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Technical Report Overview

Report: Regional Calcite Monitoring Program 2022 Report

Overview: This annual report provides an overview of calcite distribution and intensity in 2022. This report is required under Permit 107517 and has been conducted since 2013.

This report was prepared for Teck by Lotic Environmental Ltd.

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

Teck Coal Ltd.
Regional Calcite Monitoring Program

2022 Report

April 2023

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Suggested citation

Smit, R. and M.D. Robinson. 2023. Teck Coal Ltd. 2022 Calcite Monitoring Program Annual Report. Prepared for Teck Coal Ltd. by Lotic Environmental Ltd. 48 pp + appendices.

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Acknowledgements

We would like to thank Jennifer de Werk, Mike Pope, Cait Good, and Nick Manklow for their involvement in this program and in particular with reviewing the study design, providing support and safe work planning during field work, and review and input during reporting. Last, thank you to Minnow Environmental for communications involving program comparisons.

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Definitions

- AAS – Antiscalant Addition System
- AMP – Adaptive Management Plan.
- AWTF – Active Water Treatment Facility
- Cp – Calcite presence score. A binary metric of calcite presence where a score of 0 is not present and 1 is present.
- Cp' – Calcite proportional presence score. A refinement of Cp that incorporates a measure of the area of a particle covered by calcite: 0 = not present, 0.1 = 10% covered, 0.2 = 20% covered…0.9 = 90% covered, and 1 = 100% covered.
- Cc – Calcite concretion. A measure of the degree to which a particle is fused to adjacent particles by calcite: 0 = no concretion; 1 = concreted but movable by hand; 2 = concreted and immobile by hand.
- CI – Calcite index score. The sum of calcite presence (C_p) and calcite concretion (C_c) for an individual stone.
- Degree – The amount of calcite deposition estimated by the level of concretion.
- Eligible treatment reach – A reach that exceeds the site performance objective (Permit 107517) of a calcite concretion score of 0.5.
- EMC – Environmental Monitoring Committee.
- EVWQP – Elk Valley Water Quality Plan.
- EWT – early warning trigger
- Exposed – Stream locations with mine-influenced water; used to contrast the reference sites to.
- Extent – The spatial coverage of calcite deposition expressed as an area covered at a specific location or linear coverage over a stream length.
- FRO-S – Fording River South
- Habitat unit – A distinct channel unit possessing homogeneous hydraulic and geomorphological characteristics (e.g., riffle, pool, glide, cascade).
- KUs – Key uncertainties.
- MQs – Management questions.
- Reach – A relatively homogeneous section of stream in terms of channel morphology, riparian cover and flow.
- Reference – Stream location without mine-influenced water; used to contrast the exposed sites to.
- Sampling unit – A single unit used to describe a larger entity. For example, a site could be considered the sampling unit for estimating the average calcite coverage over an entire reach.

- Segment – Aggregation of adjacent reaches that have similar calcite indices identified from previous sampling and have the same exposure to mining.
- Site – A location within a reach where observations of calcite deposition were made. These are replicate observations (sample units) within the treatment unit (reach).

Executive Summary

Teck Coal Ltd. (Teck) has been documenting calcite occurrence in waterways downstream of its coal mine operations since 2008 (Berdusco 2009). To satisfy monitoring and reporting requirements of the Environmental Management Act Permit 107517 the Regional Calcite Monitoring Program was implemented in 2013. 2022 marks the tenth year of the Regional Calcite Monitoring Program.

The 2022 Regional Calcite Monitoring Program was conducted between August 18 and October 31, 2022, during which 317 sites covering 122 stream reaches were sampled for key calcite metrics including calcite index, calcite presence, and calcite concretion. Sampling effort in exposed reaches remained consistent with previous years. The total number of reference reaches (n=16) sampled followed the approved revisions in the 2022 study design, as discussed with the Environmental Monitoring Committee (EMC). The 2022 field methods were consistent with previous years and included a mandatory 100-particle pebble count at each site. To increase data consistency across field crews collecting data for multiple Teck monitoring programs, a pre-field training workshop was conducted to review quality control procedures and data collection standards. Additionally, sample collection continued to trial the proportional calcite presence metric (Cp’).

Results from this year’s sampling suggest that while the degree of calcite has generally increased since 2013, the rate of increase appears to have levelled off in approximately 2019. This supports a return to a pre-2013 steady state hypothesis proposed by Robinson et al. (2022). Forty-seven percent of reaches had significant increases in calcite index over the length of the program (2013-2022). However, only 5% showed significant increases from 2019-2022. In total, twenty-six reaches exceeded the 2024 site performance objective (SPO) of calcite concretion scores below 0.5.

As requested through the EMC, calcite trends in reaches associated with calcite management (i.e., antiscalant) found inconclusive results. Generally, calcite concretion in reaches treated with antiscalant were found to show no annual change or show a decreasing trend, but overall, these results are inconclusive due to limited sampling locations, recent or inconsistent antiscalant dosing, and potential limitations to detect subtle changes in highly concreted streams.

Comparison of sampling programs indicated that the regional and RAEMP/LAEMP produced good agreement. This is being attributed to the calcite workshops that are hosted yearly prior to sampling to calibrate all crews. Alignment between programs improves where using the proportional calcite metric. Even within the regional program, inter-crew variability is reduced with the proportional calcite method.

Reference watersheds were analyzed to ensure that they are properly identified as reference watersheds as some reference streams have elevated CI scores. A full watershed review of mining related waste rock presence in reference watersheds was completed and did not find any waste rock inside reference stream watersheds. Additionally, the Calcite Monitoring Program Reference reaches align with the RAEMP watersheds and reference criteria.

The EMC had identified concerns around the evaluation of calcite metrics in mainstems reaches. Generally, calcite index decreased in exposed mainstem reaches from 2021 to 2022 and the number of mainstem stream kilometers that exceeded a CI of 1 has decreased from 19 km to 5 km. Both exposed mainstem and exposed tributary stream kilometers show an overall increase in Cc since the start of the program, but relatively little to no change since approximately 2017 to 2018, consistent with the geomorphic equilibrium hypothesis proposed in previous reports. Concretion has been identified previously in areas of the Fording River but have remained low in 2022.

1 Introduction

Teck Coal Ltd. (Teck) has been documenting calcite occurrence in waterways downstream of its coal mine operations since 2008 (Berdusco 2009). Calcite ($CaCO_3$) is a calcium carbonate that precipitates out of freshwater streams and deposits on the stream bed, woody debris, and some biota (e.g., algae and moss). In severe cases, substrate becomes fused together potentially impacting channel morphology and sediment transport, and reduce interstitial spaces between the substrate. These impacts have been shown to impact the overall abundance and community composition of aquatic invertebrate communities (Minnow 2016), impact periphyton abundance and reduce the suitability of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) spawning habitat (Hocking et al. 2022). Although naturally occurring, the degree and extent of calcite formation can increase because of open pit mine runoff (Teck 2017).

In 2013, Teck implemented the Regional Calcite Monitoring Program, focussing on detecting and monitoring potential calcite deposition across the Elk Valley. This program has developed a comprehensive, regional database of calcite and has been designed to satisfy the requirements for Environmental Management Act Permit 107517. Changes in calcite presence and severity continue to be monitored by the Regional Calcite Monitoring Program. Within the scope of this report, mine exposure, hydrology and habitat are considered. Given the potential for calcite to be influenced by multiple variables concurrently and in different ways, continued monitoring is vital to understanding how mining is contributing to deposition and concretion. Additionally, data from this program is used to inform specific study areas under Teck's Geochemical Model and informs the extent of watershed disturbance.

Teck continues to work on managing calcite to remain in regulatory compliance with calcite site performance objectives (SPOs). The Calcite Management Plan outlines the mitigative actions that Teck is taking (Teck 2022). Calcite prevention via antiscalant addition and calcite remediation via physical excavation and habitat restoration are two calcite management strategies within the larger Calcite Management Plan.

There are currently eight locations where antiscalant is dosed within the Elk Valley (Greenhills Creek, Clode Ponds, Liverpool Outfall, Swift-Cataract, Line Creek, Fording River AWTF (FRO-S), Elkview Saturated Rockfill and LCO Dry Creek). The facility on Greenhills Creek was relocated from lower Greenhills Creek to upper Greenhills Creek in 2022. The facility on lower Greenhills Creek was assessed in this report as it was operational until the sampling for the 2022 Annual Calcite Monitoring Program took place. Facilities on Clode Creek and upper Greenhills Creek were not operational prior to the sampling program therefore they are not assessed in this report. Physical excavation and streambed restoration was completed in 2022 on 144 m of Clode Creek and 20 m of Greenhills Creek. Since these projects were completed in the fall of 2022, calcite in Clode Creek was measured prior to the remediation and calcite levels were not able to be measured in the remediated section of Greenhills Creek. Calcite levels in these reaches will be measured as part of the 2023 Annual Monitoring Program and included in the annual report.

1.1 Linkage to Adaptive Management

As required in Permit 107517 Section 10, Teck developed an Adaptive Management Plan (AMP) to support implementation of the Elk Valley Water Quality Plan (EVWQP) to achieve water quality targets including calcite, to protect human health and the environment, and where necessary, restore and to facilitate continuous improvement of water quality in the Elk Valley. The AMP was most recently updated in December 2021 (Teck 2021). Adaptive management is a systematic, rigorous approach to environmental management that maximises learning about uncertainties while simultaneously striving to meet multiple management objectives and adapt management actions based on what is learned. The adaptive management cycle comprises six stages: assess, design, implement, monitor, evaluate and adjust. The AMP identifies six Management Questions (MQs) that are re-evaluated at regular intervals. Evaluating these MQs collectively articulate whether Teck is on track to meet the environmental objectives of the EVWQP.

The results presented in this report provide information relevant to one of the six MQs. Calcite monitoring data and data collected from other programs are used to re-evaluate the answer to MQ 4: "*Is calcite being managed effectively to meet site performance objectives and to protect the aquatic ecosystem?*".

Identifying and reducing environmental management uncertainty is a foundational aspect of adaptive management. Therefore, the AMP identifies key uncertainties (KUs) that, as reduced, fill gaps in current understanding to support the achievement of the EVWQP objectives.

Calcite monitoring results assist in reducing the following KUs:

- KU 4.1 "*Are the calcite SPOs protective of fish and aquatic life?"*
- KU 4.2 "*What are the most effective management methods for calcite?"*
- KU 4.3 "*Are there interrelationships with calcite and select constituents of interest in surface water that need to be considered for calcite management?"*
- KU 4.4 *"Can EWTs be established for calcite that support calcite management?"*

Progress on reducing these KUs, and associated learnings, are described in annual AMP reports.

1.2 Program Objectives

Key objectives of the Elk Valley Calcite Monitoring Program are to:

1. Document the extent and degree of calcite deposition in streams downstream of Teck's coal operations (e.g., streams influenced by mining, calcite management, and in reference streams).
2. Satisfy the requirements for annual calcite monitoring in Environmental Management Act Permit 107517 (Table 1).

3. Provide data to support the re-evaluation of Management Question 4 ("*Is calcite being managed effectively to meet site performance objectives and protect aquatic ecosystem health?*") and Key Uncertainties in Permit 107517 as they relate to calcite.

Table 1. Permit 107517 annual reporting requirements (Section 9.7).

Requirement	Description	Report Section
i	A map of monitoring locations	Appendix 4
ii	A summary of background information on that year's Program, including discussion of Program modifications relative to previous years	2.1, 2.5 & 2.6
iii	Results of stream selection reassessment – highlight streams added/removed	2.4 & 2.5
iv	Summary of where sampling followed the methodology in the monitoring plan document, and details where sampling deviated from the approved methodology	2.5 & Appendix 3
v	Statement of results for the period over which sampling was conducted	3.3
vi	Reference to the raw data, provided as appendices	3.3
vii	General discussion of observations, including summary tables of sites with increasing and decreasing deposition indices	3.3
viii	Interpretation of location, extent, and any other observations	3.3
ix	A summary of any QA/QC issues during the year	3.1
x	Recommendations for sites to add, sites to remove, modifications to methodology, monitoring frequency adjustments	4, 5, Appendix 11
xi	A statistical evaluation of monitoring data to evaluate the presence of short and long term calcite related trends in the Elk Valley main stems and select tributaries	3.3

1.3 Additional areas of focus for 2022

Additional areas of focus are topics and questions in addition to the program objectives and Permit 107517 annual reporting requirements. Additional areas of focus have been identified through previous monitoring results, study team discussion, and through input from the EMC. The following additional areas of focus in 2022 were addressed in this year of study, in addition to the standard program objectives (Section 1.2):

- In absence of a major hydrological event, are calcite metrics returning to a pre-2013 state as proposed by Robinson et al. (2022)?
- Is calcite treatment effective at limiting additional calcite precipitation?
- Do calcite training workshops reduce inter-crew and inter-program variability?
- Does the continued use of Cp' reduce observer variability relative to Cp?
- Has detection of concretion in some reaches of the Fording mainstem been increasing, and is the monitoring data representative of within reach variability in longer mainstem reaches?
- Do reaches with lower site density (i.e., mainstem reaches) exhibit more inter site variability?

2 Methods

2.1 Calcite training workshop

One pre-field training workshop was completed prior to sampling for regional crew members, as well as members of regional and local aquatic effects monitoring programs. Crews met in the field to review methods and field manual updates. Focus was given to potential sources of variability and the proportional calcite method. A list of workshop attendees is provided in Appendix 2.

2.2 Study area and sample locations

The 2022 Regional Calcite Monitoring Program study area remained consistent with previous years as the Elk River watershed upstream of Fernie, BC. This included each of Teck's four mining operations in the Elk Valley, namely Fording River Operations (FRO), Greenhills Operations (GHO), Line Creek Operations (LCO), Elkview Operations (EVO), as well as Coal Mountain Mine (CMm) that transferred into Care and Maintenance (an operational mine status) part way through 2019, and reference areas (Figure 1).

Monitoring in 2022 occurred at 317 sites covering 122 stream reaches. Sixteen reference streams were sampled in 2022 (Table 2). The study design originally proposed 306 sites. The net difference of 11 sites came from 15 sites that were erroneously not included and added to the sampling program, and four sites that were not sampled due to access issues. All deviations from the 2022 study design are listed in Appendix 3 along with the reason for the change. This appendix provides a comprehensive list of all sites added or removed over the entire program (2013-2022). Sample locations are mapped in Appendix 4.

Table 2. Reference reaches sampled in 2022.

MU	Strata	Stream	Reach
MU-1	Tributary	Chauncey	CHAU1
	Tributary	East Dry	ETRI1
	Tributary	Ewin	EWIN1
	Mainstem	Fording	FORD12
	Tributary	Henretta	HENR3
	Tributary	Toddhunter	TODH1
MU-2	Tributary	Grace	GRAC1
	Tributary	South Line	SLINE2
MU-3	Tributary	Bingay	BING1
	Mainstem	Elk	ELKR15
	Tributary	Forsythe	FORS1
	Tributary	RG_UCWER	RG_UCWER1
	Tributary	Weigert	WEIG1
MU-4	Tributary	Alexander	ALEX3
	Tributary	Andy Good	ANDY1
	Tributary	Grave	GRAV3
	Tributary	Leach	RG_LE1
	Mainstem	Michel	MICH5
MU-5	None	-	-

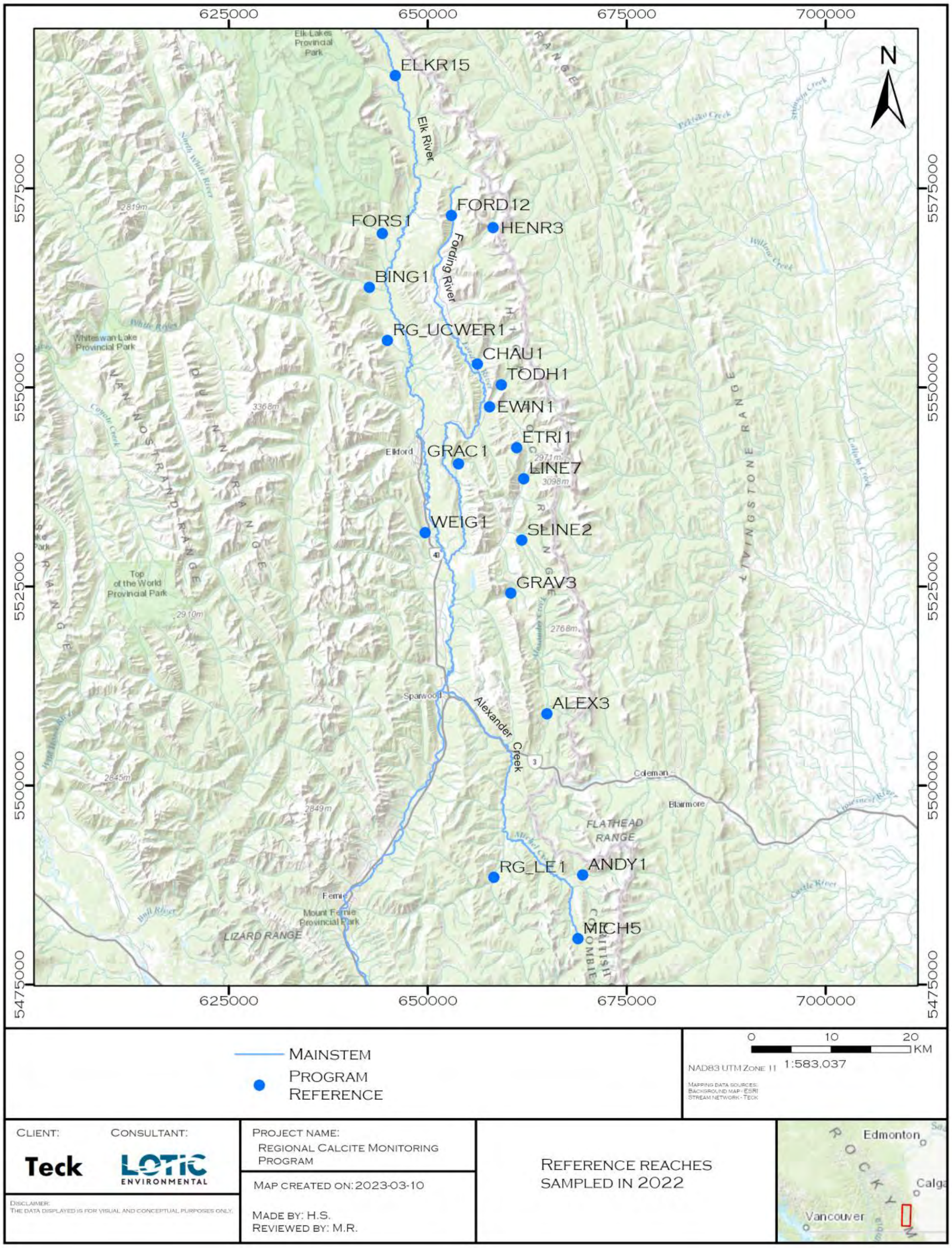

Figure 1. Regional Calcite Monitoring Program study area and reference reach locations.

2.3 Field methods

Sampling occurred between August 18 to October 31, 2022. Methods followed the calcite field sampling manual (Gordon and Robinson 2021) (Appendix 1). A modified Wolman pebble count (Wolman 1954) was used to randomly select rocks for inspection of calcite. At each site, 100 individual rocks (or substrate) were sampled over approximately 100 m, a distance that included multiple habitat units. Calcite concretion and presence were recorded for each of the 100 counts. Presence was recorded in the field as proportional presence (Cp’) but converted in the office to also provide the traditional calcite presence metric (Cp) (Zathey et al. 2021).

2.4 *Data quality assurance*

Data quality assurance procedures follow those outlined in the 2021 field sampling manual. As per Gordon and Robinson (2021):

1. Crews attended the annual calcite training course held at the beginning of the field season. At a minimum, all crew leads who conducted calcite sampling attended the annual calcite training course. All crew members were encouraged to attend the training course. This ensured each crew is familiar with different types of calcite and sampling procedures. As well, a crew calibration day occurred at the start of the regional program. Attendance was documented in the annual regional calcite monitoring report.
2. To assess inter-crew variability, 10% of sites were randomly selected for duplicate sampling by second crew. Results were compared following 2020 methods.
3. Encouraged communication between crew members completing different tasks (sampling versus recording) over the course of the entire project. Doing so likely reduced crew member variability, thereby resulting in improved data quality and consistency.
4. Data collection forms were reviewed for completeness before leaving the sampling location and signed off at the end of each field day by the crew lead.
5. Data collection forms were scanned and submitted to the Project Manager or designate daily. These data were used to calculate a preliminary calcite index score and compare to previous records. Notable deviations from previous years (i.e., greater than ±0.5 CI difference) were investigated and potentially resampled by a second crew.
6. Following data entry into Lotic’s digital form, values were assessed for accuracy using a computer script developed from R Programming Language. This checked that cells contain acceptable values (e.g., calcite presence score can only be 0, 0.1, 0.2…. 1); concreted scores can only be 0, 1, or 2; concreted score must be 0 if calcite presence is 0); habitat unit type can only be R (riffle), P (pool), G (glide), C (cascade). Cells that had errors or were blank were flagged and corrected.

2.5 Data analysis – Program objectives

2.5.1 Calcite metrics

Three standard metrics were calculated from inspection of all 100 counts:

$$\text{Cp} = \text{Calcite Presence} = \frac{\text{Sum of stones presence scores}}{\text{Number of stones counted}}$$

$$\text{Cc} = \text{Calcite Concretion} = \frac{\text{Sum of stones concretion scores}}{\text{Number of stones counted}}$$

$$\text{CI} = \text{Calcite Index} = \text{Cp} + \text{Cc}$$

Also calculated from pebble count data were the proportional calcite presence (Cp') and the resulting Calcite Index using Cp' (CI').

$$\text{Cp}' = \text{Proportional Calcite Presence}' = \frac{\text{Sum of stones proportional presence scores}}{\text{Number of stones counted}}$$

$$\text{CI}' = \text{Calcite Index} = \text{Cp}' + \text{Cc}$$

2.5.2 General calcite distribution

The general calcite distribution is a qualitative review of overall calcite distribution throughout the study area over the length of the program (2013-2022). The purpose is to provide results were presented by four stream categories (Table 3). Sites on the Elk, Michel and Fording Rivers were considered mainstem. All other streams were classified as tributaries. Reaches were also classified as reference or exposed relative to upstream mine influence.

The style of presenting general calcite distribution was modified in 2021 to align with that of the data driven metrics. Calcite Index and Calcite Concretion values were presented in stacked column graphs with values representing stream kilometers, as opposed to percentage of stream kilometers as presented in previous reports. Stream kilometers were summarized into five CI bins (0-0.25, >0.25-0.5, >0.5-1.0, >1.0-2.0, and >2.0-3.0) with smaller bins at lower values to provide increase resolution within the range of where SPO's and potential EWT occur. Six Cc bins used were 0, >0-0.25, >0.25-0.5, >0.5-1, >1-1.5, and >1.5-2.0. Trends were qualitatively described.

Table 3. The number of reaches in mainstem or tributary in exposed or reference conditions.

Strata	Exposed	Reference
Mainstem	21 reaches	3 reaches
Tributary	78 reaches	16 reaches

Mean calcite index scores for each reach were mapped to illustrate the spatial distribution of calcite relative to each of the mines. These maps show the mean calcite index value for reaches sampled in 2022 (Appendix 5). Values in the brackets next to each reach are the mean reach values for calcite index or calcite concretion.

2.5.2.1 Rate of change in calcite deposition by mine exposure

Analysis of co-variance (ANCOVA) was conducted to investigate the effect of year and type (i.e., exposed vs reference), and whether the rate of change differed between reference and exposed reaches. Linear regression was used to separately assess rates of change in reference and exposed reaches.

2.5.3 Permit 107517 Site Performance Objectives

Environmental Management Act Permit 107517 provides site performance objectives (SPO) for various water quality variables, including calcite. The Elk Valley Water Quality Plan defines short-term (December 31, 2024) and long-term (December 31, 2029) SPOs for calcite. The short-term objective states that “streams that are fish bearing, provide fish habitat or flow directly into fish bearing streams and are not scheduled by an environmental assessment certificate or mines act permit to be buried” must be managed to a calcite concretion score ≤ 0.5. All reaches that exceed this SPO are listed along with the length of each site to determine total stream kilometers, which will inform the Calcite Management Plan (section 5.1 of Permit 107517).

2.5.4 Trends by reach

2.5.4.1 Linear trend

Calcite data were assessed at a reach scale for both linear and step-wise changes over time. Linear trends were assessed for CI, Cc, and Cp using Mann-Kendall analysis. This analysis produces a tau value that represents the “strength” of correlation between the calcite test variable and year. A tau of 1 indicates a strong and positive (i.e., increasing) relationship while a value of -1 implies that it is a strong and negative (i.e. decreasing). In order to increase sensitivity of this analysis, we set two alpha values (0.05 and 0.10) to allow for early identification of potential trends. The use of the more liberal alpha value of 0.1 was used in the inaugural years of this Program, but later was found to indicate potential trends that would later become more strongly significant.

2.5.4.2 Step-wise change

Analysis of variance (ANOVA) followed by Tukey’s Honestly Significant Difference (HSD) post-hoc analysis was used to analyze the effect of year on mean calcite index values per reach to test for stepwise changes.

2.6 *Data analysis – Additional focus areas*

2.6.1 Role of hydrologic events

Previous annual Regional Calcite Monitoring Program reports have presented a theory that stream flow can affect the degree of calcite by eroding calcite and introducing new streambed material into the stream at higher flows, resulting in a direct relationship between streamflow and the rate of change in calcite between years. However, the ability to test this hypothesis was dependant on observer higher discharge freshets (e.g., > 1:10 return interval). Robinson et al. (2022) presented conceptual data to present a revised stream flow hypothesis in that there would be a hypothetical threshold flow that would need to occur before calcite reduction could be detected with these methods. Furthermore, Robinson et al. (2022) speculated that if this was indeed the case and that freshet 2013 was an event that exceeded this threshold, then calcite should be observed to increase back to pre-2013 levels and level off. To test this hypothesis, the total number of significant Mann-Kendal and ANOVA results were summarized in order to determine if there was an inflection point in the data. Mann Kendall analysis was then run on the full dataset from the inflection point to 2022 to assess trends post-inflection. These results are compared to the 2013-2022 Mann-Kendall results.

2.6.2 Trends in reaches associated with calcite management.

Reaches with antiscalant addition were investigated for changes in calcite index, concretion, and presence post-treatment (Table 4). Antiscalant is expected to prevent additional calcite deposition, but not necessarily remove or reduce calcite deposition. Calcite index, concretion and presence values were plotted for reaches downstream of the antiscalant addition and the closest upstream reach from 2013-2022, when data were available. Values were qualitatively assessed relative to prior to treatment and relative to the closest upstream reach to investigate if calcite precipitation rates are different pre- and post-treatment. It is expected for this assessment to become quantitative as the period of monitoring post-treatment increases.

Table 4. Overview of antiscalant operations throughout the study area

Location	Operational Dates	U/S Calcite Monitoring Location	D/S Calcite Monitoring Locations	Details
EVO SRF	Dec 2020 until present	N/A	ERIC1, ERIC2, ERIC3	Erickson Creek and Bodie Creek receive antiscalant treated water dosed at the SRF. The lower section of Gate Creek intermittently receives antiscalant treated water from Bodie Creek.
		GATE2-25, GATE2-50	GATE2-25	
		N/A	BODI1, BODI3	
LCO AWTF	Oct 2018 until present	SLINE2	LINE1, LINE2, LINE 3, LINE4	An AWTF was constructed on Line Creek/West Line Creek in 2014 and was intermittently operational from 2014-2018,

Location	Operational Dates	U/S Calcite Monitoring Location	D/S Calcite Monitoring Locations	Details
				before becoming fully online in 2018.
LCO Dry Creek AAS	Apr 2021 until present	N/A	DRYL1, DRYL2, DRYL3, DRYL4	AAS is located downstream of the discharge channel from Dry Creek Ponds.
FRO Swift & Cataract Creek AAS	Feb 2020 until present	FORD9b	FORD9a	This treated water flows into Fording River – Reach 9 at the same location as the FRO-S AWTF. As of September 2021, this facility became intermittently operational because Swift & Cataract Creeks became source water to FRO-S AWTF. During long-term shutdowns for the AWTF or when flow from Swift & Cataract Creeks bypass AWTF, this standalone facility becomes temporarily operational.
FRO-S AWTF	Sep 2021 until present	FORD9b	FORD9a	Swift Creek, Cataract Creek and Kilmarnock Creek are source water for this facility. This facility discharges to the Fording River.
FRO Liverpool Pond Outfall AAS	Aug 2022 until present	FORD10-89	FORD10-86	The Liverpool Pond Outfall is often dry. Antiscalant is only dosed when flows are high enough.
Lower Greenhills Creek AAS	Oct 2017 until Aug 2022	GREE3	GREE1	This antiscalant unit was moved upstream to Greenhills Creek – Reach 3 (GREE3) in Aug 2022.

2.6.3 Effect of habitat unit type

The effect of habitat unit has been periodically and weakly related to the degree of calcite in past reports (e.g., Robinson et al. 2022). It was reassessed at a site-level using individual pebble counts records where each count is assigned to a habitat unit type during the field surveys. Habitat units can be pool, riffle, glide, cascade – the standard habitat unit classifications used in the provincial level 1 Fish Habitat Assessment procedure (Johnston and Slaney 1996). ANOVA (with Tukey's HSD) tested for a significant effect of habitat unit type on CI, Cc, and Cp. These assessments were only run using reaches that contained at least a glide, pool, and riffle to aim for comparable representation.

2.6.4 Inter-program comparisons

Teck collected calcite data as part of their Regional and Local Aquatic Effects Monitoring Programs (RAEMP/LAEMP) (conducted by Minnow Environmental Ltd). RAEMP/LAEMP programs have the general objective of quantifying effects of mining in local and regional aquatic environments. Previous inter-program comparisons found moderate agreement between programs, but that agreement has improved with efforts to standardize data collection methods and conduct training workshops (Robinson et al. 2022). It is understood that some methodological differences remain (Table 5).

Table 5. Summary of spatial scale and general methods by Teck monitoring program.

Program	Scale	Methods
Regional	Reach	100 particle pebble count over a distance covering multiple habitat units present. Three sites sampled within a reach
RAEMP /LAEMP	Habitat unit (Riffle)	100 particle pebble count within a riffle. Three replicate riffles per site.

Sample locations from the different programs were spatially paired to a regional program Reach and plotted on scatterplots with a 1:1 line to visually assess unity. CI values were statistically assessed using linear regression between Regional-RAEMP/LAEMP. Agreement between programs was considered good when the regression model showed high accuracy ($r^2 \geq 0.8$) and slope of the regression line was close to 1. Results were compared to previous years to determine program results were becoming more comparable.

2.6.5 Proportional calcite presence

The 2022 program again used the proportional calcite presence (Cp’) metric to record presence as a scalable score from 0 to 1 that increased by 0.1 increments where the increments equaled percentage cover of an individual particle (Table 6) (Zathey et al. 2021). Robinson et al. (2022) found Cp’ to be superior to Cp by ways of: reducing observer variability (inter-program and within the Regional program). The effectiveness of Cp’ to reduce inter-crew variability was first assessed in the inter-program where agreement between programs using CI versus CI’ were compared. Secondly, it was assessed within the regional program using the 10% of sites will be randomly selected for duplicate sampling. ANOVA was run to determine if the mean inter-crew differences were significantly different between crews using CI versus CI’.

Table 6. Cross-referencing between the old method of calcite presence (Cp) and the new method of calcite presence (Cp') scores.

Cp	Cp'	Percent of particle area covered
0	0	0%
1	0.1	10%
	0.2	20%
	0.3	30%
	0.4	40%
	0.5	50%
	0.6	60%
	0.7	70%
	0.8	80%
	0.9	90%
	1	100%

2.6.6 Reference condition verification

The Environmental Monitoring Committee (EMC) requested a validation of reference locations, as some reference streams labelled as reference (i.e., Chauncey and Alexander Creek) have above average CI scores. A review of reference areas was completed to address concerns regarding the proper classification of reference watersheds. Given the mechanism of mine-produced calcite is understood to be the changes in geochemical process (e.g., weathering) following waste rock placement in a watershed, reference condition for all suspected reference reaches was completed by confirming that no waste rock placement occurred upstream of a reach classified as reference.

2.7 Evaluation of Observations of Concretion in the Fording River

Through input from the EMC, further evaluation of calcite concretion trends in the mainstem Fording River reaches was completed. We evaluated overall concretion trends through long term (2013-2022) and short term (2019-2022) Mann-Kendall analysis and step-wise ANOVA. A review of current site selection and reach averaging evaluation approach is adequately characterizing conditions in longer mainstem reaches.

2.7.1 Within reach variability of concretion

The Regional Calcite Monitoring Program was presented with a question of whether or not within-reach variability of calcite concretion is being properly captured over longer reaches with lower site density (i.e., sites/km). The number of sites per reach varies, depending on reach length and additional interests (i.e., influence of antiscalant treatment on calcite), but in general has been standardized to three sites/reach (Zathey et al. 2021). Robinson et al. (2016) documented the effect of CI on within reach variability of calcite metrics, showing that spatial variability does exist and that it appears highest in reaches with intermediate CI values (e.g., CI=1-2). The factors that determine spatial variability in calcite deposition are not well understood. The potential role of site density was assessed by plotting reach-level standard deviation of Cc as a function of site density to explore if variability was higher at lower site density. Assessment of evidence of this function was done qualitatively and compared to a plot of standard deviation of Cc versus CI, where a pattern would be expected.

3 Results

Sampling was conducted from August 18, 2022, to October 31, 2022. Sampling was conducted after a modest freshet in June 2022 (Figure 2). Given the modest freshet in 2022, no substantial calcite reductions from the influence of flushing flows would be expected from 2021 to 2022, given the high flow thresholds proposed by Robinson et al. (2022).

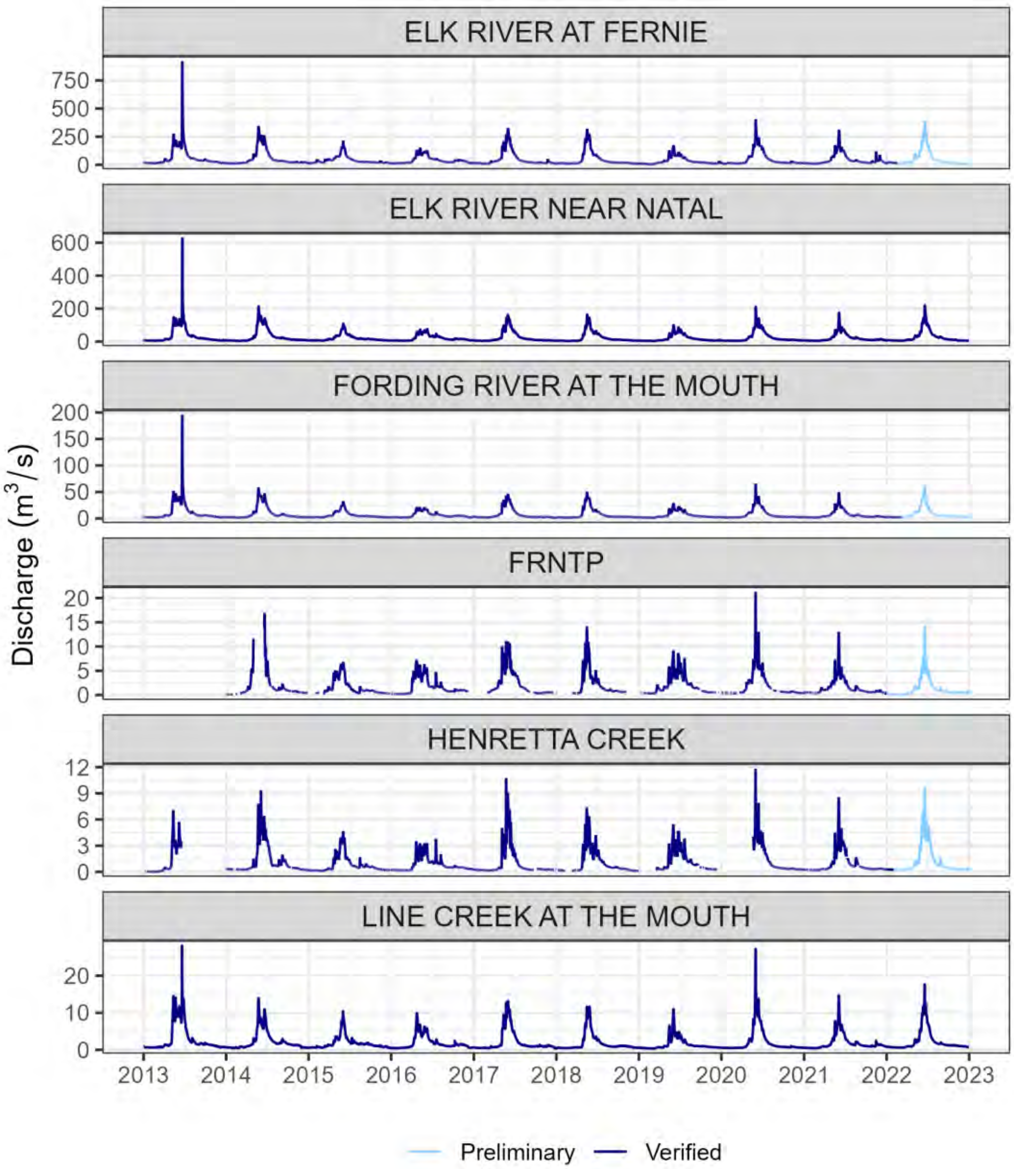

Figure 2. Hydrographs from various hydrometric stations throughout the Elk Valley (2013-2022 where data are available) (Preliminary data is subject to change after QAQC process).

3.1 Data quality assurance

Quality assurance and control was carried out on all data collected for this study. All crew members attended pre-field training. Attendance and date of the pre-field training can be found in Appendix 2.

Thirty-two (10% of the total site list) randomly selected sites were sampled in duplicate to assess inter-crew variability. Very good agreement was found between duplicates of CI which had an R^2 value of 0.96 and the relationship had a very near 1-1 fit (Figure 3).

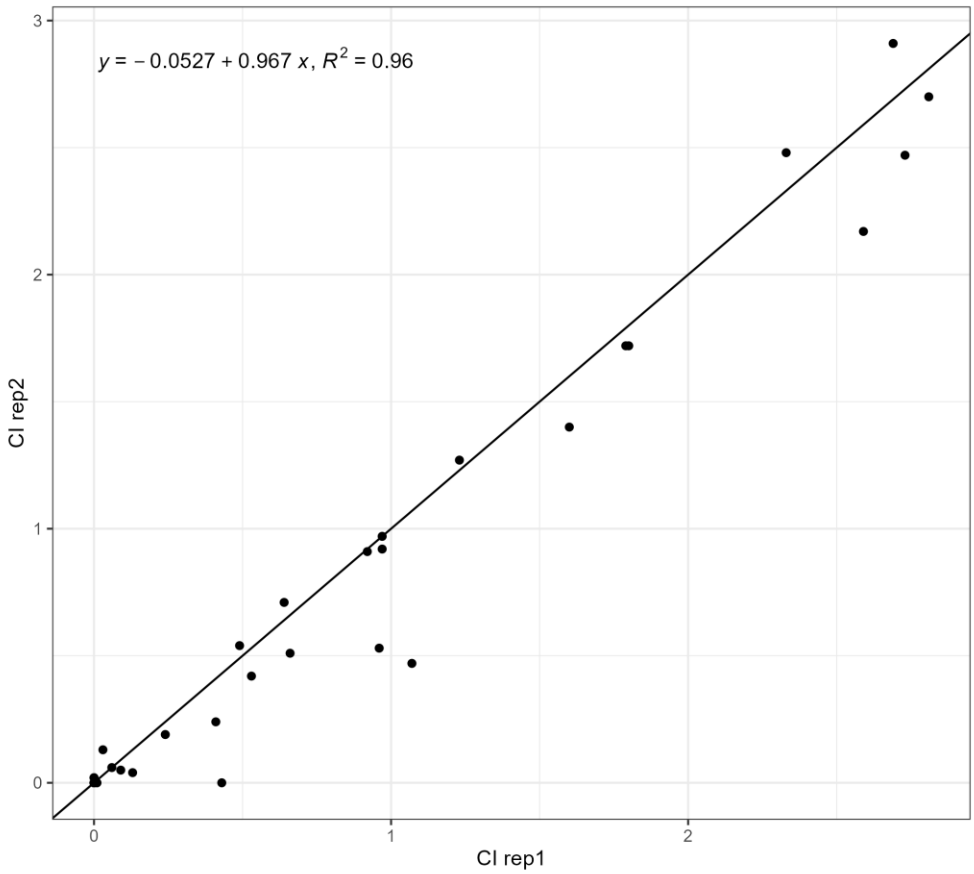

Figure 3. Regression plot of CI and values from random quality assessment sites.

Crew leads calculated CI scores during the field program to identify sites with notable deviations to previous year's data (>0.5 change in CI), which would trigger QA resampling. A total of five of the 324 sites sampled (1.5%) triggered the QA resampling threshold (SWOL1-7.5, THOM2-75, BODI1-75, SIXM1-75 and FORD7-50). An experienced sampler was used to revaluate QA triggered sites. For four of these, the confirmatory follow-up values were used. The remaining one site (THOM2-75) had comparable results to the QA sampler and no change was required.

3.2 General calcite distribution

The total number of stream kilometers evaluated and mapped in 2022 was 378 km, down from 403 km in 2021 but up from 346 km in 2020. The decrease was almost entirely from the removal reference reaches, mainly in MU5. A program summary (2013-2022) of calcite index, calcite presence, and calcite concretion values for all reaches has been provided (Appendix 6).

Generally, calcite index decreased in exposed mainstem from 2021 to 2022 (Figure 4). The number of mainstem stream kilometers that exceeded a CI of 1 has decreased from 19 km to 5 km. The one exposed mainstem reach that exceeded a CI of 1 in 2022 was FORD 6. CI has decreased from above 1 to below 1 for FORD 2, 4, and 7 from 2021 to 2022. Calcite index of exposed tributary appears relatively stable since approximately 2018. Calcite index remains low in both reference mainstem and tributary, with all reaches except ALEX3 being < 0.25 CI.

Calcite concretion showed similar results to previous years with low levels of concretion in both exposed and reference mainstem reaches and in reference tributaries (Figure 5). Exposed tributaries were also similar to previous years with some reaches showing relatively high levels of concretion. Both exposed mainstem and exposed tributary stream kilometers show an overall increase in Cc since the start of the program, but relatively little to no change since approximately 2017 to 2018. There was just one mainstem reach to exceed 0.25 Cc, FORD6, which was consistent with previous years. Concretion was not detected in any mainstem reference reach in 2022 and did not exceed 0.25 in any tributary reference reach.

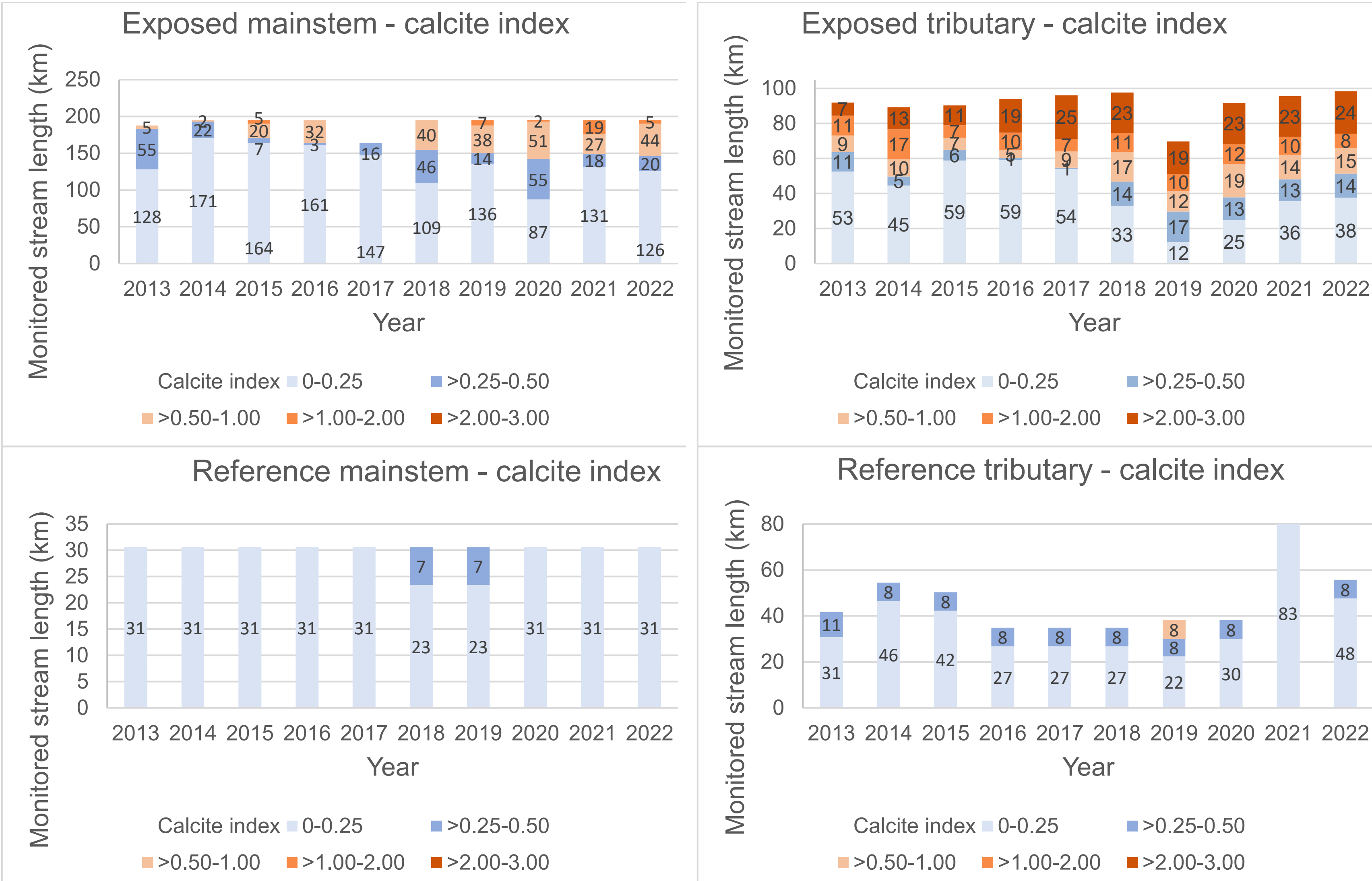

Figure 4. The distribution of calcite index by reach type (exposed/reference), strata (mainstem/tributary), and kilometers.

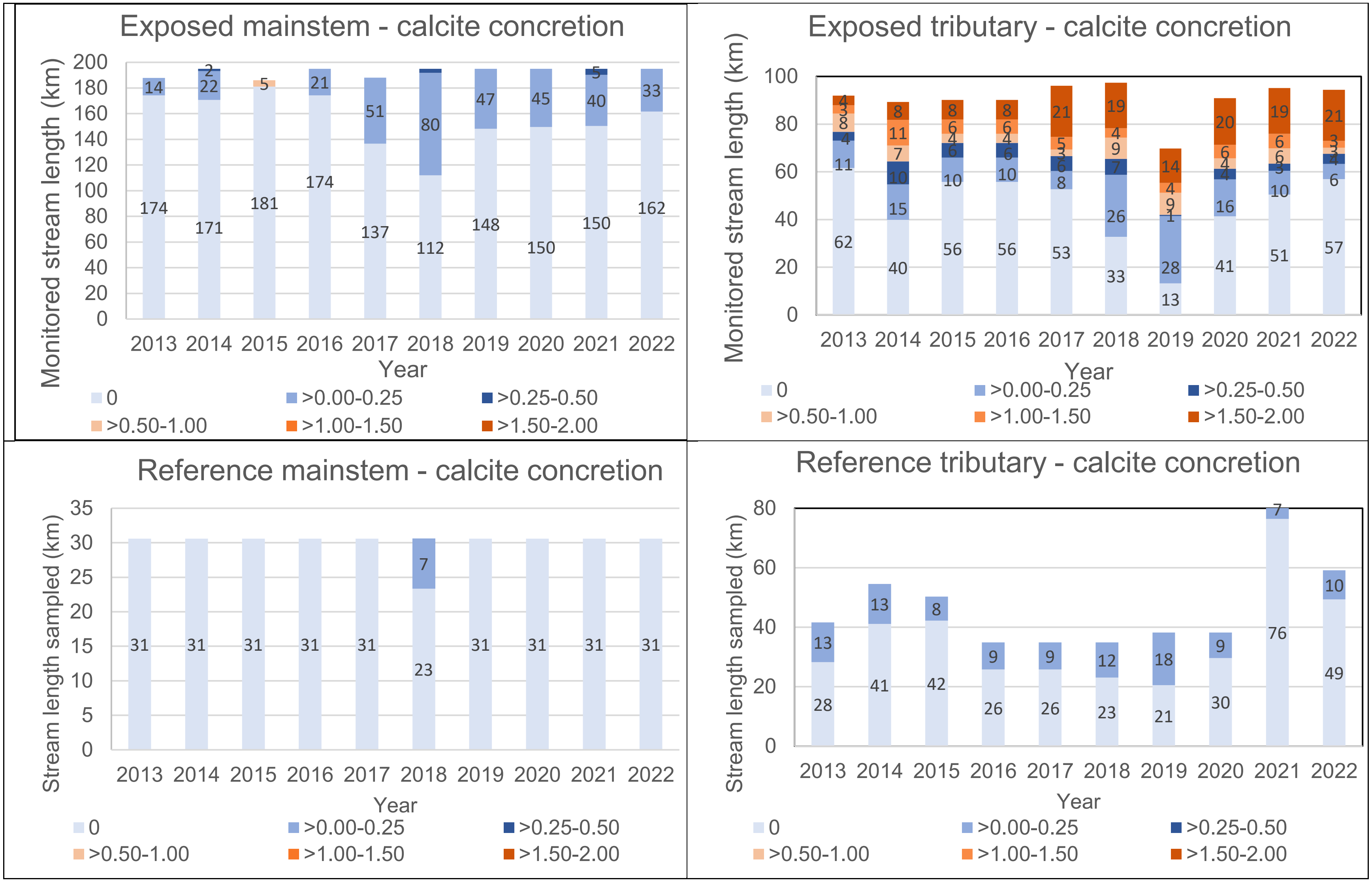

Figure 5. The distribution of calcite concretion by reach kilometer

3.2.1 Rate of change in calcite deposition by mine exposure

ANCOVA was run to evaluate how exposed and reference reaches have been trending relative to one another over the program. A significant effect of Year (p=0.007) and Type (reference vs exposed; p<0.001) were identified over the pooled 2013-2022 dataset, but so too was the interaction of Year*Type indicating that the rate of change between reference and exposed was significantly different (p=0.2; df=1116).

Using linear regression, the rate of increase in both exposed and reference was slightly lower in 2022 than 2021 (exposed: 0.06 CI/year (p<0.001); reference: 0.005 CI/year (p=0.09)). These results support the observation of an apparent leveling of in rates in recent years in both reference and exposed (Figure 6). While both groups show a general increase since 2013, there appears to be a peak in 2019 and a slight decrease since then.

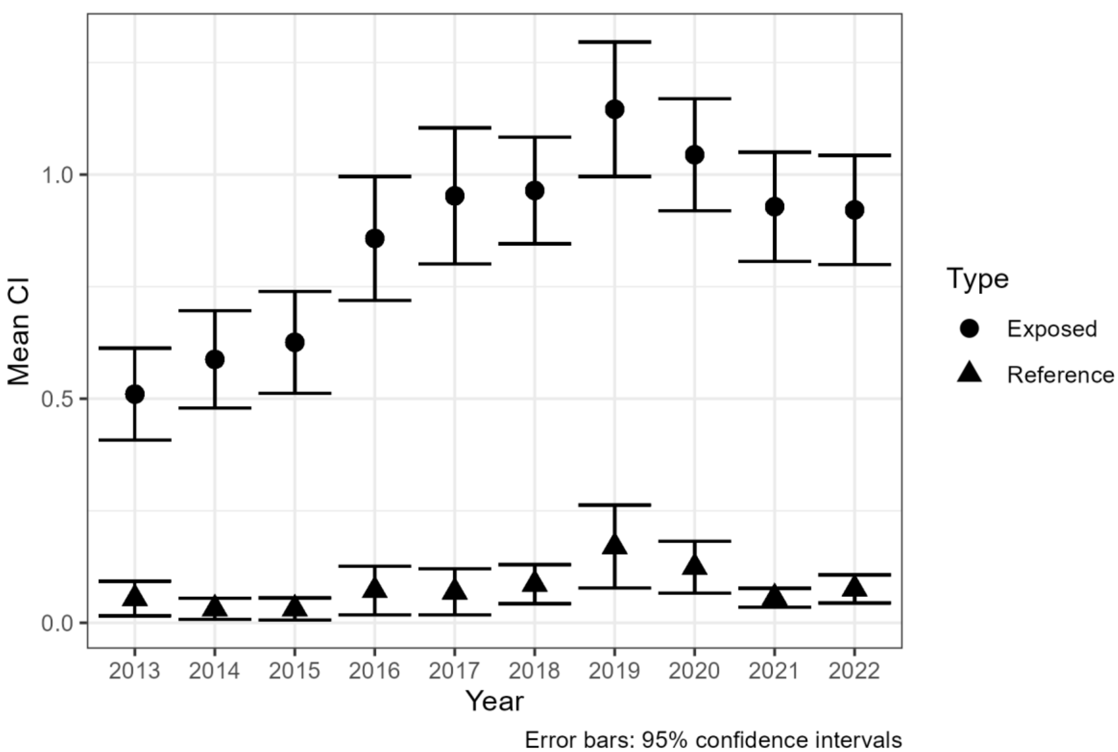

Figure 6. Mean calcite index values over time for exposed and reference sites. Error bars represent 95% confidence intervals.

