3	1.8	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50	<0.50	1.18	
	Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	1.07	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0031	0.0034	<0.0030	0.0049	
	Antimony (Sb)-Total (mg/L)	0.00018	<0.00010	0.00012	0.00014	
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.0892	0.100	0.0891	0.103	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	0.011	0.011	0.012	
	Cadmium (Cd)-Total (ug/L)	0.0311	0.0352	0.0406	0.0358	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2502320-1 WS 10-SEP-20 08:40 RG_FOBKS_WS_LAEMP_FRO_2020-09_NP	L2502320-2 WS 10-SEP-20 08:59 RG_RIVER1_WS_LAEMP_FRO_2020-09_NP	L2502320-3 WS 10-SEP-20 09:12 RG_FBLANK1_WS_LAEMP_FRO_2020-09_NP	L2502320-4 WS 10-SEP-20 09:15 RG_TRIP1_WS_LAEMP_FRO_2020-09_NP	L2502320-5 WS 10-SEP-20 09:15 RG_FOUCL_WS_LAEMP_FRO_2020-09_NP
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	107	109	<0.050	<0.050	84.5
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.028	0.031	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0365	0.0360	<0.0010	<0.0010	0.0101
	Magnesium (Mg)-Total (mg/L)	47.0	47.0	<0.10	<0.10	27.9
	Manganese (Mn)-Total (mg/L)	0.00974	0.00934	<0.00010	<0.00010	0.00088
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00130	0.00126	<0.000050	<0.000050	0.000717
	Nickel (Ni)-Total (mg/L)	0.00363	0.00368	<0.00050	<0.00050	0.00080
	Potassium (K)-Total (mg/L)	1.87	1.84	<0.050	<0.050	0.906
	Selenium (Se)-Total (ug/L)	47.2	48.0	<0.050	<0.050	27.3
	Silicon (Si)-Total (mg/L)	1.98	2.00	<0.10	<0.10	2.00
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.68	1.64	<0.050	<0.050	0.758
	Strontium (Sr)-Total (mg/L)	0.162	0.160	<0.00020	<0.00020	0.127
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00272	0.00276	<0.000010	<0.000010	0.00124
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00023	0.00022	<0.00010		0.00011
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0879	0.0831	<0.00010		0.0930
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	0.010	0.011	<0.010		<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.0395	0.0471	<0.0050		0.0165
	Calcium (Ca)-Dissolved (mg/L)	112	112	<0.050	<0.050	88.1
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		0.00012
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502320-6	L2502320-7	L2502320-8	L2502320-9	
	Description	WS	WS	WS	WS	
	Sampled Date	10-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	
	Sampled Time	13:20	09:20	13:25	09:00	
	Client ID	RG_FOUNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUEW_WS_LAEMP_FRO_2020-09_NP	RG_FODPO_WS_LAEMP_FRO_2020-09_NP	RG_FO22_WS_LAEMP_FRO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	97.1	129	137	139	
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00010	
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	0.017	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0341	0.0321	0.0340	0.0365	
	Magnesium (Mg)-Total (mg/L)	36.9	60.5	64.6	64.6	
	Manganese (Mn)-Total (mg/L)	0.00062	0.00403	0.00079	0.00501	
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.000973	0.000754	0.00100	0.000806	
	Nickel (Ni)-Total (mg/L)	0.00360	0.00078	0.00090	0.00074	
	Potassium (K)-Total (mg/L)	1.37	1.79	1.84	1.93	
	Selenium (Se)-Total (ug/L)	39.9	77.1	84.9	82.4	
	Silicon (Si)-Total (mg/L)	1.94	2.26	2.28	2.31	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	1.20	2.47	2.25	2.53	
	Strontium (Sr)-Total (mg/L)	0.151	0.156	0.163	0.167	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00227	0.00315	0.00336	0.00344	
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.00018	<0.00010	0.00011	0.00010	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	0.00011	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.0911	0.104	0.0973	0.109	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	0.011	0.011	0.012	
	Cadmium (Cd)-Dissolved (ug/L)	0.0303	0.0292	0.0419	0.0361	
	Calcium (Ca)-Dissolved (mg/L)	103	140	144	149	
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	0.00010	0.00010	0.00012	
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502320-1	L2502320-2	L2502320-3	L2502320-4	L2502320-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20
	Sampled Time	08:40	08:59	09:12	09:15	09:15
	Client ID	RG_FOBKS_WS_LAEMP_FRO_2020-09_NP	RG_RIVER1_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK1_WS_LAEMP_FRO_2020-09_NP	RG_TRIP1_WS_LAEMP_FRO_2020-09_NP	RG_FOUCL_WS_LAEMP_FRO_2020-09_NP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.018	0.018	<0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0381	0.0379	<0.0010		0.0103
	Magnesium (Mg)-Dissolved (mg/L)	43.0	42.0	<0.10	<0.0050	27.0
	Manganese (Mn)-Dissolved (mg/L)	0.00843	0.00839	<0.00010		0.00042
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00129	0.00126	<0.000050		0.000759
	Nickel (Ni)-Dissolved (mg/L)	0.00354	0.00343	<0.00050		0.00064
	Potassium (K)-Dissolved (mg/L)	1.83	1.80	<0.050	<0.050	0.922
	Selenium (Se)-Dissolved (ug/L)	48.4	48.4	<0.050		28.7
	Silicon (Si)-Dissolved (mg/L)	1.86	1.88	<0.050		1.86
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.64	1.63	<0.050	<0.050	0.765
	Strontium (Sr)-Dissolved (mg/L)	0.177	0.170	<0.00020		0.138
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Uranium (U)-Dissolved (mg/L)	0.00287	0.00282	<0.000010		0.00130
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0012	0.0021	<0.0010		<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2502320-6	L2502320-7	L2502320-8	L2502320-9	
	Description	WS	WS	WS	WS	
	Sampled Date	10-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	
	Sampled Time	13:20	09:20	13:25	09:00	
	Client ID	RG_FOUNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUEW_WS_LAEMP_FRO_2020-09_NP	RG_FODPO_WS_LAEMP_FRO_2020-09_NP	RG_FO22_WS_LAEMP_FRO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0357	0.0346	0.0362	0.0384	
	Magnesium (Mg)-Dissolved (mg/L)	34.5	57.3	65.4	62.4	
	Manganese (Mn)-Dissolved (mg/L)	0.00045	0.00354	0.00062	0.00415	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000968	0.000803	0.00102	0.000851	
	Nickel (Ni)-Dissolved (mg/L)	0.00347	0.00069	0.00073	0.00059	
	Potassium (K)-Dissolved (mg/L)	1.38	1.78	1.92	1.94	
	Selenium (Se)-Dissolved (ug/L)	42.5	82.0	92.9	92.0	
	Silicon (Si)-Dissolved (mg/L)	1.85	2.10	2.20	2.25	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	1.21	2.40	2.32	2.58	
	Strontium (Sr)-Dissolved (mg/L)	0.161	0.169	0.181	0.184	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00235	0.00322	0.00355	0.00344	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0012	0.0012	0.0013	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Laboratory Control Sample	Silicon (Si)-Total	MES	L2502320-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2502320-4
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2502320-4
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2502320-4
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2502320-1, -2, -3, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2502320-1, -2, -3, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2502320-1, -2, -3, -5, -6, -7, -8, -9
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2502320-1, -2, -3, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2502320-1, -2, -3, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L2502320-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2502320-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2502320-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Selenium (Se)-Total	MS-B	L2502320-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2502320-1, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The

Reference Information

carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP Sept 2020

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5224327								
WG3405383-14 LCS								
Acidity (as CaCO3)			102.6		%		85-115	15-SEP-20
WG3405383-13 MB								
Acidity (as CaCO3)			1.7		mg/L		2	15-SEP-20
ALK-MAN-CL	**Water**							
Batch R5226926								
WG3406781-11 LCS								
Alkalinity, Total (as CaCO3)			99.8		%		85-115	17-SEP-20
WG3406781-8 LCS								
Alkalinity, Total (as CaCO3)			103.4		%		85-115	17-SEP-20
WG3406781-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	17-SEP-20
WG3406781-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	17-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5230167								
WG3405987-3 DUP		**L2502320-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	18-SEP-20
WG3405987-2 LCS								
Beryllium (Be)-Dissolved			96.9		%		80-120	18-SEP-20
WG3405987-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	18-SEP-20
WG3405987-4 MS		**L2502320-2**						
Beryllium (Be)-Dissolved			92.8		%		70-130	18-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5226940								
WG3405859-3 DUP		**L2502320-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	17-SEP-20
WG3405859-2 LCS								
Beryllium (Be)-Total			99.7		%		80-120	17-SEP-20
WG3405859-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	17-SEP-20
WG3405859-4 MS		**L2502320-2**						
Beryllium (Be)-Total			90.9		%		70-130	17-SEP-20
BR-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Bromide (Br)			101.3		%		85-115	12-SEP-20
WG3404056-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	12-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5224784								
WG3405706-19 DUP		**L2502320-5**						
Dissolved Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	15-SEP-20
WG3405706-18 LCS								
Dissolved Organic Carbon			91.3		%		80-120	15-SEP-20
WG3405706-17 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	15-SEP-20
WG3405706-20 MS		**L2502320-5**						
Dissolved Organic Carbon			87.4		%		70-130	15-SEP-20
Batch R5225783								
WG3406453-2 LCS								
Dissolved Organic Carbon			107.5		%		80-120	16-SEP-20
WG3406453-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	16-SEP-20
Batch R5231414								
WG3408400-2 LCS								
Dissolved Organic Carbon			104.8		%		80-120	19-SEP-20
WG3408400-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5224784								
WG3405706-19 DUP		**L2502320-5**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	15-SEP-20
WG3405706-18 LCS								
Total Organic Carbon			93.8		%		80-120	15-SEP-20
WG3405706-17 MB								
Total Organic Carbon			<0.50		mg/L		0.5	15-SEP-20
WG3405706-20 MS		**L2502320-5**						
Total Organic Carbon			91.5		%		70-130	15-SEP-20
Batch R5225783								
WG3406453-2 LCS								
Total Organic Carbon			110.1		%		80-120	16-SEP-20
WG3406453-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5225783								
WG3406453-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	16-SEP-20
Batch R5231414								
WG3408400-2 LCS								
Total Organic Carbon			107.9		%		80-120	19-SEP-20
WG3408400-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	19-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Chloride (Cl)			101.1		%		85-115	12-SEP-20
WG3404056-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	12-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5226926								
WG3406781-11 LCS								
Conductivity (@ 25C)			95.1		%		90-110	17-SEP-20
WG3406781-8 LCS								
Conductivity (@ 25C)			94.8		%		90-110	17-SEP-20
WG3406781-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	17-SEP-20
WG3406781-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	17-SEP-20
F-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Fluoride (F)			102.4		%		90-110	12-SEP-20
WG3404056-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	12-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5228437								
WG3407162-2 LCS								
Mercury (Hg)-Dissolved			97.4		%		80-120	18-SEP-20
WG3407162-6 LCS								
Mercury (Hg)-Dissolved			97.2		%		80-120	18-SEP-20
WG3407162-1 MB		**NP**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5228437								
WG3407162-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	18-SEP-20
WG3407162-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	18-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5226825								
WG3406751-5 DUP		**L2502320-3**						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	17-SEP-20
WG3406751-2 LCS								
Mercury (Hg)-Total			91.8		%		80-120	17-SEP-20
WG3406751-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-SEP-20
MET-D-CCMS-CL	**Water**							
Batch R5224003								
WG3404942-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			101.8		%		80-120	15-SEP-20
Magnesium (Mg)-Dissolved			103.6		%		80-120	15-SEP-20
Potassium (K)-Dissolved			99.1		%		80-120	15-SEP-20
Sodium (Na)-Dissolved			101.3		%		80-120	15-SEP-20
WG3404942-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3405987-3 DUP		**L2502320-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	18-SEP-20
Antimony (Sb)-Dissolved		0.00023	0.00023		mg/L	0.1	20	18-SEP-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Barium (Ba)-Dissolved		0.0879	0.0872		mg/L	0.8	20	18-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-SEP-20
Boron (B)-Dissolved		0.010	0.011		mg/L	4.6	20	18-SEP-20
Cadmium (Cd)-Dissolved		0.0000395	0.0000378		mg/L	4.4	20	18-SEP-20
Calcium (Ca)-Dissolved		112	117		mg/L	4.3	20	18-SEP-20
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3405987-3 DUP		**L2502320-1**						
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	18-SEP-20
Iron (Fe)-Dissolved		0.018	0.018		mg/L	1.6	20	18-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-SEP-20
Lithium (Li)-Dissolved		0.0381	0.0387		mg/L	1.5	20	18-SEP-20
Magnesium (Mg)-Dissolved		43.0	43.6		mg/L	1.4	20	18-SEP-20
Manganese (Mn)-Dissolved		0.00843	0.00878		mg/L	4.1	20	18-SEP-20
Molybdenum (Mo)-Dissolved		0.00129	0.00127		mg/L	2.0	20	18-SEP-20
Nickel (Ni)-Dissolved		0.00354	0.00351		mg/L	0.9	20	18-SEP-20
Potassium (K)-Dissolved		1.83	1.87		mg/L	1.9	20	18-SEP-20
Selenium (Se)-Dissolved		0.0484	0.0470		mg/L	2.9	20	18-SEP-20
Silicon (Si)-Dissolved		1.86	1.88		mg/L	1.2	20	18-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-SEP-20
Sodium (Na)-Dissolved		1.64	1.67		mg/L	1.8	20	18-SEP-20
Strontium (Sr)-Dissolved		0.177	0.176		mg/L	0.5	20	18-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-SEP-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-SEP-20
Uranium (U)-Dissolved		0.00287	0.00286		mg/L	0.4	20	18-SEP-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-SEP-20
Zinc (Zn)-Dissolved		0.0012	0.0014		mg/L	14	20	18-SEP-20
WG3405987-2 LCS								
Aluminum (Al)-Dissolved			102.3		%		80-120	18-SEP-20
Antimony (Sb)-Dissolved			97.4		%		80-120	18-SEP-20
Arsenic (As)-Dissolved			96.7		%		80-120	18-SEP-20
Barium (Ba)-Dissolved			105.1		%		80-120	18-SEP-20
Bismuth (Bi)-Dissolved			108.3		%		80-120	18-SEP-20
Boron (B)-Dissolved			93.7		%		80-120	18-SEP-20
Cadmium (Cd)-Dissolved			98.1		%		80-120	18-SEP-20
Calcium (Ca)-Dissolved			101.2		%		80-120	18-SEP-20
Chromium (Cr)-Dissolved			96.0		%		80-120	18-SEP-20
Cobalt (Co)-Dissolved			96.7		%		80-120	18-SEP-20
Copper (Cu)-Dissolved			96.7		%		80-120	18-SEP-20
Iron (Fe)-Dissolved			92.9		%		80-120	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3405987-2 LCS								
Lead (Pb)-Dissolved			98.1		%		80-120	18-SEP-20
Lithium (Li)-Dissolved			97.8		%		80-120	18-SEP-20
Magnesium (Mg)-Dissolved			96.3		%		80-120	18-SEP-20
Manganese (Mn)-Dissolved			95.5		%		80-120	18-SEP-20
Molybdenum (Mo)-Dissolved			102.9		%		80-120	18-SEP-20
Nickel (Ni)-Dissolved			96.9		%		80-120	18-SEP-20
Potassium (K)-Dissolved			94.1		%		80-120	18-SEP-20
Selenium (Se)-Dissolved			104.0		%		80-120	18-SEP-20
Silicon (Si)-Dissolved			98.0		%		60-140	18-SEP-20
Silver (Ag)-Dissolved			101.9		%		80-120	18-SEP-20
Sodium (Na)-Dissolved			98.3		%		80-120	18-SEP-20
Strontium (Sr)-Dissolved			99.98		%		80-120	18-SEP-20
Thallium (Tl)-Dissolved			100.4		%		80-120	18-SEP-20
Tin (Sn)-Dissolved			99.7		%		80-120	18-SEP-20
Titanium (Ti)-Dissolved			95.8		%		80-120	18-SEP-20
Uranium (U)-Dissolved			97.5		%		80-120	18-SEP-20
Vanadium (V)-Dissolved			97.7		%		80-120	18-SEP-20
Zinc (Zn)-Dissolved			95.5		%		80-120	18-SEP-20
WG3405987-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3405987-1 MB		**NP**						
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	18-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
WG3405987-4 MS		**L2502320-2**						
Aluminum (Al)-Dissolved			97.0		%		70-130	18-SEP-20
Antimony (Sb)-Dissolved			105.9		%		70-130	18-SEP-20
Arsenic (As)-Dissolved			95.7		%		70-130	18-SEP-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Bismuth (Bi)-Dissolved			88.2		%		70-130	18-SEP-20
Boron (B)-Dissolved			87.4		%		70-130	18-SEP-20
Cadmium (Cd)-Dissolved			100.2		%		70-130	18-SEP-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Chromium (Cr)-Dissolved			93.0		%		70-130	18-SEP-20
Cobalt (Co)-Dissolved			93.8		%		70-130	18-SEP-20
Copper (Cu)-Dissolved			92.8		%		70-130	18-SEP-20
Iron (Fe)-Dissolved			95.0		%		70-130	18-SEP-20
Lead (Pb)-Dissolved			94.7		%		70-130	18-SEP-20
Lithium (Li)-Dissolved			99.3		%		70-130	18-SEP-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Manganese (Mn)-Dissolved			90.9		%		70-130	18-SEP-20
Molybdenum (Mo)-Dissolved			106.0		%		70-130	18-SEP-20
Nickel (Ni)-Dissolved			94.0		%		70-130	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3405987-4 MS		**L2502320-2**						
Potassium (K)-Dissolved			98.3		%		70-130	18-SEP-20
Selenium (Se)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Silicon (Si)-Dissolved			92.0		%		70-130	18-SEP-20
Silver (Ag)-Dissolved			103.8		%		70-130	18-SEP-20
Sodium (Na)-Dissolved			99.0		%		70-130	18-SEP-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Thallium (Tl)-Dissolved			94.0		%		70-130	18-SEP-20
Tin (Sn)-Dissolved			101.1		%		70-130	18-SEP-20
Titanium (Ti)-Dissolved			93.3		%		70-130	18-SEP-20
Uranium (U)-Dissolved			93.1		%		70-130	18-SEP-20
Vanadium (V)-Dissolved			97.4		%		70-130	18-SEP-20
Zinc (Zn)-Dissolved			90.9		%		70-130	18-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405859-3 DUP		**L2502320-1**						
Antimony (Sb)-Total		0.00024	0.00024		mg/L	0.9	20	17-SEP-20
Arsenic (As)-Total		0.00010	0.00011		mg/L	0.9	20	17-SEP-20
Barium (Ba)-Total		0.0857	0.0855		mg/L	0.1	20	17-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-20
Boron (B)-Total		0.011	0.011		mg/L	2.8	20	17-SEP-20
Cadmium (Cd)-Total		0.0000511	0.0000470		mg/L	8.4	20	17-SEP-20
Calcium (Ca)-Total		107	109		mg/L	2.0	20	17-SEP-20
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-SEP-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-SEP-20
Iron (Fe)-Total		0.028	0.030		mg/L	5.0	20	17-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	17-SEP-20
Lithium (Li)-Total		0.0365	0.0362		mg/L	0.7	20	17-SEP-20
Magnesium (Mg)-Total		47.0	46.6		mg/L	0.8	20	17-SEP-20
Manganese (Mn)-Total		0.00974	0.00971		mg/L	0.3	20	17-SEP-20
Molybdenum (Mo)-Total		0.00130	0.00124		mg/L	5.2	20	17-SEP-20
Nickel (Ni)-Total		0.00363	0.00373		mg/L	2.6	20	17-SEP-20
Potassium (K)-Total		1.87	1.88		mg/L	0.6	20	17-SEP-20
Selenium (Se)-Total		0.0472	0.0473		mg/L	0.3	20	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405859-3 DUP		**L2502320-1**						
Silicon (Si)-Total		1.98	2.06		mg/L	4.2	20	17-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-SEP-20
Sodium (Na)-Total		1.68	1.68		mg/L	0.1	20	17-SEP-20
Strontium (Sr)-Total		0.162	0.160		mg/L	1.0	20	17-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-SEP-20
Uranium (U)-Total		0.00272	0.00285		mg/L	4.6	20	17-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-SEP-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	17-SEP-20
WG3405859-2 LCS								
Aluminum (Al)-Total			101.2		%		80-120	17-SEP-20
Antimony (Sb)-Total			107.7		%		80-120	17-SEP-20
Arsenic (As)-Total			103.0		%		80-120	17-SEP-20
Barium (Ba)-Total			112.0		%		80-120	17-SEP-20
Bismuth (Bi)-Total			106.5		%		80-120	17-SEP-20
Boron (B)-Total			103.5		%		80-120	17-SEP-20
Cadmium (Cd)-Total			106.4		%		80-120	17-SEP-20
Calcium (Ca)-Total			104.8		%		80-120	17-SEP-20
Chromium (Cr)-Total			104.0		%		80-120	17-SEP-20
Cobalt (Co)-Total			104.9		%		80-120	17-SEP-20
Copper (Cu)-Total			103.1		%		80-120	17-SEP-20
Iron (Fe)-Total			109.7		%		80-120	17-SEP-20
Lead (Pb)-Total			103.4		%		80-120	17-SEP-20
Lithium (Li)-Total			99.4		%		80-120	17-SEP-20
Magnesium (Mg)-Total			104.3		%		80-120	17-SEP-20
Manganese (Mn)-Total			106.6		%		80-120	17-SEP-20
Molybdenum (Mo)-Total			102.0		%		80-120	17-SEP-20
Nickel (Ni)-Total			105.9		%		80-120	17-SEP-20
Potassium (K)-Total			107.4		%		80-120	17-SEP-20
Selenium (Se)-Total			108.7		%		80-120	17-SEP-20
Silicon (Si)-Total			120.1	MES	%		80-120	17-SEP-20
Silver (Ag)-Total			105.7		%		80-120	17-SEP-20
Sodium (Na)-Total			107.2		%		80-120	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405859-2 LCS								
Strontium (Sr)-Total			104.4		%		80-120	17-SEP-20
Thallium (Tl)-Total			103.1		%		80-120	17-SEP-20
Tin (Sn)-Total			105.9		%		80-120	17-SEP-20
Titanium (Ti)-Total			103.2		%		80-120	17-SEP-20
Uranium (U)-Total			100.8		%		80-120	17-SEP-20
Vanadium (V)-Total			103.5		%		80-120	17-SEP-20
Zinc (Zn)-Total			107.4		%		80-120	17-SEP-20
WG3405859-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	17-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	17-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	17-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	17-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	17-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	17-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	17-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	17-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	17-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	17-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	17-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	17-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	17-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	17-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	17-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	17-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405859-1 MB								
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	17-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	17-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	17-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-SEP-20
WG3405859-4 MS		**L2502320-2**						
Aluminum (Al)-Total			109.4		%		70-130	17-SEP-20
Antimony (Sb)-Total			98.7		%		70-130	17-SEP-20
Arsenic (As)-Total			96.1		%		70-130	17-SEP-20
Barium (Ba)-Total			N/A	MS-B	%		-	17-SEP-20
Bismuth (Bi)-Total			93.5		%		70-130	17-SEP-20
Boron (B)-Total			89.0		%		70-130	17-SEP-20
Cadmium (Cd)-Total			100.4		%		70-130	17-SEP-20
Calcium (Ca)-Total			N/A	MS-B	%		-	17-SEP-20
Chromium (Cr)-Total			97.4		%		70-130	17-SEP-20
Cobalt (Co)-Total			96.6		%		70-130	17-SEP-20
Copper (Cu)-Total			94.4		%		70-130	17-SEP-20
Iron (Fe)-Total			99.4		%		70-130	17-SEP-20
Lead (Pb)-Total			93.7		%		70-130	17-SEP-20
Lithium (Li)-Total			92.2		%		70-130	17-SEP-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	17-SEP-20
Manganese (Mn)-Total			97.8		%		70-130	17-SEP-20
Molybdenum (Mo)-Total			97.9		%		70-130	17-SEP-20
Nickel (Ni)-Total			96.8		%		70-130	17-SEP-20
Potassium (K)-Total			102.0		%		70-130	17-SEP-20
Selenium (Se)-Total			N/A	MS-B	%		-	17-SEP-20
Silicon (Si)-Total			88.6		%		70-130	17-SEP-20
Silver (Ag)-Total			98.7		%		70-130	17-SEP-20
Sodium (Na)-Total			105.1		%		70-130	17-SEP-20
Strontium (Sr)-Total			N/A	MS-B	%		-	17-SEP-20
Thallium (Tl)-Total			91.0		%		70-130	17-SEP-20
Tin (Sn)-Total			99.9		%		70-130	17-SEP-20
Titanium (Ti)-Total			101.2		%		70-130	17-SEP-20
Uranium (U)-Total			93.1		%		70-130	17-SEP-20
Vanadium (V)-Total			98.7		%		70-130	17-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5226940								
WG3405859-4 MS		**L2502320-2**						
Zinc (Zn)-Total			97.3		%		70-130	17-SEP-20
Batch R5230596								
WG3406929-3 DUP		**L2502320-1**						
Aluminum (Al)-Total		0.0049	0.0071	J	mg/L	0.0021	0.006	18-SEP-20
Antimony (Sb)-Total		0.00024	0.00025		mg/L	5.6	20	18-SEP-20
Arsenic (As)-Total		0.00010	0.00015		mg/L	9.4	20	18-SEP-20
Barium (Ba)-Total		0.0857	0.0881		mg/L	3.5	20	18-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-SEP-20
Boron (B)-Total		0.011	0.013		mg/L	13	20	18-SEP-20
Cadmium (Cd)-Total		0.0000511	0.0000389		mg/L	14	20	18-SEP-20
Calcium (Ca)-Total		107	107		mg/L	4.6	20	18-SEP-20
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-SEP-20
Iron (Fe)-Total		0.028	0.031		mg/L	3.0	20	18-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-SEP-20
Lithium (Li)-Total		0.0365	0.0357		mg/L	5.2	20	18-SEP-20
Magnesium (Mg)-Total		47.0	47.3		mg/L	0.7	20	18-SEP-20
Manganese (Mn)-Total		0.00974	0.00968		mg/L	1.4	20	18-SEP-20
Molybdenum (Mo)-Total		0.00130	0.00126		mg/L	4.6	20	18-SEP-20
Nickel (Ni)-Total		0.00363	0.00361		mg/L	0.9	20	18-SEP-20
Potassium (K)-Total		1.87	1.87		mg/L	2.4	20	18-SEP-20
Selenium (Se)-Total		0.0472	0.0488		mg/L	1.4	20	18-SEP-20
Silicon (Si)-Total		1.98	2.14		mg/L	5.7	20	18-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-SEP-20
Sodium (Na)-Total		1.68	1.69		mg/L	2.0	20	18-SEP-20
Strontium (Sr)-Total		0.162	0.158		mg/L	3.5	20	18-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-SEP-20
Uranium (U)-Total		0.00272	0.00294		mg/L	0.4	20	18-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-SEP-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	18-SEP-20
WG3406929-2 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230596								
WG3406929-2 LCS								
Aluminum (Al)-Total			105.3		%		80-120	18-SEP-20
Arsenic (As)-Total			110.1		%		80-120	18-SEP-20
Barium (Ba)-Total			109.6		%		80-120	18-SEP-20
Bismuth (Bi)-Total			117.2		%		80-120	18-SEP-20
Cadmium (Cd)-Total			107.2		%		80-120	18-SEP-20
Calcium (Ca)-Total			110.8		%		80-120	18-SEP-20
Chromium (Cr)-Total			114.4		%		80-120	18-SEP-20
Cobalt (Co)-Total			110.7		%		80-120	18-SEP-20
Copper (Cu)-Total			108.2		%		80-120	18-SEP-20
Iron (Fe)-Total			110.0		%		80-120	18-SEP-20
Lead (Pb)-Total			112.2		%		80-120	18-SEP-20
Lithium (Li)-Total			105.7		%		80-120	18-SEP-20
Magnesium (Mg)-Total			107.7		%		80-120	18-SEP-20
Manganese (Mn)-Total			110.0		%		80-120	18-SEP-20
Molybdenum (Mo)-Total			109.7		%		80-120	18-SEP-20
Nickel (Ni)-Total			109.5		%		80-120	18-SEP-20
Potassium (K)-Total			104.6		%		80-120	18-SEP-20
Selenium (Se)-Total			110.1		%		80-120	18-SEP-20
Silicon (Si)-Total			112.3		%		80-120	18-SEP-20
Silver (Ag)-Total			113.1		%		80-120	18-SEP-20
Sodium (Na)-Total			114.3		%		80-120	18-SEP-20
Strontium (Sr)-Total			108.5		%		80-120	18-SEP-20
Thallium (Tl)-Total			112.7		%		80-120	18-SEP-20
Tin (Sn)-Total			109.5		%		80-120	18-SEP-20
Titanium (Ti)-Total			109.3		%		80-120	18-SEP-20
Uranium (U)-Total			110.3		%		80-120	18-SEP-20
Vanadium (V)-Total			111.9		%		80-120	18-SEP-20
Zinc (Zn)-Total			108.1		%		80-120	18-SEP-20
WG3406929-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230596								
WG3406929-1 MB								
Boron (B)-Total			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	18-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	18-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	18-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-SEP-20
NH3-L-F-CL	**Water**							
Batch R5224062								
WG3404326-15 DUP		**L2502320-9**						
Ammonia as N		0.0053	0.0053		mg/L	0.0	20	14-SEP-20
WG3404326-14 LCS								
Ammonia as N			102.7		%		85-115	14-SEP-20
WG3404326-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	14-SEP-20
WG3404326-16 MS		**L2502320-9**						
Ammonia as N			104.1		%		75-125	14-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Nitrite (as N)			100.1		%		90-110	12-SEP-20
WG3404056-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	12-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Nitrate (as N)			101.8		%		90-110	12-SEP-20
WG3404056-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	12-SEP-20
ORP-CL	**Water**							
Batch R5224232								
WG3404997-2 CRM		**CL-ORP**						
ORP			220		mV		210-230	15-SEP-20
WG3404997-1 DUP		**L2502320-9**						
ORP		504	495	J	mV	9.4	15	15-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5227257								
WG3406891-3 DUP		**L2502320-8**						
Phosphorus (P)-Total		0.0035	0.0036		mg/L	2.8	20	17-SEP-20
WG3406891-2 LCS								
Phosphorus (P)-Total			106.0		%		80-120	17-SEP-20
WG3406891-1 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	17-SEP-20
WG3406891-4 MS		**L2502320-8**						
Phosphorus (P)-Total			118.2		%		70-130	17-SEP-20
Batch R5229838								
WG3407574-14 LCS								
Phosphorus (P)-Total			102.1		%		80-120	18-SEP-20
WG3407574-18 LCS								
Phosphorus (P)-Total			100.3		%		80-120	18-SEP-20
WG3407574-13 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	18-SEP-20
WG3407574-17 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	18-SEP-20
PH-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-CL	**Water**							
Batch R5226926								
WG3406781-11 LCS								
pH			7.00		pH		6.9-7.1	17-SEP-20
WG3406781-8 LCS								
pH			7.00		pH		6.9-7.1	17-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5222820								
WG3403419-10 LCS								
Orthophosphate-Dissolved (as P)			99.98		%		80-120	12-SEP-20
WG3403419-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	12-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5223278								
WG3404056-10 LCS								
Sulfate (SO4)			101.7		%		90-110	12-SEP-20
WG3404056-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	12-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5226876								
WG3405388-11 LCS								
Total Dissolved Solids			101.3		%		85-115	16-SEP-20
WG3405388-8 LCS								
Total Dissolved Solids			101.4		%		85-115	16-SEP-20
WG3405388-10 MB								
Total Dissolved Solids			<10		mg/L		10	16-SEP-20
WG3405388-7 MB								
Total Dissolved Solids			<10		mg/L		10	16-SEP-20
TKN-L-F-CL	**Water**							
Batch R5224612								
WG3405544-2 LCS								
Total Kjeldahl Nitrogen			108.2		%		75-125	16-SEP-20
WG3405544-4 LCS								
Total Kjeldahl Nitrogen			111.8		%		75-125	16-SEP-20
WG3405544-6 LCS								
Total Kjeldahl Nitrogen			110.4		%		75-125	16-SEP-20
WG3405544-8 LCS								
Total Kjeldahl Nitrogen			110.5		%		75-125	16-SEP-20
WG3405544-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5224612								
WG3405544-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
WG3405544-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
WG3405544-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
WG3405544-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	16-SEP-20
TSS-L-CL	**Water**							
Batch R5226690								
WG3405393-2 LCS								
Total Suspended Solids			94.8		%		85-115	16-SEP-20
WG3405393-4 LCS								
Total Suspended Solids			95.2		%		85-115	16-SEP-20
WG3405393-1 MB								
Total Suspended Solids			<1.0		mg/L		1	16-SEP-20
WG3405393-3 MB								
Total Suspended Solids			<1.0		mg/L		1	16-SEP-20
TURBIDITY-CL	**Water**							
Batch R5222915								
WG3403353-11 LCS								
Turbidity			96.5		%		85-115	12-SEP-20
WG3403353-8 LCS								
Turbidity			97.0		%		85-115	12-SEP-20
WG3403353-10 MB								
Turbidity			<0.10		NTU		0.1	12-SEP-20
WG3403353-7 MB								
Turbidity			<0.10		NTU		0.1	12-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	10-SEP-20 08:40	15-SEP-20 13:45	0.25	125	hours	EHTR-FM
	2	10-SEP-20 08:59	15-SEP-20 13:45	0.25	125	hours	EHTR-FM
	3	10-SEP-20 09:12	15-SEP-20 13:45	0.25	125	hours	EHTR-FM
	4	10-SEP-20 09:15	15-SEP-20 13:45	0.25	125	hours	EHTR-FM
	5	10-SEP-20 09:15	15-SEP-20 13:45	0.25	125	hours	EHTR-FM
	6	10-SEP-20 13:20	15-SEP-20 13:45	0.25	120	hours	EHTR-FM
	7	11-SEP-20 09:20	15-SEP-20 13:45	0.25	100	hours	EHTR-FM
	8	11-SEP-20 13:25	15-SEP-20 13:45	0.25	96	hours	EHTR-FM
	9	11-SEP-20 09:00	15-SEP-20 13:45	0.25	101	hours	EHTR-FM
pH							
	1	10-SEP-20 08:40	17-SEP-20 14:00	0.25	173	hours	EHTR-FM
	2	10-SEP-20 08:59	17-SEP-20 14:00	0.25	173	hours	EHTR-FM
	3	10-SEP-20 09:12	17-SEP-20 14:00	0.25	173	hours	EHTR-FM
	4	10-SEP-20 09:15	17-SEP-20 14:00	0.25	173	hours	EHTR-FM
	5	10-SEP-20 09:15	17-SEP-20 14:00	0.25	173	hours	EHTR-FM
	6	10-SEP-20 13:20	17-SEP-20 14:00	0.25	169	hours	EHTR-FM
	7	11-SEP-20 09:20	17-SEP-20 14:00	0.25	149	hours	EHTR-FM
	8	11-SEP-20 13:25	17-SEP-20 14:00	0.25	144	hours	EHTR-FM
	9	11-SEP-20 09:00	17-SEP-20 14:00	0.25	149	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2502320 were received on 12-SEP-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP Sept 2020**

TURNAROUND TIME:

PROJECT/CLIENT INFO

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PO number: 689999

SAMPLE DETAILS

L2502320-COFC

ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FOBKS_WS_LAEMP_FRO_2020-09_NP	RG_FOBKS	WS	No	9/10/2020	8:40	G	7	1	1	1	1	1	1	1
RG_RIVER1_WS_LAEMP_FRO_2020-09_NP	RG_RIVER	WS	No	9/10/2020	8:59	G	7	1	1	1	1	1	1	1
RG_FBLANK1_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK	WS	No	9/10/2020	9:12	G	7	1	1	1	1	1	1	1
RG_TRIP1_WS_LAEMP_FRO_2020-09_NP	RG_TRIP (Lab pre-filled)	WS	No	9/10/2020	9:15	G	7	1		1	1		1	
RG_FOUCL_WS_LAEMP_FRO_2020-09_NP	RG_FOUCL	WS	No	9/10/2020	9:15	G	7	1	1	1	1	1	1	1
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUNGD	WS	No	9/10/2020	13:20	G	7	1	1	1	1	1	1	1
RG_FOUEW_WS_LAEMP_FRO_2020-09_NP	RG_FOUEW	WS	No	9/11/2020	9:20	G	7	1	1	1	1	1	1	1
RG_FODPO_WS_LAEMP_FRO_2020-09_NP	RG_FODPO	WS	No	9/11/2020	13:25	G	7	1	1	1	1	1	1	1
RG_FO22_WS_LAEMP_FRO_2020-09_NP	RG_FO22	WS	No	9/11/2020	9:00	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 11, 2020		9/11 0900

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 11, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 15-SEP-20
Report Date: 21-SEP-20 16:56 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2503315

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2503315-1	L2503315-2			
	Description	WS	WS			
	Sampled Date	12-SEP-20	14-SEP-20			
	Sampled Time	09:15	09:55			
	Client ID	RG_FRUPO_WS_LAEMP_FRO_2020-09_NP	RG_FOUKI_WS_LAEMP_FRO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1010	813			
	Hardness (as CaCO3) (mg/L)	645	468			
	pH (pH)	8.08	8.19			
	ORP (mV)	486	498			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	839 DLHC	675 DLHC			
	Turbidity (NTU)	0.22	0.41			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.1	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	231	183			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	231	183			
	Ammonia as N (mg/L)	0.0135	0.0053			
	Bromide (Br) (mg/L)	<0.25 DLHC	<0.050			
	Chloride (Cl) (mg/L)	1.31 DLHC	0.94			
	Fluoride (F) (mg/L)	0.12 DLHC	0.134			
	Ion Balance (%)	108	106			
	Nitrate (as N) (mg/L)	25.1 DLHC	14.0			
	Nitrite (as N) (mg/L)	<0.0050 DLHC	0.0110			
	Total Kjeldahl Nitrogen (mg/L)	0.402 TKNI	<0.050 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	0.0024	<0.0010			
	Phosphorus (P)-Total (mg/L)	0.0023	<0.0020			
	Sulfate (SO4) (mg/L)	272 DLHC	204			
	Anion Sum (meq/L)	12.1	8.93			
	Cation Sum (meq/L)	13.1	9.46			
	Cation - Anion Balance (%)	3.7	2.9			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	<0.50	<0.50			
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	0.0041			
	Antimony (Sb)-Total (mg/L)	0.00011	0.00030			
	Arsenic (As)-Total (mg/L)	0.00011	0.00017			
	Barium (Ba)-Total (mg/L)	0.115	0.0927			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.016	0.013			
	Cadmium (Cd)-Total (ug/L)	0.0401	0.0548			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2503315-1	L2503315-2			
	Description	WS	WS			
	Sampled Date	12-SEP-20	14-SEP-20			
	Sampled Time	09:15	09:55			
	Client ID	RG_FRUPO_WS_LAEMP_FRO_2020-09_NP	RG_FOUKI_WS_LAEMP_FRO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	138	113			
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	<0.010	0.034			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0458	0.0374			
	Magnesium (Mg)-Total (mg/L)	64.9	47.3			
	Manganese (Mn)-Total (mg/L)	0.00068	0.0120			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.000839	0.00151			
	Nickel (Ni)-Total (mg/L)	0.00064	0.00449			
	Potassium (K)-Total (mg/L)	2.37	2.08			
	Selenium (Se)-Total (ug/L)	94.9	57.2			
	Silicon (Si)-Total (mg/L)	2.40	2.17			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.87	1.70			
	Strontium (Sr)-Total (mg/L)	0.152	0.164			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00424	0.00319			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	0.00011	0.00027			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.109	0.0846			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	0.018	0.011			
	Cadmium (Cd)-Dissolved (ug/L)	0.0323	0.0457			
	Calcium (Ca)-Dissolved (mg/L)	151	113			
	Chromium (Cr)-Dissolved (mg/L)	0.00011	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2503315-1	L2503315-2			
	Description	WS	WS			
	Sampled Date	12-SEP-20	14-SEP-20			
	Sampled Time	09:15	09:55			
	Client ID	RG_FRUPO_WS_LAEMP_FRO_2020-09_NP	RG_FOUKI_WS_LAEMP_FRO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.018			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0484	0.0359			
	Magnesium (Mg)-Dissolved (mg/L)	65.1	44.8			
	Manganese (Mn)-Dissolved (mg/L)	0.00044	0.00968			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	0.0000073			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000901	0.00149			
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00397			
	Potassium (K)-Dissolved (mg/L)	2.27	1.86			
	Selenium (Se)-Dissolved (ug/L)	100	57.7			
	Silicon (Si)-Dissolved (mg/L)	2.09	1.87			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.71	1.55			
	Strontium (Sr)-Dissolved (mg/L)	0.168	0.168			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00412	0.00282			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0015			

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2503315-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2503315-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2503315-1, -2
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2503315-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2503315-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2503315-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2503315-1, -2
Matrix Spike	Lithium (Li)-Total	MS-B	L2503315-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2503315-1, -2
Matrix Spike	Manganese (Mn)-Total	MS-B	L2503315-1, -2
Matrix Spike	Nickel (Ni)-Total	MS-B	L2503315-1, -2
Matrix Spike	Potassium (K)-Total	MS-B	L2503315-1, -2
Matrix Spike	Selenium (Se)-Total	MS-B	L2503315-1, -2
Matrix Spike	Sodium (Na)-Total	MS-B	L2503315-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2503315-1, -2
Matrix Spike	Uranium (U)-Total	MS-B	L2503315-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a

Reference Information

halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

Reference Information

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5224717								
WG3405808-5 LCS								
Acidity (as CaCO3)			98.2		%		85-115	16-SEP-20
WG3405808-8 LCS								
Acidity (as CaCO3)			99.2		%		85-115	16-SEP-20
WG3405808-4 MB								
Acidity (as CaCO3)			1.7		mg/L		2	16-SEP-20
WG3405808-7 MB								
Acidity (as CaCO3)			1.7		mg/L		2	16-SEP-20
ALK-MAN-CL	**Water**							
Batch R5226926								
WG3406781-2 LCS								
Alkalinity, Total (as CaCO3)			101.3		%		85-115	17-SEP-20
WG3406781-1 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	17-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-3 DUP		**L2503315-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	18-SEP-20
WG3407095-2 LCS								
Beryllium (Be)-Dissolved			107.5		%		80-120	18-SEP-20
WG3407095-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	18-SEP-20
WG3407095-4 MS		**L2503315-2**						
Beryllium (Be)-Dissolved			95.4		%		70-130	18-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5230865								
WG3407635-2 LCS								
Beryllium (Be)-Total			98.2		%		80-120	19-SEP-20
WG3407635-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	18-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5224720								
WG3405805-2 LCS								
Bromide (Br)			102.3		%		85-115	15-SEP-20
WG3405805-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	15-SEP-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5230798								
WG3407886-6 LCS								
Dissolved Organic Carbon			108.9		%		80-120	18-SEP-20
WG3407886-5 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5230798								
WG3407886-6 LCS								
Total Organic Carbon			115.9		%		80-120	18-SEP-20
WG3407886-5 MB								
Total Organic Carbon			<0.50		mg/L		0.5	18-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5224720								
WG3405805-2 LCS								
Chloride (Cl)			100.3		%		85-115	15-SEP-20
WG3405805-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	15-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5226926								
WG3406781-2 LCS								
Conductivity (@ 25C)			94.8		%		90-110	17-SEP-20
WG3406781-1 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	17-SEP-20
F-IC-N-CL	**Water**							
Batch R5224720								
WG3405805-2 LCS								
Fluoride (F)			99.5		%		90-110	15-SEP-20
WG3405805-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	15-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5231716								
WG3408817-2 LCS								
Mercury (Hg)-Dissolved			98.6		%		80-120	21-SEP-20
WG3408817-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	21-SEP-20
HG-T-U-CVAF-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5230988								
WG3408258-2 LCS								
Mercury (Hg)-Total			98.4		%		80-120	19-SEP-20
WG3408258-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	19-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-3 DUP		**L2503315-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	18-SEP-20
Antimony (Sb)-Dissolved		0.00011	0.00010		mg/L	3.4	20	18-SEP-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Barium (Ba)-Dissolved		0.109	0.108		mg/L	0.1	20	18-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-SEP-20
Boron (B)-Dissolved		0.018	0.016		mg/L	13	20	18-SEP-20
Cadmium (Cd)-Dissolved		0.0000323	0.0000395	J	mg/L	0.000007	0.00001	18-SEP-20
Calcium (Ca)-Dissolved		151	147		mg/L	2.4	20	18-SEP-20
Chromium (Cr)-Dissolved		0.00011	0.00015	J	mg/L	0.00004	0.0002	18-SEP-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	18-SEP-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	18-SEP-20
Lithium (Li)-Dissolved		0.0484	0.0477		mg/L	1.5	20	18-SEP-20
Magnesium (Mg)-Dissolved		65.1	65.5		mg/L	0.6	20	18-SEP-20
Manganese (Mn)-Dissolved		0.00044	0.00046		mg/L	5.5	20	18-SEP-20
Molybdenum (Mo)-Dissolved		0.000901	0.000864		mg/L	4.2	20	18-SEP-20
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-SEP-20
Potassium (K)-Dissolved		2.27	2.23		mg/L	1.9	20	18-SEP-20
Selenium (Se)-Dissolved		0.100	0.0999		mg/L	0.1	20	18-SEP-20
Silicon (Si)-Dissolved		2.09	2.11		mg/L	0.8	20	18-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-SEP-20
Sodium (Na)-Dissolved		2.71	2.75		mg/L	1.5	20	18-SEP-20
Strontium (Sr)-Dissolved		0.168	0.170		mg/L	1.2	20	18-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-SEP-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	18-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-SEP-20
Uranium (U)-Dissolved		0.00412	0.00419		mg/L	1.6	20	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-3 DUP		**L2503315-1**						
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	18-SEP-20
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-SEP-20
WG3407095-2 LCS								
Aluminum (Al)-Dissolved			105.3		%		80-120	18-SEP-20
Antimony (Sb)-Dissolved			108.9		%		80-120	18-SEP-20
Arsenic (As)-Dissolved			106.4		%		80-120	18-SEP-20
Barium (Ba)-Dissolved			110.9		%		80-120	18-SEP-20
Bismuth (Bi)-Dissolved			113.0		%		80-120	18-SEP-20
Boron (B)-Dissolved			100.4		%		80-120	18-SEP-20
Cadmium (Cd)-Dissolved			107.3		%		80-120	18-SEP-20
Calcium (Ca)-Dissolved			109.8		%		80-120	18-SEP-20
Chromium (Cr)-Dissolved			104.7		%		80-120	18-SEP-20
Cobalt (Co)-Dissolved			105.2		%		80-120	18-SEP-20
Copper (Cu)-Dissolved			105.6		%		80-120	18-SEP-20
Iron (Fe)-Dissolved			100.8		%		80-120	18-SEP-20
Lead (Pb)-Dissolved			108.2		%		80-120	18-SEP-20
Lithium (Li)-Dissolved			108.7		%		80-120	18-SEP-20
Magnesium (Mg)-Dissolved			103.8		%		80-120	18-SEP-20
Manganese (Mn)-Dissolved			105.7		%		80-120	18-SEP-20
Molybdenum (Mo)-Dissolved			113.3		%		80-120	18-SEP-20
Nickel (Ni)-Dissolved			106.6		%		80-120	18-SEP-20
Potassium (K)-Dissolved			103.5		%		80-120	18-SEP-20
Selenium (Se)-Dissolved			115.2		%		80-120	18-SEP-20
Silicon (Si)-Dissolved			107.2		%		60-140	18-SEP-20
Silver (Ag)-Dissolved			112.6		%		80-120	18-SEP-20
Sodium (Na)-Dissolved			107.8		%		80-120	18-SEP-20
Strontium (Sr)-Dissolved			113.8		%		80-120	18-SEP-20
Thallium (Tl)-Dissolved			109.6		%		80-120	18-SEP-20
Tin (Sn)-Dissolved			107.0		%		80-120	18-SEP-20
Titanium (Ti)-Dissolved			99.97		%		80-120	18-SEP-20
Uranium (U)-Dissolved			108.8		%		80-120	18-SEP-20
Vanadium (V)-Dissolved			105.8		%		80-120	18-SEP-20
Zinc (Zn)-Dissolved			109.8		%		80-120	18-SEP-20
WG3407095-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-1 MB		**NP**						
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	18-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	18-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	18-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-SEP-20
WG3407095-4 MS		**L2503315-2**						
Aluminum (Al)-Dissolved			97.5		%		70-130	18-SEP-20
Antimony (Sb)-Dissolved			104.2		%		70-130	18-SEP-20
Arsenic (As)-Dissolved			99.8		%		70-130	18-SEP-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5230167								
WG3407095-4 MS		**L2503315-2**						
Bismuth (Bi)-Dissolved			88.9		%		70-130	18-SEP-20
Boron (B)-Dissolved			90.2		%		70-130	18-SEP-20
Cadmium (Cd)-Dissolved			98.0		%		70-130	18-SEP-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Chromium (Cr)-Dissolved			95.1		%		70-130	18-SEP-20
Cobalt (Co)-Dissolved			93.8		%		70-130	18-SEP-20
Copper (Cu)-Dissolved			92.7		%		70-130	18-SEP-20
Iron (Fe)-Dissolved			94.4		%		70-130	18-SEP-20
Lead (Pb)-Dissolved			95.3		%		70-130	18-SEP-20
Lithium (Li)-Dissolved			96.3		%		70-130	18-SEP-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Manganese (Mn)-Dissolved			91.0		%		70-130	18-SEP-20
Molybdenum (Mo)-Dissolved			107.2		%		70-130	18-SEP-20
Nickel (Ni)-Dissolved			92.9		%		70-130	18-SEP-20
Potassium (K)-Dissolved			93.6		%		70-130	18-SEP-20
Selenium (Se)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Silicon (Si)-Dissolved			91.1		%		70-130	18-SEP-20
Silver (Ag)-Dissolved			101.9		%		70-130	18-SEP-20
Sodium (Na)-Dissolved			90.5		%		70-130	18-SEP-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	18-SEP-20
Thallium (Tl)-Dissolved			95.7		%		70-130	18-SEP-20
Tin (Sn)-Dissolved			99.9		%		70-130	18-SEP-20
Titanium (Ti)-Dissolved			90.9		%		70-130	18-SEP-20
Uranium (U)-Dissolved			93.9		%		70-130	18-SEP-20
Vanadium (V)-Dissolved			98.4		%		70-130	18-SEP-20
Zinc (Zn)-Dissolved			95.9		%		70-130	18-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5230865								
WG3407635-2 LCS								
Aluminum (Al)-Total			97.7		%		80-120	19-SEP-20
Antimony (Sb)-Total			96.0		%		80-120	19-SEP-20
Arsenic (As)-Total			94.8		%		80-120	19-SEP-20
Barium (Ba)-Total			99.6		%		80-120	19-SEP-20
Bismuth (Bi)-Total			95.7		%		80-120	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230865								
WG3407635-2 LCS								
Boron (B)-Total			94.3		%		80-120	19-SEP-20
Cadmium (Cd)-Total			95.0		%		80-120	19-SEP-20
Calcium (Ca)-Total			97.3		%		80-120	19-SEP-20
Chromium (Cr)-Total			95.1		%		80-120	19-SEP-20
Cobalt (Co)-Total			96.9		%		80-120	19-SEP-20
Copper (Cu)-Total			96.1		%		80-120	19-SEP-20
Iron (Fe)-Total			99.9		%		80-120	19-SEP-20
Lead (Pb)-Total			97.8		%		80-120	19-SEP-20
Lithium (Li)-Total			93.0		%		80-120	19-SEP-20
Magnesium (Mg)-Total			96.4		%		80-120	19-SEP-20
Manganese (Mn)-Total			98.4		%		80-120	19-SEP-20
Molybdenum (Mo)-Total			97.5		%		80-120	19-SEP-20
Nickel (Ni)-Total			95.0		%		80-120	19-SEP-20
Potassium (K)-Total			93.5		%		80-120	19-SEP-20
Selenium (Se)-Total			98.1		%		80-120	19-SEP-20
Silicon (Si)-Total			102.2		%		80-120	19-SEP-20
Silver (Ag)-Total			96.4		%		80-120	19-SEP-20
Sodium (Na)-Total			99.0		%		80-120	19-SEP-20
Strontium (Sr)-Total			103.9		%		80-120	19-SEP-20
Thallium (Tl)-Total			97.9		%		80-120	19-SEP-20
Tin (Sn)-Total			94.8		%		80-120	19-SEP-20
Titanium (Ti)-Total			91.4		%		80-120	19-SEP-20
Uranium (U)-Total			103.1		%		80-120	19-SEP-20
Vanadium (V)-Total			96.4		%		80-120	19-SEP-20
Zinc (Zn)-Total			93.2		%		80-120	19-SEP-20
WG3407635-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	18-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	18-SEP-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	18-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	18-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5230865								
WG3407635-1 MB								
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	18-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	18-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	18-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	18-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	18-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	18-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	18-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	18-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	18-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	18-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	18-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	18-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	18-SEP-20
NH3-L-F-CL	**Water**							
Batch R5228422								
WG3406742-6 LCS								
Ammonia as N			89.9		%		85-115	17-SEP-20
WG3406742-5 MB								
Ammonia as N			<0.0050		mg/L		0.005	17-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5224720								
WG3405805-2 LCS								
Nitrite (as N)			99.8		%		90-110	15-SEP-20
WG3405805-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	15-SEP-20
NO3-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5224720								
WG3405805-2 LCS								
Nitrate (as N)			100.8		%		90-110	15-SEP-20
WG3405805-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	15-SEP-20
ORP-CL	**Water**							
Batch R5224232								
WG3404997-8 CRM		**CL-ORP**						
ORP			224		mV		210-230	15-SEP-20
WG3404997-7 DUP		**L2503315-2**						
ORP		498	507	J	mV	8.8	15	15-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5230972								
WG3408145-6 LCS								
Phosphorus (P)-Total			97.6		%		80-120	19-SEP-20
WG3408145-5 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	19-SEP-20
PH-CL	**Water**							
Batch R5226926								
WG3406781-2 LCS								
pH			7.00		pH		6.9-7.1	17-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5224224								
WG3404933-4 LCS								
Orthophosphate-Dissolved (as P)			102.0		%		80-120	15-SEP-20
WG3404933-3 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	15-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5224720								
WG3405805-2 LCS								
Sulfate (SO4)			100.5		%		90-110	15-SEP-20
WG3405805-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	15-SEP-20
SOLIDS-TDS-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5229601								
WG3406333-11 LCS								
Total Dissolved Solids			103.9		%		85-115	17-SEP-20
WG3406333-5 LCS								
Total Dissolved Solids			98.3		%		85-115	17-SEP-20
WG3406333-10 MB								
Total Dissolved Solids			<10		mg/L		10	17-SEP-20
WG3406333-4 MB								
Total Dissolved Solids			<10		mg/L		10	17-SEP-20
TKN-L-F-CL	**Water**							
Batch R5226059								
WG3406476-12 LCS								
Total Kjeldahl Nitrogen			104.7		%		75-125	17-SEP-20
WG3406476-2 LCS								
Total Kjeldahl Nitrogen			99.6		%		75-125	17-SEP-20
WG3406476-4 LCS								
Total Kjeldahl Nitrogen			106.0		%		75-125	17-SEP-20
WG3406476-6 LCS								
Total Kjeldahl Nitrogen			103.7		%		75-125	17-SEP-20
WG3406476-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
WG3406476-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
WG3406476-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
WG3406476-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	17-SEP-20
TSS-L-CL	**Water**							
Batch R5229505								
WG3406130-4 LCS								
Total Suspended Solids			93.1		%		85-115	17-SEP-20
WG3406130-6 LCS								
Total Suspended Solids			106.9		%		85-115	17-SEP-20
WG3406130-3 MB								
Total Suspended Solids			<1.0		mg/L		1	17-SEP-20
WG3406130-5 MB								
Total Suspended Solids			<1.0		mg/L		1	17-SEP-20
TURBIDITY-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5224219								
WG3404934-5 LCS								
Turbidity			98.0		%		85-115	15-SEP-20
WG3404934-4 MB								
Turbidity			<0.10		NTU		0.1	15-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	12-SEP-20 09:15	15-SEP-20 15:45	0.25	78	hours	EHTR-FM
	2	14-SEP-20 09:55	15-SEP-20 15:45	0.25	30	hours	EHTR-FM
pH							
	1	12-SEP-20 09:15	17-SEP-20 14:00	0.25	125	hours	EHTR-FM
	2	14-SEP-20 09:55	17-SEP-20 14:00	0.25	76	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2503315 were received on 15-SEP-20 10:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP Sept 2020**

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
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teckcoal@equisonline.com	x	x	x
jings@minnow.ca	x	x	x
carrie.meyer@teck.com	x	x	x
PSchnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2503315-COFC

ANALYSIS REQUESTED

Filtered (F) Field, Lab, or Preserved (P) Field, Lab, or None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FRUPO _WS_LAEMP_FRO_2020-09_NP	RG_FRUPO	WS	No	9/12/2020	9:15	G	7	1	1	1	1	1	1	1
RG_FOUKI_WS_LAEMP_FRO__2020-09_NP	RG_FOUKI	WS	No	9/14/2020	9:55	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Jennifer Ings	September 14, 2020		09/15 10:00

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 14, 2020

4°

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 16-SEP-20
Report Date: 23-SEP-20 12:42 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2504032

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504032-1	L2504032-2			
	Description	WS	WS			
	Sampled Date	15-SEP-20	15-SEP-20			
	Sampled Time	09:30	13:05			
	Client ID	RG_FODHE_WS_LAEMP_FRO_2020-09_NP	RG_MP1_WS_LAEMP_FRO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	499	733			
	Hardness (as CaCO3) (mg/L)	286	423			
	pH (pH)	8.21	8.29			
	ORP (mV)	357	416			
	Total Suspended Solids (mg/L)	<1.0	<1.0			
	Total Dissolved Solids (mg/L)	376 DLHC	590 DLHC			
	Turbidity (NTU)	0.25	0.51			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	148	<1.0			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	179			
	Alkalinity, Total (as CaCO3) (mg/L)	148	179			
	Ammonia as N (mg/L)	0.0054	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	0.22	0.49			
	Fluoride (F) (mg/L)	0.221	0.175			
	Ion Balance (%)	96.1	95.5			
	Nitrate (as N) (mg/L)	3.23	12.9			
	Nitrite (as N) (mg/L)	0.0021	0.0073			
	Total Kjeldahl Nitrogen (mg/L)	0.286 TKNI	<0.25 TKNI			
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010			
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020			
	Sulfate (SO4) (mg/L)	134	214			
	Anion Sum (meq/L)	5.99	8.96			
	Cation Sum (meq/L)	5.76	8.56			
	Cation - Anion Balance (%)	-2.0	-2.3			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50			
	Total Organic Carbon (mg/L)	<0.50	0.93			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0095	0.0053			
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00023			
	Arsenic (As)-Total (mg/L)	0.00011	<0.00010			
	Barium (Ba)-Total (mg/L)	0.0414	0.0851			
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	<0.010	<0.010			
	Cadmium (Cd)-Total (ug/L)	0.0211	0.0346			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504032-1	L2504032-2			
	Description	WS	WS			
	Sampled Date	15-SEP-20	15-SEP-20			
	Sampled Time	09:30	13:05			
	Client ID	RG_FODHE_WS_LAEMP_FRO_2020-09_NP	RG_MP1_WS_LAEMP_FRO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	71.2	106			
	Chromium (Cr)-Total (mg/L)	0.00016	0.00013			
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10			
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050			
	Iron (Fe)-Total (mg/L)	0.010	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	0.0085	0.0356			
	Magnesium (Mg)-Total (mg/L)	25.9	42.0			
	Manganese (Mn)-Total (mg/L)	0.00174	0.00145			
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050			
	Molybdenum (Mo)-Total (mg/L)	0.000878	0.00124			
	Nickel (Ni)-Total (mg/L)	0.00061	0.00373			
	Potassium (K)-Total (mg/L)	0.817	1.67			
	Selenium (Se)-Total (ug/L)	22.7	49.5			
	Silicon (Si)-Total (mg/L)	1.59	1.99			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	0.693	1.38			
	Strontium (Sr)-Total (mg/L)	0.124	0.164			
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00107	0.00254			
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00023			
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010			
	Barium (Ba)-Dissolved (mg/L)	0.0475	0.0927			
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050			
	Boron (B)-Dissolved (mg/L)	<0.010	0.010			
	Cadmium (Cd)-Dissolved (ug/L)	0.0145	0.0231			
	Calcium (Ca)-Dissolved (mg/L)	73.8	106			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504032-1	L2504032-2			
	Description	WS	WS			
	Sampled Date	15-SEP-20	15-SEP-20			
	Sampled Time	09:30	13:05			
	Client ID	RG_FODHE_WS_LAEMP_FRO_2020-09_NP	RG_MP1_WS_LAEMP_FRO_2020-09_NP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0088	0.0378			
	Magnesium (Mg)-Dissolved (mg/L)	24.7	38.4			
	Manganese (Mn)-Dissolved (mg/L)	0.00079	0.00120			
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000924	0.00122			
	Nickel (Ni)-Dissolved (mg/L)	0.00065	0.00360			
	Potassium (K)-Dissolved (mg/L)	0.807	1.61			
	Selenium (Se)-Dissolved (ug/L)	20.6	50.7			
	Silicon (Si)-Dissolved (mg/L)	1.46	1.84			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	0.647	1.36			
	Strontium (Sr)-Dissolved (mg/L)	0.125	0.165			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00116	0.00258			
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2504032-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2504032-1, -2
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2504032-1, -2
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2504032-1, -2
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2504032-1, -2
Matrix Spike	Barium (Ba)-Total	MS-B	L2504032-1, -2
Matrix Spike	Calcium (Ca)-Total	MS-B	L2504032-1, -2
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2504032-1, -2
Matrix Spike	Selenium (Se)-Total	MS-B	L2504032-1, -2
Matrix Spike	Strontium (Sr)-Total	MS-B	L2504032-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

Reference Information

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5229719								
WG3407723-17 LCS								
Acidity (as CaCO3)			92.4		%		85-115	18-SEP-20
WG3407723-16 MB								
Acidity (as CaCO3)			1.8		mg/L		2	18-SEP-20
ALK-MAN-CL	**Water**							
Batch R5229761								
WG3407727-14 LCS								
Alkalinity, Total (as CaCO3)			100.8		%		85-115	18-SEP-20
WG3407727-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	18-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5231479								
WG3407983-3 DUP		**L2504032-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	19-SEP-20
WG3407983-2 LCS								
Beryllium (Be)-Dissolved			92.3		%		80-120	19-SEP-20
WG3407983-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	19-SEP-20
WG3407983-4 MS		**L2504032-2**						
Beryllium (Be)-Dissolved			94.7		%		70-130	19-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-3 DUP		**L2504032-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3407922-2 LCS								
Beryllium (Be)-Total			99.8		%		80-120	20-SEP-20
WG3407922-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	20-SEP-20
WG3407922-4 MS		**L2504032-2**						
Beryllium (Be)-Total			96.2		%		70-130	20-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5226660								
WG3406632-10 LCS								
Bromide (Br)			112.0		%		85-115	16-SEP-20
WG3406632-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	16-SEP-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5231450								
WG3408396-2 LCS								
Dissolved Organic Carbon			109.1		%		80-120	19-SEP-20
WG3408396-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5231450								
WG3408396-2 LCS								
Total Organic Carbon			115.6		%		80-120	19-SEP-20
WG3408396-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	19-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5226660								
WG3406632-10 LCS								
Chloride (Cl)			100.7		%		85-115	16-SEP-20
WG3406632-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	16-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5229761								
WG3407727-14 LCS								
Conductivity (@ 25C)			93.5		%		90-110	18-SEP-20
WG3407727-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	18-SEP-20
F-IC-N-CL	**Water**							
Batch R5226660								
WG3406632-10 LCS								
Fluoride (F)			95.7		%		90-110	16-SEP-20
WG3406632-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	16-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5231937								
WG3409373-2 LCS								
Mercury (Hg)-Dissolved			98.0		%		80-120	22-SEP-20
WG3409373-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	22-SEP-20
HG-T-U-CVAF-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-U-CVAF-VA	**Water**							
Batch R5231644								
WG3409074-2 LCS								
Mercury (Hg)-Total			90.4		%		80-120	21-SEP-20
WG3409074-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	21-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407983-3 DUP		**L2504032-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	19-SEP-20
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-SEP-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-SEP-20
Barium (Ba)-Dissolved		0.0475	0.0460		mg/L	3.4	20	19-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-SEP-20
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-SEP-20
Cadmium (Cd)-Dissolved		0.0000145	0.0000162		mg/L	11	20	19-SEP-20
Calcium (Ca)-Dissolved		73.8	69.3		mg/L	6.2	20	19-SEP-20
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-SEP-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-SEP-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	19-SEP-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	19-SEP-20
Lithium (Li)-Dissolved		0.0088	0.0085		mg/L	3.4	20	19-SEP-20
Magnesium (Mg)-Dissolved		24.7	24.7		mg/L	0.0	20	19-SEP-20
Manganese (Mn)-Dissolved		0.00079	0.00074		mg/L	6.8	20	19-SEP-20
Molybdenum (Mo)-Dissolved		0.000924	0.000855		mg/L	7.7	20	19-SEP-20
Nickel (Ni)-Dissolved		0.00065	0.00065		mg/L	0.1	20	19-SEP-20
Potassium (K)-Dissolved		0.807	0.766		mg/L	5.2	20	19-SEP-20
Selenium (Se)-Dissolved		0.0206	0.0209		mg/L	1.5	20	19-SEP-20
Silicon (Si)-Dissolved		1.46	1.45		mg/L	0.5	20	19-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-SEP-20
Sodium (Na)-Dissolved		0.647	0.623		mg/L	3.8	20	19-SEP-20
Strontium (Sr)-Dissolved		0.125	0.121		mg/L	3.7	20	19-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-SEP-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	19-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-SEP-20
Uranium (U)-Dissolved		0.00116	0.00110		mg/L	5.4	20	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407983-3 DUP		**L2504032-1**						
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	19-SEP-20
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	19-SEP-20
WG3407983-2 LCS								
Aluminum (Al)-Dissolved			94.2		%		80-120	19-SEP-20
Antimony (Sb)-Dissolved			94.7		%		80-120	19-SEP-20
Arsenic (As)-Dissolved			96.0		%		80-120	19-SEP-20
Barium (Ba)-Dissolved			108.0		%		80-120	19-SEP-20
Bismuth (Bi)-Dissolved			90.8		%		80-120	19-SEP-20
Boron (B)-Dissolved			90.3		%		80-120	19-SEP-20
Cadmium (Cd)-Dissolved			93.8		%		80-120	19-SEP-20
Calcium (Ca)-Dissolved			97.3		%		80-120	19-SEP-20
Chromium (Cr)-Dissolved			100.7		%		80-120	19-SEP-20
Cobalt (Co)-Dissolved			95.1		%		80-120	19-SEP-20
Copper (Cu)-Dissolved			94.5		%		80-120	19-SEP-20
Iron (Fe)-Dissolved			92.3		%		80-120	19-SEP-20
Lead (Pb)-Dissolved			99.1		%		80-120	19-SEP-20
Lithium (Li)-Dissolved			103.4		%		80-120	19-SEP-20
Magnesium (Mg)-Dissolved			98.2		%		80-120	19-SEP-20
Manganese (Mn)-Dissolved			94.9		%		80-120	19-SEP-20
Molybdenum (Mo)-Dissolved			95.6		%		80-120	19-SEP-20
Nickel (Ni)-Dissolved			94.6		%		80-120	19-SEP-20
Potassium (K)-Dissolved			96.4		%		80-120	19-SEP-20
Selenium (Se)-Dissolved			94.1		%		80-120	19-SEP-20
Silicon (Si)-Dissolved			99.4		%		60-140	19-SEP-20
Silver (Ag)-Dissolved			98.6		%		80-120	19-SEP-20
Sodium (Na)-Dissolved			94.4		%		80-120	19-SEP-20
Strontium (Sr)-Dissolved			101.3		%		80-120	19-SEP-20
Thallium (Tl)-Dissolved			98.8		%		80-120	19-SEP-20
Tin (Sn)-Dissolved			92.9		%		80-120	19-SEP-20
Titanium (Ti)-Dissolved			88.6		%		80-120	19-SEP-20
Uranium (U)-Dissolved			97.1		%		80-120	19-SEP-20
Vanadium (V)-Dissolved			96.9		%		80-120	19-SEP-20
Zinc (Zn)-Dissolved			92.1		%		80-120	19-SEP-20
WG3407983-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407983-1 MB		**NP**						
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	19-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
WG3407983-4 MS		**L2504032-2**						
Aluminum (Al)-Dissolved			94.3		%		70-130	19-SEP-20
Antimony (Sb)-Dissolved			101.2		%		70-130	19-SEP-20
Arsenic (As)-Dissolved			101.6		%		70-130	19-SEP-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407983-4 MS		**L2504032-2**						
Bismuth (Bi)-Dissolved			81.7		%		70-130	19-SEP-20
Boron (B)-Dissolved			99.6		%		70-130	19-SEP-20
Cadmium (Cd)-Dissolved			95.6		%		70-130	19-SEP-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	19-SEP-20
Chromium (Cr)-Dissolved			97.9		%		70-130	19-SEP-20
Cobalt (Co)-Dissolved			91.2		%		70-130	19-SEP-20
Copper (Cu)-Dissolved			89.0		%		70-130	19-SEP-20
Iron (Fe)-Dissolved			95.6		%		70-130	19-SEP-20
Lead (Pb)-Dissolved			91.3		%		70-130	19-SEP-20
Lithium (Li)-Dissolved			95.7		%		70-130	19-SEP-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	19-SEP-20
Manganese (Mn)-Dissolved			90.2		%		70-130	19-SEP-20
Molybdenum (Mo)-Dissolved			101.3		%		70-130	19-SEP-20
Nickel (Ni)-Dissolved			90.8		%		70-130	19-SEP-20
Potassium (K)-Dissolved			96.3		%		70-130	19-SEP-20
Selenium (Se)-Dissolved			N/A	MS-B	%		-	19-SEP-20
Silicon (Si)-Dissolved			87.0		%		70-130	19-SEP-20
Silver (Ag)-Dissolved			98.9		%		70-130	19-SEP-20
Sodium (Na)-Dissolved			85.3		%		70-130	19-SEP-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	19-SEP-20
Thallium (Tl)-Dissolved			91.9		%		70-130	19-SEP-20
Tin (Sn)-Dissolved			98.2		%		70-130	19-SEP-20
Titanium (Ti)-Dissolved			91.3		%		70-130	19-SEP-20
Uranium (U)-Dissolved			93.8		%		70-130	19-SEP-20
Vanadium (V)-Dissolved			97.1		%		70-130	19-SEP-20
Zinc (Zn)-Dissolved			90.3		%		70-130	19-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-3 DUP		**L2504032-1**						
Aluminum (Al)-Total		0.0095	0.0076	J	mg/L	0.0019	0.006	20-SEP-20
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-SEP-20
Arsenic (As)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	20-SEP-20
Barium (Ba)-Total		0.0414	0.0427		mg/L	3.1	20	20-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-3 DUP		**L2504032-1**						
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-SEP-20
Cadmium (Cd)-Total		0.0000211	0.0000201		mg/L	4.9	20	20-SEP-20
Calcium (Ca)-Total		71.2	70.5		mg/L	1.0	20	20-SEP-20
Chromium (Cr)-Total		0.00016	0.00010	J	mg/L	0.00006	0.0002	20-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-SEP-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-SEP-20
Iron (Fe)-Total		0.010	<0.010	RPD-NA	mg/L	N/A	20	20-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-SEP-20
Lithium (Li)-Total		0.0085	0.0084		mg/L	0.5	20	20-SEP-20
Magnesium (Mg)-Total		25.9	25.7		mg/L	1.0	20	20-SEP-20
Manganese (Mn)-Total		0.00174	0.00181		mg/L	3.5	20	20-SEP-20
Molybdenum (Mo)-Total		0.000878	0.000892		mg/L	1.5	20	20-SEP-20
Nickel (Ni)-Total		0.00061	0.00057		mg/L	7.9	20	20-SEP-20
Potassium (K)-Total		0.817	0.795		mg/L	2.7	20	20-SEP-20
Selenium (Se)-Total		0.0227	0.0228		mg/L	0.4	20	20-SEP-20
Silicon (Si)-Total		1.59	1.55		mg/L	2.6	20	20-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-SEP-20
Sodium (Na)-Total		0.693	0.672		mg/L	2.9	20	20-SEP-20
Strontium (Sr)-Total		0.124	0.123		mg/L	0.9	20	20-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-SEP-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	20-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	20-SEP-20
Uranium (U)-Total		0.00107	0.00106		mg/L	0.9	20	20-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	20-SEP-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	20-SEP-20
WG3407922-2 LCS								
Aluminum (Al)-Total			104.0		%		80-120	20-SEP-20
Antimony (Sb)-Total			106.6		%		80-120	20-SEP-20
Arsenic (As)-Total			100.5		%		80-120	20-SEP-20
Barium (Ba)-Total			99.9		%		80-120	20-SEP-20
Bismuth (Bi)-Total			103.8		%		80-120	20-SEP-20
Boron (B)-Total			92.1		%		80-120	20-SEP-20
Cadmium (Cd)-Total			103.0		%		80-120	20-SEP-20
Calcium (Ca)-Total			102.4		%		80-120	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-2 LCS								
Chromium (Cr)-Total			101.4		%		80-120	20-SEP-20
Cobalt (Co)-Total			101.0		%		80-120	20-SEP-20
Copper (Cu)-Total			100.5		%		80-120	20-SEP-20
Iron (Fe)-Total			99.7		%		80-120	20-SEP-20
Lead (Pb)-Total			102.7		%		80-120	20-SEP-20
Lithium (Li)-Total			96.8		%		80-120	20-SEP-20
Magnesium (Mg)-Total			101.6		%		80-120	20-SEP-20
Manganese (Mn)-Total			106.3		%		80-120	20-SEP-20
Molybdenum (Mo)-Total			103.4		%		80-120	20-SEP-20
Nickel (Ni)-Total			103.6		%		80-120	20-SEP-20
Potassium (K)-Total			106.7		%		80-120	20-SEP-20
Selenium (Se)-Total			103.4		%		80-120	20-SEP-20
Silicon (Si)-Total			109.1		%		80-120	20-SEP-20
Silver (Ag)-Total			105.8		%		80-120	20-SEP-20
Sodium (Na)-Total			102.4		%		80-120	20-SEP-20
Strontium (Sr)-Total			105.8		%		80-120	20-SEP-20
Thallium (Tl)-Total			101.8		%		80-120	20-SEP-20
Tin (Sn)-Total			101.4		%		80-120	20-SEP-20
Titanium (Ti)-Total			100.2		%		80-120	20-SEP-20
Uranium (U)-Total			101.3		%		80-120	20-SEP-20
Vanadium (V)-Total			105.0		%		80-120	20-SEP-20
Zinc (Zn)-Total			104.9		%		80-120	20-SEP-20
WG3407922-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	20-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	20-SEP-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	20-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	20-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-1 MB								
Iron (Fe)-Total			<0.010		mg/L		0.01	20-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	20-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	20-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	20-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	20-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	20-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	20-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	20-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	20-SEP-20
WG3407922-4 MS		**L2504032-2**						
Aluminum (Al)-Total			100.2		%		70-130	20-SEP-20
Antimony (Sb)-Total			100.9		%		70-130	20-SEP-20
Arsenic (As)-Total			96.9		%		70-130	20-SEP-20
Barium (Ba)-Total			N/A	MS-B	%		-	20-SEP-20
Bismuth (Bi)-Total			91.3		%		70-130	20-SEP-20
Boron (B)-Total			89.7		%		70-130	20-SEP-20
Cadmium (Cd)-Total			97.9		%		70-130	20-SEP-20
Calcium (Ca)-Total			N/A	MS-B	%		-	20-SEP-20
Chromium (Cr)-Total			100.3		%		70-130	20-SEP-20
Cobalt (Co)-Total			94.2		%		70-130	20-SEP-20
Copper (Cu)-Total			93.2		%		70-130	20-SEP-20
Iron (Fe)-Total			98.3		%		70-130	20-SEP-20
Lead (Pb)-Total			92.3		%		70-130	20-SEP-20
Lithium (Li)-Total			94.8		%		70-130	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-4 MS		**L2504032-2**						
Magnesium (Mg)-Total			N/A	MS-B	%		-	20-SEP-20
Manganese (Mn)-Total			98.4		%		70-130	20-SEP-20
Molybdenum (Mo)-Total			101.5		%		70-130	20-SEP-20
Nickel (Ni)-Total			95.9		%		70-130	20-SEP-20
Potassium (K)-Total			101.3		%		70-130	20-SEP-20
Selenium (Se)-Total			N/A	MS-B	%		-	20-SEP-20
Silicon (Si)-Total			96.1		%		70-130	20-SEP-20
Silver (Ag)-Total			99.9		%		70-130	20-SEP-20
Sodium (Na)-Total			94.8		%		70-130	20-SEP-20
Strontium (Sr)-Total			N/A	MS-B	%		-	20-SEP-20
Thallium (Tl)-Total			93.1		%		70-130	20-SEP-20
Tin (Sn)-Total			99.2		%		70-130	20-SEP-20
Titanium (Ti)-Total			101.8		%		70-130	20-SEP-20
Uranium (U)-Total			88.6		%		70-130	20-SEP-20
Vanadium (V)-Total			103.4		%		70-130	20-SEP-20
Zinc (Zn)-Total			97.8		%		70-130	20-SEP-20
NH3-L-F-CL	**Water**							
Batch R5229599								
WG3407646-22 LCS								
Ammonia as N			106.0		%		85-115	18-SEP-20
WG3407646-21 MB								
Ammonia as N			<0.0050		mg/L		0.005	18-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5226660								
WG3406632-10 LCS								
Nitrite (as N)			101.2		%		90-110	16-SEP-20
WG3406632-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	16-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5226660								
WG3406632-10 LCS								
Nitrate (as N)			99.0		%		90-110	16-SEP-20
WG3406632-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	16-SEP-20
ORP-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ORP-CL	**Water**							
Batch R5228156								
WG3407057-2 CRM		**CL-ORP**						
ORP			222		mV		210-230	17-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5230972								
WG3408145-18 LCS								
Phosphorus (P)-Total			98.0		%		80-120	19-SEP-20
WG3408145-17 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	19-SEP-20
PH-CL	**Water**							
Batch R5229761								
WG3407727-14 LCS								
pH			6.98		pH		6.9-7.1	18-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5226819								
WG3405836-6 LCS								
Orthophosphate-Dissolved (as P)			107.0		%		80-120	16-SEP-20
WG3405836-5 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	16-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5226660								
WG3406632-10 LCS								
Sulfate (SO4)			100.4		%		90-110	16-SEP-20
WG3406632-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	16-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5230918								
WG3407235-8 LCS								
Total Dissolved Solids			97.6		%		85-115	18-SEP-20
WG3407235-7 MB								
Total Dissolved Solids			<10		mg/L		10	18-SEP-20
TKN-L-F-CL	**Water**							
Batch R5228968								
WG3407350-2 LCS								
Total Kjeldahl Nitrogen			95.1		%		75-125	18-SEP-20
WG3407350-4 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5228968								
WG3407350-4 LCS								
Total Kjeldahl Nitrogen			117.8		%		75-125	19-SEP-20
WG3407350-6 LCS								
Total Kjeldahl Nitrogen			100.4		%		75-125	19-SEP-20
WG3407350-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	18-SEP-20
WG3407350-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	19-SEP-20
TSS-L-CL	**Water**							
Batch R5230959								
WG3407234-6 LCS								
Total Suspended Solids			92.4		%		85-115	18-SEP-20
WG3407234-5 MB								
Total Suspended Solids			<1.0		mg/L		1	18-SEP-20
TURBIDITY-CL	**Water**							
Batch R5228150								
WG3406697-3 LCS								
Turbidity			98.5		%		85-115	17-SEP-20
WG3406697-2 MB								
Turbidity			<0.10		NTU		0.1	17-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	15-SEP-20 09:30	17-SEP-20 12:15	0.25	51	hours	EHTR-FM
	2	15-SEP-20 13:05	17-SEP-20 12:15	0.25	47	hours	EHTR-FM
pH							
	1	15-SEP-20 09:30	18-SEP-20 14:00	0.25	77	hours	EHTR-FM
	2	15-SEP-20 13:05	18-SEP-20 14:00	0.25	73	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2504032 were received on 16-SEP-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	FRO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@mininnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
PSchnorr@mininnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2504032-COFC

ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FODHE_WS_LAEMP_FRO_2020-09_NP	RG_FODHE	WS	No	9/15/2020	9:30	G	7	1	1	1	1	1	1	1
RG_MP1_WS_LAEMP_FRO_2020-09_NP	RG_MP1	WS	No	9/15/2020	13:05	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 15, 2020	

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 15, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 17-SEP-20
Report Date: 24-SEP-20 12:23 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2504570

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP SEPT 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504570-1	L2504570-2	L2504570-3	L2504570-4	
	Description	WS	WS	WS	WS	
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	
	Sampled Time	09:15	09:15	09:15	09:15	
	Client ID	RG_HENUP_WS_LAEMP_FRO_2020-09_NP	RG_RIVER_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK_WS_LAEMP_FRO_2020-09_NP	RG_TRIP_WS_LAEMP_FRO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	308	311	<2.0	<2.0	
	Hardness (as CaCO3) (mg/L)	156	164	<0.50		
	pH (pH)	8.12	8.12	6.01	5.52	
	ORP (mV)	420	429	465	458	
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Total Dissolved Solids (mg/L)	181 DLHC	190 DLHC	<10	<10	
	Turbidity (NTU)	0.14	<0.10	<0.10	<0.10	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	1.7	1.9	
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	106	107	<1.0	<1.0	
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	106	107	<1.0	<1.0	
	Ammonia as N (mg/L)	0.0160	0.0086	<0.0050	<0.0050	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	0.17	0.16	<0.10	<0.10	
	Fluoride (F) (mg/L)	0.330	0.329	<0.020	<0.020	
	Ion Balance (%)	95.2	99.6	0.0	0.0	
	Nitrate (as N) (mg/L)	0.188	0.201	<0.0050	<0.0050	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.054	<0.050	<0.050	<0.050	
	Orthophosphate-Dissolved (as P) (mg/L)	0.0013	0.0011	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
	Sulfate (SO4) (mg/L)	54.5	54.6	<0.30	<0.30	
	Anion Sum (meq/L)	3.30	3.31	<0.10	<0.10	
	Cation Sum (meq/L)	3.14	3.30	<0.10	<0.10	
	Cation - Anion Balance (%)	-2.5	-0.2	0.0	0.0	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50	<0.50		
	Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	0.0034	<0.0030	<0.0030	
	Antimony (Sb)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Arsenic (As)-Total (mg/L)	<0.00010	0.00011	<0.00010	<0.00010	
	Barium (Ba)-Total (mg/L)	0.0126	0.0128	0.00039 RRV	<0.00010	
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Total (ug/L)	0.0060	<0.0050	<0.0050	<0.0050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504570-1	L2504570-2	L2504570-3	L2504570-4	
	Description	WS	WS	WS	WS	
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	
	Sampled Time	09:15	09:15	09:15	09:15	
	Client ID	RG_HENUP_WS_LAEMP_FRO_2020-09_NP	RG_RIVER_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK_WS_LAEMP_FRO_2020-09_NP	RG_TRIP_WS_LAEMP_FRO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	45.7	46.1	<0.050	<0.050	
	Chromium (Cr)-Total (mg/L)	0.00030	0.00014	0.00015 RRV	<0.00010	
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	0.00080 RRV	<0.00050	
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0011	<0.0010	<0.0010	<0.0010	
	Magnesium (Mg)-Total (mg/L)	10.5	10.5	<0.10	<0.10	
	Manganese (Mn)-Total (mg/L)	<0.00010	<0.00010	0.00014 RRV	<0.00010	
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Molybdenum (Mo)-Total (mg/L)	0.000573	0.000553	<0.000050	<0.000050	
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Potassium (K)-Total (mg/L)	0.193	0.198	<0.050	<0.050	
	Selenium (Se)-Total (ug/L)	1.03	1.10	<0.050	<0.050	
	Silicon (Si)-Total (mg/L)	1.25	1.22	<0.10	<0.10	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	0.320	0.329	0.158 RRV	<0.050	
	Strontium (Sr)-Total (mg/L)	0.139	0.139	0.00028 RRV	<0.00020	
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.000762	0.000754	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	LAB	
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0131	0.0134	0.00026 RRV		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Cadmium (Cd)-Dissolved (ug/L)	<0.0050	<0.0050	<0.0050		
	Calcium (Ca)-Dissolved (mg/L)	45.8	49.1	<0.050	<0.050	
	Chromium (Cr)-Dissolved (mg/L)	0.00012	0.00012	<0.00010		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2504570-1	L2504570-2	L2504570-3	L2504570-4	
	Description	WS	WS	WS	WS	
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	15-SEP-20	
	Sampled Time	09:15	09:15	09:15	09:15	
	Client ID	RG_HENUP_WS_LAEMP_FRO_2020-09_NP	RG_RIVER_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK_WS_LAEMP_FRO_2020-09_NP	RG_TRIP_WS_LAEMP_FRO_2020-09_NP	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00033 RRV		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0011	<0.0010	<0.0010		
	Magnesium (Mg)-Dissolved (mg/L)	10.1	10.0	<0.10	<0.0050	
	Manganese (Mn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000574	0.000580	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Potassium (K)-Dissolved (mg/L)	0.204	0.202	<0.050	<0.050	
	Selenium (Se)-Dissolved (ug/L)	1.06	0.993	<0.050		
	Silicon (Si)-Dissolved (mg/L)	1.11	1.15	0.058 RRV		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	0.323	0.318	0.144 RRV	<0.050	
	Strontium (Sr)-Dissolved (mg/L)	0.143	0.144	0.00021 RRV		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	0.00016 RRV		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000806	0.000800	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0011	0.0012	<0.0010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Total	MS-B	L2504570-1, -2, -3, -4
Matrix Spike	Barium (Ba)-Total	MS-B	L2504570-3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2504570-1, -2, -3, -4
Matrix Spike	Calcium (Ca)-Total	MS-B	L2504570-3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2504570-1, -2, -3, -4
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2504570-3
Matrix Spike	Selenium (Se)-Total	MS-B	L2504570-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2504570-1, -2, -3, -4
Matrix Spike	Strontium (Sr)-Total	MS-B	L2504570-3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP SEPT 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5229719								
WG3407723-11 LCS								
Acidity (as CaCO3)			98.7		%		85-115	18-SEP-20
WG3407723-10 MB								
Acidity (as CaCO3)			1.8		mg/L		2	18-SEP-20
ALK-MAN-CL	**Water**							
Batch R5232154								
WG3409751-8 LCS								
Alkalinity, Total (as CaCO3)			102.7		%		85-115	22-SEP-20
WG3409751-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	22-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5231479								
WG3407962-2 LCS								
Beryllium (Be)-Dissolved			103.7		%		80-120	19-SEP-20
WG3407962-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	19-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-2 LCS								
Beryllium (Be)-Total			99.8		%		80-120	20-SEP-20
WG3407922-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	20-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Bromide (Br)			102.0		%		85-115	17-SEP-20
WG3407420-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	17-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5231563								
WG3408957-2 LCS								
Dissolved Organic Carbon			87.2		%		80-120	20-SEP-20
WG3408957-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5231563								
WG3408957-2 LCS								
Total Organic Carbon			113.4		%		80-120	20-SEP-20
WG3408957-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	20-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Chloride (Cl)			99.1		%		85-115	17-SEP-20
WG3407420-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	17-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5232154								
WG3409751-8 LCS								
Conductivity (@ 25C)			99.9		%		90-110	22-SEP-20
WG3409751-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	22-SEP-20
F-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Fluoride (F)			103.5		%		90-110	17-SEP-20
WG3407420-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	17-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5231937								
WG3409373-11 DUP		**L2504570-1**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	22-SEP-20
WG3409373-10 LCS								
Mercury (Hg)-Dissolved			98.3		%		80-120	22-SEP-20
WG3409373-9 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	22-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5233172								
WG3410889-2 LCS								
Mercury (Hg)-Total			94.4		%		80-120	23-SEP-20
WG3410889-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	23-SEP-20
MET-D-CCMS-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5226619								
WG3407012-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			102.1		%		80-120	17-SEP-20
Magnesium (Mg)-Dissolved			103.7		%		80-120	17-SEP-20
Potassium (K)-Dissolved			101.9		%		80-120	17-SEP-20
Sodium (Na)-Dissolved			99.96		%		80-120	17-SEP-20
WG3407012-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	17-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	17-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407962-2 LCS								
Aluminum (Al)-Dissolved			101.4		%		80-120	19-SEP-20
Antimony (Sb)-Dissolved			104.2		%		80-120	19-SEP-20
Arsenic (As)-Dissolved			99.6		%		80-120	19-SEP-20
Barium (Ba)-Dissolved			106.4		%		80-120	19-SEP-20
Bismuth (Bi)-Dissolved			96.4		%		80-120	19-SEP-20
Boron (B)-Dissolved			105.6		%		80-120	19-SEP-20
Cadmium (Cd)-Dissolved			98.9		%		80-120	19-SEP-20
Calcium (Ca)-Dissolved			106.6		%		80-120	19-SEP-20
Chromium (Cr)-Dissolved			103.3		%		80-120	19-SEP-20
Cobalt (Co)-Dissolved			98.7		%		80-120	19-SEP-20
Copper (Cu)-Dissolved			97.4		%		80-120	19-SEP-20
Iron (Fe)-Dissolved			98.9		%		80-120	19-SEP-20
Lead (Pb)-Dissolved			100.6		%		80-120	19-SEP-20
Lithium (Li)-Dissolved			110.0		%		80-120	19-SEP-20
Magnesium (Mg)-Dissolved			97.0		%		80-120	19-SEP-20
Manganese (Mn)-Dissolved			100.3		%		80-120	19-SEP-20
Molybdenum (Mo)-Dissolved			106.3		%		80-120	19-SEP-20
Nickel (Ni)-Dissolved			99.2		%		80-120	19-SEP-20
Potassium (K)-Dissolved			102.2		%		80-120	19-SEP-20
Selenium (Se)-Dissolved			97.6		%		80-120	19-SEP-20
Silicon (Si)-Dissolved			103.2		%		60-140	19-SEP-20
Silver (Ag)-Dissolved			108.9		%		80-120	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407962-2 LCS								
Sodium (Na)-Dissolved			101.8		%		80-120	19-SEP-20
Strontium (Sr)-Dissolved			117.8		%		80-120	19-SEP-20
Thallium (Tl)-Dissolved			99.5		%		80-120	19-SEP-20
Tin (Sn)-Dissolved			101.8		%		80-120	19-SEP-20
Titanium (Ti)-Dissolved			92.9		%		80-120	19-SEP-20
Uranium (U)-Dissolved			101.6		%		80-120	19-SEP-20
Vanadium (V)-Dissolved			100.1		%		80-120	19-SEP-20
Zinc (Zn)-Dissolved			97.9		%		80-120	19-SEP-20
WG3407962-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-SEP-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	19-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	19-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	19-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	19-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	19-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5231479								
WG3407962-1 MB		**NP**						
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	19-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	19-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	19-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	19-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-SEP-20
Batch R5232289								
WG3409368-3 DUP		**L2504570-3**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	22-SEP-20
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-SEP-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-SEP-20
Barium (Ba)-Dissolved		0.00026	0.00025		mg/L	4.1	20	22-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-SEP-20
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-SEP-20
Cadmium (Cd)-Dissolved		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	22-SEP-20
Calcium (Ca)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-SEP-20
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-SEP-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	22-SEP-20
Copper (Cu)-Dissolved		0.00033	0.00031		mg/L	5.3	20	22-SEP-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-SEP-20
Lithium (Li)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-SEP-20
Magnesium (Mg)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	22-SEP-20
Manganese (Mn)-Dissolved		<0.00010	0.00011		mg/L	9.1	20	22-SEP-20
Molybdenum (Mo)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-SEP-20
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-SEP-20
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	22-SEP-20
Selenium (Se)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	22-SEP-20
Silicon (Si)-Dissolved		0.058	0.056		mg/L	4.4	20	22-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-SEP-20
Sodium (Na)-Dissolved		0.144	0.143		mg/L	0.8	20	22-SEP-20
Strontium (Sr)-Dissolved		0.00021	0.00021		mg/L	0.4	20	22-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-SEP-20
Tin (Sn)-Dissolved		0.00016	0.00017		mg/L	2.8	20	22-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5232289								
WG3409368-3 DUP		**L2504570-3**						
Uranium (U)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	22-SEP-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-SEP-20
Zinc (Zn)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	22-SEP-20
WG3409368-2 LCS								
Aluminum (Al)-Dissolved			107.9		%		80-120	22-SEP-20
Antimony (Sb)-Dissolved			105.7		%		80-120	22-SEP-20
Arsenic (As)-Dissolved			103.4		%		80-120	22-SEP-20
Barium (Ba)-Dissolved			105.5		%		80-120	22-SEP-20
Bismuth (Bi)-Dissolved			107.1		%		80-120	22-SEP-20
Boron (B)-Dissolved			93.2		%		80-120	22-SEP-20
Cadmium (Cd)-Dissolved			108.1		%		80-120	22-SEP-20
Calcium (Ca)-Dissolved			98.3		%		80-120	22-SEP-20
Chromium (Cr)-Dissolved			107.1		%		80-120	22-SEP-20
Cobalt (Co)-Dissolved			103.5		%		80-120	22-SEP-20
Copper (Cu)-Dissolved			103.9		%		80-120	22-SEP-20
Iron (Fe)-Dissolved			103.7		%		80-120	22-SEP-20
Lead (Pb)-Dissolved			104.9		%		80-120	22-SEP-20
Lithium (Li)-Dissolved			91.2		%		80-120	22-SEP-20
Magnesium (Mg)-Dissolved			110.9		%		80-120	22-SEP-20
Manganese (Mn)-Dissolved			106.1		%		80-120	22-SEP-20
Molybdenum (Mo)-Dissolved			99.7		%		80-120	22-SEP-20
Nickel (Ni)-Dissolved			102.7		%		80-120	22-SEP-20
Potassium (K)-Dissolved			110.4		%		80-120	22-SEP-20
Selenium (Se)-Dissolved			101.4		%		80-120	22-SEP-20
Silicon (Si)-Dissolved			101.3		%		60-140	22-SEP-20
Silver (Ag)-Dissolved			105.3		%		80-120	22-SEP-20
Sodium (Na)-Dissolved			102.8		%		80-120	22-SEP-20
Strontium (Sr)-Dissolved			105.5		%		80-120	22-SEP-20
Thallium (Tl)-Dissolved			104.5		%		80-120	22-SEP-20
Tin (Sn)-Dissolved			104.0		%		80-120	22-SEP-20
Titanium (Ti)-Dissolved			103.5		%		80-120	22-SEP-20
Uranium (U)-Dissolved			105.8		%		80-120	22-SEP-20
Vanadium (V)-Dissolved			107.0		%		80-120	22-SEP-20
Zinc (Zn)-Dissolved			104.7		%		80-120	22-SEP-20
WG3409368-1 MB		**NP**						

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5232289								
WG3409368-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	22-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	22-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-SEP-20
Cadmium (Cd)-Dissolved			<0.000005C		mg/L		0.000005	22-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	22-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	22-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	22-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	22-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	22-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	22-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	22-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	22-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	22-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	22-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	22-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	22-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	22-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	22-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	22-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	22-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	22-SEP-20
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-2 LCS								
Aluminum (Al)-Total			104.0		%		80-120	20-SEP-20
Antimony (Sb)-Total			106.6		%		80-120	20-SEP-20
Arsenic (As)-Total			100.5		%		80-120	20-SEP-20
Barium (Ba)-Total			99.9		%		80-120	20-SEP-20
Bismuth (Bi)-Total			103.8		%		80-120	20-SEP-20
Boron (B)-Total			92.1		%		80-120	20-SEP-20
Cadmium (Cd)-Total			103.0		%		80-120	20-SEP-20
Calcium (Ca)-Total			102.4		%		80-120	20-SEP-20
Chromium (Cr)-Total			101.4		%		80-120	20-SEP-20
Cobalt (Co)-Total			101.0		%		80-120	20-SEP-20
Copper (Cu)-Total			100.5		%		80-120	20-SEP-20
Iron (Fe)-Total			99.7		%		80-120	20-SEP-20
Lead (Pb)-Total			102.7		%		80-120	20-SEP-20
Lithium (Li)-Total			96.8		%		80-120	20-SEP-20
Magnesium (Mg)-Total			101.6		%		80-120	20-SEP-20
Manganese (Mn)-Total			106.3		%		80-120	20-SEP-20
Molybdenum (Mo)-Total			103.4		%		80-120	20-SEP-20
Nickel (Ni)-Total			103.6		%		80-120	20-SEP-20
Potassium (K)-Total			106.7		%		80-120	20-SEP-20
Selenium (Se)-Total			103.4		%		80-120	20-SEP-20
Silicon (Si)-Total			109.1		%		80-120	20-SEP-20
Silver (Ag)-Total			105.8		%		80-120	20-SEP-20
Sodium (Na)-Total			102.4		%		80-120	20-SEP-20
Strontium (Sr)-Total			105.8		%		80-120	20-SEP-20
Thallium (Tl)-Total			101.8		%		80-120	20-SEP-20
Tin (Sn)-Total			101.4		%		80-120	20-SEP-20
Titanium (Ti)-Total			100.2		%		80-120	20-SEP-20
Uranium (U)-Total			101.3		%		80-120	20-SEP-20
Vanadium (V)-Total			105.0		%		80-120	20-SEP-20
Zinc (Zn)-Total			104.9		%		80-120	20-SEP-20
WG3407922-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	20-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231517								
WG3407922-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	20-SEP-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	20-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	20-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	20-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	20-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	20-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	20-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	20-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	20-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	20-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	20-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	20-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	20-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	20-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	20-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	20-SEP-20
Batch R5232851								
WG3409113-2 LCS								
Aluminum (Al)-Total			101.9		%		80-120	23-SEP-20
Antimony (Sb)-Total			108.1		%		80-120	23-SEP-20
Arsenic (As)-Total			98.6		%		80-120	23-SEP-20
Barium (Ba)-Total			108.8		%		80-120	23-SEP-20
Bismuth (Bi)-Total			102.8		%		80-120	23-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5232851								
WG3409113-2 LCS								
Boron (B)-Total			96.0		%		80-120	23-SEP-20
Cadmium (Cd)-Total			95.0		%		80-120	23-SEP-20
Calcium (Ca)-Total			103.2		%		80-120	23-SEP-20
Chromium (Cr)-Total			100.2		%		80-120	23-SEP-20
Cobalt (Co)-Total			96.5		%		80-120	23-SEP-20
Copper (Cu)-Total			98.8		%		80-120	23-SEP-20
Iron (Fe)-Total			98.4		%		80-120	23-SEP-20
Lead (Pb)-Total			98.8		%		80-120	23-SEP-20
Lithium (Li)-Total			99.6		%		80-120	23-SEP-20
Magnesium (Mg)-Total			95.7		%		80-120	23-SEP-20
Manganese (Mn)-Total			99.8		%		80-120	23-SEP-20
Molybdenum (Mo)-Total			104.2		%		80-120	23-SEP-20
Nickel (Ni)-Total			99.6		%		80-120	23-SEP-20
Potassium (K)-Total			101.2		%		80-120	23-SEP-20
Selenium (Se)-Total			97.0		%		80-120	23-SEP-20
Silicon (Si)-Total			100.8		%		80-120	23-SEP-20
Silver (Ag)-Total			105.2		%		80-120	23-SEP-20
Sodium (Na)-Total			99.1		%		80-120	23-SEP-20
Strontium (Sr)-Total			109.3		%		80-120	23-SEP-20
Thallium (Tl)-Total			104.2		%		80-120	23-SEP-20
Tin (Sn)-Total			99.97		%		80-120	23-SEP-20
Titanium (Ti)-Total			97.0		%		80-120	23-SEP-20
Uranium (U)-Total			97.2		%		80-120	23-SEP-20
Vanadium (V)-Total			102.7		%		80-120	23-SEP-20
Zinc (Zn)-Total			102.8		%		80-120	23-SEP-20
WG3409113-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	23-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	23-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	23-SEP-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	23-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	23-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5232851								
WG3409113-1 MB								
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	23-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	23-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	23-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	23-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	23-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	23-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	23-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	23-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	23-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	23-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	23-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	23-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	23-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	23-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	23-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	23-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	23-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	23-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	23-SEP-20
NH3-L-F-CL	**Water**							
Batch R5232236								
WG3409307-3 DUP		**L2504570-2**						
Ammonia as N		0.0086	0.0091		mg/L	5.6	20	21-SEP-20
WG3409307-2 LCS								
Ammonia as N			99.7		%		85-115	21-SEP-20
WG3409307-1 MB								
Ammonia as N			<0.0050		mg/L		0.005	21-SEP-20
WG3409307-4 MS		**L2504570-2**						
Ammonia as N			103.8		%		75-125	21-SEP-20
NO2-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Nitrite (as N)			101.4		%		90-110	17-SEP-20
WG3407420-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	17-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Nitrate (as N)			100.2		%		90-110	17-SEP-20
WG3407420-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	17-SEP-20
ORP-CL	**Water**							
Batch R5230757								
WG3407855-1 CRM		**CL-ORP**						
ORP			221		mV		210-230	18-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5232246								
WG3409788-6 LCS								
Phosphorus (P)-Total			99.0		%		80-120	22-SEP-20
WG3409788-5 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	22-SEP-20
PH-CL	**Water**							
Batch R5232154								
WG3409751-8 LCS								
pH			6.98		pH		6.9-7.1	22-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5228141								
WG3406978-4 LCS								
Orthophosphate-Dissolved (as P)			100.4		%		80-120	17-SEP-20
WG3406978-3 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	17-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-2 LCS								
Sulfate (SO4)			99.9		%		90-110	17-SEP-20
WG3407420-1 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5228923								
WG3407420-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	17-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5232371								
WG3408576-11 LCS								
Total Dissolved Solids			100.3		%		85-115	21-SEP-20
WG3408576-8 LCS								
Total Dissolved Solids			96.9		%		85-115	21-SEP-20
WG3408576-10 MB								
Total Dissolved Solids			<10		mg/L		10	21-SEP-20
WG3408576-7 MB								
Total Dissolved Solids			<10		mg/L		10	21-SEP-20
TKN-L-F-CL	**Water**							
Batch R5231791								
WG3409258-12 LCS								
Total Kjeldahl Nitrogen			93.7		%		75-125	21-SEP-20
WG3409258-16 LCS								
Total Kjeldahl Nitrogen			95.0		%		75-125	21-SEP-20
WG3409258-2 LCS								
Total Kjeldahl Nitrogen			94.1		%		75-125	21-SEP-20
WG3409258-20 LCS								
Total Kjeldahl Nitrogen			97.7		%		75-125	21-SEP-20
WG3409258-4 LCS								
Total Kjeldahl Nitrogen			101.8		%		75-125	21-SEP-20
WG3409258-8 LCS								
Total Kjeldahl Nitrogen			97.6		%		75-125	21-SEP-20
WG3409258-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-19 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-7 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5231791								
WG3409258-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
TSS-L-CL	**Water**							
Batch R5231562								
WG3408575-6 LCS								
Total Suspended Solids			89.6		%		85-115	21-SEP-20
WG3408575-8 LCS								
Total Suspended Solids			88.3		%		85-115	21-SEP-20
WG3408575-5 MB								
Total Suspended Solids			<1.0		mg/L		1	21-SEP-20
WG3408575-7 MB								
Total Suspended Solids			<1.0		mg/L		1	21-SEP-20
TURBIDITY-CL	**Water**							
Batch R5228150								
WG3406697-12 LCS								
Turbidity			96.5		%		85-115	17-SEP-20
WG3406697-11 MB								
Turbidity			<0.10		NTU		0.1	17-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	15-SEP-20 09:15	18-SEP-20 12:30	0.25	75	hours	EHTR-FM
	2	15-SEP-20 09:15	18-SEP-20 12:30	0.25	75	hours	EHTR-FM
	3	15-SEP-20 09:15	18-SEP-20 12:30	0.25	75	hours	EHTR-FM
	4	15-SEP-20 09:15	18-SEP-20 12:30	0.25	75	hours	EHTR-FM
pH							
	1	15-SEP-20 09:15	22-SEP-20 14:00	0.25	173	hours	EHTR-FM
	2	15-SEP-20 09:15	22-SEP-20 14:00	0.25	173	hours	EHTR-FM
	3	15-SEP-20 09:15	22-SEP-20 14:00	0.25	173	hours	EHTR-FM
	4	15-SEP-20 09:15	22-SEP-20 14:00	0.25	173	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2504570 were received on 17-SEP-20 10:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID:	FRO LAEMP Sept 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	ALS Calgary		
Lab Contact	Lyudmyla Shvets		
Email	lyudmyla.shvets@alsglobal.com		
Address	2559 29 Street NE		
City	Calgary	Province	AB
Postal Code	T1Y 7B5	Country	Canada
Phone Number	1 403 407 1794		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@hbrenow.ca	x	x	x
caitlie.meyer@teck.com	x	x	x
pschrum@hbrenow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2504570-COFC

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.
RG_HENUP_WS_LAEMP_FRO_2020-09_NP	RG_HENUP	WS	No	9/15/2020	9:15	G	7
RG_RIVER_WS_LAEMP_FRO_2020-09_NP	RG_RIVER	WS	No	9/15/2020	9:15	G	7
RG_FBLANK_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK	WS	No	9/15/2020	9:15	G	7
RG_TRIP_WS_LAEMP_FRO_2020-09_NP	RG_TRIP	WS	No	9/15/2020	9:15	G	4

ANALYSIS REQUESTED

Preserved or Filtered?		N	F	N	N	F	N	F
			H2SO4	H2SO4		HCL	HNO3	HNO3
Bottle Qty		TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
RG_HENUP_WS_LAEMP_FRO_2020-09_NP		1	1	1	1	1	1	1
RG_RIVER_WS_LAEMP_FRO_2020-09_NP		1	1	1	1	1	1	1
RG_FBLANK_WS_LAEMP_FRO_2020-09_NP		1	1	1	1	1	1	1
RG_TRIP_WS_LAEMP_FRO_2020-09_NP		1		1	1		1	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION: Jennifer Ings

DATE/TIME: September 16, 2020

ACCEPTED BY/AFFILIATION

9/17 1055

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 16, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 18-SEP-20
Report Date: 24-SEP-20 16:52 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2505277

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505277-1	L2505277-2	L2505277-3	L2505277-4	L2505277-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	08:20	09:30	09:15	09:30	15:30
	Client ID	RG_UFR1_WS_LAEMP_FRO_2020-09_NP	RG_FOBCP_WS_LAEMP_FRO_2020-09_NP	RG_FO26_WS_LAEMP_FRO_2020-09_NP	RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK_WS_LAEMP_FRO_2020-09_NP
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	354	1170	346	1190	<2.0
	Hardness (as CaCO3) (mg/L)	188	672	180	684	<0.50
	pH (pH)	8.25	8.37	8.25	8.35	5.85
	ORP (mV)	418	499	511	443	504
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	207 DLHC	869 DLHC	207 DLHC	895 DLHC	<10
	Turbidity (NTU)	0.27	0.45	0.23	0.36	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	1.5
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	153	<1.0	145	231	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	5.8	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	232	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	153	232	145	237	<1.0
	Ammonia as N (mg/L)	<0.0050	<0.0050	0.0226	0.0115	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.25 DLHC	<0.050	<0.25 DLHC	<0.050
	Chloride (Cl) (mg/L)	0.15	1.75 DLHC	0.20	1.72 DLHC	<0.10
	Fluoride (F) (mg/L)	0.166	0.20 DLHC	0.192	0.19 DLHC	<0.020
	Ion Balance (%)	95.8	93.9	93.1	93.4	0.0
	Nitrate (as N) (mg/L)	0.0066	15.3 DLHC	0.0322	17.2 DLHC	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	0.0063 DLHC	<0.0010	0.0245 DLHC	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	<0.050	0.426 TKNI	0.156	<0.050 TKNI	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0028	<0.0010	0.0023	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	0.0055 DLM	<0.0020 DLHC	0.0043 DLM	<0.0020 DLHC	<0.0020
	Sulfate (SO4) (mg/L)	42.6	416	47.8	421	<0.30
	Anion Sum (meq/L)	3.96	14.4	3.91	14.8	<0.10
	Cation Sum (meq/L)	3.79	13.6	3.64	13.8	<0.10
	Cation - Anion Balance (%)	-2.2	-3.1	-3.6	-3.4	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	0.81	<0.50	0.75	<0.50
	Total Organic Carbon (mg/L)	<0.50	1.06	<0.50	0.84	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	0.0064	0.0058	<0.0030
	Antimony (Sb)-Total (mg/L)	<0.00010	0.00029	<0.00010	0.00033	<0.00010
	Arsenic (As)-Total (mg/L)	0.00012	<0.00010	<0.00010	0.00012	<0.00010
	Barium (Ba)-Total (mg/L)	0.0787	0.0880	0.0503	0.0852	0.00031 RRV
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.012	<0.010	0.013	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0106	0.136	0.0136	0.181	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505277-1	L2505277-2	L2505277-3	L2505277-4	L2505277-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	08:20	09:30	09:15	09:30	15:30
	Client ID	RG_UFR1_WS_LAEMP_FRO_2020-09_NP	RG_FOBCP_WS_LAEMP_FRO_2020-09_NP	RG_FO26_WS_LAEMP_FRO_2020-09_NP	RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK_WS_LAEMP_FRO_2020-09_NP
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	50.1	149	51.7	150	<0.050
	Chromium (Cr)-Total (mg/L)	0.00013	<0.00010	0.00014	0.00012	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00066 RRV
	Iron (Fe)-Total (mg/L)	<0.010	0.018	<0.010	0.024	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0022	0.0455	0.0017	0.0447	<0.0010
	Magnesium (Mg)-Total (mg/L)	13.2	78.4	13.6	80.8	<0.10
	Manganese (Mn)-Total (mg/L)	0.00029	0.00489	0.00071	0.00881	0.00020 RRV
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.000626	0.00329	0.000666	0.00352	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00862	<0.00050	0.0106	<0.00050
	Potassium (K)-Total (mg/L)	0.455	2.32	0.439	2.49	<0.050
	Selenium (Se)-Total (ug/L)	0.706	116	0.646	123	<0.050
	Silicon (Si)-Total (mg/L)	2.02	2.14	1.89	2.17	<0.10
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.672	2.04	0.727	2.03	0.139 RRV
	Strontium (Sr)-Total (mg/L)	0.104	0.189	0.110	0.187	0.00023 RRV
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000010	<0.000010	0.000014	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00014 RRV
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000469	0.00469	0.000530	0.00504	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0069	<0.0030	0.0088	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00029	<0.00010	0.00033	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0837	0.0907	0.0514	0.0858	0.00029 RRV
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.011	<0.010	0.011	<0.010
	Cadmium (Cd)-Dissolved (ug/L)	0.0090	0.121	0.0070	0.154	<0.0050
	Calcium (Ca)-Dissolved (mg/L)	53.3	146	51.1	151	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00010	0.00010	<0.00010	0.00010	<0.00010
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505277-1	L2505277-2	L2505277-3	L2505277-4	L2505277-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	16-SEP-20	16-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	08:20	09:30	09:15	09:30	15:30
	Client ID	RG_UFR1_WS_LAEMP_FRO_2020-09_NP	RG_FOBCP_WS_LAEMP_FRO_2020-09_NP	RG_FO26_WS_LAEMP_FRO_2020-09_NP	RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK_WS_LAEMP_FRO_2020-09_NP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	0.00032 RRV
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.013	<0.010	0.016	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0018	0.0426	0.0013	0.0436	<0.0010
	Magnesium (Mg)-Dissolved (mg/L)	13.2	74.5	12.7	74.4	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.00013	0.00433	0.00018	0.00753	<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000633	0.00311	0.000664	0.00359	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00804	<0.00050	0.00992	<0.00050
	Potassium (K)-Dissolved (mg/L)	0.461	2.36	0.400	2.49	<0.050
	Selenium (Se)-Dissolved (ug/L)	0.643	121	0.700	130	<0.050
	Silicon (Si)-Dissolved (mg/L)	1.97	1.94	1.80	1.90	0.058 RRV
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	0.683	1.83	0.603	1.80	0.139 RRV
	Strontium (Sr)-Dissolved (mg/L)	0.107	0.186	0.112	0.184	0.00021 RRV
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000012	<0.000010	0.000013	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00024 RRV
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000458	0.00461	0.000493	0.00458	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0068	<0.0010	0.0087	<0.0010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Boron (B)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2505277-5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2505277-5
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2505277-5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2505277-5
Matrix Spike	Barium (Ba)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Calcium (Ca)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Cobalt (Co)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Lithium (Li)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Nickel (Ni)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Potassium (K)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Sodium (Na)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Strontium (Sr)-Total	MS-B	L2505277-1, -2, -3, -4, -5
Matrix Spike	Uranium (U)-Total	MS-B	L2505277-1, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon

Reference Information

and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL Water Total Organic Carbon APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL	Water	Oxidation redution potential by elect.	ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP Sept 2020

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5231675								
WG3409068-5 LCS								
Acidity (as CaCO3)			97.4		%		85-115	19-SEP-20
WG3409068-4 MB								
Acidity (as CaCO3)			1.6		mg/L		2	19-SEP-20
ALK-MAN-CL	**Water**							
Batch R5231980								
WG3409502-8 LCS								
Alkalinity, Total (as CaCO3)			100.4		%		85-115	21-SEP-20
WG3409502-7 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	21-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5232851								
WG3409290-2 LCS								
Beryllium (Be)-Dissolved			97.1		%		80-120	23-SEP-20
WG3409290-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	23-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5231880								
WG3408361-2 LCS								
Beryllium (Be)-Total			95.9		%		80-120	21-SEP-20
WG3408361-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	21-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5230862								
WG3408087-2 LCS								
Bromide (Br)			102.1		%		85-115	18-SEP-20
WG3408087-1 MB								
Bromide (Br)			<0.050		mg/L		0.05	18-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5232353								
WG3409899-10 LCS								
Dissolved Organic Carbon			95.6		%		80-120	21-SEP-20
WG3409899-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	21-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5232355								
WG3409924-2 LCS								
Dissolved Organic Carbon			87.5		%		80-120	21-SEP-20
WG3409924-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	21-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5232353								
WG3409899-10 LCS								
Total Organic Carbon			99.5		%		80-120	21-SEP-20
WG3409899-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	21-SEP-20
Batch R5232355								
WG3409924-2 LCS								
Total Organic Carbon			85.6		%		80-120	21-SEP-20
WG3409924-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	21-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5230862								
WG3408087-2 LCS								
Chloride (Cl)			100.6		%		85-115	18-SEP-20
WG3408087-1 MB								
Chloride (Cl)			<0.10		mg/L		0.1	18-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5231980								
WG3409502-8 LCS								
Conductivity (@ 25C)			100.2		%		90-110	21-SEP-20
WG3409502-7 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	21-SEP-20
F-IC-N-CL	**Water**							
Batch R5230862								
WG3408087-2 LCS								
Fluoride (F)			104.6		%		90-110	18-SEP-20
WG3408087-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	18-SEP-20
HG-D-CVAA-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5233684								
WG3411190-6 LCS								
Mercury (Hg)-Dissolved			95.5		%		80-120	24-SEP-20
WG3411190-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	24-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5233172								
WG3410889-2 LCS								
Mercury (Hg)-Total			94.4		%		80-120	23-SEP-20
WG3410889-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	23-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5232851								
WG3409290-2 LCS								
Aluminum (Al)-Dissolved			98.8		%		80-120	23-SEP-20
Antimony (Sb)-Dissolved			102.2		%		80-120	23-SEP-20
Arsenic (As)-Dissolved			100.2		%		80-120	23-SEP-20
Barium (Ba)-Dissolved			112.5		%		80-120	23-SEP-20
Bismuth (Bi)-Dissolved			96.5		%		80-120	23-SEP-20
Boron (B)-Dissolved			93.5		%		80-120	23-SEP-20
Cadmium (Cd)-Dissolved			95.6		%		80-120	23-SEP-20
Calcium (Ca)-Dissolved			100.3		%		80-120	23-SEP-20
Chromium (Cr)-Dissolved			99.3		%		80-120	23-SEP-20
Cobalt (Co)-Dissolved			96.6		%		80-120	23-SEP-20
Copper (Cu)-Dissolved			98.0		%		80-120	23-SEP-20
Iron (Fe)-Dissolved			98.2		%		80-120	23-SEP-20
Lead (Pb)-Dissolved			97.1		%		80-120	23-SEP-20
Lithium (Li)-Dissolved			96.7		%		80-120	23-SEP-20
Magnesium (Mg)-Dissolved			94.1		%		80-120	23-SEP-20
Manganese (Mn)-Dissolved			99.96		%		80-120	23-SEP-20
Molybdenum (Mo)-Dissolved			102.3		%		80-120	23-SEP-20
Nickel (Ni)-Dissolved			98.5		%		80-120	23-SEP-20
Potassium (K)-Dissolved			103.6		%		80-120	23-SEP-20
Selenium (Se)-Dissolved			104.8		%		80-120	23-SEP-20
Silicon (Si)-Dissolved			103.0		%		60-140	23-SEP-20
Silver (Ag)-Dissolved			104.6		%		80-120	23-SEP-20
Sodium (Na)-Dissolved			98.8		%		80-120	23-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5232851								
WG3409290-2 LCS								
Strontium (Sr)-Dissolved			107.6		%		80-120	23-SEP-20
Thallium (Tl)-Dissolved			100.5		%		80-120	23-SEP-20
Tin (Sn)-Dissolved			98.7		%		80-120	23-SEP-20
Titanium (Ti)-Dissolved			96.6		%		80-120	23-SEP-20
Uranium (U)-Dissolved			99.0		%		80-120	23-SEP-20
Vanadium (V)-Dissolved			101.7		%		80-120	23-SEP-20
Zinc (Zn)-Dissolved			104.9		%		80-120	23-SEP-20
WG3409290-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	23-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	23-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	23-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	23-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	23-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	23-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	23-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	23-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	23-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	23-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	23-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	23-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	23-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	23-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5232851								
WG3409290-1 MB		**NP**						
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	23-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	23-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	23-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	23-SEP-20
Batch R5235047								
WG3410822-2 LCS								
Aluminum (Al)-Dissolved			97.2		%		80-120	24-SEP-20
Antimony (Sb)-Dissolved			102.5		%		80-120	24-SEP-20
Arsenic (As)-Dissolved			98.6		%		80-120	24-SEP-20
Barium (Ba)-Dissolved			98.1		%		80-120	24-SEP-20
Bismuth (Bi)-Dissolved			105.7		%		80-120	24-SEP-20
Boron (B)-Dissolved			96.0		%		80-120	24-SEP-20
Cadmium (Cd)-Dissolved			96.8		%		80-120	24-SEP-20
Calcium (Ca)-Dissolved			95.0		%		80-120	24-SEP-20
Chromium (Cr)-Dissolved			97.7		%		80-120	24-SEP-20
Cobalt (Co)-Dissolved			98.5		%		80-120	24-SEP-20
Copper (Cu)-Dissolved			100.2		%		80-120	24-SEP-20
Iron (Fe)-Dissolved			92.7		%		80-120	24-SEP-20
Lead (Pb)-Dissolved			93.4		%		80-120	24-SEP-20
Lithium (Li)-Dissolved			87.4		%		80-120	24-SEP-20
Magnesium (Mg)-Dissolved			95.8		%		80-120	24-SEP-20
Manganese (Mn)-Dissolved			101.7		%		80-120	24-SEP-20
Molybdenum (Mo)-Dissolved			92.5		%		80-120	24-SEP-20
Nickel (Ni)-Dissolved			98.9		%		80-120	24-SEP-20
Potassium (K)-Dissolved			92.5		%		80-120	24-SEP-20
Selenium (Se)-Dissolved			101.9		%		80-120	24-SEP-20
Silicon (Si)-Dissolved			101.1		%		60-140	24-SEP-20
Silver (Ag)-Dissolved			91.1		%		80-120	24-SEP-20
Sodium (Na)-Dissolved			103.5		%		80-120	24-SEP-20
Strontium (Sr)-Dissolved			92.6		%		80-120	24-SEP-20
Thallium (Tl)-Dissolved			97.2		%		80-120	24-SEP-20
Tin (Sn)-Dissolved			97.7		%		80-120	24-SEP-20
Titanium (Ti)-Dissolved			93.6		%		80-120	24-SEP-20
Uranium (U)-Dissolved			90.6		%		80-120	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5235047								
WG3410822-2 LCS								
Vanadium (V)-Dissolved			98.3		%		80-120	24-SEP-20
Zinc (Zn)-Dissolved			96.4		%		80-120	24-SEP-20
WG3410822-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-SEP-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	24-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	24-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	24-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	24-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	24-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231880								
WG3408361-2 LCS								
Aluminum (Al)-Total			113.5		%		80-120	21-SEP-20
Antimony (Sb)-Total			109.4		%		80-120	21-SEP-20
Arsenic (As)-Total			111.1		%		80-120	21-SEP-20
Barium (Ba)-Total			116.3		%		80-120	21-SEP-20
Bismuth (Bi)-Total			117.8		%		80-120	21-SEP-20
Boron (B)-Total			97.7		%		80-120	21-SEP-20
Cadmium (Cd)-Total			112.0		%		80-120	21-SEP-20
Calcium (Ca)-Total			106.2		%		80-120	21-SEP-20
Chromium (Cr)-Total			116.5		%		80-120	21-SEP-20
Cobalt (Co)-Total			110.2		%		80-120	21-SEP-20
Copper (Cu)-Total			110.0		%		80-120	21-SEP-20
Iron (Fe)-Total			100.1		%		80-120	21-SEP-20
Lead (Pb)-Total			114.7		%		80-120	21-SEP-20
Lithium (Li)-Total			114.3		%		80-120	21-SEP-20
Magnesium (Mg)-Total			104.2		%		80-120	21-SEP-20
Manganese (Mn)-Total			111.1		%		80-120	21-SEP-20
Molybdenum (Mo)-Total			104.3		%		80-120	21-SEP-20
Nickel (Ni)-Total			108.0		%		80-120	21-SEP-20
Potassium (K)-Total			107.9		%		80-120	21-SEP-20
Selenium (Se)-Total			105.6		%		80-120	21-SEP-20
Silicon (Si)-Total			110.6		%		80-120	21-SEP-20
Silver (Ag)-Total			105.3		%		80-120	21-SEP-20
Sodium (Na)-Total			109.7		%		80-120	21-SEP-20
Strontium (Sr)-Total			117.8		%		80-120	21-SEP-20
Thallium (Tl)-Total			108.6		%		80-120	21-SEP-20
Tin (Sn)-Total			101.8		%		80-120	21-SEP-20
Titanium (Ti)-Total			113.4		%		80-120	21-SEP-20
Uranium (U)-Total			110.7		%		80-120	21-SEP-20
Vanadium (V)-Total			113.9		%		80-120	21-SEP-20
Zinc (Zn)-Total			107.0		%		80-120	21-SEP-20
WG3408361-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	21-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	21-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	21-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5231880								
WG3408361-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	21-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	21-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	21-SEP-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	21-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	21-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	21-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	21-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	21-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	21-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	21-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	21-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	21-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	21-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	21-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	21-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	21-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	21-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	21-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	21-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	21-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	21-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	21-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	21-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	21-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	21-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	21-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	21-SEP-20
Batch R5233287								
WG3409369-3 DUP		**L2505277-5**						
Aluminum (Al)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	24-SEP-20
Antimony (Sb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-SEP-20
Arsenic (As)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-SEP-20
Barium (Ba)-Total		0.00031	0.00032		mg/L	2.7	20	24-SEP-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5233287								
WG3409369-3 DUP		**L2505277-5**						
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-SEP-20
Cadmium (Cd)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	24-SEP-20
Calcium (Ca)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-SEP-20
Chromium (Cr)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-SEP-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-SEP-20
Copper (Cu)-Total		0.00066	0.00065		mg/L	2.2	20	24-SEP-20
Iron (Fe)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-SEP-20
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-SEP-20
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	24-SEP-20
Magnesium (Mg)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	24-SEP-20
Manganese (Mn)-Total		0.00020	0.00016	J	mg/L	0.00004	0.0002	24-SEP-20
Molybdenum (Mo)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-SEP-20
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-SEP-20
Potassium (K)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	24-SEP-20
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	24-SEP-20
Silicon (Si)-Total		<0.10	0.13		mg/L	19	20	24-SEP-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-SEP-20
Sodium (Na)-Total		0.139	0.146		mg/L	4.7	20	24-SEP-20
Strontium (Sr)-Total		0.00023	0.00024		mg/L	3.6	20	24-SEP-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-SEP-20
Tin (Sn)-Total		0.00014	0.00015		mg/L	3.7	20	24-SEP-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	24-SEP-20
Uranium (U)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	24-SEP-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	24-SEP-20
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	24-SEP-20
WG3409369-2 LCS								
Aluminum (Al)-Total			101.5		%		80-120	24-SEP-20
Antimony (Sb)-Total			100.7		%		80-120	24-SEP-20
Arsenic (As)-Total			98.3		%		80-120	24-SEP-20
Barium (Ba)-Total			95.6		%		80-120	24-SEP-20
Bismuth (Bi)-Total			108.4		%		80-120	24-SEP-20
Boron (B)-Total			91.5		%		80-120	24-SEP-20
Cadmium (Cd)-Total			99.2		%		80-120	24-SEP-20
Calcium (Ca)-Total			94.3		%		80-120	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5233287								
WG3409369-2 LCS								
Chromium (Cr)-Total			101.5		%		80-120	24-SEP-20
Cobalt (Co)-Total			99.5		%		80-120	24-SEP-20
Copper (Cu)-Total			98.7		%		80-120	24-SEP-20
Iron (Fe)-Total			95.9		%		80-120	24-SEP-20
Lead (Pb)-Total			102.9		%		80-120	24-SEP-20
Lithium (Li)-Total			89.4		%		80-120	24-SEP-20
Magnesium (Mg)-Total			97.5		%		80-120	24-SEP-20
Manganese (Mn)-Total			98.9		%		80-120	24-SEP-20
Molybdenum (Mo)-Total			96.3		%		80-120	24-SEP-20
Nickel (Ni)-Total			97.4		%		80-120	24-SEP-20
Potassium (K)-Total			100.3		%		80-120	24-SEP-20
Selenium (Se)-Total			96.6		%		80-120	24-SEP-20
Silicon (Si)-Total			105.7		%		80-120	24-SEP-20
Silver (Ag)-Total			96.6		%		80-120	24-SEP-20
Sodium (Na)-Total			105.2		%		80-120	24-SEP-20
Strontium (Sr)-Total			99.8		%		80-120	24-SEP-20
Thallium (Tl)-Total			101.1		%		80-120	24-SEP-20
Tin (Sn)-Total			97.7		%		80-120	24-SEP-20
Titanium (Ti)-Total			96.4		%		80-120	24-SEP-20
Uranium (U)-Total			101.6		%		80-120	24-SEP-20
Vanadium (V)-Total			101.7		%		80-120	24-SEP-20
Zinc (Zn)-Total			97.2		%		80-120	24-SEP-20
WG3409369-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	24-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	24-SEP-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	24-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5233287								
WG3409369-1 MB								
Iron (Fe)-Total			<0.010		mg/L		0.01	24-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	24-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	24-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	24-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	24-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	24-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-SEP-20
NH3-L-F-CL	**Water**							
Batch R5232236								
WG3409307-23 DUP		**L2505277-1**						
Ammonia as N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	21-SEP-20
WG3409307-18 LCS								
Ammonia as N			99.1		%		85-115	21-SEP-20
WG3409307-22 LCS								
Ammonia as N			97.1		%		85-115	21-SEP-20
WG3409307-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	21-SEP-20
WG3409307-21 MB								
Ammonia as N			<0.0050		mg/L		0.005	21-SEP-20
WG3409307-24 MS		**L2505277-1**						
Ammonia as N			101.9		%		75-125	21-SEP-20
NO2-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-CL	**Water**							
Batch R5230862								
WG3408087-2 LCS								
Nitrite (as N)			99.0		%		90-110	18-SEP-20
WG3408087-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	18-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5230862								
WG3408087-2 LCS								
Nitrate (as N)			102.8		%		90-110	18-SEP-20
WG3408087-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	18-SEP-20
ORP-CL	**Water**							
Batch R5231034								
WG3408282-1 CRM		**CL-ORP**						
ORP			226		mV		210-230	19-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5234676								
WG3410736-10 LCS								
Phosphorus (P)-Total			97.5		%		80-120	23-SEP-20
WG3410736-14 LCS								
Phosphorus (P)-Total			98.5		%		80-120	23-SEP-20
WG3410736-13 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	23-SEP-20
WG3410736-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	23-SEP-20
PH-CL	**Water**							
Batch R5231980								
WG3409502-8 LCS								
pH			7.00		pH		6.9-7.1	21-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5230746								
WG3407781-4 LCS								
Orthophosphate-Dissolved (as P)			101.0		%		80-120	18-SEP-20
WG3407781-3 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	18-SEP-20
SO4-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5230862								
WG3408087-2 LCS								
Sulfate (SO4)			100.7		%		90-110	18-SEP-20
WG3408087-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5233145								
WG3409473-5 LCS								
Total Dissolved Solids			99.98		%		85-115	22-SEP-20
WG3409473-4 MB								
Total Dissolved Solids			<10		mg/L		10	22-SEP-20
TKN-L-F-CL	**Water**							
Batch R5231791								
WG3409258-12 LCS								
Total Kjeldahl Nitrogen			93.7		%		75-125	21-SEP-20
WG3409258-16 LCS								
Total Kjeldahl Nitrogen			95.0		%		75-125	21-SEP-20
WG3409258-2 LCS								
Total Kjeldahl Nitrogen			94.1		%		75-125	21-SEP-20
WG3409258-20 LCS								
Total Kjeldahl Nitrogen			97.7		%		75-125	21-SEP-20
WG3409258-4 LCS								
Total Kjeldahl Nitrogen			101.8		%		75-125	21-SEP-20
WG3409258-8 LCS								
Total Kjeldahl Nitrogen			97.6		%		75-125	21-SEP-20
WG3409258-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-15 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-19 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
WG3409258-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	21-SEP-20
TSS-L-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	**Water**							
Batch R5233042								
WG3409472-4 LCS								
Total Suspended Solids			93.2		%		85-115	22-SEP-20
WG3409472-6 LCS								
Total Suspended Solids			89.8		%		85-115	22-SEP-20
WG3409472-3 MB								
Total Suspended Solids			<1.0		mg/L		1	22-SEP-20
WG3409472-5 MB								
Total Suspended Solids			<1.0		mg/L		1	22-SEP-20
TURBIDITY-CL	**Water**							
Batch R5230765								
WG3407666-9 LCS								
Turbidity			98.5		%		85-115	18-SEP-20
WG3407666-8 MB								
Turbidity			<0.10		NTU		0.1	18-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	16-SEP-20 08:20	19-SEP-20 10:30	0.25	74	hours	EHTR-FM
	2	16-SEP-20 09:30	19-SEP-20 10:30	0.25	73	hours	EHTR-FM
	3	17-SEP-20 09:15	19-SEP-20 10:30	0.25	49	hours	EHTR-FM
	4	17-SEP-20 09:30	19-SEP-20 10:30	0.25	49	hours	EHTR-FM
	5	17-SEP-20 15:30	19-SEP-20 10:30	0.25	43	hours	EHTR-FM
pH							
	1	16-SEP-20 08:20	21-SEP-20 14:00	0.25	126	hours	EHTR-FM
	2	16-SEP-20 09:30	21-SEP-20 14:00	0.25	125	hours	EHTR-FM
	3	17-SEP-20 09:15	21-SEP-20 14:00	0.25	101	hours	EHTR-FM
	4	17-SEP-20 09:30	21-SEP-20 14:00	0.25	101	hours	EHTR-FM
	5	17-SEP-20 15:30	21-SEP-20 14:00	0.25	95	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2505277 were received on 18-SEP-20 09:25.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP Sept 2020**

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	x		x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
PSchnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2505277-COFC

ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
PRESERV.								N H2SO4	F H2SO4	N H2SO4	N HCL	F HNO3	N HNO3	F HNO3
RG_UFRI_WS_LAEMP_FRO_2020-09_NP	RG_UFRI	WS	No	9/16/2020	8:20	G	7	1	1	1	1	1	1	1
RG_FOBCP_WS_LAEMP_FRO_2020-09_NP	RG_FOBCP	WS	No	9/16/2020	9:30	G	7	1	1	1	1	1	1	1
RG_FO26_WS_LAEMP_FRO_2020-09_NP	RG_FO26	WS	No	9/17/2020	9:15	G	7	1	1	1	1	1	1	1
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NP	RG_SCOUTDS	WS	No	9/17/2020	9:30	G	7	1	1	1	1	1	1	1
RG_FBLANK_WS_LAEMP_FRO_2020-09_NP	RG_FBLANK	WS	No	9/17/2020	15:30	G	7	1	1	1	1	1	1	1

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
	Jennifer Ings	September 17, 2020		09/18 9:25

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 17, 2020

5

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 19-SEP-20
Report Date: 28-SEP-20 16:47 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2505599

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505599-1				
	Description	WS				
	Sampled Date	18-SEP-20				
	Sampled Time	09:30				
	Client ID	RG_FOBSC_WS_LAEMP_FRO_2020-09_NP				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1110				
	Hardness (as CaCO3) (mg/L)	696				
	pH (pH)	8.41				
	ORP (mV)	442				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	868 DLHC				
	Turbidity (NTU)	0.52				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	226				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	10.4				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	237				
	Ammonia as N (mg/L)	<0.0050				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	1.37				
	Fluoride (F) (mg/L)	0.154				
	Ion Balance (%)	97.2				
	Nitrate (as N) (mg/L)	14.4 HTD				
	Nitrite (as N) (mg/L)	0.0115 HTD				
	Total Kjeldahl Nitrogen (mg/L)	<0.25				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total (mg/L)	<0.0020				
	Sulfate (SO4) (mg/L)	415				
	Anion Sum (meq/L)	14.4				
	Cation Sum (meq/L)	14.0				
	Cation - Anion Balance (%)	-1.4				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.95				
	Total Organic Carbon (mg/L)	0.96				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0044				
	Antimony (Sb)-Total (mg/L)	0.00029				
	Arsenic (As)-Total (mg/L)	0.00010				
	Barium (Ba)-Total (mg/L)	0.0763				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	0.013				
	Cadmium (Cd)-Total (ug/L)	0.158				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505599-1				
	Description	WS				
	Sampled Date	18-SEP-20				
	Sampled Time	09:30				
	Client ID	RG_FOBSC_WS_LAEMP_FRO_2020-09_NP				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	148				
	Chromium (Cr)-Total (mg/L)	0.00011				
	Cobalt (Co)-Total (ug/L)	<0.10				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.024				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0424				
	Magnesium (Mg)-Total (mg/L)	78.7				
	Manganese (Mn)-Total (mg/L)	0.00745				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	0.00354				
	Nickel (Ni)-Total (mg/L)	0.00957				
	Potassium (K)-Total (mg/L)	2.26				
	Selenium (Se)-Total (ug/L)	107				
	Silicon (Si)-Total (mg/L)	1.95				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	1.87				
	Strontium (Sr)-Total (mg/L)	0.184				
	Thallium (Tl)-Total (mg/L)	0.000012				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00445				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	0.0083				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0034				
	Antimony (Sb)-Dissolved (mg/L)	0.00029				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	0.0806				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.012				
	Cadmium (Cd)-Dissolved (ug/L)	0.156				
	Calcium (Ca)-Dissolved (mg/L)	152				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (ug/L)	<0.10				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2505599-1				
	Description	WS				
	Sampled Date	18-SEP-20				
	Sampled Time	09:30				
	Client ID	RG_FOBSC_WS_LAEMP_FRO_2020-09_NP				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	0.017				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0410				
	Magnesium (Mg)-Dissolved (mg/L)	76.5				
	Manganese (Mn)-Dissolved (mg/L)	0.00689				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00321				
	Nickel (Ni)-Dissolved (mg/L)	0.00931				
	Potassium (K)-Dissolved (mg/L)	2.26				
	Selenium (Se)-Dissolved (ug/L)	108				
	Silicon (Si)-Dissolved (mg/L)	1.82				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	1.98				
	Strontium (Sr)-Dissolved (mg/L)	0.177				
	Thallium (Tl)-Dissolved (mg/L)	0.000011				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00454				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0081				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Calcium (Ca)-Dissolved	B	L2505599-1
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2505599-1
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2505599-1
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2505599-1
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2505599-1
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2505599-1
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2505599-1
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2505599-1
Matrix Spike	Calcium (Ca)-Total	MS-B	L2505599-1
Matrix Spike	Lithium (Li)-Total	MS-B	L2505599-1
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2505599-1
Matrix Spike	Nickel (Ni)-Total	MS-B	L2505599-1
Matrix Spike	Potassium (K)-Total	MS-B	L2505599-1
Matrix Spike	Selenium (Se)-Total	MS-B	L2505599-1
Matrix Spike	Sodium (Na)-Total	MS-B	L2505599-1
Matrix Spike	Strontium (Sr)-Total	MS-B	L2505599-1
Matrix Spike	Uranium (U)-Total	MS-B	L2505599-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

Reference Information

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum

Reference Information

metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL Water pH APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL Water Orthophosphate-Dissolved (as P) APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL Water Total Dissolved Solids APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL Water Total Kjeldahl Nitrogen APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL Water Total Suspended Solids APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL Water Turbidity APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP Sept 2020

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5231949								
WG3409471-5 LCS								
Acidity (as CaCO3)			96.0		%		85-115	21-SEP-20
WG3409471-4 MB								
Acidity (as CaCO3)			1.7		mg/L		2	21-SEP-20
ALK-MAN-CL	**Water**							
Batch R5232779								
WG3410445-11 LCS								
Alkalinity, Total (as CaCO3)			100.0		%		85-115	22-SEP-20
WG3410445-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	22-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-2 LCS								
Beryllium (Be)-Dissolved			98.7		%		80-120	24-SEP-20
WG3410182-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	24-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5235341								
WG3409952-2 LCS								
Beryllium (Be)-Total			95.4		%		80-120	24-SEP-20
WG3409952-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	24-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-14 LCS								
Bromide (Br)			106.5		%		85-115	20-SEP-20
WG3409033-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	20-SEP-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5234902								
WG3411572-2 LCS								
Dissolved Organic Carbon			98.2		%		80-120	22-SEP-20
WG3411572-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
C-TOT-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-ORG-LOW-CL	**Water**							
Batch R5234902								
WG3411572-2 LCS								
Total Organic Carbon			104.0		%		80-120	22-SEP-20
WG3411572-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	22-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-14 LCS								
Chloride (Cl)			102.8		%		85-115	20-SEP-20
WG3409033-13 MB								
Chloride (Cl)			<0.10		mg/L		0.1	20-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5232779								
WG3410445-11 LCS								
Conductivity (@ 25C)			96.1		%		90-110	22-SEP-20
WG3410445-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	22-SEP-20
F-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-14 LCS								
Fluoride (F)			93.9		%		90-110	20-SEP-20
WG3409033-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	20-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5232718								
WG3410332-6 LCS								
Mercury (Hg)-Dissolved			96.8		%		80-120	23-SEP-20
WG3410332-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	23-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5236558								
WG3412529-2 LCS								
Mercury (Hg)-Total			97.0		%		80-120	25-SEP-20
WG3412529-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	25-SEP-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-2 LCS								
Aluminum (Al)-Dissolved			110.2		%		80-120	24-SEP-20
Antimony (Sb)-Dissolved			99.7		%		80-120	24-SEP-20
Arsenic (As)-Dissolved			105.5		%		80-120	24-SEP-20
Barium (Ba)-Dissolved			117.3		%		80-120	24-SEP-20
Bismuth (Bi)-Dissolved			105.0		%		80-120	24-SEP-20
Boron (B)-Dissolved			97.9		%		80-120	24-SEP-20
Cadmium (Cd)-Dissolved			107.7		%		80-120	24-SEP-20
Calcium (Ca)-Dissolved			107.0		%		80-120	24-SEP-20
Chromium (Cr)-Dissolved			108.6		%		80-120	24-SEP-20
Cobalt (Co)-Dissolved			107.4		%		80-120	24-SEP-20
Copper (Cu)-Dissolved			105.9		%		80-120	24-SEP-20
Iron (Fe)-Dissolved			103.4		%		80-120	24-SEP-20
Lead (Pb)-Dissolved			97.3		%		80-120	24-SEP-20
Lithium (Li)-Dissolved			99.5		%		80-120	24-SEP-20
Magnesium (Mg)-Dissolved			102.5		%		80-120	24-SEP-20
Manganese (Mn)-Dissolved			106.1		%		80-120	24-SEP-20
Molybdenum (Mo)-Dissolved			99.3		%		80-120	24-SEP-20
Nickel (Ni)-Dissolved			105.5		%		80-120	24-SEP-20
Potassium (K)-Dissolved			105.1		%		80-120	24-SEP-20
Selenium (Se)-Dissolved			99.8		%		80-120	24-SEP-20
Silicon (Si)-Dissolved			104.1		%		60-140	24-SEP-20
Silver (Ag)-Dissolved			98.3		%		80-120	24-SEP-20
Sodium (Na)-Dissolved			108.3		%		80-120	24-SEP-20
Strontium (Sr)-Dissolved			102.5		%		80-120	24-SEP-20
Thallium (Tl)-Dissolved			102.1		%		80-120	24-SEP-20
Tin (Sn)-Dissolved			95.0		%		80-120	24-SEP-20
Titanium (Ti)-Dissolved			99.0		%		80-120	24-SEP-20
Uranium (U)-Dissolved			101.9		%		80-120	24-SEP-20
Vanadium (V)-Dissolved			108.7		%		80-120	24-SEP-20
Zinc (Zn)-Dissolved			103.3		%		80-120	24-SEP-20
WG3410182-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5233230								
WG3410182-1 MB		**NP**						
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	24-SEP-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	24-SEP-20
Calcium (Ca)-Dissolved			0.054	B	mg/L		0.05	24-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	24-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	24-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	24-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	24-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	24-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	24-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	24-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	24-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	24-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	24-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	24-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3409952-2 LCS								
Aluminum (Al)-Total			99.6		%		80-120	24-SEP-20
Antimony (Sb)-Total			106.3		%		80-120	24-SEP-20
Arsenic (As)-Total			96.2		%		80-120	24-SEP-20
Barium (Ba)-Total			100.8		%		80-120	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3409952-2 LCS								
Bismuth (Bi)-Total			97.0		%		80-120	24-SEP-20
Boron (B)-Total			92.9		%		80-120	24-SEP-20
Cadmium (Cd)-Total			98.1		%		80-120	24-SEP-20
Calcium (Ca)-Total			96.6		%		80-120	24-SEP-20
Chromium (Cr)-Total			99.7		%		80-120	24-SEP-20
Cobalt (Co)-Total			99.1		%		80-120	24-SEP-20
Copper (Cu)-Total			99.2		%		80-120	24-SEP-20
Iron (Fe)-Total			91.1		%		80-120	24-SEP-20
Lead (Pb)-Total			96.1		%		80-120	24-SEP-20
Lithium (Li)-Total			91.4		%		80-120	24-SEP-20
Magnesium (Mg)-Total			96.2		%		80-120	24-SEP-20
Manganese (Mn)-Total			100.2		%		80-120	24-SEP-20
Molybdenum (Mo)-Total			102.4		%		80-120	24-SEP-20
Nickel (Ni)-Total			99.6		%		80-120	24-SEP-20
Potassium (K)-Total			100.3		%		80-120	24-SEP-20
Selenium (Se)-Total			98.6		%		80-120	24-SEP-20
Silicon (Si)-Total			97.9		%		80-120	24-SEP-20
Silver (Ag)-Total			103.5		%		80-120	24-SEP-20
Sodium (Na)-Total			101.8		%		80-120	24-SEP-20
Strontium (Sr)-Total			104.9		%		80-120	24-SEP-20
Thallium (Tl)-Total			100.9		%		80-120	24-SEP-20
Tin (Sn)-Total			98.4		%		80-120	24-SEP-20
Titanium (Ti)-Total			98.3		%		80-120	24-SEP-20
Uranium (U)-Total			98.0		%		80-120	24-SEP-20
Vanadium (V)-Total			100.4		%		80-120	24-SEP-20
Zinc (Zn)-Total			101.7		%		80-120	24-SEP-20
WG3409952-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	24-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	24-SEP-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	24-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5235341								
WG3409952-1 MB								
Calcium (Ca)-Total			<0.050		mg/L		0.05	24-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	24-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	24-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	24-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	24-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	24-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	24-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	24-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	24-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	24-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	24-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	24-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	24-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	24-SEP-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	24-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	24-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	24-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	24-SEP-20
NH3-L-F-CL	**Water**							
Batch R5232866								
WG3410229-14 LCS								
Ammonia as N			100.4		%		85-115	22-SEP-20
WG3410229-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	22-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-14 LCS								
Nitrite (as N)			101.3		%		90-110	20-SEP-20
WG3409033-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	20-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-14 LCS								
Nitrate (as N)			100.4		%		90-110	20-SEP-20
WG3409033-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	20-SEP-20
ORP-CL	**Water**							
Batch R5231796								
WG3409206-8 CRM		**CL-ORP**						
ORP			222		mV		210-230	21-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5234777								
WG3411568-10 LCS								
Phosphorus (P)-Total			103.8		%		80-120	24-SEP-20
WG3411568-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	24-SEP-20
PH-CL	**Water**							
Batch R5232779								
WG3410445-11 LCS								
pH			6.99		pH		6.9-7.1	22-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5231084								
WG3408249-10 LCS								
Orthophosphate-Dissolved (as P)			104.2		%		80-120	19-SEP-20
WG3408249-9 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	19-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5231603								
WG3409033-14 LCS								
Sulfate (SO4)			100.5		%		90-110	20-SEP-20
WG3409033-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5234762								
WG3410367-5 LCS								
Total Dissolved Solids			97.8		%		85-115	23-SEP-20
WG3410367-4 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-CL	**Water**							
Batch R5234762								
WG3410367-4 MB								
Total Dissolved Solids			<10		mg/L		10	23-SEP-20
TKN-L-F-CL	**Water**							
Batch R5234612								
WG3411296-12 LCS								
Total Kjeldahl Nitrogen			85.0		%		75-125	24-SEP-20
WG3411296-2 LCS								
Total Kjeldahl Nitrogen			92.3		%		75-125	24-SEP-20
WG3411296-4 LCS								
Total Kjeldahl Nitrogen			93.1		%		75-125	24-SEP-20
WG3411296-8 LCS								
Total Kjeldahl Nitrogen			95.3		%		75-125	24-SEP-20
WG3411296-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-11 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
WG3411296-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	24-SEP-20
TSS-L-CL	**Water**							
Batch R5234760								
WG3410197-4 LCS								
Total Suspended Solids			105.4		%		85-115	23-SEP-20
WG3410197-3 MB								
Total Suspended Solids			<1.0		mg/L		1	23-SEP-20
TURBIDITY-CL	**Water**							
Batch R5231228								
WG3408414-2 LCS								
Turbidity			97.0		%		85-115	20-SEP-20
WG3408414-1 MB								
Turbidity			<0.10		NTU		0.1	20-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	18-SEP-20 09:30	21-SEP-20 14:45	0.25	77	hours	EHTR-FM
pH							
	1	18-SEP-20 09:30	22-SEP-20 14:00	0.25	101	hours	EHTR-FM
Anions and Nutrients							
Nitrate in Water by IC (Low Level)							
	1	18-SEP-20 09:30	28-SEP-20 08:00	3	10	days	EHT
Nitrite in Water by IC (Low Level)							
	1	18-SEP-20 09:30	28-SEP-20 08:00	3	10	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2505599 were received on 19-SEP-20 08:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: **FRO LAEMP Sept 2020**

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
PSchnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS / ANALYSIS REQUESTED

(Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL	N	F	N	N	F	N	F				
PRESERV.										H2SO4	H2SO4		HCL	HNO3	HNO3				
ANALYSIS									TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA				
RG_FOBSC_WS_LAEMP_FRO_2020-09_NP	RG_FOBSC	WS	No	9/18/2020	9:30	G	7		1	1	1	1	1	1	1				

L2505599-COFC

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION

Jennifer Ings

DATE/TIME

September 18, 2020

ACCEPTED BY/AFFILIATION

DK

9/19 0830

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 18, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 23-SEP-20
Report Date: 01-OCT-20 09:31 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2507219

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers:
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2507219-1	L2507219-2	L2507219-3		
	Description	WS	WS	WS		
	Sampled Date	21-SEP-20	21-SEP-20	22-SEP-20		
	Sampled Time	14:55	12:00	13:55		
	Client ID	RG_FODNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUSH_WS_LAEMP_FRO_2020-09_NP	RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	742	834	1170		
	Hardness (as CaCO3) (mg/L)	410	455	651		
	pH (pH)	8.37	8.38	8.47		
	ORP (mV)	448	425	180		
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0		
	Total Dissolved Solids (mg/L)	536 DLHC	618 DLHC	930 DLHC		
	Turbidity (NTU)	0.33	0.72	0.40		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0		
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	174	199	249		
	Alkalinity, Total (as CaCO3) (mg/L)	174	199	249		
	Ammonia as N (mg/L)	0.0060	0.0289	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.25 DLHC		
	Chloride (Cl) (mg/L)	0.34	0.60	1.44 DLHC		
	Fluoride (F) (mg/L)	0.133	0.137	0.14 DLHC		
	Ion Balance (%)	98.6	95.1	89.0		
	Nitrate (as N) (mg/L)	11.8	12.5	14.0 DLHC		
	Nitrite (as N) (mg/L)	0.0116	0.0133	0.0131 DLHC		
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050 TKNI	<0.050 TKNI		
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010		
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020		
	Sulfate (SO4) (mg/L)	195	230	421 DLHC		
	Anion Sum (meq/L)	8.41	9.69	14.8		
	Cation Sum (meq/L)	8.29	9.22	13.2		
	Cation - Anion Balance (%)	-0.7	-2.5	-5.8		
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	0.69	0.91		
	Total Organic Carbon (mg/L)	<0.50	0.69	0.92		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0058	0.0054	0.0042		
	Antimony (Sb)-Total (mg/L)	0.00021	0.00025	0.00028		
	Arsenic (As)-Total (mg/L)	0.00014	0.00014	0.00019		
	Barium (Ba)-Total (mg/L)	0.0894	0.0873	0.0807		
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Total (mg/L)	0.011	0.013	0.014		
	Cadmium (Cd)-Total (ug/L)	0.0348	0.0385	0.139		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2507219-1	L2507219-2	L2507219-3		
	Description	WS	WS	WS		
	Sampled Date	21-SEP-20	21-SEP-20	22-SEP-20		
	Sampled Time	14:55	12:00	13:55		
	Client ID	RG_FODNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUSH_WS_LAEMP_FRO_2020-09_NP	RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	107	113	154		
	Chromium (Cr)-Total (mg/L)	0.00013	0.00011	<0.00010		
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10		
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Total (mg/L)	<0.010	0.035	0.018		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)	0.0403	0.0453	0.0494		
	Magnesium (Mg)-Total (mg/L)	39.1	51.4	85.0		
	Manganese (Mn)-Total (mg/L)	0.00086	0.0116	0.00411		
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050		
	Molybdenum (Mo)-Total (mg/L)	0.00107	0.00135	0.00346		
	Nickel (Ni)-Total (mg/L)	0.00394	0.00417	0.00857		
	Potassium (K)-Total (mg/L)	1.62	2.06	2.53		
	Selenium (Se)-Total (ug/L)	49.0	52.4	112		
	Silicon (Si)-Total (mg/L)	1.96	2.12	1.98		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	1.27	1.67	2.07		
	Strontium (Sr)-Total (mg/L)	0.154	0.168	0.187		
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	0.00239	0.00276	0.00465		
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0065		
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00021	0.00026	0.00029		
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Barium (Ba)-Dissolved (mg/L)	0.0846	0.0807	0.0781		
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Boron (B)-Dissolved (mg/L)	0.011	0.011	0.014		
	Cadmium (Cd)-Dissolved (ug/L)	0.0313	0.0296	0.132		
	Calcium (Ca)-Dissolved (mg/L)	97.7	107	138		
	Chromium (Cr)-Dissolved (mg/L)	0.00012	<0.00010	0.00011		
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2507219-1	L2507219-2	L2507219-3		
	Description	WS	WS	WS		
	Sampled Date	21-SEP-20	21-SEP-20	22-SEP-20		
	Sampled Time	14:55	12:00	13:55		
	Client ID	RG_FODNGD_WS_LAEMP_FRO_2020-09_NP	RG_FOUSH_WS_LAEMP_FRO_2020-09_NP	RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NP		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00021		
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.024	0.014		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0402	0.0422	0.0476		
	Magnesium (Mg)-Dissolved (mg/L)	40.3	45.8	74.5		
	Manganese (Mn)-Dissolved (mg/L)	0.00040	0.0112	0.00369		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00106	0.00138	0.00325		
	Nickel (Ni)-Dissolved (mg/L)	0.00398	0.00397	0.00848		
	Potassium (K)-Dissolved (mg/L)	1.74	2.05	2.56		
	Selenium (Se)-Dissolved (ug/L)	44.1	45.3	106		
	Silicon (Si)-Dissolved (mg/L)	1.96	1.82	1.88		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	1.29	1.55	2.05		
	Strontium (Sr)-Dissolved (mg/L)	0.158	0.176	0.186		
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.00259	0.00282	0.00469		
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0012	0.0011	0.0062		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Magnesium (Mg)-Dissolved	B	L2507219-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2507219-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2507219-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2507219-1, -2, -3
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2507219-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2507219-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2507219-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2507219-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2507219-1, -2, -3
Matrix Spike	Selenium (Se)-Total	MS-B	L2507219-1, -2, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L2507219-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L2507219-1, -2, -3
Matrix Spike	Uranium (U)-Total	MS-B	L2507219-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon

Reference Information

dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5234956								
WG3411634-12 DUP		**L2507219-3**						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	24-SEP-20
WG3411634-11 LCS								
Acidity (as CaCO3)			98.6		%		85-115	24-SEP-20
WG3411634-10 MB								
Acidity (as CaCO3)			1.8		mg/L		2	24-SEP-20
ALK-MAN-CL	**Water**							
Batch R5238101								
WG3412920-14 LCS								
Alkalinity, Total (as CaCO3)			100.5		%		85-115	25-SEP-20
WG3412920-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	25-SEP-20
BE-D-L-CCMS-VA	**Water**							
Batch R5241419								
WG3413281-3 DUP		**L2507219-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	28-SEP-20
WG3413281-2 LCS								
Beryllium (Be)-Dissolved			92.1		%		80-120	28-SEP-20
WG3413281-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	28-SEP-20
WG3413281-4 MS		**L2507219-2**						
Beryllium (Be)-Dissolved			91.8		%		70-130	28-SEP-20
BE-T-L-CCMS-VA	**Water**							
Batch R5240798								
WG3413295-2 LCS								
Beryllium (Be)-Total			107.0		%		80-120	28-SEP-20
WG3413295-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	28-SEP-20
BR-L-IC-N-CL	**Water**							
Batch R5234408								
WG3411441-6 LCS								
Bromide (Br)			104.3		%		85-115	23-SEP-20
WG3411441-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	23-SEP-20
C-DIS-ORG-LOW-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5239077								
WG3413273-3 DUP		**L2507219-3**						
Dissolved Organic Carbon		0.91	0.85		mg/L	6.8	20	26-SEP-20
WG3413273-10 LCS								
Dissolved Organic Carbon			95.4		%		80-120	26-SEP-20
WG3413273-2 LCS								
Dissolved Organic Carbon			101.4		%		80-120	26-SEP-20
WG3413273-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	26-SEP-20
WG3413273-9 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	26-SEP-20
WG3413273-4 MS		**L2507219-3**						
Dissolved Organic Carbon			90.1		%		70-130	26-SEP-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5239077								
WG3413273-3 DUP		**L2507219-3**						
Total Organic Carbon		0.92	0.87		mg/L	5.6	20	26-SEP-20
WG3413273-10 LCS								
Total Organic Carbon			91.2		%		80-120	26-SEP-20
WG3413273-2 LCS								
Total Organic Carbon			104.2		%		80-120	26-SEP-20
WG3413273-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	26-SEP-20
WG3413273-9 MB								
Total Organic Carbon			<0.50		mg/L		0.5	26-SEP-20
WG3413273-4 MS		**L2507219-3**						
Total Organic Carbon			87.9		%		70-130	26-SEP-20
CL-L-IC-N-CL	**Water**							
Batch R5234408								
WG3411441-6 LCS								
Chloride (Cl)			99.8		%		85-115	23-SEP-20
WG3411441-5 MB								
Chloride (Cl)			<0.10		mg/L		0.1	23-SEP-20
EC-L-PCT-CL	**Water**							
Batch R5238101								
WG3412920-14 LCS								
Conductivity (@ 25C)			99.7		%		90-110	25-SEP-20
WG3412920-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	25-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5234408								
WG3411441-6 LCS								
Fluoride (F)			97.4		%		90-110	23-SEP-20
WG3411441-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	23-SEP-20
HG-D-CVAA-VA	**Water**							
Batch R5241563								
WG3414183-2 LCS								
Mercury (Hg)-Dissolved			99.2		%		80-120	29-SEP-20
WG3414183-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005(		mg/L		0.000005	29-SEP-20
HG-T-U-CVAF-VA	**Water**							
Batch R5241974								
WG3414721-3 DUP		**L2507219-2**						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	29-SEP-20
WG3414721-2 LCS								
Mercury (Hg)-Total			98.4		%		80-120	29-SEP-20
WG3414721-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	29-SEP-20
MET-D-CCMS-VA	**Water**							
Batch R5241419								
WG3413281-3 DUP		**L2507219-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	28-SEP-20
Antimony (Sb)-Dissolved		0.00021	0.00021		mg/L	1.9	20	28-SEP-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-SEP-20
Barium (Ba)-Dissolved		0.0846	0.0863		mg/L	1.9	20	28-SEP-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-SEP-20
Cadmium (Cd)-Dissolved		0.0000313	0.0000295		mg/L	5.9	20	28-SEP-20
Calcium (Ca)-Dissolved		97.7	103		mg/L	5.1	20	28-SEP-20
Chromium (Cr)-Dissolved		0.00012	0.00011		mg/L	6.9	20	28-SEP-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-SEP-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	28-SEP-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-SEP-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	28-SEP-20
Lithium (Li)-Dissolved		0.0402	0.0406		mg/L	1.1	20	28-SEP-20
Magnesium (Mg)-Dissolved		40.3	38.8		mg/L	3.8	20	28-SEP-20
Manganese (Mn)-Dissolved		0.00040	0.00051	J	mg/L	0.00011	0.0002	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5241419								
WG3413281-3 DUP		**L2507219-1**						
Molybdenum (Mo)-Dissolved		0.00106	0.00111		mg/L	5.2	20	28-SEP-20
Nickel (Ni)-Dissolved		0.00398	0.00401		mg/L	0.6	20	28-SEP-20
Potassium (K)-Dissolved		1.74	1.75		mg/L	0.5	20	28-SEP-20
Selenium (Se)-Dissolved		0.0441	0.0439		mg/L	0.4	20	28-SEP-20
Silicon (Si)-Dissolved		1.96	1.96		mg/L	0.3	20	28-SEP-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-SEP-20
Sodium (Na)-Dissolved		1.29	1.29		mg/L	0.7	20	28-SEP-20
Strontium (Sr)-Dissolved		0.158	0.170		mg/L	7.0	20	28-SEP-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	28-SEP-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-SEP-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-SEP-20
Uranium (U)-Dissolved		0.00259	0.00262		mg/L	1.3	20	28-SEP-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	28-SEP-20
Zinc (Zn)-Dissolved		0.0012	0.0016	J	mg/L	0.0004	0.002	28-SEP-20
WG3413281-2 LCS								
Aluminum (Al)-Dissolved			98.8		%		80-120	28-SEP-20
Antimony (Sb)-Dissolved			103.8		%		80-120	28-SEP-20
Arsenic (As)-Dissolved			98.8		%		80-120	28-SEP-20
Barium (Ba)-Dissolved			99.1		%		80-120	28-SEP-20
Bismuth (Bi)-Dissolved			99.9		%		80-120	28-SEP-20
Boron (B)-Dissolved			85.8		%		80-120	28-SEP-20
Cadmium (Cd)-Dissolved			100.6		%		80-120	28-SEP-20
Calcium (Ca)-Dissolved			96.1		%		80-120	28-SEP-20
Chromium (Cr)-Dissolved			102.2		%		80-120	28-SEP-20
Cobalt (Co)-Dissolved			103.8		%		80-120	28-SEP-20
Copper (Cu)-Dissolved			99.5		%		80-120	28-SEP-20
Iron (Fe)-Dissolved			99.3		%		80-120	28-SEP-20
Lead (Pb)-Dissolved			104.0		%		80-120	28-SEP-20
Lithium (Li)-Dissolved			98.6		%		80-120	28-SEP-20
Magnesium (Mg)-Dissolved			91.0		%		80-120	28-SEP-20
Manganese (Mn)-Dissolved			105.4		%		80-120	28-SEP-20
Molybdenum (Mo)-Dissolved			99.96		%		80-120	28-SEP-20
Nickel (Ni)-Dissolved			99.6		%		80-120	28-SEP-20
Potassium (K)-Dissolved			104.4		%		80-120	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5241419								
WG3413281-2 LCS								
Selenium (Se)-Dissolved			92.5		%		80-120	28-SEP-20
Silicon (Si)-Dissolved			99.1		%		60-140	28-SEP-20
Silver (Ag)-Dissolved			107.6		%		80-120	28-SEP-20
Sodium (Na)-Dissolved			107.1		%		80-120	28-SEP-20
Strontium (Sr)-Dissolved			107.3		%		80-120	28-SEP-20
Thallium (Tl)-Dissolved			103.4		%		80-120	28-SEP-20
Tin (Sn)-Dissolved			98.2		%		80-120	28-SEP-20
Titanium (Ti)-Dissolved			95.6		%		80-120	28-SEP-20
Uranium (U)-Dissolved			105.4		%		80-120	28-SEP-20
Vanadium (V)-Dissolved			103.7		%		80-120	28-SEP-20
Zinc (Zn)-Dissolved			105.3		%		80-120	28-SEP-20
WG3413281-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	28-SEP-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	28-SEP-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	28-SEP-20
Cadmium (Cd)-Dissolved			<0.000005(		mg/L		0.000005	28-SEP-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	28-SEP-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	28-SEP-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	28-SEP-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	28-SEP-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	28-SEP-20
Magnesium (Mg)-Dissolved			0.0065	B	mg/L		0.005	28-SEP-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	28-SEP-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	28-SEP-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	28-SEP-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	28-SEP-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	28-SEP-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5241419								
WG3413281-1 MB		**NP**						
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	28-SEP-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	28-SEP-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	28-SEP-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	28-SEP-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	28-SEP-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	28-SEP-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	28-SEP-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	28-SEP-20
WG3413281-4 MS		**L2507219-2**						
Aluminum (Al)-Dissolved			98.0		%		70-130	28-SEP-20
Antimony (Sb)-Dissolved			109.2		%		70-130	28-SEP-20
Arsenic (As)-Dissolved			99.9		%		70-130	28-SEP-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	28-SEP-20
Bismuth (Bi)-Dissolved			87.0		%		70-130	28-SEP-20
Boron (B)-Dissolved			84.5		%		70-130	28-SEP-20
Cadmium (Cd)-Dissolved			97.9		%		70-130	28-SEP-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	28-SEP-20
Chromium (Cr)-Dissolved			97.7		%		70-130	28-SEP-20
Cobalt (Co)-Dissolved			95.8		%		70-130	28-SEP-20
Copper (Cu)-Dissolved			93.9		%		70-130	28-SEP-20
Iron (Fe)-Dissolved			98.9		%		70-130	28-SEP-20
Lead (Pb)-Dissolved			95.1		%		70-130	28-SEP-20
Lithium (Li)-Dissolved			101.2		%		70-130	28-SEP-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	28-SEP-20
Manganese (Mn)-Dissolved			98.1		%		70-130	28-SEP-20
Molybdenum (Mo)-Dissolved			100.1		%		70-130	28-SEP-20
Nickel (Ni)-Dissolved			92.2		%		70-130	28-SEP-20
Potassium (K)-Dissolved			100.5		%		70-130	28-SEP-20
Selenium (Se)-Dissolved			N/A	MS-B	%		-	28-SEP-20
Silicon (Si)-Dissolved			89.9		%		70-130	28-SEP-20
Silver (Ag)-Dissolved			105.9		%		70-130	28-SEP-20
Sodium (Na)-Dissolved			104.5		%		70-130	28-SEP-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	28-SEP-20
Thallium (Tl)-Dissolved			97.4		%		70-130	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5241419								
WG3413281-4 MS		**L2507219-2**						
Tin (Sn)-Dissolved			99.9		%		70-130	28-SEP-20
Titanium (Ti)-Dissolved			98.7		%		70-130	28-SEP-20
Uranium (U)-Dissolved			95.0		%		70-130	28-SEP-20
Vanadium (V)-Dissolved			102.6		%		70-130	28-SEP-20
Zinc (Zn)-Dissolved			98.1		%		70-130	28-SEP-20
Batch R5242209								
WG3413281-3 DUP		**L2507219-1**						
Boron (B)-Dissolved		0.011	0.011		mg/L	2.3	20	29-SEP-20
MET-T-CCMS-VA	**Water**							
Batch R5240798								
WG3413295-2 LCS								
Aluminum (Al)-Total			106.2		%		80-120	28-SEP-20
Antimony (Sb)-Total			100.1		%		80-120	28-SEP-20
Arsenic (As)-Total			103.6		%		80-120	28-SEP-20
Barium (Ba)-Total			106.9		%		80-120	28-SEP-20
Bismuth (Bi)-Total			98.0		%		80-120	28-SEP-20
Boron (B)-Total			103.0		%		80-120	28-SEP-20
Cadmium (Cd)-Total			103.1		%		80-120	28-SEP-20
Calcium (Ca)-Total			106.9		%		80-120	28-SEP-20
Chromium (Cr)-Total			102.1		%		80-120	28-SEP-20
Cobalt (Co)-Total			106.5		%		80-120	28-SEP-20
Copper (Cu)-Total			104.4		%		80-120	28-SEP-20
Iron (Fe)-Total			94.1		%		80-120	28-SEP-20
Lead (Pb)-Total			97.1		%		80-120	28-SEP-20
Lithium (Li)-Total			108.1		%		80-120	28-SEP-20
Magnesium (Mg)-Total			102.8		%		80-120	28-SEP-20
Manganese (Mn)-Total			105.7		%		80-120	28-SEP-20
Molybdenum (Mo)-Total			97.7		%		80-120	28-SEP-20
Nickel (Ni)-Total			105.6		%		80-120	28-SEP-20
Potassium (K)-Total			111.3		%		80-120	28-SEP-20
Selenium (Se)-Total			108.4		%		80-120	28-SEP-20
Silicon (Si)-Total			102.7		%		80-120	28-SEP-20
Silver (Ag)-Total			95.8		%		80-120	28-SEP-20
Sodium (Na)-Total			108.1		%		80-120	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5240798								
WG3413295-2 LCS								
Strontium (Sr)-Total			98.3		%		80-120	28-SEP-20
Thallium (Tl)-Total			99.96		%		80-120	28-SEP-20
Tin (Sn)-Total			98.1		%		80-120	28-SEP-20
Titanium (Ti)-Total			104.0		%		80-120	28-SEP-20
Uranium (U)-Total			94.3		%		80-120	28-SEP-20
Vanadium (V)-Total			107.4		%		80-120	28-SEP-20
Zinc (Zn)-Total			106.8		%		80-120	28-SEP-20
WG3413295-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	28-SEP-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Boron (B)-Total			<0.010		mg/L		0.01	28-SEP-20
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	28-SEP-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	28-SEP-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	28-SEP-20
Iron (Fe)-Total			<0.010		mg/L		0.01	28-SEP-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	28-SEP-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	28-SEP-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	28-SEP-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	28-SEP-20
Potassium (K)-Total			<0.050		mg/L		0.05	28-SEP-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	28-SEP-20
Silicon (Si)-Total			<0.10		mg/L		0.1	28-SEP-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	28-SEP-20
Sodium (Na)-Total			<0.050		mg/L		0.05	28-SEP-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	28-SEP-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	28-SEP-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	28-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5240798								
WG3413295-1 MB								
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	28-SEP-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	28-SEP-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	28-SEP-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	28-SEP-20
NH3-L-F-CL	**Water**							
Batch R5235877								
WG3411851-14 LCS								
Ammonia as N			96.1		%		85-115	24-SEP-20
WG3411851-13 MB								
Ammonia as N			<0.0050		mg/L		0.005	24-SEP-20
NO2-L-IC-N-CL	**Water**							
Batch R5234408								
WG3411441-6 LCS								
Nitrite (as N)			99.7		%		90-110	23-SEP-20
WG3411441-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	23-SEP-20
NO3-L-IC-N-CL	**Water**							
Batch R5234408								
WG3411441-6 LCS								
Nitrate (as N)			100.4		%		90-110	23-SEP-20
WG3411441-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	23-SEP-20
ORP-CL	**Water**							
Batch R5235318								
WG3411879-5 CRM		**CL-ORP**						
ORP			221		mV		210-230	24-SEP-20
P-T-L-COL-CL	**Water**							
Batch R5241890								
WG3414459-10 LCS								
Phosphorus (P)-Total			98.1		%		80-120	28-SEP-20
WG3414459-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	28-SEP-20
PH-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-CL	**Water**							
Batch R5238101								
WG3412920-14 LCS								
pH			6.99		pH		6.9-7.1	25-SEP-20
PO4-DO-L-COL-CL	**Water**							
Batch R5234491								
WG3410890-18 LCS								
Orthophosphate-Dissolved (as P)			106.5		%		80-120	23-SEP-20
WG3410890-22 LCS								
Orthophosphate-Dissolved (as P)			101.5		%		80-120	23-SEP-20
WG3410890-17 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	23-SEP-20
WG3410890-21 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	23-SEP-20
SO4-IC-N-CL	**Water**							
Batch R5234408								
WG3411441-6 LCS								
Sulfate (SO4)			100.5		%		90-110	23-SEP-20
WG3411441-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	23-SEP-20
SOLIDS-TDS-CL	**Water**							
Batch R5236316								
WG3411604-8 LCS								
Total Dissolved Solids			106.9		%		85-115	24-SEP-20
WG3411604-7 MB								
Total Dissolved Solids			<10		mg/L		10	24-SEP-20
TKN-L-F-CL	**Water**							
Batch R5236796								
WG3412252-13 LCS								
Total Kjeldahl Nitrogen			91.2		%		75-125	25-SEP-20
WG3412252-17 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	25-SEP-20
WG3412252-19 LCS								
Total Kjeldahl Nitrogen			89.8		%		75-125	25-SEP-20
WG3412252-2 LCS								
Total Kjeldahl Nitrogen			92.8		%		75-125	25-SEP-20
WG3412252-23 LCS								
Total Kjeldahl Nitrogen			87.7		%		75-125	25-SEP-20
WG3412252-27 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5236796								
WG3412252-27 LCS								
Total Kjeldahl Nitrogen			87.6		%		75-125	25-SEP-20
WG3412252-29 LCS								
Total Kjeldahl Nitrogen			88.2		%		75-125	25-SEP-20
WG3412252-31 LCS								
Total Kjeldahl Nitrogen			92.6		%		75-125	25-SEP-20
WG3412252-6 LCS								
Total Kjeldahl Nitrogen			88.1		%		75-125	25-SEP-20
WG3412252-9 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	25-SEP-20
WG3412252-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-12 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-16 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-18 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-22 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-26 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-28 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-30 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
WG3412252-8 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	25-SEP-20
TSS-L-CL	**Water**							
Batch R5236396								
WG3411638-6 LCS								
Total Suspended Solids			104.7		%		85-115	24-SEP-20
WG3411638-5 MB								
Total Suspended Solids			<1.0		mg/L		1	24-SEP-20
TURBIDITY-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5233338								
WG3410986-14 LCS								
Turbidity			97.9		%		85-115	23-SEP-20
WG3410986-13 MB								
Turbidity			<0.10		NTU		0.1	23-SEP-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	21-SEP-20 14:55	24-SEP-20 13:15	0.25	70	hours	EHTR-FM
	2	21-SEP-20 12:00	24-SEP-20 13:15	0.25	73	hours	EHTR-FM
	3	22-SEP-20 13:55	24-SEP-20 13:15	0.25	47	hours	EHTR-FM
pH							
	1	21-SEP-20 14:55	25-SEP-20 14:00	0.25	95	hours	EHTR-FM
	2	21-SEP-20 12:00	25-SEP-20 14:00	0.25	98	hours	EHTR-FM
	3	22-SEP-20 13:55	25-SEP-20 14:00	0.25	72	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2507219 were received on 23-SEP-20 08:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP Sept 2020 | TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@eqinonline.com	x	x	x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
tschuler@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS | **ANALYSIS REQUESTED**

Filtered - F, Field, L, Lab, FL, Field & Lab, N, None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
								N	F	N	N	F	N	F
									H2SO4	H2SO4		HCL	HNO3	HNO3
RG_FODNGD_WS_LAEMP_FRO_2020-09_NP	RG_FODNGD	WS	No	9/21/2020	14:55	G	7	1	1	1	1	1	1	1
RG_FOUSH_WS_LAEMP_FRO_2020-09_NP	RG_FOUSH	WS	No	9/21/2020	12:00	G	7	1	1	1	1	1	1	1
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NP	RG_FRCP1SW	WS	No	9/22/2020	13:55	G	7	1	1	1	1	1	1	1

L2507219-COFC

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

RELINQUISHED BY/AFFILIATION: Jennifer Ings

DATE/TIME: September 22, 2020

ACCEPTED BY/AFFILIATION: 9/22/20

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 22, 2020

6

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 25-SEP-20
Report Date: 07-OCT-20 14:19 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2508974

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-1 SE 22-SEP-20 10:00 RG_FRCP1SW_SE-01_2020-09-22_1000	L2508974-2 SE 22-SEP-20 10:30 RG_FRCP1SW_SE-02_2020-09-22_1030	L2508974-3 SE 22-SEP-20 12:00 RG_FRCP1SW_SE-03_2020-09-22_1200	L2508974-4 SE 22-SEP-20 12:30 RG_FRCP1SW_SE-04_2020-09-22_1230	L2508974-5 SE 22-SEP-20 13:00 RG_FRCP1SW_SE-05_2020-09-22_1300
SOIL						
Physical Tests	Moisture (%)	53.5	45.4	50.8	54.5	70.3
	pH (1:2 soil:water) (pH)	8.42	8.51	8.54	8.56	8.30
Particle Size	% Gravel (>2mm) (%)	2.7	<1.0	<1.0	1.2	1.4
	% Sand (2.00mm - 1.00mm) (%)	1.3	<1.0	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	9.5	5.9	3.5	3.9	2.3
	% Sand (0.50mm - 0.25mm) (%)	16.0	12.4	14.6	10.7	8.6
	% Sand (0.25mm - 0.125mm) (%)	14.1	17.8	19.9	25.0	12.8
	% Sand (0.125mm - 0.063mm) (%)	10.2	14.4	14.0	13.9	11.9
	% Silt (0.063mm - 0.0312mm) (%)	18.3	19.3	17.9	18.1	24.0
	% Silt (0.0312mm - 0.004mm) (%)	22.4	23.1	22.8	21.4	30.7
	% Clay (<4um) (%)	5.5	5.9	6.4	5.0	7.9
	Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.78	5.96	5.54	5.83	7.47
Metals	Aluminum (Al) (mg/kg)	8730	8660	8690	7310	6410
	Antimony (Sb) (mg/kg)	0.34	0.33	0.47	0.65	0.55
	Arsenic (As) (mg/kg)	5.47	4.95	5.15	5.32	4.67
	Barium (Ba) (mg/kg)	208	205	196	197	198
	Beryllium (Be) (mg/kg)	0.61	0.64	0.64	0.62	0.55
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.6	10.0	11.2	9.6	10.1
	Cadmium (Cd) (mg/kg)	1.56	1.50	1.38	1.63	2.41
	Calcium (Ca) (mg/kg)	42400	43000	42300	50400	59500
	Chromium (Cr) (mg/kg)	15.6	15.1	15.8	13.7	12.4
	Cobalt (Co) (mg/kg)	5.81	5.74	5.57	6.06	6.38
	Copper (Cu) (mg/kg)	13.6	13.3	12.6	13.0	12.9
	Iron (Fe) (mg/kg)	14700	14100	14600	15300	12800
	Lead (Pb) (mg/kg)	8.09	7.92	7.79	7.77	7.68
	Lithium (Li) (mg/kg)	10.3	10.6	10.9	9.6	9.3
	Magnesium (Mg) (mg/kg)	11600	11400	11900	12000	11700
	Manganese (Mn) (mg/kg)	520	511	489	495	623
	Mercury (Hg) (mg/kg)	0.0406	0.0404	0.0357	0.0425	0.0524
	Molybdenum (Mo) (mg/kg)	1.52	1.37	1.42	1.50	1.40
	Nickel (Ni) (mg/kg)	47.6	46.4	43.5	46.6	67.6
	Phosphorus (P) (mg/kg)	1360	1350	1350	1370	1230
	Potassium (K) (mg/kg)	2330	2330	2470	2000	1740
	Selenium (Se) (mg/kg)	1.69	1.70	1.40	1.99	2.25

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-6 SE 18-SEP-20 09:40 RG_FOBSC_SE-01_2020-09-18_0940	L2508974-7 SE 18-SEP-20 10:00 RG_FOBSC_SE-02_2020-09-18_1000	L2508974-8 SE 18-SEP-20 11:00 RG_FOBSC_SE-03_2020-09-18_1100	L2508974-9 SE 18-SEP-20 11:30 RG_FOBSC_SE-04_2020-09-18_1130	L2508974-10 SE 18-SEP-20 12:00 RG_FOBSC_SE-05_2020-09-18_1200
SOIL						
Physical Tests	Moisture (%)	64.0	66.0	60.7	79.9	45.5
	pH (1:2 soil:water) (pH)	8.32	8.27	8.09	8.06	8.49
Particle Size	% Gravel (>2mm) (%)	2.3	2.2	8.4	1.7	3.1
	% Sand (2.00mm - 1.00mm) (%)	1.2	2.1	6.5	2.5	1.3
	% Sand (1.00mm - 0.50mm) (%)	9.0	3.7	5.5	3.7	2.6
	% Sand (0.50mm - 0.25mm) (%)	19.6	13.4	6.8	6.3	13.7
	% Sand (0.25mm - 0.125mm) (%)	20.0	16.7	9.2	7.5	24.0
	% Sand (0.125mm - 0.063mm) (%)	11.5	8.7	7.4	4.4	14.7
	% Silt (0.063mm - 0.0312mm) (%)	15.4	20.2	22.4	30.7	16.1
	% Silt (0.0312mm - 0.004mm) (%)	17.6	25.8	27.6	36.0	18.4
	% Clay (<4um) (%)	3.5	7.2	6.2	7.2	6.1
	Texture	Sandy loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.45	8.27	9.17	10.9	5.92
Metals	Aluminum (Al) (mg/kg)	6400	7830	6810	7030	8020
	Antimony (Sb) (mg/kg)	0.56	0.54	0.42	0.36	0.49
	Arsenic (As) (mg/kg)	4.51	4.79	4.54	4.16	4.63
	Barium (Ba) (mg/kg)	193	213	188	217	188
	Beryllium (Be) (mg/kg)	0.49	0.55	0.55	0.57	0.58
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.7	10.5	9.2	9.5	9.9
	Cadmium (Cd) (mg/kg)	2.26	2.27	1.93	2.37	1.44
	Calcium (Ca) (mg/kg)	69400	69400	50400	58900	51600
	Chromium (Cr) (mg/kg)	11.7	14.4	12.3	13.2	14.3
	Cobalt (Co) (mg/kg)	6.07	6.37	5.45	6.64	5.34
	Copper (Cu) (mg/kg)	11.6	12.4	12.8	13.5	12.1
	Iron (Fe) (mg/kg)	14000	14100	12700	12200	13000
	Lead (Pb) (mg/kg)	7.04	7.46	7.13	7.30	7.29
	Lithium (Li) (mg/kg)	9.5	9.7	8.2	9.1	10.1
	Magnesium (Mg) (mg/kg)	12500	12800	9970	12200	14300
	Manganese (Mn) (mg/kg)	599	640	553	688	424
	Mercury (Hg) (mg/kg)	0.0350	0.0401	0.0410	0.0410	0.0411
	Molybdenum (Mo) (mg/kg)	1.40	1.47	1.43	1.46	1.24
	Nickel (Ni) (mg/kg)	51.1	51.3	42.7	55.2	35.2
	Phosphorus (P) (mg/kg)	1220	1230	1240	1080	1290
	Potassium (K) (mg/kg)	1700	2050	1960	1980	2220
	Selenium (Se) (mg/kg)	3.78	4.00	2.83	3.29	1.43

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-11 SE 17-SEP-20 09:50 RG_SCOUTDS_SE-01_2020-09-17_0950	L2508974-12 SE 17-SEP-20 10:20 RG_SCOUTDS_SE-02_2020-09-17_1020	L2508974-13 SE 17-SEP-20 11:00 RG_SCOUTDS_SE-03_2020-09-17_1100	L2508974-14 SE 17-SEP-20 13:10 RG_SCOUTDS_SE-04_2020-09-17_1310	L2508974-15 SE 17-SEP-20 13:30 RG_SCOUTDS_SE-05_2020-09-17_1330
SOIL						
Physical Tests	Moisture (%)	75.6	53.0	64.2	72.1	56.4
	pH (1:2 soil:water) (pH)	8.30	8.40	8.30	8.22	8.20
Particle Size	% Gravel (>2mm) (%)	3.5	<1.0	3.6	4.9	3.2
	% Sand (2.00mm - 1.00mm) (%)	5.2	2.6	6.9	14.0	19.1
	% Sand (1.00mm - 0.50mm) (%)	13.7	22.6	16.6	14.6	18.6
	% Sand (0.50mm - 0.25mm) (%)	14.0	30.8	31.1	14.2	12.1
	% Sand (0.25mm - 0.125mm) (%)	6.8	7.6	7.4	8.6	6.0
	% Sand (0.125mm - 0.063mm) (%)	6.9	3.8	3.4	4.2	3.9
	% Silt (0.063mm - 0.0312mm) (%)	19.2	10.9	13.3	16.9	14.8
	% Silt (0.0312mm - 0.004mm) (%)	24.4	16.3	15.4	19.9	18.3
	% Clay (<4um) (%)	6.2	5.2	2.3	2.6	3.8
	Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.19	10.1	8.85	8.56	9.31
Metals	Aluminum (Al) (mg/kg)	6510	8850	8280	7310	8310
	Antimony (Sb) (mg/kg)	0.68	0.63	0.73	0.66	0.56
	Arsenic (As) (mg/kg)	4.98	5.41	5.47	4.86	4.74
	Barium (Ba) (mg/kg)	200	228	217	204	256
	Beryllium (Be) (mg/kg)	0.60	0.67	0.68	0.60	0.62
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.3	10.6	9.7	9.8	10.7
	Cadmium (Cd) (mg/kg)	1.73	1.81	1.82	2.12	2.49
	Calcium (Ca) (mg/kg)	50800	49400	45400	50100	52600
	Chromium (Cr) (mg/kg)	11.9	15.3	13.8	13.2	14.0
	Cobalt (Co) (mg/kg)	5.76	6.24	6.19	6.71	7.40
	Copper (Cu) (mg/kg)	13.3	13.6	14.1	13.9	14.1
	Iron (Fe) (mg/kg)	16700	18400	18000	15500	16100
	Lead (Pb) (mg/kg)	7.46	7.73	7.92	7.38	7.82
	Lithium (Li) (mg/kg)	9.2	10.4	10.2	9.2	11.5
	Magnesium (Mg) (mg/kg)	8480	9490	8020	8980	10600
	Manganese (Mn) (mg/kg)	555	588	590	671	760
	Mercury (Hg) (mg/kg)	0.0375	0.0399	0.0378	0.0431	0.0469
	Molybdenum (Mo) (mg/kg)	1.66	1.57	1.59	1.57	1.45
	Nickel (Ni) (mg/kg)	42.5	45.7	44.6	51.4	59.6
	Phosphorus (P) (mg/kg)	1150	1440	1260	1160	1280
	Potassium (K) (mg/kg)	1780	2350	2260	2050	2120
	Selenium (Se) (mg/kg)	1.87	1.58	1.42	1.94	1.98

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-16 SE 16-SEP-20 10:00 RG_FOBCP_SE-01_2020-09-16_1000	L2508974-17 SE 16-SEP-20 11:00 RG_FOBCP_SE-02_2020-09-16_1100	L2508974-18 SE 16-SEP-20 12:10 RG_FOBCP_SE-03_2020-09-16_1210	L2508974-19 SE 16-SEP-20 14:10 RG_FOBCP_SE-04_2020-09-16_1410	L2508974-20 SE 16-SEP-20 14:40 RG_FOBCP_SE-05_2020-09-16_1440
SOIL						
Physical Tests	Moisture (%)	65.8	50.3	47.3	49.7	61.0
	pH (1:2 soil:water) (pH)	8.27	8.30	8.34	8.34	8.55
Particle Size	% Gravel (>2mm) (%)	<1.0 PSAL	1.8	<1.0	3.1	<1.0
	% Sand (2.00mm - 1.00mm) (%)	11.5 PSAL	5.2	<1.0	1.0	2.5
	% Sand (1.00mm - 0.50mm) (%)	22.0 PSAL	9.3	1.1	2.6	8.7
	% Sand (0.50mm - 0.25mm) (%)	6.0 PSAL	16.9	12.4	10.6	17.0
	% Sand (0.25mm - 0.125mm) (%)	4.6 PSAL	16.0	31.9	16.4	18.5
	% Sand (0.125mm - 0.063mm) (%)	2.8 PSAL	8.3	18.3	10.8	10.6
	% Silt (0.063mm - 0.0312mm) (%)	22.7 PSAL	18.4	16.4	19.7	17.9
	% Silt (0.0312mm - 0.004mm) (%)	26.6 PSAL	21.0	16.1	28.3	20.2
	% Clay (<4um) (%)	3.7 PSAL	3.1	2.8	7.5	3.8
	Texture	Silt loam	Sandy loam	Sandy loam	Silt loam / Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	10.2	6.47	4.69	6.94	5.24
Metals	Aluminum (Al) (mg/kg)	6770	6980	7420	6940	8160
	Antimony (Sb) (mg/kg)	0.68	0.66	0.58	0.50	0.60
	Arsenic (As) (mg/kg)	5.47	5.40	4.75	4.73	4.99
	Barium (Ba) (mg/kg)	269	235	193	243	215
	Beryllium (Be) (mg/kg)	0.60	0.63	0.59	0.51	0.60
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.3	10.1	10.2	8.9	10.4
	Cadmium (Cd) (mg/kg)	2.82	2.22	1.60	2.23	1.66
	Calcium (Ca) (mg/kg)	58800	74700	57300	87000	56300
	Chromium (Cr) (mg/kg)	13.4	13.4	13.6	13.5	14.3
	Cobalt (Co) (mg/kg)	7.83	6.93	5.95	6.53	6.39
	Copper (Cu) (mg/kg)	16.2	13.4	12.1	13.1	13.1
	Iron (Fe) (mg/kg)	16600	17100	13100	13700	14700
	Lead (Pb) (mg/kg)	8.43	7.62	7.53	7.18	7.85
	Lithium (Li) (mg/kg)	9.2	10.0	10.2	9.0	10.8
	Magnesium (Mg) (mg/kg)	10800	11700	13000	12900	14100
	Manganese (Mn) (mg/kg)	746	702	525	676	531
	Mercury (Hg) (mg/kg)	0.0489	0.0427	0.0441	0.0458	0.0434
	Molybdenum (Mo) (mg/kg)	1.70	1.61	1.33	1.34	1.40
	Nickel (Ni) (mg/kg)	69.0	58.4	46.7	71.2	47.0
	Phosphorus (P) (mg/kg)	1400	1340	1340	1320	1340
	Potassium (K) (mg/kg)	1800	1940	2040	1900	2090
	Selenium (Se) (mg/kg)	3.01	2.13	2.00	3.26	2.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-21	L2508974-22	L2508974-23	L2508974-24	L2508974-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20
	Sampled Time	10:00	10:30	11:00	11:20	12:00
	Client ID	RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI_SE-05_2020-09-14_1200
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	72.8	75.5	80.8	77.1	82.5
	pH (1:2 soil:water) (pH)	8.10	8.05	8.06	8.01	8.08
Particle Size	% Gravel (>2mm) (%)	3.1 PSAL	2.3	5.5 PSAL	4.7	12.0
	% Sand (2.00mm - 1.00mm) (%)	4.3 PSAL	7.8	2.4 PSAL	2.2	8.3
	% Sand (1.00mm - 0.50mm) (%)	4.5 PSAL	5.6	1.9 PSAL	2.3	4.2
	% Sand (0.50mm - 0.25mm) (%)	8.0 PSAL	6.8	5.3 PSAL	3.0	8.5
	% Sand (0.25mm - 0.125mm) (%)	9.5 PSAL	13.4	17.6 PSAL	13.3	14.2
	% Sand (0.125mm - 0.063mm) (%)	13.1 PSAL	13.9	11.9 PSAL	15.4	12.7
	% Silt (0.063mm - 0.0312mm) (%)	25.2 PSAL	22.5	25.2 PSAL	26.8	17.7
	% Silt (0.0312mm - 0.004mm) (%)	27.6 PSAL	23.8	26.5 PSAL	27.5	19.2
	% Clay (<4um) (%)	4.7 PSAL	3.9	3.8 PSAL	4.8	3.2
	Texture	Silt loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	11.5	9.44	9.99	11.3	10.4
Metals	Aluminum (Al) (mg/kg)	6310	6360	5410	7100	6360
	Antimony (Sb) (mg/kg)	0.54	0.56	0.46	0.43	0.51
	Arsenic (As) (mg/kg)	4.39	4.11	4.02	4.15	5.27
	Barium (Ba) (mg/kg)	199	190	206	201	203
	Beryllium (Be) (mg/kg)	0.55	0.53	0.46	0.57	0.59
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.2	8.9	8.3	10.5	8.9
	Cadmium (Cd) (mg/kg)	1.48	1.52	1.71	1.49	1.65
	Calcium (Ca) (mg/kg)	63600	68800	81100	73400	72700
	Chromium (Cr) (mg/kg)	11.8	11.6	9.76	12.4	14.4
	Cobalt (Co) (mg/kg)	6.11	6.48	6.08	5.74	5.82
	Copper (Cu) (mg/kg)	13.1	13.2	11.3	11.1	13.5
	Iron (Fe) (mg/kg)	14100	13700	12300	12900	20600
	Lead (Pb) (mg/kg)	7.58	7.75	6.88	7.02	6.92
	Lithium (Li) (mg/kg)	10.2	11.3	8.8	10.5	8.8
	Magnesium (Mg) (mg/kg)	12100	12000	12000	13000	11300
	Manganese (Mn) (mg/kg)	550	612	677	548	726
	Mercury (Hg) (mg/kg)	0.0456	0.0484	0.0407	0.0338	0.0378
	Molybdenum (Mo) (mg/kg)	1.72	1.58	1.46	1.42	1.72
	Nickel (Ni) (mg/kg)	35.2	36.0	36.6	34.4	37.5
	Phosphorus (P) (mg/kg)	1070	999	1080	1100	1210
	Potassium (K) (mg/kg)	1690	1600	1460	1990	1770
	Selenium (Se) (mg/kg)	2.68	2.98	3.61	2.30	3.07

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-26 SE 10-SEP-20 10:00 RG_FOBKS_SE-01_2020-09-10_1000	L2508974-27 SE 10-SEP-20 10:20 RG_FOBKS_SE-02_2020-09-10_1020	L2508974-28 SE 10-SEP-20 11:30 RG_FOBKS_SE-03_2020-09-10_1130	L2508974-29 SE 10-SEP-20 11:50 RG_FOBKS_SE-04_2020-09-10_1150	L2508974-30 SE 10-SEP-20 12:20 RG_FOBKS_SE-05_2020-09-10_1220
SOIL						
Physical Tests	Moisture (%)	44.8	52.0	52.0	58.2	78.1
	pH (1:2 soil:water) (pH)	8.30	8.45	8.28	8.23	8.04
Particle Size	% Gravel (>2mm) (%)	1.3	4.1	2.2	1.5	1.1
	% Sand (2.00mm - 1.00mm) (%)	3.4	7.6	4.3	3.0	5.1
	% Sand (1.00mm - 0.50mm) (%)	9.3	14.2	11.5	9.3	35.0
	% Sand (0.50mm - 0.25mm) (%)	11.8	11.5	11.5	24.3	22.8
	% Sand (0.25mm - 0.125mm) (%)	21.2	19.0	21.9	23.7	8.7
	% Sand (0.125mm - 0.063mm) (%)	17.0	15.1	15.7	12.0	5.1
	% Silt (0.063mm - 0.0312mm) (%)	16.0	12.6	14.6	11.2	8.8
	% Silt (0.0312mm - 0.004mm) (%)	16.7	13.3	15.3	12.2	11.2
	% Clay (<4um) (%)	3.3	2.8	3.0	2.7	2.0
	Texture	Sandy loam	Loamy sand	Sandy loam	Loamy sand	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.12	5.70	5.50	5.75	7.05
Metals	Aluminum (Al) (mg/kg)	8870	8640	8590	7710	5910
	Antimony (Sb) (mg/kg)	0.34	0.30	0.59	0.56	0.56
	Arsenic (As) (mg/kg)	4.82	5.12	5.25	4.63	4.29
	Barium (Ba) (mg/kg)	221	228	209	205	198
	Beryllium (Be) (mg/kg)	0.65	0.63	0.63	0.59	0.51
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.9	8.8	10.5	9.5	9.2
	Cadmium (Cd) (mg/kg)	1.15	1.12	1.15	1.45	1.86
	Calcium (Ca) (mg/kg)	54400	61200	56900	68800	73800
	Chromium (Cr) (mg/kg)	15.1	14.9	14.8	12.9	11.0
	Cobalt (Co) (mg/kg)	5.70	5.58	6.07	5.84	6.42
	Copper (Cu) (mg/kg)	12.5	12.1	13.1	12.2	13.1
	Iron (Fe) (mg/kg)	13800	15500	14900	15500	13100
	Lead (Pb) (mg/kg)	7.73	7.49	8.16	7.37	7.21
	Lithium (Li) (mg/kg)	11.7	10.7	11.5	10.7	9.8
	Magnesium (Mg) (mg/kg)	14400	12300	13900	9460	10600
	Manganese (Mn) (mg/kg)	466	467	501	588	696
	Mercury (Hg) (mg/kg)	0.0443	0.0360	0.0461	0.0365	0.0415
	Molybdenum (Mo) (mg/kg)	1.22	1.20	1.38	1.32	1.40
	Nickel (Ni) (mg/kg)	31.5	31.6	34.9	35.7	47.0
	Phosphorus (P) (mg/kg)	1240	1250	1380	1170	1050
	Potassium (K) (mg/kg)	2390	2350	2310	2070	1550
	Selenium (Se) (mg/kg)	1.33	1.14	1.68	1.30	2.48

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L2508974-31 Description: SE Sampled Date: 11-SEP-20 Sampled Time: 09:00 Client ID: RG_FO22_SE-01_2020-09-11_0900	L2508974-32 SE 11-SEP-20 09:15 RG_FO22_SE-02_2020-09-11_0915	L2508974-33 SE 11-SEP-20 09:30 RG_FO22_SE-03_2020-09-11_0930	L2508974-34 SE 11-SEP-20 09:45 RG_FO22_SE-04_2020-09-11_0945	L2508974-35 SE 11-SEP-20 10:00 RG_FO22_SE-05_2020-09-11_1000
SOIL						
Physical Tests	Moisture (%)	48.8	36.6	39.4	38.6	42.0
	pH (1:2 soil:water) (pH)	8.22	8.26	8.37	8.30	8.30
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	1.8	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0	1.5	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0	12.3	<1.0	2.3	<1.0
	% Sand (0.50mm - 0.25mm) (%)	3.7	30.9	3.8	27.0	5.1
	% Sand (0.25mm - 0.125mm) (%)	22.0	27.5	34.6	41.4	36.2
	% Sand (0.125mm - 0.063mm) (%)	24.1	10.3	33.9	10.0	27.4
	% Silt (0.063mm - 0.0312mm) (%)	23.3	7.5	14.8	7.4	15.7
	% Silt (0.0312mm - 0.004mm) (%)	22.8	7.8	10.3	7.5	12.8
	% Clay (<4um) (%)	3.4	2.0	2.3	2.3	2.3
	Texture	Sandy loam	Loamy sand	Loamy sand	Loamy sand	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.61	2.77	3.07	4.28	3.94
Metals	Aluminum (Al) (mg/kg)	7370	8860	6000	8000	8090
	Antimony (Sb) (mg/kg)	0.57	0.48	0.51	0.67	0.53
	Arsenic (As) (mg/kg)	4.92	5.52	4.55	5.91	5.01
	Barium (Ba) (mg/kg)	191	205	159	209	191
	Beryllium (Be) (mg/kg)	0.59	0.65	0.50	0.67	0.60
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	10.2	10.3	6.9	9.7	10.4
	Cadmium (Cd) (mg/kg)	1.24	0.974	0.960	1.15	1.12
	Calcium (Ca) (mg/kg)	40400	26200	37500	30600	37500
	Chromium (Cr) (mg/kg)	14.5	16.1	11.8	14.8	15.1
	Cobalt (Co) (mg/kg)	5.25	5.61	4.58	5.99	5.00
	Copper (Cu) (mg/kg)	12.2	11.4	10.4	12.5	11.6
	Iron (Fe) (mg/kg)	13300	15700	12100	16000	13600
	Lead (Pb) (mg/kg)	7.59	7.81	6.96	8.45	7.65
	Lithium (Li) (mg/kg)	9.8	9.4	8.1	8.8	9.5
	Magnesium (Mg) (mg/kg)	13200	8010	12500	9120	12100
	Manganese (Mn) (mg/kg)	431	508	281	380	323
	Mercury (Hg) (mg/kg)	0.0450	0.0284	0.0341	0.0357	0.0448
	Molybdenum (Mo) (mg/kg)	1.35	1.26	1.03	1.40	1.17
	Nickel (Ni) (mg/kg)	26.2	25.7	21.5	27.0	24.2
	Phosphorus (P) (mg/kg)	1600	1600	1390	1740	1540
	Potassium (K) (mg/kg)	1970	2600	1520	2160	2170
	Selenium (Se) (mg/kg)	2.18	1.41	1.54	1.95	1.65

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-36 SE 12-SEP-20 09:15 RG_FRUPO_SE-01_2020-09-12_0915	L2508974-37 SE 12-SEP-20 09:30 RG_FRUPO_SE-02_2020-09-12_0930	L2508974-38 SE 12-SEP-20 09:45 RG_FRUPO_SE-03_2020-09-12_0945	L2508974-39 SE 12-SEP-20 10:00 RG_FRUPO_SE-04_2020-09-12_1000	L2508974-40 SE 12-SEP-20 10:15 RG_FRUPO_SE-05_2020-09-12_1015
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	43.5	48.9	37.4	37.9	43.6
	pH (1:2 soil:water) (pH)	8.36	8.24	8.72	8.73	8.30
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.8	1.1	<1.0	1.7	<1.0
	% Sand (1.00mm - 0.50mm) (%)	13.7	2.1	4.6	17.5	1.4
	% Sand (0.50mm - 0.25mm) (%)	7.7	9.3	27.5	19.5	13.8
	% Sand (0.25mm - 0.125mm) (%)	9.9	24.9	31.7	20.8	20.3
	% Sand (0.125mm - 0.063mm) (%)	24.2	20.6	15.6	17.0	23.1
	% Silt (0.063mm - 0.0312mm) (%)	18.7	18.7	9.2	10.5	18.2
	% Silt (0.0312mm - 0.004mm) (%)	17.2	18.9	8.6	10.2	18.8
	% Clay (<4um) (%)	3.5	4.1	2.8	2.9	4.3
	Texture	Sandy loam	Sandy loam	Loamy sand	Loamy sand	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.97	5.04	3.43	4.18	5.09
Metals	Aluminum (Al) (mg/kg)	7960	7220	9300	6970	6920
	Antimony (Sb) (mg/kg)	0.55	0.55	0.66	0.72	0.69
	Arsenic (As) (mg/kg)	4.79	4.89	5.78	5.87	5.16
	Barium (Ba) (mg/kg)	189	190	217	215	196
	Beryllium (Be) (mg/kg)	0.56	0.58	0.67	0.65	0.61
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	10.0	9.8	11.5	8.8	9.5
	Cadmium (Cd) (mg/kg)	1.25	1.21	1.18	1.28	1.36
	Calcium (Ca) (mg/kg)	48800	41000	42300	43000	48300
	Chromium (Cr) (mg/kg)	14.9	14.4	16.3	13.7	14.1
	Cobalt (Co) (mg/kg)	5.37	5.35	6.16	5.75	5.85
	Copper (Cu) (mg/kg)	12.3	12.3	13.2	13.4	13.8
	Iron (Fe) (mg/kg)	13800	13200	16700	16300	14100
	Lead (Pb) (mg/kg)	7.29	7.38	8.47	7.93	8.23
	Lithium (Li) (mg/kg)	9.6	9.3	11.0	9.0	10.4
	Magnesium (Mg) (mg/kg)	14300	11700	11400	10200	13100
	Manganese (Mn) (mg/kg)	459	464	480	464	489
	Mercury (Hg) (mg/kg)	<0.0050	0.0433	0.0329	0.0362	0.0504
	Molybdenum (Mo) (mg/kg)	1.32	1.34	1.45	1.69	1.51
	Nickel (Ni) (mg/kg)	31.2	30.4	31.6	34.2	35.1
	Phosphorus (P) (mg/kg)	1380	1240	1510	1460	1400
	Potassium (K) (mg/kg)	2160	2050	2540	1940	1870
	Selenium (Se) (mg/kg)	1.60	1.72	1.26	1.32	1.92

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-41 SE 15-SEP-20 09:15 RG_HENUP_SE-01_2020-09-15_0915	L2508974-42 SE 15-SEP-20 09:30 RG_HENUP_SE-02_2020-09-15_0930	L2508974-43 SE 15-SEP-20 09:45 RG_HENUP_SE-03_2020-09-15_0945	L2508974-44 SE 17-SEP-20 09:15 RG_FO26_SE-01_2020-09-17_0915	L2508974-45 SE 17-SEP-20 09:30 RG_FO26_SE-02_2020-09-17_0930
SOIL						
Physical Tests	Moisture (%)	38.3	31.7	62.5	29.0	37.1
	pH (1:2 soil:water) (pH)	8.33	8.48	8.22	8.79	8.67
Particle Size	% Gravel (>2mm) (%)	3.9	5.9	<1.0	1.7	<1.0
	% Sand (2.00mm - 1.00mm) (%)	6.2	6.1	<1.0	3.3	4.7
	% Sand (1.00mm - 0.50mm) (%)	14.9	17.4	2.9	15.5	17.9
	% Sand (0.50mm - 0.25mm) (%)	30.8	37.3	19.3	32.8	41.5
	% Sand (0.25mm - 0.125mm) (%)	29.2	20.5	29.6	21.0	21.7
	% Sand (0.125mm - 0.063mm) (%)	8.0	5.9	21.5	9.2	5.1
	% Silt (0.063mm - 0.0312mm) (%)	3.5	3.1	13.0	7.1	3.1
	% Silt (0.0312mm - 0.004mm) (%)	2.7	2.8	10.8	7.4	3.6
	% Clay (<4um) (%)	<1.0	<1.0	1.7	1.9	1.4
	Texture	Sand	Sand	Loamy sand	Loamy sand	Sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.1	4.9	5.6	3.86	2.73
Metals	Aluminum (Al) (mg/kg)	8940	8610	8690	1310	1280
	Antimony (Sb) (mg/kg)	0.68	0.70	0.55	<0.10	<0.10
	Arsenic (As) (mg/kg)	7.21	5.99	5.26	1.03	1.14
	Barium (Ba) (mg/kg)	191	178	173	13.7	13.5
	Beryllium (Be) (mg/kg)	0.71	0.73	0.67	<0.10	<0.10
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	11.0	10.1	11.8	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	0.867	0.843	0.935	0.250	0.230
	Calcium (Ca) (mg/kg)	56900	58900	53100	289000	265000
	Chromium (Cr) (mg/kg)	15.4	15.3	17.8	5.17	5.02
	Cobalt (Co) (mg/kg)	6.48	6.38	5.74	0.92	0.88
	Copper (Cu) (mg/kg)	14.9	15.0	14.4	1.17	1.23
	Iron (Fe) (mg/kg)	16300	17000	14500	2500	2480
	Lead (Pb) (mg/kg)	9.33	9.35	9.19	1.48	1.37
	Lithium (Li) (mg/kg)	11.1	10.7	15.7	5.3	5.4
	Magnesium (Mg) (mg/kg)	11600	10100	14000	37200	31100
	Manganese (Mn) (mg/kg)	511	506	455	99.3	119
	Mercury (Hg) (mg/kg)	0.0389	0.0336	0.0522	0.0063	<0.0050
	Molybdenum (Mo) (mg/kg)	1.63	1.58	1.54	0.27	0.31
	Nickel (Ni) (mg/kg)	22.6	22.9	21.6	5.67	6.12
	Phosphorus (P) (mg/kg)	1360	1340	1260	302	281
	Potassium (K) (mg/kg)	2440	2420	2410	490	470
	Selenium (Se) (mg/kg)	0.90	0.66	1.07	0.24	0.22

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-46	L2508974-47	L2508974-48		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	22-SEP-20	22-SEP-20		
	Sampled Time	09:45	10:30	14:45		
	Client ID	RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-2X_2020-09-22_1030	RG_RIVER_SE-3X_2020-09-22_1445		
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	34.1	55.5	34.9		
	pH (1:2 soil:water) (pH)	8.41	8.66	8.68		
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0		
	% Sand (2.00mm - 1.00mm) (%)	4.9	1.5	<1.0		
	% Sand (1.00mm - 0.50mm) (%)	7.8	6.0	3.4		
	% Sand (0.50mm - 0.25mm) (%)	15.7	13.9	21.1		
	% Sand (0.25mm - 0.125mm) (%)	19.8	17.4	32.3		
	% Sand (0.125mm - 0.063mm) (%)	14.0	16.7	17.6		
	% Silt (0.063mm - 0.0312mm) (%)	16.5	18.2	11.8		
	% Silt (0.0312mm - 0.004mm) (%)	17.2	21.4	10.6		
	% Clay (<4um) (%)	3.2	4.6	1.8		
	Texture	Sandy loam	Sandy loam	Loamy sand		
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.36	6.88	6.4		
Metals	Aluminum (Al) (mg/kg)	1890	5830	1730		
	Antimony (Sb) (mg/kg)	0.17	0.64	<0.10		
	Arsenic (As) (mg/kg)	1.44	4.77	1.26		
	Barium (Ba) (mg/kg)	18.0	189	15.1		
	Beryllium (Be) (mg/kg)	0.14	0.59	0.13		
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		
	Boron (B) (mg/kg)	<5.0	7.7	<5.0		
	Cadmium (Cd) (mg/kg)	0.260	1.63	0.257		
	Calcium (Ca) (mg/kg)	259000	45500	255000		
	Chromium (Cr) (mg/kg)	7.05	12.1	6.32		
	Cobalt (Co) (mg/kg)	1.12	5.82	1.09		
	Copper (Cu) (mg/kg)	1.79	14.1	1.49		
	Iron (Fe) (mg/kg)	3190	13000	2920		
	Lead (Pb) (mg/kg)	2.05	7.96	1.83		
	Lithium (Li) (mg/kg)	8.3	9.9	8.1		
	Magnesium (Mg) (mg/kg)	46900	11400	48000		
	Manganese (Mn) (mg/kg)	111	516	112		
	Mercury (Hg) (mg/kg)	0.0080	0.0497	0.0088		
	Molybdenum (Mo) (mg/kg)	0.34	1.51	0.33		
	Nickel (Ni) (mg/kg)	7.68	50.0	7.51		
	Phosphorus (P) (mg/kg)	354	1280	375		
	Potassium (K) (mg/kg)	610	1490	560		
	Selenium (Se) (mg/kg)	0.33	2.01	0.32		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-1 SE 22-SEP-20 10:00 RG_FRCP1SW_SE-01_2020-09-22_1000	L2508974-2 SE 22-SEP-20 10:30 RG_FRCP1SW_SE-02_2020-09-22_1030	L2508974-3 SE 22-SEP-20 12:00 RG_FRCP1SW_SE-03_2020-09-22_1200	L2508974-4 SE 22-SEP-20 12:30 RG_FRCP1SW_SE-04_2020-09-22_1230	L2508974-5 SE 22-SEP-20 13:00 RG_FRCP1SW_SE-05_2020-09-22_1300
SOIL						
Metals	Silver (Ag) (mg/kg)	0.18	0.17	0.16	0.16	0.16
	Sodium (Na) (mg/kg)	88	88	84	83	87
	Strontium (Sr) (mg/kg)	70.1	69.0	64.8	71.7	64.4
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.261	0.261	0.271	0.247	0.244
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	26.7	31.4	31.6	24.9	29.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.08	1.08	1.09	1.08	0.971
	Vanadium (V) (mg/kg)	38.0	36.7	38.1	35.1	29.7
	Zinc (Zn) (mg/kg)	138	132	128	143	205
	Zirconium (Zr) (mg/kg)	1.1	1.3	1.1	1.1	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.035	DLCI <0.040	DLCI <0.030	DLCI <0.040	DLCI <0.050
	Acenaphthylene (mg/kg)	0.0066	0.0063	<0.0050	0.0064	DLHM 0.0085
	Acridine (mg/kg)	DLCI <0.050	DLCI <0.060	DLCI <0.050	DLCI <0.050	DLCI <0.10
	Anthracene (mg/kg)	0.0091	0.0062	0.0113	0.0061	DLHM 0.0178
	Benz(a)anthracene (mg/kg)	DLCI <0.030	0.026	0.016	0.021	DLHM 0.034
	Benzo(a)pyrene (mg/kg)	0.010	0.012	<0.010	0.011	DLHM 0.017
	Benzo(b&j)fluoranthene (mg/kg)	0.054	0.054	0.036	0.040	DLHM 0.063
	Benzo(b+j+k)fluoranthene (mg/kg)	0.054	0.054	0.036	0.040	0.063
	Benzo(e)pyrene (mg/kg)	0.057	0.062	0.040	0.047	DLHM 0.076
	Benzo(g,h,i)perylene (mg/kg)	0.022	0.021	0.015	0.017	DLHM 0.031
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.016
	Chrysene (mg/kg)	DLCI <0.13	0.148	0.102	0.122	DLHM 0.171
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.020	0.0105	0.0090	0.0093	DLHM 0.0130
	Fluoranthene (mg/kg)	0.042	0.023	0.013	0.019	DLHM 0.032
	Fluorene (mg/kg)	0.093	0.110	0.055	0.109	DLHM 0.186
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.011	<0.010	<0.010	<0.010	DLHM <0.016
	1-Methylnaphthalene (mg/kg)	0.311	0.478	0.264	0.461	DLHM 0.610
	2-Methylnaphthalene (mg/kg)	0.500	0.769	0.421	0.775	DLHM 0.992
	Naphthalene (mg/kg)	0.165	0.272	0.151	0.258	DLHM 0.293
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.016
	Phenanthrene (mg/kg)	0.385	0.530	0.304	0.425	DLHM 0.640
	Pyrene (mg/kg)	0.046	0.041	0.026	0.036	DLHM 0.050
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	DLHM <0.016
	Surrogate: d10-Acenaphthene (%)	102.9	100.8	96.6	98.9	101.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-6 SE 18-SEP-20 09:40 RG_FOBSC_SE-01_2020-09-18_0940	L2508974-7 SE 18-SEP-20 10:00 RG_FOBSC_SE-02_2020-09-18_1000	L2508974-8 SE 18-SEP-20 11:00 RG_FOBSC_SE-03_2020-09-18_1100	L2508974-9 SE 18-SEP-20 11:30 RG_FOBSC_SE-04_2020-09-18_1130	L2508974-10 SE 18-SEP-20 12:00 RG_FOBSC_SE-05_2020-09-18_1200
SOIL						
Metals	Silver (Ag) (mg/kg)	0.14	0.15	0.15	0.15	0.15
	Sodium (Na) (mg/kg)	84	125	81	86	94
	Strontium (Sr) (mg/kg)	73.8	78.5	74.8	79.2	69.8
	Sulfur (S) (mg/kg)	<1000	1100	<1000	1200	<1000
	Thallium (Tl) (mg/kg)	0.228	0.224	0.202	0.202	0.234
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	22.8	26.4	29.4	17.6	28.5
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.00	1.07	1.10	1.02	1.02
	Vanadium (V) (mg/kg)	29.3	32.9	31.3	31.1	34.1
	Zinc (Zn) (mg/kg)	176	185	171	203	114
	Zirconium (Zr) (mg/kg)	<1.0	1.1	<1.0	1.0	1.3
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.060	DLCI <0.070	DLCI <0.056	DLCI <0.066	DLCI <0.040
	Acenaphthylene (mg/kg)	DLHM 0.0110	DLHM 0.0142	DLHM <0.014	DLHM 0.013	0.0077
	Acridine (mg/kg)	DLCI <0.13	DLCI <0.14	DLCI <0.12	DLCI <0.14	DLCI <0.060
	Anthracene (mg/kg)	DLHM 0.0175	DLHM 0.0119	DLHM <0.0056	DLHM 0.015	0.0052
	Benz(a)anthracene (mg/kg)	DLHM 0.038	DLHM 0.038	DLCI <0.036	DLCI <0.046	DLCI <0.12
	Benzo(a)pyrene (mg/kg)	DLHM 0.021	DLHM 0.022	DLHM 0.019	DLHM <0.025	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.064	DLHM 0.074	DLHM 0.064	DLHM 0.076	0.044
	Benzo(b+j+k)fluoranthene (mg/kg)	0.064	0.074	0.064	0.076	0.044
	Benzo(e)pyrene (mg/kg)	DLHM 0.077	DLHM 0.081	DLHM 0.077	DLHM 0.086	0.046
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.031	DLHM 0.032	DLHM 0.030	DLHM 0.036	DLCI <0.020
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.010
	Chrysene (mg/kg)	DLHM 0.178	DLHM 0.190	DLCI <0.18	DLCI 0.221	DLCI 0.119
	Dibenz(a,h)anthracene (mg/kg)	DLHM 0.0168	DLCI <0.020	DLHM 0.015	DLHM 0.018	DLCI <0.020
	Fluoranthene (mg/kg)	DLHM 0.027	DLHM 0.027	DLHM 0.026	DLHM 0.031	0.031
	Fluorene (mg/kg)	DLHM 0.213	DLHM 0.243	DLHM 0.199	DLHM 0.242	0.104
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.010
	1-Methylnaphthalene (mg/kg)	DLHM 0.713	DLHM 0.796	DLHM 0.669	DLHM 0.822	0.414
	2-Methylnaphthalene (mg/kg)	DLHM 1.18	DLHM 1.29	DLHM 1.11	DLHM 1.37	0.678
	Naphthalene (mg/kg)	DLHM 0.366	DLHM 0.407	DLHM 0.332	DLHM 0.430	0.234
	Perylene (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.010
	Phenanthrene (mg/kg)	DLHM 0.661	DLHM 0.736	DLHM 0.625	DLHM 0.708	0.431
	Pyrene (mg/kg)	DLHM 0.052	DLHM 0.057	DLHM 0.050	DLHM 0.062	0.038
	Quinoline (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.050
	Surrogate: d10-Acenaphthene (%)	107.4	103.4	100.3	102.8	99.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-11	L2508974-12	L2508974-13	L2508974-14	L2508974-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:50	10:20	11:00	13:10	13:30
	Client ID	RG_SCOUTDS_SE-01_2020-09-17_0950	RG_SCOUTDS_SE-02_2020-09-17_1020	RG_SCOUTDS_SE-03_2020-09-17_1100	RG_SCOUTDS_SE-04_2020-09-17_1310	RG_SCOUTDS_SE-05_2020-09-17_1330
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.14	0.15	0.15	0.16	0.15
	Sodium (Na) (mg/kg)	72	87	79	77	86
	Strontium (Sr) (mg/kg)	78.9	76.9	81.2	77.2	90.9
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.201	0.238	0.232	0.211	0.218
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	25.3	24.2	23.1	20.8	23.2
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.05	1.13	1.11	0.973	0.956
	Vanadium (V) (mg/kg)	31.4	38.9	36.6	34.4	34.3
	Zinc (Zn) (mg/kg)	156	161	178	190	220
	Zirconium (Zr) (mg/kg)	<1.0	1.0	1.1	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.075	DLCI <0.045	DLCI <0.076	DLCI <0.085	DLCI <0.060
	Acenaphthylene (mg/kg)	DLHM 0.016	0.0085	DLHM 0.0108	DLHM 0.0142	0.0137
	Acridine (mg/kg)	DLCI <0.10	DLCI <0.080	DLCI <0.12	DLCI <0.16	DLCI <0.12
	Anthracene (mg/kg)	DLHM 0.0182	0.0137	DLHM 0.0059	DLHM 0.0124	0.0239
	Benz(a)anthracene (mg/kg)	DLCI <0.040	DLCI <0.030	DLHM 0.034	DLHM 0.047	DLCI <0.030
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	DLCI <0.020	DLHM 0.018	DLHM 0.025	0.019
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.054	0.036	0.058	DLHM 0.082	0.062
	Benzo(b+j+k)fluoranthene (mg/kg)	0.054	0.036	0.058	0.082	0.062
	Benzo(e)pyrene (mg/kg)	DLHM 0.060	0.044	0.069	DLHM 0.098	0.070
	Benzo(g,h,i)perylene (mg/kg)	DLCI <0.030	0.018	DLHM 0.031	DLHM 0.038	0.031
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	<0.010	<0.013	<0.017	<0.010
	Chrysene (mg/kg)	DLCI <0.17	DLCI <0.13	DLHM 0.171	DLHM 0.221	DLCI <0.18
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.013	0.0085	DLHM 0.0156	DLHM 0.0189	0.0148
	Fluoranthene (mg/kg)	DLHM 0.029	0.019	DLHM 0.035	DLHM 0.043	0.028
	Fluorene (mg/kg)	DLHM 0.218	0.141	0.209	DLHM 0.293	0.222
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	<0.010	DLHM <0.013	DLHM <0.017	0.010
	1-Methylnaphthalene (mg/kg)	DLHM 0.814	0.524	0.818	DLHM 0.983	0.802
	2-Methylnaphthalene (mg/kg)	DLHM 1.42	0.893	DLHM 1.35	DLHM 1.60	1.34
	Naphthalene (mg/kg)	DLHM 0.455	0.301	0.453	DLHM 0.497	0.453
	Perylene (mg/kg)	DLHM <0.020	<0.010	DLHM <0.013	DLHM <0.017	<0.010
	Phenanthrene (mg/kg)	DLHM 0.699	0.447	0.670	DLHM 0.884	0.698
	Pyrene (mg/kg)	DLHM 0.051	0.036	DLHM 0.051	DLHM 0.070	0.051
	Quinoline (mg/kg)	DLHM <0.020	<0.050	DLHM <0.013	DLHM <0.017	<0.050
	Surrogate: d10-Acenaphthene (%)	104.4	102.3	107.3	107.4	105.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-16 SE 16-SEP-20 10:00 RG_FOBCP_SE-01_2020-09-16_1000	L2508974-17 SE 16-SEP-20 11:00 RG_FOBCP_SE-02_2020-09-16_1100	L2508974-18 SE 16-SEP-20 12:10 RG_FOBCP_SE-03_2020-09-16_1210	L2508974-19 SE 16-SEP-20 14:10 RG_FOBCP_SE-04_2020-09-16_1410	L2508974-20 SE 16-SEP-20 14:40 RG_FOBCP_SE-05_2020-09-16_1440
SOIL						
Metals	Silver (Ag) (mg/kg)	0.18	0.15	0.15	0.17	0.16
	Sodium (Na) (mg/kg)	88	89	88	92	90
	Strontium (Sr) (mg/kg)	103	89.4	71.5	77.8	75.7
	Sulfur (S) (mg/kg)	1100	<1000	<1000	1000	<1000
	Thallium (Tl) (mg/kg)	0.237	0.254	0.235	0.262	0.234
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	25.1	21.9	20.8	25.2	23.5
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.16	1.17	1.05	1.10	1.02
	Vanadium (V) (mg/kg)	33.4	36.0	32.8	32.1	33.8
	Zinc (Zn) (mg/kg)	241	168	130	157	148
	Zirconium (Zr) (mg/kg)	1.0	<1.0	1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.060	DLCI <0.060	DLCI <0.035	DLCI <0.080	DLCI <0.050
	Acenaphthylene (mg/kg)	DLHM 0.0122	0.0093	<0.0050	0.0133	DLHM 0.0098
	Acridine (mg/kg)	DLCI <0.12	DLCI <0.12	DLCI <0.060	DLCI <0.13	DLCI <0.080
	Anthracene (mg/kg)	DLHM 0.0191	0.0190	0.0074	0.0173	DLHM 0.0073
	Benz(a)anthracene (mg/kg)	DLHM 0.046	DLCI <0.040	DLCI <0.020	DLCI <0.040	DLHM 0.028
	Benzo(a)pyrene (mg/kg)	DLHM 0.018	0.017	<0.010	0.021	DLHM 0.013
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.075	0.073	0.039	0.065	DLHM 0.053
	Benzo(b+j+k)fluoranthene (mg/kg)	0.095	0.143	0.039	0.079	0.053
	Benzo(e)pyrene (mg/kg)	DLHM 0.085	0.073	0.044	0.076	DLHM 0.061
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.037	0.028	0.019	0.032	DLCI <0.030
	Benzo(k)fluoranthene (mg/kg)	DLHM 0.020	0.071	<0.010	0.014	DLHM <0.013
	Chrysene (mg/kg)	DLHM 0.195	DLCI <0.16	DLCI <0.12	DLCI <0.22	DLHM 0.164
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.027	DLCI <0.017	0.0092	DLCI <0.020	DLHM 0.0163
	Fluoranthene (mg/kg)	DLHM 0.051	0.036	0.016	0.033	DLHM 0.032
	Fluorene (mg/kg)	DLHM 0.192	0.198	0.099	0.244	DLHM 0.141
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM 0.016	<0.010	<0.010	<0.010	DLHM <0.013
	1-Methylnaphthalene (mg/kg)	DLHM 0.670	0.763	0.378	0.898	DLHM 0.631
	2-Methylnaphthalene (mg/kg)	DLHM 1.10	1.25	0.612	1.45	DLHM 1.01
	Naphthalene (mg/kg)	DLHM 0.366	0.424	0.203	0.469	DLHM 0.370
	Perylene (mg/kg)	DLHM <0.013	<0.010	<0.010	<0.010	DLHM <0.013
	Phenanthrene (mg/kg)	DLHM 0.622	0.691	0.369	0.790	DLHM 0.620
	Pyrene (mg/kg)	DLHM 0.063	0.055	0.030	0.059	DLHM 0.044
	Quinoline (mg/kg)	DLHM <0.013	<0.050	<0.050	<0.050	DLHM <0.013
	Surrogate: d10-Acenaphthene (%)	104.2	105.0	100.5	104.1	104.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-21	L2508974-22	L2508974-23	L2508974-24	L2508974-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20
	Sampled Time	10:00	10:30	11:00	11:20	12:00
	Client ID	RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI_SE-05_2020-09-14_1200
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.16	0.14	0.13	0.14
	Sodium (Na) (mg/kg)	82	89	89	107	103
	Strontium (Sr) (mg/kg)	75.0	70.5	78.5	77.7	80.0
	Sulfur (S) (mg/kg)	1100	1300	1400	1200	<1000
	Thallium (Tl) (mg/kg)	0.171	0.166	0.152	0.187	0.182
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	24.5	25.8	19.8	20.6	20.9
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.01	0.933	0.964	0.930	1.41
	Vanadium (V) (mg/kg)	28.2	25.9	23.8	29.6	41.5
	Zinc (Zn) (mg/kg)	127	125	130	118	141
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.14	DLCI <0.18	DLCI <0.15	DLCI <0.15	DLCI <0.12
	Acenaphthylene (mg/kg)	DLCI <0.030	DLCI <0.040	DLCI <0.040	DLCI <0.030	DLCI <0.030
	Acridine (mg/kg)	DLCI <0.26	DLCI <0.29	DLCI <0.30	DLCI <0.24	DLCI <0.22
	Anthracene (mg/kg)	DLCI <0.030	DLCI <0.040	DLCI <0.040	DLCI <0.030	DLCI <0.040
	Benz(a)anthracene (mg/kg)	DLHM 0.075	DLHM 0.088	DLHM 0.071	DLHM 0.069	DLHM 0.073
	Benzo(a)pyrene (mg/kg)	DLHM 0.037	DLHM 0.051	DLHM 0.040	DLHM 0.032	DLHM 0.052
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.125	DLHM 0.150	DLHM 0.115	DLHM 0.112	DLHM 0.109
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM 0.125	DLHM 0.150	DLHM 0.115	DLHM 0.112	DLHM 0.109
	Benzo(e)pyrene (mg/kg)	DLHM 0.136	DLHM 0.158	DLHM 0.137	DLHM 0.122	DLHM 0.138
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.065	DLHM 0.071	DLHM 0.065	DLHM 0.060	DLHM 0.058
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.025	DLHM <0.020	DLHM <0.025
	Chrysene (mg/kg)	DLHM 0.357	DLHM 0.415	DLHM 0.350	DLHM 0.321	DLHM 0.325
	Dibenz(a,h)anthracene (mg/kg)	DLHM 0.027	DLHM 0.040	DLCI <0.030	DLCI <0.030	DLCI <0.030
	Fluoranthene (mg/kg)	DLHM 0.075	DLHM 0.088	DLHM 0.061	DLHM 0.049	DLHM 0.046
	Fluorene (mg/kg)	DLHM 0.488	DLHM 0.455	DLHM 0.495	DLHM 0.341	DLHM 0.449
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM 0.022	DLHM 0.030	DLHM <0.025	DLHM <0.020	DLHM 0.028
	1-Methylnaphthalene (mg/kg)	DLHM 1.51	DLHM 1.81	DLHM 1.49	DLHM 1.44	DLHM 1.37
	2-Methylnaphthalene (mg/kg)	DLHM 2.44	DLHM 3.00	DLHM 2.44	DLHM 2.32	DLHM 2.27
	Naphthalene (mg/kg)	DLHM 0.710	DLHM 0.849	DLHM 0.744	DLHM 0.640	DLHM 0.662
	Perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.025	DLHM <0.020	DLHM <0.025
	Phenanthrene (mg/kg)	DLHM 1.42	DLHM 1.62	DLHM 1.42	DLHM 1.28	DLHM 1.23
	Pyrene (mg/kg)	DLHM 0.112	DLHM 0.130	DLHM 0.106	DLHM 0.098	DLHM 0.104
	Quinoline (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.025	DLHM <0.020	DLHM <0.025
	Surrogate: d10-Acenaphthene (%)	112.8	124.2	102.8	110.0	109.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-26	L2508974-27	L2508974-28	L2508974-29	L2508974-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20
	Sampled Time	10:00	10:20	11:30	11:50	12:20
	Client ID	RG_FOBKS_SE-01_2020-09-10_1000	RG_FOBKS_SE-02_2020-09-10_1020	RG_FOBKS_SE-03_2020-09-10_1130	RG_FOBKS_SE-04_2020-09-10_1150	RG_FOBKS_SE-05_2020-09-10_1220
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.13	0.16	0.12	0.16
	Sodium (Na) (mg/kg)	94	86	88	76	78
	Strontium (Sr) (mg/kg)	73.4	86.1	78.8	88.2	72.0
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	1100
	Thallium (Tl) (mg/kg)	0.224	0.213	0.235	0.202	0.184
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	19.3	17.3	22.2	21.2	20.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.01	1.00	1.05	0.978	1.02
	Vanadium (V) (mg/kg)	35.2	34.7	35.7	32.8	26.8
	Zinc (Zn) (mg/kg)	111	109	110	121	134
	Zirconium (Zr) (mg/kg)	1.1	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.045	DLCI <0.045	DLCI <0.035	DLCI <0.040	DLCI <0.080
	Acenaphthylene (mg/kg)	0.0070	0.0084	0.0081	0.0080	DLHM 0.013
	Acridine (mg/kg)	DLCI <0.090	DLCI <0.070	DLCI <0.070	DLCI <0.080	DLCI <0.15
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	DLHM <0.0080
	Benz(a)anthracene (mg/kg)	0.022	0.019	DLCI <0.020	0.021	DLHM 0.036
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	0.013	DLHM <0.020
	Benzo(b&j)fluoranthene (mg/kg)	DLCI <0.050	DLCI <0.040	0.028	0.037	DLHM 0.067
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.051	<0.041	0.028	0.037	0.067
	Benzo(e)pyrene (mg/kg)	0.044	0.035	0.030	0.040	DLHM 0.070
	Benzo(g,h,i)perylene (mg/kg)	0.023	0.017	0.014	0.014	DLCI <0.030
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.020
	Chrysene (mg/kg)	0.111	0.084	DLCI <0.090	0.108	DLHM 0.191
	Dibenz(a,h)anthracene (mg/kg)	0.0125	DLCI <0.0090	0.0075	0.0087	DLHM 0.016
	Fluoranthene (mg/kg)	0.024	0.021	0.020	0.023	DLHM 0.046
	Fluorene (mg/kg)	0.126	0.102	0.094	0.119	DLHM 0.221
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.020
	1-Methylnaphthalene (mg/kg)	0.477	0.445	0.404	0.511	DLHM 0.850
	2-Methylnaphthalene (mg/kg)	0.786	0.721	0.679	0.838	DLHM 1.44
	Naphthalene (mg/kg)	0.240	0.209	0.211	0.242	DLHM 0.413
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.020
	Phenanthrene (mg/kg)	0.534	0.428	0.423	0.450	DLHM 0.827
	Pyrene (mg/kg)	0.035	0.031	0.027	0.037	DLHM 0.059
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	DLHM <0.020
	Surrogate: d10-Acenaphthene (%)	97.8	98.3	98.6	98.3	100.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-31	L2508974-32	L2508974-33	L2508974-34	L2508974-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20
	Sampled Time	09:00	09:15	09:30	09:45	10:00
	Client ID	RG_FO22_SE-01_2020-09-11_0900	RG_FO22_SE-02_2020-09-11_0915	RG_FO22_SE-03_2020-09-11_0930	RG_FO22_SE-04_2020-09-11_0945	RG_FO22_SE-05_2020-09-11_1000
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.17	0.12	0.13	0.14	0.14
	Sodium (Na) (mg/kg)	84	75	80	78	85
	Strontium (Sr) (mg/kg)	61.7	68.9	54.1	71.2	61.5
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.213	0.225	0.185	0.219	0.219
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	23.4	14.0	25.6	23.3	23.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.12	1.10	0.954	1.22	1.07
	Vanadium (V) (mg/kg)	33.6	39.7	27.6	37.8	35.7
	Zinc (Zn) (mg/kg)	108	111	94.4	121	105
	Zirconium (Zr) (mg/kg)	1.1 DLCI	<1.0 DLCI	1.0 DLCI	1.1 DLCI	1.0 DLCI
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.025	<0.015	<0.017	<0.017	<0.020
	Acenaphthylene (mg/kg)	0.0055 DLCI	<0.0050 DLCI	<0.0050 DLCI	<0.0050 DLCI	<0.0050 DLCI
	Acridine (mg/kg)	<0.040	<0.020	<0.030	<0.020	<0.020
	Anthracene (mg/kg)	<0.0040	<0.0040	0.0083	<0.0040	0.0075
	Benz(a)anthracene (mg/kg)	0.014	<0.010	0.033	<0.010	0.011
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	0.015	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.036	0.022	0.040	0.025	0.024
	Benzo(b+j+k)fluoranthene (mg/kg)	0.036	0.022	0.040	0.025	0.024
	Benzo(e)pyrene (mg/kg)	0.038	0.021	0.033	0.027	0.024
	Benzo(g,h,i)perylene (mg/kg)	0.015	0.011	<0.020 DLCI	0.011	<0.020 DLCI
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.107	<0.060 DLCI	0.086	0.080	0.079
	Dibenz(a,h)anthracene (mg/kg)	0.0089	<0.0050	0.0059	0.0069	<0.0080 DLCI
	Fluoranthene (mg/kg)	0.020	0.011	0.059	0.016	0.014
	Fluorene (mg/kg)	0.062	0.022	0.027	0.030	0.024
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.268	0.142	0.202	0.204	0.202
	2-Methylnaphthalene (mg/kg)	0.431	0.213	0.300	0.325	0.311
	Naphthalene (mg/kg)	0.141	0.073	0.115	0.129	0.125
	Perylene (mg/kg)	0.029	0.014	0.022	0.021	0.021
	Phenanthrene (mg/kg)	0.397	0.223	0.319	0.319	0.352
	Pyrene (mg/kg)	0.027	0.016	0.058	0.022	0.024
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	97.1	96.3	96.3	95.4	99.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-36	L2508974-37	L2508974-38	L2508974-39	L2508974-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	09:15	09:30	09:45	10:00	10:15
	Client ID	RG_FRUPO_SE-01_2020-09-12_0915	RG_FRUPO_SE-02_2020-09-12_0930	RG_FRUPO_SE-03_2020-09-12_0945	RG_FRUPO_SE-04_2020-09-12_1000	RG_FRUPO_SE-05_2020-09-12_1015
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.16	0.16	0.14	0.15	0.19
	Sodium (Na) (mg/kg)	87	82	95	75	83
	Strontium (Sr) (mg/kg)	66.4	60.4	73.9	71.3	67.6
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.222	0.216	0.240	0.226	0.244
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	21.3	22.9	24.3	20.0	32.5
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.10	1.06	1.14	1.17	1.14
	Vanadium (V) (mg/kg)	34.9	34.2	40.7	36.2	33.1
	Zinc (Zn) (mg/kg)	110	109	120	123	117
	Zirconium (Zr) (mg/kg)	<1.0 DLCI	<1.0 DLCI	1.3 DLCI	<1.0 DLCI	1.3 DLCI
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.035	<0.045	<0.020	<0.020	<0.025
	Acenaphthylene (mg/kg)	0.0074	0.0098	<0.0050	0.0058	0.0063
	Acridine (mg/kg)	<0.050 DLCI	<0.060 DLCI	<0.030 DLCI	<0.040 DLCI	<0.050 DLCI
	Anthracene (mg/kg)	0.0113	0.0042	0.0061	0.0111	0.0101
	Benz(a)anthracene (mg/kg)	0.022	0.023	0.010	0.011	0.014
	Benzo(a)pyrene (mg/kg)	<0.010	0.011	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.039	0.036	0.023	0.024	0.026
	Benzo(b+j+k)fluoranthene (mg/kg)	0.039	0.036	0.023	0.024	0.026
	Benzo(e)pyrene (mg/kg)	0.041	0.042	0.027	0.027	0.030
	Benzo(g,h,i)perylene (mg/kg)	0.017	<0.020 DLCI	0.013	0.011	0.014
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.117	0.112	0.086	0.074	0.084
	Dibenz(a,h)anthracene (mg/kg)	0.0135	0.0077	0.0072	0.0065	0.0074
	Fluoranthene (mg/kg)	0.038	0.027	0.017	0.014	0.015
	Fluorene (mg/kg)	0.081	0.090	0.044	0.068	0.070
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.350	0.495	0.271	0.309	0.326
	2-Methylnaphthalene (mg/kg)	0.565	0.784	0.414	0.504	0.520
	Naphthalene (mg/kg)	0.170	0.286	0.149	0.166	0.161
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	0.402	0.581	0.337	0.367	0.437
	Pyrene (mg/kg)	0.039	0.036	0.022	0.024	0.026
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	98.8	97.2	97.7	99.9	96.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-41	L2508974-42	L2508974-43	L2508974-44	L2508974-45
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:15	09:30	09:45	09:15	09:30
	Client ID	RG_HENUP_SE-01_2020-09-15_0915	RG_HENUP_SE-02_2020-09-15_0930	RG_HENUP_SE-03_2020-09-15_0945	RG_FO26_SE-01_2020-09-17_0915	RG_FO26_SE-02_2020-09-17_0930
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.13	0.19	<0.10	<0.10
	Sodium (Na) (mg/kg)	99	93	100	179	158
	Strontium (Sr) (mg/kg)	83.2	78.3	65.8	137	125
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.250	0.257	0.252	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	24.4	16.8	25.4	16.1	14.3
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.989	1.00	0.954	0.451	0.446
	Vanadium (V) (mg/kg)	35.8	36.1	32.9	5.54	5.77
	Zinc (Zn) (mg/kg)	110	115	104	31.9	35.1
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	1.3	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.010 DLCI	<0.0050	<0.011 DLCI	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0065 DLHM	<0.0050	<0.0050
	Acridine (mg/kg)	<0.010	<0.010	<0.020 DLCI	<0.010	<0.010
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0052 DLHM	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.019	0.017	0.028 DLHM	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	0.019	0.017	<0.030 DLHM	<0.015	<0.015
	Benzo(e)pyrene (mg/kg)	0.018	0.017	0.028 DLHM	<0.010	<0.010
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Chrysene (mg/kg)	0.053	0.051	0.083 DLHM	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0065 DLHM	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	0.018 DLHM	<0.010	<0.010
	Fluorene (mg/kg)	0.020	0.014	0.047 DLHM	<0.010	0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.070	0.051	0.157 DLHM	<0.050	<0.050
	2-Methylnaphthalene (mg/kg)	0.108	0.082	0.252 DLHM	0.022	0.033
	Naphthalene (mg/kg)	0.047	0.043	0.091 DLHM	<0.010	0.011
	Perylene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Phenanthrene (mg/kg)	0.124	0.120	0.236 DLHM	0.014	0.018
	Pyrene (mg/kg)	0.013	0.011	0.025 DLHM	<0.010	<0.010
	Quinoline (mg/kg)	<0.050	<0.050	<0.013 DLHM	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	90.2	93.5	99.5	98.1	96.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-46	L2508974-47	L2508974-48		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	22-SEP-20	22-SEP-20		
	Sampled Time	09:45	10:30	14:45		
	Client ID	RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-2X_2020-09-22_1030	RG_RIVER_SE-3X_2020-09-22_1445		
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	<0.10	0.20	<0.10		
	Sodium (Na) (mg/kg)	182	76	181		
	Strontium (Sr) (mg/kg)	112	63.7	112		
	Sulfur (S) (mg/kg)	<1000	<1000	<1000		
	Thallium (Tl) (mg/kg)	<0.050	0.234	<0.050		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	23.6	27.8	21.0		
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50		
	Uranium (U) (mg/kg)	0.445	1.07	0.458		
	Vanadium (V) (mg/kg)	7.34	29.3	6.70		
	Zinc (Zn) (mg/kg)	42.1	143	40.3		
	Zirconium (Zr) (mg/kg)	<1.0	1.2	<1.0		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.035 DLCI	<0.0050		
	Acenaphthylene (mg/kg)	<0.0050	0.0052	<0.0050		
	Acridine (mg/kg)	<0.010	<0.050 DLCI	<0.010		
	Anthracene (mg/kg)	<0.0040	0.0090	<0.0040		
	Benz(a)anthracene (mg/kg)	<0.010	0.014	<0.010		
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	0.026	<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	0.026	<0.015		
	Benzo(e)pyrene (mg/kg)	<0.010	0.030	<0.010		
	Benzo(g,h,i)perylene (mg/kg)	<0.010	0.012	<0.010		
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Chrysene (mg/kg)	<0.010	0.095	<0.010		
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	0.0054	<0.0050		
	Fluoranthene (mg/kg)	<0.010	0.024	<0.010		
	Fluorene (mg/kg)	<0.010	0.078	<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	1-Methylnaphthalene (mg/kg)	<0.050	0.371	<0.050		
	2-Methylnaphthalene (mg/kg)	0.063	0.598	0.052		
	Naphthalene (mg/kg)	0.019	0.179	0.015		
	Perylene (mg/kg)	<0.010	<0.010	<0.010		
	Phenanthrene (mg/kg)	0.036	0.455	0.035		
	Pyrene (mg/kg)	<0.010	0.032	<0.010		
	Quinoline (mg/kg)	<0.050	<0.050	<0.050		
	Surrogate: d10-Acenaphthene (%)	99.0	103.2	96.5		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-1	L2508974-2	L2508974-3	L2508974-4	L2508974-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	22-SEP-20	22-SEP-20	22-SEP-20	22-SEP-20	22-SEP-20
	Sampled Time	10:00	10:30	12:00	12:30	13:00
	Client ID	RG_FRCP1SW_SE-01_2020-09-22_1000	RG_FRCP1SW_SE-02_2020-09-22_1030	RG_FRCP1SW_SE-03_2020-09-22_1200	RG_FRCP1SW_SE-04_2020-09-22_1230	RG_FRCP1SW_SE-05_2020-09-22_1300
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	93.4	91.3	128.4	88.1	92.6
	Surrogate: d8-Naphthalene (%)	98.8	98.9	95.9	95.3	99.5
	Surrogate: d10-Phenanthrene (%)	92.9	90.5	93.0	84.7	99.5
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.030	0.034	0.021	0.029	0.043
	IACR (CCME)	0.53	0.60	0.41	0.48	0.74

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-6	L2508974-7	L2508974-8	L2508974-9	L2508974-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	09:40	10:00	11:00	11:30	12:00
	Client ID	RG_FOBSC_SE-01_2020-09-18_0940	RG_FOBSC_SE-02_2020-09-18_1000	RG_FOBSC_SE-03_2020-09-18_1100	RG_FOBSC_SE-04_2020-09-18_1130	RG_FOBSC_SE-05_2020-09-18_1200
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	96.3	91.4	91.8	96.5	89.7
	Surrogate: d8-Naphthalene (%)	106.1	99.3	93.8	101.9	91.8
	Surrogate: d10-Phenanthrene (%)	101.6	96.4	93.3	89.7	90.2
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	0.052	<0.050	0.060	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.051	0.047	0.045	0.046	0.028
	IACR (CCME)	0.77	0.83	0.67	0.85	0.60

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-11 SE 17-SEP-20 09:50 RG_SCOUTDS_SE-01_2020-09-17_0950	L2508974-12 SE 17-SEP-20 10:20 RG_SCOUTDS_SE-02_2020-09-17_1020	L2508974-13 SE 17-SEP-20 11:00 RG_SCOUTDS_SE-03_2020-09-17_1100	L2508974-14 SE 17-SEP-20 13:10 RG_SCOUTDS_SE-04_2020-09-17_1310	L2508974-15 SE 17-SEP-20 13:30 RG_SCOUTDS_SE-05_2020-09-17_1330
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	87.9	87.6	91.6	93.5	90.6
	Surrogate: d8-Naphthalene (%)	103.6	103.5	103.8	103.2	102.9
	Surrogate: d10-Phenanthrene (%)	93.0	88.0	95.0	98.0	92.5
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	0.062	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.027	0.025	0.046	0.061	0.044
	IACR (CCME)	0.56	0.40	0.71	0.98	0.63

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-16	L2508974-17	L2508974-18	L2508974-19	L2508974-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	10:00	11:00	12:10	14:10	14:40
	Client ID	RG_FOBCP_SE-01_2020-09-16_1000	RG_FOBCP_SE-02_2020-09-16_1100	RG_FOBCP_SE-03_2020-09-16_1210	RG_FOBCP_SE-04_2020-09-16_1410	RG_FOBCP_SE-05_2020-09-16_1440
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	92.1	92.3	86.0	88.4	91.1
	Surrogate: d8-Naphthalene (%)	99.2	102.0	98.5	95.7	102.7
	Surrogate: d10-Phenanthrene (%)	97.4	91.6	89.5	93.5	96.9
	IACR:Coarse	<0.050	0.076	<0.050	<0.050	<0.050
	IACR:Fine	0.075	0.144	<0.050	0.055	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.050	0.043	0.021	0.042	0.041
	IACR (CCME)	0.95	1.08	0.39	0.71	0.65

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-21	L2508974-22	L2508974-23	L2508974-24	L2508974-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20
	Sampled Time	10:00	10:30	11:00	11:20	12:00
	Client ID	RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI_SE-05_2020-09-14_1200
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	129.8	122.2	125.3	127.9	128.4
	Surrogate: d8-Naphthalene (%)	99.0	108.6	91.7	95.8	96.5
	Surrogate: d10-Phenanthrene (%)	119.9	122.2	109.8	115.5	112.0
	IACR:Coarse	<0.050	0.056	<0.050	<0.050	<0.050
	IACR:Fine	0.090	0.107	0.088	0.081	0.087
	B(a)P Total Potency Equivalent (mg/kg)	0.091	0.123	0.080	0.071	0.093
	IACR (CCME)	1.48	1.80	1.37	1.29	1.36

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-26	L2508974-27	L2508974-28	L2508974-29	L2508974-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20
	Sampled Time	10:00	10:20	11:30	11:50	12:20
	Client ID	RG_FOBKS_SE-01_2020-09-10_1000	RG_FOBKS_SE-02_2020-09-10_1020	RG_FOBKS_SE-03_2020-09-10_1130	RG_FOBKS_SE-04_2020-09-10_1150	RG_FOBKS_SE-05_2020-09-10_1220
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	122.0	127.0	124.9	87.8	88.3
	Surrogate: d8-Naphthalene (%)	85.1	89.9	87.1	87.4	91.4
	Surrogate: d10-Phenanthrene (%)	103.9	96.9	102.2	96.4	104.2
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	0.054
	B(a)P Total Potency Equivalent (mg/kg)	0.025	<0.020	<0.020	0.030	0.040
	IACR (CCME)	0.38	0.29	0.31	0.46	0.79

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-31 SE 11-SEP-20 09:00 RG_FO22_SE-01_2020-09-11_0900	L2508974-32 SE 11-SEP-20 09:15 RG_FO22_SE-02_2020-09-11_0915	L2508974-33 SE 11-SEP-20 09:30 RG_FO22_SE-03_2020-09-11_0930	L2508974-34 SE 11-SEP-20 09:45 RG_FO22_SE-04_2020-09-11_0945	L2508974-35 SE 11-SEP-20 10:00 RG_FO22_SE-05_2020-09-11_1000
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	127.7	118.9	121.2	119.4	124.6
	Surrogate: d8-Naphthalene (%)	87.1	84.6	87.3	81.7	88.9
	Surrogate: d10-Phenanthrene (%)	108.9	103.9	95.0	103.9	109.1
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.021	<0.020	0.030	<0.020	<0.020
	IACR (CCME)	0.41	0.22	0.49	0.29	0.28

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-36	L2508974-37	L2508974-38	L2508974-39	L2508974-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	09:15	09:30	09:45	10:00	10:15
	Client ID	RG_FRUPO_SE-01_2020-09-12_0915	RG_FRUPO_SE-02_2020-09-12_0930	RG_FRUPO_SE-03_2020-09-12_0945	RG_FRUPO_SE-04_2020-09-12_1000	RG_FRUPO_SE-05_2020-09-12_1015
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	124.9	124.6	124.9	127.2	120.6
	Surrogate: d8-Naphthalene (%)	86.9	88.1	89.5	91.2	86.5
	Surrogate: d10-Phenanthrene (%)	99.2	104.8	101.7	109.7	106.5
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.027	0.027	<0.020	<0.020	<0.020
	IACR (CCME)	0.47	0.45	0.30	0.29	0.33

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-41 SE 15-SEP-20 09:15 RG_HENUP_SE-01_2020-09-15_0915	L2508974-42 SE 15-SEP-20 09:30 RG_HENUP_SE-02_2020-09-15_0930	L2508974-43 SE 15-SEP-20 09:45 RG_HENUP_SE-03_2020-09-15_0945	L2508974-44 SE 17-SEP-20 09:15 RG_FO26_SE-01_2020-09-17_0915	L2508974-45 SE 17-SEP-20 09:30 RG_FO26_SE-02_2020-09-17_0930
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	124.9	126.3	121.1	109.9	126.3
	Surrogate: d8-Naphthalene (%)	82.4	81.2	88.6	86.7	84.5
	Surrogate: d10-Phenanthrene (%)	93.2	99.9	111.0	90.5	95.0
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME)	0.21	0.20	0.31	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-46	L2508974-47	L2508974-48		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	22-SEP-20	22-SEP-20		
	Sampled Time	09:45	10:30	14:45		
	Client ID	RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-2X_2020-09-22_1030	RG_RIVER_SE-3X_2020-09-22_1445		
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	110.7	122.6	107.2		
	Surrogate: d8-Naphthalene (%)	86.0	88.1	85.7		
	Surrogate: d10-Phenanthrene (%)	100.5	102.9	106.4		
	IACR:Coarse	<0.050	<0.050	<0.050		
	IACR:Fine	<0.050	<0.050	<0.050		
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020		
	IACR (CCME)	<0.15	0.32	<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Fluoranthene	DUP-H	L2508974-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217
A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.			
C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2
Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)			
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
HG-200.2-CVAA-CL	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.			
IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
MET-200.2-CCMS-CL	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS. Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.			
MOISTURE-CL	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
This analysis is carried out gravimetrically by drying the sample at 105 C			
PAH-TMB-H/A-MS-CL	Soil	PAH Tumbler Extraction (Hexane/Acetone)	EPA 3570/8270-GC/MS
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-1:2-CL	Soil	pH in soil (1:2 Soil:Water Extraction)	CSSS Ch. 16
Soil and de-ionized water (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PSA-PIPET-DETAIL-SK	Soil	Particle size - Sieve and Pipette	SSIR-51 METHOD 3.2.1
Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Reference Information

Chain of Custody Numbers:

FRO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5246404								
WG3414818-1 DUP		**L2508974-21**						
Inorganic Carbon		2.67	2.66		%	0.3	20	05-OCT-20
WG3414818-4 IRM		**08-109_SOIL**						
Inorganic Carbon			109.3		%		80-120	05-OCT-20
WG3414818-2 LCS		**0.5**						
Inorganic Carbon			98.9		%		90-110	05-OCT-20
WG3414818-3 MB								
Inorganic Carbon			<0.050		%		0.05	05-OCT-20
Batch R5246406								
WG3414817-1 DUP		**L2508974-1**						
Inorganic Carbon		1.56	1.56		%	0.5	20	05-OCT-20
WG3414817-4 IRM		**08-109_SOIL**						
Inorganic Carbon			110.0		%		80-120	05-OCT-20
WG3414817-2 LCS		**0.5**						
Inorganic Carbon			98.7		%		90-110	05-OCT-20
WG3414817-3 MB								
Inorganic Carbon			<0.050		%		0.05	05-OCT-20
Batch R5246407								
WG3417237-4 IRM		**08-109_SOIL**						
Inorganic Carbon			114.4		%		80-120	05-OCT-20
WG3417237-2 LCS		**0.5**						
Inorganic Carbon			98.1		%		90-110	05-OCT-20
WG3417237-3 MB								
Inorganic Carbon			<0.050		%		0.05	05-OCT-20
Batch R5249443								
WG3414822-4 IRM		**08-109_SOIL**						
Inorganic Carbon			86.6		%		80-120	06-OCT-20
WG3414822-2 LCS		**0.5**						
Inorganic Carbon			95.5		%		90-110	06-OCT-20
WG3414822-3 MB								
Inorganic Carbon			<0.050		%		0.05	06-OCT-20
C-TOT-LECO-SK	**Soil**							
Batch R5244273								
WG3413289-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			95.8		%		80-120	01-OCT-20
WG3413289-5 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			99.3		%		90-110	01-OCT-20
WG3413289-4 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-LECO-SK	**Soil**							
Batch R5244273								
WG3413289-4 MB								
Total Carbon by Combustion			<0.05		%		0.05	01-OCT-20
Batch R5244496								
WG3414880-1 DUP		**L2508974-10**						
Total Carbon by Combustion		7.68	7.87		%	2.4	20	02-OCT-20
WG3414880-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			103.4		%		80-120	02-OCT-20
WG3414880-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			100.5		%		90-110	02-OCT-20
WG3414880-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	02-OCT-20
Batch R5244499								
WG3414881-1 DUP		**L2508974-30**						
Total Carbon by Combustion		10.1	10.1		%	0.1	20	02-OCT-20
WG3414881-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.5		%		80-120	02-OCT-20
WG3414881-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			100.6		%		90-110	02-OCT-20
WG3414881-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	02-OCT-20
HG-200.2-CVAA-CL	**Soil**							
Batch R5248923								
WG3419204-14 CRM		**TILL-1**						
Mercury (Hg)			102.0		%		70-130	06-OCT-20
WG3419204-19 CRM		**TILL-1**						
Mercury (Hg)			80.0		%		70-130	06-OCT-20
WG3419204-9 CRM		**TILL-1**						
Mercury (Hg)			114.0		%		70-130	06-OCT-20
WG3419204-15 DUP		**L2508974-17**						
Mercury (Hg)		0.0427	0.0442		mg/kg	3.4	40	06-OCT-20
WG3419204-20 DUP		**L2508974-33**						
Mercury (Hg)		0.0341	0.0330		mg/kg	3.2	40	06-OCT-20
WG3419204-13 LCS								
Mercury (Hg)			99.6		%		80-120	06-OCT-20
WG3419204-18 LCS								
Mercury (Hg)			85.7		%		80-120	06-OCT-20
WG3419204-8 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-CL	**Soil**							
Batch R5248923								
WG3419204-8 LCS								
Mercury (Hg)			109.0		%		80-120	06-OCT-20
WG3419204-11 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-OCT-20
WG3419204-16 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-OCT-20
WG3419204-6 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-OCT-20
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-14 CRM		**TILL-1**						
Aluminum (Al)			107.9		%		70-130	06-OCT-20
Antimony (Sb)			104.6		%		70-130	06-OCT-20
Arsenic (As)			107.8		%		70-130	06-OCT-20
Barium (Ba)			103.7		%		70-130	06-OCT-20
Beryllium (Be)			99.3		%		70-130	06-OCT-20
Bismuth (Bi)			101.2		%		70-130	06-OCT-20
Boron (B)			3.4		mg/kg		0-8.2	06-OCT-20
Cadmium (Cd)			105.0		%		70-130	06-OCT-20
Calcium (Ca)			112.7		%		70-130	06-OCT-20
Chromium (Cr)			113.6		%		70-130	06-OCT-20
Cobalt (Co)			109.6		%		70-130	06-OCT-20
Copper (Cu)			109.9		%		70-130	06-OCT-20
Iron (Fe)			108.5		%		70-130	06-OCT-20
Lead (Pb)			97.9		%		70-130	06-OCT-20
Lithium (Li)			100.7		%		70-130	06-OCT-20
Magnesium (Mg)			109.0		%		70-130	06-OCT-20
Manganese (Mn)			104.5		%		70-130	06-OCT-20
Molybdenum (Mo)			102.9		%		70-130	06-OCT-20
Nickel (Ni)			110.0		%		70-130	06-OCT-20
Phosphorus (P)			104.3		%		70-130	06-OCT-20
Potassium (K)			115.4		%		70-130	06-OCT-20
Selenium (Se)			0.35		mg/kg		0.11-0.51	06-OCT-20
Silver (Ag)			0.23		mg/kg		0.13-0.33	06-OCT-20
Sodium (Na)			120.2		%		70-130	06-OCT-20
Strontium (Sr)			113.5		%		70-130	06-OCT-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-14 CRM		**TILL-1**						
Thallium (Tl)			0.132		mg/kg		0.077-0.18	06-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	06-OCT-20
Titanium (Ti)			125.6		%		70-130	06-OCT-20
Tungsten (W)			0.17		mg/kg		0-0.66	06-OCT-20
Uranium (U)			105.9		%		70-130	06-OCT-20
Vanadium (V)			113.2		%		70-130	06-OCT-20
Zinc (Zn)			114.2		%		70-130	06-OCT-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	06-OCT-20
WG3419204-19 CRM		**TILL-1**						
Aluminum (Al)			99.2		%		70-130	06-OCT-20
Antimony (Sb)			97.0		%		70-130	06-OCT-20
Arsenic (As)			101.6		%		70-130	06-OCT-20
Barium (Ba)			97.0		%		70-130	06-OCT-20
Beryllium (Be)			100.9		%		70-130	06-OCT-20
Bismuth (Bi)			95.3		%		70-130	06-OCT-20
Boron (B)			3.8		mg/kg		0-8.2	06-OCT-20
Cadmium (Cd)			104.3		%		70-130	06-OCT-20
Calcium (Ca)			115.1		%		70-130	06-OCT-20
Chromium (Cr)			108.7		%		70-130	06-OCT-20
Cobalt (Co)			101.8		%		70-130	06-OCT-20
Copper (Cu)			102.4		%		70-130	06-OCT-20
Iron (Fe)			100.3		%		70-130	06-OCT-20
Lead (Pb)			92.1		%		70-130	06-OCT-20
Lithium (Li)			105.6		%		70-130	06-OCT-20
Magnesium (Mg)			106.2		%		70-130	06-OCT-20
Manganese (Mn)			98.1		%		70-130	06-OCT-20
Molybdenum (Mo)			101.8		%		70-130	06-OCT-20
Nickel (Ni)			103.2		%		70-130	06-OCT-20
Phosphorus (P)			98.8		%		70-130	06-OCT-20
Potassium (K)			119.9		%		70-130	06-OCT-20
Selenium (Se)			0.27		mg/kg		0.11-0.51	06-OCT-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	06-OCT-20
Sodium (Na)			116.8		%		70-130	06-OCT-20
Strontium (Sr)			121.4		%		70-130	06-OCT-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-19 CRM		**TILL-1**						
Thallium (Tl)			0.132		mg/kg		0.077-0.18	06-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	06-OCT-20
Titanium (Ti)			123.1		%		70-130	06-OCT-20
Tungsten (W)			0.13		mg/kg		0-0.66	06-OCT-20
Uranium (U)			103.0		%		70-130	06-OCT-20
Vanadium (V)			107.6		%		70-130	06-OCT-20
Zinc (Zn)			105.7		%		70-130	06-OCT-20
Zirconium (Zr)			0.9		mg/kg		0-1.8	06-OCT-20
WG3419204-9 CRM		**TILL-1**						
Aluminum (Al)			106.9		%		70-130	06-OCT-20
Antimony (Sb)			105.2		%		70-130	06-OCT-20
Arsenic (As)			103.9		%		70-130	06-OCT-20
Barium (Ba)			101.8		%		70-130	06-OCT-20
Beryllium (Be)			100.0		%		70-130	06-OCT-20
Bismuth (Bi)			101.7		%		70-130	06-OCT-20
Boron (B)			3.4		mg/kg		0-8.2	06-OCT-20
Cadmium (Cd)			100.0		%		70-130	06-OCT-20
Calcium (Ca)			109.5		%		70-130	06-OCT-20
Chromium (Cr)			107.5		%		70-130	06-OCT-20
Cobalt (Co)			103.7		%		70-130	06-OCT-20
Copper (Cu)			105.1		%		70-130	06-OCT-20
Iron (Fe)			108.0		%		70-130	06-OCT-20
Lead (Pb)			101.2		%		70-130	06-OCT-20
Lithium (Li)			109.2		%		70-130	06-OCT-20
Magnesium (Mg)			109.2		%		70-130	06-OCT-20
Manganese (Mn)			102.8		%		70-130	06-OCT-20
Molybdenum (Mo)			104.2		%		70-130	06-OCT-20
Nickel (Ni)			103.6		%		70-130	06-OCT-20
Phosphorus (P)			103.3		%		70-130	06-OCT-20
Potassium (K)			110.9		%		70-130	06-OCT-20
Selenium (Se)			0.33		mg/kg		0.11-0.51	06-OCT-20
Silver (Ag)			0.24		mg/kg		0.13-0.33	06-OCT-20
Sodium (Na)			119.0		%		70-130	06-OCT-20
Strontium (Sr)			113.9		%		70-130	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-9 CRM		**TILL-1**						
Thallium (Tl)			0.132		mg/kg		0.077-0.18	06-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	06-OCT-20
Titanium (Ti)			124.5		%		70-130	06-OCT-20
Tungsten (W)			0.16		mg/kg		0-0.66	06-OCT-20
Uranium (U)			108.0		%		70-130	06-OCT-20
Vanadium (V)			107.1		%		70-130	06-OCT-20
Zinc (Zn)			107.8		%		70-130	06-OCT-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	06-OCT-20
WG3419204-15 DUP		**L2508974-17**						
Aluminum (Al)		6980	6660		mg/kg	4.6	40	06-OCT-20
Antimony (Sb)		0.66	0.60		mg/kg	9.8	30	06-OCT-20
Arsenic (As)		5.40	4.95		mg/kg	8.6	30	06-OCT-20
Barium (Ba)		235	218		mg/kg	7.7	40	06-OCT-20
Beryllium (Be)		0.63	0.55		mg/kg	14	30	06-OCT-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	06-OCT-20
Boron (B)		10.1	9.5		mg/kg	6.2	30	06-OCT-20
Cadmium (Cd)		2.22	2.02		mg/kg	9.5	30	06-OCT-20
Calcium (Ca)		74700	72900		mg/kg	2.5	30	06-OCT-20
Chromium (Cr)		13.4	12.8		mg/kg	5.2	30	06-OCT-20
Cobalt (Co)		6.93	6.24		mg/kg	10	30	06-OCT-20
Copper (Cu)		13.4	12.1		mg/kg	10	30	06-OCT-20
Iron (Fe)		17100	14000		mg/kg	20	30	06-OCT-20
Lead (Pb)		7.62	7.33		mg/kg	3.9	40	06-OCT-20
Lithium (Li)		10.0	9.2		mg/kg	8.3	30	06-OCT-20
Magnesium (Mg)		11700	11700		mg/kg	0.6	30	06-OCT-20
Manganese (Mn)		702	602		mg/kg	15	30	06-OCT-20
Molybdenum (Mo)		1.61	1.44		mg/kg	11	40	06-OCT-20
Nickel (Ni)		58.4	53.5		mg/kg	8.8	30	06-OCT-20
Phosphorus (P)		1340	1250		mg/kg	7.2	30	06-OCT-20
Potassium (K)		1940	1870		mg/kg	3.5	40	06-OCT-20
Selenium (Se)		2.13	2.11		mg/kg	1.1	30	06-OCT-20
Silver (Ag)		0.15	0.14		mg/kg	5.2	40	06-OCT-20
Sodium (Na)		89	85		mg/kg	5.2	40	06-OCT-20
Strontium (Sr)		89.4	74.3		mg/kg	18	40	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-15 DUP		**L2508974-17**						
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	06-OCT-20
Thallium (Tl)		0.254	0.242		mg/kg	5.1	30	06-OCT-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	06-OCT-20
Titanium (Ti)		21.9	24.5		mg/kg	11	40	06-OCT-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	06-OCT-20
Uranium (U)		1.17	1.07		mg/kg	8.7	30	06-OCT-20
Vanadium (V)		36.0	31.8		mg/kg	12	30	06-OCT-20
Zinc (Zn)		168	153		mg/kg	9.7	30	06-OCT-20
Zirconium (Zr)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	06-OCT-20
WG3419204-20 DUP		**L2508974-33**						
Aluminum (Al)		6000	6730		mg/kg	12	40	06-OCT-20
Antimony (Sb)		0.51	0.48		mg/kg	4.8	30	06-OCT-20
Arsenic (As)		4.55	4.69		mg/kg	2.9	30	06-OCT-20
Barium (Ba)		159	163		mg/kg	2.8	40	06-OCT-20
Beryllium (Be)		0.50	0.54		mg/kg	8.5	30	06-OCT-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	06-OCT-20
Boron (B)		6.9	8.3		mg/kg	18	30	06-OCT-20
Cadmium (Cd)		0.960	0.922		mg/kg	4.0	30	06-OCT-20
Calcium (Ca)		37500	39100		mg/kg	4.1	30	06-OCT-20
Chromium (Cr)		11.8	13.1		mg/kg	11	30	06-OCT-20
Cobalt (Co)		4.58	4.52		mg/kg	1.4	30	06-OCT-20
Copper (Cu)		10.4	10.3		mg/kg	0.5	30	06-OCT-20
Iron (Fe)		12100	12300		mg/kg	1.1	30	06-OCT-20
Lead (Pb)		6.96	6.82		mg/kg	2.0	40	06-OCT-20
Lithium (Li)		8.1	8.4		mg/kg	3.9	30	06-OCT-20
Magnesium (Mg)		12500	12900		mg/kg	3.5	30	06-OCT-20
Manganese (Mn)		281	281		mg/kg	0.0	30	06-OCT-20
Molybdenum (Mo)		1.03	1.01		mg/kg	1.9	40	06-OCT-20
Nickel (Ni)		21.5	21.2		mg/kg	1.5	30	06-OCT-20
Phosphorus (P)		1390	1420		mg/kg	2.0	30	06-OCT-20
Potassium (K)		1520	1800		mg/kg	17	40	06-OCT-20
Selenium (Se)		1.54	1.53		mg/kg	0.8	30	06-OCT-20
Silver (Ag)		0.13	0.13		mg/kg	1.5	40	06-OCT-20
Sodium (Na)		80	85		mg/kg	6.6	40	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-20 DUP		**L2508974-33**						
Strontium (Sr)		54.1	56.8		mg/kg	4.9	40	06-OCT-20
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	06-OCT-20
Thallium (Tl)		0.185	0.197		mg/kg	5.8	30	06-OCT-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	06-OCT-20
Titanium (Ti)		25.6	29.2		mg/kg	13	40	06-OCT-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	06-OCT-20
Uranium (U)		0.954	0.944		mg/kg	1.1	30	06-OCT-20
Vanadium (V)		27.6	30.4		mg/kg	9.6	30	06-OCT-20
Zinc (Zn)		94.4	93.2		mg/kg	1.3	30	06-OCT-20
Zirconium (Zr)		1.0	<1.0	RPD-NA	mg/kg	N/A	30	06-OCT-20
WG3419204-13 LCS								
Aluminum (Al)			93.2		%		80-120	06-OCT-20
Antimony (Sb)			102.8		%		80-120	06-OCT-20
Arsenic (As)			101.4		%		80-120	06-OCT-20
Barium (Ba)			99.7		%		80-120	06-OCT-20
Beryllium (Be)			92.7		%		80-120	06-OCT-20
Bismuth (Bi)			96.4		%		80-120	06-OCT-20
Boron (B)			93.5		%		80-120	06-OCT-20
Cadmium (Cd)			97.5		%		80-120	06-OCT-20
Calcium (Ca)			95.7		%		80-120	06-OCT-20
Chromium (Cr)			100.2		%		80-120	06-OCT-20
Cobalt (Co)			99.5		%		80-120	06-OCT-20
Copper (Cu)			98.5		%		80-120	06-OCT-20
Iron (Fe)			99.9		%		80-120	06-OCT-20
Lead (Pb)			101.1		%		80-120	06-OCT-20
Lithium (Li)			91.2		%		80-120	06-OCT-20
Magnesium (Mg)			98.7		%		80-120	06-OCT-20
Manganese (Mn)			95.0		%		80-120	06-OCT-20
Molybdenum (Mo)			101.4		%		80-120	06-OCT-20
Nickel (Ni)			99.2		%		80-120	06-OCT-20
Phosphorus (P)			94.5		%		80-120	06-OCT-20
Potassium (K)			98.6		%		80-120	06-OCT-20
Selenium (Se)			100.9		%		80-120	06-OCT-20
Silver (Ag)			94.9		%		80-120	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-13 LCS								
Sodium (Na)			99.7		%		80-120	06-OCT-20
Strontium (Sr)			98.7		%		80-120	06-OCT-20
Sulfur (S)			95.2		%		80-120	06-OCT-20
Thallium (Tl)			99.4		%		80-120	06-OCT-20
Tin (Sn)			103.0		%		80-120	06-OCT-20
Titanium (Ti)			98.7		%		80-120	06-OCT-20
Tungsten (W)			97.0		%		80-120	06-OCT-20
Uranium (U)			98.1		%		80-120	06-OCT-20
Vanadium (V)			102.2		%		80-120	06-OCT-20
Zinc (Zn)			102.1		%		80-120	06-OCT-20
Zirconium (Zr)			98.0		%		80-120	06-OCT-20
WG3419204-18 LCS								
Aluminum (Al)			98.4		%		80-120	06-OCT-20
Antimony (Sb)			106.6		%		80-120	06-OCT-20
Arsenic (As)			107.0		%		80-120	06-OCT-20
Barium (Ba)			103.8		%		80-120	06-OCT-20
Beryllium (Be)			101.3		%		80-120	06-OCT-20
Bismuth (Bi)			100.9		%		80-120	06-OCT-20
Boron (B)			102.4		%		80-120	06-OCT-20
Cadmium (Cd)			102.9		%		80-120	06-OCT-20
Calcium (Ca)			101.2		%		80-120	06-OCT-20
Chromium (Cr)			106.0		%		80-120	06-OCT-20
Cobalt (Co)			102.8		%		80-120	06-OCT-20
Copper (Cu)			102.7		%		80-120	06-OCT-20
Iron (Fe)			103.4		%		80-120	06-OCT-20
Lead (Pb)			104.3		%		80-120	06-OCT-20
Lithium (Li)			102.9		%		80-120	06-OCT-20
Magnesium (Mg)			105.5		%		80-120	06-OCT-20
Manganese (Mn)			99.4		%		80-120	06-OCT-20
Molybdenum (Mo)			107.0		%		80-120	06-OCT-20
Nickel (Ni)			103.5		%		80-120	06-OCT-20
Phosphorus (P)			108.8		%		80-120	06-OCT-20
Potassium (K)			103.5		%		80-120	06-OCT-20
Selenium (Se)			105.0		%		80-120	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-18 LCS								
Silver (Ag)			100.7		%		80-120	06-OCT-20
Sodium (Na)			99.4		%		80-120	06-OCT-20
Strontium (Sr)			106.2		%		80-120	06-OCT-20
Sulfur (S)			96.3		%		80-120	06-OCT-20
Thallium (Tl)			100.3		%		80-120	06-OCT-20
Tin (Sn)			107.7		%		80-120	06-OCT-20
Titanium (Ti)			101.1		%		80-120	06-OCT-20
Tungsten (W)			99.7		%		80-120	06-OCT-20
Uranium (U)			103.2		%		80-120	06-OCT-20
Vanadium (V)			106.8		%		80-120	06-OCT-20
Zinc (Zn)			108.9		%		80-120	06-OCT-20
Zirconium (Zr)			103.0		%		80-120	06-OCT-20
WG3419204-8 LCS								
Aluminum (Al)			100.9		%		80-120	06-OCT-20
Antimony (Sb)			102.9		%		80-120	06-OCT-20
Arsenic (As)			101.4		%		80-120	06-OCT-20
Barium (Ba)			100.2		%		80-120	06-OCT-20
Beryllium (Be)			95.2		%		80-120	06-OCT-20
Bismuth (Bi)			98.8		%		80-120	06-OCT-20
Boron (B)			93.8		%		80-120	06-OCT-20
Cadmium (Cd)			101.4		%		80-120	06-OCT-20
Calcium (Ca)			97.7		%		80-120	06-OCT-20
Chromium (Cr)			100.3		%		80-120	06-OCT-20
Cobalt (Co)			99.4		%		80-120	06-OCT-20
Copper (Cu)			99.2		%		80-120	06-OCT-20
Iron (Fe)			107.1		%		80-120	06-OCT-20
Lead (Pb)			105.8		%		80-120	06-OCT-20
Lithium (Li)			93.2		%		80-120	06-OCT-20
Magnesium (Mg)			105.5		%		80-120	06-OCT-20
Manganese (Mn)			98.8		%		80-120	06-OCT-20
Molybdenum (Mo)			102.2		%		80-120	06-OCT-20
Nickel (Ni)			98.7		%		80-120	06-OCT-20
Potassium (K)			98.2		%		80-120	06-OCT-20
Selenium (Se)			97.4		%		80-120	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-8 LCS								
Silver (Ag)			98.1		%		80-120	06-OCT-20
Sodium (Na)			98.4		%		80-120	06-OCT-20
Strontium (Sr)			100.9		%		80-120	06-OCT-20
Sulfur (S)			90.5		%		80-120	06-OCT-20
Thallium (Tl)			101.5		%		80-120	06-OCT-20
Tin (Sn)			102.2		%		80-120	06-OCT-20
Titanium (Ti)			94.9		%		80-120	06-OCT-20
Tungsten (W)			95.9		%		80-120	06-OCT-20
Uranium (U)			101.8		%		80-120	06-OCT-20
Vanadium (V)			102.9		%		80-120	06-OCT-20
Zinc (Zn)			100.0		%		80-120	06-OCT-20
Zirconium (Zr)			98.2		%		80-120	06-OCT-20
WG3419204-11 MB								
Aluminum (Al)			<50		mg/kg		50	06-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	06-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	06-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	06-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	06-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	06-OCT-20
Boron (B)			<5.0		mg/kg		5	06-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	06-OCT-20
Calcium (Ca)			<50		mg/kg		50	06-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	06-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	06-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	06-OCT-20
Iron (Fe)			<50		mg/kg		50	06-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	06-OCT-20
Lithium (Li)			<2.0		mg/kg		2	06-OCT-20
Magnesium (Mg)			<20		mg/kg		20	06-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	06-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	06-OCT-20
Phosphorus (P)			<50		mg/kg		50	06-OCT-20
Potassium (K)			<100		mg/kg		100	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-11 MB								
Selenium (Se)			<0.20		mg/kg		0.2	06-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	06-OCT-20
Sodium (Na)			<50		mg/kg		50	06-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	06-OCT-20
Sulfur (S)			<1000		mg/kg		1000	06-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	06-OCT-20
Tin (Sn)			<2.0		mg/kg		2	06-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	06-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	06-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	06-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	06-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	06-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	06-OCT-20
WG3419204-16 MB								
Aluminum (Al)			<50		mg/kg		50	06-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	06-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	06-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	06-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	06-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	06-OCT-20
Boron (B)			<5.0		mg/kg		5	06-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	06-OCT-20
Calcium (Ca)			<50		mg/kg		50	06-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	06-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	06-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	06-OCT-20
Iron (Fe)			<50		mg/kg		50	06-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	06-OCT-20
Lithium (Li)			<2.0		mg/kg		2	06-OCT-20
Magnesium (Mg)			<20		mg/kg		20	06-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	06-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	06-OCT-20
Phosphorus (P)			<50		mg/kg		50	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-16 MB								
Potassium (K)			<100		mg/kg		100	06-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	06-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	06-OCT-20
Sodium (Na)			<50		mg/kg		50	06-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	06-OCT-20
Sulfur (S)			<1000		mg/kg		1000	06-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	06-OCT-20
Tin (Sn)			<2.0		mg/kg		2	06-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	06-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	06-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	06-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	06-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	06-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	06-OCT-20
WG3419204-6 MB								
Aluminum (Al)			<50		mg/kg		50	06-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	06-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	06-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	06-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	06-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	06-OCT-20
Boron (B)			<5.0		mg/kg		5	06-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	06-OCT-20
Calcium (Ca)			<50		mg/kg		50	06-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	06-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	06-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	06-OCT-20
Iron (Fe)			<50		mg/kg		50	06-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	06-OCT-20
Lithium (Li)			<2.0		mg/kg		2	06-OCT-20
Magnesium (Mg)			<20		mg/kg		20	06-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	06-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-6 MB								
Phosphorus (P)			<50		mg/kg		50	06-OCT-20
Potassium (K)			<100		mg/kg		100	06-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	06-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	06-OCT-20
Sodium (Na)			<50		mg/kg		50	06-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	06-OCT-20
Sulfur (S)			<1000		mg/kg		1000	06-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	06-OCT-20
Tin (Sn)			<2.0		mg/kg		2	06-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	06-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	06-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	06-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	06-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	06-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	06-OCT-20
MOISTURE-CL	**Soil**							
Batch R5241540								
WG3413461-2 LCS								
Moisture			100.3		%		90-110	28-SEP-20
WG3413461-1 MB								
Moisture			<0.25		%		0.25	28-SEP-20
Batch R5241569								
WG3413848-5 LCS								
Moisture			96.3		%		90-110	28-SEP-20
WG3413848-4 MB								
Moisture			<0.25		%		0.25	28-SEP-20
Batch R5242294								
WG3414449-6 LCS								
Moisture			97.0		%		90-110	29-SEP-20
WG3414449-5 MB								
Moisture			<0.25		%		0.25	29-SEP-20
Batch R5243043								
WG3415337-3 DUP		**L2508974-26**						
Moisture		44.8	47.1		%	5.1	20	30-SEP-20
WG3415337-2 LCS								
Moisture			97.8		%		90-110	30-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5243043								
WG3415337-1 MB								
Moisture			<0.25		%		0.25	30-SEP-20
Batch R5243055								
WG3415207-3 DUP		**L2508974-1**						
Moisture		53.5	51.6		%	3.6	20	30-SEP-20
WG3415207-2 LCS								
Moisture			97.7		%		90-110	30-SEP-20
WG3415207-1 MB								
Moisture			<0.25		%		0.25	30-SEP-20
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-12 IRM		**ALS PAH RM2**						
Acenaphthene			103.8		%		60-130	03-OCT-20
Acenaphthylene			82.8		%		60-130	03-OCT-20
Anthracene			83.9		%		60-130	03-OCT-20
Acridine			97.7		%		60-130	03-OCT-20
Benz(a)anthracene			95.6		%		60-130	03-OCT-20
Benzo(a)pyrene			91.5		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			88.0		%		60-130	03-OCT-20
Benzo(e)pyrene			98.9		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			95.1		%		60-130	03-OCT-20
Benzo(k)fluoranthene			85.9		%		60-130	03-OCT-20
Chrysene			106.6		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			94.0		%		60-130	03-OCT-20
Fluoranthene			106.2		%		60-130	03-OCT-20
Fluorene			114.1		%		60-130	03-OCT-20
Indeno(1,2,3-c,d)pyrene			106.6		%		60-130	03-OCT-20
2-Methylnaphthalene			94.0		%		60-130	03-OCT-20
Naphthalene			93.0		%		50-130	03-OCT-20
Perylene			112.5		%		60-130	03-OCT-20
Phenanthrene			97.5		%		60-130	03-OCT-20
Pyrene			106.1		%		60-130	03-OCT-20
1-Methylnaphthalene			96.9		%		60-130	03-OCT-20
WG3418177-3 IRM		**ALS PAH RM2**						
Acenaphthene			96.4		%		60-130	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-3 IRM		**ALS PAH RM2**						
Acenaphthylene			73.1		%		60-130	02-OCT-20
Anthracene			76.4		%		60-130	02-OCT-20
Acridine			87.9		%		60-130	02-OCT-20
Benz(a)anthracene			92.6		%		60-130	02-OCT-20
Benzo(a)pyrene			92.9		%		60-130	02-OCT-20
Benzo(b&j)fluoranthene			86.6		%		60-130	02-OCT-20
Benzo(e)pyrene			95.9		%		60-130	02-OCT-20
Benzo(g,h,i)perylene			81.2		%		60-130	02-OCT-20
Benzo(k)fluoranthene			83.4		%		60-130	02-OCT-20
Chrysene			101.4		%		60-130	02-OCT-20
Dibenz(a,h)anthracene			88.4		%		60-130	02-OCT-20
Fluoranthene			98.6		%		60-130	02-OCT-20
Fluorene			104.0		%		60-130	02-OCT-20
Indeno(1,2,3-c,d)pyrene			111.7		%		60-130	02-OCT-20
2-Methylnaphthalene			88.4		%		60-130	02-OCT-20
Naphthalene			92.9		%		50-130	02-OCT-20
Perylene			99.4		%		60-130	02-OCT-20
Phenanthrene			89.6		%		60-130	02-OCT-20
Pyrene			98.9		%		60-130	02-OCT-20
1-Methylnaphthalene			92.2		%		60-130	02-OCT-20
WG3418177-6 IRM		**ALS PAH RM2**						
Acenaphthene			95.8		%		60-130	03-OCT-20
Acenaphthylene			82.6		%		60-130	03-OCT-20
Anthracene			90.7		%		60-130	03-OCT-20
Acridine			96.5		%		60-130	03-OCT-20
Benz(a)anthracene			100.0		%		60-130	03-OCT-20
Benzo(a)pyrene			100.4		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			93.5		%		60-130	03-OCT-20
Benzo(e)pyrene			103.3		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			89.2		%		60-130	03-OCT-20
Benzo(k)fluoranthene			100.9		%		60-130	03-OCT-20
Chrysene			109.4		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			94.1		%		60-130	03-OCT-20
Fluoranthene			103.7		%		60-130	03-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-6 IRM		**ALS PAH RM2**						
Fluorene			104.6		%		60-130	03-OCT-20
Indeno(1,2,3-c,d)pyrene			117.4		%		60-130	03-OCT-20
2-Methylnaphthalene			84.1		%		60-130	03-OCT-20
Naphthalene			83.0		%		50-130	03-OCT-20
Perylene			110.6		%		60-130	03-OCT-20
Phenanthrene			92.9		%		60-130	03-OCT-20
Pyrene			104.6		%		60-130	03-OCT-20
1-Methylnaphthalene			87.0		%		60-130	03-OCT-20
WG3418177-13 LCS								
Acenaphthene			106.8		%		60-130	03-OCT-20
Acenaphthylene			97.5		%		60-130	03-OCT-20
Anthracene			95.7		%		60-130	03-OCT-20
Acridine			92.1		%		60-130	03-OCT-20
Benz(a)anthracene			90.1		%		60-130	03-OCT-20
Benzo(a)pyrene			69.8		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			70.2		%		60-130	03-OCT-20
Benzo(e)pyrene			80.0		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			118.5		%		60-130	03-OCT-20
Benzo(k)fluoranthene			72.6		%		60-130	03-OCT-20
Chrysene			98.0		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			91.7		%		60-130	03-OCT-20
Fluoranthene			107.3		%		60-130	03-OCT-20
Fluorene			118.6		%		60-130	03-OCT-20
Indeno(1,2,3-c,d)pyrene			92.1		%		60-130	03-OCT-20
2-Methylnaphthalene			94.5		%		60-130	03-OCT-20
Naphthalene			106.8		%		50-130	03-OCT-20
Perylene			72.6		%		60-130	03-OCT-20
Phenanthrene			107.2		%		60-130	03-OCT-20
Pyrene			108.8		%		60-130	03-OCT-20
1-Methylnaphthalene			99.7		%		60-130	03-OCT-20
Quinoline			67.3		%		60-130	03-OCT-20
WG3418177-2 LCS								
Acenaphthene			104.9		%		60-130	02-OCT-20
Acenaphthylene			103.3		%		60-130	02-OCT-20
Anthracene			109.7		%		60-130	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-2 LCS								
Acridine			99.7		%		60-130	02-OCT-20
Benz(a)anthracene			103.3		%		60-130	02-OCT-20
Benzo(a)pyrene			96.2		%		60-130	02-OCT-20
Benzo(b&j)fluoranthene			95.3		%		60-130	02-OCT-20
Benzo(e)pyrene			104.8		%		60-130	02-OCT-20
Benzo(g,h,i)perylene			103.9		%		60-130	02-OCT-20
Benzo(k)fluoranthene			104.6		%		60-130	02-OCT-20
Chrysene			109.2		%		60-130	02-OCT-20
Dibenz(a,h)anthracene			97.3		%		60-130	02-OCT-20
Fluoranthene			111.8		%		60-130	02-OCT-20
Fluorene			121.4		%		60-130	02-OCT-20
Indeno(1,2,3-c,d)pyrene			84.1		%		60-130	02-OCT-20
2-Methylnaphthalene			95.0		%		60-130	02-OCT-20
Naphthalene			105.2		%		50-130	02-OCT-20
Perylene			101.4		%		60-130	02-OCT-20
Phenanthrene			114.8		%		60-130	02-OCT-20
Pyrene			112.1		%		60-130	02-OCT-20
1-Methylnaphthalene			102.6		%		60-130	02-OCT-20
Quinoline			76.8		%		60-130	02-OCT-20
WG3418177-7 LCS								
Acenaphthene			106.7		%		60-130	03-OCT-20
Acenaphthylene			103.8		%		60-130	03-OCT-20
Anthracene			98.3		%		60-130	03-OCT-20
Acridine			93.8		%		60-130	03-OCT-20
Benz(a)anthracene			102.5		%		60-130	03-OCT-20
Benzo(a)pyrene			95.6		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			93.2		%		60-130	03-OCT-20
Benzo(e)pyrene			105.3		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			107.5		%		60-130	03-OCT-20
Benzo(k)fluoranthene			103.8		%		60-130	03-OCT-20
Chrysene			108.7		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			98.5		%		60-130	03-OCT-20
Fluoranthene			113.5		%		60-130	03-OCT-20
Fluorene			111.8		%		60-130	03-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-7 LCS								
Indeno(1,2,3-c,d)pyrene			78.5		%		60-130	03-OCT-20
2-Methylnaphthalene			98.6		%		60-130	03-OCT-20
Naphthalene			107.0		%		50-130	03-OCT-20
Perylene			105.2		%		60-130	03-OCT-20
Phenanthrene			103.1		%		60-130	03-OCT-20
Pyrene			114.7		%		60-130	03-OCT-20
1-Methylnaphthalene			103.9		%		60-130	03-OCT-20
Quinoline			72.0		%		60-130	03-OCT-20
WG3418177-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	02-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	02-OCT-20
Anthracene			<0.0040		mg/kg		0.004	02-OCT-20
Acridine			<0.010		mg/kg		0.01	02-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Chrysene			<0.010		mg/kg		0.01	02-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	02-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Fluorene			<0.010		mg/kg		0.01	02-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	02-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	02-OCT-20
Naphthalene			<0.010		mg/kg		0.01	02-OCT-20
Perylene			<0.010		mg/kg		0.01	02-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	02-OCT-20
Pyrene			<0.010		mg/kg		0.01	02-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	02-OCT-20
Quinoline			<0.050		mg/kg		0.05	02-OCT-20
Surrogate: d8-Naphthalene			89.0		%		50-130	02-OCT-20
Surrogate: d10-Acenaphthene			98.3		%		60-130	02-OCT-20
Surrogate: d10-Phenanthrene			103.0		%		60-130	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-1 MB								
Surrogate: d12-Chrysene			128.2		%		60-130	02-OCT-20
WG3418177-14 MB								
Acenaphthene			<0.0050		mg/kg		0.005	03-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	03-OCT-20
Anthracene			<0.0040		mg/kg		0.004	03-OCT-20
Acridine			<0.010		mg/kg		0.01	03-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	03-OCT-20
Chrysene			<0.010		mg/kg		0.01	03-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	03-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	03-OCT-20
Fluorene			<0.010		mg/kg		0.01	03-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	03-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	03-OCT-20
Naphthalene			<0.010		mg/kg		0.01	03-OCT-20
Perylene			<0.010		mg/kg		0.01	03-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	03-OCT-20
Pyrene			<0.010		mg/kg		0.01	03-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	03-OCT-20
Quinoline			<0.050		mg/kg		0.05	03-OCT-20
Surrogate: d8-Naphthalene			89.8		%		50-130	03-OCT-20
Surrogate: d10-Acenaphthene			94.0		%		60-130	03-OCT-20
Surrogate: d10-Phenanthrene			98.2		%		60-130	03-OCT-20
Surrogate: d12-Chrysene			88.0		%		60-130	03-OCT-20
WG3418177-4 MB								
Acenaphthene			<0.0050		mg/kg		0.005	02-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	02-OCT-20
Anthracene			<0.0040		mg/kg		0.004	02-OCT-20
Acridine			<0.010		mg/kg		0.01	02-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-4 MB								
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Chrysene			<0.010		mg/kg		0.01	02-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	02-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Fluorene			<0.010		mg/kg		0.01	02-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	02-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	02-OCT-20
Naphthalene			<0.010		mg/kg		0.01	02-OCT-20
Perylene			<0.010		mg/kg		0.01	02-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	02-OCT-20
Pyrene			<0.010		mg/kg		0.01	02-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	02-OCT-20
Quinoline			<0.050		mg/kg		0.05	02-OCT-20
Surrogate: d8-Naphthalene			86.4		%		50-130	02-OCT-20
Surrogate: d10-Acenaphthene			94.3		%		60-130	02-OCT-20
Surrogate: d10-Phenanthrene			110.3		%		60-130	02-OCT-20
Surrogate: d12-Chrysene			124.3		%		60-130	02-OCT-20
Batch R5245911								
WG3418729-4 DUP		**L2508974-1**						
Acenaphthene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	04-OCT-20
Acenaphthylene		0.0066	0.0067		mg/kg	1.5	50	04-OCT-20
Anthracene		0.0091	0.0059		mg/kg	43	50	04-OCT-20
Acridine		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	04-OCT-20
Benz(a)anthracene		<0.030	<0.030	RPD-NA	mg/kg	N/A	50	04-OCT-20
Benzo(a)pyrene		0.010	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
Benzo(b&j)fluoranthene		0.054	0.047		mg/kg	16	50	04-OCT-20
Benzo(e)pyrene		0.057	0.052		mg/kg	9.1	50	04-OCT-20
Benzo(g,h,i)perylene		0.022	0.019		mg/kg	13	50	04-OCT-20
Benzo(k)fluoranthene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
Chrysene		<0.13	<0.13	RPD-NA	mg/kg	N/A	50	04-OCT-20
Dibenz(a,h)anthracene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245911								
WG3418729-4 DUP		**L2508974-1**						
Fluoranthene		0.042	0.021	DUP-H	mg/kg	0.021	0.02	04-OCT-20
Fluorene		0.093	0.087		mg/kg	6.5	50	04-OCT-20
Indeno(1,2,3-c,d)pyrene		0.011	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
2-Methylnaphthalene		0.500	0.588		mg/kg	16	50	04-OCT-20
Naphthalene		0.165	0.211		mg/kg	24	50	04-OCT-20
Perylene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
Phenanthrene		0.385	0.443		mg/kg	14	50	04-OCT-20
Pyrene		0.046	0.035		mg/kg	26	50	04-OCT-20
1-Methylnaphthalene		0.311	0.367		mg/kg	17	50	04-OCT-20
Quinoline		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	04-OCT-20
WG3418729-3 IRM		**ALS PAH RM2**						
Acenaphthene			97.5		%		60-130	04-OCT-20
Acenaphthylene			91.9		%		60-130	04-OCT-20
Anthracene			85.1		%		60-130	04-OCT-20
Acridine			95.5		%		60-130	04-OCT-20
Benz(a)anthracene			114.9		%		60-130	04-OCT-20
Benzo(a)pyrene			106.5		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			112.8		%		60-130	04-OCT-20
Benzo(e)pyrene			120.2		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			90.2		%		60-130	04-OCT-20
Benzo(k)fluoranthene			100.6		%		60-130	04-OCT-20
Chrysene			115.4		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			97.8		%		60-130	04-OCT-20
Fluoranthene			105.5		%		60-130	04-OCT-20
Fluorene			112.1		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			124.7		%		60-130	04-OCT-20
2-Methylnaphthalene			93.9		%		60-130	04-OCT-20
Naphthalene			99.6		%		50-130	04-OCT-20
Perylene			113.3		%		60-130	04-OCT-20
Phenanthrene			93.9		%		60-130	04-OCT-20
Pyrene			107.5		%		60-130	04-OCT-20
1-Methylnaphthalene			93.2		%		60-130	04-OCT-20
WG3418729-2 LCS								
Acenaphthene			91.0		%		60-130	04-OCT-20
Acenaphthylene			86.5		%		60-130	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245911								
WG3418729-2 LCS								
Anthracene			86.8		%		60-130	04-OCT-20
Acridine			84.1		%		60-130	04-OCT-20
Benz(a)anthracene			99.5		%		60-130	04-OCT-20
Benzo(a)pyrene			93.6		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			96.2		%		60-130	04-OCT-20
Benzo(e)pyrene			100.2		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			84.5		%		60-130	04-OCT-20
Benzo(k)fluoranthene			95.0		%		60-130	04-OCT-20
Chrysene			94.9		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			86.9		%		60-130	04-OCT-20
Fluoranthene			94.5		%		60-130	04-OCT-20
Fluorene			105.2		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			84.1		%		60-130	04-OCT-20
2-Methylnaphthalene			85.7		%		60-130	04-OCT-20
Naphthalene			95.8		%		50-130	04-OCT-20
Perylene			98.1		%		60-130	04-OCT-20
Phenanthrene			92.5		%		60-130	04-OCT-20
Pyrene			97.5		%		60-130	04-OCT-20
1-Methylnaphthalene			87.1		%		60-130	04-OCT-20
Quinoline			88.0		%		60-130	04-OCT-20
WG3418729-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	04-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	04-OCT-20
Anthracene			<0.0040		mg/kg		0.004	04-OCT-20
Acridine			<0.010		mg/kg		0.01	04-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Chrysene			<0.010		mg/kg		0.01	04-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	04-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245911								
WG3418729-1 MB								
Fluorene			<0.010		mg/kg		0.01	04-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	04-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	04-OCT-20
Naphthalene			<0.010		mg/kg		0.01	04-OCT-20
Perylene			<0.010		mg/kg		0.01	04-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	04-OCT-20
Pyrene			<0.010		mg/kg		0.01	04-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	04-OCT-20
Quinoline			<0.050		mg/kg		0.05	04-OCT-20
Surrogate: d8-Naphthalene			88.2		%		50-130	04-OCT-20
Surrogate: d10-Acenaphthene			95.6		%		60-130	04-OCT-20
Surrogate: d10-Phenanthrene			90.5		%		60-130	04-OCT-20
Surrogate: d12-Chrysene			84.8		%		60-130	04-OCT-20
Batch R5247596								
WG3419270-4 DUP		**L2508974-26**						
Acenaphthene		<0.045	<0.045	RPD-NA	mg/kg	N/A	50	06-OCT-20
Acenaphthylene		0.0070	0.0072		mg/kg	2.8	50	06-OCT-20
Anthracene		<0.0040	<0.0040	RPD-NA	mg/kg	N/A	50	06-OCT-20
Acridine		<0.090	<0.090	RPD-NA	mg/kg	N/A	50	06-OCT-20
Benz(a)anthracene		0.022	0.015		mg/kg	40	50	06-OCT-20
Benzo(a)pyrene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
Benzo(b&j)fluoranthene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	06-OCT-20
Benzo(e)pyrene		0.044	0.036		mg/kg	21	50	06-OCT-20
Benzo(g,h,i)perylene		0.023	0.015		mg/kg	40	50	06-OCT-20
Benzo(k)fluoranthene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
Chrysene		0.111	0.097		mg/kg	13	50	06-OCT-20
Dibenz(a,h)anthracene		0.0125	0.0075	J	mg/kg	0.0050	0.01	06-OCT-20
Fluoranthene		0.024	0.015		mg/kg	42	50	06-OCT-20
Fluorene		0.126	0.108		mg/kg	16	50	06-OCT-20
Indeno(1,2,3-c,d)pyrene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
2-Methylnaphthalene		0.786	0.728		mg/kg	7.7	50	06-OCT-20
Naphthalene		0.240	0.227		mg/kg	5.4	50	06-OCT-20
Perylene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
Phenanthrene		0.534	0.485		mg/kg	9.7	50	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5247596								
WG3419270-4 DUP		**L2508974-26**						
Pyrene		0.035	0.030		mg/kg	17	50	06-OCT-20
1-Methylnaphthalene		0.477	0.440		mg/kg	8.1	50	06-OCT-20
Quinoline		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	06-OCT-20
WG3419270-3 IRM		**ALS PAH RM2**						
Acenaphthene			95.6		%		60-130	05-OCT-20
Acenaphthylene			84.7		%		60-130	05-OCT-20
Anthracene			79.3		%		60-130	05-OCT-20
Acridine			85.2		%		60-130	05-OCT-20
Benz(a)anthracene			111.4		%		60-130	05-OCT-20
Benzo(a)pyrene			116.0		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			90.4		%		60-130	05-OCT-20
Benzo(e)pyrene			104.7		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			87.8		%		60-130	05-OCT-20
Benzo(k)fluoranthene			112.5		%		60-130	05-OCT-20
Chrysene			118.9		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			97.9		%		60-130	05-OCT-20
Fluoranthene			102.0		%		60-130	05-OCT-20
Fluorene			97.7		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			122.0		%		60-130	05-OCT-20
2-Methylnaphthalene			87.9		%		60-130	05-OCT-20
Naphthalene			84.2		%		50-130	05-OCT-20
Perylene			105.1		%		60-130	05-OCT-20
Phenanthrene			95.5		%		60-130	05-OCT-20
Pyrene			104.1		%		60-130	05-OCT-20
1-Methylnaphthalene			89.8		%		60-130	05-OCT-20
WG3419270-2 LCS								
Acenaphthene			104.2		%		60-130	05-OCT-20
Acenaphthylene			97.1		%		60-130	05-OCT-20
Anthracene			89.6		%		60-130	05-OCT-20
Acridine			82.3		%		60-130	05-OCT-20
Benz(a)anthracene			76.9		%		60-130	05-OCT-20
Benzo(a)pyrene			80.3		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			82.3		%		60-130	05-OCT-20
Benzo(e)pyrene			83.9		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			102.9		%		60-130	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5247596								
WG3419270-2 LCS								
Benzo(k)fluoranthene			83.2		%		60-130	05-OCT-20
Chrysene			91.1		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			91.6		%		60-130	05-OCT-20
Fluoranthene			106.0		%		60-130	05-OCT-20
Fluorene			102.1		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			75.3		%		60-130	05-OCT-20
2-Methylnaphthalene			97.2		%		60-130	05-OCT-20
Naphthalene			99.2		%		50-130	05-OCT-20
Perylene			86.0		%		60-130	05-OCT-20
Phenanthrene			104.6		%		60-130	05-OCT-20
Pyrene			102.8		%		60-130	05-OCT-20
1-Methylnaphthalene			98.8		%		60-130	05-OCT-20
Quinoline			95.2		%		60-130	05-OCT-20
WG3419270-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	05-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	05-OCT-20
Anthracene			<0.0040		mg/kg		0.004	05-OCT-20
Acridine			<0.010		mg/kg		0.01	05-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Chrysene			<0.010		mg/kg		0.01	05-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	05-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Fluorene			<0.010		mg/kg		0.01	05-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	05-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	05-OCT-20
Naphthalene			<0.010		mg/kg		0.01	05-OCT-20
Perylene			<0.010		mg/kg		0.01	05-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	05-OCT-20
Pyrene			<0.010		mg/kg		0.01	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5247596								
WG3419270-1 MB								
1-Methylnaphthalene			<0.050		mg/kg		0.05	05-OCT-20
Quinoline			<0.050		mg/kg		0.05	05-OCT-20
Surrogate: d8-Naphthalene			78.3		%		50-130	05-OCT-20
Surrogate: d10-Acenaphthene			96.1		%		60-130	05-OCT-20
Surrogate: d10-Phenanthrene			101.9		%		60-130	05-OCT-20
Surrogate: d12-Chrysene			111.9		%		60-130	05-OCT-20
PH-1:2-CL	**Soil**							
Batch R5248619								
WG3419530-3 DUP		**L2508974-10**						
pH (1:2 soil:water)		8.49	8.47	J	pH	0.02	0.2	06-OCT-20
WG3419530-6 DUP		**L2508974-34**						
pH (1:2 soil:water)		8.30	8.27	J	pH	0.03	0.2	06-OCT-20
WG3419530-2 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.85		pH		7.4-8	06-OCT-20
WG3419530-5 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.78		pH		7.4-8	06-OCT-20
WG3419530-8 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.75		pH		7.4-8	06-OCT-20
WG3419530-1 LCS								
pH (1:2 soil:water)			7.00		pH		6.8-7.2	06-OCT-20
WG3419530-4 LCS								
pH (1:2 soil:water)			6.98		pH		6.8-7.2	06-OCT-20
WG3419530-7 LCS								
pH (1:2 soil:water)			7.03		pH		6.8-7.2	06-OCT-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5244707								
WG3417175-1 DUP		**L2508974-3**						
% Gravel (>2mm)		<1.0	<1.0	RPD-NA	%	N/A	5	03-OCT-20
% Sand (2.00mm - 1.00mm)		<1.0	<1.0	RPD-NA	%	N/A	5	03-OCT-20
% Sand (1.00mm - 0.50mm)		3.5	3.0	J	%	0.5	5	03-OCT-20
% Sand (0.50mm - 0.25mm)		14.6	15.2	J	%	0.6	5	03-OCT-20
% Sand (0.25mm - 0.125mm)		19.9	17.9	J	%	1.9	5	03-OCT-20
% Sand (0.125mm - 0.063mm)		14.0	12.1	J	%	1.9	5	03-OCT-20
% Silt (0.063mm - 0.0312mm)		17.9	19.6	J	%	1.7	5	03-OCT-20
% Silt (0.0312mm - 0.004mm)		22.8	25.3	J	%	2.5	5	03-OCT-20
% Clay (<4um)		6.4	6.2	J	%	0.2	5	03-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5244707								
WG3417175-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.6	03-OCT-20
% Sand (1.00mm - 0.50mm)			4.2		%		0-8.9	03-OCT-20
% Sand (0.50mm - 0.25mm)			10.2		%		5.3-15.3	03-OCT-20
% Sand (0.25mm - 0.125mm)			15.1		%		10-20	03-OCT-20
% Sand (0.125mm - 0.063mm)			12.4		%		7.3-17.3	03-OCT-20
% Silt (0.063mm - 0.0312mm)			13.5		%		9.9-19.9	03-OCT-20
% Silt (0.0312mm - 0.004mm)			21.6		%		17.6-27.6	03-OCT-20
% Clay (<4um)			20.2		%		13.4-23.4	03-OCT-20
Batch R5246456								
WG3417179-1 DUP		**L2508974-24**						
% Gravel (>2mm)		4.7	4.7	J	%	0.0	5	05-OCT-20
% Sand (2.00mm - 1.00mm)		2.2	2.1	J	%	0.2	5	05-OCT-20
% Sand (1.00mm - 0.50mm)		2.3	2.4	J	%	0.1	5	05-OCT-20
% Sand (0.50mm - 0.25mm)		3.0	3.9	J	%	0.9	5	05-OCT-20
% Sand (0.25mm - 0.125mm)		13.3	12.4	J	%	0.9	5	05-OCT-20
% Sand (0.125mm - 0.063mm)		15.4	14.5	J	%	0.9	5	05-OCT-20
% Silt (0.063mm - 0.0312mm)		26.8	27.3	J	%	0.5	5	05-OCT-20
% Silt (0.0312mm - 0.004mm)		27.5	28.0	J	%	0.5	5	05-OCT-20
% Clay (<4um)		4.8	4.7	J	%	0.1	5	05-OCT-20
WG3417179-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.6	05-OCT-20
% Sand (1.00mm - 0.50mm)			3.7		%		0-8.9	05-OCT-20
% Sand (0.50mm - 0.25mm)			9.7		%		5.3-15.3	05-OCT-20
% Sand (0.25mm - 0.125mm)			15.6		%		10-20	05-OCT-20
% Sand (0.125mm - 0.063mm)			13.1		%		7.3-17.3	05-OCT-20
% Silt (0.063mm - 0.0312mm)			14.5		%		9.9-19.9	05-OCT-20
% Silt (0.0312mm - 0.004mm)			22.2		%		17.6-27.6	05-OCT-20
% Clay (<4um)			18.3		%		13.4-23.4	05-OCT-20
Batch R5246459								
WG3417182-1 DUP		**L2508974-42**						
% Gravel (>2mm)		5.9	5.9	J	%	0.0	5	05-OCT-20
% Sand (2.00mm - 1.00mm)		6.1	5.5	J	%	0.6	5	05-OCT-20
% Sand (1.00mm - 0.50mm)		17.4	15.9	J	%	1.5	5	05-OCT-20
% Sand (0.50mm - 0.25mm)		37.3	37.4	J	%	0.1	5	05-OCT-20
% Sand (0.25mm - 0.125mm)		20.5	22.0	J	%	1.4	5	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch	**R5246459**							
WG3417182-1	**DUP**	**L2508974-42**						
% Sand (0.125mm - 0.063mm)		5.9	6.0	J	%	0.1	5	05-OCT-20
% Silt (0.063mm - 0.0312mm)		3.1	3.2	J	%	0.1	5	05-OCT-20
% Silt (0.0312mm - 0.004mm)		2.8	3.1	J	%	0.3	5	05-OCT-20
% Clay (<4um)		<1.0	<1.0	RPD-NA	%	N/A	5	05-OCT-20
WG3417182-2	**IRM**	**2017-PSA**						
% Sand (2.00mm - 1.00mm)			3.0		%		0-7.6	05-OCT-20
% Sand (1.00mm - 0.50mm)			3.9		%		0-8.9	05-OCT-20
% Sand (0.50mm - 0.25mm)			10.3		%		5.3-15.3	05-OCT-20
% Sand (0.25mm - 0.125mm)			14.6		%		10-20	05-OCT-20
% Sand (0.125mm - 0.063mm)			12.8		%		7.3-17.3	05-OCT-20
% Silt (0.063mm - 0.0312mm)			14.3		%		9.9-19.9	05-OCT-20
% Silt (0.0312mm - 0.004mm)			22.5		%		17.6-27.6	05-OCT-20
% Clay (<4um)			18.6		%		13.4-23.4	05-OCT-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Polycyclic Aromatic Hydrocarbons							
PAH Tumbler Extraction (Hexane/Acetone)							
	21	14-SEP-20 10:00	29-SEP-20	14	15	days	EHT
	22	14-SEP-20 10:30	29-SEP-20	14	15	days	EHT
	23	14-SEP-20 11:00	29-SEP-20	14	15	days	EHT
	24	14-SEP-20 11:20	29-SEP-20	14	15	days	EHT
	25	14-SEP-20 12:00	29-SEP-20	14	15	days	EHT
	26	10-SEP-20 10:00	30-SEP-20	14	20	days	EHTR
	27	10-SEP-20 10:20	30-SEP-20	14	20	days	EHTR
	28	10-SEP-20 11:30	30-SEP-20	14	20	days	EHTR
	29	10-SEP-20 11:50	30-SEP-20	14	20	days	EHTR
	30	10-SEP-20 12:20	30-SEP-20	14	19	days	EHTR
	31	11-SEP-20 09:00	30-SEP-20	14	19	days	EHTR
	32	11-SEP-20 09:15	30-SEP-20	14	19	days	EHTR
	33	11-SEP-20 09:30	30-SEP-20	14	19	days	EHTL
	34	11-SEP-20 09:45	30-SEP-20	14	19	days	EHTL
	35	11-SEP-20 10:00	30-SEP-20	14	19	days	EHTL
	36	12-SEP-20 09:15	30-SEP-20	14	18	days	EHTL
	37	12-SEP-20 09:30	30-SEP-20	14	18	days	EHT
	38	12-SEP-20 09:45	30-SEP-20	14	18	days	EHT
	39	12-SEP-20 10:00	30-SEP-20	14	18	days	EHT
	40	12-SEP-20 10:15	30-SEP-20	14	18	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2508974 were received on 25-SEP-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP Sept 2020