3.3 *Permit 107517 Site Performance Objectives*

The number of reaches with a mean concretion score currently above the 2024 SPO (Cc>0.5) in 2022 (N=26) showed a slight decrease from 2021 (N=29) (Table 7). One new reach added to list in 2022 was BODI1. Removed from the list UTHO01. MICK2 and MILL2, both which were on this list in 2021, were sampled at their lower reach due to access issues. The total stream length with an mean Cc above 0.5 was 26.8 km, which is down 15% (i.e. 4.7 km) from 31.5 km in 2021. Note, the 2024 SPO is intended to be applied to reaches that are fish bearing, provide fish habitat or flow directly into fish bearing streams and are not scheduled by an environmental assessment certificate or mines act permit to be buried. For the purpose of this data summary, all data was screened against a Cc of 0.5 as requested by the EMC and includes a broader evaluation of stream reaches outside of the intended spatial extent (i.e.: fish habitat) of the 2024 SPO. A more targeted evaluation on the 2024 SPO is needed in the future.

Table 7. Exposed reaches with mean calcite concretion scores greater than 0.5.

Type (reference or exposed)	Stream	Reach	Mean Calcite Concretion Score	Stream Length (km)
Exposed	Bodie	BODI1*	1.55	0.42
Exposed	Bodie	BODI3	1.72	0.47
Exposed	Corbin	CORB1	1.96	0.59
Exposed	Corbin	CORB2	1.52	2.33
Exposed	Dry (EVO)	DRYE1	1.67	0.04
Exposed	Dry (EVO)	DRYE3	1.57	0.48
Exposed	Dry (EVO)	DRYE4	1.71	0.93
Exposed	Erickson	ERIC1	1.91	0.35
Exposed	Erickson	ERIC2	1.94	0.24
Exposed	Erickson	ERIC3	0.60	0.19
Exposed	Erickson	ERIC4	0.53	1.58
Exposed	Goddard	GODD3	1.83	1.10
Exposed	Greenhills	GREE3	1.68	1.70
Exposed	Greenhills	GREE4	1.70	3.24
Exposed	Kilmarnock	KILM1	1.52	1.67
Exposed	Leask	LEAS2	1.69	2.39
Exposed	North Thompson	NTHO1	0.72	2.00
Exposed	North Wolfram	NWOL1	1.19	2.34
Exposed	Porter	PORT3b	1.01	0.81
Exposed	Site18	SITE	1.68	0.27
Exposed	Smith Ponds Outlet	SPOU1	1.29	0.03
Exposed	South Pit	SPIT1	1.49	0.32
Exposed	South Wolfram	SWOL1	1.35	1.85
Exposed	Thompson	THOM3	1.15	0.53
Exposed	Wolfram	WOLF2	1.49	0.60
Exposed	Wolfram	WOLF3	0.98	0.34
			Total	**26.81**

* New to list in 2022

3.4 Trends by reach

3.4.1 Mann-Kendall Analysis

Mann-Kendall analysis was run on CI, Cp, and Cc for all reaches where two or more sites were surveyed each year from 2013-2022. A total of fifty-two reaches were found to have significantly increased in calcite index from 2013-2022, which is an increase of nine reaches compared to 2020 and 2021. Two reaches were found to have significant decreases from 2013-2021 (SPRI1 and SITE). Thirty-six increasing reaches were significant at the α=0.05 level and an additional sixteen reaches were significant at the α=0.1 level. Seven reaches were reference and forty-seven exposed. Mann-Kendall results were presented by Teck Management Unit to investigate for any spatial patterns (Table 8). Significant increases were generally well-distributed throughout the study area. However, statistically significant increases were concentrated on the Fording River in MU1 and 2, and Dry Creek (Line Creek) in MU1.

Fifty-seven reaches were found to have significantly increased in Cp since 2013. One reach (SPRI1) was found to have a significant decrease at the α=0.1 level. Forty-three were found to be significantly increasing at the at the α=0.05 level, and fifteen additional reaches were found to be significantly increasing at the at the α=0.1 level.

In total nineteen reaches were found to be significantly increasing in Cc since 2013. Fourteen reaches were found to be significantly increasing at the α=0.05, and five additional reaches were found to be significantly increasing at the at the α=0.1 Four reaches were found to be significantly decreasing. Two reaches were found to be decreasing at the α=0.05, and two reaches were found to be decreasing at the at the α=0.1 level.

Plots of each metric from 2013 to 2022 for CI, Cp and Cc are in Appendix 7.

Table 8. Mean CI by Management Unit, Reach and Year 2013-2022.

* Blues cells indicate significant increases (Light blue = sig. increase (α = 0.1) and Dark blue = sig. increase (α = 0.05)) and orange indicate significant decrease (Light orange = sig. decrease (α = 0.1 and Dark orange = sig. decrease (α = 0.05))

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU1	CATA1	3.00	3.00	3.00	3.00	3.00	2.96	-	-	-	-
MU1	CATA2	1.89	0.64	-	-	-	-	-	-	-	-
MU1	CATA3	3.00	2.64	2.56	3.00	3.00	2.89	-	-	-	-
MU1	CHAU1	0.00	0.00	0.00	0.17	0.12	0.12	0.23	0.21	0.18	0.20
MU1	CLOW1	-	0.18	0.00	0.50	0.21	0.67	0.69	0.76	0.71	0.83
MU1	COUT1	0.00	1.01	1.03	1.21	0.29	1.46	1.28	1.16	1.34	1.10
MU1	DRYL1	0.00	0.00	0.00	0.00	0.02	0.57	0.65	0.62	0.74	0.50
MU1	DRYL2	0.00	0.00	0.00	0.00	0.00	0.24	0.52	0.60	0.71	0.49
MU1	DRYL3	0.00	0.00	0.00	0.00	0.00	0.06	0.16	0.29	0.38	0.42
MU1	DRYL4	0.00	.	0.00	0.00	0.00	0.32	0.15	0.30	0.34	0.51
MU1	DRYL5	0.00	-	-	-	-	-	-	-	-	-
MU1	DRYL6	0.00	-	-	-	-	-	-	-	-	-
MU1	EPOU1	1.90	1.31	0.58	0.20	0.25	0.21	-	-	-	-
MU1	ETRI1	-	-	-	-	-	-	0.01	0.02	0.00	0.01
MU1	EWIN1	-	-	-	-	-	-	-	-	0.21	0.17
MU1	FORD5	0.32	0.35	0.53	0.58	0.73	0.70	0.80	0.79	0.92	0.80
MU1	FORD6	0.74	0.43	1.53	0.64	0.68	0.79	0.98	0.96	1.19	1.20
MU1	FORD7	0.43	0.97	0.55	0.63	-	0.89	0.90	1.09	1.13	0.92
MU1	FORD8	0.31	0.49	0.48	0.63	-	0.61	0.90	0.69	0.67	0.70
MU1	FORD9a	0.00	0.00	0.00	0.00	0.43	1.04	0.84	0.55	0.46	0.59
MU1	FORD9b	0.00	0.00	0.00	0.00	0.11	0.12	0.23	0.21	0.10	0.28
MU1	FORD10	0.00	0.00	0.00	0.00	0.32	0.63	0.53	0.52	0.35	0.45
MU1	FORD11	0.00	0.00	0.00	0.00	0.32	0.27	0.53	0.18	0.10	0.21
MU1	FORD12	0.00	0.00	0.00	0.03	0.11	0.31	0.28	0.15	0.14	0.15
MU1	FPON1	0.00	0.03	0.00	0.08	0.20	0.17	0.38	0.48	0.40	0.71

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU1	GARD1	0.29	0.70	0.32	0.14	0.60	0.64	0.50	0.60	0.71	0.56
MU1	GRAS1	0.00	0.09	0.00	0.04	0.29	0.25	0.38	0.17	0.19	0.14
MU1	GREE1	0.35	1.06	0.45	0.86	1.07	0.64	0.66	0.64	0.76	1.09
MU1	GREE2	0.60	0.00	-	-	-	-	-	-	-	-
MU1	GREE3	1.30	2.22	2.46	2.18	2.55	2.49	1.91	2.58	2.68	2.64
MU1	GREE4	1.62	2.78	2.80	2.61	2.68	2.74	2.32	2.84	2.67	2.74
MU1	GSCH1	-	-	-	-	-	-	-	0.41	0.67	0.75
MU1	HENR1	0.00	0.00	0.00	0.00	0.04	0.32	0.40	0.69	0.62	0.62
MU1	HENR2	0.00	0.00	0.00	-	-	-	-	-	0.02	0.36
MU1	HENR3	0.00	0.00	0.00	0.00	0.04	0.00	0.40	0.20	0.00	0.02
MU1	KILM1	2.16	1.64	1.97	2.59	2.77	2.30	2.56	2.47	2.34	2.90
MU1	LMOU1	0.00	0.33	0.00	0.15	0.18	0.39	0.88	0.64	0.61	0.87
MU1	LMOU2	0.00	0.09	-	-	-	-	-	-	-	
MU1	LMOU3	0.00	0.00	0.00	0.15	0.18	0.39	0.88	0.64	-	-
MU1	LMOU4	0.00	0.00	0.00	0.15	0.18	0.39	0.88	0.64	-	-
MU1	PORT1	0.92	0.84	0.85	0.75	0.74	0.85	0.85	0.98	0.98	0.97
MU1	PORT2	0.11	0.10	-	-	-	-	-	-	-	-
MU1	PORT3a	2.33	1.34	0.92	0.47	0.57	0.69	0.34	0.48	0.49	0.64
MU1	PORT3b	3.00	2.28	2.45	2.46	2.68	2.60	2.53	2.55	2.22	2.47
MU1	SPOU1	2.61	2.24	2.24	3.00	2.60	2.45	2.00	2.02	2.35	2.83
MU1	SPSE1	0.00	1.50	0.05	0.00	-	-	-	-	-	-
MU1	SWIF1	2.58	2.18	2.39	2.43	2.45	1.69	1.88	-	-	-
MU1	SWIF2	0.00	1.04	0.82	2.43	2.45	1.12	1.88	-	-	-
MU1	TODH1	-	-	-	-	-	-	-	-	0.10	0.06
MU2	CPOS1	0.92	0.84	-	-	-	-	-	-	-	-
MU2	CPOU1	0.93	0.94	-	-	-	-	-	-	-	-
MU2	FORD1	0.00	0.00	0.00	0.37	0.44	0.23	0.20	0.14	0.43	0.35
MU2	FORD2	0.00	0.00	0.00	0.00	0.10	0.13	0.30	0.34	1.09	0.86

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU2	FORD3	0.00	0.01	0.00	-	-	0.49	0.30	0.96	0.85	0.79
MU2	FORD4	.	0.05	0.66	0.60	0.84	0.80	1.09	0.88	1.01	0.79
MU2	GRAC1	0.31	0.20	0.05	0.09	0.06	0.10	0.19	0.25	0.12	0.11
MU2	GRAC2	0.15	0.10	0.10	0.09	0.06	0.06	0.19	0.25	-	-
MU2	GRAC3	.	0.00	0.00	0.09	0.06	0.00	0.19	0.25	-	-
MU2	LINE1	0.27	0.00	0.00	0.03	0.00	0.52	0.46	0.76	0.53	0.35
MU2	LINE2	0.00	0.00	0.00	0.03	0.00	0.45	0.46	0.52	0.28	0.33
MU2	LINE3	0.00	0.00	0.00	0.03	0.00	0.66	0.46	0.48	0.36	0.51
MU2	LINE4	0.40	0.27	0.68	0.65	0.66	0.95	0.93	0.70	0.94	0.92
MU2	LINE7	0.00	0.00	0.00	0.00	0.00	0.01	-	-	0.00	0.00
MU2	SLINE2	0.00	0.00	0.00	0.00	0.00	0.04	0.08	0.05	0.18	0.15
MU3	ALDR1	-	-	-	-	-	-	-	-	0.00	-
MU3	BING1	-	-	-	-	-	-	-	-	0.01	0.00
MU3	ELKR11	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.22	0.17
MU3	ELKR12	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.01
MU3	ELKR15	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.00
MU3	FORS1	-	-	-	-	-	-	-	-	0.00	0.02
MU3	LEAS1	0.03	0.17	-	-	-	-	-	-	-	-
MU3	LEAS2	0.13	1.60	0.24	1.82	2.76	2.60	2.79	2.46	2.69	2.60
MU3	MICK1	0.01	0.00	0.00	2.18	1.25	1.23	1.84	1.21	-	0.98
MU3	MICK2	0.05	0.00	0.03	2.18	1.25	1.37	1.84	1.22	1.69	-
MU3	NTHO1	1.24	2.39	1.18	1.54	1.78	1.91	1.56	2.00	1.94	2.04
MU3	NWOL1	0.70	1.33	0.21	0.14	2.59	2.44	-	2.71	2.64	2.94
MU3	RG_UCWER	-	-	-	-	-	-	-	-	0.00	0.00
MU3	SWOL1	1.97	1.97	0.28	1.86	2.05	2.38	2.96	2.52	2.39	2.57
MU3	THOM1	0.00	0.00	0.00	0.22	0.83	1.04	1.63	1.29	-	-
MU3	THOM2	0.08	0.00	0.01	0.22	0.83	0.81	0.82	0.80	1.07	1.30

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU3	THOM3	0.00	0.00	0.00	0.22	0.83	1.04	1.63	1.29	1.90	1.76
MU3	THOM4	-	-	-	-	-	-	-	0.16	0.19	0.25
MU3	UTHO1	-	-	-	-	-	-	-	1.15	1.51	1.10
MU3	UTPO1	-	-	-	-	-	-	-	0.52	0.58	0.65
MU3	WEIG1	-	-	-	-	-	-	-	-	0.03	0.02
MU3	WILN2	-	-	-	0.00	0.00	0.00	-	0.02	0.01	0.00
MU3	WILS1	-	-	-	0.00	0.00	0.00	-	-	0.21	0.01
MU3	WOL1	-	-	-	0.00	0.00	0.00	0.90	0.01	0.08	0.00
MU3	WOLF2	0.27	0.14	0.23	0.69	.	0.88	0.84	2.41	2.80	2.55
MU3	WOLF3	2.93	2.07	1.60	2.61	2.80	2.69	2.86	2.95	2.91	2.96
MU4	ALEX1	-	-	-	-	-	-	-	-	0.03	-
MU4	ALEX3	0.48	0.38	0.40	0.46	0.38	0.36	0.86	0.41	0.01	0.38
MU4	ALEX8	-	-	-	-	-	-	-	-	0.00	-
MU4	ANDY1	0.00	0.00	0.00	0.00	0.00	0.04	0.09	0.00	0.05	0.01
MU4	AQUE1	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.00
MU4	AQUE2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MU4	AQUE3	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.24	0.22
MU4	BALM1	0.00	0.00	0.00	0.00	0.00	0.01	-	0.01	0.00	0.03
MU4	BODI1	0.00	0.00	0.00	0.79	0.08	1.22	1.09	1.10	1.22	1.43
MU4	BODI2	0.06	0.00	-	-	-	-	-	-	-	-
MU4	BODI3	1.16	2.47	-	1.77	2.09	2.33	2.58	2.62	2.55	2.83
MU4	CARB1	-	0.00	0.00	-	-	-	-	-	-	-
MU4	CARB2	-	0.00	0.00	-	-	-	-	-	-	-
MU4	CORB1	1.95	1.71	2.62	2.21	2.74	2.70	2.47	2.45	2.72	2.74
MU4	CORB2	2.72	2.68	2.25	2.21	2.74	2.92	2.87	2.45	2.96	2.94
MU4	CSEE1	0.00	0.00	0.85	1.40	-	-	-	-	-	-
MU4	DRYE1	2.23	2.13	2.19	2.51	2.85	2.96	2.19	2.67	2.52	2.07
MU4	DRYE2	2.23	0.03	-	-	-	-	-	-	-	-

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU4	DRYE3	2.20	2.40	2.48	2.51	2.85	2.76	2.25	2.82	2.66	2.70
MU4	DRYE4	1.42	1.84	2.37	2.51	2.85	3.00	2.51	2.94	2.56	2.64
MU4	ELKR10	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.05	0.21	0.14
MU4	ELKR9	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.08	0.07	0.06
MU4	ERIC1	2.29	2.59	2.77	2.36	2.67	2.89	2.90	2.92	2.71	2.91
MU4	ERIC2	1.78	2.27	2.58	2.36	2.67	2.50	2.46	2.57	2.87	2.89
MU4	ERIC3	2.36	2.60	3.00	2.36	2.67	2.95	2.96	2.91	2.94	2.94
MU4	ERIC4	0.62	1.28	1.17	2.36	2.67	1.73	1.74	1.68	1.42	1.54
MU4	FELT1	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.01	0.00	0.00
MU4	FENN1	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	-
MU4	GATE1	0.05	0.05	-	-	-	-	-	-	-	-
MU4	GATE2	0.29	0.00	0.74	1.47	1.98	1.14	-	1.61	1.46	1.38
MU4	GODD1	0.00	0.00	0.00	0.22	0.13	0.35	0.24	0.16	0.04	0.03
MU4	GODD2	0.00	0.00	0.00	-	-	2.62	2.52	2.14	-	-
MU4	GODD3	0.00	1.90	1.97	2.22	2.64	2.62	2.66	2.55	2.76	2.64
MU4	GRAV1	0.54	0.72	0.02	0.14	0.24	0.37	0.41	0.28	0.12	0.18
MU4	GRAV2	0.23	0.21	0.00	0.14	0.24	0.14	0.41	0.28	0.06	0.08
MU4	GRAV3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
MU4	HARM1	0.58	1.08	0.07	0.64	0.61	0.80	0.82	0.90	0.76	0.90
MU4	HARM2	0.17	0.10	-	-	-	-	-	-	-	-
MU4	HARM3	0.15	0.28	0.01	0.12	0.03	0.08	0.14	0.12	0.04	0.06
MU4	HARM4	0.17	0.70	0.17	0.12	0.03	0.35	0.14	0.12	0.21	0.11
MU4	HARM5	0.19	0.56	0.22	0.12	0.03	0.31	0.14	0.12	0.38	0.39
MU4	HDSE1	0.52	-	-	-	-	-	-	-	-	-
MU4	LCSE1	0.39	-	-	-	-	-	-	-	-	-
MU4	LIND1	0.19	0.26	0.19	0.19	0.15	0.19	-	0.11	0.06	0.29
MU4	MICH1	0.31	0.00	0.00	0.00	0.00	0.08	0.04	0.12	0.02	0.45
MU4	MICH2	0.05	0.05	0.00	0.00	0.08	0.02	0.04	0.79	0.29	0.37

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU4	MICH3	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.45	0.03	0.04
MU4	MICH4	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.07	0.11	0.07
MU4	MICH5	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.03	0.04	0.10
MU4	MILL1	0.00	0.00	0.00	1.07	0.36	1.77	-	1.33	-	1.23
MU4	MILL2	0.00	0.00	0.00	1.07	1.06	1.18	-	1.33	2.19	-
MU4	OTTO1	0.30	0.22	0.10	0.23	0.14	0.59	-	0.46	0.49	0.44
MU4	OTTO2	0.03	0.00	0.00	-	-	-	-	-	-	-
MU4	OTTO3	0.02	0.02	0.00	0.23	0.14	0.05	.	0.46	.	0.00
MU4	P12S1	0.00	-	-	-	-	-	-	-	-	-
MU4	PENG1	0.09	0.02	0.02	0.00	0.00	0.00	-	-	-	-
MU4	QUAL1	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
MU4	RG_LE1	-	-	-	-	-	-	-	-	0.00	0.01
MU4	SAWM1	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.01	0.00
MU4	SAWM2	0.38	0.54	0.62	0.00	0.00	0.00	-	-	0.00	0.06
MU4	SITE	-	-	-	-	3.00	3.00	2.93	2.97	2.49	2.85
MU4	SIXM1	0.80	1.19	0.49	0.65	0.95	0.92	.	0.93	0.66	0.15
MU4	SIXM2	0.00	-	-	-	-	-	-	-	-	-
MU4	SNOW1	-	0.00	0.00	-	-	-	-	-	-	-
MU4	SPIT1	0.00	0.00	1.14	1.59	2.49	2.77	2.43	2.30	2.15	2.59
MU4	SPIT2	0.03	0.00	0.00	-	-	-	-	-	-	-
MU4	SPRI1	0.20	0.11	0.11	0.12	0.13	0.14	0.05	0.04	0.01	0.05
MU4	STR02	-	-	-	-	0.68	0.72	-	0.02	0.00	0.02
MU4	STR14	-	-	-	-	0.00	0.40	-	-	0.46	-
MU4	THRE1	0.00	0.00	0.00	0.00	0.00	0.03	-	-	-	0.00
MU4	USOS1	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00
MU4	WHEE1	-	0.00	0.00	-	-	-	-	-	-	-
MU4	WHEE2	-	0.00	0.00	-	-	-	-	-	-	-
MU4	WHEE3	-	0.00	0.00	-	-	-	-	-	-	-

MU	Reach	Year									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
MU5	DRIN1	-	-	-	-	-	-	-	-	0.00	-
MU5	ELKR8	0.40	0.00	0.00	0.00	0.01	0.28	0.09	0.42	0.19	0.20
MU5	HART2	-	-	-	-	-	-	-	-	0.03	-
MU5	LIZA1	-	-	-	-	-	-	-	-	0.12	-
MU5	MCOO1	-	-	-	-	-	-	-	-	0.19	-
MU5	MORI1	-	-	-	-	-	-	-	-	0.00	-

3.4.2 Analysis of Variance

ANOVA was completed on the same reaches that were eligible for Mann-Kendall analysis. This analysis tested for differences in calcite presence, calcite concretion and calcite index among years within a reach. This analysis was run to detect step-wise changes within the current year of monitoring relative to the year prior.

ANOVA results give no indication of wide-spread step-wise changes in CI from 2021. Following Tukey's post hoc analysis, one reach was found to have a significant increase (HENR2) and one reach was reported to have a significant decrease from 2021 (TODH1). Of the significant increases from 2021, HENR2 also had significant Mann-Kendall results.

No significant changes in Cc were noted from 2021 to 2022. A significant decrease in Cp was reported at FORD2 and TODH1, while ALEX3 and HENR2 had a significant increase from 2021 to 2022. ANOVA plots of each metric are found in Figure 7, Figure 8, and Figure 9. ANOVA statistics and p-values are listed in Appendix 9.

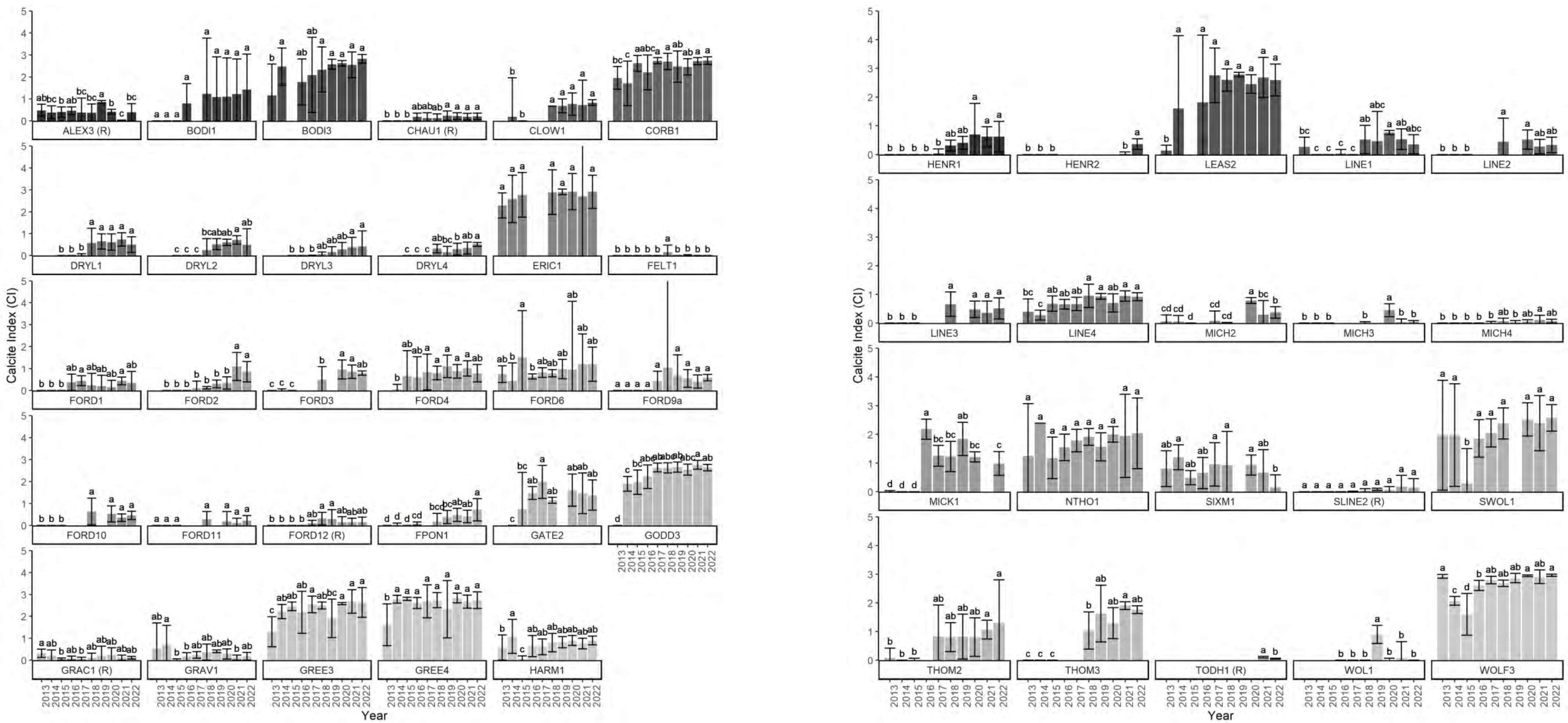

Figure 7. Bar graphs showing results of significant one-way ANOVA tests on calcite index from 2013-2022 (error bars show 95% confidence intervals). Bars with the same letters denote no significant differences in mean calcite presence among years, within the same reach. Analysis is only conducted in sites where there is a year-to-year change.

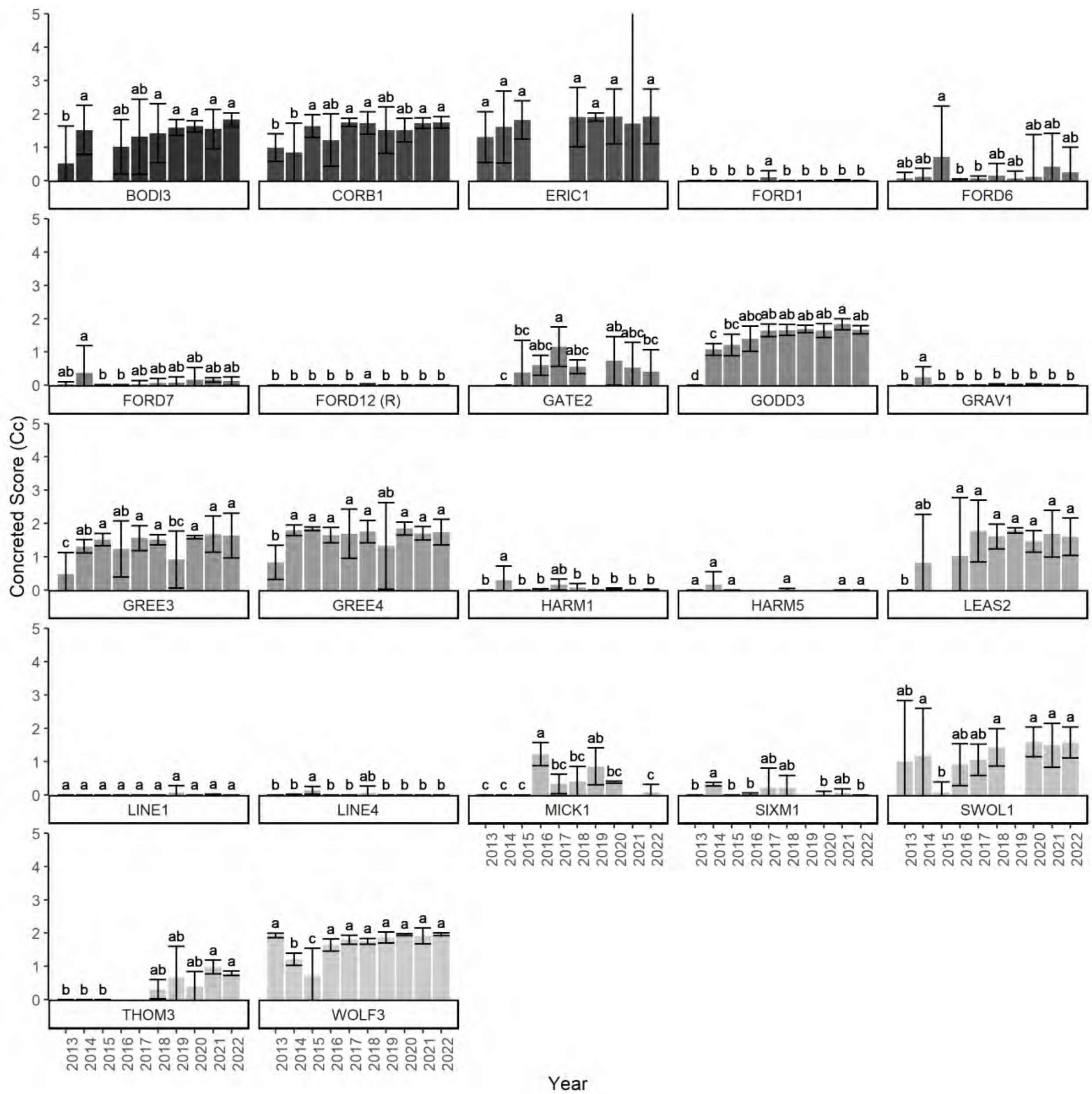

Figure 8. Bar graphs showing results of significant one-way ANOVA tests on calcite concretion from 2013-2022 (error bars show 95% confidence intervals). Same letters on bars denote no significant differences in mean calcite concretion among years, within the same reach. Analysis is only conducted in sites where there is a year-to-year change.

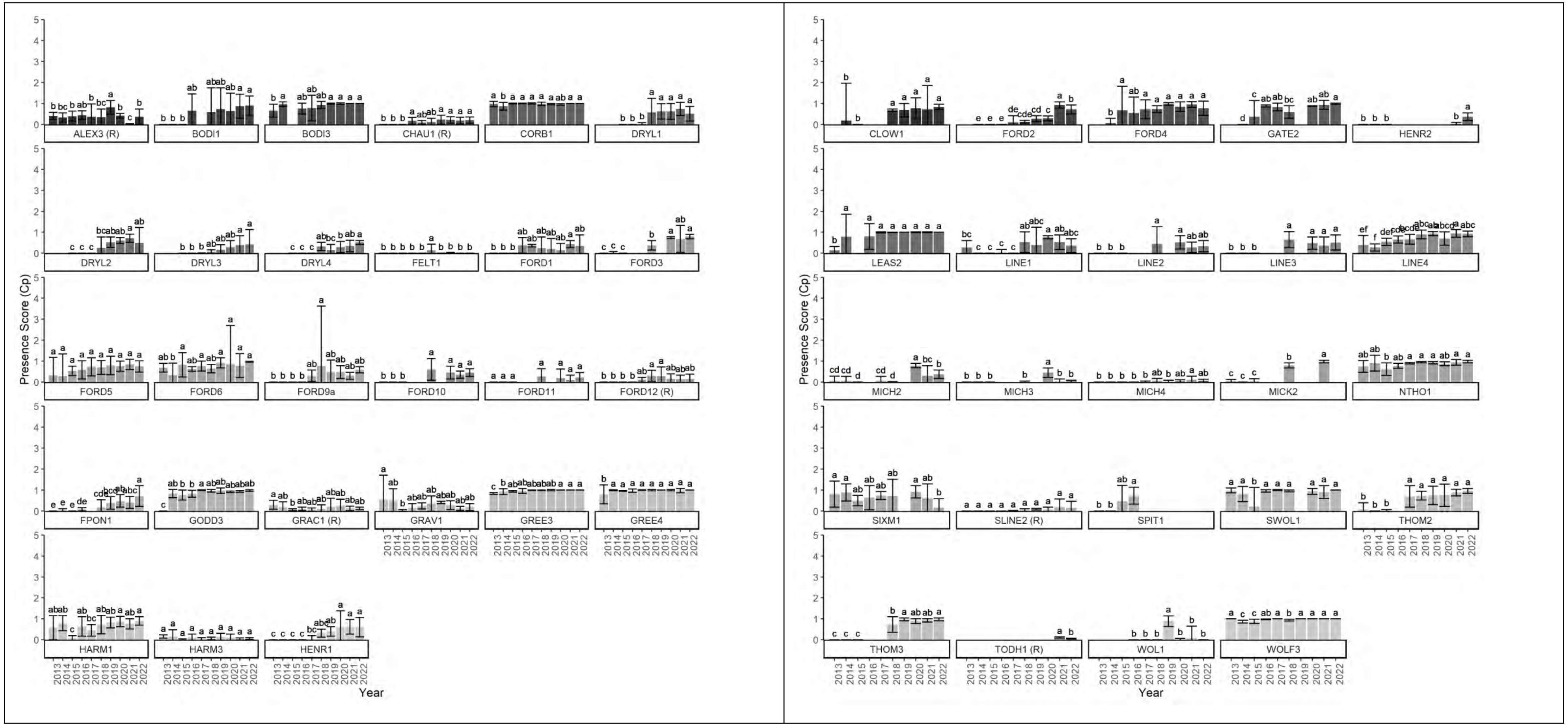

Figure 9. Bar graphs showing results of significant one-way ANOVA tests on calcite presence from 2013-2022 (error bars show 95% confidence intervals). Same letters on bars denote no significant differences in mean calcite index among years, within the same reach. Analysis is only conducted in sites where there is a year-to-year change.

3.5 *Role of Hydrologic Events*

Counts of significant results from ANOVA and Mann-Kendall (2013-2022) are summarized in Table 9. Overall, the count of significant Mann-Kendall results has increased each year. However, the rate of increase of significant reaches has decreased since 2020. Similarly, the count of significant stepwise increases (from the previous year) tested with ANOVA has also decreased, with a peak in 2018. These results corroborate the apparent asymptote described in in Section 3.2.1.

Table 9. Summary of statistically significant Mann-Kendal and ANOVA results from 2013 to 2022

Metric	2015*	2016	2017	2018	2019	2020	2021	2022
# reaches w/Sig increasing MK	1	4	9	19	27	43	43	52
Sig increasing ANOVA year to year	6	12	9	16	7	3	3	1
Sig decreasing ANOVA year to year	7	5	3	2	2	2	3	2

*used linear regression

Mann-Kendall analysis was run on CI data from 2019-2022 to assess how many reaches showed a significant increase since this apparent inflection point. Six reaches were found to have significant increasing trends from 2019-2022, compared to 52 over the full period of record (2013-2022) There were: BODI1, DRYL3, DRYL4, ERIC2, PORT3a, and SPOU1. Four reaches (BODI1, DRYL3, DRYL4, ERIC2) were detected in the 2013-2022 Mann-Kendall analysis.

Two reaches were found to be statistically significantly decreasing from 2019-2022). ELKR9 was found to be significantly increasing (α=0.10) from 2013-2022, but significantly decreasing (α=0.10) from 2019-2022. GODD1 was not found to be significantly increasing or decreasing from 2013-2022 but was found to be decreasing (α=0.10). 2019-2022 Mann-Kendall results can be found in Appendix 8. These results are consistent with the current hydrogeomorphic conceptual model (Robinson et al., 2022) where, in the absence of a large, energetic, hydrological event (i.e., flood) calcite metrics would reach a general steady state equilibrium.

3.6 Trends in reaches associated with calcite management

Calcite index values were plotted by year for reaches with water treatment and, where available, upstream reaches for control. Treatment began on GREE1 in 2017, Line Creek in 2018, FORD9a in 2019, Erickson Creek, Bodie Creek and GATE2-25 in 2020 and DRYL3 in 2021. The antiscalant operations in GREE1, stopped on August 1, 2022, as the unit was moved upstream to be installed in GREE3, but was still included in the 2022 analysis as the reach was sampled on August 31. Erickson Creek did not receive treatment from April-October as the SRF was not operating during this period. All other stations operated as scheduled in 2022, minus minor operational shutdown (Teck 2023). Due to ongoing operational confounds in water treatment and water management, calcite trends associated with calcite management should be approached with caution (Table 4). Additionally, results from effectiveness monitoring conducted under calcite management can be found in Calcite Operations 2022 Annual Performance Report (Teck 2023).

In most cases, increasing trends in CI appear to have declined following treatment relative to untreated reaches upstream (Figure 10). This reduction in CI may be related to a reduction in Cc (Figure 14, Figure 15). However, a fulsome evaluation of the efficacy of antiscalant using the methods presented in this report requires more years of data. Reaches with a Cc of <1 show a reduction in Cc since the start of treatment. Reaches with a Cc>1 show no change in Cc. Note, these results are inconclusive due to limited sampling location, short or inconsistent antiscalant dosing, and potential limitations to detect subtle changes in highly concreted streams. Evaluating the overall effect of treatment at the reach scale remains uncertain; the Calcite Operations 2022 Annual Performance Report provide a more detailed localized evaluation of treatment effectiveness.

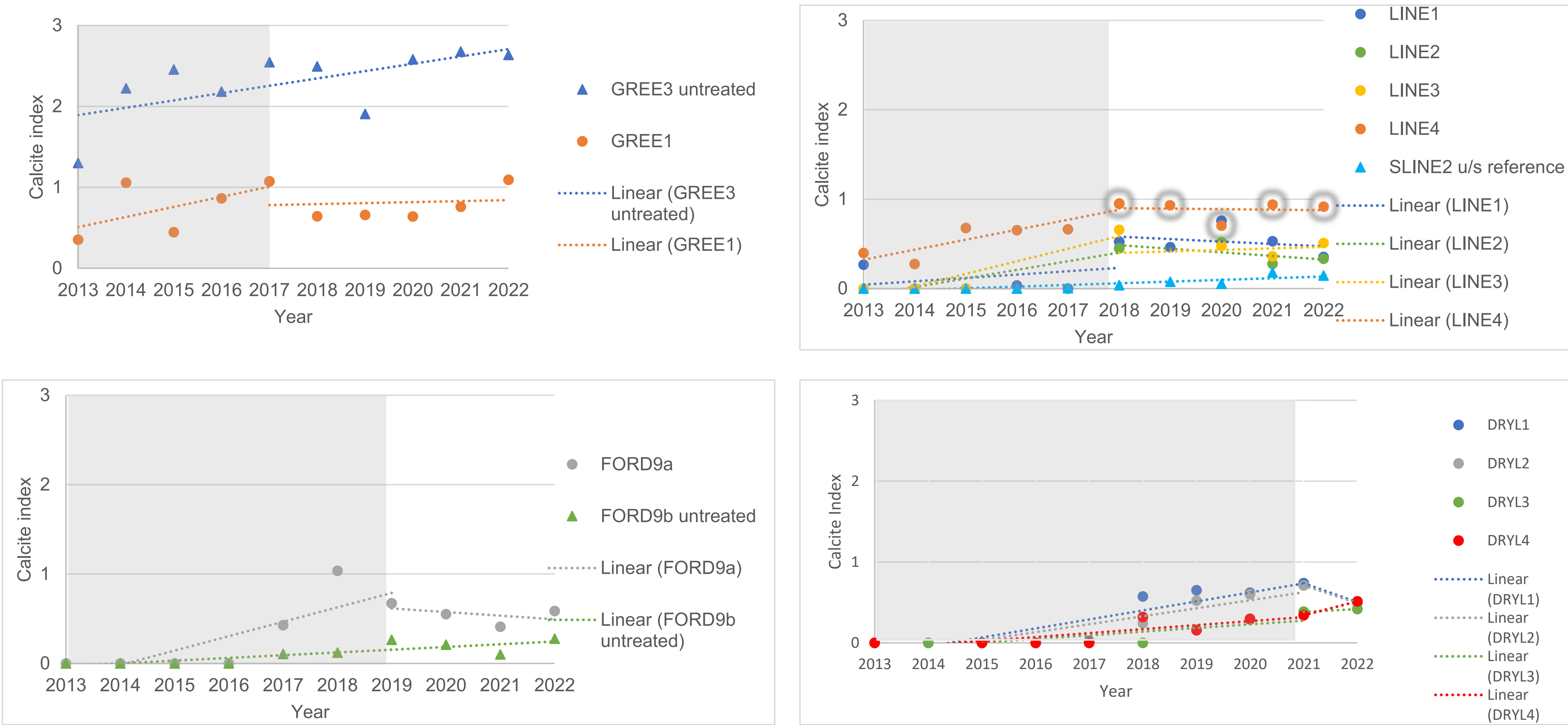

Figure 10. Treated reaches in Greenhills Creek (2017), Line Creek (2018), Fording River (2019) and Dry Creek (LCO) (2021) CI score. Lines represent linear trend lines pre- and post-treatment (shaded areas indicates untreated timeframe).

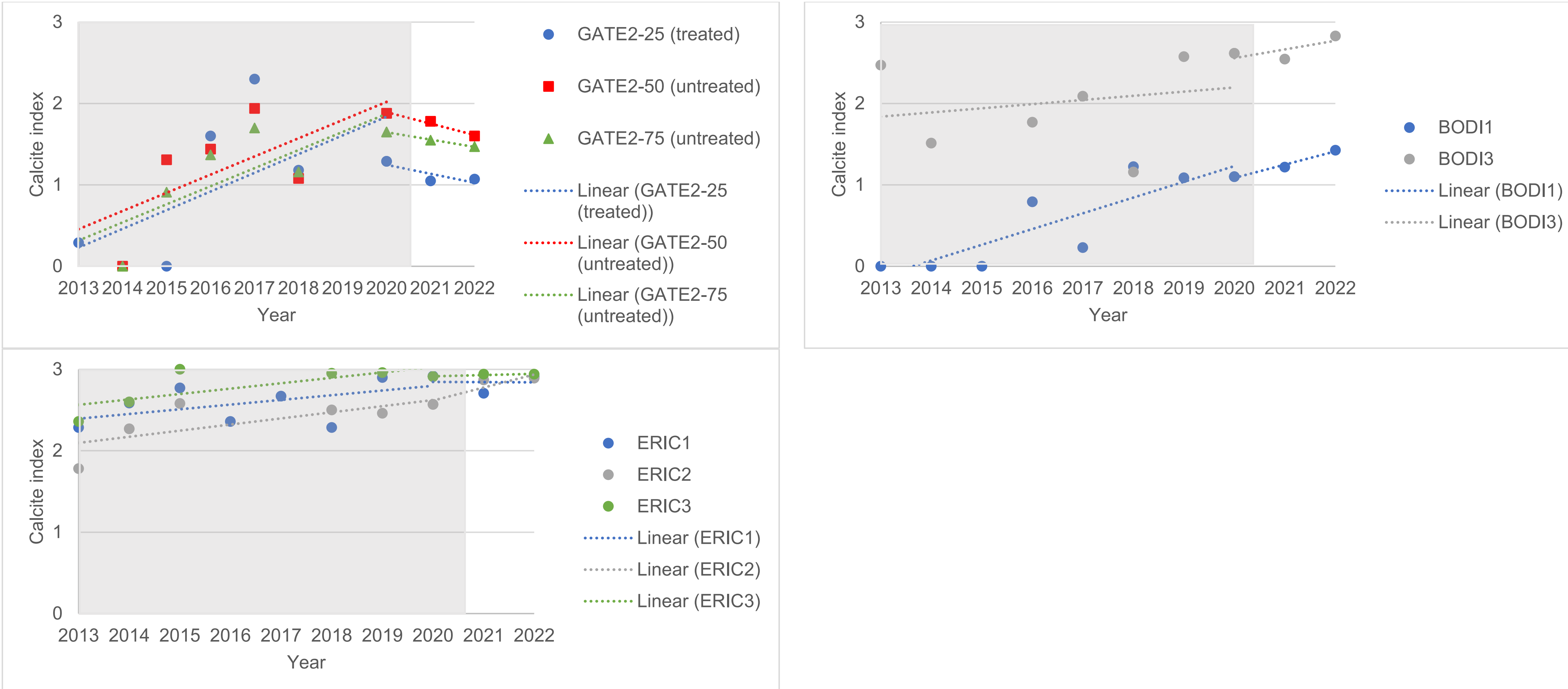

Figure 11. Treated reaches in Gate Creek (2020), Bodie Creek (2020) and Ericson Creek (2020) CI score. Lines represent linear trend lines pre- and post-treatment (shaded areas indicates untreated timeframe).

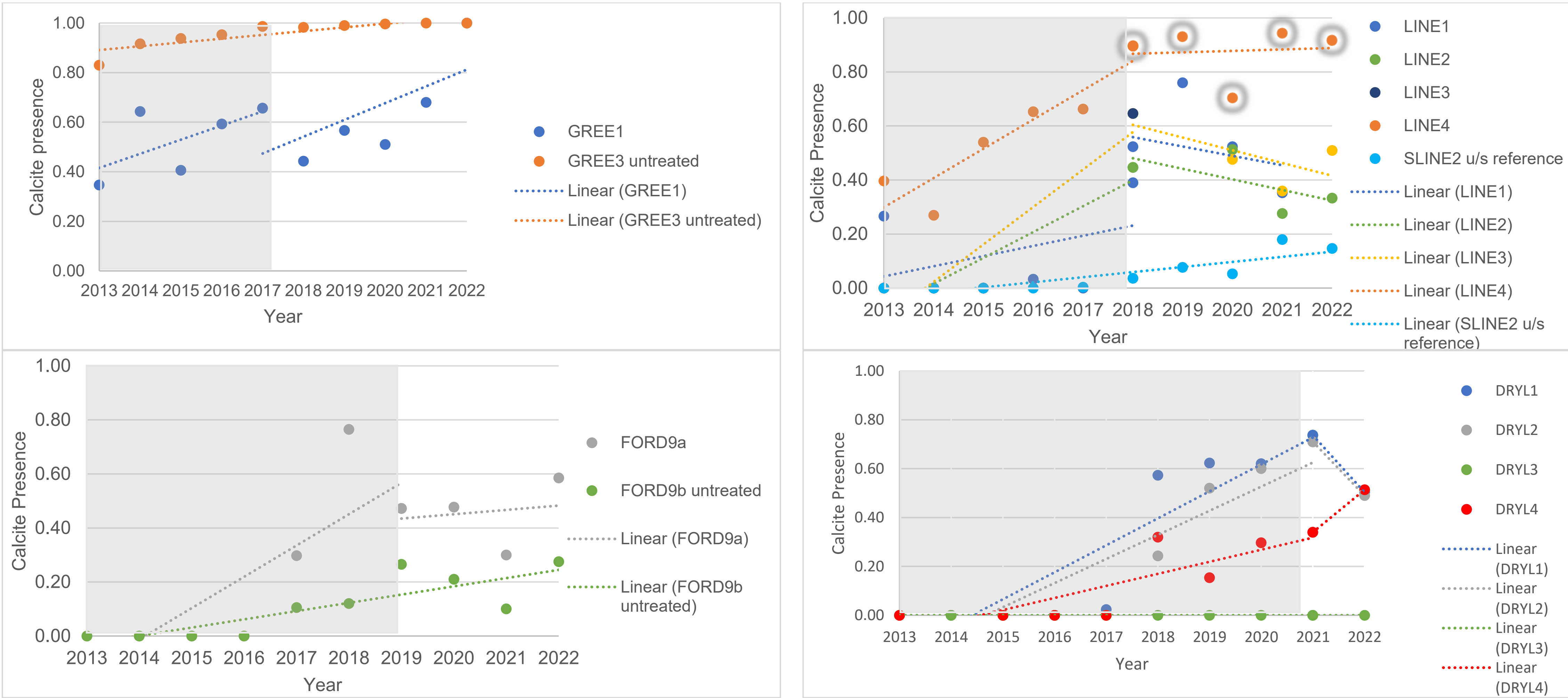

Figure 12. Treated reaches in Greenhills Creek (2017), Line Creek (2018), Fording River (2019) and Dry Creek (LCO) (2021) Cp score. Lines represent linear trend lines pre and post treatment (shaded areas indicates untreated timeframe).

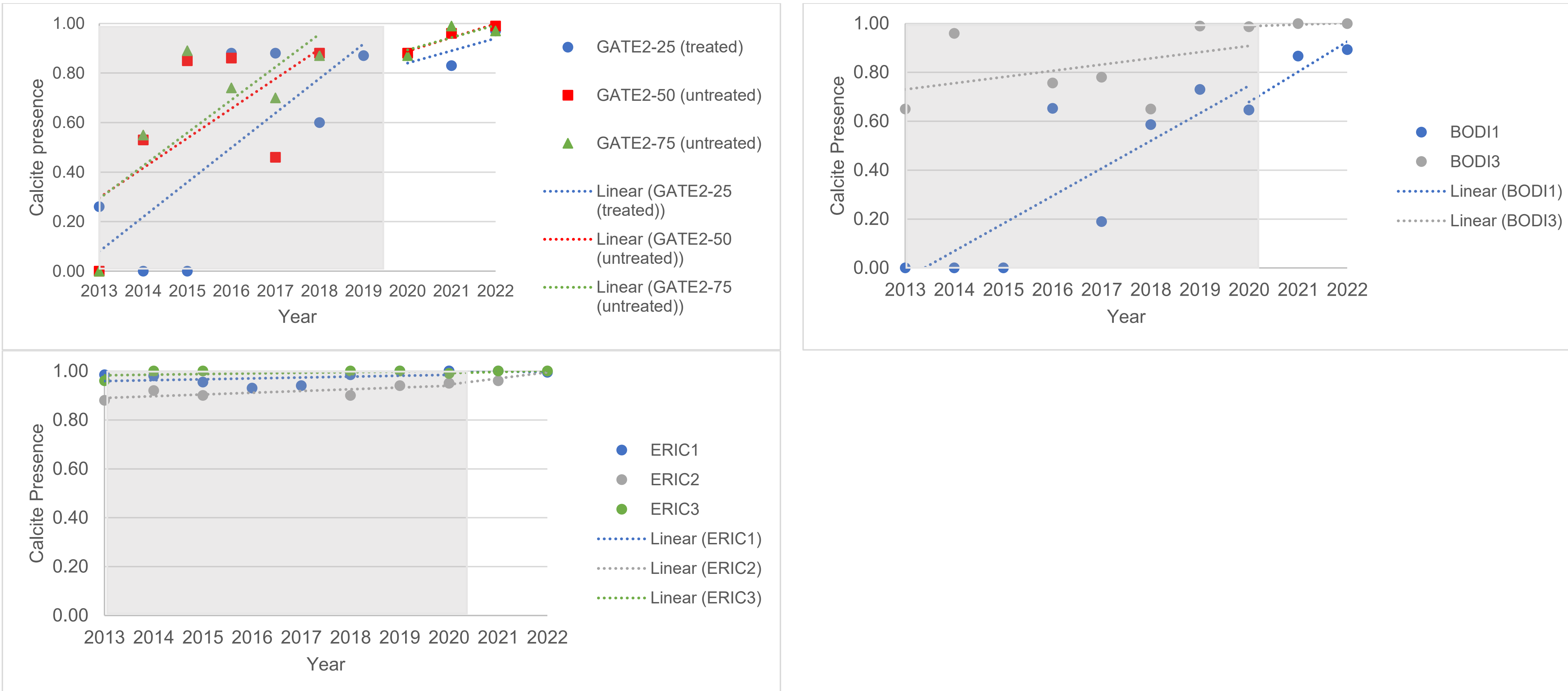

Figure 13. Treated reaches in Gate Creek (2020), Bodie Creek (2020) and Ericson Creek (2020) Cp score. Lines represent linear trend lines pre- and post-treatment (shaded areas indicates untreated timeframe).

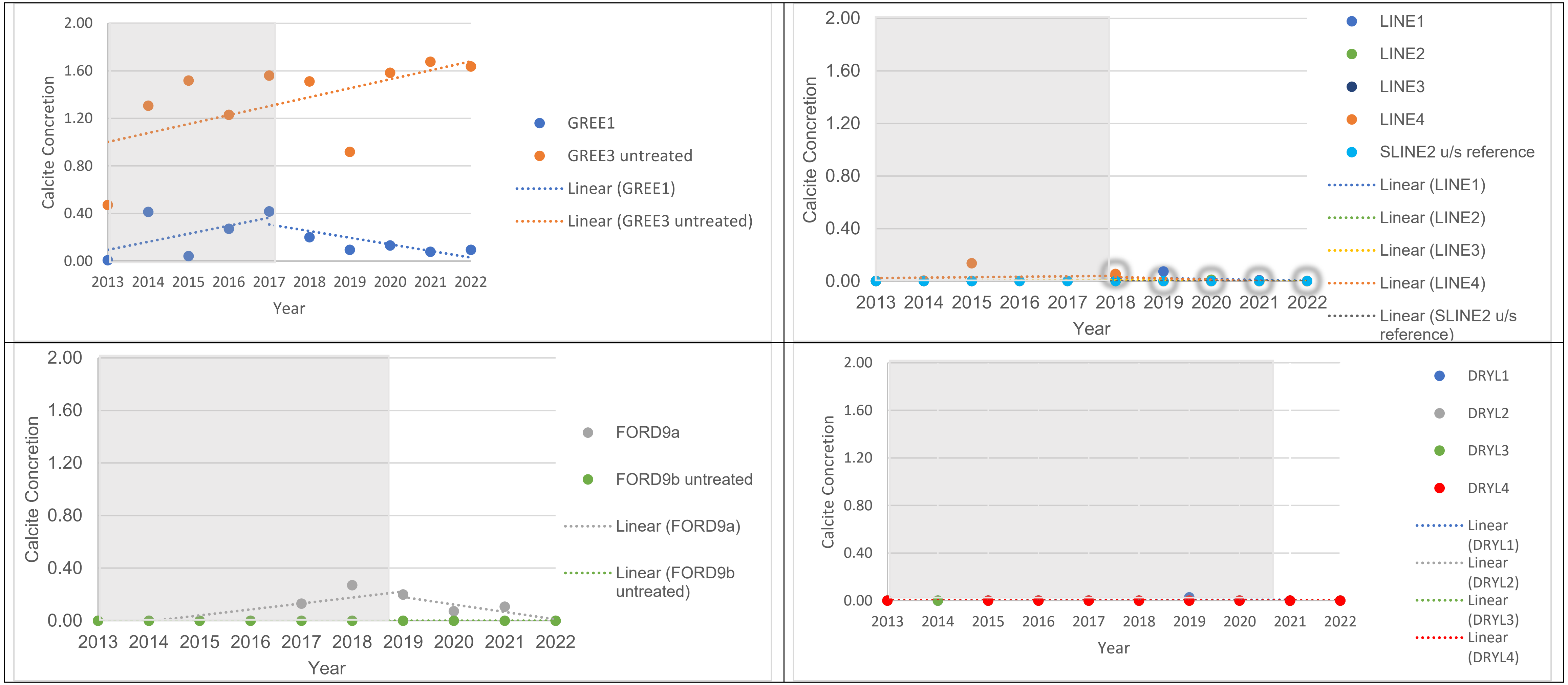

Figure 14. Treated reaches in Greenhills Creek (2017), Line Creek (2018), Fording River (2019) and Dry Creek (LCO) (2021) Cc score. Lines represent linear trend lines pre- and post-treatment (shaded areas indicates untreated timeframe).

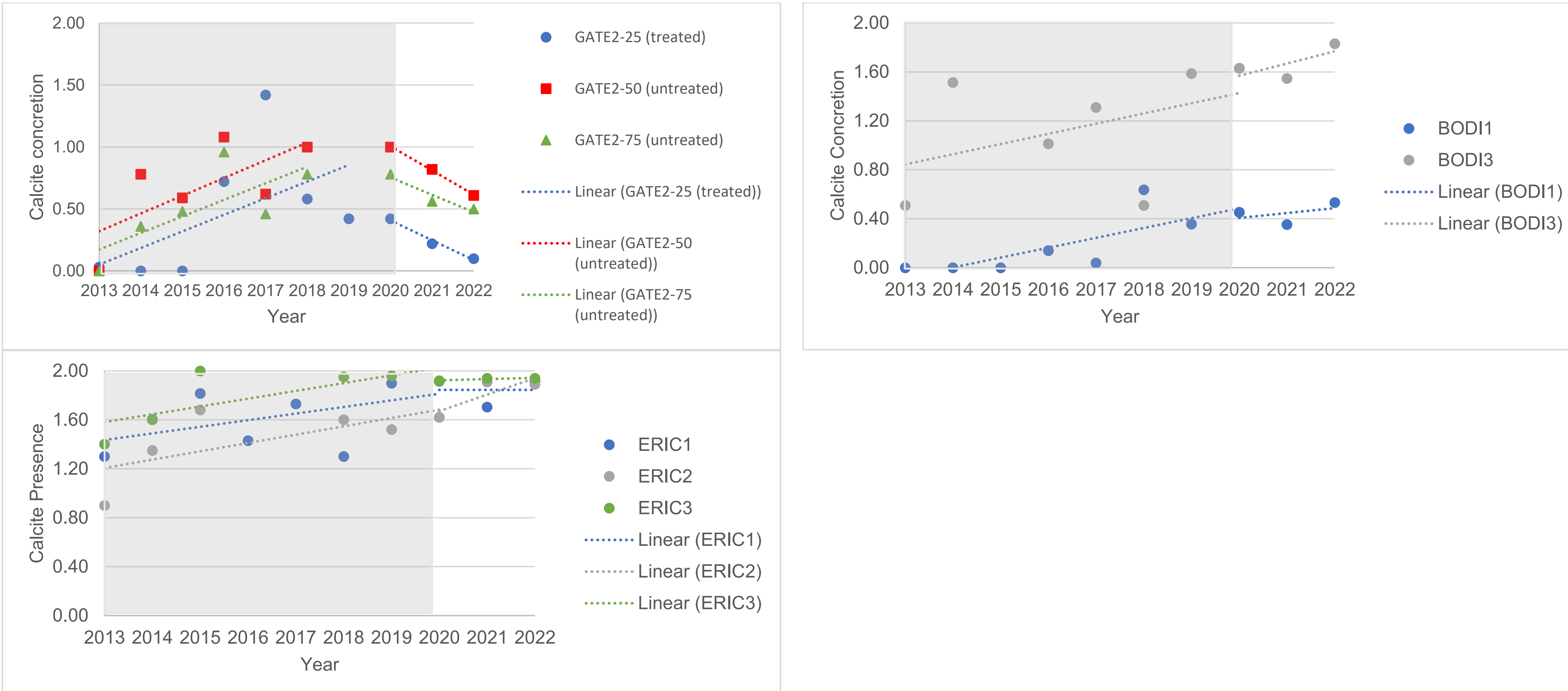

Figure 15. Treated reaches in Gate Creek (2020), Bodie Creek (2020) and Ericson Creek (2020) Cc score. Lines represent linear trend lines pre- and post-treatment (shaded areas indicates untreated timeframe).

3.7 Effect of habitat unit type

Twenty-six reaches included pebble counts from at least one pool, riffle, and glide, and were included in this pooled analysis. Together these reaches contributed 55 glides, 51 pools, 57 riffles, and 37 cascades. Like previous years habitat unit was found to have no significant effect on calcite index ($p>0.74$; df=200). Tukey post hoc analysis there were no significant differences in calcite index among pools, glides, riffles, or cascades (Figure 16). These results are consistent with the same analysis in 2020 and 2021 for all habitat units except for cascades, where Tukey post hoc analysis indicated that the calcite index in cascades was significantly greater than all other units.

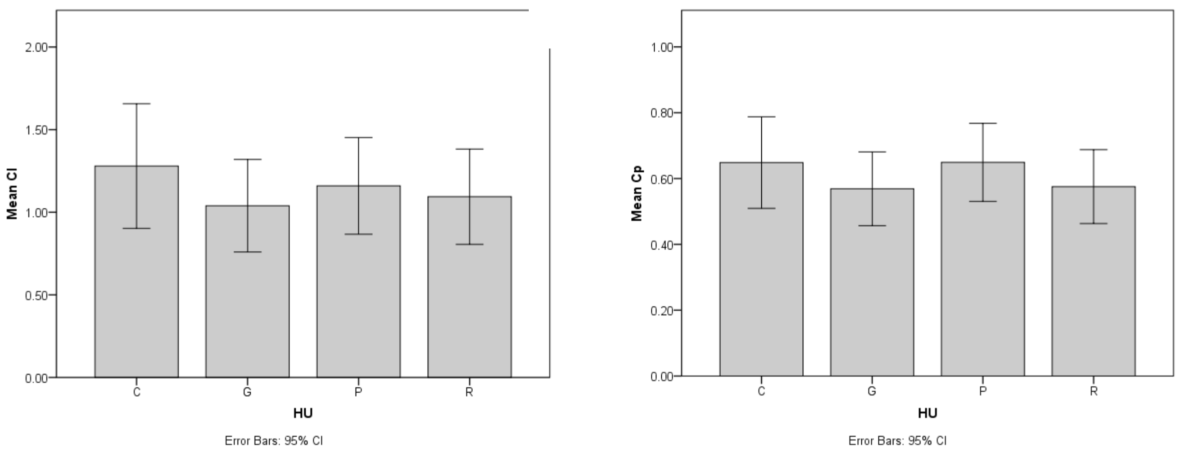

Figure 16. The mean calcite index and calcite presence values for different habitat units. Error bars represent 95% confidence intervals.

3.8 Inter-program comparisons

Regression analysis found all pairings of Teck programs to have good agreement in 2022. R^2 values ranged from 0.86 to 0.93 (Figure 17). The slopes of these relationships were near 1.

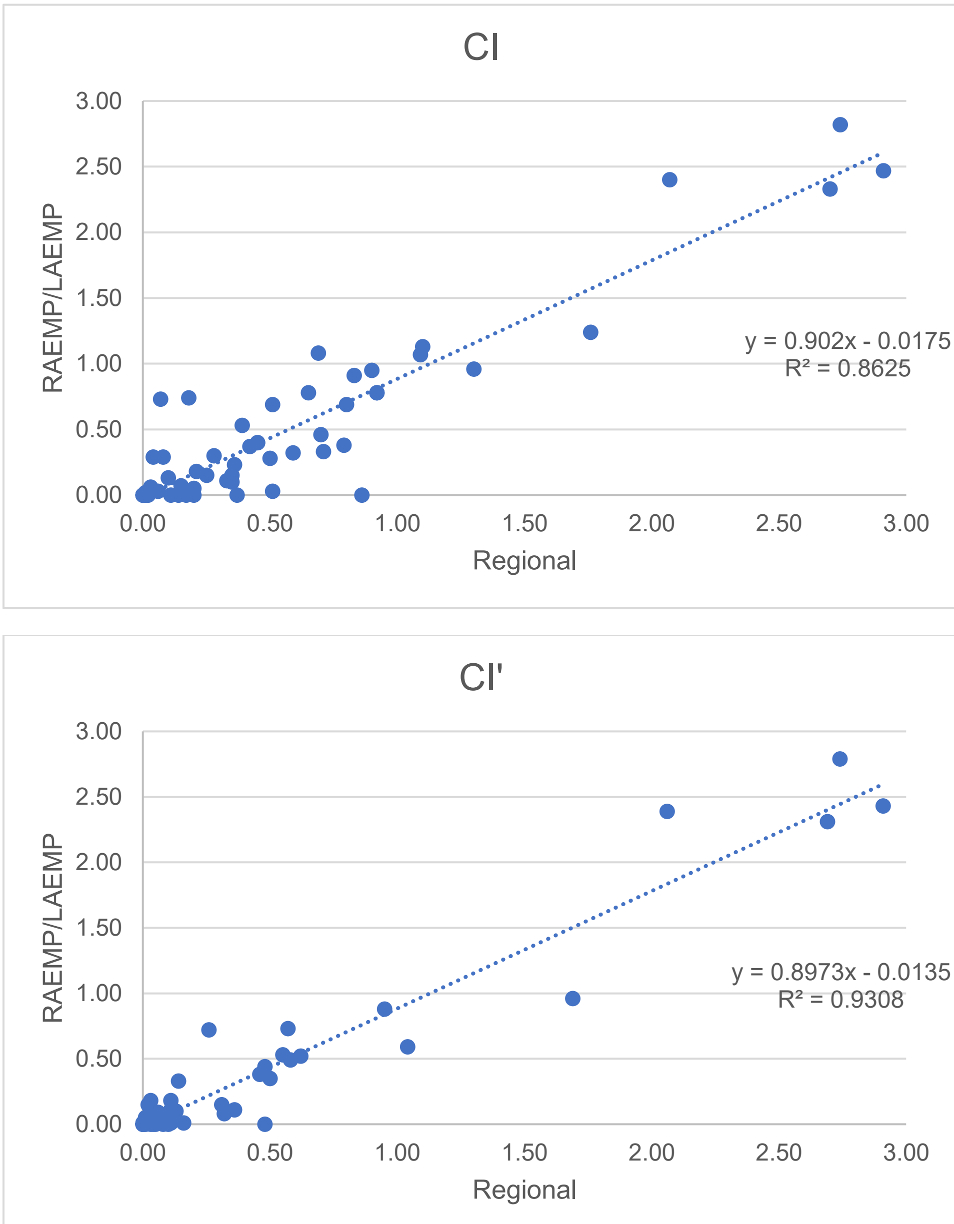

Figure 17. Regression plots of CI' (the calcite index calculated using Cp') by Teck monitoring program (black line is 1:1).

The statistics from the 2022 regression analysis suggests a meaningful improvement in the agreement of these programs since the training workshops were implemented in 2019 (Table 10). The Regional-RAEMP/LAEMP pairing provides four years of comparison. Since 2019, agreement of each metric (CI, Cp, and Cc) has been shown to have greatly improved and have held constant when comparing 2021 to 2022. Cp' and CI' have also seen greater agreement from 2021 to 2022.

Table 10. Program comparison shown as linear regression line and r^2 values.

Comparison	Metric	Linear regression fit line	2022 r^2	2021 r^2	2020 r^2	2019 r^2
Regional-RAEMP/LAEMPs	Cp	y= 0.83x + 0.01	0.64	0.67	0.75	0.23
Regional-RAEMP/LAEMPs	Cc	y= 0.88x - 0.00	0.92	0.94	0.71	0.48
Regional-RAEMP/LAEMPs	CI	y= 0.90x + 0.00	0.86	0.85	0.77	0.3
Regional-RAEMP/LAEMPs	Cp'	y= 0.86x - 0.01	0.84	0.66	-	-
Regional-RAEMP/LAEMPs	CI'	y= 0.90x - 0.01	0.93	0.87	-	-

* RAEMP/LAEMP did not collect Cp' prior to 2021

Historically, the Regional-RAEMP/LAEMP comparison showed some discrepancy between programs, and while substantially improved in 2021, and maintaining that improvement in 2022 with an r^2 of 0.86, some reach-level differences remain. Still notable were differences at FORD2, FORD7, GRAV1, MICH4, THOM2, THOM3 and UTHO1.

BODI1 was omitted from analysis due to site conditions and methodology differences. BODI has a high amount of fines present in glide and pool habitats, which are very unstable compared to the gravel and cobble substrate in riffles. Calcite readily accumulates in the cobble and gravel substrate of riffles, particularly due to them being stable. The fine substrates in the glides and pools are likely mobilized yearly during freshet, reducing their exposure time to accumulate calcite. Due to the RAEMP/LEAMP programs only sampling riffles following the CABIN protocol, compared to the Regional calcite program that samples any habitat unit within the 100 m transect, large differences in Cc, Cp and CI scores are routinely recorded at this site.

3.9 Proportional calcite presence

As noted in Section 3.8, agreement between programs improved when using CI' (r^2=0.93) compared to CI (r^2=0.86).

CI' was also found to reduce Regional inter-crew variability. Crews differed on average by 0.08 in CI and 0.06 in CI' (Figure 18). This was not found to be significant (p=0.61, df=32).

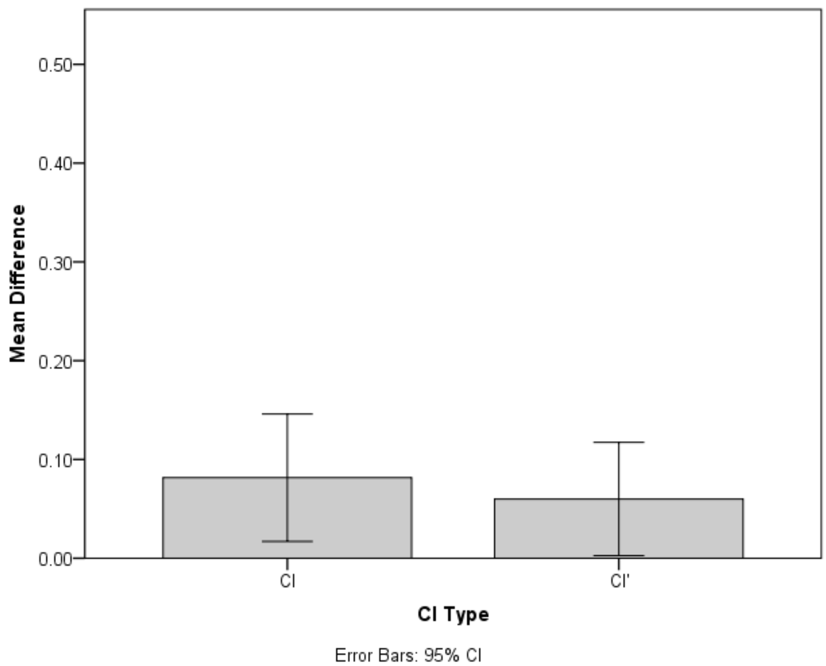

Figure 18. Mean difference in CI between Regional crews when using CI versus CI'.

3.10 Reference condition assessment

The Regional Calcite monitoring program aligns reference sites with the Regional Aquatic Effects Monitoring Program (RAEMP) annually. Reference watersheds were re-evaluated in 2022, specific to reference reaches identified by the EMC, for mine influence in the 2022 Regional Calcite Monitoring Report consistent with the RAEMP approach to evaluating reference areas. The RAEMP screens water quality data to validate reference conditions status. In addition, waste rock locations were overlayed with watershed areas and found that none of the reference streams have waste rock within their watersheds. Reaches identified as reference in this report are considered accurate.

3.11 Evaluation of observations of concretion in the Fording River

Observations of calcite concretion (Cc) has been documented in some sites within reaches in the mainstem Fording River. Low levels of concretion were observed early in the program in Fording River reaches 6, 7 and 8 (all immediately downstream of Fording River Operations (Figure 19**Error! Reference source not found.**). By 2022, low levels of Cc were observed in Fording River reaches 2-7, 9a, 9b and 10. Overall, Cc in some reaches or the Fording generally increased from 2013 to a high in 2020, after which concretion has been stable or slightly decreasing. Following Mann-Kendall analysis of Cc data from 2013-2022, FORD2 is the only reach showing a statistically significant increase. Additionally, ANOVA analysis did not detect any statistically significant increases or decreases in any of the Fording River reaches from 2021 to 2022. These results suggest that overall, concretion has stabilized and remained stable in the Fording River since at least 2020 and in most reaches, since 2013.

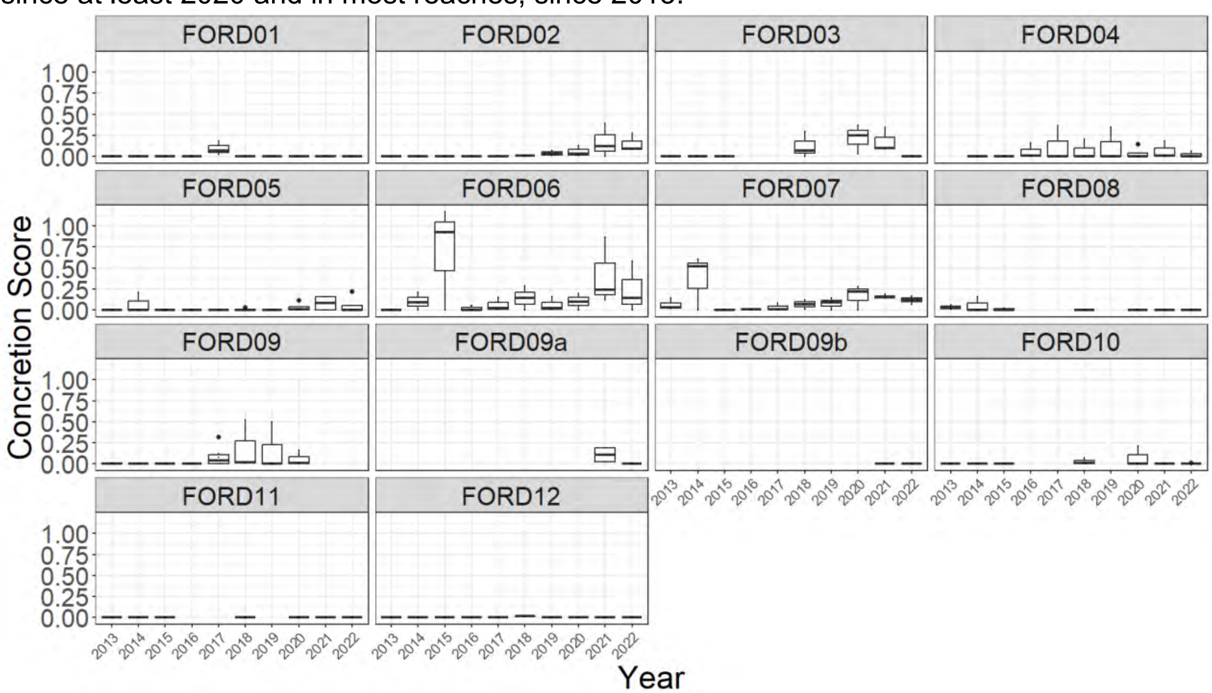

Figure 19. Reach mean concretion (scores range from 0-2) in the Fording River over time (2013-2022). Sites ordered from downstream (FORD01) to upstream (FORD12 Reference).

3.12 Site Density and Within Site Variability

Site density (i.e., sites/km) was calculated for all reaches with multiple sites. In general, site density was higher for tributary streams compared to mainstems (i.e. Fording River, Elk River and Michel Creek), with mainstem reaches not exceeding two sites per kilometer. The lower site density in mainstem reaches introduces potential uncertainty. For example, the Fording River mainstem reaches are both in a range of CI that exhibit high within-reach variability and have low site density. The effect of site density on within-reach variability would be expected to show as a negative relationship between these two variables (i.e., variability would decrease with increased site density). However, preliminary assessment of Cc standard deviation appears to be more strongly affected by CI (Figure 20).

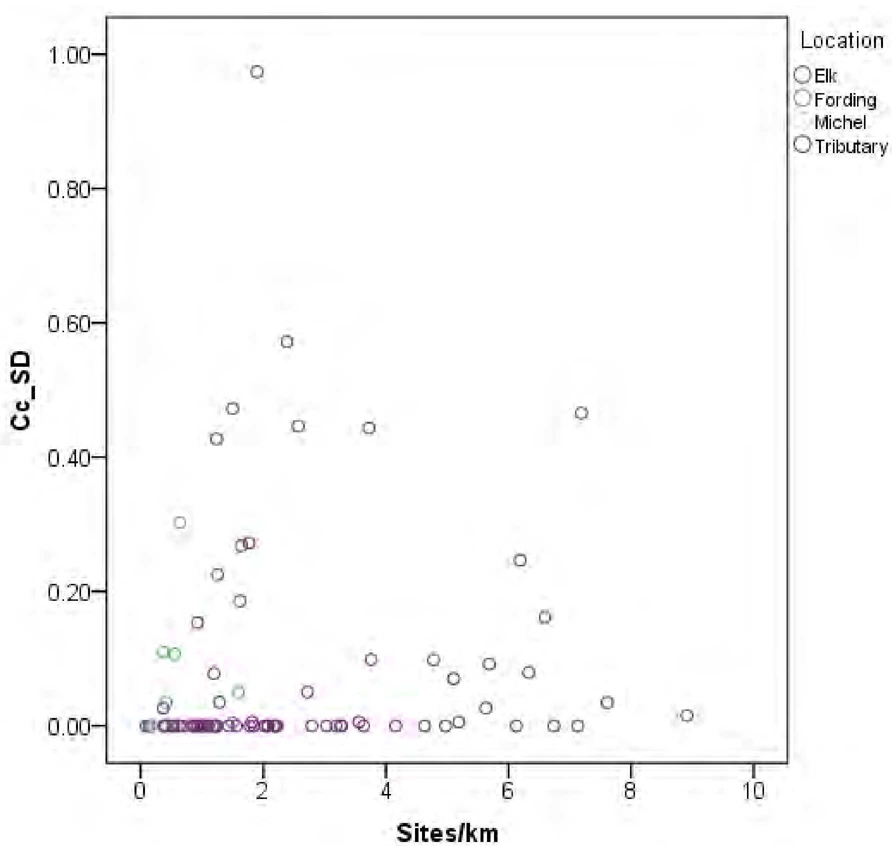

Figure 20. Mean concretion standard deviation plotted against Sites/km

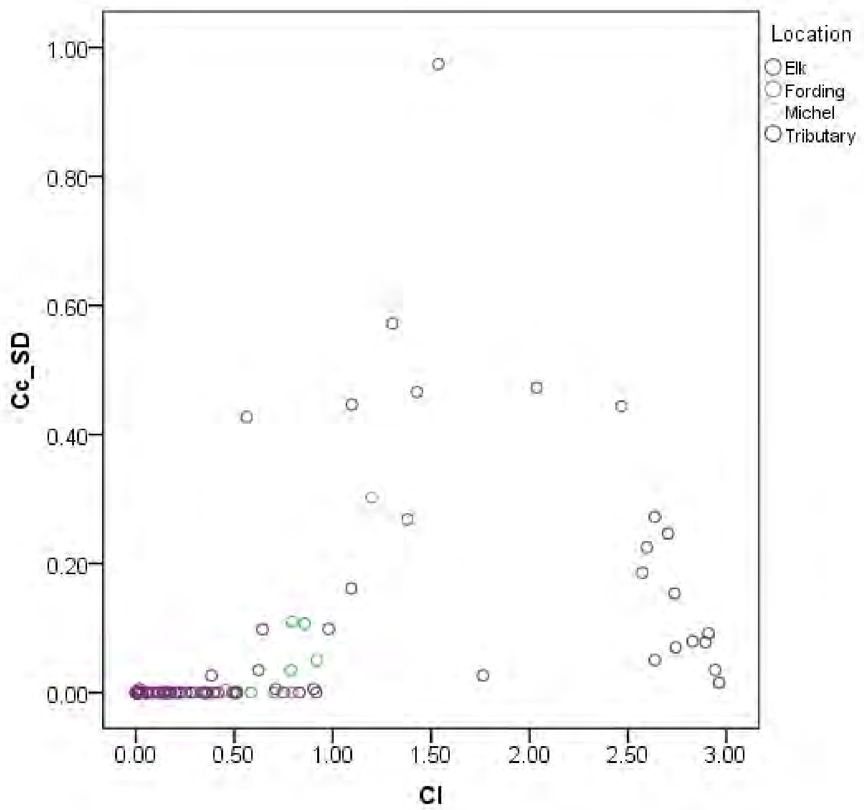

Figure 21. Mean concretion plotted against CI

4 Discussion

4.1 2022 General results

The 2022 Regional Calcite Monitoring Program was the tenth year of this program. The program was successfully completed as per the scope of work with only minor modification (i.e. substitution of MICK2 and MILL2 by MICK1 and MILL1, respectively). Overall stream kilometers sampled was up slightly for exposed tributary streams, remained constant for exposed and reference mainstem, and decreased for reference tributary. Total number of reference tributary reaches sampled was less than in 2021 due to the historical reference reach comparison removed based on EMC input. Some reference tributaries remained included to have proper reference stream representation in every MU, leaving total reference tributary streams sampled higher than any year prior to 2021.

4.2 Assessment of reference reaches

The reference reach re-assessment was added to the scope to address input received from the EMC. Reference streams were screened through the RAEMP to validate reference condition status and the two reference streams of concern (Alexander and Chauncey Creek), remain within reference conditions.

4.3 In absence of a major hydrological event, are calcite metrics returning to a pre-2013 state as proposed by Robinson et al. (2022)?

Calcite deposition has been reported as increasing in both exposed and reference reaches since 2013. This was again reported in 2022, however the overall rates of change since 2013 were lower than reported in 2021. Robinson et al. (2022) suggested a potential asymptote in CI trends after observing the 2021 data. They proposed an explanation that modified the flow hypothesis to state that while flow can affect the degree and extent of calcite, a large flow event (e.g., >1-in-10 return interval or larger) is likely required to produce a detectable reduction in calcite. Robinson et al. (2022) went on to propose that calcite values were possibly leveling off to a pre-2013 level, meaning that water quality is ultimately controlling the degree of calcite observed in a given reach, in absence of a large flood.

The results of 2022 support this hypothesis by documenting another year of negligible change at a valley wide scale. It also demonstrated reduced counts of new reaches with either significant linear or stepwise increases. Collectively these different assessments point towards a reduction in the rate of increase of calcite index throughout the valley and reaching of an equilibrium based on reach specific water quality and support the pre-2013 state hypothesis.

4.4 Is calcite treatment effective at limiting additional calcite precipitation?

Calcite treatment has been implemented since 2017 in GREE1, 2018 in Line Creek, 2019 in FORD9a, 2020 in Ericson Creek, Bodie Creek and GATE2-25 and treatment started in 2021 for Dry Creek (LCO). Overall, increasing trends in CI appear to have declined following treatment relative to untreated reaches upstream but the effects of antiscalant addition are uncertain. It appears that treatment is having a positive effect on Cc <1.00, as shown in data from GREE1 and FORD9a, while data from reaches that have Cc>1.00, have held stable or have been increasing (ERIC1, BODI3). Data from GATE 2 is inconclusive, as overall Cc has been decreasing since the start of treatment, but treated and untreated sites have been decreasing at a similar rate.

The effectiveness of treatment to prevent additional calcite deposition increases in calcite presence is uncertain, but data to date suggests it may be occurring. While some reaches appear to show a levelling off post-treatment, others may be mirroring the overall trends seen in both reference and exposed reaches throughout the study area. It should be noted that treatment has been inconsistent in Bodie Creek and Gate Creek in 2021 and Ericson Creek did not receive discharge from the EVO SRF during April-October 2022. The Calcite Operations 2022 Annual Performance Report provides a more detailed localized evaluation of treatment effectiveness.

Results are inconclusive on this question but suggest a positive effect.

4.5 Do calcite training workshops reduce inter-crew and inter-program variability?

Inter-program comparisons produced good agreement as observed in 2020 and 2021; each of these years including a calcite training workshop. Results from the 2022 program suggest that these workshops are effectively helping to reduce inter-program variability.

4.6 Does using Cp’ reduce observer variability relative to Cp?

Cp’ has been found, for a third year, to significantly reduce inter-crew variability. Variability was reduced both within the Regional Program and between Teck programs. Incorporating Cp’ may be one option remaining to reduce the remaining crew sampling error, as it more accurately represents low calcite presence scores. Cp has generally been the factor where most disagreement is between Regional and REAMP/LAEMP programs, and Cp’ reduces that agreement substantially.

Future monitoring should use Cp’ as the primary calcite presence metric.

4.7 Do reaches with lower site density (i.e., mainstem reaches) exhibit more inter-site variability?

Data suggest that the degree of calcite (i.e. CI score) is a larger factor affecting within-site concretion variability and not the sites/km ratio. However, lower site density in mainstem reaches introduces potential uncertainty when applying a reach average approach. The preliminary assessments of standard deviation of Cc by site density is inconclusive to evaluate if monitoring is effectively capturing site conditions when site density is low. Additional monitoring data will be collected to evaluate if current monitoring methods are able to capture spatial variability in mainstem reaches.

5 Conclusions and Recommendations

Generally, calcite metrics in 2022 have increased significantly in both mine-influenced and reference streams throughout the study area compared to 2013; however, ongoing monitoring suggests both reference and exposed reaches are stabilizing in recent years. Exposed tributary stream continue to be the most highly impacted, although the total number of kilometers impacted remains similar to 2021. Several exposed mainstem reaches have decreased from the CI 1-2 bin to the CI 0.5-1 bin, driven by slight decreases in the Fording River. Reference mainstem and tributary streams have remained similar to previous years. The overall distribution of calcite by general degree categories (i.e. low, moderate, high) has remained relatively unchanged over the course of Program (2013-2022). Overall, twenty percent of reaches (n=26) had a mean calcite concretion score >0.5, which is a slight decrease compared to twenty-four percent (n=30) in 2021 (this does not take fish habitat status into consideration).
We make the following recommendations to the 2023 Regional Calcite Monitoring Program:

1. Conduct the Program in 2023 at the same exposed sites sampled and following the same methods used in 2022 starting in mid-August.
2. Continue to sample Cp' and include trend analysis for years and reaches with available Cp' data. Complete a comparison of the Cp' results to Cp for the available reaches.
3. Investigate back calculation of Cp' from a relationship between various calcite metrics and rerun trend analysis to determine if Cp' can be the sole presence indicator going forward.
4. Begin the 2023 field season with an inter-program workshop.
5. Continue with Regional Calcite Monitoring Program quality assurance/quality control protocol.
6. Habitat unit has been found to not be a significant factor for three consecutive years, we suggest removing this analysis from the 2023 report.
7. Include the physical treatment areas in Clode Creek and add Greenhills Creek Reach 3 into a site, in order to monitor any changes over time.
8. Review monitoring locations with Teck to determine if any additional monitoring requirements are needed, in particular mainstem Fording River reaches.

The Regional Calcite Monitoring Program will be conducted in 2023 following the methods as required under section 8.5 in Permit 107517 and recommendations identified in this report will be considered or 2023 field season.

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7 Appendices

Appendix 1. 2021 Calcite Field Sampling Manual (Gordon and Robinson 2021).

Teck Coal Ltd
Regional Calcite Monitoring Plan

Field Manual

2021 Version
May 2021

Prepared by

Lotic Environmental Ltd.
2193 Mazur Road
Cranbrook BC
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1 Purpose and Scope

This document provides details on the field sampling protocol developed for Teck Coal Ltd. (Teck) Regional Calcite Monitoring Program (2021 update). This monitoring program has been completed annually as part of Teck's overall calcite management strategy since 2013. The results are used to describe the degree and extent of calcite deposition downstream of Teck Coal mine operations and to inform Teck's adaptive management of calcite.

This manual describes how calcite surveys are completed in the field under the Regional Calcite Monitoring program. Annual work plans provide additional detail on what streams/reaches to sample, how many sites to sample within each reach, and where to locate sites within each reach. This manual is intended to act as a reference for field crews. Information on site locations, data analysis, and reporting are not discussed here.

2 Background

There are three metrics pertaining to calcite assessment – calcite presence, calcite concretion, and calcite index. Calcite presence is the amount of calcite on a rock and is currently described by calcite present = 1 or calcite absent = 0. A new method of calcite presence is being trialed, where presence will be described by 10% increments of surficial coverage (0.1, 0.2, 0.3, etc.). For instance, a rock with 50% surficial coverage of calcite on all surfaces would get a score of 0.5. Calcite concretion is the amount of resistance due to calcite formation when picking up a rock from the streambed. Resistance is relative to a reasonable amount of effort an observer uses to remove a rock from the streambed by hand. A score of 0 indicates no resistance, 1 indicates some resistance but still movable, and 2 is non-movable or in other words fully concreted to the streambed. The calcite index score for each rock is the addition of calcite presence and calcite concretion scores and can range from 0-3.

The Regional Calcite Monitoring program has undergone continuous assessment and evaluation to improve its function in describing the degree, extent, and trends of calcite deposition. This has occurred in each annual report, as well as with one major assessment after Year 3 of conducting the program (i.e., 2013-2015 review). The 2021 calcite monitoring protocol manual builds from the existing methods developed in 2013 and 2016. Key updates to the 2021 protocol include:

1. Trial of new calcite presence metric (Cp') – Calcite presence will be recorded using bins representing 10% increments of surficial calcite coverage of an individual particle. These data are collected in a way that allows for this proportional method to be trialed for a second year, while remaining the ability to report as the binary “yes/no” presence as done in all years prior to 2020. See Zathey et al. (2021)[1] for a more comprehensive discussion on this trial;
2. Replacement of an initial calcite inspection with a mandatory 100-particle pebble count at each site;

[1] Zathey, N., Mitchell, S., and M.D. Robinson. 2021. Teck Coal Ltd. 2020 Calcite Monitoring Program Annual Report. Prepared for Teck Coal Ltd. by Lotic Environmental Ltd. 55 pp + appendices.

3. Clarification of how fines, pure calcite, and moss are treated when selected during a pebble count; and,
4. Updates following 2020 Calcite Program audit:
    a. Standardization of the number of sites per reach, three (3) sites where reach length is >300 m, one (1) site when reach length is <300 m. Robinson and Atherton (2016) suggested a variable number of sites per reach (i.e., 1, 3, or 6). The increase to 6 at intermediate Calcite Index values has not produced the intended improvements in monitoring of trends.
    b. Change of site sketch to optional where the sampler requires additional means of conveying a notable field observation.
    c. Continued standardization of collection methods as documented in Section 3 of this manual.
    d. Updated QA/QC to include:
        i. Field sampler training and documentation of attendance.
        ii. Duplicate sampling of 10% of sites.
        iii. Preliminary entry and review of current year's data against previous years to identify potential anomalies.

3 Procedures

These procedures outline the protocol a sampling crew will follow. In some instances, additional analyses of program components were required specifically for this year's update. In particular, the number of rocks sampled per site and the number of sites sampled per reach required additional analyses. The results of these are included in Appendix 2.

All sampling must be completed under a current, approved safe work plan (Teck's EHSC) specific to the mine operation or Teck's regional operating area. Equipment required for this sampling includes:

- Blank Calcite Index Data Sheet, printed on waterproof paper (Appendix 1)
- A calcite scratcher – this could be a rock hammer, a metal ruler, or a small metal ruler.
- Rubber boots or hip/chest waders appropriate to the stream conditions
- Camera and GPS
- Gloves of a suitable length appropriate to the temperature conditions
- Other PPE as appropriate to the field conditions and safety plan

3.1 Site selection

The initial calcite monitoring program proposed a target of three sites sampled per reach, those being at 25, 50, and 75% of the reach length. To address higher within-reach variability at intermediate calcite index score, Robinson and Atherton (2016)[2] proposed increasing the number of sites to six between CI 1-2. Upon reassessment of this requirement, the need for a variable number of sites per reach is now considered unnecessary and produces more inconsistency in data collection than providing benefit (see Appendix 2). As such, sampling in 2021 will return to a

[2] Robinson, M.D. and K. Atherton. 2016. Teck Coal Ltd – 2016-2018 Calcite Monitoring Program. Prepared by Lotic Environmental Ltd. and Teck Coal Ltd.

standard of three sites sampled per reach where the reach length is long enough to permit this without the risk of overlapping sites. This was defined as 300 m long. Reaches less than 300 m long will be sampled with one site.

3.2 Field procedure

Pebble counts will be completed by a two-person crew. Each crew will be led by a person experienced in conducting aquatic habitat surveys. Both crew members will be trained in all tasks of this sampling protocol and may complete any of these throughout the field program. One crew member will be instream sampling rocks (100 in total) and one crew member will be onshore as a recorder. See Appendix 2 for additional information on the need to sample 100 rocks per site. These roles will be identified on the field sampling forms. The following steps will be completed:

1. Familiarize yourself with the location. Review prior site descriptions and calcite score if available. Use maps and GPS coordinates to find the start location to ensure the data is collected from the same location.
2. Examine the stream prior to entering it to conduct the pebble count. Identify the different habitat types[3] (riffle, cascade, pool, and glide) present. Determine the sampling path, a zig zag transect through the stream should cover the entire cross section and all habitat types present. Sampling representative habitat and habitat variability is important. While no minimum sampling distance is required, a sampling path typically covers approximately 100 m.
3. Beginning at the downstream end, the sampler is to enter the stream and haphazardly select substrate to sample by touching the stream bed at the end of their toe with their index finger. The sampler will select substrate within the wetted width of the stream only, dry particles will not be sampled. If the substrate is within the wetted width but exposed to air sample the particle if presence can confidently be determined. Sampling depth is limited to safely wadable water approximately an arm's length deep. The sampler is to determine the substrate type (i.e., rock, fines, moss, calcite) and if:
    a. Rock, and movable, proceed to step 4.
    b. Rock, and too large to remove, determine if calcite is present by attempting to collect scraping from the surface. If calcite presence/absence can be confidently obtained, then proceed to step 4. If the sampler cannot confidently assess calcite presence or concretion, then abandon and proceed to next particle.
    c. Rock with moss coverage, If the shape of the rock can be visually determined through the moss sample the rock, proceed to step 4. If the shape of the underlying substrate cannot be visually determined sample the moss, proceed to Step 3f.
    d. Fines (silt, sand, clay), if there is a thin layer (less than ~1 cm) of sediment on top of a rock, select the underlying rock.
    e. Fines (silt, sand, clay), calcite presence in fines is scored by Cp (0 or 1). If there is a thick layer (greater than ~1 cm) of sediment particle, pinch the fines between thumb and forefinger. If the fines contain obvious calcified conglomerates in loose sediment, then assign sore of = 0 (no concretion) and 1 (presence). If not obviously present, assign 0 (concretion) and 0 (presence). Fines will not be examined for

[3] Habitat units will follow definitions provided in a level 1 fish habitat assessment (Johnston and Slaney 1996).

individual flakes of calcite. Examine the material for a top layer of concreted particles (calcite crust[4]). If crust present, then assign score of = 1 (partial concretion) and 1 (presence). If fines are unable to be removed, then assign = 2 (full concretion) and 1 (presence).

f. Moss, remove portion of moss and determine if calcite is present. Calcite presence in moss is scored by Cp (0 or 1) If calcite deposit is present, then assign score of = 0 (no concretion) and 1 (presence). If not present, assign = 0 (concretion) and 0 (presence). If the moss was removed with calcite-induced resistance assign score of = 1 (partial concretion) and 1 (presence) If moss is fully encrusted and is unable to be removed, assign score of = 2 (full concretion) and 1 (presence).

g. Calcite deposit/pure calcite (mobile or concreted), treat as rock and proceed to step 4

4. The following observations are recorded for each particle (rock or pure calcite) on the pebble count form (Appendix 1):

   a. **Calcite concretion** – Was the particle removed without calcite-induced resistance (0)? Was the particle removed with any noticeable amount of force to overcome calcite-induced resistance (1)? Was the particle non-movable or fully concreted by calcite (2)? Resistance may be caused from factors other than calcite (e.g., embeddedness in fines). Each rock with resistance noted will have the underside of the rock examined for evidence of concretion in the form of a calcite deposit "ring" or smaller particles still attached (Figure 1). For rocks too large to move, examination for concretion can be accomplished by attempts to remove the adjacent movable particles.

Figure 1. Partially Concreted Sample. Note calcite on the left side edge, which has extended beyond the substrate sample.

   b. **Calcite presence** – Examine all sides of the particle selected. Does the individual particle have calcite deposition? No = 0, if yes, record the percent of the rock

[4] A calcite crust is a detectable hardened outer shell that the observer feels their finger break through before touching the underlying fines. A crust can often be extracted by slipping your finger underneath and pinching while lifted up. Once extracted, it can easily be confirmed as calcite crust by being a thin, brittle layer.

surface area covered as a decimal to the nearest 10^{th} percentile (0.1, 0.2 0.3, etc.). If calcite breaks off of the particle while being removed, calcite presence will be determined by the remaining coverage on the particle. Moss and thick deposits of fines are scored as discussed in Step 3.

Calcite presence can be challenging to detect. The most effective measure to address this is for the surveyor to attend annual training hosted by Teck and to have an experienced observer assist with initial surveys to calibrate records of presence. Refer to Section 4 for additional information on determining calcite presence.

c. **Habitat type** – Record habitat type choosing between pool, riffle, glide or cascade. Acceptable habitat unit categories are pool (P), riffle (R), cascade (C), and glide (G). Refer to the level 1 Fish Habitat Assessment Procedure definitions for more clarity (Johnston and Slaney 1996).

5. Complete the calcite field form to document date, site location, coordinates, photo numbers, and type of calcite observed:

    a. Photos are taken facing upstream and downstream of the site sampled. Take two photos of rocks/substrate sampled, one rock with calcite present and one rock with calcite absent (if possible), that best describe conditions of this site. For example, in a site with low levels of calcite, do not choose the rock with highest coverage of calcite, but one that best reflects an average rock. If all rocks have calcite present, chose a variety of calcite coverage. If different forms of calcite are encountered, take additional photos.

    b. Record the dominant and co-dominant types of calcite. Section 5 Forms of calcite, further describes each type of calcite that may be encountered.

6. Calculate the mean for the totals of all 100 rocks to get the site average calcite concretion, calcite presence and calcite index scores. Report the results at the end of each field day for office verification relative to data collected from previous years. If a large discrepancy (i.e. >0.5) is found in the calcite index score compared to previous years a second crew will visit the site for QA/QC to confirm calcite index score.

$$Cp = Calcite\ Presence = \frac{Sum\ of\ stones\ presence\ scores}{Number\ of\ \text{stones}\ counted}$$

$$Cc = Calcite\ Concretion = \frac{Sum\ of\ stones\ concretion\ scores}{Number\ of\ stones\ counted}$$

$$CI = Calcite\ Index = Cp + Cc$$

4 General guidelines for calcite presence

Calcite training has been completed for each annual monitoring program since 2013 and more recently, crew leads of the regional program are providing training to other Teck calcite programs. Calcite presence has routinely provided the most variability between crew members and becomes most challenging at low levels of calcite deposition. The following are some general guidelines used to assess whether calcite is present on the surface of the rock being sampled. These are guidelines and no one item is diagnostic:

1. Before sampling, does the streambed have an "orange", oxidized colour? Most calcite deposits have this colour. However, some can be grey to black.
2. Scratch rock with a metal tool to see if a crust can be removed. Calcite is a brittle mineral that will tend to hold its shape, and will typically leave a white scratch, showing a scale breakup. Many rocks will also scratch but will show minimal depth and lack a scale breakup. Algae is soft and malleable. Calcite and algae are most often confused. Silty conditions can also prove to be confusing. Some rocks will scratch even without calcite present. A scratch alone does not confirm calcite.


Figure 2. (Left) Light thin scratches, no discernible depth or material. No calcite present. (Right) Thick, chalky scratch with depth. Calcified algae

3. Does an appreciable amount of material scrape off the surface? Is there enough to roll between fingers to assess texture? If not, it is unlikely that calcite is present.
4. If you could only choose one, does the material scraped off feel like plant-matter (i.e., smooth, slippery, will roll or form into a ball) or mineral (i.e., gritty, chalky, brittle and/or flakey)?
5. Does the rock possess a firm, elevated "ring" at the interface between the surface exposed to water and the point where the rock entered the interstitial material? Calcite will form a ring here as it becomes more extensive.

5 Forms of calcite

The dominant form of calcite must be recorded on the pebble count form. Below are descriptions and photos of all the types of calcite that may be encountered (forms and definitions from Vast 2013[5]):

[5] Vast. 2013. Calcite Monitoring Program – 2012 Field Assessment (Elk Valley). Prepared for Teck Coal Ltd. Prepared by VAST Resource Solutions. 131 pp.


Calcified algae - lumpy, soft, chalky coating on the substrate of a stream.


Calcareous laminate - an advanced stage of calcified algae. The streambed is hardened into a uniform surface.


Calcified moss/tufa - can range from soft easily broken apart to a solidified mass of moss tufa.

Barrage tufa - barrier-like growths extending cross-channel to block normal water flow.

Calcite scale - a relatively thin, crystalline coating, which is homogenous in texture.

Insect tufa - formed by encrustation of the larval caddis fly cases by calcite precipitation.

6 Training

Anyone collecting calcite index data for the first time is, at a minimum, to review calcite conditions in the field with a more experienced person; to review what calcite is, the diversity of calcite deposits, and how to complete a count. It is recommended for all personnel collecting calcite data to attend the annual training session hosted by Teck. Lotic Environmental will lead the training session on behalf of Teck and will document all attendees in the annual Regional Calcite Monitoring report.

In addition to this, Lotic Environmental will hold its own crew calibration day at the onset of the Regional Calcite Monitoring program. Attendance here will also be documented in the annual Regional Calcite Monitoring report.

7 Quality assurance and quality control (QA/QC)

Data quality will be controlled during the field program by:

1. Attending the annual calcite training course held at the beginning of the field season. At a minimum, all crew leads who will be conducting calcite sampling will attend the annual calcite training course. All crew members will be encouraged to attend the training course. This will ensure each crew is familiar with different types of calcite and sampling procedures. As well, a crew calibration day will occur at the start of the regional program. Attendance will be documented in the annual regional calcite monitoring report.
2. To assess inter-crew variability, 10% of sites will be randomly selected for duplicate sampling by second crew. Results will be compared in the annual report following 2020 methods.
3. Encourage communication between crew members completing different tasks (sampling versus recording) over the course of the entire project. Doing so is likely to reduce crew member variability, thereby resulting in improved data quality and consistency.
4. Data collection forms will be reviewed for completeness before leaving the sampling location and signed off at the end of each field day by the crew lead.
5. Data collection forms will be scanned and submitted to the Project Manager or designate daily. These data will be used to calculate a preliminary calcite index score and compare to previous records. Large deviations from previous years (>0.5 CI difference) will be investigated and potentially resampled by a second crew.
6. Following data entry into Lotic's digital form, values will be assessed for accuracy using a computer script developed from R Programming Language. This will check that cells contain acceptable values (e.g., calcite presence score can only be 0, 0.1, 0.2…. 1); concreted scores can only be 0, 1, or 2; concreted score must be 0 if calcite presence is 0); habitat unit type can only be R, P, G, C. Cells that had errors or were blank were flagged and corrected.

8 Appendices

Appendix 1. Pebble count form.

Appendix 2. Assessment of key protocol components

As part of developing this 2021 field manual, we investigated two specific components of the sampling protocol employed in recent years. These were the number of rocks sampled per site and the number of sites per reach.

Robinson et al. (2016)[6] investigated the effect of reducing the number of rocks sampled by randomly selecting a subset of rock from 10-99 rocks out of the full 100 rock counts. They compared the calcite metric scores of the subsample to the metric scores of the full sample and plotted as the absolute difference versus number of rocks sampled. This was repeated in 2021. The results in 2021 agreed well with Robinson et al. (2016) in showing that the absolute difference increases as the number of rocks sampled decreases (). For each of calcite index, calcite concretion, and calcite presence, reducing the number of rocks sampled to 75 results in approximately 8% difference relative to the full count scores. Reducing the number of rocks sampled to 50 produces between a 12-15% difference. The effect of reducing the number of rocks sampled is considered large and adverse. As such, the number of rocks to be sampled per site should remain as 100 rocks per count.

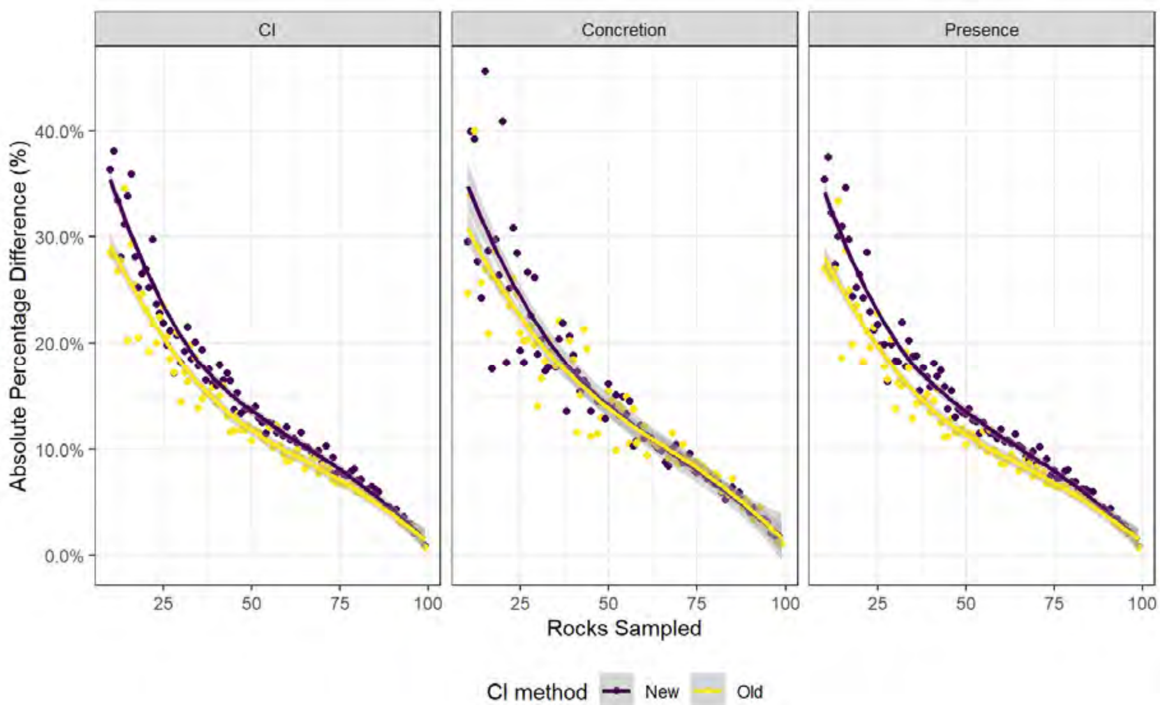


Figure 3. Absolute percentage difference of calcite metric scores by number of rocks subsampled from full 100-rock pebble counts (New = Cp', Old = Cp).

[6] Robinson, M.D. M. Chernos, K. Baranowska, and R.J. MacDonald. 2016. Teck Coal Ltd – Elk Valley 2015 Calcite Monitoring Program Annual Report and Program Assessment. Prepared for Teck Coal Ltd by Lotic Environmental Ltd. 17 pp + appendices.

Also following assessment methods of Robinson et al. (2016), we investigated the relationship of intra-reach variability of Calcite Index (CI) over the range of CI scores (0-3). Similar to 2016, the assessment indicated that within-reach variability of CI to be highest at intermediate CI values. Standard deviation of CI at the reach level was again lowest at the low (i.e., 0) and high (i.e., 3) ends of the CI range. However, different to the previous assessment was the magnitude of this variability (Figure 4). Plotting standard deviation by year shows a continual decrease (i.e., improvement) in standard deviation at the intermediate CI values. This was not able to be detected in the previous assessment give limitations in the length of dataset. This improvement is considered to be substantial enough that the need to increase the number of sites per reach where CI scores were intermediate (i.e., 1-2) is no longer needed. It is recommended that the program return to a standard of three sites per reach where the reach length is long enough to permit this without the risk of overlapping sites. This was defined as 300 m long. Reaches less than 300 m long will be sampled with one site.

The reason for the sequential reduction in within-reach variability over time has not been investigated. One potential explanation is that within-reach variability has decreased as the stream systems return to a pre-2013 flood state. It is possible that in addition to reducing the degree of calcite, the 2013 flood also produced a patchier distribution. Another potential factor is the continued training, standardization, and QA of sampling crews. By continuing to assess and identify sources are observer variability, it is expected that accurate of measurements should have improved in this program that was unique and first trialed in just 2013.