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

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cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2508974-COFC

ANALYSIS REQUESTED

Filtered (F): Field, Lr Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
							FIELD	N	N	N	N	N
							PRESERV	NONE	NONE	NONE	NONE	NONE
							ANALYSIS					
RG_FRCP1SW_SE-01_2020-09-22_1000	RG_FRCP1SW	SE	No	9/22/2022	10:00	G	2	X	X	X	X	X
RG_FRCP1SW_SE-02_2020-09-22_1030	RG_FRCP1SW	SE	No	9/22/2022	10:30	G	2	X	X	X	X	X
RG_FRCP1SW_SE-03_2020-09-22_1200	RG_FRCP1SW	SE	No	9/22/2022	12:00	G	2	X	X	X	X	X
RG_FRCP1SW_SE-04_2020-09-22_1230	RG_FRCP1SW	SE	No	9/22/2022	12:30	G	2	X	X	X	X	X
RG_FRCP1SW_SE-05_2020-09-22_1300	RG_FRCP1SW	SE	No	9/22/2022	13:00	G	2	X	X	X	X	X
RG_FOBSC_SE-01_2020-09-18_0940	RG_FOBSC	SE	No	9/18/2020	9:40	G	2	X	X	X	X	X
RG_FOBSC_SE-02_2020-09-18_1000	RG_FOBSC	SE	No	9/18/2020	10:00	G	2	X	X	X	X	X
RG_FOBSC_SE-03_2020-09-18_1100	RG_FOBSC	SE	No	9/18/2020	11:00	G	2	X	X	X	X	X
RG_FOBSC_SE-04_2020-09-18_1130	RG_FOBSC	SE	No	9/18/2020	11:30	G	2	X	X	X	X	X
RG_FOBSC_SE-05_2020-09-18_1200	RG_FOBSC	SE	No	9/18/2020	12:00	G	2	X	X	X	X	X
RG_SCOUTDS_SE-01_2020-09-17_0950	RG_SCOUTDS	SE	No	9/17/2020	9:50	G	2	X	X	X	X	X
RG_SCOUTDS_SE-02_2020-09-17_1020	RG_SCOUTDS	SE	No	9/17/2020	10:20	G	2	X	X	X	X	X
RG_SCOUTDS_SE-03_2020-09-17_1100	RG_SCOUTDS	SE	No	9/17/2020	11:00	G	2	X	X	X	X	X
RG_SCOUTDS_SE-04_2020-09-17_1310	RG_SCOUTDS	SE	No	9/17/2020	13:10	G	2	X	X	X	X	X
RG_SCOUTDS_SE-05_2020-09-17_1330	RG_SCOUTDS	SE	No	9/17/2020	13:30	G	2	X	X	X	X	X
RG_FOBCP_SE-01_2020-09-16_1000	RG_FOBCP	SE	No	9/16/2020	10:00	G	2	X	X	X	X	X
RG_FOBCP_SE-02_2020-09-16_1100	RG_FOBCP	SE	No	9/16/2020	11:00	G	2	X	X	X	X	X
RG_FOBCP_SE-03_2020-09-16_1210	RG_FOBCP	SE	No	9/16/2020	12:10	G	2	X	X	X	X	X
RG_FOBCP_SE-04_2020-09-16_1410	RG_FOBCP	SE	No	9/16/2020	14:10	G	2	X	X	X	X	X
RG_FOBCP_SE-05_2020-09-16_1440	RG_FOBCP	SE	No	9/16/2020	14:40	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 23, 2020	

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 23, 2020

Teck

COC ID: FRO LAEMP Sept 2020 | TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

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cait.good@teck.com	x	x	x
teckcoal@equis.online.com			x
Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2508974-COFC

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
							FIL	N	N	N	N	N
							PRESERV.	NONE	NONE	NONE	NONE	NONE
							ANALYSIS					
RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI	SE	No	9/14/2020	10:00	G	2	X	X	X	X	X
RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI	SE	No	9/14/2020	10:30	G	2	X	X	X	X	X
RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI	SE	No	9/14/2020	11:00	G	2	X	X	X	X	X
RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI	SE	No	9/14/2020	11:20	G	2	X	X	X	X	X
RG_FOUKI_SE-05_2020-09-14_1200	RG_FOUKI	SE	No	9/14/2020	12:00	G	2	X	X	X	X	X
RG_FOBKS_SE-01_2020-09-10_1000	RG_FOBKS	SE	No	9/10/2020	10:00	G	2	X	X	X	X	X
RG_FOBKS_SE-02_2020-09-10_1020	RG_FOBKS	SE	No	9/10/2020	10:20	G	2	X	X	X	X	X
RG_FOBKS_SE-03_2020-09-10_1130	RG_FOBKS	SE	No	9/10/2020	11:30	G	2	X	X	X	X	X
RG_FOBKS_SE-04_2020-09-10_1150	RG_FOBKS	SE	No	9/10/2020	11:50	G	2	X	X	X	X	X
RG_FOBKS_SE-05_2020-09-10_1220	RG_FOBKS	SE	No	9/10/2020	12:20	G	2	X	X	X	X	X
RG_FO22_SE-01_2020-09-11_0900	RG_FO22	SE	No	9/11/2020	9:00	G	2	X	X	X	X	X
RG_FO22_SE-02_2020-09-11_0915	RG_FO22	SE	No	9/11/2020	9:15	G	2	X	X	X	X	X
RG_FO22_SE-03_2020-09-11_0930	RG_FO22	SE	No	9/11/2020	9:30	G	2	X	X	X	X	X
RG_FO22_SE-04_2020-09-11_0945	RG_FO22	SE	No	9/11/2020	9:45	G	2	X	X	X	X	X
RG_FO22_SE-05_2020-09-11_1000	RG_FO22	SE	No	9/11/2020	10:00	G	2	X	X	X	X	X
RG_FRUPO_SE-01_2020-09-12_0915	RG_FRUPO	SE	No	9/12/2020	9:15	G	2	X	X	X	X	X
RG_FRUPO_SE-02_2020-09-12_0930	RG_FRUPO	SE	No	9/12/2020	9:30	G	2	X	X	X	X	X
RG_FRUPO_SE-03_2020-09-12_0945	RG_FRUPO	SE	No	9/12/2020	9:45	G	2	X	X	X	X	X
RG_FRUPO_SE-04_2020-09-12_1000	RG_FRUPO	SE	No	9/12/2020	10:00	G	2	X	X	X	X	X
RG_FRUPO_SE-05_2020-09-12_1015	RG_FRUPO	SE	No	9/12/2020	10:15	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 23, 2020	

9/25 9:00

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 23, 2020

Teck

COC ID: FRO LAEMP Sept 2020

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
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Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
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Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

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cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2508974-COFC

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
								FIL	N	N	N	N	N
								PRESERV.	NONE	NONE	NONE	NONE	NONE
								ANALYSIS					
RG_HENUP_SE-01_2020-09-15_0915	RG_HENUP	SE	No	9/15/2020	9:15	G	2	X	X	X	X	X	
RG_HENUP_SE-02_2020-09-15_0930	RG_HENUP	SE	No	9/15/2020	9:30	G	2	X	X	X	X	X	
RG_HENUP_SE-03_2020-09-15_0945	RG_HENUP	SE	No	9/15/2020	9:45	G	2	X	X	X	X	X	
RG_FO26_SE-01_2020-09-17_0915	RG_FO26	SE	No	9/17/2020	9:15	G	2	X	X	X	X	X	
RG_FO26_SE-02_2020-09-17_0930	RG_FO26	SE	No	9/17/2020	9:30	G	2	X	X	X	X	X	
RG_FO26_SE-03_2020-09-17_0945	RG_FO26	SE	No	9/17/2020	9:45	G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
extras		SE	No			G	2	X	X	X	X	X	
RG_RIVER_SE-2X	09-22-20-1030	SE	No			G	2	X	X	X	X	X	
3X	09-15-20-1045	SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 23, 2020	9/25 900

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 23, 2020

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 09-DEC-20
Report Date: 17-DEC-20 18:12 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2538667

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2538667-1	L2538667-2	L2538667-3	L2538667-4	L2538667-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	08-DEC-20	08-DEC-20	08-DEC-20	08-DEC-20	07-DEC-20
	Sampled Time	12:30	11:30	10:30	09:30	13:40
	Client ID	RG_UFR1_WS_LAEMP_FRO_2020-12_NP	RG_FOUCL_WS_LAEMP_FRO_2020-12_NP	RG_FOUNGD_WS_LAEMP_FRO_2020-12_NP	RG_FODNGD_WS_LAEMP_FRO_2020-12_NP	RG_TRIP_WS_2020
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	326	626	813	875	<2.0
	Hardness (as CaCO3) (mg/L)	179	350	470	490	<0.50
	pH (pH)	8.31	8.24	8.25	8.30	5.64
	ORP (mV)	434	325	426	430	453
	Total Suspended Solids (mg/L)	3.4	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	212 DLHC	474 DLHC	633 DLHC	698 DLHC	<10
	Turbidity (NTU)	0.39	0.14	<0.10	0.23	<0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	1.1
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	141	151	184	189	<1.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	2.4	<1.0	<1.0	2.8	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	143	151	184	192	<1.0
	Ammonia as N (mg/L)	<0.0050	0.0077	<0.0050	0.0114	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	0.21	0.33	0.47	0.53	<0.10
	Fluoride (F) (mg/L)	0.087	0.116	0.097	0.098	<0.020
	Ion Balance (%)	94.1	97.2	99.3	95.5	0.0
	Nitrate (as N) (mg/L)	0.0791	5.55	12.8	15.5	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	0.0012	<0.0010	0.0043	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	<0.050	0.200	<0.050	<0.050	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0015 HTD	0.0013	0.0017	0.0019	<0.0010
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	46.1	183	237	260	<0.30
	Anion Sum (meq/L)	3.84	7.24	9.55	10.4	<0.10
	Cation Sum (meq/L)	3.61	7.04	9.48	9.90	<0.10
	Cation - Anion Balance (%)	-3.0	-1.4	-0.4	-2.3	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50	
	Total Organic Carbon (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0379	0.0042	<0.0030	0.0062	<0.0030
	Antimony (Sb)-Total (mg/L)	0.00013	<0.00010	0.00016	0.00021	<0.00010
	Arsenic (As)-Total (mg/L)	0.00011	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.0726	0.0944	0.104	0.0932	<0.00010
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (ug/L)	0.0155	0.0165	0.0451	0.0605	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2538667-6 WS 07-DEC-20 13:20 RG_RIVER_WS_2020	L2538667-7 WS 07-DEC-20 13:40 RG_FBLANK_WS_2020	L2538667-8 WS 07-DEC-20 14:00 RG_FOBSC_WS_LAEMP_FRO_2020-12_NP	L2538667-9 WS 07-DEC-20 10:30 RG_FOBCP_WS_LAEMP_FRO_2020-12_NP	L2538667-10 WS 07-DEC-20 10:15 RG_FOBKS_WS_LAEMP_FRO_2020-12_NP
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1260	<2.0	1270	1330	965
	Hardness (as CaCO3) (mg/L)	781	<0.50	760	809	575
	pH (pH)	8.35	5.57	8.36	8.36	8.24
	ORP (mV)	417	468	455	476	480
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	1010 DLHC	<10	1040 DLHC	1090 DLHC	756 DLHC
	Turbidity (NTU)	0.28	<0.10	0.52	0.31	0.22
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	1.1	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	248	<1.0	235	251	214
	Alkalinity, Carbonate (as CaCO3) (mg/L)	9.4	<1.0	10.4	11.4	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	258	<1.0	246	263	214
	Ammonia as N (mg/L)	0.0791	<0.0050	0.0773	0.131	0.0909
	Bromide (Br) (mg/L)	<0.25 DLHC	<0.050	<0.25 DLHC	<0.25 DLHC	<0.25 DLHC
	Chloride (Cl) (mg/L)	2.29 DLHC	<0.10	2.40 DLHC	2.33 DLHC	2.02 DLHC
	Fluoride (F) (mg/L)	0.11	<0.020	0.11	0.11	0.11
	Ion Balance (%)	97.4	0.0	96.5	95.4	99.9
	Nitrate (as N) (mg/L)	18.4 DLHC	<0.0050	18.4 DLHC	18.6 DLHC	17.1 DLHC
	Nitrite (as N) (mg/L)	0.0273	<0.0010	0.0244	0.0197	0.0224
	Total Kjeldahl Nitrogen (mg/L)	<0.050 TKNI	<0.050	<0.050 TKNI	<0.050 TKNI	<0.050 TKNI
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Phosphorus (P)-Total (mg/L)	<0.0020	<0.0020	0.0027	<0.0020	<0.0020
	Sulfate (SO4) (mg/L)	465 DLHC	<0.30	462 DLHC	503 DLHC	293 DLHC
	Anion Sum (meq/L)	16.2	<0.10	15.9	17.1	11.7
	Cation Sum (meq/L)	15.8	<0.10	15.4	16.3	11.7
	Cation - Anion Balance (%)	-1.3	0.0	-1.8	-2.3	0.0
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.55	<0.50	0.80	1.28	<0.50
	Total Organic Carbon (mg/L)	0.80	<0.50	0.77	1.43	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.0057	<0.0030	0.0118	0.0044	0.0037
	Antimony (Sb)-Total (mg/L)	0.00035	<0.00010	0.00041	0.00040	0.00031
	Arsenic (As)-Total (mg/L)	0.00011	<0.00010	0.00012	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)	0.0835	<0.00010	0.0838	0.0848	0.0923
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.012	<0.010	0.012	0.013	0.013
	Cadmium (Cd)-Total (ug/L)	0.0975	<0.0050	0.115	0.112	0.0570

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2538667-11				
	Description	WS				
	Sampled Date	07-DEC-20				
	Sampled Time	13:15				
	Client ID	RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NP				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	1250				
	Hardness (as CaCO3) (mg/L)	780				
	pH (pH)	8.37				
	ORP (mV)	296				
	Total Suspended Solids (mg/L)	<1.0				
	Total Dissolved Solids (mg/L)	1030 DLHC				
	Turbidity (NTU)	0.26				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	233				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	12.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	245				
	Ammonia as N (mg/L)	0.0850				
	Bromide (Br) (mg/L)	<0.25 DLHC				
	Chloride (Cl) (mg/L)	2.21 DLHC				
	Fluoride (F) (mg/L)	0.11 DLHC				
	Ion Balance (%)	98.0				
	Nitrate (as N) (mg/L)	18.5 DLHC				
	Nitrite (as N) (mg/L)	0.0194 DLHC				
	Total Kjeldahl Nitrogen (mg/L)	<0.25 TKNI				
	Orthophosphate-Dissolved (as P) (mg/L)	<0.0010				
	Phosphorus (P)-Total (mg/L)	<0.0020				
	Sulfate (SO4) (mg/L)	470 DLHC				
	Anion Sum (meq/L)	16.1				
	Cation Sum (meq/L)	15.8				
	Cation - Anion Balance (%)	-1.0				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	1.04				
	Total Organic Carbon (mg/L)	1.04				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0053				
	Antimony (Sb)-Total (mg/L)	0.00035				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	0.0857				
	Beryllium (Be)-Total (ug/L)	<0.020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	0.012				
	Cadmium (Cd)-Total (ug/L)	0.101				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2538667-1	L2538667-2	L2538667-3	L2538667-4	L2538667-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	08-DEC-20	08-DEC-20	08-DEC-20	08-DEC-20	07-DEC-20
	Sampled Time	12:30	11:30	10:30	09:30	13:40
	Client ID	RG_UFR1_WS_LAEMP_FRO_2020-12_NP	RG_FOUCL_WS_LAEMP_FRO_2020-12_NP	RG_FOUNGD_WS_LAEMP_FRO_2020-12_NP	RG_FODNGD_WS_LAEMP_FRO_2020-12_NP	RG_TRIP_WS_2020
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	49.6	89.5	113	122	<0.050
	Chromium (Cr)-Total (mg/L)	0.00022	0.00014	0.00013	0.00012	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.050	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	0.000093	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0015	0.0084	0.0366	0.0467	<0.0010
	Magnesium (Mg)-Total (mg/L)	14.1	29.5	43.3	47.8	<0.10
	Manganese (Mn)-Total (mg/L)	0.00188	0.00052	0.00021	0.00061	<0.00010
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.000608	0.000740	0.000984	0.00121	<0.000050
	Nickel (Ni)-Total (mg/L)	<0.00050	<0.00050	0.00282	0.00530	<0.00050
	Potassium (K)-Total (mg/L)	0.428	0.759	1.34	1.72	<0.050
	Selenium (Se)-Total (ug/L)	0.875	32.4	58.6	68.8	<0.050
	Silicon (Si)-Total (mg/L)	1.80	1.64	1.85	1.90	<0.10
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	0.700	0.724	1.34	1.40	<0.050
	Strontium (Sr)-Total (mg/L)	0.0950	0.155	0.187	0.187	<0.00020
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000504	0.00134	0.00269	0.00325	<0.000010
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0064	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	LAB
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00016	0.00021	
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Barium (Ba)-Dissolved (mg/L)	0.0650	0.0833	0.0957	0.0850	
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Cadmium (Cd)-Dissolved (ug/L)	0.0083	0.0155	0.0424	0.0549	
	Calcium (Ca)-Dissolved (mg/L)	50.4	91.0	118	123	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00013	0.00014	0.00012	0.00012	
	Cobalt (Co)-Dissolved (ug/L)	<0.10	<0.10	<0.10	<0.10	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2538667-6 WS 07-DEC-20 13:20 RG_RIVER_WS_2020	L2538667-7 WS 07-DEC-20 13:40 RG_FBLANK_WS_2020	L2538667-8 WS 07-DEC-20 14:00 RG_FOBSC_WS_LAEMP_FRO_2020-12_NP	L2538667-9 WS 07-DEC-20 10:30 RG_FOBCP_WS_LAEMP_FRO_2020-12_NP	L2538667-10 WS 07-DEC-20 10:15 RG_FOBKS_WS_LAEMP_FRO_2020-12_NP
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	166	<0.050	167	177	136
	Chromium (Cr)-Total (mg/L)	0.00014	<0.00010	0.00019	0.00012	0.00016
	Cobalt (Co)-Total (ug/L)	0.23	<0.10	0.24	0.23	0.23
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	0.040	<0.010	0.058	0.030	0.042
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000057	0.000060	<0.000050
	Lithium (Li)-Total (mg/L)	0.0515	<0.0010	0.0518	0.0551	0.0484
	Magnesium (Mg)-Total (mg/L)	86.7	<0.10	85.4	92.8	57.5
	Manganese (Mn)-Total (mg/L)	0.0162	<0.00010	0.0182	0.0139	0.0192
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00380	<0.000050	0.00375	0.00426	0.00185
	Nickel (Ni)-Total (mg/L)	0.00999	<0.00050	0.0100	0.0115	0.00562
	Potassium (K)-Total (mg/L)	2.77	<0.050	2.78	2.92	2.47
	Selenium (Se)-Total (ug/L)	119	<0.050	115	127	63.4
	Silicon (Si)-Total (mg/L)	2.02	<0.10	2.00	2.05	1.91
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	2.21	<0.050	2.19	2.30	2.16
	Strontium (Sr)-Total (mg/L)	0.206	<0.00020	0.205	0.217	0.203
	Thallium (Tl)-Total (mg/L)	0.000016	<0.000010	0.000016	0.000019	0.000013
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00551	<0.000010	0.00541	0.00589	0.00382
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0050	<0.0030	0.0069	0.0067	0.0035
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00035	<0.00010	0.00034	0.00037	0.00031
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0792	<0.00010	0.0742	0.0779	0.0876
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.012	<0.010	0.012	0.012	0.012
	Cadmium (Cd)-Dissolved (ug/L)	0.0977	<0.0050	0.0929	0.0914	0.0515
	Calcium (Ca)-Dissolved (mg/L)	171	<0.050	163	177	137
	Chromium (Cr)-Dissolved (mg/L)	0.00012	<0.00010	0.00016	0.00014	0.00013
	Cobalt (Co)-Dissolved (ug/L)	0.22	<0.10	0.21	0.21	0.21

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2538667-11				
	Description	WS				
	Sampled Date	07-DEC-20				
	Sampled Time	13:15				
	Client ID	RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NP				
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	165				
	Chromium (Cr)-Total (mg/L)	0.00014				
	Cobalt (Co)-Total (ug/L)	0.23				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	0.038				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	0.0518				
	Magnesium (Mg)-Total (mg/L)	87.1				
	Manganese (Mn)-Total (mg/L)	0.0161				
	Mercury (Hg)-Total (ug/L)	<0.00050				
	Molybdenum (Mo)-Total (mg/L)	0.00378				
	Nickel (Ni)-Total (mg/L)	0.0114				
	Potassium (K)-Total (mg/L)	2.77				
	Selenium (Se)-Total (ug/L)	119				
	Silicon (Si)-Total (mg/L)	1.98				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	2.17				
	Strontium (Sr)-Total (mg/L)	0.204				
	Thallium (Tl)-Total (mg/L)	0.000018				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00561				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	0.0052				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0030				
	Antimony (Sb)-Dissolved (mg/L)	0.00036				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	0.0738				
	Beryllium (Be)-Dissolved (ug/L)	<0.020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	0.012				
	Cadmium (Cd)-Dissolved (ug/L)	0.0866				
	Calcium (Ca)-Dissolved (mg/L)	172				
	Chromium (Cr)-Dissolved (mg/L)	0.00012				
	Cobalt (Co)-Dissolved (ug/L)	0.21				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2538667-1	L2538667-2	L2538667-3	L2538667-4	L2538667-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	08-DEC-20	08-DEC-20	08-DEC-20	08-DEC-20	07-DEC-20
	Sampled Time	12:30	11:30	10:30	09:30	13:40
	Client ID	RG_UFR1_WS_LAEMP_FRO_2020-12_NP	RG_FOUCL_WS_LAEMP_FRO_2020-12_NP	RG_FOUNGD_WS_LAEMP_FRO_2020-12_NP	RG_FODNGD_WS_LAEMP_FRO_2020-12_NP	RG_TRIP_WS_2020
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0015	0.0080	0.0361	0.0449	
	Magnesium (Mg)-Dissolved (mg/L)	12.9	29.7	42.2	44.3	<0.0050
	Manganese (Mn)-Dissolved (mg/L)	0.00018	0.00035	0.00021	0.00037	
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000583	0.000675	0.000909	0.00109	
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	0.00278	0.00491	
	Potassium (K)-Dissolved (mg/L)	0.358	0.725	1.33	1.57	<0.050
	Selenium (Se)-Dissolved (ug/L)	0.742	33.2	60.9	70.9	
	Silicon (Si)-Dissolved (mg/L)	1.60	1.50	1.81	1.72	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	0.655	0.727	1.42	1.39	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.0946	0.146	0.181	0.177	
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.000506	0.00122	0.00272	0.00312	
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Zinc (Zn)-Dissolved (mg/L)	0.0012	0.0012	0.0017	0.0047	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2538667-6 WS 07-DEC-20 13:20 RG_RIVER_WS_2020	L2538667-7 WS 07-DEC-20 13:40 RG_FBLANK_WS_2020	L2538667-8 WS 07-DEC-20 14:00 RG_FOBSC_WS_LAEMP_FRO_2020-12_NP	L2538667-9 WS 07-DEC-20 10:30 RG_FOBCP_WS_LAEMP_FRO_2020-12_NP	L2538667-10 WS 07-DEC-20 10:15 RG_FOBKS_WS_LAEMP_FRO_2020-12_NP
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	0.00028	<0.00020	<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.025	<0.010	0.021	0.019	0.025
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0511	<0.0010	0.0493	0.0518	0.0458
	Magnesium (Mg)-Dissolved (mg/L)	85.8	<0.10	85.5	88.9	56.7
	Manganese (Mn)-Dissolved (mg/L)	0.0155	<0.00010	0.0151	0.0132	0.0186
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00360	<0.000050	0.00335	0.00388	0.00176
	Nickel (Ni)-Dissolved (mg/L)	0.0101	<0.00050	0.00960	0.0108	0.00553
	Potassium (K)-Dissolved (mg/L)	2.71	<0.050	2.59	2.72	2.42
	Selenium (Se)-Dissolved (ug/L)	134	<0.050	126	140	71.5
	Silicon (Si)-Dissolved (mg/L)	1.89	<0.050	1.81	1.91	1.87
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	2.29	<0.050	2.25	2.25	2.19
	Strontium (Sr)-Dissolved (mg/L)	0.204	<0.00020	0.196	0.206	0.200
	Thallium (Tl)-Dissolved (mg/L)	0.000016	<0.000010	0.000015	0.000018	0.000012
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00542	<0.000010	0.00512	0.00569	0.00373
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0057	<0.0010	0.0053	0.0053	0.0065

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2538667-11				
	Description	WS				
	Sampled Date	07-DEC-20				
	Sampled Time	13:15				
	Client ID	RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NP				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	0.00027				
	Iron (Fe)-Dissolved (mg/L)	0.023				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	0.0509				
	Magnesium (Mg)-Dissolved (mg/L)	84.9				
	Manganese (Mn)-Dissolved (mg/L)	0.0155				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00364				
	Nickel (Ni)-Dissolved (mg/L)	0.00980				
	Potassium (K)-Dissolved (mg/L)	2.59				
	Selenium (Se)-Dissolved (ug/L)	134				
	Silicon (Si)-Dissolved (mg/L)	1.88				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	2.23				
	Strontium (Sr)-Dissolved (mg/L)	0.209				
	Thallium (Tl)-Dissolved (mg/L)	0.000017				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00560				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	0.0049				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2538667-1, -10, -11, -2, -3, -4, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2538667-8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2538667-1, -10, -11, -2, -3, -4, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2538667-8
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2538667-1, -10, -11, -2, -3, -4, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2538667-8
Matrix Spike	Selenium (Se)-Dissolved	MS-B	L2538667-8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2538667-8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2538667-1, -10, -11, -2, -3, -4, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2538667-8
Matrix Spike	Uranium (U)-Dissolved	MS-B	L2538667-8
Matrix Spike	Barium (Ba)-Total	MS-B	L2538667-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2538667-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2538667-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2538667-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a

Reference Information

halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

Reference Information

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL	Water	Phosphorus (P)-Total	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5317885								
WG3462644-9 DUP		**L2538667-11**						
Acidity (as CaCO3)		<1.0	<1.0	RPD-NA	mg/L	N/A	20	15-DEC-20
WG3462644-8 LCS								
Acidity (as CaCO3)			105.4		%		85-115	15-DEC-20
WG3462644-7 MB								
Acidity (as CaCO3)			1.0		mg/L		2	15-DEC-20
ALK-MAN-CL	**Water**							
Batch R5318142								
WG3462931-12 DUP		**L2538667-10**						
Alkalinity, Total (as CaCO3)		214	216		mg/L	0.8	20	15-DEC-20
WG3462931-11 LCS								
Alkalinity, Total (as CaCO3)			101.3		%		85-115	15-DEC-20
WG3462931-10 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	15-DEC-20
BE-D-L-CCMS-VA	**Water**							
Batch R5310955								
WG3460074-3 DUP		**L2538667-1**						
Beryllium (Be)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	11-DEC-20
WG3460074-2 LCS								
Beryllium (Be)-Dissolved			92.6		%		80-120	11-DEC-20
WG3460074-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	11-DEC-20
WG3460074-4 MS		**L2538667-2**						
Beryllium (Be)-Dissolved			100.8		%		70-130	11-DEC-20
BE-T-L-CCMS-VA	**Water**							
Batch R5310905								
WG3460081-3 DUP		**L2538667-1**						
Beryllium (Be)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	11-DEC-20
WG3460081-2 LCS								
Beryllium (Be)-Total			101.4		%		80-120	11-DEC-20
WG3460081-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	11-DEC-20
WG3460081-4 MS		**L2538667-2**						
Beryllium (Be)-Total			97.4		%		70-130	11-DEC-20
BR-L-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-15 DUP		**L2538667-7**						
Bromide (Br)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	09-DEC-20
WG3459696-10 LCS								
Bromide (Br)			103.0		%		85-115	09-DEC-20
WG3459696-14 LCS								
Bromide (Br)			105.2		%		85-115	09-DEC-20
WG3459696-13 MB								
Bromide (Br)			<0.050		mg/L		0.05	09-DEC-20
WG3459696-9 MB								
Bromide (Br)			<0.050		mg/L		0.05	09-DEC-20
WG3459696-16 MS		**L2538667-7**						
Bromide (Br)			105.9		%		75-125	09-DEC-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5318195								
WG3462981-3 DUP		**L2538667-7**						
Dissolved Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	15-DEC-20
WG3462981-2 LCS								
Dissolved Organic Carbon			100.5		%		80-120	15-DEC-20
WG3462981-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	15-DEC-20
WG3462981-4 MS		**L2538667-7**						
Dissolved Organic Carbon			94.5		%		70-130	15-DEC-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5318195								
WG3462981-3 DUP		**L2538667-7**						
Total Organic Carbon		<0.50	<0.50	RPD-NA	mg/L	N/A	20	15-DEC-20
WG3462981-2 LCS								
Total Organic Carbon			109.8		%		80-120	15-DEC-20
WG3462981-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	15-DEC-20
WG3462981-4 MS		**L2538667-7**						
Total Organic Carbon			102.2		%		70-130	15-DEC-20
CL-L-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-15 DUP		**L2538667-7**						
Chloride (Cl)		<0.10	<0.10	RPD-NA	mg/L	N/A	20	09-DEC-20
WG3459696-10 LCS								
Chloride (Cl)			104.3		%		85-115	09-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-L-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-14 LCS								
Chloride (Cl)			104.5		%		85-115	09-DEC-20
WG3459696-13 MB								
Chloride (Cl)			<0.10		mg/L		0.1	09-DEC-20
WG3459696-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	09-DEC-20
WG3459696-16 MS		**L2538667-7**						
Chloride (Cl)			97.7		%		75-125	09-DEC-20
EC-L-PCT-CL	**Water**							
Batch R5318142								
WG3462931-12 DUP		**L2538667-10**						
Conductivity (@ 25C)		965	962		uS/cm	0.3	10	15-DEC-20
WG3462931-11 LCS								
Conductivity (@ 25C)			102.3		%		90-110	15-DEC-20
WG3462931-10 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	15-DEC-20
F-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-15 DUP		**L2538667-7**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	09-DEC-20
WG3459696-10 LCS								
Fluoride (F)			104.9		%		90-110	09-DEC-20
WG3459696-14 LCS								
Fluoride (F)			101.8		%		90-110	09-DEC-20
WG3459696-13 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-DEC-20
WG3459696-9 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-DEC-20
WG3459696-16 MS		**L2538667-7**						
Fluoride (F)			95.5		%		75-125	09-DEC-20
HG-D-CVAA-VA	**Water**							
Batch R5311027								
WG3460317-7 DUP		**L2538667-11**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	11-DEC-20
WG3460317-2 LCS								
Mercury (Hg)-Dissolved			98.2		%		80-120	11-DEC-20
WG3460317-6 LCS								
Mercury (Hg)-Dissolved			97.7		%		80-120	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-VA	**Water**							
Batch R5311027								
WG3460317-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	11-DEC-20
WG3460317-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	11-DEC-20
HG-T-U-CVAF-VA	**Water**							
Batch R5313856								
WG3461138-2 LCS								
Mercury (Hg)-Total			86.8		%		80-120	13-DEC-20
WG3461138-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	13-DEC-20
WG3461138-4 MS		**L2538667-1**						
Mercury (Hg)-Total			86.5		%		70-130	13-DEC-20
MET-D-CCMS-CL	**Water**							
Batch R5317634								
WG3462306-3 DUP		**L2538667-5**						
Calcium (Ca)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-DEC-20
Magnesium (Mg)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	15-DEC-20
Potassium (K)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-DEC-20
Sodium (Na)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	15-DEC-20
WG3462306-2 LCS		**TMRM**						
Calcium (Ca)-Dissolved			104.0		%		80-120	15-DEC-20
Magnesium (Mg)-Dissolved			108.4		%		80-120	15-DEC-20
Potassium (K)-Dissolved			106.1		%		80-120	15-DEC-20
Sodium (Na)-Dissolved			108.0		%		80-120	15-DEC-20
WG3462306-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
WG3462306-4 MS		**L2538667-5**						
Calcium (Ca)-Dissolved			107.2		%		70-130	15-DEC-20
Magnesium (Mg)-Dissolved			107.1		%		70-130	15-DEC-20
Potassium (K)-Dissolved			104.5		%		70-130	15-DEC-20
Sodium (Na)-Dissolved			109.2		%		70-130	15-DEC-20
MET-D-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5310955								
WG3460074-3 DUP		**L2538667-1**						
Aluminum (Al)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	11-DEC-20
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-DEC-20
Arsenic (As)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-DEC-20
Barium (Ba)-Dissolved		0.0650	0.0655		mg/L	0.9	20	11-DEC-20
Bismuth (Bi)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-DEC-20
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-DEC-20
Cadmium (Cd)-Dissolved		0.0000083	0.0000091		mg/L	8.5	20	11-DEC-20
Calcium (Ca)-Dissolved		50.4	49.9		mg/L	1.0	20	11-DEC-20
Chromium (Cr)-Dissolved		0.00013	0.00010	J	mg/L	0.00003	0.0002	11-DEC-20
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-DEC-20
Copper (Cu)-Dissolved		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	11-DEC-20
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-DEC-20
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-DEC-20
Lithium (Li)-Dissolved		0.0015	0.0015		mg/L	0.6	20	11-DEC-20
Magnesium (Mg)-Dissolved		12.9	12.6		mg/L	1.8	20	11-DEC-20
Manganese (Mn)-Dissolved		0.00018	0.00019		mg/L	2.3	20	11-DEC-20
Molybdenum (Mo)-Dissolved		0.000583	0.000581		mg/L	0.4	20	11-DEC-20
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-DEC-20
Potassium (K)-Dissolved		0.358	0.360		mg/L	0.5	20	11-DEC-20
Selenium (Se)-Dissolved		0.000742	0.000760		mg/L	2.4	20	11-DEC-20
Silicon (Si)-Dissolved		1.60	1.61		mg/L	0.5	20	11-DEC-20
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-DEC-20
Sodium (Na)-Dissolved		0.655	0.654		mg/L	0.0	20	11-DEC-20
Strontium (Sr)-Dissolved		0.0946	0.0937		mg/L	0.9	20	11-DEC-20
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-DEC-20
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-DEC-20
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-DEC-20
Uranium (U)-Dissolved		0.000506	0.000469		mg/L	7.7	20	11-DEC-20
Vanadium (V)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-DEC-20
Zinc (Zn)-Dissolved		0.0012	0.0012		mg/L	2.5	20	11-DEC-20
WG3460074-2 LCS								
Aluminum (Al)-Dissolved			101.7		%		80-120	11-DEC-20
Antimony (Sb)-Dissolved			99.5		%		80-120	11-DEC-20
Arsenic (As)-Dissolved			93.9		%		80-120	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5310955								
WG3460074-2 LCS								
Barium (Ba)-Dissolved			94.7		%		80-120	11-DEC-20
Bismuth (Bi)-Dissolved			100.9		%		80-120	11-DEC-20
Boron (B)-Dissolved			92.0		%		80-120	11-DEC-20
Cadmium (Cd)-Dissolved			96.6		%		80-120	11-DEC-20
Calcium (Ca)-Dissolved			100.4		%		80-120	11-DEC-20
Chromium (Cr)-Dissolved			98.1		%		80-120	11-DEC-20
Cobalt (Co)-Dissolved			98.8		%		80-120	11-DEC-20
Copper (Cu)-Dissolved			99.0		%		80-120	11-DEC-20
Iron (Fe)-Dissolved			95.4		%		80-120	11-DEC-20
Lead (Pb)-Dissolved			96.5		%		80-120	11-DEC-20
Lithium (Li)-Dissolved			97.7		%		80-120	11-DEC-20
Magnesium (Mg)-Dissolved			96.8		%		80-120	11-DEC-20
Manganese (Mn)-Dissolved			100.1		%		80-120	11-DEC-20
Molybdenum (Mo)-Dissolved			100.5		%		80-120	11-DEC-20
Nickel (Ni)-Dissolved			97.5		%		80-120	11-DEC-20
Potassium (K)-Dissolved			101.7		%		80-120	11-DEC-20
Selenium (Se)-Dissolved			90.8		%		80-120	11-DEC-20
Silicon (Si)-Dissolved			102.0		%		60-140	11-DEC-20
Silver (Ag)-Dissolved			98.9		%		80-120	11-DEC-20
Sodium (Na)-Dissolved			106.4		%		80-120	11-DEC-20
Strontium (Sr)-Dissolved			103.9		%		80-120	11-DEC-20
Thallium (Tl)-Dissolved			96.1		%		80-120	11-DEC-20
Tin (Sn)-Dissolved			95.5		%		80-120	11-DEC-20
Titanium (Ti)-Dissolved			97.4		%		80-120	11-DEC-20
Uranium (U)-Dissolved			100.2		%		80-120	11-DEC-20
Vanadium (V)-Dissolved			98.7		%		80-120	11-DEC-20
Zinc (Zn)-Dissolved			92.3		%		80-120	11-DEC-20
WG3460074-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	11-DEC-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	11-DEC-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5310955								
WG3460074-1 MB		**NP**						
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	11-DEC-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-DEC-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	11-DEC-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	11-DEC-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	11-DEC-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	11-DEC-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	11-DEC-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	11-DEC-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	11-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	11-DEC-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	11-DEC-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-DEC-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	11-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	11-DEC-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	11-DEC-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	11-DEC-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	11-DEC-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	11-DEC-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	11-DEC-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	11-DEC-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	11-DEC-20
WG3460074-4 MS		**L2538667-2**						
Aluminum (Al)-Dissolved			94.7		%		70-130	11-DEC-20
Antimony (Sb)-Dissolved			103.5		%		70-130	11-DEC-20
Arsenic (As)-Dissolved			102.4		%		70-130	11-DEC-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	11-DEC-20
Bismuth (Bi)-Dissolved			84.9		%		70-130	11-DEC-20
Boron (B)-Dissolved			99.5		%		70-130	11-DEC-20
Cadmium (Cd)-Dissolved			96.2		%		70-130	11-DEC-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	11-DEC-20
Chromium (Cr)-Dissolved			94.9		%		70-130	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5310955								
WG3460074-4 MS		**L2538667-2**						
Cobalt (Co)-Dissolved			90.9		%		70-130	11-DEC-20
Copper (Cu)-Dissolved			90.3		%		70-130	11-DEC-20
Iron (Fe)-Dissolved			91.2		%		70-130	11-DEC-20
Lead (Pb)-Dissolved			99.2		%		70-130	11-DEC-20
Lithium (Li)-Dissolved			102.4		%		70-130	11-DEC-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	11-DEC-20
Manganese (Mn)-Dissolved			96.3		%		70-130	11-DEC-20
Molybdenum (Mo)-Dissolved			101.3		%		70-130	11-DEC-20
Nickel (Ni)-Dissolved			89.9		%		70-130	11-DEC-20
Potassium (K)-Dissolved			98.0		%		70-130	11-DEC-20
Selenium (Se)-Dissolved			105.6		%		70-130	11-DEC-20
Silicon (Si)-Dissolved			92.2		%		70-130	11-DEC-20
Silver (Ag)-Dissolved			97.3		%		70-130	11-DEC-20
Sodium (Na)-Dissolved			101.7		%		70-130	11-DEC-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	11-DEC-20
Thallium (Tl)-Dissolved			100.9		%		70-130	11-DEC-20
Tin (Sn)-Dissolved			96.2		%		70-130	11-DEC-20
Titanium (Ti)-Dissolved			100.4		%		70-130	11-DEC-20
Uranium (U)-Dissolved			103.9		%		70-130	11-DEC-20
Vanadium (V)-Dissolved			97.2		%		70-130	11-DEC-20
Zinc (Zn)-Dissolved			91.7		%		70-130	11-DEC-20
Batch R5312216								
WG3460936-2 LCS								
Aluminum (Al)-Dissolved			100.4		%		80-120	12-DEC-20
Antimony (Sb)-Dissolved			105.7		%		80-120	12-DEC-20
Arsenic (As)-Dissolved			95.1		%		80-120	12-DEC-20
Barium (Ba)-Dissolved			98.5		%		80-120	12-DEC-20
Bismuth (Bi)-Dissolved			107.5		%		80-120	12-DEC-20
Boron (B)-Dissolved			95.4		%		80-120	12-DEC-20
Cadmium (Cd)-Dissolved			99.7		%		80-120	12-DEC-20
Calcium (Ca)-Dissolved			104.2		%		80-120	12-DEC-20
Chromium (Cr)-Dissolved			98.0		%		80-120	12-DEC-20
Cobalt (Co)-Dissolved			100.2		%		80-120	12-DEC-20
Copper (Cu)-Dissolved			97.8		%		80-120	12-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5312216								
WG3460936-2 LCS								
Iron (Fe)-Dissolved			93.7		%		80-120	12-DEC-20
Lead (Pb)-Dissolved			96.9		%		80-120	12-DEC-20
Lithium (Li)-Dissolved			101.3		%		80-120	12-DEC-20
Magnesium (Mg)-Dissolved			97.4		%		80-120	12-DEC-20
Manganese (Mn)-Dissolved			95.3		%		80-120	12-DEC-20
Molybdenum (Mo)-Dissolved			103.6		%		80-120	12-DEC-20
Nickel (Ni)-Dissolved			97.1		%		80-120	12-DEC-20
Potassium (K)-Dissolved			98.3		%		80-120	12-DEC-20
Selenium (Se)-Dissolved			104.1		%		80-120	12-DEC-20
Silicon (Si)-Dissolved			97.1		%		60-140	12-DEC-20
Silver (Ag)-Dissolved			105.9		%		80-120	12-DEC-20
Sodium (Na)-Dissolved			94.9		%		80-120	12-DEC-20
Strontium (Sr)-Dissolved			102.9		%		80-120	12-DEC-20
Thallium (Tl)-Dissolved			101.3		%		80-120	12-DEC-20
Tin (Sn)-Dissolved			98.6		%		80-120	12-DEC-20
Titanium (Ti)-Dissolved			91.5		%		80-120	12-DEC-20
Uranium (U)-Dissolved			102.8		%		80-120	12-DEC-20
Vanadium (V)-Dissolved			99.9		%		80-120	12-DEC-20
Zinc (Zn)-Dissolved			93.5		%		80-120	12-DEC-20
WG3460936-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	12-DEC-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	12-DEC-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	12-DEC-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	12-DEC-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	12-DEC-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	12-DEC-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	12-DEC-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	12-DEC-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	12-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5312216								
WG3460936-1 MB		**NP**						
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	12-DEC-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	12-DEC-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	12-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	12-DEC-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	12-DEC-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	12-DEC-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	12-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	12-DEC-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	12-DEC-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	12-DEC-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	12-DEC-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	12-DEC-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	12-DEC-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	12-DEC-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	12-DEC-20
WG3460936-4 MS		**L2538667-8**						
Aluminum (Al)-Dissolved			92.9		%		70-130	12-DEC-20
Antimony (Sb)-Dissolved			112.3		%		70-130	12-DEC-20
Arsenic (As)-Dissolved			99.2		%		70-130	12-DEC-20
Barium (Ba)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Bismuth (Bi)-Dissolved			89.8		%		70-130	12-DEC-20
Boron (B)-Dissolved			90.0		%		70-130	12-DEC-20
Cadmium (Cd)-Dissolved			95.5		%		70-130	12-DEC-20
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Chromium (Cr)-Dissolved			97.0		%		70-130	12-DEC-20
Cobalt (Co)-Dissolved			91.9		%		70-130	12-DEC-20
Copper (Cu)-Dissolved			88.7		%		70-130	12-DEC-20
Iron (Fe)-Dissolved			91.8		%		70-130	12-DEC-20
Lead (Pb)-Dissolved			97.6		%		70-130	12-DEC-20
Lithium (Li)-Dissolved			95.3		%		70-130	12-DEC-20
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Manganese (Mn)-Dissolved			87.8		%		70-130	12-DEC-20
Molybdenum (Mo)-Dissolved			111.3		%		70-130	12-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5312216								
WG3460936-4 MS		**L2538667-8**						
Nickel (Ni)-Dissolved			87.8		%		70-130	12-DEC-20
Potassium (K)-Dissolved			95.3		%		70-130	12-DEC-20
Selenium (Se)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Silicon (Si)-Dissolved			91.9		%		70-130	12-DEC-20
Silver (Ag)-Dissolved			103.6		%		70-130	12-DEC-20
Sodium (Na)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Strontium (Sr)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Thallium (Tl)-Dissolved			97.5		%		70-130	12-DEC-20
Tin (Sn)-Dissolved			99.4		%		70-130	12-DEC-20
Titanium (Ti)-Dissolved			95.8		%		70-130	12-DEC-20
Uranium (U)-Dissolved			N/A	MS-B	%		-	12-DEC-20
Vanadium (V)-Dissolved			100.2		%		70-130	12-DEC-20
Zinc (Zn)-Dissolved			88.3		%		70-130	12-DEC-20
MET-T-CCMS-VA	**Water**							
Batch R5310905								
WG3460081-3 DUP		**L2538667-1**						
Aluminum (Al)-Total		0.0379	0.0360		mg/L	5.2	20	11-DEC-20
Antimony (Sb)-Total		0.00013	0.00012		mg/L	9.7	20	11-DEC-20
Arsenic (As)-Total		0.00011	0.00010		mg/L	6.2	20	11-DEC-20
Barium (Ba)-Total		0.0726	0.0686		mg/L	5.7	20	11-DEC-20
Bismuth (Bi)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-DEC-20
Boron (B)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-DEC-20
Cadmium (Cd)-Total		0.0000155	0.0000133		mg/L	15	20	11-DEC-20
Calcium (Ca)-Total		49.6	49.7		mg/L	0.2	20	11-DEC-20
Chromium (Cr)-Total		0.00022	0.00022		mg/L	0.1	20	11-DEC-20
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-DEC-20
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-DEC-20
Iron (Fe)-Total		0.050	0.039	J	mg/L	0.011	0.02	11-DEC-20
Lead (Pb)-Total		0.000093	0.000096		mg/L	3.2	20	11-DEC-20
Lithium (Li)-Total		0.0015	0.0015		mg/L	0.7	20	11-DEC-20
Magnesium (Mg)-Total		14.1	13.2		mg/L	6.6	20	11-DEC-20
Manganese (Mn)-Total		0.00188	0.00172		mg/L	8.5	20	11-DEC-20
Molybdenum (Mo)-Total		0.000608	0.000616		mg/L	1.3	20	11-DEC-20
Nickel (Ni)-Total		<0.00050	0.00060	RPD-NA	mg/L	N/A	20	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5310905								
WG3460081-3 DUP		**L2538667-1**						
Potassium (K)-Total		0.428	0.402		mg/L	6.3	20	11-DEC-20
Selenium (Se)-Total		0.000875	0.000788		mg/L	11	20	11-DEC-20
Silicon (Si)-Total		1.80	1.74		mg/L	3.5	20	11-DEC-20
Silver (Ag)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-DEC-20
Sodium (Na)-Total		0.700	0.652		mg/L	7.1	20	11-DEC-20
Strontium (Sr)-Total		0.0950	0.0958		mg/L	0.9	20	11-DEC-20
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	11-DEC-20
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-DEC-20
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	11-DEC-20
Uranium (U)-Total		0.000504	0.000496		mg/L	1.6	20	11-DEC-20
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-DEC-20
Zinc (Zn)-Total		0.0064	0.0060		mg/L	6.4	20	11-DEC-20
WG3460081-2 LCS								
Aluminum (Al)-Total			107.7		%		80-120	11-DEC-20
Antimony (Sb)-Total			104.9		%		80-120	11-DEC-20
Arsenic (As)-Total			98.9		%		80-120	11-DEC-20
Barium (Ba)-Total			106.9		%		80-120	11-DEC-20
Bismuth (Bi)-Total			105.7		%		80-120	11-DEC-20
Boron (B)-Total			96.2		%		80-120	11-DEC-20
Cadmium (Cd)-Total			99.4		%		80-120	11-DEC-20
Calcium (Ca)-Total			106.3		%		80-120	11-DEC-20
Chromium (Cr)-Total			99.7		%		80-120	11-DEC-20
Cobalt (Co)-Total			101.3		%		80-120	11-DEC-20
Copper (Cu)-Total			98.7		%		80-120	11-DEC-20
Iron (Fe)-Total			101.9		%		80-120	11-DEC-20
Lead (Pb)-Total			104.5		%		80-120	11-DEC-20
Lithium (Li)-Total			100.4		%		80-120	11-DEC-20
Magnesium (Mg)-Total			94.2		%		80-120	11-DEC-20
Manganese (Mn)-Total			100.8		%		80-120	11-DEC-20
Molybdenum (Mo)-Total			106.8		%		80-120	11-DEC-20
Nickel (Ni)-Total			96.9		%		80-120	11-DEC-20
Potassium (K)-Total			105.2		%		80-120	11-DEC-20
Selenium (Se)-Total			101.1		%		80-120	11-DEC-20
Silicon (Si)-Total			102.8		%		80-120	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5310905								
WG3460081-2 LCS								
Silver (Ag)-Total			105.4		%		80-120	11-DEC-20
Sodium (Na)-Total			100.3		%		80-120	11-DEC-20
Strontium (Sr)-Total			108.0		%		80-120	11-DEC-20
Thallium (Tl)-Total			105.5		%		80-120	11-DEC-20
Tin (Sn)-Total			101.2		%		80-120	11-DEC-20
Titanium (Ti)-Total			100.1		%		80-120	11-DEC-20
Uranium (U)-Total			104.3		%		80-120	11-DEC-20
Vanadium (V)-Total			100.8		%		80-120	11-DEC-20
Zinc (Zn)-Total			101.9		%		80-120	11-DEC-20
WG3460081-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	11-DEC-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Barium (Ba)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	11-DEC-20
Boron (B)-Total			<0.010		mg/L		0.01	11-DEC-20
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	11-DEC-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	11-DEC-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	11-DEC-20
Iron (Fe)-Total			<0.010		mg/L		0.01	11-DEC-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	11-DEC-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	11-DEC-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	11-DEC-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	11-DEC-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	11-DEC-20
Potassium (K)-Total			<0.050		mg/L		0.05	11-DEC-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	11-DEC-20
Silicon (Si)-Total			<0.10		mg/L		0.1	11-DEC-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	11-DEC-20
Sodium (Na)-Total			<0.050		mg/L		0.05	11-DEC-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5310905								
WG3460081-1 MB								
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	11-DEC-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	11-DEC-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	11-DEC-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	11-DEC-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	11-DEC-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	11-DEC-20
WG3460081-4 MS		**L2538667-2**						
Aluminum (Al)-Total			100.5		%		70-130	11-DEC-20
Antimony (Sb)-Total			101.5		%		70-130	11-DEC-20
Arsenic (As)-Total			98.1		%		70-130	11-DEC-20
Barium (Ba)-Total			N/A	MS-B	%		-	11-DEC-20
Bismuth (Bi)-Total			98.1		%		70-130	11-DEC-20
Boron (B)-Total			91.1		%		70-130	11-DEC-20
Cadmium (Cd)-Total			96.5		%		70-130	11-DEC-20
Calcium (Ca)-Total			N/A	MS-B	%		-	11-DEC-20
Chromium (Cr)-Total			96.5		%		70-130	11-DEC-20
Cobalt (Co)-Total			94.4		%		70-130	11-DEC-20
Copper (Cu)-Total			91.4		%		70-130	11-DEC-20
Iron (Fe)-Total			92.7		%		70-130	11-DEC-20
Lead (Pb)-Total			98.9		%		70-130	11-DEC-20
Lithium (Li)-Total			96.7		%		70-130	11-DEC-20
Magnesium (Mg)-Total			N/A	MS-B	%		-	11-DEC-20
Manganese (Mn)-Total			96.6		%		70-130	11-DEC-20
Molybdenum (Mo)-Total			105.3		%		70-130	11-DEC-20
Nickel (Ni)-Total			90.1		%		70-130	11-DEC-20
Potassium (K)-Total			102.8		%		70-130	11-DEC-20
Selenium (Se)-Total			100.4		%		70-130	11-DEC-20
Silicon (Si)-Total			94.0		%		70-130	11-DEC-20
Silver (Ag)-Total			99.6		%		70-130	11-DEC-20
Sodium (Na)-Total			101.5		%		70-130	11-DEC-20
Strontium (Sr)-Total			N/A	MS-B	%		-	11-DEC-20
Thallium (Tl)-Total			97.0		%		70-130	11-DEC-20
Tin (Sn)-Total			99.6		%		70-130	11-DEC-20
Titanium (Ti)-Total			99.9		%		70-130	11-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5310905								
WG3460081-4 MS		**L2538667-2**						
Uranium (U)-Total			100.7		%		70-130	11-DEC-20
Vanadium (V)-Total			100.4		%		70-130	11-DEC-20
Zinc (Zn)-Total			97.4		%		70-130	11-DEC-20
NH3-L-F-CL	**Water**							
Batch R5314122								
WG3460796-19 DUP		**L2538667-11**						
Ammonia as N		0.0850	0.0785		mg/L	8.0	20	11-DEC-20
WG3460796-18 LCS								
Ammonia as N			95.6		%		85-115	11-DEC-20
WG3460796-17 MB								
Ammonia as N			<0.0050		mg/L		0.005	11-DEC-20
WG3460796-20 MS		**L2538667-11**						
Ammonia as N			100.0		%		75-125	11-DEC-20
NO2-L-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-15 DUP		**L2538667-7**						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	09-DEC-20
WG3459696-10 LCS								
Nitrite (as N)			104.3		%		90-110	09-DEC-20
WG3459696-14 LCS								
Nitrite (as N)			103.8		%		90-110	09-DEC-20
WG3459696-13 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	09-DEC-20
WG3459696-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	09-DEC-20
WG3459696-16 MS		**L2538667-7**						
Nitrite (as N)			99.4		%		75-125	09-DEC-20
NO3-L-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-15 DUP		**L2538667-7**						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	09-DEC-20
WG3459696-10 LCS								
Nitrate (as N)			104.4		%		90-110	09-DEC-20
WG3459696-14 LCS								
Nitrate (as N)			104.8		%		90-110	09-DEC-20
WG3459696-13 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	09-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	09-DEC-20
WG3459696-16 MS		**L2538667-7**						
Nitrate (as N)			98.5		%		75-125	09-DEC-20
ORP-CL	**Water**							
Batch R5318244								
WG3463004-1 CRM		**CL-ORP**						
ORP			220		mV		210-230	16-DEC-20
WG3463004-3 CRM		**CL-ORP**						
ORP			221		mV		210-230	16-DEC-20
WG3463004-2 DUP		**L2538667-11**						
ORP		296	281	J	mV	14.6	15	16-DEC-20
P-T-L-COL-CL	**Water**							
Batch R5317617								
WG3462296-11 DUP		**L2538667-11**						
Phosphorus (P)-Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	15-DEC-20
WG3462296-10 LCS								
Phosphorus (P)-Total			94.2		%		80-120	15-DEC-20
WG3462296-9 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	15-DEC-20
WG3462296-12 MS		**L2538667-11**						
Phosphorus (P)-Total			78.7		%		70-130	15-DEC-20
PH-CL	**Water**							
Batch R5318142								
WG3462931-12 DUP		**L2538667-10**						
pH		8.24	8.24	J	pH	0.00	0.2	15-DEC-20
WG3462931-11 LCS								
pH			6.99		pH		6.9-7.1	15-DEC-20
PO4-DO-L-COL-CL	**Water**							
Batch R5310271								
WG3459208-14 LCS								
Orthophosphate-Dissolved (as P)			108.0		%		80-120	09-DEC-20
WG3459208-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	09-DEC-20
SO4-IC-N-CL	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-CL	**Water**							
Batch R5310472								
WG3459696-15 DUP		**L2538667-7**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	09-DEC-20
WG3459696-10 LCS								
Sulfate (SO4)			102.5		%		90-110	09-DEC-20
WG3459696-14 LCS								
Sulfate (SO4)			102.6		%		90-110	09-DEC-20
WG3459696-13 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-DEC-20
WG3459696-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	09-DEC-20
WG3459696-16 MS		**L2538667-7**						
Sulfate (SO4)			95.7		%		75-125	09-DEC-20
SOLIDS-TDS-CL	**Water**							
Batch R5316756								
WG3461132-8 LCS								
Total Dissolved Solids			102.9		%		85-115	14-DEC-20
WG3461132-7 MB								
Total Dissolved Solids			<10		mg/L		10	14-DEC-20
Batch R5317951								
WG3462112-5 LCS								
Total Dissolved Solids			101.9		%		85-115	15-DEC-20
WG3462112-4 MB								
Total Dissolved Solids			<10		mg/L		10	15-DEC-20
TKN-L-F-CL	**Water**							
Batch R5311504								
WG3460420-15 DUP		**L2538667-7**						
Total Kjeldahl Nitrogen		<0.050	<0.050	RPD-NA	mg/L	N/A	20	11-DEC-20
WG3460420-14 LCS								
Total Kjeldahl Nitrogen			106.4		%		75-125	11-DEC-20
WG3460420-18 LCS								
Total Kjeldahl Nitrogen			106.0		%		75-125	11-DEC-20
WG3460420-2 LCS								
Total Kjeldahl Nitrogen			104.9		%		75-125	11-DEC-20
WG3460420-4 LCS								
Total Kjeldahl Nitrogen			104.3		%		75-125	11-DEC-20
WG3460420-6 LCS								
Total Kjeldahl Nitrogen			106.2		%		75-125	11-DEC-20
WG3460420-8 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-L-F-CL	**Water**							
Batch R5311504								
WG3460420-8 LCS								
Total Kjeldahl Nitrogen			103.3		%		75-125	11-DEC-20
WG3460420-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	11-DEC-20
WG3460420-13 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	11-DEC-20
WG3460420-17 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	11-DEC-20
WG3460420-3 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	11-DEC-20
WG3460420-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	11-DEC-20
WG3460420-7 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	11-DEC-20
WG3460420-16 MS		**L2538667-7**						
Total Kjeldahl Nitrogen			108.4		%		70-130	11-DEC-20
TSS-L-CL	**Water**							
Batch R5316594								
WG3461125-6 LCS								
Total Suspended Solids			104.8		%		85-115	14-DEC-20
WG3461125-8 LCS								
Total Suspended Solids			106.8		%		85-115	14-DEC-20
WG3461125-5 MB								
Total Suspended Solids			<1.0		mg/L		1	14-DEC-20
WG3461125-7 MB								
Total Suspended Solids			<1.0		mg/L		1	14-DEC-20
Batch R5317910								
WG3461596-4 LCS								
Total Suspended Solids			97.5		%		85-115	15-DEC-20
WG3461596-3 MB								
Total Suspended Solids			<1.0		mg/L		1	15-DEC-20
TURBIDITY-CL	**Water**							
Batch R5310377								
WG3459601-15 DUP		**L2538667-1**						
Turbidity		0.39	0.39		NTU	0.5	15	09-DEC-20
WG3459601-14 LCS								
Turbidity			102.4		%		85-115	09-DEC-20
WG3459601-17 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-CL	**Water**							
Batch R5310377								
WG3459601-17 LCS								
Turbidity			99.4		%		85-115	09-DEC-20
WG3459601-20 LCS								
Turbidity			98.9		%		85-115	09-DEC-20
WG3459601-13 MB								
Turbidity			<0.10		NTU		0.1	09-DEC-20
WG3459601-16 MB								
Turbidity			<0.10		NTU		0.1	09-DEC-20
WG3459601-19 MB								
Turbidity			<0.10		NTU		0.1	09-DEC-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	08-DEC-20 12:30	16-DEC-20 07:00	0.25	186	hours	EHTR-FM
	2	08-DEC-20 11:30	16-DEC-20 07:00	0.25	187	hours	EHTR-FM
	3	08-DEC-20 10:30	16-DEC-20 07:00	0.25	188	hours	EHTR-FM
	4	08-DEC-20 09:30	16-DEC-20 07:00	0.25	190	hours	EHTR-FM
	5	07-DEC-20 13:40	16-DEC-20 07:00	0.25	209	hours	EHTR-FM
	6	07-DEC-20 13:20	16-DEC-20 07:00	0.25	210	hours	EHTR-FM
	7	07-DEC-20 13:40	16-DEC-20 07:00	0.25	209	hours	EHTR-FM
	8	07-DEC-20 14:00	16-DEC-20 07:00	0.25	209	hours	EHTR-FM
	9	07-DEC-20 10:30	16-DEC-20 07:00	0.25	212	hours	EHTR-FM
	10	07-DEC-20 10:15	16-DEC-20 07:00	0.25	213	hours	EHTR-FM
	11	07-DEC-20 13:15	16-DEC-20 07:00	0.25	210	hours	EHTR-FM
pH							
	1	08-DEC-20 12:30	15-DEC-20 13:00	0.25	168	hours	EHTR-FM
	2	08-DEC-20 11:30	15-DEC-20 13:00	0.25	169	hours	EHTR-FM
	3	08-DEC-20 10:30	15-DEC-20 13:00	0.25	170	hours	EHTR-FM
	4	08-DEC-20 09:30	15-DEC-20 13:00	0.25	172	hours	EHTR-FM
	5	07-DEC-20 13:40	15-DEC-20 13:00	0.25	191	hours	EHTR-FM
	6	07-DEC-20 13:20	15-DEC-20 13:00	0.25	192	hours	EHTR-FM
	7	07-DEC-20 13:40	15-DEC-20 13:00	0.25	191	hours	EHTR-FM
	8	07-DEC-20 14:00	15-DEC-20 13:00	0.25	191	hours	EHTR-FM
	9	07-DEC-20 10:30	15-DEC-20 13:00	0.25	194	hours	EHTR-FM
	10	07-DEC-20 10:15	15-DEC-20 13:00	0.25	195	hours	EHTR-FM
	11	07-DEC-20 13:15	15-DEC-20 13:00	0.25	192	hours	EHTR-FM
Anions and Nutrients							
Orthophosphate-Dissolved (as P)							
	1	08-DEC-20 12:30	17-DEC-20 14:00	3	9	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2538667 were received on 09-DEC-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

teck

COC ID:	FRO LAEMP 20-09	TURNAROUND TIME:	

PROJECT CLIENT INFO

Facility Name / Job#	FRO				
Project Manager	Cait Good				
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LABORATORY

Lab Name	ALS Calgary		
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pschnurr@minnow.ca	x	x	x

SAMPLE DETAILS

L2538667-COFC

L2538667

ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA
							Preserved	N	F	N	N	F	N	F
							Preservative		H2SO4	H2SO4		HCL	HNO3	HNO3
RG_UFR1_WS_LAEMP_FRO_2020-12_NP	RG_UFR1	WS	No	12/8/2020	12:30	G	7	X	X	X	X	X	X	X
RG_FOUCL_WS_LAEMP_FRO_2020-12_NP	RG_FOUCL	WS	No	12/8/2020	11:30	G	7	X	X	X	X	X	X	X
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NP	RG_FOUNGD	WS	No	12/8/2020	10:30	G	7	X	X	X	X	X	X	X
RG_FODNGD_WS_LAEMP_FRO_2020-12_NP	RG_FODNGD	WS	No	12/8/2020	9:30	G	7	X	X	X	X	X	X	X
RG_TRIP_WS_2020	RG_TRIP	WS	No	12/7/2020	13:40	G	4	X		X	X		X	
RG_RIVER_WS_2020	RG_RIVER	WS	No	12/7/2020	13:20	G	7	X	X	X	X	X	X	X
RG_FBLANK_WS_2020	RG_FBLANK	WS	No	12/7/2020	13:40	G	7	X	X	X	X	X	X	X
RG_FOBSC_WS_LAEMP_FRO_2020-12_NP	RG_FOBSC	WS	No	12/7/2020	14:00	G	7	X	X	X	X	X	X	X
RG_FOBCP_WS_LAEMP_FRO_2020-12_NP	RG_FOBCP	WS	No	12/7/2020	10:30	G	7	X	X	X	X	X	X	X
RG_FOBKS_WS_LAEMP_FRO_2020-12_NP	RG_FOBKS	WS	No	12/7/2020	10:15	G	7	X	X	X	X	X	X	X
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NP	RG_SCOUTDS	WS	No	12/7/2020	13:15	G	7	X	X	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
PO 689999			12/9 9:00

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Peter Schnurr	Mobile #	647-967-9403
Sampler's Signature	PS	Date/Time	December 8 2020

4°

8

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 11-DEC-20
Report Date: 20-DEC-20 15:05 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2539625

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP 20-09
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2539625-1 WS 09-DEC-20 09:00 RG_MPI_WS_LAEMP_FRO_2020-12-09_0900	L2539625-2 WS 09-DEC-20 10:40 RG_FOUSH_WS_LAEMP_FRO_2020-12-09_1140	L2539625-3 WS 09-DEC-20 13:10 RG_FOUKI_WS_LAEMP_FRO_2020-12-09_1300	L2539625-4 WS 09-DEC-20 11:30 RG_FODPO_WS_LAEMP_FRO_2020-12-09_1130	L2539625-5 WS 09-DEC-20 15:00 RG_FO22_WS_LAEMP_FRO_2020-12-09_1500
WATER						
Physical Tests	Conductivity (@ 25C) (uS/cm)	923	962	955	1110	1090
	Hardness (as CaCO3) (mg/L)	529	591	588	680	679
	pH (pH)	8.36	8.23	8.25	8.30	8.12
	ORP (mV)	426	441	332	432	428
	Total Suspended Solids (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)	700 DLHC	760 DLHC	712 DLHC	863 DLHC	882 DLHC
	Turbidity (NTU)	0.19	0.30	0.26	0.10	0.10
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	179	203	207	242	222
	Alkalinity, Carbonate (as CaCO3) (mg/L)	5.4	<1.0	<1.0	2.6	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	184	203	207	245	222
	Ammonia as N (mg/L)	0.0077 DLHC	<0.0050 DLHC	0.0884 DLHC	0.0050 DLHC	0.0133 DLHC
	Bromide (Br) (mg/L)	<0.25 DLHC	<0.25 DLHC	<0.25 DLHC	<0.25 DLHC	<0.25 DLHC
	Chloride (Cl) (mg/L)	0.80 DLHC	0.95 DLHC	1.62 DLHC	1.45 DLHC	1.65 DLHC
	Fluoride (F) (mg/L)	0.14	0.14	0.15	0.12	0.11
	Ion Balance (%)	96.6 DLHC	103 DLHC	103 DLHC	101 DLHC	103 DLHC
	Nitrate (as N) (mg/L)	17.6 DLHC	16.7 DLHC	15.5 DLHC	20.2 DLHC	22.7 DLHC
	Nitrite (as N) (mg/L)	<0.0050 TKNI	0.0366 TKNI	0.0348 TKNI	<0.0050 TKNI	<0.0050 TKNI
	Total Kjeldahl Nitrogen (mg/L)	<0.050	0.382	0.447	0.158	<0.050
	Orthophosphate-Dissolved (as P) (mg/L)	0.0016	<0.0010	<0.0010	0.0027	0.0019
	Phosphorus (P)-Total (mg/L)	<0.0020	0.0021	0.0022	0.0025	<0.0020
	Sulfate (SO4) (mg/L)	293 DLHC	304 DLHC	301 DLHC	345 DLHC	350 DLHC
	Anion Sum (meq/L)	11.1	11.6	11.6	13.6	13.4
	Cation Sum (meq/L)	10.7	12.0	11.9	13.7	13.7
	Cation - Anion Balance (%)	-1.8	1.5	1.4	0.6	1.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	0.88	0.57	0.71	<0.50	0.53
	Total Organic Carbon (mg/L)	0.86	<0.50	0.67	<0.50	0.50
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	0.0031	0.0054	0.0041	0.0039
	Antimony (Sb)-Total (mg/L)	0.00021	0.00031	0.00027	0.00012	<0.00010
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00010	0.00011	<0.00010
	Barium (Ba)-Total (mg/L)	0.0898	0.0893	0.0849	0.0905	0.125
	Beryllium (Be)-Total (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.012	0.013	0.010	0.011
	Cadmium (Cd)-Total (ug/L)	0.0641	0.0494	0.0585	0.0353	0.0438

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID	L2539625-6	L2539625-7	L2539625-8	L2539625-9	L2539625-10
		Description	WS	WS	WS	WS	WS
		Sampled Date	10-DEC-20	10-DEC-20	10-DEC-20	10-DEC-20	10-DEC-20
		Sampled Time	11:56	11:56	11:56	10:35	11:20
		Client ID	RG_TRIP_WS_2020-12-10_1156	RG_RIVER_WS_2020-12-10_1156	RG_FBLANK_WS_2020-12-10_1156	RG_FRUPO_WS_LAEMP_FRO_2020-12-10_1035	RG_FOUEW_WS_LAEMP_FRO_2020-12-10_1120
WATER							
Physical Tests	Conductivity (@ 25C) (uS/cm)		<2.0	1250	<2.0	1240	1110
	Hardness (as CaCO3) (mg/L)			792	<0.50	765	704
	pH (pH)		5.59	8.21	5.60	8.26	8.23
	ORP (mV)		389	397	459	405	412
	Total Suspended Solids (mg/L)		<1.0	3.4	<1.0	<1.0	<1.0
	Total Dissolved Solids (mg/L)		<10	980 DLHC	<10	1000 DLHC	831 DLHC
	Turbidity (NTU)		<0.10	0.17	<0.10	<0.10	0.12
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		1.3	4.0	1.5	2.1	1.4
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		<1.0	277	<1.0	268	226
	Alkalinity, Carbonate (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)		<1.0	277	<1.0	268	226
	Ammonia as N (mg/L)		<0.0050	0.0281	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)		<0.050	<0.25 DLHC	<0.050	<0.25 DLHC	<0.25 DLHC
	Chloride (Cl) (mg/L)		<0.10	2.28 DLHC	<0.10	2.00 DLHC	1.67 DLHC
	Fluoride (F) (mg/L)		<0.020	0.12	<0.020	0.12	0.11
	Ion Balance (%)		0.0	103	0.0	101	105
	Nitrate (as N) (mg/L)		<0.0050	30.9 DLHC	<0.0050	30.8 DLHC	22.9 DLHC
	Nitrite (as N) (mg/L)		<0.0010	<0.0050 TKNI	<0.0010	<0.0050 TKNI	<0.0050 TKNI
	Total Kjeldahl Nitrogen (mg/L)		<0.050	<0.050	<0.050	<0.050	0.062
	Orthophosphate-Dissolved (as P) (mg/L)		<0.0010	0.0033	<0.0010	0.0035	0.0017
	Phosphorus (P)-Total (mg/L)		<0.0020	0.0040	<0.0020	0.0031	0.0063
	Sulfate (SO4) (mg/L)		<0.30	376 DLHC	<0.30	373 DLHC	354 DLHC
	Anion Sum (meq/L)		<0.10	15.6	<0.10	15.4	13.6
	Cation Sum (meq/L)		<0.10	16.0	<0.10	15.5	14.2
	Cation - Anion Balance (%)		0.0	1.3	0.0	0.4	2.3
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)			<0.50	<0.50	<0.50	<0.50
	Total Organic Carbon (mg/L)		<0.50	<0.50	<0.50	<0.50	0.57
Total Metals	Aluminum (Al)-Total (mg/L)		<0.0030	0.0056	<0.0030	<0.0030	0.0117
	Antimony (Sb)-Total (mg/L)		<0.00010	0.00012	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	0.00010
	Barium (Ba)-Total (mg/L)		<0.00010	0.146	<0.00010	0.148	0.126
	Beryllium (Be)-Total (ug/L)		<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Total (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)		<0.010	0.016	<0.010	0.016	0.011
	Cadmium (Cd)-Total (ug/L)		<0.0050	0.0610	<0.0050	0.0606	0.0455

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2539625-1	L2539625-2	L2539625-3	L2539625-4	L2539625-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	09-DEC-20	09-DEC-20	09-DEC-20	09-DEC-20	09-DEC-20
	Sampled Time	09:00	10:40	13:10	11:30	15:00
	Client ID	RG_MPI_WS_LAEMP_FRO_2020-12-09_0900	RG_FOUSH_WS_LAEMP_FRO_2020-12-09_1140	RG_FOUKI_WS_LAEMP_FRO_2020-12-09_1300	RG_FODPO_WS_LAEMP_FRO_2020-12-09_1130	RG_FO22_WS_LAEMP_FRO_2020-12-09_1500
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	120	126	124	141	143
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
	Cobalt (Co)-Total (ug/L)	<0.10	0.36	0.28	<0.10	0.10
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	0.053	0.046	<0.010	0.016
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0466	0.0534	0.0501	0.0367	0.0368
	Magnesium (Mg)-Total (mg/L)	52.2	57.8	57.3	71.6	70.0
	Manganese (Mn)-Total (mg/L)	0.00175	0.0219	0.0222	0.00097	0.00888
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	0.00123	0.00166	0.00156	0.000857	0.000741
	Nickel (Ni)-Total (mg/L)	0.00499	0.00679	0.00551	<0.00050	<0.00050
	Potassium (K)-Total (mg/L)	1.62	2.12	2.14	1.79	1.83
	Selenium (Se)-Total (ug/L)	68.1	61.3	56.2	95.4	96.2
	Silicon (Si)-Total (mg/L)	1.79	1.89	1.86	2.34	2.45
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.58	1.94	2.17	2.46	2.64
	Strontium (Sr)-Total (mg/L)	0.176	0.192	0.184	0.179	0.183
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000012	0.000011	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00329	0.00363	0.00374	0.00367	0.00363
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.00020	0.00032	0.00030	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0886	0.0900	0.0859	0.0865	0.102
	Beryllium (Be)-Dissolved (ug/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.014	0.015	0.012	0.013
	Cadmium (Cd)-Dissolved (ug/L)	0.0548	0.0427	0.0516	0.0305	0.0330
	Calcium (Ca)-Dissolved (mg/L)	129	140	142	159	161
	Chromium (Cr)-Dissolved (mg/L)	0.00014	0.00011	0.00013	0.00015	0.00016
	Cobalt (Co)-Dissolved (ug/L)	<0.10	0.34	0.26	<0.10	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2539625-6	L2539625-7	L2539625-8	L2539625-9	L2539625-10
	Description	WS	WS	WS	WS	WS
	Sampled Date	10-DEC-20	10-DEC-20	10-DEC-20	10-DEC-20	10-DEC-20
	Sampled Time	11:56	11:56	11:56	10:35	11:20
	Client ID	RG_TRIP_WS_2020-12-10_1156	RG_RIVER_WS_2020-12-10_1156	RG_FBLANK_WS_2020-12-10_1156	RG_FRUPO_WS_LAEMP_FRO_2020-12-10_1035	RG_FOUEW_WS_LAEMP_FRO_2020-12-10_1120
Grouping	**Analyte**					
WATER						
Total Metals	Calcium (Ca)-Total (mg/L)	<0.050	169	<0.050	170	150
	Chromium (Cr)-Total (mg/L)	<0.00010	0.00014	<0.00010	0.00010	0.00012
	Cobalt (Co)-Total (ug/L)	<0.10	0.12	<0.10	0.11	0.12
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	0.025
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0010	0.0526	<0.0010	0.0547	0.0381
	Magnesium (Mg)-Total (mg/L)	<0.10	78.7	<0.10	78.8	68.8
	Manganese (Mn)-Total (mg/L)	<0.00010	0.00101	<0.00010	0.00067	0.00515
	Mercury (Hg)-Total (ug/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000819	<0.000050	0.000791	0.000736
	Nickel (Ni)-Total (mg/L)	<0.00050	0.00059	<0.00050	0.00064	0.00056
	Potassium (K)-Total (mg/L)	<0.050	2.48	<0.050	2.51	1.78
	Selenium (Se)-Total (ug/L)	<0.050	116	<0.050	114	96.3
	Silicon (Si)-Total (mg/L)	<0.10	2.59	<0.10	2.53	2.54
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	<0.050	3.26	<0.050	3.25	2.64
	Strontium (Sr)-Total (mg/L)	<0.00020	0.205	<0.00020	0.198	0.190
	Thallium (Tl)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	0.00483	<0.000010	0.00485	0.00356
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	LAB	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		0.0092	<0.0030	<0.0030	<0.0030
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)-Dissolved (mg/L)		0.124	<0.00010	0.126	0.108
	Beryllium (Be)-Dissolved (ug/L)		<0.020	<0.020	<0.020	<0.020
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)		0.019	<0.010	0.018	0.013
	Cadmium (Cd)-Dissolved (ug/L)		0.0537	<0.0050	0.0474	0.0364
	Calcium (Ca)-Dissolved (mg/L)	<0.050	188	<0.050	179	171
	Chromium (Cr)-Dissolved (mg/L)		0.00015	<0.00010	0.00017	0.00015
	Cobalt (Co)-Dissolved (ug/L)		0.11	<0.10	0.11	<0.10

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2539625-1	L2539625-2	L2539625-3	L2539625-4	L2539625-5
	Description	WS	WS	WS	WS	WS
	Sampled Date	09-DEC-20	09-DEC-20	09-DEC-20	09-DEC-20	09-DEC-20
	Sampled Time	09:00	10:40	13:10	11:30	15:00
	Client ID	RG_MPI_WS_LAEMP_FRO_2020-12-09_0900	RG_FOUSH_WS_LAEMP_FRO_2020-12-09_1140	RG_FOUKI_WS_LAEMP_FRO_2020-12-09_1300	RG_FODPO_WS_LAEMP_FRO_2020-12-09_1130	RG_FO22_WS_LAEMP_FRO_2020-12-09_1500
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.036	0.028	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0491	0.0593	0.0608	0.0416	0.0438
	Magnesium (Mg)-Dissolved (mg/L)	50.1	58.6	56.6	68.3	67.6
	Manganese (Mn)-Dissolved (mg/L)	0.00175	0.0216	0.0199	0.00040	0.00665
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00125	0.00168	0.00173	0.000864	0.000743
	Nickel (Ni)-Dissolved (mg/L)	0.00479	0.00676	0.00531	<0.00050	0.00101
	Potassium (K)-Dissolved (mg/L)	1.68	2.23	2.27	1.84	1.84
	Selenium (Se)-Dissolved (ug/L)	76.0	70.5	63.6	103	102
	Silicon (Si)-Dissolved (mg/L)	1.72	1.84	1.80	2.30	2.31
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.58	1.86	2.13	2.40	2.58
	Strontium (Sr)-Dissolved (mg/L)	0.184	0.196	0.203	0.188	0.184
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	0.000014	0.000014	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00316	0.00346	0.00381	0.00356	0.00340
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0027	0.0023	0.0018	<0.0010	0.0012

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2539625-6	L2539625-7	L2539625-8	L2539625-9	L2539625-10
	Description	WS	WS	WS	WS	WS
	Sampled Date	10-DEC-20	10-DEC-20	10-DEC-20	10-DEC-20	10-DEC-20
	Sampled Time	11:56	11:56	11:56	10:35	11:20
	Client ID	RG_TRIP_WS_2020-12-10_1156	RG_RIVER_WS_2020-12-10_1156	RG_FBLANK_WS_2020-12-10_1156	RG_FRUPO_WS_LAEMP_FRO_2020-12-10_1035	RG_FOUEW_WS_LAEMP_FRO_2020-12-10_1120
Grouping	**Analyte**					
WATER						
Dissolved Metals	Copper (Cu)-Dissolved (mg/L)		<0.00020	<0.00020	<0.00020	<0.00020
	Iron (Fe)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		0.0596	<0.0010	0.0616	0.0437
	Magnesium (Mg)-Dissolved (mg/L)	<0.0050	78.3	<0.10	77.1	67.2
	Manganese (Mn)-Dissolved (mg/L)		0.00087	<0.00010	0.00062	0.00373
	Mercury (Hg)-Dissolved (mg/L)		<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000757	<0.000050	0.000759	0.000799
	Nickel (Ni)-Dissolved (mg/L)		0.00081	<0.00050	0.00080	0.00068
	Potassium (K)-Dissolved (mg/L)	<0.050	2.64	<0.050	2.64	1.85
	Selenium (Se)-Dissolved (ug/L)		132	<0.050	130	108
	Silicon (Si)-Dissolved (mg/L)		2.47	<0.050	2.44	2.40
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	<0.050	3.20	<0.050	3.13	2.54
	Strontium (Sr)-Dissolved (mg/L)		0.198	<0.00020	0.200	0.203
	Thallium (Tl)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)		0.00447	<0.000010	0.00448	0.00364
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		0.0018	<0.0010	<0.0010	0.0011

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2539625-1, -10, -2, -3, -4, -5, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2539625-1, -10, -2, -3, -4, -5, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2539625-1, -10, -2, -3, -4, -5, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2539625-1, -10, -2, -3, -4, -5, -7, -8, -9
Matrix Spike	Barium (Ba)-Total	MS-B	L2539625-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Total	MS-B	L2539625-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2539625-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Selenium (Se)-Total	MS-B	L2539625-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L2539625-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L2539625-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
TKNI	TKN result may be biased low due to Nitrate interference. Nitrate-N is > 10x TKN.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-PCT-CL	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-MAN-CL	Water	Alkalinity (Species) by Manual Titration	APHA 2320 ALKALINITY

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

BR-L-IC-N-CL	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

C-DIS-ORG-LOW-CL	Water	Dissolved Organic Carbon	APHA 5310 B-Instrumental

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This method is applicable to the analysis of ground water, wastewater, and surface water samples. The form detected depends upon sample pretreatment: Unfiltered sample = TC, 0.45um filtered = TDC. Samples are injected into a combustion tube containing an oxidation catalyst. The carrier gas containing the combustion product from the combustion tube flows through an inorganic carbon reactor vessel and is then sent through a halogen scrubber into a sample cell set in a non-dispersive infrared gas analyzer (NDIR) where carbon dioxide is detected. For total inorganic carbon and dissolved inorganic carbon, the sample is injected into an IC reactor vessel where only the IC component is decomposed to become carbon dioxide.

The peak area generated by the NDIR indicates the TC/TDC or TIC/DIC as applicable. The total organic carbon content of the sample is calculated by subtracting the TIC from the TC.
TOC = TC-TIC, DOC = TDC-DIC, Particulate = Total - Dissolved.

CL-L-IC-N-CL	Water	Chloride in Water by IC	EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

EC-L-PCT-CL Water Electrical Conductivity (EC) APHA 2510B

Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25C.

F-IC-N-CL Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

HG-T-U-CVAF-VA Water Total Mercury in Water by CVAFS (Ultra) EPA 1631 REV. E

This analysis is carried out using procedures adapted from Method 1631 Rev. E. by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to a purge and trap concentration step and final reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry.

IONBALANCE-BC-CL Water Ion Balance Calculation APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

MET-D-CCMS-CL Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

NH3-L-F-CL Water Ammonia, Total (as N) J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-CL Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-CL Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

ORP-CL Water Oxidation redution potential by elect. ASTM D1498

This analysis is carried out in accordance with the procedure described in the "ASTM" method D1498 "Oxidation-Reduction Potential of Water" published by the American Society for Testing and Materials (ASTM). Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

It is recommended that this analysis be conducted in the field.

P-T-L-COL-CL Water Phosphorus (P)-Total APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

Reference Information

PH-CL	Water	pH	APHA 4500 H-Electrode

pH is determined in the laboratory using a pH electrode. All samples analyzed by this method for pH will have exceeded the 15 minute recommended hold time from time of sampling (field analysis is recommended for pH where highly accurate results are needed)

PO4-DO-L-COL-CL	Water	Orthophosphate-Dissolved (as P)	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

SO4-IC-N-CL	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-CL	Water	Total Dissolved Solids	APHA 2540 C

A well-mixed sample is filtered through a glass fibre filter paper. The filtrate is then evaporated to dryness in a pre-weighed vial and dried at 180 – 2 °C. The increase in vial weight represents the total dissolved solids (TDS).

TECKCOAL-IONBAL-CL	Water	Ion Balance Calculation	APHA 1030E

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

TKN-L-F-CL	Water	Total Kjeldahl Nitrogen	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-L-CL	Water	Total Suspended Solids	APHA 2540 D-Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, and by drying the filter at 104 deg. C.

TURBIDITY-CL	Water	Turbidity	APHA 2130 B-Nephelometer

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

FRO LAEMP 20-09

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-PCT-CL	**Water**							
Batch R5319584								
WG3464463-11 LCS								
Acidity (as CaCO3)			105.4		%		85-115	17-DEC-20
WG3464463-10 MB								
Acidity (as CaCO3)			1.4		mg/L		2	17-DEC-20
ALK-MAN-CL	**Water**							
Batch R5319497								
WG3464423-14 LCS								
Alkalinity, Total (as CaCO3)			102.9		%		85-115	17-DEC-20
WG3464423-13 MB								
Alkalinity, Total (as CaCO3)			<1.0		mg/L		1	17-DEC-20
BE-D-L-CCMS-VA	**Water**							
Batch R5315837								
WG3461130-2 LCS								
Beryllium (Be)-Dissolved			103.2		%		80-120	15-DEC-20
WG3461130-1 MB		**NP**						
Beryllium (Be)-Dissolved			<0.000020		mg/L		0.00002	15-DEC-20
BE-T-L-CCMS-VA	**Water**							
Batch R5315860								
WG3461088-2 LCS								
Beryllium (Be)-Total			102.2		%		80-120	14-DEC-20
WG3461088-1 MB								
Beryllium (Be)-Total			<0.000020		mg/L		0.00002	14-DEC-20
BR-L-IC-N-CL	**Water**							
Batch R5313337								
WG3461016-6 LCS								
Bromide (Br)			102.7		%		85-115	11-DEC-20
WG3461016-5 MB								
Bromide (Br)			<0.050		mg/L		0.05	11-DEC-20
C-DIS-ORG-LOW-CL	**Water**							
Batch R5319761								
WG3464651-2 LCS								
Dissolved Organic Carbon			91.5		%		80-120	18-DEC-20
WG3464651-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	18-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-LOW-CL	**Water**							
Batch R5319811								
WG3464762-2 LCS								
Dissolved Organic Carbon			106.2		%		80-120	19-DEC-20
WG3464762-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-DEC-20
Batch R5319815								
WG3464765-2 LCS								
Dissolved Organic Carbon			106.5		%		80-120	19-DEC-20
WG3464765-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	19-DEC-20
C-TOT-ORG-LOW-CL	**Water**							
Batch R5319761								
WG3464651-2 LCS								
Total Organic Carbon			94.7		%		80-120	18-DEC-20
WG3464651-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	18-DEC-20
Batch R5319811								
WG3464762-2 LCS								
Total Organic Carbon			109.6		%		80-120	19-DEC-20
WG3464762-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	19-DEC-20
Batch R5319815								
WG3464765-2 LCS								
Total Organic Carbon			109.2		%		80-120	19-DEC-20
WG3464765-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	19-DEC-20
CL-L-IC-N-CL	**Water**							
Batch R5313337								
WG3461016-6 LCS								
Chloride (Cl)			103.3		%		85-115	11-DEC-20
WG3461016-5 MB								
Chloride (Cl)			<0.10		mg/L		0.1	11-DEC-20
EC-L-PCT-CL	**Water**							
Batch R5319497								
WG3464423-14 LCS								
Conductivity (@ 25C)			103.6		%		90-110	17-DEC-20
WG3464423-13 MB								
Conductivity (@ 25C)			<2.0		uS/cm		2	17-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-CL	**Water**							
Batch R5313337								
WG3461016-6 LCS								
Fluoride (F)			100.8		%		90-110	11-DEC-20
WG3461016-5 MB								
Fluoride (F)			<0.020		mg/L		0.02	11-DEC-20
HG-D-CVAA-VA	**Water**							
Batch R5316181								
WG3461829-7 DUP		**L2539625-7**						
Mercury (Hg)-Dissolved		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	15-DEC-20
WG3461829-2 LCS								
Mercury (Hg)-Dissolved			97.8		%		80-120	15-DEC-20
WG3461829-6 LCS								
Mercury (Hg)-Dissolved			98.5		%		80-120	15-DEC-20
WG3461829-1 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	15-DEC-20
WG3461829-5 MB		**NP**						
Mercury (Hg)-Dissolved			<0.000005C		mg/L		0.000005	15-DEC-20
WG3461829-8 MS		**L2539625-8**						
Mercury (Hg)-Dissolved			98.2		%		70-130	15-DEC-20
HG-T-U-CVAF-VA	**Water**							
Batch R5318920								
WG3463825-3 DUP		**L2539625-1**						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	17-DEC-20
WG3463825-5 DUP		**L2539625-2**						
Mercury (Hg)-Total		<0.00050	<0.00050	RPD-NA	ug/L	N/A	20	17-DEC-20
WG3463825-2 LCS								
Mercury (Hg)-Total			105.8		%		80-120	17-DEC-20
WG3463825-1 MB								
Mercury (Hg)-Total			<0.00050		ug/L		0.0005	17-DEC-20
MET-D-CCMS-CL	**Water**							
Batch R5317634								
WG3462306-10 LCS		**TMRM**						
Calcium (Ca)-Dissolved			98.8		%		80-120	15-DEC-20
Magnesium (Mg)-Dissolved			101.5		%		80-120	15-DEC-20
Potassium (K)-Dissolved			100.4		%		80-120	15-DEC-20
Sodium (Na)-Dissolved			100.6		%		80-120	15-DEC-20
WG3462306-9 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-CL	**Water**							
Batch R5317634								
WG3462306-9 MB								
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
MET-D-CCMS-VA	**Water**							
Batch R5315837								
WG3461130-2 LCS								
Aluminum (Al)-Dissolved			99.4		%		80-120	15-DEC-20
Antimony (Sb)-Dissolved			109.0		%		80-120	15-DEC-20
Arsenic (As)-Dissolved			96.7		%		80-120	15-DEC-20
Barium (Ba)-Dissolved			103.9		%		80-120	15-DEC-20
Bismuth (Bi)-Dissolved			106.3		%		80-120	15-DEC-20
Boron (B)-Dissolved			101.1		%		80-120	15-DEC-20
Cadmium (Cd)-Dissolved			101.4		%		80-120	15-DEC-20
Calcium (Ca)-Dissolved			104.2		%		80-120	15-DEC-20
Chromium (Cr)-Dissolved			98.2		%		80-120	15-DEC-20
Cobalt (Co)-Dissolved			97.2		%		80-120	15-DEC-20
Copper (Cu)-Dissolved			97.5		%		80-120	15-DEC-20
Iron (Fe)-Dissolved			93.3		%		80-120	15-DEC-20
Lead (Pb)-Dissolved			109.6		%		80-120	15-DEC-20
Lithium (Li)-Dissolved			108.7		%		80-120	15-DEC-20
Magnesium (Mg)-Dissolved			96.4		%		80-120	15-DEC-20
Manganese (Mn)-Dissolved			99.4		%		80-120	15-DEC-20
Molybdenum (Mo)-Dissolved			106.4		%		80-120	15-DEC-20
Nickel (Ni)-Dissolved			97.3		%		80-120	15-DEC-20
Potassium (K)-Dissolved			100.8		%		80-120	15-DEC-20
Selenium (Se)-Dissolved			99.5		%		80-120	15-DEC-20
Silicon (Si)-Dissolved			96.0		%		60-140	15-DEC-20
Silver (Ag)-Dissolved			110.4		%		80-120	15-DEC-20
Sodium (Na)-Dissolved			96.3		%		80-120	15-DEC-20
Strontium (Sr)-Dissolved			106.5		%		80-120	15-DEC-20
Thallium (Tl)-Dissolved			106.1		%		80-120	15-DEC-20
Tin (Sn)-Dissolved			101.1		%		80-120	15-DEC-20
Titanium (Ti)-Dissolved			92.6		%		80-120	15-DEC-20
Uranium (U)-Dissolved			102.1		%		80-120	15-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R5315837								
WG3461130-2 LCS								
Vanadium (V)-Dissolved			99.8		%		80-120	15-DEC-20
Zinc (Zn)-Dissolved			98.2		%		80-120	15-DEC-20
WG3461130-1 MB		**NP**						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	15-DEC-20
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	15-DEC-20
Boron (B)-Dissolved			<0.010		mg/L		0.01	15-DEC-20
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	15-DEC-20
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	15-DEC-20
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	15-DEC-20
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	15-DEC-20
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	15-DEC-20
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	15-DEC-20
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	15-DEC-20
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	15-DEC-20
Potassium (K)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	15-DEC-20
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	15-DEC-20
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	15-DEC-20
Strontium (Sr)-Dissolved			<0.00020		mg/L		0.0002	15-DEC-20
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	15-DEC-20
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	15-DEC-20
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	15-DEC-20
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	15-DEC-20
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	15-DEC-20
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	15-DEC-20
MET-T-CCMS-VA	**Water**							

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5315860								
WG3461088-2 LCS								
Aluminum (Al)-Total			99.0		%		80-120	14-DEC-20
Antimony (Sb)-Total			115.2		%		80-120	14-DEC-20
Arsenic (As)-Total			102.1		%		80-120	14-DEC-20
Barium (Ba)-Total			102.9		%		80-120	14-DEC-20
Bismuth (Bi)-Total			112.5		%		80-120	14-DEC-20
Boron (B)-Total			96.7		%		80-120	14-DEC-20
Cadmium (Cd)-Total			107.8		%		80-120	14-DEC-20
Calcium (Ca)-Total			103.2		%		80-120	14-DEC-20
Chromium (Cr)-Total			97.7		%		80-120	14-DEC-20
Cobalt (Co)-Total			99.1		%		80-120	14-DEC-20
Copper (Cu)-Total			97.8		%		80-120	14-DEC-20
Iron (Fe)-Total			97.0		%		80-120	14-DEC-20
Lead (Pb)-Total			107.6		%		80-120	14-DEC-20
Lithium (Li)-Total			97.7		%		80-120	14-DEC-20
Magnesium (Mg)-Total			97.9		%		80-120	14-DEC-20
Manganese (Mn)-Total			98.7		%		80-120	14-DEC-20
Molybdenum (Mo)-Total			106.0		%		80-120	14-DEC-20
Nickel (Ni)-Total			101.8		%		80-120	14-DEC-20
Potassium (K)-Total			99.7		%		80-120	14-DEC-20
Selenium (Se)-Total			101.6		%		80-120	14-DEC-20
Silicon (Si)-Total			103.3		%		80-120	14-DEC-20
Silver (Ag)-Total			99.1		%		80-120	14-DEC-20
Sodium (Na)-Total			106.6		%		80-120	14-DEC-20
Strontium (Sr)-Total			104.8		%		80-120	14-DEC-20
Thallium (Tl)-Total			112.3		%		80-120	14-DEC-20
Tin (Sn)-Total			98.5		%		80-120	14-DEC-20
Titanium (Ti)-Total			99.5		%		80-120	14-DEC-20
Uranium (U)-Total			106.7		%		80-120	14-DEC-20
Vanadium (V)-Total			102.0		%		80-120	14-DEC-20
Zinc (Zn)-Total			100.5		%		80-120	14-DEC-20
WG3461088-1 MB								
Aluminum (Al)-Total			<0.0030		mg/L		0.003	14-DEC-20
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	14-DEC-20
Arsenic (As)-Total			<0.00010		mg/L		0.0001	14-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	**Water**							
Batch R5315860								
WG3461088-1 MB								
Barium (Ba)-Total			<0.00010		mg/L		0.0001	14-DEC-20
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	14-DEC-20
Boron (B)-Total			<0.010		mg/L		0.01	14-DEC-20
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	14-DEC-20
Calcium (Ca)-Total			<0.050		mg/L		0.05	14-DEC-20
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	14-DEC-20
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	14-DEC-20
Copper (Cu)-Total			<0.00050		mg/L		0.0005	14-DEC-20
Iron (Fe)-Total			<0.010		mg/L		0.01	14-DEC-20
Lead (Pb)-Total			<0.000050		mg/L		0.00005	14-DEC-20
Lithium (Li)-Total			<0.0010		mg/L		0.001	14-DEC-20
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	14-DEC-20
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	14-DEC-20
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	14-DEC-20
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	14-DEC-20
Potassium (K)-Total			<0.050		mg/L		0.05	14-DEC-20
Selenium (Se)-Total			<0.000050		mg/L		0.00005	14-DEC-20
Silicon (Si)-Total			<0.10		mg/L		0.1	14-DEC-20
Silver (Ag)-Total			<0.000010		mg/L		0.00001	14-DEC-20
Sodium (Na)-Total			<0.050		mg/L		0.05	14-DEC-20
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	14-DEC-20
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	14-DEC-20
Tin (Sn)-Total			<0.00010		mg/L		0.0001	14-DEC-20
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	14-DEC-20
Uranium (U)-Total			<0.000010		mg/L		0.00001	14-DEC-20
Vanadium (V)-Total			<0.00050		mg/L		0.0005	14-DEC-20
Zinc (Zn)-Total			<0.0030		mg/L		0.003	14-DEC-20
NH3-L-F-CL	**Water**							
Batch R5319315								
WG3464283-11 DUP		**L2539625-8**						
Ammonia as N		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-DEC-20
WG3464283-10 LCS								
Ammonia as N			98.6		%		85-115	18-DEC-20
WG3464283-9 MB								
Ammonia as N			<0.0050		mg/L		0.005	18-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-L-F-CL	**Water**							
Batch R5319315								
WG3464283-12 MS		**L2539625-8**						
Ammonia as N			91.5		%		75-125	18-DEC-20
NO2-L-IC-N-CL	**Water**							
Batch R5313337								
WG3461016-6 LCS								
Nitrite (as N)			105.8		%		90-110	11-DEC-20
WG3461016-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	11-DEC-20
NO3-L-IC-N-CL	**Water**							
Batch R5313337								
WG3461016-6 LCS								
Nitrate (as N)			102.8		%		90-110	11-DEC-20
WG3461016-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	11-DEC-20
ORP-CL	**Water**							
Batch R5319506								
WG3464454-1 CRM		**CL-ORP**						
ORP			225		mV		210-230	18-DEC-20
WG3464454-3 CRM		**CL-ORP**						
ORP			224		mV		210-230	18-DEC-20
P-T-L-COL-CL	**Water**							
Batch R5317617								
WG3462296-22 LCS								
Phosphorus (P)-Total			99.6		%		80-120	15-DEC-20
WG3462296-21 MB								
Phosphorus (P)-Total			<0.0020		mg/L		0.002	15-DEC-20
PH-CL	**Water**							
Batch R5319497								
WG3464423-14 LCS								
pH			7.00		pH		6.9-7.1	17-DEC-20
PO4-DO-L-COL-CL	**Water**							
Batch R5312789								
WG3460863-14 LCS								
Orthophosphate-Dissolved (as P)			100.3		%		80-120	11-DEC-20
WG3460863-13 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PO4-DO-L-COL-CL	**Water**							
Batch R5312789								
WG3460863-13 MB								
Orthophosphate-Dissolved (as P)			<0.0010		mg/L		0.001	11-DEC-20
SO4-IC-N-CL	**Water**							
Batch R5313337								
WG3461016-6 LCS								
Sulfate (SO4)			104.1		%		90-110	11-DEC-20
WG3461016-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	11-DEC-20
SOLIDS-TDS-CL	**Water**							
Batch R5318634								
WG3462777-11 LCS								
Total Dissolved Solids			102.2		%		85-115	16-DEC-20
WG3462777-10 MB								
Total Dissolved Solids			<10		mg/L		10	16-DEC-20
Batch R5319384								
WG3463284-11 LCS								
Total Dissolved Solids			98.2		%		85-115	17-DEC-20
WG3463284-8 LCS								
Total Dissolved Solids			98.2		%		85-115	17-DEC-20
WG3463284-10 MB								
Total Dissolved Solids			<10		mg/L		10	17-DEC-20
WG3463284-7 MB								
Total Dissolved Solids			<10		mg/L		10	17-DEC-20
TKN-L-F-CL	**Water**							
Batch R5317701								
WG3462410-10 LCS								
Total Kjeldahl Nitrogen			101.8		%		75-125	15-DEC-20
WG3462410-2 LCS								
Total Kjeldahl Nitrogen			96.9		%		75-125	15-DEC-20
WG3462410-6 LCS								
Total Kjeldahl Nitrogen			97.5		%		75-125	15-DEC-20
WG3462410-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	15-DEC-20
WG3462410-5 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	15-DEC-20
WG3462410-9 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	15-DEC-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TSS-L-CL	**Water**							
Batch R5318568								
WG3462776-20 LCS								
Total Suspended Solids			90.9		%		85-115	16-DEC-20
WG3462776-19 MB								
Total Suspended Solids			<1.0		mg/L		1	16-DEC-20
Batch R5319152								
WG3463283-6 LCS								
Total Suspended Solids			90.1		%		85-115	17-DEC-20
WG3463283-8 LCS								
Total Suspended Solids			91.7		%		85-115	17-DEC-20
WG3463283-5 MB								
Total Suspended Solids			<1.0		mg/L		1	17-DEC-20
WG3463283-7 MB								
Total Suspended Solids			<1.0		mg/L		1	17-DEC-20
TURBIDITY-CL	**Water**							
Batch R5313536								
WG3461040-11 LCS								
Turbidity			95.9		%		85-115	12-DEC-20
WG3461040-8 LCS								
Turbidity			95.4		%		85-115	12-DEC-20
WG3461040-10 MB								
Turbidity			<0.10		NTU		0.1	12-DEC-20
WG3461040-7 MB								
Turbidity			<0.10		NTU		0.1	12-DEC-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Oxidation redution potential by elect.							
	1	09-DEC-20 09:00	18-DEC-20 11:50	0.25	219	hours	EHTR-FM
	2	09-DEC-20 10:40	18-DEC-20 11:50	0.25	217	hours	EHTR-FM
	3	09-DEC-20 13:10	18-DEC-20 11:50	0.25	215	hours	EHTR-FM
	4	09-DEC-20 11:30	18-DEC-20 12:30	0.25	217	hours	EHTR-FM
	5	09-DEC-20 15:00	18-DEC-20 12:30	0.25	214	hours	EHTR-FM
	6	10-DEC-20 11:56	18-DEC-20 12:30	0.25	192	hours	EHTR-FM
	7	10-DEC-20 11:56	18-DEC-20 12:30	0.25	192	hours	EHTR-FM
	8	10-DEC-20 11:56	18-DEC-20 12:30	0.25	192	hours	EHTR-FM
	9	10-DEC-20 10:35	18-DEC-20 12:30	0.25	194	hours	EHTR-FM
	10	10-DEC-20 11:20	18-DEC-20 12:30	0.25	193	hours	EHTR-FM
pH							
	1	09-DEC-20 09:00	17-DEC-20 19:00	0.25	202	hours	EHTR-FM
	2	09-DEC-20 10:40	17-DEC-20 19:00	0.25	200	hours	EHTR-FM
	3	09-DEC-20 13:10	17-DEC-20 19:00	0.25	198	hours	EHTR-FM
	4	09-DEC-20 11:30	17-DEC-20 19:00	0.25	199	hours	EHTR-FM
	5	09-DEC-20 15:00	17-DEC-20 19:00	0.25	196	hours	EHTR-FM
	6	10-DEC-20 11:56	17-DEC-20 19:00	0.25	175	hours	EHTR-FM
	7	10-DEC-20 11:56	17-DEC-20 19:00	0.25	175	hours	EHTR-FM
	8	10-DEC-20 11:56	17-DEC-20 19:00	0.25	175	hours	EHTR-FM
	9	10-DEC-20 10:35	17-DEC-20 19:00	0.25	176	hours	EHTR-FM
	10	10-DEC-20 11:20	17-DEC-20 19:00	0.25	176	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2539625 were received on 11-DEC-20 08:55.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP 20-09 | **TURNAROUND TIME:**

PROJECT/CLIENT INFO				LABORATORY			
Facility Name / Job#	FRO			Lab Name	ALS Calgary		
Project Manager	Cait Good			Lab Contact	Lyudmyla Shvets		
Email	cait.good@teck.com			Email	lyudmyla.shvets@alsglobal.com		
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L2539625-COFC

ANALYSIS REQUESTED — Please rank Priority (1-5) and indicate Lab (N) or Field (F) for analysis

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	PRESERVATIVE	F/L	N	F	N	N	F	N	F				
											H2SO4	H2SO4		HCL	HNO3	HNO3				
								ANALYSIS		TECKCOAL-ROUTINE-VA	ALS_Package-DOC	ALS_Package-TKN/TOC	HG-T-U-CVAF-VA	HG-D-CVAF-VA	TECKCOAL-MET-T-VA	TECKCOAL-MET-D-VA				
RG_MP1_WS_LAEMP_FRO_2020-12_09_0900	RG_MP1	WS	No	12/9/2020	9:00	G	7			X	X	X	X	X	X	X				
RG_FOUSH_WS_LAEMP_FRO_2020-12_09_1140	RG_FOUSH	WS	No	12/9/2020	10:40	G	7			X	X	X	X	X	X	X				
RG_FOUKI_WS_LAEMP_FRO_2020-12_09_1300	RG_FOUKI	WS	No	12/9/2020	13:10	G	7			X	X	X	X	X	X	X				
RG_FODPO_WS_LAEMP_FRO_2020-12_09_1130	RG_FODPO	WS	No	12/9/2020	11:30	G	7			X	X	X	X	X	X	X				
RG_FO22_WS_LAEMP_FRO_2020-12_09_1500	RG_FO22	WS	No	12/9/2020	15:00	G	7			X	X	X	X	X	X	X				
RG_TRIP_WS_2020-12-10_1156	RG_TRIP	WS	No	12/10/2020	11:56	G	4			X		X	X		X					
RG_RIVER_WS_2020-12-10_1156	RG_RIVER	WS	No	12/10/2020	11:56	G	7			X	X	X	X	X	X	X				
RG_FBLANK_WS_2020-12-10_1156	RG_FBLANK	WS	No	12/10/2020	11:56	G	7			X	X	X	X	X	X	X				
RG_FRUPO_WS_LAEMP_FRO_2020-12_10-1035	FRUPO	WS	No	12/10/2020	10:35	G	7			X	X	X	X	X	X	X				
RG_FOUEW_WS_LAEMP_FRO_2020-12_10_1120	RG_FOUEW	WS	No	12/10/2020	11:20	G	7			X	X	X	X	X	X	X				

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
PO 689999			12/11/85

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Peter Schnurr	Mobile #	647-967-9403		
Sampler's Signature	PS	Date/Time	December 10 2020		

SELENIUM IN WATER

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

December 15, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@teck.com

Re: REP

Dear Cait Good,

On December 3, 2020, Brooks Applied Labs (BAL) received eight (8) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se, and Se speciation analyses, according to the chain-of-custody (COC) form. The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL; sample fractions for total recoverable and dissolved Se had also been preserved by the client prior to receipt. All samples were stored according to BAL SOPs.

The IDs of the last six samples listed on the COC form were updated per client request. The ending terms of the speciation IDs were changed from "*NP_NAL*" to "*NP*". Furthermore, the ending terms of the total recoverable and dissolved Se IDs were changed from "*NP*" to "*NP_NAL*".

Total Recoverable and Dissolved Se
Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

The Se result of a continuing calibration blank (CCB) was greater than the method reporting limit (MRL). However, all sample results bracketed by the CCB outlier were either greater than ten times the value of the elevated blank or were not detected (ND) at the instrument. Therefore, the CCB outlier should have no impact on data quality. No corrective actions were deemed necessary and no data were qualified.

Se Speciation
Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, Se speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], methaneselenonic acid [*MeSe(VI)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This was identified on the report as [*Unk Se Sp*].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

Chromatographic interference, as indicated by a significantly co-eluting peak, was observed for $SeSO_3$ and/or SeCN in samples 2012136-01, -04, -07, and -10. Due to potential bias in the obtained results, the affected data have been qualified as estimated (**J-1**). Upon client request, BAL can apply a higher dilution to these samples to potentially mitigate the chromatographic interference, but a higher dilution would elevate the detection limit for SeMet above the client's requested limit of 0.010µg/L.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs, and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific method detection limits (MDLs), MRLs, and other details.

In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the RPD of the MS/MSD set was not calculated (N/C).

All data were reported without further qualification, aside from concentration qualifiers, and all associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Collette Machado
Project Manager
Brooks Applied Labs
Collette@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 27, 2020; Valid to: June 30, 2021
Certificate Number: E87982-35

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: November 20, 2020; Valid to: March 20, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
BAL-5000	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100 (waters)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic, As(III) (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP	2012136-01	WS	Sample	11/23/2020	12/03/2020
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-02	WS	Sample	11/23/2020	12/03/2020
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-03	WS	Sample	11/23/2020	12/03/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP	2012136-04	WS	Sample	11/23/2020	12/03/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-05	WS	Sample	11/23/2020	12/03/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-06	WS	Sample	11/23/2020	12/03/2020
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP	2012136-07	WS	Sample	11/23/2020	12/03/2020
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-08	WS	Sample	11/23/2020	12/03/2020
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-09	WS	Sample	11/23/2020	12/03/2020
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP	2012136-10	WS	Sample	11/23/2020	12/03/2020
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-11	WS	Sample	11/23/2020	12/03/2020
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL	2012136-12	WS	Sample	11/23/2020	12/03/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
MeSe(IV)	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
Se	Water	EPA 1638 Mod	12/04/2020	12/08/2020	B204012	S202008
MeSe(VI)	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
Se(IV)	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
Se(VI)	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
SeCN	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
SeMet	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
SeSO3	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003
Unk Se Sp	Water	SOP BAL-4201	12/04/2020	12/05/2020	B204006	S202003

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP										
2012136-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-01	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-01	Se(IV)	WS	D	0.358		0.010	0.075	µg/L	B204006	S202003
2012136-01	Se(VI)	WS	D	45.1		0.010	0.055	µg/L	B204006	S202003
2012136-01	SeCN	WS	D	≤ 0.010	U J-1	0.010	0.050	µg/L	B204006	S202003
2012136-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-01	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204006	S202003
2012136-01	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204006	S202003
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-02	Se	WS	TR	46.5		0.132	0.528	µg/L	B204012	S202008
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-03	Se	WS	D	48.0		0.132	0.528	µg/L	B204012	S202008
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP										
2012136-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-04	MeSe(IV)	WS	D	0.015	J	0.010	0.025	µg/L	B204006	S202003
2012136-04	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-04	Se(IV)	WS	D	0.429		0.010	0.075	µg/L	B204006	S202003
2012136-04	Se(VI)	WS	D	95.8		0.010	0.055	µg/L	B204006	S202003
2012136-04	SeCN	WS	D	≤ 0.010	U J-1	0.010	0.050	µg/L	B204006	S202003
2012136-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-04	SeSO3	WS	D	≤ 0.010	U J-1	0.010	0.055	µg/L	B204006	S202003
2012136-04	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204006	S202003
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-05	Se	WS	TR	98.6		0.132	0.528	µg/L	B204012	S202008
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-06	Se	WS	D	96.9		0.132	0.528	µg/L	B204012	S202008

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP										
2012136-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-07	MeSe(IV)	WS	D	0.015	J	0.010	0.025	µg/L	B204006	S202003
2012136-07	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-07	Se(IV)	WS	D	0.437		0.010	0.075	µg/L	B204006	S202003
2012136-07	Se(VI)	WS	D	103		0.010	0.055	µg/L	B204006	S202003
2012136-07	SeCN	WS	D	≤ 0.010	J-1 U	0.010	0.050	µg/L	B204006	S202003
2012136-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-07	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204006	S202003
2012136-07	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204006	S202003
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-08	Se	WS	TR	105		0.132	0.528	µg/L	B204012	S202008
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-09	Se	WS	D	107		0.132	0.528	µg/L	B204012	S202008
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP										
2012136-10	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-10	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-10	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-10	Se(IV)	WS	D	0.413		0.010	0.075	µg/L	B204006	S202003
2012136-10	Se(VI)	WS	D	97.1		0.010	0.055	µg/L	B204006	S202003
2012136-10	SeCN	WS	D	≤ 0.010	J-1 U	0.010	0.050	µg/L	B204006	S202003
2012136-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204006	S202003
2012136-10	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204006	S202003
2012136-10	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204006	S202003
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-11	Se	WS	TR	100		0.132	0.528	µg/L	B204012	S202008
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL										
2012136-12	Se	WS	D	101		0.132	0.528	µg/L	B204012	S202008

Accuracy & Precision Summary

Batch: B204006
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204006-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.395	µg/L	106% 75-125	
	Se(IV)		5.000	4.654	µg/L	93% 75-125	
	Se(VI)		5.000	4.607	µg/L	92% 75-125	
	SeCN		5.015	4.391	µg/L	88% 75-125	
	SeMet		4.932	4.707	µg/L	95% 75-125	
B204006-DUP7	**Duplicate, (2012134-03)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	8.241		8.277	µg/L		0.4% 25
	Se(VI)	24.43		24.29	µg/L		0.6% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B204006-MS7	**Matrix Spike, (2012134-03)**						
	Se(IV)	8.241	4.900	12.71	µg/L	91% 75-125	
	Se(VI)	24.43	5.100	29.26	µg/L	NR 75-125	
	SeCN	ND	4.905	4.832	µg/L	99% 75-125	
	SeMet	ND	1.977	1.976	µg/L	100% 75-125	
B204006-MSD7	**Matrix Spike Duplicate, (2012134-03)**						
	Se(IV)	8.241	4.900	12.82	µg/L	94% 75-125	0.9% 25
	Se(VI)	24.43	5.100	29.46	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.928	µg/L	100% 75-125	2% 25
	SeMet	ND	1.977	1.994	µg/L	101% 75-125	0.9% 25

Accuracy & Precision Summary

Batch: B204012
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204012-BS1	**Blank Spike, (2035012)**						
	Se		200.0	202.0	µg/L	101% 75-125	
B204012-BS2	**Blank Spike, (2035012)**						
	Se		200.0	203.8	µg/L	102% 75-125	
B204012-BS3	**Blank Spike, (2035012)**						
	Se		200.0	199.1	µg/L	100% 75-125	
B204012-BS4	**Blank Spike, (2035012)**						
	Se		200.0	200.8	µg/L	100% 75-125	
B204012-BS5	**Blank Spike, (2035012)**						
	Se		200.0	204.8	µg/L	102% 75-125	
B204012-SRM1	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	13.99	µg/L	98% 75-125	
B204012-SRM2	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	13.40	µg/L	94% 75-125	
B204012-SRM3	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.10	µg/L	99% 75-125	
B204012-SRM4	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	13.69	µg/L	96% 75-125	
B204012-SRM5	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	13.73	µg/L	96% 75-125	
B204012-DUPA	**Duplicate, (2012136-05)**						
	Se	98.59		97.77	µg/L		0.8% 20

Accuracy & Precision Summary

Batch: B204012
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204012-MSA	**Matrix Spike, (2012136-05)**						
	Se	98.59	220.0	326.9	µg/L	104% 75-125	
B204012-MSDA	**Matrix Spike Duplicate, (2012136-05)**						
	Se	98.59	220.0	334.8	µg/L	107% 75-125	2% 20

Method Blanks & Reporting Limits

Batch: B204006
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B204006-BLK1	0.0006	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B204006-BLK1	0.00	µg/L
B204006-BLK2	0.00	µg/L
B204006-BLK3	0.00	µg/L
B204006-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B204012
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B204012-BLK1	0.074	µg/L
B204012-BLK2	0.019	µg/L
B204012-BLK3	0.070	µg/L
B204012-BLK4	0.037	µg/L
B204012-BLK5	0.051	µg/L

Average: 0.050
Limit: 0.480

MDL: 0.120
MRL: 0.480

Sample Containers

Lab ID: 2012136-01
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-11_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136

Lab ID: 2012136-02
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Lab ID: 2012136-03
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Lab ID: 2012136-04
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136

Sample Containers

Lab ID: 2012136-05
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Lab ID: 2012136-06
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Lab ID: 2012136-07
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-11_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136

Lab ID: 2012136-08
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Sample Containers

Lab ID: 2012136-09
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Lab ID: 2012136-10
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-11_NP
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136
C	XTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #3 - 2012136

Lab ID: 2012136-11
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Lab ID: 2012136-12
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 11/23/2020
Received: 12/03/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #2 - 2012136

Shipping Containers

Styrofoam Cooler #2 - 2012136

Received: December 3, 2020 7:00
Tracking No: 82274 via Courier
Coolant Type: Blue Ice
Temperature: 0.8 °C

Description: Styrofoam Cooler #2
Damaged in transit? No
Returned to client? No
Comments: IR #21

Custody seals present? No
Custody seals intact? No
COC present? Yes

Styrofoam Cooler #3 - 2012136

Received: December 3, 2020 7:00
Tracking No: 82274 via Courier
Coolant Type: Blue Ice
Temperature: 0.8 °C

Description: Styrofoam Cooler #3
Damaged in transit? No
Returned to client? No
Comments: IR #21

Custody seals present? No
Custody seals intact? No
COC present? No

Teck Confidential

COC ID: Se Speciation Nov

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	REP			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Cait Good			Lab Contact	Ben Wozniak			Email 1:	cait.good@teck.com	X	X	X
Email	cait.good@teck.com			Email	ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:		X	X	X
								Email 4:	JIngs@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:	carlie.meyer@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA	Email 5:	PSchnurr@minnow.ca	X	X	X
Phone Number	250.425.8257			Phone Number	206-632-6206			PO number	PO 690100			

SAMPLE DETAILS / **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS: Total Selenium	Dissolved Selenium	Selenium Speciation	
								FIL.	F	F	
								PRESERV.	HNO3	HNO3	
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP	FR_FR2	WS	No	23-Nov-20	10:26	G	1			1	
RG_FOBKS_WS_LAEMP_FRO_2020-11_NP_NAL	FR_FR2	WS	No		10:30	G	2	1	1		
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP_NAL	FR_SCCAT	WS	No		12:45	G	1			1	
RG_SCOUTDS_WS_LAEMP_FRO_2020-11_NP	FR_SCCAT	WS	No		12:45	G	2	1	1		
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP_NAL	FR_KC1	WS	No		14:15	G	1			1	
RG_FOBSC_WS_LAEMP_FRO_2020-11_NP	FR_KC1	WS	No		14:15	G	2	1	1		
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP_NAL	FR_FRCP1	WS	No		16:00	G	1			1	
RG_FOBCP_WS_LAEMP_FRO_2020-11_NP	FR_FRCP1	WS	No		16:00	G	2	1	1		

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Samples for total selenium have been preserved in the field. Dissolve selenium have been filtered and preserved. Speciation samples have been filtered and frozen.			[illegible]	[illegible]

SERVICE REQUEST (rush - subject to availability)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Nicole Zottey	**Mobile #**	647 454-1818
Sampler's Signature	[signature]	**Date/Time**	26-Nov-20 11:00

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 82274

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

DATE

INVOICE TO

PURCHASE ORDER NUMBER

BILL OF LADING #

CONSIGNEE TO

SHIPPER (FROM)

STREET

STREET

CITY/PROVINCE

POSTAL CODE

CITY/PROVINCE

POSTAL CODE

SPECIAL INSTRUCTIONS

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
If not indicated, shipping will automatically move collect.

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IS A OWNER'S RISK WRITE ORD HERE

UNIT #

DECLARED VALUATION - Maximum liability on same is $2.00 per lb. ($4.40 per kilogram) unless declared valuation states otherwise $

DRIVER'S SIGNATURE PICK UP TIME

DRIVER'S SIGNATURE DELIVERY BY FINISH TIME

CONSIGNEE PRINT

CONSIGNEE SIGN

DATE

TIME

NUMBER OF PIECES RECEIVED

GOLDEN CARD Shipper

GST 864540398RT0001

Cooler ID: Cooler #2 COC (Y/N) Temperature: 0.8 IR: 24

Cooling Method: Ice Blue Ice Ambient

Sampling Locations: CC EQ CWD RIG

Sample Times:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
	VLS			1120		VLS	60			
Containers Types:										

Opened By: DSK Date: 12/3/20

EQ CCI - 125ml Amber

Effective 7/25, 20 Revision 004

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 82274

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

DATE

INVOICE TO

PURCHASE ORDER NUMBER

BILL OF LADING #

SHIPPER (FROM)

CONSIGNEE (TO)

STREET

STREET

CITY PROVINCE

POSTAL CODE

CITY PROVINCE

POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)

FREIGHT CHARGES
SHIPPER TO CHECK
☐ PREPAID ☐ COLLECT
(If not indicated shipping will automatically move collect)

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
SHIPPER'S RISK VALUE AS PER
DATE
TIME

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per pound unless shipper declares a higher value and pays additional charges if applicable

$

DRIVER'S SIGNATURE PICKED UP BY PICK UP TIME

DRIVER'S SIGNATURE DELIVERED BY FINISH TIME

SIGNED

CONSIGNEE

GST # 864540393RT0001

NUMBER OF PIECES RECEIVED

Cooler: Styrocooler #3 COC (Y/N) Temperature: 0.8 IR: 21

Coolant: Ice Blue Ice Ambient

Sampling Locations:	WC		LC		E4		WC mid MPR		RSP	
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Containers:	40	125		125		125	60			60

DBK DBK

Preserved: DBK Date: 11/30/10

E4 CC WC mid MPR SP
min. RBR 11/01 done TH

Effective [illegible] 20

Revision 004

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

January 4, 2021

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@teck.com

Re: REP

Dear Cait Good,

On December 17, 2020, Brooks Applied Labs (BAL) received fifteen (15) aqueous samples.

The container label for sample 2012244-36 (selenium speciation fraction) listed a field ID of *RG_River_WS _2020-12_NAL*, while the corresponding cell on the COC forms indicates a sample ID of *RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL*. Sample 2012244-36 was logged in and reported under the sample ID listed on the COC form (*RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL)*. It should be noted that the corresponding total recoverable Se fraction (laboratory ID 2012244-34) also arrived with a container label listing *RG_River_WS _2020-12_NAL* as the field ID, but this sample ID was crossed out and corrected by the field samplers to reflect *RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL* as the sample ID.

The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) form. The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL; sample fractions for total recoverable and dissolved Se had also been preserved by the client prior to receipt. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se
Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Se Speciation
Each aqueous sample was analyzed for Se speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, Se speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], methaneselenonic acid [*MeSe(VI)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. Unknown Se species was defined as the total concentration of all unknown Se species observed during the analysis. This item is identified on the report as [*Unk Se Sp*].

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional Se species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting Se species.

Chromatographic interference, as indicated by an elevated baseline or co-eluting peak, was observed for selenosulfate in several client samples. Due to potential bias in the obtained results, the affected data have been qualified as estimated (**J-1**). Upon client request, Brooks Applied Labs can apply a higher dilution to these samples to potentially mitigate the chromatographic interferences, but a higher dilution would elevate the detection limits for selenomethionine [SeMet] above the client's requested limit of 0.010µg/L.

Poor mass balance was observed in samples (2012244-06, 2012244-12, 2012244-15, 2012244-18, 2012244-21, 2012244-27, 2012244-33, and 2012244-42) when Se speciation results were compared to corresponding dissolved Se results. Re-analyses confirmed the results. Container labels were checked and there was no indication of samples miss-labeled. Consequently, no additional corrective actions are necessary. The reported results are deemed representative of the submitted containers.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific method detection limits (MDLs), MRLs, and other details.

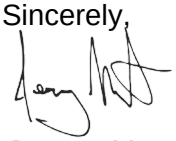
In instances when a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries, and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (**NR**) and the RPD of the MS/MSD set was not calculated (**N/C**).

Except for items noted above, and aside from concentration qualifiers, all data were reported without qualification. All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited met all NELAP requirements. For more information, please see the Report Information page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,



Jeremy Maute
Senior Project Manager
Brooks Applied Labs
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations/certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 27, 2020; Valid to: June 30, 2021
Certificate Number: E87982-35

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: November 20, 2020; Valid to: March 20, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
BAL-5000	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn Hg (Biological Only)	Not Accredited
EPA 1640 Mod	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn Cr, Co, Se, Tl, V (ISO Only)	Not Accredited
EPA 1631E Mod BAL-3100 (waters)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters	Inorganic Arsenic, As(III) (ISO Only)	Not Accredited
	Biological/Food Solids/Chemicals	Inorganic Arsenic (ISO Only)	Not Accredited
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs (ISO Only)	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II) (ISO Only)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2

(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1

(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL	2012244-01	WS	Sample	12/08/2020	12/17/2020
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL	2012244-02	WS	Sample	12/08/2020	12/17/2020
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL	2012244-03	WS	Sample	12/08/2020	12/17/2020
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL	2012244-04	WS	Sample	12/08/2020	12/17/2020
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL	2012244-05	WS	Sample	12/08/2020	12/17/2020
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL	2012244-06	WS	Sample	12/08/2020	12/17/2020
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL	2012244-07	WS	Sample	12/08/2020	12/17/2020
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL	2012244-08	WS	Sample	12/08/2020	12/17/2020
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL	2012244-09	WS	Sample	12/08/2020	12/17/2020
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL	2012244-10	WS	Sample	12/10/2020	12/17/2020
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL	2012244-11	WS	Sample	12/10/2020	12/17/2020
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL	2012244-12	WS	Sample	12/10/2020	12/17/2020
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL	2012244-13	WS	Sample	12/09/2020	12/17/2020
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL	2012244-14	WS	Sample	12/09/2020	12/17/2020
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL	2012244-15	WS	Sample	12/09/2020	12/17/2020
RG_FO22_WS_LAEMP_FRO_2020-12_NAL	2012244-16	WS	Sample	12/09/2020	12/17/2020
RG_FO22_WS_LAEMP_FRO_2020-12_NAL	2012244-17	WS	Sample	12/09/2020	12/17/2020
RG_FO22_WS_LAEMP_FRO_2020-12_NAL	2012244-18	WS	Sample	12/09/2020	12/17/2020
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL	2012244-19	WS	Sample	12/08/2020	12/17/2020
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL	2012244-20	WS	Sample	12/08/2020	12/17/2020
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL	2012244-21	WS	Sample	12/08/2020	12/17/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_MP1_WS_LAEMP_FRO_2020-12_NAL	2012244-22	WS	Sample	12/09/2020	12/17/2020
RG_MP1_WS_LAEMP_FRO_2020-12_NAL	2012244-23	WS	Sample	12/09/2020	12/17/2020
RG_MP1_WS_LAEMP_FRO_2020-12_NAL	2012244-24	WS	Sample	12/09/2020	12/17/2020
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL	2012244-25	WS	Sample	12/09/2020	12/17/2020
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL	2012244-26	WS	Sample	12/09/2020	12/17/2020
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL	2012244-27	WS	Sample	12/09/2020	12/17/2020
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL	2012244-28	WS	Sample	12/09/2020	12/17/2020
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL	2012244-29	WS	Sample	12/09/2020	12/17/2020
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL	2012244-30	WS	Sample	12/09/2020	12/17/2020
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL	2012244-31	WS	Sample	12/07/2020	12/17/2020
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL	2012244-32	WS	Sample	12/07/2020	12/17/2020
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL	2012244-33	WS	Sample	12/07/2020	12/17/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL	2012244-34	WS	Sample	12/07/2020	12/17/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL	2012244-35	WS	Sample	12/07/2020	12/17/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL	2012244-36	WS	Sample	12/07/2020	12/17/2020
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL	2012244-37	WS	Sample	12/07/2020	12/17/2020
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL	2012244-38	WS	Sample	12/07/2020	12/17/2020
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL	2012244-39	WS	Sample	12/07/2020	12/17/2020
RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL	2012244-40	WS	Sample	12/07/2020	12/17/2020
RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL	2012244-41	WS	Sample	12/07/2020	12/17/2020
RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL	2012244-42	WS	Sample	12/07/2020	12/17/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL	2012244-43	WS	Sample	12/10/2020	12/17/2020
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL	2012244-44	WS	Sample	12/10/2020	12/17/2020
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL	2012244-45	WS	Sample	12/10/2020	12/17/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
MeSe(IV)	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
MeSe(VI)	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
Se	Water	EPA 1638 Mod	12/17/2020	12/18/2020	B204093	S202042
Se(IV)	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
Se(VI)	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
SeCN	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
SeMet	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
SeSO3	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034
Unk Se Sp	Water	SOP BAL-4201	12/17/2020	12/17/2020	B204083	S202034

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL										
2012244-01	Se	WS	TR	0.803		0.121	0.528	µg/L	B204093	S202042
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL										
2012244-02	Se	WS	D	0.812		0.121	0.528	µg/L	B204093	S202042
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL										
2012244-03	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-03	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-03	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-03	Se(IV)	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
2012244-03	Se(VI)	WS	D	0.414		0.010	0.055	µg/L	B204083	S202034
2012244-03	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-03	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-03	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-03	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL										
2012244-04	Se	WS	TR	35.0		0.121	0.528	µg/L	B204093	S202042
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL										
2012244-05	Se	WS	D	33.5		0.121	0.528	µg/L	B204093	S202042
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL										
2012244-06	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-06	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-06	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-06	Se(IV)	WS	D	0.067	J	0.010	0.075	µg/L	B204083	S202034
2012244-06	Se(VI)	WS	D	24.6		0.010	0.055	µg/L	B204083	S202034
2012244-06	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-06	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-06	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-06	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL										
2012244-07	Se	WS	TR	57.8		0.121	0.528	µg/L	B204093	S202042
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL										
2012244-08	Se	WS	D	55.5		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL										
2012244-09	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-09	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-09	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-09	Se(IV)	WS	D	0.080		0.010	0.075	µg/L	B204083	S202034
2012244-09	Se(VI)	WS	D	49.6		0.010	0.055	µg/L	B204083	S202034
2012244-09	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-09	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-09	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204083	S202034
2012244-09	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL										
2012244-10	Se	WS	TR	112		0.121	0.528	µg/L	B204093	S202042
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL										
2012244-11	Se	WS	D	113		0.121	0.528	µg/L	B204093	S202042
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL										
2012244-12	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-12	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-12	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-12	Se(IV)	WS	D	0.073	J	0.010	0.075	µg/L	B204083	S202034
2012244-12	Se(VI)	WS	D	56.1		0.010	0.055	µg/L	B204083	S202034
2012244-12	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-12	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-12	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-12	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL										
2012244-13	Se	WS	TR	93.1		0.121	0.528	µg/L	B204093	S202042
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL										
2012244-14	Se	WS	D	90.2		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL										
2012244-15	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-15	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-15	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-15	Se(IV)	WS	D	0.030	J	0.010	0.075	µg/L	B204083	S202034
2012244-15	Se(VI)	WS	D	44.6		0.010	0.055	µg/L	B204083	S202034
2012244-15	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-15	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-15	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-15	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FO22_WS_LAEMP_FRO_2020-12_NAL										
2012244-16	Se	WS	TR	90.5		0.121	0.528	µg/L	B204093	S202042
RG_FO22_WS_LAEMP_FRO_2020-12_NAL										
2012244-17	Se	WS	D	94.2		0.121	0.528	µg/L	B204093	S202042
RG_FO22_WS_LAEMP_FRO_2020-12_NAL										
2012244-18	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-18	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-18	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-18	Se(IV)	WS	D	0.088		0.010	0.075	µg/L	B204083	S202034
2012244-18	Se(VI)	WS	D	70.5		0.010	0.055	µg/L	B204083	S202034
2012244-18	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-18	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-18	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204083	S202034
2012244-18	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL										
2012244-19	Se	WS	TR	66.5		0.121	0.528	µg/L	B204093	S202042
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL										
2012244-20	Se	WS	D	67.1		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL										
2012244-21	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-21	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-21	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-21	Se(IV)	WS	D	0.109		0.010	0.075	µg/L	B204083	S202034
2012244-21	Se(VI)	WS	D	40.2		0.010	0.055	µg/L	B204083	S202034
2012244-21	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-21	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-21	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-21	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_MP1_WS_LAEMP_FRO_2020-12_NAL										
2012244-22	Se	WS	TR	68.0		0.121	0.528	µg/L	B204093	S202042
RG_MP1_WS_LAEMP_FRO_2020-12_NAL										
2012244-23	Se	WS	D	69.3		0.121	0.528	µg/L	B204093	S202042
RG_MP1_WS_LAEMP_FRO_2020-12_NAL										
2012244-24	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-24	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-24	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-24	Se(IV)	WS	D	0.143		0.010	0.075	µg/L	B204083	S202034
2012244-24	Se(VI)	WS	D	54.8		0.010	0.055	µg/L	B204083	S202034
2012244-24	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-24	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-24	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-24	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL										
2012244-25	Se	WS	TR	62.1		0.121	0.528	µg/L	B204093	S202042
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL										
2012244-26	Se	WS	D	61.9		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL										
2012244-27	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-27	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-27	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-27	Se(IV)	WS	D	0.189		0.010	0.075	µg/L	B204083	S202034
2012244-27	Se(VI)	WS	D	40.3		0.010	0.055	µg/L	B204083	S202034
2012244-27	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-27	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-27	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-27	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL										
2012244-28	Se	WS	TR	56.4		0.121	0.528	µg/L	B204093	S202042
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL										
2012244-29	Se	WS	D	56.9		0.121	0.528	µg/L	B204093	S202042
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL										
2012244-30	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-30	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-30	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-30	Se(IV)	WS	D	0.187		0.010	0.075	µg/L	B204083	S202034
2012244-30	Se(VI)	WS	D	45.2		0.010	0.055	µg/L	B204083	S202034
2012244-30	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-30	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-30	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL										
2012244-31	Se	WS	TR	63.6		0.121	0.528	µg/L	B204093	S202042
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL										
2012244-32	Se	WS	D	63.0		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL										
2012244-33	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-33	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-33	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-33	Se(IV)	WS	D	0.222		0.010	0.075	µg/L	B204083	S202034
2012244-33	Se(VI)	WS	D	47.4		0.010	0.055	µg/L	B204083	S202034
2012244-33	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-33	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-33	SeSO3	WS	D	≤ 0.010	U	0.010	0.055	µg/L	B204083	S202034
2012244-33	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL										
2012244-34	Se	WS	TR	118		0.121	0.528	µg/L	B204093	S202042
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL										
2012244-35	Se	WS	D	119		0.121	0.528	µg/L	B204093	S202042
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL										
2012244-36	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-36	MeSe(IV)	WS	D	0.013	J	0.010	0.025	µg/L	B204083	S202034
2012244-36	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-36	Se(IV)	WS	D	0.312		0.010	0.075	µg/L	B204083	S202034
2012244-36	Se(VI)	WS	D	95.8		0.010	0.055	µg/L	B204083	S202034
2012244-36	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-36	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-36	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204083	S202034
2012244-36	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL										
2012244-37	Se	WS	TR	120		0.121	0.528	µg/L	B204093	S202042
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL										
2012244-38	Se	WS	D	115		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL										
2012244-39	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-39	MeSe(IV)	WS	D	0.016	J	0.010	0.025	µg/L	B204083	S202034
2012244-39	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-39	Se(IV)	WS	D	0.340		0.010	0.075	µg/L	B204083	S202034
2012244-39	Se(VI)	WS	D	111		0.010	0.055	µg/L	B204083	S202034
2012244-39	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-39	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-39	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204083	S202034
2012244-39	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL										
2012244-40	Se	WS	TR	139		0.121	0.528	µg/L	B204093	S202042
RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL										
2012244-41	Se	WS	D	124		0.121	0.528	µg/L	B204093	S202042
RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL										
2012244-42	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-42	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-42	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-42	Se(IV)	WS	D	0.244		0.010	0.075	µg/L	B204083	S202034
2012244-42	Se(VI)	WS	D	70.8		0.010	0.055	µg/L	B204083	S202034
2012244-42	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-42	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-42	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204083	S202034
2012244-42	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL										
2012244-43	Se	WS	TR	93.2		0.121	0.528	µg/L	B204093	S202042
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL										
2012244-44	Se	WS	D	91.0		0.121	0.528	µg/L	B204093	S202042

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL										
2012244-45	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-45	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-45	MeSe(VI)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-45	Se(IV)	WS	D	0.151		0.010	0.075	µg/L	B204083	S202034
2012244-45	Se(VI)	WS	D	78.5		0.010	0.055	µg/L	B204083	S202034
2012244-45	SeCN	WS	D	≤ 0.010	U	0.010	0.050	µg/L	B204083	S202034
2012244-45	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B204083	S202034
2012244-45	SeSO3	WS	D	≤ 0.010	J-1 U	0.010	0.055	µg/L	B204083	S202034
2012244-45	Unk Se Sp	WS	D	≤ 0.010	U	0.010	0.075	µg/L	B204083	S202034

Accuracy & Precision Summary

Batch: B204083
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204083-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.584	µg/L	110% 75-125	
	Se(IV)		5.000	4.911	µg/L	98% 75-125	
	Se(VI)		5.000	4.815	µg/L	96% 75-125	
	SeCN		5.015	4.762	µg/L	95% 75-125	
	SeMet		4.932	5.063	µg/L	103% 75-125	
B204083-DUP4	**Duplicate, (2012244-45)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	MeSe(VI)	ND		ND	µg/L		N/C 25
	Se(IV)	0.151		0.152	µg/L		0.5% 25
	Se(VI)	78.51		80.25	µg/L		2% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B204083-MS4	**Matrix Spike, (2012244-45)**						
	Se(IV)	0.151	4.900	4.949	µg/L	98% 75-125	
	Se(VI)	78.51	5.100	84.60	µg/L	NR 75-125	
	SeCN	ND	4.905	4.646	µg/L	95% 75-125	
	SeMet	ND	1.977	2.084	µg/L	105% 75-125	
B204083-MSD4	**Matrix Spike Duplicate, (2012244-45)**						
	Se(IV)	0.151	4.900	4.866	µg/L	96% 75-125	2% 25
	Se(VI)	78.51	5.100	83.93	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.645	µg/L	95% 75-125	0.02% 25
	SeMet	ND	1.977	2.056	µg/L	104% 75-125	1% 25

Accuracy & Precision Summary

Batch: B204093
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204093-BS1	**Blank Spike, (2035013)**						
	Se		200.0	197.2	µg/L	99% 75-125	
B204093-BS2	**Blank Spike, (2035013)**						
	Se		200.0	220.3	µg/L	110% 75-125	
B204093-BS3	**Blank Spike, (2035013)**						
	Se		200.0	218.0	µg/L	109% 75-125	
B204093-SRM1	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	14.77	µg/L	103% 75-125	
B204093-SRM2	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	15.99	µg/L	112% 75-125	
B204093-SRM3	**Reference Material (2041015, TMDA 51.5 Reference Standard - Bottle 2 - SRM)**						
	Se		14.30	13.82	µg/L	97% 75-125	
B204093-DUP2	**Duplicate, (2012244-13)**						
	Se	93.08		94.96	µg/L		2% 20
B204093-MS2	**Matrix Spike, (2012244-13)**						
	Se	93.08	220.0	332.1	µg/L	109% 75-125	
B204093-MSD2	**Matrix Spike Duplicate, (2012244-13)**						
	Se	93.08	220.0	329.2	µg/L	107% 75-125	0.9% 20
B204093-DUP3	**Duplicate, (2012244-22)**						
	Se	67.99		68.27	µg/L		0.4% 20
B204093-MS3	**Matrix Spike, (2012244-22)**						
	Se	67.99	220.0	287.3	µg/L	100% 75-125	

Accuracy & Precision Summary

Batch: B204093
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B204093-MSD3	**Matrix Spike Duplicate, (2012244-22)**						
	Se	67.99	220.0	303.4	µg/L	107% 75-125	5% 20
B204093-DUP4	**Duplicate, (2012244-28)**						
	Se	56.39		57.70	µg/L		2% 20
B204093-MS4	**Matrix Spike, (2012244-28)**						
	Se	56.39	220.0	287.1	µg/L	105% 75-125	
B204093-MSD4	**Matrix Spike Duplicate, (2012244-28)**						
	Se	56.39	220.0	308.0	µg/L	114% 75-125	7% 20
B204093-DUP5	**Duplicate, (2012244-37)**						
	Se	120.2		116.5	µg/L		3% 20
B204093-MS5	**Matrix Spike, (2012244-37)**						
	Se	120.2	220.0	348.9	µg/L	104% 75-125	
B204093-MSD5	**Matrix Spike Duplicate, (2012244-37)**						
	Se	120.2	220.0	349.3	µg/L	104% 75-125	0.1% 20

Method Blanks & Reporting Limits

Batch: B204083
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(VI)

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.001	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Analyte: Se(VI)

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.004	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.001
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: SeCN

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.010

MDL: 0.002
MRL: 0.010

Analyte: SeMet

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.011

MDL: 0.002
MRL: 0.011

Analyte: Unk Se Sp

Sample	Result	Units
B204083-BLK1	0.00	µg/L
B204083-BLK2	0.00	µg/L
B204083-BLK3	0.00	µg/L
B204083-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.015

MDL: 0.002
MRL: 0.015

Method Blanks & Reporting Limits

Batch: B204093
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B204093-BLK1	0.093	µg/L
B204093-BLK2	0.077	µg/L
B204093-BLK3	0.083	µg/L
B204093-BLK4	0.072	µg/L

Average: 0.081
Limit: 0.480

MDL: 0.110
MRL: 0.480

Sample Containers

Lab ID: 2012244-01
Sample: RG_UFR1_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-02
Sample: RG_UFR1_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-03
Sample: RG_UFR1_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-04
Sample: RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-05
Sample: RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-06
Sample: RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-07
Sample: RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-08
Sample: RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-09
Sample: RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-10
Sample: RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/10/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-11
Sample: RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/10/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-12
Sample: RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/10/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-13
Sample: RG_FODPO_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-14
Sample: RG_FODPO_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-15
Sample: RG_FODPO_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-16
Sample: RG_FO22_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-17
Sample: RG_FO22_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-18
Sample: RG_FO22_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-19
Sample: RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-20
Sample: RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-21
Sample: RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/08/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-22
Sample: RG_MP1_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-23
Sample: RG_MP1_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-24
Sample: RG_MP1_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-25
Sample: RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-26
Sample: RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-27
Sample: RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-28
Sample: RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-29
Sample: RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-30
Sample: RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/09/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-31
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-32
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-33
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-34
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-35
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-36
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-37
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-38
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-39
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-40
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-41
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-42
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/07/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-43
Sample: RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/10/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Lab ID: 2012244-44
Sample: RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/10/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	2037003	<2	Styrofoam Cooler #1 - 2012244

Sample Containers

Lab ID: 2012244-45
Sample: RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 12/10/2020
Received: 12/17/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #1 - 2012244

Shipping Containers

Styrofoam Cooler #1 - 2012244

Received: December 17, 2020 7:00
Tracking No: 82428 via Courier
Coolant Type: Blue Ice
Temperature: 0.4 °C

Description: Styrofoam Cooler #1
Damaged in transit? No
Returned to client? No
Comments: IR #31

Custody seals present? No
Custody seals intact? No
COC present? No

COC ID:	FRO LAEMP December 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO

Facility Name	REP		
Project Manager	Cait Good		
Email	cait.good@teck.com		
Address	421 Pine Avenue		
City	Sparwood	Province	BC
Postal Code	V0B 2G0	Country	Canada
Phone Number	250-425-8202		

LABORATORY

Lab Name	Brooks Applied Labs		
Lab Contact	Ben Wozniak		
Email	ben@brooksapplied.com		
Address	18804 North Creek Parkway		
City	Bothell	Province	WA
Postal Code	98011	Country	USA
Phone Number	206-632-6206		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
[illegible]			x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x
jings@minnow.ca	x	x	x

SAMPLE DETAILS

ANALYSIS REQUESTED

Filtered - F; Field, L - Lab, FL - Field & Lab, N - None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIL.	HNO3	HNO3									
								PRESERV.	P	F/P	F								
								ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation								
RG_UFR1_WS_LAEMP_FRO_2020-12_NAL	RG_UFR1	WS	No	12/8/2020	12:30	G	3		X	X	X								
RG_FOUCL_WS_LAEMP_FRO_2020-12_NAL	RG_FOUCL	WS	No	12/8/2020	11:55	G	3		X	X	X								
RG_FOUNGD_WS_LAEMP_FRO_2020-12_NAL	RG_FOUNGD	WS	No	12/8/2020	10:50	G	3		X	X	X								
RG_FRUPO _WS_LAEMP_FRO_2020-12_NAL	RG_FRUPO	WS	No	12/10/2020	10:35	G	3		X	X	X								
RG_FODPO_WS_LAEMP_FRO_2020-12_NAL	RG_FODPO	WS	No	12/9/2020	11:30	G	3		X	X	X								
RG_FO22_WS_LAEMP_FRO_2020-12_NAL	RG_FO22	WS	No	12/9/2020	15:00	G	3		X	X	X								
RG_FODNGD_WS_LAEMP_FRO_2020-12_NAL	RG_FODNGD	WS	No	12/8/2020	9:50	G	3		X	X	X								
RG_MP1_WS_LAEMP_FRO_2020-12_NAL	RG_MP1	WS	No	12/9/2020	9:00	G	3		X	X	X								
RG_FOUSH_WS_LAEMP_FRO_2020-12_NAL	RG_FOUSH	WS	No	12/9/2020	10:50	G	3		X	X	X								
RG_FOUKI_WS_LAEMP_FRO_2020-12_NAL	RG_FOUKI	WS	No	12/9/2020	13:30	G	3		X	X	X								
RG_FOBKS_WS_LAEMP_FRO_2020-12_NAL	RG_FOBKS	WS	No	12/7/2020	10:30	G	3		X	X	X								
RG_SCOUTDS_WS_LAEMP_FRO_2020-12_NAL	RG_SCOUTDS	WS	No	12/7/2020	13:40	G	3		X	X	X								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Purchase Order Number - VPO00690100.
Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Peter Schnurr/Minnow	12/11/20 9:00	BAL	12/17/20 7:00

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Peter Schnurr	Mobile #	647-967-9403
Sampler's Signature		Date/Time	12/11/20 9:00

COC ID:	FRO LAEMP December 2020	TURNAROUND TIME:	

PROJECT/CLIENT INFO				LABORATORY			
Facility Name	REP			Lab Name	Brooks Applied Labs		
Project Manager	Cait Good			Lab Contact	Ben Wozniak		
Email	cait.good@teck.com			Email	ben@brooksapplied.com		
Address	421 Pine Avenue			Address	18804 North Creek Parkway		
City	Sparwood	Province	BC	City	Bothell	Province	WA
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA
Phone Number	250-425-8202			Phone Number	206-632-6206		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
reclaw@equisolve.com			x
carlai.meyer@teck.com	x	x	x
zschnurr@minnow.ca	x	x	x
jrigg@minnow.ca	x	x	x

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Total Selenium	Dissolved Selenium	Selenium Speciation									
FIL								HNO3	HNO3										
PRESERV.								F	F/F	F									
ANALYSIS																			
RG_FOBSC_WS_LAEMP_FRO_2020-12_NAL	RG_FOBSC	WS	No	12/7/2020	14:00	G	3	X	X	X									
RG_FORCP_WS_LAEMP_FRO_2020-12_NAL	RG_FORCP	WS	No	12/7/2020	10:35	G	3	X	X	X									
RG_FOUEW_WS_LAEMP_FRO_2020-12_NAL	RG_FOUPW	WS	No	12/10/2020	11:30	G	3	X	X	X									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
Purchase Order Number - VPO00690100. **Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.**	**Peter Schnurr/Minnow**	**12/11/20 9:00**	Date-Rec'd BAL ~ 12/17/20 9:00

NB OF BOTTLES RETURNED/DESCRIPTION					
Regular (default)	x	**Sampler's Name**	**Peter Schnurr**	**Mobile**	**647-967-9403**
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		**Sampler's Signature**		**Date/Time**	**12/11/20 9:00**
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

Confidential

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 82428

Sparwood, BC
Terrace, BC
Red Deer, AB

Vancouver, BC
Calgary, AB
Montreal, QC

Prince George, BC
Edmonton, AB
Spokane, WA

Elkford, BC
Ft. McMurray, AB
Shelby, MT

Tumbler Ridge, BC
Hinton, AB
Gillette, WY

INVOICE TO	DATE Dec 16/20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM) Teck Coal Ltd	CONSIGNEE (TO) Brooks Applied Labs
STREET West Line Creek Turnoff	STREET 2004 N. Creek Parkway
CITY/PROVINCE Sparwood BC	POSTAL CODE
	CITY/PROVINCE Bothell WA
SPECIAL INSTRUCTIONS	POSTAL CODE

COPY

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
3	Coolers - Water Samples	120 lbs

PAPS# RWHV82428

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME
			12-17-2020

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the B.I of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, on the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party at any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consigner and accepted for himself and his assigns Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns
The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT	DATE 12-17-20
SHIPPER SIGN	CONSIGNEE SIGN	TIME 1:00

3

NUMBER OF PIECES RECEIVED

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper

GST # 864540398RT0001

AMIGOS PRINTING

Cooler ID: Styro Cooler #1 **COC (Y/N)** **Temperature:** 0.4 **IR:** 31

Coolant Type: Ice Blue Ice Ambient

Notes:

Sampling Locations:	RG		FK		WLC						
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP	
Container Types:	120	120	40		90	120					

Opened By: DSL **Date:** 12/17/20

Effective 7/29/20

Revision 004

BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

July 24, 2020

Teck Resources Limited - Vancouver
Carlie Meyer
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Carlie.Meyer@teck.com

Re: REP

Ms. Meyer,

On July 2, 2020, Brooks Applied Labs (BAL) received thirty-eight (38) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) form.

The COC form listed a field ID of *RG_FOBKS_WS_2019-06-16-1030_N_NAL* for sample 2027056-43. The COC form listed a field ID of *RG_FO26_WS_2020-06-17_0900_N_NAL* for sample 2027056-55. Per client request, sample 2027056-43 was logged in under the field ID *RG_FOBKS_WS_2019-06-16-1030_N* and 2027056-55 was logged in under the field ID *RG_FO26_WS_2020-06-17_0900_N*.

The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL; sample fractions for total recoverable and dissolved Se had also been preserved by the client prior to receipt. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se
Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Selenium Speciation
Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid

[*MeSe(IV)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. An unknown selenium species eluting between MeSe(IV) and SeMet is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile selenium species present in some client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported as [*Unk Se Sp]*.

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

Chromatographic interference, as indicated by an elevated baseline or co-eluting peak, was observed for SeSO3 in samples *RG_FO22_WS_2019-12-19_0830_N, RG_FOUEW_WS_2020-06-19_1130_N, RG_FRCP1SW_WS_2020-06-18_0830_N, RG_FODPO_WS_2020-06-19_1200_N,* and *RG_FOBSC_WS_2020-06-18_1400_N*. Due to potential bias in the obtained results, the affected data have been qualified as estimates (**J-1**). Upon client request, Brooks Applied Labs can apply a higher dilution to these samples to potentially mitigate the chromatographic interferences, but a higher dilution would elevate the detection limits for SeMet above the client's requested limit of 0.010µg/L.

There were significant discrepancies between the dissolved Se and Se speciation results for samples *RG_FRUPO_WS_2020-06-19_0900_N* and *RG_FOUSH_WS_2020-06-23-0900_N*. Container labels were inspected and there was no evidence of samples mislabeled. Subsequent re-analyses confirmed that the Se concentrations of the speciation bottles were lower than results yielded by the associated dissolved Se bottles, suggesting sampling heterogeneity. The reported results are therefore deemed representative of the submitted containers.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) values are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

Except for the items noted above, all data were reported without qualification (aside from concentration qualifiers). All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E An estimated value due to the presence of interferences. A full explanation is presented in the narrative.

H Holding time and/or preservation requirements not met. Please see narrative for explanation.

J Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.

J-1 Estimated value. A full explanation is presented in the narrative.

M Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.

N Spike recovery was not within acceptance criteria. Please see narrative for explanation.

R Rejected, unusable value. A full explanation is presented in the narrative.

U Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.

X Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.

Z Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 1, 2019; Valid to: June 30, 2020
Certificate Number: E87982-33

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
EPA 1632A	Non-Potable Waters	Inorganic Arsenic, As(III)
	Biological	Inorganic Arsenic
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_UFR1_WS_2020-06-17-1300_N	2027056-01	WS	Sample	06/17/2020	07/02/2020
RG_UFR1_WS_2020-06-17-1300_N_NAL	2027056-02	WS	Sample	06/17/2020	07/02/2020
RG_UFR1_WS_2020-06-17-1300_N_NAL	2027056-03	WS	Sample	06/17/2020	07/02/2020
RG_FODHE_WS_2020-06-15-1330_N	2027056-04	WS	Sample	06/15/2020	07/02/2020
RG_FODHE_WS_2020-06-15-1330_N_NAL	2027056-05	WS	Sample	06/15/2020	07/02/2020
RG_FODHE_WS_2020-06-15-1330_N_NAL	2027056-06	WS	Sample	06/15/2020	07/02/2020
RG_FOUCL_WS_2020-06-15_1100_N	2027056-07	WS	Sample	06/15/2020	07/02/2020
RG_FOUCL_WS_2020-06-15_1100_N_NAL	2027056-08	WS	Sample	06/15/2020	07/02/2020
RG_FOUCL_WS_2020-06-15_1100_N_NAL	2027056-09	WS	Sample	06/15/2020	07/02/2020
RG_FOUNGD_WS_2020-06-16-1200_N	2027056-10	WS	Sample	06/16/2020	07/02/2020
RG_FOUNGD_WS_2020-06-16-1200_N_NAL	2027056-11	WS	Sample	06/16/2020	07/02/2020
RG_FOUNGD_WS_2020-06-16-1200_N_NAL	2027056-12	WS	Sample	06/16/2020	07/02/2020
RG_FODNGD_WS_2020-06-16-0830_N	2027056-13	WS	Sample	06/16/2020	07/02/2020
RG_FODNGD_WS_2020-06-16-0830_N_NAL	2027056-14	WS	Sample	06/16/2020	07/02/2020
RG_FODNGD_WS_2020-06-16-0830_N_NAL	2027056-15	WS	Sample	06/16/2020	07/02/2020
RG_SCOUTDS_WS_2020-06-16-1400_N	2027056-16	WS	Sample	06/16/2020	07/02/2020
RG_SCOUTDS_WS_2020-06-16-1400_N_NAL	2027056-17	WS	Sample	06/16/2020	07/02/2020
RG_SCOUTDS_WS_2020-06-16-1400_N_NAL	2027056-18	WS	Sample	06/16/2020	07/02/2020
RG_FOBCP_WS_2020-06-17_1300_N	2027056-19	WS	Sample	06/17/2020	07/02/2020
RG_FOBCP_WS_2020-06-17_1300_N_NAL	2027056-20	WS	Sample	06/17/2020	07/02/2020
RG_FOBCP_WS_2020-06-17_1300_N_NAL	2027056-21	WS	Sample	06/17/2020	07/02/2020
RG_FRUPO_WS_2020-06-19_0900_N	2027056-22	WS	Sample	06/19/2020	07/02/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FRUPO_WS_2020-06-19_0900_N_NAL	2027056-23	WS	Sample	06/19/2020	07/02/2020
RG_FRUPO_WS_2020-06-19_0900_N_NAL	2027056-24	WS	Sample	06/19/2020	07/02/2020
RG_FO22_WS_2019-12-19_0830_N	2027056-25	WS	Sample	06/19/2020	07/02/2020
RG_FO22_WS_2019-12-19_0830_N_NAL	2027056-26	WS	Sample	06/19/2020	07/02/2020
RG_FO22_WS_2019-12-19_0830_N_NAL	2027056-27	WS	Sample	06/19/2020	07/02/2020
RG_FOUEW_WS_2020-06-19_1130_N	2027056-28	WS	Sample	06/19/2020	07/02/2020
RG_FOUEW_WS_2020-06-19_1130_N_NAL	2027056-29	WS	Sample	06/19/2020	07/02/2020
RG_FOUEW_WS_2020-06-19_1130_N_NAL	2027056-30	WS	Sample	06/19/2020	07/02/2020
RG_FRCP1SW_WS_2020-06-18_0830_N	2027056-31	WS	Sample	06/18/2020	07/02/2020
RG_FRCP1SW_WS_2020-06-18_0830_N_NAL	2027056-32	WS	Sample	06/18/2020	07/02/2020
RG_FRCP1SW_WS_2020-06-18_0830_N_NAL	2027056-33	WS	Sample	06/18/2020	07/02/2020
RG_FODPO_WS_2020-06-19_1200_N	2027056-34	WS	Sample	06/19/2020	07/02/2020
RG_FODPO_WS_2020-06-19_1200_N_NAL	2027056-35	WS	Sample	06/19/2020	07/02/2020
RG_FODPO_WS_2020-06-19_1200_N_NAL	2027056-36	WS	Sample	06/19/2020	07/02/2020
RG_MP1_WS_2020-06-15-1500_N	2027056-37	WS	Sample	06/15/2020	07/02/2020
RG_MP1_WS_2020-06-15-1500_N_NAL	2027056-38	WS	Sample	06/15/2020	07/02/2020
RG_MP1_WS_2020-06-15-1500_N_NAL	2027056-39	WS	Sample	06/15/2020	07/02/2020
RG_FOUSH_WS_2020-06-23-0900_N	2027056-40	WS	Sample	06/23/2020	07/02/2020
RG_FOUSH_WS_2020-06-23-0900_N_NAL	2027056-41	WS	Sample	06/23/2020	07/02/2020
RG_FOUSH_WS_2020-06-23-0900_N_NAL	2027056-42	WS	Sample	06/23/2020	07/02/2020
RG_FOBKS_WS_2019-06-16-1030_N	2027056-43	WS	Sample	06/16/2020	07/02/2020
RG_FOBKS_WS_2019-06-16-1030_N_NAL	2027056-44	WS	Sample	06/16/2020	07/02/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FOBKS_WS_2019-06-16-1030_N_NAL	2027056-45	WS	Sample	06/16/2020	07/02/2020
RG_HENUP_WS_2020-06-15_1100_N	2027056-46	WS	Sample	06/15/2020	07/02/2020
RG_HENUP_WS_2020-06-15_1100_N_NAL	2027056-47	WS	Sample	06/15/2020	07/02/2020
RG_HENUP_WS_2020-06-15_1100_N_NAL	2027056-48	WS	Sample	06/15/2020	07/02/2020
RG_FOBSC_WS_2020-06-18_1400_N	2027056-49	WS	Sample	06/18/2020	07/02/2020
RG_FOBSC_WS_2020-06-18_1400_N_NAL	2027056-50	WS	Sample	06/18/2020	07/02/2020
RG_FOBSC_WS_2020-06-18_1400_N_NAL	2027056-51	WS	Sample	06/18/2020	07/02/2020
RG_FOUKI_WS_2020-06-17_1500_N	2027056-52	WS	Sample	06/17/2020	07/02/2020
RG_FOUKI_WS_2020-06-17_1500_N_NAL	2027056-53	WS	Sample	06/17/2020	07/02/2020
RG_FOUKI_WS_2020-06-17_1500_N_NAL	2027056-54	WS	Sample	06/17/2020	07/02/2020
RG_FO26_WS_2020-06-17_0900_N	2027056-55	WS	Sample	06/17/2020	07/02/2020
RG_FO26_WS_2020-06-17_0900_N_NAL	2027056-56	WS	Sample	06/17/2020	07/02/2020
RG_FO26_WS_2020-06-17_0900_N_NAL	2027056-57	WS	Sample	06/17/2020	07/02/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
MeSe(IV)	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
Se	Water	EPA 1638 Mod	07/06/2020	07/08/2020	B201849	2000848
Se Unk A	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
Se(IV)	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
Se(VI)	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
SeCN	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
SeMet	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
SeSO3	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835
Unk Se Sp	Water	SOP BAL-4201	07/02/2020	07/03/2020	B201827	2000835

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_UFR1_WS_2020-06-17-1300_N										
2027056-01	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-01	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-01	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-01	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B201827	2000835
2027056-01	Se(VI)	WS	D	0.397		0.060	0.125	µg/L	B201827	2000835
2027056-01	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-01	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-01	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-01	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_UFR1_WS_2020-06-17-1300_N_NAL										
2027056-02	Se	WS	TR	0.405	J	0.165	0.528	µg/L	B201849	2000848
RG_UFR1_WS_2020-06-17-1300_N_NAL										
2027056-03	Se	WS	D	0.392	J	0.165	0.528	µg/L	B201849	2000848
RG_FODHE_WS_2020-06-15-1330_N										
2027056-04	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-04	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-04	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-04	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B201827	2000835
2027056-04	Se(VI)	WS	D	3.55		0.060	0.125	µg/L	B201827	2000835
2027056-04	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-04	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-04	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-04	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FODHE_WS_2020-06-15-1330_N_NAL										
2027056-05	Se	WS	TR	4.13		0.165	0.528	µg/L	B201849	2000848
RG_FODHE_WS_2020-06-15-1330_N_NAL										
2027056-06	Se	WS	D	4.08		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUCL_WS_2020-06-15_1100_N										
2027056-07	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-07	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-07	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-07	Se(IV)	WS	D	0.053	J	0.050	0.125	µg/L	B201827	2000835
2027056-07	Se(VI)	WS	D	5.85		0.060	0.125	µg/L	B201827	2000835
2027056-07	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-07	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-07	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-07	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOUCL_WS_2020-06-15_1100_N_NAL										
2027056-08	Se	WS	TR	5.90		0.165	0.528	µg/L	B201849	2000848
RG_FOUCL_WS_2020-06-15_1100_N_NAL										
2027056-09	Se	WS	D	5.58		0.165	0.528	µg/L	B201849	2000848
RG_FOUNGD_WS_2020-06-16-1200_N										
2027056-10	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-10	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-10	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-10	Se(IV)	WS	D	0.057	J	0.050	0.125	µg/L	B201827	2000835
2027056-10	Se(VI)	WS	D	7.68		0.060	0.125	µg/L	B201827	2000835
2027056-10	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-10	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-10	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-10	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOUNGD_WS_2020-06-16-1200_N_NAL										
2027056-11	Se	WS	TR	9.70		0.165	0.528	µg/L	B201849	2000848
RG_FOUNGD_WS_2020-06-16-1200_N_NAL										
2027056-12	Se	WS	D	9.47		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FODNGD_WS_2020-06-16-0830_N										
2027056-13	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-13	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-13	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-13	Se(IV)	WS	D	0.060	J	0.050	0.125	µg/L	B201827	2000835
2027056-13	Se(VI)	WS	D	7.69		0.060	0.125	µg/L	B201827	2000835
2027056-13	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-13	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-13	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-13	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FODNGD_WS_2020-06-16-0830_N_NAL										
2027056-14	Se	WS	TR	9.71		0.165	0.528	µg/L	B201849	2000848
RG_FODNGD_WS_2020-06-16-0830_N_NAL										
2027056-15	Se	WS	D	9.86		0.165	0.528	µg/L	B201849	2000848
RG_SCOUTDS_WS_2020-06-16-1400_N										
2027056-16	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-16	MeSe(IV)	WS	D	0.011	J	0.010	0.025	µg/L	B201827	2000835
2027056-16	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-16	Se(IV)	WS	D	0.154		0.050	0.125	µg/L	B201827	2000835
2027056-16	Se(VI)	WS	D	20.4		0.060	0.125	µg/L	B201827	2000835
2027056-16	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-16	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-16	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-16	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_SCOUTDS_WS_2020-06-16-1400_N_NAL										
2027056-17	Se	WS	TR	20.2		0.165	0.528	µg/L	B201849	2000848
RG_SCOUTDS_WS_2020-06-16-1400_N_NAL										
2027056-18	Se	WS	D	20.7		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBCP_WS_2020-06-17_1300_N										
2027056-19	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-19	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-19	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-19	Se(IV)	WS	D	0.107	J	0.050	0.125	µg/L	B201827	2000835
2027056-19	Se(VI)	WS	D	31.9		0.060	0.125	µg/L	B201827	2000835
2027056-19	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-19	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-19	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-19	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOBCP_WS_2020-06-17_1300_N_NAL										
2027056-20	Se	WS	TR	43.3		0.165	0.528	µg/L	B201849	2000848
RG_FOBCP_WS_2020-06-17_1300_N_NAL										
2027056-21	Se	WS	D	42.2		0.165	0.528	µg/L	B201849	2000848
RG_FRUPO_WS_2020-06-19_0900_N										
2027056-22	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-22	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-22	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-22	Se(IV)	WS	D	0.070	J	0.050	0.125	µg/L	B201827	2000835
2027056-22	Se(VI)	WS	D	29.2		0.060	0.125	µg/L	B201827	2000835
2027056-22	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-22	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-22	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-22	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FRUPO_WS_2020-06-19_0900_N_NAL										
2027056-23	Se	WS	TR	47.5		0.165	0.528	µg/L	B201849	2000848
RG_FRUPO_WS_2020-06-19_0900_N_NAL										
2027056-24	Se	WS	D	47.3		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FO22_WS_2019-12-19_0830_N										
2027056-25	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-25	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-25	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-25	Se(IV)	WS	D	0.105	J	0.050	0.125	µg/L	B201827	2000835
2027056-25	Se(VI)	WS	D	43.5		0.060	0.125	µg/L	B201827	2000835
2027056-25	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-25	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-25	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B201827	2000835
2027056-25	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FO22_WS_2019-12-19_0830_N_NAL										
2027056-26	Se	WS	TR	41.8		0.165	0.528	µg/L	B201849	2000848
RG_FO22_WS_2019-12-19_0830_N_NAL										
2027056-27	Se	WS	D	42.6		0.165	0.528	µg/L	B201849	2000848
RG_FOUEW_WS_2020-06-19_1130_N										
2027056-28	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-28	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-28	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-28	Se(IV)	WS	D	0.093	J	0.050	0.125	µg/L	B201827	2000835
2027056-28	Se(VI)	WS	D	36.1		0.060	0.125	µg/L	B201827	2000835
2027056-28	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-28	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-28	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B201827	2000835
2027056-28	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOUEW_WS_2020-06-19_1130_N_NAL										
2027056-29	Se	WS	TR	35.6		0.165	0.528	µg/L	B201849	2000848
RG_FOUEW_WS_2020-06-19_1130_N_NAL										
2027056-30	Se	WS	D	36.6		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FRCP1SW_WS_2020-06-18_0830_N										
2027056-31	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-31	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-31	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-31	Se(IV)	WS	D	0.115	J	0.050	0.125	µg/L	B201827	2000835
2027056-31	Se(VI)	WS	D	43.5		0.060	0.125	µg/L	B201827	2000835
2027056-31	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-31	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-31	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B201827	2000835
2027056-31	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FRCP1SW_WS_2020-06-18_0830_N_NAL										
2027056-32	Se	WS	TR	40.8		0.165	0.528	µg/L	B201849	2000848
RG_FRCP1SW_WS_2020-06-18_0830_N_NAL										
2027056-33	Se	WS	D	40.6		0.165	0.528	µg/L	B201849	2000848
RG_FODPO_WS_2020-06-19_1200_N										
2027056-34	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-34	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-34	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-34	Se(IV)	WS	D	0.093	J	0.050	0.125	µg/L	B201827	2000835
2027056-34	Se(VI)	WS	D	34.6		0.060	0.125	µg/L	B201827	2000835
2027056-34	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-34	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-34	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B201827	2000835
2027056-34	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FODPO_WS_2020-06-19_1200_N_NAL										
2027056-35	Se	WS	TR	42.6		0.165	0.528	µg/L	B201849	2000848
RG_FODPO_WS_2020-06-19_1200_N_NAL										
2027056-36	Se	WS	D	42.2		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_MP1_WS_2020-06-15-1500_N										
2027056-37	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-37	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-37	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-37	Se(IV)	WS	D	0.096	J	0.050	0.125	µg/L	B201827	2000835
2027056-37	Se(VI)	WS	D	10.2		0.060	0.125	µg/L	B201827	2000835
2027056-37	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-37	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-37	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-37	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_MP1_WS_2020-06-15-1500_N_NAL										
2027056-38	Se	WS	TR	11.1		0.165	0.528	µg/L	B201849	2000848
RG_MP1_WS_2020-06-15-1500_N_NAL										
2027056-39	Se	WS	D	11.4		0.165	0.528	µg/L	B201849	2000848
RG_FOUSH_WS_2020-06-23-0900_N										
2027056-40	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-40	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-40	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-40	Se(IV)	WS	D	0.066	J	0.050	0.125	µg/L	B201827	2000835
2027056-40	Se(VI)	WS	D	5.79		0.060	0.125	µg/L	B201827	2000835
2027056-40	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-40	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-40	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-40	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOUSH_WS_2020-06-23-0900_N_NAL										
2027056-41	Se	WS	TR	11.0		0.165	0.528	µg/L	B201849	2000848
RG_FOUSH_WS_2020-06-23-0900_N_NAL										
2027056-42	Se	WS	D	11.9		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBKS_WS_2019-06-16-1030_N										
2027056-43	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-43	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-43	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-43	Se(IV)	WS	D	0.148		0.050	0.125	µg/L	B201827	2000835
2027056-43	Se(VI)	WS	D	13.0		0.060	0.125	µg/L	B201827	2000835
2027056-43	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-43	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-43	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-43	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOBKS_WS_2019-06-16-1030_N_NAL										
2027056-44	Se	WS	TR	14.6		0.165	0.528	µg/L	B201849	2000848
RG_FOBKS_WS_2019-06-16-1030_N_NAL										
2027056-45	Se	WS	D	14.5		0.165	0.528	µg/L	B201849	2000848
RG_HENUP_WS_2020-06-15_1100_N										
2027056-46	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-46	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-46	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-46	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B201827	2000835
2027056-46	Se(VI)	WS	D	0.255		0.060	0.125	µg/L	B201827	2000835
2027056-46	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-46	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-46	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-46	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_HENUP_WS_2020-06-15_1100_N_NAL										
2027056-47	Se	WS	TR	0.337	J	0.165	0.528	µg/L	B201849	2000848
RG_HENUP_WS_2020-06-15_1100_N_NAL										
2027056-48	Se	WS	D	0.410	J	0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBSC_WS_2020-06-18_1400_N										
2027056-49	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-49	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-49	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-49	Se(IV)	WS	D	0.088	J	0.050	0.125	µg/L	B201827	2000835
2027056-49	Se(VI)	WS	D	79.1		0.060	0.125	µg/L	B201827	2000835
2027056-49	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-49	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-49	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B201827	2000835
2027056-49	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOBSC_WS_2020-06-18_1400_N_NAL										
2027056-50	Se	WS	TR	70.9		0.165	0.528	µg/L	B201849	2000848
RG_FOBSC_WS_2020-06-18_1400_N_NAL										
2027056-51	Se	WS	D	72.3		0.165	0.528	µg/L	B201849	2000848
RG_FOUKI_WS_2020-06-17_1500_N										
2027056-52	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-52	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-52	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-52	Se(IV)	WS	D	0.149		0.050	0.125	µg/L	B201827	2000835
2027056-52	Se(VI)	WS	D	15.7		0.060	0.125	µg/L	B201827	2000835
2027056-52	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-52	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-52	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-52	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FOUKI_WS_2020-06-17_1500_N_NAL										
2027056-53	Se	WS	TR	15.8		0.165	0.528	µg/L	B201849	2000848
RG_FOUKI_WS_2020-06-17_1500_N_NAL										
2027056-54	Se	WS	D	15.9		0.165	0.528	µg/L	B201849	2000848

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FO26_WS_2020-06-17_0900_N										
2027056-55	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-55	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-55	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-55	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B201827	2000835
2027056-55	Se(VI)	WS	D	0.352		0.060	0.125	µg/L	B201827	2000835
2027056-55	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B201827	2000835
2027056-55	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B201827	2000835
2027056-55	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
2027056-55	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B201827	2000835
RG_FO26_WS_2020-06-17_0900_N_NAL										
2027056-56	Se	WS	TR	0.356	J	0.165	0.528	µg/L	B201849	2000848
RG_FO26_WS_2020-06-17_0900_N_NAL										
2027056-57	Se	WS	D	0.372	J	0.165	0.528	µg/L	B201849	2000848

Accuracy & Precision Summary

Batch: B201827
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201827-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	6.289	µg/L	123% 75-125	
	Se(IV)		5.000	5.866	µg/L	117% 75-125	
	Se(VI)		5.000	5.788	µg/L	116% 75-125	
	SeCN		5.015	5.583	µg/L	111% 75-125	
	SeMet		4.932	5.595	µg/L	113% 75-125	
B201827-DUP2	**Duplicate, (2027056-25)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	ND		ND	µg/L		N/C 25
	Se Unk A	ND		ND	µg/L		N/C 25
	Se(IV)	0.105		0.107	µg/L		2% 25
	Se(VI)	43.51		44.38	µg/L		2% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B201827-MS2	**Matrix Spike, (2027056-25)**						
	Se(IV)	0.105	4.900	5.448	µg/L	109% 75-125	
	Se(VI)	43.51	5.100	49.73	µg/L	NR 75-125	
	SeCN	ND	4.905	4.918	µg/L	100% 75-125	
	SeMet	ND	0.9885	1.047	µg/L	106% 75-125	
B201827-MSD2	**Matrix Spike Duplicate, (2027056-25)**						
	Se(IV)	0.105	4.900	5.592	µg/L	112% 75-125	3% 25
	Se(VI)	43.51	5.100	50.73	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.943	µg/L	101% 75-125	0.5% 25
	SeMet	ND	0.9885	1.074	µg/L	109% 75-125	3% 25

Accuracy & Precision Summary

Batch: B201849
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201849-BS1	**Blank Spike, (1943020)**						
	Se		200.0	201.7	µg/L	101% 75-125	
B201849-BS2	**Blank Spike, (1943020)**						
	Se		200.0	205.5	µg/L	103% 75-125	
B201849-BS3	**Blank Spike, (1943020)**						
	Se		200.0	203.1	µg/L	102% 75-125	
B201849-SRM1	**Reference Material (1938023, TMDA 51.5 Reference Standard - Bottle 8- SRM)**						
	Se		14.30	14.04	µg/L	98% 75-125	
B201849-SRM2	**Reference Material (1938023, TMDA 51.5 Reference Standard - Bottle 8- SRM)**						
	Se		14.30	14.09	µg/L	99% 75-125	
B201849-SRM3	**Reference Material (1938023, TMDA 51.5 Reference Standard - Bottle 8- SRM)**						
	Se		14.30	13.95	µg/L	98% 75-125	
B201849-DUP2	**Duplicate, (2027056-05)**						
	Se	4.129		3.964	µg/L		4% 20
B201849-MS2	**Matrix Spike, (2027056-05)**						
	Se	4.129	220.0	222.1	µg/L	99% 75-125	
B201849-MSD2	**Matrix Spike Duplicate, (2027056-05)**						
	Se	4.129	220.0	225.4	µg/L	101% 75-125	2% 20
B201849-DUP3	**Duplicate, (2027056-23)**						
	Se	47.46		47.65	µg/L		0.4% 20
B201849-MS3	**Matrix Spike, (2027056-23)**						
	Se	47.46	220.0	266.7	µg/L	100% 75-125	

Accuracy & Precision Summary

Batch: B201849
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B201849-MSD3	**Matrix Spike Duplicate, (2027056-23)**						
	Se	47.46	220.0	272.7	µg/L	102% 75-125	2% 20
B201849-DUP4	**Duplicate, (2027056-41)**						
	Se	10.95		11.11	µg/L		1% 20
B201849-MS4	**Matrix Spike, (2027056-41)**						
	Se	10.95	220.0	234.6	µg/L	102% 75-125	
B201849-MSD4	**Matrix Spike Duplicate, (2027056-41)**						
	Se	10.95	220.0	241.2	µg/L	105% 75-125	3% 20

Method Blanks & Reporting Limits

Batch: B201827
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B201827-BLK1	0.00	µg/L
B201827-BLK2	0.00	µg/L
B201827-BLK3	0.00	µg/L
B201827-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B201849
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B201849-BLK1	-0.015	µg/L
B201849-BLK2	-0.025	µg/L
B201849-BLK3	-0.084	µg/L
B201849-BLK4	-0.069	µg/L

Average: -0.048
Limit: 0.480

MDL: 0.150
MRL: 0.480

Sample Containers

Lab ID: 2027056-01 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_UFR1_WS_2020-06-17-1300_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-02 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_UFR1_WS_2020-06-17-1300_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-03 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_UFR1_WS_2020-06-17-1300_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-04 **Report Matrix:** WS **Collected:** 06/15/2020
Sample: RG_FODHE_WS_2020-06-15-1330_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Sample Containers

Lab ID: 2027056-05
Sample: RG_FODHE_WS_2020-06-15-1330_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-06
Sample: RG_FODHE_WS_2020-06-15-1330_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-07
Sample: RG_FOUCL_WS_2020-06-15_1100_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-08
Sample: RG_FOUCL_WS_2020-06-15_1100_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Sample Containers

Lab ID: 2027056-09
Sample: RG_FOUCL_WS_2020-06-15_1100_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-10
Sample: RG_FOUNGD_WS_2020-06-16-1200_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-11
Sample: RG_FOUNGD_WS_2020-06-16-1200_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-12
Sample: RG_FOUNGD_WS_2020-06-16-1200_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Sample Containers

Lab ID: 2027056-13 **Report Matrix:** WS **Collected:** 06/16/2020
Sample: RG_FODNGD_WS_2020-06-16-0830_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-14 **Report Matrix:** WS **Collected:** 06/16/2020
Sample: RG_FODNGD_WS_2020-06-16-0830_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-15 **Report Matrix:** WS **Collected:** 06/16/2020
Sample: RG_FODNGD_WS_2020-06-16-0830_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-16 **Report Matrix:** WS **Collected:** 06/16/2020
Sample: RG_SCOUTDS_WS_2020-06-16-1400_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Sample Containers

Lab ID: 2027056-17
Sample: RG_SCOUTDS_WS_2020-06-16-1400_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-18
Sample: RG_SCOUTDS_WS_2020-06-16-1400_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-19
Sample: RG_FOBCP_WS_2020-06-17_1300_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/17/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-20
Sample: RG_FOBCP_WS_2020-06-17_1300_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/17/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Sample Containers

Lab ID: 2027056-21
Sample: RG_FOBCP_WS_2020-06-17_1300_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/17/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-22
Sample: RG_FRUPO_WS_2020-06-19_0900_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-23
Sample: RG_FRUPO_WS_2020-06-19_0900_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-24
Sample: RG_FRUPO_WS_2020-06-19_0900_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Sample Containers

Lab ID: 2027056-25 **Report Matrix:** WS **Collected:** 06/19/2020
Sample: RG_FO22_WS_2019-12-19_0830_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-26 **Report Matrix:** WS **Collected:** 06/19/2020
Sample: RG_FO22_WS_2019-12-19_0830_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-27 **Report Matrix:** WS **Collected:** 06/19/2020
Sample: RG_FO22_WS_2019-12-19_0830_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-28 **Report Matrix:** WS **Collected:** 06/19/2020
Sample: RG_FOUEW_WS_2020-06-19_1130_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Sample Containers

Lab ID: 2027056-29
Sample: RG_FOUEW_WS_2020-06-19_1130_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-30
Sample: RG_FOUEW_WS_2020-06-19_1130_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-31
Sample: RG_FRCP1SW_WS_2020-06-18_0830_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/18/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-32
Sample: RG_FRCP1SW_WS_2020-06-18_0830_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/18/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Sample Containers

Lab ID: 2027056-33
Sample: RG_FRCP1SW_WS_2020-06-18_0830_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/18/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-34
Sample: RG_FODPO_WS_2020-06-19_1200_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-35
Sample: RG_FODPO_WS_2020-06-19_1200_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-36
Sample: RG_FODPO_WS_2020-06-19_1200_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/19/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Sample Containers

Lab ID: 2027056-37 **Report Matrix:** WS **Collected:** 06/15/2020
Sample: RG_MP1_WS_2020-06-15-1500_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-38 **Report Matrix:** WS **Collected:** 06/15/2020
Sample: RG_MP1_WS_2020-06-15-1500_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-39 **Report Matrix:** WS **Collected:** 06/15/2020
Sample: RG_MP1_WS_2020-06-15-1500_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #2 - 2027056

Lab ID: 2027056-40 **Report Matrix:** WS **Collected:** 06/23/2020
Sample: RG_FOUSH_WS_2020-06-23-0900_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Sample Containers

Lab ID: 2027056-41
Sample: RG_FOUSH_WS_2020-06-23-0900_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/23/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-42
Sample: RG_FOUSH_WS_2020-06-23-0900_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/23/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-43
Sample: RG_FOBKS_WS_2019-06-16-1030_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-44
Sample: RG_FOBKS_WS_2019-06-16-1030_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Sample Containers

Lab ID: 2027056-45
Sample: RG_FOBKS_WS_2019-06-16-1030_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/16/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-46
Sample: RG_HENUP_WS_2020-06-15_1100_N
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-47
Sample: RG_HENUP_WS_2020-06-15_1100_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-48
Sample: RG_HENUP_WS_2020-06-15_1100_N_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 06/15/2020
Received: 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Sample Containers

Lab ID: 2027056-49 **Report Matrix:** WS **Collected:** 06/18/2020
Sample: RG_FOBSC_WS_2020-06-18_1400_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-50 **Report Matrix:** WS **Collected:** 06/18/2020
Sample: RG_FOBSC_WS_2020-06-18_1400_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-51 **Report Matrix:** WS **Collected:** 06/18/2020
Sample: RG_FOBSC_WS_2020-06-18_1400_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-52 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_FOUKI_WS_2020-06-17_1500_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Sample Containers

Lab ID: 2027056-53 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_FOUKI_WS_2020-06-17_1500_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-54 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_FOUKI_WS_2020-06-17_1500_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-55 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_FO26_WS_2020-06-17_0900_N **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
B	EXTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056
C	EXTRA_VOL	60 mL	na	none	na	na	Styrofoam Cooler #1 - 2027056

Lab ID: 2027056-56 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_FO26_WS_2020-06-17_0900_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Lab ID: 2027056-57 **Report Matrix:** WS **Collected:** 06/17/2020
Sample: RG_FO26_WS_2020-06-17_0900_N_NAL **Sample Type:** Sample + Sum **Received:** 07/02/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	60 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #6 - 2027056

Shipping Containers

Styrofoam Cooler #1 - 2027056

Received: July 2, 2020 7:00
Tracking No: 80088 via Courier
Coolant Type: Blue Ice
Temperature: -0.8 °C

Description: Styrofoam Cooler #1
Damaged in transit? No
Returned to client? No
Comments: IR #19

Custody seals present? No
Custody seals intact? No
COC present? No

Styrofoam Cooler #2 - 2027056

Received: July 2, 2020 7:00
Tracking No: 80088 via Courier
Coolant Type: Blue Ice
Temperature: 8.1 °C

Description: Styrofoam Cooler #2
Damaged in transit? No
Returned to client? No
Comments: IR #19

Custody seals present? No
Custody seals intact? No
COC present? No

Styrofoam Cooler #6 - 2027056

Received: July 2, 2020 7:00
Tracking No: 80088 via Courier
Coolant Type: Blue Ice
Temperature: 8.1 °C

Description: Styrofoam Cooler #6
Damaged in transit? No
Returned to client? No
Comments: IR #19

Custody seals present? No
Custody seals intact? No
COC present? No

Conf Teck

BAL Final Report 2027056

COC ID:	Se Speciation 20-09 FRO LAEMP	TURNAROUND TIME:	Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	REP			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Carlie Meyer			Lab Contact	Ben Wozniak			Email 1:	carlie.meyer@teck.com	X	X	X
Email	carlie.meyer@teck.com			Email	ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:	pschnurr@minnow.ca	X	X	X
								Email 4:	jings@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:	Carl.Good@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA					
Phone Number	250-425-8441			Phone Number	206-632-6206			PO number	690100			

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	PRESERVE: N	PRESERVE: F	PRESERVE: F									
								HNO3	HNO3	N									
								ANALYSIS: Total Selenium	Dissolved Selenium	Selenium Speciation									
RG_UFR1_WS_2020-06-17-1300_N	RG_UFR1	WS	No	17-Jun-20	13:00	G	1			X									
RG_UFR1_WS_2020-06-17-1300_N_NAL	RG_UFR1	WS	No	17-Jun-20	13:00	G	2	X	X										
RG_FODHE_WS_2020-06-15-1330_N	RG_FODHE	WS	No	15-Jun-20	13:30	G	1			X									
RG_FODHE_WS_2020-06-15-1330_N_NAL	RG_FODHE	WS	No	15-Jun-20	13:30	G	2	X	X										
RG_FOUCL_WS_2020-06-15_1100_N	RG_FOUCL	WS	No	15-Jun-20	11:00	G	1			X									
RG_FOUCL_WS_2020-06-15_1100_N_NAL	RG_FOUCL	WS	No	15-Jun-20	11:00	G	2	X	X										
RG_FOUNGD_WS_2020-06-16-1200_N	RG_FOUNGD	WS	No	16-Jun-20	12:00	G	1			X									
RG_FOUNGD_WS_2020-06-16-1200_N_NAL	RG_FOUNGD	WS	No	16-Jun-20	12:00	G	2	X	X										
RG_FODNGD_WS_2020-06-16-0830_N	RG_FODNGD	WS	No	16-Jun-20	8:30	G	1			X									
RG_FODNGD_WS_2020-06-16-0830_N_NAL	RG_FODNGD	WS	No	16-Jun-20	8:30	G	2	X	X										

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Samples for total selenium have been preserved in the field. Dissolve selenium have been filtered and preserved. Speciation samples have been filtered and frozen.			[illegible] (BAL)	7/2/20 7:09

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Peter Schnurr	Mobile #	647-967-9403
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature	[signature]	Date/Time	June 29, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

125ml plastic
+ 7 x 60ml plastic

PG 1/4

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Page 2 of 2

COC ID: Se Speciation 20-09 FRO LAEMP

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO

Facility Name / Job#	REP
Project Manager	Carlie Meyer
Email	carlie.meyer@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8441

LABORATORY

Lab Name	Brooks Applied Labs
Lab Contact	Ben Wozniak
Email	ben@brooksapplied.com
Address	18804 North Creek Parkway
City	Bothell
Province	WA
Postal Code	98011
Country	USA
Phone Number	206-632-6206

OTHER INFO

Report Format / Distribution		Excel	PDF	EDD
Email 1:	carlie.meyer@teck.com	X	X	X
Email 2:	teckcoal@equisonline.com			X
Email 3:	pschnurr@minnow.ca	X	X	X
Email 4:	jings@minnow.ca	X	X	X
Email 5:	Cait.Good@teck.com	X	X	X

PO number 690100

SAMPLE DETAILS / **ANALYSIS REQUESTED**

Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Total Selenium	Dissolved Selenium	Selenium Speciation
							Preserv.	N	F	F
								HNO3	HNO3	N
RG_SCOUTDS_WS_2020-06-16-1400_N	RG_SCOUTDS	WS	No	16-Jun-20	14:00	G	1			X
RG_SCOUTDS_WS_2020-06-16-1400_N_NAL	RG_SCOUTDS	WS	No	16-Jun-20	14:00	G	2	X	X	
RG_FOBCP_WS_2020-06-17_1300_N	RG_FOBCP	WS	No	17-Jun-20	13:00	G	1			X
RG_FOBCP_WS_2020-06-17_1300_N_NAL	RG_FOBCP	WS	No	17-Jun-20	13:00	G	2	X	X	
RG_FRUPO_WS_2020-06-19_0900_N	RG_FRUPO	WS	No	19-Jun-20	9:00:00	G	1			X
RG_FRUPO_WS_2020-06-19_0900_N_NAL	RG_FRUPO	WS	No	19-Jun-20	9:00:00	G	2	X	X	
RG_FO22_WS_2019-12-19_0830_N	RG_FO22	WS	No	19-Jun-20	8:30:00	G	1			X
RG_FO22_WS_2019-12-19_0830_N_NAL	RG_FO22	WS	No	19-Jun-20	8:30:00	G	2	X	X	
RG_FOUEW_WS_2020-06-19_1130_N	RG_FOUEW	WS	No	19-Jun-20	11:30:00	G	1			X
RG_FOUEW_WS_2020-06-19_1130_N_NAL	RG_FOUEW	WS	No	19-Jun-20	11:30:00	G	2	X	X	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Samples for total selenium have been preserved in the field. Dissolve selenium have been filtered and preserved. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME

SERVICE REQUEST (may be subject to surcharges)

Regular (default)	X
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Peter Schnurr	Mobile #	647-967-9403
Sampler's Signature		Date/Time	June 29, 2020

PG 2/4

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Page 2 of 2

COC ID: Se Speciation 20-09 FRO LAEMP

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	REP			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Carlie Meyer			Lab Contact	Ben Wozniak			Email 1:	carlie.meyer@teck.com	X	X	X
Email	carlie.meyer@teck.com			Email	ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:	pschnurr@minnow.ca	X	X	X
								Email 4:	jings@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:	Cait.Good@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA					
Phone Number	250-425-8441			Phone Number	206-632-6206			PO number	690100			

SAMPLE DETAILS								ANALYSIS REQUESTED											
								# of Containers	N	F	P								
								Preservative	HNO3	HNO3	N								
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.		Total Selenium	Dissolved Selenium	Selenium Speciation								
RG_FRCP1SW_WS_2020-06-18_0830_N	RG_FRCP1SW	WS	No	18-Jun-20	8:30:00	G	1				X								
RG_FRCP1SW_WS_2020-06-18_0830_N_NAL	RG_FRCP1SW	WS	No	18-Jun-20	8:30:00	G	2		X	X									
RG_FODPO_WS_2020-06-19_1200_N	RG_FODPO	WS	No	19-Jun-20	12:00:00	G	1				X								
RG_FODPO_WS_2020-06-19_1200_N_NAL	RG_FODPO	WS	No	19-Jun-20	12:00:00	G	2		X	X									
RG_MP1_WS_2020-06-15-1500_N	RG_MP1	WS	No	15-Jun-20	15:00	G	1				X								
RG_MP1_WS_2020-06-15-1500_N_NAL	RG_MP1	WS	No	15-Jun-20	15:00	G	2		X	X									
RG_FOUSH_WS_2020-06-23-0900_N	RG_FOUSH	WS	No	23-Jun-20	9:00	G	1				X								
RG_FOUSH_WS_2020-06-23-0900_N_NAL	RG_FOUSH	WS	No	23-Jun-20	9:00	G	2		X	X									
RG_FOBKS_WS_2019-06-16-1030_N_NAL	RG_FOBKS	WS	No	16-Jun-20	10:30	G	1				X								
RG_FOBKS_WS_2019-06-16-1030_N_NAL	RG_FOBKS	WS	No	16-Jun-20	10:30	G	2		X	X									

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Samples for total selenium have been preserved in the field. Dissolve selenium have been filtered and preserved. Speciation samples have been filtered and frozen.				

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	Sampler's Name	Peter Schnurr	Mobile #	647-967-9403
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		Sampler's Signature		Date/Time	June 29, 2020
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

G 3/4

Teck

Page 2 of 2

COC ID: Se Speciation 20-09 FRO LAEMP

TURNAROUND TIME: Regular

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name / Job#	REP			Lab Name	Brooks Applied Labs			Report Format / Distribution		Excel	PDF	EDD
Project Manager	Carlie Meyer			Lab Contact	Ben Wozniak			Email 1:	carlie.meyer@teck.com	X	X	X
Email	carlie.meyer@teck.com			Email	ben@brooksapplied.com			Email 2:	teckcoal@equisonline.com			X
Address	421 Pine Avenue			Address	18804 North Creek Parkway			Email 3:	pschnurr@minnow.ca	X	X	X
								Email 4:	jings@minnow.ca	X	X	X
City	Sparwood	Province	BC	City	Bothell	Province	WA	Email 5:	Cait.Good@teck.com	X	X	X
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA					
Phone Number	250-425-8441			Phone Number	206-632-6206			PO number	690100			

SAMPLE DETAILS								ANALYSIS REQUESTED										
								PRESERVE	N	F	F							
									HNO3	HNO3	N							
Sample ID	Sample Location (sys_loc_code)	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation							
RG_HENUP_WS_2020-06-15_1100_N	RG_HENUP	WS	No	15-Jun-20	11:00:00	G	1				X							
RG_HENUP_WS_2020-06-15_1100_N_NAL	RG_HENUP	WS	No	15-Jun-20	11:00:00	G	2		X	X								
RG_FOBSC_WS_2020-06-18_1400_N	RG_FOBSC	WS	No	18-Jun-20	14:00:00	G	1				X							
RG_FOBSC_WS_2020-06-18_1400_N_NAL	RG_FOBSC	WS	No	18-Jun-20	14:00:00	G	2		X	X								
RG_FOUKI_WS_2020-06-17_1500_N	RG_FOUKI	WS	No	17-Jun-20	15:00:00	G	1				X							
RG_FOUKI_WS_2020-06-17_1500_N_NAL	RG_FOUKI	WS	No	17-Jun-20	15:00:00	G	2		X	X								
RG_FO26_WS_2020-06-17_0900_N_NAL	RG_FO26	WS	No	17-Jun-20	9:00:00	G	1				X							
RG_FO26_WS_2020-06-17_0900_N_NAL	RG_FO26	WS	No	17-Jun-20	9:00:00	G	2		X	X								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
Samples for total selenium have been preserved in the field. Dissolve selenium have been filtered and preserved. Speciation samples have been filtered and frozen.				

SERVICE REQUEST (rush - subject to availability)					
Regular (default)	X	**Sampler's Name**	**Peter Schnurr**	**Mobile #**	**647-967-9403**
Priority (2-3 business days) - 50% surcharge					
Emergency (1 Business Day) - 100% surcharge		**Sampler's Signature**		**Date/Time**	**June 29, 2020**
For Emergency <1 Day, ASAP or Weekend - Contact ALS					

PG 4/4

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 80088

Sparwood, BC · Kamloops, BC · Terrace, BC · Vancouver, BC · Prince George, BC · Tumbler Ridge, BC · Elkford, BC · Calgary, AB · Edmonton, AB · Ft. McMurray, AB · Hinton, AB · Red Deer, AB · Montreal, QC · Gillette, WY · Spokane, WA · Shelby, MT

INVOICE TO	DATE July 1 20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM) Teck Coal Ltd	CONSIGNEE (TO) Brooks Applied Labs
STREET West Line Creek Terminal #1	STREET 18804 N. Creek Parkway
CITY/PROVINCE Sparwood BC	POSTAL CODE
CITY/PROVINCE Bothell WA 98011	POSTAL CODE
SPECIAL INSTRUCTIONS	

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
6	Coolers - Water Samples	240 lbs

PAPS# RWHV80088

FREIGHT CHARGES
SHIPPER TO CHECK

☐ PREPAID ☐ COLLECT

If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IS AT OWNER'S RISK, WRITE ORD HERE

UNIT #	DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $
DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME
DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME 07:00

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, on the case of failure to make delivery within nine (9) months from the date of shipment. (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT Dalton Reynolds	DATE 7-2-20
SHIPPER SIGN	CONSIGNEE SIGN	TIME 07:00

WHITE: Office · YELLOW: Carrier · PINK: Consignee · GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED 6

AMIGOS PRINTING

Styrocooler #1 0.8°C IR#19 -0.8°C
Blue Ice
LCO TIDIS 125mL/60mL
LCO DryCreek - 125mL HD 60mL SP
FRO-AWTF SP 60mL
Teck EAF 125mL Amber

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 80088

Sparwood, BC · Kamloops, BC · Terrace, BC · Vancouver, BC · Prince George, BC · Tumbler Ridge, BC · Elkford, BC · Calgary, AB · Edmonton, AB · Ft. McMurray, AB · Hinton, AB · Red Deer, AB · Montreal, QC · Gillette, WY · Spokane, WA · Shelby, MT

INVOICE TO

DATE July 1 '20

BILL OF LADING #

PURCHASE ORDER NUMBER

SHIPPER (FROM) Teck Coal Ltd

CONSIGNEE (TO) Brooks Applied Labs

STREET West Line Creek Treatment

STREET 18804 N. Creek Pkwy

CITY/PROVINCE Sparwood BC

POSTAL CODE

CITY/PROVINCE Bothell WA 98011

POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
6	Coolers - Water Samples	240 lbs

PAPS# RWHV80088

FREIGHT CHARGES
SHIPPER TO CHECK

☐ PREPAID ☐ COLLECT

If not indicated, shipping will automatically move collect.

FEE

WAITING

XPU

CHARGES

FSC

US

SUB TOTAL

GST

TOTAL $

IF AT OWNER'S RISK, WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY

PICK UP TIME

DRIVER'S SIGNATURE - DELIVERY BY

FINISH TIME 07:00

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, on the case of failure to make delivery within nine (9) months from the date of shipment. (b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment, it is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT

CONSIGNEE PRINT Dalton Reynolds

SHIPPER SIGN

CONSIGNEE SIGN

DATE 7-2-20

TIME 07:00

WHITE: Office · YELLOW: Carrier · PINK: Consignee · GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED

AMIGOS PRINTING

Styrocooler #2
Blue Ice - 9.1 8.1 corrected IR#19

LCO TID 125ml
RG-FREO TID 125ml

STRAIGHT BILL OF LADING
NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.

250-425-7447

24 Hour Hot Shot Service

No. 80088

Sparwood, BC · Kamloops, BC · Terrace, BC · Vancouver, BC · Prince George, BC · Tumbler Ridge, BC · Elkford, BC · Calgary, AB · Edmonton, AB · Ft. McMurray, AB · Hinton, AB · Red Deer, AB · Montreal, QC · Gillette, WY · Spokane, WA · Shelby, MT

INVOICE TO	DATE July 1 20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM) Teck Coal Ltd	CONSIGNEE (TO) Brooks Analytical Labs
STREET West Line Creek Treatment	STREET 18804 N. Creek Pkwy
CITY/PROVINCE Sparwood BC	POSTAL CODE
CITY/PROVINCE Bothell WA 98011	POSTAL CODE

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
6	Coolers - Water Samples	240 lbs

PAPS# RWHV80088

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $ _____

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME
			07:00

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect.

FEE _____
WAITING _____
XPU _____
CHARGES _____
FSC _____
US _____
SUB TOTAL _____
GST _____
TOTAL $ _____
IF AT OWNER'S RISK, WRITE ORD HERE _____

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, oin the case of failure to make delivery within nine (9) months from the date of shipment. (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT Dalton Reynolds	DATE 7-2-20
SHIPPER SIGN	CONSIGNEE SIGN	TIME 07:00

WHITE: Office · YELLOW: Carrier · PINK: Consignee · GOLDENROAD: Shipper

GST # 864540398RT0001

NUMBER OF PIECES RECEIVED 6

AMIGOS PRINTING

Styrofoam Cooler #6

No COC, No CSC

Blue ice

LC SeT/D 120mL HDPE / 60mL HDPE FR SeT/D 125mL Amber glas

8.1°C

JMG 7/1/20

From: Peter Schnurr
To: Cole Cinelli; Meyer Carlie SPO; Jennifer Ings
Cc: Jeremy Maute; Collette Machado
Subject: RE: Brooks - Samples Received - 2027056 REP - Privileged and Confidential
Date: Thursday, July 23, 2020 6:53:17 AM
Attachments: image001.jpg

Hi Cole,

Thanks for catching that. Yes, please make all speciation samples have the ending "N' rather than "N_NAL"

Thanks,
Peter

Peter Schnurr, Ph.D., R.P.Bio.
Aquatic Scientist

Minnow_TrinityCo logo_CO

Minnow Environmental Inc. (A Trinity Consultants Company)
2 Lamb Street | Georgetown, Ontario L7G 3M9
905.873.3371 ext. 323

From: Cole Cinelli <cole@brooksapplied.com>
Sent: Wednesday, July 22, 2020 6:39 PM
To: Meyer Carlie SPO <Carlie.Meyer@teck.com>; Peter Schnurr <PSchnurr@minnow.ca>; Jennifer Ings <JIngs@minnow.ca>
Cc: Jeremy Maute <Jeremy@brooksapplied.com>; Collette Machado <Collette@brooksapplied.com>
Subject: RE: Brooks - Samples Received - 2027056 REP - Privileged and Confidential

Afternoon,

Apologies for the late follow up, when reviewing the data for this report I noticed a couple of the sample IDs looked out of place. For the sample ID for the speciation fraction on RG_FOBKS would you like the "N_NAL" changed to just an "N" to match the other speciation fractions from the COC? Also, the same thing would go for sample RG_FO26. Please let us know so it can potentially be corrected in the final report.

Thank you,

Cole Cinelli
Project Coordinator
206-632-6206, ext. 164
cole@brooksapplied.com

BROOKS APPLIED LABS

Meaningful Metals Data and Advanced Speciation Solutions

P: 206-632-6206 | F: 206-632-6017 | **18804 North Creek Parkway, Suite 100, Bothell, WA 98011, USA**

From: Cole Cinelli
Sent: Friday, July 3, 2020 11:53 AM
To: Meyer Carlie SPO <Carlie.Meyer@teck.com>; pschnurr@minnow.ca; jings@minnow.ca
Cc: Jeremy Maute <Jeremy@brooksapplied.com>; Collette Machado <Collette@brooksapplied.com>
Subject: Brooks - Samples Received - 2027056 REP - Privileged and Confidential

Morning,

This is confirmation that samples from the Regional Effects Program were received at Brooks Applied Labs on July 2, 2020. The samples arrived intact, at an acceptable temperature, and were logged in for the following TAT:

2027056 – 10 to 14 business days

Please note, the turnaround time will be pushed back one day due to the 4th of July holiday.

I've attached a copy of the COC for your reference. Please let us know if you have any questions.

Thank you,

Cole Cinelli
Project Coordinator
206-632-6206, ext. 164
cole@brooksapplied.com

BROOKS APPLIED LABS

Meaningful Metals Data and Advanced Speciation Solutions

P: 206-632-6206 | F: 206-632-6017 | **18804 North Creek Parkway, Suite 100, Bothell, WA 98011, USA**

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BROOKS APPLIED LABS
18804 North Creek Parkway, Ste 100, Bothell, WA 98011 • USA • T: 206 632 6206 F: 206 632 6017 • info@brooksapplied.com

October 21, 2020

Teck Resources Limited - Vancouver
Cait Good
421 Pine Avenue
Sparwood, B.C. CANADA V0B2G0
Cait.Good@Teck.com

Re: REP

Ms. Good,

On October 1, 2020, Brooks Applied Labs (BAL) received nineteen (19) aqueous samples. The samples were logged-in for total recoverable selenium [*Se*], dissolved Se [*Se*], and Se speciation analyses, according to the chain-of-custody (COC) form. The sample fractions logged in for Se speciation and dissolved Se had been field-filtered prior to receipt at BAL; sample fractions for total recoverable and dissolved Se had also been preserved by the client prior to receipt. All samples were stored according to BAL SOPs.

Total Recoverable and Dissolved Se
Each aqueous sample fraction for total recoverable or dissolved Se was digested in a closed vessel (bomb) with nitric and hydrochloric acids. The resulting digests were analyzed for Se content via inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS instrumentation uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website, brooksapplied.com.

Selenium Speciation
Each aqueous sample was analyzed for selenium speciation using ion chromatography inductively coupled plasma collision reaction cell mass spectrometry (IC-ICP-CRC-MS). Selenium species are chromatographically separated on an ion exchange column and then quantified using inductively coupled plasma collision reaction cell mass spectrometry (ICP-CRC-MS); for more information on this determinative technique, please visit the *Interference Reduction Technology* section on our website. The chromatographic method applied for the analyses provides greater retention of methylseleninic acid and selenomethionine, allowing for more definitive quantitation of these species.

In accordance with the quotation issued for this project, selenium speciation was defined as dissolved selenite [*Se(IV)*], selenate [*Se(VI)*], selenocyanate [*SeCN*], methylseleninic acid [*MeSe(IV)*], selenomethionine [*SeMet*], selenosulfate [$SeSO_3$], and dimethylselenoxide [*DMSeO*]. An unknown selenium species eluting between MeSe(IV) and SeMet is also reported [*Se Unk A*]. Research at BAL has indicated that [*Se Unk A*] is a product of the oxidation of volatile selenium species present in some client samples. The total concentration of any remaining unidentified selenium-containing species detected in each sample has also been reported as [*Unk Se Sp]*.

DMSeO elutes early in the chromatographic run due to the nature of the molecule and the applied chromatographic separation method. Since this species elutes near the dead volume, additional selenium species may coelute. Alternate methods can be applied, upon client request, to increase the separation of DMSeO from potentially co-eluting selenium species.

Chromatographic interference, as indicated by an elevated baseline or co-eluting peak, was observed for selenosulfate in several client samples. Due to potential bias in the obtained results, the affected data have been qualified as estimates (**J-1**). Upon client request, Brooks Applied Labs can apply a higher dilution to these samples to potentially mitigate the chromatographic interferences, but a higher dilution would elevate the detection limits for SeMet above the client's requested limit of 0.010µg/L.

Poor mass balance was observed when the sum of Se species was compared to the corresponding dissolved Se results for several samples in this work order. Container labels were checked and there was no indication of samples mis-labeled by BAL staff. Re-analyses confirmed that the Se concentrations in the Se speciation fractions were significantly less than the dissolved Se fractions, suggesting sampling heterogeneity. The reported results are therefore deemed representative of the submitted containers.

The results were not method blank corrected, as described in the calculations section of the relevant BAL SOPs and were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

In instances where a matrix spike/matrix spike duplicate (MS/MSD) set was spiked at a level less than the native sample concentration, the recoveries and the relative percent difference (RPD) are not considered valid indicators of data quality. In such instances, the recoveries of the laboratory fortified blanks (BS) and/or standard reference materials (SRM) demonstrate the accuracy of the applied methods. When the spiking level was less than 25% of the native sample concentration, the spike recovery was not reported (NR) and the relative percent difference (RPD) of the MS/MSD set was not calculated (N/C).

Except for the items noted above, all data were reported without qualification (aside from concentration qualifiers). All associated quality control sample results met the acceptance criteria.

BAL, an accredited laboratory, certifies that the reported results of all analyses for which BAL is NELAP accredited meet all NELAP requirements. For more information please see the *Report Information* page.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Jeremy Maute
Senior Project Manager
Jeremy@brooksapplied.com

Report Information

Laboratory Accreditation

BAL is accredited by the *National Environmental Laboratory Accreditation Program* (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87982) and is certified to perform many environmental analyses. BAL is also certified by many other states to perform environmental analyses. For a current list of our accreditations /certifications, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/> or review Tables 1 and 2 in our Accreditation Information. Results reported relate only to the samples listed in the report.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received
BAL	Brooks Applied Labs
BLK	method blank
BS	blank spike
CAL	calibration standard
CCB	continuing calibration blank
CCV	continuing calibration verification
COC	chain of custody record
D	dissolved fraction
DUP	duplicate
IBL	instrument blank
ICV	initial calibration verification
MDL	method detection limit
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
ND	non-detect
NR	non-reportable
N/C	not calculated
PS	post preparation spike
REC	percent recovery
RPD	relative percent difference
SCV	secondary calibration verification
SOP	standard operating procedure
SRM	reference material
T	total fraction
TR	total recoverable fraction

Definition of Data Qualifiers

(Effective 3/23/2020)

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

These qualifiers are based on those previously utilized by Brooks Applied Labs, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review; USEPA; January 2010. These supersede all previous qualifiers ever employed by BAL.

Accreditation Information

Table 1. Accredited method/matrix/analytes for TNI

Issued by: State of Florida Dept. of Health (The NELAC Institute 2016 Standard)
Issued on: July 27, 2020; Valid to: June 30, 2021
Certificate Number: E87982-35

Method	Matrix	TNI Accredited Analyte(s)
EPA 1638	Non-Potable Waters	Ag, Cd, Cu, Ni, Pb, Sb, Se, Tl, Zn
EPA 200.8	Non-Potable Waters	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
EPA 6020	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, U, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn
BAL-5000	Non-Potable Waters	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn, Hardness
	Solids/Chemicals	Ag, As, B, Be, Cd, Co, Cr, Cu, Pb, Mo, Ni, Sb, Se, Sn, Sr, Tl, V, Zn
	Biological	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Tl, V, Zn
EPA 1640	Non-Potable Waters	Ag, As, Cd, Cu, Pb, Ni, Zn
EPA 1631E	Non-Potable Waters, Solids/Chemicals & Biological	Total Mercury
EPA 1630	Non-Potable Waters	Methyl Mercury
BAL-3200	Solids/Chemicals & Biological	Methyl Mercury
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs
BAL-4200	Non-Potable Waters	Se(IV), Se(VI)
BAL-4201	Non-Potable Waters	Se(IV), Se(VI)
BAL-4300	Non-Potable Waters Solid/Chemicals	Cr(VI)
SM2340B	Non-Potable Waters	Hardness

Accreditation Information

Table 2. Accredited method/matrix/analytes for ISO (1), Non-Governmental TNI (2), and DoD/DOE (3)

Issued by: ANAB

Issued on: January 10, 2020; Valid to: March 30, 2022

Method	Matrix	ISO and Non-Gov. TNI Accredited Analyte(s)	DoD/DOE Accredited Analytes
EPA 1638 Mod EPA 200.8 Mod EPA 6020 Mod BAL-5000	Non-Potable Waters	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, U, V, Zn	Ag, Al, As, Ba, Ca, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Ni, Sb, Se, V, Zn
	Solids/Chemicals & Biological	Ag, Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn	Ag, As, Cd, Cr, Cu, Pb, Ni, Se, Zn
EPA 1640 Mod	Non-Potable Waters	Ag, As, Be, Cd, Cr, Co, Cu, Pb, Ni, Se, Tl, V, Zn	Not Accredited
EPA 1631E Mod BAL-3100 (waters) BAL-3101 (solids)	Non-Potable Waters, Solids/Chemicals & Biological/Food	Total Mercury	Total Mercury
EPA 1630 Mod BAL-3200	Non-Potable Waters, Solids/Chemicals Biological	Methyl Mercury	Methyl Mercury (excluding Solids/Chemicals)
EPA 1632A Mod BAL-3300	Non-Potable Waters Solids/Chemicals	Inorganic Arsenic, As(III)	Inorganic Arsenic. As(III) for waters only.
	Biological/Food	Inorganic Arsenic	Inorganic Arsenic (excluding Food)
AOAC 2015.01 Mod BAL-5000 by BAL-5040	Food	As, Cd, Hg, Pb	Not Accredited
BAL-4100	Non-Potable Waters	As(III), As(V), DMAs, MMAs	Not Accredited
	Biological by BAL-4115	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4101	Food by BAL-4116	Inorganic Arsenic, DMAs, MMAs	Not Accredited
BAL-4200	Non-Potable Waters	Se(IV), Se(VI), SeCN	Not Accredited
BAL-4201	Non-Potable Waters	Se(IV), Se(VI), SeCN, SeMet	Not Accredited
BAL-4300	Non-Potable Waters, Solid/Chemicals	Cr(VI)	Cr(VI)
SM 3500-Fe BAL-4500	Non-Potable Waters	Fe, Fe(II)	Not Accredited
SM2340B	Non-Potable Waters	Hardness	Hardness
SM 2540G EPA 160.3 BAL-0501	Solids/Chemicals & Biological	% Dry Weight	% Dry Weight

(1) ISO/IEC 17025:2017 – Certificate Number ADE-1447.2
(2) Non-Governmental NELAC Institute 2016 Standard – Certificate Number ADE-1447.1
(3) Department of Defense/Energy Consolidated Quality Systems Manual v. 5.3 – Certificate Numbers ADE-1447 for DoD, ADE-1447.3 for DOE.

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL	2040045-01	WS	Sample	09/15/2020	10/01/2020
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL	2040045-02	WS	Sample	09/15/2020	10/01/2020
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL	2040045-03	WS	Sample	09/15/2020	10/01/2020
RG_FO26_WS_LAEMP_FRO_2020-09_NAL	2040045-04	WS	Sample	09/12/2020	10/01/2020
RG_FO26_WS_LAEMP_FRO_2020-09_NAL	2040045-05	WS	Sample	09/12/2020	10/01/2020
RG_FO26_WS_LAEMP_FRO_2020-09_NAL	2040045-06	WS	Sample	09/12/2020	10/01/2020
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL	2040045-07	WS	Sample	09/16/2020	10/01/2020
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL	2040045-08	WS	Sample	09/16/2020	10/01/2020
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL	2040045-09	WS	Sample	09/16/2020	10/01/2020
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL	2040045-10	WS	Sample	09/10/2020	10/01/2020
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL	2040045-11	WS	Sample	09/10/2020	10/01/2020
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL	2040045-12	WS	Sample	09/10/2020	10/01/2020
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL	2040045-13	WS	Sample	09/10/2020	10/01/2020
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL	2040045-14	WS	Sample	09/10/2020	10/01/2020
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL	2040045-15	WS	Sample	09/10/2020	10/01/2020
RG_FRUPO_WS_LAEMP_FRO_2020-09_NAL	2040045-16	WS	Sample	09/12/2020	10/01/2020
RG_FRUPO_WS_LAEMP_FRO_2020-09_NAL	2040045-17	WS	Sample	09/12/2020	10/01/2020
RG_FRUPO_WS_LAEMP_FRO_2020-09_NAL	2040045-18	WS	Sample	09/12/2020	10/01/2020
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL	2040045-19	WS	Sample	09/11/2020	10/01/2020
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL	2040045-20	WS	Sample	09/11/2020	10/01/2020
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL	2040045-21	WS	Sample	09/11/2020	10/01/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_FO22_WS_LAEMP_FRO_2020-09_NAL	2040045-22	WS	Sample	09/11/2020	10/01/2020
RG_FO22_WS_LAEMP_FRO_2020-09_NAL	2040045-23	WS	Sample	09/11/2020	10/01/2020
RG_FO22_WS_LAEMP_FRO_2020-09_NAL	2040045-24	WS	Sample	09/11/2020	10/01/2020
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL	2040045-25	WS	Sample	09/15/2020	10/01/2020
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL	2040045-26	WS	Sample	09/15/2020	10/01/2020
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL	2040045-27	WS	Sample	09/15/2020	10/01/2020
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL	2040045-28	WS	Sample	09/21/2020	10/01/2020
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL	2040045-29	WS	Sample	09/21/2020	10/01/2020
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL	2040045-30	WS	Sample	09/21/2020	10/01/2020
RG_MP1_WS_LAEMP_FRO_2020-09_NAL	2040045-31	WS	Sample	09/15/2020	10/01/2020
RG_MP1_WS_LAEMP_FRO_2020-09_NAL	2040045-32	WS	Sample	09/15/2020	10/01/2020
RG_MP1_WS_LAEMP_FRO_2020-09_NAL	2040045-33	WS	Sample	09/15/2020	10/01/2020
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL	2040045-34	WS	Sample	09/21/2020	10/01/2020
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL	2040045-35	WS	Sample	09/21/2020	10/01/2020
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL	2040045-36	WS	Sample	09/21/2020	10/01/2020
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL	2040045-37	WS	Sample	09/14/2020	10/01/2020
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL	2040045-38	WS	Sample	09/14/2020	10/01/2020
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL	2040045-39	WS	Sample	09/14/2020	10/01/2020
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL	2040045-40	WS	Sample	09/10/2020	10/01/2020
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL	2040045-41	WS	Sample	09/10/2020	10/01/2020
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL	2040045-42	WS	Sample	09/10/2020	10/01/2020

Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL	2040045-43	WS	Sample	09/17/2020	10/01/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL	2040045-44	WS	Sample	09/17/2020	10/01/2020
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL	2040045-45	WS	Sample	09/17/2020	10/01/2020
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL	2040045-46	WS	Sample	09/18/2020	10/01/2020
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL	2040045-47	WS	Sample	09/18/2020	10/01/2020
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL	2040045-48	WS	Sample	09/18/2020	10/01/2020
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL	2040045-49	WS	Sample	09/16/2020	10/01/2020
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL	2040045-50	WS	Sample	09/16/2020	10/01/2020
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL	2040045-51	WS	Sample	09/16/2020	10/01/2020
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL	2040045-52	WS	Sample	09/22/2020	10/01/2020
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL	2040045-53	WS	Sample	09/22/2020	10/01/2020
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL	2040045-54	WS	Sample	09/22/2020	10/01/2020
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL	2040045-55	WS	Sample	09/11/2020	10/01/2020
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL	2040045-56	WS	Sample	09/11/2020	10/01/2020
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL	2040045-57	WS	Sample	09/11/2020	10/01/2020

Batch Summary

Analyte	Lab Matrix	Method	Prepared	Analyzed	Batch	Sequence
DMSeO	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
MeSe(IV)	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
Se	Water	EPA 1638 Mod	10/01/2020	10/03/2020	B202657	2001198
Se Unk A	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
Se(IV)	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
Se(VI)	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
SeCN	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
SeMet	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
SeSO3	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191
Unk Se Sp	Water	SOP BAL-4201	10/01/2020	10/02/2020	B202647	2001191

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL										
2040045-01	Se	WS	TR	0.844		0.192	0.528	µg/L	B202657	2001198
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL										
2040045-02	Se	WS	D	0.999		0.192	0.528	µg/L	B202657	2001198
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL										
2040045-03	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-03	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-03	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-03	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202647	2001191
2040045-03	Se(VI)	WS	D	0.835		0.060	0.125	µg/L	B202647	2001191
2040045-03	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-03	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-03	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
2040045-03	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FO26_WS_LAEMP_FRO_2020-09_NAL										
2040045-04	Se	WS	TR	0.496	J	0.192	0.528	µg/L	B202657	2001198
RG_FO26_WS_LAEMP_FRO_2020-09_NAL										
2040045-05	Se	WS	D	0.624		0.192	0.528	µg/L	B202657	2001198
RG_FO26_WS_LAEMP_FRO_2020-09_NAL										
2040045-06	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-06	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-06	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-06	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202647	2001191
2040045-06	Se(VI)	WS	D	0.547		0.060	0.125	µg/L	B202647	2001191
2040045-06	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-06	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-06	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
2040045-06	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL										
2040045-07	Se	WS	TR	0.487	J	0.192	0.528	µg/L	B202657	2001198
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL										
2040045-08	Se	WS	D	0.530		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL										
2040045-09	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-09	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-09	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-09	Se(IV)	WS	D	≤ 0.050	U	0.050	0.125	µg/L	B202647	2001191
2040045-09	Se(VI)	WS	D	0.503		0.060	0.125	µg/L	B202647	2001191
2040045-09	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-09	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-09	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
2040045-09	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL										
2040045-10	Se	WS	TR	24.9		0.192	0.528	µg/L	B202657	2001198
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL										
2040045-11	Se	WS	D	25.4		0.192	0.528	µg/L	B202657	2001198
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL										
2040045-12	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-12	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-12	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-12	Se(IV)	WS	D	0.081	J	0.050	0.125	µg/L	B202647	2001191
2040045-12	Se(VI)	WS	D	23.5		0.060	0.125	µg/L	B202647	2001191
2040045-12	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-12	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-12	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-12	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL										
2040045-13	Se	WS	TR	36.8		0.192	0.528	µg/L	B202657	2001198
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL										
2040045-14	Se	WS	D	37.5		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL										
2040045-15	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-15	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-15	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-15	Se(IV)	WS	D	0.117	J	0.050	0.125	µg/L	B202647	2001191
2040045-15	Se(VI)	WS	D	34.8		0.060	0.125	µg/L	B202647	2001191
2040045-15	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-15	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-15	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-15	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FRUPO _WS_LAEMP_FRO_2020-09_NAL										
2040045-16	Se	WS	TR	84.4		0.192	0.528	µg/L	B202657	2001198
RG_FRUPO _WS_LAEMP_FRO_2020-09_NAL										
2040045-17	Se	WS	D	85.2		0.192	0.528	µg/L	B202657	2001198
RG_FRUPO _WS_LAEMP_FRO_2020-09_NAL										
2040045-18	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-18	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-18	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-18	Se(IV)	WS	D	0.095	J	0.050	0.125	µg/L	B202647	2001191
2040045-18	Se(VI)	WS	D	79.1		0.060	0.125	µg/L	B202647	2001191
2040045-18	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-18	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-18	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-18	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL										
2040045-19	Se	WS	TR	78.8		0.192	0.528	µg/L	B202657	2001198
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL										
2040045-20	Se	WS	D	78.7		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL										
2040045-21	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-21	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-21	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-21	Se(IV)	WS	D	0.071	J	0.050	0.125	µg/L	B202647	2001191
2040045-21	Se(VI)	WS	D	62.4		0.060	0.125	µg/L	B202647	2001191
2040045-21	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-21	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-21	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-21	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FO22_WS_LAEMP_FRO_2020-09_NAL										
2040045-22	Se	WS	TR	77.4		0.192	0.528	µg/L	B202657	2001198
RG_FO22_WS_LAEMP_FRO_2020-09_NAL										
2040045-23	Se	WS	D	76.5		0.192	0.528	µg/L	B202657	2001198
RG_FO22_WS_LAEMP_FRO_2020-09_NAL										
2040045-24	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-24	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-24	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-24	Se(IV)	WS	D	0.109	J	0.050	0.125	µg/L	B202647	2001191
2040045-24	Se(VI)	WS	D	74.3		0.060	0.125	µg/L	B202647	2001191
2040045-24	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-24	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-24	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-24	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL										
2040045-25	Se	WS	TR	19.9		0.192	0.528	µg/L	B202657	2001198
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL										
2040045-26	Se	WS	D	20.8		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL										
2040045-27	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-27	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-27	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-27	Se(IV)	WS	D	0.067	J	0.050	0.125	µg/L	B202647	2001191
2040045-27	Se(VI)	WS	D	15.4		0.060	0.125	µg/L	B202647	2001191
2040045-27	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-27	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-27	SeSO3	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
2040045-27	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL										
2040045-28	Se	WS	TR	43.5		0.192	0.528	µg/L	B202657	2001198
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL										
2040045-29	Se	WS	D	40.8		0.192	0.528	µg/L	B202657	2001198
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL										
2040045-30	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-30	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-30	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-30	Se(IV)	WS	D	0.152		0.050	0.125	µg/L	B202647	2001191
2040045-30	Se(VI)	WS	D	38.2		0.060	0.125	µg/L	B202647	2001191
2040045-30	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-30	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-30	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-30	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_MP1_WS_LAEMP_FRO_2020-09_NAL										
2040045-31	Se	WS	TR	44.3		0.192	0.528	µg/L	B202657	2001198
RG_MP1_WS_LAEMP_FRO_2020-09_NAL										
2040045-32	Se	WS	D	45.9		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_MP1_WS_LAEMP_FRO_2020-09_NAL										
2040045-33	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-33	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-33	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-33	Se(IV)	WS	D	0.179		0.050	0.125	µg/L	B202647	2001191
2040045-33	Se(VI)	WS	D	36.9		0.060	0.125	µg/L	B202647	2001191
2040045-33	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-33	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-33	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-33	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL										
2040045-34	Se	WS	TR	43.5		0.192	0.528	µg/L	B202657	2001198
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL										
2040045-35	Se	WS	D	45.4		0.192	0.528	µg/L	B202657	2001198
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL										
2040045-36	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-36	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-36	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-36	Se(IV)	WS	D	0.258		0.050	0.125	µg/L	B202647	2001191
2040045-36	Se(VI)	WS	D	28.0		0.060	0.125	µg/L	B202647	2001191
2040045-36	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-36	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-36	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-36	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL										
2040045-37	Se	WS	TR	48.3		0.192	0.528	µg/L	B202657	2001198
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL										
2040045-38	Se	WS	D	47.8		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL										
2040045-39	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-39	MeSe(IV)	WS	D	0.016	J	0.010	0.025	µg/L	B202647	2001191
2040045-39	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-39	Se(IV)	WS	D	0.314		0.050	0.125	µg/L	B202647	2001191
2040045-39	Se(VI)	WS	D	55.3		0.060	0.125	µg/L	B202647	2001191
2040045-39	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-39	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-39	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-39	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL										
2040045-40	Se	WS	TR	42.1		0.192	0.528	µg/L	B202657	2001198
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL										
2040045-41	Se	WS	D	44.3		0.192	0.528	µg/L	B202657	2001198
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL										
2040045-42	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-42	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-42	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-42	Se(IV)	WS	D	0.191		0.050	0.125	µg/L	B202647	2001191
2040045-42	Se(VI)	WS	D	30.6		0.060	0.125	µg/L	B202647	2001191
2040045-42	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-42	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-42	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-42	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL										
2040045-43	Se	WS	TR	104		0.192	0.528	µg/L	B202657	2001198
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL										
2040045-44	Se	WS	D	104		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL										
2040045-45	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-45	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-45	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-45	Se(IV)	WS	D	0.238		0.050	0.125	µg/L	B202647	2001191
2040045-45	Se(VI)	WS	D	60.1		0.060	0.125	µg/L	B202647	2001191
2040045-45	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-45	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-45	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-45	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL										
2040045-46	Se	WS	TR	97.4		0.192	0.528	µg/L	B202657	2001198
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL										
2040045-47	Se	WS	D	94.8		0.192	0.528	µg/L	B202657	2001198
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL										
2040045-48	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-48	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-48	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-48	Se(IV)	WS	D	0.262		0.050	0.125	µg/L	B202647	2001191
2040045-48	Se(VI)	WS	D	69.2		0.060	0.125	µg/L	B202647	2001191
2040045-48	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-48	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-48	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-48	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL										
2040045-49	Se	WS	TR	95.6		0.192	0.528	µg/L	B202657	2001198
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL										
2040045-50	Se	WS	D	95.6		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL										
2040045-51	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-51	MeSe(IV)	WS	D	0.015	J	0.010	0.025	µg/L	B202647	2001191
2040045-51	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-51	Se(IV)	WS	D	0.251		0.050	0.125	µg/L	B202647	2001191
2040045-51	Se(VI)	WS	D	73.8		0.060	0.125	µg/L	B202647	2001191
2040045-51	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-51	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-51	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-51	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL										
2040045-52	Se	WS	TR	91.7		0.192	0.528	µg/L	B202657	2001198
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL										
2040045-53	Se	WS	D	92.4		0.192	0.528	µg/L	B202657	2001198
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL										
2040045-54	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-54	MeSe(IV)	WS	D	0.023	J	0.010	0.025	µg/L	B202647	2001191
2040045-54	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-54	Se(IV)	WS	D	0.375		0.050	0.125	µg/L	B202647	2001191
2040045-54	Se(VI)	WS	D	90.9		0.060	0.125	µg/L	B202647	2001191
2040045-54	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-54	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-54	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-54	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL										
2040045-55	Se	WS	TR	69.4		0.192	0.528	µg/L	B202657	2001198
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL										
2040045-56	Se	WS	D	71.6		0.192	0.528	µg/L	B202657	2001198

Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL										
2040045-57	DMSeO	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-57	MeSe(IV)	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-57	Se Unk A	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-57	Se(IV)	WS	D	0.113	J	0.050	0.125	µg/L	B202647	2001191
2040045-57	Se(VI)	WS	D	51.7		0.060	0.125	µg/L	B202647	2001191
2040045-57	SeCN	WS	D	≤ 0.040	U	0.040	0.125	µg/L	B202647	2001191
2040045-57	SeMet	WS	D	≤ 0.010	U	0.010	0.025	µg/L	B202647	2001191
2040045-57	SeSO3	WS	D	≤ 0.060	J-1 U	0.060	0.125	µg/L	B202647	2001191
2040045-57	Unk Se Sp	WS	D	≤ 0.060	U	0.060	0.125	µg/L	B202647	2001191

Accuracy & Precision Summary

Batch: B202647
Lab Matrix: Water
Method: SOP BAL-4201

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202647-BS1	**Blank Spike, (1923027)**						
	MeSe(IV)		5.095	5.464	µg/L	107% 75-125	
	Se(IV)		5.000	4.821	µg/L	96% 75-125	
	Se(VI)		5.000	4.598	µg/L	92% 75-125	
	SeCN		5.015	4.717	µg/L	94% 75-125	
	SeMet		4.932	4.797	µg/L	97% 75-125	
B202647-DUP7	**Duplicate, (2040045-39)**						
	DMSeO	ND		ND	µg/L		N/C 25
	MeSe(IV)	0.016		0.016	µg/L		5% 25
	Se Unk A	ND		ND	µg/L		N/C 25
	Se(IV)	0.314		0.317	µg/L		0.9% 25
	Se(VI)	55.28		55.06	µg/L		0.4% 25
	SeCN	ND		ND	µg/L		N/C 25
	SeMet	ND		ND	µg/L		N/C 25
	SeSO3	ND		ND	µg/L		N/C 25
	Unk Se Sp	ND		ND	µg/L		N/C 25
B202647-MS7	**Matrix Spike, (2040045-39)**						
	Se(IV)	0.314	4.900	5.062	µg/L	97% 75-125	
	Se(VI)	55.28	5.100	59.19	µg/L	NR 75-125	
	SeCN	ND	4.905	4.588	µg/L	94% 75-125	
	SeMet	ND	0.9885	0.944	µg/L	95% 75-125	
B202647-MSD7	**Matrix Spike Duplicate, (2040045-39)**						
	Se(IV)	0.314	4.900	5.083	µg/L	97% 75-125	0.4% 25
	Se(VI)	55.28	5.100	58.29	µg/L	NR 75-125	N/C 25
	SeCN	ND	4.905	4.603	µg/L	94% 75-125	0.3% 25
	SeMet	ND	0.9885	0.939	µg/L	95% 75-125	0.6% 25

Accuracy & Precision Summary

Batch: B202657
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202657-BS1	**Blank Spike, (2035012)**						
	Se		200.0	186.5	µg/L	93% 75-125	
B202657-BS2	**Blank Spike, (2035012)**						
	Se		200.0	185.8	µg/L	93% 75-125	
B202657-BS3	**Blank Spike, (2035012)**						
	Se		200.0	184.7	µg/L	92% 75-125	
B202657-BS4	**Blank Spike, (2035012)**						
	Se		200.0	185.9	µg/L	93% 75-125	
B202657-BS5	**Blank Spike, (2035012)**						
	Se		200.0	181.8	µg/L	91% 75-125	
B202657-BS6	**Blank Spike, (2035012)**						
	Se		200.0	181.4	µg/L	91% 75-125	
B202657-BS7	**Blank Spike, (2035012)**						
	Se		200.0	182.7	µg/L	91% 75-125	
B202657-BS8	**Blank Spike, (2035012)**						
	Se		200.0	181.2	µg/L	91% 75-125	
B202657-SRM1	**Reference Material (2033007, T221)**						
	Se		3.800	3.462	µg/L	91% 75-125	
B202657-SRM2	**Reference Material (2033007, T221)**						
	Se		3.800	3.423	µg/L	90% 75-125	
B202657-SRM3	**Reference Material (2033007, T221)**						
	Se		3.800	3.730	µg/L	98% 75-125	

Accuracy & Precision Summary

Batch: B202657
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202657-SRM4	**Reference Material (2033007, T221)**						
	Se		3.800	3.612	µg/L	95% 75-125	
B202657-SRM5	**Reference Material (2033007, T221)**						
	Se		3.800	3.430	µg/L	90% 75-125	
B202657-SRM6	**Reference Material (2033007, T221)**						
	Se		3.800	3.530	µg/L	93% 75-125	
B202657-SRM7	**Reference Material (2033007, T221)**						
	Se		3.800	3.338	µg/L	88% 75-125	
B202657-SRM8	**Reference Material (2033007, T221)**						
	Se		3.800	3.256	µg/L	86% 75-125	
B202657-DUP4	**Duplicate, (2040045-10)**						
	Se	24.93		25.99	µg/L		4% 20
B202657-MS4	**Matrix Spike, (2040045-10)**						
	Se	24.93	220.0	247.0	µg/L	101% 75-125	
B202657-MSD4	**Matrix Spike Duplicate, (2040045-10)**						
	Se	24.93	220.0	237.5	µg/L	97% 75-125	4% 20
B202657-DUP5	**Duplicate, (2040045-19)**						
	Se	78.82		77.53	µg/L		2% 20
B202657-MS5	**Matrix Spike, (2040045-19)**						
	Se	78.82	220.0	280.3	µg/L	92% 75-125	
B202657-MSD5	**Matrix Spike Duplicate, (2040045-19)**						
	Se	78.82	220.0	280.9	µg/L	92% 75-125	0.2% 20

Accuracy & Precision Summary

Batch: B202657
Lab Matrix: Water
Method: EPA 1638 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B202657-DUP6	**Duplicate, (2040045-31)**						
	Se	44.34		45.02	µg/L		2% 20
B202657-MS6	**Matrix Spike, (2040045-31)**						
	Se	44.34	220.0	256.7	µg/L	97% 75-125	
B202657-MSD6	**Matrix Spike Duplicate, (2040045-31)**						
	Se	44.34	220.0	261.0	µg/L	98% 75-125	2% 20
B202657-DUP7	**Duplicate, (2040045-49)**						
	Se	95.63		96.68	µg/L		1% 20
B202657-MS7	**Matrix Spike, (2040045-49)**						
	Se	95.63	220.0	305.2	µg/L	95% 75-125	
B202657-MSD7	**Matrix Spike Duplicate, (2040045-49)**						
	Se	95.63	220.0	299.5	µg/L	93% 75-125	2% 20

Method Blanks & Reporting Limits

Batch: B202647
Matrix: Water
Method: SOP BAL-4201
Analyte: DMSeO

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: MeSe(IV)

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Analyte: Se Unk A

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005
MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: Se(IV)

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.010
MRL: 0.025

Analyte: Se(VI)

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: SeCN

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.008
MRL: 0.025

Analyte: SeMet

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.005

MDL: 0.002
MRL: 0.005

Method Blanks & Reporting Limits

Analyte: SeSO3

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Analyte: Unk Se Sp

Sample	Result	Units
B202647-BLK1	0.00	µg/L
B202647-BLK2	0.00	µg/L
B202647-BLK3	0.00	µg/L
B202647-BLK4	0.00	µg/L

Average: 0.000
Limit: 0.025

MDL: 0.012
MRL: 0.025

Method Blanks & Reporting Limits

Batch: B202657
Matrix: Water
Method: EPA 1638 Mod
Analyte: Se

Sample	Result	Units
B202657-BLK1	0.090	µg/L
B202657-BLK2	0.106	µg/L
B202657-BLK3	0.020	µg/L
B202657-BLK4	0.071	µg/L
B202657-BLK5	0.086	µg/L
B202657-BLK6	0.073	µg/L
B202657-BLK7	0.011	µg/L
B202657-BLK8	0.091	µg/L

Average: 0.068
Limit: 0.480

MDL: 0.175
MRL: 0.480

Sample Containers

Lab ID: 2040045-01
Sample: RG_HENUP_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-02
Sample: RG_HENUP_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-03
Sample: RG_HENUP_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-04
Sample: RG_FO26_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-05
Sample: RG_FO26_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-06
Sample: RG_FO26_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-07
Sample: RG_UFR1_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-08
Sample: RG_UFR1_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-09
Sample: RG_UFR1_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-10
Sample: RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-11
Sample: RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-12
Sample: RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-13
Sample: RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-14
Sample: RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-15
Sample: RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-16
Sample: RG_FRUPO_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-17
Sample: RG_FRUPO _WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-18
Sample: RG_FRUPO _WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/12/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-19
Sample: RG_FODPO_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-20
Sample: RG_FODPO_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-21
Sample: RG_FODPO_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-22
Sample: RG_FO22_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-23
Sample: RG_FO22_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-24
Sample: RG_FO22_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-25
Sample: RG_FODHE_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-26
Sample: RG_FODHE_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-27
Sample: RG_FODHE_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-28
Sample: RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/21/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-29
Sample: RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/21/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-30
Sample: RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/21/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-31
Sample: RG_MP1_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-32
Sample: RG_MP1_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-33
Sample: RG_MP1_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/15/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-34
Sample: RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/21/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-35
Sample: RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/21/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-36
Sample: RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/21/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-37
Sample: RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/14/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-38
Sample: RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/14/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-39
Sample: RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/14/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-40
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Sample Containers

Lab ID: 2040045-41
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-42
Sample: RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/10/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-43
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-44
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Sample Containers

Lab ID: 2040045-45
Sample: RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/17/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-46
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/18/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-47
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/18/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-48
Sample: RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/18/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Sample Containers

Lab ID: 2040045-49
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-50
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-51
Sample: RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/16/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-52
Sample: RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/22/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Sample Containers

Lab ID: 2040045-53
Sample: RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/22/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-54
Sample: RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/22/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Lab ID: 2040045-55
Sample: RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Lab ID: 2040045-56
Sample: RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL
Report Matrix: WS
Sample Type: Sample + Sum
Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Client-Provided - TM	120 mL	na	10% HNO3 (BAL)	1950008	<2	Styrofoam Cooler #9 - 2040045

Sample Containers

Lab ID: 2040045-57
Sample: RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL

Report Matrix: WS
Sample Type: Sample + Sum

Collected: 09/11/2020
Received: 10/01/2020

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Cent Tube 15mL Se-Sp	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
B	XTRA_VOL	15 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045
C	XTRA_VOL	120 mL	na	none	na	na	Styrofoam Cooler #7 - 2040045

Shipping Containers

Styrofoam Cooler #7 - 2040045

Received: October 1, 2020 7:00
Tracking No: 81528 via Courier
Coolant Type: Ice
Temperature: 0.3 °C

Description: Styrofoam Cooler #7
Damaged in transit? No
Returned to client? No
Comments: IR #21

Custody seals present? No
Custody seals intact? No
COC present? Yes

Styrofoam Cooler #9 - 2040045

Received: October 1, 2020 7:00
Tracking No: 81528 via Courier
Coolant Type: Ice
Temperature: 7.3 °C

Description: Styrofoam Cooler #9
Damaged in transit? No
Returned to client? No
Comments: IR #21

Custody seals present? No
Custody seals intact? No
COC present? Yes

COC ID:	FRO LAEMP Sept 2020	TURNAROUND TIME:		BAL Final Report 2040045

PROJECT/CLIENT INFO

Facility Name	REP				
Project Manager	Cait Good				
Email	cait.good@teck.com				
Address	421 Pine Avenue				
City	Sparwood	Province	BC		
Postal Code	V0B 2G0	Country	Canada		
Phone Number	250-425-8202				

LABORATORY

Lab Name	Brooks Applied Labs		
Lab Contact	Ben Wozniak		
Email	ben@brooksapplied.com		
Address	18804 North Creek Parkway		
City	Bothell	Province	WA
Postal Code	98011	Country	USA
Phone Number	206-632-6206		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
carlie.meyer@teck.com	x	x	x
[illegible]@minnow.ca	x	x	x
jings@minnow.ca	x	x	x

SAMPLE DETAILS / **ANALYSIS REQUESTED**

Filtered - F; Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	FIS	HNO3	HNO3									
								PRESERV.	P	F/P	F								
								ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation								
RG_HENUP_WS_LAEMP_FRO_2020-09_NAL	RG_HENUP	WS	No	9/15/2020	9:15	G	3		X	X	X								
RG_FO26_WS_LAEMP_FRO_2020-09_NAL	RG_FO26	WS	No	9/12/2020	9:15	G	3		X	X	X								
RG_UFR1_WS_LAEMP_FRO_2020-09_NAL	RG_UFR1	WS	No	9/16/2020	8:20	G	3		X	X	X								
RG_FOUCL_WS_LAEMP_FRO_2020-09_NAL	RG_FOUCL	WS	No	9/10/2020	9:15	G	3		X	X	X								
RG_FOUNGD_WS_LAEMP_FRO_2020-09_NAL	RG_FOUNGD	WS	No	9/10/2020	13:20	G	3		X	X	X								
RG_FRUPO _WS_LAEMP_FRO_2020-09_NAL	RG_FRUPO	WS	No	9/12/2020	9:15	G	3		X	X	X								
RG_FODPO_WS_LAEMP_FRO_2020-09_NAL	RG_FODPO	WS	No	9/11/2020	13:05	G	3		X	X	X								
RG_FO22_WS_LAEMP_FRO_2020-09_NAL	RG_FO22	WS	No	9/11/2020	9:00	G	3		X	X	X								
RG_FODHE_WS_LAEMP_FRO_2020-09_NAL	RG_FODHE	WS	No	9/15/2020	9:45	G	3		X	X	X								
RG_FODNGD_WS_LAEMP_FRO_2020-09_NAL	RG_FODNGD	WS	No	9/21/2020	15:10	G	3		X	X	X								
RG_MP1_WS_LAEMP_FRO_2020-09_NAL	RG_MP1	WS	No	9/15/2020	13:20	G	3		X	X	X								
RG_FOUSH_WS_LAEMP_FRO_2020-09_NAL	RG_FOUSH	WS	No	9/21/2020	12:10	G	3		X	X	X								
RG_FOUKI_WS_LAEMP_FRO_2020-09_NAL	RG_FOUKI	WS	No	9/14/2020	14:25	G	3		X	X	X								
RG_FOBKS_WS_LAEMP_FRO_2020-09_NAL	RG_FOBKS	WS	No	9/10/2020	9:30	G	3		X	X	X								
RG_SCOUTDS_WS_LAEMP_FRO_2020-09_NAL	RG_SCOUTDS	WS	No	9/17/2020	9:45	G	3		X	X	X								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Purchase Order Number - VPO00690100.
Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	
Jennifer Ings/Minnow	9/24/20 9:00	[illegible] BAL	09/24/20 7:00

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature	[signature]	Date/Time	9/24/20 9:00

Confidential Teck

BAL Final Report 2040045

COC ID: FRO LAEMP Sept 2020 | **TURNAROUND TIME:**

PROJECT/CLIENT INFO				LABORATORY			
Facility Name	REP			Lab Name	Brooks Applied Labs		
Project Manager	Cait Good			Lab Contact	Ben Wozniak		
Email	cait.good@teck.com			Email	ben@brooksapplied.com		
Address	421 Pine Avenue			Address	18804 North Creek Parkway		
City	Sparwood	Province	BC	City	Bothell	Province	WA
Postal Code	V0B 2G0	Country	Canada	Postal Code	98011	Country	USA
Phone Number	250-425-8202			Phone Number	206-632-6206		

	Excel	PDF	EDD
cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x
jings@minnow.ca	x	x	x

SAMPLE DETAILS | **ANALYSIS REQUESTED** (Filtered - F: Field, L: Lab, FL: Field & Lab, N: None)

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	Filt.	HNO3	HNO3									
								PRESERV.	P	F/P	F								
								ANALYSIS	Total Selenium	Dissolved Selenium	Selenium Speciation								
RG_FOBSC_WS_LAEMP_FRO_2020-09_NAL	RG_FOBSC	WS	No	9/18/2020	9:45	G	3		X	X	X								
RG_FOBCP_WS_LAEMP_FRO_2020-09_NAL	RG_FOBCP	WS	No	9/16/2020	16:25	G	3		X	X	X								
RG_FRCP1SW_WS_LAEMP_FRO_2020-09_NAL	RG_FRCP1SW	WS	No	9/22/2020	13:55	G	3		X	X	X								
RG_FOUEW_WS_LAEMP_FRO_2020-09_NAL	RG_FOUEW	WS	No	9/11/2020	9:00	G	3		X	X	X								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS

Purchase Order Number - VPO00690100.
Samples for total selenium have been preserved in the field. Dissolved selenium have been filtered and preserved. Speciation samples have been filtered and frozen.

RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
Jennifer Ings/Minnow	9/24/20 9:00	TBA 19/1/20 7:00 DSR 10/4/20

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	9/24/20 9:00

STRAIGHT BILL OF LADING
Confidential NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 81528

Sparwood, BC
Kamloops, BC
Terrace, BC
Vancouver, BC
Prince George, BC
Tumbler Ridge, BC
Elkford, BC
Calgary, AB
Edmonton, AB
Ft. McMurray, AB
Hinton, AB
Red Deer, AB
Montreal, QC
Gillette, WY
Spokane, WA
Shelby, MT

COPY

INVOICE TO	DATE Sept 30/20
BILL OF LADING #	PURCHASE ORDER NUMBER
SHIPPER (FROM) Teck Coal Ltd	CONSIGNEE (TO) Brooks Applied Labs
STREET West Line Creek Treatment	STREET 18804 N. Creek Parkway
CITY/PROVINCE Sparwood BC	POSTAL CODE CITY/PROVINCE Bothell WA POSTAL CODE 98011

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
10	Coolers - Water Samples	400 LBS

PAPS# RWHV81528

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY | PICK UP TIME | DRIVER'S SIGNATURE - DELIVERY BY | FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the claim, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, and in the case of failure to make delivery within nine (9) months from the date of shipment. (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns. The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT	CONSIGNEE PRINT
SHIPPER SIGN	CONSIGNEE SIGN

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST # 864540398RT0001

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

DATE 10-1-20
TIME 7:20

NUMBER OF PIECES RECEIVED 10

AMICOS PRINTING

Cooler ID: Styro #7 **COC** (Y/N) **Temperature:** 0.3 **IR:** 4

Coolant Type: (Ice) Blue Ice Ambient

Notes:

	44		45		46		47		48	
Sampling Locations:										
Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	120	120	120	120	120	120	120	120	120	120

Opened By: DSL **Date:** 10/1/20

Effective 7/29/20

Revision 004

STRAIGHT BILL OF LADING
Confidential NOT NEGOTIABLE

RW HOT SHOT SERVICE INC.
250-425-7447
24 Hour Hot Shot Service

No. 81528

Sparwood, BC | Vancouver, BC | Elkford, BC | Ft. McMurray, AB | Montreal, QC | Shelby, MT
Kamloops, BC | Prince George, BC | Calgary, AB | Hinton, AB | Gillette, WY
Terrace, BC | Tumbler Ridge, BC | Edmonton, AB | Red Deer, AB | Spokane, WA

INVOICE TO		DATE	Sept 30/20
BILL OF LADING #		PURCHASE ORDER NUMBER	
SHIPPER (FROM)	Teck Coal Ltd.	CONSIGNEE (TO)	Brooks Applied Labs
STREET	West Line Creek Treatment	STREET	18804 N. Creek Parkway
CITY/PROVINCE	Sparwood, BC	CITY/PROVINCE	Bothell WA
POSTAL CODE		POSTAL CODE	98011

SPECIAL INSTRUCTIONS

PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)
10	Coolers - Water Samples	400 Lbs

PAPS# RWHV81528

FREIGHT CHARGES
SHIPPER TO CHECK
☐PREPAID ☐COLLECT
If not indicated, shipping will automatically move collect.

FEE
WAITING
XPU
CHARGES
FSC
US
SUB TOTAL
GST
TOTAL $
IF AT OWNER'S RISK, WRITE ORD HERE

UNIT #

DECLARED VALUATION: Maximum liability of carrier is $2.00 per lb. ($4.41 per kilogram) unless declared valuation states otherwise. $

DRIVER'S SIGNATURE - PICK UP BY	PICK UP TIME	DRIVER'S SIGNATURE - DELIVERY BY	FINISH TIME

NOTICE OF CLAIM: (a) No carrier is liable for loss, damage or delay of any goods under the Bill of Lading unless notice, therefor setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or in the case of failure to make delivery within nine (9) months from the date of shipment. (b)The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill. RECEIVED at the point of origin on the date specified from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and condition of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consigned at the said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions standard Bill of Lading, in power at the date of issuing, which are hereto agreed by the consignor and accepted for himself and his assigns. Printed or written, including conditions set aside by the standard Bill of Lading, in power at the date of issuing, which are hereby agreed by the consignor and accepted for himself and his assigns.
The Contract for the carriage of the goods listed in the Bill of Lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such conditions.

SHIPPER PRINT		CONSIGNEE PRINT	DATE 10-1-20
SHIPPER SIGN		CONSIGNEE SIGN	TIME 7:00

WHITE: Office YELLOW: Carrier PINK: Consignee GOLDENROAD: Shipper GST # 864540398RT0001 NUMBER OF PIECES RECEIVED 10

AIRGOS PRINTING

Cooler ID: Styro #9 **COC (Y/N)** (Y) **Temperature:** 7.3 **IR:** 21

Coolant Type: (Ice) Blue Ice Ambient

Notes:

Sampling Locations: 126

Sample Types:	T/D	SP	T/D	SP	T/D	SP	T/D	SP	T/D	SP
Container Types:	120	120 DSR 10/1/20								

Opened By: DSR **Date:** 10/1/20

Effective 7/29/20 Revision 004

SEDIMENT CHEMISTRY

Teck Coal Ltd.
ATTN: Cait Good
421 Pine Avenue
Sparwood BC V0B 2G0

Date Received: 25-SEP-20
Report Date: 07-OCT-20 14:19 (MT)
Version: FINAL

Client Phone: 250-425-8202

Certificate of Analysis

Lab Work Order #: L2508974

Project P.O. #: VPO00689999
Job Reference: REGIONAL EFFECTS PROGRAM
C of C Numbers: FRO LAEMP Sept 2020
Legal Site Desc:

Lyudmyla Shvets, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-1 SE 22-SEP-20 10:00 RG_FRCP1SW_SE-01_2020-09-22_1000	L2508974-2 SE 22-SEP-20 10:30 RG_FRCP1SW_SE-02_2020-09-22_1030	L2508974-3 SE 22-SEP-20 12:00 RG_FRCP1SW_SE-03_2020-09-22_1200	L2508974-4 SE 22-SEP-20 12:30 RG_FRCP1SW_SE-04_2020-09-22_1230	L2508974-5 SE 22-SEP-20 13:00 RG_FRCP1SW_SE-05_2020-09-22_1300
SOIL						
Physical Tests	Moisture (%)	53.5	45.4	50.8	54.5	70.3
	pH (1:2 soil:water) (pH)	8.42	8.51	8.54	8.56	8.30
Particle Size	% Gravel (>2mm) (%)	2.7	<1.0	<1.0	1.2	1.4
	% Sand (2.00mm - 1.00mm) (%)	1.3	<1.0	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	9.5	5.9	3.5	3.9	2.3
	% Sand (0.50mm - 0.25mm) (%)	16.0	12.4	14.6	10.7	8.6
	% Sand (0.25mm - 0.125mm) (%)	14.1	17.8	19.9	25.0	12.8
	% Sand (0.125mm - 0.063mm) (%)	10.2	14.4	14.0	13.9	11.9
	% Silt (0.063mm - 0.0312mm) (%)	18.3	19.3	17.9	18.1	24.0
	% Silt (0.0312mm - 0.004mm) (%)	22.4	23.1	22.8	21.4	30.7
	% Clay (<4um) (%)	5.5	5.9	6.4	5.0	7.9
	Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Silt loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.78	5.96	5.54	5.83	7.47
Metals	Aluminum (Al) (mg/kg)	8730	8660	8690	7310	6410
	Antimony (Sb) (mg/kg)	0.34	0.33	0.47	0.65	0.55
	Arsenic (As) (mg/kg)	5.47	4.95	5.15	5.32	4.67
	Barium (Ba) (mg/kg)	208	205	196	197	198
	Beryllium (Be) (mg/kg)	0.61	0.64	0.64	0.62	0.55
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.6	10.0	11.2	9.6	10.1
	Cadmium (Cd) (mg/kg)	1.56	1.50	1.38	1.63	2.41
	Calcium (Ca) (mg/kg)	42400	43000	42300	50400	59500
	Chromium (Cr) (mg/kg)	15.6	15.1	15.8	13.7	12.4
	Cobalt (Co) (mg/kg)	5.81	5.74	5.57	6.06	6.38
	Copper (Cu) (mg/kg)	13.6	13.3	12.6	13.0	12.9
	Iron (Fe) (mg/kg)	14700	14100	14600	15300	12800
	Lead (Pb) (mg/kg)	8.09	7.92	7.79	7.77	7.68
	Lithium (Li) (mg/kg)	10.3	10.6	10.9	9.6	9.3
	Magnesium (Mg) (mg/kg)	11600	11400	11900	12000	11700
	Manganese (Mn) (mg/kg)	520	511	489	495	623
	Mercury (Hg) (mg/kg)	0.0406	0.0404	0.0357	0.0425	0.0524
	Molybdenum (Mo) (mg/kg)	1.52	1.37	1.42	1.50	1.40
	Nickel (Ni) (mg/kg)	47.6	46.4	43.5	46.6	67.6
	Phosphorus (P) (mg/kg)	1360	1350	1350	1370	1230
	Potassium (K) (mg/kg)	2330	2330	2470	2000	1740
	Selenium (Se) (mg/kg)	1.69	1.70	1.40	1.99	2.25

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-6 SE 18-SEP-20 09:40 RG_FOBSC_SE-01_2020-09-18_0940	L2508974-7 SE 18-SEP-20 10:00 RG_FOBSC_SE-02_2020-09-18_1000	L2508974-8 SE 18-SEP-20 11:00 RG_FOBSC_SE-03_2020-09-18_1100	L2508974-9 SE 18-SEP-20 11:30 RG_FOBSC_SE-04_2020-09-18_1130	L2508974-10 SE 18-SEP-20 12:00 RG_FOBSC_SE-05_2020-09-18_1200
SOIL						
Physical Tests	Moisture (%)	64.0	66.0	60.7	79.9	45.5
	pH (1:2 soil:water) (pH)	8.32	8.27	8.09	8.06	8.49
Particle Size	% Gravel (>2mm) (%)	2.3	2.2	8.4	1.7	3.1
	% Sand (2.00mm - 1.00mm) (%)	1.2	2.1	6.5	2.5	1.3
	% Sand (1.00mm - 0.50mm) (%)	9.0	3.7	5.5	3.7	2.6
	% Sand (0.50mm - 0.25mm) (%)	19.6	13.4	6.8	6.3	13.7
	% Sand (0.25mm - 0.125mm) (%)	20.0	16.7	9.2	7.5	24.0
	% Sand (0.125mm - 0.063mm) (%)	11.5	8.7	7.4	4.4	14.7
	% Silt (0.063mm - 0.0312mm) (%)	15.4	20.2	22.4	30.7	16.1
	% Silt (0.0312mm - 0.004mm) (%)	17.6	25.8	27.6	36.0	18.4
	% Clay (<4um) (%)	3.5	7.2	6.2	7.2	6.1
	Texture	Sandy loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	6.45	8.27	9.17	10.9	5.92
Metals	Aluminum (Al) (mg/kg)	6400	7830	6810	7030	8020
	Antimony (Sb) (mg/kg)	0.56	0.54	0.42	0.36	0.49
	Arsenic (As) (mg/kg)	4.51	4.79	4.54	4.16	4.63
	Barium (Ba) (mg/kg)	193	213	188	217	188
	Beryllium (Be) (mg/kg)	0.49	0.55	0.55	0.57	0.58
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.7	10.5	9.2	9.5	9.9
	Cadmium (Cd) (mg/kg)	2.26	2.27	1.93	2.37	1.44
	Calcium (Ca) (mg/kg)	69400	69400	50400	58900	51600
	Chromium (Cr) (mg/kg)	11.7	14.4	12.3	13.2	14.3
	Cobalt (Co) (mg/kg)	6.07	6.37	5.45	6.64	5.34
	Copper (Cu) (mg/kg)	11.6	12.4	12.8	13.5	12.1
	Iron (Fe) (mg/kg)	14000	14100	12700	12200	13000
	Lead (Pb) (mg/kg)	7.04	7.46	7.13	7.30	7.29
	Lithium (Li) (mg/kg)	9.5	9.7	8.2	9.1	10.1
	Magnesium (Mg) (mg/kg)	12500	12800	9970	12200	14300
	Manganese (Mn) (mg/kg)	599	640	553	688	424
	Mercury (Hg) (mg/kg)	0.0350	0.0401	0.0410	0.0410	0.0411
	Molybdenum (Mo) (mg/kg)	1.40	1.47	1.43	1.46	1.24
	Nickel (Ni) (mg/kg)	51.1	51.3	42.7	55.2	35.2
	Phosphorus (P) (mg/kg)	1220	1230	1240	1080	1290
	Potassium (K) (mg/kg)	1700	2050	1960	1980	2220
	Selenium (Se) (mg/kg)	3.78	4.00	2.83	3.29	1.43

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-11 SE 17-SEP-20 09:50 RG_SCOUTDS_SE-01_2020-09-17_0950	L2508974-12 SE 17-SEP-20 10:20 RG_SCOUTDS_SE-02_2020-09-17_1020	L2508974-13 SE 17-SEP-20 11:00 RG_SCOUTDS_SE-03_2020-09-17_1100	L2508974-14 SE 17-SEP-20 13:10 RG_SCOUTDS_SE-04_2020-09-17_1310	L2508974-15 SE 17-SEP-20 13:30 RG_SCOUTDS_SE-05_2020-09-17_1330
SOIL						
Physical Tests	Moisture (%)	75.6	53.0	64.2	72.1	56.4
	pH (1:2 soil:water) (pH)	8.30	8.40	8.30	8.22	8.20
Particle Size	% Gravel (>2mm) (%)	3.5	<1.0	3.6	4.9	3.2
	% Sand (2.00mm - 1.00mm) (%)	5.2	2.6	6.9	14.0	19.1
	% Sand (1.00mm - 0.50mm) (%)	13.7	22.6	16.6	14.6	18.6
	% Sand (0.50mm - 0.25mm) (%)	14.0	30.8	31.1	14.2	12.1
	% Sand (0.25mm - 0.125mm) (%)	6.8	7.6	7.4	8.6	6.0
	% Sand (0.125mm - 0.063mm) (%)	6.9	3.8	3.4	4.2	3.9
	% Silt (0.063mm - 0.0312mm) (%)	19.2	10.9	13.3	16.9	14.8
	% Silt (0.0312mm - 0.004mm) (%)	24.4	16.3	15.4	19.9	18.3
	% Clay (<4um) (%)	6.2	5.2	2.3	2.6	3.8
	Texture	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	8.19	10.1	8.85	8.56	9.31
Metals	Aluminum (Al) (mg/kg)	6510	8850	8280	7310	8310
	Antimony (Sb) (mg/kg)	0.68	0.63	0.73	0.66	0.56
	Arsenic (As) (mg/kg)	4.98	5.41	5.47	4.86	4.74
	Barium (Ba) (mg/kg)	200	228	217	204	256
	Beryllium (Be) (mg/kg)	0.60	0.67	0.68	0.60	0.62
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	8.3	10.6	9.7	9.8	10.7
	Cadmium (Cd) (mg/kg)	1.73	1.81	1.82	2.12	2.49
	Calcium (Ca) (mg/kg)	50800	49400	45400	50100	52600
	Chromium (Cr) (mg/kg)	11.9	15.3	13.8	13.2	14.0
	Cobalt (Co) (mg/kg)	5.76	6.24	6.19	6.71	7.40
	Copper (Cu) (mg/kg)	13.3	13.6	14.1	13.9	14.1
	Iron (Fe) (mg/kg)	16700	18400	18000	15500	16100
	Lead (Pb) (mg/kg)	7.46	7.73	7.92	7.38	7.82
	Lithium (Li) (mg/kg)	9.2	10.4	10.2	9.2	11.5
	Magnesium (Mg) (mg/kg)	8480	9490	8020	8980	10600
	Manganese (Mn) (mg/kg)	555	588	590	671	760
	Mercury (Hg) (mg/kg)	0.0375	0.0399	0.0378	0.0431	0.0469
	Molybdenum (Mo) (mg/kg)	1.66	1.57	1.59	1.57	1.45
	Nickel (Ni) (mg/kg)	42.5	45.7	44.6	51.4	59.6
	Phosphorus (P) (mg/kg)	1150	1440	1260	1160	1280
	Potassium (K) (mg/kg)	1780	2350	2260	2050	2120
	Selenium (Se) (mg/kg)	1.87	1.58	1.42	1.94	1.98

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-16 SE 16-SEP-20 10:00 RG_FOBCP_SE-01_2020-09-16_1000	L2508974-17 SE 16-SEP-20 11:00 RG_FOBCP_SE-02_2020-09-16_1100	L2508974-18 SE 16-SEP-20 12:10 RG_FOBCP_SE-03_2020-09-16_1210	L2508974-19 SE 16-SEP-20 14:10 RG_FOBCP_SE-04_2020-09-16_1410	L2508974-20 SE 16-SEP-20 14:40 RG_FOBCP_SE-05_2020-09-16_1440
SOIL						
Physical Tests	Moisture (%)	65.8	50.3	47.3	49.7	61.0
	pH (1:2 soil:water) (pH)	8.27	8.30	8.34	8.34	8.55
Particle Size	% Gravel (>2mm) (%)	<1.0 PSAL	1.8	<1.0	3.1	<1.0
	% Sand (2.00mm - 1.00mm) (%)	11.5 PSAL	5.2	<1.0	1.0	2.5
	% Sand (1.00mm - 0.50mm) (%)	22.0 PSAL	9.3	1.1	2.6	8.7
	% Sand (0.50mm - 0.25mm) (%)	6.0 PSAL	16.9	12.4	10.6	17.0
	% Sand (0.25mm - 0.125mm) (%)	4.6 PSAL	16.0	31.9	16.4	18.5
	% Sand (0.125mm - 0.063mm) (%)	2.8 PSAL	8.3	18.3	10.8	10.6
	% Silt (0.063mm - 0.0312mm) (%)	22.7 PSAL	18.4	16.4	19.7	17.9
	% Silt (0.0312mm - 0.004mm) (%)	26.6 PSAL	21.0	16.1	28.3	20.2
	% Clay (<4um) (%)	3.7 PSAL	3.1	2.8	7.5	3.8
	Texture	Silt loam	Sandy loam	Sandy loam	Silt loam / Sandy loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	10.2	6.47	4.69	6.94	5.24
Metals	Aluminum (Al) (mg/kg)	6770	6980	7420	6940	8160
	Antimony (Sb) (mg/kg)	0.68	0.66	0.58	0.50	0.60
	Arsenic (As) (mg/kg)	5.47	5.40	4.75	4.73	4.99
	Barium (Ba) (mg/kg)	269	235	193	243	215
	Beryllium (Be) (mg/kg)	0.60	0.63	0.59	0.51	0.60
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.3	10.1	10.2	8.9	10.4
	Cadmium (Cd) (mg/kg)	2.82	2.22	1.60	2.23	1.66
	Calcium (Ca) (mg/kg)	58800	74700	57300	87000	56300
	Chromium (Cr) (mg/kg)	13.4	13.4	13.6	13.5	14.3
	Cobalt (Co) (mg/kg)	7.83	6.93	5.95	6.53	6.39
	Copper (Cu) (mg/kg)	16.2	13.4	12.1	13.1	13.1
	Iron (Fe) (mg/kg)	16600	17100	13100	13700	14700
	Lead (Pb) (mg/kg)	8.43	7.62	7.53	7.18	7.85
	Lithium (Li) (mg/kg)	9.2	10.0	10.2	9.0	10.8
	Magnesium (Mg) (mg/kg)	10800	11700	13000	12900	14100
	Manganese (Mn) (mg/kg)	746	702	525	676	531
	Mercury (Hg) (mg/kg)	0.0489	0.0427	0.0441	0.0458	0.0434
	Molybdenum (Mo) (mg/kg)	1.70	1.61	1.33	1.34	1.40
	Nickel (Ni) (mg/kg)	69.0	58.4	46.7	71.2	47.0
	Phosphorus (P) (mg/kg)	1400	1340	1340	1320	1340
	Potassium (K) (mg/kg)	1800	1940	2040	1900	2090
	Selenium (Se) (mg/kg)	3.01	2.13	2.00	3.26	2.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-21	L2508974-22	L2508974-23	L2508974-24	L2508974-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20
	Sampled Time	10:00	10:30	11:00	11:20	12:00
	Client ID	RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI_SE-05_2020-09-14_1200
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	72.8	75.5	80.8	77.1	82.5
	pH (1:2 soil:water) (pH)	8.10	8.05	8.06	8.01	8.08
Particle Size	% Gravel (>2mm) (%)	3.1 PSAL	2.3	5.5 PSAL	4.7	12.0
	% Sand (2.00mm - 1.00mm) (%)	4.3 PSAL	7.8	2.4 PSAL	2.2	8.3
	% Sand (1.00mm - 0.50mm) (%)	4.5 PSAL	5.6	1.9 PSAL	2.3	4.2
	% Sand (0.50mm - 0.25mm) (%)	8.0 PSAL	6.8	5.3 PSAL	3.0	8.5
	% Sand (0.25mm - 0.125mm) (%)	9.5 PSAL	13.4	17.6 PSAL	13.3	14.2
	% Sand (0.125mm - 0.063mm) (%)	13.1 PSAL	13.9	11.9 PSAL	15.4	12.7
	% Silt (0.063mm - 0.0312mm) (%)	25.2 PSAL	22.5	25.2 PSAL	26.8	17.7
	% Silt (0.0312mm - 0.004mm) (%)	27.6 PSAL	23.8	26.5 PSAL	27.5	19.2
	% Clay (<4um) (%)	4.7 PSAL	3.9	3.8 PSAL	4.8	3.2
	Texture	Silt loam	Sandy loam	Silt loam	Silt loam	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	11.5	9.44	9.99	11.3	10.4
Metals	Aluminum (Al) (mg/kg)	6310	6360	5410	7100	6360
	Antimony (Sb) (mg/kg)	0.54	0.56	0.46	0.43	0.51
	Arsenic (As) (mg/kg)	4.39	4.11	4.02	4.15	5.27
	Barium (Ba) (mg/kg)	199	190	206	201	203
	Beryllium (Be) (mg/kg)	0.55	0.53	0.46	0.57	0.59
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.2	8.9	8.3	10.5	8.9
	Cadmium (Cd) (mg/kg)	1.48	1.52	1.71	1.49	1.65
	Calcium (Ca) (mg/kg)	63600	68800	81100	73400	72700
	Chromium (Cr) (mg/kg)	11.8	11.6	9.76	12.4	14.4
	Cobalt (Co) (mg/kg)	6.11	6.48	6.08	5.74	5.82
	Copper (Cu) (mg/kg)	13.1	13.2	11.3	11.1	13.5
	Iron (Fe) (mg/kg)	14100	13700	12300	12900	20600
	Lead (Pb) (mg/kg)	7.58	7.75	6.88	7.02	6.92
	Lithium (Li) (mg/kg)	10.2	11.3	8.8	10.5	8.8
	Magnesium (Mg) (mg/kg)	12100	12000	12000	13000	11300
	Manganese (Mn) (mg/kg)	550	612	677	548	726
	Mercury (Hg) (mg/kg)	0.0456	0.0484	0.0407	0.0338	0.0378
	Molybdenum (Mo) (mg/kg)	1.72	1.58	1.46	1.42	1.72
	Nickel (Ni) (mg/kg)	35.2	36.0	36.6	34.4	37.5
	Phosphorus (P) (mg/kg)	1070	999	1080	1100	1210
	Potassium (K) (mg/kg)	1690	1600	1460	1990	1770
	Selenium (Se) (mg/kg)	2.68	2.98	3.61	2.30	3.07

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-26 SE 10-SEP-20 10:00 RG_FOBKS_SE-01_2020-09-10_1000	L2508974-27 SE 10-SEP-20 10:20 RG_FOBKS_SE-02_2020-09-10_1020	L2508974-28 SE 10-SEP-20 11:30 RG_FOBKS_SE-03_2020-09-10_1130	L2508974-29 SE 10-SEP-20 11:50 RG_FOBKS_SE-04_2020-09-10_1150	L2508974-30 SE 10-SEP-20 12:20 RG_FOBKS_SE-05_2020-09-10_1220
SOIL						
Physical Tests	Moisture (%)	44.8	52.0	52.0	58.2	78.1
	pH (1:2 soil:water) (pH)	8.30	8.45	8.28	8.23	8.04
Particle Size	% Gravel (>2mm) (%)	1.3	4.1	2.2	1.5	1.1
	% Sand (2.00mm - 1.00mm) (%)	3.4	7.6	4.3	3.0	5.1
	% Sand (1.00mm - 0.50mm) (%)	9.3	14.2	11.5	9.3	35.0
	% Sand (0.50mm - 0.25mm) (%)	11.8	11.5	11.5	24.3	22.8
	% Sand (0.25mm - 0.125mm) (%)	21.2	19.0	21.9	23.7	8.7
	% Sand (0.125mm - 0.063mm) (%)	17.0	15.1	15.7	12.0	5.1
	% Silt (0.063mm - 0.0312mm) (%)	16.0	12.6	14.6	11.2	8.8
	% Silt (0.0312mm - 0.004mm) (%)	16.7	13.3	15.3	12.2	11.2
	% Clay (<4um) (%)	3.3	2.8	3.0	2.7	2.0
	Texture	Sandy loam	Loamy sand	Sandy loam	Loamy sand	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	7.12	5.70	5.50	5.75	7.05
Metals	Aluminum (Al) (mg/kg)	8870	8640	8590	7710	5910
	Antimony (Sb) (mg/kg)	0.34	0.30	0.59	0.56	0.56
	Arsenic (As) (mg/kg)	4.82	5.12	5.25	4.63	4.29
	Barium (Ba) (mg/kg)	221	228	209	205	198
	Beryllium (Be) (mg/kg)	0.65	0.63	0.63	0.59	0.51
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	9.9	8.8	10.5	9.5	9.2
	Cadmium (Cd) (mg/kg)	1.15	1.12	1.15	1.45	1.86
	Calcium (Ca) (mg/kg)	54400	61200	56900	68800	73800
	Chromium (Cr) (mg/kg)	15.1	14.9	14.8	12.9	11.0
	Cobalt (Co) (mg/kg)	5.70	5.58	6.07	5.84	6.42
	Copper (Cu) (mg/kg)	12.5	12.1	13.1	12.2	13.1
	Iron (Fe) (mg/kg)	13800	15500	14900	15500	13100
	Lead (Pb) (mg/kg)	7.73	7.49	8.16	7.37	7.21
	Lithium (Li) (mg/kg)	11.7	10.7	11.5	10.7	9.8
	Magnesium (Mg) (mg/kg)	14400	12300	13900	9460	10600
	Manganese (Mn) (mg/kg)	466	467	501	588	696
	Mercury (Hg) (mg/kg)	0.0443	0.0360	0.0461	0.0365	0.0415
	Molybdenum (Mo) (mg/kg)	1.22	1.20	1.38	1.32	1.40
	Nickel (Ni) (mg/kg)	31.5	31.6	34.9	35.7	47.0
	Phosphorus (P) (mg/kg)	1240	1250	1380	1170	1050
	Potassium (K) (mg/kg)	2390	2350	2310	2070	1550
	Selenium (Se) (mg/kg)	1.33	1.14	1.68	1.30	2.48

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L2508974-31 Description: SE Sampled Date: 11-SEP-20 Sampled Time: 09:00 Client ID: RG_FO22_SE-01_2020-09-11_0900	L2508974-32 SE 11-SEP-20 09:15 RG_FO22_SE-02_2020-09-11_0915	L2508974-33 SE 11-SEP-20 09:30 RG_FO22_SE-03_2020-09-11_0930	L2508974-34 SE 11-SEP-20 09:45 RG_FO22_SE-04_2020-09-11_0945	L2508974-35 SE 11-SEP-20 10:00 RG_FO22_SE-05_2020-09-11_1000
SOIL						
Physical Tests	Moisture (%)	48.8	36.6	39.4	38.6	42.0
	pH (1:2 soil:water) (pH)	8.22	8.26	8.37	8.30	8.30
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	1.8	<1.0
	% Sand (2.00mm - 1.00mm) (%)	<1.0	1.5	<1.0	<1.0	<1.0
	% Sand (1.00mm - 0.50mm) (%)	<1.0	12.3	<1.0	2.3	<1.0
	% Sand (0.50mm - 0.25mm) (%)	3.7	30.9	3.8	27.0	5.1
	% Sand (0.25mm - 0.125mm) (%)	22.0	27.5	34.6	41.4	36.2
	% Sand (0.125mm - 0.063mm) (%)	24.1	10.3	33.9	10.0	27.4
	% Silt (0.063mm - 0.0312mm) (%)	23.3	7.5	14.8	7.4	15.7
	% Silt (0.0312mm - 0.004mm) (%)	22.8	7.8	10.3	7.5	12.8
	% Clay (<4um) (%)	3.4	2.0	2.3	2.3	2.3
	Texture	Sandy loam	Loamy sand	Loamy sand	Loamy sand	Loamy sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	4.61	2.77	3.07	4.28	3.94
Metals	Aluminum (Al) (mg/kg)	7370	8860	6000	8000	8090
	Antimony (Sb) (mg/kg)	0.57	0.48	0.51	0.67	0.53
	Arsenic (As) (mg/kg)	4.92	5.52	4.55	5.91	5.01
	Barium (Ba) (mg/kg)	191	205	159	209	191
	Beryllium (Be) (mg/kg)	0.59	0.65	0.50	0.67	0.60
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	10.2	10.3	6.9	9.7	10.4
	Cadmium (Cd) (mg/kg)	1.24	0.974	0.960	1.15	1.12
	Calcium (Ca) (mg/kg)	40400	26200	37500	30600	37500
	Chromium (Cr) (mg/kg)	14.5	16.1	11.8	14.8	15.1
	Cobalt (Co) (mg/kg)	5.25	5.61	4.58	5.99	5.00
	Copper (Cu) (mg/kg)	12.2	11.4	10.4	12.5	11.6
	Iron (Fe) (mg/kg)	13300	15700	12100	16000	13600
	Lead (Pb) (mg/kg)	7.59	7.81	6.96	8.45	7.65
	Lithium (Li) (mg/kg)	9.8	9.4	8.1	8.8	9.5
	Magnesium (Mg) (mg/kg)	13200	8010	12500	9120	12100
	Manganese (Mn) (mg/kg)	431	508	281	380	323
	Mercury (Hg) (mg/kg)	0.0450	0.0284	0.0341	0.0357	0.0448
	Molybdenum (Mo) (mg/kg)	1.35	1.26	1.03	1.40	1.17
	Nickel (Ni) (mg/kg)	26.2	25.7	21.5	27.0	24.2
	Phosphorus (P) (mg/kg)	1600	1600	1390	1740	1540
	Potassium (K) (mg/kg)	1970	2600	1520	2160	2170
	Selenium (Se) (mg/kg)	2.18	1.41	1.54	1.95	1.65

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-36 SE 12-SEP-20 09:15 RG_FRUPO_SE-01_2020-09-12_0915	L2508974-37 SE 12-SEP-20 09:30 RG_FRUPO_SE-02_2020-09-12_0930	L2508974-38 SE 12-SEP-20 09:45 RG_FRUPO_SE-03_2020-09-12_0945	L2508974-39 SE 12-SEP-20 10:00 RG_FRUPO_SE-04_2020-09-12_1000	L2508974-40 SE 12-SEP-20 10:15 RG_FRUPO_SE-05_2020-09-12_1015
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	43.5	48.9	37.4	37.9	43.6
	pH (1:2 soil:water) (pH)	8.36	8.24	8.72	8.73	8.30
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0	<1.0	<1.0
	% Sand (2.00mm - 1.00mm) (%)	4.8	1.1	<1.0	1.7	<1.0
	% Sand (1.00mm - 0.50mm) (%)	13.7	2.1	4.6	17.5	1.4
	% Sand (0.50mm - 0.25mm) (%)	7.7	9.3	27.5	19.5	13.8
	% Sand (0.25mm - 0.125mm) (%)	9.9	24.9	31.7	20.8	20.3
	% Sand (0.125mm - 0.063mm) (%)	24.2	20.6	15.6	17.0	23.1
	% Silt (0.063mm - 0.0312mm) (%)	18.7	18.7	9.2	10.5	18.2
	% Silt (0.0312mm - 0.004mm) (%)	17.2	18.9	8.6	10.2	18.8
	% Clay (<4um) (%)	3.5	4.1	2.8	2.9	4.3
	Texture	Sandy loam	Sandy loam	Loamy sand	Loamy sand	Sandy loam
Organic / Inorganic Carbon	Total Organic Carbon (%)	3.97	5.04	3.43	4.18	5.09
Metals	Aluminum (Al) (mg/kg)	7960	7220	9300	6970	6920
	Antimony (Sb) (mg/kg)	0.55	0.55	0.66	0.72	0.69
	Arsenic (As) (mg/kg)	4.79	4.89	5.78	5.87	5.16
	Barium (Ba) (mg/kg)	189	190	217	215	196
	Beryllium (Be) (mg/kg)	0.56	0.58	0.67	0.65	0.61
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	10.0	9.8	11.5	8.8	9.5
	Cadmium (Cd) (mg/kg)	1.25	1.21	1.18	1.28	1.36
	Calcium (Ca) (mg/kg)	48800	41000	42300	43000	48300
	Chromium (Cr) (mg/kg)	14.9	14.4	16.3	13.7	14.1
	Cobalt (Co) (mg/kg)	5.37	5.35	6.16	5.75	5.85
	Copper (Cu) (mg/kg)	12.3	12.3	13.2	13.4	13.8
	Iron (Fe) (mg/kg)	13800	13200	16700	16300	14100
	Lead (Pb) (mg/kg)	7.29	7.38	8.47	7.93	8.23
	Lithium (Li) (mg/kg)	9.6	9.3	11.0	9.0	10.4
	Magnesium (Mg) (mg/kg)	14300	11700	11400	10200	13100
	Manganese (Mn) (mg/kg)	459	464	480	464	489
	Mercury (Hg) (mg/kg)	<0.0050	0.0433	0.0329	0.0362	0.0504
	Molybdenum (Mo) (mg/kg)	1.32	1.34	1.45	1.69	1.51
	Nickel (Ni) (mg/kg)	31.2	30.4	31.6	34.2	35.1
	Phosphorus (P) (mg/kg)	1380	1240	1510	1460	1400
	Potassium (K) (mg/kg)	2160	2050	2540	1940	1870
	Selenium (Se) (mg/kg)	1.60	1.72	1.26	1.32	1.92

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-41 SE 15-SEP-20 09:15 RG_HENUP_SE-01_2020-09-15_0915	L2508974-42 SE 15-SEP-20 09:30 RG_HENUP_SE-02_2020-09-15_0930	L2508974-43 SE 15-SEP-20 09:45 RG_HENUP_SE-03_2020-09-15_0945	L2508974-44 SE 17-SEP-20 09:15 RG_FO26_SE-01_2020-09-17_0915	L2508974-45 SE 17-SEP-20 09:30 RG_FO26_SE-02_2020-09-17_0930
SOIL						
Physical Tests	Moisture (%)	38.3	31.7	62.5	29.0	37.1
	pH (1:2 soil:water) (pH)	8.33	8.48	8.22	8.79	8.67
Particle Size	% Gravel (>2mm) (%)	3.9	5.9	<1.0	1.7	<1.0
	% Sand (2.00mm - 1.00mm) (%)	6.2	6.1	<1.0	3.3	4.7
	% Sand (1.00mm - 0.50mm) (%)	14.9	17.4	2.9	15.5	17.9
	% Sand (0.50mm - 0.25mm) (%)	30.8	37.3	19.3	32.8	41.5
	% Sand (0.25mm - 0.125mm) (%)	29.2	20.5	29.6	21.0	21.7
	% Sand (0.125mm - 0.063mm) (%)	8.0	5.9	21.5	9.2	5.1
	% Silt (0.063mm - 0.0312mm) (%)	3.5	3.1	13.0	7.1	3.1
	% Silt (0.0312mm - 0.004mm) (%)	2.7	2.8	10.8	7.4	3.6
	% Clay (<4um) (%)	<1.0	<1.0	1.7	1.9	1.4
	Texture	Sand	Sand	Loamy sand	Loamy sand	Sand
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.1	4.9	5.6	3.86	2.73
Metals	Aluminum (Al) (mg/kg)	8940	8610	8690	1310	1280
	Antimony (Sb) (mg/kg)	0.68	0.70	0.55	<0.10	<0.10
	Arsenic (As) (mg/kg)	7.21	5.99	5.26	1.03	1.14
	Barium (Ba) (mg/kg)	191	178	173	13.7	13.5
	Beryllium (Be) (mg/kg)	0.71	0.73	0.67	<0.10	<0.10
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Boron (B) (mg/kg)	11.0	10.1	11.8	<5.0	<5.0
	Cadmium (Cd) (mg/kg)	0.867	0.843	0.935	0.250	0.230
	Calcium (Ca) (mg/kg)	56900	58900	53100	289000	265000
	Chromium (Cr) (mg/kg)	15.4	15.3	17.8	5.17	5.02
	Cobalt (Co) (mg/kg)	6.48	6.38	5.74	0.92	0.88
	Copper (Cu) (mg/kg)	14.9	15.0	14.4	1.17	1.23
	Iron (Fe) (mg/kg)	16300	17000	14500	2500	2480
	Lead (Pb) (mg/kg)	9.33	9.35	9.19	1.48	1.37
	Lithium (Li) (mg/kg)	11.1	10.7	15.7	5.3	5.4
	Magnesium (Mg) (mg/kg)	11600	10100	14000	37200	31100
	Manganese (Mn) (mg/kg)	511	506	455	99.3	119
	Mercury (Hg) (mg/kg)	0.0389	0.0336	0.0522	0.0063	<0.0050
	Molybdenum (Mo) (mg/kg)	1.63	1.58	1.54	0.27	0.31
	Nickel (Ni) (mg/kg)	22.6	22.9	21.6	5.67	6.12
	Phosphorus (P) (mg/kg)	1360	1340	1260	302	281
	Potassium (K) (mg/kg)	2440	2420	2410	490	470
	Selenium (Se) (mg/kg)	0.90	0.66	1.07	0.24	0.22

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-46	L2508974-47	L2508974-48		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	22-SEP-20	22-SEP-20		
	Sampled Time	09:45	10:30	14:45		
	Client ID	RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-2X_2020-09-22_1030	RG_RIVER_SE-3X_2020-09-22_1445		
Grouping	**Analyte**					
SOIL						
Physical Tests	Moisture (%)	34.1	55.5	34.9		
	pH (1:2 soil:water) (pH)	8.41	8.66	8.68		
Particle Size	% Gravel (>2mm) (%)	<1.0	<1.0	<1.0		
	% Sand (2.00mm - 1.00mm) (%)	4.9	1.5	<1.0		
	% Sand (1.00mm - 0.50mm) (%)	7.8	6.0	3.4		
	% Sand (0.50mm - 0.25mm) (%)	15.7	13.9	21.1		
	% Sand (0.25mm - 0.125mm) (%)	19.8	17.4	32.3		
	% Sand (0.125mm - 0.063mm) (%)	14.0	16.7	17.6		
	% Silt (0.063mm - 0.0312mm) (%)	16.5	18.2	11.8		
	% Silt (0.0312mm - 0.004mm) (%)	17.2	21.4	10.6		
	% Clay (<4um) (%)	3.2	4.6	1.8		
	Texture	Sandy loam	Sandy loam	Loamy sand		
Organic / Inorganic Carbon	Total Organic Carbon (%)	5.36	6.88	6.4		
Metals	Aluminum (Al) (mg/kg)	1890	5830	1730		
	Antimony (Sb) (mg/kg)	0.17	0.64	<0.10		
	Arsenic (As) (mg/kg)	1.44	4.77	1.26		
	Barium (Ba) (mg/kg)	18.0	189	15.1		
	Beryllium (Be) (mg/kg)	0.14	0.59	0.13		
	Bismuth (Bi) (mg/kg)	<0.20	<0.20	<0.20		
	Boron (B) (mg/kg)	<5.0	7.7	<5.0		
	Cadmium (Cd) (mg/kg)	0.260	1.63	0.257		
	Calcium (Ca) (mg/kg)	259000	45500	255000		
	Chromium (Cr) (mg/kg)	7.05	12.1	6.32		
	Cobalt (Co) (mg/kg)	1.12	5.82	1.09		
	Copper (Cu) (mg/kg)	1.79	14.1	1.49		
	Iron (Fe) (mg/kg)	3190	13000	2920		
	Lead (Pb) (mg/kg)	2.05	7.96	1.83		
	Lithium (Li) (mg/kg)	8.3	9.9	8.1		
	Magnesium (Mg) (mg/kg)	46900	11400	48000		
	Manganese (Mn) (mg/kg)	111	516	112		
	Mercury (Hg) (mg/kg)	0.0080	0.0497	0.0088		
	Molybdenum (Mo) (mg/kg)	0.34	1.51	0.33		
	Nickel (Ni) (mg/kg)	7.68	50.0	7.51		
	Phosphorus (P) (mg/kg)	354	1280	375		
	Potassium (K) (mg/kg)	610	1490	560		
	Selenium (Se) (mg/kg)	0.33	2.01	0.32		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-1 SE 22-SEP-20 10:00 RG_FRCP1SW_SE-01_2020-09-22_1000	L2508974-2 SE 22-SEP-20 10:30 RG_FRCP1SW_SE-02_2020-09-22_1030	L2508974-3 SE 22-SEP-20 12:00 RG_FRCP1SW_SE-03_2020-09-22_1200	L2508974-4 SE 22-SEP-20 12:30 RG_FRCP1SW_SE-04_2020-09-22_1230	L2508974-5 SE 22-SEP-20 13:00 RG_FRCP1SW_SE-05_2020-09-22_1300
SOIL						
Metals	Silver (Ag) (mg/kg)	0.18	0.17	0.16	0.16	0.16
	Sodium (Na) (mg/kg)	88	88	84	83	87
	Strontium (Sr) (mg/kg)	70.1	69.0	64.8	71.7	64.4
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.261	0.261	0.271	0.247	0.244
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	26.7	31.4	31.6	24.9	29.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.08	1.08	1.09	1.08	0.971
	Vanadium (V) (mg/kg)	38.0	36.7	38.1	35.1	29.7
	Zinc (Zn) (mg/kg)	138	132	128	143	205
	Zirconium (Zr) (mg/kg)	1.1	1.3	1.1	1.1	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.035	DLCI <0.040	DLCI <0.030	DLCI <0.040	DLCI <0.050
	Acenaphthylene (mg/kg)	0.0066	0.0063	<0.0050	0.0064	DLHM 0.0085
	Acridine (mg/kg)	DLCI <0.050	DLCI <0.060	DLCI <0.050	DLCI <0.050	DLCI <0.10
	Anthracene (mg/kg)	0.0091	0.0062	0.0113	0.0061	DLHM 0.0178
	Benz(a)anthracene (mg/kg)	DLCI <0.030	0.026	0.016	0.021	DLHM 0.034
	Benzo(a)pyrene (mg/kg)	0.010	0.012	<0.010	0.011	DLHM 0.017
	Benzo(b&j)fluoranthene (mg/kg)	0.054	0.054	0.036	0.040	DLHM 0.063
	Benzo(b+j+k)fluoranthene (mg/kg)	0.054	0.054	0.036	0.040	0.063
	Benzo(e)pyrene (mg/kg)	0.057	0.062	0.040	0.047	DLHM 0.076
	Benzo(g,h,i)perylene (mg/kg)	0.022	0.021	0.015	0.017	DLHM 0.031
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.016
	Chrysene (mg/kg)	DLCI <0.13	0.148	0.102	0.122	DLHM 0.171
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.020	0.0105	0.0090	0.0093	DLHM 0.0130
	Fluoranthene (mg/kg)	0.042	0.023	0.013	0.019	DLHM 0.032
	Fluorene (mg/kg)	0.093	0.110	0.055	0.109	DLHM 0.186
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.011	<0.010	<0.010	<0.010	DLHM <0.016
	1-Methylnaphthalene (mg/kg)	0.311	0.478	0.264	0.461	DLHM 0.610
	2-Methylnaphthalene (mg/kg)	0.500	0.769	0.421	0.775	DLHM 0.992
	Naphthalene (mg/kg)	0.165	0.272	0.151	0.258	DLHM 0.293
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.016
	Phenanthrene (mg/kg)	0.385	0.530	0.304	0.425	DLHM 0.640
	Pyrene (mg/kg)	0.046	0.041	0.026	0.036	DLHM 0.050
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	DLHM <0.016
	Surrogate: d10-Acenaphthene (%)	102.9	100.8	96.6	98.9	101.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-6 SE 18-SEP-20 09:40 RG_FOBSC_SE-01_2020-09-18_0940	L2508974-7 SE 18-SEP-20 10:00 RG_FOBSC_SE-02_2020-09-18_1000	L2508974-8 SE 18-SEP-20 11:00 RG_FOBSC_SE-03_2020-09-18_1100	L2508974-9 SE 18-SEP-20 11:30 RG_FOBSC_SE-04_2020-09-18_1130	L2508974-10 SE 18-SEP-20 12:00 RG_FOBSC_SE-05_2020-09-18_1200
SOIL						
Metals	Silver (Ag) (mg/kg)	0.14	0.15	0.15	0.15	0.15
	Sodium (Na) (mg/kg)	84	125	81	86	94
	Strontium (Sr) (mg/kg)	73.8	78.5	74.8	79.2	69.8
	Sulfur (S) (mg/kg)	<1000	1100	<1000	1200	<1000
	Thallium (Tl) (mg/kg)	0.228	0.224	0.202	0.202	0.234
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	22.8	26.4	29.4	17.6	28.5
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.00	1.07	1.10	1.02	1.02
	Vanadium (V) (mg/kg)	29.3	32.9	31.3	31.1	34.1
	Zinc (Zn) (mg/kg)	176	185	171	203	114
	Zirconium (Zr) (mg/kg)	<1.0	1.1	<1.0	1.0	1.3
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.060	DLCI <0.070	DLCI <0.056	DLCI <0.066	DLCI <0.040
	Acenaphthylene (mg/kg)	DLHM 0.0110	DLHM 0.0142	DLHM <0.014	DLHM 0.013	0.0077
	Acridine (mg/kg)	DLCI <0.13	DLCI <0.14	DLCI <0.12	DLCI <0.14	DLCI <0.060
	Anthracene (mg/kg)	DLHM 0.0175	DLHM 0.0119	DLHM <0.0056	DLHM 0.015	0.0052
	Benz(a)anthracene (mg/kg)	DLHM 0.038	DLHM 0.038	DLCI <0.036	DLCI <0.046	DLCI <0.12
	Benzo(a)pyrene (mg/kg)	DLHM 0.021	DLHM 0.022	DLHM 0.019	DLHM <0.025	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.064	DLHM 0.074	DLHM 0.064	DLHM 0.076	0.044
	Benzo(b+j+k)fluoranthene (mg/kg)	0.064	0.074	0.064	0.076	0.044
	Benzo(e)pyrene (mg/kg)	DLHM 0.077	DLHM 0.081	DLHM 0.077	DLHM 0.086	0.046
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.031	DLHM 0.032	DLHM 0.030	DLHM 0.036	DLCI <0.020
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.010
	Chrysene (mg/kg)	DLHM 0.178	DLHM 0.190	DLCI <0.18	DLCI 0.221	DLCI 0.119
	Dibenz(a,h)anthracene (mg/kg)	DLHM 0.0168	DLCI <0.020	DLHM 0.015	DLHM 0.018	DLCI <0.020
	Fluoranthene (mg/kg)	DLHM 0.027	DLHM 0.027	DLHM 0.026	DLHM 0.031	0.031
	Fluorene (mg/kg)	DLHM 0.213	DLHM 0.243	DLHM 0.199	DLHM 0.242	0.104
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.010
	1-Methylnaphthalene (mg/kg)	DLHM 0.713	DLHM 0.796	DLHM 0.669	DLHM 0.822	0.414
	2-Methylnaphthalene (mg/kg)	DLHM 1.18	DLHM 1.29	DLHM 1.11	DLHM 1.37	0.678
	Naphthalene (mg/kg)	DLHM 0.366	DLHM 0.407	DLHM 0.332	DLHM 0.430	0.234
	Perylene (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.010
	Phenanthrene (mg/kg)	DLHM 0.661	DLHM 0.736	DLHM 0.625	DLHM 0.708	0.431
	Pyrene (mg/kg)	DLHM 0.052	DLHM 0.057	DLHM 0.050	DLHM 0.062	0.038
	Quinoline (mg/kg)	DLHM <0.012	DLHM <0.014	DLHM <0.014	DLHM <0.025	<0.050
	Surrogate: d10-Acenaphthene (%)	107.4	103.4	100.3	102.8	99.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-11	L2508974-12	L2508974-13	L2508974-14	L2508974-15
	Description	SE	SE	SE	SE	SE
	Sampled Date	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:50	10:20	11:00	13:10	13:30
	Client ID	RG_SCOUTDS_SE-01_2020-09-17_0950	RG_SCOUTDS_SE-02_2020-09-17_1020	RG_SCOUTDS_SE-03_2020-09-17_1100	RG_SCOUTDS_SE-04_2020-09-17_1310	RG_SCOUTDS_SE-05_2020-09-17_1330
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.14	0.15	0.15	0.16	0.15
	Sodium (Na) (mg/kg)	72	87	79	77	86
	Strontium (Sr) (mg/kg)	78.9	76.9	81.2	77.2	90.9
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.201	0.238	0.232	0.211	0.218
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	25.3	24.2	23.1	20.8	23.2
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.05	1.13	1.11	0.973	0.956
	Vanadium (V) (mg/kg)	31.4	38.9	36.6	34.4	34.3
	Zinc (Zn) (mg/kg)	156	161	178	190	220
	Zirconium (Zr) (mg/kg)	<1.0	1.0	1.1	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.075	DLCI <0.045	DLCI <0.076	DLCI <0.085	DLCI <0.060
	Acenaphthylene (mg/kg)	DLHM 0.016	0.0085	DLHM 0.0108	DLHM 0.0142	0.0137
	Acridine (mg/kg)	DLCI <0.10	DLCI <0.080	DLCI <0.12	DLCI <0.16	DLCI <0.12
	Anthracene (mg/kg)	DLHM 0.0182	0.0137	DLHM 0.0059	DLHM 0.0124	0.0239
	Benz(a)anthracene (mg/kg)	DLCI <0.040	DLCI <0.030	DLHM 0.034	DLHM 0.047	DLCI <0.030
	Benzo(a)pyrene (mg/kg)	DLHM <0.020	DLCI <0.020	DLHM 0.018	DLHM 0.025	0.019
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.054	0.036	0.058	DLHM 0.082	0.062
	Benzo(b+j+k)fluoranthene (mg/kg)	0.054	0.036	0.058	0.082	0.062
	Benzo(e)pyrene (mg/kg)	DLHM 0.060	0.044	0.069	DLHM 0.098	0.070
	Benzo(g,h,i)perylene (mg/kg)	DLCI <0.030	0.018	DLHM 0.031	DLHM 0.038	0.031
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	<0.010	<0.013	<0.017	<0.010
	Chrysene (mg/kg)	DLCI <0.17	DLCI <0.13	DLHM 0.171	DLHM 0.221	DLCI <0.18
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.013	0.0085	DLHM 0.0156	DLHM 0.0189	0.0148
	Fluoranthene (mg/kg)	DLHM 0.029	0.019	DLHM 0.035	DLHM 0.043	0.028
	Fluorene (mg/kg)	DLHM 0.218	0.141	0.209	DLHM 0.293	0.222
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM <0.020	<0.010	DLHM <0.013	DLHM <0.017	0.010
	1-Methylnaphthalene (mg/kg)	DLHM 0.814	0.524	0.818	DLHM 0.983	0.802
	2-Methylnaphthalene (mg/kg)	DLHM 1.42	0.893	DLHM 1.35	DLHM 1.60	1.34
	Naphthalene (mg/kg)	DLHM 0.455	0.301	0.453	DLHM 0.497	0.453
	Perylene (mg/kg)	DLHM <0.020	<0.010	DLHM <0.013	DLHM <0.017	<0.010
	Phenanthrene (mg/kg)	DLHM 0.699	0.447	0.670	DLHM 0.884	0.698
	Pyrene (mg/kg)	DLHM 0.051	0.036	DLHM 0.051	DLHM 0.070	0.051
	Quinoline (mg/kg)	DLHM <0.020	<0.050	DLHM <0.013	DLHM <0.017	<0.050
	Surrogate: d10-Acenaphthene (%)	104.4	102.3	107.3	107.4	105.8