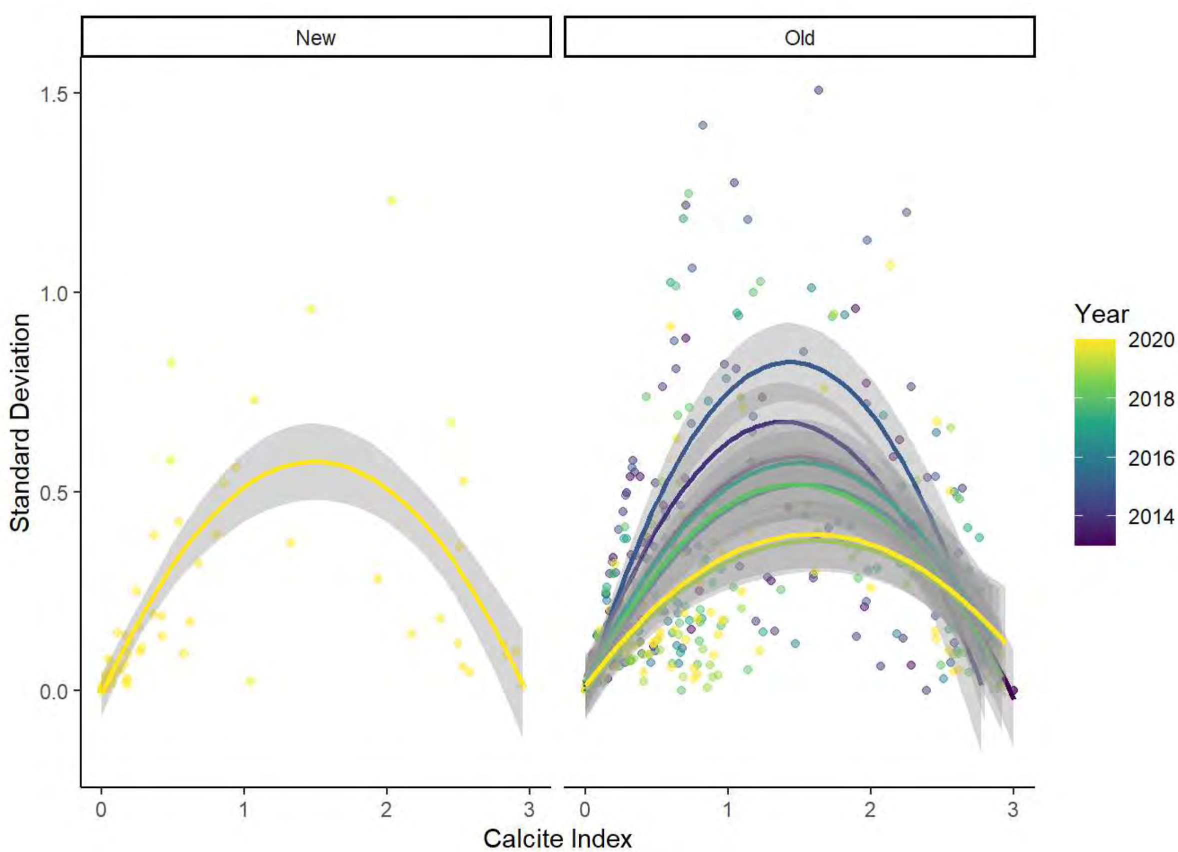


Figure 4. Standard deviation of within-reach calcite index versus calcite index scores.

Appendix 2. Attendees at the September 7, 2022 calcite training workshop.

Attendee	Company
Allie Ferguson	Teck
Mike Pope	Teck
Vanessa Bourne	Teck
Jenni de Werk	Teck
Giovanna Diaz	Teck
Nicole Zathey	Teck
Hannah Penner	Teck
Brady Sherwood	Teck
Mike Robinson	Lotic
Scott Gordon	Lotic
Josh Sullivan	Lotic
Tanner McLean	Lotic
Nick Lippert	Lotic
Connor Brooks	Minnow
Patrick Schaefer	Minnow
Amy Wiebe	Minnow
Jess Tester	Minnow
Amanda Soliguin	Minnow
Hillary Quinn-Austin	Minnow
Jenna Webb	Minnow
Robin Valleau	Minnow
Yen Dinh	Minnow
Katharina Batchelar	Minnow
Liva Ramanjehimanana	Minnow
Emily Dutton	Minnow
Rhiannon Hodgson	Minnow
Sam Burke	Minnow
Heidi Currier	Minnow
Zhe Shi	Minnow
Petra Kovarikova	Vast
Liz Law	Vast

Appendix 3. Reach sampling changes from 2013-2022.

Stream name	Reach Code	Site type	2013 CI	2014 CI	2015 CI	2016 CI	2017 CI	2018 CI	2019 CI	2020 CI	2021 CI	2022 CI	reason added or removed
Aldridge	ALDR1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	r	removed from additional reference sites
Alexander	ALEX1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03	r	removed from additional reference sites
Alexander	ALEX3	Reference	0.48	0.38	0.40	0.46	0.38	0.36	0.86	0.41	0.01	0.38	
Alexander	ALEX8	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	r	removed from additional reference sites
Andy Good	ANDY1	Reference	0.00	0.00	0.00	0.00	0.00	0.04	0.09	0.00	0.05	0.01	
Aqueduct	AQUE1	Exposed	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.01	0.00	
Aqueduct	AQUE2	Exposed	0.00	0.00	0.00	s	s	0.00	s	s	0.00	0.00	
Aqueduct	AQUE3	Exposed	0.00	0.00	0.00	s	s	0.14	s	s	0.24	0.22	
Balmer	BALM1	Exposed	0.00	0.00	0.00	0.00	0.00	0.01	d	0.01	0.00	0.03	
Bingay	BING1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.00	
Bodie	BODI1	Exposed	0.00	0.00	0.00	0.79	0.23	1.22	1.09	1.10	1.22	1.43	
Bodie	BODI2	Exposed	0.00	0.06	r	r	r	r	r	r	r	r	removed due to being lentic
Bodie	BODI3	Exposed	1.16	2.47	N/A	1.77	2.09	2.33	2.58	2.62	2.55	2.83	
Carbon Creek	CARB1	Reference	N/A	0.00	0.00	r	r	r	r	r	r	r	No longer required under the CMO2 project
Carbon Creek	CARB2	Reference	N/A	0.00	0.00	r	r	r	r	r	r	r	No longer required under the CMO2 project
Cataract	CATA1	Exposed	3.00	3.00	3.00	3.00	3.00	2.96	r	r	r	r	Removed due to stream diversion
Cataract	CATA2	Exposed	2.45	0.64	r	r	r	r	r	r	r	r	removed due to being lentic
Cataract	CATA3	Exposed	3.00	2.64	2.56	s	s	2.89	r	r	r	r	Removed due to stream diversion
Chauncey	CHAU1	Reference	0.00	0.00	0.00	0.17	0.12	0.12	0.23	0.21	0.18	0.20	
Clode Pond Outlet	COUT1	Exposed	0.00	1.01	1.03	1.21	0.29	1.46	0.23	1.16	1.34	1.10	
Clode West Infiltration	CLOW1	Exposed	N/A	0.18	0.00	0.50	0.21	0.67	0.23	0.76	0.71	0.83	
Contingency Pond Seep	CPOS1	Exposed	0.92	0.84	r	r	r	r	r	r	r	r	removed due to stream diverted
Contingency Pond Outlet	CPOU1	Exposed	0.93	0.94	r	r	r	r	r	r	r	r	removed due to stream diverted
CCR Seep	CSEE1	Exposed	0.00	0.00	0.85	1.40	r	r	r	r	r	r	removed due to being lentic
Corbin	CORB1	Exposed	1.95	1.71	2.62	2.21	2.74	2.70	2.47	2.45	2.72	2.74	
Corbin	CORB2	Exposed	2.72	2.68	2.25	s	s	2.92	2.87	s	2.96	2.94	
Drinnian	DRIN1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	r	removed from additional reference sites
Dry (EVO)	DRYE1	Exposed	2.23	2.13	2.19	s	s	2.96	2.19	2.67	2.52	2.07	
Dry (EVO)	DRYE2	Exposed	2.23	0.03	r	r	r	r	r	r	r	r	removed due to being lentic
Dry (EVO)	DRYE3	Exposed	2.20	2.40	2.48	2.51	2.85	2.76	2.25	2.82	2.66	2.70	
Dry (EVO)	DRYE4	Exposed	1.42	1.84	2.37	s	s	3.00	2.51	2.94	2.56	2.64	
Dry (LCO)	DRYL1	Exposed	0.00	0.00	0.00	0.00	0.02	0.57	0.65	0.62	0.74	0.50	
Dry (LCO)	DRYL2	Exposed	0.00	0.00	0.00	0.00	0.00	0.24	0.52	0.60	0.71	0.49	
Dry (LCO)	DRYL3	Exposed	0.00	0.00	0.00	0.00	0.00	0.06	0.16	0.29	0.38	0.42	
Dry (LCO)	DRYL4	Exposed	0.00	N/A	0.00	0.00	0.00	0.32	0.15	0.30	0.34	0.51	
Eagle Pond Outlet	EPOU1	Exposed	1.90	1.31	0.58	0.20	0.25	0.21	r	r	r	r	reach dry from 2018 forward and no well defined channel present.
East Dry	ETRI1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.02	0.00	0.01	
Elk	ELKR10	Exposed	0.00	0.00	0.00	s	s	0.03	0.01	0.05	0.21	0.14	
Elk	ELKR11	Exposed	0.00	0.00	0.00	s	s	0.00	s	s	0.22	0.17	
Elk	ELKR12	Exposed	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.01	
Elk	ELKR15	Reference	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.00	
Elk	ELKR8	Exposed	0.40	0.00	0.00	0.00	0.01	0.28	0.09	0.42	0.19	0.20	
Elk	ELKR9	Exposed	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.08	0.07	0.06	

Stream name	Reach Code	Site type	2013 CI	2014 CI	2015 CI	2016 CI	2017 CI	2018 CI	2019 CI	2020 CI	2021 CI	2022 CI	reason added or removed
Erickson	ERIC1	Exposed	2.29	2.59	2.77	2.36	2.67	2.89	2.90	2.92	2.71	2.91	
Erickson	ERIC2	Exposed	1.78	2.27	2.58	s	s	2.50	2.46	2.57	2.87	2.89	
Erickson	ERIC3	Exposed	2.36	2.60	3.00	s	s	2.95	2.96	2.91	2.94	2.94	
Erickson	ERIC4	Exposed	0.62	1.28	1.17	s	s	1.73	1.74	1.68	1.42	1.54	
Ewin	EWIN1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.21	0.17	added as new reference stream
Feltham	FELT1	Exposed	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.01	0.00	0.00	
Fennelon	FENN1	Exposed	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	d	
Fish Pond	FPON1	Exposed	0.00	0.03	0.00	0.08	0.20	0.17	0.38	0.48	0.40	0.71	
Fording	FORD1	Exposed	0.00	0.00	0.00	0.37	0.44	0.23	0.20	0.14	0.43	0.35	
Fording	FORD10	Exposed	0.00	0.00	0.00	s	s	0.63	s	0.52	0.35	0.45	
Fording	FORD11	Exposed	0.00	0.00	0.00	s	s	0.27	s	0.18	0.10	0.21	
Fording	FORD12	Reference	0.00	0.00	0.00	0.08	0.11	0.31	0.28	0.15	0.14	0.15	
Fording	FORD2	Exposed	0.00	0.00	0.00	0.00	0.10	0.13	0.30	0.34	1.09	0.86	
Fording	FORD3	Exposed	0.00	0.01	0.00	s	s	0.49	s	0.96	0.85	0.79	
Fording	FORD4	Exposed	N/A	0.05	0.66	0.60	0.84	0.80	1.09	0.88	1.01	0.79	
Fording	FORD5	Exposed	0.32	0.35	0.53	0.58	0.73	0.70	0.80	0.79	0.92	0.80	
Fording	FORD6	Exposed	0.74	0.43	1.53	0.64	0.68	0.79	0.98	0.96	1.19	1.20	
Fording	FORD7	Exposed	0.43	0.97	0.55	0.63	0.71	0.89	0.90	1.09	1.13	0.92	
Fording	FORD8	Exposed	0.31	0.49	0.48	s	s	0.61	s	0.69	0.67	0.70	
Fording	FORD9	Exposed	0.00	0.00	0.00	0.00	0.32	0.73	0.71	0.44	rs	rs	Reach split into FORD9a and FORD9b due to antiscalant being installed in Swift/Cateract outfall
Fording	FORD9a	Exposed	0.00	0.00	0.00	0.00	0.43	1.04	0.84	0.55	0.41	0.59	
Fording	FORD9b	Exposed	0.00	0.00	0.00	0.00	0.11	0.12	0.23	0.21	0.10	0.28	
Forsythe	FORS1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	0.02	
Gardine	GARD1	Exposed	0.29	0.70	0.32	0.14	0.60	0.64	0.50	0.60	0.71	0.56	
Gate	GATE2	Exposed	0.15	0.00	0.74	1.47	1.98	1.14	f	1.61	1.46	1.38	
Goddard	GODD1	Exposed	0.00	0.00	0.00	0.22	0.13	0.35	0.24	0.16	0.04	0.03	
Goddard	GODD2	Exposed	0.00	0.00	0.00	s	s	2.62	2.52	2.14	r	r	unable to sample reach appropriately due to abundant concrete substrate
Goddard	GODD3	Exposed	0.00	1.90	1.97	2.22	2.64	2.62	2.66	2.55	2.76	2.64	
Grace	GRAC1	Reference	0.31	0.20	0.05	0.09	0.06	0.10	0.19	0.25	0.12	0.11	
Grace	GRAC2	Reference	0.15	0.10	0.10	s	s	0.06	s	s	r	r	no longer required as a reference location
Grace	GRAC3	Reference	N/A	0.00	0.00	s	s	0.00	s	s	r	r	no longer required as a reference location
Grassy	GRAS1	Exposed	0.00	0.09	0.00	0.04	0.29	0.25	0.38	0.17	0.19	0.14	
Grave	GRAV1	Exposed	0.54	0.72	0.02	0.14	0.24	0.37	0.41	0.28	0.12	0.18	
Grave	GRAV2	Exposed	0.23	0.21	0.00	s	s	0.14	s	s	0.06	0.08	
Grave	GRAV3	Reference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	
Greenhills	GREE1	Exposed	0.35	1.06	0.45	0.86	1.07	0.64	0.66	0.64	0.76	1.09	
Greenhills	GREE2	Exposed	0.60	0.00	r	r	r	r	r	r	r	r	removed due to being lentic
Greenhills	GREE3	Exposed	1.30	2.22	2.46	2.18	2.55	2.49	1.91	2.58	2.68	2.64	
Greenhills	GREE4	Exposed	1.62	2.78	2.80	2.61	2.68	2.74	2.32	2.84	2.67	2.74	
Greenhouse side channel	GSCH1	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.41	0.67	0.75	
Harmer	HARM1	Exposed	0.58	1.08	0.07	0.64	0.61	0.80	0.82	0.90	0.76	0.90	
Harmer	HARM2	Exposed	0.17	0.10	r	r	r	r	r	r	r	r	removed due to being lentic
Harmer	HARM3	Exposed	0.15	0.28	0.01	0.12	0.03	0.08	0.14	0.12	0.04	0.06	
Harmer	HARM4	Exposed	0.17	0.70	0.17	s	s	0.35	s	s	0.21	0.11	
Harmer	HARM5	Exposed	0.19	0.56	0.22	s	s	0.31	s	s	0.38	0.39	
Harmer Dump Seeps	HDSE1	Exposed	0.52	r	r	r	r	r	r	r	r	r	removed due to safety reasons

Stream name	Reach Code	Site type	2013 CI	2014 CI	2015 CI	2016 CI	2017 CI	2018 CI	2019 CI	2020 CI	2021 CI	2022 CI	reason added or removed
Hartley	HART2	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03	r	no longer required as a reference location
Henretta	HENR1	Exposed	0.00	0.00	0.00	0.00	0.04	0.32	0.40	0.69	0.62	0.62	
Henretta	HENR2	Exposed	0.00	0.00	0.00	s	s	s	s	s	0.02	0.36	
Henretta	HENR3	Reference	0.00	0.00	0.00	s	s	0.00	s	0.20	0.00	0.02	
Kilmamock	KILM1	Exposed	2.16	1.64	1.97	2.59	2.77	2.30	2.56	2.47	2.34	2.90	
Lagoon C Seep	LCSE1	Exposed	0.39	r	r	r	r	r	r	r	r	r	Channel diverted into pipe
Lake Mountain	LMOU1	Exposed	0.00	0.33	0.00	0.15	0.18	0.39	0.88	0.64	0.61	0.87	
Lake Mountain	LMOU2	Exposed	0.00	0.09	r	r	r	r	r	r	r	r	removed due to stream diverted into pipe at site location
Lake Mountain	LMOU3	Exposed	0.00	0.00	0.00	0.15	0.18	r	r	r	r	r	dropped from program due to wasterock dumping in samping area
Lake Mountain	LMOU4	Exposed	0.00	0.00	0.00	0.15	0.18	r	r	r	r	r	dropped from program due to wasterock dumping in samping area
Leask	LEAS1	Exposed	0.00	0.17	r	r	r	r	r	r	r	r	removed due to being lentic
Leask	LEAS2	Exposed	0.13	1.60	0.24	1.82	2.76	2.60	2.79	2.46	2.69	2.60	
Leach	RG_LE1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	0.01	
Lindsay	LIND1	Exposed	0.19	0.26	0.19	0.19	0.15	0.19	f	0.11	0.06	0.29	
Line	LINE1	Exposed	0.27	0.00	0.00	0.03	0.00	0.52	0.46	0.76	0.53	0.35	
Line	LINE2	Exposed	0.00	0.00	0.00	s	s	0.45	s	0.52	0.28	0.33	
Line	LINE3	Exposed	0.00	0.00	0.00	s	s	0.66	s	0.48	0.36	0.51	
Line	LINE4	Exposed	0.40	0.27	0.68	0.65	0.66	0.95	0.93	0.70	0.94	0.92	
Line	LINE7	Reference	0.00	0.00	0.00	0.00	0.00	0.01	f	d	0.00	0.00	
Liver Pool Outfall	Liverpool outfall	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.55	r	only sampled once in 2021
Lizard	LIZA1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.12	r	no longer required as a reference location
McCool	MCOO1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.19	r	no longer required as a reference location
Michel	MICH1	Exposed	0.31	0.00	0.00	0.00	0.00	0.08	0.04	0.12	0.02	0.45	
Michel	MICH2	Exposed	0.05	0.05	0.00	s	0.08	0.02	s	0.79	0.29	0.37	
Michel	MICH3	Exposed	0.00	0.00	0.00	s	s	0.01	s	0.45	0.03	0.04	
Michel	MICH4	Exposed	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.05	0.11	0.07	
Michel	MICH5	Reference	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.03	0.04	0.10	
Mickelson	MICK1	Exposed	0.01	0.00	0.00	2.18	1.25	1.23	1.84	1.22	1.19	0.98	
Mickelson	MICK2	Exposed	0.05	0.00	0.03	s	s	1.37	f	s	1.69	r	dropped due to safety reason/access
Milligan	MILL1	Exposed	0.00	0.00	0.00	N/A	0.36	1.77	f	1.33	dry	1.23	
Milligan	MILL2	Exposed	0.00	0.00	0.00	1.07	1.06	1.18	f	s	2.19	r	dropped due to access
Morrissey	MORI1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	r	no longer required as a reference location
North Thompson	NTHO1	Exposed	1.24	2.39	1.18	1.54	1.78	1.91	1.56	2.00	1.94	2.04	
North Wolfram	NWOL1	Exposed	0.70	1.33	0.21	0.14	2.59	2.44	d	2.71	2.64	2.94	
Otto	OTTO1	Exposed	0.30	0.22	0.10	0.23	0.14	0.59	f	0.46	0.49	0.44	
Otto	OTTO2	Exposed	0.03	0.00	0.00	r	r	r	r	r	r	r	removed due to being lentic
Otto	OTTO3	Exposed	0.02	0.02	0.00	s	s	0.05	f	s	n/a	0.00	
Pengally	PENG1	Exposed	0.09	0.02	0.02	0.00	0.00	0.00	d	r	d	r	removed due to being dry for multiple years
Pit Road 12 Seep	P12S1	Exposed	0.09	r	r	r	r	r	r	r	r	r	removed due to safety reasons
Porter	PORT1	Exposed	0.92	0.84	0.85	0.75	0.74	0.85	0.85	0.98	0.98	0.97	
Porter	PORT2	Exposed	0.11	0.10	r	r	r	r	r	r	r	r	removed due to being lentic
Porter	PORT3	Exposed	2.78	1.94	1.94	1.46	1.62	1.65	1.44	rs	rs	rs	reach split into PORT3a and PORT3b
Porter	PORT3a	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48	0.49	0.64	
Porter	PORT3b	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.55	2.22	2.47	
Qualteri	QUAL1	Exposed	0.00	0.00	0.00	0.00	0.00	d	f	d	r	r	removed due to being dry for multiple years
RG_UCWER	UCWE1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.00	0.00	

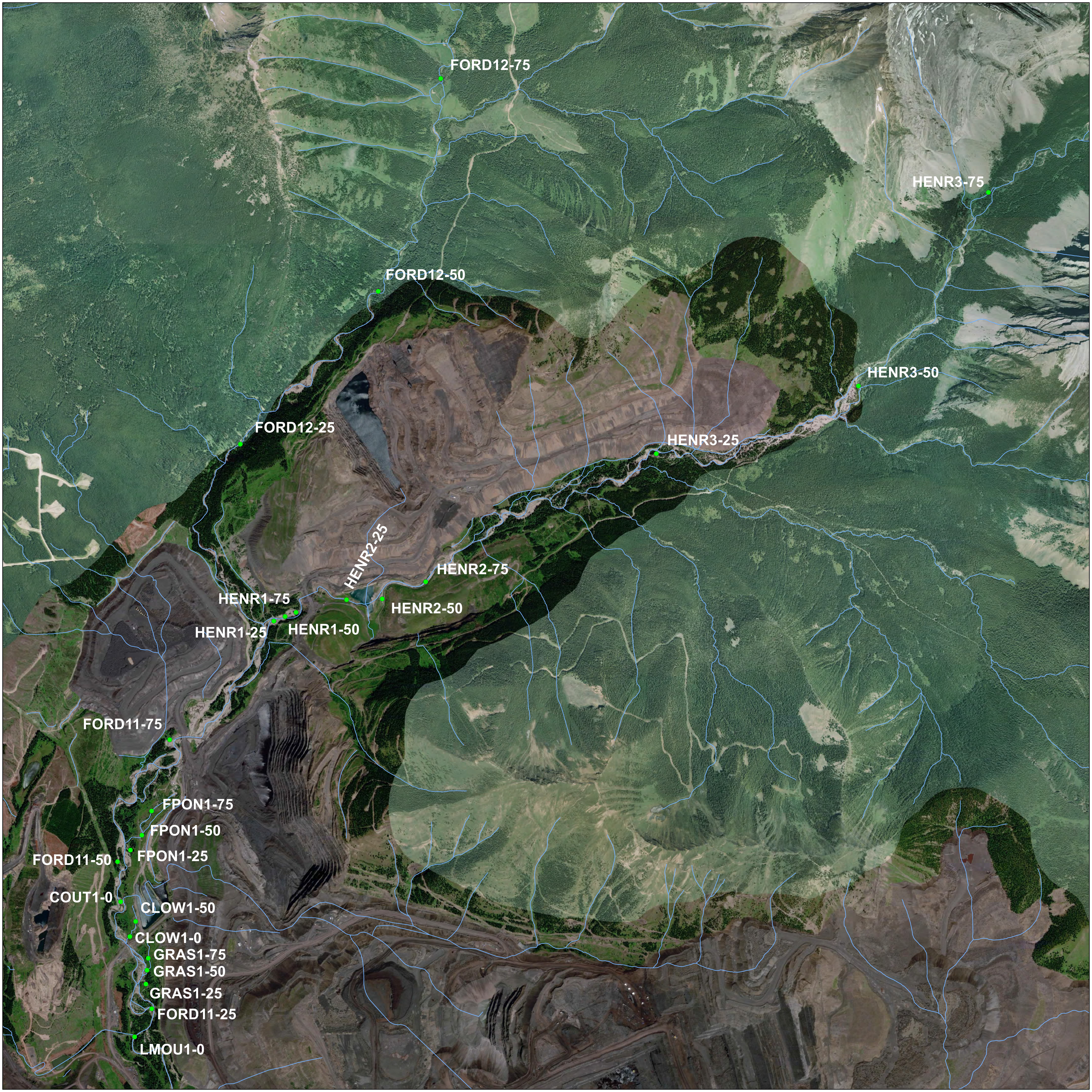
Stream name	Reach Code	Site type	2013 CI	2014 CI	2015 CI	2016 CI	2017 CI	2018 CI	2019 CI	2020 CI	2021 CI	2022 CI	reason added or removed
Sawmill	SAWM1	Exposed	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.01	0.00	
Sawmill	SAWM2	Exposed	0.38	0.54	0.62	0.00	0.00	0.00	d	s	0.00	0.06	
Site18	SITE	Exposed	N/A	N/A	N/A	N/A	3.00	3.00	2.93	2.97	2.49	2.85	
Six Mile	SIXM1	Exposed	0.80	1.19	0.49	0.65	0.95	0.92	f	0.93	0.66	0.15	
Smith Pond Outlet	SPOU1	Exposed	2.61	2.24	2.24	3.00	2.60	2.45	2.00	2.02	2.35	2.83	
South Line	SLINE2	Reference	0.00	0.00	0.00	0.00	0.00	0.04	0.08	0.05	0.18	0.15	
Snowslide Creek	SNOW1	Reference	N/A	0.00	0.00	r	r	r	r	r	r	r	No longer required under the CMO2 project
South Pit	SPIT1	Exposed	0.00	0.00	1.14	1.59	2.49	2.77	2.43	2.30	2.15	2.59	
South Pit	SPIT2	Exposed	0.00	0.00	0.00	r	r	r	r	r	r	r	removed due to safety reasons
SouthWolfram	SWOL1	Exposed	1.97	1.97	0.28	1.86	2.05	2.38	2.96	2.52	2.39	2.57	
Spring	SPRI1	Exposed	0.20	0.11	0.11	0.12	0.13	0.14	0.05	0.04	0.01	0.05	
South Pond Seep	SPSE1	Exposed	2.83	1.50	0.10	0.00	r	r	r	r	r	r	not connected to habitat/lentic
Stream 02	STR02	Exposed	N/A	N/A	N/A	N/A	0.68	0.72	d	0.02	0.00	0.02	
Stream 14	STR14	Exposed	N/A	N/A	N/A	N/A	0.00	0.40	d	d	0.46	dry	
Swift	SWIF1	Exposed	2.58	2.18	2.39	2.43	2.45	1.69	1.88	r	r	r	removed due to being diverted
Swift	SWIF2	Exposed	0.00	1.04	0.82	s	s	1.12	c	r	r	r	removed due to being diverted
Thompson	THOM1	Exposed	0.22	0.00	0.00	0.00	r	r	r	r	r	r	removed due to being lentic
Thompson	THOM2	Exposed	0.08	0.00	0.01	N/A	0.83	0.81	1.88	0.80	1.07	1.30	
Thompson	THOM3	Exposed	0.00	0.00	0.00	s	s	1.04	1.63	1.29	1.90	1.76	
Thompson	THOM4	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.16	0.19	0.25	
Thresher	THRE1	Exposed	0.00	0.00	0.00	0.00	0.00	0.03	d	d	d	0.00	
Toddhunter	TODH1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10	0.06	added as new reference stream
Unnamed Trib South of Sawmill	USOS1	Exposed	0.00	0.00	0.00	0.00	0.00	0.00	f	0.00	0.00	0.00	
Upper Thompson	UTHO1	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.15	1.51	1.10	
Upper Thompson Pond Outlet	UTPO1	Exposed	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.52	0.58	0.65	
Wheeler Creek	WHEE1	Reference	N/A	0.00	0.00	r	r	r	r	r	r	r	No longer required under the CMO2 project
Wheeler Creek	WHEE2	Reference	N/A	0.00	0.00	r	r	r	r	r	r	r	No longer required under the CMO2 project
Wheeler Creek	WHEE3	Reference	N/A	0.00	0.00	r	r	r	r	r	r	r	No longer required under the CMO2 project
Willow North	WILN2	Exposed	N/A	N/A	0.00	0.00	0.00	0.00	f	0.02	0.01	0.00	
Willow South	WILS1	Exposed	N/A	N/A	0.00	0.00	0.00	0.00	f	d	0.21	0.01	
Weigert	WEIG1	Reference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.03	0.02	added as new reference stream
Wolf	WOL1	Exposed	N/A	N/A	0.00	0.00	0.00	0.00	0.90	0.01	0.08	0.00	
Wolfram	WOLF2	Exposed	0.27	0.42	0.70	s	s	0.88	0.84	2.41	2.80	2.55	
Wolfram	WOLF3	Exposed	2.93	2.07	1.60	2.61	2.80	2.69	2.86	2.95	2.91	2.96	

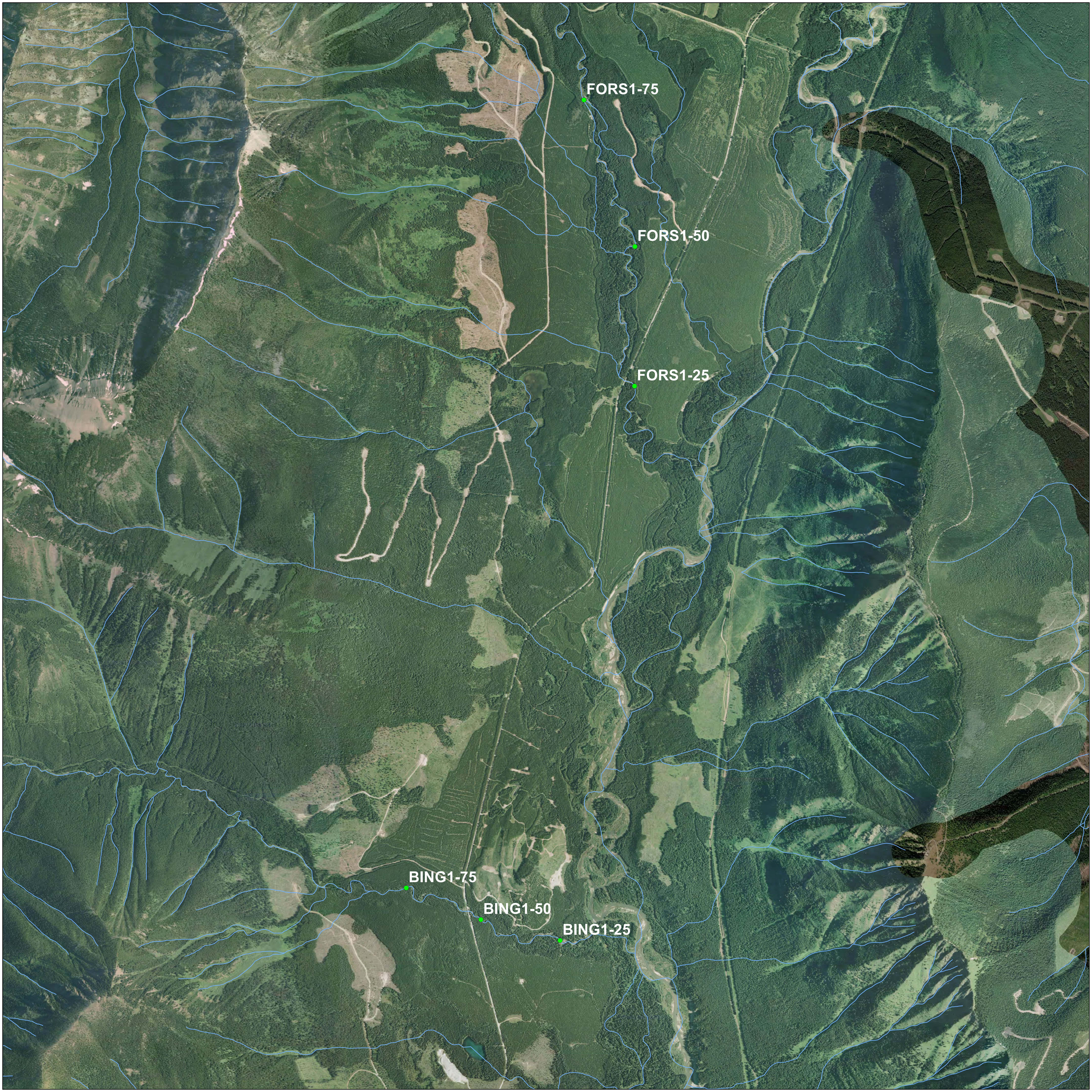
*PORT3 is now broken up into PORT3a and 3b, historic data is still being compared to new reaches depending on site location

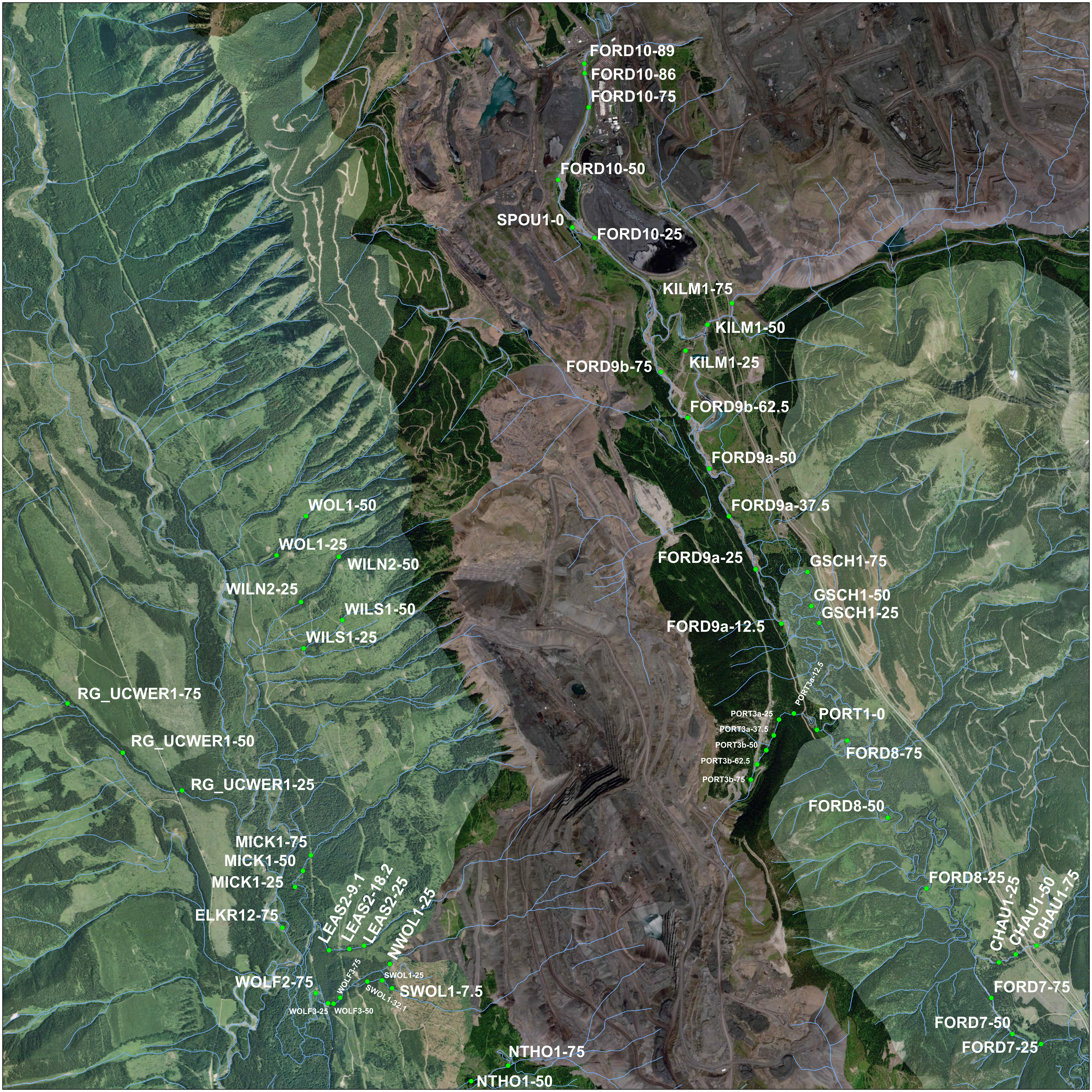
Legend	
s	stream segment approach
d	dry
r	removed from regional program
f	frozen
N/A	not part of program
c	construction or safety considerations
rs	reach has been split

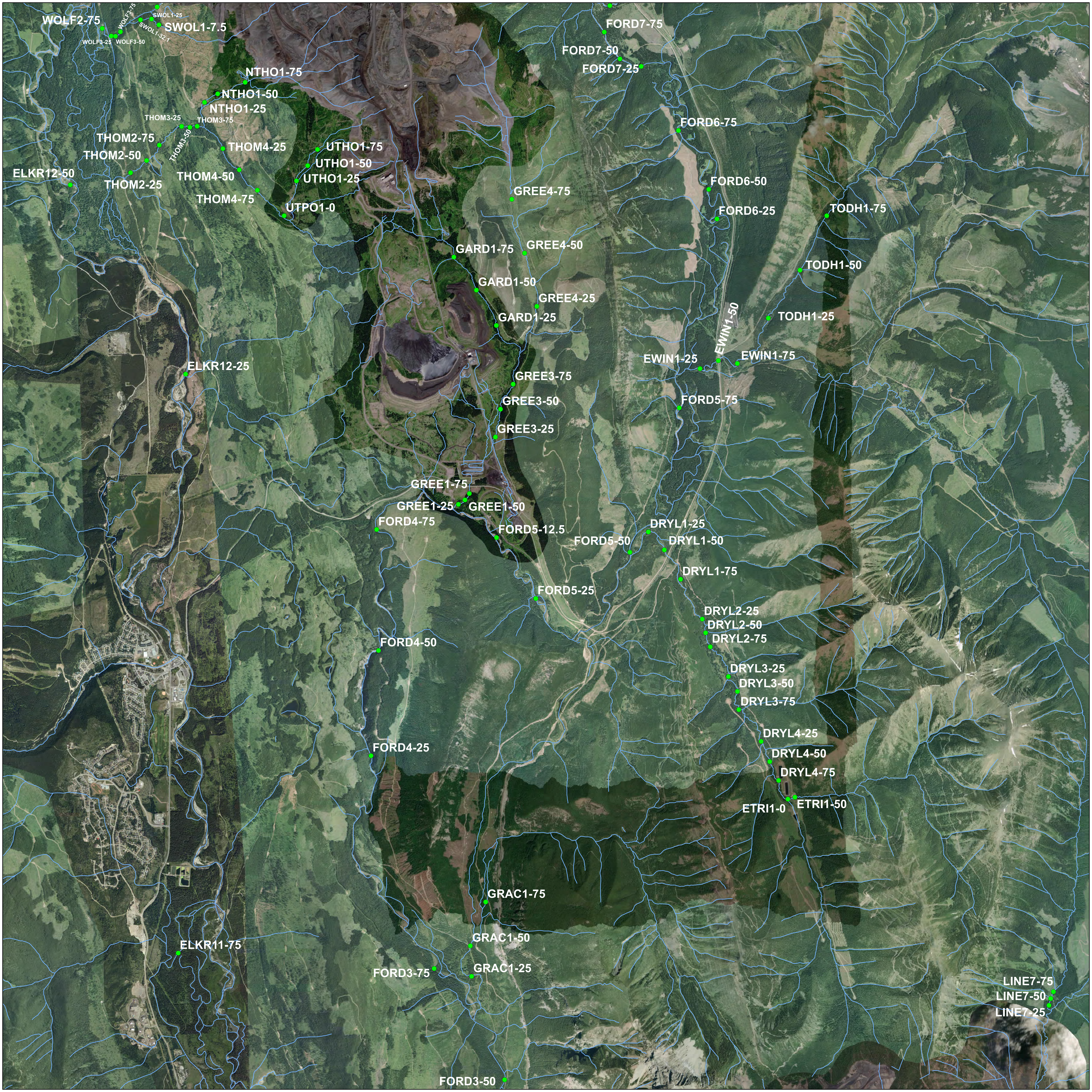
Appendix 4. Maps of sample sites.


ELKR15-75
ELKR15-50
ELKR15-25


FORD12-75
HENR3-75
FORD12-50
HENR3-50
FORD12-25
HENR3-25
HENR2-25
HENR2-75
HENR1-75
HENR2-50
HENR1-25
HENR1-50
FORD11-75
FPON1-75
FPON1-50
FORD11-50
FPON1-25
COUT1-0
CLOW1-50
CLOW1-0
GRAS1-75
GRAS1-50
GRAS1-25
FORD11-25
LMOU1-0


FORS1-75
FORS1-50
FORS1-25
BING1-75
BING1-50
BING1-25


FORD10-89
FORD10-86
FORD10-75
FORD10-50
SPOU1-0
FORD10-25
KILM1-75
KILM1-50
KILM1-25
FORD9b-75
FORD9b-62.5
FORD9a-50
FORD9a-37.5
WOL1-50
WOL1-25
WILN2-50
WILN2-25
WILS1-50
WILS1-25
FORD9a-25
GSCH1-75
GSCH1-50
GSCH1-25
FORD9a-12.5
PORT3a-12.5
RG_UCWER1-75
PORT3a-25
PORT1-0
PORT3a-37.5
PORT3b-50
FORD8-75
PORT3b-62.5
RG_UCWER1-50
PORT3b-75
RG_UCWER1-25
FORD8-50
MICK1-75
MICK1-50
MICK1-25
FORD8-25
LEAS2-9.1
LEAS2-18.2
LEAS2-25
NWOL1-25
CHAU1-25
CHAU1-50
CHAU1-75
ELKR12-75
WOLF2-75
WOLF3-75
SWOL1-25
SWOL1-7.5
SWOL1-32.1
WOLF3-25
WOLF3-50
FORD7-75
FORD7-50
FORD7-25
NTHO1-75
NTHO1-50


WOLF2-75
WOLF3-75
SWOL1-25
SWOL1-7.5
WOLF3-25
WOLF3-50
SWOL1-32.1
FORD7-75
FORD7-50
FORD7-25
NTHO1-75
NTHO1-50
NTHO1-25
THOM3-25
THOM3-75
THOM3-50
THOM2-75
THOM2-50
THOM2-25
THOM4-25
THOM4-50
THOM4-75
ELKR12-50
UTHO1-75
UTHO1-50
UTHO1-25
UTPO1-0
FORD6-75
FORD6-50
FORD6-25
GREE4-75
GREE4-50
GREE4-25
TODH1-75
TODH1-50
TODH1-25
GARD1-75
GARD1-50
GARD1-25
EWIN1-50
EWIN1-25
EWIN1-75
ELKR12-25
GREE3-75
GREE3-50
GREE3-25
FORD5-75
GREE1-75
GREE1-25
GREE1-50
FORD4-75
FORD5-12.5
DRYL1-25
FORD5-50
DRYL1-50
DRYL1-75
FORD5-25
DRYL2-25
DRYL2-50
DRYL2-75
FORD4-50
DRYL3-25
DRYL3-50
DRYL3-75
DRYL4-25
FORD4-25
DRYL4-50
DRYL4-75
ETRI1-0
ETRI1-50
GRAC1-75
GRAC1-50
ELKR11-75
FORD3-75
GRAC1-25
LINE7-75
LINE7-50
LINE7-25
FORD3-50


ELKR11-75
GRAC1-50
FORD3-75
GRAC1-25
LINE7-75
LINE7-50
LINE7-25
FORD3-50
ELKR11-50
FORD3-25
WEIG1-75
WEIG1-50
WEIG1-25
ELKR11-25
FORD2-75
LINE4-75
LINE4-50
LINE4-25
FORD2-50
SLINE2-25
LINE3-75
SLINE2-50
SLINE2-75
LINE3-50
FORD2-25
LINE3-25
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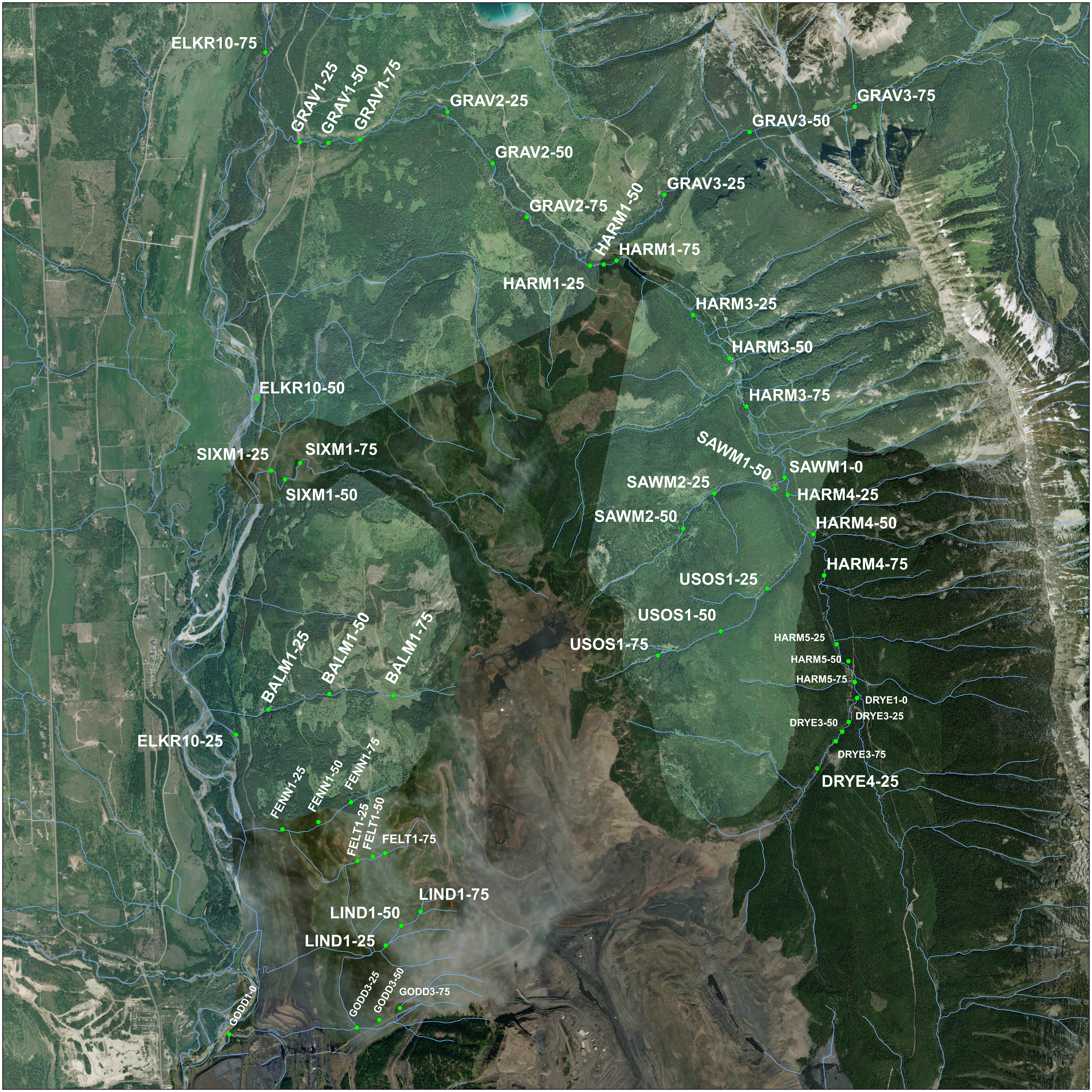
FORD1-50
FORD1-25


ELKR10-75
GRAV1-25
GRAV1-50
GRAV1-75
GRAV2-25
GRAV2-50
GRAV2-75
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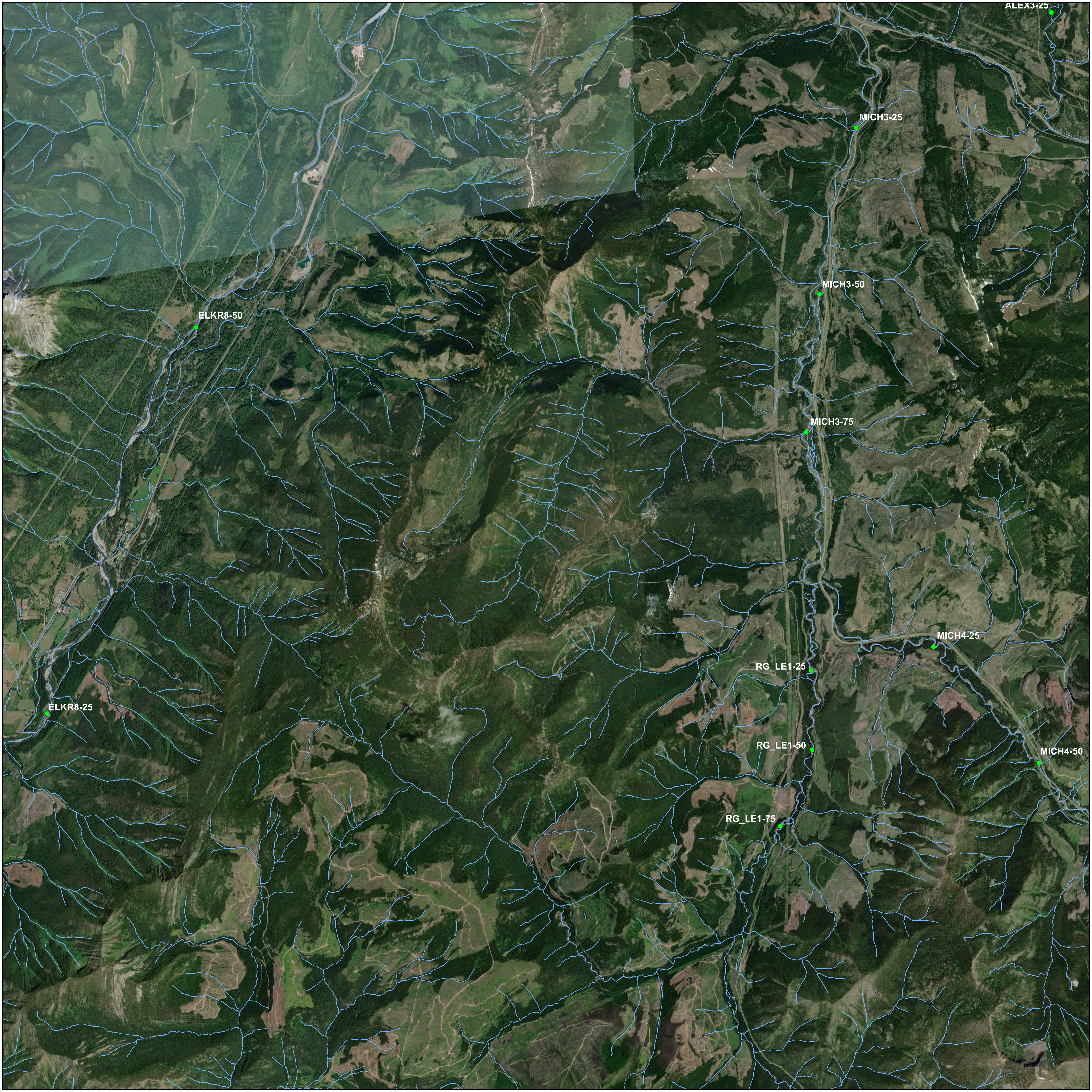
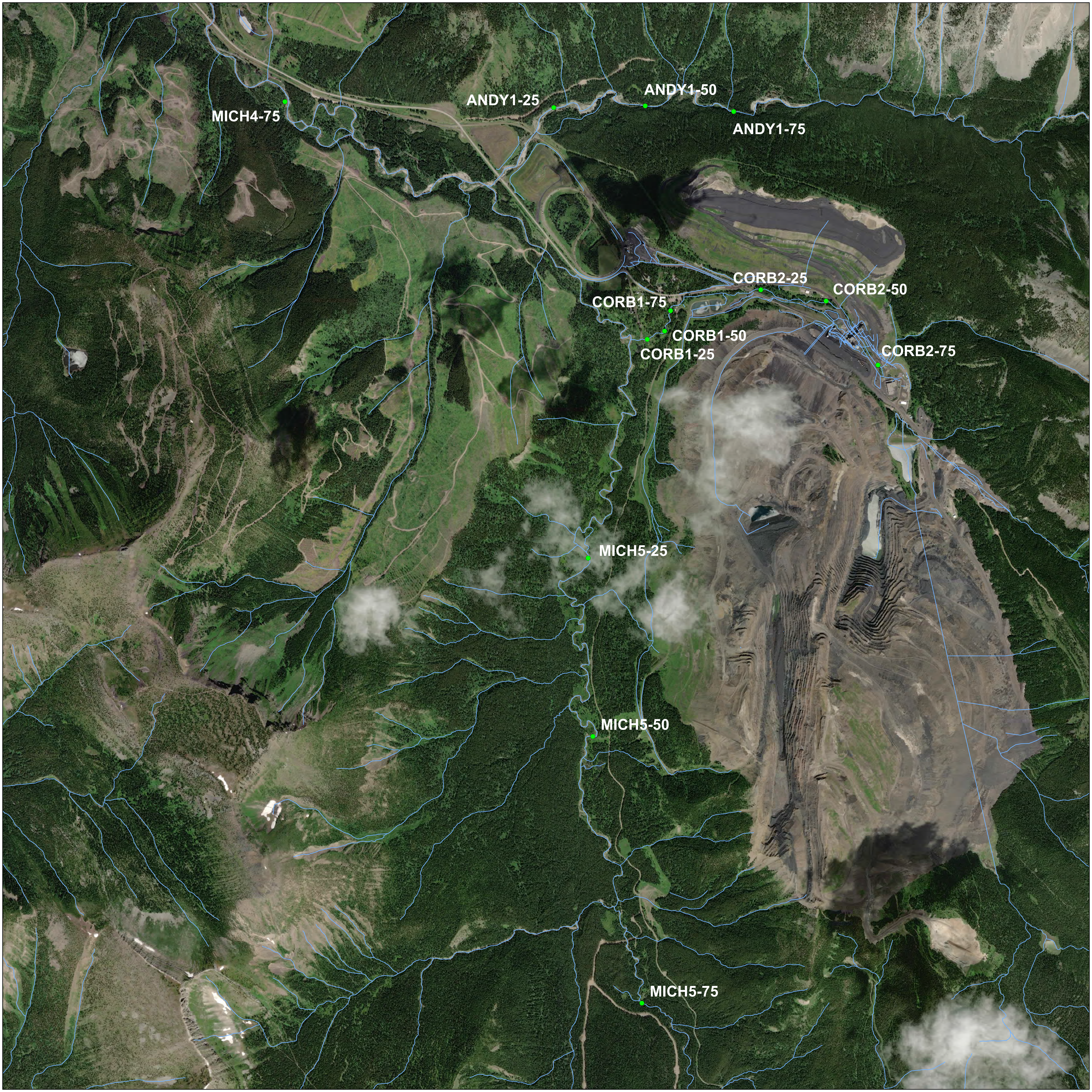
GRAV3-50
GRAV3-75
HARM1-50
HARM1-75
HARM1-25
HARM3-25
HARM3-50
HARM3-75
ELKR10-50
SIXM1-25
SIXM1-75
SIXM1-50
SAWM1-50
SAWM1-0
SAWM2-25
HARM4-25
SAWM2-50
HARM4-50
HARM4-75
USOS1-25
USOS1-50
USOS1-75
HARM5-25
HARM5-50
HARM5-75
DRYE1-0
DRYE3-25
DRYE3-50
DRYE3-75
DRYE4-25
BALM1-25
BALM1-50
BALM1-75
ELKR10-25
FENN1-25
FENN1-50
FENN1-75
FELT1-25
FELT1-50
FELT1-75
LIND1-75
LIND1-50
LIND1-25
GODD1-0
GODD3-25
GODD3-50
GODD3-75

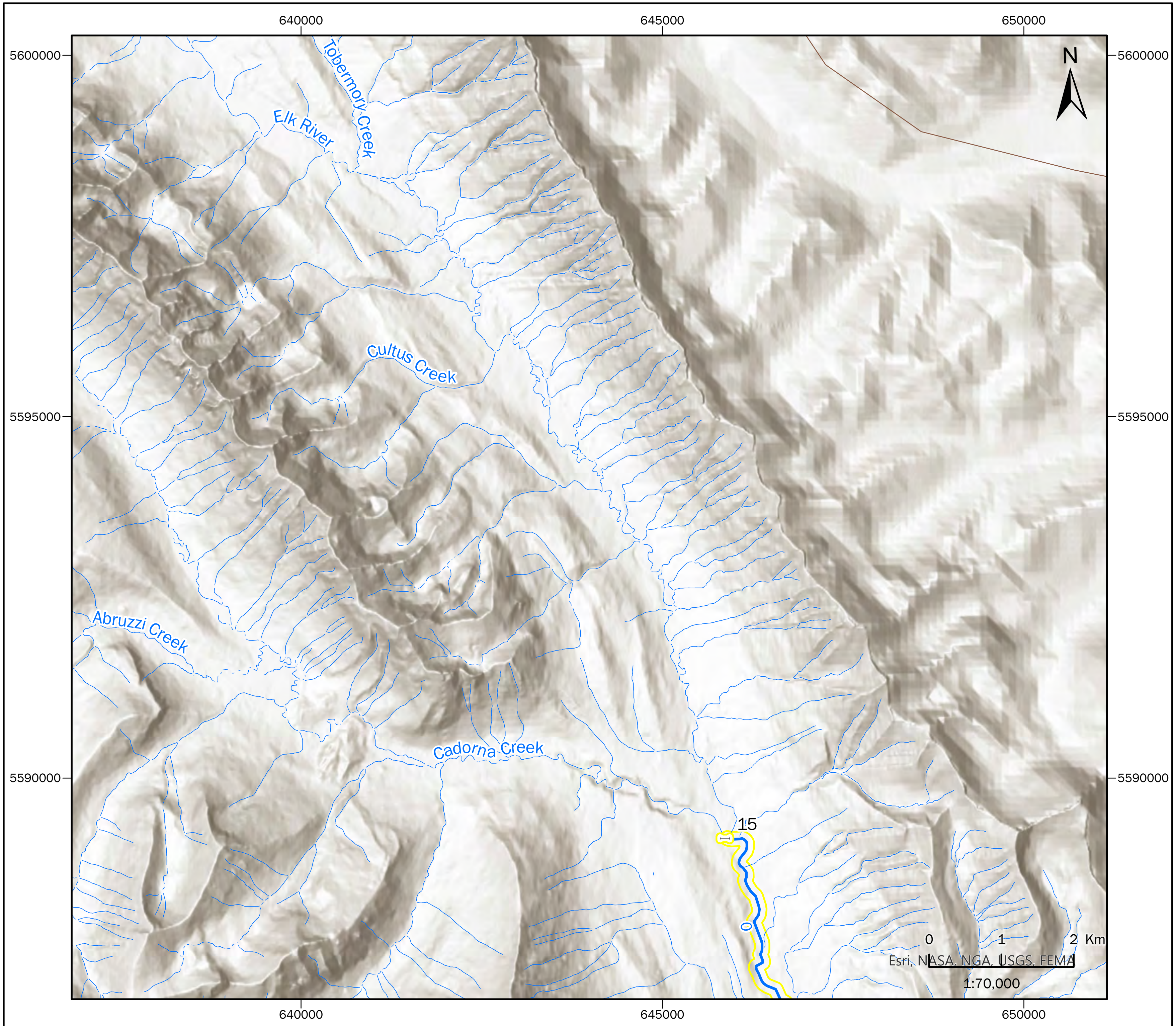

GODD1-0
GODD3-25
GODD3-50
GODD3-75
ELKR9-75
OTTO3-50
OTTO3-75
OTTO3-25
ELKR9-50
OTTO1-0
ELKR9-25
AQUE2-0
AQUE2-50
SPRI1-0
MICH1-25
MICH1-50
AQUE3-25
AQUE1-0
AQUE3-50
AQUE3-75
MICH1-75
SITE-18
STR02-25
STR02-50
STR14-25
STR02-75
STR14-50
STR14-75
BODI1-25
BODI1-50
BODI1-75
BODI3-75
BODI3-50
BODI3-25
GATE2-75
GATE2-25
GATE2-50
MICH2-25
THRE1-50
MICH2-50
THRE1-25
ALEX3-75
ERIC4-75
MILL1-0
ERIC4-50
MICH2-75
ERIC4-25
ALEX3-50
SPIT1-0
ERIC3-0
ERIC1-50
ERIC2-0
ERIC1-0
ELKR8-75
ALEX3-25
MICH3-25



ALEX3-25
MICH3-25
MICH3-50
ELKR8-50
MICH3-75
MICH4-25
RG_LE1-25
ELKR8-25
RG_LE1-50
MICH4-50
RG_LE1-75


MICH4-75
ANDY1-25
ANDY1-50
ANDY1-75
CORB2-25
CORB2-50
CORB1-75
CORB1-50
CORB1-25
CORB2-75
MICH5-25
MICH5-50
MICH5-75

Appendix 5. Reach calcite index distribution maps.