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-16 SE 16-SEP-20 10:00 RG_FOBCP_SE-01_2020-09-16_1000	L2508974-17 SE 16-SEP-20 11:00 RG_FOBCP_SE-02_2020-09-16_1100	L2508974-18 SE 16-SEP-20 12:10 RG_FOBCP_SE-03_2020-09-16_1210	L2508974-19 SE 16-SEP-20 14:10 RG_FOBCP_SE-04_2020-09-16_1410	L2508974-20 SE 16-SEP-20 14:40 RG_FOBCP_SE-05_2020-09-16_1440
SOIL						
Metals	Silver (Ag) (mg/kg)	0.18	0.15	0.15	0.17	0.16
	Sodium (Na) (mg/kg)	88	89	88	92	90
	Strontium (Sr) (mg/kg)	103	89.4	71.5	77.8	75.7
	Sulfur (S) (mg/kg)	1100	<1000	<1000	1000	<1000
	Thallium (Tl) (mg/kg)	0.237	0.254	0.235	0.262	0.234
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	25.1	21.9	20.8	25.2	23.5
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.16	1.17	1.05	1.10	1.02
	Vanadium (V) (mg/kg)	33.4	36.0	32.8	32.1	33.8
	Zinc (Zn) (mg/kg)	241	168	130	157	148
	Zirconium (Zr) (mg/kg)	1.0	<1.0	1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.060	DLCI <0.060	DLCI <0.035	DLCI <0.080	DLCI <0.050
	Acenaphthylene (mg/kg)	DLHM 0.0122	0.0093	<0.0050	0.0133	DLHM 0.0098
	Acridine (mg/kg)	DLCI <0.12	DLCI <0.12	DLCI <0.060	DLCI <0.13	DLCI <0.080
	Anthracene (mg/kg)	DLHM 0.0191	0.0190	0.0074	0.0173	DLHM 0.0073
	Benz(a)anthracene (mg/kg)	DLHM 0.046	DLCI <0.040	DLCI <0.020	DLCI <0.040	DLHM 0.028
	Benzo(a)pyrene (mg/kg)	DLHM 0.018	0.017	<0.010	0.021	DLHM 0.013
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.075	0.073	0.039	0.065	DLHM 0.053
	Benzo(b+j+k)fluoranthene (mg/kg)	0.095	0.143	0.039	0.079	0.053
	Benzo(e)pyrene (mg/kg)	DLHM 0.085	0.073	0.044	0.076	DLHM 0.061
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.037	0.028	0.019	0.032	DLCI <0.030
	Benzo(k)fluoranthene (mg/kg)	DLHM 0.020	0.071	<0.010	0.014	DLHM <0.013
	Chrysene (mg/kg)	DLHM 0.195	DLCI <0.16	DLCI <0.12	DLCI <0.22	DLHM 0.164
	Dibenz(a,h)anthracene (mg/kg)	DLCI <0.027	DLCI <0.017	0.0092	DLCI <0.020	DLHM 0.0163
	Fluoranthene (mg/kg)	DLHM 0.051	0.036	0.016	0.033	DLHM 0.032
	Fluorene (mg/kg)	DLHM 0.192	0.198	0.099	0.244	DLHM 0.141
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM 0.016	<0.010	<0.010	<0.010	DLHM <0.013
	1-Methylnaphthalene (mg/kg)	DLHM 0.670	0.763	0.378	0.898	DLHM 0.631
	2-Methylnaphthalene (mg/kg)	DLHM 1.10	1.25	0.612	1.45	DLHM 1.01
	Naphthalene (mg/kg)	DLHM 0.366	0.424	0.203	0.469	DLHM 0.370
	Perylene (mg/kg)	DLHM <0.013	<0.010	<0.010	<0.010	DLHM <0.013
	Phenanthrene (mg/kg)	DLHM 0.622	0.691	0.369	0.790	DLHM 0.620
	Pyrene (mg/kg)	DLHM 0.063	0.055	0.030	0.059	DLHM 0.044
	Quinoline (mg/kg)	DLHM <0.013	<0.050	<0.050	<0.050	DLHM <0.013
	Surrogate: d10-Acenaphthene (%)	104.2	105.0	100.5	104.1	104.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-21	L2508974-22	L2508974-23	L2508974-24	L2508974-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20
	Sampled Time	10:00	10:30	11:00	11:20	12:00
	Client ID	RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI_SE-05_2020-09-14_1200
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.16	0.14	0.13	0.14
	Sodium (Na) (mg/kg)	82	89	89	107	103
	Strontium (Sr) (mg/kg)	75.0	70.5	78.5	77.7	80.0
	Sulfur (S) (mg/kg)	1100	1300	1400	1200	<1000
	Thallium (Tl) (mg/kg)	0.171	0.166	0.152	0.187	0.182
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	24.5	25.8	19.8	20.6	20.9
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.01	0.933	0.964	0.930	1.41
	Vanadium (V) (mg/kg)	28.2	25.9	23.8	29.6	41.5
	Zinc (Zn) (mg/kg)	127	125	130	118	141
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.14	DLCI <0.18	DLCI <0.15	DLCI <0.15	DLCI <0.12
	Acenaphthylene (mg/kg)	DLCI <0.030	DLCI <0.040	DLCI <0.040	DLCI <0.030	DLCI <0.030
	Acridine (mg/kg)	DLCI <0.26	DLCI <0.29	DLCI <0.30	DLCI <0.24	DLCI <0.22
	Anthracene (mg/kg)	DLCI <0.030	DLCI <0.040	DLCI <0.040	DLCI <0.030	DLCI <0.040
	Benz(a)anthracene (mg/kg)	DLHM 0.075	DLHM 0.088	DLHM 0.071	DLHM 0.069	DLHM 0.073
	Benzo(a)pyrene (mg/kg)	DLHM 0.037	DLHM 0.051	DLHM 0.040	DLHM 0.032	DLHM 0.052
	Benzo(b&j)fluoranthene (mg/kg)	DLHM 0.125	DLHM 0.150	DLHM 0.115	DLHM 0.112	DLHM 0.109
	Benzo(b+j+k)fluoranthene (mg/kg)	DLHM 0.125	DLHM 0.150	DLHM 0.115	DLHM 0.112	DLHM 0.109
	Benzo(e)pyrene (mg/kg)	DLHM 0.136	DLHM 0.158	DLHM 0.137	DLHM 0.122	DLHM 0.138
	Benzo(g,h,i)perylene (mg/kg)	DLHM 0.065	DLHM 0.071	DLHM 0.065	DLHM 0.060	DLHM 0.058
	Benzo(k)fluoranthene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.025	DLHM <0.020	DLHM <0.025
	Chrysene (mg/kg)	DLHM 0.357	DLHM 0.415	DLHM 0.350	DLHM 0.321	DLHM 0.325
	Dibenz(a,h)anthracene (mg/kg)	DLHM 0.027	DLHM 0.040	DLCI <0.030	DLCI <0.030	DLCI <0.030
	Fluoranthene (mg/kg)	DLHM 0.075	DLHM 0.088	DLHM 0.061	DLHM 0.049	DLHM 0.046
	Fluorene (mg/kg)	DLHM 0.488	DLHM 0.455	DLHM 0.495	DLHM 0.341	DLHM 0.449
	Indeno(1,2,3-c,d)pyrene (mg/kg)	DLHM 0.022	DLHM 0.030	DLHM <0.025	DLHM <0.020	DLHM 0.028
	1-Methylnaphthalene (mg/kg)	DLHM 1.51	DLHM 1.81	DLHM 1.49	DLHM 1.44	DLHM 1.37
	2-Methylnaphthalene (mg/kg)	DLHM 2.44	DLHM 3.00	DLHM 2.44	DLHM 2.32	DLHM 2.27
	Naphthalene (mg/kg)	DLHM 0.710	DLHM 0.849	DLHM 0.744	DLHM 0.640	DLHM 0.662
	Perylene (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.025	DLHM <0.020	DLHM <0.025
	Phenanthrene (mg/kg)	DLHM 1.42	DLHM 1.62	DLHM 1.42	DLHM 1.28	DLHM 1.23
	Pyrene (mg/kg)	DLHM 0.112	DLHM 0.130	DLHM 0.106	DLHM 0.098	DLHM 0.104
	Quinoline (mg/kg)	DLHM <0.020	DLHM <0.020	DLHM <0.025	DLHM <0.020	DLHM <0.025
	Surrogate: d10-Acenaphthene (%)	112.8	124.2	102.8	110.0	109.7

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-26	L2508974-27	L2508974-28	L2508974-29	L2508974-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20
	Sampled Time	10:00	10:20	11:30	11:50	12:20
	Client ID	RG_FOBKS_SE-01_2020-09-10_1000	RG_FOBKS_SE-02_2020-09-10_1020	RG_FOBKS_SE-03_2020-09-10_1130	RG_FOBKS_SE-04_2020-09-10_1150	RG_FOBKS_SE-05_2020-09-10_1220
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.13	0.16	0.12	0.16
	Sodium (Na) (mg/kg)	94	86	88	76	78
	Strontium (Sr) (mg/kg)	73.4	86.1	78.8	88.2	72.0
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	1100
	Thallium (Tl) (mg/kg)	0.224	0.213	0.235	0.202	0.184
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	19.3	17.3	22.2	21.2	20.4
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.01	1.00	1.05	0.978	1.02
	Vanadium (V) (mg/kg)	35.2	34.7	35.7	32.8	26.8
	Zinc (Zn) (mg/kg)	111	109	110	121	134
	Zirconium (Zr) (mg/kg)	1.1	<1.0	<1.0	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	DLCI <0.045	DLCI <0.045	DLCI <0.035	DLCI <0.040	DLCI <0.080
	Acenaphthylene (mg/kg)	0.0070	0.0084	0.0081	0.0080	DLHM 0.013
	Acridine (mg/kg)	DLCI <0.090	DLCI <0.070	DLCI <0.070	DLCI <0.080	DLCI <0.15
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0040	<0.0040	DLHM <0.0080
	Benz(a)anthracene (mg/kg)	0.022	0.019	DLCI <0.020	0.021	DLHM 0.036
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	0.013	DLHM <0.020
	Benzo(b&j)fluoranthene (mg/kg)	DLCI <0.050	DLCI <0.040	0.028	0.037	DLHM 0.067
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.051	<0.041	0.028	0.037	0.067
	Benzo(e)pyrene (mg/kg)	0.044	0.035	0.030	0.040	DLHM 0.070
	Benzo(g,h,i)perylene (mg/kg)	0.023	0.017	0.014	0.014	DLCI <0.030
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.020
	Chrysene (mg/kg)	0.111	0.084	DLCI <0.090	0.108	DLHM 0.191
	Dibenz(a,h)anthracene (mg/kg)	0.0125	DLCI <0.0090	0.0075	0.0087	DLHM 0.016
	Fluoranthene (mg/kg)	0.024	0.021	0.020	0.023	DLHM 0.046
	Fluorene (mg/kg)	0.126	0.102	0.094	0.119	DLHM 0.221
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.020
	1-Methylnaphthalene (mg/kg)	0.477	0.445	0.404	0.511	DLHM 0.850
	2-Methylnaphthalene (mg/kg)	0.786	0.721	0.679	0.838	DLHM 1.44
	Naphthalene (mg/kg)	0.240	0.209	0.211	0.242	DLHM 0.413
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	DLHM <0.020
	Phenanthrene (mg/kg)	0.534	0.428	0.423	0.450	DLHM 0.827
	Pyrene (mg/kg)	0.035	0.031	0.027	0.037	DLHM 0.059
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	DLHM <0.020
	Surrogate: d10-Acenaphthene (%)	97.8	98.3	98.6	98.3	100.6

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-31	L2508974-32	L2508974-33	L2508974-34	L2508974-35
	Description	SE	SE	SE	SE	SE
	Sampled Date	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20	11-SEP-20
	Sampled Time	09:00	09:15	09:30	09:45	10:00
	Client ID	RG_FO22_SE-01_2020-09-11_0900	RG_FO22_SE-02_2020-09-11_0915	RG_FO22_SE-03_2020-09-11_0930	RG_FO22_SE-04_2020-09-11_0945	RG_FO22_SE-05_2020-09-11_1000
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.17	0.12	0.13	0.14	0.14
	Sodium (Na) (mg/kg)	84	75	80	78	85
	Strontium (Sr) (mg/kg)	61.7	68.9	54.1	71.2	61.5
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.213	0.225	0.185	0.219	0.219
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	23.4	14.0	25.6	23.3	23.1
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.12	1.10	0.954	1.22	1.07
	Vanadium (V) (mg/kg)	33.6	39.7	27.6	37.8	35.7
	Zinc (Zn) (mg/kg)	108	111	94.4	121	105
	Zirconium (Zr) (mg/kg)	1.1 DLCI	<1.0 DLCI	1.0 DLCI	1.1 DLCI	1.0 DLCI
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.025	<0.015	<0.017	<0.017	<0.020
	Acenaphthylene (mg/kg)	0.0055 DLCI	<0.0050 DLCI	<0.0050 DLCI	<0.0050 DLCI	<0.0050 DLCI
	Acridine (mg/kg)	<0.040	<0.020	<0.030	<0.020	<0.020
	Anthracene (mg/kg)	<0.0040	<0.0040	0.0083	<0.0040	0.0075
	Benz(a)anthracene (mg/kg)	0.014	<0.010	0.033	<0.010	0.011
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	0.015	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.036	0.022	0.040	0.025	0.024
	Benzo(b+j+k)fluoranthene (mg/kg)	0.036	0.022	0.040	0.025	0.024
	Benzo(e)pyrene (mg/kg)	0.038	0.021	0.033	0.027	0.024
	Benzo(g,h,i)perylene (mg/kg)	0.015	0.011	<0.020 DLCI	0.011	<0.020 DLCI
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.107	<0.060 DLCI	0.086	0.080	0.079
	Dibenz(a,h)anthracene (mg/kg)	0.0089	<0.0050	0.0059	0.0069	<0.0080 DLCI
	Fluoranthene (mg/kg)	0.020	0.011	0.059	0.016	0.014
	Fluorene (mg/kg)	0.062	0.022	0.027	0.030	0.024
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.268	0.142	0.202	0.204	0.202
	2-Methylnaphthalene (mg/kg)	0.431	0.213	0.300	0.325	0.311
	Naphthalene (mg/kg)	0.141	0.073	0.115	0.129	0.125
	Perylene (mg/kg)	0.029	0.014	0.022	0.021	0.021
	Phenanthrene (mg/kg)	0.397	0.223	0.319	0.319	0.352
	Pyrene (mg/kg)	0.027	0.016	0.058	0.022	0.024
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	97.1	96.3	96.3	95.4	99.0

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-36	L2508974-37	L2508974-38	L2508974-39	L2508974-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	09:15	09:30	09:45	10:00	10:15
	Client ID	RG_FRUPO_SE-01_2020-09-12_0915	RG_FRUPO_SE-02_2020-09-12_0930	RG_FRUPO_SE-03_2020-09-12_0945	RG_FRUPO_SE-04_2020-09-12_1000	RG_FRUPO_SE-05_2020-09-12_1015
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.16	0.16	0.14	0.15	0.19
	Sodium (Na) (mg/kg)	87	82	95	75	83
	Strontium (Sr) (mg/kg)	66.4	60.4	73.9	71.3	67.6
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.222	0.216	0.240	0.226	0.244
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	21.3	22.9	24.3	20.0	32.5
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	1.10	1.06	1.14	1.17	1.14
	Vanadium (V) (mg/kg)	34.9	34.2	40.7	36.2	33.1
	Zinc (Zn) (mg/kg)	110	109	120	123	117
	Zirconium (Zr) (mg/kg)	<1.0 DLCI	<1.0 DLCI	1.3 DLCI	<1.0 DLCI	1.3 DLCI
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.035	<0.045	<0.020	<0.020	<0.025
	Acenaphthylene (mg/kg)	0.0074	0.0098	<0.0050	0.0058	0.0063
	Acridine (mg/kg)	<0.050 DLCI	<0.060 DLCI	<0.030 DLCI	<0.040 DLCI	<0.050 DLCI
	Anthracene (mg/kg)	0.0113	0.0042	0.0061	0.0111	0.0101
	Benz(a)anthracene (mg/kg)	0.022	0.023	0.010	0.011	0.014
	Benzo(a)pyrene (mg/kg)	<0.010	0.011	<0.010	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.039	0.036	0.023	0.024	0.026
	Benzo(b+j+k)fluoranthene (mg/kg)	0.039	0.036	0.023	0.024	0.026
	Benzo(e)pyrene (mg/kg)	0.041	0.042	0.027	0.027	0.030
	Benzo(g,h,i)perylene (mg/kg)	0.017	<0.020 DLCI	0.013	0.011	0.014
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	0.117	0.112	0.086	0.074	0.084
	Dibenz(a,h)anthracene (mg/kg)	0.0135	0.0077	0.0072	0.0065	0.0074
	Fluoranthene (mg/kg)	0.038	0.027	0.017	0.014	0.015
	Fluorene (mg/kg)	0.081	0.090	0.044	0.068	0.070
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.350	0.495	0.271	0.309	0.326
	2-Methylnaphthalene (mg/kg)	0.565	0.784	0.414	0.504	0.520
	Naphthalene (mg/kg)	0.170	0.286	0.149	0.166	0.161
	Perylene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Phenanthrene (mg/kg)	0.402	0.581	0.337	0.367	0.437
	Pyrene (mg/kg)	0.039	0.036	0.022	0.024	0.026
	Quinoline (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	98.8	97.2	97.7	99.9	96.9

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-41	L2508974-42	L2508974-43	L2508974-44	L2508974-45
	Description	SE	SE	SE	SE	SE
	Sampled Date	15-SEP-20	15-SEP-20	15-SEP-20	17-SEP-20	17-SEP-20
	Sampled Time	09:15	09:30	09:45	09:15	09:30
	Client ID	RG_HENUP_SE-01_2020-09-15_0915	RG_HENUP_SE-02_2020-09-15_0930	RG_HENUP_SE-03_2020-09-15_0945	RG_FO26_SE-01_2020-09-17_0915	RG_FO26_SE-02_2020-09-17_0930
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	0.15	0.13	0.19	<0.10	<0.10
	Sodium (Na) (mg/kg)	99	93	100	179	158
	Strontium (Sr) (mg/kg)	83.2	78.3	65.8	137	125
	Sulfur (S) (mg/kg)	<1000	<1000	<1000	<1000	<1000
	Thallium (Tl) (mg/kg)	0.250	0.257	0.252	<0.050	<0.050
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0	<2.0	<2.0
	Titanium (Ti) (mg/kg)	24.4	16.8	25.4	16.1	14.3
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50	<0.50	<0.50
	Uranium (U) (mg/kg)	0.989	1.00	0.954	0.451	0.446
	Vanadium (V) (mg/kg)	35.8	36.1	32.9	5.54	5.77
	Zinc (Zn) (mg/kg)	110	115	104	31.9	35.1
	Zirconium (Zr) (mg/kg)	<1.0	<1.0	1.3	<1.0	<1.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.010 DLCI	<0.0050	<0.011 DLCI	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0050	<0.0065 DLHM	<0.0050	<0.0050
	Acridine (mg/kg)	<0.010	<0.010	<0.020 DLCI	<0.010	<0.010
	Anthracene (mg/kg)	<0.0040	<0.0040	<0.0052 DLHM	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Benzo(b&j)fluoranthene (mg/kg)	0.019	0.017	0.028 DLHM	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	0.019	0.017	<0.030 DLHM	<0.015	<0.015
	Benzo(e)pyrene (mg/kg)	0.018	0.017	0.028 DLHM	<0.010	<0.010
	Benzo(g,h,i)perylene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Chrysene (mg/kg)	0.053	0.051	0.083 DLHM	<0.010	<0.010
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0050	<0.0065 DLHM	<0.0050	<0.0050
	Fluoranthene (mg/kg)	<0.010	<0.010	0.018 DLHM	<0.010	<0.010
	Fluorene (mg/kg)	0.020	0.014	0.047 DLHM	<0.010	0.010
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	1-Methylnaphthalene (mg/kg)	0.070	0.051	0.157 DLHM	<0.050	<0.050
	2-Methylnaphthalene (mg/kg)	0.108	0.082	0.252 DLHM	0.022	0.033
	Naphthalene (mg/kg)	0.047	0.043	0.091 DLHM	<0.010	0.011
	Perylene (mg/kg)	<0.010	<0.010	<0.013 DLHM	<0.010	<0.010
	Phenanthrene (mg/kg)	0.124	0.120	0.236 DLHM	0.014	0.018
	Pyrene (mg/kg)	0.013	0.011	0.025 DLHM	<0.010	<0.010
	Quinoline (mg/kg)	<0.050	<0.050	<0.013 DLHM	<0.050	<0.050
	Surrogate: d10-Acenaphthene (%)	90.2	93.5	99.5	98.1	96.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-46	L2508974-47	L2508974-48		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	22-SEP-20	22-SEP-20		
	Sampled Time	09:45	10:30	14:45		
	Client ID	RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-2X_2020-09-22_1030	RG_RIVER_SE-3X_2020-09-22_1445		
Grouping	**Analyte**					
SOIL						
Metals	Silver (Ag) (mg/kg)	<0.10	0.20	<0.10		
	Sodium (Na) (mg/kg)	182	76	181		
	Strontium (Sr) (mg/kg)	112	63.7	112		
	Sulfur (S) (mg/kg)	<1000	<1000	<1000		
	Thallium (Tl) (mg/kg)	<0.050	0.234	<0.050		
	Tin (Sn) (mg/kg)	<2.0	<2.0	<2.0		
	Titanium (Ti) (mg/kg)	23.6	27.8	21.0		
	Tungsten (W) (mg/kg)	<0.50	<0.50	<0.50		
	Uranium (U) (mg/kg)	0.445	1.07	0.458		
	Vanadium (V) (mg/kg)	7.34	29.3	6.70		
	Zinc (Zn) (mg/kg)	42.1	143	40.3		
	Zirconium (Zr) (mg/kg)	<1.0	1.2	<1.0		
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.035 DLCI	<0.0050		
	Acenaphthylene (mg/kg)	<0.0050	0.0052	<0.0050		
	Acridine (mg/kg)	<0.010	<0.050 DLCI	<0.010		
	Anthracene (mg/kg)	<0.0040	0.0090	<0.0040		
	Benz(a)anthracene (mg/kg)	<0.010	0.014	<0.010		
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	Benzo(b&j)fluoranthene (mg/kg)	<0.010	0.026	<0.010		
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	0.026	<0.015		
	Benzo(e)pyrene (mg/kg)	<0.010	0.030	<0.010		
	Benzo(g,h,i)perylene (mg/kg)	<0.010	0.012	<0.010		
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010		
	Chrysene (mg/kg)	<0.010	0.095	<0.010		
	Dibenz(a,h)anthracene (mg/kg)	<0.0050	0.0054	<0.0050		
	Fluoranthene (mg/kg)	<0.010	0.024	<0.010		
	Fluorene (mg/kg)	<0.010	0.078	<0.010		
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	<0.010	<0.010		
	1-Methylnaphthalene (mg/kg)	<0.050	0.371	<0.050		
	2-Methylnaphthalene (mg/kg)	0.063	0.598	0.052		
	Naphthalene (mg/kg)	0.019	0.179	0.015		
	Perylene (mg/kg)	<0.010	<0.010	<0.010		
	Phenanthrene (mg/kg)	0.036	0.455	0.035		
	Pyrene (mg/kg)	<0.010	0.032	<0.010		
	Quinoline (mg/kg)	<0.050	<0.050	<0.050		
	Surrogate: d10-Acenaphthene (%)	99.0	103.2	96.5		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-1	L2508974-2	L2508974-3	L2508974-4	L2508974-5
	Description	SE	SE	SE	SE	SE
	Sampled Date	22-SEP-20	22-SEP-20	22-SEP-20	22-SEP-20	22-SEP-20
	Sampled Time	10:00	10:30	12:00	12:30	13:00
	Client ID	RG_FRCP1SW_SE-01_2020-09-22_1000	RG_FRCP1SW_SE-02_2020-09-22_1030	RG_FRCP1SW_SE-03_2020-09-22_1200	RG_FRCP1SW_SE-04_2020-09-22_1230	RG_FRCP1SW_SE-05_2020-09-22_1300
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	93.4	91.3	128.4	88.1	92.6
	Surrogate: d8-Naphthalene (%)	98.8	98.9	95.9	95.3	99.5
	Surrogate: d10-Phenanthrene (%)	92.9	90.5	93.0	84.7	99.5
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.030	0.034	0.021	0.029	0.043
	IACR (CCME)	0.53	0.60	0.41	0.48	0.74

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-6	L2508974-7	L2508974-8	L2508974-9	L2508974-10
	Description	SE	SE	SE	SE	SE
	Sampled Date	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20	18-SEP-20
	Sampled Time	09:40	10:00	11:00	11:30	12:00
	Client ID	RG_FOBSC_SE-01_2020-09-18_0940	RG_FOBSC_SE-02_2020-09-18_1000	RG_FOBSC_SE-03_2020-09-18_1100	RG_FOBSC_SE-04_2020-09-18_1130	RG_FOBSC_SE-05_2020-09-18_1200
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	96.3	91.4	91.8	96.5	89.7
	Surrogate: d8-Naphthalene (%)	106.1	99.3	93.8	101.9	91.8
	Surrogate: d10-Phenanthrene (%)	101.6	96.4	93.3	89.7	90.2
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	0.052	<0.050	0.060	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.051	0.047	0.045	0.046	0.028
	IACR (CCME)	0.77	0.83	0.67	0.85	0.60

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-11 SE 17-SEP-20 09:50 RG_SCOUTDS_SE-01_2020-09-17_0950	L2508974-12 SE 17-SEP-20 10:20 RG_SCOUTDS_SE-02_2020-09-17_1020	L2508974-13 SE 17-SEP-20 11:00 RG_SCOUTDS_SE-03_2020-09-17_1100	L2508974-14 SE 17-SEP-20 13:10 RG_SCOUTDS_SE-04_2020-09-17_1310	L2508974-15 SE 17-SEP-20 13:30 RG_SCOUTDS_SE-05_2020-09-17_1330
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	87.9	87.6	91.6	93.5	90.6
	Surrogate: d8-Naphthalene (%)	103.6	103.5	103.8	103.2	102.9
	Surrogate: d10-Phenanthrene (%)	93.0	88.0	95.0	98.0	92.5
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	0.062	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.027	0.025	0.046	0.061	0.044
	IACR (CCME)	0.56	0.40	0.71	0.98	0.63

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-16	L2508974-17	L2508974-18	L2508974-19	L2508974-20
	Description	SE	SE	SE	SE	SE
	Sampled Date	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20	16-SEP-20
	Sampled Time	10:00	11:00	12:10	14:10	14:40
	Client ID	RG_FOBCP_SE-01_2020-09-16_1000	RG_FOBCP_SE-02_2020-09-16_1100	RG_FOBCP_SE-03_2020-09-16_1210	RG_FOBCP_SE-04_2020-09-16_1410	RG_FOBCP_SE-05_2020-09-16_1440
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	92.1	92.3	86.0	88.4	91.1
	Surrogate: d8-Naphthalene (%)	99.2	102.0	98.5	95.7	102.7
	Surrogate: d10-Phenanthrene (%)	97.4	91.6	89.5	93.5	96.9
	IACR:Coarse	<0.050	0.076	<0.050	<0.050	<0.050
	IACR:Fine	0.075	0.144	<0.050	0.055	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.050	0.043	0.021	0.042	0.041
	IACR (CCME)	0.95	1.08	0.39	0.71	0.65

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-21	L2508974-22	L2508974-23	L2508974-24	L2508974-25
	Description	SE	SE	SE	SE	SE
	Sampled Date	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20	14-SEP-20
	Sampled Time	10:00	10:30	11:00	11:20	12:00
	Client ID	RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI_SE-05_2020-09-14_1200
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	129.8	122.2	125.3	127.9	128.4
	Surrogate: d8-Naphthalene (%)	99.0	108.6	91.7	95.8	96.5
	Surrogate: d10-Phenanthrene (%)	119.9	122.2	109.8	115.5	112.0
	IACR:Coarse	<0.050	0.056	<0.050	<0.050	<0.050
	IACR:Fine	0.090	0.107	0.088	0.081	0.087
	B(a)P Total Potency Equivalent (mg/kg)	0.091	0.123	0.080	0.071	0.093
	IACR (CCME)	1.48	1.80	1.37	1.29	1.36

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-26	L2508974-27	L2508974-28	L2508974-29	L2508974-30
	Description	SE	SE	SE	SE	SE
	Sampled Date	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20	10-SEP-20
	Sampled Time	10:00	10:20	11:30	11:50	12:20
	Client ID	RG_FOBKS_SE-01_2020-09-10_1000	RG_FOBKS_SE-02_2020-09-10_1020	RG_FOBKS_SE-03_2020-09-10_1130	RG_FOBKS_SE-04_2020-09-10_1150	RG_FOBKS_SE-05_2020-09-10_1220
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	122.0	127.0	124.9	87.8	88.3
	Surrogate: d8-Naphthalene (%)	85.1	89.9	87.1	87.4	91.4
	Surrogate: d10-Phenanthrene (%)	103.9	96.9	102.2	96.4	104.2
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	0.054
	B(a)P Total Potency Equivalent (mg/kg)	0.025	<0.020	<0.020	0.030	0.040
	IACR (CCME)	0.38	0.29	0.31	0.46	0.79

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-31 SE 11-SEP-20 09:00 RG_FO22_SE-01_2020-09-11_0900	L2508974-32 SE 11-SEP-20 09:15 RG_FO22_SE-02_2020-09-11_0915	L2508974-33 SE 11-SEP-20 09:30 RG_FO22_SE-03_2020-09-11_0930	L2508974-34 SE 11-SEP-20 09:45 RG_FO22_SE-04_2020-09-11_0945	L2508974-35 SE 11-SEP-20 10:00 RG_FO22_SE-05_2020-09-11_1000
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	127.7	118.9	121.2	119.4	124.6
	Surrogate: d8-Naphthalene (%)	87.1	84.6	87.3	81.7	88.9
	Surrogate: d10-Phenanthrene (%)	108.9	103.9	95.0	103.9	109.1
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.021	<0.020	0.030	<0.020	<0.020
	IACR (CCME)	0.41	0.22	0.49	0.29	0.28

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-36	L2508974-37	L2508974-38	L2508974-39	L2508974-40
	Description	SE	SE	SE	SE	SE
	Sampled Date	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20	12-SEP-20
	Sampled Time	09:15	09:30	09:45	10:00	10:15
	Client ID	RG_FRUPO_SE-01_2020-09-12_0915	RG_FRUPO_SE-02_2020-09-12_0930	RG_FRUPO_SE-03_2020-09-12_0945	RG_FRUPO_SE-04_2020-09-12_1000	RG_FRUPO_SE-05_2020-09-12_1015
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	124.9	124.6	124.9	127.2	120.6
	Surrogate: d8-Naphthalene (%)	86.9	88.1	89.5	91.2	86.5
	Surrogate: d10-Phenanthrene (%)	99.2	104.8	101.7	109.7	106.5
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	0.027	0.027	<0.020	<0.020	<0.020
	IACR (CCME)	0.47	0.45	0.30	0.29	0.33

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2508974-41 SE 15-SEP-20 09:15 RG_HENUP_SE-01_2020-09-15_0915	L2508974-42 SE 15-SEP-20 09:30 RG_HENUP_SE-02_2020-09-15_0930	L2508974-43 SE 15-SEP-20 09:45 RG_HENUP_SE-03_2020-09-15_0945	L2508974-44 SE 17-SEP-20 09:15 RG_FO26_SE-01_2020-09-17_0915	L2508974-45 SE 17-SEP-20 09:30 RG_FO26_SE-02_2020-09-17_0930
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	124.9	126.3	121.1	109.9	126.3
	Surrogate: d8-Naphthalene (%)	82.4	81.2	88.6	86.7	84.5
	Surrogate: d10-Phenanthrene (%)	93.2	99.9	111.0	90.5	95.0
	IACR:Coarse	<0.050	<0.050	<0.050	<0.050	<0.050
	IACR:Fine	<0.050	<0.050	<0.050	<0.050	<0.050
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020
	IACR (CCME)	0.21	0.20	0.31	<0.15	<0.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2508974-46	L2508974-47	L2508974-48		
	Description	SE	SE	SE		
	Sampled Date	17-SEP-20	22-SEP-20	22-SEP-20		
	Sampled Time	09:45	10:30	14:45		
	Client ID	RG_FO26_SE-03_2020-09-17_0945	RG_RIVER_SE-2X_2020-09-22_1030	RG_RIVER_SE-3X_2020-09-22_1445		
Grouping	**Analyte**					
SOIL						
Polycyclic Aromatic Hydrocarbons	Surrogate: d12-Chrysene (%)	110.7	122.6	107.2		
	Surrogate: d8-Naphthalene (%)	86.0	88.1	85.7		
	Surrogate: d10-Phenanthrene (%)	100.5	102.9	106.4		
	IACR:Coarse	<0.050	<0.050	<0.050		
	IACR:Fine	<0.050	<0.050	<0.050		
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020		
	IACR (CCME)	<0.15	0.32	<0.15		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Fluoranthene	DUP-H	L2508974-1, -10, -11, -12, -13, -14, -15, -16, -17, -18, -19, -2, -20, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLHM	Detection Limit Adjusted: Sample has High Moisture Content
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
PSAL	Limited sample was available for PSA (100g minimum is standard). Measurement Uncertainty for PSA results may be higher than usual.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
C-TIC-PCT-SK	Soil	Total Inorganic Carbon in Soil	CSSS (2008) P216-217
A known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.			
C-TOC-CALC-SK	Soil	Total Organic Carbon Calculation	CSSS (2008) 21.2
Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon. (TIC)			
C-TOT-LECO-SK	Soil	Total Carbon by combustion method	CSSS (2008) 21.2
The sample is ignited in a combustion analyzer where carbon in the reduced CO2 gas is determined using a thermal conductivity detector.			
HG-200.2-CVAA-CL	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.			
IC-CACO3-CALC-SK	Soil	Inorganic Carbon as CaCO3 Equivalent	Calculation
MET-200.2-CCMS-CL	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS. Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.			
MOISTURE-CL	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
This analysis is carried out gravimetrically by drying the sample at 105 C			
PAH-TMB-H/A-MS-CL	Soil	PAH Tumbler Extraction (Hexane/Acetone)	EPA 3570/8270-GC/MS
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.			
PH-1:2-CL	Soil	pH in soil (1:2 Soil:Water Extraction)	CSSS Ch. 16
Soil and de-ionized water (by volume) are mixed in a defined ratio. The slurry is allowed to stand, shaken, and then allowed to stand again prior to taking measurements. After equilibration, the pH of the liquid portion of the extract is measured by a pH meter. Field Measurement is recommended where accurate pH measurements are required, due to the 15 minute recommended hold time.			
PSA-PIPET-DETAIL-SK	Soil	Particle size - Sieve and Pipette	SSIR-51 METHOD 3.2.1
Particle size distribution is determined by a combination of techniques. Dry sieving is performed for coarse particles, wet sieving for sand particles and the pipette sedimentation method for clay particles.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA
CL	ALS ENVIRONMENTAL - CALGARY, ALBERTA, CANADA

Reference Information

Chain of Custody Numbers:

FRO LAEMP Sept 2020

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Teck Coal Ltd.
421 Pine Avenue
Sparwood BC V0B 2G0
Contact: Cait Good

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TIC-PCT-SK	**Soil**							
Batch R5246404								
WG3414818-1 DUP		**L2508974-21**						
Inorganic Carbon		2.67	2.66		%	0.3	20	05-OCT-20
WG3414818-4 IRM		**08-109_SOIL**						
Inorganic Carbon			109.3		%		80-120	05-OCT-20
WG3414818-2 LCS		**0.5**						
Inorganic Carbon			98.9		%		90-110	05-OCT-20
WG3414818-3 MB								
Inorganic Carbon			<0.050		%		0.05	05-OCT-20
Batch R5246406								
WG3414817-1 DUP		**L2508974-1**						
Inorganic Carbon		1.56	1.56		%	0.5	20	05-OCT-20
WG3414817-4 IRM		**08-109_SOIL**						
Inorganic Carbon			110.0		%		80-120	05-OCT-20
WG3414817-2 LCS		**0.5**						
Inorganic Carbon			98.7		%		90-110	05-OCT-20
WG3414817-3 MB								
Inorganic Carbon			<0.050		%		0.05	05-OCT-20
Batch R5246407								
WG3417237-4 IRM		**08-109_SOIL**						
Inorganic Carbon			114.4		%		80-120	05-OCT-20
WG3417237-2 LCS		**0.5**						
Inorganic Carbon			98.1		%		90-110	05-OCT-20
WG3417237-3 MB								
Inorganic Carbon			<0.050		%		0.05	05-OCT-20
Batch R5249443								
WG3414822-4 IRM		**08-109_SOIL**						
Inorganic Carbon			86.6		%		80-120	06-OCT-20
WG3414822-2 LCS		**0.5**						
Inorganic Carbon			95.5		%		90-110	06-OCT-20
WG3414822-3 MB								
Inorganic Carbon			<0.050		%		0.05	06-OCT-20
C-TOT-LECO-SK	**Soil**							
Batch R5244273								
WG3413289-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			95.8		%		80-120	01-OCT-20
WG3413289-5 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			99.3		%		90-110	01-OCT-20
WG3413289-4 MB								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-TOT-LECO-SK	**Soil**							
Batch R5244273								
WG3413289-4 MB								
Total Carbon by Combustion			<0.05		%		0.05	01-OCT-20
Batch R5244496								
WG3414880-1 DUP		**L2508974-10**						
Total Carbon by Combustion		7.68	7.87		%	2.4	20	02-OCT-20
WG3414880-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			103.4		%		80-120	02-OCT-20
WG3414880-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			100.5		%		90-110	02-OCT-20
WG3414880-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	02-OCT-20
Batch R5244499								
WG3414881-1 DUP		**L2508974-30**						
Total Carbon by Combustion		10.1	10.1		%	0.1	20	02-OCT-20
WG3414881-2 IRM		**08-109_SOIL**						
Total Carbon by Combustion			99.5		%		80-120	02-OCT-20
WG3414881-4 LCS		**SULFADIAZINE**						
Total Carbon by Combustion			100.6		%		90-110	02-OCT-20
WG3414881-3 MB								
Total Carbon by Combustion			<0.05		%		0.05	02-OCT-20
HG-200.2-CVAA-CL	**Soil**							
Batch R5248923								
WG3419204-14 CRM		**TILL-1**						
Mercury (Hg)			102.0		%		70-130	06-OCT-20
WG3419204-19 CRM		**TILL-1**						
Mercury (Hg)			80.0		%		70-130	06-OCT-20
WG3419204-9 CRM		**TILL-1**						
Mercury (Hg)			114.0		%		70-130	06-OCT-20
WG3419204-15 DUP		**L2508974-17**						
Mercury (Hg)		0.0427	0.0442		mg/kg	3.4	40	06-OCT-20
WG3419204-20 DUP		**L2508974-33**						
Mercury (Hg)		0.0341	0.0330		mg/kg	3.2	40	06-OCT-20
WG3419204-13 LCS								
Mercury (Hg)			99.6		%		80-120	06-OCT-20
WG3419204-18 LCS								
Mercury (Hg)			85.7		%		80-120	06-OCT-20
WG3419204-8 LCS								

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-200.2-CVAA-CL	**Soil**							
Batch R5248923								
WG3419204-8 LCS								
Mercury (Hg)			109.0		%		80-120	06-OCT-20
WG3419204-11 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-OCT-20
WG3419204-16 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-OCT-20
WG3419204-6 MB								
Mercury (Hg)			<0.0050		mg/kg		0.005	06-OCT-20
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-14 CRM		**TILL-1**						
Aluminum (Al)			107.9		%		70-130	06-OCT-20
Antimony (Sb)			104.6		%		70-130	06-OCT-20
Arsenic (As)			107.8		%		70-130	06-OCT-20
Barium (Ba)			103.7		%		70-130	06-OCT-20
Beryllium (Be)			99.3		%		70-130	06-OCT-20
Bismuth (Bi)			101.2		%		70-130	06-OCT-20
Boron (B)			3.4		mg/kg		0-8.2	06-OCT-20
Cadmium (Cd)			105.0		%		70-130	06-OCT-20
Calcium (Ca)			112.7		%		70-130	06-OCT-20
Chromium (Cr)			113.6		%		70-130	06-OCT-20
Cobalt (Co)			109.6		%		70-130	06-OCT-20
Copper (Cu)			109.9		%		70-130	06-OCT-20
Iron (Fe)			108.5		%		70-130	06-OCT-20
Lead (Pb)			97.9		%		70-130	06-OCT-20
Lithium (Li)			100.7		%		70-130	06-OCT-20
Magnesium (Mg)			109.0		%		70-130	06-OCT-20
Manganese (Mn)			104.5		%		70-130	06-OCT-20
Molybdenum (Mo)			102.9		%		70-130	06-OCT-20
Nickel (Ni)			110.0		%		70-130	06-OCT-20
Phosphorus (P)			104.3		%		70-130	06-OCT-20
Potassium (K)			115.4		%		70-130	06-OCT-20
Selenium (Se)			0.35		mg/kg		0.11-0.51	06-OCT-20
Silver (Ag)			0.23		mg/kg		0.13-0.33	06-OCT-20
Sodium (Na)			120.2		%		70-130	06-OCT-20
Strontium (Sr)			113.5		%		70-130	06-OCT-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-14 CRM		**TILL-1**						
Thallium (Tl)			0.132		mg/kg		0.077-0.18	06-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	06-OCT-20
Titanium (Ti)			125.6		%		70-130	06-OCT-20
Tungsten (W)			0.17		mg/kg		0-0.66	06-OCT-20
Uranium (U)			105.9		%		70-130	06-OCT-20
Vanadium (V)			113.2		%		70-130	06-OCT-20
Zinc (Zn)			114.2		%		70-130	06-OCT-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	06-OCT-20
WG3419204-19 CRM		**TILL-1**						
Aluminum (Al)			99.2		%		70-130	06-OCT-20
Antimony (Sb)			97.0		%		70-130	06-OCT-20
Arsenic (As)			101.6		%		70-130	06-OCT-20
Barium (Ba)			97.0		%		70-130	06-OCT-20
Beryllium (Be)			100.9		%		70-130	06-OCT-20
Bismuth (Bi)			95.3		%		70-130	06-OCT-20
Boron (B)			3.8		mg/kg		0-8.2	06-OCT-20
Cadmium (Cd)			104.3		%		70-130	06-OCT-20
Calcium (Ca)			115.1		%		70-130	06-OCT-20
Chromium (Cr)			108.7		%		70-130	06-OCT-20
Cobalt (Co)			101.8		%		70-130	06-OCT-20
Copper (Cu)			102.4		%		70-130	06-OCT-20
Iron (Fe)			100.3		%		70-130	06-OCT-20
Lead (Pb)			92.1		%		70-130	06-OCT-20
Lithium (Li)			105.6		%		70-130	06-OCT-20
Magnesium (Mg)			106.2		%		70-130	06-OCT-20
Manganese (Mn)			98.1		%		70-130	06-OCT-20
Molybdenum (Mo)			101.8		%		70-130	06-OCT-20
Nickel (Ni)			103.2		%		70-130	06-OCT-20
Phosphorus (P)			98.8		%		70-130	06-OCT-20
Potassium (K)			119.9		%		70-130	06-OCT-20
Selenium (Se)			0.27		mg/kg		0.11-0.51	06-OCT-20
Silver (Ag)			0.22		mg/kg		0.13-0.33	06-OCT-20
Sodium (Na)			116.8		%		70-130	06-OCT-20
Strontium (Sr)			121.4		%		70-130	06-OCT-20

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-19 CRM		**TILL-1**						
Thallium (Tl)			0.132		mg/kg		0.077-0.18	06-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	06-OCT-20
Titanium (Ti)			123.1		%		70-130	06-OCT-20
Tungsten (W)			0.13		mg/kg		0-0.66	06-OCT-20
Uranium (U)			103.0		%		70-130	06-OCT-20
Vanadium (V)			107.6		%		70-130	06-OCT-20
Zinc (Zn)			105.7		%		70-130	06-OCT-20
Zirconium (Zr)			0.9		mg/kg		0-1.8	06-OCT-20
WG3419204-9 CRM		**TILL-1**						
Aluminum (Al)			106.9		%		70-130	06-OCT-20
Antimony (Sb)			105.2		%		70-130	06-OCT-20
Arsenic (As)			103.9		%		70-130	06-OCT-20
Barium (Ba)			101.8		%		70-130	06-OCT-20
Beryllium (Be)			100.0		%		70-130	06-OCT-20
Bismuth (Bi)			101.7		%		70-130	06-OCT-20
Boron (B)			3.4		mg/kg		0-8.2	06-OCT-20
Cadmium (Cd)			100.0		%		70-130	06-OCT-20
Calcium (Ca)			109.5		%		70-130	06-OCT-20
Chromium (Cr)			107.5		%		70-130	06-OCT-20
Cobalt (Co)			103.7		%		70-130	06-OCT-20
Copper (Cu)			105.1		%		70-130	06-OCT-20
Iron (Fe)			108.0		%		70-130	06-OCT-20
Lead (Pb)			101.2		%		70-130	06-OCT-20
Lithium (Li)			109.2		%		70-130	06-OCT-20
Magnesium (Mg)			109.2		%		70-130	06-OCT-20
Manganese (Mn)			102.8		%		70-130	06-OCT-20
Molybdenum (Mo)			104.2		%		70-130	06-OCT-20
Nickel (Ni)			103.6		%		70-130	06-OCT-20
Phosphorus (P)			103.3		%		70-130	06-OCT-20
Potassium (K)			110.9		%		70-130	06-OCT-20
Selenium (Se)			0.33		mg/kg		0.11-0.51	06-OCT-20
Silver (Ag)			0.24		mg/kg		0.13-0.33	06-OCT-20
Sodium (Na)			119.0		%		70-130	06-OCT-20
Strontium (Sr)			113.9		%		70-130	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-9 CRM		**TILL-1**						
Thallium (Tl)			0.132		mg/kg		0.077-0.18	06-OCT-20
Tin (Sn)			1.1		mg/kg		0-3.1	06-OCT-20
Titanium (Ti)			124.5		%		70-130	06-OCT-20
Tungsten (W)			0.16		mg/kg		0-0.66	06-OCT-20
Uranium (U)			108.0		%		70-130	06-OCT-20
Vanadium (V)			107.1		%		70-130	06-OCT-20
Zinc (Zn)			107.8		%		70-130	06-OCT-20
Zirconium (Zr)			0.7		mg/kg		0-1.8	06-OCT-20
WG3419204-15 DUP		**L2508974-17**						
Aluminum (Al)		6980	6660		mg/kg	4.6	40	06-OCT-20
Antimony (Sb)		0.66	0.60		mg/kg	9.8	30	06-OCT-20
Arsenic (As)		5.40	4.95		mg/kg	8.6	30	06-OCT-20
Barium (Ba)		235	218		mg/kg	7.7	40	06-OCT-20
Beryllium (Be)		0.63	0.55		mg/kg	14	30	06-OCT-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	06-OCT-20
Boron (B)		10.1	9.5		mg/kg	6.2	30	06-OCT-20
Cadmium (Cd)		2.22	2.02		mg/kg	9.5	30	06-OCT-20
Calcium (Ca)		74700	72900		mg/kg	2.5	30	06-OCT-20
Chromium (Cr)		13.4	12.8		mg/kg	5.2	30	06-OCT-20
Cobalt (Co)		6.93	6.24		mg/kg	10	30	06-OCT-20
Copper (Cu)		13.4	12.1		mg/kg	10	30	06-OCT-20
Iron (Fe)		17100	14000		mg/kg	20	30	06-OCT-20
Lead (Pb)		7.62	7.33		mg/kg	3.9	40	06-OCT-20
Lithium (Li)		10.0	9.2		mg/kg	8.3	30	06-OCT-20
Magnesium (Mg)		11700	11700		mg/kg	0.6	30	06-OCT-20
Manganese (Mn)		702	602		mg/kg	15	30	06-OCT-20
Molybdenum (Mo)		1.61	1.44		mg/kg	11	40	06-OCT-20
Nickel (Ni)		58.4	53.5		mg/kg	8.8	30	06-OCT-20
Phosphorus (P)		1340	1250		mg/kg	7.2	30	06-OCT-20
Potassium (K)		1940	1870		mg/kg	3.5	40	06-OCT-20
Selenium (Se)		2.13	2.11		mg/kg	1.1	30	06-OCT-20
Silver (Ag)		0.15	0.14		mg/kg	5.2	40	06-OCT-20
Sodium (Na)		89	85		mg/kg	5.2	40	06-OCT-20
Strontium (Sr)		89.4	74.3		mg/kg	18	40	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-15 DUP		**L2508974-17**						
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	06-OCT-20
Thallium (Tl)		0.254	0.242		mg/kg	5.1	30	06-OCT-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	06-OCT-20
Titanium (Ti)		21.9	24.5		mg/kg	11	40	06-OCT-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	06-OCT-20
Uranium (U)		1.17	1.07		mg/kg	8.7	30	06-OCT-20
Vanadium (V)		36.0	31.8		mg/kg	12	30	06-OCT-20
Zinc (Zn)		168	153		mg/kg	9.7	30	06-OCT-20
Zirconium (Zr)		<1.0	<1.0	RPD-NA	mg/kg	N/A	30	06-OCT-20
WG3419204-20 DUP		**L2508974-33**						
Aluminum (Al)		6000	6730		mg/kg	12	40	06-OCT-20
Antimony (Sb)		0.51	0.48		mg/kg	4.8	30	06-OCT-20
Arsenic (As)		4.55	4.69		mg/kg	2.9	30	06-OCT-20
Barium (Ba)		159	163		mg/kg	2.8	40	06-OCT-20
Beryllium (Be)		0.50	0.54		mg/kg	8.5	30	06-OCT-20
Bismuth (Bi)		<0.20	<0.20	RPD-NA	mg/kg	N/A	30	06-OCT-20
Boron (B)		6.9	8.3		mg/kg	18	30	06-OCT-20
Cadmium (Cd)		0.960	0.922		mg/kg	4.0	30	06-OCT-20
Calcium (Ca)		37500	39100		mg/kg	4.1	30	06-OCT-20
Chromium (Cr)		11.8	13.1		mg/kg	11	30	06-OCT-20
Cobalt (Co)		4.58	4.52		mg/kg	1.4	30	06-OCT-20
Copper (Cu)		10.4	10.3		mg/kg	0.5	30	06-OCT-20
Iron (Fe)		12100	12300		mg/kg	1.1	30	06-OCT-20
Lead (Pb)		6.96	6.82		mg/kg	2.0	40	06-OCT-20
Lithium (Li)		8.1	8.4		mg/kg	3.9	30	06-OCT-20
Magnesium (Mg)		12500	12900		mg/kg	3.5	30	06-OCT-20
Manganese (Mn)		281	281		mg/kg	0.0	30	06-OCT-20
Molybdenum (Mo)		1.03	1.01		mg/kg	1.9	40	06-OCT-20
Nickel (Ni)		21.5	21.2		mg/kg	1.5	30	06-OCT-20
Phosphorus (P)		1390	1420		mg/kg	2.0	30	06-OCT-20
Potassium (K)		1520	1800		mg/kg	17	40	06-OCT-20
Selenium (Se)		1.54	1.53		mg/kg	0.8	30	06-OCT-20
Silver (Ag)		0.13	0.13		mg/kg	1.5	40	06-OCT-20
Sodium (Na)		80	85		mg/kg	6.6	40	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-20 DUP		**L2508974-33**						
Strontium (Sr)		54.1	56.8		mg/kg	4.9	40	06-OCT-20
Sulfur (S)		<1000	<1000	RPD-NA	mg/kg	N/A	30	06-OCT-20
Thallium (Tl)		0.185	0.197		mg/kg	5.8	30	06-OCT-20
Tin (Sn)		<2.0	<2.0	RPD-NA	mg/kg	N/A	40	06-OCT-20
Titanium (Ti)		25.6	29.2		mg/kg	13	40	06-OCT-20
Tungsten (W)		<0.50	<0.50	RPD-NA	mg/kg	N/A	30	06-OCT-20
Uranium (U)		0.954	0.944		mg/kg	1.1	30	06-OCT-20
Vanadium (V)		27.6	30.4		mg/kg	9.6	30	06-OCT-20
Zinc (Zn)		94.4	93.2		mg/kg	1.3	30	06-OCT-20
Zirconium (Zr)		1.0	<1.0	RPD-NA	mg/kg	N/A	30	06-OCT-20
WG3419204-13 LCS								
Aluminum (Al)			93.2		%		80-120	06-OCT-20
Antimony (Sb)			102.8		%		80-120	06-OCT-20
Arsenic (As)			101.4		%		80-120	06-OCT-20
Barium (Ba)			99.7		%		80-120	06-OCT-20
Beryllium (Be)			92.7		%		80-120	06-OCT-20
Bismuth (Bi)			96.4		%		80-120	06-OCT-20
Boron (B)			93.5		%		80-120	06-OCT-20
Cadmium (Cd)			97.5		%		80-120	06-OCT-20
Calcium (Ca)			95.7		%		80-120	06-OCT-20
Chromium (Cr)			100.2		%		80-120	06-OCT-20
Cobalt (Co)			99.5		%		80-120	06-OCT-20
Copper (Cu)			98.5		%		80-120	06-OCT-20
Iron (Fe)			99.9		%		80-120	06-OCT-20
Lead (Pb)			101.1		%		80-120	06-OCT-20
Lithium (Li)			91.2		%		80-120	06-OCT-20
Magnesium (Mg)			98.7		%		80-120	06-OCT-20
Manganese (Mn)			95.0		%		80-120	06-OCT-20
Molybdenum (Mo)			101.4		%		80-120	06-OCT-20
Nickel (Ni)			99.2		%		80-120	06-OCT-20
Phosphorus (P)			94.5		%		80-120	06-OCT-20
Potassium (K)			98.6		%		80-120	06-OCT-20
Selenium (Se)			100.9		%		80-120	06-OCT-20
Silver (Ag)			94.9		%		80-120	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-13 LCS								
Sodium (Na)			99.7		%		80-120	06-OCT-20
Strontium (Sr)			98.7		%		80-120	06-OCT-20
Sulfur (S)			95.2		%		80-120	06-OCT-20
Thallium (Tl)			99.4		%		80-120	06-OCT-20
Tin (Sn)			103.0		%		80-120	06-OCT-20
Titanium (Ti)			98.7		%		80-120	06-OCT-20
Tungsten (W)			97.0		%		80-120	06-OCT-20
Uranium (U)			98.1		%		80-120	06-OCT-20
Vanadium (V)			102.2		%		80-120	06-OCT-20
Zinc (Zn)			102.1		%		80-120	06-OCT-20
Zirconium (Zr)			98.0		%		80-120	06-OCT-20
WG3419204-18 LCS								
Aluminum (Al)			98.4		%		80-120	06-OCT-20
Antimony (Sb)			106.6		%		80-120	06-OCT-20
Arsenic (As)			107.0		%		80-120	06-OCT-20
Barium (Ba)			103.8		%		80-120	06-OCT-20
Beryllium (Be)			101.3		%		80-120	06-OCT-20
Bismuth (Bi)			100.9		%		80-120	06-OCT-20
Boron (B)			102.4		%		80-120	06-OCT-20
Cadmium (Cd)			102.9		%		80-120	06-OCT-20
Calcium (Ca)			101.2		%		80-120	06-OCT-20
Chromium (Cr)			106.0		%		80-120	06-OCT-20
Cobalt (Co)			102.8		%		80-120	06-OCT-20
Copper (Cu)			102.7		%		80-120	06-OCT-20
Iron (Fe)			103.4		%		80-120	06-OCT-20
Lead (Pb)			104.3		%		80-120	06-OCT-20
Lithium (Li)			102.9		%		80-120	06-OCT-20
Magnesium (Mg)			105.5		%		80-120	06-OCT-20
Manganese (Mn)			99.4		%		80-120	06-OCT-20
Molybdenum (Mo)			107.0		%		80-120	06-OCT-20
Nickel (Ni)			103.5		%		80-120	06-OCT-20
Phosphorus (P)			108.8		%		80-120	06-OCT-20
Potassium (K)			103.5		%		80-120	06-OCT-20
Selenium (Se)			105.0		%		80-120	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-18 LCS								
Silver (Ag)			100.7		%		80-120	06-OCT-20
Sodium (Na)			99.4		%		80-120	06-OCT-20
Strontium (Sr)			106.2		%		80-120	06-OCT-20
Sulfur (S)			96.3		%		80-120	06-OCT-20
Thallium (Tl)			100.3		%		80-120	06-OCT-20
Tin (Sn)			107.7		%		80-120	06-OCT-20
Titanium (Ti)			101.1		%		80-120	06-OCT-20
Tungsten (W)			99.7		%		80-120	06-OCT-20
Uranium (U)			103.2		%		80-120	06-OCT-20
Vanadium (V)			106.8		%		80-120	06-OCT-20
Zinc (Zn)			108.9		%		80-120	06-OCT-20
Zirconium (Zr)			103.0		%		80-120	06-OCT-20
WG3419204-8 LCS								
Aluminum (Al)			100.9		%		80-120	06-OCT-20
Antimony (Sb)			102.9		%		80-120	06-OCT-20
Arsenic (As)			101.4		%		80-120	06-OCT-20
Barium (Ba)			100.2		%		80-120	06-OCT-20
Beryllium (Be)			95.2		%		80-120	06-OCT-20
Bismuth (Bi)			98.8		%		80-120	06-OCT-20
Boron (B)			93.8		%		80-120	06-OCT-20
Cadmium (Cd)			101.4		%		80-120	06-OCT-20
Calcium (Ca)			97.7		%		80-120	06-OCT-20
Chromium (Cr)			100.3		%		80-120	06-OCT-20
Cobalt (Co)			99.4		%		80-120	06-OCT-20
Copper (Cu)			99.2		%		80-120	06-OCT-20
Iron (Fe)			107.1		%		80-120	06-OCT-20
Lead (Pb)			105.8		%		80-120	06-OCT-20
Lithium (Li)			93.2		%		80-120	06-OCT-20
Magnesium (Mg)			105.5		%		80-120	06-OCT-20
Manganese (Mn)			98.8		%		80-120	06-OCT-20
Molybdenum (Mo)			102.2		%		80-120	06-OCT-20
Nickel (Ni)			98.7		%		80-120	06-OCT-20
Potassium (K)			98.2		%		80-120	06-OCT-20
Selenium (Se)			97.4		%		80-120	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-8 LCS								
Silver (Ag)			98.1		%		80-120	06-OCT-20
Sodium (Na)			98.4		%		80-120	06-OCT-20
Strontium (Sr)			100.9		%		80-120	06-OCT-20
Sulfur (S)			90.5		%		80-120	06-OCT-20
Thallium (Tl)			101.5		%		80-120	06-OCT-20
Tin (Sn)			102.2		%		80-120	06-OCT-20
Titanium (Ti)			94.9		%		80-120	06-OCT-20
Tungsten (W)			95.9		%		80-120	06-OCT-20
Uranium (U)			101.8		%		80-120	06-OCT-20
Vanadium (V)			102.9		%		80-120	06-OCT-20
Zinc (Zn)			100.0		%		80-120	06-OCT-20
Zirconium (Zr)			98.2		%		80-120	06-OCT-20
WG3419204-11 MB								
Aluminum (Al)			<50		mg/kg		50	06-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	06-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	06-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	06-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	06-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	06-OCT-20
Boron (B)			<5.0		mg/kg		5	06-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	06-OCT-20
Calcium (Ca)			<50		mg/kg		50	06-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	06-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	06-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	06-OCT-20
Iron (Fe)			<50		mg/kg		50	06-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	06-OCT-20
Lithium (Li)			<2.0		mg/kg		2	06-OCT-20
Magnesium (Mg)			<20		mg/kg		20	06-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	06-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	06-OCT-20
Phosphorus (P)			<50		mg/kg		50	06-OCT-20
Potassium (K)			<100		mg/kg		100	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-11 MB								
Selenium (Se)			<0.20		mg/kg		0.2	06-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	06-OCT-20
Sodium (Na)			<50		mg/kg		50	06-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	06-OCT-20
Sulfur (S)			<1000		mg/kg		1000	06-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	06-OCT-20
Tin (Sn)			<2.0		mg/kg		2	06-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	06-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	06-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	06-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	06-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	06-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	06-OCT-20
WG3419204-16 MB								
Aluminum (Al)			<50		mg/kg		50	06-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	06-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	06-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	06-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	06-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	06-OCT-20
Boron (B)			<5.0		mg/kg		5	06-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	06-OCT-20
Calcium (Ca)			<50		mg/kg		50	06-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	06-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	06-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	06-OCT-20
Iron (Fe)			<50		mg/kg		50	06-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	06-OCT-20
Lithium (Li)			<2.0		mg/kg		2	06-OCT-20
Magnesium (Mg)			<20		mg/kg		20	06-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	06-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	06-OCT-20
Phosphorus (P)			<50		mg/kg		50	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-16 MB								
Potassium (K)			<100		mg/kg		100	06-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	06-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	06-OCT-20
Sodium (Na)			<50		mg/kg		50	06-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	06-OCT-20
Sulfur (S)			<1000		mg/kg		1000	06-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	06-OCT-20
Tin (Sn)			<2.0		mg/kg		2	06-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	06-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	06-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	06-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	06-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	06-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	06-OCT-20
WG3419204-6 MB								
Aluminum (Al)			<50		mg/kg		50	06-OCT-20
Antimony (Sb)			<0.10		mg/kg		0.1	06-OCT-20
Arsenic (As)			<0.10		mg/kg		0.1	06-OCT-20
Barium (Ba)			<0.50		mg/kg		0.5	06-OCT-20
Beryllium (Be)			<0.10		mg/kg		0.1	06-OCT-20
Bismuth (Bi)			<0.20		mg/kg		0.2	06-OCT-20
Boron (B)			<5.0		mg/kg		5	06-OCT-20
Cadmium (Cd)			<0.020		mg/kg		0.02	06-OCT-20
Calcium (Ca)			<50		mg/kg		50	06-OCT-20
Chromium (Cr)			<0.50		mg/kg		0.5	06-OCT-20
Cobalt (Co)			<0.10		mg/kg		0.1	06-OCT-20
Copper (Cu)			<0.50		mg/kg		0.5	06-OCT-20
Iron (Fe)			<50		mg/kg		50	06-OCT-20
Lead (Pb)			<0.50		mg/kg		0.5	06-OCT-20
Lithium (Li)			<2.0		mg/kg		2	06-OCT-20
Magnesium (Mg)			<20		mg/kg		20	06-OCT-20
Manganese (Mn)			<1.0		mg/kg		1	06-OCT-20
Molybdenum (Mo)			<0.10		mg/kg		0.1	06-OCT-20
Nickel (Ni)			<0.50		mg/kg		0.5	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-CL	**Soil**							
Batch R5248645								
WG3419204-6 MB								
Phosphorus (P)			<50		mg/kg		50	06-OCT-20
Potassium (K)			<100		mg/kg		100	06-OCT-20
Selenium (Se)			<0.20		mg/kg		0.2	06-OCT-20
Silver (Ag)			<0.10		mg/kg		0.1	06-OCT-20
Sodium (Na)			<50		mg/kg		50	06-OCT-20
Strontium (Sr)			<0.50		mg/kg		0.5	06-OCT-20
Sulfur (S)			<1000		mg/kg		1000	06-OCT-20
Thallium (Tl)			<0.050		mg/kg		0.05	06-OCT-20
Tin (Sn)			<2.0		mg/kg		2	06-OCT-20
Titanium (Ti)			<1.0		mg/kg		1	06-OCT-20
Tungsten (W)			<0.50		mg/kg		0.5	06-OCT-20
Uranium (U)			<0.050		mg/kg		0.05	06-OCT-20
Vanadium (V)			<0.20		mg/kg		0.2	06-OCT-20
Zinc (Zn)			<2.0		mg/kg		2	06-OCT-20
Zirconium (Zr)			<1.0		mg/kg		1	06-OCT-20
MOISTURE-CL	**Soil**							
Batch R5241540								
WG3413461-2 LCS								
Moisture			100.3		%		90-110	28-SEP-20
WG3413461-1 MB								
Moisture			<0.25		%		0.25	28-SEP-20
Batch R5241569								
WG3413848-5 LCS								
Moisture			96.3		%		90-110	28-SEP-20
WG3413848-4 MB								
Moisture			<0.25		%		0.25	28-SEP-20
Batch R5242294								
WG3414449-6 LCS								
Moisture			97.0		%		90-110	29-SEP-20
WG3414449-5 MB								
Moisture			<0.25		%		0.25	29-SEP-20
Batch R5243043								
WG3415337-3 DUP		**L2508974-26**						
Moisture		44.8	47.1		%	5.1	20	30-SEP-20
WG3415337-2 LCS								
Moisture			97.8		%		90-110	30-SEP-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MOISTURE-CL	**Soil**							
Batch R5243043								
WG3415337-1 MB								
Moisture			<0.25		%		0.25	30-SEP-20
Batch R5243055								
WG3415207-3 DUP		**L2508974-1**						
Moisture		53.5	51.6		%	3.6	20	30-SEP-20
WG3415207-2 LCS								
Moisture			97.7		%		90-110	30-SEP-20
WG3415207-1 MB								
Moisture			<0.25		%		0.25	30-SEP-20
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-12 IRM		**ALS PAH RM2**						
Acenaphthene			103.8		%		60-130	03-OCT-20
Acenaphthylene			82.8		%		60-130	03-OCT-20
Anthracene			83.9		%		60-130	03-OCT-20
Acridine			97.7		%		60-130	03-OCT-20
Benz(a)anthracene			95.6		%		60-130	03-OCT-20
Benzo(a)pyrene			91.5		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			88.0		%		60-130	03-OCT-20
Benzo(e)pyrene			98.9		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			95.1		%		60-130	03-OCT-20
Benzo(k)fluoranthene			85.9		%		60-130	03-OCT-20
Chrysene			106.6		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			94.0		%		60-130	03-OCT-20
Fluoranthene			106.2		%		60-130	03-OCT-20
Fluorene			114.1		%		60-130	03-OCT-20
Indeno(1,2,3-c,d)pyrene			106.6		%		60-130	03-OCT-20
2-Methylnaphthalene			94.0		%		60-130	03-OCT-20
Naphthalene			93.0		%		50-130	03-OCT-20
Perylene			112.5		%		60-130	03-OCT-20
Phenanthrene			97.5		%		60-130	03-OCT-20
Pyrene			106.1		%		60-130	03-OCT-20
1-Methylnaphthalene			96.9		%		60-130	03-OCT-20
WG3418177-3 IRM		**ALS PAH RM2**						
Acenaphthene			96.4		%		60-130	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-3 IRM		**ALS PAH RM2**						
Acenaphthylene			73.1		%		60-130	02-OCT-20
Anthracene			76.4		%		60-130	02-OCT-20
Acridine			87.9		%		60-130	02-OCT-20
Benz(a)anthracene			92.6		%		60-130	02-OCT-20
Benzo(a)pyrene			92.9		%		60-130	02-OCT-20
Benzo(b&j)fluoranthene			86.6		%		60-130	02-OCT-20
Benzo(e)pyrene			95.9		%		60-130	02-OCT-20
Benzo(g,h,i)perylene			81.2		%		60-130	02-OCT-20
Benzo(k)fluoranthene			83.4		%		60-130	02-OCT-20
Chrysene			101.4		%		60-130	02-OCT-20
Dibenz(a,h)anthracene			88.4		%		60-130	02-OCT-20
Fluoranthene			98.6		%		60-130	02-OCT-20
Fluorene			104.0		%		60-130	02-OCT-20
Indeno(1,2,3-c,d)pyrene			111.7		%		60-130	02-OCT-20
2-Methylnaphthalene			88.4		%		60-130	02-OCT-20
Naphthalene			92.9		%		50-130	02-OCT-20
Perylene			99.4		%		60-130	02-OCT-20
Phenanthrene			89.6		%		60-130	02-OCT-20
Pyrene			98.9		%		60-130	02-OCT-20
1-Methylnaphthalene			92.2		%		60-130	02-OCT-20
WG3418177-6 IRM		**ALS PAH RM2**						
Acenaphthene			95.8		%		60-130	03-OCT-20
Acenaphthylene			82.6		%		60-130	03-OCT-20
Anthracene			90.7		%		60-130	03-OCT-20
Acridine			96.5		%		60-130	03-OCT-20
Benz(a)anthracene			100.0		%		60-130	03-OCT-20
Benzo(a)pyrene			100.4		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			93.5		%		60-130	03-OCT-20
Benzo(e)pyrene			103.3		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			89.2		%		60-130	03-OCT-20
Benzo(k)fluoranthene			100.9		%		60-130	03-OCT-20
Chrysene			109.4		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			94.1		%		60-130	03-OCT-20
Fluoranthene			103.7		%		60-130	03-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-6 IRM		**ALS PAH RM2**						
Fluorene			104.6		%		60-130	03-OCT-20
Indeno(1,2,3-c,d)pyrene			117.4		%		60-130	03-OCT-20
2-Methylnaphthalene			84.1		%		60-130	03-OCT-20
Naphthalene			83.0		%		50-130	03-OCT-20
Perylene			110.6		%		60-130	03-OCT-20
Phenanthrene			92.9		%		60-130	03-OCT-20
Pyrene			104.6		%		60-130	03-OCT-20
1-Methylnaphthalene			87.0		%		60-130	03-OCT-20
WG3418177-13 LCS								
Acenaphthene			106.8		%		60-130	03-OCT-20
Acenaphthylene			97.5		%		60-130	03-OCT-20
Anthracene			95.7		%		60-130	03-OCT-20
Acridine			92.1		%		60-130	03-OCT-20
Benz(a)anthracene			90.1		%		60-130	03-OCT-20
Benzo(a)pyrene			69.8		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			70.2		%		60-130	03-OCT-20
Benzo(e)pyrene			80.0		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			118.5		%		60-130	03-OCT-20
Benzo(k)fluoranthene			72.6		%		60-130	03-OCT-20
Chrysene			98.0		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			91.7		%		60-130	03-OCT-20
Fluoranthene			107.3		%		60-130	03-OCT-20
Fluorene			118.6		%		60-130	03-OCT-20
Indeno(1,2,3-c,d)pyrene			92.1		%		60-130	03-OCT-20
2-Methylnaphthalene			94.5		%		60-130	03-OCT-20
Naphthalene			106.8		%		50-130	03-OCT-20
Perylene			72.6		%		60-130	03-OCT-20
Phenanthrene			107.2		%		60-130	03-OCT-20
Pyrene			108.8		%		60-130	03-OCT-20
1-Methylnaphthalene			99.7		%		60-130	03-OCT-20
Quinoline			67.3		%		60-130	03-OCT-20
WG3418177-2 LCS								
Acenaphthene			104.9		%		60-130	02-OCT-20
Acenaphthylene			103.3		%		60-130	02-OCT-20
Anthracene			109.7		%		60-130	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-2 LCS								
Acridine			99.7		%		60-130	02-OCT-20
Benz(a)anthracene			103.3		%		60-130	02-OCT-20
Benzo(a)pyrene			96.2		%		60-130	02-OCT-20
Benzo(b&j)fluoranthene			95.3		%		60-130	02-OCT-20
Benzo(e)pyrene			104.8		%		60-130	02-OCT-20
Benzo(g,h,i)perylene			103.9		%		60-130	02-OCT-20
Benzo(k)fluoranthene			104.6		%		60-130	02-OCT-20
Chrysene			109.2		%		60-130	02-OCT-20
Dibenz(a,h)anthracene			97.3		%		60-130	02-OCT-20
Fluoranthene			111.8		%		60-130	02-OCT-20
Fluorene			121.4		%		60-130	02-OCT-20
Indeno(1,2,3-c,d)pyrene			84.1		%		60-130	02-OCT-20
2-Methylnaphthalene			95.0		%		60-130	02-OCT-20
Naphthalene			105.2		%		50-130	02-OCT-20
Perylene			101.4		%		60-130	02-OCT-20
Phenanthrene			114.8		%		60-130	02-OCT-20
Pyrene			112.1		%		60-130	02-OCT-20
1-Methylnaphthalene			102.6		%		60-130	02-OCT-20
Quinoline			76.8		%		60-130	02-OCT-20
WG3418177-7 LCS								
Acenaphthene			106.7		%		60-130	03-OCT-20
Acenaphthylene			103.8		%		60-130	03-OCT-20
Anthracene			98.3		%		60-130	03-OCT-20
Acridine			93.8		%		60-130	03-OCT-20
Benz(a)anthracene			102.5		%		60-130	03-OCT-20
Benzo(a)pyrene			95.6		%		60-130	03-OCT-20
Benzo(b&j)fluoranthene			93.2		%		60-130	03-OCT-20
Benzo(e)pyrene			105.3		%		60-130	03-OCT-20
Benzo(g,h,i)perylene			107.5		%		60-130	03-OCT-20
Benzo(k)fluoranthene			103.8		%		60-130	03-OCT-20
Chrysene			108.7		%		60-130	03-OCT-20
Dibenz(a,h)anthracene			98.5		%		60-130	03-OCT-20
Fluoranthene			113.5		%		60-130	03-OCT-20
Fluorene			111.8		%		60-130	03-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-7 LCS								
Indeno(1,2,3-c,d)pyrene			78.5		%		60-130	03-OCT-20
2-Methylnaphthalene			98.6		%		60-130	03-OCT-20
Naphthalene			107.0		%		50-130	03-OCT-20
Perylene			105.2		%		60-130	03-OCT-20
Phenanthrene			103.1		%		60-130	03-OCT-20
Pyrene			114.7		%		60-130	03-OCT-20
1-Methylnaphthalene			103.9		%		60-130	03-OCT-20
Quinoline			72.0		%		60-130	03-OCT-20
WG3418177-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	02-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	02-OCT-20
Anthracene			<0.0040		mg/kg		0.004	02-OCT-20
Acridine			<0.010		mg/kg		0.01	02-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Chrysene			<0.010		mg/kg		0.01	02-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	02-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Fluorene			<0.010		mg/kg		0.01	02-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	02-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	02-OCT-20
Naphthalene			<0.010		mg/kg		0.01	02-OCT-20
Perylene			<0.010		mg/kg		0.01	02-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	02-OCT-20
Pyrene			<0.010		mg/kg		0.01	02-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	02-OCT-20
Quinoline			<0.050		mg/kg		0.05	02-OCT-20
Surrogate: d8-Naphthalene			89.0		%		50-130	02-OCT-20
Surrogate: d10-Acenaphthene			98.3		%		60-130	02-OCT-20
Surrogate: d10-Phenanthrene			103.0		%		60-130	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-1 MB								
Surrogate: d12-Chrysene			128.2		%		60-130	02-OCT-20
WG3418177-14 MB								
Acenaphthene			<0.0050		mg/kg		0.005	03-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	03-OCT-20
Anthracene			<0.0040		mg/kg		0.004	03-OCT-20
Acridine			<0.010		mg/kg		0.01	03-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	03-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	03-OCT-20
Chrysene			<0.010		mg/kg		0.01	03-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	03-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	03-OCT-20
Fluorene			<0.010		mg/kg		0.01	03-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	03-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	03-OCT-20
Naphthalene			<0.010		mg/kg		0.01	03-OCT-20
Perylene			<0.010		mg/kg		0.01	03-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	03-OCT-20
Pyrene			<0.010		mg/kg		0.01	03-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	03-OCT-20
Quinoline			<0.050		mg/kg		0.05	03-OCT-20
Surrogate: d8-Naphthalene			89.8		%		50-130	03-OCT-20
Surrogate: d10-Acenaphthene			94.0		%		60-130	03-OCT-20
Surrogate: d10-Phenanthrene			98.2		%		60-130	03-OCT-20
Surrogate: d12-Chrysene			88.0		%		60-130	03-OCT-20
WG3418177-4 MB								
Acenaphthene			<0.0050		mg/kg		0.005	02-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	02-OCT-20
Anthracene			<0.0040		mg/kg		0.004	02-OCT-20
Acridine			<0.010		mg/kg		0.01	02-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	02-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245092								
WG3418177-4 MB								
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	02-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Chrysene			<0.010		mg/kg		0.01	02-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	02-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	02-OCT-20
Fluorene			<0.010		mg/kg		0.01	02-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	02-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	02-OCT-20
Naphthalene			<0.010		mg/kg		0.01	02-OCT-20
Perylene			<0.010		mg/kg		0.01	02-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	02-OCT-20
Pyrene			<0.010		mg/kg		0.01	02-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	02-OCT-20
Quinoline			<0.050		mg/kg		0.05	02-OCT-20
Surrogate: d8-Naphthalene			86.4		%		50-130	02-OCT-20
Surrogate: d10-Acenaphthene			94.3		%		60-130	02-OCT-20
Surrogate: d10-Phenanthrene			110.3		%		60-130	02-OCT-20
Surrogate: d12-Chrysene			124.3		%		60-130	02-OCT-20
Batch R5245911								
WG3418729-4 DUP		**L2508974-1**						
Acenaphthene		<0.035	<0.035	RPD-NA	mg/kg	N/A	50	04-OCT-20
Acenaphthylene		0.0066	0.0067		mg/kg	1.5	50	04-OCT-20
Anthracene		0.0091	0.0059		mg/kg	43	50	04-OCT-20
Acridine		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	04-OCT-20
Benz(a)anthracene		<0.030	<0.030	RPD-NA	mg/kg	N/A	50	04-OCT-20
Benzo(a)pyrene		0.010	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
Benzo(b&j)fluoranthene		0.054	0.047		mg/kg	16	50	04-OCT-20
Benzo(e)pyrene		0.057	0.052		mg/kg	9.1	50	04-OCT-20
Benzo(g,h,i)perylene		0.022	0.019		mg/kg	13	50	04-OCT-20
Benzo(k)fluoranthene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
Chrysene		<0.13	<0.13	RPD-NA	mg/kg	N/A	50	04-OCT-20
Dibenz(a,h)anthracene		<0.020	<0.020	RPD-NA	mg/kg	N/A	50	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245911								
WG3418729-4 DUP		**L2508974-1**						
Fluoranthene		0.042	0.021	DUP-H	mg/kg	0.021	0.02	04-OCT-20
Fluorene		0.093	0.087		mg/kg	6.5	50	04-OCT-20
Indeno(1,2,3-c,d)pyrene		0.011	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
2-Methylnaphthalene		0.500	0.588		mg/kg	16	50	04-OCT-20
Naphthalene		0.165	0.211		mg/kg	24	50	04-OCT-20
Perylene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	04-OCT-20
Phenanthrene		0.385	0.443		mg/kg	14	50	04-OCT-20
Pyrene		0.046	0.035		mg/kg	26	50	04-OCT-20
1-Methylnaphthalene		0.311	0.367		mg/kg	17	50	04-OCT-20
Quinoline		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	04-OCT-20
WG3418729-3 IRM		**ALS PAH RM2**						
Acenaphthene			97.5		%		60-130	04-OCT-20
Acenaphthylene			91.9		%		60-130	04-OCT-20
Anthracene			85.1		%		60-130	04-OCT-20
Acridine			95.5		%		60-130	04-OCT-20
Benz(a)anthracene			114.9		%		60-130	04-OCT-20
Benzo(a)pyrene			106.5		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			112.8		%		60-130	04-OCT-20
Benzo(e)pyrene			120.2		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			90.2		%		60-130	04-OCT-20
Benzo(k)fluoranthene			100.6		%		60-130	04-OCT-20
Chrysene			115.4		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			97.8		%		60-130	04-OCT-20
Fluoranthene			105.5		%		60-130	04-OCT-20
Fluorene			112.1		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			124.7		%		60-130	04-OCT-20
2-Methylnaphthalene			93.9		%		60-130	04-OCT-20
Naphthalene			99.6		%		50-130	04-OCT-20
Perylene			113.3		%		60-130	04-OCT-20
Phenanthrene			93.9		%		60-130	04-OCT-20
Pyrene			107.5		%		60-130	04-OCT-20
1-Methylnaphthalene			93.2		%		60-130	04-OCT-20
WG3418729-2 LCS								
Acenaphthene			91.0		%		60-130	04-OCT-20
Acenaphthylene			86.5		%		60-130	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245911								
WG3418729-2 LCS								
Anthracene			86.8		%		60-130	04-OCT-20
Acridine			84.1		%		60-130	04-OCT-20
Benz(a)anthracene			99.5		%		60-130	04-OCT-20
Benzo(a)pyrene			93.6		%		60-130	04-OCT-20
Benzo(b&j)fluoranthene			96.2		%		60-130	04-OCT-20
Benzo(e)pyrene			100.2		%		60-130	04-OCT-20
Benzo(g,h,i)perylene			84.5		%		60-130	04-OCT-20
Benzo(k)fluoranthene			95.0		%		60-130	04-OCT-20
Chrysene			94.9		%		60-130	04-OCT-20
Dibenz(a,h)anthracene			86.9		%		60-130	04-OCT-20
Fluoranthene			94.5		%		60-130	04-OCT-20
Fluorene			105.2		%		60-130	04-OCT-20
Indeno(1,2,3-c,d)pyrene			84.1		%		60-130	04-OCT-20
2-Methylnaphthalene			85.7		%		60-130	04-OCT-20
Naphthalene			95.8		%		50-130	04-OCT-20
Perylene			98.1		%		60-130	04-OCT-20
Phenanthrene			92.5		%		60-130	04-OCT-20
Pyrene			97.5		%		60-130	04-OCT-20
1-Methylnaphthalene			87.1		%		60-130	04-OCT-20
Quinoline			88.0		%		60-130	04-OCT-20
WG3418729-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	04-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	04-OCT-20
Anthracene			<0.0040		mg/kg		0.004	04-OCT-20
Acridine			<0.010		mg/kg		0.01	04-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	04-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	04-OCT-20
Chrysene			<0.010		mg/kg		0.01	04-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	04-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	04-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5245911								
WG3418729-1 MB								
Fluorene			<0.010		mg/kg		0.01	04-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	04-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	04-OCT-20
Naphthalene			<0.010		mg/kg		0.01	04-OCT-20
Perylene			<0.010		mg/kg		0.01	04-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	04-OCT-20
Pyrene			<0.010		mg/kg		0.01	04-OCT-20
1-Methylnaphthalene			<0.050		mg/kg		0.05	04-OCT-20
Quinoline			<0.050		mg/kg		0.05	04-OCT-20
Surrogate: d8-Naphthalene			88.2		%		50-130	04-OCT-20
Surrogate: d10-Acenaphthene			95.6		%		60-130	04-OCT-20
Surrogate: d10-Phenanthrene			90.5		%		60-130	04-OCT-20
Surrogate: d12-Chrysene			84.8		%		60-130	04-OCT-20
Batch R5247596								
WG3419270-4 DUP		**L2508974-26**						
Acenaphthene		<0.045	<0.045	RPD-NA	mg/kg	N/A	50	06-OCT-20
Acenaphthylene		0.0070	0.0072		mg/kg	2.8	50	06-OCT-20
Anthracene		<0.0040	<0.0040	RPD-NA	mg/kg	N/A	50	06-OCT-20
Acridine		<0.090	<0.090	RPD-NA	mg/kg	N/A	50	06-OCT-20
Benz(a)anthracene		0.022	0.015		mg/kg	40	50	06-OCT-20
Benzo(a)pyrene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
Benzo(b&j)fluoranthene		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	06-OCT-20
Benzo(e)pyrene		0.044	0.036		mg/kg	21	50	06-OCT-20
Benzo(g,h,i)perylene		0.023	0.015		mg/kg	40	50	06-OCT-20
Benzo(k)fluoranthene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
Chrysene		0.111	0.097		mg/kg	13	50	06-OCT-20
Dibenz(a,h)anthracene		0.0125	0.0075	J	mg/kg	0.0050	0.01	06-OCT-20
Fluoranthene		0.024	0.015		mg/kg	42	50	06-OCT-20
Fluorene		0.126	0.108		mg/kg	16	50	06-OCT-20
Indeno(1,2,3-c,d)pyrene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
2-Methylnaphthalene		0.786	0.728		mg/kg	7.7	50	06-OCT-20
Naphthalene		0.240	0.227		mg/kg	5.4	50	06-OCT-20
Perylene		<0.010	<0.010	RPD-NA	mg/kg	N/A	50	06-OCT-20
Phenanthrene		0.534	0.485		mg/kg	9.7	50	06-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5247596								
WG3419270-4 DUP		**L2508974-26**						
Pyrene		0.035	0.030		mg/kg	17	50	06-OCT-20
1-Methylnaphthalene		0.477	0.440		mg/kg	8.1	50	06-OCT-20
Quinoline		<0.050	<0.050	RPD-NA	mg/kg	N/A	50	06-OCT-20
WG3419270-3 IRM		**ALS PAH RM2**						
Acenaphthene			95.6		%		60-130	05-OCT-20
Acenaphthylene			84.7		%		60-130	05-OCT-20
Anthracene			79.3		%		60-130	05-OCT-20
Acridine			85.2		%		60-130	05-OCT-20
Benz(a)anthracene			111.4		%		60-130	05-OCT-20
Benzo(a)pyrene			116.0		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			90.4		%		60-130	05-OCT-20
Benzo(e)pyrene			104.7		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			87.8		%		60-130	05-OCT-20
Benzo(k)fluoranthene			112.5		%		60-130	05-OCT-20
Chrysene			118.9		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			97.9		%		60-130	05-OCT-20
Fluoranthene			102.0		%		60-130	05-OCT-20
Fluorene			97.7		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			122.0		%		60-130	05-OCT-20
2-Methylnaphthalene			87.9		%		60-130	05-OCT-20
Naphthalene			84.2		%		50-130	05-OCT-20
Perylene			105.1		%		60-130	05-OCT-20
Phenanthrene			95.5		%		60-130	05-OCT-20
Pyrene			104.1		%		60-130	05-OCT-20
1-Methylnaphthalene			89.8		%		60-130	05-OCT-20
WG3419270-2 LCS								
Acenaphthene			104.2		%		60-130	05-OCT-20
Acenaphthylene			97.1		%		60-130	05-OCT-20
Anthracene			89.6		%		60-130	05-OCT-20
Acridine			82.3		%		60-130	05-OCT-20
Benz(a)anthracene			76.9		%		60-130	05-OCT-20
Benzo(a)pyrene			80.3		%		60-130	05-OCT-20
Benzo(b&j)fluoranthene			82.3		%		60-130	05-OCT-20
Benzo(e)pyrene			83.9		%		60-130	05-OCT-20
Benzo(g,h,i)perylene			102.9		%		60-130	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5247596								
WG3419270-2 LCS								
Benzo(k)fluoranthene			83.2		%		60-130	05-OCT-20
Chrysene			91.1		%		60-130	05-OCT-20
Dibenz(a,h)anthracene			91.6		%		60-130	05-OCT-20
Fluoranthene			106.0		%		60-130	05-OCT-20
Fluorene			102.1		%		60-130	05-OCT-20
Indeno(1,2,3-c,d)pyrene			75.3		%		60-130	05-OCT-20
2-Methylnaphthalene			97.2		%		60-130	05-OCT-20
Naphthalene			99.2		%		50-130	05-OCT-20
Perylene			86.0		%		60-130	05-OCT-20
Phenanthrene			104.6		%		60-130	05-OCT-20
Pyrene			102.8		%		60-130	05-OCT-20
1-Methylnaphthalene			98.8		%		60-130	05-OCT-20
Quinoline			95.2		%		60-130	05-OCT-20
WG3419270-1 MB								
Acenaphthene			<0.0050		mg/kg		0.005	05-OCT-20
Acenaphthylene			<0.0050		mg/kg		0.005	05-OCT-20
Anthracene			<0.0040		mg/kg		0.004	05-OCT-20
Acridine			<0.010		mg/kg		0.01	05-OCT-20
Benz(a)anthracene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(a)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(e)pyrene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	05-OCT-20
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Chrysene			<0.010		mg/kg		0.01	05-OCT-20
Dibenz(a,h)anthracene			<0.0050		mg/kg		0.005	05-OCT-20
Fluoranthene			<0.010		mg/kg		0.01	05-OCT-20
Fluorene			<0.010		mg/kg		0.01	05-OCT-20
Indeno(1,2,3-c,d)pyrene			<0.010		mg/kg		0.01	05-OCT-20
2-Methylnaphthalene			<0.010		mg/kg		0.01	05-OCT-20
Naphthalene			<0.010		mg/kg		0.01	05-OCT-20
Perylene			<0.010		mg/kg		0.01	05-OCT-20
Phenanthrene			<0.010		mg/kg		0.01	05-OCT-20
Pyrene			<0.010		mg/kg		0.01	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-TMB-H/A-MS-CL	**Soil**							
Batch R5247596								
WG3419270-1 MB								
1-Methylnaphthalene			<0.050		mg/kg		0.05	05-OCT-20
Quinoline			<0.050		mg/kg		0.05	05-OCT-20
Surrogate: d8-Naphthalene			78.3		%		50-130	05-OCT-20
Surrogate: d10-Acenaphthene			96.1		%		60-130	05-OCT-20
Surrogate: d10-Phenanthrene			101.9		%		60-130	05-OCT-20
Surrogate: d12-Chrysene			111.9		%		60-130	05-OCT-20
PH-1:2-CL	**Soil**							
Batch R5248619								
WG3419530-3 DUP		**L2508974-10**						
pH (1:2 soil:water)		8.49	8.47	J	pH	0.02	0.2	06-OCT-20
WG3419530-6 DUP		**L2508974-34**						
pH (1:2 soil:water)		8.30	8.27	J	pH	0.03	0.2	06-OCT-20
WG3419530-2 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.85		pH		7.4-8	06-OCT-20
WG3419530-5 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.78		pH		7.4-8	06-OCT-20
WG3419530-8 IRM		**SAL-STD10**						
pH (1:2 soil:water)			7.75		pH		7.4-8	06-OCT-20
WG3419530-1 LCS								
pH (1:2 soil:water)			7.00		pH		6.8-7.2	06-OCT-20
WG3419530-4 LCS								
pH (1:2 soil:water)			6.98		pH		6.8-7.2	06-OCT-20
WG3419530-7 LCS								
pH (1:2 soil:water)			7.03		pH		6.8-7.2	06-OCT-20
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5244707								
WG3417175-1 DUP		**L2508974-3**						
% Gravel (>2mm)		<1.0	<1.0	RPD-NA	%	N/A	5	03-OCT-20
% Sand (2.00mm - 1.00mm)		<1.0	<1.0	RPD-NA	%	N/A	5	03-OCT-20
% Sand (1.00mm - 0.50mm)		3.5	3.0	J	%	0.5	5	03-OCT-20
% Sand (0.50mm - 0.25mm)		14.6	15.2	J	%	0.6	5	03-OCT-20
% Sand (0.25mm - 0.125mm)		19.9	17.9	J	%	1.9	5	03-OCT-20
% Sand (0.125mm - 0.063mm)		14.0	12.1	J	%	1.9	5	03-OCT-20
% Silt (0.063mm - 0.0312mm)		17.9	19.6	J	%	1.7	5	03-OCT-20
% Silt (0.0312mm - 0.004mm)		22.8	25.3	J	%	2.5	5	03-OCT-20
% Clay (<4um)		6.4	6.2	J	%	0.2	5	03-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch R5244707								
WG3417175-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.6	03-OCT-20
% Sand (1.00mm - 0.50mm)			4.2		%		0-8.9	03-OCT-20
% Sand (0.50mm - 0.25mm)			10.2		%		5.3-15.3	03-OCT-20
% Sand (0.25mm - 0.125mm)			15.1		%		10-20	03-OCT-20
% Sand (0.125mm - 0.063mm)			12.4		%		7.3-17.3	03-OCT-20
% Silt (0.063mm - 0.0312mm)			13.5		%		9.9-19.9	03-OCT-20
% Silt (0.0312mm - 0.004mm)			21.6		%		17.6-27.6	03-OCT-20
% Clay (<4um)			20.2		%		13.4-23.4	03-OCT-20
Batch R5246456								
WG3417179-1 DUP		**L2508974-24**						
% Gravel (>2mm)		4.7	4.7	J	%	0.0	5	05-OCT-20
% Sand (2.00mm - 1.00mm)		2.2	2.1	J	%	0.2	5	05-OCT-20
% Sand (1.00mm - 0.50mm)		2.3	2.4	J	%	0.1	5	05-OCT-20
% Sand (0.50mm - 0.25mm)		3.0	3.9	J	%	0.9	5	05-OCT-20
% Sand (0.25mm - 0.125mm)		13.3	12.4	J	%	0.9	5	05-OCT-20
% Sand (0.125mm - 0.063mm)		15.4	14.5	J	%	0.9	5	05-OCT-20
% Silt (0.063mm - 0.0312mm)		26.8	27.3	J	%	0.5	5	05-OCT-20
% Silt (0.0312mm - 0.004mm)		27.5	28.0	J	%	0.5	5	05-OCT-20
% Clay (<4um)		4.8	4.7	J	%	0.1	5	05-OCT-20
WG3417179-2 IRM		**2017-PSA**						
% Sand (2.00mm - 1.00mm)			2.9		%		0-7.6	05-OCT-20
% Sand (1.00mm - 0.50mm)			3.7		%		0-8.9	05-OCT-20
% Sand (0.50mm - 0.25mm)			9.7		%		5.3-15.3	05-OCT-20
% Sand (0.25mm - 0.125mm)			15.6		%		10-20	05-OCT-20
% Sand (0.125mm - 0.063mm)			13.1		%		7.3-17.3	05-OCT-20
% Silt (0.063mm - 0.0312mm)			14.5		%		9.9-19.9	05-OCT-20
% Silt (0.0312mm - 0.004mm)			22.2		%		17.6-27.6	05-OCT-20
% Clay (<4um)			18.3		%		13.4-23.4	05-OCT-20
Batch R5246459								
WG3417182-1 DUP		**L2508974-42**						
% Gravel (>2mm)		5.9	5.9	J	%	0.0	5	05-OCT-20
% Sand (2.00mm - 1.00mm)		6.1	5.5	J	%	0.6	5	05-OCT-20
% Sand (1.00mm - 0.50mm)		17.4	15.9	J	%	1.5	5	05-OCT-20
% Sand (0.50mm - 0.25mm)		37.3	37.4	J	%	0.1	5	05-OCT-20
% Sand (0.25mm - 0.125mm)		20.5	22.0	J	%	1.4	5	05-OCT-20

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PSA-PIPET-DETAIL-SK	**Soil**							
Batch	**R5246459**							
WG3417182-1	**DUP**	**L2508974-42**						
% Sand (0.125mm - 0.063mm)		5.9	6.0	J	%	0.1	5	05-OCT-20
% Silt (0.063mm - 0.0312mm)		3.1	3.2	J	%	0.1	5	05-OCT-20
% Silt (0.0312mm - 0.004mm)		2.8	3.1	J	%	0.3	5	05-OCT-20
% Clay (<4um)		<1.0	<1.0	RPD-NA	%	N/A	5	05-OCT-20
WG3417182-2	**IRM**	**2017-PSA**						
% Sand (2.00mm - 1.00mm)			3.0		%		0-7.6	05-OCT-20
% Sand (1.00mm - 0.50mm)			3.9		%		0-8.9	05-OCT-20
% Sand (0.50mm - 0.25mm)			10.3		%		5.3-15.3	05-OCT-20
% Sand (0.25mm - 0.125mm)			14.6		%		10-20	05-OCT-20
% Sand (0.125mm - 0.063mm)			12.8		%		7.3-17.3	05-OCT-20
% Silt (0.063mm - 0.0312mm)			14.3		%		9.9-19.9	05-OCT-20
% Silt (0.0312mm - 0.004mm)			22.5		%		17.6-27.6	05-OCT-20
% Clay (<4um)			18.6		%		13.4-23.4	05-OCT-20

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Polycyclic Aromatic Hydrocarbons							
PAH Tumbler Extraction (Hexane/Acetone)							
	21	14-SEP-20 10:00	29-SEP-20	14	15	days	EHT
	22	14-SEP-20 10:30	29-SEP-20	14	15	days	EHT
	23	14-SEP-20 11:00	29-SEP-20	14	15	days	EHT
	24	14-SEP-20 11:20	29-SEP-20	14	15	days	EHT
	25	14-SEP-20 12:00	29-SEP-20	14	15	days	EHT
	26	10-SEP-20 10:00	30-SEP-20	14	20	days	EHTR
	27	10-SEP-20 10:20	30-SEP-20	14	20	days	EHTR
	28	10-SEP-20 11:30	30-SEP-20	14	20	days	EHTR
	29	10-SEP-20 11:50	30-SEP-20	14	20	days	EHTR
	30	10-SEP-20 12:20	30-SEP-20	14	19	days	EHTR
	31	11-SEP-20 09:00	30-SEP-20	14	19	days	EHTR
	32	11-SEP-20 09:15	30-SEP-20	14	19	days	EHTR
	33	11-SEP-20 09:30	30-SEP-20	14	19	days	EHTL
	34	11-SEP-20 09:45	30-SEP-20	14	19	days	EHTL
	35	11-SEP-20 10:00	30-SEP-20	14	19	days	EHTL
	36	12-SEP-20 09:15	30-SEP-20	14	18	days	EHTL
	37	12-SEP-20 09:30	30-SEP-20	14	18	days	EHT
	38	12-SEP-20 09:45	30-SEP-20	14	18	days	EHT
	39	12-SEP-20 10:00	30-SEP-20	14	18	days	EHT
	40	12-SEP-20 10:15	30-SEP-20	14	18	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2508974 were received on 25-SEP-20 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Teck

COC ID: FRO LAEMP Sept 2020

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
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Phone Number	250-425-8202

LABORATORY

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Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

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teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2508974-COFC

ANALYSIS REQUESTED

Filtered (F): Field, Lr Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
							FIELD	N	N	N	N	N
							PRESERV	NONE	NONE	NONE	NONE	NONE
							ANALYSIS					
RG_FRCP1SW_SE-01_2020-09-22_1000	RG_FRCP1SW	SE	No	9/22/2022	10:00	G	2	X	X	X	X	X
RG_FRCP1SW_SE-02_2020-09-22_1030	RG_FRCP1SW	SE	No	9/22/2022	10:30	G	2	X	X	X	X	X
RG_FRCP1SW_SE-03_2020-09-22_1200	RG_FRCP1SW	SE	No	9/22/2022	12:00	G	2	X	X	X	X	X
RG_FRCP1SW_SE-04_2020-09-22_1230	RG_FRCP1SW	SE	No	9/22/2022	12:30	G	2	X	X	X	X	X
RG_FRCP1SW_SE-05_2020-09-22_1300	RG_FRCP1SW	SE	No	9/22/2022	13:00	G	2	X	X	X	X	X
RG_FOBSC_SE-01_2020-09-18_0940	RG_FOBSC	SE	No	9/18/2020	9:40	G	2	X	X	X	X	X
RG_FOBSC_SE-02_2020-09-18_1000	RG_FOBSC	SE	No	9/18/2020	10:00	G	2	X	X	X	X	X
RG_FOBSC_SE-03_2020-09-18_1100	RG_FOBSC	SE	No	9/18/2020	11:00	G	2	X	X	X	X	X
RG_FOBSC_SE-04_2020-09-18_1130	RG_FOBSC	SE	No	9/18/2020	11:30	G	2	X	X	X	X	X
RG_FOBSC_SE-05_2020-09-18_1200	RG_FOBSC	SE	No	9/18/2020	12:00	G	2	X	X	X	X	X
RG_SCOUTDS_SE-01_2020-09-17_0950	RG_SCOUTDS	SE	No	9/17/2020	9:50	G	2	X	X	X	X	X
RG_SCOUTDS_SE-02_2020-09-17_1020	RG_SCOUTDS	SE	No	9/17/2020	10:20	G	2	X	X	X	X	X
RG_SCOUTDS_SE-03_2020-09-17_1100	RG_SCOUTDS	SE	No	9/17/2020	11:00	G	2	X	X	X	X	X
RG_SCOUTDS_SE-04_2020-09-17_1310	RG_SCOUTDS	SE	No	9/17/2020	13:10	G	2	X	X	X	X	X
RG_SCOUTDS_SE-05_2020-09-17_1330	RG_SCOUTDS	SE	No	9/17/2020	13:30	G	2	X	X	X	X	X
RG_FOBCP_SE-01_2020-09-16_1000	RG_FOBCP	SE	No	9/16/2020	10:00	G	2	X	X	X	X	X
RG_FOBCP_SE-02_2020-09-16_1100	RG_FOBCP	SE	No	9/16/2020	11:00	G	2	X	X	X	X	X
RG_FOBCP_SE-03_2020-09-16_1210	RG_FOBCP	SE	No	9/16/2020	12:10	G	2	X	X	X	X	X
RG_FOBCP_SE-04_2020-09-16_1410	RG_FOBCP	SE	No	9/16/2020	14:10	G	2	X	X	X	X	X
RG_FOBCP_SE-05_2020-09-16_1440	RG_FOBCP	SE	No	9/16/2020	14:40	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 23, 2020	

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 23, 2020

Teck

COC ID: FRO LAEMP Sept 2020 | TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
Postal Code	V0B 2G0
Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

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Jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2508974-COFC

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
							FIL	N	N	N	N	N
							PRESERV.	NONE	NONE	NONE	NONE	NONE
							ANALYSIS					
RG_FOUKI_SE-01_2020-09-14_1000	RG_FOUKI	SE	No	9/14/2020	10:00	G	2	X	X	X	X	X
RG_FOUKI_SE-02_2020-09-14_1030	RG_FOUKI	SE	No	9/14/2020	10:30	G	2	X	X	X	X	X
RG_FOUKI_SE-03_2020-09-14_1100	RG_FOUKI	SE	No	9/14/2020	11:00	G	2	X	X	X	X	X
RG_FOUKI_SE-04_2020-09-14_1120	RG_FOUKI	SE	No	9/14/2020	11:20	G	2	X	X	X	X	X
RG_FOUKI_SE-05_2020-09-14_1200	RG_FOUKI	SE	No	9/14/2020	12:00	G	2	X	X	X	X	X
RG_FOBKS_SE-01_2020-09-10_1000	RG_FOBKS	SE	No	9/10/2020	10:00	G	2	X	X	X	X	X
RG_FOBKS_SE-02_2020-09-10_1020	RG_FOBKS	SE	No	9/10/2020	10:20	G	2	X	X	X	X	X
RG_FOBKS_SE-03_2020-09-10_1130	RG_FOBKS	SE	No	9/10/2020	11:30	G	2	X	X	X	X	X
RG_FOBKS_SE-04_2020-09-10_1150	RG_FOBKS	SE	No	9/10/2020	11:50	G	2	X	X	X	X	X
RG_FOBKS_SE-05_2020-09-10_1220	RG_FOBKS	SE	No	9/10/2020	12:20	G	2	X	X	X	X	X
RG_FO22_SE-01_2020-09-11_0900	RG_FO22	SE	No	9/11/2020	9:00	G	2	X	X	X	X	X
RG_FO22_SE-02_2020-09-11_0915	RG_FO22	SE	No	9/11/2020	9:15	G	2	X	X	X	X	X
RG_FO22_SE-03_2020-09-11_0930	RG_FO22	SE	No	9/11/2020	9:30	G	2	X	X	X	X	X
RG_FO22_SE-04_2020-09-11_0945	RG_FO22	SE	No	9/11/2020	9:45	G	2	X	X	X	X	X
RG_FO22_SE-05_2020-09-11_1000	RG_FO22	SE	No	9/11/2020	10:00	G	2	X	X	X	X	X
RG_FRUPO_SE-01_2020-09-12_0915	RG_FRUPO	SE	No	9/12/2020	9:15	G	2	X	X	X	X	X
RG_FRUPO_SE-02_2020-09-12_0930	RG_FRUPO	SE	No	9/12/2020	9:30	G	2	X	X	X	X	X
RG_FRUPO_SE-03_2020-09-12_0945	RG_FRUPO	SE	No	9/12/2020	9:45	G	2	X	X	X	X	X
RG_FRUPO_SE-04_2020-09-12_1000	RG_FRUPO	SE	No	9/12/2020	10:00	G	2	X	X	X	X	X
RG_FRUPO_SE-05_2020-09-12_1015	RG_FRUPO	SE	No	9/12/2020	10:15	G	2	X	X	X	X	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 23, 2020	

9/25 9:00

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 23, 2020

Teck

COC ID: FRO LAEMP Sept 2020

TURNAROUND TIME:

PROJECT/CLIENT INFO

Facility Name	REP
Project Manager	Cait Good
Email	cait.good@teck.com
Address	421 Pine Avenue
City	Sparwood
Province	BC
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Country	Canada
Phone Number	250-425-8202

LABORATORY

Lab Name	ALS Calgary
Lab Contact	Lyudmyla Shvets
Email	lyudmyla.shvets@alsglobal.com
Address	2559 29 Street NE
City	Calgary
Province	AB
Postal Code	T1Y 7B5
Country	Canada
Phone Number	1 403 407 1794

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cait.good@teck.com	x	x	x
teckcoal@equisonline.com			x
jings@minnow.ca	x	x	x
carlie.meyer@teck.com	x	x	x
pschnurr@minnow.ca	x	x	x

PO number: 689999

SAMPLE DETAILS

L2508974-COFC

ANALYSIS REQUESTED

Filtered - F: Field, L: Lab, FL: Field & Lab, N: None

Sample ID	Sample Location	Field Matrix	Hazardous Material (Yes/No)	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.	C-TOC-SK	MET-CCME+FULL-CL	MOISTURE-CL - % Moisture	PSA-PIPET-DETAIL-SK Particle Size	PAH-TMB-D/A-MS-CL-PAHs
								FIL	N	N	N	N	N
								PRESERV.	NONE	NONE	NONE	NONE	NONE
								ANALYSIS					
RG_HENUP_SE-01_2020-09-15_0915	RG_HENUP	SE	No	9/15/2020	9:15	G	2	X	X	X	X	X	
RG_HENUP_SE-02_2020-09-15_0930	RG_HENUP	SE	No	9/15/2020	9:30	G	2	X	X	X	X	X	
RG_HENUP_SE-03_2020-09-15_0945	RG_HENUP	SE	No	9/15/2020	9:45	G	2	X	X	X	X	X	
RG_FO26_SE-01_2020-09-17_0915	RG_FO26	SE	No	9/17/2020	9:15	G	2	X	X	X	X	X	
RG_FO26_SE-02_2020-09-17_0930	RG_FO26	SE	No	9/17/2020	9:30	G	2	X	X	X	X	X	
RG_FO26_SE-03_2020-09-17_0945	RG_FO26	SE	No	9/17/2020	9:45	G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
extras		SE	No			G	2	X	X	X	X	X	
RG_RIVER_SE-2X	09-22-20-1030	SE	No			G	2	X	X	X	X	X	
3X	09-15-20-1045	SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	
		SE	No			G	2	X	X	X	X	X	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION
	Jennifer Ings	September 23, 2020	9/25 900

NB OF BOTTLES RETURNED/DESCRIPTION

Regular (default)	x
Priority (2-3 business days) - 50% surcharge	
Emergency (1 Business Day) - 100% surcharge	
For Emergency <1 Day, ASAP or Weekend - Contact ALS	

Sampler's Name	Jennifer Ings	Mobile #	519-500-3444
Sampler's Signature		Date/Time	September 23, 2020

BENTHIC COMMUNITY

Cordillera Methods, QC Report, and Raw Data

APRIL

Methods and QC Report 2020

Project ID: Fording Recolonization (20-09)

Client: Minnow

Prepared by:
Cordillera Consulting Inc.
Summerland, BC

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Table of Contents

*** Note ***

A note on the data. There are some new, exciting additions to the Cordillera data spreadsheet. You will immediately notice that we are now providing whole sample data and metrics at the Family level. You will also notice two tabs with ND. This in an important improvement to our data. This allows the metrics to be more accurately calculated. The ND or Non-Distinct is used in the lab to identify things at a higher taxonomic resolution than other things from the same Family/Order that are already counted at the Genu/Species level. This removes some duplication in the taxa richness counts. Cordillera's taxonomists use the ND when there are juvenile or damaged specimens that we can't quite ID but that we're sure are represented by existing ID's. We have been working on these changes for a while to provide better data for you, our client.

Sample Reception

On May 20, 2020, Cordillera Consulting received 42 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Project	Site	Sample	CC#	Date	Size	# of Jars
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-01_2020-04-15	CC202805	4/15/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-02_2020-04-15	CC202806	4/15/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-03_2020-04-15	CC202807	4/15/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-01_2020-04-16	CC202808	4/16/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-02_2020-04-16	CC202809	4/16/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-03_2020-04-16	CC202810	4/16/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-01_2020-04-07	CC202811	4/7/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-02_2020-04-07	CC202812	4/7/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-03_2020-04-07	CC202813	4/7/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-01_2020-04-08	CC202814	4/8/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-02_2020-04-08	CC202815	4/8/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-03_2020-04-08	CC202816	4/8/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-01_2020-04-07	CC202817	4/7/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-02_2020-04-07	CC202818	4/7/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-03_2020-04-07	CC202819	4/7/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-01_2020-04-06	CC202820	4/6/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-02_2020-04-06	CC202821	4/6/2020	400µM	1

Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-03_2020-04-06	CC202822	4/6/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-01_2020-04-16	CC202823	4/16/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-02_2020-04-16	CC202824	4/16/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-03_2020-04-16	CC202825	4/16/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-01_2020-04-29	CC202826	4/29/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-02_2020-04-29	CC202827	4/29/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-03_2020-04-29	CC202828	4/29/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-01_2020-04-28	CC202829	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-02_2020-04-28	CC202830	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-03_2020-04-28	CC202831	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-01_2020-04-28	CC202832	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-02_2020-04-28	CC202833	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-03_2020-04-28	CC202834	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-01_2020-04-29	CC202835	4/29/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-02_2020-04-29	CC202836	4/29/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-03_2020-04-29	CC202837	4/29/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-01_2020-04-28	CC202838	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-02_2020-04-28	CC202839	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-03_2020-04-28	CC202840	4/28/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-01_2020-04-30	CC202841	4/30/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-02_2020-04-30	CC202842	4/30/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-03_2020-04-30	CC202843	4/30/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-01_2020-04-30	CC202844	4/30/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-02_2020-04-30	CC202845	4/30/2020	400µM	1
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-03_2020-04-30	CC202846	4/30/2020	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence

(given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.

- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Project	Site	Sample	Date	CC#	400 micron fraction	
					% Sampled	# Invertebrates
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-01_2020-04-15	15-Apr-20	CC202805	24%	338
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-02_2020-04-15	15-Apr-20	CC202806	100%	457
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-03_2020-04-15	15-Apr-20	CC202807	50%	325
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-01_2020-04-16	16-Apr-20	CC202808	100%	396
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-02_2020-04-16	16-Apr-20	CC202809	100%	229
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-03_2020-04-16	16-Apr-20	CC202810	6%	348
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-01_2020-04-07	07-Apr-20	CC202811	6%	323
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-02_2020-04-07	07-Apr-20	CC202812	7%	322
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-03_2020-04-07	07-Apr-20	CC202813	6%	330
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-01_2020-04-08	08-Apr-20	CC202814	5%	326
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-02_2020-04-08	08-Apr-20	CC202815	5%	432
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-03_2020-04-08	08-Apr-20	CC202816	5%	461

Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-01_2020-04-07	07-Apr-20	CC202817	5%	446
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-02_2020-04-07	07-Apr-20	CC202818	5%	485
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-03_2020-04-07	07-Apr-20	CC202819	5%	684
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-01_2020-04-06	06-Apr-20	CC202820	23%	374
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-02_2020-04-06	06-Apr-20	CC202821	12%	324
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-03_2020-04-06	06-Apr-20	CC202822	23%	344
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-01_2020-04-16	16-Apr-20	CC202823	5%	453
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-02_2020-04-16	16-Apr-20	CC202824	5%	714
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-03_2020-04-16	16-Apr-20	CC202825	100%	182
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-01_2020-04-29	29-Apr-20	CC202826	7%	344
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-02_2020-04-29	29-Apr-20	CC202827	10%	401
Fording Recolonization (20-09)	2020	RG_FOUKI_BIC-03_2020-04-29	29-Apr-20	CC202828	5%	482
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-01_2020-04-28	28-Apr-20	CC202829	6%	419
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-02_2020-04-28	28-Apr-20	CC202830	7%	357
Fording Recolonization (20-09)	2020	RG_FOUEW_BIC-03_2020-04-28	28-Apr-20	CC202831	8%	338
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-01_2020-04-28	28-Apr-20	CC202832	17%	319
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-02_2020-04-28	28-Apr-20	CC202833	20%	404
Fording Recolonization (20-09)	2020	RG_FOBCP_BIC-03_2020-04-28	28-Apr-20	CC202834	14%	354
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-01_2020-04-29	29-Apr-20	CC202835	10%	448
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-02_2020-04-29	29-Apr-20	CC202836	7%	342
Fording Recolonization (20-09)	2020	RG_FOUSH_BIC-03_2020-04-29	29-Apr-20	CC202837	8%	385
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-01_2020-04-28	28-Apr-20	CC202838	20%	328
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-02_2020-04-28	28-Apr-20	CC202839	20%	338
Fording Recolonization (20-09)	2020	RG_FOBCPD_BIC-03_2020-04-28	28-Apr-20	CC202840	31%	316
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-01_2020-04-30	30-Apr-20	CC202841	48%	319
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-02_2020-04-30	30-Apr-20	CC202842	50%	323
Fording Recolonization (20-09)	2020	RG_FRCP1SW_BIC-03_2020-04-30	30-Apr-20	CC202843	100%	526
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-01_2020-04-30	30-Apr-20	CC202844	13%	366
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-02_2020-04-30	30-Apr-20	CC202845	9%	320
Fording Recolonization (20-09)	2020	RG_FRCP1SWD_BIC-03_2020-04-30	30-Apr-20	CC202846	38%	335

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

				Total from Sample	Percent Efficiency
Site - QC, Sample - QC1, CC# - CC202810, Percent sampled = 6%, Sieve size = 400					
Chironomidae		1			
Plecoptera		1			
Total:		**2**		**348**	**99%**
Site - QC, Sample - QC2, CC# - CC202816, Percent sampled = 5%, Sieve size = 400					
Trichoptera		1			
Total:		**1**		**461**	**100%**
Site - QC, Sample - QC3, CC# - CC202829, Percent sampled = 6%, Sieve size = 400					
Chironomidae		1			
Total:		**1**		**419**	**100%**

Site - QC, Sample - QC4, CC# - CC202836, Percent sampled = 7%, Sieve size = 400					
Chironomidae		3			
Total:		**3**		**342**	**99%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10											By	Time		Percent Range		Min	Max
202807	RG_F0BCPD_BIC-03	324	321																			TV	145	645	0.93	0.93	0.47	0.47
202835	RG_FOUSH_BIC-01	444	478	520	494	464	467	529	499	492	525											CM	540	4912	0.40	16.07	0.16	9.61
202833	RG_FOBCP_BIC-02	381	357	348	384	384																CM	180	1854	0.00	9.38	2.75	6.15
202827	RG_FOUK1_BIC-02	393	363	363	404	356	387	388	383	341	364											CM	405	3742	0.00	15.59	2.35	8.87

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2020, Sample - RG_FOBCPD_BIC-01_2020-04-15, CC# - CC202805, Percent sampled = 24%, Sieve size = 400	338	0.00	0	0.29585799	0.00295858
Site - 2020, Sample - RG_FOUEW_BIC-02_2020-04-08, CC# - CC202815, Percent sampled = 5%, Sieve size = 400	430	0.23	0.23201856	1.15740741	0.00928074
Site - 2020, Sample - RG_FRCP1SWD_BIC-02_2020-04-16, CC# - CC202824, Percent sampled = 5%, Sieve size = 400	712	0.00	0.14025245	0.70028011	0.0056101
Site - 2020, Sample - RG_FRCP1SW_BIC-02_2020-04-30, CC# - CC202842, Percent sampled = 50%, Sieve size = 400	317	0.00	0.9375	1.85758514	0.009375

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2020, Sample - RG_FOBCPD_BIC-01_2020-04-15, CC# - CC202805, Percent sampled = 24%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Arctopsyche	1	1						
Baetidae	1	1						
Brachycentridae	8	8						
Capniidae	128	129	No			X		
Capnura	1	1						

Chloroperlidae	1	1						
Diamesa	2	2						
Enchytraeus	6	6						
Eukiefferiella	3	3						
Heptageniidae	16	16						
Hydrobaenus	5	5						
Isoperla	2	2						
Lebertia	5	5						
Micropsectra	4	4						
Nemoura	12	12						
Nemouridae	44	44						
Orthocladiinae	1	1						
Orthocladius complex	9	9						
Pagastia	4	3	No			X		
Pericoma/Telmatoscopus	5	5						
Perlodidae	42	42						
Plecoptera	12	12						
Rheocricotopus	2	2						
Rhyacophila	17	17						
Sperchon	1	1						
Tvetenia	4	4						
Zapada cinctipes	2	2						
Total:	**338**	**338**						
					0	2	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

Site - 2020, Sample - RG_FOUEW_BIC-02_2020-04-08, CC# - CC202815, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Antocha	3	3						
Aturus	2	2						
Brachycentridae	2	2						
Brillia	1	1						
Capniidae	23	22	No			X		
Capnura	2	2						
Chironomidae	2	2						
Chloroperlidae	5	5						

Cinygmula	8	8						
Empididae	1	1						
Epeorus	2	2						
Ephemerellidae	1	1						
Eukiefferiella	15	15						
Haploperla	1	1						
Heptageniidae	35	33	No			X		
Heterlimnius	3	3						
Hydrobaenus	5	5						
Isoperla	12	12						
Lebertia	7	7						
Megarcys	2	2						
Micropsectra	6	6						
Nais	2	2						
Nemoura	31	30	No			X		
Nemouridae	89	91	No			X		
Neoplasta	3	3						
Orthocladius complex	21	21						
Ostrocerca	18	18						
Pagastia	5	5						
Pediciidae	1	1						
Pericoma/Telmatoscopus	1	1						
Perlodidae	24	24						
Plecoptera	22	22						
Rheocricotopus	1	1						
Rhithrogena	1	1						
Rhyacophila	22	22						
Rhyacophila brunnea/vemna group	2	2						
Rhynchelmis	2	2						
Sperchon	3	3						
Sweltsa	1	1						
Tanytarsini	2	2						
Tvetenia	18	18						
Zapada	20	20						
Zapada cinctipes	3	2	No			X		
Zapada oregonensis group	2	3	No	1		X		
Total:	**432**	**430**						
					0	**6**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.23	**Pass**				

Site - 2020, Sample - RG_FRCP1SWD_BIC-02_2020-04-16, CC# - CC202824, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Brachycentridae	1	1						
Capniidae	21	20	No			X		
Capnura	3	4	No			X		
Chironomidae	10	10						
Chloroperlidae	14	14						
Diamesa	1	1						
Dicranota	3	3						
Drunella doddsii	1	1						
Ecclisomyia	1	1						
Empididae	1	1						
Eukiefferiella	16	17	No			X		
Heptageniidae	10	10						
Hydrobaenus	4	4						
Isoperla	21	21						
Kogotus	3	3						
Lebertia	2	2						
Mallochohelea	2	2						
Megarcys	6	6						
Nemoura	9	9						
Nemouridae	220	217	No			X		
Orthocladius complex	116	116						
Ostrocerca	83	84	No			X		
Pagastia	5	5						
Paraleuctra	1	1						
Pericoma/Telmatoscopus	3	3						
Perlidae	6	6						
Perlodidae	7	7						
Plecoptera	2	2						
Rheocricotopus	2	2						
Rhyacophila	38	38						
Rhyacophila brunnea/vemna group	4	4						
Rhyacophila narvae	1	1						
Simuliidae	1	1						
Tanytarsini	7	7						
Tvetenia	52	51	No			X		
Zapada	37	37						

Total:	**714**	**712**						
					0	**6**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

Site - 2020, Sample - RG_FRCP1SW_BIC-02_2020-04-30, CC# - CC202842, Percent sampled = 50%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Brachycentridae	2	2						
Capniidae	1	1						
Chironomidae	2	2						
Corynoneura	2	1	No			X		
Ecclisomyia	1	1						
Empididae	1	1						
Enchytraeus	49	46	No			X		
Ephemerellidae	3	3						
Eukiefferiella	2	2						
Heptageniidae	6	6						
Hydraenidae	1	1						
Hydrobaenus	1	1						
Isoperla	1	1						
Lebertia	13	13						
Limnephilidae	1	1						
Mallochohelea	2	2						
Micropsectra	6	6						
Oribatida	1	1						
Orthocladius complex	99	97	No			X		
Pagastia	6	6						
Pericoma/Telmatoscopus	10	10						
Perlidae	1	1						
Plecoptera	1	1						
Rhabdomastix	1	1						
Rheocricotopus	9	9						
Rhyacophila	87	87						
Sperchon	3	3						
Tanytarsini	2	2						
Thienemanniella	2	2						
Thienemannimyia group	3	3						

Tvetenia	2	2						
Zapada	2	2						
Total:	**323**	**317**						
					0	**3**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

References

[1] McDermott, H., Paull, T., Strachan, S. (May 2014). Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples, Environment Canada. ISBN: 978-1-100-25417-3

[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
http://www.safit.org/Docs/SAFIT_Taxonomic_Literature_Database_1_March_2011.enl

Brook, Arthur R. and Leonard A. Kelton. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera) Memoirs of the Entomological Society of Canada. No. 51.

Brown HP & White DS (1978) Notes on Seperation and Identification of North
American Riffle Beetles (Coleoptera: Dryopidea: Elmidae).Entomological News 89 (1&2): 1-13

Clifford, Hugh F. 1991. Aquatic Invertebrates of Alberta. University of Alberta Press Edmonton, Alberta.

Epler, John. 2001 The Larval Chironomids of North and South Carolina. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Water Beetles of Florida. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida.
http://home.earthlink.net/~johnepler/

Trond Andersen, Peter S. Cranston & John H. Epler (Eds) (2013) Chironomidae of the Holarctic Region: Keys and DIagnoses. Part 1. Larvae. *Insect Systematics and Evolution Supplements* 66: 1-571.

Jacobus, Luke and Pat Randolph. 2005. Northwest Ephemeroptera Nymphs. Manual from Northwest Biological Assessment Working Group. Moscow Idaho 2005. Not Published.

Jacobus LM, McCafferty WP (2004) Revisionary Contributions to the Genus Drunella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 112: 127-147

Jacobus LM, McCafferty WP (2003) Revisionary Contributions to North American Ephemerella and Serratella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 111 (4): 174-193.

Kathman,R.D., R.O. Brinkhurst. 1999. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, Tennessee.

Larson, D.J., Y. Alarie, R.E. Roughly.2005. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Neararctic Region. NRC-CNRC Research Press. Ottawa.

Merritt, R.W., K.W. Cummins, M. B. Berg. (eds.). 2007. An introduction to the aquatic insects of North America, 4th. Kendall/Hunt, Dubuque, IA

Morihara DK, McCafferty WP (1979) The Baetis Larvae of North American (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105: 139-221.

Needham, James, M. May, M. Westfall Jr. 2000. Dragonflies of North America. Scientific Publishers. Gainsville FL.

Prescott David, R.C.and Medea M. Curteanu.2004. Survey of Aquatic Gastropods of Alberta. Species at Risk Report No. 104. ISSN: 1496-7146 (Online Edition)

Needham, K. 1996. An Identification Guide to the Nymphal Mayflies of British Columbia. Publication #046 Resource Inventory Committee, Government of British Columbia.

Oliver, Donald R. and Mary E. Roussel. 1983. The Insects and Arachnids of Canada Part 11. The Genera of larval midges of Canada. Biosystematics Research Institute. Ottawa, Ontario. Research Branch, Agriculture Canada. Publication 1746.

Proctor, H. The 'Top 18' Water Mite Families in Alberta. Zoology 351. University of Alberta, Edmonton, Alberta.

Rogers, D.C. and M. Hill, 2008. Key to the Freshwater Malacostraca (Crustacea) of the mid-Atlantic Region. EPA-230-R-08-017. US Environmental Protection Agency, Office of Environmental Information, Washington, DC.

Stewart, Kenneth W. and Bill Stark. 2002. The Nymphs of North American Stonefly Genera (Plecoptera). The Caddis Press. Columbus Ohio.

Stewart, Kenneth W. and Mark W. Oswood. 2006 The Stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press.

Stonedahl, Gary and John D. Lattin. 1986. The Corixidae of Oregon and Washington (Hemiptera: Heteroptera). Technical Bulletin 150. Oregon State University, Corvalis Oregon.

Thorpe, J. H. and A. P. Covich [Eds.] 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego.

Tinerella, Paul P. and Ralph W. Gunderson.2005. The Waterboatmen (Insecta: Heteroptera: Corixidae) of Minisota. Publication No.23 Dept. Of Entomology, North Dakota State University, Fargo, North Dakota, USA.

Weiderholm, Torgny (Ed.) 1983. The larvae of Chironomidae (Diptera) of the Holartic region. Entomologica Scaninavica. Supplement No. 19.

Westfall, Minter J. Jr. and May, Michael L. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

Wiggins, Glenn B. 1998. Larvae of the North American Caddisfly Genera (Tricoptera) 2nd ed. University of Toronto Press. Toronto Ontario.

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Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02
Sample Collection Date:	15-Apr-20	15-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	08-Apr-20	08-Apr-20
CC#:	CC202805	CC202806	CC202807	CC202808	CC202809	CC202810	CC202811	CC202812	CC202813	CC202814	CC202815
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	1	2	4	2	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	2	0	0	17	0	0	0	0
| Family: Baetidae	4	0	0	0	1	0	0	0	0	0	0
Baetis	0	0	0	0	0	0	0	0	0	0	0
Baetis rhodani group	0	0	0	0	0	0	0	0	0	20	0
Callibaetis	0	0	0	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	0	0	1	0	17	0	17	20	20
Drunella	0	0	0	0	0	0	0	0	0	0	0
Drunella grandis group	0	0	0	0	0	0	0	0	0	20	0
Drunella doddsii	0	1	0	0	0	17	0	14	0	0	0
Drunella spinifera	0	1	0	0	0	0	0	0	17	0	0
Ephemerella	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	67	30	42	2	1	0	217	286	400	180	700
Cinygmula	0	0	0	0	0	0	0	0	0	0	160
Epeorus	0	0	0	0	0	0	0	0	0	40	40
Rhithrogena	0	0	0	0	0	0	0	0	0	0	20
| Family: Leptohyphidae	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes	0	1	0	0	0	0	0	0	0	0	0
| Order: Plecoptera	50	4	16	4	4	167	0	0	33	40	440
| Family: Capniidae	533	80	106	1	2	417	217	86	83	40	460
Bolshecapnia	0	0	0	0	0	0	0	0	0	0	0
Capnura	4	8	6	0	0	50	0	0	50	20	40
Mesocapnia	0	0	0	0	0	183	0	14	0	0	0
| Family: Chloroperlidae	4	0	0	0	0	33	0	0	33	60	100
Haploperla	0	0	0	0	0	0	0	0	0	0	20
Sweltsa	0	0	0	0	0	0	0	0	0	0	20
| Family: Leuctridae	0	0	0	1	0	17	33	71	17	40	0
Despaxia augusta	0	0	0	0	0	0	0	0	0	0	0
Paraleuctra	0	0	0	0	0	0	50	0	50	40	0
| Family: Nemouridae	183	72	86	4	4	1,650	717	443	350	760	1,780
Nemoura	50	8	14	0	0	267	267	157	300	400	620
Ostrocerca	0	14	4	0	0	433	0	314	633	980	360
Zapada	0	0	0	0	0	17	0	86	150	760	400
Zapada oregonensis group	0	0	0	0	0	0	17	0	17	60	40
Zapada cinctipes	8	0	2	0	0	217	33	43	0	180	60
Zapada columbiana	0	0	0	0	0	17	0	0	17	0	0
| Family: Perlidae	0	0	0	1	0	0	0	14	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	175	32	96	4	0	183	33	43	17	140	480
Cultus	0	0	0	0	0	0	0	0	0	0	0
Diura	0	0	0	0	0	0	0	0	0	0	0
Isoperla	8	25	14	1	0	283	17	0	0	160	240
Kogotus	0	1	0	0	0	0	0	0	0	180	0
Megarcys	0	1	0	1	0	17	17	29	0	20	40
Skwala	0	0	0	1	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	0	1	0	0	0	0	0	0
Doddsia occidentalis	0	1	0	4	0	0	0	0	0	0	0
| Order: Trichoptera	0	1	0	0	0	0	17	0	0	0	0
| Family: Brachycentridae	33	45	12	9	2	0	17	14	17	0	40
Micrasema	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	17	0	0	0	0
Glossosoma	0	1	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0
Arctopsyche	4	0	0	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	14	0	0	0
Parapsyche	0	0	0	0	0	0	50	29	83	0	0
Parapsyche elsis	0	0	0	0	0	0	0	0	17	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0

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Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02
Sample Collection Date:	15-Apr-20	15-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	08-Apr-20	08-Apr-20
CC#:	CC202805	CC202806	CC202807	CC202808	CC202809	CC202810	CC202811	CC202812	CC202813	CC202814	CC202815
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	3	2	0	17	0	0	0	0
Ecclisomyia	0	0	0	0	0	17	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	71	26	52	35	56	267	33	200	50	180	440
Rhyacophila angelita group	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	0	0	33	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	0	0	0	0	17	0	129	133	120	40
Rhyacophila hyalinata group	0	0	0	0	0	0	0	29	0	0	0
Rhyacophila vofixa group	0	0	0	0	0	0	17	0	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	0	17	17	0	17	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	1	0	0	0	0	0	60	0
Heterlimnius	0	0	0	0	0	0	0	0	0	140	60
| Family: Hydraenidae	0	0	0	0	4	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	1	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	1	0	0	0	0	0	0	0
| Order: Tipuloidea	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	17	0	0	0	0
| Family: Chironomidae	0	2	4	5	1	0	117	0	0	40	40
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	33	33	0	33	20	40
Constempellina sp. C	0	0	0	0	1	0	0	0	0	0	0
Micropsectra	17	9	10	7	1	0	367	57	267	40	120
Stempellina	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	14	17	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0
Diamesa	8	2	0	0	0	0	0	14	0	0	0
Pagastia	17	4	22	11	3	17	550	271	250	280	100
| Subfamily: Orthocladiinae	4	0	4	2	0	17	17	0	17	0	0
Brillia	0	1	0	0	0	0	17	0	0	20	20
Corynoneura	0	1	2	1	1	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	1	0	17	0	0	0	0	0
Eukiefferiella	12	10	12	2	0	33	167	557	383	400	300
Heterotrissocladius	0	0	0	1	0	0	0	0	0	0	0
Hydrobaenus	21	2	14	0	0	0	83	0	17	0	100
Limnophyes	0	0	2	9	9	0	0	0	0	0	0
Metriocnemus	0	0	0	3	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	38	4	26	13	3	483	967	729	1,083	420	420
Orthocladius lignicola	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	167	0	0	0	0	0
Parametriocnemus	0	0	2	0	0	0	0	0	0	0	0
Paraphaenocladius	0	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	0	0	0	0	17	0	33	0	0
Rheocricotopus	8	4	10	0	2	33	117	29	17	20	20
Thienemanniella	0	1	6	0	0	0	17	0	0	0	0
Tvetenia	17	6	14	2	3	550	433	457	367	220	360
| Subfamily: Tanypodinae	0	0	0	1	0	0	0	0	0	0	0
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	6	8	2	3	0	167	86	133	0	0
| Family: Dixidae	0	0	0	1	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	2	0	0	0	0	0	0	0	0
| Family: Empididae	0	2	2	3	1	17	0	0	0	0	20
Chelifera/ Metachela	0	0	0	0	0	0	0	0	0	40	0
Clinocera	0	1	0	1	2	0	0	0	0	0	0
Neoplasta	0	0	0	0	0	0	0	0	0	20	60
Trichoclinocera	0	0	0	0	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	0	0	0	0	0	0

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Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02
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CC#:	CC202805	CC202806	CC202807	CC202808	CC202809	CC202810	CC202811	CC202812	CC202813	CC202814	CC202815
| **Family: Pelecorhynchidae**	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0
| **Family: Psychodidae**	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	21	9	12	5	0	0	183	186	100	0	20
| **Family: Simuliidae**	0	0	0	0	0	33	17	0	0	0	0
Prosimulium/Helodon	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0
| **Family: Stratiomyidae**	0	0	0	0	0	0	0	0	0	0	0
Euparyphus	0	0	0	0	0	0	0	0	0	0	0
| **Family: Tipulidae**	0	0	0	0	0	0	0	0	0	0	0
| **Family: Limoniidae**	0	1	0	0	1	17	0	0	33	0	0
| **Family: Pediciidae**	0	0	0	0	0	0	0	0	0	0	20
Antocha	0	0	0	0	0	0	17	0	0	40	60
Dicranota	0	1	0	3	1	50	33	29	0	20	0
Hesperoconopa	0	0	0	0	0	0	0	0	0	20	0
Hexatoma	0	0	0	0	0	17	0	29	50	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0
| **Order: Thysanoptera**	0	1	0	1	1	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0
| **Order: Trombidiformes**	0	1	2	4	1	0	0	29	0	0	0
| **Family: Aturidae**	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	2	0	0	0	67	14	0	40	40
| **Family: Feltriidae**	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	2	0	0	0	0	0	17	0	0
| **Family: Lebertiidae**	0	0	0	0	0	0	0	0	0	0	0
Lebertia	21	15	6	8	2	0	33	43	67	120	140
| **Family: Mideopsidae**	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0	0	17	0	0
| **Family: Sperchontidae**	0	0	0	0	0	0	0	0	0	0	0
Sperchon	4	2	2	2	0	0	33	43	100	20	60
Sperchonopsis	0	0	0	0	0	0	0	0	0	20	0
| **Family: Torrenticolidae**	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	20	0
| **Order: Sarcoptiformes**	0	0	0	0	0	0	0	0	0	0	0
| **Order: Oribatida**	0	1	4	1	2	0	0	0	0	0	0
| **Family: Hydrozetidae**	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0
| **Order: Veneroida**	0	0	0	0	0	0	0	0	0	0	0
| **Family: Pisidiidae**	0	0	0	0	0	0	0	0	0	20	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0
| **Order: Lumbriculida**	0	0	0	0	0	0	0	0	0	0	0
| **Family: Lumbriculidae**	0	0	0	5	5	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0	0	0	0	40
| **Order: Tubificida**	0	0	0	0	0	0	0	0	0	0	0
| **Family: Enchytraeidae**	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	25	18	28	222	106	0	83	0	0	20	0
| **Family: Naididae**	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0	40
| **Subfamily: Tubificinae without hair chaetae**	0	0	0	0	0	0	0	0	0	0	0
Totals:	**1,407**	**457**	**650**	**396**	**229**	**5,803**	**5,389**	**4,602**	**5,502**	**6,520**	**8,640**

Project: Fording Recolonization (20-09)
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02
Sample Collection Date:	15-Apr-20	15-Apr-20	15-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	08-Apr-20	08-Apr-20
CC#:	CC202805	CC202806	CC202807	CC202808	CC202809	CC202810	CC202811	CC202812	CC202813	CC202814	CC202815
Taxa present but not included:											
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	25	7	10	11	8	17	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	0	0	0	1	0	17	17	14	17	20	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	1	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	4	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	0	1	2	1	1	0	0	0	17	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	1	0	1	0	0	17	14	17	20	20
Totals:	**29**	**9**	**12**	**15**	**9**	**34**	**34**	**28**	**51**	**40**	**20**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUEW_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	08-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	06-Apr-20	06-Apr-20	06-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	29-Apr-20	29-Apr-20
CC#:	CC202816	CC202817	CC202818	CC202819	CC202820	CC202821	CC202822	CC202823	CC202824	CC202825	CC202826	CC202827
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	0	0	0	0	3	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	40	20	0	0	0	0	0	0	0	0	0
Baetis	0	80	80	100	0	0	0	0	0	0	0	10
Baetis rhodani group	0	0	0	20	0	0	0	40	0	0	0	10
Callibaetis	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ephemerellidae	20	60	40	160	4	0	0	0	0	0	14	0
Drunella	0	0	0	0	0	8	0	0	0	0	0	0
Drunella grandis group	0	0	0	0	0	0	0	0	0	0	0	0
Drunella doddsii	0	20	0	40	0	0	9	0	20	0	14	0
Drunella spinifera	20	0	0	0	0	0	0	0	0	0	0	0
Ephemerella	0	0	0	20	0	0	0	0	0	0	0	20
| Family: Heptageniidae	720	2,840	3,220	4,060	178	117	30	20	200	0	1,057	790
Cinygmula	40	160	200	160	4	0	0	0	0	0	157	50
Epeorus	0	100	220	100	0	0	0	100	0	0	200	280
Rhithrogena	0	0	0	0	0	0	0	0	0	0	14	0
| Family: Leptohyphidae	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Plecoptera	20	0	20	0	0	67	9	0	40	1	0	40
| Family: Capniidae	40	20	20	200	226	650	217	240	420	2	43	40
Bolshecapnia	0	0	0	0	0	0	0	0	0	0	0	0
Capnura	0	0	60	0	52	200	83	160	60	0	0	20
Mesocapnia	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	80	0	0	0	0	8	0	100	280	0	0	20
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leuctridae	40	20	0	20	0	0	0	0	0	0	0	0
Despaxia augusta	0	0	0	20	0	0	0	0	0	0	0	0
Paraleuctra	0	0	40	0	0	0	0	0	20	0	0	0
| Family: Nemouridae	840	820	780	1,660	265	1,317	896	2,140	4,400	2	300	320
Nemoura	220	520	180	2,100	0	0	0	80	180	3	100	310
Ostrocerca	1,200	200	1,140	240	0	0	22	500	1,660	0	757	220
Zapada	1,380	0	160	60	30	0	0	1,360	740	0	0	0
Zapada oregonensis group	20	20	20	40	4	0	0	0	0	0	29	10
Zapada cinctipes	100	0	40	20	9	0	4	80	0	0	0	0
Zapada columbiana	20	20	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	60	0	0	0	22	0	0	20	120	0	29	0
Hesperoperla	0	0	40	0	0	0	0	0	0	0	14	0
| Family: Perlodidae	80	0	0	80	174	75	78	140	140	2	0	0
Cultus	0	0	0	0	0	0	0	0	0	0	0	10
Diura	0	0	0	0	0	0	0	0	0	0	0	0
Isoperla	60	60	20	0	57	8	13	40	420	0	14	0
Kogotus	180	40	0	20	4	0	0	40	60	0	0	30
Megarcys	0	40	0	0	4	0	0	0	120	0	43	10
Skwala	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Taeniopterygidae	0	0	0	20	0	8	0	0	0	0	0	0
Doddsia occidentalis	0	80	0	60	4	33	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	4	8	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	40	26	0	9	0	20	8	29	0
Micrasema	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	20	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	0	0	0	14	10
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0
Arctopsyche	0	20	0	60	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	20	9	0	0	0	0	0	0	0
Parapsyche elsis	20	20	40	20	0	0	4	0	0	0	14	20
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUEW_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	08-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	06-Apr-20	06-Apr-20	06-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	29-Apr-20	29-Apr-20
CC#:	CC202816	CC202817	CC202818	CC202819	CC202820	CC202821	CC202822	CC202823	CC202824	CC202825	CC202826	CC202827
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	2	0	0
Ecclisomyia	0	0	0	0	4	0	0	0	20	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	440	0	20	80	17	0	0	720	760	70	57	110
Rhyacophila angelita group	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	20	0	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	100	0	0	0	4	0	0	20	80	0	0	10
Rhyacophila hyalinata group	0	20	40	20	0	0	4	0	0	0	14	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	0	40	20	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	4	0	0	0	0	0	0	0
| Family: Elmidae	140	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	100	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydraenidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tipuloidea	20	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	14	0
Mallochohelea	0	20	0	20	0	0	0	120	40	1	43	30
| Family: Chironomidae	180	320	20	160	0	8	0	80	200	0	171	130
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	40	180	40	0	9	8	9	100	140	0	86	40
Constempellina sp. C	0	20	0	20	4	0	0	0	0	0	0	0
Micropsectra	200	420	740	0	0	8	4	0	0	0	0	0
Stempellina	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	20	0	320	9	8	0	0	0	0	0	20
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	0	0	0	20	0	14	0
Pagastia	400	300	160	360	65	17	0	40	100	3	43	60
| Subfamily: Orthocladiinae	0	20	40	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	10
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	10
Diplocladius cultriger	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	300	480	240	480	30	0	13	200	320	0	14	10
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	40	20	20	0	4	0	4	0	80	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	1	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	940	920	620	1,260	26	17	17	1,660	2,320	7	657	600
Orthocladius lignicola	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	0	40	0	0	0	0	0	0	0	0
Parametriocnemus	0	0	60	0	4	0	0	0	0	0	0	0
Paraphaenocladius	0	0	20	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	0	40	0	0	0	0	0	0	0	0
Rheocricotopus	0	20	160	0	17	17	0	0	40	0	0	20
Thienemanniella	0	0	0	0	4	0	0	0	0	0	0	10
Tvetenia	180	480	560	680	9	17	0	780	1,040	6	329	340
| Subfamily: Tanypodinae	0	20	0	0	0	0	0	0	0	0	0	0
Nilotanypus	0	0	0	0	0	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	80	80	180	30	8	0	20	0	3	100	20
| Family: Dixidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	120	0	0	0	4	0	0	20	20	2	14	0
Chelifera/ Metachela	60	0	0	0	4	0	0	0	0	0	0	0
Clinocera	0	0	20	0	0	8	0	0	0	1	0	0
Neoplasta	80	0	0	0	0	0	0	20	0	0	0	0
Trichoclinocera	0	0	0	0	0	0	0	0	0	0	14	0
Wiedemannia	0	0	0	60	4	0	0	0	0	0	0	0

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Sample:	RG_FOUEW_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	08-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	06-Apr-20	06-Apr-20	06-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	29-Apr-20	29-Apr-20
CC#:	CC202816	CC202817	CC202818	CC202819	CC202820	CC202821	CC202822	CC202823	CC202824	CC202825	CC202826	CC202827
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	40	0	0	0	4	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	20	220	260	320	126	8	4	40	60	2	300	180
| Family: Simuliidae	20	0	0	0	0	0	0	0	20	0	0	0
Prosimulium/Helodon	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stratiomyidae	0	0	0	0	0	0	0	0	0	0	0	0
Euparyphus	0	0	0	0	0	0	0	0	0	0	0	10
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limoniidae	0	0	0	20	0	0	0	0	0	0	0	10
| Family: Pediciidae	0	0	0	0	0	0	0	0	0	0	0	0
Antocha	200	0	0	0	0	0	0	0	0	0	14	0
Dicranota	0	0	60	80	0	0	0	20	60	1	29	20
Hesperoconopa	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	60	0	0	0	0	0	0	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	4	0	0	0	0	0	0	0
| Order: Thysanoptera	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	20	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	20	0	0	20	0	0	0	0	0	1	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	1	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	220	100	100	20	48	17	9	80	40	4	114	80
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	20	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	60	20	40	20	4	8	4	20	0	1	0	0
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	120	104	50	52	20	0	55	43	70
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0
Nais	40	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	60	0	40	0	0	0	0	0	0	0	0	0
Totals:	**9,220**	**8,920**	**9,700**	**13,680**	**1,618**	**2,698**	**1,494**	**9,060**	**14,280**	**182**	**4,912**	**4,010**

Project: Fording Recolonization (20-09)
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUEW_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	08-Apr-20	07-Apr-20	07-Apr-20	07-Apr-20	06-Apr-20	06-Apr-20	06-Apr-20	16-Apr-20	16-Apr-20	16-Apr-20	29-Apr-20	29-Apr-20
CC#:	CC202816	CC202817	CC202818	CC202819	CC202820	CC202821	CC202822	CC202823	CC202824	CC202825	CC202826	CC202827
Taxa present but not included:												
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	8	0	0	0	15	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	20	4	0	0	20	20	0	14	10
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	20	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	0	20	0	0	0	0	4	0	0	0	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	20	20	4	0	0	0	0	0	14	10
Totals:	**40**	**80**	**40**	**40**	**8**	**8**	**4**	**20**	**20**	**15**	**28**	**20**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02
Sample Collection Date:	29-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	29-Apr-20	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20
CC#:	CC202828	CC202829	CC202830	CC202831	CC202832	CC202833	CC202834	CC202835	CC202836	CC202837	CC202838	CC202839
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	5	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	12	0	0	0	0	0	25	5	0
| Family: Baetidae	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	100	0	0	0	0	0	0	0	0	0	0	0
Baetis rhodani group	20	0	14	0	0	0	0	0	0	0	0	0
Callibaetis	20	0	0	0	0	0	0	0	0	12	0	0
| Family: Ephemerellidae	60	17	14	12	0	5	0	10	0	0	0	0
Drunella	20	0	0	12	0	0	0	0	0	0	0	0
Drunella grandis group	0	0	0	0	0	5	0	10	0	0	0	0
Drunella doddsii	0	0	0	0	0	0	0	0	0	0	0	5
Drunella spinifera	0	0	0	0	6	5	0	0	0	0	0	10
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	2,180	317	257	200	106	50	57	210	157	238	50	65
Cinygmula	480	33	14	50	0	0	0	20	43	0	0	0
Epeorus	380	117	71	62	0	0	21	20	14	12	0	0
Rhithrogena	40	17	0	0	0	0	0	0	0	0	0	0
| Family: Leptohyphidae	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Plecoptera	0	0	0	0	0	30	0	0	0	25	25	5
| Family: Capniidae	60	417	157	25	147	95	114	90	43	38	110	80
Bolshecapnia	0	0	0	0	6	0	0	0	14	12	0	5
Capnura	40	233	57	0	41	35	107	0	57	62	85	85
Mesocapnia	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	33	100	200	0	5	0	0	0	0	0	5
Haploperla	0	0	0	12	0	0	0	0	0	0	0	0
Sweltsa	20	33	0	12	0	0	0	0	14	25	0	0
| Family: Leuctridae	0	0	0	12	0	5	0	10	0	0	0	0
Despaxia augusta	0	0	0	0	0	0	0	0	0	0	0	0
Paraleuctra	0	0	0	25	0	0	7	10	0	0	0	0
| Family: Nemouridae	480	1,350	800	425	324	350	750	420	457	412	190	245
Nemoura	220	183	114	100	24	80	36	270	86	50	25	5
Ostrocerca	2,160	1,117	586	375	88	65	286	80	314	250	100	40
Zapada	80	333	600	538	0	0	7	0	129	12	0	10
Zapada oregonensis group	20	0	0	0	0	0	0	10	0	50	0	0
Zapada cinctipes	0	17	29	25	6	10	0	0	0	0	0	5
Zapada columbiana	0	0	0	0	0	0	0	0	43	0	0	0
| Family: Perlidae	20	33	0	0	41	45	0	0	0	12	0	0
Hesperoperla	0	0	0	38	0	0	0	10	0	0	0	0
| Family: Perlodidae	140	300	200	138	176	130	71	0	14	25	50	65
Cultus	0	0	0	0	6	0	0	0	0	0	0	5
Diura	0	0	0	0	0	5	0	0	0	0	0	0
Isoperla	0	333	43	38	82	140	121	10	0	12	30	20
Kogotus	20	0	0	0	0	0	7	0	0	0	0	0
Megarcys	20	117	14	25	0	5	29	0	0	38	0	25
Skwala	0	0	0	0	0	0	0	0	0	0	0	5
| Family: Taeniopterygidae	0	0	0	0	0	0	7	0	0	0	0	0
Doddsia occidentalis	0	0	0	0	0	5	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	0	5	7	0	0	0	0	0
| Family: Brachycentridae	0	17	0	0	18	40	14	30	0	12	10	20
Micrasema	0	17	0	0	0	5	0	0	0	0	0	5
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	12	0	0
Glossosoma	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0
Arctopsyche	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	12	0	0	0	20	29	12	0	0
Parapsyche elsis	0	0	0	0	0	0	0	10	0	50	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	5	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02
Sample Collection Date:	29-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	29-Apr-20	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20
CC#:	CC202828	CC202829	CC202830	CC202831	CC202832	CC202833	CC202834	CC202835	CC202836	CC202837	CC202838	CC202839
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	12	18	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	5	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	140	233	243	188	276	245	229	130	214	275	370	390
Rhyacophila angelita group	0	0	29	0	0	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	0	0	0	0	0	0	12	0	0
Rhyacophila brunnea/vemna group	0	17	43	238	0	0	0	0	0	288	0	0
Rhyacophila hyalinata group	20	0	0	0	0	0	0	0	0	38	0	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila narvae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	25	0	5	0	10	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	386	12	0	0	0	0	0	0	0	0
Heterlimnius	0	0	43	75	0	0	0	0	0	12	0	0
| Family: Hydraenidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tipuloidea	20	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	20	0	0	0	0	0	0	30	29	0	0	0
| Family: Chironomidae	60	17	29	25	18	10	7	120	0	112	5	15
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	60	117	100	138	29	15	7	70	114	112	30	35
Constempellina sp. C	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	0	0	0	29	0	0	60	43	38	10	5
Stempellina	20	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus	120	0	0	38	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	0	0	0	29	0	0	0
Pagastia	100	17	71	62	29	50	43	200	171	62	20	65
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	20	0	0	25	0	0	0	0	0	25	0	0
Corynoneura	0	0	0	0	0	10	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	140	33	86	12	29	40	7	170	214	225	30	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	0	0	0	0	0	0	0	0	14	0	10	10
Limnophyes	0	0	0	0	0	0	0	0	14	0	0	0
Metriocnemus	0	0	0	0	0	0	0	0	0	0	0	0
Nanocladius	0	17	0	0	12	0	0	0	0	0	0	0
Orthocladius complex	1,220	333	314	375	76	245	193	1,530	1,229	1,262	185	170
Orthocladius lignicola	0	0	0	0	0	5	0	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	0	0	0	0	12	0	0
Parametriocnemus	0	0	0	0	0	0	0	0	0	0	0	10
Paraphaenocladius	0	0	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	133	0	12	35	25	0	10	14	12	35	40
Thienemanniella	20	17	14	0	12	0	7	10	29	25	5	10
Tvetenia	580	583	114	112	41	50	29	360	971	588	25	35
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	25	0	10
Nilotanypus	0	0	0	12	0	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	0	0	0	0	0	15	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	17	14	0	41	0	14	80	29	50	30	20
| Family: Dixidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	20	17	0	12	0	0	0	0	0	0	0	0
Chelifera/ Metachela	0	0	0	0	0	0	0	0	0	0	0	0
Clinocera	0	0	0	0	6	0	0	0	0	0	0	0
Neoplasta	0	0	57	25	6	0	0	0	0	0	0	0
Trichoclinocera	20	0	0	0	0	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	5	0	10	0	0	0	0

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Sample:	RG_FOUKI_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02
Sample Collection Date:	29-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	29-Apr-20	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20
CC#:	CC202828	CC202829	CC202830	CC202831	CC202832	CC202833	CC202834	CC202835	CC202836	CC202837	CC202838	CC202839
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	14	25	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	340	0	100	62	65	20	29	270	157	100	40	25
| Family: Simuliidae	20	167	29	12	0	5	0	0	0	12	5	0
Prosimulium/Helodon	0	67	14	0	0	0	0	10	0	0	0	0
Simulium	0	0	0	0	0	5	0	0	0	0	0	0
| Family: Stratiomyidae	0	0	0	0	0	0	0	0	0	0	0	0
Euparyphus	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limoniidae	0	0	14	12	0	0	0	0	0	0	0	0
| Family: Pediciidae	0	0	0	0	0	5	0	0	0	0	0	0
Antocha	0	0	57	75	0	0	0	0	0	12	0	5
Dicranota	20	17	0	12	12	15	7	30	0	38	5	0
Hesperoconopa	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	17	0	0	0	0	0	0	29	25	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Thysanoptera	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	6	5	0	0	0	12	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	17	0	12	0	0	0	20	14	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	50	0	0	5	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	60	33	186	200	41	60	14	50	29	25	35	20
| Family: Mideopsidae	0	0	0	0	0	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	20	0	0	12	6	10	0	10	86	12	5	5
Sperchonopsis	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	12	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	29	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	25	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	83	0	0	0	0	0	0	0	0	0	0
Enchytraeus	20	0	43	12	6	60	300	10	43	0	90	110
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	12	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**9,640**	**6,986**	**5,099**	**4,217**	**1,876**	**2,020**	**2,527**	**4,480**	**4,886**	**4,805**	**1,640**	**1,690**

Project: Fording Recolonization (20-09)
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02
Sample Collection Date:	29-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	29-Apr-20	29-Apr-20	29-Apr-20	28-Apr-20	28-Apr-20
CC#:	CC202828	CC202829	CC202830	CC202831	CC202832	CC202833	CC202834	CC202835	CC202836	CC202837	CC202838	CC202839
Taxa present but not included:												
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	7	0	0	0	10	10
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	17	14	12	0	5	7	10	14	12	0	5
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	6	0	0	0	0	0	0	5
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	33	0	0	0	0	7	10	0	0	0	0
Phylum: Nemata	0	0	14	12	0	0	0	0	0	0	0	5
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	17	14	12	0	0	0	10	14	12	0	0
Totals:	**40**	**67**	**42**	**36**	**6**	**5**	**21**	**30**	**28**	**24**	**10**	**25**

Project: Fording Recolonization (20-09)
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03
Sample Collection Date:	28-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20
CC#:	CC202840	CC202841	CC202842	CC202843	CC202844	CC202845	CC202846
Phylum: Arthropoda	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	2	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0
Ameletus	0	0	0	1	0	0	0
| Family: Baetidae	0	0	0	0	0	0	0
Baetis	0	0	0	0	0	0	0
Baetis rhodani group	0	0	0	0	0	0	0
Callibaetis	0	0	0	0	0	0	0
| Family: Ephemerellidae	0	0	6	0	0	0	0
Drunella	0	0	0	0	0	0	0
Drunella grandis group	0	0	0	0	0	0	0
Drunella doddsii	0	0	0	0	8	11	0
Drunella spinifera	0	0	0	0	8	0	0
Ephemerella	0	0	0	0	0	0	0
| Family: Heptageniidae	29	8	12	2	0	11	3
Cinygmula	0	0	0	0	0	0	0
Epeorus	0	0	0	0	15	44	5
Rhithrogena	0	0	0	0	0	0	0
| Family: Leptohyphidae	0	0	0	0	0	0	0
Tricorythodes	0	0	0	0	0	0	0
| Order: Plecoptera	23	2	2	3	8	33	0
| Family: Capniidae	123	6	2	4	92	56	50
Bolshecapnia	0	2	0	0	0	0	8
Capnura	29	4	0	0	62	78	13
Mesocapnia	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	0	1	46	56	8
Haploperla	0	0	0	0	8	0	0
Sweltsa	0	0	0	0	0	11	0
| Family: Leuctridae	0	0	0	0	0	0	0
Despaxia augusta	0	0	0	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0
| Family: Nemouridae	84	10	0	1	315	267	37
Nemoura	6	0	0	0	62	56	8
Ostrocerca	52	0	0	0	46	333	55
Zapada	0	2	4	1	238	944	95
Zapada oregonensis group	0	0	0	0	8	0	0
Zapada cinctipes	0	0	0	0	62	11	8
Zapada columbiana	0	0	0	0	23	0	0
| Family: Perlidae	0	0	2	2	0	44	3
Hesperoperla	0	0	0	0	0	0	0
| Family: Perlodidae	19	2	0	0	0	89	8
Cultus	0	0	0	0	8	0	0
Diura	0	0	0	0	0	0	0
Isoperla	23	2	2	1	31	78	8
Kogotus	0	0	0	0	0	0	0
Megarcys	0	0	0	0	15	11	0
Skwala	0	0	0	0	0	0	0
| Family: Taeniopterygidae	3	0	0	0	0	0	0
Doddsia occidentalis	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	8	0	21
| Family: Brachycentridae	16	6	4	4	0	0	0
Micrasema	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	8	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0
Arctopsyche	0	0	0	0	0	0	0
Hydropsyche	0	0	0	0	0	0	0
Parapsyche	0	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0

Project: Fording Recolonization (20-09)
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03
Sample Collection Date:	28-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20
CC#:	CC202840	CC202841	CC202842	CC202843	CC202844	CC202845	CC202846
| Family: Lepidostomatidae	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0
| Family: Limnephilidae	0	2	2	1	0	0	0
Ecclisomyia	0	0	2	1	0	0	5
| Family: Rhyacophilidae	0	0	0	0	0	0	0
Rhyacophila	219	129	174	155	454	378	134
Rhyacophila angelita group	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	0	0	1	54	56	0
Rhyacophila hyalinata group	0	0	0	0	0	0	0
Rhyacophila vofixa group	0	0	0	0	0	0	0
Rhyacophila narvae	0	0	0	0	46	11	0
| Family: Thremmatidae	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	8	0	0
| Order: Coleoptera	0	0	0	1	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	1	0	0	0
Heterlimnius	0	0	0	0	15	0	0
| Family: Hydraenidae	0	0	2	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Order: Tipuloidea	0	0	0	0	0	0	5
| Family: Ceratopogonidae	0	0	0	0	0	0	13
Mallochohelea	0	4	4	6	108	56	147
| Family: Chironomidae	3	0	4	1	38	0	3
| Subfamily: Chironominae	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	4	9	38	33	3
Constempellina sp. C	0	0	0	0	0	0	5
Micropsectra	10	6	12	5	0	0	0
Stempellina	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0
Diamesa	0	0	0	1	0	0	0
Pagastia	16	8	12	10	38	56	3
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0
Corynoneura	0	0	4	3	0	0	3
Diplocladius cultriger	0	0	0	0	0	0	0
Eukiefferiella	26	8	4	4	23	0	0
Heterotrissocladius	0	2	0	1	0	0	0
Hydrobaenus	0	0	2	1	0	0	0
Limnophyes	3	0	0	1	15	11	0
Metriocnemus	0	0	0	0	0	0	0
Nanocladius	0	2	0	0	0	0	0
Orthocladius complex	184	108	198	106	669	589	161
Orthocladius lignicola	0	0	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	0	0
Parametriocnemus	0	0	0	0	0	0	0
Paraphaenocladius	0	0	0	0	0	0	0
Parorthocladius	0	0	0	0	0	0	0
Rheocricotopus	3	6	18	12	0	0	0
Thienemanniella	6	4	4	0	0	0	0
Tvetenia	19	19	4	8	108	44	16
| Subfamily: Tanypodinae	0	0	0	2	15	0	3
Nilotanypus	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0
Thienemannimyia group	3	6	6	0	0	0	0
| Family: Dixidae	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0
| Family: Empididae	0	8	2	1	16	22	0
Chelifera/ Metachela	0	0	0	0	0	0	0
Clinocera	0	0	0	0	0	0	0
Neoplasta	0	0	0	0	8	22	0
Trichoclinocera	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	0	0

Project: Fording Recolonization (20-09)
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03
Sample Collection Date:	28-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20
CC#:	CC202840	CC202841	CC202842	CC202843	CC202844	CC202845	CC202846
| Family: Pelecorhynchidae	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	32	17	20	12	31	22	0
| Family: Simuliidae	3	6	0	2	0	0	13
Prosimulium/Helodon	0	0	0	0	0	0	0
Simulium	0	0	0	0	0	0	0
| Family: Stratiomyidae	0	0	0	0	0	0	0
Euparyphus	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0
| Family: Limoniidae	0	0	0	0	0	0	0
| Family: Pediciidae	0	0	0	0	0	0	0
Antocha	0	0	0	0	0	11	0
Dicranota	0	8	0	1	46	56	0
Hesperoconopa	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	8	0	0
Rhabdomastix	0	0	2	3	0	0	0
Tipula	0	0	0	0	0	0	5
| Order: Thysanoptera	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0
Lebertia	23	8	26	10	0	44	5
| Family: Mideopsidae	0	0	0	0	0	0	0
Mideopsis	0	0	0	0	0	0	0
| Family: Sperchontidae	0	0	0	0	0	0	0
Sperchon	3	4	6	3	8	0	0
Sperchonopsis	0	0	0	0	0	0	0
| Family: Torrenticolidae	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0
| Order: Oribatida	0	0	2	1	0	0	8
| Family: Hydrozetidae	0	0	0	1	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0
Pisidium	3	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	5	0	0	0
Rhynchelmis	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0
Enchytraeus	55	260	98	135	0	11	21
| Family: Naididae	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0	0
Totals:	**1,018**	**659**	**646**	**526**	**2,817**	**3,555**	**883**

Project: Fording Recolonization (20-09)
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-01	RG_FRCP1SW_BIC-02	RG_FRCP1SW_BIC-03	RG_FRCP1SWD_BIC-01	RG_FRCP1SWD_BIC-02	RG_FRCP1SWD_BIC-03
Sample Collection Date:	28-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20	30-Apr-20
CC#:	CC202840	CC202841	CC202842	CC202843	CC202844	CC202845	CC202846
Taxa present but not included:							
Phylum: Arthropoda	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0
| Family: Cecidomyiidae	23	2	12	1	0	44	0
Subphylum: Crustacea	0	0	0	0	0	0	0
| Class: Ostracoda	0	2	0	1	8	11	3
| Class: Branchiopoda	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	1	0	0	3
Phylum: Annelida	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0
| Family: Lumbricidae	3	2	10	0	0	0	0
Phylum: Nemata	3	2	0	0	8	0	3
Phylum: Platyhelminthes	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	8	11	3
Totals:	**29**	**8**	**22**	**3**	**24**	**66**	**12**

BENTHIC COMMUNITY

Cordillera Methods, QC Report, and Raw Data

JUNE

Methods and QC Report 2020

Project ID: FRO LAEMP #2

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC

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Table of Contents

Sample Reception

On July 7, 2020, Cordillera Consulting received 61 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
RG_HENUP_BIC-01_2020-06-15	CC210077	6/15/2020	400µM	1
RG_HENUP_BIC-02_2020-06-15	CC210078	6/15/2020	400µM	1
RG_HENUP_BIC-03_2020-06-15	CC210079	6/15/2020	400µM	1
RG_FODHE_BIC-01_2020-06-15	CC210080	6/15/2020	400µM	1
RG_FODHE_BIC-02_2020-06-15	CC210081	6/15/2020	400µM	1
RG_FODHE_BIC-03_2020-06-15	CC210082	6/15/2020	400µM	1
RG_MP1_BIC-01_2020-06-15	CC210083	6/15/2020	400µM	1
RG_MP1_BIC-02_2020-06-15	CC210084	6/15/2020	400µM	1
RG_MP1_BIC-03_2020-06-15	CC210085	6/15/2020	400µM	3
RG_FOUCL_BIC-01_2020-06-15	CC210086	6/15/2020	400µM	2
RG_FOUCL_BIC-02_2020-06-15	CC210087	6/15/2020	400µM	2
RG_FOUCL_BIC-03_2020-06-15	CC210088	6/15/2020	400µM	2
RG_FOUNGD_BIC-01_2020-06-16	CC210089	6/16/2020	400µM	1
RG_FOUNGD_BIC-02_2020-06-16	CC210090	6/16/2020	400µM	1
RG_FOUNGD_BIC-03_2020-06-16	CC210091	6/16/2020	400µM	1
RG_FODNGD_BIC-01_2020-06-16	CC210092	6/16/2020	400µM	1
RG_FODNGD_BIC-02_2020-06-16	CC210093	6/16/2020	400µM	1
RG_FODNGD_BIC-03_2020-06-16	CC210094	6/16/2020	400µM	1
RG_FOBKS_BIC-01_2020-06-16	CC210095	6/16/2020	400µM	2
RG_FOBKS_BIC-02_2020-06-16	CC210096	6/16/2020	400µM	2
RG_FOBKS_BIC-03_2020-06-16	CC210097	6/16/2020	400µM	2
RG_SCOUTDS_BIC-01_2020-06-16	CC210098	6/16/2020	400µM	1
RG_SCOUTDS_BIC-02_2020-06-16	CC210099	6/16/2020	400µM	1
RG_SCOUTDS_BIC-03_2020-06-16	CC210100	6/16/2020	400µM	2
RG_FOUKI_BIC-01_2020-06-17	CC210101	6/17/2020	400µM	1
RG_FOUKI_BIC-02_2020-06-17	CC210102	6/17/2020	400µM	1
RG_FOUKI_BIC-03_2020-06-17	CC210103	6/17/2020	400µM	1

RG_FOBCP_BIC-01_2020-06-17	CC210104	6/17/2020	400µM	1
RG_FOBCP_BIC-02_2020-06-17	CC210105	6/17/2020	400µM	1
RG_FOBCP_BIC-03_2020-06-17	CC210106	6/17/2020	400µM	1
RG_FO26_BIC-01_2020-06-17	CC210107	6/17/2020	400µM	2
RG_FO26_BIC-02_2020-06-17	CC210108	6/17/2020	400µM	2
RG_FO26_BIC-03_2020-06-17	CC210109	6/17/2020	400µM	2
RG_UFR1_BIC-01_2020-06-17	CC210110	6/17/2020	400µM	1
RG_UFR1_BIC-02_2020-06-17	CC210111	6/17/2020	400µM	2
RG_UFR1_BIC-03_2020-06-17	CC210112	6/17/2020	400µM	2
RG_FOBSC_BIC-01_2020-06-18	CC210113	6/18/2020	400µM	1
RG_FOBSC_BIC-02_2020-06-18	CC210114	6/18/2020	400µM	1
RG_FOBSC_BIC-03_2020-06-18	CC210115	6/18/2020	400µM	1
RG_FOBCPD_BIC-01_2020-06-18	CC210116	6/18/2020	400µM	1
RG_FOBCPD_BIC-02_2020-06-18	CC210117	6/18/2020	400µM	1
RG_FOBCPD_BIC-03_2020-06-18	CC210118	6/18/2020	400µM	1
RG_FRCP1SW_BIC-01_2020-06-18	CC210119	6/18/2020	400µM	2
RG_FRCP1SW_BIC-02_2020-06-18	CC210120	6/18/2020	400µM	2
RG_FRCP1SW_BIC-03_2020-06-18	CC210121	6/18/2020	400µM	1
RG_FRCP1SWD_BIC-01_2020-06-18	CC210122	6/18/2020	400µM	2
RG_FRCP1SWD_BIC-02_2020-06-18	CC210123	6/18/2020	400µM	2
RG_FRCP1SWD_BIC-03_2020-06-18	CC210124	6/18/2020	400µM	2
RG_FODPO_BIC-01_2020-06-19	CC210125	6/19/2020	400µM	1
RG_FODPO_BIC-02_2020-06-19	CC210126	6/19/2020	400µM	1
RG_FODPO_BIC-03_2020-06-19	CC210127	6/19/2020	400µM	1
RG_FRUPO_BIC-01_2020-06-19	CC210128	6/19/2020	400µM	1
RG_FRUPO_BIC-02_2020-06-19	CC210129	6/19/2020	400µM	1
RG_FRUPO_BIC-03_2020-06-19	CC210130	6/19/2020	400µM	1
RG_FOUEW_BIC-01_2020-06-19	CC210131	6/19/2020	400µM	2
RG_FOUEW_BIC-02_2020-06-19	CC210132	6/19/2020	400µM	1
RG_FOUEW_BIC-03_2020-06-19	CC210133	6/19/2020	400µM	2
RG_FO22_BIC-02_2020-06-19	CC210134	6/19/2020	400µM	1
RG_FOUSH_BIC-01_2020-06-23	CC210135	6/23/2020	400µM	1
RG_FOUSH_BIC-02_2020-06-23	CC210136	6/23/2020	400µM	1
RG_FOUSH_BIC-03_2020-06-23	CC210137	6/23/2020	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.

- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	400 micron fraction	
			% Sampled	# Invertebrates
RG_HENUP_BIC-01_2020-06-15	15-Jun-20	CC210077	50%	479
RG_HENUP_BIC-02_2020-06-15	15-Jun-20	CC210078	33%	342
RG_HENUP_BIC-03_2020-06-15	15-Jun-20	CC210079	26%	358
RG_FODHE_BIC-01_2020-06-15	15-Jun-20	CC210080	15%	327
RG_FODHE_BIC-02_2020-06-15	15-Jun-20	CC210081	50%	389
RG_FODHE_BIC-03_2020-06-15	15-Jun-20	CC210082	17%	320
RG_MP1_BIC-01_2020-06-15	15-Jun-20	CC210083	8%	371
RG_MP1_BIC-02_2020-06-15	15-Jun-20	CC210084	18%	339
RG_MP1_BIC-03_2020-06-15	15-Jun-20	CC210085	29%	378
RG_FOUCL_BIC-01_2020-06-15	15-Jun-20	CC210086	31%	340
RG_FOUCL_BIC-02_2020-06-15	15-Jun-20	CC210087	36%	342
RG_FOUCL_BIC-03_2020-06-15	15-Jun-20	CC210088	100%	174
RG_FOUNGD_BIC-01_2020-06-16	16-Jun-20	CC210089	20%	352
RG_FOUNGD_BIC-02_2020-06-16	16-Jun-20	CC210090	21%	368
RG_FOUNGD_BIC-03_2020-06-16	16-Jun-20	CC210091	10%	346
RG_FODNGD_BIC-01_2020-06-16	16-Jun-20	CC210092	50%	409
RG_FODNGD_BIC-02_2020-06-16	16-Jun-20	CC210093	100%	519
RG_FODNGD_BIC-03_2020-06-16	16-Jun-20	CC210094	15%	357
RG_FOBKS_BIC-01_2020-06-16	16-Jun-20	CC210095	100%	567
RG_FOBKS_BIC-02_2020-06-16	16-Jun-20	CC210096	100%	612
RG_FOBKS_BIC-03_2020-06-16	16-Jun-20	CC210097	50%	248
RG_SCOUTDS_BIC-01_2020-06-16	16-Jun-20	CC210098	15%	351
RG_SCOUTDS_BIC-02_2020-06-16	16-Jun-20	CC210099	50%	327

RG_SCOUTDS_BIC-03_2020-06-16	16-Jun-20	CC210100	33%	344
RG_FOUKI_BIC-01_2020-06-17	17-Jun-20	CC210101	10%	349
RG_FOUKI_BIC-02_2020-06-17	17-Jun-20	CC210102	12%	325
RG_FOUKI_BIC-03_2020-06-17	17-Jun-20	CC210103	20%	422
RG_FOBCP_BIC-01_2020-06-17	17-Jun-20	CC210104	100%	478
RG_FOBCP_BIC-02_2020-06-17	17-Jun-20	CC210105	45%	359
RG_FOBCP_BIC-03_2020-06-17	17-Jun-20	CC210106	50%	480
RG_FO26_BIC-01_2020-06-17	17-Jun-20	CC210107	7%	350
RG_FO26_BIC-02_2020-06-17	17-Jun-20	CC210108	27%	332
RG_FO26_BIC-03_2020-06-17	17-Jun-20	CC210109	12%	372
RG_UFR1_BIC-01_2020-06-17	17-Jun-20	CC210110	10%	322
RG_UFR1_BIC-02_2020-06-17	17-Jun-20	CC210111	8%	405
RG_UFR1_BIC-03_2020-06-17	17-Jun-20	CC210112	25%	411
RG_FOBSC_BIC-01_2020-06-18	18-Jun-20	CC210113	27%	355
RG_FOBSC_BIC-02_2020-06-18	18-Jun-20	CC210114	12%	335
RG_FOBSC_BIC-03_2020-06-18	18-Jun-20	CC210115	11%	335
RG_FOBCPD_BIC-01_2020-06-18	18-Jun-20	CC210116	16%	332
RG_FOBCPD_BIC-02_2020-06-18	18-Jun-20	CC210117	29%	390
RG_FOBCPD_BIC-03_2020-06-18	18-Jun-20	CC210118	16%	373
RG_FRCP1SW_BIC-01_2020-06-18	18-Jun-20	CC210119	100%	380
RG_FRCP1SW_BIC-02_2020-06-18	18-Jun-20	CC210120	25%	374
RG_FRCP1SW_BIC-03_2020-06-18	18-Jun-20	CC210121	12%	437
RG_FRCP1SWD_BIC-01_2020-06-18	18-Jun-20	CC210122	25%	364
RG_FRCP1SWD_BIC-02_2020-06-18	18-Jun-20	CC210123	19%	370
RG_FRCP1SWD_BIC-03_2020-06-18	18-Jun-20	CC210124	25%	266
RG_FODPO_BIC-01_2020-06-19	19-Jun-20	CC210125	100%	440
RG_FODPO_BIC-02_2020-06-19	19-Jun-20	CC210126	14%	331
RG_FODPO_BIC-03_2020-06-19	19-Jun-20	CC210127	13%	324
RG_FRUPO_BIC-01_2020-06-19	19-Jun-20	CC210128	9%	230
RG_FRUPO_BIC-02_2020-06-19	19-Jun-20	CC210129	15%	374
RG_FRUPO_BIC-03_2020-06-19	19-Jun-20	CC210130	14%	343
RG_FOUEW_BIC-01_2020-06-19	19-Jun-20	CC210131	15%	338
RG_FOUEW_BIC-02_2020-06-19	19-Jun-20	CC210132	12%	337
RG_FOUEW_BIC-03_2020-06-19	19-Jun-20	CC210133	10%	354
RG_FO22_BIC-02_2020-06-19	19-Jun-20	CC210134	14%	331
RG_FOUSH_BIC-01_2020-06-23	23-Jun-20	CC210135	20%	400
RG_FOUSH_BIC-02_2020-06-23	23-Jun-20	CC210136	9%	375
RG_FOUSH_BIC-03_2020-06-23	23-Jun-20	CC210137	13%	316

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.

- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

				Total from Sample	Percent Efficiency
Site - QC, Sample - QC1, CC# - CC210078, Percent sampled = 33%, Sieve size = 400					
Ephemeroptera		2			
Total:		**2**		**342**	**99%**
Site - QC, Sample - QC2, CC# - CC210087, Percent sampled = 36%, Sieve size = 400					
Ephemeroptera		1			
Plecoptera		1			
Total:		**2**		**342**	**99%**
Site - QC, Sample - QC3, CC# - CC210096, Percent sampled = 100%, Sieve size = 400					
Ephemeroptera		4			
Total:		**4**		**612**	**99%**
Site - QC, Sample - QC4, CC# - CC210102, Percent sampled = 12%, Sieve size = 400					
No Invertebrates Found		0			
Total:		**0**		**325**	**100%**
Site - QC, Sample - QC5, CC# - CC210122, Percent sampled = 25%, Sieve size = 400					

Oligochaeta		1			
Total:		**1**		**364**	**100%**
Site - QC, Sample - QC6, CC# - CC210136, Percent sampled = 9%, Sieve size = 400					
Ceratopogonidae		1			
Total:		**1**		**375**	**100%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5																By	Time		Percent Range		Min	Max
210106	RG_FOBCP_BIC-03_2020006-17	459	462																			CM	60	921	0.65	0.65	0.33	0.33
210135	RG_FOUSH_BIC-01_2020-06-23	381	346	351	366	400																CM	310	1844	1.42	13.50	0.76	8.46
210077	RG_HENUP_BIC-01_2020-06-15	454	445																			TV	90	899	1.98	1.98	1.00	1.00
210124	RG_FRCP1SWD_BIC-03_2020-06-18	338	317	325	333																	CM	180	1313	1.48	6.21	0.99	3.43
210103	RG_FOUK1_BIC-03_2020-06-17	418	418	431	414	417																CM	310	2098	0.00	3.94	0.38	2.72
210089	RG_FOUNGD_BIC-01_2020-06-16	336	328	320	318	311																CM	240	1613	0.62	7.44	0.81	4.15

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2020, Sample - RG_HENUP_BIC-01_2020-06-15, CC# - CC210077, Percent sampled = 50%, Sieve size = 400	477	0.00	0.20920502	0.6263048	0.0041841
Site - 2020, Sample - RG_FOUCL_BIC-01_2020-06-15, CC# - CC210086, Percent sampled = 31%, Sieve size = 400	338	0.00	0.29498525	0.58823529	0.00294985
Site - 2020, Sample - RG_FODNGD_BIC-01_2020-06-16, CC# - CC210092, Percent sampled = 50%, Sieve size = 400	409	0.00	0	0.24449878	0.00244499
Site - 2020, Sample - RG_FO26_BIC-01_2020-06-17, CC# - CC210107, Percent sampled = 7%, Sieve size = 400	350	0.00	0	0.28571429	0.00285714
Site - 2020, Sample - RG_FOBSC_BIC-03_2020-06-18, CC# - CC210115, Percent sampled = 11%, Sieve size = 400	335	0.00	0	0.29850746	0.00298507
Site - 2020, Sample - RG_FRUPO_BIC-03_2020-06-19, CC# - CC210130, Percent sampled = 14%, Sieve size = 400	342	0.00	0.1459854	0.29154519	0.00145985

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2020, Sample - RG_HENUP_BIC-01_2020-06-15, CC# - CC210077, Percent sampled = 50%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	3	3						
Baetidae	1	1						

Baetis	61	60	No			X		
Baetis rhodani group	13	14	No			X		
Brillia	1	1						
Chironomidae	1	1						
Chloroperlidae	29	28	No			X		
Cinygmula	2	2						
Drunella doddsii	10	10						
Drunella grandis group	6	6						
Epeorus	8	8						
Eukiefferiella	11	11						
Heptageniidae	207	206	No			X		
Limoniidae	1	1						
Megarcys	25	25						
Oligophlebodes	10	10						
Oreogeton	2	2						
Orthocladius complex	3	3						
Parapsyche	3	3						
Perlodidae	22	22						
Rhithrogena	7	7						
Rhyacophila	3	3						
Rhyacophila hyalinata group	4	4						
Suwallia	5	5						
Sweltsa	5	5						
Tvetenia	4	4						
Zapada	28	28						
Zapada oregonensis group	4	4						
Total:	**479**	**477**						
					0	4	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

Site - 2020, Sample - RG_FOUCL_BIC-01_2020-06-15, CC# - CC210086, Percent sampled = 31%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	17	17						
Baetis	34	34						

Baetis rhodani group	6	6						
Chloroperlidae	3	3						
Cinygmula	46	46						
Cricotopus (Nostococladius)	1	1						
Diamesa	1	1						
Dicranota	6	6						
Drunella	10	10						
Drunella coloradensis	1	1						
Drunella doddsii	1	1						
Enchytraeus	2	2						
Epeorus	1	1						
Ephemerellidae	1	1						
Heptageniidae	126	125	No			X		
Kogotus	3	3						
Lebertia	1	1						
Limoniidae	1	1						
Mallochohelea	9	9						
Micropsectra	5	5						
Neoplasta	3	3						
Oligophlebodes	4	4						
Orthocladius complex	1	1						
Pagastia	1	1						
Pericoma/Telmatoscopus	7	7						
Perlodidae	17	17						
Rheocricotopus	1	1						
Rhithrogena	1	1						
Rhyacophila	7	7						
Rhyacophila alberta group	2	2						
Rhyacophila atrata complex	2	2						
Rhyacophila hyalinata group	1	1						
Rhyacophila narvae	2	2						
Simulium	1	1						
Sperchon	2	2						
Sweltsa	5	5						
Thienemannimyia group	3	3						
Zapada	1	1						
Zapada columbiana	2	1	No			X		
Zapada oregonensis group	2	2						
Total:	**340**	**338**						

					0	2	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2020, Sample - RG_FODNGD_BIC-01_2020-06-16, CC# - CC210092, Percent sampled = 50%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Ameletus	3	3						
Baetidae	3	3						
Baetis	149	150	No			X		
Baetis rhodani group	3	3						
Camptocladius	2	2						
Chloroperlidae	4	4						
Cinygmula	4	4						
Collembola	2	2						
Diamesa	1	1						
Dicranota	4	4						
Drunella	40	40						
Drunella coloradensis	10	10						
Ecclisomyia	1	1						
Enchytraeidae	13	13						
Enchytraeus	3	3						
Ephemerellidae	6	6						
Eukiefferiella	3	3						
Heleniella	1	1						
Heptageniidae	51	51						
Kogotus	2	2						
Lebertia	3	3						
Megarcys	4	4						
Micropsectra	4	4						
Oligophlebodes	11	10	No			X		
Orthocladius complex	3	3						
Pagastia	4	4						
Parametriocnemus	6	6						
Paraphaenocladius	2	2						
Perlodidae	7	7						
Rheocricotopus	1	1						
Rhyacophila	5	5						
Rhyacophila alberta group	6	6						

Rhyacophila brunnea/vemna group	4	4						
Rhyacophila hyalinata group	1	1						
Simuliidae	2	2						
Simulium	28	28						
Sperchon	1	1						
Sweltsa	1	1						
Tipulidae	1	1						
Tvetenia	3	3						
Zapada	7	7						
Total:	**409**	**409**						
					0	2	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2020, Sample - RG_FO26_BIC-01_2020-06-17, CC# - CC210107, Percent sampled = 7%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Ameletus	1	1						
Baetidae	3	3						
Baetis	38	38						
Baetis rhodani group	12	12						
Chloroperlidae	3	3						
Cinygmula	8	8						
Cricotopus (Nostococladius)	1	1						
Dicranota	1	1						
Drunella	15	15						
Drunella doddsii	8	8						
Epeorus	12	12						
Ephemerellidae	2	2						
Eukiefferiella	1	1						
Haploperla	1	1						
Heptageniidae	60	60						
Lebertia	1	1						
Megarcys	7	7						
Oligophlebodes	12	12						

Orthocladius complex	2	2						
Parapsyche	3	3						
Parapsyche elsis	1	1						
Perlodidae	25	24	No			X		
Rhithrogena	5	5						
Rhyacophila	16	16						
Rhyacophila atrata complex	3	3						
Rhyacophila brunnea/vemna group	1	1						
Rhyacophila hyalinata group	6	6						
Rhyacophila vofixa group	1	1						
Simuliidae	1	1						
Sperchon	4	4						
Suwallia	14	14						
Sweltsa	1	1						
Tvetenia	8	8						
Zapada	70	71	No			X		
Zapada columbiana	3	3						
Total:	**350**	**350**						
					0	2	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

Site - 2020, Sample - RG_FOBSC_BIC-03_2020-06-18, CC# - CC210115, Percent sampled = 11%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	1	1						
Baetidae	2	2						
Baetis	35	35						
Baetis rhodani group	2	2						
Chironomidae	2	2						
Chloroperlidae	1	1						
Cinygmula	15	15						
Drunella	13	13						
Drunella coloradensis	6	6						
Drunella spinifera	1	1						

Enchytraeus	1	1						
Epeorus	66	65	No			X		
Ephemerellidae	8	8						
Heptageniidae	94	95	No			X		
Kogotus	7	7						
Lebertia	2	2						
Orthocladius complex	1	1						
Ostrocerca	2	2						
Pagastia	1	1						
Parametriocnemus	2	2						
Parapsyche elsis	1	1						
Pericoma/Telmatoscopus	1	1						
Perlodidae	5	5						
Rhyacophila	16	16						
Rhyacophila alberta group	3	3						
Rhyacophila atrata complex	2	2						
Simuliidae	2	2						
Simulium	38	38						
Sweltsa	1	1						
Tvetenia	1	1						
Zapada	1	1						
Zapada columbiana	1	1						
Zapada oregonensis group	1	1						
Total:	**335**	**335**						
					0	2	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2020, Sample - RG_FRUPO_BIC-03_2020-06-19, CC# - CC210130, Percent sampled = 14%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Baetis	7	7						
Baetis rhodani group	2	2						
Brillia	1	1						
Capniidae	3	3						
Chironomidae	1	1						
Chloroperlidae	3	3						

Cinygmula	18	18						
Clinocera	1	1						
Dicranota	1	1						
Drunella	12	12						
Drunella coloradensis	1	1						
Ecclisomyia	1	1						
Enchytraeidae	6	6						
Epeorus	111	110	No			X		
Ephemerellidae	18	18						
Heptageniidae	87	87						
Isoperla	1	1						
Kogotus	3	3						
Lebertia	4	4						
Micropsectra	1	1						
Neoplasta	4	4						
Orthocladius complex	2	2						
Pagastia	2	2						
Parametriocnemus	1	1						
Perlodidae	1	1						
Prosimulium/Helodon	1	1						
Rhabdomastix	1	1						
Rhithrogena	2	2						
Rhyacophila	24	24						
Rhyacophila alberta group	8	8						
Rhyacophila atrata complex	1	1						
Simuliidae	4	4						
Simulium	6	6						
Tipula	1	1						
Tvetenia	1	1						
Zapada oregonensis group	2	2						
Total:	**343**	**342**						
					0	**1**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

References

[1] McDermott, H., Paull, T., Strachan, S. (May 2014). Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples, Environment Canada. ISBN: 978-1-100-25417-3

[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
http://www.safit.org/Docs/SAFIT_Taxonomic_Literature_Database_1_March_2011.enl

Brook, Arthur R. and Leonard A. Kelton. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera) Memoirs of the Entomological Society of Canada. No. 51.

Brown HP & White DS (1978) Notes on Seperation and Identification of North
American Riffle Beetles (Coleoptera: Dryopidea: Elmidae).Entomological News 89 (1&2): 1-13

Clifford, Hugh F. 1991. Aquatic Invertebrates of Alberta. University of Alberta Press Edmonton, Alberta.

Epler, John. 2001 The Larval Chironomids of North and South Carolina. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Water Beetles of Florida. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida.
http://home.earthlink.net/~johnepler/

Trond Andersen, Peter S. Cranston & John H. Epler (Eds) (2013) Chironomidae of the Holarctic Region: Keys and Diagnoses. Part 1. Larvae. *Insect Systematics and Evolution Supplements* 66: 1-571.

Jacobus, Luke and Pat Randolph. 2005. Northwest Ephemeroptera Nymphs. Manual from Northwest Biological Assessment Working Group. Moscow Idaho 2005. Not Published.

Jacobus LM, McCafferty WP (2004) Revisionary Contributions to the Genus Drunella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 112: 127-147

Jacobus LM, McCafferty WP (2003) Revisionary Contributions to North American Ephemerella and Serratella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 111 (4): 174-193.

Kathman,R.D., R.O. Brinkhurst. 1999. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, Tennessee.

Larson, D.J., Y. Alarie, R.E. Roughly.2005. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Neararctic Region. NRC-CNRC Research Press. Ottawa.

Merritt, R.W., K.W. Cummins, M. B. Berg. (eds.). 2007. An introduction to the aquatic insects of North America, 4th. Kendall/Hunt, Dubuque, IA

Morihara DK, McCafferty WP (1979) The Baetis Larvae of North American (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105: 139-221.

Needham, James, M. May, M. Westfall Jr. 2000. Dragonflies of North America. Scientific Publishers. Gainsville FL.

Prescott David, R.C.and Medea M. Curteanu.2004. Survey of Aquatic Gastropods of Alberta. Species at Risk Report No. 104. ISSN: 1496-7146 (Online Edition)

Needham, K. 1996. An Identification Guide to the Nymphal Mayflies of British Columbia. Publication #046 Resource Inventory Committee, Government of British Columbia.

Oliver, Donald R. and Mary E. Roussel. 1983. The Insects and Arachnids of Canada Part 11. The Genera of larval midges of Canada. Biosystematics Research Institute. Ottawa, Ontario. Research Branch, Agriculture Canada. Publication 1746.

Proctor, H. The 'Top 18' Water Mite Families in Alberta. Zoology 351. University of Alberta, Edmonton, Alberta.

Rogers, D.C. and M. Hill, 2008. Key to the Freshwater Malacostraca (Crustacea) of the mid-Atlantic Region. EPA-230-R-08-017. US Environmental Protection Agency, Office of Environmental Information, Washington, DC.

Stewart, Kenneth W. and Bill Stark. 2002. The Nymphs of North American Stonefly Genera (Plecoptera). The Caddis Press. Columbus Ohio.

Stewart, Kenneth W. and Mark W. Oswood. 2006 The Stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press.

Stonedahl, Gary and John D. Lattin. 1986. The Corixidae of Oregon and Washington (Hemiptera: Heteroptera). Technical Bulletin 150. Oregon State University, Corvalis Oregon.

Thorpe, J. H. and A. P. Covich [Eds.] 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego.

Tinerella, Paul P. and Ralph W. Gunderson.2005. The Waterboatmen (Insecta: Heteroptera: Corixidae) of Minisota. Publication No.23 Dept. Of Entomology, North Dakota State University, Fargo, North Dakota, USA.

Weiderholm, Torgny (Ed.) 1983. The larvae of Chironomidae (Diptera) of the Holartic region. Entomologica Scaninavica. Supplement No. 19.

Westfall, Minter J. Jr. and May, Michael L. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

Wiggins, Glenn B. 1998. Larvae of the North American Caddisfly Genera (Tricoptera) 2nd ed. University of Toronto Press. Toronto Ontario.

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-01	RG_HENUP_BIC-02	RG_HENUP_BIC-03	RG_FODHE_BIC-01	RG_FODHE_BIC-02	RG_FODHE_BIC-03	RG_MP1_BIC-01	RG_MP1_BIC-02	RG_MP1_BIC-03	RG_FOUCL_BIC-01	RG_FOUCL_BIC-02	RG_FOUCL_BIC-03	RG_FOUNGD_BIC-01
Sample Collection Date:	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20
CC#:	CC210077	CC210078	CC210079	CC210080	CC210081	CC210082	CC210083	CC210084	CC210085	CC210086	CC210087	CC210088	CC210089
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	2	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	6	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	6	3	23	27	14	24	12	6	3	55	6	2	15
| Family: Baetidae	2	24	19	7	0	0	25	11	3	0	3	0	15
Baetis	122	182	292	373	194	318	588	428	107	110	147	27	390
Baetis rhodani group	26	21	35	140	22	35	50	56	7	19	14	4	30
| Family: Ephemerellidae	0	0	0	0	2	12	50	28	0	3	0	0	25
Drunella	0	9	12	133	46	147	200	61	69	32	56	14	130
Drunella grandis group	12	0	0	0	0	0	0	0	0	0	0	0	0
Drunella coloradensis	0	0	4	20	12	0	50	61	0	3	17	0	45
Drunella doddsii	20	33	4	13	4	6	50	17	34	3	11	1	5
Drunella spinifera	0	0	0	0	0	0	0	0	0	0	0	0	5
Ephemerella	0	0	0	0	0	6	0	0	0	0	0	0	0
| Family: Heptageniidae	414	315	481	533	256	700	1488	428	493	406	383	33	390
Cinygmula	4	12	38	127	20	47	488	133	238	148	67	6	95
Epeorus	16	55	23	27	4	12	388	89	59	3	3	0	10
Rhithrogena	14	0	27	7	0	6	12	6	3	3	0	1	5
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	0	0	4	7	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	58	24	8	13	0	0	50	0	7	10	14	4	5
Haploperla	0	0	0	0	0	0	0	0	7	0	6	4	5
Neaviperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	10	27	8	0	0	0	0	0	0	0	0	0	0
Sweltsa	10	3	4	0	0	0	0	0	0	16	0	0	0
| Family: Leuctridae	0	0	0	0	0	0	0	6	0	0	3	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	12	0	0	0	12	0	0	0	0	0	0
Ostrocerca	0	0	0	0	2	0	0	0	0	0	6	1	0
Zapada	56	55	62	80	24	59	25	39	3	3	6	2	35
Zapada oregonensis group	8	12	23	0	0	0	0	11	0	6	3	2	0
Zapada cinctipes	0	0	0	0	0	6	0	0	0	0	0	0	0
Zapada columbiana	0	6	0	0	0	0	25	0	0	6	0	0	0
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	44	130	81	80	20	18	412	106	69	55	39	7	135
Isoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Kogotus	0	0	0	0	0	0	138	17	21	10	6	0	25
Megarcys	50	15	73	7	0	24	0	6	0	0	8	1	5
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	2	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	6	6	8	7	0	6	0	0	0	0	0	1	0
Parapsyche elsis	0	0	0	7	0	12	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	0	0	5

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-01	RG_HENUP_BIC-02	RG_HENUP_BIC-03	RG_FODHE_BIC-01	RG_FODHE_BIC-02	RG_FODHE_BIC-03	RG_MP1_BIC-01	RG_MP1_BIC-02	RG_MP1_BIC-03	RG_FOUCL_BIC-01	RG_FOUCL_BIC-02	RG_FOUCL_BIC-03	RG_FOUNGD_BIC-01
Sample Collection Date:	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20
CC#:	CC210077	CC210078	CC210079	CC210080	CC210081	CC210082	CC210083	CC210084	CC210085	CC210086	CC210087	CC210088	CC210089
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	6	15	19	87	18	47	138	39	28	23	33	7	55
Rhyacophila betteni group	0	0	0	7	0	0	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	0	3	0	7	0	0	62	17	3	0	3	0	15
Rhyacophila hyalinata group	8	3	8	0	0	24	25	0	10	3	11	0	5
Rhyacophila vofixa group	0	0	0	33	2	6	0	0	0	0	0	0	0
Rhyacophila alberta group	0	3	0	0	0	0	50	44	14	6	3	0	10
Rhyacophila atrata complex	0	0	0	27	0	12	12	28	21	6	0	8	15
Rhyacophila narvae	0	0	0	0	0	0	0	6	10	6	3	3	0
Rhyacophila verrula group	0	0	4	7	0	0	0	0	0	0	3	2	0
| Family: Thrammatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	20	21	19	33	10	29	0	39	24	13	22	6	70
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Curculionidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Liodessus	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreodytes	0	0	0	0	0	0	0	0	0	0	0	0	0
Stictotarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Melyridae	0	3	0	0	0	0	0	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tipuloidea	0	0	4	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	2	0	0	0	0	0	0	0	10
Mallochohelea	0	0	0	0	0	0	0	0	0	29	3	0	0
| Family: Chironomidae	2	0	0	7	4	0	0	0	3	0	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	3	0	20	4	29	38	6	10	16	3	2	10
Tanytarsus	0	0	0	7	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympotthastia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	0	33	4	18	0	0	0	3	0	1	0
Pagastia	0	9	19	7	2	0	50	22	0	3	6	4	0
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	2	0	0	0	4	0	0	0	3	0	3	0	0
Camptocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	0	7	0	12	0	0	0	3	3	5	0
Eukiefferiella	22	3	23	13	6	6	12	0	0	0	0	0	5
Heleniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	0	0	0	0	0	0	0	0	0	0	0	0	0
Krenosmittia	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	3	0	0
Orthocladius	0	3	0	0	0	6	0	0	3	0	0	0	5
Orthocladius complex	6	3	8	113	14	118	38	17	0	3	14	8	30
Paracladius	0	0	0	0	0	0	0	0	3	0	0	0	0
Parakiefferiella	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus	0	0	0	0	2	6	0	0	0	0	0	1	10
Paraphaenocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	7	0	0	0	0
Rheocricotopus	0	0	0	20	12	12	0	0	3	3	3	0	5
Rheosmittia	0	0	0	0	0	0	0	0	0	0	0	0	0
Smittia	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	12	0	0	0	0	0	0	0
Tvetenia	8	9	15	73	38	71	25	0	0	0	6	2	15
Zalutschia	0	0	0	0	0	0	0	0	0	0	3	0	0

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-01	RG_HENUP_BIC-02	RG_HENUP_BIC-03	RG_FODHE_BIC-01	RG_FODHE_BIC-02	RG_FODHE_BIC-03	RG_MP1_BIC-01	RG_MP1_BIC-02	RG_MP1_BIC-03	RG_FOUCL_BIC-01	RG_FOUCL_BIC-02	RG_FOUCL_BIC-03	RG_FOUNGD_BIC-01
Sample Collection Date:	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20
CC#:	CC210077	CC210078	CC210079	CC210080	CC210081	CC210082	CC210083	CC210084	CC210085	CC210086	CC210087	CC210088	CC210089
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	0	0	0	0	0	10	0	1	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0	0	0	0	0	1	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	0	0	0	0	12	6	0	0	0	0	10
Clinocera	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoplasta	0	0	0	0	0	0	12	0	0	10	0	1	5
Oreogeton	4	3	0	0	0	0	0	0	0	0	0	0	0
| Family: Oreoleptidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreoleptis torrenticola	0	0	0	0	0	0	0	0	0	0	3	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	0	0	4	6	0	11	3	23	3	1	0
| Family: Sciaridae	0	0	0	0	0	0	0	0	0	0	3	0	0
| Family: Simuliidae	0	0	4	7	8	0	0	50	7	0	0	5	0
Prosimulium	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	0	0	0	0	0	0	12	22	0	0	0	0	0
Simulium	0	0	0	47	4	6	0	33	7	3	11	0	30
| Family: Tanyderidae	0	0	0	0	0	0	0	0	3	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limoniidae	2	0	0	0	0	0	25	0	0	3	0	0	10
| Family: Pediciidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Antocha	0	0	0	0	0	0	12	6	0	0	0	0	0
Dicranota	0	0	0	0	2	12	12	11	3	19	6	4	10
Hexatoma	0	0	0	0	0	0	0	0	3	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0	0	3	0	0
| Order: Thysanoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	7	0	0	0	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	2	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	6	4	0	2	6	0	17	0	3	0	0	20
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	9	12	7	8	0	25	0	0	6	0	0	10
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	2	0	0	0	0	0	0	0	0
| Family: Hydrozetidae	0	6	0	0	0	0	0	0	3	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Gastropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	7	2	0	0	0	0	0	0	0	25
Enchytraeus	0	0	0	0	0	6	12	6	3	6	6	0	5
Totals:	**958**	**1,034**	**1,380**	**2,184**	**778**	**1,888**	**4,635**	**1,889**	**1,297**	**1,091**	**958**	**174**	**1,760**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-01	RG_HENUP_BIC-02	RG_HENUP_BIC-03	RG_FODHE_BIC-01	RG_FODHE_BIC-02	RG_FODHE_BIC-03	RG_MP1_BIC-01	RG_MP1_BIC-02	RG_MP1_BIC-03	RG_FOUCL_BIC-01	RG_FOUCL_BIC-02	RG_FOUCL_BIC-03	RG_FOUNGD_BIC-01
Sample Collection Date:	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	15-Jun-20	16-Jun-20
CC#:	CC210077	CC210078	CC210079	CC210080	CC210081	CC210082	CC210083	CC210084	CC210085	CC210086	CC210087	CC210088	CC210089
Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	2	0	4	7	2	6	12	6	3	0	3	1	5
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	6	0	0	0	0	0	0	0
Phylum: Nemata	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	0	0	0	0	0	0	3	0	5
Totals:	**2**	**0**	**4**	**7**	**2**	**12**	**12**	**6**	**3**	**0**	**6**	**1**	**10**

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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-02	RG_FOUNGD_BIC-03	RG_FODNGD_BIC-01	RG_FODNGD_BIC-02	RG_FODNGD_BIC-03	RG_FOBKS_BIC-01	RG_FOBKS_BIC-02	RG_FOBKS_BIC-03	RG_SCOUTDS_BIC-01	RG_SCOUTDS_BIC-02	RG_SCOUTDS_BIC-0	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	17-Jun-20	17-Jun-20
CC#:	CC210090	CC210091	CC210092	CC210093	CC210094	CC210095	CC210096	CC210097	CC210098	CC210099	CC210100	CC210101	CC210102
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	10	0	4	0	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	52	10	6	3	13	0	5	0	7	2	3	0	17
| Family: Baetidae	10	0	6	0	0	2	4	8	0	0	0	0	0
Baetis	362	480	298	98	453	46	95	102	253	58	118	430	350
Baetis rhodani group	48	40	6	10	20	7	11	8	60	18	21	230	150
| Family: Ephemerellidae	81	40	12	0	7	1	0	4	60	12	33	20	0
Drunella	100	280	80	25	153	11	20	6	80	12	27	90	92
Drunella grandis group	0	0	0	0	0	0	0	0	0	0	0	0	0
Drunella coloradensis	57	30	20	5	40	1	3	4	27	8	6	0	17
Drunella doddsii	0	30	0	3	13	8	1	0	27	4	3	30	25
Drunella spinifera	0	0	0	0	0	0	0	0	0	0	0	10	0
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	238	1340	102	185	820	342	266	40	753	242	397	990	725
Cinygmula	62	240	8	43	193	0	15	54	127	28	70	290	408
Epeorus	5	20	0	8	47	15	32	30	320	108	64	570	508
Rhithrogena	0	0	0	1	7	3	2	2	0	0	3	0	0
| Order: Plecoptera	0	0	0	0	0	0	0	2	0	0	0	0	0
| Family: Capniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	70	8	6	33	13	9	10	0	2	6	0	8
Haploperla	0	0	0	1	0	0	0	4	13	2	0	0	0
Neaviperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	0	10	0	0	13	1	0	0	0	0	0	0	0
Sweltsa	14	10	2	0	0	1	0	4	0	0	0	0	0
| Family: Leuctridae	0	0	0	0	0	0	0	0	0	0	0	0	8
Paraleuctra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	1	0	1	0	0	13	0	3	0	0
Ostrocerca	5	0	0	0	0	0	0	0	0	0	0	10	0
Zapada	14	90	14	9	20	4	4	6	0	0	3	0	0
Zapada oregonensis group	0	20	0	1	7	0	0	0	0	0	0	0	0
Zapada cinctipes	5	0	0	0	0	0	0	0	0	0	0	0	0
Zapada columbiana	19	0	0	3	0	0	0	2	0	2	0	20	8
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla	0	10	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	48	210	14	23	100	16	18	20	67	8	21	70	25
Isoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Kogotus	0	20	4	8	13	3	12	12	47	12	21	110	42
Megarcys	0	60	8	1	7	3	2	0	0	0	0	20	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	0	0	0	1	2	0	0	3	10	0
Parapsyche elsis	5	0	0	0	0	2	0	2	0	2	3	10	0
| Family: Hydroptilidae	5	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	5	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	19	0	2	0	0	0	0	2	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-02	RG_FOUNGD_BIC-03	RG_FODNGD_BIC-01	RG_FODNGD_BIC-02	RG_FODNGD_BIC-03	RG_FOBKS_BIC-01	RG_FOBKS_BIC-02	RG_FOBKS_BIC-03	RG_SCOUTDS_BIC-0	RG_SCOUTDS_BIC-0	RG_SCOUTDS_BIC-0	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	17-Jun-20	17-Jun-20
CC#:	CC210090	CC210091	CC210092	CC210093	CC210094	CC210095	CC210096	CC210097	CC210098	CC210099	CC210100	CC210101	CC210102
| **Family: Rhyacophilidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	48	100	10	8	107	40	51	74	153	46	100	130	183
Rhyacophila betteni group	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	24	30	8	0	33	4	6	2	47	4	18	70	8
Rhyacophila hyalinata group	5	20	2	2	0	8	2	6	7	2	18	20	8
Rhyacophila vofixa group	0	10	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila alberta group	10	10	12	6	40	2	7	10	33	4	9	0	25
Rhyacophila atrata complex	24	30	0	7	13	5	4	16	33	10	15	10	17
Rhyacophila narvae	33	20	0	0	7	0	0	0	0	0	0	0	0
Rhyacophila verrula group	0	0	0	0	7	0	0	0	0	0	0	0	0
| **Family: Thrammatidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	29	10	22	39	7	0	0	2	7	2	0	30	0
| **Order: Coleoptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Curculionidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Dytiscidae**	5	0	0	0	0	0	0	0	0	0	0	0	0
Liodessus	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreodytes	5	0	0	0	0	0	0	0	0	0	0	0	0
Stictotarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Elmidae**	0	0	0	0	0	0	0	2	0	2	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	20	0
| **Family: Melyridae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Staphylinidae**	0	0	0	0	0	0	0	0	0	0	3	0	0
| **Order: Diptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Tipuloidea**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Ceratopogonidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	5	0	0	0	7	1	1	0	0	0	0	10	17
| **Family: Chironomidae**	10	0	0	0	7	1	0	2	0	2	3	0	0
| **Subfamily: Chironominae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Chironomini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Tanytarsini**	0	0	0	1	0	0	0	0	0	0	0	0	0
Micropsectra	62	30	8	0	13	3	2	0	13	2	0	30	8
Tanytarsus	5	0	0	0	0	0	0	0	0	0	0	0	0
| **Subfamily: Diamesinae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympotthastia	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Diamesini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	2	0	0	0	0	0	0	0	0	0	0
Pagastia	33	10	8	1	13	2	3	0	20	4	6	30	8
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Subfamily: Orthocladiinae**	0	0	0	0	0	1	1	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0
Camptocladius	0	0	4	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	20	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	5	0	6	1	0	1	0	0	0	0	0	0	0
Heleniella	5	0	2	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	5	0	0	0	0	0	0	0	0	0	0	0	0
Krenosmittia	0	0	0	0	0	0	1	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius	0	0	0	0	0	0	1	0	0	0	0	0	0
Orthocladius complex	14	10	6	2	27	2	1	4	27	8	6	10	17
Paracladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	10	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus	14	30	12	2	0	0	5	0	13	4	0	20	0
Paraphaenocladius	14	0	4	0	0	0	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	5	0	2	1	7	1	0	2	0	0	0	0	8
Rheosmittia	0	0	0	0	0	0	0	0	0	0	0	0	0
Smittia	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	0	0	6	1	27	4	2	2	7	2	3	20	8
Zalutschia	0	0	0	1	0	0	0	0	0	0	0	0	0

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-02	RG_FOUNGD_BIC-03	RG_FODNGD_BIC-01	RG_FODNGD_BIC-02	RG_FODNGD_BIC-03	RG_FOBKS_BIC-01	RG_FOBKS_BIC-02	RG_FOBKS_BIC-03	RG_SCOUTDS_BIC-0	RG_SCOUTDS_BIC-0	RG_SCOUTDS_BIC-0	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	17-Jun-20	17-Jun-20
CC#:	CC210090	CC210091	CC210092	CC210093	CC210094	CC210095	CC210096	CC210097	CC210098	CC210099	CC210100	CC210101	CC210102
| **Subfamily: Tanypodinae**	0	0	0	0	0	0	0	0	0	0	0	10	0
Zavrelimyia	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Pentaneurini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	0	1	1	2	7	0	0	10	0
| **Tribe: Procladiini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Dolichopodidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Empididae**	0	0	0	0	7	0	0	0	0	0	0	0	17
Clinocera	5	0	0	0	0	0	1	0	0	0	3	0	0
Neoplasta	0	0	0	1	0	0	1	0	7	0	0	10	0
Oreogeton	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Oreoleptidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreoleptis torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Pelecorhynchidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	2	0	0	0	0	0
| **Family: Psychodidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	5	0	0	0	20	2	0	0	7	0	0	0	0
| **Family: Sciaridae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Simuliidae**	0	0	4	0	0	0	0	0	0	0	3	10	0
Prosimulium	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	5	0	0	0	0	0	0	0	0	0	0	0	0
Simulium	33	20	56	6	60	2	16	46	53	12	21	70	0
| **Family: Tanyderidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Tipulidae**	0	0	2	0	0	0	0	0	0	0	0	0	0
| **Family: Limoniidae**	5	20	0	0	0	0	0	0	7	0	12	0	0
| **Family: Pediciidae**	0	0	0	0	7	0	0	0	0	0	0	0	0
Antocha	5	0	0	1	0	0	0	0	0	0	0	0	0
Dicranota	14	10	8	1	7	0	2	0	7	4	3	10	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Lepidoptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Thysanoptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Trombidiformes**	0	0	0	0	0	0	0	0	0	0	0	20	0
| **Family: Aturidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	5	0	0	1	0	0	0	0	7	0	0	0	0
| **Family: Feltriidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Lebertiidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	86	20	6	0	0	2	1	0	13	4	3	40	0
| **Family: Sperchontidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	14	0	2	0	0	0	0	0	0	0	0	0	0
| **Order: Sarcoptiformes**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Oribatida**	5	0	0	0	0	1	0	0	0	0	3	0	0
| **Family: Hydrozetidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Veneroida**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Pisidiidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Gastropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Lumbriculida**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Lumbriculidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Tubificida**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Enchytraeidae**	29	30	26	1	0	3	3	0	0	16	6	0	0
Enchytraeus	24	10	6	2	7	1	0	0	20	6	0	0	0
Totals:	**1,759**	**3,460**	**818**	**519**	**2,382**	**567**	**612**	**496**	**2,342**	**654**	**1,040**	**3,490**	**2,707**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-02	RG_FOUNGD_BIC-03	RG_FODNGD_BIC-01	RG_FODNGD_BIC-02	RG_FODNGD_BIC-03	RG_FOBKS_BIC-01	RG_FOBKS_BIC-02	RG_FOBKS_BIC-03	RG_SCOUTDS_BIC-0	RG_SCOUTDS_BIC-0	RG_SCOUTDS_BIC-0	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02
Sample Collection Date:	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	16-Jun-20	17-Jun-20	17-Jun-20
CC#:	CC210090	CC210091	CC210092	CC210093	CC210094	CC210095	CC210096	CC210097	CC210098	CC210099	CC210100	CC210101	CC210102
Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	5	10	2	1	7	0	1	2	0	2	0	10	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	0	0	0	0	0	0	0	0	0	2	0	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	5	0	2	0	0	0	0	0	7	0	3	0	0
Totals:	**10**	**10**	**4**	**1**	**7**	**0**	**1**	**2**	**7**	**4**	**3**	**10**	**0**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FO26_BIC-01	RG_FO26_BIC-02	RG_FO26_BIC-03	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20
CC#:	CC210103	CC210104	CC210105	CC210106	CC210107	CC210108	CC210109	CC210110	CC210111	CC210112	CC210113	CC210114	CC210115
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	2	0	2	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	5	2	0	0	14	7	8	50	0	8	7	8	9
| Family: Baetidae	0	0	2	0	43	11	25	0	12	0	0	0	18
Baetis	320	17	44	40	543	159	383	330	800	236	93	158	318
Baetis rhodani group	95	11	27	8	171	26	67	90	38	36	74	83	18
| Family: Ephemerellidae	0	16	9	20	29	7	0	0	25	16	11	75	73
Drunella	35	6	16	8	214	70	133	150	300	136	26	42	118
Drunella grandis group	0	0	4	0	0	0	0	0	0	0	0	0	0
Drunella coloradensis	15	12	0	8	0	0	0	0	0	12	19	50	55
Drunella doddsii	10	2	2	8	114	15	117	50	112	16	48	8	0
Drunella spinifera	0	3	2	0	0	0	0	0	0	0	0	0	9
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	630	71	182	266	857	144	392	550	588	364	352	292	855
Cinygmula	170	61	62	64	114	30	75	150	25	28	100	58	136
Epeorus	505	141	193	304	171	44	83	120	125	0	141	250	600
Rhithrogena	0	0	0	0	71	15	125	100	100	0	7	0	0
| Order: Plecoptera	0	0	0	0	0	7	0	0	50	0	0	0	0
| Family: Capniidae	0	0	0	2	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	2	4	43	37	42	90	38	16	7	17	9
Haploperla	5	0	0	0	14	0	0	0	0	0	0	0	0
Neaviperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	0	0	0	0	200	26	17	10	12	8	4	0	0
Sweltsa	0	0	0	0	14	4	17	40	25	0	0	0	9
| Family: Leuctridae	0	0	0	2	0	7	8	20	12	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	10	0	0	0	0	0
| Family: Nemouridae	5	0	2	0	0	0	0	0	0	0	0	0	0
Ostrocerca	0	0	0	0	0	0	0	0	0	0	4	0	18
Zapada	0	0	0	0	1000	215	708	440	738	192	7	17	9
Zapada oregonensis group	0	0	0	2	0	22	8	0	12	0	0	0	9
Zapada cinctipes	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada columbiana	35	0	2	0	43	22	0	0	12	4	0	17	9
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	8	0	0	0	0	0	0
| Family: Perlidae	0	0	2	0	0	0	0	0	0	0	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	40	7	11	16	357	96	225	260	350	204	48	8	45
Isoperla	0	0	0	2	0	0	0	0	0	0	0	0	0
Kogotus	5	4	20	4	0	0	0	90	0	36	30	42	64
Megarcys	0	0	0	0	100	0	58	20	262	0	4	0	0
| Order: Trichoptera	0	1	0	0	0	0	0	0	0	0	4	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	2	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus	0	0	0	2	0	0	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	4	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	0	0	0	4	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	1	2	4	43	11	33	20	25	8	4	0	0
Parapsyche elsis	5	0	0	0	14	4	33	10	50	0	0	8	9
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	1	0	2	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	8	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FO26_BIC-01	RG_FO26_BIC-02	RG_FO26_BIC-03	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20
CC#:	CC210103	CC210104	CC210105	CC210106	CC210107	CC210108	CC210109	CC210110	CC210111	CC210112	CC210113	CC210114	CC210115
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	80	41	51	54	229	93	183	220	312	100	137	67	145
Rhyacophila betteni group	5	0	0	0	0	0	8	0	25	0	0	0	0
Rhyacophila brunnea/vemna group	10	1	0	4	14	0	0	10	12	8	0	33	0
Rhyacophila hyalinata group	5	0	0	0	86	41	92	50	100	4	11	8	0
Rhyacophila vofixa group	0	0	0	0	14	7	0	0	12	4	0	0	0
Rhyacophila alberta group	20	13	20	14	0	0	0	0	25	8	11	75	27
Rhyacophila atrata complex	5	1	2	14	43	11	0	30	138	40	4	17	18
Rhyacophila narvae	0	0	0	0	0	4	0	10	0	8	0	0	0
Rhyacophila verrula group	0	0	4	0	0	0	0	0	0	0	0	0	0
| Family: Thrammatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	2	0	0	171	48	133	20	300	44	4	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Curculionidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Liodessus	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreodytes	0	0	0	0	0	0	0	0	0	0	0	0	0
Stictotarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Melyridae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tipuloidea	5	0	0	2	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	8	0	0	0
Mallochohelea	0	2	7	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	0	4	7	2	0	0	8	0	25	0	19	17	18
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	12	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	1	0	4	0	4	8	60	62	4	0	17	0
Tanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympotthastia	0	0	0	0	0	0	0	0	0	0	4	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	1	2	0	0	0	0	10	0	0	0	0	0
Pagastia	15	3	22	0	0	0	0	0	0	16	11	17	9
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	3	2	2	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	4	0	0	0
Camptocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	8	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	2	0	14	4	0	10	25	8	4	0	0
Eukiefferiella	0	1	0	0	14	0	0	20	12	0	0	17	0
Heleniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus	0	1	0	0	0	0	0	0	0	0	0	0	0
Krenosmittia	0	1	0	0	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	5	5	11	10	29	0	0	10	0	0	33	42	9
Paracladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	0	2	0	0	0	0	0	0	0	0	0
Parametriocnemus	0	2	2	2	0	0	0	10	0	0	11	8	18
Paraphaenocladius	0	0	0	0	0	4	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	2	0	4	25	30	25	0	0	0	0
Rheosmittia	0	0	0	0	0	0	0	0	0	0	4	0	0
Smittia	0	0	2	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	10	0	4	4	114	7	17	60	75	20	0	0	9
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FO26_BIC-01	RG_FO26_BIC-02	RG_FO26_BIC-03	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20
CC#:	CC210103	CC210104	CC210105	CC210106	CC210107	CC210108	CC210109	CC210110	CC210111	CC210112	CC210113	CC210114	CC210115
| Subfamily: Tanypodinae	0	1	0	0	0	0	0	0	0	4	0	0	0
Zavrelimyia	0	2	2	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	5	1	0	0	0	0	0	0	0	0	4	8	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	1	0	0	0	0	0	0	0	0	0	0	0
| Family: Empididae	5	0	0	0	0	0	0	0	12	0	4	8	0
Clinocera	0	0	0	0	0	0	0	0	0	0	4	0	0
Neoplasta	0	0	0	0	0	0	8	10	12	0	0	0	0
Oreogeton	0	0	0	0	0	0	8	0	0	0	0	0	0
| Family: Oreoleptidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreoleptis torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	3	2	0	0	0	0	0	25	0	0	8	9
| Family: Sciaridae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	2	0	0	14	0	0	0	0	0	0	42	18
Prosimulium	0	0	0	4	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	0	2	0	4	0	0	0	0	0	4	0	92	0
Simulium	50	9	18	38	0	0	0	0	12	0	7	1050	345
| Family: Tanyderidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limoniidae	0	1	2	0	0	0	0	0	0	0	4	0	0
| Family: Pediciidae	0	0	0	0	0	0	0	0	0	4	0	0	0
Antocha	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranota	0	3	0	0	14	0	8	0	12	4	7	17	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	4	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	8	0
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Thysanoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	0	0	0	0	8	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	3	13	4	14	15	0	10	25	0	4	17	18
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	10	0	0	0	57	4	8	40	88	24	4	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	8	0	0	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	8	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Gastropoda	0	0	2	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	14	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	10	0	0	30	33	0
Enchytraeus	0	8	31	12	0	0	0	0	0	0	0	50	9
Totals:	**2,110**	**478**	**792**	**960**	**4,996**	**1,229**	**3,095**	**3,220**	**5,057**	**1,644**	**1,319**	**2,792**	**3,042**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-03	RG_FOBCP_BIC-01	RG_FOBCP_BIC-02	RG_FOBCP_BIC-03	RG_FO26_BIC-01	RG_FO26_BIC-02	RG_FO26_BIC-03	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	17-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20
CC#:	CC210103	CC210104	CC210105	CC210106	CC210107	CC210108	CC210109	CC210110	CC210111	CC210112	CC210113	CC210114	CC210115
Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	0	1	2	2	14	4	8	10	12	0	4	8	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	2	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	2	0	0	0	0	0	0	4	0	0
Phylum: Nemata	0	1	0	2	0	0	8	0	0	0	0	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	14	0	0	0	0	0	0	0	0
Totals:	**0**	**2**	**4**	**6**	**28**	**4**	**16**	**10**	**12**	**0**	**8**	**8**	**0**

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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FRUPO_BIC-01
Sample Collection Date:	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
CC#:	CC210116	CC210117	CC210118	CC210119	CC210120	CC210121	CC210122	CC210123	CC210124	CC210125	CC210126	CC210127	CC210128
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	2	0	0	0	0	0	0	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	3	0	0	0	8	0	0	0	0	0	8	22
| Family: Baetidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	56	52	144	8	72	75	44	11	48	8	7	23	11
Baetis rhodani group	50	24	38	3	8	0	20	21	4	7	0	8	44
| Family: Ephemerellidae	75	41	69	7	8	58	8	26	28	18	14	85	278
Drunella	19	17	25	2	8	58	28	26	16	3	14	8	44
Drunella grandis group	0	0	0	0	0	0	4	0	4	0	0	0	0
Drunella coloradensis	19	24	44	0	12	8	4	0	16	1	14	15	11
Drunella doddsii	0	3	12	0	8	17	16	5	4	0	0	8	0
Drunella spinifera	0	7	0	1	4	0	0	0	4	1	0	23	11
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	762	359	562	147	576	1517	360	542	328	82	336	623	767
Cinygmula	112	66	150	40	144	425	128	284	124	13	179	92	167
Epeorus	506	166	662	27	272	708	376	395	296	78	586	669	33
Rhithrogena	0	0	0	2	0	0	0	0	0	0	0	0	11
| Order: Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Capniidae	6	0	6	3	0	17	12	11	28	38	179	185	22
| Family: Chloroperlidae	6	3	19	2	0	8	4	37	52	19	29	38	22
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Neaviperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	6	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Leuctridae	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	6	0	0	0	0	8	0	0	0	0	0	8	22
Ostrocerca	0	3	0	0	4	0	0	0	0	1	0	0	0
Zapada	0	17	6	1	4	0	0	5	0	0	14	0	67
Zapada oregonensis group	0	0	0	0	4	0	0	0	0	4	21	15	0
Zapada cinctipes	0	7	0	0	0	0	0	0	0	6	7	0	33
Zapada columbiana	0	7	0	0	0	0	0	0	0	3	14	8	11
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	1	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Hesperoperla pacifica	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	0	10	25	8	24	67	40	37	16	18	29	31	56
Isoperla	19	0	12	1	16	8	0	5	0	1	7	0	11
Kogotus	19	7	19	9	32	75	24	16	0	2	43	77	111
Megarcys	0	0	0	0	0	0	0	0	8	0	7	0	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	3	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	3	6	1	0	8	0	0	0	0	0	0	0
Brachycentrus	0	0	0	0	0	8	0	0	0	0	0	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	5	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche elsis	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	8	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	2	0	0	22

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FRUPO_BIC-01
Sample Collection Date:	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
CC#:	CC210116	CC210117	CC210118	CC210119	CC210120	CC210121	CC210122	CC210123	CC210124	CC210125	CC210126	CC210127	CC210128
| **Family: Rhyacophilidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	200	145	238	37	112	150	196	284	0	34	150	185	244
Rhyacophila betteni group	0	0	0	0	0	0	0	0	0	1	7	8	0
Rhyacophila brunnea/vemna group	0	21	0	1	0	8	4	0	0	1	29	15	11
Rhyacophila hyalinata group	0	3	6	1	0	0	4	0	0	0	0	0	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila alberta group	25	31	75	30	68	67	88	84	0	9	29	54	67
Rhyacophila atrata complex	6	0	12	7	4	0	16	47	0	7	0	31	22
Rhyacophila narvae	0	0	0	0	0	0	0	11	0	7	14	62	0
Rhyacophila verrula group	0	0	0	0	0	0	0	0	0	3	64	8	0
| **Family: Thremmatidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	7	0	1	0	0	0	0	0	0	0	0	0
| **Order: Coleoptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Curculionidae**	0	0	0	1	0	0	0	0	0	0	0	0	0
| **Family: Dytiscidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Liodessus	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreodytes	0	0	0	0	0	0	0	0	0	0	0	0	0
Stictotarsus	0	0	0	0	0	0	0	0	0	0	0	0	11
| **Family: Elmidae**	0	0	0	0	0	0	0	0	0	3	43	15	0
Heterlimnius	0	0	0	0	0	0	0	0	0	2	50	0	0
| **Family: Melyridae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Staphylinidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Diptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Tipuloidea**	0	0	6	0	0	0	0	0	4	0	0	0	0
| **Family: Ceratopogonidae**	0	0	0	0	0	0	0	0	0	7	0	46	0
Mallochohelea	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Chironomidae**	19	0	0	3	0	17	4	0	4	1	29	15	44
| **Subfamily: Chironominae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Chironomini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Tanytarsini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra	0	14	19	0	12	8	0	5	4	1	14	8	56
Tanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Subfamily: Diamesinae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympotthastia	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Diamesini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	0	0	5	0	1	0	0	0
Pagastia	0	21	6	2	0	17	0	11	20	3	29	38	78
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Subfamily: Orthocladiinae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0
Camptocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	3	0	0	0	0	0	0	0	1	0	0	0
Cricotopus (Nostococladius)	0	0	6	2	0	0	0	0	4	0	0	0	11
Eukiefferiella	0	7	6	1	0	0	0	0	0	0	7	0	0
Heleniella	0	3	0	0	0	0	0	0	0	0	7	0	0
Heterotrissocladius	0	0	0	0	0	0	0	5	0	0	7	0	0
Hydrobaenus	0	0	0	0	0	0	0	0	0	0	0	0	0
Krenosmittia	0	0	0	0	0	0	0	5	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius	6	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	25	52	44	1	8	33	8	5	12	4	129	38	44
Paracladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	0	4	0	0	0	0	0	0
Parametriocnemus	12	14	25	3	4	8	8	0	0	2	7	0	22
Paraphaenocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Rheocricotopus	6	0	0	0	0	8	0	0	0	0	7	0	0
Rheosmittia	0	7	0	0	0	0	0	0	0	0	0	0	0
Smittia	0	0	0	0	0	0	0	0	0	0	0	0	11
Thienemanniella	0	0	0	0	0	0	0	0	0	0	7	0	0
Tvetenia	19	7	0	0	8	42	4	0	0	3	0	0	22
Zalutschia	0	0	0	0	0	0	0	0	0	0	0	0	0

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FRUPO_BIC-01
Sample Collection Date:	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
CC#:	CC210116	CC210117	CC210118	CC210119	CC210120	CC210121	CC210122	CC210123	CC210124	CC210125	CC210126	CC210127	CC210128
| **Subfamily: Tanypodinae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Tribe: Pentaneurini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	7	0	3	4	0	0	0	0	3	0	0	22
| **Tribe: Procladiini**	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Dolichopodidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Empididae**	6	0	0	0	0	0	0	5	0	1	71	0	0
Clinocera	0	10	0	0	0	0	0	0	0	0	0	0	0
Neoplasta	0	0	0	0	0	0	0	0	4	1	71	0	0
Oreogeton	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Oreoleptidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreoleptis torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Pelecorhynchidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Psychodidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	0	0	6	1	0	0	0	0	8	0	0	0	0
| **Family: Sciaridae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Simuliidae**	0	0	6	5	0	17	0	0	8	1	0	0	0
Prosimulium	0	0	0	0	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	0	0	0	6	0	0	0	0	0	0	0	0	0
Simulium	81	14	50	5	44	58	16	37	4	28	0	0	11
| **Family: Tanyderidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Tipulidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Limoniidae**	0	3	0	0	0	0	0	0	0	0	0	0	0
| **Family: Pediciidae**	0	0	0	1	0	0	0	0	0	0	0	0	0
Antocha	0	0	0	0	0	0	0	0	4	0	0	0	0
Dicranota	0	3	0	0	0	0	0	5	0	0	0	8	11
Hexatoma	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	1	0	0	0
Tipula	0	0	0	0	0	8	0	0	0	1	14	0	0
| **Order: Lepidoptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Thysanoptera**	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Trombidiformes**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Aturidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	3	0	0	0	0	0	0	0	0	0	0	0
| **Family: Feltriidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Lebertiidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	41	6	2	0	25	8	0	8	2	50	8	56
| **Family: Sperchontidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	14	0	0	0	0	0	0	0	0	0	0	0
| **Order: Sarcoptiformes**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Oribatida**	0	0	0	0	0	0	0	0	0	1	0	0	0
| **Family: Hydrozetidae**	0	0	0	0	0	0	0	0	0	0	0	0	11
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Veneroida**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Pisidiidae**	0	3	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	1	0	0	0
| Class: Gastropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	34	0	0	16	0	4	0	0	0	0	0	0
| **Order: Lumbriculida**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Lumbriculidae**	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Order: Tubificida**	0	0	0	0	0	0	0	0	0	0	0	0	0
| **Family: Enchytraeidae**	0	0	0	0	0	0	0	5	0	0	0	0	11
Enchytraeus	6	52	19	3	20	100	24	5	4	4	29	23	11
Totals:	**2,072**	**1,341**	**2,329**	**380**	**1,496**	**3,639**	**1,456**	**1,945**	**1,064**	**440**	**2,364**	**2,494**	**2,552**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCPD_BIC-01	RG_FOBCPD_BIC-02	RG_FOBCPD_BIC-03	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	RG_FRCP1SW_BIC-0	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	G_FRCP1SWD_BIC-(	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FRUPO_BIC-01
Sample Collection Date:	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	18-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20
CC#:	CC210116	CC210117	CC210118	CC210119	CC210120	CC210121	CC210122	CC210123	CC210124	CC210125	CC210126	CC210127	CC210128
Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	6	0	0	8	12	5	0	0	0	0	33
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	6	3	0	1	0	8	0	0	4	1	0	8	11
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	3	0	2	0	0	0	0	12	0	0	8	33
Phylum: Nemata	0	0	0	1	0	0	0	0	0	0	0	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	3	0	0	0	0	0	0	0	1	7	8	0
Totals:	**6**	**9**	**6**	**4**	**0**	**16**	**12**	**5**	**16**	**2**	**7**	**24**	**77**

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FO22_BIC-02	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03
Sample Collection Date:	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	23-Jun-20	23-Jun-20	23-Jun-20
CC#:	CC210129	CC210130	CC210131	CC210132	CC210133	CC210134	CC210135	CC210136	CC210137
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0
| Order: Collembola	0	0	0	0	0	7	0	0	0
| Family: Sminthuridae	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0
Ameletus	7	0	20	33	0	0	45	0	23
| Family: Baetidae	7	0	0	0	0	0	0	0	31
Baetis	20	50	433	475	610	21	410	478	315
Baetis rhodani group	7	14	87	200	130	21	100	311	15
| Family: Ephemerellidae	233	129	20	125	40	43	65	56	215
Drunella	47	86	20	83	50	7	30	89	15
Drunella grandis group	0	0	0	0	0	0	5	0	0
Drunella coloradensis	13	7	0	8	10	0	20	67	62
Drunella doddsii	7	0	53	33	10	14	0	22	15
Drunella spinifera	7	0	0	0	0	29	0	22	0
Ephemerella	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	200	621	487	658	1,290	236	605	1,022	392
Cinygmula	33	129	133	100	260	50	230	333	200
Epeorus	520	793	233	150	130	193	125	533	315
Rhithrogena	0	14	7	0	0	0	0	0	0
| Order: Plecoptera	0	0	0	0	0	0	0	0	0
| Family: Capniidae	20	21	33	58	60	386	0	0	0
| Family: Chloroperlidae	0	21	53	167	150	64	10	0	23
Haploperla	7	0	0	0	0	7	0	0	0
Neaviperla	0	0	0	0	0	0	0	0	8
Suwallia	0	0	0	8	0	0	0	0	0
Sweltsa	0	0	0	0	20	0	0	0	15
| Family: Leuctridae	0	0	0	0	0	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	10	14	0	0	0
Ostrocerca	0	0	0	0	0	0	0	0	0
Zapada	0	0	100	33	120	143	10	11	23
Zapada oregonensis group	7	14	0	50	30	0	0	22	0
Zapada cinctipes	0	0	0	0	40	7	0	0	0
Zapada columbiana	0	0	0	33	30	36	0	11	15
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0
Yoraperla	0	0	0	0	0	0	0	0	0
| Family: Perlidae	7	0	0	0	10	0	0	11	0
Hesperoperla	0	0	0	0	0	0	0	0	0
Hesperoperla pacifica	0	0	0	0	10	0	0	0	0
| Family: Perlodidae	0	7	67	150	90	14	25	100	138
Isoperla	0	7	0	0	10	21	0	0	0
Kogotus	27	21	27	42	50	43	20	0	8
Megarcys	0	0	7	0	0	0	0	22	15
| Order: Trichoptera	0	0	0	0	0	0	0	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	0	0	0	10	0	0	0	0
| Family: Brachycentridae	7	0	0	0	0	0	0	0	0
Brachycentrus	0	0	0	0	0	0	5	0	0
Brachycentrus americanus	0	0	0	0	0	0	0	11	0
| Family: Glossosomatidae	0	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	0	0	0	0	0	0
Parapsyche elsis	7	0	7	0	0	0	0	33	15
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	7	0	0	0
Ecclisomyia	7	7	7	0	0	79	5	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FO22_BIC-02	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03
Sample Collection Date:	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	23-Jun-20	23-Jun-20	23-Jun-20
CC#:	CC210129	CC210130	CC210131	CC210132	CC210133	CC210134	CC210135	CC210136	CC210137
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0
Rhyacophila	193	171	60	58	30	50	40	33	46
Rhyacophila betteni group	0	0	0	8	0	0	0	0	8
Rhyacophila brunnea/vemna group	13	0	47	17	40	21	15	11	8
Rhyacophila hyalinata group	0	0	0	8	0	0	5	22	38
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0
Rhyacophila alberta group	73	57	20	25	20	7	15	89	38
Rhyacophila atrata complex	13	7	7	8	10	7	5	11	31
Rhyacophila narvae	0	0	0	0	0	7	0	0	0
Rhyacophila verrula group	0	0	0	0	0	7	0	22	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	0	0	20	22	100
| Order: Coleoptera	0	0	0	0	0	0	0	0	0
| Family: Curculionidae	0	0	0	0	0	0	0	0	0
| Family: Dytiscidae	0	0	0	0	0	0	0	0	0
Liodessus	0	0	0	0	0	0	5	0	0
Oreodytes	0	0	0	0	0	0	0	0	0
Stictotarsus	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	7	50	60	121	0	0	0
Heterlimnius	0	0	27	42	20	100	0	0	0
| Family: Melyridae	0	0	0	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0
| Order: Tipuloidea	0	0	7	8	0	0	0	0	0
| Family: Ceratopogonidae	7	0	0	8	0	0	0	11	46
Mallochohelea	0	0	0	0	0	7	0	0	0
| Family: Chironomidae	7	7	0	0	30	14	0	11	15
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	7	0	0	0	0	0	0	11	8
Micropsectra	53	7	33	17	30	7	15	67	8
Tanytarsus	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0
Sympotthastia	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0
Diamesa	7	0	0	0	0	0	10	0	8
Pagastia	147	14	40	8	0	36	15	56	38
Pseudodiamesa	0	0	0	0	0	0	5	0	0
| Subfamily: Orthocladiinae	20	0	0	0	0	0	0	33	0
Brillia	0	7	0	8	0	0	0	0	0
Camptocladius	0	0	0	0	0	0	0	0	8
Corynoneura	7	0	0	8	0	0	0	11	0
Cricotopus (Nostococladius)	0	0	0	0	0	0	5	0	0
Eukiefferiella	20	0	7	0	0	0	0	22	8
Heleniella	0	0	0	0	0	0	0	0	0
Heterotrissocladius	7	0	0	0	0	7	0	0	0
Hydrobaenus	7	0	0	0	0	0	0	0	0
Krenosmittia	0	0	0	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0
Orthocladius	0	0	0	0	0	0	15	100	8
Orthocladius complex	460	14	7	17	20	36	25	200	15
Paracladius	0	0	0	0	0	0	0	0	0
Parakiefferiella	0	0	0	0	0	0	0	0	0
Parametriocnemus	27	7	0	0	10	14	15	67	23
Paraphaenocladius	0	0	0	0	0	0	0	0	0
Pseudorthocladius	0	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	7	0	0	7	0	44	0
Rheosmittia	0	0	0	0	0	0	0	0	0
Smittia	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	11	0
Tvetenia	7	7	13	17	10	7	20	56	8
Zalutschia	0	0	0	0	0	0	0	0	0

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FO22_BIC-02	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03
Sample Collection Date:	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	23-Jun-20	23-Jun-20	23-Jun-20
CC#:	CC210129	CC210130	CC210131	CC210132	CC210133	CC210134	CC210135	CC210136	CC210137
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0
Zavrelimyia	0	0	0	0	0	7	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0
Thienemannimyia group	7	0	0	0	0	0	0	0	0
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0
Procladius	0	0	0	0	0	0	0	0	0
| Family: Dolichopodidae	0	0	0	0	0	0	0	0	0
| Family: Empididae	0	0	40	0	0	14	0	0	0
Clinocera	0	7	0	0	0	7	0	0	0
Neoplasta	0	29	60	0	0	0	0	0	8
Oreogeton	0	0	0	0	0	0	0	0	0
| Family: Oreoleptidae	0	0	0	0	0	0	0	0	0
Oreoleptis torrenticola	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0
Glutops	0	0	7	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	13	0	0	0	0	0	0	0	15
| Family: Sciaridae	0	0	0	0	0	0	0	0	0
| Family: Simuliidae	0	29	13	17	0	0	0	0	0
Prosimulium	0	0	0	0	0	0	0	0	0
Prosimulium/Helodon	0	7	0	0	0	0	0	0	0
Simulium	13	43	0	17	0	29	15	11	0
| Family: Tanyderidae	0	0	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	0	0	0
| Family: Limoniidae	0	0	0	0	0	29	0	0	0
| Family: Pediciidae	0	0	0	0	0	0	0	0	0
Antocha	13	0	0	0	0	0	0	0	0
Dicranota	0	7	0	0	0	0	10	0	8
Hexatoma	0	0	0	0	0	0	0	0	31
Rhabdomastix	7	7	0	8	10	0	0	0	8
Tipula	7	7	0	0	0	7	0	0	8
| Order: Lepidoptera	0	0	0	0	0	0	0	0	0
| Order: Thysanoptera	7	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	13	0	0	0	0	0	0	22	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	8	0	0	0	11	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0
Lebertia	47	29	33	33	30	29	35	33	31
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0
Sperchon	7	0	0	0	0	0	0	11	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0
| Order: Oribatida	7	0	0	0	10	0	0	0	0
| Family: Hydrozetidae	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	20	0	20	93	0	0	0
Pisidium	0	0	7	0	0	186	0	0	0
| Class: Gastropoda	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	0	0	10	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	80	43	0	0	10	64	0	11	0
Enchytraeus	13	0	0	8	0	0	0	0	0
Totals:	**2,499**	**2,447**	**2,256**	**2,804**	**3,540**	**2,362**	**2,000**	**4,163**	**2,429**

Project: FRO LAEMP (20-09)#2
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03	RG_FO22_BIC-02	RG_FOUSH_BIC-01	RG_FOUSH_BIC-02	RG_FOUSH_BIC-03
Sample Collection Date:	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	19-Jun-20	23-Jun-20	23-Jun-20	23-Jun-20
CC#:	CC210129	CC210130	CC210131	CC210132	CC210133	CC210134	CC210135	CC210136	CC210137
Taxa present but not included:									
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	7	14	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	7	0	7	0	0	7	5	11	8
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	11	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	7	0	0	8	0	0	0	0	0
Phylum: Nemata	0	0	0	0	0	0	0	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	7	0	0	8	10	7	0	0	8
Totals:	**28**	**14**	**7**	**16**	**10**	**14**	**5**	**22**	**16**

BENTHIC COMMUNITY

Cordillera Methods, QC Report, and Raw Data

SEPTEMBER

Methods and QC Report 2020

Project ID: FRO LAEMP (20-09) #3

Client: Minnow Environmental

Prepared by:
Cordillera Consulting Inc.
Summerland, BC

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Table of Contents

Sample Reception

On September 29, 2030, Cordillera Consulting received 61 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
RG_HENUP_BIC-1_2020-09-15	CC210861	9/15/2020	400µM	1
RG_HENUP_BIC-2_2020-09-15	CC210862	9/15/2020	400µM	1
RG_HENUP_BIC-3_2020-09-15	CC210863	9/15/2020	400µM	1
RG_UFR1_BIC-1_2020-09-16	CC210864	9/16/2020	400µM	1
RG_UFR1_BIC-2_2020-09-16	CC210865	9/16/2020	400µM	1
RG_UFR1_BIC-3_2020-09-16	CC210866	9/16/2020	400µM	1
RG_FODHE_BIC-1_2020-09-15	CC210867	9/15/2020	400µM	2
RG_FODHE_BIC-2_2020-09-15	CC210868	9/15/2020	400µM	2
RG_FODHE_BIC-3_2020-09-15	CC210869	9/15/2020	400µM	2
RG_FOUCL_BIC-1_2020-09-10	CC210870	9/10/2020	400µM	1
RG_FOUCL_BIC-2_2020-09-10	CC210871	9/10/2020	400µM	1
RG_FOUCL_BIC-3_2020-09-10	CC210872	9/10/2020	400µM	1
RG_FOUNGD_BIC-1_2020-09-10	CC210873	9/10/2020	400µM	1
RG_FOUNGD_BIC-2_2020-09-10	CC210874	9/10/2020	400µM	1
RG_FOUNGD_BIC-3_2020-09-10	CC210875	9/10/2020	400µM	1
RG_FODNGD_BIC-1_2020-09-21	CC210876	9/21/2020	400µM	1
RG_FODNGD_BIC-2_2020-09-21	CC210877	9/21/2020	400µM	1
RG_FODNGD_BIC-3_2020-09-21	CC210878	9/21/2020	400µM	1
RG_MP1_BIC-1_2020-09-15	CC210879	9/15/2020	400µM	1
RG_MP1_BIC-2_2020-09-15	CC210880	9/15/2020	400µM	1
RG_MP1_BIC-3_2020-09-15	CC210881	9/15/2020	400µM	1
RG_FOUSH_BIC-1_2020-09-21	CC210882	9/21/2020	400µM	1
RG_FOUSH_BIC-2_2020-09-21	CC210883	9/21/2020	400µM	1
RG_FOUSH_BIC-3_2020-09-21	CC210884	9/21/2020	400µM	1
RG_FOUKI_BIC-1_2020-09-14	CC210885	9/14/2020	400µM	1
RG_FOUKI_BIC-2_2020-09-14	CC210886	9/14/2020	400µM	1
RG_FOUKI_BIC-3_2020-09-14	CC210887	9/14/2020	400µM	1

RG_FOBKS-BIC-1_2020-09-10	CC210888	9/10/2020	400µM	1
RG_FOBKS-BIC-2_2020-09-10	CC210889	9/10/2020	400µM	1
RG_FOBKS-BIC-3_2020-09-10	CC210890	9/10/2020	400µM	1
RG_SCOUTDS_BIC-1_2020-09-17	CC210891	9/17/2020	400µM	1
RG_SCOUTDS_BIC-2_2020-09-17	CC210892	9/17/2020	400µM	1
RG_SCOUTDS_BIC-3_2020-09-17	CC210893	9/17/2020	400µM	1
RG_FOBSC_BIC-1_2020-09-18	CC210894	9/18/2020	400µM	1
RG_FOBSC_BIC-2_2020-09-18	CC210895	9/18/2020	400µM	1
RG_FOBSC_BIC-3_2020-09-18	CC210896	9/18/2020	400µM	1
RG_FRUPO_BIC-1_2020-09-12	CC210897	9/12/2020	400µM	1
RG_FRUPO_BIC-2_2020-09-12	CC210898	9/12/2020	400µM	1
RG_FRUPO_BIC-3_2020-09-12	CC210899	9/12/2020	400µM	1
RG_FODPO_BIC-1_2020-09-11	CC210900	9/11/2020	400µM	1
RG_FODPO_BIC-2_2020-09-11	CC210901	9/11/2020	400µM	1
RG_FODPO_BIC-3_2020-09-11	CC210902	9/11/2020	400µM	1
RG_FO22_BIC-1_2020-09-11	CC210903	9/11/2020	400µM	2
RG_FO22_BIC-2_2020-09-11	CC210904	9/11/2020	400µM	2
RG_FO22_BIC-3_2020-09-11	CC210905	9/11/2020	400µM	1
RG_FO22_BIC-4_2020-09-11	CC210906	9/11/2020	400µM	2
RG_FO22_BIC-5_2020-09-11	CC210907	9/11/2020	400µM	2
RG_FOUEW_BIC-1_2020-09-11	CC210908	9/11/2020	400µM	1
RG_FOUEW_BIC-2_2020-09-11	CC210909	9/11/2020	400µM	1
RG_FOUEW_BIC-3_2020-09-11	CC210910	9/11/2020	400µM	1
RG_FOBCP-BIC-1_2020-09-16	CC210911	9/16/2020	400µM	1
RG_FOBCP-BIC-2_2020-09-16	CC210912	9/16/2020	400µM	1
RG_FOBCP-BIC-3_2020-09-16	CC210913	9/16/2020	400µM	1
RG_FOBCP-BIC-4_2020-09-16	CC210914	9/16/2020	400µM	1
RG_FOBCP-BIC-5_2020-09-16	CC210915	9/16/2020	400µM	1
RG_FRCP1SW_BIC-1_2020-09-22	CC210916	9/22/2020	400µM	1
RG_FRCP1SW_BIC-2_2020-09-22	CC210917	9/22/2020	400µM	1
RG_FRCP1SW_BIC-3_2020-09-22	CC210918	9/22/2020	400µM	1
RG_FO26_BIC-1_2020-09-17	CC210919	9/17/2020	400µM	1
RG_FO26_BIC-2_2020-09-17	CC210920	9/17/2020	400µM	1
RG_FO26_BIC-3_2020-09-17	CC210921	9/17/2020	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.

- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	400 micron fraction	
			% Sampled	# Invertebrates
RG_HENUP_BIC-1_2020-09-15	15-Sep-20	CC210861	5%	415
RG_HENUP_BIC-2_2020-09-15	15-Sep-20	CC210862	5%	488
RG_HENUP_BIC-3_2020-09-15	15-Sep-20	CC210863	5%	446
RG_UFR1_BIC-1_2020-09-16	16-Sep-20	CC210864	5%	979
RG_UFR1_BIC-2_2020-09-16	16-Sep-20	CC210865	5%	753
RG_UFR1_BIC-3_2020-09-16	16-Sep-20	CC210866	5%	1295
RG_FODHE_BIC-1_2020-09-15	15-Sep-20	CC210867	5%	1670
RG_FODHE_BIC-2_2020-09-15	15-Sep-20	CC210868	5%	2092
RG_FODHE_BIC-3_2020-09-15	15-Sep-20	CC210869	5%	1123
RG_FOUCL_BIC-1_2020-09-10	10-Sep-20	CC210870	5%	1112
RG_FOUCL_BIC-2_2020-09-10	10-Sep-20	CC210871	5%	1124
RG_FOUCL_BIC-3_2020-09-10	10-Sep-20	CC210872	5%	741
RG_FOUNGD_BIC-1_2020-09-10	10-Sep-20	CC210873	5%	826
RG_FOUNGD_BIC-2_2020-09-10	10-Sep-20	CC210874	5%	1281
RG_FOUNGD_BIC-3_2020-09-10	10-Sep-20	CC210875	5%	642
RG_FODNGD_BIC-1_2020-09-21	21-Sep-20	CC210876	5%	817
RG_FODNGD_BIC-2_2020-09-21	21-Sep-20	CC210877	5%	444
RG_FODNGD_BIC-3_2020-09-21	21-Sep-20	CC210878	5%	849
RG_MP1_BIC-1_2020-09-15	15-Sep-20	CC210879	5%	475
RG_MP1_BIC-2_2020-09-15	15-Sep-20	CC210880	5%	407
RG_MP1_BIC-3_2020-09-15	15-Sep-20	CC210881	5%	534
RG_FOUSH_BIC-1_2020-09-21	21-Sep-20	CC210882	5%	569

RG_FOUSH_BIC-2_2020-09-21	21-Sep-20	CC210883	5%	588
RG_FOUSH_BIC-3_2020-09-21	21-Sep-20	CC210884	5%	528
RG_FOUKI_BIC-1_2020-09-14	14-Sep-20	CC210885	5%	491
RG_FOUKI_BIC-2_2020-09-14	14-Sep-20	CC210886	5%	426
RG_FOUKI_BIC-3_2020-09-14	14-Sep-20	CC210887	5%	836
RG_FOBKS-BIC-1_2020-09-10	10-Sep-20	CC210888	5%	397
RG_FOBKS-BIC-2_2020-09-10	10-Sep-20	CC210889	5%	358
RG_FOBKS-BIC-3_2020-09-10	10-Sep-20	CC210890	6%	632
RG_SCOUTDS_BIC-1_2020-09-17	17-Sep-20	CC210891	5%	468
RG_SCOUTDS_BIC-2_2020-09-17	17-Sep-20	CC210892	5%	468
RG_SCOUTDS_BIC-3_2020-09-17	17-Sep-20	CC210893	5%	590
RG_FOBSC_BIC-1_2020-09-18	18-Sep-20	CC210894	5%	365
RG_FOBSC_BIC-2_2020-09-18	18-Sep-20	CC210895	5%	397
RG_FOBSC_BIC-3_2020-09-18	18-Sep-20	CC210896	5%	559
RG_FRUPO_BIC-1_2020-09-12	12-Sep-20	CC210897	5%	1294
RG_FRUPO_BIC-2_2020-09-12	12-Sep-20	CC210898	5%	340
RG_FRUPO_BIC-3_2020-09-12	12-Sep-20	CC210899	5%	807
RG_FODPO_BIC-1_2020-09-11	11-Sep-20	CC210900	5%	776
RG_FODPO_BIC-2_2020-09-11	11-Sep-20	CC210901	5%	1418
RG_FODPO_BIC-3_2020-09-11	11-Sep-20	CC210902	5%	733
RG_FO22_BIC-1_2020-09-11	11-Sep-20	CC210903	5%	430
RG_FO22_BIC-2_2020-09-11	11-Sep-20	CC210904	5%	759
RG_FO22_BIC-3_2020-09-11	11-Sep-20	CC210905	5%	956
RG_FO22_BIC-4_2020-09-11	11-Sep-20	CC210906	5%	1063
RG_FO22_BIC-5_2020-09-11	11-Sep-20	CC210907	5%	1043
RG_FOUEW_BIC-1_2020-09-11	11-Sep-20	CC210908	5%	463
RG_FOUEW_BIC-2_2020-09-11	11-Sep-20	CC210909	5%	454
RG_FOUEW_BIC-3_2020-09-11	11-Sep-20	CC210910	5%	412
RG_FOBCP-BIC-1_2020-09-16	16-Sep-20	CC210911	5%	549
RG_FOBCP-BIC-2_2020-09-16	16-Sep-20	CC210912	5%	553
RG_FOBCP-BIC-3_2020-09-16	16-Sep-20	CC210913	5%	376
RG_FOBCP-BIC-4_2020-09-16	16-Sep-20	CC210914	5%	800
RG_FOBCP-BIC-5_2020-09-16	16-Sep-20	CC210915	5%	996
RG_FRCP1SW_BIC-1_2020-09-22	22-Sep-20	CC210916	5%	838
RG_FRCP1SW_BIC-2_2020-09-22	22-Sep-20	CC210917	5%	830
RG_FRCP1SW_BIC-3_2020-09-22	22-Sep-20	CC210918	10%	331
RG_FO26_BIC-1_2020-09-17	17-Sep-20	CC210919	5%	1656
RG_FO26_BIC-2_2020-09-17	17-Sep-20	CC210920	5%	1730
RG_FO26_BIC-3_2020-09-17	17-Sep-20	CC210921	5%	1494

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.

- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

		Total from Sample	Percent Efficiency
Site - QC, Sample - QC1, CC# - CC210863, Percent sampled = 5%, Sieve size = 400			
Trombidiformes	1		
Total:	**1**	**446**	**100%**
Site - QC, Sample - QC2, CC# - CC210893, Percent sampled = 5%, Sieve size = 400			
No Invertebrates Found	0		
Total:	**0**	**590**	**100%**
Site - QC, Sample - QC3, CC# - CC210902, Percent sampled = 5%, Sieve size = 400			
Heptageniidae	1		
Plecoptera	3		
Total:	**4**	**733**	**99%**
Site - QC, Sample - QC4, CC# - CC210906, Percent sampled = 5%, Sieve size = 400			
Coleoptera	1		
Baetidae	1		
Plecoptera	2		
Bivalvia	1		
Total:	**5**	**1063**	**100%**

Site - QC, Sample - QC5, CC# - CC210908, Percent sampled = 5%, Sieve size = 400				
No Invertebrates Found		0		
	Total:	**0**	**463**	**100%**

Site - QC, Sample - QC6, CC# - CC210914, Percent sampled = 5%, Sieve size = 400				
Chironomidae		1		
Ephemerellidae		1		
	Total:	**2**	**800**	**100%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																				Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	By	Time		Percent Range		Min	Max
210905	FO22_BIC_3	925	916	943	920	959	976	914	939	918	953	911	997	945	895	913	908	913	965	846	931	AR	1620	18587	0.00	15.15	0.18	8.97
210880	RG_MP1_BIC_2	411	388	396	375	331	364	400	369	343	411	377	381	329	382	405	383	330	395	406	397	AR	855	7573	0.00	19.95	0.44	13.11
210918	RG_FRCP1SW_BIC_3	334	344	283	301	336	306	324	305	311	353											TV	315	3197	0.33	19.83	1.35	11.48
210894	RG_FOBSC_BIC_1	364	332	338	352	329	327	354	369	328	329	363	371	332	336	346	345	378	359	337	341	TV	830	6930	0.00	13.49	0.14	9.09
210881	RG_MP1_BIC_3	531	590	599	521	531	561	530	546	560	540	540	522	571	551	551	502	576	522	547	538	CM	1085	10929	0.00	16.19	0.08	9.62
210913	RG_FOBCP_BIC_3	378	379	374	342	390	382	400	367	388	388	364	346	369	381	380	352	373	377	354	353	CM	765	7437	0.00	14.50	0.31	8.03

Table to follow at a later date.

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2020, Sample - RG_HENUP_BIC-1_2020-09-15, CC# - CC210861, Percent sampled = 5%, Sieve size = 400	413	0.24	0.24154589	0.96385542	0.00724638
Site - 2020, Sample - RG_FOUCL_BIC-2_2020-09-10, CC# - CC210871, Percent sampled = 5%, Sieve size = 400	1125	0.00	0.04446421	0.71111111	0.00666963
Site - 2020, Sample - RG_FOUSH_BIC-3_2020-09-21, CC# - CC210884, Percent sampled = 5%, Sieve size = 400	525	0.00	0.28490028	1.51515152	0.01234568
Site - 2020, Sample - RG_FOBSC_BIC-3_2020-09-18, CC# - CC210896, Percent sampled = 5%, Sieve size = 400	557	0.18	0.17921147	0.89445438	0.00716846
Site - 2020, Sample - RG_FODPO_BIC-3_2020-09-11, CC# - CC210902, Percent sampled = 5%, Sieve size = 400	724	0.00	0.61770762	1.77353342	0.01166781
Site - 2020, Sample - RG_FOUEW_BIC-2_2020-09-11, CC# - CC210909, Percent sampled = 5%, Sieve size = 400	450	0.00	0.44247788	0.88105727	0.00442478

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2020, Sample - RG_HENUP_BIC-1_2020-09-15, CC# - CC210861, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Atractides	2	2						

Chironomidae	6	6						
Chloroperlidae	2	2						
Diamesa	1	1						
Drunella doddsii	17	17						
Empididae	1	1						
Ephemerellidae	9	9						
Eukiefferiella	2	2						
Glossosoma	1	1						
Heptageniidae	244	241	No			X		
Hydropsychidae	29	29						
Lebertia	1	1						
Mallochohelea	1	1						
Megarcys	11	11						
Micropsectra	3	3						
Nemouridae	2	2						
Oreogeton	7	7						
Orthocladius complex	2	2						
Pagastia	2	2						
Parapsyche elsis	1	1						
Pericoma/Telmatoscopus	3	3						
Perlodidae	1	1						
Rhithrogena	2	3	No			X		
Rhyacophila	1	1						
Rhyacophila hyalinata group	2	2						
Sperchon	8	8						
Suwallia	1	1						
Sweltsa	1	1						
Taeniopterygidae	22	22						
Tanytarsini	9	9						
Tvetenia	3	3						
Zapada cinctipes	1	1						
Zapada columbiana	15	14	No	1		X		
Zapada oregonensis group	2	3	No			X		
Total:	**415**	**413**						
					0	**4**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.24	**Pass**				

Site - 2020, Sample - RG_FOUCL_BIC-2_2020-09-10, CC# - CC210871, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	2	2						
Apatania	6	6						
Baetidae	3	3						
Baetis	25	29	No			X		
Baetis rhodani group	22	19	No			X		
Brachycentridae	1	1						
Brillia	3	3						
Chironomidae	21	21						
Cinygmula	1	1						
Constempellina sp. C	1	1						
Dicosmoecus	1	1						
Dicranota	3	3						
Drunella	1	1						
Drunella coloradensis	2	2						
Drunella doddsii	25	25						
Ecclisomyia	1	1						
Empididae	1	1						
Enchytraeidae	2	2						
Epeorus	1	1						
Ephemerella	2	2						
Ephemerella tibialis	6	6						
Ephemerellidae	205	202	No			X		
Eukiefferiella	14	14						
Feltria	5	5						
Glossosoma	2	2						
Glossosomatidae	1	1						
Heptageniidae	374	376	No			X		
Hexatoma	2	2						
Hydropsychidae	4	4						
Kogotus	1	1						
Lebertia	3	3						
Leuctridae	1	1						
Limnephilidae	1	1						
Mallochohelea	1	1						
Megarcys	4	4						

Micropsectra	7	7						
Neoplasta	2	2						
Orthocladiinae	3	3						
Orthocladius complex	45	44	No			X		
Pagastia	9	9						
Parapsyche elsis	4	4						
Parorthocladius	1	1						
Pericoma/Telmatoscopus	109	109						
Rhithrogena	1	3	No			X		
Rhyacophila	29	29						
Rhyacophila atrata complex	3	3						
Rhyacophila brunnea/vemna group	1	1						
Rhyacophila hyalinata group	1	1						
Rhyacophila narvae	2	2						
Simulium	1	1						
Sperchon	2	2						
Stygothrombium	1	1						
Sweltsa	7	7						
Taeniopterygidae	15	15						
Tanytarsini	16	16						
Thienemannimyia group	1	1						
Trichoptera	51	51						
Tvetenia	17	17						
Zapada	47	47						
Zapada oregonensis group	1	1						
Total:	**1124**	**1125**						
					0	**6**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2020, Sample - RG_FOUSH_BIC-3_2020-09-21, CC# - CC210884, Percent sampled = 5%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Apatania	1	1						
Baetidae	5	5						

Baetis	24	25	No			X		
Baetis rhodani group	4	3	No			X		
Brachycentridae	2	2						
Capniidae	1	1						
Ceratopogonidae	3	3						
Chironomidae	16	16						
Constempellina sp. C	4	4						
Diamesa	1	1						
Drunella doddsii	2	2						
Enchytraeidae	1	1						
Ephemerellidae	40	41	No			X		
Eukiefferiella	8	8						
Feltria	1	1						
Glossosomatidae	1	1						
Heptageniidae	92	91	No			X		
Hexatoma	4	4						
Hydropsychidae	3	3						
Hydroptila	1	1						
Kogotus	3	3						
Lebertia	4	4						
Mallochohelea	4	4						
Megarcys	5	5						
Micropsectra	6	6						
Nemouridae	10	10						
Oligophlebodes	3	3						
Orthocladius complex	97	97						
Pagastia	5	5						
Parapsyche	1	1						
Pericoma/Telmatoscopus	86	85	No			X		
Pseudodiamesa	1	1						
Rheocricotopus	1	1						
Rhithrogena	15	15						
Rhyacophila	13	13						
Rhyacophila atrata complex	3	3						
Rhyacophila brunnea/vemna group	1	1						
Rhyacophila hyalinata group	2	2						
Simulium	2	2						
Sperchon	4	4						
Sweltsa	1	1						
Taenionema	1	1						

Taeniopterygidae	7	7						
Tanytarsini	1	1						
Thienemannimyia group	3	3						
Tipula	1	1						
Trombidiformes	1	1						
Tvetenia	2	2						
Zapada	25	20	No			X		
Zapada cinctipes	3	4	No			X		
Zapada columbiana	2	3	No			X		
Zapada oregonensis group	1	2	No			X		
Total:	**528**	**525**						
					0	**9**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				
Site - 2020, Sample - RG_FOBSC_BIC-3_2020-09-18, CC# - CC210896, Percent sampled = 5%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Apatania	1	1						
Arctopsyche	1	1						
Baetidae	2	2						
Baetis	12	12						
Baetis rhodani group	3	3						
Brachycentridae	9	9						
Brillia	1	1						
Capniidae	4	4						
Ceratopogonidae	2	2						
Chironomidae	5	5						
Chloroperlidae	1	1						
Dicranota	3	3						
Empididae	1	1						
Enchytraeus	4	4						
Ephemerellidae	26	26						
Eukiefferiella	4	3	No	1		X		
Feltria	1	1						
Glossosomatidae	1	1						
Heptageniidae	123	122	No			X		

Hesperoperla	1	1						
Isoperla	3	3						
Kogotus	6	6						
Lebertia	19	19						
Mallochohelea	1	1						
Micropsectra	6	6						
Nemouridae	7	7						
Orthocladiinae	1	1						
Orthocladius complex	24	24						
Pagastia	6	6						
Pericoma/Telmatoscopus	108	107	No			X		
Perlodidae	1	1						
Rhithrogena	5	5						
Rhyacophila	14	14						
Rhyacophila atrata complex	1	1						
Sperchon	2	2						
Taeniopterygidae	12	12						
Tanytarsini	3	3						
Thienemannimyia group	3	3						
Tvetenia	12	13	No			X		
Wiedemannia	6	6						
Zapada	57	55	No			X		
Zapada cinctipes	51	53	No			X		
Zapada columbiana	2	2						
Zapada oregonensis group	4	4						
Total:	**559**	**557**						
					0	**6**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.18	**Pass**				

Site - 2020, Sample - RG_FODPO_BIC-3_2020-09-11, CC# - CC210902, Percent sampled = 5%, Sieve size = 400	**Laboratory Count**	**QC Audit Count**	**Agreement**	**Misidentification**	**Questionable Taxonomic Resolution**	**Enumeration**	**Insufficient Taxonomic Resolution**	**Comments**
Apatania	4	4						
Baetidae	3	3						
Baetis	6	6						
Baetis rhodani group	22	22						

Capniidae	10	10						
Chironomidae	54	54						
Chloroperlidae	1	1						
Cinygmula	1	1						
Clinocerinae Unknown Genus A	1	1						
Dicranota	2	2						
Drunella coloradensis	1	1						
Drunella grandis group	1	1						
Elmidae	9	9						
Eloeophila	1	1						
Empididae	4	4						
Enchytraeus	2	2						
Epeorus	3	3						
Ephemerella tibialis	1	1						
Ephemerellidae	11	11						
Eukiefferiella	46	44	No			X		
Glossosoma	1	1						
Glossosomatidae	2	2						
Heptageniidae	57	57						
Heterlimnius	18	18						
Hydrobaenus	1	1						
Isoperla	18	18						
Kogotus	10	1	No			X		
Lebertia	28	28						
Limnephilidae	2	2						
Limnophyes	1	1						
Mallochohelea	1	1						
Megarcys	1	1						
Mesocapnia	7	7						
Micropsectra	2	2						
Nemouridae	21	21						
Neoplasta	9	9						
Orthocladius complex	80	81	No			X		
Pagastia	7	7						
Parorthocladius	4	4						
Pericoma/Telmatoscopus	18	18						
Perlidae	1	1						
Perlodidae	51	51						
Pisidiidae	1	1						
Rhyacophila	7	7						
Rhyacophila angelita group	1	1						

Rhyacophila atrata complex	3	3						
Rhyacophila betteni group	1	1						
Rhyacophila brunnea/vemna group	6	6						
Rhyacophila narvae	14	14						
Simuliidae	1	1						
Simulium	5	5						
Sperchon	3	3						
Sweltsa	1	1						
Taeniopterygidae	7	7						
Tipula	1	1						
Trombidiformes	1	1						
Tvetenia	20	21	No			X		
Zapada	131	129	No			X		
Zapada cinctipes	4	5	No			X		
Zapada oregonensis group	3	4	No			X		
Total:	**733**	**724**						
					0	7	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

Site - 2020, Sample - RG_FOUEW_BIC-2_2020-09-11, CC# - CC210909, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Apatania	1	1						
Baetidae	1	1						
Baetis	8	8						
Capniidae	6	6						
Chironomidae	14	14						
Chloroperlidae	1	1						
Dicranota	2	2						
Elmidae	18	18						
Empididae	1	1						
Ephemerella excrucians complex	1	1						
Ephemerellidae	10	10						
Eukiefferiella	6	6						

Feltria	1	1						
Glutops	2	2						
Heptageniidae	21	21						
Heterlimnius	17	16	No			X		
Heterlimnius	7	7						
Hydrobaenus	2	2						
Hydropsychidae	1	1						
Kogotus	5	5						
Lebertia	25	24	No			X		
Limnophyes	2	2						
Malenka	1	1						
Megarcys	2	2						
Nais	14	14						
Neoplasta	8	8						
Orthocladius complex	45	44	No			X		
Pagastia	5	5						
Pedomoecus sierra	1	1						
Pericoma/Telmatoscopus	13	13						
Perlidae	2	2						
Perlodidae	48	48						
Rheocricotopus	1	1						
Rhyacophila	18	18						
Rhyacophila atrata complex	3	3						
Rhyacophila brunnea/vemna group	18	18						
Simulium	3	3						
Sperchon	1	1						
Sweltsa	2	2						
Taeniopterygidae	1	1						
Tanytarsini	1	1						
Testudacarus	1	1						
Trichoptera	1	1						
Trichoptera	4	4						
Zapada	96	96						
Zapada cinctipes	5	5						
Zapada columbiana	2	2						
Zapada oregonensis group	6	5	No			X		
Total:	**454**	**450**						
					0	**4**	**0**	

% Total Misidentification Rate =	misidentifications	x100 =	0.00	**Pass**		
	total number					

References

[1] McDermott, H., Paull, T., Strachan, S. (May 2014). Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples, Environment Canada. ISBN: 978-1-100-25417-3

[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
http://www.safit.org/Docs/SAFIT_Taxonomic_Literature_Database_1_March_2011.enl

Brook, Arthur R. and Leonard A. Kelton. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera) Memoirs of the Entomological Society of Canada. No. 51.

Brown HP & White DS (1978) Notes on Seperation and Identification of North
American Riffle Beetles (Coleoptera: Dryopidea: Elmidae).Entomological News 89 (1&2): 1-13

Clifford, Hugh F. 1991. Aquatic Invertebrates of Alberta. University of Alberta Press Edmonton, Alberta.

Epler, John. 2001 The Larval Chironomids of North and South Carolina. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Water Beetles of Florida. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida.
http://home.earthlink.net/~johnepler/

Trond Andersen, Peter S. Cranston & John H. Epler (Eds) (2013) Chironomidae of the Holarctic Region: Keys and DIagnoses. Part 1. Larvae. *Insect Systematics and Evolution Supplements* 66: 1-571.

Jacobus, Luke and Pat Randolph. 2005. Northwest Ephemeroptera Nymphs. Manual from Northwest Biological Assessment Working Group. Moscow Idaho 2005. Not Published.

Jacobus LM, McCafferty WP (2004) Revisionary Contributions to the Genus Drunella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 112: 127-147

Jacobus LM, McCafferty WP (2003) Revisionary Contributions to North American Ephemerella and Serratella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 111 (4): 174-193.

Kathman,R.D., R.O. Brinkhurst. 1999. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, Tennessee.

Larson, D.J., Y. Alarie, R.E. Roughly.2005. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Neararctic Region. NRC-CNRC Research Press. Ottawa.

Merritt, R.W., K.W. Cummins, M. B. Berg. (eds.). 2007. An introduction to the aquatic insects of North America, 4th. Kendall/Hunt, Dubuque, IA

Morihara DK, McCafferty WP (1979) The Baetis Larvae of North American (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105: 139-221.

Needham, James, M. May, M. Westfall Jr. 2000. Dragonflies of North America. Scientific Publishers. Gainsville FL.

Prescott David, R.C.and Medea M. Curteanu.2004. Survey of Aquatic Gastropods of Alberta. Species at Risk Report No. 104. ISSN: 1496-7146 (Online Edition)

Needham, K. 1996. An Identification Guide to the Nymphal Mayflies of British Columbia. Publication #046 Resource Inventory Committee, Government of British Columbia.

Oliver, Donald R. and Mary E. Roussel. 1983. The Insects and Arachnids of Canada Part 11. The Genera of larval midges of Canada. Biosystematics Research Institute. Ottawa, Ontario. Research Branch, Agriculture Canada. Publication 1746.

Proctor, H. The 'Top 18' Water Mite Families in Alberta. Zoology 351. University of Alberta, Edmonton, Alberta.

Rogers, D.C. and M. Hill, 2008. Key to the Freshwater Malacostraca (Crustacea) of the mid-Atlantic Region. EPA-230-R-08-017. US Environmental Protection Agency, Office of Environmental Information, Washington, DC.

Stewart, Kenneth W. and Bill Stark. 2002. The Nymphs of North American Stonefly Genera (Plecoptera). The Caddis Press. Columbus Ohio.

Stewart, Kenneth W. and Mark W. Oswood. 2006 The Stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press.

Stonedahl, Gary and John D. Lattin. 1986. The Corixidae of Oregon and Washington (Hemiptera: Heteroptera). Technical Bulletin 150. Oregon State University, Corvalis Oregon.

Thorpe, J. H. and A. P. Covich [Eds.] 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego.

Tinerella, Paul P. and Ralph W. Gunderson.2005. The Waterboatmen (Insecta: Heteroptera: Corixidae) of Minisota. Publication No.23 Dept. Of Entomology, North Dakota State University, Fargo, North Dakota, USA.

Weiderholm, Torgny (Ed.) 1983. The larvae of Chironomidae (Diptera) of the Holartic region. Entomologica Scaninavica. Supplement No. 19.

Westfall, Minter J. Jr. and May, Michael L. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

Wiggins, Glenn B. 1998. Larvae of the North American Caddisfly Genera (Tricoptera) 2nd ed. University of Toronto Press. Toronto Ontario.

Project: FRO LAEMP (20-09) #3
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Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-1	RG_HENUP_BIC-2	RG_HENUP_BIC-3	RG_UFR1_BIC-1	RG_UFR1_BIC-2	RG_UFR1_BIC-3	RG_FODHE_BIC-1	RG_FODHE_BIC-2	RG_FODHE_BIC-3	RG_FOUCL_BIC-1	RG_FOUCL_BIC-2	RG_FOUCL_BIC-3	RG_FOUNGD_BIC-1
Sample Collection Date:	15-Sep-20	15-Sep-20	15-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20
CC#:	CC210861	CC210862	CC210863	CC210864	CC210865	CC210866	CC210867	CC210868	CC210869	CC210870	CC210871	CC210872	CC210873
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	60	60	20	40	0	140	40	20	80	40	0	0
| Family: Baetidae	0	0	0	220	300	80	20	160	20	200	60	180	40
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	0	20	0	1,060	1,840	1,760	820	800	400	700	500	360	220
Baetis fuscatus gr.	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis rhodani group	0	0	0	40	20	40	380	760	140	240	440	160	140
| Family: Ephemerellidae	180	280	720	3,440	1,960	3,220	6,420	9,240	5,060	2,260	4,100	2,640	2,660
Drunella	0	40	0	20	20	20	60	20	0	40	20	60	0
Drunella grandis group	0	0	0	0	0	0	0	0	0	0	0	0	0
Drunella coloradensis	0	0	0	0	0	0	0	0	0	0	40	0	0
Drunella doddsii	340	160	40	240	240	760	740	1,080	820	500	500	360	180
Drunella spinifera	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella	0	0	0	0	0	0	0	20	0	0	40	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella tibialis	0	0	0	0	0	0	0	0	0	180	120	20	20
| Family: Heptageniidae	4,880	6,040	5,180	4,120	3,340	8,940	6,880	10,320	4,960	8,580	7,480	5,220	5,140
Cinygmula	0	0	0	0	0	0	0	20	0	0	20	0	0
Epeorus	0	0	0	20	160	140	340	60	200	40	20	40	80
Rhithrogena	40	40	200	40	40	60	40	20	60	20	20	0	40
| Order: Plecoptera	0	60	60	20	80	0	0	40	0	20	0	0	0
| Family: Capniidae	0	20	0	0	0	40	20	0	20	40	0	0	20
Mesocapnia	0	0	0	0	0	0	0	0	0	0	0	0	0
Utacapnia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	40	140	200	40	80	20	40	0	60	40	0	140	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	20	140	200	0	0	20	20	0	0	0	0	0	0
Sweltsa	20	0	40	260	160	340	60	20	80	220	140	60	160
| Family: Leuctridae	0	20	0	120	40	120	0	0	0	0	20	80	20
Paraleuctra	0	0	0	20	20	20	0	0	0	0	0	0	0
| Family: Nemouridae	40	20	40	1,640	60	240	40	260	0	40	0	0	0
Malenka	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada	0	60	0	1,180	1,040	2,020	1,620	2,060	1,320	900	940	280	1,160
Zapada oregonensis group	40	200	100	560	780	580	220	320	100	120	20	80	140
Zapada cinctipes	20	0	0	0	0	0	20	0	20	240	0	0	100
Zapada columbiana	300	200	60	280	320	380	220	100	120	160	0	60	380
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	20	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	20	40	20	120	80	80	20	220	80	180	0	80	140
Isoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Kogotus	0	0	0	600	440	500	120	360	0	80	20	60	20
Megarcys	220	140	200	560	460	220	260	360	240	160	80	120	60
| Family: Taeniopterygidae	440	460	160	180	260	380	700	380	920	320	300	360	560
Taenionema	0	0	0	0	0	0	220	0	0	0	0	0	20
| Order: Trichoptera	0	60	20	80	80	20	20	40	40	180	1,020	180	460
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Apatania	0	0	0	0	0	0	20	20	0	60	120	20	0
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	20	0	40
| Family: Glossosomatidae	0	0	0	20	40	0	0	60	0	0	20	0	0
Anagapetus	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	20	100	40	0	0	0	0	0	0	0	40	20	20
| Family: Hydropsychidae	580	220	120	180	240	900	100	60	60	20	80	40	80
Arctopsyche	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche elsis	20	40	0	240	180	100	100	60	40	20	80	80	80
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	20	20	0	20
Dicosmoecus	0	0	0	0	0	0	0	60	0	0	20	0	0
Ecclisomyia	0	20	0	0	0	0	0	0	0	0	20	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	20	40	100	280	760	1,800	360	280	400	220	580	500	1,720

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-1	RG_HENUP_BIC-2	RG_HENUP_BIC-3	RG_UFR1_BIC-1	RG_UFR1_BIC-2	RG_UFR1_BIC-3	RG_FODHE_BIC-1	RG_FODHE_BIC-2	RG_FODHE_BIC-3	RG_FOUCL_BIC-1	RG_FOUCL_BIC-2	RG_FOUCL_BIC-3	RG_FOUNGD_BIC-1
Sample Collection Date:	15-Sep-20	15-Sep-20	15-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20
CC#:	CC210861	CC210862	CC210863	CC210864	CC210865	CC210866	CC210867	CC210868	CC210869	CC210870	CC210871	CC210872	CC210873
Rhyacophila angelita group	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	40	40	0	0	0	20	0	0	20	0
Rhyacophila brunnea/vemna group	0	0	20	100	180	80	40	80	80	0	20	60	140
Rhyacophila hyalinata group	40	40	40	220	200	140	80	140	60	40	20	20	0
Rhyacophila vofixa group	0	0	0	40	40	20	20	80	0	0	0	0	0
Rhyacophila atrata complex	0	0	0	80	20	200	0	20	40	0	60	80	40
Rhyacophila narvae	0	0	0	0	0	80	0	0	0	20	40	40	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	80	0	120	0	0	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	20	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	20	0	0	0	20	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	0	20	0
Heterlimnius	0	0	0	0	20	0	0	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	20	20	0	140	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	20	0	0	20	20	120	0	0	40	100	20	520	100
| Family: Chironomidae	120	200	220	40	60	80	2,120	1,660	1,000	680	420	240	140
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	20	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	180	380	420	140	60	20	120	60	20	180	320	20	20
Constempellina sp. C	0	0	0	0	0	0	20	0	0	0	20	0	0
Micropsectra	60	40	40	60	40	100	140	20	20	40	140	20	20
Paratanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	20	0	0	0	20	0	1,820	1,240	1,140	20	0	40	0
Pagastia	40	40	20	20	20	0	140	320	140	60	180	0	20
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	20	0	40	20	20	60	0	0
Brillia	0	0	0	60	0	0	20	20	0	100	60	60	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	40
Cricotopus (Nostococladius)	0	0	0	20	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	40	100	40	80	0	0	2,360	1,680	740	420	280	180	40
Hydrobaenus	0	80	40	20	0	0	200	0	0	60	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	40	40	120	120	0	20	4,060	6,380	2,440	1,780	900	260	180
Orthocladius lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	40	0	0	0	0	0	0	40	20	0	0
Rheocricotopus	0	0	20	20	20	0	40	20	0	40	0	20	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	60	40	60	180	40	0	300	100	380	760	340	320	160
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	20	0	0	0	0	0	20	0	20
| Family: Empididae	20	0	0	40	0	20	0	0	0	20	20	0	0
Clinocera	0	0	0	0	0	0	0	0	0	0	0	0	0
Clinocerinae Unknown Genus A	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoplasta	0	0	0	20	0	20	0	0	0	20	40	100	0
Oreogeton	140	40	100	0	0	0	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	60	0	100	1,980	660	1,460	1,000	1,240	500	1,480	2,180	1,420	1,640
| Family: Simuliidae	0	0	0	0	0	0	120	20	40	0	0	0	0
Simulium	0	0	0	80	0	20	460	40	220	0	20	20	60
| Family: Tipulidae	0	0	0	20	20	0	0	0	0	0	0	0	0
Antocha	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_HENUP_BIC-1	RG_HENUP_BIC-2	RG_HENUP_BIC-3	RG_UFR1_BIC-1	RG_UFR1_BIC-2	RG_UFR1_BIC-3	RG_FODHE_BIC-1	RG_FODHE_BIC-2	RG_FODHE_BIC-3	RG_FOUCL_BIC-1	RG_FOUCL_BIC-2	RG_FOUCL_BIC-3	RG_FOUNGD_BIC-1
Sample Collection Date:	15-Sep-20	15-Sep-20	15-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20
CC#:	CC210861	CC210862	CC210863	CC210864	CC210865	CC210866	CC210867	CC210868	CC210869	CC210870	CC210871	CC210872	CC210873
Dicranota	0	0	0	40	0	0	0	20	0	20	60	0	0
| Family: Limoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Eloeophila	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0	0	0	40	0	20
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Hymenoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	0	20	0	40	0	0	20
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	100	40	20	20	40	0	60	100	0	40
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	20	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	20	0	0	0	0
Atractides	40	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	20	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	20	60	20	200	160	260	160	420	120	140	60	0	40
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	160	80	60	160	240	260	140	940	160	140	40	20	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	20	20	0	0	0	0	20	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	40	0	0
Enchytraeus	0	0	0	0	0	0	0	0	40	0	0	0	60
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**8,300**	**9,760**	**8,920**	**19,580**	**15,060**	**25,900**	**33,400**	**41,840**	**22,460**	**22,240**	**22,480**	**14,820**	**16,520**

Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Psocodea	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	0	0	0	20	20	20	20	20	20	20	20	20	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	20	0
Phylum: Nemata	0	20	0	20	0	20	0	20	20	20	20	0	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	20	20	20	20	20	20	20	20	20	0	20
Totals:	0	**20**	**20**	**60**	**40**	**60**	**40**	**60**	**60**	**60**	**60**	**40**	**40**

Project: FRO LAEMP (20-09) #3
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-2	RG_FOUNGD_BIC-3	RG_FODNGD_BIC-1	RG_FODNGD_BIC-2	RG_FODNGD_BIC-3	RG_MP1_BIC-1	RG_MP1_BIC-2	RG_MP1_BIC-3	RG_FOUSH_BIC-1	RG_FOUSH_BIC-2	RG_FOUSH_BIC-3	RG_FOUKI_BIC-1	RG_FOUKI_BIC-2
Sample Collection Date:	10-Sep-20	10-Sep-20	21-Sep-20	21-Sep-20	21-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	21-Sep-20	21-Sep-20	21-Sep-20	14-Sep-20	14-Sep-20
CC#:	CC210874	CC210875	CC210876	CC210877	CC210878	CC210879	CC210880	CC210881	CC210882	CC210883	CC210884	CC210885	CC210886
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	20	0	0	0	0	0	20	20
| Family: Baetidae	20	20	40	0	0	20	20	0	20	0	100	0	40
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	420	200	360	260	220	160	40	240	420	340	480	0	200
Baetis fuscatus gr.	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis rhodani group	480	280	40	140	220	260	140	520	60	80	80	40	40
| Family: Ephemerellidae	5,480	2,680	2,220	620	2,500	1,500	1,260	1,200	1,100	620	800	340	480
Drunella	0	20	0	0	0	0	0	20	0	20	0	0	0
Drunella grandis group	0	0	0	0	0	0	0	0	0	0	0	0	0
Drunella coloradensis	0	20	0	0	0	0	0	0	0	0	0	0	0
Drunella doddsii	360	200	200	100	180	20	20	60	60	60	40	60	40
Drunella spinifera	0	0	0	0	0	20	0	0	0	0	0	0	0
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella tibialis	20	0	0	0	0	0	20	0	0	0	0	0	0
| Family: Heptageniidae	8,960	3,900	4,560	2,920	5,600	2,400	2,340	3,600	2,760	1,380	1,840	3,600	3,340
Cinygmula	0	0	0	0	0	20	0	0	0	0	0	0	0
Epeorus	20	20	40	40	20	0	20	0	0	0	0	20	20
Rhithrogena	20	0	60	20	60	0	0	0	0	0	300	0	20
| Order: Plecoptera	0	0	0	0	0	0	40	20	0	20	0	80	40
| Family: Capniidae	20	0	0	20	60	0	0	0	20	20	20	60	120
Mesocapnia	0	0	0	0	0	0	0	0	0	0	0	0	0
Utacapnia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	200	0	0	0	20	20	20	0	0	0	0	0	0
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Suwallia	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	740	80	100	40	40	100	40	0	60	0	20	20	40
| Family: Leuctridae	60	0	0	0	20	0	0	0	20	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	0	0	0	0	20	0	0	0	40	20	200	20	40
Malenka	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada	2,220	520	1,060	600	760	380	380	360	260	440	500	180	200
Zapada oregonensis group	280	100	140	140	140	0	80	60	40	20	20	20	0
Zapada cinctipes	140	0	200	80	360	80	120	200	320	340	60	220	220
Zapada columbiana	280	0	160	60	0	20	20	0	0	0	40	40	0
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	0	0	0	0	0	0	0	0	0	60	0	0	0
Hesperoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlodidae	60	200	20	80	0	0	0	20	0	0	0	20	20
Isoperla	0	0	0	0	0	0	0	0	0	0	0	0	0
Kogotus	320	360	180	0	20	100	60	20	80	0	60	0	0
Megarcys	60	0	200	20	200	100	40	260	180	140	100	80	40
| Family: Taeniopterygidae	1,320	80	340	220	420	80	120	160	340	80	140	20	40
Taeniionema	0	0	0	0	0	0	0	0	0	0	20	0	20
| Order: Trichoptera	120	20	20	100	180	80	160	380	80	40	0	20	120
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Apatania	0	0	40	20	0	0	0	0	0	20	20	20	0
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	40	0	60	0	20	20	100	40	80	60	40	0	80
| Family: Glossosomatidae	0	20	0	60	140	0	0	0	0	0	20	20	0
Anagapetus	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	0	20	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	60	0	100	40	40	0	0	0	160	20	60	80	120
Arctopsyche	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	20	0	0	0	0	0	20	20	0	0
Parapsyche elsis	60	0	20	0	0	0	0	20	20	80	0	0	0
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	20	0	0	20	20	0	0
| Family: Limnephilidae	0	160	0	0	0	0	0	0	0	0	0	0	0
Dicosmoecus	0	0	0	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	1,140	340	300	420	600	500	480	560	80	0	260	80	20

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-2	RG_FOUNGD_BIC-3	RG_FODNGD_BIC-1	RG_FODNGD_BIC-2	RG_FODNGD_BIC-3	RG_MP1_BIC-1	RG_MP1_BIC-2	RG_MP1_BIC-3	RG_FOUSH_BIC-1	RG_FOUSH_BIC-2	RG_FOUSH_BIC-3	RG_FOUKI_BIC-1	RG_FOUKI_BIC-2
Sample Collection Date:	10-Sep-20	10-Sep-20	21-Sep-20	21-Sep-20	21-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	21-Sep-20	21-Sep-20	21-Sep-20	14-Sep-20	14-Sep-20
CC#:	CC210874	CC210875	CC210876	CC210877	CC210878	CC210879	CC210880	CC210881	CC210882	CC210883	CC210884	CC210885	CC210886
Rhyacophila angelita group	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila betteni group	0	20	20	0	0	20	0	0	0	0	0	0	20
Rhyacophila brunnea/vemna group	200	140	100	180	300	40	140	200	40	20	20	20	20
Rhyacophila hyalinata group	0	0	0	0	20	20	0	20	100	20	40	0	20
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	20	0	0	0
Rhyacophila atrata complex	240	300	140	20	200	40	0	40	20	0	60	60	0
Rhyacophila narvae	100	160	0	20	20	0	0	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	80	0	60	40	100	0	280	60	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	20	0	0	40	0	20	0	0	0	0
Heterlimnius	0	0	0	0	0	80	20	0	0	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	20	0	0	0	0	0	0
| Family: Ceratopogonidae	0	40	0	0	0	0	0	0	0	40	60	40	20
Bezzia/ Palpomyia	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	140	200	80	40	60	40	0	0	60	0	80	80	80
| Family: Chironomidae	60	40	180	60	60	80	60	0	200	300	320	160	100
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	60	40	100	0	0	0	40	120	20	20	0
Constempellina sp. C	0	0	0	0	0	0	0	0	0	0	80	0	0
Micropsectra	0	20	40	100	80	0	0	20	60	280	120	60	60
Paratanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	20	260	20	20	80	0	100	20	20	20	0	0
Pagastia	60	20	240	20	160	20	40	80	260	140	100	0	20
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	20	0	0
| Subfamily: Orthocladiinae	0	0	0	0	20	0	0	0	0	20	0	20	20
Brillia	0	0	0	0	20	0	20	0	0	20	0	0	0
Corynoneura	20	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	0	0	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	60	60	560	0	180	40	20	20	200	100	160	80	120
Hydrobaenus	0	0	0	0	0	0	0	0	20	160	0	20	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	80	420	1,900	420	1,580	780	460	840	1,860	2,740	1,940	840	480
Orthocladius lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus	0	0	0	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	0	0	0	0	0	20	0	0	0	0	0
Rheocricotopus	0	0	0	20	0	0	0	0	0	0	20	20	0
Thienemanniella	20	0	0	0	20	0	0	0	20	20	0	0	0
Tvetenia	160	20	20	40	60	0	0	40	80	100	40	40	200
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	60	0	0	0	40	0	20	100	60	0	0
| Family: Empididae	0	20	0	0	0	20	20	20	20	0	0	20	20
Clinocera	0	0	0	0	0	0	0	0	0	0	0	0	20
Clinocerinae Unknown Genus A	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoplasta	60	20	20	0	0	20	0	0	0	0	0	0	0
Oreogeton	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophora	0	0	20	0	0	0	0	0	0	20	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	1,260	1,460	1,680	1,380	1,660	1,620	1,360	980	1,920	2,700	1,720	3,040	1,700
| Family: Simuliidae	0	0	0	0	0	0	40	0	0	0	0	20	20
Simulium	20	20	20	0	0	20	0	0	0	40	40	0	0
| Family: Tipulidae	0	0	0	40	0	0	40	0	0	0	0	0	0
Antocha	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUNGD_BIC-2	RG_FOUNGD_BIC-3	RG_FODNGD_BIC-1	RG_FODNGD_BIC-2	RG_FODNGD_BIC-3	RG_MP1_BIC-1	RG_MP1_BIC-2	RG_MP1_BIC-3	RG_FOUSH_BIC-1	RG_FOUSH_BIC-2	RG_FOUSH_BIC-3	RG_FOUKI_BIC-1	RG_FOUKI_BIC-2
Sample Collection Date:	10-Sep-20	10-Sep-20	21-Sep-20	21-Sep-20	21-Sep-20	15-Sep-20	15-Sep-20	15-Sep-20	21-Sep-20	21-Sep-20	21-Sep-20	14-Sep-20	14-Sep-20
CC#:	CC210874	CC210875	CC210876	CC210877	CC210878	CC210879	CC210880	CC210881	CC210882	CC210883	CC210884	CC210885	CC210886
Dicranota	80	20	0	0	0	40	20	20	60	0	0	0	40
| Family: Limoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Eloeophila	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	20	0	0	0	0	20	20	80	20	20
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	20	0	0
| Order: Hymenoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	20	0	0	0	0	0	0	20	0	20	40	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	20	20	0	0	0	0	0	0	0	140	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	40	60	0	0	40	0	0	0	20	80	20	20	40
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	20	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	20	420	240	240	360	420	200	400	20	100	80	120	140
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	60	80	220	100	160	140	20	40	60	120	80	0	20
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	20	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	20	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	20	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	20	0	0
Enchytraeus	20	0	20	0	0	20	0	0	20	40	0	20	20
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	40	0	0	0
Totals:	**25,620**	**12,840**	**16,340**	**8,880**	**16,980**	**9,500**	**8,140**	**10,680**	**11,380**	**11,760**	**10,560**	**9,820**	**8,520**

Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Psocodea	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	20	20	20	20	20	20	20	20	20	20
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	20	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Nemata	20	0	20	0	0	20	20	0	20	20	0	20	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	0	0	0	0	20	20	20	20	20	20	20	20	20
Totals:	**40**	**20**	**40**	**20**	**60**	**60**	**60**	**40**	**60**	**60**	**40**	**60**	**40**

Project: FRO LAEMP (20-09) #3
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-3	RG_FOBKS_BIC-1	RG_FOBKS_BIC-2	RG_FOBKS_BIC-3	RG_SCOUTDS_BIC-1	RG_SCOUTDS_BIC-2	RG_SCOUTDS_BIC-3	RG_FOBSC_BIC-1	RG_FOBSC_BIC-2	RG_FOBSC_BIC-3	RG_FRUPO_BIC-1	RG_FRUPO_BIC-2	RG_FRUPO_BIC-3
Sample Collection Date:	14-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20
CC#:	CC210887	CC210888	CC210889	CC210890	CC210891	CC210892	CC210893	CC210894	CC210895	CC210896	CC210897	CC210898	CC210899
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	2,650	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	40	0	0	0	0	0	0	0	0	0	0	20	0
| Family: Baetidae	40	0	0	0	0	0	0	0	0	40	60	40	160
Acentrella	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis	260	180	60	183	220	140	40	60	40	240	520	360	120
Baetis fuscatus gr.	0	0	0	0	0	0	0	0	0	0	20	0	0
Baetis rhodani group	240	60	100	100	20	60	80	60	60	60	340	340	560
| Family: Ephemerellidae	1,060	220	340	167	700	1,060	1,020	360	420	520	2,060	160	280
Drunella	20	0	0	0	0	0	0	0	0	0	20	0	0
Drunella grandis group	0	140	0	0	0	0	0	0	0	0	0	0	0
Drunella coloradensis	0	0	0	0	0	0	0	0	0	0	0	0	0
Drunella doddsii	120	0	40	17	60	100	20	0	0	0	100	20	40
Drunella spinifera	20	0	20	0	0	0	0	0	0	0	0	20	0
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	60	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella tibialis	0	0	0	0	0	0	0	0	0	0	0	0	20
| Family: Heptageniidae	3,680	2,140	2,220	2,133	1,840	1,900	3,320	1,460	1,600	2,460	2,060	300	960
Cinygmula	0	0	0	0	40	0	0	0	0	0	20	0	20
Epeorus	0	20	20	0	0	0	0	0	20	0	20	0	160
Rhithrogena	0	0	0	0	0	40	0	0	0	100	0	0	0
| Order: Plecoptera	40	0	0	750	0	0	0	0	0	0	0	0	0
| Family: Capniidae	60	0	20	0	0	100	40	20	20	80	280	60	180
Mesocapnia	0	0	0	0	0	0	0	0	0	0	0	0	20
Utacapnia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	0	20	0	0	0	60	40	20	20	20	120	0	60
Haploperla	0	0	0	0	0	0	0	0	0	0	0	0	240
Suwallia	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	20	0	0	0	0	0	20	20	0	0	160	0	120
| Family: Leuctridae	0	0	0	0	0	20	0	0	0	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0	0	0	20	0
| Family: Nemouridae	300	0	0	0	0	40	40	20	0	140	0	0	240
Malenka	0	0	0	0	0	0	0	0	0	0	0	0	0
Zapada	460	440	240	133	760	120	500	600	420	1,140	2,800	700	1,060
Zapada oregonensis group	80	0	40	33	60	120	160	60	60	80	0	0	20
Zapada cinctipes	600	100	120	183	500	740	560	660	120	1,020	1,280	180	140
Zapada columbiana	60	40	20	0	20	80	80	20	0	40	20	0	0
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	60	80	20	0	20	40	0	40	20	0	120	20	0
Hesperoperla	0	20	0	0	0	40	20	0	20	20	0	0	20
| Family: Perlodidae	0	60	0	167	140	0	140	100	40	20	5,340	1,420	1,760
Isoperla	0	0	0	33	20	40	60	20	20	60	520	180	1,580
Kogotus	40	140	120	0	100	80	220	60	100	120	640	80	60
Megarcys	200	20	0	33	20	120	40	40	40	0	140	0	120
| Family: Taeniopterygidae	300	80	20	167	260	380	300	160	320	240	1,440	160	1,320
Taenionema	0	0	0	0	0	0	80	0	0	0	0	0	0
| Order: Trichoptera	100	40	80	483	20	40	40	0	0	0	60	40	40
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Apatania	20	0	20	0	0	0	20	0	0	20	260	40	40
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	60	40	60	33	60	0	20	20	60	180	0	0	0
| Family: Glossosomatidae	60	0	0	17	0	0	0	20	0	20	40	40	20
Anagapetus	0	0	0	0	0	0	0	0	0	0	0	0	40
Glossosoma	0	0	0	0	0	0	20	0	0	0	60	0	60
| Family: Hydropsychidae	120	20	100	50	80	100	0	60	60	0	0	40	60
Arctopsyche	0	0	0	0	0	0	0	60	0	20	0	0	0
Parapsyche	0	40	0	0	0	0	0	0	20	0	0	0	0
Parapsyche elsis	100	0	20	17	0	40	20	20	60	0	0	0	20
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	20	0	0	0	0	0	0	0	0	0	0
Dicosmoecus	0	0	20	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	80	740	260	183	380	280	120	280	440	280	160	60	60

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Sample:	RG_FOUKI_BIC-3	RG_FOBKS_BIC-1	RG_FOBKS_BIC-2	RG_FOBKS_BIC-3	RG_SCOUTDS_BIC-1	RG_SCOUTDS_BIC-2	RG_SCOUTDS_BIC-3	RG_FOBSC_BIC-1	RG_FOBSC_BIC-2	RG_FOBSC_BIC-3	RG_FRUPO_BIC-1	RG_FRUPO_BIC-2	RG_FRUPO_BIC-3
Sample Collection Date:	14-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20
CC#:	CC210887	CC210888	CC210889	CC210890	CC210891	CC210892	CC210893	CC210894	CC210895	CC210896	CC210897	CC210898	CC210899
Rhyacophila angelita group	0	0	0	0	0	0	0	0	0	0	0	0	160
Rhyacophila betteni group	20	0	40	50	0	20	0	0	0	0	0	0	40
Rhyacophila brunnea/vemna group	40	40	40	33	60	20	60	60	40	0	0	0	20
Rhyacophila hyalinata group	40	0	0	33	40	40	40	0	20	0	0	0	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila atrata complex	0	0	0	0	0	40	40	0	60	20	280	20	80
Rhyacophila narvae	0	20	0	0	0	0	0	0	0	0	160	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	0	0	40	0	0	0	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	20	0	0	0	20	0	0	0	0	160	0	0
Heterlimnius	20	0	20	0	0	20	0	0	0	0	120	0	0
| Family: Staphylinidae	0	20	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	1,183	0	0	0	0	0	0	0	20	0
| Family: Ceratopogonidae	0	0	20	0	20	40	20	0	40	40	40	20	0
Bezzia/ Palpomyia	0	0	20	0	0	0	0	0	0	0	0	0	0
Mallochohelea	100	0	20	0	40	0	140	0	60	20	200	20	0
| Family: Chironomidae	420	40	20	33	60	40	40	120	20	100	380	180	700
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	60	0	0	0	0	60	0	0	0	60	0	0	0
Constempellina sp. C	0	0	20	0	0	0	0	0	0	0	0	0	0
Micropsectra	100	20	0	17	40	20	80	0	0	120	0	40	0
Paratanytarsus	0	40	0	0	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	60	0	0	0	0	0	0	0	20	0	40	0	20
Pagastia	60	20	60	17	60	140	0	40	80	120	280	40	140
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	40	0	0	0	0	20	0	0	0	20	0	0	0
Brillia	0	0	0	0	0	0	0	0	0	20	0	0	20
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	0	0	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	0	0	0	0	0	0	0	0	20	0
Eukiefferiella	340	40	0	33	20	40	0	0	20	80	120	140	240
Hydrobaenus	0	0	20	0	0	0	20	0	0	0	0	0	0
Limnophyes	0	0	0	0	0	0	0	0	0	0	0	0	20
Orthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthocladius complex	3,080	160	40	17	260	40	160	200	180	480	3,080	1,080	1,980
Orthocladius lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus	0	20	20	0	0	0	0	0	0	0	0	0	0
Parorthocladius	0	0	0	0	0	0	0	0	0	0	20	40	40
Rheocricotopus	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemanniella	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	160	0	60	17	40	60	40	40	100	240	320	80	200
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	20	0	40	17	20	60	120	60	20	60	0	0	40
| Family: Empididae	20	60	80	17	0	20	0	20	0	20	20	0	60
Clinocera	0	0	0	0	0	0	0	0	0	0	0	0	0
Clinocerinae Unknown Genus A	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoplasta	20	0	0	0	0	0	20	20	40	0	160	40	60
Oreogeton	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiedemannia	20	20	20	0	60	40	40	80	40	120	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0	0	0	0	0	0	20
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	3,240	2,200	2,140	1,150	2,540	2,140	3,000	2,000	2,280	2,160	240	120	820
| Family: Simuliidae	0	20	0	0	0	0	20	0	0	0	20	60	360
Simulium	40	0	20	0	0	0	0	0	20	0	0	160	1,100
| Family: Tipulidae	0	0	0	0	0	20	20	0	0	0	20	0	0
Antocha	0	0	0	0	0	0	0	0	20	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOUKI_BIC-3	RG_FOBKS_BIC-1	RG_FOBKS_BIC-2	RG_FOBKS_BIC-3	RG_SCOUTDS_BIC-1	RG_SCOUTDS_BIC-2	RG_SCOUTDS_BIC-3	RG_FOBSC_BIC-1	RG_FOBSC_BIC-2	RG_FOBSC_BIC-3	RG_FRUPO_BIC-1	RG_FRUPO_BIC-2	RG_FRUPO_BIC-3
Sample Collection Date:	14-Sep-20	10-Sep-20	10-Sep-20	10-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20	18-Sep-20	18-Sep-20	18-Sep-20	12-Sep-20	12-Sep-20	12-Sep-20
CC#:	CC210887	CC210888	CC210889	CC210890	CC210891	CC210892	CC210893	CC210894	CC210895	CC210896	CC210897	CC210898	CC210899
Dicranota	20	20	80	17	20	80	40	40	40	60	0	0	80
| Family: Limoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Eloeophila	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexatoma	100	0	0	0	20	40	20	0	0	0	40	0	0
Rhabdomastix	0	20	0	0	0	0	0	0	0	0	0	20	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Hymenoptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	167	0	20	0	0	0	0	20	0	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	0	20	0	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	20	0	0	0	20	0	0	20	20	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	260	380	340	150	520	440	680	340	540	380	1,380	300	260
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	140	80	20	0	40	20	0	0	20	40	80	40	20
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	40	0	17	0	0	20	0	0	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0	0	0	20	0	20
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	60	0	0	0	0
Enchytraeus	60	20	20	33	180	120	80	40	240	80	0	0	40
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**16,720**	**7,940**	**7,160**	**10,533**	**9,360**	**9,360**	**11,800**	**7,300**	**7,940**	**11,180**	**25,880**	**6,800**	**16,140**

Taxa present but not included:													
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	20	0	0	0	0	0	0	0	0
| Order: Psocodea	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	0	20	0	0	0	0	0	20	20	0	0	20
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	20	0	0	0	0	0	0	0	0	0	20	0	0
Phylum: Nemata	20	20	20	17	0	20	20	20	0	0	20	20	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	0	20	17	20	20	20	20	0	0	0	0	0
Totals:	**80**	**20**	**60**	**34**	**40**	**40**	**40**	**40**	**20**	**20**	**40**	**20**	**40**

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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FODPO_BIC-1	RG_FODPO_BIC-2	RG_FODPO_BIC-3	RG_FO22_BIC-1	RG_FO22_BIC-2	RG_FO22_BIC-3	RG_FO22_BIC-4	RG_FO22_BIC-5	RG_FOUEW_BIC-1	RG_FOUEW_BIC-2	RG_FOUEW_BIC-3	RG_FOBCP_BIC-1	RG_FOBCP_BIC-2	RG_FOBCP_BIC-3
Sample Collection Date:	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20
CC#:	CC210900	CC210901	CC210902	CC210903	CC210904	CC210905	CC210906	CC210907	CC210908	CC210909	CC210910	CC210911	CC210912	CC210913
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	20	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	100	320	60	60	80	80	80	120	20	20	0	40	80	60
Acentrella	20	0	0	20	20	20	40	20	0	0	0	0	0	0
Baetis	260	240	120	60	100	80	160	140	240	160	160	460	480	200
Baetis fuscatus gr.	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis rhodani group	460	780	440	240	340	500	620	800	160	0	180	300	180	180
| Family: Ephemerellidae	360	440	220	180	160	280	220	280	220	200	160	660	920	200
Drunella	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drunella grandis group	0	20	20	0	20	80	20	80	0	0	0	0	0	0
Drunella coloradensis	0	0	20	0	0	0	0	0	0	0	0	0	0	0
Drunella doddsii	60	60	0	40	0	40	20	20	40	0	60	20	80	20
Drunella spinifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella	0	0	0	0	0	0	0	0	0	0	0	0	20	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0	0	20	0	0	0	0
Ephemerella tibialis	20	20	20	20	0	40	60	20	0	0	0	0	0	0
| Family: Heptageniidae	1,860	1,560	1,140	580	660	600	540	220	440	420	1,120	1,560	2,840	1,080
Cinygmula	0	20	20	0	20	0	0	0	0	0	0	0	0	0
Epeorus	40	60	60	20	40	20	0	0	0	0	20	0	0	0
Rhithrogena	40	0	0	0	20	0	20	40	0	0	0	0	80	0
| Order: Plecoptera	20	40	0	0	0	0	0	0	0	0	20	0	0	0
| Family: Capniidae	540	460	200	120	140	300	300	160	40	120	0	60	160	60
Mesocapnia	340	180	140	140	60	160	80	60	0	0	0	0	0	0
Utacapnia	0	0	0	0	0	20	0	20	0	0	0	0	0	0
| Family: Chloroperlidae	0	0	20	100	80	0	100	0	40	20	0	20	60	0
Haploperla	60	20	0	0	20	20	0	0	0	0	0	0	0	0
Suwallia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweltsa	0	140	20	40	60	20	20	20	60	40	20	0	0	0
| Family: Leuctridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paraleuctra	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	260	1,260	420	100	120	180	300	120	20	0	40	520	60	40
Malenka	0	40	0	0	0	40	20	0	0	20	0	0	0	0
Zapada	2,580	9,880	2,620	600	1,700	2,540	2,800	1,400	1,680	1,920	1,580	1,160	1,500	1,460
Zapada oregonensis group	40	140	60	40	140	60	140	120	60	120	120	20	60	20
Zapada cinctipes	120	320	80	40	180	740	420	260	60	100	100	360	0	160
Zapada columbiana	0	0	0	0	0	0	0	0	40	40	140	0	20	0
| Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Perlidae	40	0	20	0	0	0	0	0	0	40	0	0	80	40
Hesperoperla	60	80	0	0	40	0	0	0	80	0	0	20	40	60
| Family: Perlodidae	720	1,220	1,020	360	940	1,240	1,280	780	500	960	640	640	240	220
Isoperla	460	620	360	460	520	940	1,060	460	0	0	0	0	0	0
Kogotus	200	520	200	60	440	220	480	220	240	100	140	220	280	100
Megarcys	200	20	20	40	20	20	40	0	60	40	20	160	0	0
| Family: Taeniopterygidae	1,620	360	140	780	400	60	600	120	20	20	240	660	440	80
Taenionema	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	140	40	0	0	80	140	120	160	120	100	0	20	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apatania	80	60	80	0	20	240	0	160	0	20	0	20	0	40
Pedomoecus sierra	0	0	0	0	0	0	0	40	0	20	20	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	40	0	20	0	0	80
| Family: Glossosomatidae	0	0	40	20	240	520	100	240	40	0	40	0	20	0
Anagapetus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosoma	60	0	20	140	180	440	200	800	0	0	0	0	0	20
| Family: Hydropsychidae	20	20	0	0	0	0	0	0	120	20	200	140	120	80
Arctopsyche	0	0	0	0	0	0	0	0	0	0	0	0	40	20
Parapsyche	0	0	0	0	0	0	0	0	0	0	0	20	0	0
Parapsyche elsis	0	0	0	0	0	0	0	0	40	0	0	60	40	20
| Family: Hydroptilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	20	60	40	120	180	1,080	260	460	40	0	0	0	0	0
Dicosmoecus	0	0	0	0	0	0	0	0	20	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	120	80	140	0	60	0	40	0	200	360	220	220	120	80

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Sample:	RG_FODPO_BIC-1	RG_FODPO_BIC-2	RG_FODPO_BIC-3	RG_FO22_BIC-1	RG_FO22_BIC-2	RG_FO22_BIC-3	RG_FO22_BIC-4	RG_FO22_BIC-5	RG_FOUEW_BIC-1	RG_FOUEW_BIC-2	RG_FOUEW_BIC-3	RG_FOBCP_BIC-1	RG_FOBCP_BIC-2	RG_FOBCP_BIC-3
Sample Collection Date:	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20
CC#:	CC210900	CC210901	CC210902	CC210903	CC210904	CC210905	CC210906	CC210907	CC210908	CC210909	CC210910	CC210911	CC210912	CC210913
Rhyacophila angelita group	80	20	20	0	0	0	60	0	0	0	0	0	0	0
Rhyacophila betteni group	40	0	20	20	0	0	0	0	0	0	0	0	0	0
Rhyacophila brunnea/vemna group	240	80	120	80	140	60	280	80	200	360	260	40	20	0
Rhyacophila hyalinata group	0	0	0	0	0	0	0	0	0	0	20	20	60	0
Rhyacophila vofixa group	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila atrata complex	20	20	60	80	60	80	40	80	140	60	40	0	40	0
Rhyacophila narvae	80	100	280	60	20	0	40	20	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	0	0	0	0	0	0	20	0	20	0
| Family: Uenoidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Coleoptera	300	0	0	0	0	0	0	5,600	0	0	0	0	0	0
| Family: Elmidae	160	280	180	820	1,080	2,340	2,000	1,700	280	360	160	0	0	0
Heterlimnius	140	380	360	2,540	2,160	3,060	3,400	3,900	740	480	440	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	20	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0	40	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	60	40	20	0	0	0	100	20	20	0	0	0	60	0
| Family: Chironomidae	520	1,580	1,080	120	1,260	400	1,260	300	420	280	200	160	60	100
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	0	20	0	0	0	20	0	0	0	40
Constempellina sp. C	0	0	0	0	0	0	0	0	0	0	0	20	20	0
Micropsectra	0	20	40	0	0	60	0	0	20	0	20	0	40	20
Paratanytarsus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	0	0	0	20	0	0	0	0	0
Pagastia	80	280	140	0	20	40	40	60	100	100	0	20	0	60
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	20	0	0	0	0	0	0	0	0	0	0	0	20
Brillia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diplocladius cultriger	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella	380	820	920	80	780	160	800	280	380	120	400	0	0	40
Hydrobaenus	0	0	20	20	0	0	0	0	0	40	20	0	0	20
Limnophyes	0	20	20	0	40	20	40	40	60	40	20	0	0	0
Orthocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	180
Orthocladius complex	1,380	2,760	1,600	140	1,380	640	1,820	500	1,120	900	700	820	480	0
Orthocladius lignicola	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parametriocnemus	0	0	0	0	0	0	20	0	0	0	0	0	0	0
Parorthocladius	20	80	80	0	0	60	0	20	40	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	20	0	0	0	20	60	0	0	0
Thienemanniella	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Tvetenia	320	700	400	40	220	240	220	120	100	0	100	40	160	80
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	40	40	0	0	0	0	0	0	20	0	0	20	20	20
| Family: Empididae	20	20	80	0	0	0	140	20	40	20	0	0	40	40
Clinocera	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clinocerinae Unknown Genus A	0	0	20	0	0	0	0	0	0	0	0	0	0	0
Neoplasta	100	220	180	0	120	60	40	40	140	160	140	0	20	20
Oreogeton	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	0	0	0	0	0	0	20	20	0
| Family: Muscidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0	0	40	20	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	120	540	360	0	260	180	100	60	100	260	40	1,560	1,020	1,820
| Family: Simuliidae	0	20	20	0	20	0	0	0	20	0	40	0	0	0
Simulium	0	220	100	80	40	0	100	0	40	60	80	0	0	0
| Family: Tipulidae	0	40	0	0	0	0	0	0	20	0	20	0	0	0
Antocha	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FODPO_BIC-1	RG_FODPO_BIC-2	RG_FODPO_BIC-3	RG_FO22_BIC-1	RG_FO22_BIC-2	RG_FO22_BIC-3	RG_FO22_BIC-4	RG_FO22_BIC-5	RG_FOUEW_BIC-1	RG_FOUEW_BIC-2	RG_FOUEW_BIC-3	RG_FOBCP_BIC-1	RG_FOBCP_BIC-2	RG_FOBCP_BIC-3
Sample Collection Date:	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	11-Sep-20	16-Sep-20	16-Sep-20	16-Sep-20
CC#:	CC210900	CC210901	CC210902	CC210903	CC210904	CC210905	CC210906	CC210907	CC210908	CC210909	CC210910	CC210911	CC210912	CC210913
Dicranota	120	120	40	20	80	80	60	240	20	40	40	60	180	0
| Family: Limoniidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eloeophila	0	0	20	0	0	0	40	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	20	0	0	0	0	0	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula	60	0	20	0	40	40	20	40	20	0	0	0	0	0
| Order: Hymenoptera	0	0	0	0	0	0	20	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	20	100	20	0	80	20	0	0	0	0	0	0	20	0
| Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aturus	0	40	0	20	0	40	0	0	40	0	0	0	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feltria	0	20	0	0	0	0	0	0	0	20	0	0	20	20
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	180	580	560	60	120	420	160	180	220	500	100	820	480	420
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	0	20	60	0	0	20	0	0	60	20	0	0	0	100
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0	20	20	0	40	0
Torrenticola	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Oribatida	0	20	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	20	0	20	0	0	60	0	40	20	0	0	0	0	0
Pisidium	0	0	0	20	0	160	0	80	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	60	0	0	0	0	0
Enchytraeus	40	40	40	0	40	0	20	0	0	0	0	20	240	200
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	20	0	0	0
Nais	0	0	0	20	120	120	300	100	160	280	0	0	0	0
Totals:	**15,520**	**28,360**	**14,660**	**8,600**	**15,180**	**19,120**	**21,260**	**20,860**	**9,260**	**9,080**	**8,240**	**10,980**	**11,060**	**7,520**

Taxa present but not included:														
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Psocodea	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	0	20	20	20	0	0	0	0	20	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	0	0	20	0	0	0	0	0	20	0	0	0	0
Phylum: Nemata	20	20	20	20	20	20	20	20	0	0	20	0	20	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	0	20	20	20	20	20	0	20	20	0	20	0
Totals:	**80**	**60**	**20**	**80**	**60**	**60**	**40**	**40**	**0**	**40**	**60**	**0**	**40**	**0**

Project: FRO LAEMP (20-09) #3
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCP_BIC-4	RG_FOBCP_BIC-5	RG_FRCP1SW_BIC-1	RG_FRCP1SW_BIC-2	RG_FRCP1SW_BIC-3	RG_FO26_BIC-1	RG_FO26_BIC-2	RG_FO26_BIC-3
Sample Collection Date:	16-Sep-20	16-Sep-20	22-Sep-20	22-Sep-20	22-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20
CC#:	CC210914	CC210915	CC210916	CC210917	CC210918	CC210919	CC210920	CC210921
Phylum: Arthropoda	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0
Ameletus	0	20	0	0	0	60	0	0
| Family: Baetidae	0	180	0	0	0	100	0	220
Acentrella	0	0	0	0	0	0	0	0
Baetis	780	860	740	360	10	2,360	5,460	2,900
Baetis fuscatus gr.	0	0	0	0	0	0	0	0
Baetis rhodani group	320	260	80	20	0	40	40	1,420
| Family: Ephemerellidae	560	640	0	100	0	5,360	6,580	4,160
Drunella	0	0	20	0	0	0	20	0
Drunella grandis group	0	0	0	0	0	0	0	0
Drunella coloradensis	0	0	0	0	0	0	0	0
Drunella doddsii	40	60	20	100	10	420	440	640
Drunella spinifera	0	0	0	20	20	0	0	0
Ephemerella	0	0	0	0	0	0	0	0
Ephemerella excrucians complex	0	0	0	0	0	0	0	0
Ephemerella tibialis	0	0	0	0	0	0	0	0
| Family: Heptageniidae	3,000	3,320	2,380	2,520	1,020	6,820	6,540	6,300
Cinygmula	0	0	0	0	0	0	0	0
Epeorus	0	0	0	0	0	60	0	80
Rhithrogena	0	20	60	80	20	100	20	140
| Order: Plecoptera	80	120	60	80	0	0	220	0
| Family: Capniidae	240	120	240	260	100	0	80	0
Mesocapnia	0	0	0	0	0	0	0	0
Utacapnia	0	0	0	0	0	0	0	0
| Family: Chloroperlidae	20	0	0	20	10	140	60	120
Haploperla	0	0	0	0	0	0	0	0
Suwallia	0	0	0	0	0	40	20	0
Sweltsa	0	0	20	20	0	500	200	160
| Family: Leuctridae	0	0	20	20	0	40	20	40
Paraleuctra	0	0	0	0	0	40	0	20
| Family: Nemouridae	180	140	240	20	0	360	860	160
Malenka	0	0	0	0	0	0	0	0
Zapada	2,260	6,040	2,320	1,920	220	5,500	2,380	2,920
Zapada oregonensis group	20	60	120	60	0	820	660	360
Zapada cinctipes	1,140	200	2,300	2,500	220	0	0	0
Zapada columbiana	0	20	60	80	0	700	540	440
| Family: Peltoperlidae	0	0	0	0	0	20	0	0
| Family: Perlidae	20	220	40	60	0	0	0	0
Hesperoperla	20	0	0	40	0	0	0	0
| Family: Perlodidae	680	1,300	480	600	70	140	180	20
Isoperla	0	0	900	0	0	0	0	0
Kogotus	40	160	140	300	140	160	300	260
Megarcys	100	40	0	80	0	200	200	140
| Family: Taeniopterygidae	1,460	1,340	4,300	2,260	40	740	600	560
Taenionema	0	0	0	2,040	50	0	0	0
| Order: Trichoptera	0	0	0	20	10	200	120	440
| Family: Apataniidae	0	0	0	0	0	0	0	0
Apatania	0	20	320	460	340	0	0	0
Pedomoecus sierra	0	0	0	0	0	0	0	0
| Family: Brachycentridae	100	180	240	140	10	0	0	0
| Family: Glossosomatidae	0	0	0	20	0	0	20	0
Anagapetus	0	0	0	0	0	0	0	0
Glossosoma	0	0	0	20	0	0	0	0
| Family: Hydropsychidae	40	80	0	0	0	1,680	2,100	1,360
Arctopsyche	160	180	100	80	0	0	0	0
Parapsyche	0	0	0	0	0	0	0	0
Parapsyche elsis	20	0	0	20	0	180	200	60
| Family: Hydroptilidae	0	0	0	0	0	0	0	0
Hydroptila	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	20	20	40
Dicosmoecus	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0
Rhyacophila	220	180	320	280	50	140	80	20

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Site:	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCP_BIC-4	RG_FOBCP_BIC-5	RG_FRCP1SW_BIC-1	RG_FRCP1SW_BIC-2	RG_FRCP1SW_BIC-3	RG_FO26_BIC-1	RG_FO26_BIC-2	RG_FO26_BIC-3
Sample Collection Date:	16-Sep-20	16-Sep-20	22-Sep-20	22-Sep-20	22-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20
CC#:	CC210914	CC210915	CC210916	CC210917	CC210918	CC210919	CC210920	CC210921
Rhyacophila angelita group	0	0	0	0	0	0	0	0
Rhyacophila betteni group	0	0	0	0	0	0	0	40
Rhyacophila brunnea/vemna group	40	0	0	0	0	0	0	0
Rhyacophila hyalinata group	40	0	0	20	0	200	200	120
Rhyacophila vofixa group	0	0	0	0	0	60	80	100
Rhyacophila atrata complex	0	0	0	0	0	0	20	40
Rhyacophila narvae	0	0	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0
Oligophlebodes	0	0	0	0	30	0	0	0
| Family: Uenoidae	0	0	0	0	0	0	0	0
Neothremma	0	0	0	0	0	0	0	0
| Order: Coleoptera	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0
Heterlimnius	0	0	0	60	0	0	0	0
| Family: Staphylinidae	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	20	0	0	0	0
Bezzia/ Palpomyia	0	0	0	0	0	0	0	0
Mallochohelea	40	80	0	80	0	40	100	100
| Family: Chironomidae	180	120	40	0	0	80	160	140
| Subfamily: Chironominae	0	0	0	0	0	20	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	60	0	0
| Tribe: Tanytarsini	0	0	0	0	0	140	100	240
Constempellina sp. C	0	0	0	0	0	0	0	0
Micropsectra	0	20	0	0	0	120	260	260
Paratanytarsus	0	0	0	0	0	0	0	0
Stempellinella	0	0	0	0	0	0	0	20
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0
Diamesa	0	0	0	0	0	620	320	340
Pagastia	60	80	0	40	10	420	420	340
Pseudodiamesa	0	0	0	0	0	0	0	20
| Subfamily: Orthocladiinae	0	0	0	0	0	20	0	0
Brillia	0	0	0	0	0	40	80	0
Corynoneura	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	0	0	0	40	0	20
Diplocladius cultriger	0	0	0	0	0	0	0	0
Eukiefferiella	60	80	20	0	0	60	20	0
Hydrobaenus	0	0	0	0	0	0	80	100
Limnophyes	0	0	0	0	10	0	0	0
Orthocladius	0	0	0	0	0	0	0	0
Orthocladius complex	700	720	40	0	10	1,860	1,220	1,860
Orthocladius lignicola	0	0	0	0	0	0	0	20
Parametriocnemus	0	0	0	0	0	0	0	0
Parorthocladius	0	0	0	0	0	0	0	0
Rheocricotopus	0	0	0	0	0	0	20	0
Thienemanniella	0	0	0	0	0	0	0	0
Tvetenia	160	180	40	0	0	100	260	40
| Subfamily: Tanypodinae	20	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0
Thienemannimyia group	20	40	40	0	20	0	0	0
| Family: Empididae	20	20	0	0	0	0	0	0
Clinocera	0	0	0	0	0	0	0	0
Clinocerinae Unknown Genus A	0	0	0	0	0	0	0	0
Neoplasta	0	0	0	0	10	0	0	0
Oreogeton	0	0	0	0	0	20	20	0
Wiedemannia	0	0	20	40	0	0	0	0
| Family: Muscidae	0	0	0	0	0	0	0	0
Limnophora	0	0	0	0	0	0	0	0
| Family: Pelecorhynchidae	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	2,120	1,720	760	1,500	810	1,380	2,420	2,380
| Family: Simuliidae	0	0	0	0	0	20	0	0
Simulium	0	20	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	0	0	20	0
Antocha	0	0	0	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FOBCP_BIC-4	RG_FOBCP_BIC-5	RG_FRCP1SW_BIC-1	RG_FRCP1SW_BIC-2	RG_FRCP1SW_BIC-3	RG_FO26_BIC-1	RG_FO26_BIC-2	RG_FO26_BIC-3
Sample Collection Date:	16-Sep-20	16-Sep-20	22-Sep-20	22-Sep-20	22-Sep-20	17-Sep-20	17-Sep-20	17-Sep-20
CC#:	CC210914	CC210915	CC210916	CC210917	CC210918	CC210919	CC210920	CC210921
Dicranota	200	80	20	60	20	60	0	0
| Family: Limoniidae	0	0	0	0	0	0	0	0
Eloeophila	0	0	0	0	0	0	0	0
Hexatoma	0	0	0	0	0	0	0	0
Rhabdomastix	0	0	0	0	0	0	0	0
Tipula	0	0	0	0	0	0	0	0
| Order: Hymenoptera	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	20	40	20
| Family: Aturidae	0	0	0	0	0	0	0	0
Aturus	0	0	0	0	0	20	0	0
| Family: Feltriidae	0	0	0	0	0	0	0	0
Feltria	0	0	40	0	10	60	40	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0
Atractides	0	0	0	0	0	0	0	0
Hygrobates	0	0	0	0	10	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0
Lebertia	500	820	160	120	10	320	220	260
| Family: Sperchontidae	0	0	0	0	0	0	0	0
Sperchon	40	40	40	0	0	400	540	440
| Family: Torrenticolidae	0	0	0	0	0	0	0	0
Testudacarus	20	20	0	20	0	0	0	0
Torrenticola	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	0	0	0	0
| Order: Sarcoptiformes	0	0	0	0	0	0	0	0
| Order: Oribatida	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0
Pisidium	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0
Enchytraeus	280	120	20	40	20	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0
Totals:	**16.000**	**19.920**	**16.760**	**16.600**	**3.310**	**33.120**	**34.600**	**29.880**

Taxa present but not included:								
Phylum: Arthropoda	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0
| Family: Cecidomyiidae	0	0	0	0	10	0	0	0
| Order: Psocodea	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	0	20	10	20	20	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0
| Family: Lumbricidae	0	20	0	0	0	0	0	0
Phylum: Nemata	20	0	0	0	10	20	20	20
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	0	20	20	10	0	20	0
Totals:	**60**	**40**	**20**	**40**	**40**	**40**	**60**	**20**

BENTHIC COMMUNITY

Cordillera Methods, QC Report, and Raw Data

DECEMBER

Methods and QC Report 2021

Project ID: FROLAEMP (20-09) #4

Client: Minnow Environmental

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Table of Contents

Sample Reception

On December 16, 2020, Cordillera Consulting received 21 benthic samples from Minnow Environmental. When samples arrived to Cordillera Consulting, exterior packaging was initially inspected for damage or wet spots that would have indicated damage to the interior containers.

Samples were logged into a proprietary software database (INSTAR1) where the clients assigned sample name was recorded along with a Cordillera Consulting (CC) number for cross-reference. Each sample was checked to ensure that all sites and replicates recorded on field sheets or packing lists were delivered intact and with adequate preservative. Any missing, mislabelled or extra samples were reported to the client immediately to confirm the total numbers and correct names on the sample jars. The client representative was notified of the arrival of the shipment and provided a sample inventory once intake was completed.
See table below for sample inventory:

Table 1: Summary of sample information including Cordillera Consulting (CC) number

Sample	CC#	Date	Size	# of Jars
RG_UFR1_BIC-01_2020-12-08	CC211616	12/8/2020	400µM	2
RG_UFR1_BIC-02_2020-12-08	CC211617	12/8/2020	400µM	1
RG_UFR1_BIC-03_2020-12-08	CC211618	12/8/2020	400µM	1
RG_FOUKI_BIC-01_2020-12-09	CC211619	12/9/2020	400µM	1
RG_FOUKI_BIC-02_2020-12-09	CC211620	12/9/2020	400µM	1
RG_FOUKI_BIC-03_2020-12-09	CC211621	12/9/2020	400µM	1
RG_SCOUTDS_BIC-01_2020-12-07	CC211622	12/7/2020	400µM	1
RG_SCOUTDS_BIC-02_2020-12-07	CC211623	12/7/2020	400µM	2
RG_SCOUTDS_BIC-03_2020-12-07	CC211624	12/7/2020	400µM	1
RG_FOBSC_BIC-01_2020-12-07	CC211625	12/7/2020	400µM	1
RG_FOBSC_BIC-02_2020-12-07	CC211626	12/7/2020	400µM	1
RG_FOBSC_BIC-03_2020-12-07	CC211627	12/7/2020	400µM	1
RG_FRUPO_BIC-01_ 2020-12-10	CC211628	12/10/2020	400µM	1
RG_FRUPO_BIC-02_2020-12-10	CC211629	12/10/2020	400µM	1
RG_FRUPO_BIC-03_ 2020-12-10	CC211630	12/10/2020	400µM	1
RG_FODPO_BIC-01_2020-12-09	CC211631	12/9/2020	400µM	1
RG_FODPO_BIC-02_2020-12-09	CC211632	12/9/2020	400µM	1
RG_FODPO_BIC-03_2020-12-09	CC211633	12/9/2020	400µM	2
RG_FOUEW_BIC-01_2020-12-10	CC211634	12/10/2020	400µM	1
RG_FOUEW_BIC-02_2020-12-10	CC211635	12/10/2020	400µM	1
RG_FOUEW_BIC-03_2020-12-10	CC211636	12/10/2020	400µM	1

Sample Sorting

- Using a gridded Petri dish, fine forceps and a low power stereo-microscope (Olympus, Nikon, Leica) the sorting technicians removed the invertebrates and sorted them into family/orders.
- The sorting technician kept a running tally of total numbers excluding organisms from Porifera, Nemata, Platyhelminthes, Ostracoda, Copepoda, Cladocera and terrestrial drop-ins such as aphids. These organisms were marked for their presence (given a value of 1) only and left in the sample. They were not included towards the 300-organism subsample count.
- Where specimens are broken or damaged, only heads were counted.
- Subsampling was conducted with the use of a Marchant Box.
- When using the Marchant box, cells were extracted at the same time in the order indicated by a random number table. If the 300th organism was found part way into sorting a cell then the balance of that cell was sorted. If the organism count had not reached 300 by the 50th cell then the entire sample was sorted.
- The total number of cells sorted and the number of organisms removed were recorded manually on a bench sheet and then recorded into INSTAR1
- Organisms were stored in vials containing 80% ethanol and an interior label indicating the site names, date of sampling, site code numbers and portion subsampled. This information was also recorded on the laboratory bench sheet and on INSTAR1.
- The sorted portion of the debris was preserved and labeled separately from the unsorted portion and was tested for sorting efficiency (Sorting Quality Control – Sorting Efficiency). The unsorted portion was also labeled and preserved in separate jars.

Percent sub-sampled and total countable invertebrates pulled from the samples were summarized in the table below.

Table 2: Percent sub-sample and invertebrate count for each sample

Sample	Date	CC#	400 micron fraction	
			% Sampled	# Invertebrates
RG_UFR1_BIC-01_2020-12-08	08-Dec-20	CC211616	5%	1736
RG_UFR1_BIC-02_2020-12-08	08-Dec-20	CC211617	5%	1168
RG_UFR1_BIC-03_2020-12-08	08-Dec-20	CC211618	5%	1296
RG_FOUKI_BIC-01_2020-12-09	09-Dec-20	CC211619	5%	767
RG_FOUKI_BIC-02_2020-12-09	09-Dec-20	CC211620	5%	735
RG_FOUKI_BIC-03_2020-12-09	09-Dec-20	CC211621	5%	361
RG_SCOUTDS_BIC-01_2020-12-07	07-Dec-20	CC211622	5%	1174
RG_SCOUTDS_BIC-02_2020-12-07	07-Dec-20	CC211623	5%	700
RG_SCOUTDS_BIC-03_2020-12-07	07-Dec-20	CC211624	5%	655
RG_FOBSC_BIC-01_2020-12-07	07-Dec-20	CC211625	20%	463
RG_FOBSC_BIC-02_2020-12-07	07-Dec-20	CC211626	20%	338
RG_FOBSC_BIC-03_2020-12-07	07-Dec-20	CC211627	17%	344

RG_FRUPO_BIC-01_ 2020-12-10	10-Dec-20	CC211628	5%	1560
RG_FRUPO_BIC-02_2020-12-10	10-Dec-20	CC211629	5%	786
RG_FRUPO_BIC-03_ 2020-12-10	10-Dec-20	CC211630	5%	994
RG_FODPO_BIC-01_2020-12-09	09-Dec-20	CC211631	5%	2327
RG_FODPO_BIC-02_2020-12-09	09-Dec-20	CC211632	5%	3489
RG_FODPO_BIC-03_2020-12-09	09-Dec-20	CC211633	5%	2442
RG_FOUEW_BIC-01_2020-12-10	10-Dec-20	CC211634	5%	387
RG_FOUEW_BIC-02_2020-12-10	10-Dec-20	CC211635	5%	859
RG_FOUEW_BIC-03_2020-12-10	10-Dec-20	CC211636	5%	651

Sorting Quality Control - Sorting Efficiency

As a part of Cordillera's laboratory policy, all projects undergo sorting efficiency checks.

- As sorting progresses, 10% of samples were randomly chosen by senior members of the sorting team for resorting.
- All sorters working on a project had at least 1 sample resorted by another sorter.
- An efficiency of 90 % was expected (95% for CABIN samples).
- If 90/95% efficiency was not met, samples from that sorter were resorted.
- To calculated sorting efficiency the following formula was used:

$$\frac{\#OrganismsMissed}{TotalOrganismsFound} * 100 = \%OM$$

Table 3 Summary of sorting efficiency

			Total from Sample	Percent Efficiency
Site - QC, Sample - QC1, CC# - CC211618, Percent sampled = 5%, Sieve size = 400				
Plecoptera		2		
	Total:	**2**	**1296**	**100%**
Site - QC, Sample - QC2, CC# - CC211635, Percent sampled = 5%, Sieve size = 400				
Plecoptera		1		
	Total:	**1**	**859**	**100%**

Sorting Quality Control - Sub-Sampling QC

Certain Provincial and Mining projects require additional sorting checks in the form of sub-sampling QC, (Environmental Effects Monitoring (EEM) protocol). This ensured that any fraction of the total sample that was examined was actually an accurate representation of the number of total organisms. Organisms from the additional sub-samples were not identified; rather total organism count only was compared.

Sub-Sampling efficiency was measured on 10% of the number of sub-sampled samples in the project. Ex. In a project where 50 of 100 total samples were processed through subsampling using a Marchant box, then 10% of 50; or 5 samples were used for sub sampling efficiency.

Sub-Sampling efficiency was performed by fractioning the entire sample into sub-sample percentages. On each sub-sampled portion, a total organism count was recorded and compared to the rest of the sub-samples. In order to pass, all fractions were required to be within 20% of total organism count.

Example: If 300 organisms are found in 10% of the sample, the sorter will continue to sample in 10% fractions until the entire sample is separated. They will then count the total number of organisms in each of the 10 fractions of 10% and compare the organism count.

When divergence is >20% the sorting manager examines for the source of the problem and takes steps to correct it. With the Marchant box, the problem typically rested with how the box is flipped back to the upright position. For this reason, subsampling was performed by experienced employees only. Another common source of error would be the type of debris in the sample. Samples with algae or heavy with periphyton have a higher incident of failure due to clumping than clear samples.

Table 4 Summary of Sub Sample efficiency

Station ID		Organisms in Subsample																			Sorter		Actual Total	Precision		Accuracy	
CC#	Sample Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	By	Time		Percent Range		Min	Max
211626	2020_RG-FOBSC_BIC-2	332	337	348	346	371																JH	190	1734	0.57	10.51	0.23	6.98
211625	2020_RG_FOBSC_BIC-01	459	430	420	441	396																CM	190	2146	2.33	13.73	0.19	7.74

Taxonomic Effort

The next procedure was the identification to genus-species level where possible of all the organisms in the sample.

- Identifications were made at the genus/species level for all insect organisms found including Chironomidae (Based on CABIN protocol).
- Non-insect organisms (except those not included in CABIN count) were identified to genus/species where possible and to a minimum of family level with intact and mature specimens.
- The Standard Taxonomic Effort lists compiled by the CABIN manual[1], SAFIT[2] , and PNAMP[3] were used as a guide line for what level of identification to achieve where the condition and maturity of the organism enabled.
- Organisms from the same families/order were kept in separate vials with 80% ethanol and an interior label of printed laser paper.
- Chironomidae was identified to genus/species level where possible and was aided by slide mounts. CMC-10 was used to clear and mount the slide.
- Oligochaetes was identified to family/genus level with the aid of slide mounts. CMC-10 was used to clear and mount the slide.
- Other Annelida (leeches, polychaetes) were identified to the family/genus/species level with undamaged, mature specimens.
- Mollusca was identified to family and genus/species where possible
- Decapoda, Amphipoda and Isopoda were identified at family/genus/species level where possible.
- Bryozoans and Nemata remained at the phylum level
- Hydrachnidae and Cnidaria were identified at the family/genus level where possible.
- When requested, reference collections were made containing at least one individual from each taxa listed. Organisms represented will have been identified to the lowest practical level.
- Reference collection specimens were stored in 55 mm glass vials with screw-cap lids with polyseal inserts (museum quality). They were labeled with taxa name, site code, date identified and taxonomist name. The same information was applied to labels on the slide mounts.

Taxonomists

The taxonomists for this project were certified by the Society of Freshwater Science (SFS) Taxonomic Certification Program at level 2 which is the required certification for CABIN projects:

Scott Finlayson: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae (East/West); Group 4 Oligochaeta

Adam Bliss: Group 1 General Arthropods (East/West); Group 2 EPT (East/West); Group 3 Chironomidae
Rita Avery: Group 1 General Arthropods (East/West); Group 2 EPT (East/West)

Taxonomic QC

Taxonomic QC was performed in house by someone other than the original taxonomist.

- Quality control protocol involved complete, blind re-identification and re-enumeration of at least 10% of samples by a second SFS-certified taxonomist.
- Samples for taxonomic quality control were randomly selected and quality control procedures were conducted as the project progresses through the laboratories.

- The second (QC) taxonomist will calculate and record four types of errors:
    1. Misidentification error
    2. Enumeration error
    3. Questionable taxonomic resolution error
    4. Insufficient taxonomic resolution error

The QC coordinator then calculates the following estimates of taxonomic precision.

1. The percent total identification error rate is calculated as:

$$\frac{Sum\ of\ incorrect\ identifications}{total\ organisms\ counted\ in\ audit} * (100)$$

The average total identification error rate of audited samples did not exceed 5%. All samples that exceed a 5% error rate were re-evaluated to determine whether repeated errors or patterns in error contributed.

2. The percent difference in enumeration (PDE) to quantify the consistency of specimen counts.

$$PDE = \frac{|n_1 - n_2|}{n_1 + n_2} x100$$

3. The percent taxonomic disagreement (PTD) to quantify the shared precision between two sets of identifications.

$$PTD = \left(1 - \left[\frac{a}{N}\right]\right) x100$$

4. Bray Curtis dissimilarity Index to quantify the differences in identifications.

$$BC_{ij} = 1 - \frac{2C_{ij}}{S_j + S_i}$$

Error Summary

All samples report errors within the acceptable limits for CABIN Laboratory methods (less than 5% error).

Table 5 Summary of taxonomic error following QC

Site	Taxa Identified	% Error	PDE	PTD	Bray - Curtis Dissimilarity index
Site - 2020, Sample - RG_FOUKI_BIC-02_2020-12-09, CC# - CC211620, Percent sampled = 5%, Sieve size = 400	735	0.14	0	0.40816327	0.00408163
Site - 2020, Sample - RG_FOUKI_BIC-03_2020-12-09, CC# - CC211621, Percent sampled = 5%, Sieve size = 400	362	0.00	0.13831259	0.82872928	0.00691563

There will always be disagreements between taxonomists regarding the degree of taxonomic resolution in immature specimens and when laboratories make use of different keys for certain groups (Mollusks is an especially disputed group). It is always possible that some taxa found by the original taxonomist were overlooked in QC.

All of the Taxonomic QC samples that were observed passed testing according to the CABIN misidentification protocols. See the tables below for results from taxonomic QC audit.

Error Rationale

Site - 2020, Sample - RG_FOUKI_BIC-02_2020-12-09, CC# - CC211620, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Ameletus	1	1						
Arctopsyche	1	1						
Baetidae	3	3						
Baetis	37	38	No			X		
Baetis rhodani group	32	31	No			X		

Capniidae	5	5						
Chloroperlidae	1	1						
Cinygmula	4	4						
Drunella doddsii	1	1						
Empididae	1	1						
Ephemerellidae	6	6						
Eukiefferiella	89	90	No			X		
Heptageniidae	140	140						
Hydropsychidae	2	2						
Kogotus	1	1						
Lebertia	6	6						
Mallochohelea	2	2						
Megarcys	3	3						
Micropsectra	5	5						
Nemouridae	177	178	No			X		
Oligophlebodes	1	1						
Orthocladius complex	16	16						
Pagastia	27	27						
Parapsyche elsis	1	1						
Pericoma/Telmatoscopus	53	52	No			X		
Perlidae	1	1						
Perlodidae	1	1						
Plecoptera	3	3						
Rhithrogena	2	2						
Rhyacophila	1	1						
Rhyacophila hyalinata group	1	1						
Simulium	1	1						
Sperchon	2	2						
Sweltsa	1	1						
Taeniopterygidae	5	5						
Thienemannimyia group	6	6						
Tipulidae	1	1						
Tvetenia	21	20	No	1		X		
Wiedemannia	3	3						
Zapada	57	57						
Zapada cinctipes	9	9						
Zapada columbiana	4	4						
Zapada oregonensis group	1	1						

Total:	735	735						
					0	6	0	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.14	Pass				
Site - 2020, Sample - RG_FOUKI_BIC-03_2020-12-09, CC# - CC211621, Percent sampled = 5%, Sieve size = 400	Laboratory Count	QC Audit Count	Agreement	Misidentification	Questionable Taxonomic Resolution	Enumeration	Insufficient Taxonomic Resolution	Comments
Baetis	38	37	No			X		
Baetis rhodani group	10	11	No			X		
Brillia	1	1						
Capniidae	7	7						
Chloroperlidae	2	2						
Dicranota	3	3						
Drunella doddsii	1	1						
Empididae	1	1						
Empididae	1	1						
Ephemerellidae	6	6						
Eukiefferiella	58	58						
Heptageniidae	3	3						
Hydrobaenus	1	1						
Lebertia	1	1						
Lepidostoma	1	1						
Megarcys	1	1						
Micropsectra	4	4						
Nemouridae	120	121	No			X		
Orthocladius complex	7	7						
Pagastia	14	14						
Parapsyche	1	1						
Parapsyche elsis	1	1						
Pericoma/Telmatoscopus	27	27						
Perlodidae	2	2						
Rhithrogena	4	4						
Rhyacophila	4	4						
Rhyacophila hyalinata group	3	3						
Sperchon	1	1						
Sweltsa	1	1						
Taenionema	5	4	No			X		

Taeniopterygidae	2	3	No			X		
Tvetenia	11	11						
Wiedemannia	2	2						
Zapada	15	15						
Zapada cinctipes	1	1						
Zapada columbiana	1	1						
Total:	**361**	**362**						
					0	**5**	**0**	
% Total Misidentification Rate =	misidentifications / total number	x100 =	0.00	**Pass**				

References

[1] McDermott, H., Paull, T., Strachan, S. (May 2014). Laboratory Methods: Processing, Taxonomy, and Quality Control of Benthic Macroinvertebrate Samples, Environment Canada. ISBN: 978-1-100-25417-3

[2] Southwest Association of Freshwater Invertebrate Taxonomists. (2015). www.safit.org

[3] Pacific Northwest Aquatic Monitoring Partnership (Accessed 2015). www.pnamp.org

Taxonomic Keys

Below is a reference list of taxonomic keys utilized by taxonomists at Cordillera Consulting. Cordillera taxonomists routinely seek out new literature to ensure the most accurate identification keys are being utilized. This is not reflective of the exhaustive list of resources that we use for identification. A more complete list of taxonomic resources can be found at Southwest Association of Freshwater Invertebrate Taxonomists. (2015).
http://www.safit.org/Docs/SAFIT_Taxonomic_Literature_Database_1_March_2011.enl

Brook, Arthur R. and Leonard A. Kelton. 1967. Aquatic and semiaquatic Heteroptera of Alberta, Saskatchewan and Manitoba (Hemiptera) Memoirs of the Entomological Society of Canada. No. 51.

Brown HP & White DS (1978) Notes on Seperation and Identification of North
American Riffle Beetles (Coleoptera: Dryopidea: Elmidae).Entomological News 89 (1&2): 1-13

Clifford, Hugh F. 1991. Aquatic Invertebrates of Alberta. University of Alberta Press Edmonton, Alberta.

Epler, John. 2001 The Larval Chironomids of North and South Carolina. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Water Beetles of Florida. http://home.earthlink.net/~johnepler/

Epler, John. Identification Manual for the Aquatic and Semi-aquatic Heteroptera of Florida.
http://home.earthlink.net/~johnepler/

Trond Andersen, Peter S. Cranston & John H. Epler (Eds) (2013) Chironomidae of the Holarctic Region: Keys and DIagnoses. Part 1. Larvae. *Insect Systematics and Evolution Supplements* 66: 1-571.

Jacobus, Luke and Pat Randolph. 2005. Northwest Ephemeroptera Nymphs. Manual from Northwest Biological Assessment Working Group. Moscow Idaho 2005. Not Published.

Jacobus LM, McCafferty WP (2004) Revisionary Contributions to the Genus Drunella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 112: 127-147

Jacobus LM, McCafferty WP (2003) Revisionary Contributions to North American Ephemerella and Serratella (Ephemeroptera : Ephemerellidae). Journal of the New York Entomological Society 111 (4): 174-193.

Kathman,R.D., R.O. Brinkhurst. 1999. Guide to the Freshwater Oligochaetes of North America. Aquatic Resources Center, College Grove, Tennessee.

Larson, D.J., Y. Alarie, R.E. Roughly.2005. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Neararctic Region. NRC-CNRC Research Press. Ottawa.

Merritt, R.W., K.W. Cummins, M. B. Berg. (eds.). 2007. An introduction to the aquatic insects of North America, 4th. Kendall/Hunt, Dubuque, IA

Morihara DK, McCafferty WP (1979) The Baetis Larvae of North American (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105: 139-221.

Needham, James, M. May, M. Westfall Jr. 2000. Dragonflies of North America. Scientific Publishers. Gainsville FL.

Prescott David, R.C.and Medea M. Curteanu.2004. Survey of Aquatic Gastropods of Alberta. Species at Risk Report No. 104. ISSN: 1496-7146 (Online Edition)

Needham, K. 1996. An Identification Guide to the Nymphal Mayflies of British Columbia. Publication #046 Resource Inventory Committee, Government of British Columbia.

Oliver, Donald R. and Mary E. Roussel. 1983. The Insects and Arachnids of Canada Part 11. The Genera of larval midges of Canada. Biosystematics Research Institute. Ottawa, Ontario. Research Branch, Agriculture Canada. Publication 1746.

Proctor, H. The 'Top 18' Water Mite Families in Alberta. Zoology 351. University of Alberta, Edmonton, Alberta.

Rogers, D.C. and M. Hill, 2008. Key to the Freshwater Malacostraca (Crustacea) of the mid-Atlantic Region. EPA-230-R-08-017. US Environmental Protection Agency, Office of Environmental Information, Washington, DC.

Stewart, Kenneth W. and Bill Stark. 2002. The Nymphs of North American Stonefly Genera (Plecoptera). The Caddis Press. Columbus Ohio.

Stewart, Kenneth W. and Mark W. Oswood. 2006 The Stoneflies (Plecoptera) of Alaska and Western Canada. The Caddis Press.

Stonedahl, Gary and John D. Lattin. 1986. The Corixidae of Oregon and Washington (Hemiptera: Heteroptera). Technical Bulletin 150. Oregon State University, Corvalis Oregon.

Thorpe, J. H. and A. P. Covich [Eds.] 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, San Diego.

Tinerella, Paul P. and Ralph W. Gunderson.2005. The Waterboatmen (Insecta: Heteroptera: Corixidae) of Minisota. Publication No.23 Dept. Of Entomology, North Dakota State University, Fargo, North Dakota, USA.

Weiderholm, Torgny (Ed.) 1983. The larvae of Chironomidae (Diptera) of the Holartic region. Entomologica Scaninavica. Supplement No. 19.

Westfall, Minter J. Jr. and May, Michael L. 1996. Damselflies of North America. Scientific Publishers, Gainesville, FL.

Wiggins, Glenn B. 1998. Larvae of the North American Caddisfly Genera (Tricoptera) 2nd ed. University of Toronto Press. Toronto Ontario.

Project: FRO LAEMP (20-09)#4
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_SCOUTDS_BIC-01	RG_SCOUTDS_BIC-02	RG_SCOUTDS_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	08-Dec-20	08-Dec-20	08-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20
CC#:	CC211616	CC211617	CC211618	CC211619	CC211620	CC211621	CC211622	CC211623	CC211624	CC211625	CC211626	CC211627
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0	0
Ameletus	60	60	0	0	20	0	0	0	20	0	0	0
| Family: Baetidae	460	0	40	40	60	0	20	0	0	0	0	0
Baetis	1,460	700	560	1,140	740	760	1,360	820	300	30	0	12
Baetis rhodani group	140	0	0	0	640	200	0	0	0	0	0	0
| Family: Ephemerellidae	6,180	2,380	4,660	220	120	120	200	200	200	15	10	18
Drunella doddsii	180	120	200	20	20	20	0	0	0	0	0	0
Drunella spinifera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Heptageniidae	7,900	8,020	4,600	3,920	2,800	60	3,680	1,600	1,840	130	375	171
Cinygmula	0	40	0	20	80	0	0	0	0	0	0	0
Rhithrogena	100	100	20	60	40	80	40	80	20	5	0	0
| Order: Plecoptera	60	0	0	0	60	0	0	20	0	25	0	100
| Family: Capniidae	20	0	20	300	100	140	1,020	2,360	1,580	30	45	594
| Family: Chloroperlidae	60	40	140	40	20	40	0	40	20	5	0	12
Sweltsa	180	340	80	0	20	20	20	0	20	10	10	6
| Family: Leuctridae	60	40	20	20	0	0	0	100	60	0	5	6
Paraleuctra	40	20	0	0	0	0	0	0	0	0	0	0
| Family: Nemouridae	7,660	2,700	3,960	3,800	3,540	2,400	10,600	5,040	4,380	995	510	412
Nemoura	0	100	0	0	0	0	0	0	0	0	0	0
Ostrocerca	0	20	0	0	0	0	0	0	0	0	0	0
Zapada	4,760	4,200	5,180	540	1,140	300	2,600	1,000	1,400	210	40	171
Zapada oregonensis group	40	140	140	20	20	0	20	20	20	15	0	6
Zapada cinctipes	20	80	40	140	180	20	180	280	380	70	25	24
Zapada columbiana	40	100	100	120	80	20	40	20	40	5	0	6
| Family: Perlidae	0	0	0	40	20	0	20	0	0	0	0	0
Hesperoperla	0	0	0	0	0	0	20	0	0	0	0	0
| Family: Perlodidae	160	60	0	0	20	40	20	40	60	45	25	18
Isoperla	0	0	0	0	0	0	60	100	20	5	0	0
Kogotus	300	160	500	40	20	0	20	20	60	20	0	0
Megarcys	40	120	80	100	60	20	20	60	80	5	5	0
| Family: Taeniopterygidae	440	180	240	20	100	40	320	220	120	15	0	176
Taenionema	60	100	60	80	0	100	160	180	100	35	15	47
| Order: Trichoptera	0	0	40	0	0	0	0	0	0	0	15	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0	0	0
Micrasema	0	0	0	0	0	0	0	0	20	0	0	0
| Family: Glossosomatidae	20	0	0	0	0	0	0	0	0	10	0	0
Glossosoma	0	0	20	20	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	40	100	80	20	40	0	0	0	20	0	0	0
Arctopsyche	0	0	0	0	20	0	0	20	0	5	0	0
Parapsyche	0	0	20	20	0	20	0	0	0	5	5	6
Parapsyche elsis	0	80	100	20	20	20	20	0	40	5	0	0
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	20	0	0	0	5	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0
Ecclisomyia	60	0	20	0	0	0	0	0	0	0	0	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila	740	660	1,000	60	20	80	140	80	100	80	30	6
Rhyacophila angelita group	0	0	0	0	0	0	0	0	0	0	0	0
Rhyacophila betteni group	20	0	80	0	0	0	0	20	0	5	0	0
Rhyacophila brunnea/vemna group	40	60	60	20	0	0	80	0	60	25	0	6
Rhyacophila hyalinata group	120	60	180	20	20	60	100	60	80	10	10	12
Rhyacophila vofixa group	20	20	120	0	0	0	0	0	0	0	0	0
Rhyacophila atrata complex	120	60	80	20	0	0	20	0	0	0	0	6
Rhyacophila narvae	120	0	20	0	0	0	0	0	20	0	0	0
Rhyacophila verrula group	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0	0	0
Oligophlebodes	420	120	640	40	20	0	0	0	0	5	10	0

Project: FRO LAEMP (20-09)#4
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_SCOUTDS_BIC-01	RG_SCOUTDS_BIC-02	RG_SCOUTDS_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	08-Dec-20	08-Dec-20	08-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20
CC#:	CC211616	CC211617	CC211618	CC211619	CC211620	CC211621	CC211622	CC211623	CC211624	CC211625	CC211626	CC211627
| Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	0	0	0	0	0	0	5	0
Heterlimnius	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Ceratopogonidae	0	0	0	0	0	0	0	0	0	0	0	0
Mallochohelea	40	0	0	0	40	0	0	0	0	0	0	0
| Family: Chironomidae	0	0	0	0	0	0	20	0	0	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	660	420	160	0	0	0	0	0	20	0	0	0
Constempellina sp. C	0	0	0	0	0	0	0	0	0	0	0	6
Micropsectra	100	80	80	160	100	80	20	0	40	0	35	18
Tanytarsus	0	0	0	0	0	0	0	0	0	35	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0	0
Diamesa	0	0	20	20	0	0	60	80	40	5	0	0
Pagastia	220	140	200	320	540	280	320	220	160	105	20	6
Pseudodiamesa	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0
Brillia	20	0	40	0	0	20	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	40	0	0	0	0	0	0	0	0	0
Eukiefferiella	40	0	40	2,240	1,780	1,160	440	300	380	70	0	12
Hydrobaenus	0	0	0	0	0	20	0	0	0	0	0	0
Limnophyes	0	0	20	0	0	0	0	0	40	0	5	0
Orthocladius complex	120	20	180	220	320	140	100	40	20	10	0	0
Rheocricotopus	40	40	20	0	0	0	0	0	0	0	0	0
Tvetenia	480	420	400	260	420	220	180	80	80	5	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	0	0	20	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	20	120	0	40	20	20	5	5	6
| Family: Empididae	40	40	160	20	20	40	0	20	0	5	0	6
Chelifera/ Metachela	20	0	0	0	0	0	0	0	0	0	0	0
Clinocera	0	0	0	0	0	0	40	0	0	0	0	0
Neoplasta	0	0	60	0	0	0	20	40	0	5	0	0
Oreogeton	0	0	0	0	0	0	0	0	0	15	5	0
Wiedemannia	0	0	0	0	60	40	40	0	80	0	0	6
| Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	200	680	700	1,000	1,060	540	1,140	600	940	160	315	135
| Family: Simuliidae	0	0	0	0	0	0	20	0	0	0	0	0
Simulium	0	0	20	0	20	0	0	0	0	0	0	0
| Family: Tipulidae	0	0	0	0	20	0	0	0	0	0	0	0
Antocha	0	0	20	0	0	0	0	0	0	0	0	0
Dicranota	40	80	160	0	0	60	60	40	40	10	15	0
Hexatoma	0	0	0	40	0	0	0	40	40	0	0	0
Tipula	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0	0
Protzia	20	0	40	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	180	180	180	80	120	20	140	120	100	55	140	18
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0	0
Sperchon	240	240	240	40	40	20	60	0	20	5	5	0
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	20	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0	0	0	0
Stygothrombium	120	40	20	0	0	0	0	0	0	0	0	0
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	0	0	0	0	0	0

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_UFR1_BIC-01	RG_UFR1_BIC-02	RG_UFR1_BIC-03	RG_FOUKI_BIC-01	RG_FOUKI_BIC-02	RG_FOUKI_BIC-03	RG_SCOUTDS_BIC-01	RG_SCOUTDS_BIC-02	RG_SCOUTDS_BIC-03	RG_FOBSC_BIC-01	RG_FOBSC_BIC-02	RG_FOBSC_BIC-03
Sample Collection Date:	08-Dec-20	08-Dec-20	08-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20	07-Dec-20
CC#:	CC211616	CC211617	CC211618	CC211619	CC211620	CC211621	CC211622	CC211623	CC211624	CC211625	CC211626	CC211627
Pisidium	0	0	0	0	0	0	0	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	20	0	0	5	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	0	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	**34,720**	**23,360**	**25,920**	**15,340**	**14,700**	**7,220**	**23,480**	**14,000**	**13,100**	**2,315**	**1,690**	**2,028**
Taxa present but not included:												
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	20	20	20	0	20	0	0	0	0	5	5	6
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0	0	5	0
Phylum: Nemata	0	0	20	20	0	0	20	0	0	5	0	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	20	20	20	20	20	20	20	0	5	0
Totals:	**40**	**40**	**60**	**40**	**40**	**20**	**40**	**20**	**20**	**10**	**15**	**6**

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250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-01	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03
Sample Collection Date:	10-Dec-20	10-Dec-20	10-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	10-Dec-20	10-Dec-20	10-Dec-20
CC#:	CC211628	CC211629	CC211630	CC211631	CC211632	CC211633	CC211634	CC211635	CC211636
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0
| Family: Ameletidae	0	0	0	0	0	0	0	0	0
Ameletus	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	0	0	120	40	100	40	20	0
Baetis	420	180	480	2,000	3,020	2,260	280	420	540
Baetis rhodani group	100	0	0	140	80	160	20	80	120
| Family: Ephemerellidae	0	0	0	60	80	20	20	40	60
Drunella doddsii	0	0	0	0	20	0	0	20	0
Drunella spinifera	0	0	0	0	0	0	0	20	0
| Family: Heptageniidae	360	240	180	580	1,020	960	240	640	540
Cinygmula	0	0	0	0	0	0	0	0	0
Rhithrogena	0	0	0	0	0	0	0	0	0
| Order: Plecoptera	60	120	100	420	980	420	80	80	60
| Family: Capniidae	1,020	340	1,360	760	1,320	380	100	260	80
| Family: Chloroperlidae	180	20	80	40	0	80	0	60	20
Sweltsa	0	20	0	0	40	80	0	0	40
| Family: Leuctridae	0	20	60	0	0	140	0	40	0
Paraleuctra	0	0	0	0	0	0	0	20	20
| Family: Nemouridae	13,320	6,820	10,240	17,680	30,180	17,860	3,760	8,460	4,820
Nemoura	0	0	0	0	0	0	0	0	0
Ostrocerca	0	0	0	0	0	0	0	0	0
Zapada	5,900	4,140	2,760	12,820	20,060	16,020	1,720	3,740	3,940
Zapada oregonensis group	0	0	0	0	0	20	0	40	60
Zapada cinctipes	920	420	240	1,440	3,060	2,140	200	600	280
Zapada columbiana	0	0	0	40	40	0	0	0	40
| Family: Perlidae	0	0	0	0	0	0	0	0	0
Hesperoperla	0	0	0	0	20	0	0	20	0
| Family: Perlodidae	2,160	400	740	520	460	420	220	460	220
Isoperla	2,180	280	1,440	1,240	1,540	900	80	180	120
Kogotus	0	120	260	140	120	160	0	0	0
Megarcys	200	0	0	160	40	40	0	0	80
| Family: Taeniopterygidae	580	60	240	860	520	980	0	40	20
Taenionema	260	20	120	80	220	300	0	0	40
| Order: Trichoptera	0	0	0	0	0	0	0	0	0
| Family: Apataniidae	0	0	0	0	0	0	0	0	0
Pedomoecus sierra	0	0	0	0	0	0	40	0	0
| Family: Brachycentridae	0	0	0	20	0	0	0	0	20
Micrasema	0	0	0	0	0	0	0	20	0
| Family: Glossosomatidae	0	0	40	0	0	60	0	0	0
Glossosoma	40	20	20	20	20	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	0
Arctopsyche	0	0	0	0	0	0	0	0	0
Parapsyche	0	0	0	20	0	20	0	0	20
Parapsyche elsis	0	20	0	0	0	0	0	0	20
| Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	0	0	0	0	0
| Family: Limnephilidae	0	0	0	0	0	0	0	0	0
Ecclisomyia	0	0	0	80	20	0	0	60	0
| Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0
Rhyacophila	480	120	100	440	680	620	20	520	360
Rhyacophila angelita group	60	0	0	0	0	0	0	0	40
Rhyacophila betteni group	0	0	0	0	0	40	0	0	0
Rhyacophila brunnea/vemna group	120	140	40	240	140	360	120	40	200
Rhyacophila hyalinata group	0	0	0	0	0	0	0	0	0
Rhyacophila vofixa group	0	0	20	0	0	0	0	0	0
Rhyacophila atrata complex	0	0	0	20	0	0	0	20	0
Rhyacophila narvae	40	0	0	80	300	160	0	0	0
Rhyacophila verrula group	0	0	0	20	20	0	0	0	0
| Family: Thremmatidae	0	0	0	0	0	0	0	0	0
Oligophlebodes	20	20	0	20	0	0	20	40	40

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Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-01	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03
Sample Collection Date:	10-Dec-20	10-Dec-20	10-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	10-Dec-20	10-Dec-20	10-Dec-20
CC#:	CC211628	CC211629	CC211630	CC211631	CC211632	CC211633	CC211634	CC211635	CC211636
| Order: Coleoptera	0	0	0	0	0	0	0	0	0
| Family: Elmidae	0	0	0	0	20	80	80	0	20
Heterlimnius	20	0	0	100	100	320	40	220	40
| Order: Diptera	0	0	0	0	0	20	0	0	0
| Family: Ceratopogonidae	20	0	0	0	0	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	0	0	0	0	0	0	0	0	0
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0
| Tribe: Tanytarsini	0	0	0	0	20	0	0	0	0
Constempellina sp. C	0	0	0	0	0	0	0	0	0
Micropsectra	0	20	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	0	0
| Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0
| Tribe: Diamesini	0	0	0	0	0	0	0	0	0
Diamesa	100	100	120	320	60	60	0	0	0
Pagastia	1,240	740	500	1,800	2,760	1,440	220	280	400
Pseudodiamesa	0	0	0	20	20	0	0	0	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	0	0	0	0
Cricotopus (Nostococladius)	0	0	0	0	0	0	0	0	0
Eukiefferiella	640	620	160	1,400	880	740	60	40	140
Hydrobaenus	0	20	0	20	0	0	0	0	0
Limnophyes	0	0	0	0	0	40	0	20	0
Orthocladius complex	180	120	60	1,560	940	680	20	60	140
Rheocricotopus	0	0	0	0	0	0	0	0	0
Tvetenia	280	40	80	580	360	420	40	40	40
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0
Ablabesmyia	0	0	0	0	0	0	0	0	0
| Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	20	0	0	0	0	0	0
| Family: Empididae	0	40	0	80	20	40	0	0	0
Chelifera/ Metachela	0	0	0	0	0	0	0	0	0
Clinocera	0	0	20	0	0	0	0	0	0
Neoplasta	0	0	0	80	40	40	40	160	40
Oreogeton	0	0	0	0	0	0	0	0	0
Wiedemannia	0	0	0	0	0	0	0	0	0
| Family: Psychodidae	0	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	120	180	100	140	260	0	0	40	40
| Family: Simuliidae	0	20	0	0	0	60	0	0	20
Simulium	20	0	80	140	40	0	20	0	0
| Family: Tipulidae	0	0	0	0	20	0	0	60	40
Antocha	0	0	0	0	0	0	0	20	40
Dicranota	20	100	60	20	60	20	0	0	0
Hexatoma	20	0	0	0	0	0	0	0	0
Tipula	20	0	0	20	0	20	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0
| Family: Hydryphantidae	0	0	0	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0
Lebertia	100	160	120	160	100	140	120	180	180
| Family: Sperchontidae	0	0	0	0	0	0	0	0	0
Sperchon	0	40	40	20	20	0	0	60	40
| Family: Torrenticolidae	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	0	0	0
Suborder: Prostigmata	0	0	0	0	0	0	0	0	0
| Family: Stygothrombidiidae	0	0	0	0	0	0	0	0	0
Stygothrombium	0	0	0	0	20	20	0	0	20
Phylum: Mollusca	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	0	0	0	0	0	0	20	60	0

Project: FRO LAEMP (20-09)#4
Minnow Environmental (Ontario)
Taxonomist: Scott Finlayson
scottfinlayson@cordilleraconsulting.ca
250-494-7553

Site:	2020	2020	2020	2020	2020	2020	2020	2020	2020
Sample:	RG_FRUPO_BIC-01	RG_FRUPO_BIC-02	RG_FRUPO_BIC-03	RG_FODPO_BIC-01	RG_FODPO_BIC-02	RG_FODPO_BIC-03	RG_FOUEW_BIC-01	RG_FOUEW_BIC-02	RG_FOUEW_BIC-03
Sample Collection Date:	10-Dec-20	10-Dec-20	10-Dec-20	09-Dec-20	09-Dec-20	09-Dec-20	10-Dec-20	10-Dec-20	10-Dec-20
CC#:	CC211628	CC211629	CC211630	CC211631	CC211632	CC211633	CC211634	CC211635	CC211636
Pisidium	0	0	0	20	0	0	0	0	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0
| Order: Tubificida	0	0	0	0	0	0	0	0	0
| Family: Enchytraeidae	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0
Nais	0	0	0	0	0	0	80	0	20
| Subfamily: Tubificinae without hair chaetae	0	0	0	0	0	0	40	0	0
Totals:	**31,200**	**15,720**	**19,880**	**46,540**	**69,780**	**48,840**	**7,740**	**17,180**	**13,020**
Taxa present but not included:									
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	0	0	0	20	20	20	0	0	20
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0
| Class: Copepoda	0	0	0	0	0	0	0	0	0
Phylum: Nemata	0	0	0	0	20	0	20	20	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	20	20	0	20	20	20	20	20	20
Totals:	**20**	**20**	**0**	**40**	**60**	**40**	**40**	**40**	**40**

BENTHIC INVERTEBRATE BIOMASS

ZEAS Biomass Creek Data

BENTHIC INVERTEBRATE TISSUE CHEMISTRY

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Peter Schnurr
Aquatic Scientist
Minnow Environmental
Phone: (905) 873-3371 ext. 323
Email: pschnurr@minnow.ca

Date Received: 08 Jul 2020
Date of Analysis: 20 Jul 2020
21 Jul 2020
22 Jul 2020
Final Report Date: 23 Jul 2020
Project No.: 2020-121
Method No.: MET-002.04

Client Project: Regional Effects Monitoring/Fording LAEMP 20-09

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 77 samples.
See chain of custody form provided for sample identification numbers.

Notes:
Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average achieved 99%; range 92 - 109%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 23 Jul 2020 (Date)

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_HENUP_INV-01_2020-06-15	RG_HENUP_INV-02_2020-06-15	RG_HENUP_INV-03_2020-06-15	RG_MP1_INV-01_2020-06-15	RG_MP1_INV-02_2020-06-15
		Lab ID	001	002	003	004	005
		Wet Weight (g)	2.8464	3.2588	2.8179	1.6053	1.9890
		Dry Weight (g)	0.7178	0.7773	0.5858	0.4019	0.4689
		Moisture (%)	74.8	76.1	79.2	75.0	76.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.323	0.367	0.243	1.4	0.874
11B	0.105	0.350	0.470	0.527	0.410	1.6	0.929
23Na	6.7	22	6,211	6,209	4,748	3,796	3,005
24Mg	0.057	0.190	3,311	3,553	1,974	1,889	1,664
27Al	0.444	1.5	123	135	111	1,446	674
31P	64	213	22,610	21,931	13,915	11,399	9,902
39K	6.1	20	15,164	15,294	11,498	9,633	8,001
44Ca	128	427	14,290	9,556	7,231	4,707	2,389
49Ti	0.221	0.737	7.6	7.9	5.0	105	40
51V	0.021	0.070	0.328	0.404	0.278	3.1	1.5
52Cr	0.596	2.0	4.8	2.8	2.7	5.8	5.8
55Mn	0.023	0.077	21	14	10	47	47
57Fe	3.9	13	267	202	148	689	534
59Co	0.003	0.010	0.401	0.378	0.230	8.2	6.4
60Ni	0.016	0.053	7.9	4.3	3.0	16	16
63Cu	0.008	0.027	15	20	13	24	17
66Zn	0.329	1.1	338	339	269	292	274
75As	0.439	1.5	0.636	0.732	0.528	0.663	0.684
77Se	0.263	0.877	5.1	7.5	3.6	6.1	6.8
88Sr	0.001	0.003	21	13	9.4	5.7	3.3
95Mo	0.008	0.027	0.352	0.404	0.303	0.399	0.306
107Ag	0.001	0.003	0.096	0.105	0.077	0.143	0.088
111Cd	0.084	0.280	0.821	1.3	0.711	4.0	4.4
118Sn	0.020	0.067	0.123	0.468	0.168	0.692	0.235
121Sb	0.008	0.027	0.011	0.011	0.009	0.046	0.032
137Ba	0.001	0.003	22	12	8.1	35	28
202Hg	0.045	0.150	0.048	0.062	0.058	0.062	0.062
205Tl	0.001	0.003	0.017	0.019	0.013	0.048	0.037
208Pb	0.003	0.010	0.071	0.070	0.058	0.336	0.212
238U	0.001	0.003	0.021	0.041	0.015	0.082	0.051

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Tissue Analysis Results

		Client ID	RG_MP1_INV-03_2020-06-15	RG_FOUCL_INV-01_2020-06-15	RG_FOUCL_INV-02_2020-06-15	RG_FOUCL_INV-03_2020-06-15	RG_FODHE_INV-01_2020-06-15
		Lab ID	006	007	008	009	010
		Wet Weight (g)	1.4091	1.7151	1.2802	0.7571	2.0409
		Dry Weight (g)	0.3426	0.4089	0.3126	0.1642	0.5064
		Moisture (%)	75.7	76.2	75.6	78.3	75.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.2	0.689	1.1	1.1	0.514
11B	0.105	0.350	1.8	0.662	2.7	2.7	0.804
23Na	6.7	22	2,802	3,599	3,029	3,650	4,310
24Mg	0.057	0.190	2,318	1,428	1,661	2,070	2,940
27Al	0.444	1.5	1,076	366	2,604	2,065	476
31P	64	213	10,204	13,362	10,733	11,173	16,356
39K	6.1	20	9,036	9,797	8,652	44,035	16,663
44Ca	128	427	5,305	5,550	5,740	6,780	5,529
49Ti	0.221	0.737	67	27	170	131	25
51V	0.021	0.070	3.0	0.943	4.8	3.6	1.0
52Cr	0.596	2.0	47	6.6	24	22	4.0
55Mn	0.023	0.077	111	119	85	69	53
57Fe	3.9	13	884	422	1,187	1,028	265
59Co	0.003	0.010	17	2.8	4.7	2.9	1.3
60Ni	0.016	0.053	74	13	42	41	9.8
63Cu	0.008	0.027	24	16	16	22	21
66Zn	0.329	1.1	468	205	294	361	278
75As	0.439	1.5	1.6	1.2	1.4	1.1	2.3
77Se	0.263	0.877	6.7	7.9	5.5	6.6	5.7
88Sr	0.001	0.003	8.4	6.5	7.8	8.8	7.4
95Mo	0.008	0.027	0.922	0.409	0.502	0.471	0.471
107Ag	0.001	0.003	0.133	0.086	0.120	0.180	0.160
111Cd	0.084	0.280	8.4	3.4	5.8	4.3	1.5
118Sn	0.020	0.067	0.437	0.216	0.364	0.580	0.326
121Sb	0.008	0.027	0.121	0.027	0.059	0.057	0.034
137Ba	0.001	0.003	41	45	66	75	46
202Hg	0.045	0.150	0.069	0.056	0.060	0.052	0.064
205Tl	0.001	0.003	0.083	0.025	0.046	0.032	0.020
208Pb	0.003	0.010	0.904	44035.000	0.631	0.453	0.202
238U	0.001	0.003	0.111	0.035	0.102	0.082	0.036

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FODHE_INV-02_2020-06-15	RG_FODHE_INV-03_2020-06-15	RG_FOBKS_INV-01_2020-06-16	RG_FOBKS_INV-02_2020-06-16	RG_FOBKS_INV-03_2020-06-16
		Lab ID	011	012	013	014	015
		Wet Weight (g)	2.0849	2.0389	2.6652	1.6316	0.8024
		Dry Weight (g)	0.5103	0.5070	0.5862	0.4441	0.1806
		Moisture (%)	75.5	75.1	78.0	72.8	77.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.463	0.306	1.4	1.2	1.8
11B	0.105	0.350	1.1	0.502	1.8	2.6	4.8
23Na	6.7	22	3,682	2,636	4,136	2,844	2,781
24Mg	0.057	0.190	2,536	1,313	2,060	1,731	2,058
27Al	0.444	1.5	753	233	1,430	2,334	4,693
31P	64	213	15,003	9,237	13,290	9,255	10,074
39K	6.1	20	12,020	9,246	11,699	8,137	10,625
44Ca	128	427	7,591	3,186	4,952	3,728	6,499
49Ti	0.221	0.737	35	15	91	196	327
51V	0.021	0.070	1.5	0.547	2.5	4.4	7.8
52Cr	0.596	2.0	7.1	2.7	6.9	23	30
55Mn	0.023	0.077	52	62	81	83	128
57Fe	3.9	13	462	162	613	1,020	1,867
59Co	0.003	0.010	1.7	1.2	7.2	8.6	13
60Ni	0.016	0.053	15	5.8	18	44	59
63Cu	0.008	0.027	19	11	27	23	21
66Zn	0.329	1.1	295	190	486	420	491
75As	0.439	1.5	1.6	1.1	0.732	0.896	1.4
77Se	0.263	0.877	5.4	3.3	6.0	4.4	6.6
88Sr	0.001	0.003	9.5	4.0	6.2	4.9	8.4
95Mo	0.008	0.027	0.352	0.199	0.460	0.349	0.532
107Ag	0.001	0.003	0.114	0.059	0.198	0.151	0.135
111Cd	0.084	0.280	1.6	1.1	7.3	4.8	9.3
118Sn	0.020	0.067	0.405	0.098	0.432	0.259	0.617
121Sb	0.008	0.027	0.039	0.023	0.044	0.068	0.091
137Ba	0.001	0.003	41	14	53	49	86
202Hg	0.045	0.150	0.052	<0.045	0.064	0.052	0.076
205Tl	0.001	0.003	0.018	0.011	0.038	0.044	0.059
208Pb	0.003	0.010	0.238	0.107	0.323	0.472	0.903
238U	0.001	0.003	0.036	0.018	0.071	0.081	0.166

Notes:

ppm = parts per million

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< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FOBKS_INV-04_2020-06-16	RG_FOBKS_INV-05_2020-06-16	RG_FOUNGD_INV-01_2020-06-16	RG_FOUNGD_INV-02_2020-06-16	RG_FOUNGD_INV-03_2020-06-16
		Lab ID	016	017	018	019	020
		Wet Weight (g)	0.9073	0.8126	3.0144	2.1657	2.9035
		Dry Weight (g)	0.2251	0.1704	0.9310	0.6947	0.9350
		Moisture (%)	75.2	79.0	69.1	67.9	67.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	2.0	2.9	0.635	0.525	0.690
11B	0.105	0.350	4.9	7.1	0.502	0.755	0.476
23Na	6.7	22	2,787	3,191	3,523	2,674	2,431
24Mg	0.057	0.190	2,128	2,231	1,613	1,725	1,460
27Al	0.444	1.5	4,207	7,788	316	512	282
31P	64	213	10,543	11,146	11,162	12,760	8,775
39K	6.1	20	8,149	11,456	9,599	8,033	7,991
44Ca	128	427	5,531	6,529	4,385	4,255	2,007
49Ti	0.221	0.737	295	553	15	27	17
51V	0.021	0.070	7.2	12	0.573	0.793	0.518
52Cr	0.596	2.0	32	146	3.8	5.1	2.9
55Mn	0.023	0.077	205	194	26	48	58
57Fe	3.9	13	1,794	5,009	209	367	233
59Co	0.003	0.010	12	15	1.0	2.2	1.3
60Ni	0.016	0.053	59	227	7.2	13	7.8
63Cu	0.008	0.027	26	20	25	19	14
66Zn	0.329	1.1	481	454	194	240	203
75As	0.439	1.5	1.0	1.9	<0.439	0.559	0.547
77Se	0.263	0.877	6.0	5.9	4.5	4.7	4.3
88Sr	0.001	0.003	8.2	11	4.3	5.0	2.4
95Mo	0.008	0.027	0.610	0.653	0.236	0.295	0.270
107Ag	0.001	0.003	0.130	0.151	0.125	0.092	0.065
111Cd	0.084	0.280	7.1	7.8	1.1	1.6	0.924
118Sn	0.020	0.067	0.248	0.764	0.061	0.065	0.078
121Sb	0.008	0.027	0.082	0.196	0.021	0.035	0.031
137Ba	0.001	0.003	83	141	20	42	26
202Hg	0.045	0.150	0.060	0.075	<0.045	0.050	<0.045
205Tl	0.001	0.003	0.052	0.111	0.014	0.024	0.016
208Pb	0.003	0.010	0.743	1.5	0.105	0.177	0.113
238U	0.001	0.003	0.161	0.274	0.014	0.053	0.031

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_SCOUTDS_INV-01_2020-06-16	RG_SCOUTDS_INV-02_2020-06-16	RG_SCOUTDS_INV-03_2020-06-16	RG_SCOUTDS_INV-04_2020-06-16	RG_SCOUTDS_INV-05_2020-06-16
		Lab ID	021	022	023	024	025
		Wet Weight (g)	2.2412	1.2683	2.9242	2.5931	2.2342
		Dry Weight (g)	0.5190	0.3207	0.7132	0.6743	0.6097
		Moisture (%)	76.8	74.7	75.6	74.0	72.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.3	2.0	1.1	2.2	1.7
11B	0.105	0.350	1.9	1.8	1.8	1.8	2.1
23Na	6.7	22	3,573	3,192	2,857	4,086	3,591
24Mg	0.057	0.190	2,102	1,956	1,732	1,600	2,464
27Al	0.444	1.5	1,885	1,550	1,656	1,371	1,869
31P	64	213	11,120	11,875	9,905	10,496	13,585
39K	6.1	20	10,212	9,777	7,521	10,980	10,386
44Ca	128	427	6,129	4,394	3,245	2,709	5,093
49Ti	0.221	0.737	155	135	122	125	149
51V	0.021	0.070	3.0	2.8	2.6	2.5	3.5
52Cr	0.596	2.0	10	11	8.5	4.0	13
55Mn	0.023	0.077	80	61	74	138	130
57Fe	3.9	13	910	814	755	686	989
59Co	0.003	0.010	14	8.4	10	6.1	7.9
60Ni	0.016	0.053	27	24	21	16	32
63Cu	0.008	0.027	23	24	19	19	22
66Zn	0.329	1.1	655	453	460	410	586
75As	0.439	1.5	0.860	0.714	0.592	0.531	0.856
77Se	0.263	0.877	5.2	5.3	4.9	7.2	7.5
88Sr	0.001	0.003	7.2	5.7	4.4	4.4	8.1
95Mo	0.008	0.027	0.361	0.402	0.367	0.534	0.379
107Ag	0.001	0.003	0.225	0.131	0.103	0.140	0.127
111Cd	0.084	0.280	9.7	5.3	5.0	5.9	5.3
118Sn	0.020	0.067	0.207	0.304	0.142	0.181	0.205
121Sb	0.008	0.027	0.073	0.090	0.052	0.069	0.070
137Ba	0.001	0.003	53	48	40	51	87
202Hg	0.045	0.150	0.067	0.059	0.050	0.067	0.064
205Tl	0.001	0.003	0.077	0.059	0.053	0.052	0.053
208Pb	0.003	0.010	0.464	0.413	0.364	0.416	0.482
238U	0.001	0.003	0.088	0.080	0.069	0.088	0.083

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FODNGD_INV-01_2020-06-16	RG_FODNGD_INV-02_2020-06-16	RG_FODNGD_INV-03_2020-06-16	RG_FOUKI_INV-01_2020-06-17	RG_FOUKI_INV-02_2020-06-17
		Lab ID	026	027	028	029	030
		Wet Weight (g)	2.0849	2.0256	1.7432	1.4551	1.3723
		Dry Weight (g)	0.5390	0.5471	0.5073	0.3590	0.2590
		Moisture (%)	74.1	73.0	70.9	75.3	81.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.896	0.960	0.475	1.2	2.5
11B	0.105	0.350	1.3	1.3	0.368	1.5	3.8
23Na	6.7	22	4,336	3,410	2,254	3,552	4,419
24Mg	0.057	0.190	2,543	1,974	950	1,332	2,211
27Al	0.444	1.5	1,030	1,021	263	1,317	3,313
31P	64	213	15,724	13,230	6,606	8,842	11,239
39K	6.1	20	11,658	9,447	5,795	9,621	11,710
44Ca	128	427	3,233	5,624	2,561	2,064	4,177
49Ti	0.221	0.737	74	77	12	107	295
51V	0.021	0.070	1.8	1.8	0.423	2.7	5.7
52Cr	0.596	2.0	7.9	5.0	2.3	6.7	8.6
55Mn	0.023	0.077	58	47	23	111	102
57Fe	3.9	13	571	524	136	664	1,259
59Co	0.003	0.010	8.4	11	1.4	6.9	13
60Ni	0.016	0.053	23	19	5.7	21	29
63Cu	0.008	0.027	27	23	8.9	16	21
66Zn	0.329	1.1	478	341	169	391	503
75As	0.439	1.5	1.4	1.1	<0.439	0.735	1.4
77Se	0.263	0.877	6.3	5.8	2.5	6.3	6.8
88Sr	0.001	0.003	5.8	5.8	3.1	3.7	6.6
95Mo	0.008	0.027	0.379	0.345	0.159	0.327	0.543
107Ag	0.001	0.003	0.103	0.110	0.039	0.096	0.140
111Cd	0.084	0.280	5.2	5.7	1.0	5.5	8.7
118Sn	0.020	0.067	0.156	0.152	0.055	0.220	0.454
121Sb	0.008	0.027	0.043	0.050	0.023	0.058	0.085
137Ba	0.001	0.003	41	32	12	56	70
202Hg	0.045	0.150	<0.045	0.140	<0.045	0.055	0.073
205Tl	0.001	0.003	0.056	0.038	0.017	0.046	0.085
208Pb	0.003	0.010	0.210	0.276	0.107	0.447	0.669
238U	0.001	0.003	0.078	0.076	0.017	0.107	0.142

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FOUKI_INV-03_2020-06-17	RG_FOUKI_INV-04_2020-06-17	RG_FOUKI_INV-05_2020-06-17	RG_FO26_INV-01_2020-06-17	RG_FO26_INV-02_2020-06-17
		Lab ID	031	032	033	034	035
		Wet Weight (g)	1.7245	1.2745	1.7129	1.1403	0.9944
		Dry Weight (g)	0.3645	0.2685	0.4050	0.2318	0.2230
		Moisture (%)	78.9	78.9	76.4	79.7	77.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	2.1	2.4	1.3	0.245	0.518
11B	0.105	0.350	2.9	3.2	1.9	0.921	1.8
23Na	6.7	22	3,699	2,852	3,437	2,168	3,267
24Mg	0.057	0.190	2,014	1,604	2,077	1,267	2,168
27Al	0.444	1.5	2,470	4,075	1,648	762	1,603
31P	64	213	11,772	9,580	11,438	9,001	14,377
39K	6.1	20	10,950	9,254	10,355	7,555	11,119
44Ca	128	427	3,501	3,683	7,012	1,749	4,567
49Ti	0.221	0.737	225	265	89	40	113
51V	0.021	0.070	4.6	5.3	2.4	0.972	1.7
52Cr	0.596	2.0	18	10	5.9	3.7	4.1
55Mn	0.023	0.077	134	71	70	93	84
57Fe	3.9	13	1,452	1,060	643	352	586
59Co	0.003	0.010	14	8.0	8.0	0.762	0.928
60Ni	0.016	0.053	49	30	15	4.9	6.4
63Cu	0.008	0.027	23	16	23	15	21
66Zn	0.329	1.1	495	511	432	247	267
75As	0.439	1.5	1.1	1.2	0.640	1.2	1.3
77Se	0.263	0.877	6.3	4.9	4.8	4.4	4.0
88Sr	0.001	0.003	5.9	7.1	8.9	3.2	6.9
95Mo	0.008	0.027	0.482	0.474	0.363	0.486	0.377
107Ag	0.001	0.003	0.117	0.126	0.125	0.057	0.125
111Cd	0.084	0.280	7.8	5.4	5.1	1.4	1.8
118Sn	0.020	0.067	0.218	0.351	0.122	0.175	0.325
121Sb	0.008	0.027	0.082	0.078	0.066	0.020	0.033
137Ba	0.001	0.003	83	67	39	57	80
202Hg	0.045	0.150	0.070	0.061	0.047	0.076	0.094
205Tl	0.001	0.003	0.077	0.061	0.068	0.031	0.038
208Pb	0.003	0.010	0.863	0.546	0.413	0.331	0.393
238U	0.001	0.003	0.134	0.089	0.083	0.050	0.062

Notes:

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DL = detection limit

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% = percent

Tissue Analysis Results

		Client ID	RG_FO26_INV-03_2020-06-17	RG_UFR1_INV-01_2020-06-17	RG_UFR1_INV-02_2020-06-17	RG_UFR1_INV-03_2020-06-17	RG_UFR1_INV-04_2020-06-17
		Lab ID	036	037	038	039	040
		Wet Weight (g)	1.6862	1.6575	1.4938	1.6281	2.1665
		Dry Weight (g)	0.3778	0.3280	0.3803	0.3823	0.5720
		Moisture (%)	77.6	80.2	74.5	76.5	73.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.629	0.322	0.468	0.541	0.271
11B	0.105	0.350	2.0	1.1	1.3	1.8	0.956
23Na	6.7	22	3,198	2,826	3,735	4,022	3,809
24Mg	0.057	0.190	1,662	1,213	2,035	2,550	2,036
27Al	0.444	1.5	2,056	922	982	1,532	791
31P	64	213	12,864	10,506	16,136	17,515	14,011
39K	6.1	20	10,458	8,193	10,380	11,286	11,004
44Ca	128	427	3,138	2,313	5,792	8,938	6,033
49Ti	0.221	0.737	127	55	66	117	37
51V	0.021	0.070	2.7	1.1	1.6	2.5	1.1
52Cr	0.596	2.0	8.8	4.1	8.5	7.8	3.4
55Mn	0.023	0.077	111	39	69	60	32
57Fe	3.9	13	820	361	559	703	380
59Co	0.003	0.010	1.1	1.3	0.732	0.877	0.551
60Ni	0.016	0.053	17	8.1	14	14	5.7
63Cu	0.008	0.027	16	20	18	20	20
66Zn	0.329	1.1	275	259	271	268	179
75As	0.439	1.5	1.5	1.5	0.933	1.3	1.1
77Se	0.263	0.877	5.0	3.8	6.4	5.3	4.1
88Sr	0.001	0.003	5.9	3.4	8.5	11	7.7
95Mo	0.008	0.027	0.473	0.377	0.438	0.411	0.319
107Ag	0.001	0.003	0.092	0.119	0.119	0.162	0.149
111Cd	0.084	0.280	1.4	3.1	1.2	1.3	0.604
118Sn	0.020	0.067	0.299	0.238	0.159	0.308	0.108
121Sb	0.008	0.027	0.043	0.033	0.040	0.046	0.040
137Ba	0.001	0.003	110	31	96	86	50
202Hg	0.045	0.150	0.068	0.052	0.105	0.063	<0.045
205Tl	0.001	0.003	0.043	0.029	0.029	0.036	0.022
208Pb	0.003	0.010	0.530	0.194	0.379	0.381	0.242
238U	0.001	0.003	0.080	0.035	0.046	0.064	0.052

Notes:

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		Client ID	RG_UFR1_INV-05_2020-06-17	RG_FOBSC_INV-01_2020-06-18	RG_FOBSC_INV-02_2020-06-18	RG_FOBSC_INV-03_2020-06-18	RG_FOBSC_INV-04_2020-06-18
		Lab ID	041	042	043	044	045
		Wet Weight (g)	1.9341	2.1790	2.5409	2.1304	2.1709
		Dry Weight (g)	0.5421	0.5229	0.6484	0.5832	0.5410
		Moisture (%)	72.0	76.0	74.5	72.6	75.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.301	1.2	1.5	1.1	1.2
11B	0.105	0.350	0.943	1.7	1.4	1.0	2.0
23Na	6.7	22	1,989	2,873	3,076	3,557	3,048
24Mg	0.057	0.190	2,005	1,288	1,751	1,617	2,004
27Al	0.444	1.5	689	1,340	1,012	745	1,435
31P	64	213	12,049	7,971	10,174	10,947	8,375
39K	6.1	20	6,205	8,076	9,702	8,968	9,255
44Ca	128	427	6,663	3,540	3,783	3,643	3,279
49Ti	0.221	0.737	57	81	76	53	88
51V	0.021	0.070	1.3	2.5	2.2	1.5	2.7
52Cr	0.596	2.0	3.7	6.6	4.4	4.4	3.9
55Mn	0.023	0.077	24	66	76	47	64
57Fe	3.9	13	352	618	577	348	714
59Co	0.003	0.010	0.542	7.4	6.7	4.6	11
60Ni	0.016	0.053	6.1	19	16	11	20
63Cu	0.008	0.027	18	25	21	19	22
66Zn	0.329	1.1	149	386	415	376	470
75As	0.439	1.5	1.1	0.748	0.549	0.529	0.738
77Se	0.263	0.877	3.6	5.0	5.6	4.9	7.4
88Sr	0.001	0.003	7.1	4.5	4.4	4.2	4.9
95Mo	0.008	0.027	0.451	0.585	0.435	0.297	0.419
107Ag	0.001	0.003	0.091	0.133	0.120	0.112	0.149
111Cd	0.084	0.280	0.493	4.3	4.2	3.6	7.9
118Sn	0.020	0.067	0.150	0.154	0.142	0.077	0.207
121Sb	0.008	0.027	0.023	0.056	0.059	0.040	0.059
137Ba	0.001	0.003	45	32	34	21	43
202Hg	0.045	0.150	<0.045	0.081	0.081	<0.045	0.067
205Tl	0.001	0.003	0.021	0.062	0.074	0.049	0.086
208Pb	0.003	0.010	0.175	0.324	0.343	0.219	0.485
238U	0.001	0.003	0.030	0.062	0.067	0.040	0.107

Notes:

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Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FOBSC_INV-05_2020-06-18	RG_FRCP1SW_INV-01_2020-06-18	RG_FRCP1SW_INV-02_2020-06-18	RG_FRCP1SW_INV-03_2020-06-18	RG_FRCP1SW_INV-04_2020-06-18
		Lab ID	046	047	048	049	050
		Wet Weight (g)	1.6558	1.4034	1.1990	2.5384	1.7604
		Dry Weight (g)	0.4930	0.3121	0.2670	0.6149	0.3055
		Moisture (%)	70.2	77.8	77.7	75.8	82.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.4	1.9	4.6	6.1	1.7
11B	0.105	0.350	0.995	2.4	11	12	2.6
23Na	6.7	22	3,101	4,167	3,262	5,653	3,736
24Mg	0.057	0.190	1,738	2,025	2,485	2,612	1,785
27Al	0.444	1.5	824	2,168	11,042	12,184	2,532
31P	64	213	11,857	12,745	10,627	10,673	11,866
39K	6.1	20	7,991	15,150	14,986	15,477	11,111
44Ca	128	427	5,365	5,876	7,909	5,955	4,048
49Ti	0.221	0.737	57	127	1,083	931	174
51V	0.021	0.070	1.5	4.5	19	17	5.2
52Cr	0.596	2.0	4.1	4.2	76	56	13
55Mn	0.023	0.077	53	100	142	156	75
57Fe	3.9	13	442	1,036	4,428	4,725	1,187
59Co	0.003	0.010	6.5	13	13	14	9.9
60Ni	0.016	0.053	12	20	138	116	35
63Cu	0.008	0.027	30	26	20	21	21
66Zn	0.329	1.1	400	773	531	524	553
75As	0.439	1.5	0.449	1.9	2.8	5.7	0.958
77Se	0.263	0.877	4.2	39	29	103	6.7
88Sr	0.001	0.003	6.3	7.9	15	13	5.8
95Mo	0.008	0.027	0.372	0.657	0.926	1.1	0.657
107Ag	0.001	0.003	0.117	0.305	0.372	0.516	0.154
111Cd	0.084	0.280	3.4	16	16	20	10
118Sn	0.020	0.067	0.067	0.243	0.798	0.702	0.418
121Sb	0.008	0.027	0.056	0.073	0.251	0.221	0.063
137Ba	0.001	0.003	28	68	172	194	61
202Hg	0.045	0.150	0.058	0.319	0.250	0.540	0.096
205Tl	0.001	0.003	0.060	0.118	0.185	0.228	0.099
208Pb	0.003	0.010	0.187	0.613	2.1	1.9	0.573
238U	0.001	0.003	0.044	0.182	0.465	0.644	0.134

Notes:

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Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FRCP1SW_INV-05_2020-06-18	RG_FODPO_INV-01_2020-06-19	RG_FODPO_INV-02_2020-06-19	RG_FODPO_INV-03_2020-06-19	RG_FODPO_INV-04_2020-06-19
		Lab ID	051	052	053	054	055
		Wet Weight (g)	1.4687	0.9171	1.0521	1.1068	1.1816
		Dry Weight (g)	0.3148	0.2125	0.2417	0.2484	0.2984
		Moisture (%)	78.6	76.8	77.0	77.6	74.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.1	1.8	2.4	1.8	1.8
11B	0.105	0.350	1.1	4.7	7.2	4.4	5.7
23Na	6.7	22	3,883	2,450	3,401	2,809	2,490
24Mg	0.057	0.190	1,799	1,882	2,339	1,987	2,726
27Al	0.444	1.5	826	4,149	6,973	3,618	3,946
31P	64	213	13,396	9,054	11,757	8,585	14,363
39K	6.1	20	11,157	9,030	10,650	8,692	12,437
44Ca	128	427	3,320	4,704	7,152	6,039	11,624
49Ti	0.221	0.737	62	300	513	289	367
51V	0.021	0.070	1.6	7.1	14	6.6	7.3
52Cr	0.596	2.0	7.9	36	58	15	9.5
55Mn	0.023	0.077	75	153	203	107	147
57Fe	3.9	13	673	1,853	3,437	1,750	1,543
59Co	0.003	0.010	8.5	12	12	10	6.7
60Ni	0.016	0.053	26	67	125	33	30
63Cu	0.008	0.027	26	23	25	17	20
66Zn	0.329	1.1	465	397	363	435	568
75As	0.439	1.5	0.610	1.1	1.5	0.995	1.2
77Se	0.263	0.877	5.2	6.2	6.9	5.5	6.7
88Sr	0.001	0.003	4.3	7.3	9.7	7.8	17
95Mo	0.008	0.027	0.341	0.540	0.751	0.446	0.703
107Ag	0.001	0.003	0.105	0.137	0.164	0.153	0.157
111Cd	0.084	0.280	6.5	7.0	4.3	8.4	7.9
118Sn	0.020	0.067	0.169	0.248	0.469	0.274	0.461
121Sb	0.008	0.027	0.044	0.103	0.224	0.097	0.160
137Ba	0.001	0.003	31	87	131	82	239
202Hg	0.045	0.150	0.091	0.106	0.081	0.086	0.078
205Tl	0.001	0.003	0.072	0.101	0.109	0.096	0.082
208Pb	0.003	0.010	0.278	0.900	1.9	0.842	1.2
238U	0.001	0.003	0.079	0.187	0.289	0.196	0.406

Notes:

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% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FODPO_INV-05_2020-06-19	RG_FOUEW_INV-01_2020-06-19	RG_FOUEW_INV-02_2020-06-19	RG_FOUEW_INV-03_2020-06-19	RG_FOUEW_INV-04_2020-06-19
		Lab ID	056	057	058	059	060
		Wet Weight (g)	1.3423	1.4613	1.1040	1.2638	1.1101
		Dry Weight (g)	0.3629	0.3345	0.2883	0.3078	0.2626
		Moisture (%)	73.0	77.1	73.9	75.6	76.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	0.969	1.1	0.730	0.671	0.889
11B	0.105	0.350	1.4	1.9	0.672	0.814	1.1
23Na	6.7	22	3,591	4,160	3,411	2,397	2,954
24Mg	0.057	0.190	2,281	2,086	1,743	1,594	1,323
27Al	0.444	1.5	1,188	865	472	534	807
31P	64	213	11,929	12,438	11,939	11,526	10,689
39K	6.1	20	8,886	11,680	8,624	6,462	7,939
44Ca	128	427	4,771	5,183	4,622	4,839	5,498
49Ti	0.221	0.737	84	136	25	35	59
51V	0.021	0.070	1.9	2.8	0.760	1.2	1.6
52Cr	0.596	2.0	5.8	14	3.7	6.5	7.4
55Mn	0.023	0.077	81	92	32	44	36
57Fe	3.9	13	548	828	296	468	526
59Co	0.003	0.010	6.7	2.8	1.4	1.9	1.9
60Ni	0.016	0.053	18	36	8.9	12	16
63Cu	0.008	0.027	23	24	15	20	22
66Zn	0.329	1.1	376	222	303	360	189
75As	0.439	1.5	0.568	1.1	<0.439	<0.439	<0.439
77Se	0.263	0.877	5.5	6.1	4.5	5.0	5.3
88Sr	0.001	0.003	4.9	5.7	4.6	4.3	5.0
95Mo	0.008	0.027	0.399	0.392	0.301	0.243	0.444
107Ag	0.001	0.003	0.154	0.157	0.108	0.130	0.187
111Cd	0.084	0.280	3.9	2.7	1.7	3.1	2.0
118Sn	0.020	0.067	0.114	0.181	0.106	0.118	0.189
121Sb	0.008	0.027	0.070	0.062	0.040	0.026	0.039
137Ba	0.001	0.003	26	55	23	25	30
202Hg	0.045	0.150	0.051	0.056	<0.045	0.051	<0.045
205Tl	0.001	0.003	0.043	0.056	0.026	0.022	0.022
208Pb	0.003	0.010	0.287	0.424	0.150	0.161	0.263
238U	0.001	0.003	0.076	0.124	0.026	0.036	0.040

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FOUEW_INV-05_2020-06-19	RG_FO22_INV-01_2020-06-19	RG_FO22_INV-02_2020-06-19	RG_FO22_INV-03_2020-06-19	RG_FRUPO_INV-01_2020-06-19
		Lab ID	061	062	063	064	065
		Wet Weight (g)	0.9408	1.4268	1.4281	0.7287	2.0407
		Dry Weight (g)	0.2444	0.3317	0.3382	0.1642	0.5401
		Moisture (%)	74.0	76.8	76.3	77.5	73.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.3	3.2	5.2	4.7	1.1
11B	0.105	0.350	1.4	5.9	12	12	0.376
23Na	6.7	22	4,896	3,650	2,499	2,756	3,945
24Mg	0.057	0.190	2,166	2,317	2,566	2,615	2,234
27Al	0.444	1.5	929	5,300	12,040	11,031	159
31P	64	213	15,040	10,109	9,386	9,508	14,223
39K	6.1	20	11,457	11,078	12,360	12,525	9,324
44Ca	128	427	6,891	6,621	8,120	8,498	4,595
49Ti	0.221	0.737	73	349	1,027	837	10
51V	0.021	0.070	1.8	7.8	15	15	0.357
52Cr	0.596	2.0	7.7	21	41	57	2.3
55Mn	0.023	0.077	81	239	168	338	54
57Fe	3.9	13	571	2,690	2,854	4,623	263
59Co	0.003	0.010	3.9	11	7.9	11	5.2
60Ni	0.016	0.053	19	47	66	109	11
63Cu	0.008	0.027	42	37	25	28	24
66Zn	0.329	1.1	325	336	250	323	498
75As	0.439	1.5	0.514	1.6	1.2	1.8	<0.439
77Se	0.263	0.877	6.7	6.7	5.5	8.2	4.5
88Sr	0.001	0.003	6.0	7.9	15	13	3.7
95Mo	0.008	0.027	0.426	0.870	0.607	1.1	0.315
107Ag	0.001	0.003	0.249	0.204	0.150	0.237	0.203
111Cd	0.084	0.280	3.5	6.7	3.6	5.7	4.5
118Sn	0.020	0.067	0.143	0.248	0.460	0.496	0.070
121Sb	0.008	0.027	0.042	0.138	0.165	0.224	0.026
137Ba	0.001	0.003	34	115	152	232	13
202Hg	0.045	0.150	0.054	0.100	0.080	0.092	0.056
205Tl	0.001	0.003	0.025	0.094	0.130	0.130	0.029
208Pb	0.003	0.010	0.299	1.5	1.7	2.5	0.094
238U	0.001	0.003	0.108	0.337	0.512	0.445	0.043

Notes:

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Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FRUPO_INV-02_2020-06-19	RG_FRUPO_INV-03_2020-06-19	RG_FRUPO_INV-04_2020-06-19	RG_FRUPO_INV-05_2020-06-19	RG_FOUSH_INV-01_2020-06-23
		Lab ID	066	067	068	069	070
		Wet Weight (g)	1.6917	2.4049	1.4123	1.4241	1.4691
		Dry Weight (g)	0.5052	0.6690	0.2862	0.3372	0.3108
		Moisture (%)	70.1	72.2	79.7	76.3	78.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.0	1.1	2.0	1.6	1.3
11B	0.105	0.350	0.630	0.641	3.2	3.1	1.3
23Na	6.7	22	3,659	4,096	4,440	3,965	3,130
24Mg	0.057	0.190	1,463	1,950	1,939	2,198	2,086
27Al	0.444	1.5	541	496	4,206	2,397	1,277
31P	64	213	13,674	15,740	10,970	10,825	10,593
39K	6.1	20	9,390	8,863	10,924	10,659	7,407
44Ca	128	427	6,880	9,810	4,012	3,913	4,104
49Ti	0.221	0.737	32	27	247	213	84
51V	0.021	0.070	0.928	0.861	5.8	4.3	2.1
52Cr	0.596	2.0	5.7	2.8	18	13	5.4
55Mn	0.023	0.077	50	30	122	59	95
57Fe	3.9	13	405	285	1,373	769	553
59Co	0.003	0.010	2.6	2.0	10	10	11
60Ni	0.016	0.053	11	6.8	42	34	24
63Cu	0.008	0.027	19	25	29	27	18
66Zn	0.329	1.1	234	234	455	516	580
75As	0.439	1.5	<0.439	<0.439	0.905	0.565	0.931
77Se	0.263	0.877	5.7	4.2	7.7	7.4	6.3
88Sr	0.001	0.003	5.6	6.6	5.6	5.1	4.9
95Mo	0.008	0.027	0.415	0.295	0.713	0.390	0.308
107Ag	0.001	0.003	0.121	0.163	0.150	0.179	0.101
111Cd	0.084	0.280	3.1	2.3	9.2	6.8	6.4
118Sn	0.020	0.067	0.161	0.081	0.496	0.244	0.101
121Sb	0.008	0.027	0.039	0.033	0.083	0.066	0.040
137Ba	0.001	0.003	27	22	61	49	48
202Hg	0.045	0.150	<0.045	<0.045	0.076	0.065	0.055
205Tl	0.001	0.003	0.021	0.022	0.064	0.066	0.045
208Pb	0.003	0.010	0.161	0.138	0.967	0.431	0.299
238U	0.001	0.003	0.031	0.033	0.164	0.129	0.062

Notes:

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Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

		Client ID	RG_FOUSH_INV-02_2020-06-23	RG_FOUSH_INV-03_2020-06-23	RG_FOBCP_INV-01_2020-06-17	RG_FOBCP_INV-02_2020-06-17	RG_FOBCP_INV-03_2020-06-17
		Lab ID	071	072	073	074	075
		Wet Weight (g)	1.7024	1.8333	1.8501	1.5871	1.7819
		Dry Weight (g)	0.3942	0.4062	0.4480	0.4218	0.4053
		Moisture (%)	76.8	77.8	75.8	73.4	77.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.1	2.6	0.962	0.825	1.0
11B	0.105	0.350	1.8	1.2	1.7	0.805	0.734
23Na	6.7	22	4,353	3,880	2,736	2,278	2,596
24Mg	0.057	0.190	1,451	1,769	1,811	1,796	1,055
27Al	0.444	1.5	1,153	731	1,313	583	282
31P	64	213	9,104	10,450	8,873	8,166	10,365
39K	6.1	20	11,024	8,394	8,090	5,829	7,065
44Ca	128	427	4,720	2,611	3,336	2,690	1,316
49Ti	0.221	0.737	71	55	104	38	17
51V	0.021	0.070	1.8	1.5	1.9	0.997	0.509
52Cr	0.596	2.0	2.6	3.4	3.4	3.2	2.5
55Mn	0.023	0.077	37	108	71	51	54
57Fe	3.9	13	378	661	430	385	176
59Co	0.003	0.010	5.0	7.3	5.3	8.4	3.2
60Ni	0.016	0.053	8.9	15	13	9.7	10
63Cu	0.008	0.027	11	20	17	26	12
66Zn	0.329	1.1	257	553	414	543	343
75As	0.439	1.5	0.921	0.891	0.555	<0.439	<0.439
77Se	0.263	0.877	4.5	7.7	5.3	6.4	5.3
88Sr	0.001	0.003	4.5	3.9	4.6	3.2	1.3
95Mo	0.008	0.027	0.236	0.390	0.270	0.262	0.169
107Ag	0.001	0.003	0.082	0.227	0.090	0.129	0.052
111Cd	0.084	0.280	3.2	5.6	4.2	4.1	3.1
118Sn	0.020	0.067	0.133	0.173	0.124	0.046	0.048
121Sb	0.008	0.027	0.051	0.046	0.056	0.026	0.028
137Ba	0.001	0.003	32	47	36	18	11
202Hg	0.045	0.150	<0.045	0.087	0.055	0.065	<0.045
205Tl	0.001	0.003	0.044	0.050	0.052	0.052	0.036
208Pb	0.003	0.010	0.305	0.418	0.283	0.142	0.108
238U	0.001	0.003	0.054	0.073	0.099	0.040	0.031

Notes:

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Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue Analysis Results

			Client ID	RG_FOBCP_INV-04_2020-06-17	RG_FOBCP_INV-05_2020-06-17
			Lab ID	076	077
			Wet Weight (g)	1.2170	1.7355
			Dry Weight (g)	0.3021	0.4660
			Moisture (%)	75.2	73.1
Parameter	DL (ppm)	LOQ (ppm)		(ppm)	(ppm)
7Li	0.005	0.017		1.0	1.1
11B	0.105	0.350		1.8	1.6
23Na	6.7	22		2,204	2,360
24Mg	0.057	0.190		2,307	1,611
27Al	0.444	1.5		1,291	1,302
31P	64	213		10,825	8,094
39K	6.1	20		7,288	6,458
44Ca	128	427		5,469	2,862
49Ti	0.221	0.737		102	102
51V	0.021	0.070		2.4	2.3
52Cr	0.596	2.0		10	6.0
55Mn	0.023	0.077		58	73
57Fe	3.9	13		629	653
59Co	0.003	0.010		4.3	6.5
60Ni	0.016	0.053		26	20
63Cu	0.008	0.027		16	18
66Zn	0.329	1.1		407	431
75As	0.439	1.5		<0.439	0.584
77Se	0.263	0.877		4.9	4.3
88Sr	0.001	0.003		7.1	4.0
95Mo	0.008	0.027		0.277	0.293
107Ag	0.001	0.003		0.096	0.112
111Cd	0.084	0.280		3.2	3.9
118Sn	0.020	0.067		0.152	0.133
121Sb	0.008	0.027		0.053	0.046
137Ba	0.001	0.003		33	36
202Hg	0.045	0.150		<0.045	0.049
205Tl	0.001	0.003		0.061	0.044
208Pb	0.003	0.010		0.343	0.323
238U	0.001	0.003		0.085	0.100

Notes:

ppm = parts per million

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LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_HENUP_INV-03_2020-06-15			RG_FOUCL_INV-02_2020-06-15			RG_FOUCL_INV-03_2020-06-15		
Lab ID		003			008			009		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	0.243	0.259	6.4	1.1	1.3	16.7	1.1	1.2	8.7
11B	0.105	0.410	0.444	-	2.7	3.3	20.0	2.7	2.7	0.0
23Na	6.7	4,748	3,987	17.4	3,029	3,565	16.3	3,650	3,317	9.6
24Mg	0.057	1,974	2,451	21.6	1,661	1,989	18.0	2,070	2,154	4.0
27Al	0.444	111	137	21.0	2,604	3,231	21.5	2,065	2,047	0.9
31P	64	13,915	14,417	3.5	10,733	11,347	5.6	11,173	11,705	4.7
39K	6.1	11,498	8,736	27.3	8,652	10,490	19.2	10,140	9,940	2.0
44Ca	128	7,231	6,954	3.9	5,740	6,054	5.3	6,780	6,744	0.5
49Ti	0.221	5.0	6.6	27.6	170	248	37.3	131	44,035	10.1
51V	0.021	0.278	0.323	15.0	4.8	5.8	18.9	3.6	3.9	8.0
52Cr	0.596	2.7	2.6	-	24	20	18.2	22	23	4.4
55Mn	0.023	10	11	9.5	85	99	15.2	69	67	2.9
57Fe	3.9	148	152	2.7	1,187	1,280	7.5	1,028	1,053	2.4
59Co	0.003	0.230	0.216	6.3	4.7	5.0	6.2	2.9	3.1	6.7
60Ni	0.016	3.0	3.6	18.2	42	36	15.4	41	42	2.4
63Cu	0.008	13	16	20.7	16	19	17.1	22	20	9.5
66Zn	0.329	269	264	1.9	294	275	6.7	361	336	7.2
75As	0.439	0.528	0.511	-	1.4	1.4	-	1.1	1.2	-
77Se	0.263	3.6	4.5	22.2	5.5	6.5	16.7	6.6	6.6	0.0
88Sr	0.001	9.4	10	6.2	7.8	9.1	15.4	8.8	9.0	2.2
95Mo	0.008	0.303	0.306	1.0	0.502	0.539	7.1	0.471	0.443	6.1
107Ag	0.001	0.077	0.085	9.9	0.120	0.139	14.7	0.180	0.143	22.9
111Cd	0.084	0.711	0.803	-	5.8	6.1	5.0	4.3	3.9	9.8
118Sn	0.020	0.168	0.220	-	0.364	0.475	26.5	0.580	0.505	13.8
121Sb	0.008	0.009	0.009	-	0.059	0.068	-	0.057	0.052	-
137Ba	0.001	8.1	8.3	2.4	66	82	21.6	75	73	2.7
202Hg	0.045	0.058	0.050	-	0.060	0.069	-	0.052	0.064	-
205Tl	0.001	0.013	0.012	8.0	0.046	0.057	21.4	0.032	0.033	3.1
208Pb	0.003	0.058	0.067	14.4	0.631	0.715	12.5	0.453	0.475	4.7
238U	0.001	0.015	0.021	33.3	0.102	0.133	26.4	0.082	0.088	7.1

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FOBKS_INV-03_2020-06-16			RG_FOBKS_INV-05_2020-06-16			RG_SCOUTDS_INV-02_2020-06-16		
Lab ID		015			017			022		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	1.8	2.0	10.5	2.9	2.6	10.9	2.0	1.6	22.2
11B	0.105	4.8	4.9	2.1	7.1	6.4	10.4	1.8	1.8	0.0
23Na	6.7	2,781	2,580	7.5	3,191	3,077	3.6	3,192	3,305	3.5
24Mg	0.057	2,058	2,208	7.0	2,231	2,000	10.9	1,956	1,872	4.4
27Al	0.444	4,693	4,816	2.6	7,788	7,083	9.5	1,550	1,575	1.6
31P	64	10,074	10,292	2.1	11,146	10,525	5.7	11,875	11,654	1.9
39K	6.1	10,625	9,286	13.4	11,456	10,355	10.1	9,777	9,405	3.9
44Ca	128	6,499	5,219	21.8	6,529	6,443	1.3	4,394	4,337	1.3
49Ti	0.221	327	367	11.5	553	494	11.3	135	152	11.8
51V	0.021	7.8	7.5	3.9	12	11	8.7	2.8	2.9	3.5
52Cr	0.596	30	23	26.4	146	183	22.5	11	11	0.0
55Mn	0.023	128	112	13.3	194	193	0.5	61	85	32.9
57Fe	3.9	1,867	1,620	14.2	5,009	5,225	4.2	814	725	11.6
59Co	0.003	13	12	8.0	15	16	6.5	8.4	8.6	2.4
60Ni	0.016	59	44	29.1	227	280	20.9	24	24	0.0
63Cu	0.008	21	21	0.0	20	20	0.0	24	23	4.3
66Zn	0.329	491	521	5.9	454	443	2.5	453	367	21.0
75As	0.439	1.4	1.4	-	1.9	1.9	-	0.714	0.677	-
77Se	0.263	6.6	6.3	4.7	5.9	5.7	3.4	5.3	6.0	12.4
88Sr	0.001	8.4	8.4	0.0	11	10	9.5	5.7	6.0	5.1
95Mo	0.008	0.532	0.554	4.1	0.653	0.635	2.8	0.402	0.446	10.4
107Ag	0.001	0.135	0.133	1.5	0.151	0.151	0.0	0.131	0.139	5.9
111Cd	0.084	9.3	8.9	4.4	7.8	7.5	3.9	5.3	5.0	5.8
118Sn	0.020	0.617	0.562	9.3	0.764	0.719	6.1	0.304	0.353	14.9
121Sb	0.008	0.091	0.096	5.3	0.196	0.205	4.5	0.090	0.082	9.3
137Ba	0.001	86	88	2.3	141	128	9.7	48	54	11.8
202Hg	0.045	0.076	0.072	-	0.075	0.075	-	0.059	0.063	-
205Tl	0.001	0.059	0.062	5.0	0.111	0.107	3.7	0.059	0.053	10.7
208Pb	0.003	0.903	0.837	7.6	1.5	1.4	6.9	0.413	0.448	8.1
238U	0.001	0.166	0.182	9.2	0.274	0.248	10.0	0.080	0.076	5.1

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

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% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FOUKI_INV-02_2020-06-17			RG_FO26_INV-03_2020-06-17		
Lab ID		030			036		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	2.5	2.2	12.8	0.629	0.507	21.5
11B	0.105	3.8	3.2	17.1	2.0	1.8	10.5
23Na	6.7	4,419	4,346	1.7	3,198	3,850	18.5
24Mg	0.057	2,211	1,962	11.9	1,662	1,850	10.7
27Al	0.444	3,313	2,800	16.8	2,056	1,557	27.6
31P	64	11,239	10,300	8.7	12,864	12,705	1.2
39K	6.1	11,710	10,722	8.8	10,458	12,228	15.6
44Ca	128	4,177	4,219	1.0	3,138	3,471	10.1
49Ti	0.221	295	266	10.3	127	97	26.8
51V	0.021	5.7	4.8	17.1	2.7	2.4	11.8
52Cr	0.596	8.6	11	24.5	8.8	7.3	18.6
55Mn	0.023	102	94	8.2	111	95	15.5
57Fe	3.9	1,259	1,141	9.8	820	714	13.8
59Co	0.003	13	11	16.7	1.1	1.2	8.7
60Ni	0.016	29	30	3.4	17	16	6.1
63Cu	0.008	21	21	0.0	16	18	11.8
66Zn	0.329	503	533	5.8	275	255	7.5
75As	0.439	1.4	1.3	-	1.5	1.4	-
77Se	0.263	6.8	5.8	15.9	5.0	5.3	5.8
88Sr	0.001	6.6	6.4	3.1	5.9	6.0	1.7
95Mo	0.008	0.543	0.526	3.2	0.473	0.418	12.3
107Ag	0.001	0.140	0.158	12.1	0.092	0.096	4.3
111Cd	0.084	8.7	8.2	5.9	1.4	1.5	6.9
118Sn	0.020	0.454	0.399	12.9	0.299	0.280	6.6
121Sb	0.008	0.085	0.082	3.6	0.043	0.040	-
137Ba	0.001	70	67	4.4	110	90	20.0
202Hg	0.045	0.073	0.091	-	0.068	0.089	-
205Tl	0.001	0.085	0.073	15.2	0.043	0.046	6.7
208Pb	0.003	0.669	0.606	9.9	0.530	0.488	8.3
238U	0.001	0.142	0.129	9.6	0.080	0.086	7.2

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	01			02	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	105	5.2	1.3	111	9.6
11B	0.105	4.5	5.6	125	1.3	5.7	127	2.7
23Na	6.7	14000	16,501	118	3.2	15,976	114	10.8
24Mg	0.057	910	1,086	119	9.0	1,011	111	11.9
27Al	0.444	197.2	218	111	5.9	203	103	5.0
31P	64	8000	8,646	108	6.3	8,486	106	10.9
39K	6.1	15500	17,610	114	5.7	16,784	108	11.3
44Ca	128	2360	2,707	115	4.9	2,765	117	7.9
49Ti	0.221	12.24	14	118	15.0	13	105	5.8
51V	0.021	1.57	1.8	116	9.6	1.6	104	8.6
52Cr	0.596	1.87	2.2	115	3.7	2.1	113	11.6
55Mn	0.023	3.17	3.8	119	8.1	3.6	115	9.4
57Fe	3.9	343	430	125	6.7	398	116	9.9
59Co	0.003	0.25	0.299	120	4.9	0.301	121	11.5
60Ni	0.016	1.34	1.6	120	4.0	1.6	118	10.9
63Cu	0.008	15.7	19	119	5.0	19	123	11.1
66Zn	0.329	51.6	56	109	5.1	62	121	7.9
75As	0.439	6.87	7.1	103	7.2	7.3	106	13.3
77Se	0.263	3.45	3.2	94	9.3	3.4	100	12.9
88Sr	0.001	10.1	12	114	2.9	12	119	7.9
95Mo	0.008	0.29	0.328	113	5.3	0.339	117	12.4
107Ag	0.001	0.0252	0.032	125	6.9	0.031	123	11.5
111Cd	0.084	0.299	0.342	114	8.0	0.377	126	9.8
118Sn	0.020	0.061	0.067	110	7.7	0.069	113	13.2
121Sb	0.008	0.011	0.011	99	9.3	0.015	135	21.8
137Ba	0.001	8.6	9.9	116	2.6	9.8	113	4.1
202Hg	0.045	0.412	0.423	103	7.4	0.464	113	11.9
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.564	**140**	14.7	0.446	111	12.9
238U	0.001	0.05	0.065	129	5.3	0.061	122	8.6

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance.

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	03			04	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	105	5.3	1.3	111	3.8
11B	0.105	4.5	5.6	125	1.6	4.7	104	3.5
23Na	6.7	14000	15,365	110	1.5	15,114	108	6.1
24Mg	0.057	910	981	108	5.9	1,006	111	2.6
27Al	0.444	197.2	222	113	4.8	173	88	5.6
31P	64	8000	8,525	107	2.3	8,614	108	5.5
39K	6.1	15500	17,857	115	5.1	16,497	106	8.2
44Ca	128	2360	2,745	116	4.8	2,445	104	3.6
49Ti	0.221	12.24	15	125	9.3	13	102	4.7
51V	0.021	1.57	1.7	108	6.2	1.6	100	9.3
52Cr	0.596	1.87	2.1	111	2.3	1.9	104	2.3
55Mn	0.023	3.17	3.6	113	7.1	3.4	108	3.9
57Fe	3.9	343	398	116	5.8	372	108	5.3
59Co	0.003	0.25	0.283	113	4.3	0.273	109	6.0
60Ni	0.016	1.34	1.5	111	3.8	1.4	106	2.1
63Cu	0.008	15.7	17	111	4.7	18	112	2.4
66Zn	0.329	51.6	57	111	7.1	58	112	4.1
75As	0.439	6.87	7.0	102	3.0	7.5	109	2.0
77Se	0.263	3.45	3.2	92	4.1	3.7	109	4.8
88Sr	0.001	10.1	12	115	3.6	11	105	3.9
95Mo	0.008	0.29	0.332	115	5.1	0.314	108	2.7
107Ag	0.001	0.0252	0.028	109	6.0	0.027	106	7.7
111Cd	0.084	0.299	0.353	118	8.9	0.346	116	3.0
118Sn	0.020	0.061	0.066	108	8.3	0.061	100	14.2
121Sb	0.008	0.011	0.014	126	0.0	0.011	99	16.0
137Ba	0.001	8.6	9.8	113	3.1	8.7	101	5.1
202Hg	0.045	0.412	0.436	106	8.7	0.464	113	8.2
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.445	110	9.2	0.429	106	15.1
238U	0.001	0.05	0.063	126	5.4	0.050	99	7.0

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	05			06		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	109	4.3	1.3	103	7.0
11B	0.105	4.5	5.6	125	1.7	4.6	103	1.8
23Na	6.7	14000	16,331	117	5.7	14,966	107	3.9
24Mg	0.057	910	1,012	111	4.2	947	104	2.6
27Al	0.444	197.2	227	115	8.0	184	93	6.0
31P	64	8000	8,346	104	2.1	8,415	105	2.6
39K	6.1	15500	17,615	114	6.1	16,545	107	5.8
44Ca	128	2360	2,583	110	5.8	2,474	105	3.0
49Ti	0.221	12.24	15	125	14.4	12	102	10.5
51V	0.021	1.57	1.7	108	16.9	1.9	123	12.3
52Cr	0.596	1.87	2.1	113	8.4	2.0	105	4.9
55Mn	0.023	3.17	3.4	109	4.4	3.3	105	2.2
57Fe	3.9	343	383	112	5.5	369	108	1.8
59Co	0.003	0.25	0.284	114	5.7	0.267	107	3.3
60Ni	0.016	1.34	1.5	115	5.0	1.4	108	2.4
63Cu	0.008	15.7	20	125	3.6	17	106	5.0
66Zn	0.329	51.6	57	110	3.9	55	107	3.1
75As	0.439	6.87	7.2	105	1.8	7.4	108	1.4
77Se	0.263	3.45	3.5	101	5.1	3.6	103	4.1
88Sr	0.001	10.1	11	108	4.7	11	104	3.4
95Mo	0.008	0.29	0.330	114	7.7	0.290	100	4.0
107Ag	0.001	0.0252	0.033	131	11.7	0.026	104	7.8
111Cd	0.084	0.299	0.346	116	6.6	0.322	108	4.5
118Sn	0.020	0.061	0.074	121	9.3	0.071	117	11.6
121Sb	0.008	0.011	0.013	114	11.8	0.009	84	16.0
137Ba	0.001	8.6	9.9	115	3.1	8.9	103	4.6
202Hg	0.045	0.412	0.493	120	3.5	0.427	104	7.7
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.482	119	17.6	0.474	117	9.0
238U	0.001	0.05	0.056	111	11.9	0.056	111	6.2

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	07			08	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.4	114	6.4	1.3	104	9.0
11B	0.105	4.5	5.8	129	3.2	4.7	104	2.2
23Na	6.7	14000	15,941	114	5.4	14,594	104	5.8
24Mg	0.057	910	1,046	115	7.7	923	101	6.5
27Al	0.444	197.2	216	110	8.0	176	89	10.4
31P	64	8000	8,830	110	3.9	7,768	97	2.6
39K	6.1	15500	18,445	119	3.2	16,113	104	8.1
44Ca	128	2360	2,791	118	3.6	2,498	106	7.1
49Ti	0.221	12.24	15	124	13.1	11	92	11.4
51V	0.021	1.57	2.0	125	4.7	1.4	92	7.4
52Cr	0.596	1.87	2.2	116	0.5	1.9	99	4.1
55Mn	0.023	3.17	3.9	122	3.3	3.3	103	7.0
57Fe	3.9	343	429	125	4.0	362	105	4.9
59Co	0.003	0.25	0.318	127	4.8	0.263	105	5.1
60Ni	0.016	1.34	1.7	126	2.4	1.4	104	4.9
63Cu	0.008	15.7	19	123	3.8	17	108	1.9
66Zn	0.329	51.6	62	120	3.1	57	110	4.1
75As	0.439	6.87	7.4	108	1.2	6.5	94	4.7
77Se	0.263	3.45	3.5	100	4.4	3.3	95	4.8
88Sr	0.001	10.1	12	121	3.9	10	104	9.4
95Mo	0.008	0.29	0.336	116	5.0	0.300	103	5.8
107Ag	0.001	0.0252	0.033	132	4.0	0.030	118	8.1
111Cd	0.084	0.299	0.374	125	7.8	0.334	112	9.0
118Sn	0.020	0.061	0.084	137	13.0	0.059	97	7.8
121Sb	0.008	0.011	0.012	107	14.0	0.014	123	15.4
137Ba	0.001	8.6	11	122	3.9	8.0	94	4.4
202Hg	0.045	0.412	0.482	117	4.0	0.395	96	6.5
205Tl	0.001	-	-	-	-	-	-	-
208Pb	0.003	0.404	0.579	**143**	6.7	0.354	88	8.0
238U	0.001	0.05	0.068	**135**	1.0	0.050	100	4.0

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Bold indicates DQO exceedance.

Teck Coal Limited: Regional Effects Monitoring/Fording LAEMP 20-09

Tissue QA/QC Accuracy and Precision Results

Sample Group ID			09		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.2	103	5.3
11B	0.105	4.5	4.8	106	2.4
23Na	6.7	14000	13,681	98	2.3
24Mg	0.057	910	918	101	4.0
27Al	0.444	197.2	174	88	8.0
31P	64	8000	8,060	101	3.2
39K	6.1	15500	15,206	98	3.5
44Ca	128	2360	2,300	98	2.7
49Ti	0.221	12.24	12	98	11.7
51V	0.021	1.57	1.5	95	4.2
52Cr	0.596	1.87	1.8	98	3.1
55Mn	0.023	3.17	3.1	98	4.0
57Fe	3.9	343	340	99	2.3
59Co	0.003	0.25	0.255	102	3.6
60Ni	0.016	1.34	1.3	98	2.0
63Cu	0.008	15.7	15	98	4.4
66Zn	0.329	51.6	52	100	1.5
75As	0.439	6.87	6.9	101	1.5
77Se	0.263	3.45	3.5	101	2.0
88Sr	0.001	10.1	9.9	98	3.0
95Mo	0.008	0.29	0.262	90	4.1
107Ag	0.001	0.0252	0.026	105	7.5
111Cd	0.084	0.299	0.337	113	5.0
118Sn	0.020	0.061	0.050	82	12.4
121Sb	0.008	0.011	0.011	99	13.6
137Ba	0.001	8.6	8.5	99	2.8
202Hg	0.045	0.412	0.382	93	9.0
205Tl	0.001	-	-	-	-
208Pb	0.003	0.404	0.347	86	17.9
238U	0.001	0.05	0.044	87	9.6

Notes:

ppm = parts per million

% = percent

DL = detection limit

RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% was established for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_HENUP_INV-01_2020-06-15	001	20 Jul 2020
	RG_HENUP_INV-02_2020-06-15	002	
	RG_HENUP_INV-03_2020-06-15	003	
	RG_MP1_INV-01_2020-06-15	004	
	RG_MP1_INV-02_2020-06-15	005	
	RG_MP1_INV-03_2020-06-15	006	
	RG_FOUCL_INV-01_2020-06-15	007	
	RG_FOUCL_INV-02_2020-06-15	008	
02	RG_FOUCL_INV-03_2020-06-15	009	21 Jul 2020
	RG_FODHE_INV-01_2020-06-15	010	
	RG_FODHE_INV-02_2020-06-15	011	
	RG_FODHE_INV-03_2020-06-15	012	
	RG_FOBKS_INV-01_2020-06-16	013	
	RG_FOBKS_INV-02_2020-06-16	014	
	RG_FOBKS_INV-03_2020-06-16	015	
	RG_FOBKS_INV-04_2020-06-16	016	
03	RG_FOBKS_INV-05_2020-06-16	017	20 Jul 2020
	RG_FOUNGD_INV-01_2020-06-16	018	
	RG_FOUNGD_INV-02_2020-06-16	019	
	RG_FOUNGD_INV-03_2020-06-16	020	
	RG_SCOUTDS_INV-01_2020-06-16	021	
	RG_SCOUTDS_INV-02_2020-06-16	022	
	RG_SCOUTDS_INV-03_2020-06-16	023	
	RG_SCOUTDS_INV-04_2020-06-16	024	
04	RG_SCOUTDS_INV-05_2020-06-16	025	21 Jul 2020
	RG_FODNGD_INV-01_2020-06-16	026	
	RG_FODNGD_INV-02_2020-06-16	027	
	RG_FODNGD_INV-03_2020-06-16	028	
	RG_FOUKI_INV-01_2020-06-17	029	
	RG_FOUKI_INV-02_2020-06-17	030	
	RG_FOUKI_INV-03_2020-06-17	031	
	RG_FOUKI_INV-04_2020-06-17	032	
05	RG_FOUKI_INV-05_2020-06-17	033	20 Jul 2020
	RG_FO26_INV-01_2020-06-17	034	
	RG_FO26_INV-02_2020-06-17	035	
	RG_FO26_INV-03_2020-06-17	036	
	RG_UFR1_INV-01_2020-06-17	037	
	RG_UFR1_INV-02_2020-06-17	038	
	RG_UFR1_INV-03_2020-06-17	039	
	RG_UFR1_INV-04_2020-06-17	040	

Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
06	RG_UFR1_INV-05_2020-06-17	041	20 Jul 2020
	RG_FOBSC_INV-01_2020-06-18	042	
	RG_FOBSC_INV-02_2020-06-18	043	
	RG_FOBSC_INV-03_2020-06-18	044	
	RG_FOBSC_INV-04_2020-06-18	045	
	RG_FOBSC_INV-05_2020-06-18	046	
	RG_FRCP1SW_INV-01_2020-06-18	047	
	RG_FRCP1SW_INV-02_2020-06-18	048	
	RG_FRCP1SW_INV-03_2020-06-18	049	
	RG_FRCP1SW_INV-04_2020-06-18	050	
07	RG_FRCP1SW_INV-05_2020-06-18	051	20 Jul 2020
	RG_FODPO_INV-01_2020-06-19	052	
	RG_FODPO_INV-02_2020-06-19	053	
	RG_FODPO_INV-03_2020-06-19	054	
	RG_FODPO_INV-04_2020-06-19	055	
	RG_FODPO_INV-05_2020-06-19	056	
	RG_FOUEW_INV-01_2020-06-19	057	
	RG_FOUEW_INV-02_2020-06-19	058	
	RG_FOUEW_INV-03_2020-06-19	059	
08	RG_FOUEW_INV-04_2020-06-19	060	22 Jul 2020
	RG_FOUEW_INV-05_2020-06-19	061	
	RG_FO22_INV-01_2020-06-19	062	
	RG_FO22_INV-02_2020-06-19	063	
	RG_FO22_INV-03_2020-06-19	064	
	RG_FRUPO_INV-01_2020-06-19	065	
	RG_FRUPO_INV-02_2020-06-19	066	
	RG_FRUPO_INV-03_2020-06-19	067	
	RG_FRUPO_INV-04_2020-06-19	068	
09	RG_FRUPO_INV-05_2020-06-19	069	21 Jul 2020
	RG_FOUSH_INV-01_2020-06-23	070	
	RG_FOUSH_INV-02_2020-06-23	071	
	RG_FOUSH_INV-03_2020-06-23	072	
	RG_FOBCP_INV-01_2020-06-17	073	
	RG_FOBCP_INV-02_2020-06-17	074	7/23/2020
	RG_FOBCP_INV-03_2020-06-17	075	
	RG_FOBCP_INV-04_2020-06-17	076	
	RG_FOBCP_INV-05_2020-06-17	077	

Re-issued after Receipt
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TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 542-3084	Chain of Custody (COC) for LA-ICP-MS Analysis
Invoicing	Reporting (if different from Invoicing)

Project Number: Regional Effects Monitoring/Froding LAEMP 20-09

Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

Trich ID #		Sample Identification:	Sample Type: Species	Sample type
001	1	RG_HENUP_INV-01_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
002	2	RG_HENUP_INV-02_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
003	3	RG_HENUP_INV-03_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
004	4	RG_MP1_INV-01_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
005	5	RG_MP1_INV-02_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
006	6	RG_MP1_INV-03_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
007	7	RG_FOUCL_INV-01_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
008	8	RG_FOUCL_INV-02_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
009	9	RG_FOUCL_INV-03_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
010	10	RG_FODHE_INV-01_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
011	11	RG_FODHE_INV-02_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
012	12	RG_FODHE_INV-03_2020-06-15	Composite	Benthic Invertebrate, Total Metals and % Moisture
013	13	RG_FOBKS_INV-01_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
014	14	RG_FOBKS_INV-02_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
015	15	RG_FOBKS_INV-03_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
016	16	RG_FOBKS_INV-04_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
017	17	RG_FOBKS_INV-05_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
018	18	RG_FOUNGD_INV-01_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
019	19	RG_FOUNGD_INV-02_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
020	20	RG_FOUNGD_INV-03_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture

Sample(s) Released By:	Maddy Stokes	Sample(s) Received By:	Genevieve LaBine
Signature:	Maddy Stokes	Signature:	Genevieve LaBine
Date Sent:	6-Jul-20	Date Received:	08 Jul 2020 (Project #: 2020-121)
Sample(s) Returned to Client By: NOTE: page 1 of 4 GOL		Shipping Conditions:	
		Shipping Container:	
Signature:		Date Sent:	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: Regional Effects Monitoring/Froding LAEMP 20-09			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

Trich ID#:		Sample Identification:	Sample Type: Species	Sample Type
021	1	RG_SCOUTDS_INV-01_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
022	2	RG_SCOUTDS_INV-02_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
023	3	RG_SCOUTDS_INV-03_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
024	4	RG_SCOUTDS_INV-04_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
025	5	RG_SCOUTDS_INV-05_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
026	6	RG_FODNGD_INV-01_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
027	7	RG_FODNGD_INV-02_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
028	8	RG_FODNGD_INV-03_2020-06-16	Composite	Benthic Invertebrate, Total Metals and % Moisture
029	9	RG_FOUKI_INV-01_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
030	10	RG_FOUKI_INV-02_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
031	11	RG_FOUKI_INV-03_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
032	12	RG_FOUKI_INV-04_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
033	13	RG_FOUKI_INV-05_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
034	14	RG_FO28_INV-01_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
035	15	RG_FO28_INV-02_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
036	16	RG_FO28_INV-03_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
037	17	RG_UFR1_INV-01_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
038	18	RG_UFR1_INV-02_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
039	19	RG_UFR1_INV-03_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
040	20	RG_UFR1_INV-04_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture

Sample(s) Release Maddy Stokes	Sample(s) Received By: Geneve LaBine
Signature: Maddy Stokes	Signature: Geneve LaBine
Date Sent: 6-Jul-20	Date Received: 08 JUL 2020 (Project # 2020-121)
Sample(s) Returned to Client By: NOTE: page 2 of 4	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis
Invoicing	Reporting (if different from invoicing)

Project Number: Regional Effects Monitoring/Froding LAEMP 20-09

Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

Trich ID#:		Sample Identification:	Sample Type: Species	Sample type
041	1	RG_UFR1_INV-05_2020-06-17	Composite	Benthic Invertebrate, Total Metals and % Moisture
042	2	RG_FOBSC_INV-01_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
043	3	RG_FOBSC_INV-02_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
044	4	RG_FOBSC_INV-03_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
045	5	RG_FOBSC_INV-04_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
046	6	RG_FOBSC_INV-05_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
047	7	RG_FRCP1SW_INV-01_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
048	8	RG_FRCP1SW_INV-02_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
049	9	RG_FRCP1SW_INV-03_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
050	10	RG_FRCP1SW_INV-04_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
051	11	RG_FRCP1SW_INV-05_2020-06-18	Composite	Benthic Invertebrate, Total Metals and % Moisture
052	12	RG_FODPO_INV-01_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
053	13	RG_FODPO_INV-02_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
054	14	RG_FODPO_INV-03_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
055	15	RG_FODPO_INV-04_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
056	16	RG_FODPO_INV-05_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
057	17	RG_FOUEW_INV-01_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
058	18	RG_FOUEW_INV-02_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
059	19	RG_FOUEW_INV-03_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture
060	20	RG_FOUEW_INV-04_2020-06-19	Composite	Benthic Invertebrate, Total Metals and % Moisture

Sample(s) Release Maddy Stokes	Sample(s) Received By: Geneve LaBine.
Signature: Maddy Stokes	Signature: Geneve LaBine
Date Sent: 6-Jul-20	Date Received: 08 Jul 2020 (Project #: 2020-121)
Sample(s) Returned to Client By: NOTE: page 3 of 4	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1081	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: Regional Effects Monitoring/Frading LAEMP 20-09			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

Trich ID #:		Sample Identification:	Sample Type: Species	Sample Type
061	1	RG_FOUEW_INV-05_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
062	2	RG_FO22_INV-01_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
063	3	RG_FO22_INV-02_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
064	4	RG_FO22_INV-03_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
065	5	RG_FRUPO_INV-01_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
066	6	RG_FRUPO_INV-02_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
067	7	RG_FRUPO_INV-03_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
068	8	RG_FRUPO_INV-04_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
069	9	RG_FRUPO_INV-05_2020-06-19	Composite	Benthic Invertebrate: Total Metals and % Moisture
070	10	RG_FOUSH_INV-01_2020-06-23	Composite	Benthic Invertebrate: Total Metals and % Moisture
071	11	RG_FOUSH_INV-02_2020-06-23	Composite	Benthic Invertebrate: Total Metals and % Moisture
072	12	RG_FOUSH_INV-03_2020-06-23	Composite	Benthic Invertebrate: Total Metals and % Moisture
073	13	RG_FOBCP_INV-01_2020-06-17	Composite	Benthic Invertebrate: Total Metals and % Moisture
074	14	RG_FOBCP_INV-02_2020-06-17	Composite	Benthic Invertebrate: Total Metals and % Moisture
075	15	RG_FOBCP_INV-03_2020-06-17	Composite	Benthic Invertebrate: Total Metals and % Moisture
076	16	RG_FOBCP_INV-04_2020-06-17	Composite	Benthic Invertebrate: Total Metals and % Moisture
077	17	RG_FOBCP_INV-05_2020-06-17	Composite	Benthic Invertebrate: Total Metals and % Moisture
	18			
	19			
	20			

Sample(s) Release Maddy Stokes	Sample(s) Received By: Gericie LaBrie
Signature: Maddy Stokes	Signature: Gericie LaBrie
Date Sent: 6-Jul-20	Date Received: 08 Jul 2020 (Project #: 2020-121)
Sample(s) Returned to Client By: NOTE: page 4 of 4	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

COM-011.01

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Peter Schnurr
Aquatic Scientist
Minnow Environmental
Phone: (905) 873-3371 ext. 323
Email: pschnurr@minnow.ca

Date Received: 29 Sep 2020
Date of Analysis: 12 Oct 2020
13 Oct 2020
Final Report Date: 14 Oct 2020
Project No.: 2020-152
Method No.: MET-002.04

Client Project: Teck Coal Limited/Minnow Environmental FRO LAEMP (20-09)

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 79 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average achieved 103%; range 91 - 109%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 14 Oct 2020 Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_HENUP_INV-1_2020-09-15	RG_HENUP_INV-2_2020-09-15	RG_HENUP_INV-3_2020-09-15	RG_FO26_INV-1_2020-09-17	RG_FO26_INV-2_2020-09-17
		Lab ID	190	191	192	193	194
		Wet Weight (g)	1.1764	0.6410	1.2094	1.1525	1.0217
		Dry Weight (g)	0.2472	0.1318	0.2655	0.2696	0.2273
		Moisture (%)	79.0	79.4	78.0	76.6	77.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.244	0.309	0.275	0.271	0.243
11B	0.104	0.347	0.813	1.2	1.5	0.600	0.757
23Na	3.6	12	4,243	4,778	3,940	3,757	3,331
24Mg	0.047	0.157	1,254	1,533	1,231	1,292	1,337
27Al	0.047	0.157	126	192	148	193	432
31P	97	323	11,670	13,499	11,529	12,165	13,080
39K	14	47	12,810	13,547	12,857	10,630	11,885
44Ca	22	73	1,618	2,218	2,042	1,364	1,455
49Ti	0.225	0.750	5.7	8.7	5.4	10	21
51V	0.037	0.123	0.342	0.489	0.346	0.377	0.745
52Cr	0.298	0.993	2.6	4.3	2.3	2.3	3.6
55Mn	0.008	0.027	17	19	18	35	41
57Fe	3.9	13	126	193	123	164	278
59Co	0.006	0.020	0.121	0.321	0.122	0.164	0.350
60Ni	0.012	0.040	4.2	9.5	4.6	2.2	5.5
63Cu	0.010	0.033	11	12	9.6	12	13
66Zn	0.822	2.7	214	275	197	168	167
75As	0.455	1.5	1.6	2.2	1.7	1.8	1.3
77Se	0.359	1.2	6.0	6.9	5.7	3.9	5.0
88Sr	0.001	0.003	4.2	4.8	4.5	2.2	2.6
95Mo	0.009	0.030	0.199	0.249	0.261	0.311	0.336
107Ag	0.001	0.003	0.069	0.069	0.076	0.041	0.048
111Cd	0.077	0.257	0.352	0.665	0.383	0.423	0.604
118Sn	0.024	0.080	0.511	0.378	0.654	0.218	0.170
121Sb	0.007	0.023	<0.007	0.017	0.011	0.017	0.022
137Ba	0.001	0.003	7.8	9.5	8.0	30	36
202Hg	0.031	0.103	0.051	0.044	0.051	<0.031	0.036
205Tl	0.001	0.003	0.018	0.026	0.020	0.014	0.018
208Pb	0.001	0.003	0.045	0.075	0.066	0.161	0.163
238U	0.001	0.003	0.028	0.059	0.045	0.028	0.029

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FO26_INV-3_2020-09-17	RG_UFR1_INV-1_2020-09-16	RG_FODHE_INV-1_2020-09-15	RG_FODHE_INV-2_2020-09-15	RG_FODHE_INV-3_2020-09-15
		Lab ID	195	196	197	198	199
		Wet Weight (g)	0.6584	0.3528	1.4345	1.6628	2.1021
		Dry Weight (g)	0.1386	0.0817	0.2840	0.3387	0.4153
		Moisture (%)	78.9	76.8	80.2	79.6	80.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.309	0.495	1.4	0.777	0.981
11B	0.104	0.347	1.2	5.2	1.3	1.6	1.9
23Na	3.6	12	4,129	4,684	3,898	4,252	3,539
24Mg	0.047	0.157	1,506	1,809	1,416	1,285	1,419
27Al	0.047	0.157	686	887	356	136	251
31P	97	323	13,692	14,297	10,733	12,017	13,761
39K	14	47	12,999	16,668	12,033	13,186	12,614
44Ca	22	73	1,918	2,638	1,398	1,642	1,549
49Ti	0.225	0.750	37	52	16	7.2	14
51V	0.037	0.123	1.4	1.7	0.604	0.308	0.536
52Cr	0.298	0.993	6.7	4.6	2.5	2.1	2.3
55Mn	0.008	0.027	41	42	57	41	53
57Fe	3.9	13	508	377	241	148	164
59Co	0.006	0.020	0.666	0.756	0.456	0.400	0.451
60Ni	0.012	0.040	14	11	4.8	6.1	7.1
63Cu	0.010	0.033	13	19	11	13	12
66Zn	0.822	2.7	215	205	183	214	165
75As	0.455	1.5	1.7	2.1	<0.455	0.484	0.470
77Se	0.359	1.2	4.8	6.5	8.1	8.1	7.5
88Sr	0.001	0.003	3.9	4.6	2.8	2.5	2.4
95Mo	0.009	0.030	0.360	0.435	0.174	0.186	0.199
107Ag	0.001	0.003	0.062	0.084	0.058	0.062	0.045
111Cd	0.077	0.257	0.776	2.8	0.685	0.806	0.624
118Sn	0.024	0.080	0.416	0.552	0.256	0.334	0.146
121Sb	0.007	0.023	0.039	0.083	0.022	0.022	0.044
137Ba	0.001	0.003	37	61	22	21	17
202Hg	0.031	0.103	0.036	0.058	0.044	0.044	0.044
205Tl	0.001	0.003	0.027	0.052	0.020	0.018	0.020
208Pb	0.001	0.003	0.316	0.236	0.130	0.092	0.098
238U	0.001	0.003	0.056	0.071	0.036	0.036	0.041

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOUCL_INV-1_2020-09-10	RG_FOUCL_INV-2_2020-09-10	RG_FOUCL_INV-3_2020-09-10	RG_FOUNGD_INV-1_2020-09-10	RG_FOUNGD_INV-2_2020-09-10
		Lab ID	200	201	202	203	204
		Wet Weight (g)	1.9108	2.0230	1.9161	2.0332	1.8167
		Dry Weight (g)	0.3631	0.4170	0.4009	0.3782	0.3351
		Moisture (%)	81.0	79.4	79.1	81.4	81.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.1	0.954	0.433	4.2	8.5
11B	0.104	0.347	1.5	1.4	0.600	0.475	0.976
23Na	3.6	12	4,003	3,185	1,965	4,337	5,561
24Mg	0.047	0.157	1,789	1,280	711	1,504	1,236
27Al	0.047	0.157	505	1,119	248	215	776
31P	97	323	15,811	10,278	6,018	11,298	9,082
39K	14	47	15,283	9,325	5,769	11,026	9,946
44Ca	22	73	2,385	1,785	841	1,700	1,547
49Ti	0.225	0.750	32	82	12	12	43
51V	0.037	0.123	1.1	3.0	0.474	0.523	1.7
52Cr	0.298	0.993	3.4	6.3	2.7	2.7	6.9
55Mn	0.008	0.027	50	63	34	44	53
57Fe	3.9	13	384	1,131	139	180	559
59Co	0.006	0.020	1.1	1.1	0.335	0.933	2.0
60Ni	0.012	0.040	10	15	4.5	10	21
63Cu	0.010	0.033	16	15	8.0	16	15
66Zn	0.822	2.7	244	203	132	225	193
75As	0.455	1.5	0.974	0.790	<0.455	0.545	0.586
77Se	0.359	1.2	13	10	6.7	11	11
88Sr	0.001	0.003	4.1	3.5	1.3	2.5	2.7
95Mo	0.009	0.030	0.311	0.398	0.112	0.224	0.348
107Ag	0.001	0.003	0.093	0.086	0.036	0.079	0.100
111Cd	0.077	0.257	2.0	1.2	0.443	1.2	1.8
118Sn	0.024	0.080	0.252	0.198	0.164	0.348	0.682
121Sb	0.007	0.023	0.055	0.050	0.017	0.028	0.052
137Ba	0.001	0.003	129	89	36	34	55
202Hg	0.031	0.103	0.073	0.058	<0.031	0.044	0.058
205Tl	0.001	0.003	0.031	0.033	0.012	0.025	0.033
208Pb	0.001	0.003	0.230	0.540	0.092	0.109	0.349
238U	0.001	0.003	0.228	0.104	0.036	0.069	0.126

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOUNGD_INV-3_2020-09-10	RG_FODNGD_INV-1_2020-09-21	RG_FODNGD_INV-2_2020-09-21	RG_FODNGD_INV-3_2020-09-21	RG_MP1_INV-1_2020-09-15
		Lab ID	205	206	207	208	209
		Wet Weight (g)	1.7977	1.2706	1.6926	2.0937	1.7152
		Dry Weight (g)	0.3616	0.2701	0.3689	0.4632	0.3436
		Moisture (%)	79.9	78.7	78.2	77.9	80.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.2	3.3	3.2	1.5	2.4
11B	0.104	0.347	0.525	1.5	0.732	1.0	0.549
23Na	3.6	12	2,318	3,654	2,995	3,166	4,112
24Mg	0.047	0.157	1,002	1,545	1,298	1,203	1,488
27Al	0.047	0.157	280	625	421	432	216
31P	97	323	8,155	10,899	8,971	11,567	10,851
39K	14	47	5,529	9,935	8,271	10,808	9,556
44Ca	22	73	1,338	2,465	1,418	1,631	1,937
49Ti	0.225	0.750	16	37	21	29	22
51V	0.037	0.123	0.584	1.3	0.710	0.792	0.617
52Cr	0.298	0.993	2.7	4.4	3.0	2.9	2.6
55Mn	0.008	0.027	41	29	34	39	19
57Fe	3.9	13	176	303	160	182	244
59Co	0.006	0.020	0.882	1.6	1.9	1.7	1.3
60Ni	0.012	0.040	10	18	8.8	10	5.7
63Cu	0.010	0.033	14	15	11	13	19
66Zn	0.822	2.7	214	184	170	169	228
75As	0.455	1.5	<0.455	0.681	<0.455	0.534	<0.455
77Se	0.359	1.2	9.6	6.9	7.9	9.6	13
88Sr	0.001	0.003	2.1	4.0	2.5	2.6	2.8
95Mo	0.009	0.030	0.224	0.199	0.137	0.188	0.222
107Ag	0.001	0.003	0.082	0.093	0.052	0.061	0.132
111Cd	0.077	0.257	0.866	0.896	0.584	0.710	1.3
118Sn	0.024	0.080	0.252	0.279	0.334	0.269	0.273
121Sb	0.007	0.023	0.028	0.044	0.028	0.033	0.020
137Ba	0.001	0.003	32	27	26	29	21
202Hg	0.031	0.103	0.051	0.044	0.044	0.034	0.046
205Tl	0.001	0.003	0.021	0.023	0.018	0.022	0.021
208Pb	0.001	0.003	0.137	0.179	0.089	0.139	0.116
238U	0.001	0.003	0.055	0.067	0.035	0.049	0.036

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_MP1_INV-2_2020-09-15	RG_MP1_INV-3_2020-09-15	RG_FOUSH_INV-1_2020-09-21	RG_FOUSH_INV-2_2020-09-21	RG_FOUSH_INV-3_2020-09-21
		Lab ID	210	211	212	213	214
		Wet Weight (g)	1.5608	1.6150	1.9685	1.8073	1.7320
		Dry Weight (g)	0.2931	0.3370	0.3998	0.3762	0.3764
		Moisture (%)	81.2	79.1	79.7	79.2	78.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.1	2.9	2.4	1.2	3.8
11B	0.104	0.347	1.1	1.0	0.686	0.824	1.0
23Na	3.6	12	3,206	4,053	4,290	2,680	4,969
24Mg	0.047	0.157	1,735	1,391	1,384	915	1,504
27Al	0.047	0.157	727	579	294	335	570
31P	97	323	12,357	10,874	12,432	9,045	12,469
39K	14	47	9,043	11,009	10,937	7,566	11,345
44Ca	22	73	2,187	1,943	2,251	1,528	2,345
49Ti	0.225	0.750	58	40	27	23	42
51V	0.037	0.123	1.7	1.2	1.1	0.889	1.5
52Cr	0.298	0.993	5.7	3.6	2.9	2.8	4.0
55Mn	0.008	0.027	35	35	49	94	108
57Fe	3.9	13	574	392	896	673	1,095
59Co	0.006	0.020	2.1	1.7	0.448	0.622	1.0
60Ni	0.012	0.040	18	14	9.3	10	16
63Cu	0.010	0.033	18	16	17	12	20
66Zn	0.822	2.7	227	176	200	143	248
75As	0.455	1.5	0.516	<0.455	<0.455	<0.455	0.489
77Se	0.359	1.2	12	9.6	8.1	7.3	11
88Sr	0.001	0.003	4.4	2.9	3.1	2.3	3.6
95Mo	0.009	0.030	0.205	0.222	0.222	0.205	0.358
107Ag	0.001	0.003	0.090	0.085	0.128	0.090	0.175
111Cd	0.077	0.257	1.2	1.2	0.622	0.414	1.1
118Sn	0.024	0.080	0.309	0.415	0.317	0.224	0.529
121Sb	0.007	0.023	0.033	0.033	0.033	0.046	0.059
137Ba	0.001	0.003	36	25	23	23	34
202Hg	0.031	0.103	0.040	<0.031	0.046	<0.031	0.057
205Tl	0.001	0.003	0.031	0.024	0.018	0.015	0.030
208Pb	0.001	0.003	0.245	0.197	0.112	0.100	0.251
238U	0.001	0.003	0.059	0.045	0.032	0.032	0.051

Notes:

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% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOUKI_INV-1_2020-09-14	RG_FOUKI_INV-2_2020-09-14	RG_FOUKI_INV-3_2020-09-14	RG_FOUKI_INV-4_2020-09-14	RG_FOUKI_INV-5_2020-09-14
		Lab ID	215	216	217	218	219
		Wet Weight (g)	1.8766	1.7448	2.3612	1.6148	2.1805
		Dry Weight (g)	0.4196	0.4265	0.4484	0.3178	0.5117
		Moisture (%)	77.6	75.6	81.0	80.3	76.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.1	1.3	2.3	2.4	1.4
11B	0.104	0.347	0.659	0.750	0.856	1.0	0.448
23Na	3.6	12	3,204	2,795	4,534	5,077	3,700
24Mg	0.047	0.157	1,558	1,296	1,389	1,929	1,307
27Al	0.047	0.157	232	180	372	416	119
31P	97	323	10,829	10,634	10,744	15,300	11,490
39K	14	47	9,405	8,513	8,618	11,726	9,686
44Ca	22	73	2,854	2,198	1,979	2,858	1,765
49Ti	0.225	0.750	19	12	28	32	7.1
51V	0.037	0.123	0.522	0.320	0.762	0.790	0.293
52Cr	0.298	0.993	2.7	1.9	4.3	3.5	2.2
55Mn	0.008	0.027	87	117	101	154	175
57Fe	3.9	13	290	192	321	430	212
59Co	0.006	0.020	1.4	1.6	0.946	1.8	1.4
60Ni	0.012	0.040	13	9.5	13	18	14
63Cu	0.010	0.033	18	14	14	19	17
66Zn	0.822	2.7	275	264	198	328	210
75As	0.455	1.5	<0.455	<0.455	<0.455	0.756	0.510
77Se	0.359	1.2	9.4	9.0	8.5	12	11
88Sr	0.001	0.003	3.8	2.6	2.7	4.5	2.3
95Mo	0.009	0.030	0.273	0.205	0.226	0.435	0.278
107Ag	0.001	0.003	0.139	0.061	0.081	0.141	0.101
111Cd	0.077	0.257	2.3	3.2	1.1	2.5	1.7
118Sn	0.024	0.080	0.330	0.114	0.153	0.640	0.278
121Sb	0.007	0.023	0.059	0.033	0.047	0.138	0.050
137Ba	0.001	0.003	28	21	34	32	28
202Hg	0.031	0.103	0.046	0.034	0.045	0.051	0.034
205Tl	0.001	0.003	0.019	0.045	0.026	0.046	0.049
208Pb	0.001	0.003	0.100	0.060	0.116	0.134	0.058
238U	0.001	0.003	0.035	0.024	0.043	0.066	0.029

Notes:

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% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBKS_INV-1_2020-09-10	RG_FOBKS_INV-2_2020-09-10	RG_FOBKS_INV-3_2020-09-10	RG_FOBKS_INV-4_2020-09-10	RG_FOBKS_INV-5_2020-09-10
		Lab ID	220	221	222	223	224
		Wet Weight (g)	2.5743	1.8269	2.4470	2.0494	3.5152
		Dry Weight (g)	0.7094	0.3866	0.4695	0.4801	0.8678
		Moisture (%)	72.4	78.8	80.8	76.6	75.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.977	1.3	9.0	1.6	1.3
11B	0.104	0.347	0.350	1.3	2.3	0.506	0.389
23Na	3.6	12	2,401	3,191	6,707	2,759	2,840
24Mg	0.047	0.157	999	1,767	1,847	1,203	871
27Al	0.047	0.157	154	815	1,733	245	141
31P	97	323	7,470	11,694	11,186	9,403	9,606
39K	14	47	5,851	10,883	11,547	7,255	7,850
44Ca	22	73	1,304	3,369	3,878	2,615	1,490
49Ti	0.225	0.750	8.0	66	89	16	7.5
51V	0.037	0.123	0.271	1.4	3.7	0.482	0.288
52Cr	0.298	0.993	2.4	3.8	9.5	2.0	2.0
55Mn	0.008	0.027	66	121	122	104	90
57Fe	3.9	13	125	512	784	225	158
59Co	0.006	0.020	0.906	2.5	2.8	1.0	0.725
60Ni	0.012	0.040	6.9	23	38	14	7.8
63Cu	0.010	0.033	10	20	19	13	13
66Zn	0.822	2.7	190	354	213	166	149
75As	0.455	1.5	<0.455	0.907	0.642	<0.455	<0.455
77Se	0.359	1.2	6.6	13	11	11	7.8
88Sr	0.001	0.003	1.6	5.4	6.0	2.7	1.4
95Mo	0.009	0.030	0.252	0.452	0.557	0.365	0.226
107Ag	0.001	0.003	0.086	0.146	0.156	0.066	0.050
111Cd	0.077	0.257	0.541	3.3	3.1	1.1	0.637
118Sn	0.024	0.080	0.028	0.297	0.482	0.074	0.037
121Sb	0.007	0.023	0.027	0.122	0.143	0.048	0.040
137Ba	0.001	0.003	18	46	62	31	18
202Hg	0.031	0.103	0.040	0.068	0.068	0.045	<0.031
205Tl	0.001	0.003	0.015	0.040	0.076	0.020	0.018
208Pb	0.001	0.003	0.045	0.179	0.460	0.089	0.062
238U	0.001	0.003	0.015	0.084	0.130	0.041	0.027

Notes:

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_SCOUTDS_INV-1_2020-09-17	RG_SCOUTDS_INV-2_2020-09-17	RG_SCOUTDS_INV-3_2020-09-17	RG_SCOUTDS_INV-4_2020-09-17	RG_SCOUTDS_INV-5_2020-09-17
		Lab ID	225	226	227	228	229
		Wet Weight (g)	2.2777	1.7783	1.9206	2.7785	1.7898
		Dry Weight (g)	0.4907	0.3814	0.4920	0.3502	0.3313
		Moisture (%)	78.5	78.6	74.4	87.4	81.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.3	2.6	0.995	1.7	1.3
11B	0.104	0.347	1.1	0.759	0.510	0.402	0.625
23Na	3.6	12	4,462	3,416	1,982	2,591	2,409
24Mg	0.047	0.157	1,631	1,061	779	1,021	1,071
27Al	0.047	0.157	317	168	129	144	197
31P	97	323	11,822	7,852	5,722	7,421	8,913
39K	14	47	10,649	7,917	5,990	5,447	7,151
44Ca	22	73	2,182	1,772	1,264	1,067	1,475
49Ti	0.225	0.750	20	11	8.1	7.7	11
51V	0.037	0.123	0.653	0.411	0.294	0.341	0.385
52Cr	0.298	0.993	3.2	2.6	2.0	2.4	2.4
55Mn	0.008	0.027	159	115	123	84	84
57Fe	3.9	13	297	173	121	161	166
59Co	0.006	0.020	1.7	1.1	0.833	0.771	0.814
60Ni	0.012	0.040	21	15	11	8.1	12
63Cu	0.010	0.033	26	16	16	11	16
66Zn	0.822	2.7	320	274	145	170	213
75As	0.455	1.5	0.491	<0.455	<0.455	<0.455	<0.455
77Se	0.359	1.2	8.5	8.5	7.6	7.1	8.0
88Sr	0.001	0.003	2.6	1.6	1.2	1.1	1.5
95Mo	0.009	0.030	0.261	0.268	0.201	0.234	0.251
107Ag	0.001	0.003	0.121	0.085	0.090	0.072	0.079
111Cd	0.077	0.257	2.8	2.4	1.2	1.1	1.4
118Sn	0.024	0.080	0.297	0.435	0.142	0.106	0.184
121Sb	0.007	0.023	0.052	0.029	0.020	0.018	0.024
137Ba	0.001	0.003	12	11	7.5	8.4	10
202Hg	0.031	0.103	0.034	0.043	0.031	0.043	0.047
205Tl	0.001	0.003	0.041	0.030	0.021	0.023	0.025
208Pb	0.001	0.003	0.098	0.087	0.051	0.058	0.066
238U	0.001	0.003	0.038	0.036	0.016	0.018	0.023

Notes:

ppm = parts per million

DL = detection limit

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBSC_INV-1_2020-09-18	RG_FOBSC_INV-2_2020-09-18	RG_FOBSC_INV-3_2020-09-18	RG_FOBSC_INV-4_2020-09-18	RG_FOBSC_INV-5_2020-09-18
		Lab ID	230	231	232	233	234
		Wet Weight (g)	1.5243	1.6891	1.7298	2.3597	1.1684
		Dry Weight (g)	0.3289	0.3763	0.3877	0.5908	0.3208
		Moisture (%)	78.4	77.7	77.6	75.0	72.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.1	2.2	1.4	1.7	1.9
11B	0.104	0.347	0.983	1.3	1.2	0.651	1.2
23Na	3.6	12	3,846	3,927	2,399	3,277	3,219
24Mg	0.047	0.157	1,559	1,377	1,353	1,442	1,458
27Al	0.047	0.157	271	434	290	190	691
31P	97	323	12,102	11,969	9,100	9,835	9,854
39K	14	47	9,746	11,561	8,089	9,711	9,340
44Ca	22	73	2,318	1,629	2,860	1,494	1,971
49Ti	0.225	0.750	23	34	23	12	58
51V	0.037	0.123	0.611	0.952	0.673	0.441	1.6
52Cr	0.298	0.993	2.8	3.1	2.7	2.5	3.3
55Mn	0.008	0.027	73	128	158	138	164
57Fe	3.9	13	221	323	266	223	462
59Co	0.006	0.020	0.723	0.962	1.1	0.981	1.2
60Ni	0.012	0.040	13	16	15	13	23
63Cu	0.010	0.033	18	17	19	20	18
66Zn	0.822	2.7	220	259	468	280	274
75As	0.455	1.5	<0.455	0.504	0.490	<0.455	0.672
77Se	0.359	1.2	10	12	8.2	11	12
88Sr	0.001	0.003	2.6	2.2	2.9	1.7	2.7
95Mo	0.009	0.030	0.251	0.368	0.393	0.351	0.402
107Ag	0.001	0.003	0.094	0.094	0.187	0.122	0.112
111Cd	0.077	0.257	2.1	1.7	2.3	1.6	3.0
118Sn	0.024	0.080	0.255	0.234	0.106	0.184	0.163
121Sb	0.007	0.023	0.032	0.035	0.055	0.021	0.051
137Ba	0.001	0.003	11	19	15	14	27
202Hg	0.031	0.103	0.055	0.071	0.071	0.031	0.055
205Tl	0.001	0.003	0.039	0.040	0.039	0.029	0.061
208Pb	0.001	0.003	0.087	0.137	0.149	0.084	0.188
238U	0.001	0.003	0.034	0.041	0.061	0.034	0.058

Notes:

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBCP_INV-1_2020-09-16	RG_FOBCP_INV-2_2020-09-16	RG_FOBCP_INV-3_2020-09-16	RG_FOBCP_INV-4_2020-09-16	RG_FOBCP_INV-5_2020-09-16
		Lab ID	235	236	237	238	239
		Wet Weight (g)	2.2925	1.4616	1.5184	1.4323	1.3118
		Dry Weight (g)	0.5466	0.2910	0.3794	0.3700	0.3138
		Moisture (%)	76.2	80.1	75.0	74.2	76.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.8	1.3	0.955	1.2	1.9
11B	0.104	0.347	0.628	0.541	0.445	0.489	0.646
23Na	3.6	12	4,193	3,756	2,868	3,098	5,030
24Mg	0.047	0.157	1,425	1,784	1,570	1,468	1,269
27Al	0.047	0.157	205	166	156	163	231
31P	97	323	11,361	12,726	10,908	11,654	13,532
39K	14	47	10,772	12,413	10,302	9,370	12,849
44Ca	22	73	2,087	2,696	1,760	1,642	1,565
49Ti	0.225	0.750	17	10	9.2	12	18
51V	0.037	0.123	0.514	0.360	0.318	0.361	0.536
52Cr	0.298	0.993	2.5	2.7	2.7	2.7	2.9
55Mn	0.008	0.027	149	57	131	91	144
57Fe	3.9	13	247	215	230	182	267
59Co	0.006	0.020	1.2	1.5	2.0	0.777	1.2
60Ni	0.012	0.040	18	13	14	11	17
63Cu	0.010	0.033	19	19	18	20	16
66Zn	0.822	2.7	338	405	407	256	259
75As	0.455	1.5	<0.455	0.466	<0.455	<0.455	<0.455
77Se	0.359	1.2	11	9.9	9.9	11	11
88Sr	0.001	0.003	2.5	3.1	2.2	2.0	2.1
95Mo	0.009	0.030	0.486	0.405	0.324	0.324	0.324
107Ag	0.001	0.003	0.119	0.124	0.097	0.116	0.092
111Cd	0.077	0.257	3.0	4.7	4.0	3.0	2.8
118Sn	0.024	0.080	0.272	0.909	0.132	0.093	0.170
121Sb	0.007	0.023	0.040	0.040	0.033	0.046	0.040
137Ba	0.001	0.003	16	12	14	12	22
202Hg	0.031	0.103	0.037	0.037	0.056	<0.031	<0.031
205Tl	0.001	0.003	0.029	0.042	0.050	0.028	0.031
208Pb	0.001	0.003	0.092	0.061	0.080	0.080	0.126
238U	0.001	0.003	0.059	0.049	0.034	0.037	0.049

Notes:

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DL = detection limit

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRCP1SW_INV-1_2020-09-22	RG_FRCP1SW_INV-2_2020-09-22	RG_FRCP1SW_INV-3_2020-09-22	RG_FRCP1SW_INV-4_2020-09-22	RG_FRCP1SW_INV-5_2020-09-22
		Lab ID	240	241	242	243	244
		Wet Weight (g)	1.0724	0.8049	1.3183	1.6355	1.5315
		Dry Weight (g)	0.1770	0.1539	0.2707	0.4258	0.3302
		Moisture (%)	83.5	80.9	79.5	74.0	78.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.5	1.5	2.8	1.1	1.1
11B	0.104	0.347	0.663	0.523	0.593	0.349	0.616
23Na	3.6	12	7,808	5,148	4,747	2,518	3,000
24Mg	0.047	0.157	2,196	2,082	1,431	773	1,396
27Al	0.047	0.157	243	228	304	200	134
31P	97	323	17,421	13,524	12,995	8,123	10,005
39K	14	47	18,251	14,184	11,391	6,876	9,609
44Ca	22	73	2,466	2,797	1,986	965	1,966
49Ti	0.225	0.750	18	15	21	14	7.8
51V	0.037	0.123	0.597	0.541	0.676	0.449	0.214
52Cr	0.298	0.993	3.2	2.7	3.7	2.1	1.9
55Mn	0.008	0.027	32	78	96	46	28
57Fe	3.9	13	228	238	294	161	122
59Co	0.006	0.020	1.1	1.2	1.1	0.519	0.548
60Ni	0.012	0.040	15	15	19	6.7	6.8
63Cu	0.010	0.033	26	26	16	11	17
66Zn	0.822	2.7	414	493	353	178	245
75As	0.455	1.5	<0.455	<0.455	<0.455	<0.455	<0.455
77Se	0.359	1.2	13	16	14	8.2	7.4
88Sr	0.001	0.003	2.8	3.1	2.7	1.7	1.9
95Mo	0.009	0.030	0.303	0.344	0.445	0.405	0.252
107Ag	0.001	0.003	0.194	0.243	0.113	0.099	0.113
111Cd	0.077	0.257	4.2	4.6	3.8	1.7	2.7
118Sn	0.024	0.080	0.391	0.607	0.093	0.153	0.201
121Sb	0.007	0.023	0.066	0.066	0.053	0.023	0.033
137Ba	0.001	0.003	9.6	18	22	6.0	7.5
202Hg	0.031	0.103	0.042	0.065	0.074	0.037	<0.031
205Tl	0.001	0.003	0.044	0.046	0.048	0.019	0.028
208Pb	0.001	0.003	0.078	0.099	0.153	0.029	0.056
238U	0.001	0.003	0.052	0.065	0.057	0.011	0.027

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRUPO_INV-1_2020-09-12	RG_FRUPO_INV-2_2020-09-12	RG_FRUPO_INV-3_2020-09-12	RG_FRUPO_INV-4_2020-09-12	RG_FRUPO_INV-5_2020-09-12
		Lab ID	245	246	247	248	249
		Wet Weight (g)	1.2694	1.8420	1.6080	2.1563	1.8275
		Dry Weight (g)	0.3032	0.4347	0.3282	0.5706	0.3736
		Moisture (%)	76.1	76.4	79.6	73.5	79.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.684	2.1	1.6	0.994	0.884
11B	0.104	0.347	1.3	1.9	1.9	0.787	1.4
23Na	3.6	12	3,016	5,197	4,745	4,282	3,729
24Mg	0.047	0.157	1,881	1,327	1,569	1,463	2,077
27Al	0.047	0.157	429	1,122	774	281	385
31P	97	323	12,389	7,991	7,720	11,311	12,761
39K	14	47	9,711	8,780	8,794	11,350	11,723
44Ca	22	73	3,124	1,888	3,012	2,081	3,333
49Ti	0.225	0.750	30	218	76	33	30
51V	0.037	0.123	0.796	2.1	2.0	0.626	1.1
52Cr	0.298	0.993	3.8	7.6	6.4	2.8	4.7
55Mn	0.008	0.027	43	46	45	59	38
57Fe	3.9	13	329	676	669	296	376
59Co	0.006	0.020	0.897	1.2	1.4	1.2	0.881
60Ni	0.012	0.040	8.5	21	21	6.4	9.2
63Cu	0.010	0.033	15	14	14	15	16
66Zn	0.822	2.7	275	184	145	169	212
75As	0.455	1.5	0.479	0.676	0.684	0.530	<0.455
77Se	0.359	1.2	9.5	9.1	10	9.4	10
88Sr	0.001	0.003	4.8	3.3	3.4	2.6	5.5
95Mo	0.009	0.030	0.314	0.524	0.461	0.356	0.356
107Ag	0.001	0.003	0.080	0.066	0.085	0.076	0.118
111Cd	0.077	0.257	2.7	2.1	2.5	2.6	1.9
118Sn	0.024	0.080	0.241	0.082	0.312	0.320	0.364
121Sb	0.007	0.023	0.033	0.046	0.053	0.033	0.046
137Ba	0.001	0.003	32	38	36	25	38
202Hg	0.031	0.103	<0.031	0.042	<0.031	<0.031	0.033
205Tl	0.001	0.003	0.021	0.043	0.037	0.024	0.028
208Pb	0.001	0.003	0.148	0.348	0.368	0.181	0.289
238U	0.001	0.003	0.085	0.076	0.088	0.062	0.091

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FODPO_INV-1_2020-09-11	RG_FODPO_INV-2_2020-09-11	RG_FODPO_INV-3_2020-09-11	RG_FODPO_INV-4_2020-09-11	RG_FODPO_INV-5_2020-09-11
		Lab ID	250	251	252	253	254
		Wet Weight (g)	0.9472	1.3655	3.0037	3.0639	3.1201
		Dry Weight (g)	0.2191	0.2889	0.5855	0.5875	0.4052
		Moisture (%)	76.9	78.8	80.5	80.8	87.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.5	1.1	2.3	1.4	4.1
11B	0.104	0.347	3.1	4.2	4.7	2.2	11
23Na	3.6	12	3,509	3,095	6,229	3,784	10,835
24Mg	0.047	0.157	2,164	1,787	1,659	1,606	1,995
27Al	0.047	0.157	1,665	1,723	2,304	1,266	2,712
31P	97	323	11,703	8,830	8,429	8,598	11,516
39K	14	47	10,307	8,964	12,270	11,121	19,924
44Ca	22	73	3,254	3,253	2,847	2,016	3,442
49Ti	0.225	0.750	135	154	211	108	202
51V	0.037	0.123	3.7	3.3	4.8	2.6	5.4
52Cr	0.298	0.993	7.4	7.1	11	5.3	9.4
55Mn	0.008	0.027	53	41	60	38	57
57Fe	3.9	13	979	961	1,119	710	1,376
59Co	0.006	0.020	1.4	0.881	1.6	0.871	1.6
60Ni	0.012	0.040	23	21	32	19	34
63Cu	0.010	0.033	18	15	14	13	12
66Zn	0.822	2.7	249	209	115	126	132
75As	0.455	1.5	0.650	0.667	1.3	0.627	1.4
77Se	0.359	1.2	9.3	6.7	7.2	7.1	10
88Sr	0.001	0.003	6.8	7.0	6.4	3.6	6.4
95Mo	0.009	0.030	0.524	0.419	0.587	0.331	0.539
107Ag	0.001	0.003	0.099	0.092	0.085	0.065	0.081
111Cd	0.077	0.257	2.1	1.7	1.4	1.1	2.2
118Sn	0.024	0.080	0.275	0.282	0.215	0.120	0.176
121Sb	0.007	0.023	0.092	0.079	0.119	0.059	0.106
137Ba	0.001	0.003	53	54	54	29	56
202Hg	0.031	0.103	<0.031	0.033	0.033	0.035	<0.031
205Tl	0.001	0.003	0.048	0.046	0.062	0.043	0.097
208Pb	0.001	0.003	0.503	0.460	0.582	0.345	0.463
238U	0.001	0.003	0.164	0.189	0.143	0.101	0.143

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FO22_INV-1_2020-09-11	RG_FO22_INV-2_2020-09-11	RG_FO22_INV-3_2020-09-11	RG_FO22_INV-4_2020-09-11	RG_FO22_INV-5_2020-09-11
		Lab ID	255	256	257	258	259
		Wet Weight (g)	1.2468	1.7533	1.6840	1.7547	1.6986
		Dry Weight (g)	0.2416	0.3580	0.3712	0.3863	0.3365
		Moisture (%)	80.6	79.6	78.0	78.0	80.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.3	2.3	6.2	1.3	2.5
11B	0.104	0.347	4.4	4.8	13	2.5	4.7
23Na	3.6	12	4,000	4,666	6,568	3,501	4,866
24Mg	0.047	0.157	1,797	1,475	2,344	1,797	1,914
27Al	0.047	0.157	2,970	2,922	10,568	1,768	3,796
31P	97	323	10,625	7,434	8,566	10,189	8,609
39K	14	47	12,588	10,803	15,948	9,585	13,330
44Ca	22	73	3,170	3,622	4,310	3,586	3,880
49Ti	0.225	0.750	242	250	941	158	296
51V	0.037	0.123	6.3	6.6	21	3.6	7.5
52Cr	0.298	0.993	23	13	40	12	19
55Mn	0.008	0.027	67	96	144	71	108
57Fe	3.9	13	1,856	2,135	4,900	1,375	2,781
59Co	0.006	0.020	2.6	2.2	6.0	1.8	4.7
60Ni	0.012	0.040	61	41	142	37	63
63Cu	0.010	0.033	20	11	22	18	21
66Zn	0.822	2.7	220	124	148	227	230
75As	0.455	1.5	0.932	1.4	2.6	0.592	1.2
77Se	0.359	1.2	9.1	8.4	11	8.9	10
88Sr	0.001	0.003	6.5	7.7	13	5.8	7.4
95Mo	0.009	0.030	0.684	0.559	0.953	0.725	0.746
107Ag	0.001	0.003	0.135	0.097	0.302	0.154	0.178
111Cd	0.077	0.257	2.6	1.4	1.6	2.8	2.7
118Sn	0.024	0.080	0.812	0.312	0.488	0.384	0.276
121Sb	0.007	0.023	0.106	0.119	0.297	0.079	0.139
137Ba	0.001	0.003	69	84	218	47	100
202Hg	0.031	0.103	0.040	<0.031	0.080	0.040	0.070
205Tl	0.001	0.003	0.076	0.083	0.243	0.064	0.106
208Pb	0.001	0.003	0.654	0.877	3.0	0.582	1.3
238U	0.001	0.003	0.201	0.171	0.445	0.138	0.218

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

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g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOUEW_INV-1_2020-09-11	RG_FOUEW_INV-2_2020-09-11	RG_FOUEW_INV-3_2020-09-11	RG_FOUEW_INV-4_2020-09-11	RG_FOUEW_INV-5_2020-09-11
		Lab ID	260	261	262	263	264
		Wet Weight (g)	2.8015	2.9599	2.7459	2.5030	2.2828
		Dry Weight (g)	0.7304	0.7457	0.7135	0.6327	0.4993
		Moisture (%)	73.9	74.8	74.0	74.7	78.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.637	0.615	0.858	0.809	0.491
11B	0.104	0.347	0.687	0.704	1.2	0.886	1.3
23Na	3.6	12	2,222	3,052	3,482	3,473	2,831
24Mg	0.047	0.157	963	1,757	1,792	1,193	1,853
27Al	0.047	0.157	233	183	532	317	328
31P	97	323	7,265	10,920	12,349	10,234	10,555
39K	14	47	6,662	9,211	10,670	8,951	8,872
44Ca	22	73	1,081	2,753	2,871	1,506	3,327
49Ti	0.225	0.750	12	12	39	26	23
51V	0.037	0.123	0.542	0.453	1.3	0.831	0.864
52Cr	0.298	0.993	3.2	2.6	5.8	3.1	3.7
55Mn	0.008	0.027	53	44	78	112	62
57Fe	3.9	13	279	277	627	495	466
59Co	0.006	0.020	0.427	0.708	1.7	0.883	0.902
60Ni	0.012	0.040	5.3	5.7	18	9.9	10
63Cu	0.010	0.033	8.4	21	25	14	15
66Zn	0.822	2.7	116	270	245	163	199
75As	0.455	1.5	<0.455	<0.455	<0.455	<0.455	<0.455
77Se	0.359	1.2	7.5	7.1	9.7	9.1	9.9
88Sr	0.001	0.003	1.3	3.4	3.6	2.0	5.3
95Mo	0.009	0.030	0.186	0.269	0.394	0.297	0.336
107Ag	0.001	0.003	0.054	0.130	0.194	0.095	0.125
111Cd	0.077	0.257	0.646	1.4	1.9	1.3	1.6
118Sn	0.024	0.080	0.048	0.336	0.184	0.079	0.167
121Sb	0.007	0.023	0.020	0.026	0.046	0.033	0.033
137Ba	0.001	0.003	21	18	29	36	35
202Hg	0.031	0.103	<0.031	<0.031	0.050	<0.031	<0.031
205Tl	0.001	0.003	0.018	0.018	0.031	0.020	0.020
208Pb	0.001	0.003	0.169	0.162	0.323	0.323	0.237
238U	0.001	0.003	0.032	0.055	0.084	0.083	0.089

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_UFR1_INV-2_2020-09-16	RG_UFR1_INV-3_2020-09-16	RG_UFR1_INV-4_2020-09-16	RG_UFR1_INV-5_2020-09-16
		Lab ID	265	266	267	268
		Wet Weight (g)	1.0817	0.5648	0.7392	0.7314
		Dry Weight (g)	0.2460	0.1042	0.1516	0.1407
		Moisture (%)	77.3	81.6	79.5	80.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.354	0.745	0.396	0.698
11B	0.104	0.347	3.7	7.7	7.2	11
23Na	3.6	12	3,665	4,800	4,337	3,291
24Mg	0.047	0.157	987	1,531	1,253	1,637
27Al	0.047	0.157	841	1,653	830	2,040
31P	97	323	10,086	14,233	11,175	10,662
39K	14	47	10,199	15,272	12,561	11,099
44Ca	22	73	1,281	1,932	1,923	2,798
49Ti	0.225	0.750	51	125	52	148
51V	0.037	0.123	1.9	3.8	1.7	3.7
52Cr	0.298	0.993	6.8	10	5.3	8.6
55Mn	0.008	0.027	58	60	66	83
57Fe	3.9	13	514	915	494	984
59Co	0.006	0.020	0.637	1.4	0.969	1.3
60Ni	0.012	0.040	19	30	15	29
63Cu	0.010	0.033	15	15	17	19
66Zn	0.822	2.7	193	200	164	181
75As	0.455	1.5	1.0	1.4	1.2	1.8
77Se	0.359	1.2	4.9	6.3	5.8	4.4
88Sr	0.001	0.003	2.7	4.9	3.8	7.0
95Mo	0.009	0.030	0.593	0.445	0.336	0.593
107Ag	0.001	0.003	0.080	0.090	0.076	0.090
111Cd	0.077	0.257	1.4	1.8	1.9	2.3
118Sn	0.024	0.080	0.176	0.423	0.379	0.489
121Sb	0.007	0.023	0.059	0.073	0.066	0.092
137Ba	0.001	0.003	63	90	75	119
202Hg	0.031	0.103	0.062	0.058	0.045	0.053
205Tl	0.001	0.003	0.034	0.061	0.038	0.052
208Pb	0.001	0.003	0.365	0.494	0.369	0.939
238U	0.001	0.003	0.056	0.106	0.071	0.155

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FO26_INV-1_2020-09-17			RG_FOUNGD_INV-2_2020-09-10			RG_FODNGD_INV-3_2020-09-21		
Lab ID		193			204			208		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.006	0.271	0.288	6.1	8.5	5.8	37.8	1.5	1.3	14.3
11B	0.104	0.600	0.625	-	0.976	1.3	-	1.0	1.0	-
23Na	3.6	3,757	4,301	13.5	5,561	4,254	26.6	3,166	3,081	2.7
24Mg	0.047	1,292	1,129	13.5	1,236	1,322	6.7	1,203	1,161	3.6
27Al	0.047	193	274	34.7	776	873	11.8	432	337	24.7
31P	97	12,165	11,684	4.0	9,082	9,341	2.8	11,567	10,823	6.6
39K	14	10,630	12,462	15.9	9,946	8,471	16.0	10,808	10,675	1.2
44Ca	22	1,364	1,270	7.1	1,547	1,920	21.5	1,631	1,680	3.0
49Ti	0.225	10	13	26.1	43	48	11.0	29	21	32.0
51V	0.037	0.377	0.478	23.6	1.7	1.8	5.7	0.792	0.564	33.6
52Cr	0.298	2.3	2.4	-	6.9	5.3	26.2	2.9	2.5	-
55Mn	0.008	35	39	10.8	53	62	15.7	39	35	10.8
57Fe	3.9	164	206	22.7	559	544	2.7	182	134	30.4
59Co	0.006	0.164	0.168	2.4	2.0	2.2	9.5	1.7	1.9	11.1
60Ni	0.012	2.2	3.0	30.8	21	23	9.1	10	9.1	9.4
63Cu	0.010	12	11	8.7	15	15	0.0	13	13	0.0
66Zn	0.822	168	166	1.2	193	246	24.1	169	176	4.1
75As	0.455	1.8	1.7	-	0.586	0.668	-	0.534	<0.455	-
77Se	0.359	3.9	4.0	2.5	11	12	8.7	9.6	8.6	11.0
88Sr	0.001	2.2	2.2	0.0	2.7	3.9	36.4	2.6	2.5	3.9
95Mo	0.009	0.311	0.323	3.8	0.348	0.348	0.0	0.188	0.171	9.5
107Ag	0.001	0.041	0.055	29.2	0.100	0.105	4.9	0.061	0.066	7.9
111Cd	0.077	0.423	0.423	-	1.8	2.0	10.5	0.710	0.770	-
118Sn	0.024	0.218	0.136	-	0.682	0.688	0.9	0.269	0.252	6.5
121Sb	0.007	0.017	0.022	-	0.052	0.063	-	0.033	0.026	-
137Ba	0.001	30	34	12.5	55	58	5.3	29	24	18.9
202Hg	0.031	<0.031	0.044	-	0.058	0.051	-	0.034	<0.031	-
205Tl	0.001	0.014	0.014	0.0	0.033	0.035	5.9	0.022	0.019	14.6
208Pb	0.001	0.161	0.146	9.8	0.349	0.304	13.8	0.139	0.119	15.5
238U	0.001	0.028	0.029	3.5	0.126	0.140	10.5	0.049	0.058	16.8

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_SCOUTDS_INV-1_2020-09-17			RG_SCOUTDS_INV-5_2020-09-17			RG_FRUPO_INV-5_2020-09-12		
Lab ID		225			229			249		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.006	2.3	2.0	14.0	1.3	1.3	0.0	0.884	0.591	39.7
11B	0.104	1.1	0.934	-	0.625	0.696	-	1.4	0.838	-
23Na	3.6	4,462	3,688	19.0	2,409	2,606	7.9	3,729	2,582	36.3
24Mg	0.047	1,631	1,274	24.6	1,071	1,126	5.0	2,077	1,666	22.0
27Al	0.047	317	400	23.2	197	166	17.1	385	322	17.8
31P	97	11,822	10,551	11.4	8,913	8,406	5.9	12,761	11,340	11.8
39K	14	10,649	8,753	19.5	7,151	7,307	2.2	11,723	8,684	29.8
44Ca	22	2,182	1,365	46.1	1,475	1,521	3.1	3,333	2,436	31.1
49Ti	0.225	20	30	40.0	11	13	16.7	30	21	35.3
51V	0.037	0.653	0.781	17.9	0.385	0.421	8.9	1.1	0.758	36.8
52Cr	0.298	3.2	2.6	-	2.4	1.9	-	4.7	3.5	29.3
55Mn	0.008	159	131	19.3	84	101	18.4	38	31	20.3
57Fe	3.9	297	320	7.5	166	198	17.6	376	333	12.1
59Co	0.006	1.7	1.4	19.4	0.814	0.852	4.6	0.881	0.669	27.4
60Ni	0.012	21	19	10.0	12	13	8.0	9.2	6.3	37.4
63Cu	0.010	26	16	**47.6**	16	17	6.1	16	16	0.0
66Zn	0.822	320	316	1.3	213	219	2.8	212	203	4.3
75As	0.455	0.491	<0.455	-	<0.455	<0.455	-	<0.455	<0.455	-
77Se	0.359	8.5	8.9	4.6	8.0	9.2	14.0	10	8.6	15.1
88Sr	0.001	2.6	1.8	36.4	1.5	1.8	18.2	5.5	3.8	36.6
95Mo	0.009	0.261	0.313	18.1	0.251	0.343	31.0	0.356	0.260	31.2
107Ag	0.001	0.121	0.101	18.0	0.079	0.090	13.0	0.118	0.085	32.5
111Cd	0.077	2.8	2.3	19.6	1.4	1.9	30.3	1.9	1.9	0.0
118Sn	0.024	0.297	0.195	-	0.184	0.134	-	0.364	0.223	-
121Sb	0.007	0.052	0.050	-	0.024	0.026	-	0.046	0.033	-
137Ba	0.001	12	16	28.6	10	12	18.2	38	26	37.5
202Hg	0.031	0.034	0.068	-	0.047	0.047	-	0.033	0.033	-
205Tl	0.001	0.041	0.039	5.0	0.025	0.027	7.7	0.028	0.020	33.3
208Pb	0.001	0.098	0.121	21.0	0.066	0.075	12.8	0.221	0.166	28.4
238U	0.001	0.038	0.044	14.6	0.023	0.037	**46.7**	0.091	0.067	30.4

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Bold indicates DQO exceedance, but result is accepted as it does not impact the reportable results.

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_UFR1_INV-2_2020-09-16			RG_UFR1_INV-5_2020-09-16		
Lab ID		265			268		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.006	0.354	0.460	26.0	0.698	0.549	23.9
11B	0.104	3.7	4.0	7.8	11	9.7	12.6
23Na	3.6	3,665	4,817	27.2	3,291	3,322	0.9
24Mg	0.047	1,165	1,505	25.5	1,637	1,625	0.7
27Al	0.047	841	1,165	32.3	2,040	1,360	40.0
31P	97	10,086	14,584	36.5	10,662	12,017	11.9
39K	14	10,199	12,887	23.3	11,099	11,433	3.0
44Ca	22	1,281	1,379	7.4	2,798	2,578	8.2
49Ti	0.225	51	58	12.8	148	104	34.9
51V	0.037	1.9	2.4	23.3	3.7	2.7	31.2
52Cr	0.298	6.8	7.6	11.1	8.6	7.9	8.5
55Mn	0.008	58	57	1.7	83	63	27.4
57Fe	3.9	514	641	22.0	984	797	21.0
59Co	0.006	0.637	0.760	17.6	1.3	1.1	16.7
60Ni	0.012	19	26	31.1	29	24	18.9
63Cu	0.010	15	15	0.0	19	17	11.1
66Zn	0.822	193	204	5.5	181	181	0.0
75As	0.455	1.0	1.0	-	1.8	1.4	-
77Se	0.359	4.9	4.7	4.2	4.4	5.6	24.4
88Sr	0.001	2.7	3.2	16.9	7.0	5.4	25.8
95Mo	0.009	0.593	0.534	10.5	0.593	0.514	14.3
107Ag	0.001	0.080	0.076	5.1	0.090	0.076	16.9
111Cd	0.077	1.4	1.1	24.0	2.3	1.9	19.0
118Sn	0.024	0.176	0.247	-	0.489	0.480	1.9
121Sb	0.007	0.059	0.066	-	0.092	0.099	7.3
137Ba	0.001	63	65	3.1	119	93	24.5
202Hg	0.031	0.062	0.053	-	0.053	0.045	-
205Tl	0.001	0.034	0.045	27.8	0.052	0.045	14.4
208Pb	0.001	0.365	0.417	13.3	0.939	0.724	25.9
238U	0.001	0.056	0.067	17.9	0.155	0.116	28.8

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID		01			02		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.5	125	10.1	1.2	103	5.5
11B	0.104	4.5	5.4	121	2.3	4.5	101	2.4
23Na	3.6	14,000	16,558	118	6.9	14,059	100	4.4
24Mg	0.047	910	1,075	118	5.3	923	101	5.5
27Al	0.047	197.2	201	102	4.6	183	93	5.2
31P	97	8,000	8,960	112	4.6	8,290	104	2.2
39K	14	15,500	18,566	120	8.0	15,385	99	7.0
44Ca	22	2,360	2,557	108	4.9	2,409	102	7.0
49Ti	0.225	12.24	12	100	9.4	13	103	6.2
51V	0.037	1.57	1.7	108	9.8	1.5	97	15.7
52Cr	0.298	1.87	2.2	116	6.5	1.9	101	6.3
55Mn	0.008	3.17	3.9	122	1.3	3.2	100	2.2
57Fe	3.9	343	427	125	5.0	352	103	4.2
59Co	0.006	0.25	0.311	124	3.4	0.257	103	3.1
60Ni	0.012	1.34	1.6	121	3.5	1.4	105	5.4
63Cu	0.010	15.7	19	123	6.3	16	103	3.9
66Zn	0.822	51.6	61	119	4.6	56	108	5.9
75As	0.455	6.87	7.7	112	6.3	7.2	105	3.2
77Se	0.552	3.45	3.8	109	7.3	3.7	107	4.0
88Sr	0.001	10.1	12	120	5.9	11	105	6.1
95Mo	0.009	0.29	0.331	114	11.2	0.297	102	6.9
107Ag	0.001	0.0252	0.031	124	9.8	0.026	105	9.8
111Cd	0.077	0.299	0.401	**134**	8.3	0.342	114	5.4
118Sn	0.024	0.061	0.089	**147**	6.6	0.054	88	9.2
121Sb	0.007	0.011	0.015	140	**20.4**	0.012	108	**24.8**
137Ba	0.001	8.6	10	118	3.0	8.6	100	2.3
202Hg	0.031	0.412	0.428	104	7.2	0.475	115	5.9
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.495	123	8.4	0.342	85	**31.3**
238U	0.001	0.05	0.057	114	6.1	0.049	99	**21.0**

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID		03			04		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.2	100	7.4	1.2	96	3.4
11B	0.104	4.5	4.8	107	2.8	4.4	97	4.3
23Na	3.6	14,000	15,165	108	3.9	14,146	101	5.5
24Mg	0.047	910	957	105	3.6	874	96	2.1
27Al	0.047	197.2	207	105	6.8	177	90	4.9
31P	97	8,000	8,417	105	4.3	7,678	96	6.2
39K	14	15,500	16,707	108	3.2	14,662	95	4.5
44Ca	22	2,360	2,582	109	6.5	2,331	99	1.9
49Ti	0.225	12.24	15	123	4.5	12	98	6.9
51V	0.037	1.57	1.6	102	5.5	1.6	103	10.3
52Cr	0.298	1.87	2.0	109	5.3	1.9	103	4.5
55Mn	0.008	3.17	3.4	108	5.3	3.1	98	4.5
57Fe	3.9	343	387	113	5.5	345	101	5.3
59Co	0.006	0.25	0.281	112	4.2	0.252	101	2.4
60Ni	0.012	1.34	1.4	108	3.8	1.4	103	4.6
63Cu	0.010	15.7	18	113	2.6	16	101	4.5
66Zn	0.822	51.6	57	111	4.3	51	99	6.2
75As	0.455	6.87	7.4	108	3.0	6.8	99	5.4
77Se	0.552	3.45	3.7	108	3.3	3.7	107	5.2
88Sr	0.001	10.1	11	106	2.4	9.7	96	2.2
95Mo	0.009	0.29	0.299	103	2.6	0.291	100	6.6
107Ag	0.001	0.0252	0.027	108	10.1	0.022	89	13.5
111Cd	0.077	0.299	0.326	109	7.1	0.318	107	13.6
118Sn	0.024	0.061	0.063	104	8.1	0.063	104	15.3
121Sb	0.007	0.011	0.015	128	8.2	0.013	105	15.0
137Ba	0.001	8.6	9.2	107	2.3	8.2	96	4.0
202Hg	0.031	0.412	0.438	106	6.4	0.425	103	9.6
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.428	106	13.2	0.392	97	6.3
238U	0.001	0.05	0.053	105	5.2	0.049	98	9.8

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	05			06		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.1	92	4.2	1.2	95	9.1
11B	0.104	4.5	4.7	104	1.5	4.9	110	2.6
23Na	3.6	14,000	14,307	102	3.7	13,621	97	4.5
24Mg	0.047	910	929	102	4.2	883	97	6.7
27Al	0.047	197.2	190	96	3.0	198	101	7.7
31P	97	8,000	8,157	102	4.4	7,433	93	3.7
39K	14	15,500	16,070	104	5.5	15,085	97	7.0
44Ca	22	2,360	2,373	101	6.5	2,398	102	2.5
49Ti	0.225	12.24	13	107	6.2	12	100	5.4
51V	0.037	1.57	1.7	106	6.8	1.4	89	11.3
52Cr	0.298	1.87	1.9	104	7.2	2.0	105	5.5
55Mn	0.008	3.17	3.2	101	5.9	3.2	102	5.4
57Fe	3.9	343	355	104	4.8	356	104	5.8
59Co	0.006	0.25	0.262	105	4.3	0.270	108	8.8
60Ni	0.012	1.34	1.4	104	6.7	1.4	101	6.2
63Cu	0.010	15.7	16	103	9.8	16	102	5.6
66Zn	0.822	51.6	54	105	3.9	51	99	5.2
75As	0.455	6.87	6.9	101	6.0	6.6	96	5.5
77Se	0.552	3.45	3.4	100	8.2	3.1	91	9.8
88Sr	0.001	10.1	10	101	6.7	11	105	3.4
95Mo	0.009	0.29	0.310	107	2.9	0.293	101	11.3
107Ag	0.001	0.0252	0.028	111	16.1	0.026	101	10.1
111Cd	0.077	0.299	0.316	106	14.6	0.318	106	11.1
118Sn	0.024	0.061	0.071	116	17.3	0.066	109	14.8
121Sb	0.007	0.011	0.013	120	0.0	0.012	108	**24.8**
137Ba	0.001	8.6	8.8	102	3.4	8.8	102	4.0
202Hg	0.031	0.412	0.402	98	3.6	0.448	109	7.4
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.393	97	13.5	0.422	104	12.0
238U	0.001	0.05	0.046	93	8.5	0.046	93	13.1

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

	Sample Group ID		07			08		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.2	103	2.6	1.2	100	6.3
11B	0.104	4.5	4.6	103	2.9	4.8	107	3.5
23Na	3.6	14,000	13,501	96	4.8	14,235	102	2.5
24Mg	0.047	910	886	97	4.7	958	105	3.9
27Al	0.047	197.2	188	95	3.6	199	101	3.3
31P	97	8,000	7,666	96	2.9	7,910	99	2.9
39K	14	15,500	14,989	97	4.6	16,240	105	6.2
44Ca	22	2,360	2,308	98	3.7	2,498	106	4.0
49Ti	0.225	12.24	11	93	8.2	11	92	9.2
51V	0.037	1.57	1.4	89	5.2	1.7	106	8.9
52Cr	0.298	1.87	1.9	101	1.9	2.0	107	4.5
55Mn	0.008	3.17	3.2	100	4.4	3.4	107	2.8
57Fe	3.9	343	348	102	2.7	375	109	3.4
59Co	0.006	0.25	0.257	103	3.1	0.276	110	5.5
60Ni	0.012	1.34	1.3	100	2.4	1.4	108	3.4
63Cu	0.010	15.7	16	103	2.6	17	110	2.0
66Zn	0.822	51.6	52	101	2.0	54	105	1.4
75As	0.455	6.87	7.0	102	3.4	6.8	100	1.8
77Se	0.552	3.45	3.7	106	5.0	3.4	98	3.6
88Sr	0.001	10.1	10	100	3.4	11	105	2.7
95Mo	0.009	0.29	0.298	103	3.8	0.277	96	0.0
107Ag	0.001	0.0252	0.031	124	7.7	0.025	98	8.6
111Cd	0.077	0.299	0.298	100	8.5	0.347	116	11.1
118Sn	0.024	0.061	0.049	80	12.7	0.059	97	6.5
121Sb	0.007	0.011	0.013	120	0.0	0.012	108	**24.8**
137Ba	0.001	8.6	8.5	99	5.2	8.8	102	2.8
202Hg	0.031	0.412	0.460	112	3.3	0.452	110	5.4
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.001	0.404	0.386	96	14.0	0.444	110	11.6
238U	0.001	0.05	0.045	89	5.5	0.053	106	10.5

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_HENUP_INV-1_2020-09-15	190	12 Oct 2020
	RG_HENUP_INV-2_2020-09-15	191	
	RG_HENUP_INV-3_2020-09-15	192	
	RG_FO26_INV-1_2020-09-17	193	
	RG_FO26_INV-2_2020-09-17	194	
	RG_FO26_INV-3_2020-09-17	195	
	RG_UFR1_INV-1_2020-09-16	196	
	RG_FODHE_INV-1_2020-09-15	197	
	RG_FODHE_INV-2_2020-09-15	198	
	RG_FODHE_INV-3_2020-09-15	199	
	RG_FOUCL_INV-1_2020-09-10	200	
	RG_FOUCL_INV-2_2020-09-10	201	
	RG_FOUCL_INV-3_2020-09-10	202	
	RG_FOUNGD_INV-1_2020-09-10	203	
	RG_FOUNGD_INV-2_2020-09-10	204	
	RG_FOUNGD_INV-3_2020-09-10	205	
	RG_FODNGD_INV-1_2020-09-21	206	
	RG_FODNGD_INV-2_2020-09-21	207	
02	RG_FODNGD_INV-3_2020-09-21	208	12 Oct 2020
	RG_MP1_INV-1_2020-09-15	209	
	RG_MP1_INV-2_2020-09-15	210	
	RG_MP1_INV-3_2020-09-15	211	
	RG_FOUSH_INV-1_2020-09-21	212	
	RG_FOUSH_INV-2_2020-09-21	213	
	RG_FOUSH_INV-3_2020-09-21	214	
	RG_FOUKI_INV-1_2020-09-14	215	
	RG_FOUKI_INV-2_2020-09-14	216	
03	RG_FOUKI_INV-3_2020-09-14	217	12 Oct 2020
	RG_FOUKI_INV-4_2020-09-14	218	
	RG_FOUKI_INV-5_2020-09-14	219	
	RG_FOBKS_INV-1_2020-09-10	220	
	RG_FOBKS_INV-2_2020-09-10	221	
	RG_FOBKS_INV-3_2020-09-10	222	
	RG_FOBKS_INV-4_2020-09-10	223	
	RG_FOBKS_INV-5_2020-09-10	224	
	RG_SCOUTDS_INV-1_2020-09-17	225	
04	RG_SCOUTDS_INV-2_2020-09-17	226	13 Oct 2020
	RG_SCOUTDS_INV-3_2020-09-17	227	
	RG_SCOUTDS_INV-4_2020-09-17	228	
	RG_SCOUTDS_INV-5_2020-09-17	229	

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
04	RG_FOBSC_INV-1_2020-09-18	230	13 Oct 2020
	RG_FOBSC_INV-2_2020-09-18	231	
	RG_FOBSC_INV-3_2020-09-18	232	
	RG_FOBSC_INV-4_2020-09-18	233	
	RG_FOBSC_INV-5_2020-09-18	234	
05	RG_FOBCP_INV-1_2020-09-16	235	13 Oct 2020
	RG_FOBCP_INV-2_2020-09-16	236	
	RG_FOBCP_INV-3_2020-09-16	237	
	RG_FOBCP_INV-4_2020-09-16	238	
	RG_FOBCP_INV-5_2020-09-16	239	
	RG_FRCP1SW_INV-1_2020-09-22	240	
	RG_FRCP1SW_INV-2_2020-09-22	241	
	RG_FRCP1SW_INV-3_2020-09-22	242	
	RG_FRCP1SW_INV-4_2020-09-22	243	
06	RG_FRCP1SW_INV-5_2020-09-22	244	13 Oct 2020
	RG_FRUPO_INV-1_2020-09-12	245	
	RG_FRUPO_INV-2_2020-09-12	246	
	RG_FRUPO_INV-3_2020-09-12	247	
	RG_FRUPO_INV-4_2020-09-12	248	
	RG_FRUPO_INV-5_2020-09-12	249	
	RG_FODPO_INV-1_2020-09-11	250	
	RG_FODPO_INV-2_2020-09-11	251	
	RG_FODPO_INV-3_2020-09-11	252	
07	RG_FODPO_INV-4_2020-09-11	253	13 Oct 2020
	RG_FODPO_INV-5_2020-09-11	254	
	RG_FO22_INV-1_2020-09-11	255	
	RG_FO22_INV-2_2020-09-11	256	
	RG_FO22_INV-3_2020-09-11	257	
	RG_FO22_INV-4_2020-09-11	258	
	RG_FO22_INV-5_2020-09-11	259	
	RG_FOUEW_INV-1_2020-09-11	260	
	RG_FOUEW_INV-2_2020-09-11	261	
	RG_FOUEW_INV-3_2020-09-11	262	
08	RG_FOUEW_INV-4_2020-09-11	263	13 Oct 2020
	RG_FOUEW_INV-5_2020-09-11	264	
	RG_UFR1_INV-2_2020-09-16	265	
	RG_UFR1_INV-3_2020-09-16	266	
	RG_UFR1_INV-4_2020-09-16	267	
	RG_UFR1_INV-5_2020-09-16	268	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (20-09) (PO 707822)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.goog@teck.com	Email:	pschnurr@minnow.ca

Sample Analysis Requested

Trich Sample ID:		Sample Identification:		Sample Type: Species	Sample Type: Sample type
190	1	RG_HENUP_INV-1_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
191	2	RG_HENUP_INV-2_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
192	3	RG_HENUP_INV-3_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
193	4	RG_FO26_INV-1_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
194	5	RG_FO26_INV-2_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
195	6	RG_FO26_INV-3_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
196	7	RG_UFR1_INV-1_2020-09-16	✓	-	Composite-taxa benthic invertebrate tissue samples
197	8	RG_FODHE_INV-1_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
198	9	RG_FODHE_INV-2_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
199	10	RG_FODHE_INV-3_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
200	11	RG_FOUCL_INV-1_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
201	12	RG_FOUCL_INV-2_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
202	13	RG_FOUCL_INV-3_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
203	14	RG_FOUNGD_INV-1_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
204	15	RG_FOUNGD_INV-2_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
205	16	RG_FOUNGD_INV-3_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
206	17	RG_FODNGD_INV-1_2020-09-21	✓	-	Composite-taxa benthic invertebrate tissue samples
207	18	RG_FODNGD_INV-2_2020-09-21	✓	-	Composite-taxa benthic invertebrate tissue samples
208	19	RG_FODNGD_INV-3_2020-09-21	✓	-	Composite-taxa benthic invertebrate tissue samples
209	20	RG_MP1_INV-1_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By: Jennifer Ings	Sample(s) Received By: GERIENE LABINE
Signature:	Signature:
Date Sent:	Date Received: 30 SEP 2020 (PROJECT # 2020-152)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (20-09) (PO 707822)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.goog@teck.com	Email:	pschnurr@minnow.ca

Sample Analysis Requested

Trich Sample ID:		Sample Identification:		Sample Type: Species	Sample Type: Sample type
210	21	RG_MP1_INV-2_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
211	22	RG_MP1_INV-3_2020-09-15	✓	-	Composite-taxa benthic invertebrate tissue samples
212	23	RG_FOUSH_INV-1_2020-09-21	✓	-	Composite-taxa benthic invertebrate tissue samples
213	24	RG_FOUSH_INV-2_2020-09-21	✓	-	Composite-taxa benthic invertebrate tissue samples
214	25	RG_FOUSH_INV-3_2020-09-21	✓	-	Composite-taxa benthic invertebrate tissue samples
215	26	RG_FOUKI_INV-1_2020-09-14	✓	-	Composite-taxa benthic invertebrate tissue samples
216	27	RG_FOUKI_INV-2_2020-09-14	✓	-	Composite-taxa benthic invertebrate tissue samples
217	28	RG_FOUKI_INV-3_2020-09-14	✓	-	Composite-taxa benthic invertebrate tissue samples
218	29	RG_FOUKI_INV-4_2020-09-14	✓	-	Composite-taxa benthic invertebrate tissue samples
219	30	RG_FOUKI_INV-5_2020-09-14	✓	-	Composite-taxa benthic invertebrate tissue samples
220	31	RG_FOBKS_INV-1_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
221	32	RG_FOBKS_INV-2_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
222	33	RG_FOBKS_INV-3_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
223	34	RG_FOBKS_INV-4_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
224	35	RG_FOBKS_INV-5_2020-09-10	✓	-	Composite-taxa benthic invertebrate tissue samples
225	36	RG_SCOUTDS_INV-1_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
226	37	RG_SCOUTDS_INV-2_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
227	38	RG_SCOUTDS_INV-3_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
228	39	RG_SCOUTDS_INV-4_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples
229	40	RG_SCOUTDS_INV-5_2020-09-17	✓	-	Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By: Jennifer Ings	Sample(s) Received By: GERIENE LABINE
Signature:	Signature:
Date Sent:	Date Received: 30 SEP 2020 (PROJECT #: 2020-152)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (20-09) (PO 707822)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.goog@teck.com	Email:	pschnurr@minnow.ca

Sample Analysis Requested

Trich Sample ID:		Sample Identification:		Sample Type: Species	Sample Type: Sample type
230	41	RG_FOBSC_INV-1_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
231	42	RG_FOBSC_INV-2_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
232	43	RG_FOBSC_INV-3_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
233	44	RG_FOBSC_INV-4_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
234	45	RG_FOBSC_INV-5_2020-09-18	✓	-	Composite-taxa benthic invertebrate tissue samples
235	46	RG_FOBCP_INV-1_2020-09-16	✓	-	Composite-taxa benthic invertebrate tissue samples
236	47	RG_FOBCP_INV-2_2020-09-16	✓	-	Composite-taxa benthic invertebrate tissue samples
237	48	RG_FOBCP_INV-3_2020-09-16	✓	-	Composite-taxa benthic invertebrate tissue samples
238	49	RG_FOBCP_INV-4_2020-09-16	✓	-	Composite-taxa benthic invertebrate tissue samples
239	50	RG_FOBCP_INV-5_2020-09-16	✓	-	Composite-taxa benthic invertebrate tissue samples
240	51	RG_FRCP1SW_INV-1_2020-09-22	✓	-	Composite-taxa benthic invertebrate tissue samples
241	52	RG_FRCP1SW_INV-2_2020-09-22	✓	-	Composite-taxa benthic invertebrate tissue samples
242	53	RG_FRCP1SW_INV-3_2020-09-22	✓	-	Composite-taxa benthic invertebrate tissue samples
243	54	RG_FRCP1SW_INV-4_2020-09-22	✓	-	Composite-taxa benthic invertebrate tissue samples
244	55	RG_FRCP1SW_INV-5_2020-09-22	✓	-	Composite-taxa benthic invertebrate tissue samples
245	56	RG_FRUPO_INV-1_2020-09-12	✓	-	Composite-taxa benthic invertebrate tissue samples
246	57	RG_FRUPO_INV-2_2020-09-12	✓	-	Composite-taxa benthic invertebrate tissue samples
247	58	RG_FRUPO_INV-3_2020-09-12	✓	-	Composite-taxa benthic invertebrate tissue samples
248	59	RG_FRUPO_INV-4_2020-09-12	✓	-	Composite-taxa benthic invertebrate tissue samples
249	60	RG_FRUPO_INV-5_2020-09-12	✓	-	Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By: Jennifer Ings	Sample(s) Received By: GERIENE LABINE
Signature:	Signature: Gerriene LaB
Date Sent:	Date Received: 30 SEP 2020 (PROJECT #: 2020-152)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084	Chain of Custody (COC) for LA-ICP-MS Analysis

Invoicing		Reporting (if different from Invoicing)	
Project Number: FRO LAEMP (20-09) (PO 707822)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.goog@teck.com	Email:	pschnurr@minnow.ca

Sample Analysis Requested

Trich Sample ID:		Sample Identification:			Sample Type: Species	Sample Type: Sample type
250	61	RG_FODPO_INV-1_2020-09-11	*	✓	-	Composite-taxa benthic invertebrate tissue samples
251	62	RG_FODPO_INV-2_2020-09-11	*	✓	-	Composite-taxa benthic invertebrate tissue samples
252	63	RG_FODPO_INV-3_2020-09-11	*	✓	-	Composite-taxa benthic invertebrate tissue samples
253	64	RG_FODPO_INV-4_2020-09-11	*	✓	-	Composite-taxa benthic invertebrate tissue samples
254	65	RG_FODPO_INV-5_2020-09-11	*	✓	-	Composite-taxa benthic invertebrate tissue samples
255	66	RG_FO22_INV-1_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
256	67	RG_FO22_INV-2_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
257	68	RG_FO22_INV-3_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
258	69	RG_FO22_INV-4_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
259	70	RG_FO22_INV-5_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
260	71	RG_FOUEW_INV-1_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
261	72	RG_FOUEW_INV-2_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
262	73	RG_FOUEW_INV-3_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
263	74	RG_FOUEW_INV-4_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
264	75	RG_FOUEW_INV-5_2020-09-11		✓	-	Composite-taxa benthic invertebrate tissue samples
265	76	RG_UFR1_INV-2_2020-09-16		✓	-	Composite-taxa benthic invertebrate tissue samples
266	77	RG_UFR1_INV-3_2020-09-16		✓	-	Composite-taxa benthic invertebrate tissue samples
267	78	RG_UFR1_INV-4_2020-09-16		✓	-	Composite-taxa benthic invertebrate tissue samples
268	79	RG_UFR1_INV-5_2020-09-16		✓	-	Composite-taxa benthic invertebrate tissue samples
	80					

Sample(s) Released By: Jennifer Ings	Sample(s) Received By: GERIENE LABINE
Signature:	Signature:
Date Sent:	Date Received: 30 SEP 2020 (PROJECT # 2020-152)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

* Sample containers reads "20-06." GCA 01 Oct 2020

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Jennifer Ings
Aquatic Scientist
Minnow Environmental
Phone: 250-595-1627
Email: jings@minnow.ca

Date Received: 03 Dec 2020
Date of Analysis: 04 Dec 2020
07 Dec 2020
Final Report Date: 07 Dec 2020
Project No.: 2020-174
Method No.: MET-002.04

Client Project: Teck Coal Limited/Minnow Swift Ponds Decommissioning (FRO LAEMP 20-09)

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 15 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average result 107%; range 104 - 110%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 07 Dec 2020 Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBKS_INV-1_2020-11-23	RG_FOBKS_INV-2_2020-11-23	RG_FOBKS_INV-3_2020-11-23	RG_FOBKS_INV-4_2020-11-23	RG_FOBKS_INV-5_2020-11-23
		Lab ID	008	009	010	011	012
		Wet Weight (g)	1.4545	1.4928	1.5730	1.8757	1.5809
		Dry Weight (g)	0.2779	0.2902	0.2769	0.4504	0.4045
		Moisture (%)	80.9	80.6	82.4	76.0	74.4
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.3	1.9	2.0	1.6	2.3
11B	0.096	0.320	2.9	1.7	1.3	1.2	1.6
23Na	0.783	2.6	2,498	2,817	3,102	2,047	2,444
24Mg	0.020	0.067	1,510	1,353	1,800	1,287	1,412
27Al	0.326	1.1	1,171	666	716	796	1,273
31P	54	180	8,361	7,044	9,331	7,278	6,926
39K	11	37	7,617	6,599	6,397	6,054	6,682
44Ca	65	217	12,449	6,887	6,295	8,967	19,354
49Ti	0.269	0.897	133	60	59	72	102
51V	0.058	0.193	3.3	1.6	1.5	1.9	2.9
52Cr	0.869	2.9	7.6	3.6	2.9	3.4	3.1
55Mn	0.009	0.030	139	66	100	130	222
57Fe	3.4	11	943	423	396	459	711
59Co	0.004	0.013	3.3	2.6	2.4	2.7	3.6
60Ni	0.014	0.047	36	21	16	21	27
63Cu	0.014	0.047	15	12	16	16	8.6
66Zn	0.342	1.1	188	151	191	127	103
75As	0.424	1.4	0.583	0.463	<0.424	0.426	0.537
77Se	0.328	1.1	5.9	4.9	5.9	6.4	5.0
88Sr	0.001	0.003	9.7	7.2	8.0	8.3	24
95Mo	0.001	0.003	0.424	0.301	0.357	0.312	0.290
107Ag	0.001	0.003	0.126	0.082	0.088	0.120	0.076
111Cd	0.062	0.207	1.7	1.6	1.1	0.919	0.766
118Sn	0.019	0.063	0.411	0.226	0.257	0.103	0.144
121Sb	0.008	0.027	0.128	0.091	0.116	0.116	0.132
137Ba	0.001	0.003	112	40	46	52	182
202Hg	0.036	0.120	0.036	0.036	0.036	0.036	0.036
205Tl	0.001	0.003	0.074	0.044	0.035	0.031	0.046
208Pb	0.006	0.020	0.335	0.147	0.147	0.172	0.314
238U	0.001	0.003	0.144	0.074	0.084	0.085	0.130

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_SCOUTDS_INV-1_2020-11-23	RG_SCOUTDS_INV-2_2020-11-23	RG_SCOUTDS_INV-3_2020-11-23	RG_SCOUTDS_INV-4_2020-11-23	RG_SCOUTDS_INV-5_2020-11-23
		Lab ID	013	014	015	016	017
		Wet Weight (g)	1.2582	1.4639	2.1653	2.3802	1.3631
		Dry Weight (g)	0.2275	0.3327	0.4960	0.4007	0.2748
		Moisture (%)	81.9	77.3	77.1	83.2	79.8
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	2.4	2.7	1.8	2.0	1.4
11B	0.096	0.320	1.5	2.6	1.6	2.5	1.9
23Na	0.783	2.6	5,642	3,481	3,414	3,640	2,440
24Mg	0.020	0.067	1,580	1,363	1,249	1,797	1,564
27Al	0.326	1.1	1,127	1,590	915	1,701	1,539
31P	54	180	10,345	9,829	9,953	9,235	8,564
39K	11	37	9,166	8,801	9,161	9,649	7,325
44Ca	65	217	2,348	2,385	1,654	2,284	2,103
49Ti	0.269	0.897	80	100	72	119	105
51V	0.058	0.193	2.3	3.3	2.0	2.9	2.4
52Cr	0.869	2.9	4.0	4.2	4.2	5.3	3.8
55Mn	0.009	0.030	157	206	138	221	129
57Fe	3.4	11	500	783	455	711	593
59Co	0.004	0.013	2.5	4.2	3.4	4.8	2.4
60Ni	0.014	0.047	16	30	23	36	17
63Cu	0.014	0.047	13	14	13	17	16
66Zn	0.342	1.1	282	226	188	298	267
75As	0.424	1.4	0.481	0.740	0.435	0.753	0.533
77Se	0.328	1.1	8.6	8.7	9.5	11	10
88Sr	0.001	0.003	4.1	4.6	3.2	5.4	4.8
95Mo	0.001	0.003	0.435	0.491	0.402	0.450	0.338
107Ag	0.001	0.003	0.101	0.088	0.088	0.115	0.101
111Cd	0.062	0.207	3.9	1.9	1.2	3.0	1.6
118Sn	0.019	0.063	0.231	0.211	0.092	0.464	0.126
121Sb	0.008	0.027	0.058	0.099	0.074	0.091	0.055
137Ba	0.001	0.003	43	50	33	55	50
202Hg	0.036	0.120	0.049	0.036	0.061	0.074	0.087
205Tl	0.001	0.003	0.061	0.056	0.050	0.034	0.025
208Pb	0.006	0.020	0.260	0.352	0.197	0.339	0.271
238U	0.001	0.003	0.062	0.076	0.050	0.102	0.073

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBSC_INV-1_2020-11-23	RG_FOBSC_INV-2_2020-11-23	RG_FOBSC_INV-3_2020-11-23	RG_FOBSC_INV-4_2020-11-23	RG_FOBSC_INV-5_2020-11-23
		Lab ID	018	019	020	021	022
		Wet Weight (g)	1.2351	0.9644	1.6942	1.3061	1.2109
		Dry Weight (g)	0.2084	0.2124	0.3164	0.2637	0.2157
		Moisture (%)	83.1	78.0	81.3	79.8	82.2
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	3.1	1.8	3.2	2.7	1.6
11B	0.096	0.320	2.8	3.2	3.1	6.5	2.7
23Na	0.783	2.6	3,947	3,699	3,980	4,209	1,913
24Mg	0.020	0.067	2,282	2,019	2,090	1,825	1,860
27Al	0.326	1.1	1,899	2,424	2,248	5,747	2,053
31P	54	180	10,368	10,856	9,158	8,246	8,143
39K	11	37	8,920	12,097	7,788	10,380	6,006
44Ca	65	217	3,282	2,814	3,654	3,277	2,450
49Ti	0.269	0.897	148	183	176	426	148
51V	0.058	0.193	3.4	4.4	4.1	9.6	3.6
52Cr	0.869	2.9	4.4	6.7	6.8	10	6.1
55Mn	0.009	0.030	78	124	69	116	101
57Fe	3.4	11	713	863	895	1,650	751
59Co	0.004	0.013	1.8	4.3	2.4	3.0	2.6
60Ni	0.014	0.047	23	35	30	54	27
63Cu	0.014	0.047	28	32	21	23	17
66Zn	0.342	1.1	396	425	229	304	310
75As	0.424	1.4	0.614	0.819	0.570	0.906	0.504
77Se	0.328	1.1	8.4	10	8.3	7.9	8.7
88Sr	0.001	0.003	7.2	8.0	6.7	9.9	5.5
95Mo	0.001	0.003	0.405	0.570	0.735	0.750	0.495
107Ag	0.001	0.003	0.155	0.155	0.135	0.123	0.092
111Cd	0.062	0.207	3.2	5.0	3.9	3.3	2.2
118Sn	0.019	0.063	0.289	0.238	0.323	0.208	0.304
121Sb	0.008	0.027	0.066	0.094	0.083	0.143	0.061
137Ba	0.001	0.003	52	67	51	118	52
202Hg	0.036	0.120	0.087	0.104	0.061	0.078	0.070
205Tl	0.001	0.003	0.038	0.042	0.036	0.056	0.030
208Pb	0.006	0.020	0.351	0.430	0.417	0.846	0.339
238U	0.001	0.003	0.097	0.111	0.086	0.185	0.093

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_SCOUTDS_INV-4_2020-11-23			RG_FOBSC_INV-1_2020-11-23		
Lab ID		016			018		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.006	2.0	2.5	22	3.1	3.3	6.2
11B	0.096	2.5	3.0	18	2.8	3.4	19
23Na	0.783	3,640	3,482	4.4	3,947	4,330	9.3
24Mg	0.020	1,797	1,682	6.6	2,282	2,197	3.8
27Al	0.326	1,701	2,112	22	1,899	2,723	36
31P	54	9,235	9,694	4.8	10,368	9,816	5.5
39K	11	9,649	9,227	4.5	8,920	11,256	23
44Ca	65	2,284	2,384	4.3	3,282	3,115	5.2
49Ti	0.269	119	165	32	148	202	31
51V	0.058	2.9	3.8	27	3.4	4.5	28
52Cr	0.869	5.3	5.2	-	4.4	4.8	-
55Mn	0.009	221	313	35	78	89	13
57Fe	3.4	711	779	9.1	713	937	27
59Co	0.004	4.8	5.5	14	1.8	2.3	24
60Ni	0.014	36	45	22	23	27	16
63Cu	0.014	17	20	16	28	19	38
66Zn	0.342	298	325	8.7	396	374	5.7
75As	0.424	0.753	0.731	-	0.614	0.680	-
77Se	0.328	11	11	0.0	8.4	9.4	11
88Sr	0.001	5.4	5.5	1.8	7.2	8.1	12
95Mo	0.001	0.450	0.495	9.5	0.405	0.420	3.6
107Ag	0.001	0.115	0.125	8.3	0.155	0.115	30
111Cd	0.062	3.0	3.3	9.5	3.2	3.3	3.1
118Sn	0.019	0.464	0.512	9.8	0.289	0.360	22
121Sb	0.008	0.091	0.094	3.2	0.066	0.083	-
137Ba	0.001	55	62	12	52	69	28
202Hg	0.036	0.074	0.104	-	0.087	0.091	-
205Tl	0.001	0.034	0.034	0.0	0.038	0.042	10
208Pb	0.006	0.339	0.353	4.0	0.351	0.481	31
238U	0.001	0.102	0.119	15	0.097	0.119	20

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	01			02	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.4	112	4.9	1.5	122	5.3
11B	0.096	4.5	4.8	107	3.1	5.6	124	4.9
23Na	0.783	14,000	15,293	109	3.1	15,674	112	5.6
24Mg	0.020	910	998	110	0.9	1,078	118	5.5
27Al	0.326	197.2	184	94	4.3	222	112	9.1
31P	54	8,000	8,924	112	4.4	8,698	109	7.5
39K	11	15,500	17,184	111	5.5	17,422	112	8.1
44Ca	65	2,360	2,695	114	4.7	2,535	107	3.8
49Ti	0.269	12.24	13	103	9.6	14	115	7.3
51V	0.058	1.57	2.0	128	10	1.7	111	6.4
52Cr	0.869	1.87	2.1	114	2.5	2.1	114	5.4
55Mn	0.009	3.17	3.6	114	5.1	3.8	119	7.7
57Fe	3.4	343	396	116	2.3	411	120	5.4
59Co	0.004	0.25	0.286	114	4.7	0.311	125	8.3
60Ni	0.014	1.34	1.5	115	4.4	1.7	126	5.7
63Cu	0.014	15.7	18	113	2.9	20	126	8.2
66Zn	0.342	51.6	58	113	1.9	63	121	6.4
75As	0.424	6.87	7.5	109	3.8	7.5	109	6.3
77Se	0.328	3.45	3.8	110	5.3	3.6	104	8.5
88Sr	0.001	10.1	12	114	5.3	12	118	4.1
95Mo	0.001	0.29	0.321	111	6.2	0.323	111	8.4
107Ag	0.001	0.0252	0.028	110	12	0.034	136	6.4
111Cd	0.062	0.299	0.350	117	5.7	0.334	112	8.4
118Sn	0.019	0.061	0.073	120	9.9	0.074	121	12
121Sb	0.008	0.011	0.012	105	**39**	0.013	120	**23**
137Ba	0.001	8.6	9.2	107	3.5	11	124	4.2
202Hg	0.036	0.412	0.444	108	3.3	0.467	113	6.1
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.006	0.404	0.509	126	11	0.452	112	18
238U	0.001	0.05	0.061	121	8.5	0.053	106	8.3

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FOBKS_INV-1_2020-11-23	008	04 Dec 2020
	RG_FOBKS_INV-2_2020-11-23	009	
	RG_FOBKS_INV-3_2020-11-23	010	
	RG_FOBKS_INV-4_2020-11-23	011	
	RG_FOBKS_INV-5_2020-11-23	012	
	RG_SCOUTDS_INV-1_2020-11-23	013	
	RG_SCOUTDS_INV-2_2020-11-23	014	
	RG_SCOUTDS_INV-3_2020-11-23	015	
02	RG_SCOUTDS_INV-4_2020-11-23	016	07 Dec 2020
	RG_SCOUTDS_INV-5_2020-11-23	017	
	RG_FOBSC_INV-1_2020-11-23	018	
	RG_FOBSC_INV-2_2020-11-23	019	
	RG_FOBSC_INV-3_2020-11-23	020	
	RG_FOBSC_INV-4_2020-11-23	021	
	RG_FOBSC_INV-5_2020-11-23	022	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: Swift Ponds Decommissioning (under FRO LAEMP [20-09]) (PO 707822)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Jennifer Ings
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.goog@teck.com	Email:	jings@minnow.ca

Sample Analysis Requested

TrichSample ID		Sample Identification:	Sample Type: Species	Sample Type: Sample type
008	1	RG_FOBKS_INV-1_2020-11-23	Stonefly, Ryax, Para	Composite-taxa benthic invertebrate tissue samples
009	2	RG_FOBKS_INV-2_2020-11-23	Stonefly, Ryax, Para	Composite-taxa benthic invertebrate tissue samples
010	3	RG_FOBKS_INV-3_2020-11-23	Stonefly, Ryax, Cranefly	Composite-taxa benthic invertebrate tissue samples
011	4	RG_FOBKS_INV-4_2020-11-23	Stonefly, Para, Mayfly	Composite-taxa benthic invertebrate tissue samples
012	5	RG_FOBKS_INV-5_2020-11-23	Stonefly, Para, Ryax	Composite-taxa benthic invertebrate tissue samples
013	6	RG_SCOUTDS_INV-1_2020-11-23	Ryax, Stonefly, Para	Composite-taxa benthic invertebrate tissue samples
014	7	RG_SCOUTDS_INV-2_2020-11-23	Stonefly, Para, Ryax	Composite-taxa benthic invertebrate tissue samples
015	8	RG_SCOUTDS_INV-3_2020-11-23	Stonefly, Ryax, Para	Composite-taxa benthic invertebrate tissue samples
016	9	RG_SCOUTDS_INV-4_2020-11-23	Stonefly, Ryax, Para	Composite-taxa benthic invertebrate tissue samples
017	10	RG_SCOUTDS_INV-5_2020-11-23	Ryax, Stonefly, Mayfly	Composite-taxa benthic invertebrate tissue samples
018	11	RG_FOBSC_INV-1_2020-11-23	Stonefly, Mayfly, Ryax	Composite-taxa benthic invertebrate tissue samples
019	12	RG_FOBSC_INV-2_2020-11-23	Stonefly, Mayfly, Para	Composite-taxa benthic invertebrate tissue samples
020	13	RG_FOBSC_INV-3_2020-11-23	Stonefly, Mayfly, Ryax	Composite-taxa benthic invertebrate tissue samples
021	14	RG_FOBSC_INV-4_2020-11-23	Stonefly, Ryax, Mayfly	Composite-taxa benthic invertebrate tissue samples
022	15	RG_FOBSC_INV-5_2020-11-23	Stonefly, Mayfly, Ryax	Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By: Mia Otto	Sample(s) Received By: Geriene LaBine
Signature: MOtto	Signature: Geriene LaBine
Date Sent: December, 2, 2020	Date Received: 03 Dec 2020 (Project #: 2020-174)
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

COM-011.01

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Jennifer Ings
Aquatic Scientist
Minnow Environmental
Phone: 250-595-1627
Email: jings@minnow.ca

Date Received: 10 Dec 2020
Date of Analysis: 11 Dec 2020
Final Report Date: 14 Dec 2020
Project No.: 2020-177
Method No.: MET-002.04

Client Project: Teck Coal Limited/Minnow Swift Ponds Decommissioning (FRO LAEMP 20-09)

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 20 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average result 104%; range 99 - 108%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 14 Dec 2020 Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBKS_INV-1_2020-12-07	RG_FOBKS_INV-2_2020-12-07	RG_FOBKS_INV-3_2020-12-07	RG_FOBKS_INV-4_2020-12-07	RG_FOBKS_INV-5_2020-12-07
		Lab ID	053	054	055	056	057
		Wet Weight (g)	0.9875	0.8232	0.6648	0.5994	0.5985
		Dry Weight (g)	0.2284	0.2377	0.1944	0.1542	0.1936
		Moisture (%)	76.9	71.1	70.8	74.3	67.7
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.8	1.2	2.1	1.7	2.4
11B	0.096	0.320	1.1	0.616	0.822	1.0	1.2
23Na	0.682	2.3	2,399	1,706	2,032	2,950	2,408
24Mg	0.012	0.040	1,511	1,060	1,206	1,385	1,497
27Al	0.025	0.083	665	388	438	580	739
31P	61	203	8,254	7,734	6,628	9,549	8,399
39K	11	37	7,037	6,345	5,886	9,594	7,616
44Ca	32	107	9,162	8,287	4,871	6,642	14,221
49Ti	0.177	0.590	63	26	29	40	69
51V	0.034	0.113	1.7	0.827	0.961	1.4	2.1
52Cr	0.588	2.0	3.3	2.6	2.7	4.0	3.2
55Mn	0.012	0.040	258	136	155	216	405
57Fe	3.1	10	435	258	304	385	629
59Co	0.001	0.003	5.9	2.5	2.5	3.4	6.0
60Ni	0.012	0.040	27	12	15	21	24
63Cu	0.010	0.033	15	15	15	13	12
66Zn	0.457	1.5	204	158	135	212	156
75As	0.466	1.6	<0.466	<0.466	<0.466	<0.466	0.477
77Se	0.392	1.3	7.0	8.0	5.8	7.6	8.0
88Sr	0.001	0.003	9.6	6.1	4.5	6.5	15
95Mo	0.004	0.013	0.354	0.472	0.348	0.311	0.572
107Ag	0.001	0.003	0.076	0.082	0.085	0.076	0.085
111Cd	0.062	0.207	1.3	0.616	0.654	1.1	1.3
118Sn	0.013	0.043	0.169	0.076	0.070	0.254	0.055
121Sb	0.006	0.020	0.114	0.073	0.077	0.103	0.158
137Ba	0.001	0.003	65	49	47	57	117
202Hg	0.032	0.107	0.044	<0.032	0.037	0.044	0.037
205Tl	0.001	0.003	0.030	0.017	0.023	0.027	0.025
208Pb	0.004	0.013	0.188	0.088	0.133	0.147	0.216
238U	0.001	0.003	0.107	0.054	0.040	0.074	0.143

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_SCOUTDS_INV-1_2020-12-07	RG_SCOUTDS_INV-2_2020-12-07	RG_SCOUTDS_INV-3_2020-12-07	RG_SCOUTDS_INV-4_2020-12-07	RG_SCOUTDS_INV-5_2020-12-07
		Lab ID	058	059	060	061	062
		Wet Weight (g)	1.6538	0.8244	1.3134	0.9935	0.6364
		Dry Weight (g)	0.4441	0.1821	0.3246	0.2332	0.1363
		Moisture (%)	73.1	77.9	75.3	76.5	78.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.2	1.4	1.7	1.3	0.901
11B	0.096	0.320	1.1	2.0	1.0	1.5	1.5
23Na	0.682	2.3	3,269	3,124	3,662	2,844	2,825
24Mg	0.012	0.040	1,251	1,261	1,042	768	1,622
27Al	0.025	0.083	272	1,433	554	436	996
31P	61	203	8,882	9,432	8,848	6,495	10,062
39K	11	37	9,221	9,135	8,827	7,459	9,636
44Ca	32	107	2,011	2,061	2,125	985	2,610
49Ti	0.177	0.590	17	99	33	34	73
51V	0.034	0.113	0.623	3.1	1.3	0.837	2.1
52Cr	0.588	2.0	2.0	6.4	3.6	2.8	6.1
55Mn	0.012	0.040	146	161	104	80	52
57Fe	3.1	10	215	656	333	232	490
59Co	0.001	0.003	3.2	2.6	2.2	1.7	1.9
60Ni	0.012	0.040	16	25	16	11	19
63Cu	0.010	0.033	19	20	17	10	22
66Zn	0.457	1.5	105	226	191	203	334
75As	0.466	1.6	<0.466	<0.466	<0.466	<0.466	0.435
77Se	0.392	1.3	4.3	7.6	5.3	5.7	5.9
88Sr	0.001	0.003	2.2	4.2	2.9	1.4	4.4
95Mo	0.004	0.013	0.348	0.373	0.360	0.258	0.363
107Ag	0.001	0.003	0.050	0.101	0.079	0.042	0.141
111Cd	0.062	0.207	0.741	1.3	1.6	0.919	3.3
118Sn	0.013	0.043	0.076	0.219	0.134	0.076	0.294
121Sb	0.006	0.020	0.059	0.055	0.037	0.039	0.050
137Ba	0.001	0.003	14	37	18	13	25
202Hg	0.032	0.107	<0.032	0.056	0.052	0.034	0.045
205Tl	0.001	0.003	0.024	0.039	0.030	0.035	0.041
208Pb	0.004	0.013	0.086	0.285	0.127	0.110	0.197
238U	0.001	0.003	0.044	0.064	0.028	0.024	0.052

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBSC_INV-1_2020-12-07	RG_FOBSC_INV-2_2020-12-07	RG_FOBSC_INV-3_2020-12-07	RG_FOBSC_INV-4_2020-12-07	RG_FOBSC_INV-5_2020-12-07
		Lab ID	063	064	065	066	067
		Wet Weight (g)	0.7918	1.4898	1.4164	0.9987	0.6682
		Dry Weight (g)	0.1663	0.3417	0.3159	0.2522	0.1974
		Moisture (%)	79.0	77.1	77.7	74.7	70.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.2	0.962	4.0	4.8	2.1
11B	0.096	0.320	1.9	0.731	1.1	1.0	0.945
23Na	0.682	2.3	2,818	3,409	3,185	4,724	3,502
24Mg	0.012	0.040	1,269	1,008	819	969	1,100
27Al	0.025	0.083	799	397	513	661	560
31P	61	203	8,468	7,742	7,260	10,579	9,940
39K	11	37	8,316	8,027	5,770	10,503	8,923
44Ca	32	107	2,277	1,362	1,376	1,063	1,268
49Ti	0.177	0.590	62	26	33	42	42
51V	0.034	0.113	2.9	0.821	1.0	1.4	1.4
52Cr	0.588	2.0	11	2.6	3.2	3.7	5.7
55Mn	0.012	0.040	68	116	93	171	193
57Fe	3.1	10	826	245	281	425	456
59Co	0.001	0.003	2.3	3.0	1.5	3.1	3.6
60Ni	0.012	0.040	31	21	12	19	28
63Cu	0.010	0.033	26	15	12	13	15
66Zn	0.457	1.5	356	190	132	148	271
75As	0.466	1.6	0.533	<0.466	<0.466	<0.466	0.449
77Se	0.392	1.3	7.3	8.6	6.1	8.1	9.4
88Sr	0.001	0.003	4.9	1.8	2.4	2.4	2.9
95Mo	0.004	0.013	0.419	0.435	0.274	0.532	0.499
107Ag	0.001	0.003	0.141	0.094	0.094	0.089	0.083
111Cd	0.062	0.207	2.9	2.4	1.6	1.1	2.1
118Sn	0.013	0.043	0.269	0.147	0.219	0.135	0.076
121Sb	0.006	0.020	0.077	0.050	0.039	0.055	0.052
137Ba	0.001	0.003	35	15	18	24	38
202Hg	0.032	0.107	0.068	0.045	<0.032	0.034	0.045
205Tl	0.001	0.003	0.061	0.033	0.024	0.044	0.040
208Pb	0.004	0.013	0.303	0.122	0.151	0.178	0.182
238U	0.001	0.003	0.060	0.030	0.028	0.034	0.052

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOBCP_INV-1_2020-12-07	RG_FOBCP_INV-2_2020-12-07	RG_FOBCP_INV-3_2020-12-07	RG_FOBCP_INV-4_2020-12-07	RG_FOBCP_INV-5_2020-12-07
		Lab ID	068	069	070	071	072
		Wet Weight (g)	1.6497	1.3233	1.3398	1.6004	1.4557
		Dry Weight (g)	0.4927	0.3561	0.2957	0.3639	0.3711
		Moisture (%)	70.1	73.1	77.9	77.3	74.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.005	0.017	1.1	1.1	0.757	1.6	1.1
11B	0.096	0.320	0.571	1.0	0.870	0.781	0.736
23Na	0.682	2.3	2,777	1,814	1,901	2,832	2,007
24Mg	0.012	0.040	1,091	913	1,077	869	813
27Al	0.025	0.083	342	333	556	446	472
31P	61	203	9,566	6,704	7,202	5,622	7,039
39K	11	37	8,424	5,396	6,347	5,578	6,940
44Ca	32	107	1,434	1,373	1,862	1,195	1,624
49Ti	0.177	0.590	19	21	34	28	29
51V	0.034	0.113	0.628	0.736	1.0	0.938	0.842
52Cr	0.588	2.0	2.6	2.3	2.4	2.5	2.2
55Mn	0.012	0.040	117	91	149	144	192
57Fe	3.1	10	232	203	285	318	259
59Co	0.001	0.003	2.5	2.0	1.7	2.2	3.3
60Ni	0.012	0.040	12	13	13	15	21
63Cu	0.010	0.033	15	12	18	12	12
66Zn	0.457	1.5	234	178	263	130	131
75As	0.466	1.6	<0.466	<0.466	<0.466	<0.466	<0.466
77Se	0.392	1.3	8.9	6.5	6.9	5.8	4.4
88Sr	0.001	0.003	2.7	2.0	2.8	1.9	2.5
95Mo	0.004	0.013	0.403	0.240	0.190	0.270	0.270
107Ag	0.001	0.003	0.083	0.062	0.058	0.078	0.063
111Cd	0.062	0.207	1.1	1.4	2.2	0.764	0.764
118Sn	0.013	0.043	0.059	0.084	0.043	0.055	0.043
121Sb	0.006	0.020	0.028	0.044	0.044	0.033	0.040
137Ba	0.001	0.003	14	15	18	16	17
202Hg	0.032	0.107	0.045	0.060	0.070	0.040	0.033
205Tl	0.001	0.003	0.029	0.020	0.020	0.018	0.018
208Pb	0.004	0.013	0.093	0.090	0.116	0.091	0.099
238U	0.001	0.003	0.030	0.031	0.035	0.024	0.025

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FOBKS_INV-4_2020-12-07			RG_FOBSC_INV-2_2020-12-07		
Lab ID		056			064		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.005	1.7	1.6	6.1	0.962	0.859	11
11B	0.096	1.0	0.860	-	0.731	0.909	-
23Na	0.682	2,950	2,234	28	3,409	2,807	19
24Mg	0.012	1,385	1,245	11	1,008	899	11
27Al	0.025	580	675	15	397	527	28
31P	61	9,549	8,295	14	7,742	6,992	10
39K	11	9,594	7,363	26	8,027	8,447	5.1
44Ca	32	6,642	8,196	21	1,362	1,490	9.0
49Ti	0.177	40	48	18	26	32	21
51V	0.034	1.4	1.4	0.0	0.821	1.1	29
52Cr	0.588	4.0	3.6	-	2.6	3.2	21
55Mn	0.012	216	170	24	116	128	10
57Fe	3.1	385	383	0.5	245	287	16
59Co	0.001	3.4	3.1	9.2	3.0	2.3	26
60Ni	0.012	21	17	21	21	19	10
63Cu	0.010	13	13	0.0	15	18	18
66Zn	0.457	212	162	27	190	184	3.2
75As	0.466	<0.466	<0.466	-	<0.466	<0.466	-
77Se	0.392	7.6	6.5	16	8.6	6.5	28
88Sr	0.001	6.5	6.7	3.0	1.8	2.6	36
95Mo	0.004	0.311	0.348	11	0.435	0.354	21
107Ag	0.001	0.076	0.091	18	0.094	0.078	19
111Cd	0.062	1.1	0.828	28	2.4	2.5	4.1
118Sn	0.013	0.254	0.262	3.1	0.147	0.151	-
121Sb	0.006	0.103	0.088	16	0.050	0.044	-
137Ba	0.001	57	64	12	15	19	27
202Hg	0.032	0.044	0.037	-	0.045	0.034	-
205Tl	0.001	0.027	0.024	12	0.033	0.036	8.7
208Pb	0.004	0.147	0.142	3.5	0.122	0.159	30
238U	0.001	0.074	0.077	4.0	0.030	0.024	22

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	01			02	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	110	7.4	1.2	103	2.7
11B	0.096	4.5	4.9	109	2.2	4.7	104	3.7
23Na	0.682	14,000	15,206	109	4.3	14,707	105	2.2
24Mg	0.012	910	986	108	3.7	938	103	3.3
27Al	0.025	197.2	196	100	6.4	198	100	5.0
31P	61	8,000	8,481	106	5.0	8,512	106	3.7
39K	11	15,500	15,891	102	7.4	16,629	107	2.7
44Ca	32	2,360	2,447	104	8.0	2,510	106	2.8
49Ti	0.177	12.24	12	99	11	13	105	15
51V	0.034	1.57	1.7	109	7.5	1.6	100	3.4
52Cr	0.588	1.87	2.1	112	6.6	2.1	110	3.2
55Mn	0.012	3.17	3.6	113	5.3	3.3	105	5.1
57Fe	3.1	343	395	115	5.0	374	109	2.6
59Co	0.001	0.25	0.277	111	3.8	0.265	106	4.9
60Ni	0.012	1.34	1.5	110	4.4	1.4	108	2.7
63Cu	0.010	15.7	18	118	3.8	17	111	3.1
66Zn	0.457	51.6	57	111	6.0	56	108	2.4
75As	0.466	6.87	7.5	109	5.4	7.3	107	2.5
77Se	0.392	3.45	3.7	108	7.1	3.7	107	1.6
88Sr	0.001	10.1	11	112	2.8	11	108	3.4
95Mo	0.004	0.29	0.350	121	4.6	0.306	106	3.7
107Ag	0.001	0.0252	0.030	120	9.3	0.029	116	9.8
111Cd	0.062	0.299	0.337	113	5.3	0.348	116	10
118Sn	0.013	0.061	0.069	113	10	0.076	125	11
121Sb	0.006	0.011	0.010	93	13	0.011	100	0.0
137Ba	0.001	8.6	9.1	105	7.4	9.0	105	2.9
202Hg	0.032	0.412	0.442	107	7.7	0.475	115	2.4
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.004	0.404	0.434	107	9.8	0.423	105	5.5
238U	0.001	0.05	0.051	102	6.7	0.054	108	3.9

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

Sample Group ID			03		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.005	1.21	1.3	110	14
11B	0.096	4.5	4.4	97	6.5
23Na	0.682	14,000	15,388	110	7.8
24Mg	0.012	910	1,021	112	7.7
27Al	0.025	197.2	176	89	4.7
31P	61	8,000	8,567	107	4.6
39K	11	15,500	16,487	106	5.0
44Ca	32	2,360	2,212	94	5.7
49Ti	0.177	12.24	11	94	13
51V	0.034	1.57	1.7	109	6.3
52Cr	0.588	1.87	2.0	105	6.6
55Mn	0.012	3.17	3.6	113	4.0
57Fe	3.1	343	398	116	5.6
59Co	0.001	0.25	0.298	119	5.9
60Ni	0.012	1.34	1.6	119	2.2
63Cu	0.010	15.7	18	118	4.7
66Zn	0.457	51.6	60	116	5.4
75As	0.466	6.87	7.2	104	6.0
77Se	0.404	3.45	3.4	99	10
88Sr	0.001	10.1	11	114	7.3
95Mo	0.004	0.29	0.306	106	9.7
107Ag	0.001	0.0252	0.031	122	10
111Cd	0.062	0.299	0.355	119	5.8
118Sn	0.013	0.061	0.071	117	10
121Sb	0.006	0.011	0.010	93	**30**
137Ba	0.001	8.6	8.4	98	2.4
202Hg	0.032	0.412	0.455	110	11
205Tl	0.001	0.0013	-	-	-
208Pb	0.004	0.404	0.442	109	13
238U	0.001	0.05	0.052	104	6.7

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_FOBKS_INV-1_2020-12-07	053	11 Dec 2020
	RG_FOBKS_INV-2_2020-12-07	054	
	RG_FOBKS_INV-3_2020-12-07	055	
	RG_FOBKS_INV-4_2020-12-07	056	
	RG_FOBKS_INV-5_2020-12-07	057	
	RG_SCOUTDS_INV-1_2020-12-07	058	
	RG_SCOUTDS_INV-2_2020-12-07	059	
	RG_SCOUTDS_INV-3_2020-12-07	060	
02	RG_SCOUTDS_INV-4_2020-12-07	061	11 Dec 2020
	RG_SCOUTDS_INV-5_2020-12-07	062	
	RG_FOBSC_INV-1_2020-12-07	063	
	RG_FOBSC_INV-2_2020-12-07	064	
	RG_FOBSC_INV-3_2020-12-07	065	
	RG_FOBSC_INV-4_2020-12-07	066	
	RG_FOBSC_INV-5_2020-12-07	067	
	RG_FOBCP_INV-1_2020-12-07	068	
03	RG_FOBCP_INV-2_2020-12-07	069	11 Dec 2020
	RG_FOBCP_INV-3_2020-12-07	070	
	RG_FOBCP_INV-4_2020-12-07	071	
	RG_FOBCP_INV-5_2020-12-07	072	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: Swift Ponds Decommissioning/FRO LAEMP [20-09] (PO 707822)			
Company Name:	Teck Coal Limited	Company Name:	Minnow Environmental
Contact Name:	Cait Good	Contact Name:	Peter Schnurr and Jennifer Ings
Address:	421 Pine Avenue	Address:	2 Lamb Street
City, Province:	Sparwood, BC	City, Province:	Georgetown, ON
Postal Code:	V0B 2G0	Postal Code:	L7G 2G7
Phone:	250-425-8202	Phone:	250-595-1627
Email:	cait.good@teck.com	Email:	pschnurr@minnow.ca; jings@minnow.ca

Sample Analysis Requested					
Trich Sample ID:		Sample Identification:		Sample Type: Species	Sample Type: Sample type
053	1	RG_FOBKS_INV-1_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
054	2	RG_FOBKS_INV-2_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
055	3	RG_FOBKS_INV-3_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
056	4	RG_FOBKS_INV-4_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
057	5	RG_FOBKS_INV-5_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
058	6	RG_SCOUTDS_INV-1_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
059	7	RG_SCOUTDS_INV-2_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
060	8	RG_SCOUTDS_INV-3_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
061	9	RG_SCOUTDS_INV-4_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
062	10	RG_SCOUTDS_INV-5_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
063	11	RG_FOBSC_INV-1_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
064	12	RG_FOBSC_INV-2_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
065	13	RG_FOBSC_INV-3_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
066	14	RG_FOBSC_INV-4_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
067	15	RG_FOBSC_INV-5_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
068	16	RG_FOBCP_INV-1_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
069	17	RG_FOBCP_INV-2_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
070	18	RG_FOBCP_INV-3_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
071	19	RG_FOBCP_INV-4_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples
072	20	RG_FOBCP_INV-5_2020-12-07	✓		Composite-taxa benthic invertebrate tissue samples

Sample(s) Released By: Peter Schnurr	Sample(s) Received By: Geneine LaBine
Signature:	Signature:
Date Sent: Dec 8/2020	Date Received: 10 Dec 2020 (Project #: 2020-177
Sample(s) Returned to Client By:	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

COM-011.01

TrichAnalytics Inc.

Tissue Microchemistry Analysis Report

Client: Peter Schnurr
Aquatic Scientist
Minnow Environmental
Phone: (905) 873-3371 ext. 323
Email: pschnurr@minnow.ca

Date Received: 17 Dec 2020
Date of Analysis: 18 Dec 2020
21 Dec 2020
Final Report Date: 23 Dec 2020
Project No.: 2020-180
Method No.: MET-002.04

Client Project: Teck Coal Limited/Minnow Environmental Regional Effects FRO LAEMP (20-09)

Analytical Request: Benthic Invertebrate Tissue Microchemistry (total metals and moisture) – 45 samples.
See chain of custody form provided for sample identification numbers.

Notes:

Analytical results are expressed in part per million (ppm) dry weight.
Samples quantified using DORM-4, NIST-1566b, and NIST-2976 certified reference standards.
Aluminum concentrations above 1,000 ppm are outside linear range of the calibration curve.
Client specific DQO for Selenium accuracy is 90 - 110% of the certified value; (average achieved 104%; range 99 - 108%).
RPD values calculated according to the British Columbia Environmental Laboratory Manual (2020) criteria.

This report provides the analytical results only for tissue samples noted above as received from the Client.

Reviewed and Approved by Jennie Christensen, PhD, RPBio — 23 Dec 2020 Date

TrichAnalytics Inc.
207-1753 Sean Heights
Saanichton, BC V8M 0B3
www.trichanalytics.com

CALA Testing Accreditation No. A4196

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_MP1_INV-01_2020-12-09	RG_MP1_INV-02_2020-12-09	RG_MP1_INV-03_2020-12-09	RG_FOUCL_INV-01_2020-12-08	RG_FOUCL_INV-02_2020-12-08
		Lab ID	130	131	132	133	134
		Wet Weight (g)	0.8735	1.1652	0.8486	1.3006	1.2854
		Dry Weight (g)	0.2191	0.2840	0.1920	0.3403	0.3180
		Moisture (%)	74.9	75.6	77.4	73.8	75.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.712	0.796	0.829	0.377	0.436
11B	0.118	0.393	0.639	1.3	1.1	0.861	1.0
23Na	0.943	3.1	2,360	2,591	2,650	2,609	2,535
24Mg	0.015	0.050	1,107	1,452	1,515	1,084	1,395
27Al	0.024	0.080	614	757	674	261	248
31P	60	200	9,614	9,767	9,367	9,743	9,502
39K	6.7	22	8,060	8,339	8,054	7,474	7,706
44Ca	41	137	1,432	1,997	2,138	1,668	1,879
49Ti	0.224	0.747	36	58	52	15	16
51V	0.042	0.140	0.900	1.7	1.3	0.559	0.482
52Cr	0.469	1.6	3.1	3.0	3.6	2.0	2.0
55Mn	0.005	0.017	16	28	24	24	24
57Fe	1.9	6.3	241	401	360	128	121
59Co	0.002	0.007	0.591	0.541	0.926	0.272	0.381
60Ni	0.012	0.040	5.6	8.6	11	3.0	4.2
63Cu	0.025	0.083	13	14	14	11	11
66Zn	0.543	1.8	163	199	273	178	182
75As	0.582	1.9	<0.582	<0.582	<0.582	<0.582	0.909
77Se	0.299	0.997	5.7	5.9	6.0	6.4	5.9
88Sr	0.001	0.003	2.4	4.5	4.3	2.3	2.6
95Mo	0.001	0.003	0.127	0.253	0.237	0.174	0.190
107Ag	0.001	0.003	0.066	0.076	0.096	0.045	0.045
111Cd	0.048	0.160	0.650	0.624	1.2	0.676	0.728
118Sn	0.033	0.110	0.062	0.156	0.102	0.297	0.281
121Sb	0.004	0.013	0.019	0.028	0.028	0.011	0.011
137Ba	0.001	0.003	15	37	29	26	25
202Hg	0.033	0.110	0.037	<0.033	0.041	<0.033	0.037
205Tl	0.001	0.003	0.015	0.022	0.024	0.011	0.008
208Pb	0.004	0.013	0.145	0.248	0.195	0.064	0.074
238U	0.001	0.003	0.020	0.041	0.044	0.025	0.037

Notes:

ppm = parts per million

DL = detection limit

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< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

			RG_FOUCL_INV-03_2020-12-08	RG_FOUNGD_INV-01_2020-12-08	RG_FOUNGD_INV-02_2020-12-08	RG_FOUNGD_INV-03_2020-12-08	RG_FODNGD_INV-01_2020-12-08
		Client ID					
		Lab ID	135	136	137	138	139
		Wet Weight (g)	1.1693	1.3502	1.3391	0.8892	1.1613
		Dry Weight (g)	0.3113	0.3108	0.3316	0.2033	0.2611
		Moisture (%)	73.4	77.0	75.2	77.1	77.5
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.348	0.951	1.2	1.5	2.3
11B	0.118	0.393	1.4	1.7	1.6	0.913	1.2
23Na	0.943	3.1	2,621	2,593	2,765	2,230	3,582
24Mg	0.015	0.050	1,249	1,152	1,071	1,158	1,404
27Al	0.024	0.080	205	276	376	156	624
31P	60	200	9,587	8,367	8,099	9,362	9,876
39K	6.7	22	7,138	7,459	7,199	7,259	9,537
44Ca	41	137	1,826	1,738	1,262	1,441	2,378
49Ti	0.224	0.747	13	35	26	10	49
51V	0.042	0.140	0.439	0.839	0.714	0.428	1.5
52Cr	0.469	1.6	2.2	2.5	2.5	2.8	3.7
55Mn	0.005	0.017	27	26	25	21	22
57Fe	1.9	6.3	120	157	135	93	243
59Co	0.002	0.007	0.307	0.577	0.713	0.407	1.2
60Ni	0.012	0.040	3.9	9.6	7.5	6.0	8.7
63Cu	0.025	0.083	11	12	9.0	11	14
66Zn	0.543	1.8	154	169	206	185	161
75As	0.582	1.9	0.724	0.667	0.611	<0.582	<0.582
77Se	0.299	0.997	5.8	5.1	6.7	6.3	6.0
88Sr	0.001	0.003	2.9	2.9	2.3	2.1	3.5
95Mo	0.001	0.003	0.221	0.174	0.142	0.174	0.232
107Ag	0.001	0.003	0.040	0.066	0.050	0.043	0.070
111Cd	0.048	0.160	0.910	0.858	1.1	0.748	0.988
118Sn	0.033	0.110	0.078	0.102	0.125	0.047	0.279
121Sb	0.004	0.013	0.017	0.028	0.022	0.017	0.028
137Ba	0.001	0.003	25	28	23	20	24
202Hg	0.033	0.110	<0.033	<0.033	0.041	<0.033	0.050
205Tl	0.001	0.003	0.010	0.012	0.013	0.014	0.023
208Pb	0.004	0.013	0.071	0.118	0.083	0.056	0.153
238U	0.001	0.003	0.044	0.044	0.029	0.022	0.036

Notes:

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Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FODNGD_INV-02_2020-12-08	RG_FODNGD_INV-03_2020-12-08	RG_FOUKI_INV-01_2020-12-09	RG_FOUKI_INV-02_2020-12-09	RG_FOUKI_INV-03_2020-12-09
		Lab ID	140	141	142	143	144
		Wet Weight (g)	0.8827	1.3898	1.3187	1.4905	1.3076
		Dry Weight (g)	0.2098	0.3139	0.3435	0.3639	0.3671
		Moisture (%)	76.2	77.4	74.0	75.6	71.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.8	1.9	1.1	1.9	0.823
11B	0.118	0.393	1.3	1.4	0.831	0.676	0.424
23Na	0.943	3.1	3,215	1,985	1,912	2,741	1,506
24Mg	0.015	0.050	1,204	1,019	1,026	961	812
27Al	0.024	0.080	803	878	504	366	213
31P	60	200	10,341	7,844	7,718	8,236	5,511
39K	6.7	22	9,422	5,949	6,379	8,147	4,937
44Ca	41	137	1,723	1,885	2,100	2,766	1,671
49Ti	0.224	0.747	58	61	37	25	17
51V	0.042	0.140	1.9	2.2	1.3	0.957	0.685
52Cr	0.469	1.6	5.0	6.3	3.5	2.3	2.4
55Mn	0.005	0.017	31	31	119	135	94
57Fe	1.9	6.3	287	349	388	314	261
59Co	0.002	0.007	2.3	1.7	2.4	4.5	1.9
60Ni	0.012	0.040	14	16	13	18	9.7
63Cu	0.025	0.083	14	16	14	13	9.3
66Zn	0.543	1.8	151	120	121	123	92
75As	0.582	1.9	<0.582	<0.582	<0.582	<0.582	<0.582
77Se	0.299	0.997	5.6	5.7	5.6	6.2	4.2
88Sr	0.001	0.003	2.8	3.3	3.1	3.2	2.1
95Mo	0.001	0.003	0.271	0.329	0.367	0.445	0.251
107Ag	0.001	0.003	0.070	0.065	0.086	0.081	0.059
111Cd	0.048	0.160	0.694	0.561	0.454	0.854	0.400
118Sn	0.033	0.110	0.267	0.185	0.063	0.149	0.039
121Sb	0.004	0.013	0.028	0.033	0.077	0.099	0.066
137Ba	0.001	0.003	25	30	31	33	21
202Hg	0.033	0.110	0.038	0.038	0.038	0.038	<0.033
205Tl	0.001	0.003	0.018	0.020	0.024	0.023	0.014
208Pb	0.004	0.013	0.167	0.178	0.098	0.092	0.059
238U	0.001	0.003	0.035	0.039	0.032	0.043	0.020

Notes:

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Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOUKI_INV-04_2020-12-09	RG_FOUKI_INV-05_2020-12-09	RG_UFR1_INV-01_2020-12-08	RG_UFR1_INV-02_2020-12-08	RG_UFR1_INV-03_2020-12-08
		Lab ID	145	146	147	148	149
		Wet Weight (g)	1.2364	1.1271	1.4572	1.4348	1.4508
		Dry Weight (g)	0.3423	0.2445	0.2825	0.3022	0.3003
		Moisture (%)	72.3	78.3	80.6	78.9	79.3
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.5	2.8	0.323	0.329	0.391
11B	0.118	0.393	0.685	0.947	3.6	3.0	3.5
23Na	0.943	3.1	2,668	2,938	3,456	2,982	2,656
24Mg	0.015	0.050	932	1,048	1,130	1,086	1,061
27Al	0.024	0.080	400	643	492	404	450
31P	60	200	8,319	7,785	10,385	9,286	9,005
39K	6.7	22	7,543	7,041	10,495	8,686	8,403
44Ca	41	137	2,279	2,576	1,640	1,249	1,334
49Ti	0.224	0.747	25	57	38	29	31
51V	0.042	0.140	1.1	1.4	1.0	0.926	1.1
52Cr	0.469	1.6	2.9	3.6	3.7	3.0	2.9
55Mn	0.005	0.017	227	42	34	25	31
57Fe	1.9	6.3	389	460	257	198	306
59Co	0.002	0.007	4.4	1.2	0.517	0.343	0.438
60Ni	0.012	0.040	19	14	6.7	5.7	5.4
63Cu	0.025	0.083	12	13	15	13	10
66Zn	0.543	1.8	133	135	165	140	133
75As	0.582	1.9	<0.582	<0.582	1.6	1.5	2.0
77Se	0.299	0.997	5.6	3.0	4.7	3.9	3.9
88Sr	0.001	0.003	2.8	3.8	3.6	2.6	2.3
95Mo	0.001	0.003	0.445	0.406	0.290	0.271	0.271
107Ag	0.001	0.003	0.068	0.093	0.076	0.064	0.050
111Cd	0.048	0.160	0.721	0.697	2.6	1.2	2.1
118Sn	0.033	0.110	0.063	0.141	0.141	0.149	0.145
121Sb	0.004	0.013	0.099	0.050	0.028	0.022	0.022
137Ba	0.001	0.003	38	25	33	36	25
202Hg	0.033	0.110	0.038	<0.033	0.037	0.050	<0.033
205Tl	0.001	0.003	0.023	0.024	0.012	0.011	0.009
208Pb	0.004	0.013	0.103	0.152	0.159	0.152	0.106
238U	0.001	0.003	0.028	0.029	0.035	0.028	0.026

Notes:

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Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_UFR1_INV-04_2020-12-08	RG_UFR1_INV-05_2020-12-08	RG_FODPO_INV-01_2020-12-09	RG_FODPO_INV-02_2020-12-09	RG_FODPO_INV-03_2020-12-09
		Lab ID	150	151	152	153	154
		Wet Weight (g)	1.4000	1.0311	1.1734	1.2662	1.0726
		Dry Weight (g)	0.2960	0.2123	0.2841	0.2824	0.2668
		Moisture (%)	78.9	79.4	75.8	77.7	75.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.392	0.203	0.418	0.621	0.408
11B	0.118	0.393	3.4	1.6	0.249	0.848	0.641
23Na	0.943	3.1	2,782	2,392	1,519	2,755	2,400
24Mg	0.015	0.050	879	1,021	1,429	1,331	1,020
27Al	0.024	0.080	571	218	59	355	183
31P	60	200	8,108	7,806	6,885	7,476	7,210
39K	6.7	22	9,341	7,282	5,165	6,838	7,514
44Ca	41	137	1,361	1,056	1,625	1,988	1,641
49Ti	0.224	0.747	42	15	2.5	25	9.9
51V	0.042	0.140	1.2	0.475	0.125	0.916	0.372
52Cr	0.469	1.6	3.7	2.4	1.8	3.5	2.1
55Mn	0.005	0.017	29	30	21	23	14
57Fe	1.9	6.3	244	123	66	234	109
59Co	0.002	0.007	0.413	0.358	0.108	0.313	0.222
60Ni	0.012	0.040	6.4	3.0	1.4	6.4	2.8
63Cu	0.025	0.083	11	11	14	13	8.7
66Zn	0.543	1.8	118	195	106	78	125
75As	0.582	1.9	1.3	0.989	<0.582	<0.582	<0.582
77Se	0.299	0.997	3.5	4.8	3.8	3.3	3.1
88Sr	0.001	0.003	3.0	2.1	3.0	2.6	2.1
95Mo	0.001	0.003	0.290	0.213	0.097	0.213	0.120
107Ag	0.001	0.003	0.047	0.076	0.047	0.047	0.040
111Cd	0.048	0.160	1.2	1.2	0.189	0.232	0.368
118Sn	0.033	0.110	0.183	0.083	0.108	0.133	0.106
121Sb	0.004	0.013	0.028	0.017	0.011	0.017	0.017
137Ba	0.001	0.003	32	37	11	12	8.7
202Hg	0.033	0.110	0.037	0.037	<0.033	<0.033	<0.033
205Tl	0.001	0.003	0.011	0.008	0.004	0.010	0.006
208Pb	0.004	0.013	0.175	0.091	0.030	0.091	0.058
238U	0.001	0.003	0.028	0.017	0.017	0.069	0.028

Notes:

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Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FODPO_INV-04_2020-12-09	RG_FODPO_INV-05_2020-12-09	RG_FOUEW_INV-01_2020-12-10	RG_FOUEW_INV-02_2020-12-10	RG_FOUEW_INV-03_2020-12-10
		Lab ID	155	156	157	158	159
		Wet Weight (g)	1.1737	1.4573	1.3711	1.3114	1.3345
		Dry Weight (g)	0.2888	0.3272	0.2958	0.2776	0.3340
		Moisture (%)	75.4	77.5	78.4	78.8	75.0
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.6	0.603	0.418	0.825	0.638
11B	0.118	0.393	0.957	1.0	0.494	1.3	0.879
23Na	0.943	3.1	2,621	2,490	1,842	3,047	2,426
24Mg	0.015	0.050	1,240	1,372	948	1,408	1,389
27Al	0.024	0.080	314	183	170	676	382
31P	60	200	6,977	9,490	6,078	9,928	9,657
39K	6.7	22	7,076	7,432	5,152	7,603	7,749
44Ca	41	137	1,737	1,634	1,385	1,965	1,846
49Ti	0.224	0.747	20	11	10	48	27
51V	0.042	0.140	0.556	0.423	0.372	1.3	0.753
52Cr	0.469	1.6	2.6	2.4	2.5	4.1	3.1
55Mn	0.005	0.017	31	18	62	72	83
57Fe	1.9	6.3	161	124	186	527	332
59Co	0.002	0.007	0.236	0.214	0.393	0.563	0.492
60Ni	0.012	0.040	3.0	3.2	3.2	8.6	6.4
63Cu	0.025	0.083	9.7	9.2	12	12	13
66Zn	0.543	1.8	162	131	162	163	166
75As	0.582	1.9	<0.582	<0.582	<0.582	<0.582	<0.582
77Se	0.299	0.997	4.5	4.1	5.8	7.3	4.9
88Sr	0.001	0.003	2.0	2.3	2.0	3.1	2.6
95Mo	0.001	0.003	0.159	0.105	0.103	0.182	0.224
107Ag	0.001	0.003	0.040	0.037	0.056	0.097	0.070
111Cd	0.048	0.160	0.297	0.320	0.446	0.545	0.388
118Sn	0.033	0.110	0.177	0.062	0.113	0.119	0.110
121Sb	0.004	0.013	0.022	0.017	0.011	0.031	0.025
137Ba	0.001	0.003	14	12	18	34	27
202Hg	0.033	0.110	<0.033	<0.033	<0.033	0.034	<0.033
205Tl	0.001	0.003	0.011	0.009	0.007	0.018	0.013
208Pb	0.004	0.013	0.096	0.062	0.085	0.247	0.154
238U	0.001	0.003	0.025	0.030	0.021	0.055	0.035

Notes:

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% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FOUEW_INV-04_2020-12-10	RG_FOUEW_INV-05_2020-12-10	RG_FO22_INV-01_2020-12-09	RG_FO22_INV-02_2020-12-09	RG_FO22_INV-03_2020-12-09
		Lab ID	160	161	162	163	164
		Wet Weight (g)	1.2876	1.5528	1.1972	1.3366	1.5622
		Dry Weight (g)	0.3172	0.4137	0.2763	0.3054	0.3303
		Moisture (%)	75.4	73.4	76.9	77.2	78.9
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	1.1	0.905	0.619	1.1	2.0
11B	0.118	0.393	0.909	0.772	0.804	1.3	2.1
23Na	0.943	3.1	3,445	3,219	2,382	2,837	3,685
24Mg	0.015	0.050	1,454	1,206	1,243	1,401	1,329
27Al	0.024	0.080	516	420	638	1,077	1,814
31P	60	200	12,039	10,586	8,431	8,510	7,951
39K	6.7	22	9,804	10,208	7,082	8,724	8,555
44Ca	41	137	1,908	1,765	2,002	2,055	2,212
49Ti	0.224	0.747	42	33	41	68	121
51V	0.042	0.140	1.1	0.987	1.6	2.6	4.6
52Cr	0.469	1.6	3.1	2.7	3.9	3.8	4.0
55Mn	0.005	0.017	123	103	38	60	80
57Fe	1.9	6.3	442	433	999	1,370	1,746
59Co	0.002	0.007	0.670	0.613	0.350	0.426	0.995
60Ni	0.012	0.040	6.4	5.8	7.0	8.4	11
63Cu	0.025	0.083	16	14	13	17	12
66Zn	0.543	1.8	190	141	152	167	141
75As	0.582	1.9	<0.582	<0.582	<0.582	<0.582	0.599
77Se	0.299	0.997	9.1	9.5	6.1	6.1	7.2
88Sr	0.001	0.003	2.6	2.3	3.9	4.0	4.6
95Mo	0.001	0.003	0.332	0.284	0.206	0.280	0.310
107Ag	0.001	0.003	0.119	0.098	0.064	0.102	0.091
111Cd	0.048	0.160	0.712	0.618	0.426	0.490	0.661
118Sn	0.033	0.110	0.104	0.145	0.101	0.164	0.268
121Sb	0.004	0.013	0.031	0.028	0.022	0.035	0.044
137Ba	0.001	0.003	44	40	29	38	52
202Hg	0.033	0.110	<0.033	<0.033	0.039	0.039	<0.033
205Tl	0.001	0.003	0.018	0.015	0.009	0.014	0.020
208Pb	0.004	0.013	0.233	0.224	0.204	0.288	0.522
238U	0.001	0.003	0.058	0.050	0.042	0.060	0.077

Notes:

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Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FO22_INV-04_2020-12-09	RG_FO22_INV-05_2020-12-09	RG_FRUPO_INV-01_2020-12-10	RG_FRUPO_INV-02_2020-12-10	RG_FRUPO_INV-03_2020-12-10
		Lab ID	165	166	167	168	169
		Wet Weight (g)	1.0107	1.0982	1.0664	1.1566	1.4288
		Dry Weight (g)	0.2409	0.2773	0.2346	0.2808	0.3202
		Moisture (%)	76.2	74.7	78.0	75.7	77.6
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.272	0.406	0.791	0.450	0.762
11B	0.118	0.393	0.358	0.396	0.694	0.264	0.677
23Na	0.943	3.1	1,206	1,886	2,935	1,738	3,026
24Mg	0.015	0.050	924	1,238	1,383	1,025	1,294
27Al	0.024	0.080	190	181	254	92	305
31P	60	200	5,892	8,247	7,651	7,065	8,975
39K	6.7	22	4,183	6,656	7,111	5,740	7,254
44Ca	41	137	1,210	1,830	1,657	1,360	2,337
49Ti	0.224	0.747	10	8.6	16	4.6	18
51V	0.042	0.140	0.573	0.682	0.618	0.215	0.621
52Cr	0.469	1.6	2.5	2.6	3.2	1.8	2.4
55Mn	0.005	0.017	31	33	33	20	18
57Fe	1.9	6.3	397	510	186	77	179
59Co	0.002	0.007	0.167	0.165	0.500	0.335	0.376
60Ni	0.012	0.040	3.5	3.8	6.1	2.1	4.0
63Cu	0.025	0.083	10	11	13	9.7	13
66Zn	0.543	1.8	97	155	140	130	149
75As	0.582	1.9	<0.582	<0.582	<0.582	<0.582	<0.582
77Se	0.299	0.997	4.0	4.7	5.1	3.6	5.0
88Sr	0.001	0.003	2.0	3.0	2.2	1.6	2.6
95Mo	0.001	0.003	0.118	0.133	0.162	0.133	0.177
107Ag	0.001	0.003	0.045	0.072	0.045	0.040	0.064
111Cd	0.048	0.160	0.192	0.277	0.575	0.512	0.606
118Sn	0.033	0.110	0.079	0.151	0.075	0.046	0.165
121Sb	0.004	0.013	0.009	0.013	0.018	0.013	0.022
137Ba	0.001	0.003	12	21	11	9.1	15
202Hg	0.033	0.110	<0.033	<0.033	<0.033	<0.033	<0.033
205Tl	0.001	0.003	0.004	0.004	0.005	0.004	0.009
208Pb	0.004	0.013	0.084	0.087	0.076	0.033	0.097
238U	0.001	0.003	0.018	0.022	0.033	0.017	0.037

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue Analysis Results

		Client ID	RG_FRUPO_INV-04_2020-12-10	RG_FRUPO_INV-05_2020-12-10	RG_FOUSH_INV-01_2020-12-09	RG_FOUSH_INV-02_2020-12-09	RG_FOUSH_INV-03_2020-12-09
		Lab ID	170	171	172	173	174
		Wet Weight (g)	1.3658	1.3362	1.4396	1.4018	1.2751
		Dry Weight (g)	0.3568	0.3885	0.3514	0.3475	0.3431
		Moisture (%)	73.9	70.9	75.6	75.2	73.1
Parameter	DL (ppm)	LOQ (ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
7Li	0.006	0.020	0.606	0.538	1.2	0.824	1.2
11B	0.118	0.393	0.877	0.435	0.428	0.456	0.470
23Na	0.943	3.1	2,434	2,479	2,083	2,158	1,913
24Mg	0.015	0.050	1,269	952	807	776	805
27Al	0.024	0.080	189	127	221	289	266
31P	60	200	8,592	7,924	7,429	6,284	6,713
39K	6.7	22	8,055	7,953	6,318	5,746	5,911
44Ca	41	137	1,694	1,231	944	1,604	1,688
49Ti	0.224	0.747	10	5.3	14	19	17
51V	0.042	0.140	0.473	0.294	1.2	1.6	1.6
52Cr	0.469	1.6	2.3	2.0	1.7	2.5	2.1
55Mn	0.005	0.017	25	25	38	34	33
57Fe	1.9	6.3	137	98	1,619	2,164	2,397
59Co	0.002	0.007	0.415	0.355	0.972	0.958	0.647
60Ni	0.012	0.040	4.1	2.6	6.2	9.9	8.5
63Cu	0.025	0.083	12	13	8.0	12	17
66Zn	0.543	1.8	147	108	126	116	115
75As	0.582	1.9	<0.582	<0.582	<0.582	<0.582	0.698
77Se	0.299	0.997	5.0	4.9	5.8	4.7	5.3
88Sr	0.001	0.003	2.0	1.5	1.7	3.4	3.4
95Mo	0.001	0.003	0.217	0.163	0.150	0.177	0.177
107Ag	0.001	0.003	0.048	0.040	0.052	0.076	0.088
111Cd	0.048	0.160	0.538	0.651	0.381	0.359	0.359
118Sn	0.033	0.110	0.071	0.074	0.060	0.040	0.074
121Sb	0.004	0.013	0.022	0.017	0.044	0.044	0.055
137Ba	0.001	0.003	15	11	34	36	38
202Hg	0.033	0.110	<0.033	<0.033	<0.033	<0.033	<0.033
205Tl	0.001	0.003	0.010	0.006	0.014	0.024	0.017
208Pb	0.004	0.013	0.078	0.056	0.069	0.084	0.080
238U	0.001	0.003	0.032	0.021	0.017	0.019	0.021

Notes:

ppm = parts per million

DL = detection limit

LOQ = limit of quantitation

< = less than detection limit

g = grams

% = percent

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FOUNGD_INV-02_2020-12-08			RG_FODNGD_INV-03_2020-12-08			RG_FODPO_INV-02_2020-12-09		
Lab ID		137			141			153		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.006	1.2	0.904	28	1.9	2.5	27	0.621	0.545	13
11B	0.118	1.6	1.3	21	1.4	1.4	0.0	0.848	0.848	-
23Na	0.943	2,765	2,178	24	1,985	1,877	5.6	2,755	2,559	7.4
24Mg	0.015	1,071	882	19	1,019	1,194	16	1,331	1,148	15
27Al	0.024	376	405	7.4	878	840	4.4	355	358	0.8
31P	60	8,099	7,437	8.5	7,844	6,813	14	7,476	7,270	2.8
39K	6.7	7,199	5,700	23	5,949	6,815	14	6,838	6,169	10
44Ca	41	1,262	1,300	3.0	1,885	1,846	2.1	1,988	1,627	20
49Ti	0.224	26	29	11	61	74	19	25	21	17
51V	0.042	0.714	0.831	15	2.2	2.1	4.7	0.916	0.844	8.2
52Cr	0.469	2.5	2.2	-	6.3	4.8	27	3.5	3.8	-
55Mn	0.005	25	26	3.9	31	37	18	23	23	0.0
57Fe	1.9	135	159	16	349	332	5.0	234	204	14
59Co	0.002	0.713	0.705	1.1	1.7	2.0	16	0.313	0.307	1.9
60Ni	0.012	7.5	6.3	17	16	14	13	6.4	6.2	3.2
63Cu	0.025	9.0	8.0	12	16	16	0.0	13	9.9	27
66Zn	0.543	206	226	9.3	120	106	12	78	96	21
75As	0.582	0.611	<0.582	-	<0.582	0.621	-	<0.582	<0.582	-
77Se	0.299	6.7	5.6	18	5.7	6.1	6.8	3.3	3.5	5.9
88Sr	0.001	2.3	2.9	23	3.3	3.2	3.1	2.6	2.5	3.9
95Mo	0.001	0.142	0.190	29	0.329	0.309	6.3	0.213	0.174	20
107Ag	0.001	0.050	0.050	0.0	0.065	0.070	7.4	0.047	0.041	14
111Cd	0.048	1.1	1.1	0.0	0.561	0.641	13	0.232	0.232	-
118Sn	0.033	0.125	0.141	-	0.185	0.149	-	0.133	0.166	-
121Sb	0.004	0.022	0.022	-	0.033	0.033	-	0.017	0.017	-
137Ba	0.001	23	28	20	30	29	3.4	12	12	0.0
202Hg	0.033	0.041	0.037	-	0.038	<0.033	-	<0.033	<0.033	-
205Tl	0.001	0.013	0.012	8.0	0.020	0.022	9.5	0.010	0.008	22
208Pb	0.004	0.083	0.101	20	0.178	0.192	7.6	0.091	0.095	4.3
238U	0.001	0.029	0.035	19	0.039	0.045	14	0.069	0.076	9.7

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Relative Percent Difference Results

Client ID		RG_FOUEW_INV-01_2020-12-10			RG_FOUEW_INV-05_2020-12-10		
Lab ID		157			161		
Parameter	DL (ppm)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)	Sample (ppm)	Sample Duplicate (ppm)	RPD (%)
7Li	0.006	0.418	0.436	4.2	0.905	0.769	16
11B	0.118	0.494	0.540	-	0.772	0.818	-
23Na	0.943	1,842	2,257	20	3,219	3,002	7.0
24Mg	0.015	948	1,339	34	1,206	1,109	8.4
27Al	0.024	170	211	22	420	391	7.2
31P	60	6,078	8,579	34	10,586	9,599	9.8
39K	6.7	5,152	6,327	21	10,208	8,337	20
44Ca	41	1,385	1,439	3.8	1,765	1,862	5.3
49Ti	0.224	10	12	18	33	30	9.5
51V	0.042	0.372	0.452	-	0.987	0.785	23
52Cr	0.469	2.5	2.8	-	2.7	2.5	-
55Mn	0.005	62	84	30	103	110	6.6
57Fe	1.9	186	254	31	433	382	13
59Co	0.002	0.393	0.571	37	0.613	0.622	1.5
60Ni	0.012	3.2	4.3	29	5.8	4.9	17
63Cu	0.025	12	14	15	14	14	0.0
66Zn	0.543	162	196	19	141	131	7.4
75As	0.582	<0.582	<0.582	-	<0.582	<0.582	-
77Se	0.299	5.8	6.4	9.8	9.5	7.5	24
88Sr	0.001	2.0	2.2	9.5	2.3	2.1	9.1
95Mo	0.001	0.103	0.136	28	0.284	0.252	12
107Ag	0.001	0.056	0.073	26	0.098	0.078	23
111Cd	0.048	0.446	0.741	-	0.618	0.504	20
118Sn	0.033	0.113	0.132	-	0.145	0.202	-
121Sb	0.004	0.011	0.013	-	0.028	0.024	-
137Ba	0.001	18	27	40	40	41	2.5
202Hg	0.033	<0.033	<0.033	-	<0.033	<0.033	-
205Tl	0.001	0.007	0.008	-	0.015	0.014	6.9
208Pb	0.004	0.085	0.118	33	0.224	0.196	13
238U	0.001	0.021	0.030	35	0.050	0.040	22

Notes:

ppm = parts per million

RPD = relative percent difference

DL = detection limit

< = less than detection limit

% = percent

Data Quality Objectives:

Laboratory Duplicates - RPD ≤40% for all elements, except Ca and Sr, which are ≤60%

Minimum DQOs apply to individual samples at concentrations above 10x DL

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	01			02	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.3	106	3.5	1.3	106	2.9
11B	0.118	4.5	5.4	119	1.2	4.9	109	1.7
23Na	0.943	14,000	15,031	107	2.8	15,201	109	4.7
24Mg	0.015	910	960	106	2.5	976	107	7.0
27Al	0.024	197.2	215	109	5.2	179	91	5.1
31P	60	8,000	8,373	105	2.7	8,422	105	8.3
39K	6.7	15,500	16,506	106	2.4	16,627	107	7.3
44Ca	41	2,360	2,446	104	4.0	2,484	105	6.1
49Ti	0.224	12.24	15	121	6.8	13	104	12
51V	0.042	1.57	1.6	105	3.7	1.8	112	16
52Cr	0.469	1.87	2.0	107	2.1	2.1	110	7.8
55Mn	0.005	3.17	3.4	109	6.5	3.4	106	6.9
57Fe	1.9	343	375	109	6.6	372	108	7.8
59Co	0.002	0.25	0.278	111	6.6	0.265	106	5.9
60Ni	0.012	1.34	1.5	114	4.8	1.5	113	7.0
63Cu	0.025	15.7	17	108	4.4	18	114	6.5
66Zn	0.543	51.6	55	107	5.3	57	111	6.2
75As	0.582	6.87	7.2	104	2.0	7.5	109	4.9
77Se	0.299	3.45	3.5	102	3.0	3.7	108	5.3
88Sr	0.001	10.1	11	106	2.8	11	104	5.1
95Mo	0.001	0.29	0.296	102	8.4	0.317	109	7.0
107Ag	0.001	0.0252	0.031	124	7.2	0.027	107	0.0
111Cd	0.048	0.299	0.308	103	17	0.335	112	18
118Sn	0.033	0.061	0.065	107	9.0	0.063	104	**28**
121Sb	0.004	0.011	0.011	100	0.0	0.010	90	**25**
137Ba	0.001	8.6	10	120	2.1	8.5	99	2.3
202Hg	0.033	0.412	0.432	105	5.3	0.471	114	6.9
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.004	0.404	0.386	96	7.5	0.380	94	11
238U	0.001	0.05	0.054	109	5.7	0.052	103	14

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

			Sample Group ID	03			04	
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.3	108	4.4	1.4	113	6.5
11B	0.118	4.5	4.5	101	2.0	4.8	107	3.6
23Na	0.943	14,000	13,722	98	2.4	14,139	101	6.2
24Mg	0.015	910	918	101	3.9	957	105	4.8
27Al	0.024	197.2	187	95	6.3	192	97	4.0
31P	60	8,000	7,798	98	2.4	7,817	98	3.1
39K	6.7	15,500	16,087	104	4.2	16,162	104	6.1
44Ca	41	2,360	2,361	100	3.7	2,433	103	6.9
49Ti	0.224	12.24	13	105	8.8	12	100	6.1
51V	0.042	1.57	1.4	91	3.5	1.6	100	9.1
52Cr	0.469	1.87	1.9	100	2.9	1.9	99	2.0
55Mn	0.005	3.17	3.2	102	3.0	3.2	102	4.6
57Fe	1.9	343	347	101	2.4	351	102	7.8
59Co	0.002	0.25	0.248	99	2.3	0.251	100	6.8
60Ni	0.012	1.34	1.4	106	4.5	1.4	103	4.4
63Cu	0.025	15.7	16	104	2.1	16	102	6.1
66Zn	0.543	51.6	55	106	2.9	52	102	3.4
75As	0.582	6.87	7.0	103	1.5	6.8	99	5.0
77Se	0.299	3.45	3.4	99	2.7	3.5	101	6.0
88Sr	0.001	10.1	10	100	1.9	10	102	4.1
95Mo	0.001	0.29	0.313	108	5.2	0.295	102	6.1
107Ag	0.001	0.0252	0.027	106	12	0.023	91	18
111Cd	0.048	0.299	0.318	106	11	0.296	99	12
118Sn	0.033	0.061	0.052	85	12	0.056	91	8.5
121Sb	0.004	0.011	0.011	100	0.0	0.011	104	**26**
137Ba	0.001	8.6	8.8	103	4.5	9.3	108	2.7
202Hg	0.033	0.412	0.429	104	5.5	0.407	99	6.4
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.004	0.404	0.364	90	10	0.401	99	14
238U	0.001	0.05	0.048	97	5.0	0.054	108	12

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Bold indicates DQO exceedance but result is accepted as it does not impact the reportable results

Teck Coal Limited

Tissue QA/QC Accuracy and Precision Results

		Sample Group ID	05			06		
Parameter	DL (ppm)	Certified Conc. (ppm)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)	Mean Estimated Conc. (ppm)	Accuracy (%)	Precision RSD (%)
7Li	0.006	1.21	1.3	108	5.1	1.4	114	9.6
11B	0.118	4.5	5.0	111	4.5	4.6	102	2.9
23Na	0.943	14,000	15,120	108	6.6	14,910	106	3.4
24Mg	0.015	910	963	106	4.6	957	105	2.0
27Al	0.024	197.2	196	99	5.9	195	99	6.3
31P	60	8,000	8,390	105	3.1	8,431	105	4.0
39K	6.7	15,500	17,040	110	7.2	15,905	103	1.9
44Ca	41	2,360	2,402	102	5.3	2,494	106	2.9
49Ti	0.224	12.24	13	108	4.4	14	111	9.6
51V	0.042	1.57	1.8	117	6.1	1.6	104	3.6
52Cr	0.469	1.87	2.1	111	2.6	2.0	108	3.8
55Mn	0.005	3.17	3.5	111	4.0	3.4	108	2.9
57Fe	1.9	343	389	114	1.1	360	105	1.6
59Co	0.002	0.25	0.291	116	4.5	0.273	109	2.7
60Ni	0.012	1.34	1.5	112	2.0	1.5	109	1.9
63Cu	0.025	15.7	18	113	3.0	17	111	3.3
66Zn	0.543	51.6	57	110	0.6	55	107	2.2
75As	0.582	6.87	7.6	110	1.6	7.1	103	3.9
77Se	0.299	3.45	3.7	107	1.8	3.7	106	3.5
88Sr	0.001	10.1	12	114	4.1	11	105	3.7
95Mo	0.001	0.29	0.330	114	2.4	0.294	101	5.3
107Ag	0.001	0.0252	0.029	114	12	0.026	104	8.3
111Cd	0.048	0.299	0.354	118	8.3	0.311	104	11
118Sn	0.033	0.061	0.067	109	12	0.059	97	18
121Sb	0.004	0.011	0.013	120	0.0	0.012	110	20
137Ba	0.001	8.6	9.5	110	3.5	9.1	106	3.7
202Hg	0.033	0.412	0.350	85	4.9	0.452	110	9.1
205Tl	0.001	0.0013	-	-	-	-	-	-
208Pb	0.004	0.404	0.506	125	13	0.372	92	6.3
238U	0.001	0.05	0.057	113	1.7	0.048	96	4.5

Notes:

ppm = parts per million; % = percent; DL = detection limit; RSD = relative standard deviation

Data Quality Objectives:

Accuracy: DQO of 60 - 140% of the certified values for B, Ti, Ag, Sn, Sb, and Ba.

Accuracy: DQO of 90 - 110% of the certified values for Se.

Accuracy: DQO of 70 - 130% of the certified values for all other elements provided.

Precision: DQO of ≤20% for all elements.

DORM-4 used for all parameters except B, Ti, Sb, Ba, and Al where NIST-1566b was used.

Tl certified concentration from NIST-2976.

Accuracy and precision for Tl are not reported as the certified concentration is too close to the reportable detection limit.

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
01	RG_MP1_INV-01_2020-12-09	130	21 Dec 2020
	RG_MP1_INV-02_2020-12-09	131	
	RG_MP1_INV-03_2020-12-09	132	
	RG_FOUCL_INV-01_2020-12-08	133	
	RG_FOUCL_INV-02_2020-12-08	134	
	RG_FOUCL_INV-03_2020-12-08	135	
	RG_FOUNGD_INV-01_2020-12-08	136	
	RG_FOUNGD_INV-02_2020-12-08	137	
02	RG_FOUNGD_INV-03_2020-12-08	138	18 Dec 2020
	RG_FODNGD_INV-01_2020-12-08	139	
	RG_FODNGD_INV-02_2020-12-08	140	
	RG_FODNGD_INV-03_2020-12-08	141	
	RG_FOUKI_INV-01_2020-12-09	142	
	RG_FOUKI_INV-02_2020-12-09	143	
	RG_FOUKI_INV-03_2020-12-09	144	
	RG_FOUKI_INV-04_2020-12-09	145	
03	RG_FOUKI_INV-05_2020-12-09	146	18 Dec 2020
	RG_UFR1_INV-01_2020-12-08	147	
	RG_UFR1_INV-02_2020-12-08	148	
	RG_UFR1_INV-03_2020-12-08	149	
	RG_UFR1_INV-04_2020-12-08	150	
	RG_UFR1_INV-05_2020-12-08	151	
	RG_FODPO_INV-01_2020-12-09	152	
	RG_FODPO_INV-02_2020-12-09	153	
04	RG_FODPO_INV-03_2020-12-09	154	21 Dec 2020
	RG_FODPO_INV-04_2020-12-09	155	
	RG_FODPO_INV-05_2020-12-09	156	
	RG_FOUEW_INV-01_2020-12-10	157	
	RG_FOUEW_INV-02_2020-12-10	158	
	RG_FOUEW_INV-03_2020-12-10	159	
	RG_FOUEW_INV-04_2020-12-10	160	
	RG_FOUEW_INV-05_2020-12-10	161	
05	RG_FO22_INV-01_2020-12-09	162	21 Dec 2020
	RG_FO22_INV-02_2020-12-09	163	
	RG_FO22_INV-03_2020-12-09	164	
	RG_FO22_INV-04_2020-12-09	165	
	RG_FO22_INV-05_2020-12-09	166	
	RG_FRUPO_INV-01_2020-12-10	167	
	RG_FRUPO_INV-02_2020-12-10	168	
06	RG_FRUPO_INV-03_2020-12-10	169	18 Dec 2020

Teck Coal Limited
Sample Group Information

Sample Group ID	Client ID	Lab ID	Date of Analysis
06	RG_FRUPO_INV-04_2020-12-10	170	18 Dec 2020
	RG_FRUPO_INV-05_2020-12-10	171	
	RG_FOUSH_INV-01_2020-12-09	172	
	RG_FOUSH_INV-02_2020-12-09	173	
	RG_FOUSH_INV-03_2020-12-09	174	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: Regional Effects Monitoring/Froding LAEMP 20-09			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

Trich Samples		Sample Identification:		Sample Type: Species	Sample type
130	1	RG_MP1_INV-01_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
131	2	RG_MP1_INV-02_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
132	3	RG_MP1_INV-03_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
133	4	RG_FOUCL_INV-01_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
134	5	RG_FOUCL_INV-02_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
135	6	RG_FOUCL_INV-03_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
136	7	RG_FOUNGD_INV-01_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
137	8	RG_FOUNGD_INV-02_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
138	9	RG_FOUNGD_INV-03_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
139	10	RG_FODNGD_INV-01_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
140	11	RG_FODNGD_INV-02_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
141	12	RG_FODNGD_INV-03_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
142	13	RG_FOUKI_INV-01_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
143	14	RG_FOUKI_INV-02_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
144	15	RG_FOUKI_INV-03_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
145	16	RG_FOUKI_INV-04_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
146 (Error 17Dec2020)	17	RG_FOUKI_INV-05_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
147	18	RG_UFR1_INV-01_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
148	19	RG_UFR1_INV-02_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
149	20	RG_UFR1_INV-03_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture

Sample(s) Released By:	Alex McClymont	Sample(s) Received By:	Geneviève LaBine
Signature:	Alex McClymont	Signature:	Geneviève LaBine
Date Sent:	11-Dec-20	Date Received:	17 Dec 2020 (Project #: 2020-180)
Sample(s) Returned to Client By: NOTE: page 1 of 3		Shipping Conditions:	
		Shipping Container:	
Signature:		Date Sent:	

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: Regional Effects Monitoring/Froding LAEMP 20-09			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

Trich Sample IDs:		Sample Identification:		Sample Type: Species	Sample type
150	1	RG_UFR1_INV-04_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
151	2	RG_UFR1_INV-05_2020-12-08	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
152	3	RG_FODPO_INV-01_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
153	4	RG_FODPO_INV-02_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
154	5	RG_FODPO_INV-03_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
155	6	RG_FODPO_INV-04_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
156	7	RG_FODPO_INV-05_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
157	8	RG_FOUEW_INV-01_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
158	9	RG_FOUEW_INV-02_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
159	10	RG_FOUEW_INV-03_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
160	11	RG_FOUEW_INV-04_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
161	12	RG_FOUEW_INV-05_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
162	13	RG_FO22_INV-01_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
163	14	RG_FO22_INV-02_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
164	15	RG_FO22_INV-03_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
165	16	RG_FO22_INV-04_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
166	17	RG_FO22_INV-05_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
167	18	RG_FRUPO_INV-01_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
168	19	RG_FRUPO_INV-02_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
169	20	RG_FRUPO_INV-03_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture

Sample(s) Release Alex McClymont	Sample(s) Received By: Genevieve LaBine
Signature: Alex McClymont	Signature:
Date Sent: 11-Dec-20	Date Received: 17 Dec 2020 (Project #: 2020-180)
Sample(s) Returned to Client By: NOTE: page 2 of 3	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

COM-011.01

TrichAnalytics Inc. 207-1753 Sean Heights, Saanichton, BC, V8M 0B3 Ph: (250) 532-1084		Chain of Custody (COC) for LA-ICP-MS Analysis	
Invoicing		Reporting (if different from Invoicing)	
Project Number: Regional Effects Monitoring/Froding LAEMP 20-09			
Company Name:	Minnow Environmental	Company Name:	
Contact Name:	Peter Schnurr	Contact Name:	
Address:	2 Lamb St	Address:	
City, Province:	Georgetown, ON	City, Province:	
Postal Code:	L7G 3M9	Postal Code:	
Phone:	647-967-9403	Phone:	
Email:	pschnurr@minnow.ca	Email:	

Sample Analysis Requested

TrichSampleID:		Sample Identification:		Sample Type: Species	Sample Type: Sample type
170	1	RG_FRUPO_INV-04_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
171	2	RG_FRUPO_INV-05_2020-12-10	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
172	3	RG_FOUSH_INV-01_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
173	4	RG_FOUSH_INV-02_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture
174	5	RG_FOUSH_INV-03_2020-12-09	✓	Composite	Benthic Invertebrate; Total Metals and % Moisture

Sample(s) Release Alex McClymont	Sample(s) Received By: Genevieve LaBrie
Signature: Alex McClymont	Signature: Genevieve LaBrie
Date Sent: 11-Dec-20	Date Received: 17 Dec 2020 (Project # 2020-180)
Sample(s) Returned to Client By: NOTE: page 3 of 3	Shipping Conditions:
	Shipping Container:
Signature:	Date Sent:

COM-011.01

APPENDIX K
HYDROLOGY
GRADING

MacHydro
MacDonald Hydrology Consultants Ltd.

May 25, 2021

Mike Robinson
Senior Aquatic Ecologist
Lotic Environmental Ltd.

FRO Hydrometric Stations

MacDonald Hydrology Consultants Ltd. has reviewed hydrometric data obtained from seven hydrometric stations in the upper Fording River watershed in southeastern British Columbia. In addition to reviewing the field measurements, we have verified stage records, constructed stage-discharge curves, created plots for water temperature and discharge, and derived hourly discharge records from the continuous stage records. These hydrometric stations were then graded following British Columbia Ministry of Environment Hydrological Resources Information Standards Committee (RISC; 2018) standards.

For each hydrometric station, a log-linear stage-discharge curve was generated using manual stage and discharge measurements. Stage (m) and Discharge (m^3/s) values were initially manually verified and measurements with suspected errors or high uncertainty were removed from further analyses. All stage measurements below 0.001 m were treated as 'dry' and were excluded. The water level record was also verified by comparing to manual measurements and spikes and other erroneous readings were cleaned and shifts due to relocation of loggers were corrected.

Once stage-discharge curves were generated for each hydrometric station, discharge was calculated from hourly average stage records. Hourly average discharge and stage were compared against corresponding manual observations to calculate the Offset (m), Absolute Error (m^3/s), and the Mean Relative Error (Absolute Error divided by Measured Flow; expressed as a percentage). Summary statistics for each site are provided in

Table **1**.

Table 1. Summary statistics for seven hydrometric stations in the upper Fording River.

Site	Number of Measurements	Mean Measured Flow (m^3/s)	Max Measured Flow (m^3/s)	Mean Absolute Error (m^3/s)	Mean Relative Error (%)	Percent Extrapolated (%)
GH_PC2	30	1.73	13.33	0.10	15%	1%
FR_FRRD	25	1.45	7.67	0.30	19%	7%
FR_FRCP1SW	18	2.60	13.56	0.59	30%	1%
FR_FRCP1	20	0.99	8.38	0.38	28%	6%
FR_FR4	19	1.28	7.19	0.24	31%	4%
FR_FR2	26	1.48	11.79	0.37	20%	0%
FR_FR3	21	0.54	1.24	0.14	23%	0%

Data were graded according to RISC standards which is presented in Table 2. The data are generally of modest quality. Instrumentation and field procedures were of good quality and followed recommended guidelines for an 'A' or 'B' grade. Manual flow measurements had 20 panels, while the largest panel typically contained roughly 10-15% of the flow, which falls under a 'C' grade, but should be noted as still relatively reliable measurements. This 'C' grade for the number of flow measurement panels indicates exceedances of percentage flow were only occasionally over 10% of total flow per panel (in approximately 1 out of 10 measurements) and also did not occur at every site visit. Discharge rating accuracy was relatively modest for many sites. Streamflow data across the seven hydrometric stations

shows sites FR_FR4 and FR_FR3 do not follow the same pattern for spring freshet (April-August). Data for the end of 2019 and early 2020 for site FR_FR4 was removed due to ice effects, and data for spring freshet (May-July) was removed because the stilling well was destroyed and the new Solinst was not installed until July 24th, 2020. For site FR_FR3, there were no staff gauge readings for 2020 until May when a new staff gauge was installed. This new staff gauge was subsequently taken out by high flows, creating a gap in the field measurements. The data for this site do not appear to follow seasonal streamflow patterns and do not fall along observation points. Additionally, there were a few divergences in the data for CP1SW and FRRD which we suspect are related to incidents of the sensor vent becoming submerged during high flows.

Table 2. RISC standards for seven hydrometric stations.

Station	GH_PC2	FR_FRRD	FR_FRCP1SW	FR_FRCP1	FR_FR4	FR_FR2	FR_FR3
Meter calibration	A	A	A	A	A	A	A
Meter field verification	A	A	A	A	A	A	A
Water level gauge type	A	A	A	A	A	A	A
Water level gauge sensor accuracy	B	B	B	B	B	B	B
# Bench Marks	A	A	A	A	A	A	A
# Manual Flow Measurement Panels	C	C	C	C	C	C	C
# Manual Flow Measurements per Year	A	A	A	A	A	A	A
# Level checks per year	A	A	A	B	A	A	B
Discharge Rating accuracy	C	C	C	C	C	C	C
Reviewed for anomalies	A	A	A	A	A	A	A
Stations/years compared as check	A	A	A	A	A	A	A

Correlations to Regional Station

As an additional check in data quality control, all daily streamflow records were compared against the preliminary streamflow data from the Fording River at North Tailings Pond hydrometric site for years 2017 - 2019 (Kerr-Wood Leidal, 2019). As of writing (April 2021), records were unavailable for FRNTP for 2020. All hydrometric sites were highly correlated with each other and with the Fording River at North Tailings Pond station; r^2 values ranged from 0.86 at FR_FR2 to 0.96 at GH_PC2 (

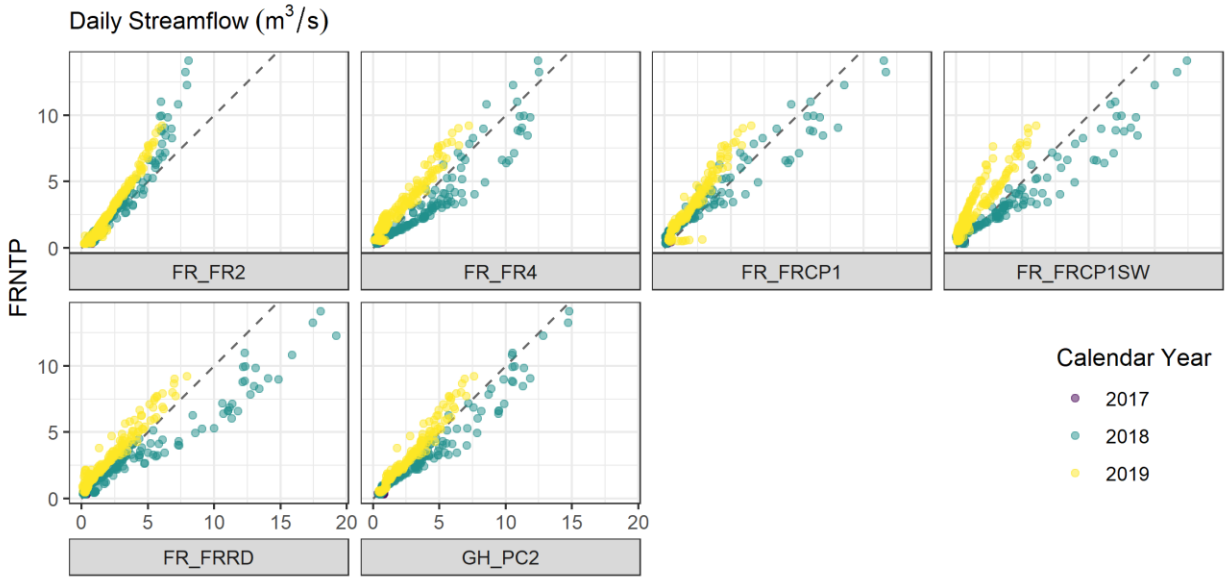

Figure 1). The relationship between the hydrometric sites and FRNTP appear to be non-linear. However, we note that there is meaningful uncertainty in the stage-discharge curves for these sites, in particular at high flows, and this may affect the linearity of the curves.

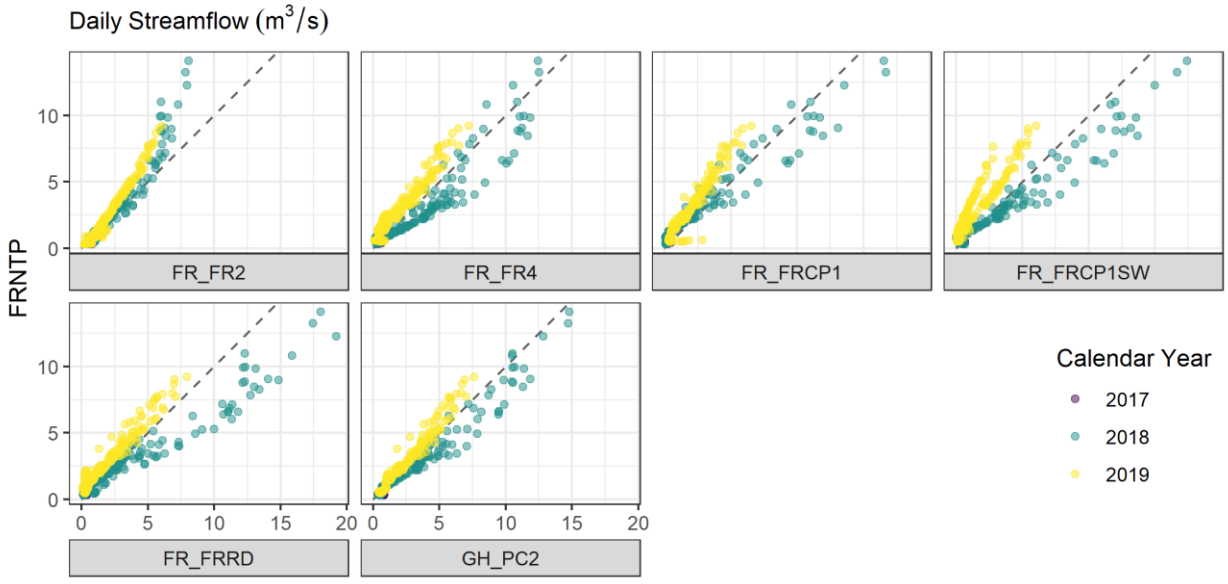

Figure 1. Scatter plot for hydrometric gauges with complete cases against Fording River at North Tailings Pit (FRNTP) KWL hydrometric station.

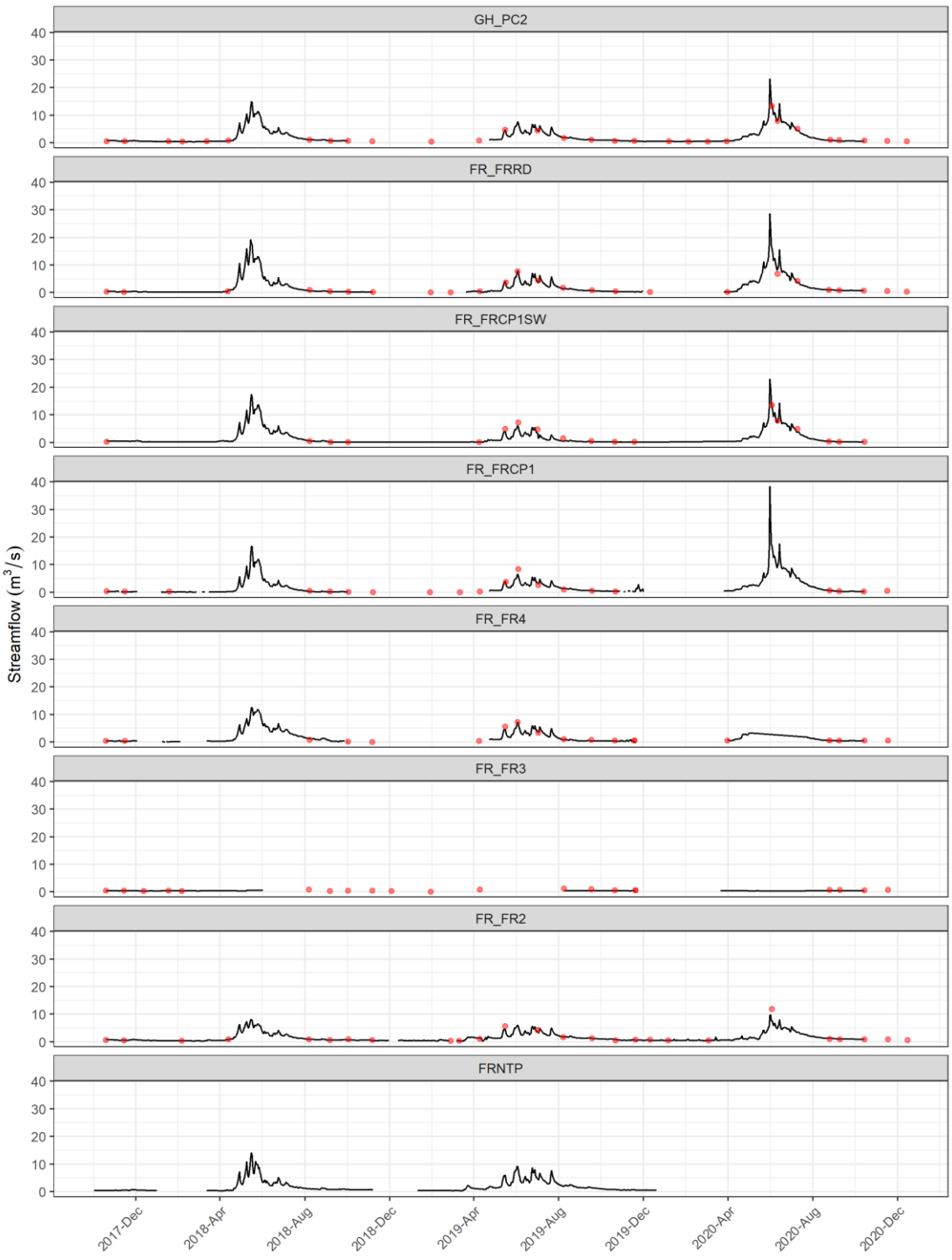
GH_PC2
FR_FRRD
FR_FRCP1SW
FR_FRCP1
FR_FR4
FR_FR3
FR_FR2
FRNTP
Streamflow (m3/s)
0
10
20
30
40
2017-Dec
2018-Apr
2018-Aug
2018-Dec
2019-Apr
2019-Aug
2019-Dec
2020-Apr
2020-Aug
2020-Dec

Figure 2. Daily streamflow for seven hydrometric stations and Fording River at North Tailings Pond KWL hydrometric station. Red points correspond to manual observations.

Limitations

Given these findings, additional measurements during high flow periods in subsequent years for sites FR_FR4, FR_FRCP1SW, and FR_FRRD would likely improve the derived stage-discharge curves, particularly for high discharge values. Specifically, further investigation into site FR_FR3 may be necessary in the future as the discharge data do not follow seasonal patterns that we would expect. We recommend Lotic Environmental Ltd. gather high flow measurements (that can be safely measured) to populate data for the stage-discharge curves for all sites, especially for new sites. Data for high flow periods would be informative for level and discharge data, since data for this period is lacking for most sites in previous years (specifically April-June). Winter data for a few sites (FR_FR4, FR_FR3, FR_CP1SW, FR_CP1) was also excluded, due to ice effect, which can be expected but also results in a loss of data.

We note that MacDonald Hydrology Consultants Ltd. has not visited the field site or collected these field data, and therefore rely on Lotic Environmental Ltd. field technicians to perform accurate survey checks, level offsets, and to determine RISC standard ratings for Instrumentation, Stream Channel Condition, and Field Procedures. Meter calibration and meter field verification were given 'A' grades because the Solinst Levelvent 5m loggers used by Lotic Environmental Ltd. have an accuracy of 3 mm, although we note that the Hobo U20-001-04 level loggers (also used for some sites earlier in 2020) have an accuracy of 3 - 6 mm. We also rely on Lotic Environmental Ltd. to check benchmarks for each site, and we have given an 'A' grade because sites have at least 3 benchmarks.

Closing

Please find daily streamflow for all seven hydrometric stations, presented in

. Full records, analyses, scripts, and intermediate files have been sent via email to Lotic Environmental. Should you have any questions, please do not hesitate to contact us.

Sincerely,

Hannah Schaefer
Biologist

Matthew Chernos, MSc., P.Geo.
Hydrologist