2022 Regional Calcite Monitoring Program - Calcite Index

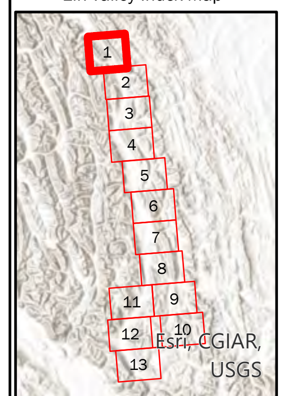
Elk Valley Map #1

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Reference Stream
Reach Break
Water Network
Road - Regional and Main
Railway
Teck Coal Operations

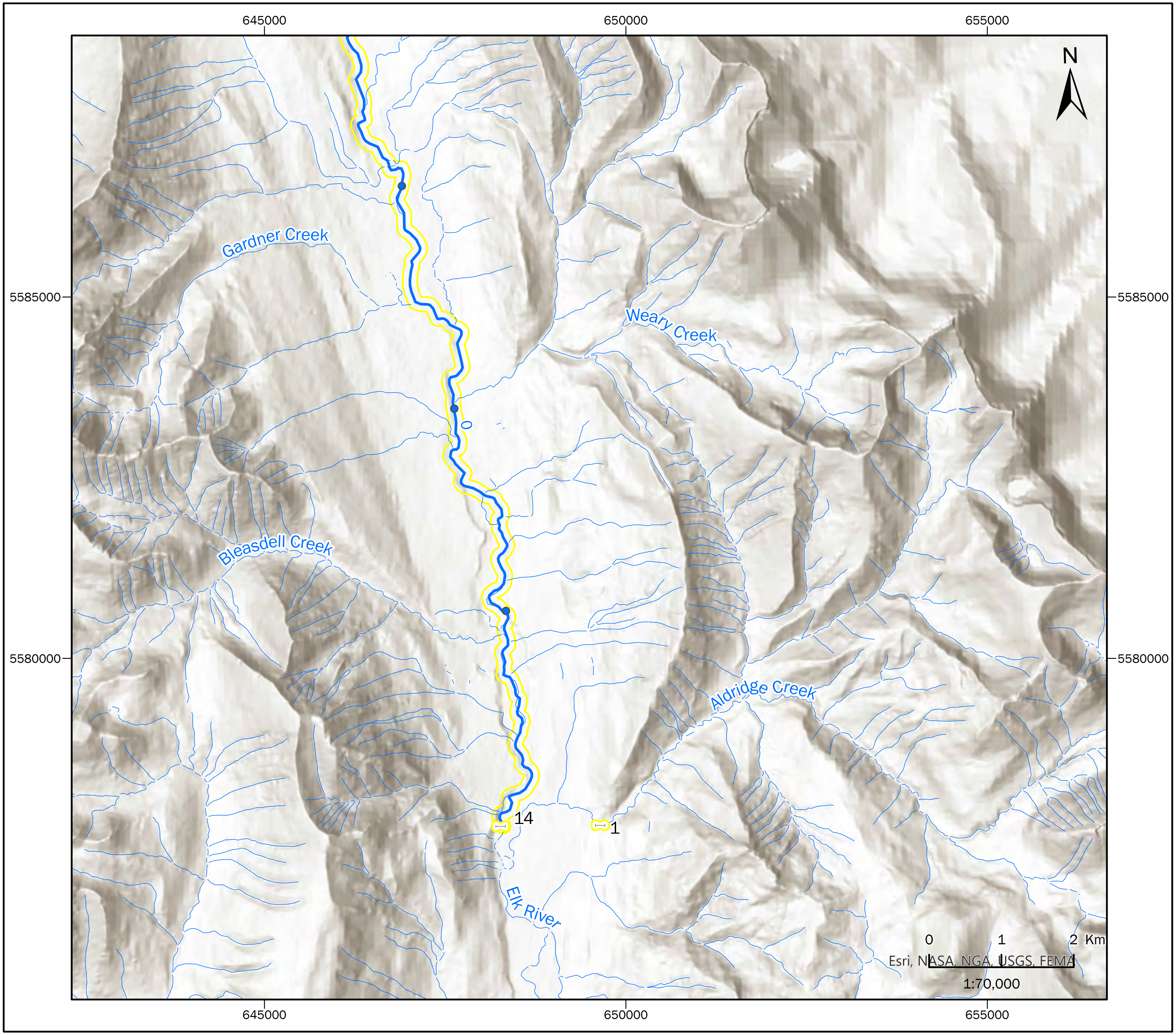
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



2022 Regional Calcite Monitoring Program - Calcite Index

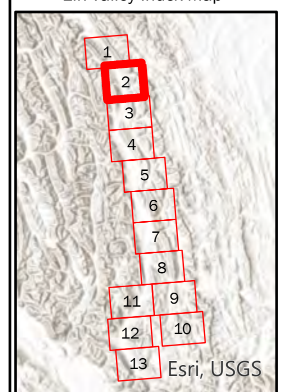
Elk Valley Map #2

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

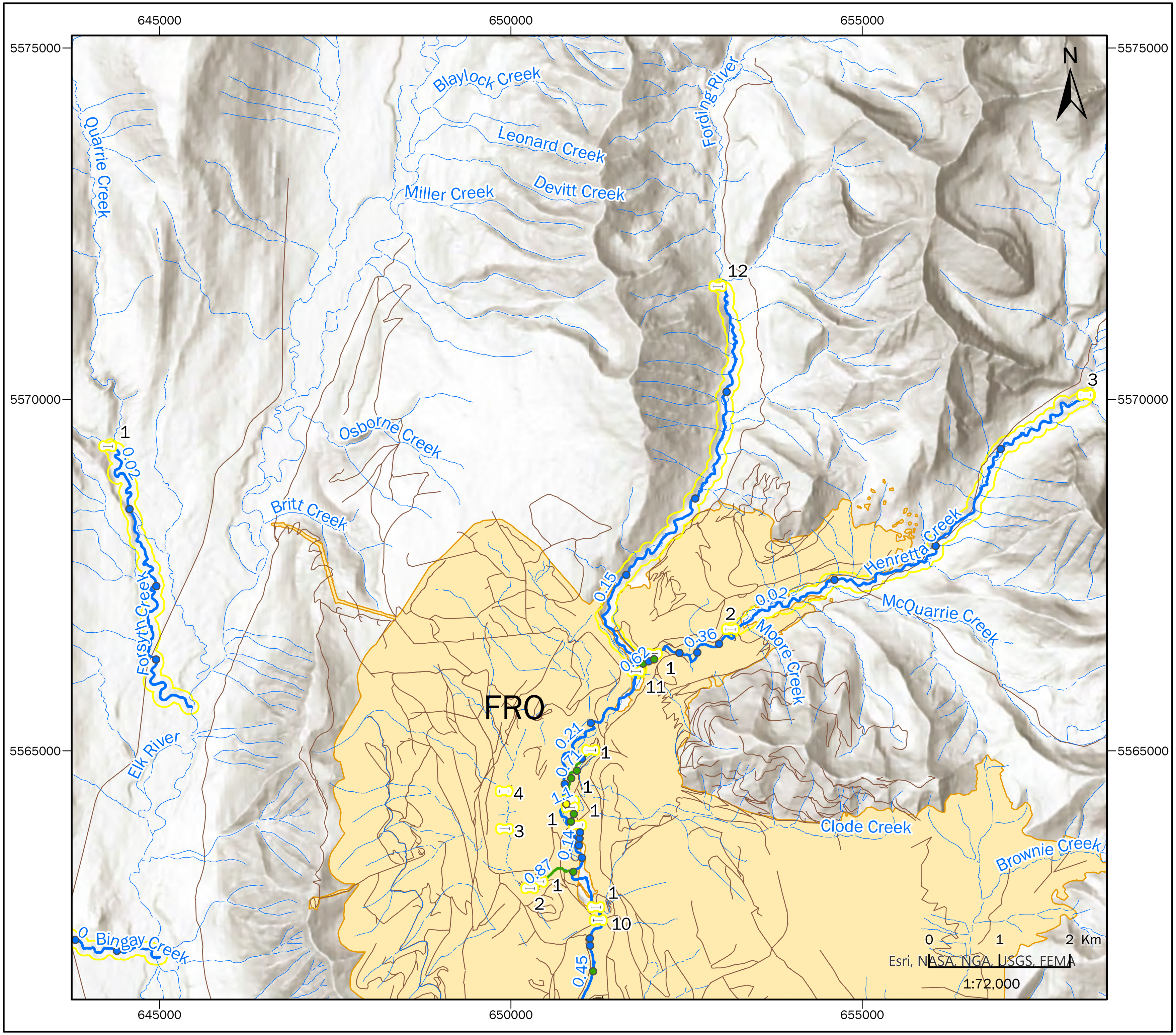
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



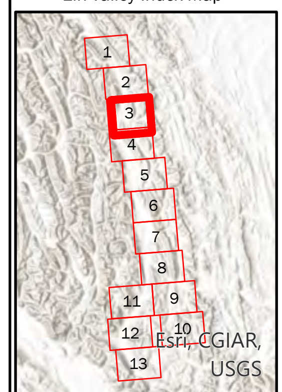
2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #3

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

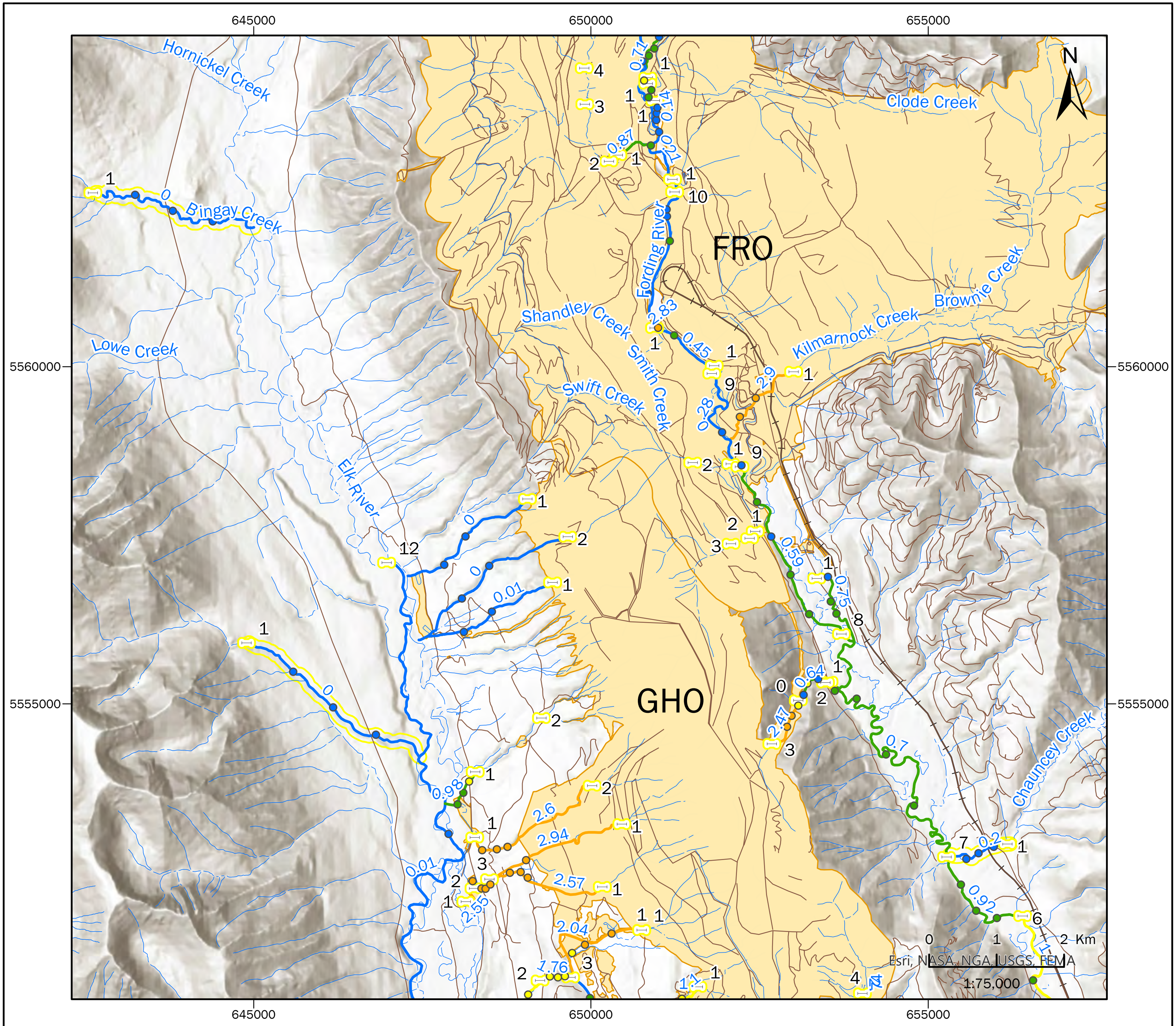
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #4

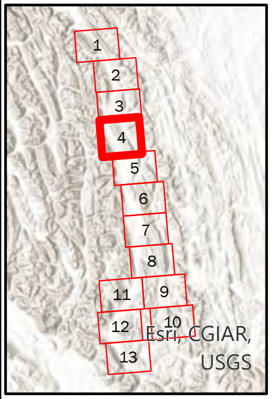
Calcite Index

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

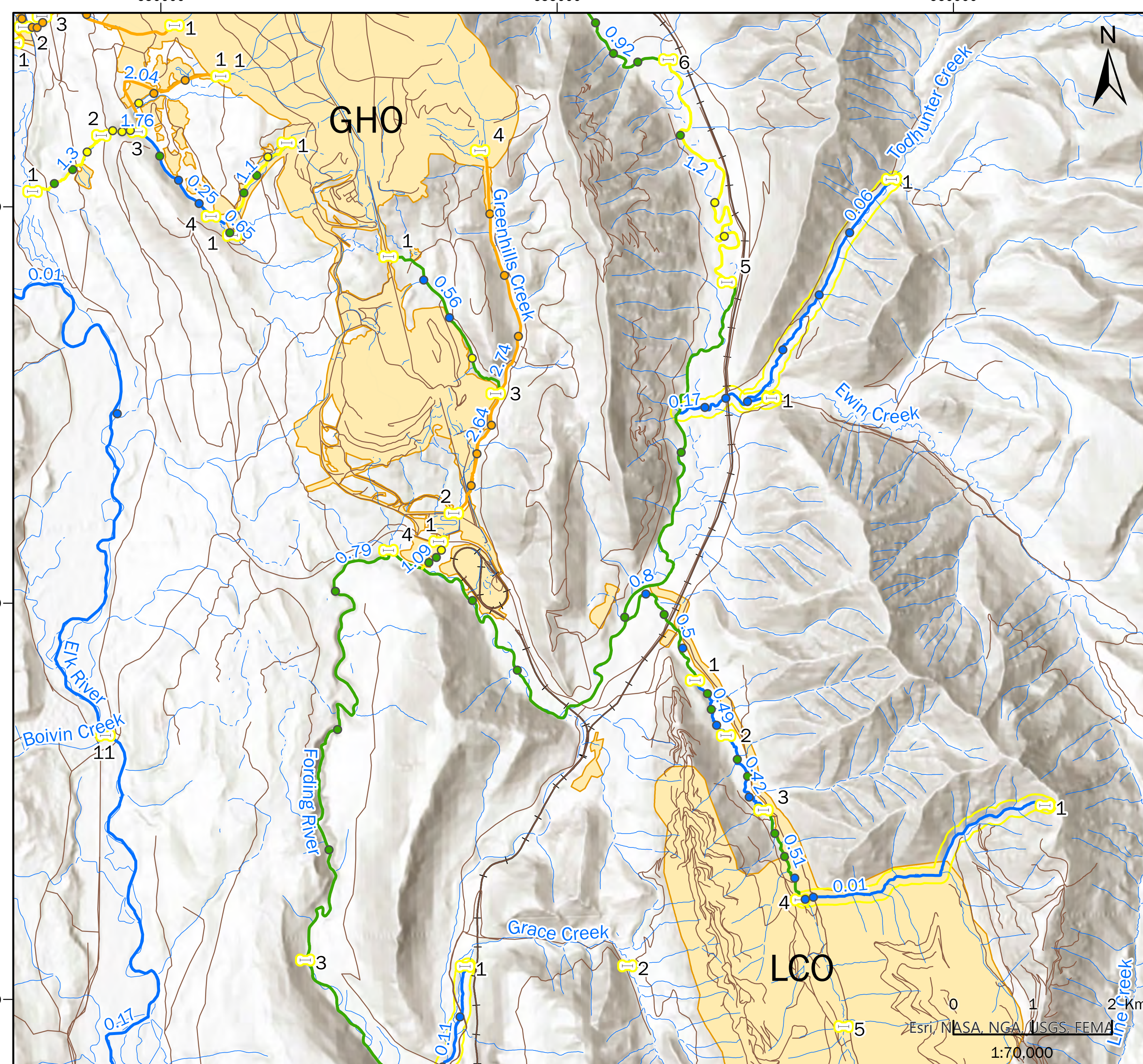
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



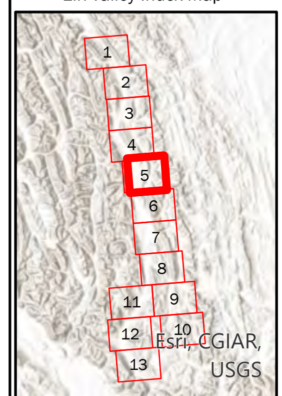
2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #5

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

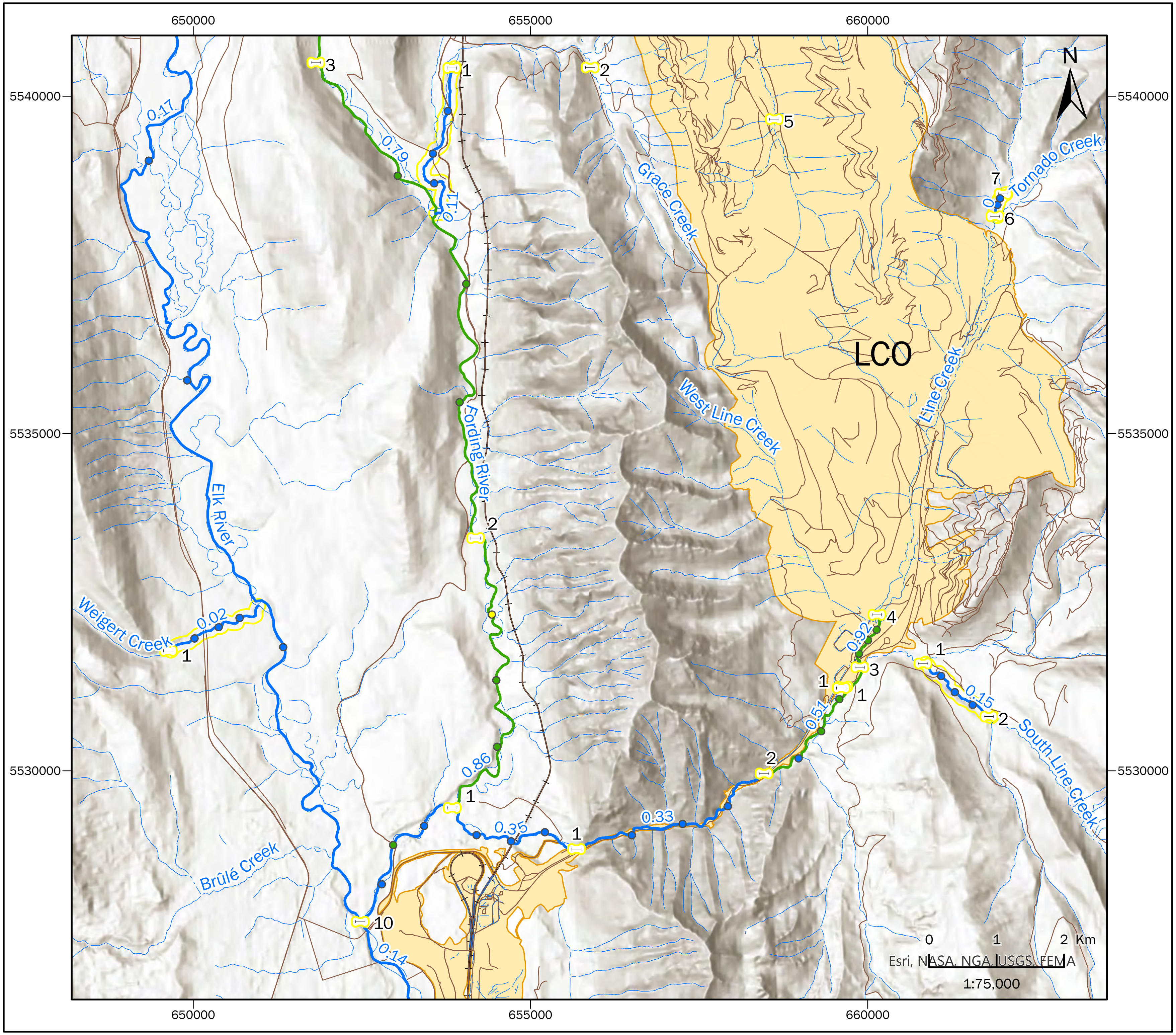
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



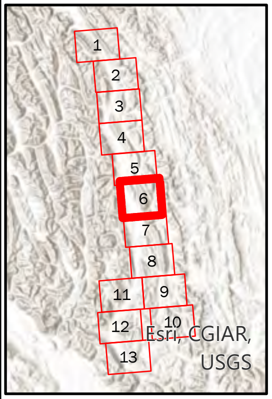
2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #6

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

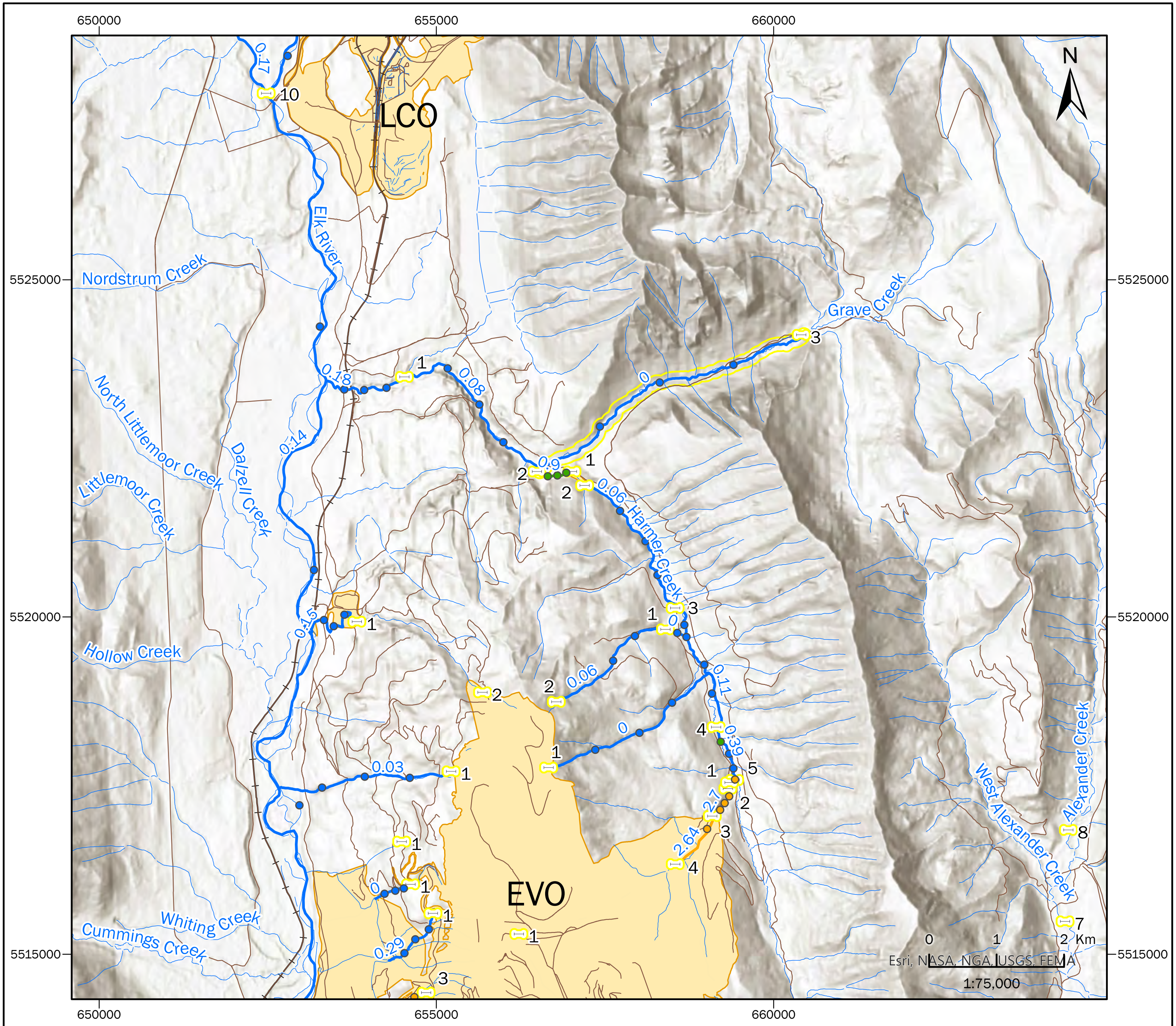
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



2022 Regional Calcite Monitoring Program - Calcite Index

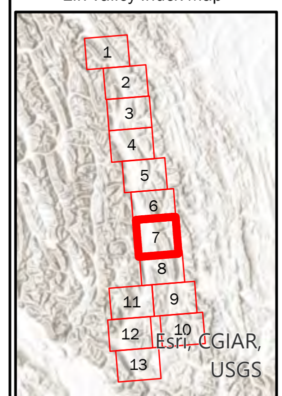
Elk Valley Map #7

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Reference Stream
Reach Break
Water Network
Road - Regional and Main
Railway
Teck Coal Operations

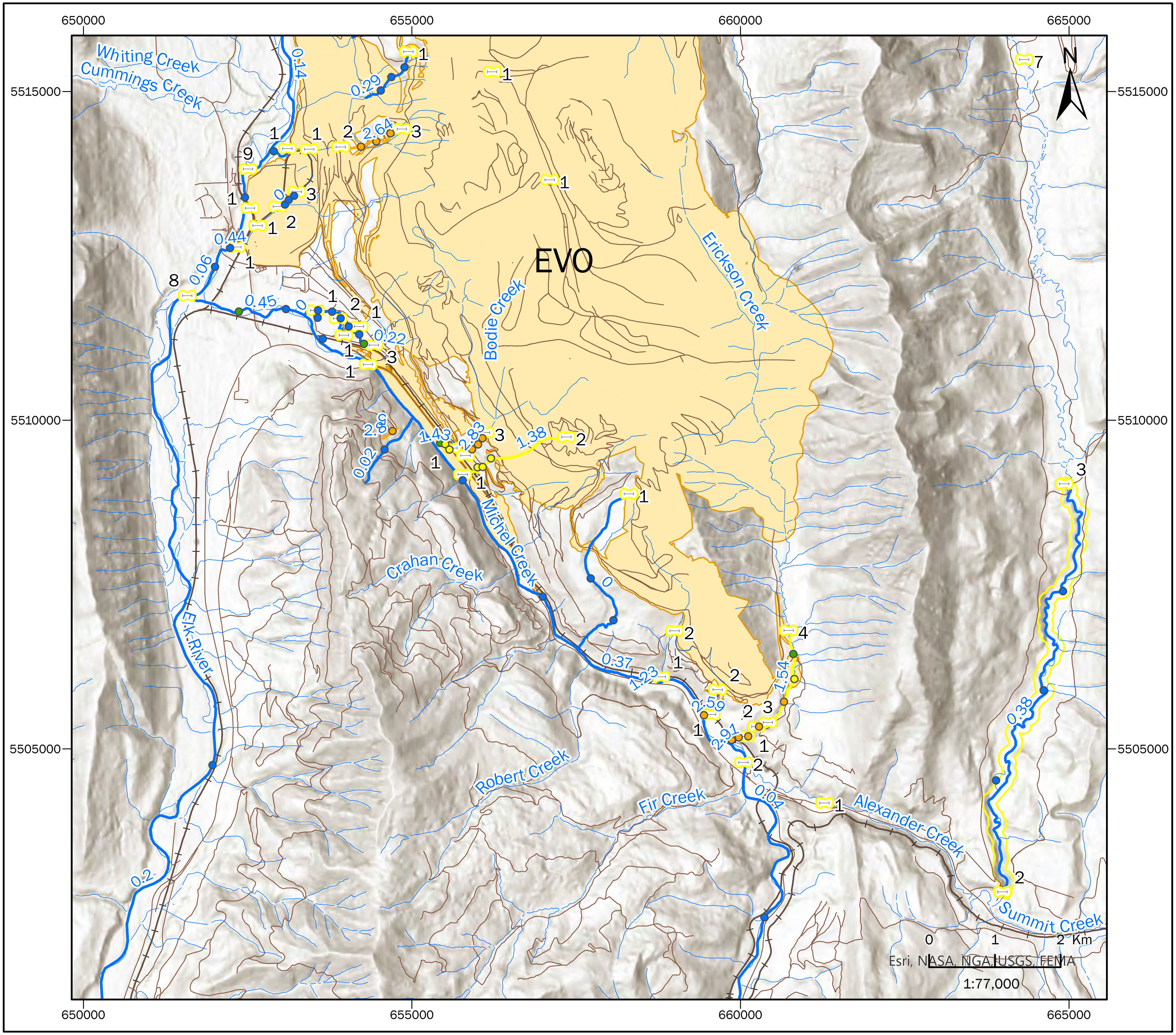
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



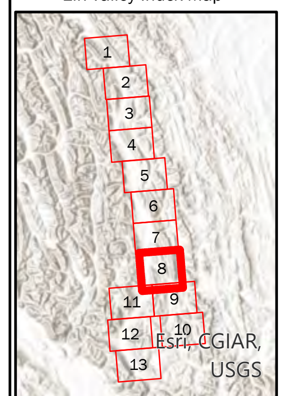
2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #8

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

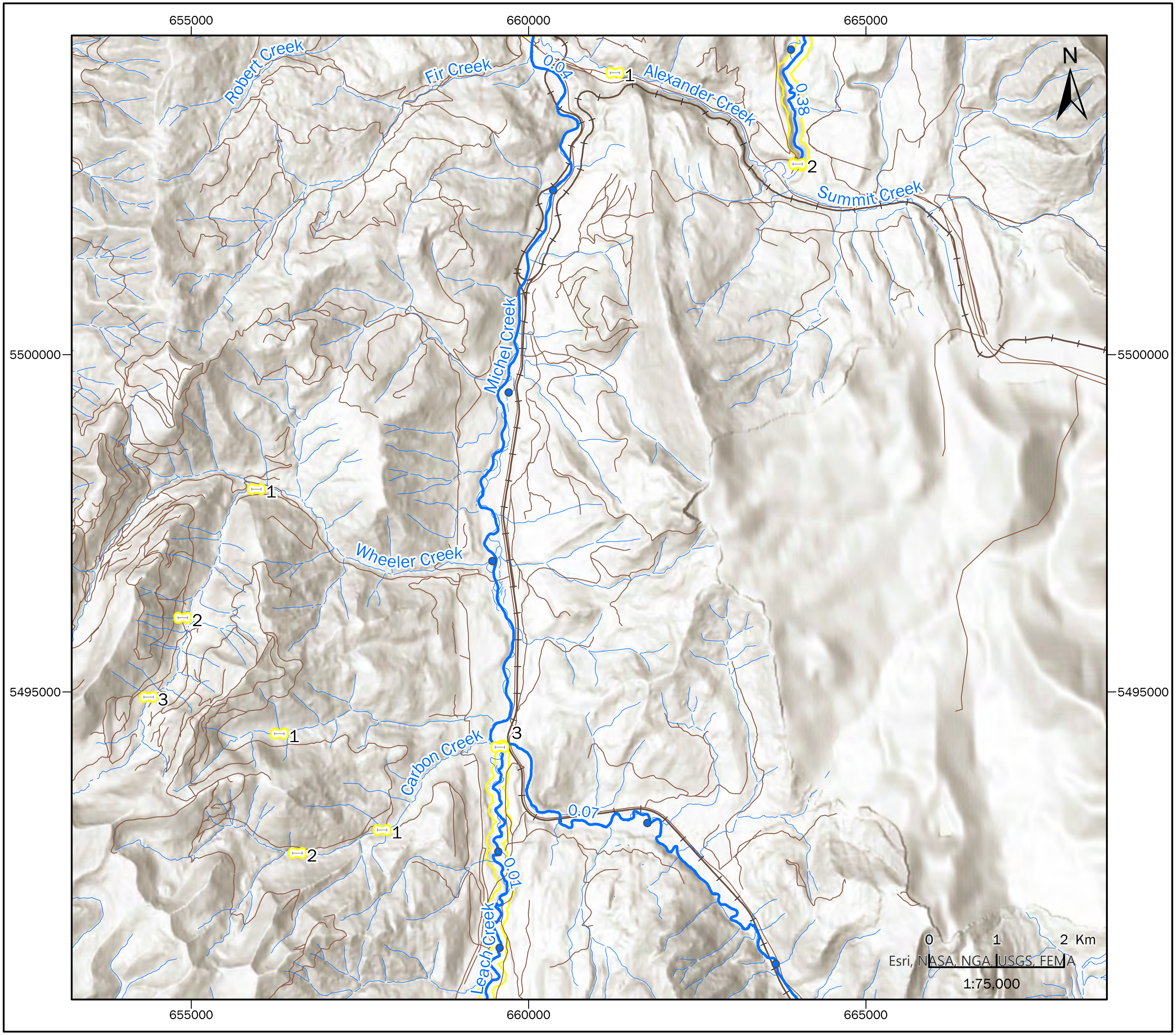
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



2022 Regional Calcite Monitoring Program - Calcite Index

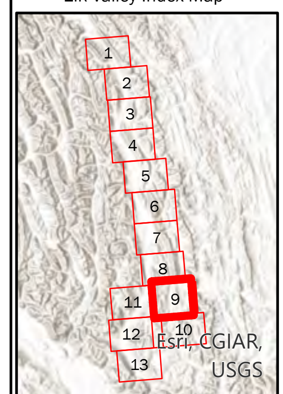
Elk Valley Map #9

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Reference Stream
Reach Break
Water Network
Road - Regional and Main
Railway
Teck Coal Operations

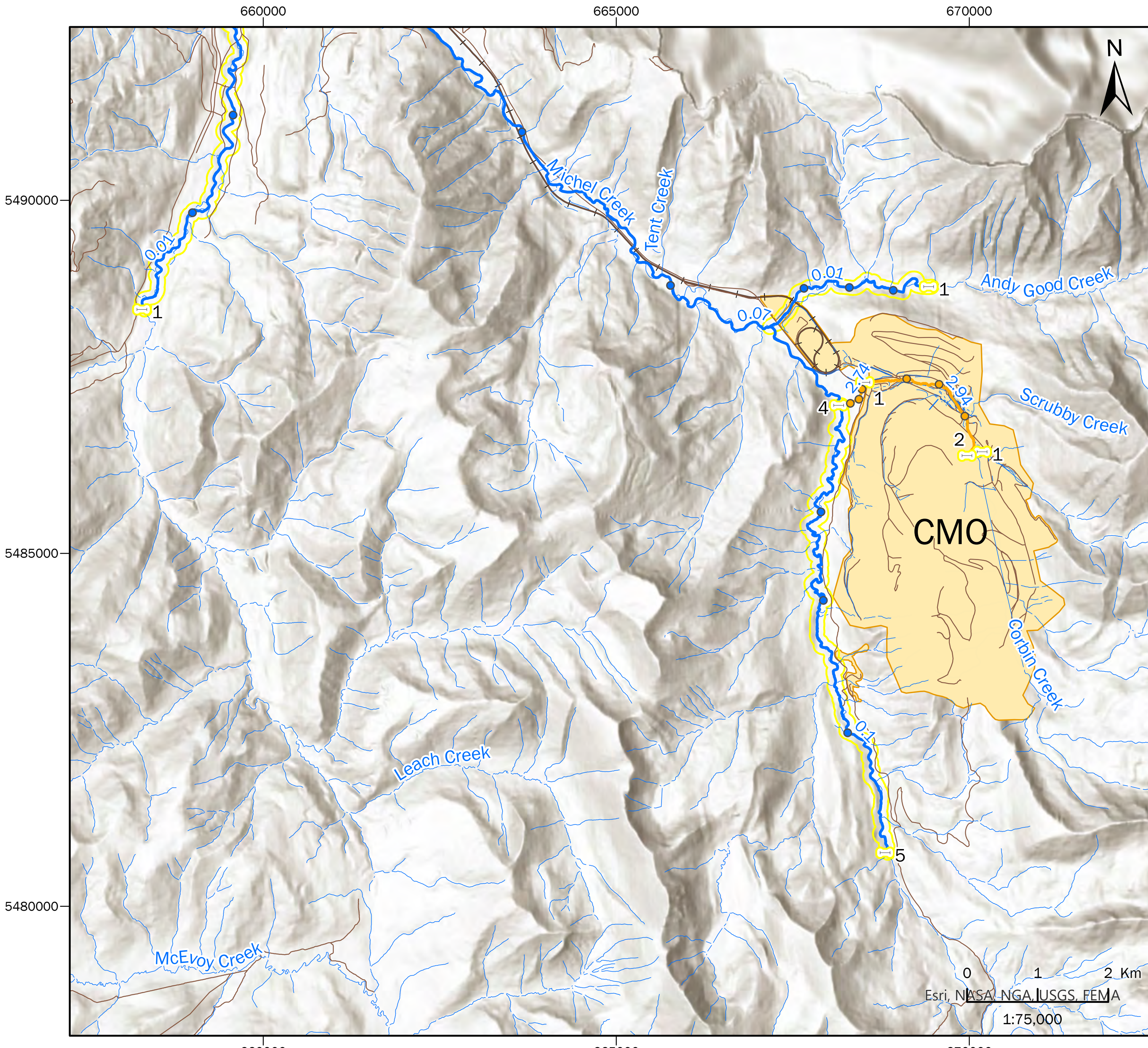
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



2022 Regional Calcite Monitoring Program - Calcite Index

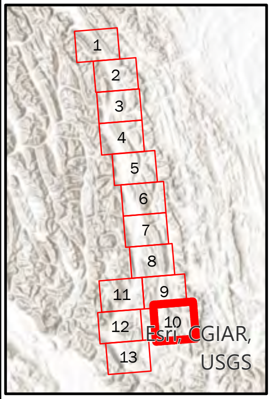
Elk Valley Map #10

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Reference Stream
Reach Break
Water Network
Road - Regional and Main
Railway
Teck Coal Operations

Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation

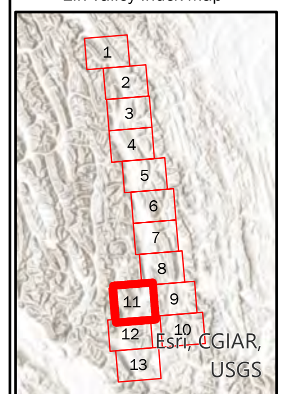
2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #11

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

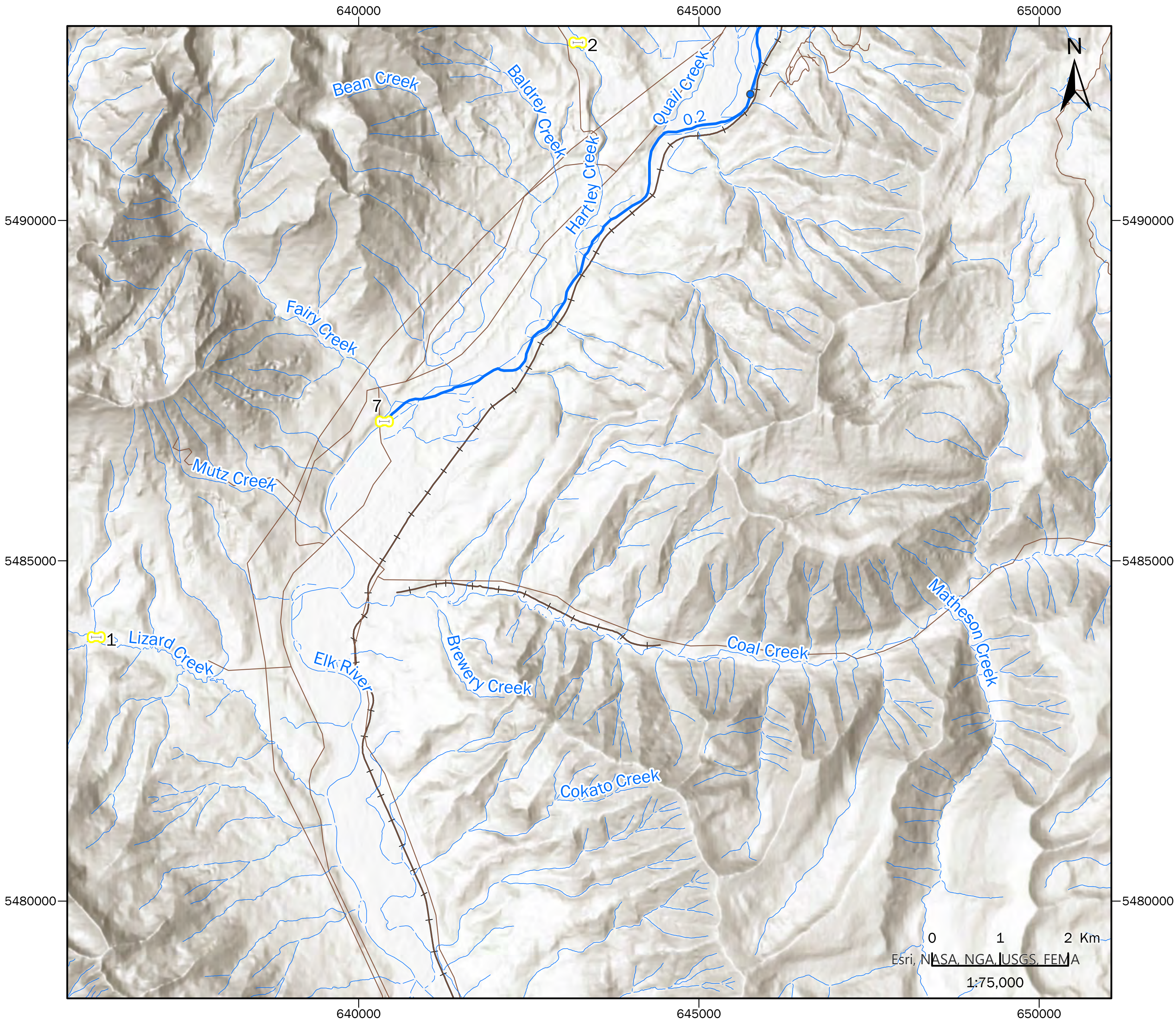
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



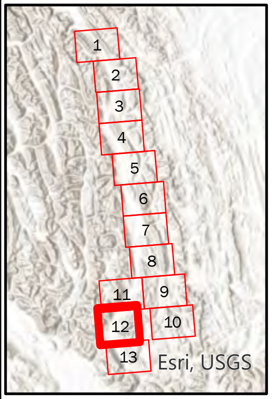
2022 Regional Calcite Monitoring Program - Calcite Index

Elk Valley Map #12

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- Reference Stream
- Reach Break
- Water Network
- Road - Regional and Main
- Railway
- Teck Coal Operations

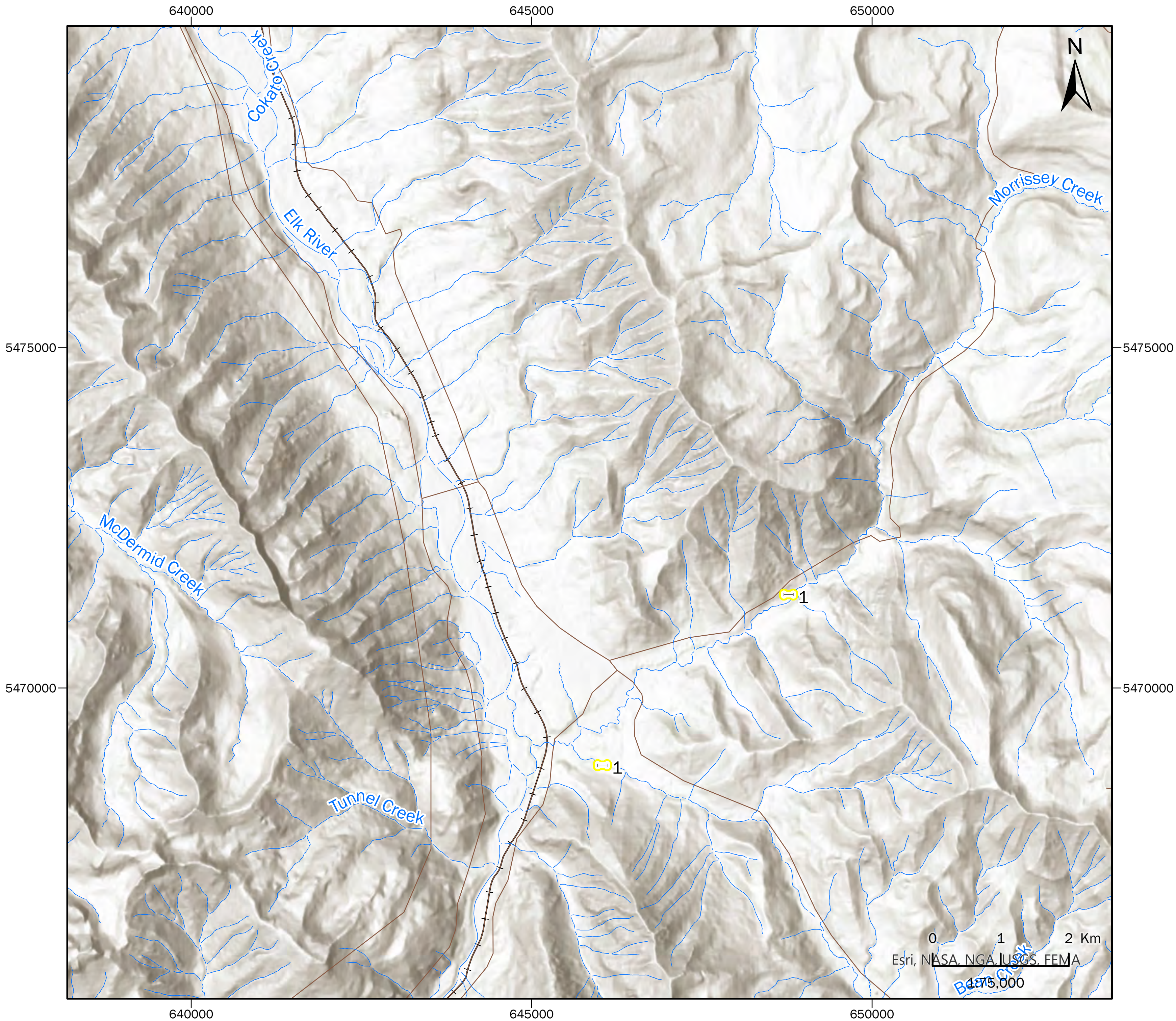
Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation



2022 Regional Calcite Monitoring Program - Calcite Index

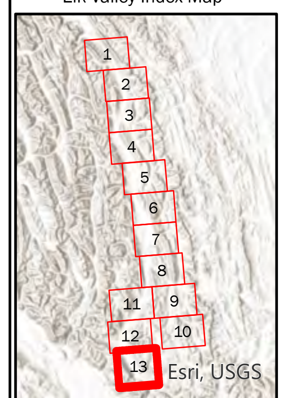
Elk Valley Map #13

Calcite Index
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Mean Calcite Index Reach Score
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00

Reference Stream
Reach Break
Water Network
Road - Regional and Main
Railway
Teck Coal Operations

Elk Valley Index Map



Client: Teck

Mapping by: LOTIC ENVIRONMENTAL

Data Sources:
- Teck Coal Operations - Teck
- Stream Network - Teck
- Road and Railway - Teck Transportation

Appendix 6. Calcite index, calcite presence, and calcite concretion for all reaches from 2013-2022.

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2013	Reference	Alexander	ALEX3	0.48	0.40	0.08
Tributary	2013	Reference	Andy Good	ANDY1	0.00	0.00	0.00
Tributary	2013	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2013	Exposed	Aqueduct	AQUE2	0.00	0.00	0.00
Tributary	2013	Exposed	Aqueduct	AQUE3	0.00	0.00	0.00
Tributary	2013	Exposed	Balmer	BALM1	0.00	0.00	0.00
Tributary	2013	Exposed	Bodie	BODI1	0.00	0.00	0.00
Tributary	2013	Exposed	Bodie	BODI2	0.06	0.06	0.00
Tributary	2013	Exposed	Bodie	BODI3	1.16	0.65	0.51
Tributary	2013	Exposed	Cataract	CATA1	3.00	1.00	2.00
Tributary	2013	Exposed	Cataract	CATA2	1.89	1.00	0.89
Tributary	2013	Exposed	Cataract	CATA3	3.00	1.00	2.00
Tributary	2013	Reference	Chauncey	CHAU1	0.00	0.00	0.00
Tributary	2013	Exposed	Corbin	CORB1	1.95	0.97	0.99
Tributary	2013	Exposed	Corbin	CORB2	2.72	0.98	1.74
Tributary	2013	Exposed	Clode Outlet	COUT1	0.00	0.00	0.00
Tributary	2013	Exposed	Contingency Pond Seep	CPOS1	0.92	0.92	0.00
Tributary	2013	Exposed	Contingency Pond Outlet	CPOU1	0.93	0.93	0.00
Tributary	2013	Exposed	CCR Seep	CSEE1	0.00	0.00	0.00
Tributary	2013	Exposed	Dry - EVO	DRYE1	2.23	0.85	1.38
Tributary	2013	Exposed	Dry - EVO	DRYE2	2.23	0.85	1.38
Tributary	2013	Exposed	Dry - EVO	DRYE3	2.20	0.85	1.35
Tributary	2013	Exposed	Dry - EVO	DRYE4	1.42	0.75	0.68
Tributary	2013	Reference	Dry - LCO	DRYL1	0.00	0.00	0.00
Tributary	2013	Reference	Dry - LCO	DRYL2	0.00	0.00	0.00
Tributary	2013	Reference	Dry - LCO	DRYL3	0.00	0.00	0.00
Tributary	2013	Reference	Dry - LCO	DRYL4	0.00	0.00	0.00
Tributary	2013	Reference	Dry - LCO	DRYL5	0.00	0.00	0.00
Tributary	2013	Reference	Dry - LCO	DRYL6	0.00	0.00	0.00
Mainstem	2013	Exposed	Elk	ELKR10	0.00	0.00	0.00
Mainstem	2013	Exposed	Elk	ELKR11	0.00	0.00	0.00
Mainstem	2013	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2013	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2013	Exposed	Elk	ELKR8	0.40	0.40	0.00
Mainstem	2013	Exposed	Elk	ELKR9	0.00	0.00	0.00
Tributary	2013	Exposed	Eagle Pond Outlet	EPOU1	1.90	1.00	0.90
Tributary	2013	Exposed	Erickson	ERIC1	2.29	0.99	1.30
Tributary	2013	Exposed	Erickson	ERIC2	1.78	0.88	0.90
Tributary	2013	Exposed	Erickson	ERIC3	2.36	0.96	1.40
Tributary	2013	Exposed	Erickson	ERIC4	0.62	0.53	0.09
Tributary	2013	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2013	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Mainstem	2013	Exposed	Fording	FORD1	0.00	0.00	0.00
Mainstem	2013	Exposed	Fording	FORD10	0.00	0.00	0.00
Mainstem	2013	Exposed	Fording	FORD11	0.00	0.00	0.00
Mainstem	2013	Reference	Fording	FORD12	0.00	0.00	0.00
Mainstem	2013	Exposed	Fording	FORD2	0.00	0.00	0.00
Mainstem	2013	Exposed	Fording	FORD3	0.00	0.00	0.00
Mainstem	2013	Exposed	Fording	FORD5	0.32	0.32	0.00
Mainstem	2013	Exposed	Fording	FORD6	0.74	0.68	0.06
Mainstem	2013	Exposed	Fording	FORD7	0.43	0.40	0.03

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Mainstem	2013	Exposed	Fording	FORD8	0.31	0.30	0.01
Mainstem	2021	Exposed	Fording	FORD9b	0.10	0.10	0.00
Tributary	2013	Exposed	Fish Pond	FPON1	0.00	0.00	0.00
Tributary	2013	Exposed	Gardine	GARD1	0.29	0.29	0.00
Tributary	2013	Exposed	Gate	GATE1	0.05	0.05	0.00
Tributary	2013	Exposed	Gate	GATE2	0.29	0.26	0.03
Tributary	2013	Exposed	Goddard	GODD1	0.00	0.00	0.00
Tributary	2013	Exposed	Goddard	GODD2	0.00	0.00	0.00
Tributary	2013	Exposed	Goddard	GODD3	0.00	0.00	0.00
Tributary	2013	Reference	Grace	GRAC1	0.31	0.29	0.02
Tributary	2013	Reference	Grace	GRAC2	0.15	0.15	0.01
Tributary	2013	Exposed	Grassy	GRAS1	0.00	0.00	0.00
Tributary	2013	Exposed	Grave	GRAV1	0.54	0.54	0.00
Tributary	2013	Exposed	Grave	GRAV2	0.23	0.23	0.00
Tributary	2013	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2013	Exposed	Greenhills	GREE1	0.35	0.35	0.01
Tributary	2013	Exposed	Greenhills	GREE2	0.60	0.60	0.00
Tributary	2013	Exposed	Greenhills	GREE3	1.30	0.83	0.47
Tributary	2013	Exposed	Greenhills	GREE4	1.62	0.79	0.83
Tributary	2013	Exposed	Harmer	HARM1	0.58	0.58	0.00
Tributary	2013	Exposed	Harmer	HARM2	0.17	0.17	0.00
Tributary	2013	Exposed	Harmer	HARM3	0.15	0.15	0.00
Tributary	2013	Exposed	Harmer	HARM4	0.17	0.16	0.01
Tributary	2013	Exposed	Harmer	HARM5	0.19	0.19	0.00
Tributary	2013	Exposed	Harmer Dump Seep	HDSE1	0.52	0.49	0.03
Tributary	2013	Exposed	Henretta	HENR1	0.00	0.00	0.00
Tributary	2013	Exposed	Henretta	HENR2	0.00	0.00	0.00
Tributary	2013	Reference	Henretta	HENR3	0.00	0.00	0.00
Tributary	2013	Exposed	Kilmarmock	KILM1	2.16	0.83	1.33
Tributary	2013	Exposed	Lagoon C Seep	LCSE1	0.39	0.39	0.00
Tributary	2013	Exposed	Leask	LEAS1	0.03	0.03	0.00
Tributary	2013	Exposed	Leask	LEAS2	0.13	0.13	0.00
Tributary	2013	Exposed	Lindsay	LIND1	0.19	0.19	0.00
Tributary	2013	Exposed	Line	LINE1	0.27	0.27	0.00
Tributary	2013	Exposed	Line	LINE2	0.00	0.00	0.00
Tributary	2013	Exposed	Line	LINE3	0.00	0.00	0.00
Tributary	2013	Exposed	Line	LINE4	0.40	0.40	0.00
Tributary	2013	Reference	Line	LINE7	0.00	0.00	0.00
Tributary	2013	Exposed	Lake Mountain	LMOU1	0.00	0.00	0.00
Tributary	2013	Exposed	Lake Mountain	LMOU2	0.00	0.00	0.00
Tributary	2013	Exposed	Lake Mountain	LMOU3	0.00	0.00	0.00
Tributary	2013	Exposed	Lake Mountain	LMOU4	0.00	0.00	0.00
Mainstem	2013	Exposed	Michel	MICH1	0.31	0.31	0.00
Mainstem	2013	Exposed	Michel	MICH2	0.05	0.05	0.00
Mainstem	2013	Exposed	Michel	MICH3	0.00	0.00	0.00
Mainstem	2013	Exposed	Michel	MICH4	0.00	0.00	0.00
Mainstem	2013	Reference	Michel	MICH5	0.00	0.00	0.00
Tributary	2013	Exposed	Mickelson	MICK1	0.01	0.01	0.00
Tributary	2013	Exposed	Mickelson	MICK2	0.05	0.05	0.00
Tributary	2013	Exposed	Milligan	MILL1	0.00	0.00	0.00
Tributary	2013	Exposed	Milligan	MILL2	0.00	0.00	0.00
Tributary	2013	Exposed	North Thompson	NTHO1	1.24	0.74	0.50
Tributary	2013	Exposed	North Wolfram	NWOL1	0.70	0.45	0.25

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2013	Exposed	Otto	OTTO1	0.30	0.30	0.00
Tributary	2013	Exposed	Otto	OTTO2	0.03	0.03	0.00
Tributary	2013	Exposed	Otto	OTTO3	0.02	0.01	0.01
Tributary	2013	Exposed	Pit Road 12 Seep	P12S1	0.00	0.00	0.00
Tributary	2013	Exposed	Pengelly	PENG1	0.09	0.09	0.00
Tributary	2013	Exposed	Porter	PORT1	0.92	0.78	0.14
Tributary	2013	Exposed	Porter	PORT2	0.11	0.05	0.06
Tributary	2013	Exposed	Porter	PORT3a	2.33	0.92	1.41
Tributary	2013	Exposed	Porter	PORT3b	3.00	1.00	2.00
Tributary	2013	Exposed	Qualteri	QUAL1	0.00	0.00	0.00
Tributary	2013	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2013	Exposed	Sawmill	SAWM2	0.38	0.38	0.00
Tributary	2013	Exposed	Sixmile	SIXM1	0.80	0.80	0.00
Tributary	2013	Exposed	Sixmile	SIXM2	0.00	0.00	0.00
Tributary	2013	Reference	South Line	SLINE2	0.00	0.00	0.00
Tributary	2013	Exposed	South Pit	SPIT1	0.00	0.00	0.00
Tributary	2013	Exposed	South Pit	SPIT2	0.03	0.02	0.01
Tributary	2013	Exposed	Smith Ponds Outlet	SPOU1	2.61	0.89	1.72
Tributary	2013	Exposed	Spring	SPRI1	0.20	0.20	0.00
Tributary	2013	Exposed	South Pond Seep	SPSE1	0.00	0.00	0.00
Tributary	2013	Exposed	Swift	SWIF1	2.58	0.87	1.71
Tributary	2013	Exposed	Swift	SWIF2	0.00	0.00	0.00
Tributary	2013	Exposed	South Wolfram	SWOL1	1.97	0.97	1.00
Tributary	2013	Exposed	Thompson	THOM1	0.00	0.00	0.00
Tributary	2013	Exposed	Thompson	THOM2	0.08	0.07	0.01
Tributary	2013	Exposed	Thompson	THOM3	0.00	0.00	0.00
Tributary	2013	Exposed	Thresher	THRE1	0.00	0.00	0.00
Tributary	2013	Exposed	Unnamed South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2013	Exposed	Wolfram	WOLF2	0.27	0.25	0.02
Tributary	2013	Exposed	Wolfram	WOLF3	2.93	1.00	1.93
Tributary	2014	Reference	Alexander	ALEX3	0.38	0.33	0.05
Tributary	2014	Reference	Andy Good	ANDY1	0.00	0.00	0.00
Tributary	2014	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2014	Exposed	Aqueduct	AQUE2	0.00	0.00	0.00
Tributary	2014	Exposed	Aqueduct	AQUE3	0.00	0.00	0.00
Tributary	2014	Exposed	Balmer	BALM1	0.00	0.00	0.00
Tributary	2014	Exposed	Bodie	BODI1	0.00	0.00	0.00
Tributary	2014	Exposed	Bodie	BODI2	0.00	0.00	0.00
Tributary	2014	Exposed	Bodie	BODI3	2.47	0.96	1.51
Tributary	2014	Exposed	CCR Seep	CSEE1	0.00	0.00	0.00
Tributary	2014	Reference	Carbon	CARB1	0.00	0.00	0.00
Tributary	2014	Reference	Carbon	CARB2	0.00	0.00	0.00
Tributary	2014	Exposed	Cataract	CATA1	3.00	1.00	2.00
Tributary	2014	Exposed	Cataract	CATA2	0.64	0.27	0.37
Tributary	2014	Exposed	Cataract	CATA3	2.64	0.88	1.76
Tributary	2014	Reference	Chauncey	CHAU1	0.00	0.00	0.00
Tributary	2014	Exposed	Clode Pond Outlet	COUT1	1.01	0.65	0.36
Tributary	2014	Exposed	Clode West Infiltration	CLOW1	0.18	0.18	0.00
Tributary	2014	Exposed	Contingency Pond Outlet	CPOU1	0.94	0.94	0.00
Tributary	2014	Exposed	Contingency Pond Seep	CPOS1	0.84	0.84	0.00
Tributary	2014	Exposed	Corbin	CORB1	1.71	0.86	0.84
Tributary	2014	Exposed	Corbin	CORB2	2.68	1.00	1.68
Tributary	2014	Exposed	Dry (EVO)	DRYE1	2.13	0.97	1.16

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2014	Exposed	Dry (EVO)	DRYE2	0.03	0.03	0.00
Tributary	2014	Exposed	Dry (EVO)	DRYE3	2.40	0.81	1.59
Tributary	2014	Exposed	Dry (EVO)	DRYE4	1.84	0.62	1.22
Tributary	2014	Reference	Dry (LCO)	DRYL1	0.00	0.00	0.00
Tributary	2014	Reference	Dry (LCO)	DRYL2	0.00	0.00	0.00
Tributary	2014	Reference	Dry (LCO)	DRYL3	0.00	0.00	0.00
Tributary	2014	Exposed	Eagle Pond Outlet	EPOU1	1.31	0.58	0.73
Mainstem	2014	Exposed	Elk	ELKR10	0.00	0.00	0.00
Mainstem	2014	Exposed	Elk	ELKR11	0.00	0.00	0.00
Mainstem	2014	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2014	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2014	Exposed	Elk	ELKR8	0.00	0.00	0.00
Mainstem	2014	Exposed	Elk	ELKR9	0.00	0.00	0.00
Tributary	2014	Exposed	Erickson	ERIC1	2.59	0.98	1.61
Tributary	2014	Exposed	Erickson	ERIC2	2.27	0.92	1.35
Tributary	2014	Exposed	Erickson	ERIC3	2.60	1.00	1.60
Tributary	2014	Exposed	Erickson	ERIC4	1.28	0.83	0.44
Tributary	2014	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2014	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Tributary	2014	Exposed	Fish Pond	FPON1	0.03	0.03	0.00
Mainstem	2014	Exposed	Fording	FORD1	0.00	0.00	0.00
Mainstem	2014	Exposed	Fording	FORD10	0.00	0.00	0.00
Mainstem	2014	Exposed	Fording	FORD11	0.00	0.00	0.00
Mainstem	2014	Reference	Fording	FORD12	0.00	0.00	0.00
Mainstem	2014	Exposed	Fording	FORD2	0.00	0.00	0.00
Mainstem	2014	Exposed	Fording	FORD3	0.01	0.01	0.00
Mainstem	2014	Exposed	Fording	FORD4	0.05	0.05	0.00
Mainstem	2014	Exposed	Fording	FORD5	0.35	0.28	0.07
Mainstem	2014	Exposed	Fording	FORD6	0.43	0.33	0.10
Mainstem	2014	Exposed	Fording	FORD7	0.97	0.60	0.37
Mainstem	2014	Exposed	Fording	FORD8	0.49	0.44	0.05
Mainstem	2021	Exposed	Fording	FORD9a	0.41	0.30	0.11
Tributary	2014	Exposed	Gardine	GARD1	0.70	0.31	0.40
Tributary	2014	Exposed	Gate	GATE1	0.05	0.05	0.00
Tributary	2014	Exposed	Gate	GATE2	0.00	0.00	0.00
Tributary	2014	Exposed	Goddard	GODD1	0.00	0.00	0.00
Tributary	2014	Exposed	Goddard	GODD2	0.00	0.00	0.00
Tributary	2014	Exposed	Goddard	GODD3	1.90	0.82	1.07
Tributary	2014	Reference	Grace	GRAC1	0.20	0.18	0.02
Tributary	2014	Reference	Grace	GRAC2	0.10	0.09	0.01
Tributary	2014	Reference	Grace	GRAC3	0.00	0.00	0.00
Tributary	2014	Exposed	Grassy	GRAS1	0.09	0.07	0.01
Tributary	2014	Exposed	Grave	GRAV1	0.72	0.49	0.23
Tributary	2014	Exposed	Grave	GRAV2	0.21	0.15	0.06
Tributary	2014	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2014	Exposed	Greenhills	GREE1	1.06	0.64	0.41
Tributary	2014	Exposed	Greenhills	GREE2	0.00	0.00	0.00
Tributary	2014	Exposed	Greenhills	GREE3	2.22	0.92	1.31
Tributary	2014	Exposed	Greenhills	GREE4	2.78	0.98	1.80
Tributary	2014	Exposed	Harmer	HARM1	1.08	0.79	0.29
Tributary	2014	Exposed	Harmer	HARM2	0.10	0.10	0.00
Tributary	2014	Exposed	Harmer	HARM3	0.28	0.16	0.12
Tributary	2014	Exposed	Harmer	HARM4	0.70	0.41	0.29

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2014	Exposed	Harmer	HARM5	0.56	0.40	0.16
Tributary	2014	Exposed	Henretta	HENR1	0.00	0.00	0.00
Tributary	2014	Exposed	Henretta	HENR2	0.00	0.00	0.00
Tributary	2014	Reference	Henretta	HENR3	0.00	0.00	0.00
Tributary	2014	Exposed	Kilmamock	KILM1	1.64	0.59	1.05
Tributary	2014	Exposed	Lake Mountain	LMOU1	0.33	0.28	0.06
Tributary	2014	Exposed	Lake Mountain	LMOU2	0.09	0.05	0.04
Tributary	2014	Exposed	Lake Mountain	LMOU3	0.00	0.00	0.00
Tributary	2014	Exposed	Lake Mountain	LMOU4	0.00	0.00	0.00
Tributary	2014	Exposed	Leask	LEAS1	0.17	0.10	0.07
Tributary	2014	Exposed	Leask	LEAS2	1.60	0.79	0.82
Tributary	2014	Exposed	Lindsay	LIND1	0.26	0.23	0.03
Tributary	2014	Exposed	Line	LINE1	0.00	0.00	0.00
Tributary	2014	Exposed	Line	LINE2	0.00	0.00	0.00
Tributary	2014	Exposed	Line	LINE3	0.00	0.00	0.00
Tributary	2014	Exposed	Line	LINE4	0.27	0.27	0.00
Tributary	2014	Reference	Line	LINE7	0.00	0.00	0.00
Mainstem	2014	Exposed	Michel	MICH1	0.00	0.00	0.00
Mainstem	2014	Exposed	Michel	MICH2	0.05	0.05	0.00
Mainstem	2014	Exposed	Michel	MICH3	0.00	0.00	0.00
Mainstem	2014	Exposed	Michel	MICH4	0.00	0.00	0.00
Mainstem	2014	Reference	Michel	MICH5	0.00	0.00	0.00
Tributary	2014	Exposed	Mickelson	MICK1	0.00	0.00	0.00
Tributary	2014	Exposed	Mickelson	MICK2	0.00	0.00	0.00
Tributary	2014	Exposed	Milligan	MILL1	0.00	0.00	0.00
Tributary	2014	Exposed	Milligan	MILL2	0.00	0.00	0.00
Tributary	2014	Exposed	North Thompson	NTHO1	2.39	0.90	1.49
Tributary	2014	Exposed	North Wolfram	NWOL1	1.33	0.76	0.57
Tributary	2014	Exposed	Otto	OTTO1	0.22	0.20	0.02
Tributary	2014	Exposed	Otto	OTTO2	0.00	0.00	0.00
Tributary	2014	Exposed	Otto	OTTO3	0.02	0.02	0.01
Tributary	2014	Exposed	Pengally	PENG1	0.02	0.02	0.00
Tributary	2014	Exposed	Porter	PORT1	0.84	0.78	0.06
Tributary	2014	Exposed	Porter	PORT2	0.10	0.10	0.00
Tributary	2014	Exposed	Porter	PORT3a	1.34	0.94	0.40
Tributary	2014	Exposed	Porter	PORT3b	2.28	0.92	1.37
Tributary	2014	Exposed	Qualteri	QUAL1	0.00	0.00	0.00
Tributary	2014	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2014	Exposed	Sawmill	SAWM2	0.54	0.31	0.24
Tributary	2014	Exposed	Six Mile	SIXM1	1.19	0.88	0.32
Tributary	2014	Exposed	Smith Pond Outlet	SPOU1	2.24	0.85	1.39
Tributary	2014	Reference	Snowslide	SNOW1	0.00	0.00	0.00
Tributary	2014	Reference	South Line	SLINE2	0.00	0.00	0.00
Tributary	2014	Exposed	South Pit	SPIT1	0.00	0.00	0.00
Tributary	2014	Exposed	South Pit	SPIT2	0.00	0.00	0.00
Tributary	2014	Exposed	South Pond Seep	SPSE1	1.50	0.50	1.00
Tributary	2014	Exposed	South Wolfram Creek	SWOL1	1.97	0.80	1.17
Tributary	2014	Exposed	Spring	SPRI1	0.11	0.11	0.00
Tributary	2014	Exposed	Swift	SWIF1	2.18	0.91	1.27
Tributary	2014	Exposed	Swift	SWIF2	1.04	0.46	0.58
Tributary	2014	Exposed	Thompson	THOM1	0.00	0.00	0.00
Tributary	2014	Exposed	Thompson	THOM2	0.00	0.00	0.00
Tributary	2014	Exposed	Thompson	THOM3	0.00	0.00	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2014	Exposed	Thresher	THRE1	0.00	0.00	0.00
Tributary	2014	Exposed	Unnamed South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2014	Reference	Wheeler	WHEE1	0.00	0.00	0.00
Tributary	2014	Reference	Wheeler	WHEE2	0.00	0.00	0.00
Tributary	2014	Reference	Wheeler	WHEE3	0.00	0.00	0.00
Tributary	2014	Exposed	Wolfram	WOLF2	0.14	0.08	0.06
Tributary	2014	Exposed	Wolfram	WOLF3	2.07	0.86	1.21
Tributary	2015	Reference	Alexander	ALEX3	0.40	0.39	0.01
Tributary	2015	Reference	Andy Good	ANDY1	0.00	0.00	0.00
Tributary	2015	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2015	Exposed	Aqueduct	AQUE2	0.00	0.00	0.00
Tributary	2015	Exposed	Aqueduct	AQUE3	0.00	0.00	0.00
Tributary	2015	Exposed	Balmer	BALM1	0.00	0.00	0.00
Tributary	2015	Exposed	Bodie	BODI1	0.00	0.00	0.00
Tributary	2015	Exposed	CCR Seep	CSEE1	0.85	0.31	0.54
Tributary	2015	Reference	Carbon	CARB1	0.00	0.00	0.00
Tributary	2015	Reference	Carbon	CARB2	0.00	0.00	0.00
Tributary	2015	Exposed	Cataract	CATA1	3.00	1.00	2.00
Tributary	2015	Exposed	Cataract	CATA3	2.56	0.99	1.58
Tributary	2015	Reference	Chauncey	CHAU1	0.00	0.00	0.00
Tributary	2015	Exposed	Clode Pond Outlet	COUT1	1.03	0.87	0.16
Tributary	2015	Exposed	Clode West Infiltration	CLOW1	0.00	0.00	0.00
Tributary	2015	Exposed	Corbin	CORB1	2.62	0.99	1.63
Tributary	2015	Exposed	Corbin	CORB2	2.25	0.83	1.42
Tributary	2015	Exposed	Dry (EVO)	DRYE1	2.19	0.94	1.25
Tributary	2015	Exposed	Dry (EVO)	DRYE3	2.48	0.92	1.56
Tributary	2015	Exposed	Dry (EVO)	DRYE4	2.37	0.94	1.43
Tributary	2015	Exposed	Dry (LCO)	DRYL1	0.00	0.00	0.00
Tributary	2015	Exposed	Dry (LCO)	DRYL2	0.00	0.00	0.00
Tributary	2015	Exposed	Dry (LCO)	DRYL3	0.00	0.00	0.00
Tributary	2015	Exposed	Dry (LCO)	DRYL4	0.00	0.00	0.00
Tributary	2015	Exposed	Eagle Pond Outlet	EPOU1	0.58	0.26	0.32
Mainstem	2015	Exposed	Elk	ELKR10	0.00	0.00	0.00
Mainstem	2015	Exposed	Elk	ELKR11	0.00	0.00	0.00
Mainstem	2015	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2015	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2015	Exposed	Elk	ELKR8	0.00	0.00	0.00
Mainstem	2015	Exposed	Elk	ELKR9	0.00	0.00	0.00
Tributary	2015	Exposed	Erickson	ERIC1	2.77	0.96	1.82
Tributary	2015	Exposed	Erickson	ERIC2	2.58	0.90	1.68
Tributary	2015	Exposed	Erickson	ERIC3	3.00	1.00	2.00
Tributary	2015	Exposed	Erickson	ERIC4	1.17	0.71	0.46
Tributary	2015	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2015	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Tributary	2015	Exposed	Fish Pond	FPON1	0.00	0.00	0.00
Mainstem	2015	Exposed	Fording	FORD1	0.00	0.00	0.00
Mainstem	2015	Exposed	Fording	FORD10	0.00	0.00	0.00
Mainstem	2015	Exposed	Fording	FORD11	0.00	0.00	0.00
Mainstem	2015	Reference	Fording	FORD12	0.00	0.00	0.00
Mainstem	2015	Exposed	Fording	FORD2	0.00	0.00	0.00
Mainstem	2015	Exposed	Fording	FORD3	0.00	0.00	0.00
Mainstem	2015	Exposed	Fording	FORD4	0.66	0.66	0.00
Mainstem	2015	Exposed	Fording	FORD5	0.53	0.53	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Mainstem	2015	Exposed	Fording	FORD6	1.53	0.83	0.70
Mainstem	2015	Exposed	Fording	FORD7	0.55	0.55	0.00
Mainstem	2015	Exposed	Fording	FORD8	0.48	0.47	0.01
Mainstem	2013	Exposed	Fording	FORD9	0.00	0.00	0.00
Tributary	2015	Exposed	Gardine	GARD1	0.32	0.27	0.06
Tributary	2015	Exposed	Gate	GATE2	0.74	0.36	0.38
Tributary	2015	Exposed	Goddard	GODD1	0.00	0.00	0.00
Tributary	2015	Exposed	Goddard	GODD2	0.00	0.00	0.00
Tributary	2015	Exposed	Goddard	GODD3	1.97	0.76	1.21
Tributary	2015	Reference	Grace	GRAC1	0.05	0.05	0.00
Tributary	2015	Reference	Grace	GRAC2	0.10	0.10	0.00
Tributary	2015	Reference	Grace	GRAC3	0.00	0.00	0.00
Tributary	2015	Exposed	Grassy	GRAS1	0.00	0.00	0.00
Tributary	2015	Exposed	Grave	GRAV1	0.02	0.02	0.00
Tributary	2015	Exposed	Grave	GRAV2	0.00	0.00	0.00
Tributary	2015	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2015	Exposed	Greenhills	GREE1	0.45	0.41	0.04
Tributary	2015	Exposed	Greenhills	GREE3	2.46	0.94	1.52
Tributary	2015	Exposed	Greenhills	GREE4	2.80	0.96	1.84
Tributary	2015	Exposed	Harmer	HARM1	0.07	0.07	0.00
Tributary	2015	Exposed	Harmer	HARM3	0.01	0.01	0.00
Tributary	2015	Exposed	Harmer	HARM4	0.17	0.17	0.00
Tributary	2015	Exposed	Harmer	HARM5	0.22	0.22	0.00
Tributary	2015	Exposed	Henretta	HENR1	0.00	0.00	0.00
Tributary	2015	Exposed	Henretta	HENR2	0.00	0.00	0.00
Tributary	2015	Reference	Henretta	HENR3	0.00	0.00	0.00
Tributary	2015	Exposed	Kilmamock	KILM1	1.97	0.69	1.28
Tributary	2015	Exposed	Lake Mountain	LMOU1	0.00	0.00	0.00
Tributary	2015	Exposed	Lake Mountain	LMOU3	0.00	0.00	0.00
Tributary	2015	Exposed	Lake Mountain	LMOU4	0.00	0.00	0.00
Tributary	2015	Exposed	Leask	LEAS2	0.24	0.24	0.00
Tributary	2015	Exposed	Lindsay	LIND1	0.19	0.17	0.02
Tributary	2015	Exposed	Line	LINE1	0.00	0.00	0.00
Tributary	2015	Exposed	Line	LINE2	0.00	0.00	0.00
Tributary	2015	Exposed	Line	LINE3	0.00	0.00	0.00
Tributary	2015	Exposed	Line	LINE4	0.68	0.54	0.14
Tributary	2015	Reference	Line	LINE7	0.00	0.00	0.00
Mainstem	2015	Exposed	Michel	MICH1	0.00	0.00	0.00
Mainstem	2015	Exposed	Michel	MICH2	0.00	0.00	0.00
Mainstem	2015	Exposed	Michel	MICH3	0.00	0.00	0.00
Mainstem	2015	Exposed	Michel	MICH4	0.00	0.00	0.00
Mainstem	2015	Reference	Michel	MICH5	0.00	0.00	0.00
Tributary	2015	Exposed	Mickelson	MICK1	0.00	0.00	0.00
Tributary	2015	Exposed	Mickelson	MICK2	0.03	0.03	0.00
Tributary	2015	Exposed	Milligan	MILL1	0.00	0.00	0.00
Tributary	2015	Exposed	Milligan	MILL2	0.00	0.00	0.00
Tributary	2015	Exposed	North Thompson	NTHO1	1.18	0.61	0.57
Tributary	2015	Exposed	North Wolfram	NWOL1	0.21	0.17	0.04
Tributary	2015	Exposed	Otto	OTTO1	0.10	0.10	0.00
Tributary	2015	Exposed	Otto	OTTO2	0.00	0.00	0.00
Tributary	2015	Exposed	Otto	OTTO3	0.00	0.00	0.00
Tributary	2015	Exposed	Pengally	PENG1	0.02	0.02	0.00
Tributary	2015	Exposed	Porter	PORT1	0.85	0.62	0.23

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2015	Exposed	Porter	PORT3a	0.92	0.59	0.33
Tributary	2015	Exposed	Porter	PORT3b	2.45	0.88	1.57
Tributary	2015	Exposed	Qualteri	QUAL1	0.00	0.00	0.00
Tributary	2015	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2015	Exposed	Sawmill	SAWM2	0.62	0.31	0.32
Tributary	2015	Exposed	Six Mile	SIXM1	0.49	0.49	0.00
Tributary	2015	Exposed	Smith Pond Outlet	SPOU1	2.24	0.85	1.39
Tributary	2015	Reference	Snowslide	SNOW1	0.00	0.00	0.00
Tributary	2015	Reference	South Line	SLINE2	0.00	0.00	0.00
Tributary	2015	Exposed	South Pit	SPIT1	1.14	0.47	0.68
Tributary	2015	Exposed	South Pit	SPIT2	0.00	0.00	0.00
Tributary	2015	Exposed	South Pond Seep	SPSE1	0.10	0.08	0.02
Tributary	2015	Exposed	South Wolfram Creek	SWOL1	0.28	0.21	0.07
Tributary	2015	Exposed	Spring	SPRI1	0.11	0.11	0.00
Tributary	2015	Exposed	Swift	SWIF1	2.39	0.86	1.53
Tributary	2015	Exposed	Swift	SWIF2	0.82	0.31	0.51
Tributary	2015	Exposed	Thompson	THOM1	0.00	0.00	0.00
Tributary	2015	Exposed	Thompson	THOM2	0.01	0.01	0.00
Tributary	2015	Exposed	Thompson	THOM3	0.00	0.00	0.00
Tributary	2015	Exposed	Thresher	THRE1	0.00	0.00	0.00
Tributary	2015	Exposed	Unnamed South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2015	Reference	Wheeler	WHEE1	0.00	0.00	0.00
Tributary	2015	Reference	Wheeler	WHEE2	0.00	0.00	0.00
Tributary	2015	Reference	Wheeler	WHEE3	0.00	0.00	0.00
Tributary	2015	Exposed	Wolfram	WOLF2	0.23	0.21	0.02
Tributary	2015	Exposed	Wolfram	WOLF3	1.60	0.87	0.73
Tributary	2015	Exposed	South Pond Seep	SPSE1	0.00	0.00	0.00
Tributary	2016	Reference	Alexander	ALEX3	0.46	0.44	0.02
Tributary	2016	Reference	Andy Good	ANDY1	0.00	0.00	0.00
Tributary	2016	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2016	Exposed	Balmer	BALM1	0.00	0.00	0.00
Tributary	2016	Exposed	Bodie	BODI1	0.79	0.65	0.14
Tributary	2016	Exposed	Bodie	BODI3	1.77	0.76	1.01
Tributary	2016	Exposed	CCR Seep	CSEE1	1.40	0.82	0.58
Tributary	2016	Exposed	Cataract	CATA1	3.00	1.00	2.00
Tributary	2016	Reference	Chauncey	CHAU1	0.17	0.16	0.01
Tributary	2016	Exposed	Clode Pond Outlet	COUT1	1.21	0.96	0.25
Tributary	2016	Exposed	Clode West Infiltration	CLOW1	0.50	0.50	0.00
Tributary	2016	Exposed	Corbin	CORB1	2.21	1.00	1.21
Tributary	2016	Exposed	Dry (EVO)	DRYE3	2.51	0.96	1.54
Tributary	2016	Exposed	Dry (LCO)	DRYL1	0.00	0.00	0.00
Tributary	2016	Exposed	Dry (LCO)	DRYL2	0.00	0.00	0.00
Tributary	2016	Exposed	Dry (LCO)	DRYL3	0.00	0.00	0.00
Tributary	2016	Exposed	Dry (LCO)	DRYL4	0.00	0.00	0.00
Tributary	2016	Exposed	Eagle Pond Outlet	EPOU1	0.20	0.14	0.06
Mainstem	2016	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2016	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2016	Exposed	Elk	ELKR8	0.00	0.00	0.00
Mainstem	2016	Exposed	Elk	ELKR9	0.00	0.00	0.00
Tributary	2016	Exposed	Erickson	ERIC1	2.36	0.93	1.43
Tributary	2016	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2016	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Tributary	2016	Exposed	Fish Pond	FPON1	0.08	0.08	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Mainstem	2016	Exposed	Fording	FORD1	0.37	0.37	0.00
Mainstem	2016	Reference	Fording	FORD12	0.03	0.03	0.00
Mainstem	2016	Exposed	Fording	FORD2	0.00	0.00	0.00
Mainstem	2016	Exposed	Fording	FORD4	0.60	0.54	0.06
Mainstem	2016	Exposed	Fording	FORD5	0.58	0.58	0.00
Mainstem	2016	Exposed	Fording	FORD6	0.64	0.62	0.02
Mainstem	2016	Exposed	Fording	FORD7	0.63	0.63	0.01
Mainstem	2014	Exposed	Fording	FORD9	0.00	0.00	0.00
Tributary	2016	Exposed	Gardine	GARD1	0.14	0.12	0.02
Tributary	2016	Exposed	Gate	GATE2	1.47	0.87	0.60
Tributary	2016	Exposed	Goddard	GODD1	0.22	0.20	0.02
Tributary	2016	Exposed	Goddard	GODD3	2.22	0.82	1.40
Tributary	2016	Reference	Grace	GRAC1	0.09	0.09	0.00
Tributary	2016	Exposed	Grassy	GRAS1	0.04	0.03	0.01
Tributary	2016	Exposed	Grave	GRAV1	0.14	0.14	0.00
Tributary	2016	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2016	Exposed	Greenhills	GREE1	0.86	0.59	0.27
Tributary	2016	Exposed	Greenhills	GREE3	2.18	0.95	1.23
Tributary	2016	Exposed	Greenhills	GREE4	2.61	0.96	1.64
Tributary	2016	Exposed	Harmer	HARM1	0.64	0.64	0.01
Tributary	2016	Exposed	Harmer	HARM3	0.12	0.11	0.01
Tributary	2016	Exposed	Henretta	HENR1	0.00	0.00	0.00
Tributary	2016	Exposed	Kilmamock	KILM1	2.59	0.95	1.64
Tributary	2016	Exposed	Lake Mountain	LMOU1	0.15	0.15	0.00
Tributary	2016	Exposed	Leask	LEAS2	1.82	0.79	1.02
Tributary	2016	Exposed	Lindsay	LIND1	0.19	0.18	0.02
Tributary	2016	Exposed	Line	LINE1	0.03	0.03	0.00
Tributary	2016	Exposed	Line	LINE4	0.65	0.65	0.00
Tributary	2016	Reference	Line	LINE7	0.00	0.00	0.00
Mainstem	2016	Exposed	Michel	MICH1	0.00	0.00	0.00
Mainstem	2016	Exposed	Michel	MICH4	0.00	0.00	0.00
Mainstem	2016	Reference	Michel	MICH5	0.00	0.00	0.00
Tributary	2016	Exposed	Mickelson	MICK1	2.18	0.96	1.22
Tributary	2016	Exposed	Milligan	MILL2	1.07	0.59	0.48
Tributary	2016	Exposed	North Thompson	NTHO1	1.54	0.77	0.77
Tributary	2016	Exposed	North Wolfram	NWOL1	0.14	0.14	0.00
Tributary	2016	Exposed	Otto	OTTO1	0.23	0.21	0.02
Tributary	2016	Exposed	Pengally	PENG1	0.00	0.00	0.00
Tributary	2016	Exposed	Porter	PORT1	0.75	0.75	0.00
Tributary	2016	Exposed	Porter	PORT3a	0.47	0.45	0.02
Tributary	2016	Exposed	Porter	PORT3b	2.46	0.90	1.55
Tributary	2016	Exposed	Qualteri	QUAL1	0.00	0.00	0.00
Tributary	2016	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2016	Exposed	Sawmill	SAWM2	0.00	0.00	0.00
Tributary	2016	Exposed	Six Mile	SIXM1	0.65	0.63	0.02
Tributary	2016	Exposed	Smith Pond Outlet	SPOU1	3.00	1.00	2.00
Tributary	2016	Reference	South Line	SLINE2	0.00	0.00	0.00
Tributary	2016	Exposed	South Pit	SPIT1	1.59	0.73	0.85
Tributary	2016	Exposed	South Pond Seep	SPSE1	0.00	0.00	0.00
Tributary	2016	Exposed	South Wolfram Creek	SWOL1	1.86	0.95	0.91
Tributary	2016	Exposed	Spring	SPRI1	0.12	0.12	0.00
Tributary	2016	Exposed	Swift	SWIF1	2.43	0.95	1.48
Tributary	2016	Exposed	Thompson	THOM1	0.22	0.22	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2016	Exposed	Thresher	THRE1	0.00	0.00	0.00
Tributary	2016	Exposed	Unnamed South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2016	Exposed	Willow North	WILN2	0.00	0.00	0.00
Tributary	2016	Exposed	Willow South	WILS1	0.00	0.00	0.00
Tributary	2016	Exposed	Wolf	WOL1	0.00	0.00	0.00
Tributary	2016	Exposed	Wolfram	WOLF2	0.69	0.49	0.20
Tributary	2016	Exposed	Wolfram	WOLF3	2.61	0.97	1.64
Tributary	2017	Reference	Alexander	ALEX3	0.38	0.37	0.01
Tributary	2017	Reference	Andy Good	ANDY1	0.00	0.00	0.00
Tributary	2017	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2017	Exposed	Balmer	BALM1	0.00	0.00	0.00
Tributary	2017	Exposed	Bodie	BODI1	0.08	0.06	0.01
Tributary	2017	Exposed	Bodie	BODI3	2.09	0.78	1.31
Tributary	2017	Exposed	Cataract	CATA1	3.00	1.00	2.00
Tributary	2017	Reference	Chauncey	CHAU1	0.12	0.08	0.04
Tributary	2017	Exposed	Clode Pond Outlet	COUT1	0.29	0.24	0.05
Tributary	2017	Exposed	Clode West Infiltration	CLOW1	0.21	0.21	0.00
Tributary	2017	Exposed	Corbin	CORB1	2.74	0.99	1.74
Tributary	2017	Exposed	Dry (EVO)	DRYE3	2.85	1.00	1.85
Tributary	2017	Exposed	Dry (LCO)	DRYL1	0.02	0.02	0.00
Tributary	2017	Exposed	Dry (LCO)	DRYL2	0.00	0.00	0.00
Tributary	2017	Exposed	Dry (LCO)	DRYL3	0.00	0.00	0.00
Tributary	2017	Exposed	Dry (LCO)	DRYL4	0.00	0.00	0.00
Tributary	2017	Exposed	Eagle Pond Outlet	EPOU1	0.25	0.21	0.04
Mainstem	2017	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2017	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2017	Exposed	Elk	ELKR8	0.01	0.01	0.00
Mainstem	2017	Exposed	Elk	ELKR9	0.00	0.00	0.00
Tributary	2017	Exposed	Erickson	ERIC1	2.67	0.94	1.73
Tributary	2017	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2017	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Tributary	2017	Exposed	Fish Pond	FPON1	0.20	0.20	0.00
Mainstem	2017	Exposed	Fording	FORD1	0.44	0.35	0.09
Mainstem	2017	Reference	Fording	FORD12	0.11	0.11	0.00
Mainstem	2017	Exposed	Fording	FORD2	0.10	0.09	0.00
Mainstem	2017	Exposed	Fording	FORD4	0.84	0.72	0.12
Mainstem	2017	Exposed	Fording	FORD5	0.73	0.73	0.00
Mainstem	2017	Exposed	Fording	FORD6	0.68	0.64	0.05
Mainstem	2015	Exposed	Fording	FORD9	0.00	0.00	0.00
Tributary	2017	Exposed	Gardine	GARD1	0.60	0.31	0.28
Tributary	2017	Exposed	Gate	GATE2	1.98	0.83	1.15
Tributary	2017	Exposed	Goddard	GODD1	0.13	0.13	0.00
Tributary	2017	Exposed	Goddard	GODD3	2.64	0.99	1.65
Tributary	2017	Reference	Grace	GRAC1	0.06	0.06	0.00
Tributary	2017	Exposed	Grassy	GRAS1	0.29	0.18	0.11
Tributary	2017	Exposed	Grave	GRAV1	0.24	0.24	0.00
Tributary	2017	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2017	Exposed	Greenhills	GREE1	1.07	0.66	0.42
Tributary	2017	Exposed	Greenhills	GREE4	2.68	1.00	1.69
Tributary	2017	Exposed	Harmer	HARM1	0.61	0.45	0.16
Tributary	2017	Exposed	Harmer	HARM3	0.03	0.03	0.00
Tributary	2017	Exposed	Henretta	HENR1	0.04	0.04	0.00
Tributary	2017	Exposed	Kilmamock	KILM1	2.77	0.96	1.81

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2017	Exposed	Lake Mountain	LMOU1	0.18	0.18	0.00
Tributary	2017	Exposed	Leask	LEAS2	2.76	0.99	1.77
Tributary	2017	Exposed	Lindsay	LIND1	0.15	0.12	0.03
Tributary	2017	Exposed	Line	LINE1	0.00	0.00	0.00
Tributary	2017	Exposed	Line	LINE4	0.66	0.66	0.00
Tributary	2017	Reference	Line	LINE7	0.00	0.00	0.00
Mainstem	2017	Exposed	Michel	MICH1	0.00	0.00	0.00
Mainstem	2017	Exposed	Michel	MICH2	0.08	0.05	0.03
Mainstem	2017	Exposed	Michel	MICH4	0.01	0.01	0.00
Mainstem	2017	Reference	Michel	MICH5	0.01	0.01	0.00
Tributary	2017	Exposed	Mickelson	MICK1	1.25	0.93	0.32
Tributary	2017	Exposed	Milligan	MILL1	0.36	0.21	0.15
Tributary	2017	Exposed	Milligan	MILL2	1.06	0.52	0.54
Tributary	2017	Exposed	North Thompson	NTHO1	1.78	0.91	0.87
Tributary	2017	Exposed	North Wolfram	NWOL1	2.59	0.97	1.62
Tributary	2017	Exposed	Otto	OTTO1	0.14	0.12	0.02
Tributary	2017	Exposed	Pengally	PENG1	0.00	0.00	0.00
Tributary	2017	Exposed	Porter	PORT1	0.74	0.74	0.00
Tributary	2017	Exposed	Porter	PORT3a	0.57	0.40	0.16
Tributary	2017	Exposed	Porter	PORT3b	2.68	0.94	1.74
Tributary	2017	Exposed	Qualteri	QUAL1	0.00	0.00	0.00
Tributary	2017	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2017	Exposed	Sawmill	SAWM2	0.00	0.00	0.00
Tributary	2017	Exposed	Site18	SITE	3.00	1.00	2.00
Tributary	2017	Exposed	Six Mile	SIXM1	0.95	0.73	0.22
Tributary	2017	Exposed	Smith Pond Outlet	SPOU1	2.60	0.94	1.66
Tributary	2017	Reference	South Line	SLINE2	0.00	0.00	0.00
Tributary	2017	Exposed	South Pit	SPIT1	2.49	0.90	1.59
Tributary	2017	Exposed	South Wolfram Creek	SWOL1	2.05	0.99	1.05
Tributary	2017	Exposed	Spring	SPRI1	0.13	0.12	0.01
Tributary	2017	Exposed	Stream 02	STR02	0.68	0.24	0.44
Tributary	2017	Exposed	Stream 14	STR14	0.00	0.00	0.00
Tributary	2017	Exposed	Swift	SWIF1	2.45	0.98	1.47
Tributary	2017	Exposed	Thompson	THOM2	0.83	0.69	0.15
Tributary	2017	Exposed	Thresher	THRE1	0.00	0.00	0.00
Tributary	2017	Exposed	Unnamed South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2017	Exposed	Willow North	WILN2	0.00	0.00	0.00
Tributary	2017	Exposed	Willow South	WILS1	0.00	0.00	0.00
Tributary	2017	Exposed	Wolf	WOL1	0.00	0.00	0.00
Tributary	2017	Exposed	Wolfram	WOLF3	2.80	1.00	1.80
Tributary	2017	Exposed	Greenhills	GREE3	2.55	0.99	1.56
Tributary	2018	Reference	Alexander	ALEX3	0.36	0.34	0.02
Tributary	2018	Reference	Andy Good	ANDY1	0.04	0.04	0.00
Tributary	2018	Exposed	Aqueduct	AQUE1	0.03	0.02	0.01
Tributary	2018	Exposed	Aqueduct	AQUE2	0.00	0.00	0.00
Tributary	2018	Exposed	Aqueduct	AQUE3	0.14	0.14	0.00
Tributary	2018	Exposed	Balmer	BALM1	0.01	0.01	0.00
Tributary	2018	Exposed	Bodie	BODI1	1.22	0.59	0.64
Tributary	2018	Reference	Chauncey	CHAU1	0.12	0.11	0.01
Tributary	2018	Exposed	Bodie	BODI3	2.33	0.92	1.41
Tributary	2018	Exposed	Cataract	CATA1	2.96	1.00	1.96
Tributary	2018	Exposed	Cataract	CATA3	2.89	1.00	1.89
Tributary	2018	Exposed	Clode West Infiltration	CLOW1	0.67	0.67	0.01

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2018	Exposed	Corbin	CORB1	2.70	0.98	1.72
Tributary	2018	Exposed	Corbin	CORB2	2.92	1.00	1.92
Tributary	2018	Exposed	Clode Pond Outlet	COUT1	1.46	0.91	0.55
Tributary	2018	Exposed	Dry (EVO)	DRYE1	2.96	1.00	1.96
Mainstem	2018	Exposed	Elk	ELKR10	0.03	0.03	0.00
Mainstem	2018	Exposed	Elk	ELKR11	0.00	0.00	0.00
Mainstem	2018	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2018	Reference	Elk	ELKR15	0.02	0.02	0.00
Mainstem	2018	Exposed	Elk	ELKR8	0.28	0.26	0.01
Mainstem	2018	Exposed	Elk	ELKR9	0.07	0.07	0.00
Tributary	2018	Exposed	Dry (EVO)	DRYE3	2.76	1.00	1.76
Tributary	2018	Exposed	Dry (EVO)	DRYE4	3.00	1.00	2.00
Tributary	2018	Exposed	Dry (LCO)	DRYL1	0.57	0.57	0.00
Mainstem	2018	Exposed	Fording	FORD1	0.23	0.23	0.00
Mainstem	2018	Exposed	Fording	FORD10	0.63	0.60	0.03
Mainstem	2018	Exposed	Fording	FORD11	0.27	0.27	0.00
Mainstem	2018	Reference	Fording	FORD12	0.31	0.30	0.01
Mainstem	2018	Exposed	Fording	FORD2	0.13	0.12	0.01
Mainstem	2018	Exposed	Fording	FORD3	0.49	0.37	0.12
Mainstem	2018	Exposed	Fording	FORD4	0.80	0.73	0.07
Mainstem	2018	Exposed	Fording	FORD5	0.70	0.69	0.01
Mainstem	2018	Exposed	Fording	FORD6	0.79	0.64	0.14
Mainstem	2018	Exposed	Fording	FORD7	0.89	0.82	0.07
Mainstem	2018	Exposed	Fording	FORD8	0.61	0.61	0.00
Mainstem	2016	Exposed	Fording	FORD9	0.00	0.00	0.00
Tributary	2018	Exposed	Dry (LCO)	DRYL2	0.24	0.24	0.00
Tributary	2018	Exposed	Dry (LCO)	DRYL3	0.06	0.06	0.00
Tributary	2018	Exposed	Dry (LCO)	DRYL4	0.32	0.32	0.00
Tributary	2018	Reference	Grace	GRAC1	0.10	0.09	0.01
Tributary	2018	Reference	Grace	GRAC2	0.06	0.06	0.00
Tributary	2018	Reference	Grace	GRAC3	0.00	0.00	0.00
Tributary	2018	Exposed	Eagle Pond Outlet	EPOU1	0.21	0.21	0.00
Tributary	2018	Exposed	Erickson	ERIC1	2.89	0.99	1.90
Tributary	2018	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2018	Exposed	Erickson	ERIC2	2.50	0.90	1.60
Tributary	2018	Exposed	Erickson	ERIC3	2.95	1.00	1.95
Tributary	2018	Exposed	Erickson	ERIC4	1.73	0.85	0.88
Tributary	2018	Exposed	Feltham	FELT1	0.15	0.14	0.01
Tributary	2018	Reference	Henretta	HENR3	0.00	0.00	0.00
Tributary	2018	Exposed	Fennelon	FENN1	0.02	0.02	0.00
Tributary	2018	Exposed	Fish Pond	FPON1	0.17	0.17	0.01
Tributary	2018	Exposed	Gardine	GARD1	0.64	0.34	0.29
Tributary	2018	Exposed	Gate	GATE2	1.14	0.59	0.55
Tributary	2018	Reference	Line	LINE7	0.01	0.01	0.00
Mainstem	2018	Exposed	Michel	MICH1	0.08	0.08	0.00
Mainstem	2018	Exposed	Michel	MICH2	0.02	0.02	0.00
Mainstem	2018	Exposed	Michel	MICH3	0.01	0.01	0.00
Mainstem	2018	Exposed	Michel	MICH4	0.06	0.06	0.00
Mainstem	2018	Reference	Michel	MICH5	0.00	0.00	0.00
Tributary	2018	Exposed	Goddard	GODD1	0.35	0.35	0.00
Tributary	2018	Exposed	Goddard	GODD2	2.62	0.99	1.63
Tributary	2018	Exposed	Goddard	GODD3	2.62	0.96	1.66
Tributary	2018	Exposed	Grassy	GRAS1	0.25	0.16	0.09

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2018	Exposed	Grave	GRAV1	0.37	0.35	0.02
Tributary	2018	Exposed	Grave	GRAV2	0.14	0.14	0.00
Tributary	2018	Exposed	Greenhills	GREE1	0.64	0.44	0.20
Tributary	2018	Exposed	Greenhills	GREE3	2.49	0.98	1.51
Tributary	2018	Exposed	Greenhills	GREE4	2.74	0.99	1.75
Tributary	2018	Reference	South Line	SLINE2	0.04	0.04	0.00
Tributary	2018	Exposed	Harmer	HARM1	0.80	0.73	0.08
Tributary	2018	Exposed	Harmer	HARM3	0.08	0.06	0.02
Tributary	2018	Exposed	Harmer	HARM4	0.35	0.30	0.05
Tributary	2018	Exposed	Harmer	HARM5	0.31	0.29	0.01
Tributary	2018	Exposed	Henretta	HENR1	0.32	0.32	0.00
Tributary	2018	Exposed	Kilmamock	KILM1	2.30	0.91	1.40
Tributary	2018	Exposed	Leask	LEAS2	2.60	0.99	1.61
Tributary	2018	Exposed	Lindsay	LIND1	0.19	0.19	0.00
Tributary	2018	Exposed	Line	LINE1	0.52	0.52	0.00
Tributary	2018	Exposed	Line	LINE2	0.45	0.45	0.00
Tributary	2018	Exposed	Line	LINE3	0.66	0.65	0.01
Tributary	2018	Exposed	Line	LINE4	0.95	0.90	0.05
Tributary	2018	Exposed	Lake Mountain	LMOU1	0.39	0.39	0.00
Tributary	2018	Exposed	Mickelson	MICK1	1.23	0.82	0.40
Tributary	2018	Exposed	Mickelson	MICK2	1.37	0.79	0.58
Tributary	2018	Exposed	Milligan	MILL1	1.77	0.90	0.87
Tributary	2018	Exposed	Milligan	MILL2	1.18	0.56	0.62
Tributary	2018	Exposed	North Thompson	NTHO1	1.91	0.95	0.96
Tributary	2018	Exposed	North Wolfram	NWOL1	2.44	0.90	1.54
Tributary	2018	Exposed	Otto	OTTO1	0.59	0.56	0.03
Tributary	2018	Exposed	Otto	OTTO3	0.05	0.05	0.00
Tributary	2018	Exposed	Pengally	PENG1	0.00	0.00	0.00
Tributary	2018	Exposed	Pengally	PENG1	0.00	0.00	0.00
Tributary	2018	Exposed	Porter	PORT1	0.85	0.79	0.06
Tributary	2018	Exposed	Porter	PORT3a	0.69	0.56	0.13
Tributary	2018	Exposed	Porter	PORT3b	2.60	0.97	1.63
Tributary	2018	Exposed	Sawmill	SAWM1	0.01	0.01	0.00
Tributary	2018	Exposed	Sawmill	SAWM2	0.00	0.00	0.00
Tributary	2018	Exposed	Site18	SITE	3.00	1.00	2.00
Tributary	2018	Exposed	Six Mile	SIXM1	0.92	0.72	0.21
Tributary	2018	Exposed	South Pit	SPIT1	2.77	1.00	1.77
Tributary	2018	Exposed	Smith Pond Outlet	SPOU1	2.45	0.91	1.54
Tributary	2018	Exposed	Spring	SPRI1	0.14	0.14	0.00
Tributary	2018	Exposed	Stream 02	STR02	0.72	0.25	0.47
Tributary	2018	Exposed	Stream 14	STR14	0.40	0.34	0.06
Tributary	2018	Exposed	Swift	SWIF1	1.69	0.85	0.84
Tributary	2018	Exposed	Swift	SWIF2	1.12	0.87	0.25
Tributary	2018	Exposed	South Wolfram Creek	SWOL1	2.38	0.95	1.43
Tributary	2018	Exposed	Thompson	THOM2	0.81	0.73	0.08
Tributary	2018	Exposed	Thompson	THOM3	1.04	0.73	0.31
Tributary	2018	Exposed	Thresher	THRE1	0.03	0.02	0.01
Tributary	2018	Exposed	Unnamed South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2018	Exposed	Willow North	WILN2	0.00	0.00	0.00
Tributary	2018	Exposed	Willow South	WILS1	0.00	0.00	0.00
Tributary	2018	Exposed	Wolf	WOL1	0.00	0.00	0.00
Tributary	2018	Exposed	Wolfram	WOLF2	0.88	0.36	0.52
Tributary	2018	Exposed	Wolfram	WOLF3	2.69	0.94	1.75

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2019	Reference	Alexander	ALEX3	0.86	0.82	0.04
Tributary	2019	Reference	Andy Good	ANDY1	0.09	0.09	0.00
Tributary	2019	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2019	Exposed	Bodie	BODI1	1.09	0.73	0.36
Tributary	2019	Exposed	Bodie	BODI3	2.58	0.99	1.59
Tributary	2019	Reference	Chauncey	CHAU1	0.23	0.22	0.01
Tributary	2019	Exposed	Clode Pond Outlet	COUT1	1.28	0.90	0.38
Tributary	2019	Exposed	Clode West Infiltration	CLOW1	0.69	0.69	0.00
Tributary	2019	Exposed	Corbin	CORB1	2.47	0.96	1.51
Tributary	2019	Exposed	Corbin	CORB2	2.87	0.99	1.88
Tributary	2019	Exposed	Dry (EVO)	DRYE1	2.19	0.99	1.20
Tributary	2019	Exposed	Dry (EVO)	DRYE3	2.25	1.00	1.25
Tributary	2019	Exposed	Dry (EVO)	DRYE4	2.51	1.00	1.51
Tributary	2019	Exposed	Dry (LCO)	DRYL1	0.65	0.62	0.03
Tributary	2019	Exposed	Dry (LCO)	DRYL2	0.52	0.52	0.00
Tributary	2019	Exposed	Dry (LCO)	DRYL3	0.16	0.16	0.00
Tributary	2019	Exposed	Dry (LCO)	DRYL4	0.15	0.15	0.00
Tributary	2019	Reference	East Dry	ETRI1	0.01	0.01	0.00
Mainstem	2019	Exposed	Elk	ELKR10	0.01	0.01	0.00
Mainstem	2019	Exposed	Elk	ELKR12	0.03	0.03	0.00
Mainstem	2019	Reference	Elk	ELKR15	0.02	0.02	0.00
Mainstem	2019	Exposed	Elk	ELKR8	0.09	0.09	0.00
Mainstem	2019	Exposed	Elk	ELKR9	0.08	0.08	0.00
Tributary	2019	Exposed	Erickson	ERIC1	2.90	1.00	1.90
Tributary	2019	Exposed	Erickson	ERIC2	2.46	0.94	1.52
Tributary	2019	Exposed	Erickson	ERIC3	2.96	1.00	1.96
Tributary	2019	Exposed	Erickson	ERIC4	1.74	0.94	0.81
Tributary	2019	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2019	Exposed	Fennelon	FENN1	0.02	0.02	0.00
Tributary	2019	Exposed	Fish Pond	FPON1	0.38	0.38	0.00
Mainstem	2019	Exposed	Fording	FORD1	0.20	0.20	0.00
Mainstem	2019	Reference	Fording	FORD12	0.28	0.28	0.00
Mainstem	2019	Exposed	Fording	FORD2	0.30	0.27	0.03
Mainstem	2019	Exposed	Fording	FORD4	1.09	0.98	0.12
Mainstem	2019	Exposed	Fording	FORD5	0.80	0.80	0.00
Mainstem	2019	Exposed	Fording	FORD6	0.98	0.92	0.06
Mainstem	2019	Exposed	Fording	FORD7	0.90	0.82	0.08
Mainstem	2017	Exposed	Fording	FORD9	0.32	0.23	0.09
Tributary	2019	Exposed	Gardine	GARD1	0.50	0.50	0.01
Tributary	2019	Exposed	Goddard	GODD1	0.24	0.24	0.00
Tributary	2019	Exposed	Goddard	GODD2	2.52	0.98	1.54
Tributary	2019	Exposed	Goddard	GODD3	2.66	0.97	1.69
Tributary	2019	Reference	Grace	GRAC1	0.19	0.19	0.01
Tributary	2019	Exposed	Grassy	GRAS1	0.38	0.26	0.12
Tributary	2019	Exposed	Grave	GRAV1	0.41	0.40	0.00
Tributary	2019	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2019	Exposed	Greenhills	GREE1	0.66	0.57	0.09
Tributary	2019	Exposed	Greenhills	GREE3	1.91	0.99	0.92
Tributary	2019	Exposed	Greenhills	GREE4	2.32	1.00	1.32
Tributary	2019	Exposed	Harmer	HARM1	0.82	0.82	0.00
Tributary	2019	Exposed	Harmer	HARM3	0.14	0.13	0.00
Tributary	2019	Exposed	Henretta	HENR1	0.40	0.40	0.00
Tributary	2019	Exposed	Kilmamock	KILM1	2.56	0.91	1.65

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2019	Exposed	Lake Mountain	LMOU1	0.88	0.88	0.00
Tributary	2019	Exposed	Leask	LEAS2	2.79	1.00	1.79
Tributary	2019	Exposed	Line	LINE1	0.46	0.39	0.07
Tributary	2019	Exposed	Line	LINE4	0.93	0.93	0.00
Mainstem	2019	Exposed	Michel	MICH1	0.04	0.04	0.00
Mainstem	2019	Exposed	Michel	MICH4	0.02	0.02	0.00
Mainstem	2019	Reference	Michel	MICH5	0.06	0.06	0.00
Tributary	2019	Exposed	Mickelson	MICK1	1.84	0.98	0.86
Tributary	2019	Exposed	North Thompson	NTHO1	1.56	0.92	0.64
Tributary	2019	Exposed	Porter	PORT1	0.85	0.85	0.00
Tributary	2019	Exposed	Porter	PORT3a	0.34	0.33	0.01
Tributary	2019	Exposed	Porter	PORT3b	2.53	0.98	1.55
Tributary	2019	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2019	Exposed	Site18	SITE	2.93	1.00	1.93
Tributary	2019	Exposed	Smith Pond Outlet	SPOU1	2.00	0.91	1.09
Tributary	2019	Reference	South Line	SLINE2	0.08	0.08	0.00
Tributary	2019	Exposed	South Pit	SPIT1	2.43	1.00	1.43
Tributary	2019	Exposed	SouthWolfram	SWOL1	2.96	1.00	1.96
Tributary	2019	Exposed	Spring	SPRI1	0.05	0.05	0.00
Tributary	2019	Exposed	Swift	SWIF1	1.88	0.97	0.91
Tributary	2019	Exposed	Thompson	THOM2	0.82	0.74	0.08
Tributary	2019	Exposed	Thompson	THOM3	1.63	0.97	0.66
Tributary	2019	Exposed	Wolf	WOL1	0.90	0.89	0.01
Tributary	2019	Exposed	Wolfram	WOLF2	0.84	0.78	0.06
Tributary	2019	Exposed	Wolfram	WOLF3	2.86	1.00	1.86
Tributary	2020	Reference	Alexander	ALEX3	0.41	0.41	0.00
Tributary	2020	Reference	Andy Good	ANDY1	0.00	0.00	0.00
Tributary	2020	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2020	Exposed	Balmer	BALM1	0.01	0.01	0.00
Tributary	2020	Exposed	Bodie	BODI1	1.10	0.65	0.45
Tributary	2020	Exposed	Bodie	BODI3	2.62	0.99	1.63
Tributary	2020	Reference	Chauncey	CHAU1	0.21	0.21	0.00
Tributary	2020	Exposed	Clode West Infiltration	CLOW1	0.76	0.76	0.00
Tributary	2020	Exposed	Corbin	CORB1	2.45	0.95	1.51
Tributary	2020	Exposed	Clode Pond Outlet	COUT1	1.16	0.87	0.29
Tributary	2020	Exposed	Dry (EVO)	DRYE1	2.67	1.00	1.67
Tributary	2020	Exposed	Dry (EVO)	DRYE3	2.82	1.00	1.82
Tributary	2020	Exposed	Dry (EVO)	DRYE4	2.94	1.00	1.94
Tributary	2020	Exposed	Dry (LCO)	DRYL1	0.62	0.62	0.00
Tributary	2020	Exposed	Dry (LCO)	DRYL2	0.60	0.60	0.00
Tributary	2020	Exposed	Dry (LCO)	DRYL3	0.29	0.29	0.00
Tributary	2020	Exposed	Dry (LCO)	DRYL4	0.30	0.30	0.00
Mainstem	2020	Exposed	Elk	ELKR10	0.05	0.05	0.00
Mainstem	2020	Exposed	Elk	ELKR12	0.05	0.05	0.00
Mainstem	2020	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2020	Exposed	Elk	ELKR8	0.42	0.42	0.00
Mainstem	2020	Exposed	Elk	ELKR9	0.08	0.08	0.00
Tributary	2020	Exposed	Erickson	ERIC1	2.92	1.00	1.92
Tributary	2020	Exposed	Erickson	ERIC2	2.57	0.95	1.62
Tributary	2020	Exposed	Erickson	ERIC3	2.91	0.99	1.92
Tributary	2020	Exposed	Erickson	ERIC4	1.68	0.90	0.78
Tributary	2020	Reference	East Dry	ETRI1	0.02	0.02	0.00
Tributary	2020	Exposed	Feltham	FELT1	0.01	0.01	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2020	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Mainstem	2020	Exposed	Fording	FORD1	0.14	0.14	0.00
Mainstem	2020	Exposed	Fording	FORD10	0.52	0.45	0.07
Mainstem	2020	Exposed	Fording	FORD11	0.18	0.18	0.00
Mainstem	2020	Reference	Fording	FORD12	0.15	0.15	0.00
Mainstem	2020	Exposed	Fording	FORD2	0.34	0.28	0.05
Mainstem	2020	Exposed	Fording	FORD3	0.96	0.74	0.22
Mainstem	2020	Exposed	Fording	FORD4	0.88	0.84	0.04
Mainstem	2020	Exposed	Fording	FORD5	0.79	0.76	0.03
Mainstem	2020	Exposed	Fording	FORD6	0.96	0.86	0.10
Mainstem	2020	Exposed	Fording	FORD7	1.09	0.93	0.17
Mainstem	2020	Exposed	Fording	FORD8	0.69	0.69	0.00
Mainstem	2018	Exposed	Fording	FORD9	0.73	0.55	0.18
Tributary	2020	Exposed	Fish Pond	FPON1	0.48	0.48	0.00
Tributary	2020	Exposed	Gardine	GARD1	0.60	0.38	0.22
Tributary	2020	Exposed	Gate	GATE2	1.61	0.87	0.73
Tributary	2020	Exposed	Goddard	GODD1	0.16	0.16	0.00
Tributary	2020	Exposed	Goddard	GODD2	2.14	0.82	1.31
Tributary	2020	Exposed	Goddard	GODD3	2.55	0.91	1.64
Tributary	2020	Reference	Grace	GRAC1	0.25	0.24	0.01
Tributary	2020	Exposed	Grassy	GRAS1	0.17	0.16	0.02
Tributary	2020	Exposed	Grave	GRAV1	0.28	0.27	0.01
Tributary	2020	Reference	Grave	GRAV3	0.01	0.01	0.00
Tributary	2020	Exposed	Greenhills	GREE1	0.64	0.51	0.13
Tributary	2020	Exposed	Greenhills	GREE3	2.58	1.00	1.58
Tributary	2020	Exposed	Greenhills	GREE4	2.84	0.99	1.84
Tributary	2020	Exposed	Greenhouse side channel	GSCH1	0.41	0.41	0.00
Tributary	2020	Exposed	Harmer	HARM1	0.90	0.87	0.03
Tributary	2020	Exposed	Harmer	HARM3	0.12	0.12	0.00
Tributary	2020	Exposed	Henretta	HENR1	0.69	0.62	0.08
Tributary	2020	Reference	Henretta	HENR3	0.20	0.20	0.00
Tributary	2020	Exposed	Kilmarnock	KILM1	2.47	0.86	1.61
Tributary	2020	Exposed	Leask	LEAS2	2.46	1.00	1.46
Tributary	2020	Exposed	Lindsay	LIND1	0.11	0.11	0.00
Tributary	2020	Exposed	Line	LINE1	0.76	0.76	0.00
Tributary	2020	Exposed	Line	LINE2	0.52	0.51	0.01
Tributary	2020	Exposed	Line	LINE3	0.48	0.48	0.00
Tributary	2020	Exposed	Line	LINE4	0.70	0.70	0.00
Tributary	2020	Exposed	Lake Mountain	LMOU1	0.64	0.64	0.00
Mainstem	2020	Exposed	Michel	MICH1	0.12	0.12	0.00
Mainstem	2020	Exposed	Michel	MICH2	0.79	0.79	0.00
Mainstem	2020	Exposed	Michel	MICH3	0.45	0.45	0.00
Mainstem	2020	Exposed	Michel	MICH4	0.07	0.07	0.00
Mainstem	2020	Reference	Michel	MICH5	0.03	0.03	0.00
Tributary	2020	Exposed	Mickelson	MICK1	1.22	0.84	0.38
Tributary	2020	Exposed	Milligan	MILL1	1.33	0.82	0.51
Tributary	2020	Exposed	North Thompson	NTHO1	2.00	0.87	1.13
Tributary	2020	Exposed	North Wolfram	NWOL1	2.71	1.00	1.71
Tributary	2020	Exposed	Otto	OTTO1	0.46	0.46	0.00
Tributary	2020	Exposed	Porter	PORT1	0.98	0.98	0.00
Tributary	2020	Exposed	Porter	PORT3a	0.48	0.47	0.00
Tributary	2020	Exposed	Porter	PORT3b	2.55	0.94	1.61
Tributary	2020	Exposed	Sawmill	SAWM1	0.05	0.05	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2020	Exposed	Site18	SITE	2.97	1.00	1.97
Tributary	2020	Exposed	Six Mile	SIXM1	0.93	0.91	0.02
Tributary	2020	Reference	South Line	SLINE2	0.05	0.05	0.00
Tributary	2020	Exposed	South Pit	SPIT1	2.30	0.95	1.35
Tributary	2020	Exposed	Smith Pond Outlet	SPOU1	2.02	1.00	1.02
Tributary	2020	Exposed	Spring	SPRI1	0.04	0.04	0.00
Tributary	2020	Exposed	Stream 02	STR02	0.02	0.02	0.00
Tributary	2020	Exposed	SouthWolfram	SWOL1	2.52	0.93	1.59
Tributary	2020	Exposed	Thompson	THOM2	0.80	0.75	0.06
Tributary	2020	Exposed	Thompson	THOM3	1.29	0.89	0.40
Tributary	2020	Exposed	Thompson	THOM4	0.16	0.16	0.00
Tributary	2020	Exposed	Unnamed Trib South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2020	Exposed	Upper Thompson	UTHO1	1.15	0.87	0.28
Tributary	2020	Exposed	Upper Thompson Pond Outlet	UTPO1	0.52	0.40	0.12
Tributary	2020	Exposed	North Willow	WILN2	0.02	0.02	0.00
Tributary	2020	Exposed	Wolf	WOL1	0.01	0.01	0.00
Tributary	2020	Exposed	Wolfram	WOLF2	2.41	0.90	1.51
Tributary	2020	Exposed	Wolfram	WOLF3	2.95	1.00	1.95
Tributary	2021	Reference	Aldridge	ALDR1	0.00	0.00	0.00
Tributary	2021	Reference	Alexander	ALEX1	0.03	0.02	0.00
Tributary	2021	Reference	Alexander	ALEX3	0.01	0.01	0.00
Tributary	2021	Reference	Alexander	ALEX8	0.00	0.00	0.00
Tributary	2021	Reference	Andy Good	ANDY1	0.05	0.05	0.00
Tributary	2021	Exposed	Aqueduct	AQUE1	0.01	0.01	0.00
Tributary	2021	Exposed	Aqueduct	AQUE2	0.00	0.00	0.00
Tributary	2021	Exposed	Aqueduct	AQUE3	0.24	0.24	0.00
Tributary	2021	Exposed	Balmer	BALM1	0.00	0.00	0.00
Tributary	2021	Reference	Bingay	BING1	0.01	0.01	0.00
Tributary	2021	Exposed	Bodie	BODI1	1.22	0.87	0.35
Tributary	2021	Exposed	Bodie	BODI3	2.55	1.00	1.55
Tributary	2021	Reference	Chauncey	CHAU1	0.18	0.18	0.00
Tributary	2021	Exposed	Clode Pond Outlet	COUT1	1.34	0.86	0.48
Tributary	2021	Exposed	Clode West Infiltration	CLOW1	0.71	0.71	0.00
Tributary	2021	Exposed	Corbin	CORB1	2.72	1.00	1.72
Tributary	2021	Exposed	Corbin	CORB2	2.96	1.00	1.96
Tributary	2021	Reference	Drinkwater	DRIN1	0.00	0.00	0.00
Tributary	2021	Exposed	Dry (EVO)	DRYE1	2.52	1.00	1.52
Tributary	2021	Exposed	Dry (EVO)	DRYE3	2.66	0.99	1.67
Tributary	2021	Exposed	Dry (EVO)	DRYE4	2.56	0.99	1.57
Tributary	2021	Exposed	Dry (LCO)	DRYL1	0.74	0.74	0.00
Tributary	2021	Exposed	Dry (LCO)	DRYL2	0.71	0.71	0.00
Tributary	2021	Exposed	Dry (LCO)	DRYL3	0.38	0.38	0.00
Tributary	2021	Exposed	Dry (LCO)	DRYL4	0.34	0.34	0.00
Tributary	2021	Reference	East Dry	ETRI1	0.00	0.00	0.00
Mainstem	2021	Exposed	Elk	ELKR10	0.21	0.21	0.00
Mainstem	2021	Exposed	Elk	ELKR11	0.22	0.22	0.00
Mainstem	2021	Exposed	Elk	ELKR12	0.00	0.00	0.00
Mainstem	2021	Reference	Elk	ELKR15	0.03	0.03	0.00
Mainstem	2021	Exposed	Elk	ELKR8	0.19	0.19	0.00
Mainstem	2021	Exposed	Elk	ELKR9	0.07	0.07	0.00
Tributary	2021	Exposed	Erickson	ERIC1	2.71	1.00	1.71
Tributary	2021	Exposed	Erickson	ERIC2	2.87	0.96	1.91

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2021	Exposed	Erickson	ERIC3	2.94	1.00	1.94
Tributary	2021	Exposed	Erickson	ERIC4	1.42	0.83	0.60
Tributary	2021	Reference	Ewin	EWIN1	0.21	0.21	0.00
Tributary	2021	Exposed	Feltham	FELT1	0.00	0.00	0.00
Tributary	2021	Exposed	Fennelon	FENN1	0.00	0.00	0.00
Tributary	2021	Exposed	Fish Pond	FPON1	0.40	0.40	0.00
Mainstem	2021	Exposed	Fording	FORD1	0.43	0.43	0.00
Mainstem	2021	Exposed	Fording	FORD10	0.35	0.35	0.00
Mainstem	2021	Exposed	Fording	FORD11	0.10	0.10	0.00
Mainstem	2021	Reference	Fording	FORD12	0.14	0.14	0.00
Mainstem	2021	Exposed	Fording	FORD2	1.09	0.92	0.17
Mainstem	2021	Exposed	Fording	FORD3	0.85	0.68	0.18
Mainstem	2021	Exposed	Fording	FORD4	1.01	0.94	0.06
Mainstem	2021	Exposed	Fording	FORD5	0.92	0.84	0.08
Mainstem	2021	Exposed	Fording	FORD6	1.19	0.78	0.41
Mainstem	2021	Exposed	Fording	FORD7	1.13	0.97	0.16
Mainstem	2021	Exposed	Fording	FORD8	0.67	0.67	0.00
Mainstem	2019	Exposed	Fording	FORD9	0.53	0.40	0.13
Mainstem	2020	Exposed	Fording	FORD9	0.44	0.39	0.05
Tributary	2021	Reference	Forsythe	FORS1	0.00	0.00	0.00
Tributary	2021	Exposed	Gardine	GARD1	0.71	0.32	0.39
Tributary	2021	Exposed	Gate	GATE2	1.46	0.93	0.53
Tributary	2021	Exposed	Goddard	GODD1	0.04	0.04	0.00
Tributary	2021	Exposed	Goddard	GODD3	2.76	0.93	1.83
Tributary	2021	Reference	Grace	GRAC1	0.12	0.12	0.00
Tributary	2021	Exposed	Grassy	GRAS1	0.19	0.19	0.00
Tributary	2021	Exposed	Grave	GRAV1	0.12	0.11	0.00
Tributary	2021	Exposed	Grave	GRAV2	0.06	0.06	0.00
Tributary	2021	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2021	Exposed	Greenhills	GREE1	0.76	0.68	0.08
Tributary	2021	Exposed	Greenhills	GREE3	2.68	1.00	1.68
Tributary	2021	Exposed	Greenhills	GREE4	2.67	0.97	1.70
Tributary	2021	Exposed	Greenhouse side channel	GSCH1	0.67	0.67	0.00
Tributary	2021	Exposed	Harmer	HARM1	0.76	0.76	0.00
Tributary	2021	Exposed	Harmer	HARM3	0.04	0.04	0.00
Tributary	2021	Exposed	Harmer	HARM4	0.21	0.21	0.00
Tributary	2021	Exposed	Harmer	HARM5	0.38	0.38	0.00
Tributary	2021	Reference	Hartley	HART2	0.03	0.03	0.00
Tributary	2021	Exposed	Henretta	HENR1	0.62	0.62	0.00
Tributary	2021	Exposed	Henretta	HENR2	0.02	0.02	0.00
Tributary	2021	Reference	Henretta	HENR3	0.00	0.00	0.00
Tributary	2021	Exposed	Kilmamock	KILM1	2.34	0.82	1.52
Tributary	2021	Exposed	Lake Mountain	LMOU1	0.61	0.61	0.00
Tributary	2021	Reference	Leach	RG_LE1	0.00	0.00	0.00
Tributary	2021	Exposed	Leask	LEAS2	2.69	1.00	1.69
Tributary	2021	Exposed	Lindsay	LIND1	0.06	0.06	0.00
Tributary	2021	Exposed	Line	LINE1	0.53	0.52	0.01
Tributary	2021	Exposed	Line	LINE2	0.28	0.28	0.00
Tributary	2021	Exposed	Line	LINE3	0.36	0.36	0.00
Tributary	2021	Exposed	Line	LINE4	0.94	0.94	0.00
Tributary	2021	Exposed	Line	LINE7	0.00	0.00	0.00
Tributary	2021	Exposed	Liver Pool Outfall	LIVE1	2.55	1.00	1.55
Tributary	2021	Reference	Lizard	LIZA1	0.12	0.12	0.00

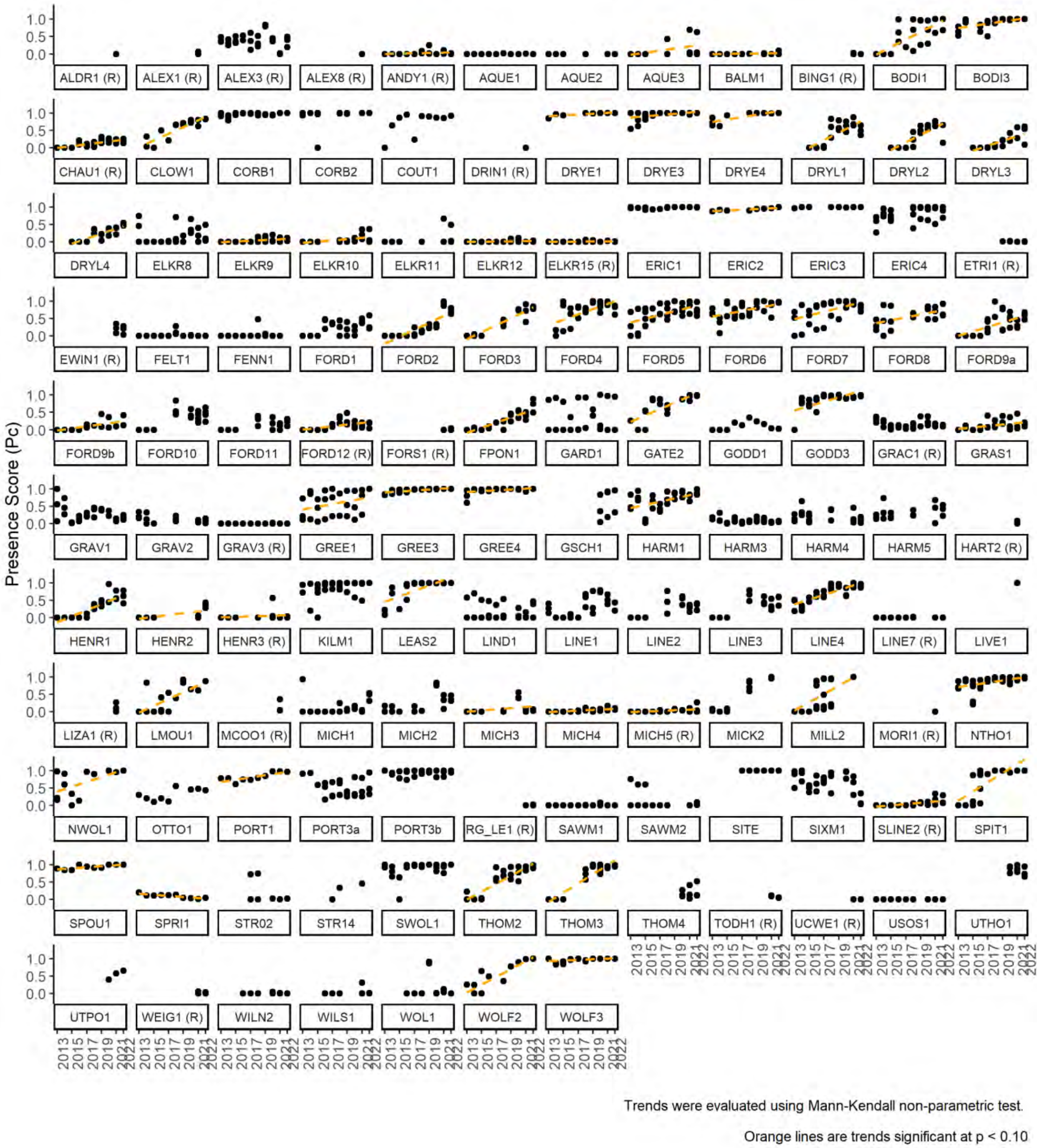
Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2021	Reference	McCool	MCOO1	0.19	0.14	0.05
Mainstem	2021	Exposed	Michel	MICH1	0.02	0.02	0.00
Mainstem	2021	Exposed	Michel	MICH2	0.29	0.29	0.00
Mainstem	2021	Exposed	Michel	MICH3	0.03	0.03	0.00
Mainstem	2021	Exposed	Michel	MICH4	0.11	0.11	0.00
Mainstem	2021	Reference	Michel	MICH5	0.04	0.04	0.00
Tributary	2020	Exposed	Mickelson	MICK1	1.19	0.82	0.37
Tributary	2021	Exposed	Mickelson	MICK2	1.69	0.98	0.72
Tributary	2021	Exposed	Milligan	MILL2	2.19	1.00	1.19
Tributary	2021	Reference	Morrissey	MORI1	0.00	0.00	0.00
Tributary	2021	Exposed	North Thompson	NTHO1	1.94	0.94	1.01
Tributary	2021	Exposed	North Willow	WILN2	0.01	0.01	0.00
Tributary	2021	Exposed	North Wolfram	NWOL1	2.64	0.96	1.68
Tributary	2021	Exposed	Otto	OTTO1	0.49	0.48	0.01
Tributary	2021	Exposed	Porter	PORT1	0.98	0.98	0.00
Tributary	2021	Exposed	Porter	PORT3a	0.49	0.48	0.01
Tributary	2021	Exposed	Porter	PORT3b	2.22	0.93	1.29
Tributary	2021	Reference	RG_UCWER	RG_UCWER1	0.00	0.00	0.00
Tributary	2021	Exposed	Sawmill	SAWM1	0.01	0.01	0.00
Tributary	2021	Exposed	Sawmill	SAWM2	0.00	0.00	0.00
Tributary	2021	Exposed	Site18	SITE	2.49	1.00	1.49
Tributary	2021	Exposed	Six Mile	SIXM1	0.66	0.60	0.05
Tributary	2021	Exposed	Smith Pond Outlet	SPOU1	2.35	1.00	1.35
Tributary	2021	Reference	South Line	SLINE2	0.18	0.18	0.00
Tributary	2021	Exposed	South Pit	SPIT1	2.15	1.00	1.15
Tributary	2021	Exposed	South Willow	WILS1	0.21	0.16	0.05
Tributary	2021	Exposed	South Wolfram	SWOL1	2.39	0.90	1.49
Tributary	2021	Exposed	Spring	SPRI1	0.01	0.01	0.00
Tributary	2021	Exposed	Stream 02	STR02	0.00	0.00	0.00
Tributary	2021	Exposed	Stream 14	STR14	0.46	0.46	0.00
Tributary	2021	Exposed	Thompson	THOM2	1.07	0.88	0.19
Tributary	2021	Exposed	Thompson	THOM3	1.90	0.93	0.98
Tributary	2021	Exposed	Thompson	THOM4	0.19	0.19	0.00
Tributary	2021	Reference	Toddhunter	TODH1	0.10	0.10	0.00
Tributary	2021	Exposed	Unnamed Trib South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2021	Exposed	Upper Thompson	UTHO1	1.51	0.89	0.62
Tributary	2021	Exposed	Upper Thompson Pond Outlet	UTPO1	0.58	0.58	0.00
Tributary	2021	Reference	Weigert	WEIG1	0.03	0.03	0.00
Tributary	2021	Exposed	Wolf	WOL1	0.08	0.08	0.00
Tributary	2021	Exposed	Wolfram	WOLF2	2.80	0.99	1.81
Tributary	2021	Exposed	Wolfram	WOLF3	2.91	1.00	1.91
Tributary	2022	Exposed	Aqueduct	AQUE1	0.00	0.00	0.00
Tributary	2022	Exposed	Aqueduct	AQUE2	0.00	0.00	0.00
Tributary	2022	Exposed	Aqueduct	AQUE3	0.22	0.22	0.00
Tributary	2022	Exposed	Balmer	BALM1	0.03	0.03	0.00
Tributary	2022	Exposed	Bodie	BODI1	1.43	0.89	0.53
Tributary	2022	Exposed	Bodie	BODI3	2.83	1.00	1.83
Tributary	2022	Exposed	Clode Pond Outlet	COUT1	1.10	0.92	0.18
Tributary	2022	Exposed	Clode West Infiltration	CLOW1	0.83	0.83	0.00
Tributary	2022	Exposed	Corbin	CORB1	2.74	1.00	1.74
Tributary	2022	Exposed	Corbin	CORB2	2.94	1.00	1.94
Tributary	2022	Exposed	Dry (EVO)	DRYE1	2.07	1.00	1.07

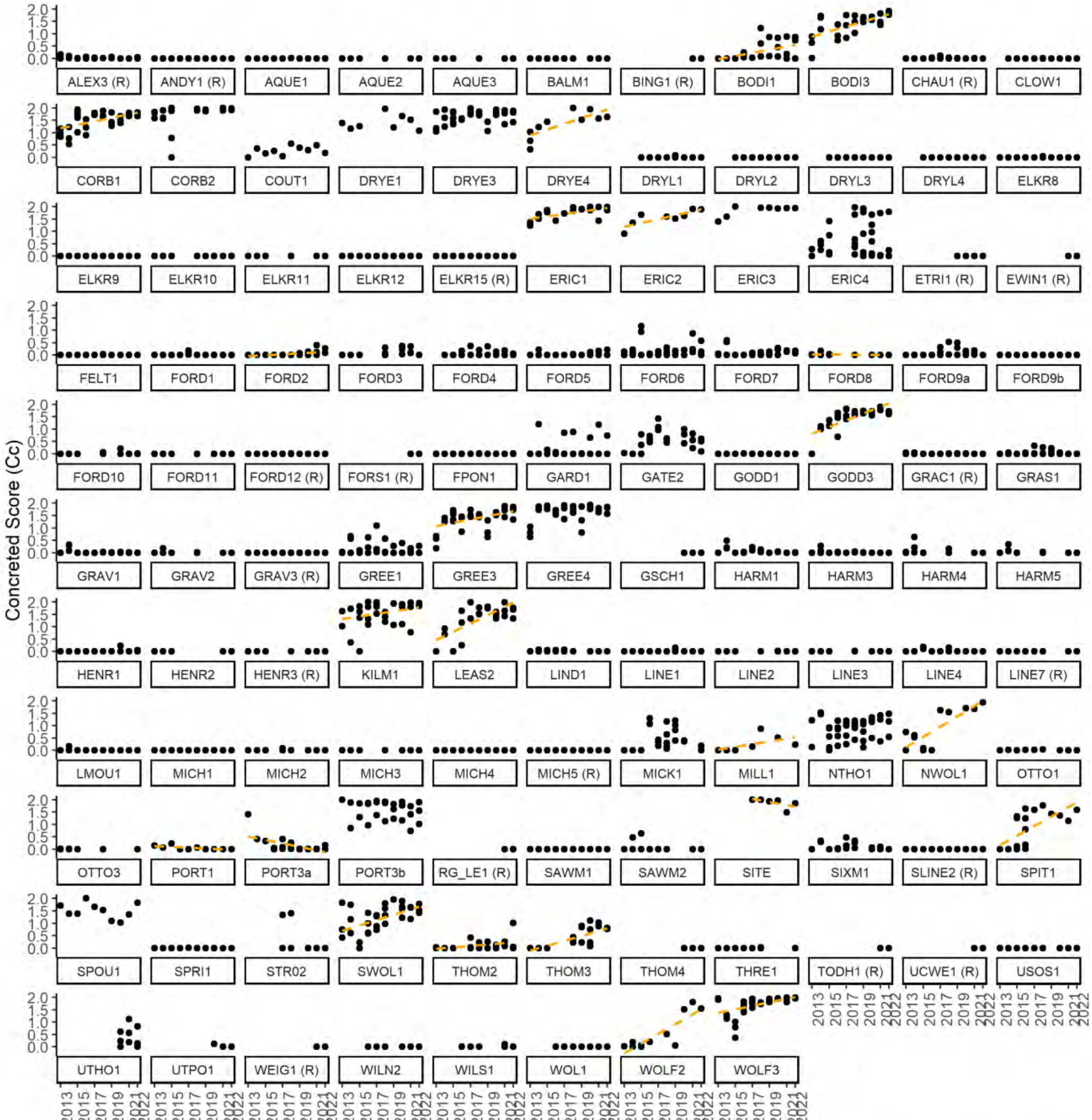
Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2022	Exposed	Dry (EVO)	DRYE3	2.70	1.00	1.70
Tributary	2022	Exposed	Dry (EVO)	DRYE4	2.64	1.00	1.64
Tributary	2022	Exposed	Dry (LCO)	DRYL1	0.50	0.50	0.00
Tributary	2022	Exposed	Dry (LCO)	DRYL2	0.49	0.49	0.00
Tributary	2022	Exposed	Dry (LCO)	DRYL3	0.42	0.42	0.00
Tributary	2022	Exposed	Dry (LCO)	DRYL4	0.51	0.51	0.00
Tributary	2022	Exposed	Erickson	ERIC1	2.91	1.00	1.92
Tributary	2022	Exposed	Erickson	ERIC2	2.89	1.00	1.89
Tributary	2022	Exposed	Erickson	ERIC3	2.94	1.00	1.94
Tributary	2022	Exposed	Erickson	ERIC4	1.54	0.86	0.67
Tributary	2022	Exposed	Feltham	FELT1	0.00	0.00	0.00
Mainstem	2022	Exposed	Elk	ELKR10	0.14	0.14	0.00
Mainstem	2022	Exposed	Elk	ELKR11	0.17	0.17	0.00
Mainstem	2022	Exposed	Elk	ELKR12	0.01	0.01	0.00
Mainstem	2022	Exposed	Elk	ELKR8	0.20	0.20	0.00
Mainstem	2022	Exposed	Elk	ELKR9	0.06	0.06	0.00
Mainstem	2022	Exposed	Fording	FORD1	0.35	0.35	0.00
Tributary	2022	Exposed	Fish Pond	FPON1	0.71	0.71	0.00
Tributary	2022	Exposed	Gardine	GARD1	0.56	0.32	0.25
Tributary	2022	Exposed	Gate	GATE2	1.38	0.98	0.40
Tributary	2022	Exposed	Goddard	GODD1	0.03	0.03	0.00
Tributary	2022	Exposed	Goddard	GODD3	2.64	0.97	1.66
Tributary	2022	Exposed	Grassy	GRAS1	0.14	0.14	0.00
Tributary	2022	Exposed	Grave	GRAV1	0.18	0.18	0.00
Mainstem	2022	Exposed	Fording	FORD10	0.45	0.45	0.00
Mainstem	2022	Exposed	Fording	FORD11	0.21	0.21	0.00
Mainstem	2022	Exposed	Fording	FORD2	0.86	0.71	0.15
Mainstem	2022	Exposed	Fording	FORD3	0.79	0.79	0.00
Mainstem	2022	Exposed	Fording	FORD4	0.79	0.77	0.02
Mainstem	2022	Exposed	Fording	FORD5	0.80	0.74	0.06
Mainstem	2022	Exposed	Fording	FORD6	1.20	0.96	0.24
Mainstem	2022	Exposed	Fording	FORD7	0.92	0.80	0.12
Mainstem	2022	Exposed	Fording	FORD8	0.70	0.70	0.00
Mainstem	2022	Exposed	Fording	FORD9a	0.59	0.59	0.00
Mainstem	2022	Exposed	Fording	FORD9b	0.28	0.28	0.00
Mainstem	2022	Exposed	Michel	MICH1	0.45	0.45	0.00
Mainstem	2022	Exposed	Michel	MICH2	0.37	0.37	0.00
Tributary	2022	Exposed	Grave	GRAV2	0.08	0.08	0.00
Tributary	2022	Exposed	Greenhills	GREE1	1.09	1.00	0.09
Tributary	2022	Exposed	Greenhills	GREE3	2.64	1.00	1.64
Tributary	2022	Exposed	Greenhills	GREE4	2.74	1.00	1.74
Tributary	2022	Exposed	Greenhouse side channel	GSCH1	0.75	0.75	0.00
Tributary	2022	Exposed	Harmer	HARM1	0.90	0.90	0.00
Tributary	2022	Exposed	Harmer	HARM3	0.06	0.06	0.00
Tributary	2022	Exposed	Harmer	HARM4	0.11	0.11	0.00
Tributary	2022	Exposed	Harmer	HARM5	0.39	0.39	0.00
Tributary	2022	Exposed	Henretta	HENR1	0.62	0.60	0.02
Tributary	2022	Exposed	Henretta	HENR2	0.36	0.36	0.00
Tributary	2022	Exposed	Kilmamock	KILM1	2.90	1.00	1.90
Tributary	2022	Exposed	Lake Mountain	LMOU1	0.87	0.87	0.00
Tributary	2022	Exposed	Leask	LEAS2	2.60	1.00	1.60
Tributary	2022	Exposed	Lindsay	LIND1	0.29	0.29	0.00
Tributary	2022	Exposed	Line	LINE1	0.35	0.35	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2022	Exposed	Line	LINE2	0.33	0.33	0.00
Tributary	2022	Exposed	Line	LINE3	0.51	0.51	0.00
Tributary	2022	Exposed	Line	LINE4	0.92	0.92	0.00
Tributary	2022	Exposed	Mickelson	MICK1	0.98	0.91	0.07
Tributary	2022	Exposed	Milligan	MILL1	1.23	1.00	0.23
Tributary	2022	Exposed	North Thompson	NTHO1	2.04	0.97	1.06
Tributary	2022	Exposed	North Willow	WILN2	0.00	0.00	0.00
Tributary	2022	Exposed	North Wolfram	NWOL1	2.94	1.00	1.94
Tributary	2022	Exposed	Otto	OTTO1	0.44	0.44	0.00
Tributary	2022	Exposed	Otto	OTTO3	0.00	0.00	0.00
Tributary	2022	Exposed	Porter	PORT1	0.97	0.97	0.00
Tributary	2022	Exposed	Porter	PORT3a	0.64	0.59	0.06
Tributary	2022	Exposed	Porter	PORT3b	2.47	0.98	1.48
Tributary	2022	Exposed	Sawmill	SAWM1	0.00	0.00	0.00
Tributary	2022	Exposed	Sawmill	SAWM2	0.06	0.06	0.00
Mainstem	2022	Exposed	Michel	MICH3	0.04	0.04	0.00
Mainstem	2022	Exposed	Michel	MICH4	0.07	0.07	0.00
Mainstem	2022	Reference	Elk	ELKR15	0.00	0.00	0.00
Mainstem	2022	Reference	Fording	FORD12	0.15	0.15	0.00
Mainstem	2022	Reference	Michel	MICH5	0.10	0.10	0.00
Tributary	2022	Exposed	Site18	SITE	2.85	1.00	1.85
Tributary	2022	Exposed	Six Mile	SIXM1	0.15	0.15	0.00
Tributary	2022	Exposed	Smith Pond Outlet	SPOU1	2.83	1.00	1.83
Tributary	2022	Exposed	South Pit	SPIT1	2.59	1.00	1.59
Tributary	2022	Exposed	South Willow	WILS1	0.01	0.01	0.00
Tributary	2022	Exposed	SouthWolfram	SWOL1	2.57	1.00	1.57
Tributary	2022	Exposed	Spring	SPRI1	0.05	0.05	0.00
Tributary	2022	Exposed	Stream 02	STR02	0.02	0.02	0.00
Tributary	2022	Exposed	Thompson	THOM2	1.30	0.95	0.35
Tributary	2022	Exposed	Thompson	THOM3	1.76	0.97	0.79
Tributary	2022	Exposed	Thompson	THOM4	0.25	0.25	0.00
Tributary	2022	Exposed	Thresher	THRE1	0.00	0.00	0.00
Tributary	2022	Exposed	Unnamed Trib South of Sawmill	USOS1	0.00	0.00	0.00
Tributary	2022	Exposed	Upper Thompson	UTHO1	1.10	0.78	0.32
Tributary	2022	Exposed	Upper Thompson Pond Outlet	UTPO1	0.65	0.65	0.00
Tributary	2022	Exposed	Wolf	WOL1	0.00	0.00	0.00
Tributary	2022	Exposed	Wolfram	WOLF2	2.55	1.00	1.55
Tributary	2022	Exposed	Wolfram	WOLF3	2.96	1.00	1.96
Tributary	2022	Reference	Alexander	ALEX3	0.38	0.36	0.02
Tributary	2022	Reference	Andy Good	ANDY1	0.01	0.01	0.00
Tributary	2022	Reference	Bingay	BING1	0.00	0.00	0.00
Tributary	2022	Reference	Chauncey	CHAU1	0.20	0.20	0.00
Tributary	2022	Reference	East Dry	ETRI1	0.01	0.01	0.00
Tributary	2022	Reference	Ewin	EWIN1	0.17	0.17	0.00
Tributary	2022	Reference	Forsythe	FORS1	0.02	0.02	0.00
Tributary	2022	Reference	Grace	GRAC1	0.11	0.11	0.00
Tributary	2022	Reference	Grave	GRAV3	0.00	0.00	0.00
Tributary	2022	Reference	Henretta	HENR3	0.02	0.02	0.00
Tributary	2022	Reference	Leach	RG_LE1	0.01	0.01	0.00
Tributary	2022	Reference	Line	LINE7	0.00	0.00	0.00
Tributary	2022	Reference	RG_UCWER	UCWE1	0.00	0.00	0.00
Tributary	2022	Reference	South Line	SLINE2	0.15	0.15	0.00

Strata	Year	Type	Stream	Reach	CI	Cp	Cc
Tributary	2022	Reference	Toddhunter	TODH1	0.06	0.06	0.00
Tributary	2022	Reference	Weigert	WEIG1	0.02	0.01	0.00

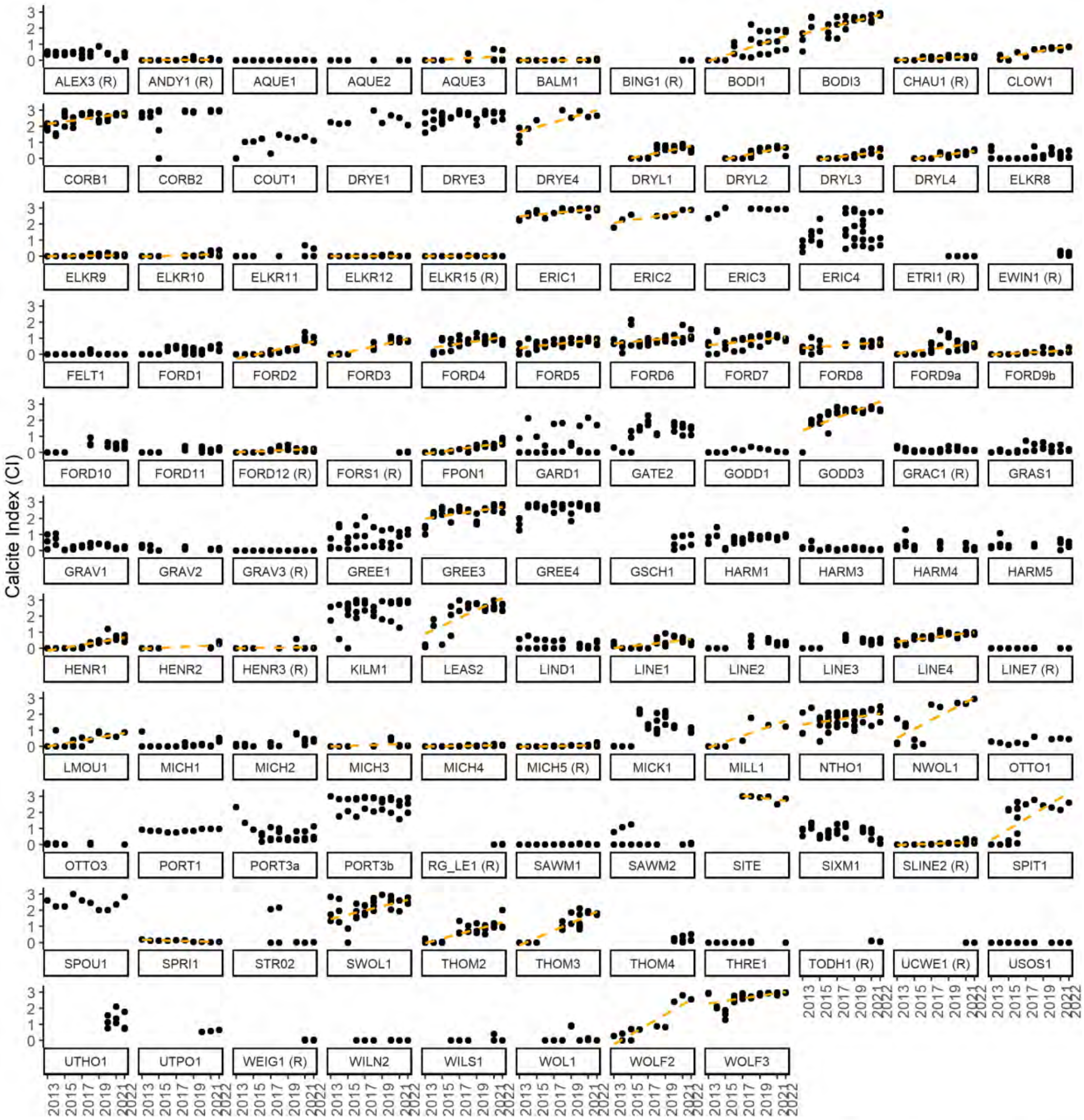
Appendix 7. Plots of the calcite presence, concretion and index for 2013-2022 data with trends evaluated by Mann-Kendall analysis.





Trends were evaluated using Mann-Kendall non-parametric test.

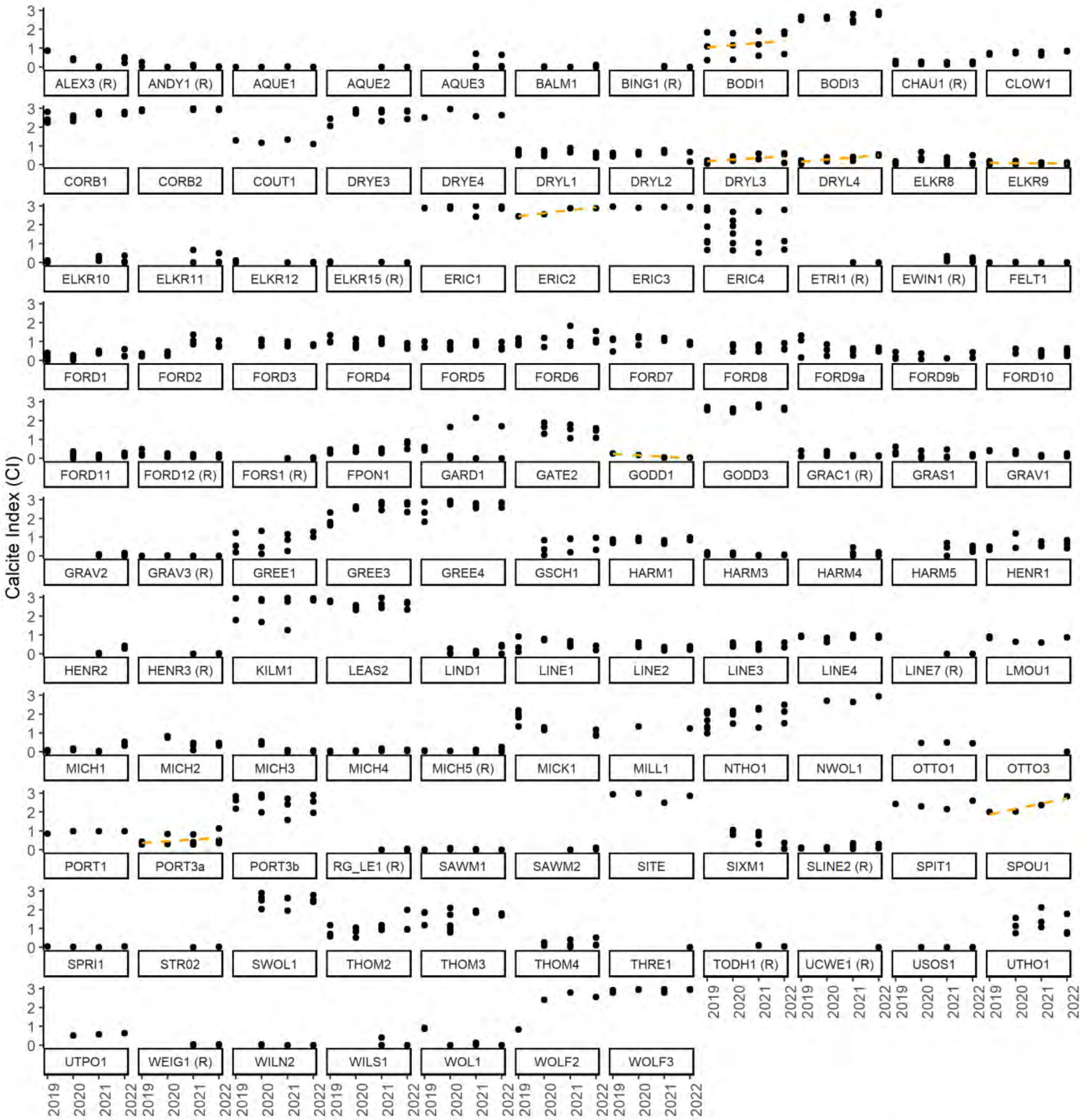
Orange lines are trends significant at $p < 0.10$



Trends were evaluated using Mann-Kendall non-parametric test.

Orange lines are trends significant at $p < 0.10$

Appendix 8. Plots of the calcite index for 2019-2022 data for reaches in 2022 with trends evaluated by Mann-Kendall analysis.



Trends were evaluated using Mann-Kendall non-parametric test.

Orange lines are trends significant at $p < 0.10$

Appendix 9. 2022 ANOVA results by reach.

Reach	df	p.value
WOLF3	9	1.09E-12
GODD3	9	6.57E-12
MICK1	8	2.40E-09
FORD2	8	4.91E-09
MICH3	6	4.35E-08
WOL1	6	4.86E-08
THOM3	7	6.20E-08
GREE3	9	2.70E-07
FORD3	6	3.91E-07
MICH2	7	5.40E-07
DRYL4	7	6.15E-07
LINE4	9	6.24E-07
HENR2	4	6.83E-07
FPON1	8	9.95E-07
LEAS2	8	2.57E-06
DRYL1	7	3.36E-06
LINE3	6	7.13E-06
DRYL2	7	1.10E-05
FORD10	6	1.25E-05
HENR1	9	1.60E-05
GREE4	9	2.98E-05
LINE1	9	4.68E-05
HARM1	9	5.05E-05
GATE2	7	6.67E-05
SWOL1	8	0.0001158
THOM2	8	0.0001604
CORB1	9	0.0001931
CHAU1 (R)	9	0.0002417
CLOW1	6	0.0002435
ALEX3 (R)	9	0.0006384
FORD12 (R)	9	0.0010881
FORD1	9	0.0011297
LINE2	6	0.0012458
BODI3	8	0.0014118
MICH4	9	0.0014689
DRYL3	7	0.0027372
TODH1 (R)	1	0.0033198
FORD4	8	0.0055166
SIXM1	8	0.0065815

Reach	df	p.value
GRAC1 (R)	9	0.0089673
FELT1	9	0.0091203
GRAV1	9	0.0097441
SLINE2 (R)	9	0.0179037
FORD11	6	0.0179633
BODI1	8	0.0216475
FORD6	9	0.0251792
NTHO1	9	0.0271244
FORD9a	9	0.0285047
ERIC1	7	0.0437373
FORD5	9	0.0502789
SPIT1	3	0.0535669
LINE7 (R)	7	0.0613911
MICH1	9	0.0688588
ELKR10	7	0.0732918
HARM4	5	0.0736097
GRAV2	5	0.0739527
ELKR15 (R)	9	0.0849618
HARM3	9	0.0871195
LMOU1	5	0.0914318
ETRI1 (R)	3	0.1375977
ELKR12	9	0.1699416
ELKR8	9	0.1701964
DRYE3	9	0.2008791
BING1 (R)	1	0.2051065
ELKR9	9	0.2306456
FORS1 (R)	1	0.2377961
ANDY1 (R)	9	0.2535537
MICH5 (R)	9	0.2609232
GRAS1	9	0.2639314
NWOL1	2	0.3273021
SAWM1	6	0.3282604
RG_LE1 (R)	1	0.373901
FORD7	9	0.41368
OTTO3	4	0.4294856
WILS1	4	0.4905329
THRE1	6	0.4918041
HARM5	5	0.5054916
GRAV3 (R)	9	0.5101258
HENR3 (R)	4	0.5117415
BALM1	2	0.512
WEIG1 (R)	1	0.5304117

Reach	df	p.value
WILN2	5	0.5333286
FORD8	6	0.5705756
GSCH1	2	0.5758024
ERIC4	7	0.5843833
UTHO1	2	0.592647
SAWM2	7	0.5940963
ELKR11	5	0.6030737
AQUE3	5	0.61818
CORB2	6	0.6529733
KILM1	9	0.6664246
EWIN1 (R)	1	0.7258106
STR02	2	0.7445122
WOLF2	1	0.7488685
FORD9b	4	0.771886
GREE1	9	0.8212488
THOM4	2	0.8246775
PORT3a	6	0.8687316
PORT3b	9	0.9075375
LIND1	8	0.9909743
GARD1	9	0.9975422

Appendix 10. Calcite presence (Cp) and new calcite presence (Cp'), and associated calcite indices.

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp	ALEX3	ALEX3-25	0.00	0.45	0.45
2020	Cp	ALEX3	ALEX3-50	0.00	0.41	0.41
2020	Cp	ALEX3	ALEX3-75	0.00	0.36	0.36
2020	Cp	ANDY1	ANDY1-25	0.00	0.00	0.00
2020	Cp	ANDY1	ANDY1-50	0.00	0.00	0.00
2020	Cp	ANDY1	ANDY1-75	0.00	0.00	0.00
2020	Cp	BALM1	BALM1-25	0.00	0.01	0.01
2020	Cp	BALM1	BALM1-50	0.00	0.02	0.02
2020	Cp	BALM1	BALM1-75	0.00	0.00	0.00
2020	Cp	BODI1	BODI1-25	0.08	0.29	0.37
2020	Cp	BODI1	BODI1-50	0.83	0.96	1.79
2020	Cp	BODI1	BODI1-75	0.45	0.69	1.14
2020	Cp	BODI3	BODI3-25	1.69	0.97	2.66
2020	Cp	BODI3	BODI3-50	1.64	0.99	2.63
2020	Cp	BODI3	BODI3-75	1.56	1.00	2.56
2020	Cp	CHAU1	CHAU1-25	0.00	0.15	0.15
2020	Cp	CHAU1	CHAU1-50	0.00	0.21	0.21
2020	Cp	CHAU1	CHAU1-75	0.00	0.27	0.27
2020	Cp	CORB1	CORB1-25	1.38	0.93	2.31
2020	Cp	CORB1	CORB1-50	1.66	0.95	2.61
2020	Cp	CORB1	CORB1-75	1.48	0.96	2.44
2020	Cp	DRYE3	DRYE3-25	1.93	1.00	2.93
2020	Cp	DRYE3	DRYE3-50	1.83	1.00	2.83
2020	Cp	DRYE3	DRYE3-75	1.71	1.00	2.71
2020	Cp	DRYL1	DRYL1-25	0.00	0.46	0.46
2020	Cp	DRYL1	DRYL1-50	0.00	0.76	0.76
2020	Cp	DRYL1	DRYL1-75	0.00	0.64	0.64
2020	Cp	DRYL2	DRYL2-25	0.00	0.60	0.60
2020	Cp	DRYL2	DRYL2-50	0.00	0.66	0.66
2020	Cp	DRYL2	DRYL2-75	0.00	0.54	0.54
2020	Cp	DRYL3	DRYL3-25	0.00	0.43	0.43
2020	Cp	DRYL3	DRYL3-50	0.00	0.20	0.20
2020	Cp	DRYL3	DRYL3-75	0.00	0.23	0.23
2020	Cp	DRYL4	DRYL4-25	0.00	0.39	0.39
2020	Cp	DRYL4	DRYL4-50	0.00	0.18	0.18
2020	Cp	DRYL4	DRYL4-75	0.00	0.32	0.32

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp	ELKR12	ELKR12-25	0.00	0.05	0.05
2020	Cp	ELKR12	ELKR12-50	0.00	0.00	0.00
2020	Cp	ELKR12	ELKR12-75	0.00	0.11	0.11
2020	Cp	ELKR15	ELKR15-25	0.00	0.00	0.00
2020	Cp	ELKR15	ELKR15-50	0.00	0.00	0.00
2020	Cp	ELKR15	ELKR15-75	0.00	0.00	0.00
2020	Cp	ELKR8	ELKR8-25	0.00	0.34	0.34
2020	Cp	ELKR8	ELKR8-50	0.00	0.66	0.66
2020	Cp	ELKR8	ELKR8-75	0.00	0.25	0.25
2020	Cp	ELKR9	ELKR9-25	0.00	0.01	0.01
2020	Cp	ELKR9	ELKR9-50	0.00	0.03	0.03
2020	Cp	ELKR9	ELKR9-75	0.00	0.20	0.20
2020	Cp	FELT1	FELT1-25	0.00	0.01	0.01
2020	Cp	FELT1	FELT1-50	0.00	0.02	0.02
2020	Cp	FELT1	FELT1-75	0.00	0.00	0.00
2020	Cp	FPON1	FPON1-25	0.00	0.56	0.56
2020	Cp	FPON1	FPON1-50	0.00	0.53	0.53
2020	Cp	FPON1	FPON1-75	0.00	0.34	0.34
2020	Cp	FORD1	FORD1-25	0.00	0.15	0.15
2020	Cp	FORD1	FORD1-50	0.00	0.01	0.01
2020	Cp	FORD1	FORD1-75	0.00	0.27	0.27
2020	Cp	FORD10	FORD10-25	0.21	0.41	0.62
2020	Cp	FORD10	FORD10-50	0.00	0.35	0.35
2020	Cp	FORD10	FORD10-75	0.00	0.59	0.59
2020	Cp	FORD11	FORD11-25	0.00	0.36	0.36
2020	Cp	FORD11	FORD11-50	0.00	0.18	0.18
2020	Cp	FORD11	FORD11-75	0.00	0.00	0.00
2020	Cp	FORD12	FORD12-25	0.00	0.14	0.14
2020	Cp	FORD12	FORD12-50	0.00	0.25	0.25
2020	Cp	FORD12	FORD12-75	0.00	0.05	0.05
2020	Cp	FORD2	FORD2-25	0.00	0.24	0.24
2020	Cp	FORD2	FORD2-50	0.03	0.28	0.31
2020	Cp	FORD2	FORD2-75	0.13	0.33	0.46
2020	Cp	FORD3	FORD3-25	0.25	0.76	1.01
2020	Cp	FORD3	FORD3-50	0.03	0.73	0.76
2020	Cp	FORD3	FORD3-75	0.37	0.73	1.10
2020	Cp	FORD4	FORD4-12.5	0.14	0.99	1.13
2020	Cp	FORD4	FORD4-50	0.00	0.90	0.90

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp	FORD4	FORD4-62.5	0.00	0.66	0.66
2020	Cp	FORD4	FORD4-75	0.00	0.82	0.82
2020	Cp	FORD5	FORD5-12.5	0.00	0.71	0.71
2020	Cp	FORD5	FORD5-25	0.00	0.57	0.57
2020	Cp	FORD5	FORD5-50	0.01	0.94	0.95
2020	Cp	FORD5	FORD5-75	0.11	0.81	0.92
2020	Cp	FORD7	FORD7-25	0.22	0.97	1.19
2020	Cp	FORD7	FORD7-50	0.00	0.81	0.81
2020	Cp	FORD7	FORD7-75	0.28	1.00	1.28
2020	Cp	FORD8	FORD8-25	0.00	0.47	0.47
2020	Cp	FORD8	FORD8-50	0.00	0.76	0.76
2020	Cp	FORD8	FORD8-75	0.00	0.84	0.84
2020	Cp	FORD9	FORD9-12.5	0.02	0.53	0.55
2020	Cp	FORD9	FORD9-25	0.16	0.69	0.85
2020	Cp	FORD9	FORD9-37.5	0.11	0.46	0.57
2020	Cp	FORD9	FORD9-50	0.00	0.23	0.23
2020	Cp	FORD9	FORD9-62.5	0.00	0.36	0.36
2020	Cp	FORD9	FORD9-75	0.00	0.06	0.06
2020	Cp	GARD1	GARD1-25	0.65	1.00	1.65
2020	Cp	GARD1	GARD1-50	0.00	0.12	0.12
2020	Cp	GARD1	GARD1-75	0.00	0.02	0.02
2020	Cp	GATE2	GATE2-25	0.42	0.87	1.29
2020	Cp	GATE2	GATE2-50	1.00	0.88	1.88
2020	Cp	GATE2	GATE2-75	0.78	0.87	1.65
2020	Cp	GODD2	GODD2-25	0.32	0.61	0.93
2020	Cp	GODD2	GODD2-50	1.96	1.00	2.96
2020	Cp	GODD2	GODD2-75	1.66	0.86	2.52
2020	Cp	GODD3	GODD3-25	1.65	0.91	2.56
2020	Cp	GODD3	GODD3-50	1.55	0.89	2.44
2020	Cp	GODD3	GODD3-75	1.72	0.92	2.64
2020	Cp	GRAC1	GRAC1-25	0.02	0.22	0.24
2020	Cp	GRAC1	GRAC1-50	0.00	0.38	0.38
2020	Cp	GRAC1	GRAC1-75	0.00	0.13	0.13
2020	Cp	GRAS1	GRAS1-25	0.04	0.36	0.40
2020	Cp	GRAS1	GRAS1-50	0.00	0.01	0.01
2020	Cp	GRAS1	GRAS1-75	0.01	0.10	0.11
2020	Cp	GRAV1	GRAV1-25	0.01	0.22	0.23
2020	Cp	GRAV1	GRAV1-50	0.02	0.37	0.39

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp	GRAV1	GRAV1-75	0.00	0.23	0.23
2020	Cp	GRAV3	GRAV3-25	0.00	0.00	0.00
2020	Cp	GRAV3	GRAV3-50	0.00	0.00	0.00
2020	Cp	GRAV3	GRAV3-75	0.00	0.02	0.02
2020	Cp	GREE1	GREE1-25	0.00	0.47	0.47
2020	Cp	GREE1	GREE1-50	0.00	0.11	0.11
2020	Cp	GREE1	GREE1-75	0.39	0.95	1.34
2020	Cp	GREE3	GREE3-12.5	1.60	1.00	2.60
2020	Cp	GREE3	GREE3-25	1.51	1.00	2.51
2020	Cp	GREE3	GREE3-37.5	1.63	0.99	2.62
2020	Cp	GREE3	GREE3-50	1.60	1.00	2.60
2020	Cp	GREE3	GREE3-62.5	1.54	0.99	2.53
2020	Cp	GREE3	GREE3-75	1.62	1.00	2.62
2020	Cp	GREE4	GREE4-25	1.92	1.00	2.92
2020	Cp	GREE4	GREE4-50	1.85	1.00	2.85
2020	Cp	GREE4	GREE4-75	1.76	0.98	2.74
2020	Cp	GSCH1	GSCH1-25	0.00	0.83	0.83
2020	Cp	GSCH1	GSCH1-50	0.00	0.36	0.36
2020	Cp	GSCH1	GSCH1-75	0.00	0.05	0.05
2020	Cp	HARM1	HARM1-25	0.04	0.76	0.80
2020	Cp	HARM1	HARM1-50	0.03	0.90	0.93
2020	Cp	HARM1	HARM1-75	0.02	0.95	0.97
2020	Cp	HARM3	HARM3-25	0.00	0.17	0.17
2020	Cp	HARM3	HARM3-50	0.00	0.05	0.05
2020	Cp	HARM3	HARM3-75	0.00	0.13	0.13
2020	Cp	HENR1	HENR1-25	0.23	0.97	1.20
2020	Cp	HENR1	HENR1-50	0.00	0.44	0.44
2020	Cp	HENR1	HENR1-75	0.00	0.44	0.44
2020	Cp	HENR3	HENR3-25	0.00	0.57	0.57
2020	Cp	HENR3	HENR3-50	0.00	0.04	0.04
2020	Cp	HENR3	HENR3-75	0.00	0.00	0.00
2020	Cp	KILM1	KILM1-25	1.81	1.00	2.81
2020	Cp	KILM1	KILM1-50	1.91	0.99	2.90
2020	Cp	KILM1	KILM1-75	1.11	0.58	1.69
2020	Cp	LEAS2	LEAS2-18.2	1.59	1.00	2.59
2020	Cp	LEAS2	LEAS2-25	1.46	0.99	2.45
2020	Cp	LEAS2	LEAS2-9.1	1.33	1.00	2.33
2020	Cp	LIND1	LIND1-25	0.00	0.28	0.28

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp	LIND1	LIND1-50	0.00	0.04	0.04
2020	Cp	LIND1	LIND1-75	0.00	0.00	0.00
2020	Cp	LINE1	LINE1-25	0.00	0.76	0.76
2020	Cp	LINE1	LINE1-50	0.00	0.79	0.79
2020	Cp	LINE1	LINE1-75	0.00	0.73	0.73
2020	Cp	LINE2	LINE2-25	0.00	0.56	0.56
2020	Cp	LINE2	LINE2-50	0.02	0.61	0.63
2020	Cp	LINE2	LINE2-75	0.00	0.37	0.37
2020	Cp	LINE3	LINE3-25	0.00	0.43	0.43
2020	Cp	LINE3	LINE3-50	0.00	0.61	0.61
2020	Cp	LINE3	LINE3-75	0.00	0.39	0.39
2020	Cp	LINE4	LINE4-25	0.00	0.85	0.85
2020	Cp	LINE4	LINE4-50	0.00	0.62	0.62
2020	Cp	LINE4	LINE4-75	0.00	0.64	0.64
2020	Cp	MICH1	MICH1-25	0.00	0.16	0.16
2020	Cp	MICH1	MICH1-50	0.00	0.12	0.12
2020	Cp	MICH1	MICH1-75	0.00	0.08	0.08
2020	Cp	MICH2	MICH2-25	0.00	0.78	0.78
2020	Cp	MICH2	MICH2-50	0.00	0.83	0.83
2020	Cp	MICH2	MICH2-75	0.00	0.75	0.75
2020	Cp	MICH3	MICH3-25	0.00	0.38	0.38
2020	Cp	MICH3	MICH3-50	0.00	0.55	0.55
2020	Cp	MICH3	MICH3-75	0.00	0.41	0.41
2020	Cp	MICH4	MICH4-50	0.00	0.50	0.50
2020	Cp	MICH4	MICH4-75	0.00	0.44	0.44
2020	Cp	MICH5	MICH5-25	0.00	0.04	0.04
2020	Cp	MICH5	MICH5-50	0.00	0.03	0.03
2020	Cp	MICH5	MICH5-75	0.00	0.03	0.03
2020	Cp	NTHO1	NTHO1-12.5	1.33	0.81	2.14
2020	Cp	NTHO1	NTHO1-25	1.20	0.78	1.98
2020	Cp	NTHO1	NTHO1-37.5	1.30	0.79	2.09
2020	Cp	NTHO1	NTHO1-50	1.27	0.90	2.17
2020	Cp	NTHO1	NTHO1-62.5	1.15	0.96	2.11
2020	Cp	NTHO1	NTHO1-75	0.50	0.99	1.49
2020	Cp	PORT3a	PORT3a-12.5	0.00	0.33	0.33
2020	Cp	PORT3a	PORT3a-25	0.01	0.81	0.82
2020	Cp	PORT3a	PORT3a-37.5	0.00	0.28	0.28
2020	Cp	PORT3b	PORT3b-50	1.16	0.82	1.98

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp	PORT3b	PORT3b-62.5	1.77	1.00	2.77
2020	Cp	PORT3b	PORT3b-75	1.91	1.00	2.91
2020	Cp	SIXM1	SIXM1-25	0.06	0.98	1.04
2020	Cp	SIXM1	SIXM1-50	0.00	0.77	0.77
2020	Cp	SIXM1	SIXM1-75	0.00	0.97	0.97
2020	Cp	SLINE2	SLINE2-25	0.00	0.11	0.11
2020	Cp	SLINE2	SLINE2-50	0.00	0.03	0.03
2020	Cp	SLINE2	SLINE2-75	0.00	0.02	0.02
2020	Cp	SWOL1	SWOL1-16	1.89	1.00	2.89
2020	Cp	SWOL1	SWOL1-25	1.58	0.92	2.50
2020	Cp	SWOL1	SWOL1-32.1	1.66	0.99	2.65
2020	Cp	SWOL1	SWOL1-7.5	1.22	0.81	2.03
2020	Cp	THOM2	THOM2-25	0.05	0.78	0.83
2020	Cp	THOM2	THOM2-50	0.00	0.52	0.52
2020	Cp	THOM2	THOM2-75	0.12	0.94	1.06
2020	Cp	THOM3	THOM3-12.5	0.74	1.00	1.74
2020	Cp	THOM3	THOM3-25	1.10	1.00	2.10
2020	Cp	THOM3	THOM3-37.5	0.19	0.79	0.98
2020	Cp	THOM3	THOM3-50	0.07	0.73	0.80
2020	Cp	THOM3	THOM3-62.5	0.22	0.94	1.16
2020	Cp	THOM3	THOM3-75	0.07	0.88	0.95
2020	Cp	THOM4	THOM4-25	0.00	0.27	0.27
2020	Cp	THOM4	THOM4-50	0.00	0.12	0.12
2020	Cp	THOM4	THOM4-75	0.00	0.09	0.09
2020	Cp	USOS1	USOS1-25	0.00	0.00	0.00
2020	Cp	USOS1	USOS1-50	0.00	0.00	0.00
2020	Cp	USOS1	USOS1-75	0.00	0.00	0.00
2020	Cp	UTHO1	UTHO1-25	0.23	0.91	1.14
2020	Cp	UTHO1	UTHO1-50	0.00	0.76	0.76
2020	Cp	UTHO1	UTHO1-75	0.61	0.95	1.56
2020	Cp	UTPO1	UTPO1-0	0.12	0.40	0.52
2020	Cp	WOLF3	WOLF3-25	1.94	1.00	2.94
2020	Cp	WOLF3	WOLF3-50	1.96	1.00	2.96
2020	Cp	WOLF3	WOLF3-75	1.94	1.00	2.94
2020	Cp'	ALEX3	ALEX3-25	0.00	0.09	0.09
2020	Cp'	ALEX3	ALEX3-50	0.00	0.08	0.08
2020	Cp'	ALEX3	ALEX3-75	0.00	0.05	0.05
2020	Cp'	ANDY1	ANDY1-25	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp'	ANDY1	ANDY1-50	0.00	0.00	0.00
2020	Cp'	ANDY1	ANDY1-75	0.00	0.00	0.00
2020	Cp'	BALM1	BALM1-25	0.00	0.00	0.00
2020	Cp'	BALM1	BALM1-50	0.00	0.00	0.00
2020	Cp'	BALM1	BALM1-75	0.00	0.00	0.00
2020	Cp'	BODI1	BODI1-25	0.08	0.24	0.32
2020	Cp'	BODI1	BODI1-50	0.83	0.95	1.78
2020	Cp'	BODI1	BODI1-75	0.45	0.64	1.09
2020	Cp'	BODI3	BODI3-25	1.69	0.93	2.62
2020	Cp'	BODI3	BODI3-50	1.64	0.95	2.59
2020	Cp'	BODI3	BODI3-75	1.56	0.97	2.53
2020	Cp'	CHAU1	CHAU1-25	0.00	0.03	0.03
2020	Cp'	CHAU1	CHAU1-50	0.00	0.04	0.04
2020	Cp'	CHAU1	CHAU1-75	0.00	0.03	0.03
2020	Cp'	CORB1	CORB1-25	1.38	0.82	2.20
2020	Cp'	CORB1	CORB1-50	1.66	0.90	2.56
2020	Cp'	CORB1	CORB1-75	1.48	0.87	2.35
2020	Cp'	DRYE3	DRYE3-25	1.93	1.00	2.93
2020	Cp'	DRYE3	DRYE3-50	1.83	0.99	2.82
2020	Cp'	DRYE3	DRYE3-75	1.71	0.98	2.69
2020	Cp'	DRYL1	DRYL1-25	0.00	0.09	0.09
2020	Cp'	DRYL1	DRYL1-50	0.00	0.23	0.23
2020	Cp'	DRYL1	DRYL1-75	0.00	0.17	0.17
2020	Cp'	DRYL2	DRYL2-25	0.00	0.16	0.16
2020	Cp'	DRYL2	DRYL2-50	0.00	0.19	0.19
2020	Cp'	DRYL2	DRYL2-75	0.00	0.15	0.15
2020	Cp'	DRYL3	DRYL3-25	0.00	0.11	0.11
2020	Cp'	DRYL3	DRYL3-50	0.00	0.04	0.04
2020	Cp'	DRYL3	DRYL3-75	0.00	0.05	0.05
2020	Cp'	DRYL4	DRYL4-25	0.00	0.10	0.10
2020	Cp'	DRYL4	DRYL4-50	0.00	0.03	0.03
2020	Cp'	DRYL4	DRYL4-75	0.00	0.07	0.07
2020	Cp'	ELKR12	ELKR12-25	0.00	0.01	0.01
2020	Cp'	ELKR12	ELKR12-50	0.00	0.00	0.00
2020	Cp'	ELKR12	ELKR12-75	0.00	0.02	0.02
2020	Cp'	ELKR15	ELKR15-25	0.00	0.00	0.00
2020	Cp'	ELKR15	ELKR15-50	0.00	0.00	0.00
2020	Cp'	ELKR15	ELKR15-75	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp'	ELKR8	ELKR8-25	0.00	0.05	0.05
2020	Cp'	ELKR8	ELKR8-50	0.00	0.14	0.14
2020	Cp'	ELKR8	ELKR8-75	0.00	0.05	0.05
2020	Cp'	ELKR9	ELKR9-25	0.00	0.00	0.00
2020	Cp'	ELKR9	ELKR9-50	0.00	0.00	0.00
2020	Cp'	ELKR9	ELKR9-75	0.00	0.04	0.04
2020	Cp'	FELT1	FELT1-25	0.00	0.00	0.00
2020	Cp'	FELT1	FELT1-50	0.00	0.00	0.00
2020	Cp'	FELT1	FELT1-75	0.00	0.00	0.00
2020	Cp'	FPON1	FPON1-25	0.00	0.19	0.19
2020	Cp'	FPON1	FPON1-50	0.00	0.14	0.14
2020	Cp'	FPON1	FPON1-75	0.00	0.08	0.08
2020	Cp'	FORD1	FORD1-25	0.00	0.05	0.05
2020	Cp'	FORD1	FORD1-50	0.00	0.01	0.01
2020	Cp'	FORD1	FORD1-75	0.00	0.11	0.11
2020	Cp'	FORD10	FORD10-25	0.21	0.20	0.41
2020	Cp'	FORD10	FORD10-50	0.00	0.09	0.09
2020	Cp'	FORD10	FORD10-75	0.00	0.29	0.29
2020	Cp'	FORD11	FORD11-25	0.00	0.14	0.14
2020	Cp'	FORD11	FORD11-50	0.00	0.04	0.04
2020	Cp'	FORD11	FORD11-75	0.00	0.00	0.00
2020	Cp'	FORD12	FORD12-25	0.00	0.04	0.04
2020	Cp'	FORD12	FORD12-50	0.00	0.06	0.06
2020	Cp'	FORD12	FORD12-75	0.00	0.01	0.01
2020	Cp'	FORD2	FORD2-25	0.00	0.09	0.09
2020	Cp'	FORD2	FORD2-50	0.03	0.17	0.20
2020	Cp'	FORD2	FORD2-75	0.13	0.14	0.27
2020	Cp'	FORD3	FORD3-25	0.25	0.47	0.72
2020	Cp'	FORD3	FORD3-50	0.03	0.39	0.42
2020	Cp'	FORD3	FORD3-75	0.37	0.36	0.73
2020	Cp'	FORD4	FORD4-12.5	0.14	0.47	0.61
2020	Cp'	FORD4	FORD4-50	0.00	0.44	0.44
2020	Cp'	FORD4	FORD4-62.5	0.00	0.34	0.34
2020	Cp'	FORD4	FORD4-75	0.00	0.31	0.31
2020	Cp'	FORD5	FORD5-12.5	0.00	0.33	0.33
2020	Cp'	FORD5	FORD5-25	0.00	0.21	0.21
2020	Cp'	FORD5	FORD5-50	0.01	0.47	0.48
2020	Cp'	FORD5	FORD5-75	0.11	0.54	0.65

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp'	FORD7	FORD7-25	0.22	0.66	0.88
2020	Cp'	FORD7	FORD7-50	0.00	0.38	0.38
2020	Cp'	FORD7	FORD7-75	0.28	0.87	1.15
2020	Cp'	FORD8	FORD8-25	0.00	0.16	0.16
2020	Cp'	FORD8	FORD8-50	0.00	0.36	0.36
2020	Cp'	FORD8	FORD8-75	0.00	0.33	0.33
2020	Cp'	FORD9	FORD9-12.5	0.02	0.15	0.17
2020	Cp'	FORD9	FORD9-25	0.16	0.22	0.38
2020	Cp'	FORD9	FORD9-37.5	0.11	0.15	0.26
2020	Cp'	FORD9	FORD9-50	0.00	0.06	0.06
2020	Cp'	FORD9	FORD9-62.5	0.00	0.10	0.10
2020	Cp'	FORD9	FORD9-75	0.00	0.02	0.02
2020	Cp'	GARD1	GARD1-25	0.65	0.79	1.44
2020	Cp'	GARD1	GARD1-50	0.00	0.02	0.02
2020	Cp'	GARD1	GARD1-75	0.00	0.00	0.00
2020	Cp'	GATE2	GATE2-25	0.42	0.51	0.93
2020	Cp'	GATE2	GATE2-50	1.00	0.66	1.66
2020	Cp'	GATE2	GATE2-75	0.78	0.60	1.38
2020	Cp'	GODD2	GODD2-25	0.32	0.32	0.64
2020	Cp'	GODD2	GODD2-50	1.96	0.99	2.95
2020	Cp'	GODD2	GODD2-75	1.66	0.85	2.51
2020	Cp'	GODD3	GODD3-25	1.65	0.86	2.51
2020	Cp'	GODD3	GODD3-50	1.55	0.83	2.38
2020	Cp'	GODD3	GODD3-75	1.72	0.89	2.61
2020	Cp'	GRAC1	GRAC1-25	0.02	0.05	0.07
2020	Cp'	GRAC1	GRAC1-50	0.00	0.08	0.08
2020	Cp'	GRAC1	GRAC1-75	0.00	0.02	0.02
2020	Cp'	GRAS1	GRAS1-25	0.04	0.23	0.27
2020	Cp'	GRAS1	GRAS1-50	0.00	0.01	0.01
2020	Cp'	GRAS1	GRAS1-75	0.01	0.03	0.04
2020	Cp'	GRAV1	GRAV1-25	0.01	0.06	0.07
2020	Cp'	GRAV1	GRAV1-50	0.02	0.09	0.11
2020	Cp'	GRAV1	GRAV1-75	0.00	0.04	0.04
2020	Cp'	GRAV3	GRAV3-25	0.00	0.00	0.00
2020	Cp'	GRAV3	GRAV3-50	0.00	0.00	0.00
2020	Cp'	GRAV3	GRAV3-75	0.00	0.00	0.00
2020	Cp'	GREE1	GREE1-25	0.00	0.29	0.29
2020	Cp'	GREE1	GREE1-50	0.00	0.03	0.03

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp'	GREE1	GREE1-75	0.39	0.74	1.13
2020	Cp'	GREE3	GREE3-12.5	1.60	0.94	2.54
2020	Cp'	GREE3	GREE3-25	1.51	0.95	2.46
2020	Cp'	GREE3	GREE3-37.5	1.63	0.95	2.58
2020	Cp'	GREE3	GREE3-50	1.60	0.97	2.57
2020	Cp'	GREE3	GREE3-62.5	1.54	0.92	2.46
2020	Cp'	GREE3	GREE3-75	1.62	0.97	2.59
2020	Cp'	GREE4	GREE4-25	1.92	1.00	2.92
2020	Cp'	GREE4	GREE4-50	1.85	1.00	2.85
2020	Cp'	GREE4	GREE4-75	1.76	0.98	2.74
2020	Cp'	GSCH1	GSCH1-25	0.00	0.52	0.52
2020	Cp'	GSCH1	GSCH1-50	0.00	0.20	0.20
2020	Cp'	GSCH1	GSCH1-75	0.00	0.02	0.02
2020	Cp'	HARM1	HARM1-25	0.04	0.46	0.50
2020	Cp'	HARM1	HARM1-50	0.03	0.51	0.54
2020	Cp'	HARM1	HARM1-75	0.02	0.66	0.68
2020	Cp'	HARM3	HARM3-25	0.00	0.02	0.02
2020	Cp'	HARM3	HARM3-50	0.00	0.01	0.01
2020	Cp'	HARM3	HARM3-75	0.00	0.02	0.02
2020	Cp'	HENR1	HENR1-25	0.23	0.59	0.82
2020	Cp'	HENR1	HENR1-50	0.00	0.14	0.14
2020	Cp'	HENR1	HENR1-75	0.00	0.15	0.15
2020	Cp'	HENR3	HENR3-25	0.00	0.14	0.14
2020	Cp'	HENR3	HENR3-50	0.00	0.01	0.01
2020	Cp'	HENR3	HENR3-75	0.00	0.00	0.00
2020	Cp'	KILM1	KILM1-25	1.81	0.98	2.79
2020	Cp'	KILM1	KILM1-50	1.91	0.98	2.89
2020	Cp'	KILM1	KILM1-75	1.11	0.57	1.68
2020	Cp'	LEAS2	LEAS2-18.2	1.59	0.73	2.32
2020	Cp'	LEAS2	LEAS2-25	1.46	0.70	2.16
2020	Cp'	LEAS2	LEAS2-9.1	1.33	0.70	2.03
2020	Cp'	LIND1	LIND1-25	0.00	0.08	0.08
2020	Cp'	LIND1	LIND1-50	0.00	0.01	0.01
2020	Cp'	LIND1	LIND1-75	0.00	0.00	0.00
2020	Cp'	LINE1	LINE1-25	0.00	0.18	0.18
2020	Cp'	LINE1	LINE1-50	0.00	0.16	0.16
2020	Cp'	LINE1	LINE1-75	0.00	0.19	0.19
2020	Cp'	LINE2	LINE2-25	0.00	0.11	0.11

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp'	LINE2	LINE2-50	0.02	0.14	0.16
2020	Cp'	LINE2	LINE2-75	0.00	0.05	0.05
2020	Cp'	LINE3	LINE3-25	0.00	0.09	0.09
2020	Cp'	LINE3	LINE3-50	0.00	0.17	0.17
2020	Cp'	LINE3	LINE3-75	0.00	0.08	0.08
2020	Cp'	LINE4	LINE4-25	0.00	0.58	0.58
2020	Cp'	LINE4	LINE4-50	0.00	0.21	0.21
2020	Cp'	LINE4	LINE4-75	0.00	0.29	0.29
2020	Cp'	MICH1	MICH1-25	0.00	0.03	0.03
2020	Cp'	MICH1	MICH1-50	0.00	0.02	0.02
2020	Cp'	MICH1	MICH1-75	0.00	0.01	0.01
2020	Cp'	MICH2	MICH2-25	0.00	0.18	0.18
2020	Cp'	MICH2	MICH2-50	0.00	0.21	0.21
2020	Cp'	MICH2	MICH2-75	0.00	0.15	0.15
2020	Cp'	MICH3	MICH3-25	0.00	0.06	0.06
2020	Cp'	MICH3	MICH3-50	0.00	0.10	0.10
2020	Cp'	MICH3	MICH3-75	0.00	0.05	0.05
2020	Cp'	MICH4	MICH4-50	0.00	0.07	0.07
2020	Cp'	MICH4	MICH4-75	0.00	0.08	0.08
2020	Cp'	MICH5	MICH5-25	0.00	0.00	0.00
2020	Cp'	MICH5	MICH5-50	0.00	0.01	0.01
2020	Cp'	MICH5	MICH5-75	0.00	0.00	0.00
2020	Cp'	NTHO1	NTHO1-12.5	1.33	0.70	2.03
2020	Cp'	NTHO1	NTHO1-25	1.20	0.68	1.88
2020	Cp'	NTHO1	NTHO1-37.5	1.30	0.79	2.09
2020	Cp'	NTHO1	NTHO1-50	1.27	0.90	2.17
2020	Cp'	NTHO1	NTHO1-62.5	1.15	0.91	2.06
2020	Cp'	NTHO1	NTHO1-75	0.50	0.90	1.40
2020	Cp'	PORT3a	PORT3a-12.5	0.00	0.08	0.08
2020	Cp'	PORT3a	PORT3a-25	0.01	0.26	0.27
2020	Cp'	PORT3a	PORT3a-37.5	0.00	0.13	0.13
2020	Cp'	PORT3b	PORT3b-50	1.16	0.78	1.94
2020	Cp'	PORT3b	PORT3b-62.5	1.77	1.00	2.77
2020	Cp'	PORT3b	PORT3b-75	1.91	1.00	2.91
2020	Cp'	SIXM1	SIXM1-25	0.06	0.81	0.87
2020	Cp'	SIXM1	SIXM1-50	0.00	0.31	0.31
2020	Cp'	SIXM1	SIXM1-75	0.00	0.86	0.86
2020	Cp'	SLINE2	SLINE2-25	0.00	0.02	0.02

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2020	Cp'	SLINE2	SLINE2-50	0.00	0.01	0.01
2020	Cp'	SLINE2	SLINE2-75	0.00	0.00	0.00
2020	Cp'	SWOL1	SWOL1-16	1.89	1.00	2.89
2020	Cp'	SWOL1	SWOL1-25	1.58	0.90	2.48
2020	Cp'	SWOL1	SWOL1-32.1	1.66	0.98	2.64
2020	Cp'	SWOL1	SWOL1-7.5	1.22	0.81	2.03
2020	Cp'	THOM2	THOM2-25	0.05	0.15	0.20
2020	Cp'	THOM2	THOM2-50	0.00	0.07	0.07
2020	Cp'	THOM2	THOM2-75	0.12	0.20	0.32
2020	Cp'	THOM3	THOM3-12.5	0.74	0.54	1.28
2020	Cp'	THOM3	THOM3-25	1.10	0.62	1.72
2020	Cp'	THOM3	THOM3-37.5	0.19	0.40	0.59
2020	Cp'	THOM3	THOM3-50	0.07	0.36	0.43
2020	Cp'	THOM3	THOM3-62.5	0.22	0.42	0.64
2020	Cp'	THOM3	THOM3-75	0.07	0.41	0.48
2020	Cp'	THOM4	THOM4-25	0.00	0.08	0.08
2020	Cp'	THOM4	THOM4-50	0.00	0.02	0.02
2020	Cp'	THOM4	THOM4-75	0.00	0.02	0.02
2020	Cp'	USOS1	USOS1-25	0.00	0.00	0.00
2020	Cp'	USOS1	USOS1-50	0.00	0.00	0.00
2020	Cp'	USOS1	USOS1-75	0.00	0.00	0.00
2020	Cp'	UTHO1	UTHO1-25	0.23	0.71	0.94
2020	Cp'	UTHO1	UTHO1-50	0.00	0.38	0.38
2020	Cp'	UTHO1	UTHO1-75	0.61	0.89	1.50
2020	Cp'	UTPO1	UTPO1-0	0.12	0.35	0.47
2020	Cp'	WOLF3	WOLF3-25	1.94	1.00	2.94
2020	Cp'	WOLF3	WOLF3-50	1.96	1.00	2.96
2020	Cp'	WOLF3	WOLF3-75	1.94	1.00	2.94
2021	Cp	ALDR1	ALDR1-25	0.00	0.00	0.00
2021	Cp	ALDR1	ALDR1-50	0.00	0.00	0.00
2021	Cp	ALDR1	ALDR1-75	0.00	0.00	0.00
2021	Cp	ALEX1	ALEX1-25	0.00	0.01	0.01
2021	Cp	ALEX1	ALEX1-50	0.01	0.06	0.07
2021	Cp	ALEX1	ALEX1-75	0.00	0.00	0.00
2021	Cp	ALEX3	ALEX3-25	0.00	0.02	0.02
2021	Cp	ALEX3	ALEX3-50	0.00	0.01	0.01
2021	Cp	ALEX3	ALEX3-75	0.00	0.00	0.00
2021	Cp	ALEX8	ALEX8-25	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	ALEX8	ALEX8-50	0.00	0.00	0.00
2021	Cp	ALEX8	ALEX8-75	0.00	0.00	0.00
2021	Cp	ANDY1	ANDY1-25	0.00	0.01	0.01
2021	Cp	ANDY1	ANDY1-50	0.00	0.03	0.03
2021	Cp	ANDY1	ANDY1-75	0.00	0.11	0.11
2021	Cp	AQUE1	AQUE1-0	0.00	0.01	0.01
2021	Cp	AQUE2	AQUE2-0	0.00	0.00	0.00
2021	Cp	AQUE2	AQUE2-50	0.00	0.00	0.00
2021	Cp	AQUE3	AQUE3-25	0.00	0.00	0.00
2021	Cp	AQUE3	AQUE3-50	0.00	0.04	0.04
2021	Cp	AQUE3	AQUE3-75	0.00	0.69	0.69
2021	Cp	BALM1	BALM1-25	0.00	0.00	0.00
2021	Cp	BALM1	BALM1-50	0.00	0.00	0.00
2021	Cp	BALM1	BALM1-75	0.00	0.00	0.00
2021	Cp	BING1	BING1-25	0.00	0.00	0.00
2021	Cp	BING1	BING1-50	0.00	0.01	0.01
2021	Cp	BING1	BING1-75	0.00	0.03	0.03
2021	Cp	BODI1	BODI1-25	0.00	0.60	0.60
2021	Cp	BODI1	BODI1-50	0.88	1.00	1.88
2021	Cp	BODI1	BODI1-75	0.18	1.00	1.18
2021	Cp	BODI3	BODI3-25	1.48	1.00	2.48
2021	Cp	BODI3	BODI3-50	1.35	1.00	2.35
2021	Cp	BODI3	BODI3-75	1.81	1.00	2.81
2021	Cp	CHAU1	CHAU1-25	0.00	0.13	0.13
2021	Cp	CHAU1	CHAU1-50	0.01	0.16	0.17
2021	Cp	CHAU1	CHAU1-75	0.00	0.25	0.25
2021	Cp	COUT1	COUT1-0	0.48	0.86	1.34
2021	Cp	CLOW1	CLOW1-0	0.00	0.80	0.80
2021	Cp	CLOW1	CLOW1-50	0.00	0.62	0.62
2021	Cp	CORB1	CORB1-25	1.70	1.00	2.70
2021	Cp	CORB1	CORB1-50	1.79	1.00	2.79
2021	Cp	CORB1	CORB1-75	1.67	1.00	2.67
2021	Cp	CORB2	CORB2-25	1.90	1.00	2.90
2021	Cp	CORB2	CORB2-50	1.99	1.00	2.99
2021	Cp	CORB2	CORB2-75	1.98	1.00	2.98
2021	Cp	DRIN1	DRIN1-25	0.00	0.00	0.00
2021	Cp	DRIN1	DRIN1-50	0.00	0.00	0.00
2021	Cp	DRIN1	DRIN1-75	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	DRYE1	DRYE1-0	1.52	1.00	2.52
2021	Cp	DRYE3	DRYE3-25	1.90	1.00	2.90
2021	Cp	DRYE3	DRYE3-50	1.78	1.00	2.78
2021	Cp	DRYE3	DRYE3-75	1.34	0.96	2.30
2021	Cp	DRYE4	DRYE4-25	1.57	0.99	2.56
2021	Cp	DRYL1	DRYL1-25	0.00	0.68	0.68
2021	Cp	DRYL1	DRYL1-50	0.00	0.88	0.88
2021	Cp	DRYL1	DRYL1-75	0.00	0.65	0.65
2021	Cp	DRYL2	DRYL2-25	0.00	0.77	0.77
2021	Cp	DRYL2	DRYL2-50	0.00	0.74	0.74
2021	Cp	DRYL2	DRYL2-75	0.00	0.62	0.62
2021	Cp	DRYL3	DRYL3-25	0.00	0.59	0.59
2021	Cp	DRYL3	DRYL3-50	0.00	0.28	0.28
2021	Cp	DRYL3	DRYL3-75	0.00	0.28	0.28
2021	Cp	DRYL4	DRYL4-25	0.00	0.40	0.40
2021	Cp	DRYL4	DRYL4-50	0.00	0.21	0.21
2021	Cp	DRYL4	DRYL4-75	0.00	0.41	0.41
2021	Cp	ETRI1	ETRI1-0	0.00	0.00	0.00
2021	Cp	ETRI1	ETRI1-50	0.00	0.00	0.00
2021	Cp	ELKR10	ELKR10-25	0.00	0.08	0.08
2021	Cp	ELKR10	ELKR10-50	0.00	0.21	0.21
2021	Cp	ELKR10	ELKR10-75	0.00	0.35	0.35
2021	Cp	ELKR11	ELKR11-25	0.00	0.67	0.67
2021	Cp	ELKR11	ELKR11-50	0.00	0.00	0.00
2021	Cp	ELKR11	ELKR11-75	0.00	0.00	0.00
2021	Cp	ELKR12	ELKR12-25	0.00	0.00	0.00
2021	Cp	ELKR12	ELKR12-50	0.00	0.00	0.00
2021	Cp	ELKR12	ELKR12-75	0.00	0.00	0.00
2021	Cp	ELKR15	ELKR15-25	0.00	0.03	0.03
2021	Cp	ELKR15	ELKR15-50	0.00	0.02	0.02
2021	Cp	ELKR15	ELKR15-75	0.00	0.03	0.03
2021	Cp	ELKR8	ELKR8-25	0.00	0.18	0.18
2021	Cp	ELKR8	ELKR8-50	0.00	0.00	0.00
2021	Cp	ELKR8	ELKR8-75	0.00	0.40	0.40
2021	Cp	ELKR9	ELKR9-25	0.00	0.10	0.10
2021	Cp	ELKR9	ELKR9-50	0.00	0.12	0.12
2021	Cp	ELKR9	ELKR9-75	0.00	0.00	0.00
2021	Cp	ERIC1	ERIC1-0	1.43	1.00	2.43

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	ERIC1	ERIC1-50	1.98	1.00	2.98
2021	Cp	ERIC2	ERIC2-0	1.91	0.96	2.87
2021	Cp	ERIC3	ERIC3-0	1.94	1.00	2.94
2021	Cp	ERIC4	ERIC4-25	1.75	0.97	2.72
2021	Cp	ERIC4	ERIC4-50	0.04	1.00	1.04
2021	Cp	ERIC4	ERIC4-75	0.00	0.51	0.51
2021	Cp	EWIN1	EWIN1-25	0.00	0.22	0.22
2021	Cp	EWIN1	EWIN1-50	0.00	0.34	0.34
2021	Cp	EWIN1	EWIN1-75	0.00	0.07	0.07
2021	Cp	FELT1	FELT1-25	0.00	0.00	0.00
2021	Cp	FELT1	FELT1-50	0.00	0.00	0.00
2021	Cp	FELT1	FELT1-75	0.00	0.00	0.00
2021	Cp	FENN1	FENN1-50	0.00	0.00	0.00
2021	Cp	FPON1	FPON1-25	0.00	0.41	0.41
2021	Cp	FPON1	FPON1-50	0.00	0.51	0.51
2021	Cp	FPON1	FPON1-75	0.00	0.28	0.28
2021	Cp	FORD1	FORD1-25	0.00	0.36	0.36
2021	Cp	FORD1	FORD1-50	0.01	0.43	0.44
2021	Cp	FORD1	FORD1-75	0.00	0.50	0.50
2021	Cp	FORD10	FORD10-25	0.00	0.33	0.33
2021	Cp	FORD10	FORD10-50	0.00	0.23	0.23
2021	Cp	FORD10	FORD10-75	0.00	0.54	0.54
2021	Cp	FORD10	FORD10-86	0.00	0.44	0.44
2021	Cp	FORD10	FORD10-89	0.00	0.21	0.21
2021	Cp	FORD11	FORD11-25	0.00	0.18	0.18
2021	Cp	FORD11	FORD11-50	0.00	0.12	0.12
2021	Cp	FORD11	FORD11-75	0.00	0.00	0.00
2021	Cp	FORD12	FORD12-25	0.00	0.21	0.21
2021	Cp	FORD12	FORD12-50	0.00	0.14	0.14
2021	Cp	FORD12	FORD12-75	0.00	0.06	0.06
2021	Cp	FORD2	FORD2-25	0.00	0.86	0.86
2021	Cp	FORD2	FORD2-50	0.12	0.93	1.05
2021	Cp	FORD2	FORD2-75	0.39	0.98	1.37
2021	Cp	FORD3	FORD3-25	0.08	0.91	0.99
2021	Cp	FORD3	FORD3-50	0.10	0.72	0.82
2021	Cp	FORD3	FORD3-75	0.35	0.40	0.75
2021	Cp	FORD4	FORD4-25	0.18	0.98	1.16
2021	Cp	FORD4	FORD4-50	0.01	0.97	0.98

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	FORD4	FORD4-75	0.00	0.88	0.88
2021	Cp	FORD5	FORD5-12.5	0.00	0.87	0.87
2021	Cp	FORD5	FORD5-25	0.16	0.87	1.03
2021	Cp	FORD5	FORD5-50	0.00	0.99	0.99
2021	Cp	FORD5	FORD5-75	0.16	0.63	0.79
2021	Cp	FORD6	FORD6-25	0.24	0.52	0.76
2021	Cp	FORD6	FORD6-50	0.87	0.95	1.82
2021	Cp	FORD6	FORD6-75	0.12	0.88	1.00
2021	Cp	FORD7	FORD7-25	0.19	1.00	1.19
2021	Cp	FORD7	FORD7-50	0.14	0.90	1.04
2021	Cp	FORD7	FORD7-75	0.15	1.00	1.15
2021	Cp	FORD8	FORD8-25	0.00	0.47	0.47
2021	Cp	FORD8	FORD8-50	0.00	0.71	0.71
2021	Cp	FORD8	FORD8-75	0.00	0.83	0.83
2021	Cp	FORD9a	FORD9a-12.5	0.03	0.23	0.26
2021	Cp	FORD9a	FORD9a-25	0.19	0.45	0.64
2021	Cp	FORD9a	FORD9a-37.5	0.19	0.29	0.48
2021	Cp	FORD9a	FORD9a-50	0.02	0.23	0.25
2021	Cp	FORD9b	FORD9b-62.5	0.00	0.10	0.10
2021	Cp	FORD9b	FORD9b-75	0.00	0.10	0.10
2021	Cp	FORS1	FORS1-25	0.00	0.00	0.00
2021	Cp	FORS1	FORS1-50	0.00	0.00	0.00
2021	Cp	FORS1	FORS1-75	0.00	0.00	0.00
2021	Cp	GARD1	GARD1-25	1.17	0.97	2.14
2021	Cp	GARD1	GARD1-50	0.00	0.00	0.00
2021	Cp	GARD1	GARD1-75	0.00	0.00	0.00
2021	Cp	GATE2	GATE2-25	0.22	0.83	1.05
2021	Cp	GATE2	GATE2-50	0.82	0.96	1.78
2021	Cp	GATE2	GATE2-75	0.56	0.99	1.55
2021	Cp	GODD1	GODD1-0	0.00	0.04	0.04
2021	Cp	GODD3	GODD3-25	1.82	0.92	2.74
2021	Cp	GODD3	GODD3-50	1.90	0.95	2.85
2021	Cp	GODD3	GODD3-75	1.77	0.92	2.69
2021	Cp	GRAC1	GRAC1-25	0.00	0.09	0.09
2021	Cp	GRAC1	GRAC1-50	0.00	0.17	0.17
2021	Cp	GRAC1	GRAC1-75	0.00	0.09	0.09
2021	Cp	GRAS1	GRAS1-25	0.00	0.46	0.46
2021	Cp	GRAS1	GRAS1-50	0.00	0.08	0.08

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	GRAS1	GRAS1-75	0.00	0.04	0.04
2021	Cp	GRAV1	GRAV1-25	0.00	0.07	0.07
2021	Cp	GRAV1	GRAV1-50	0.01	0.15	0.16
2021	Cp	GRAV1	GRAV1-75	0.00	0.12	0.12
2021	Cp	GRAV2	GRAV2-25	0.00	0.04	0.04
2021	Cp	GRAV2	GRAV2-50	0.00	0.10	0.10
2021	Cp	GRAV2	GRAV2-75	0.00	0.04	0.04
2021	Cp	GRAV3	GRAV3-25	0.00	0.00	0.00
2021	Cp	GRAV3	GRAV3-50	0.00	0.00	0.00
2021	Cp	GRAV3	GRAV3-75	0.00	0.00	0.00
2021	Cp	GREE1	GREE1-25	0.05	0.81	0.86
2021	Cp	GREE1	GREE1-50	0.00	0.26	0.26
2021	Cp	GREE1	GREE1-75	0.18	0.97	1.15
2021	Cp	GREE3	GREE3-25	1.44	1.00	2.44
2021	Cp	GREE3	GREE3-50	1.87	1.00	2.87
2021	Cp	GREE3	GREE3-75	1.72	1.00	2.72
2021	Cp	GREE4	GREE4-25	1.63	0.92	2.55
2021	Cp	GREE4	GREE4-50	1.79	1.00	2.79
2021	Cp	GREE4	GREE4-75	1.68	0.98	2.66
2021	Cp	GSCH1	GSCH1-25	0.00	0.92	0.92
2021	Cp	GSCH1	GSCH1-50	0.00	0.90	0.90
2021	Cp	GSCH1	GSCH1-75	0.00	0.19	0.19
2021	Cp	HARM1	HARM1-25	0.00	0.65	0.65
2021	Cp	HARM1	HARM1-50	0.00	0.83	0.83
2021	Cp	HARM1	HARM1-75	0.00	0.81	0.81
2021	Cp	HARM3	HARM3-25	0.00	0.03	0.03
2021	Cp	HARM3	HARM3-50	0.00	0.06	0.06
2021	Cp	HARM3	HARM3-75	0.00	0.02	0.02
2021	Cp	HARM4	HARM4-25	0.00	0.04	0.04
2021	Cp	HARM4	HARM4-50	0.00	0.13	0.13
2021	Cp	HARM4	HARM4-75	0.00	0.46	0.46
2021	Cp	HARM5	HARM5-25	0.00	0.68	0.68
2021	Cp	HARM5	HARM5-50	0.00	0.46	0.46
2021	Cp	HARM5	HARM5-75	0.00	0.01	0.01
2021	Cp	HART2	HART2-25	0.00	0.00	0.00
2021	Cp	HART2	HART2-50	0.00	0.08	0.08
2021	Cp	HART2	HART2-75	0.00	0.00	0.00
2021	Cp	HENR1	HENR1-25	0.00	0.78	0.78

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	HENR1	HENR1-50	0.00	0.55	0.55
2021	Cp	HENR1	HENR1-75	0.00	0.53	0.53
2021	Cp	HENR2	HENR2-25	0.00	0.05	0.05
2021	Cp	HENR2	HENR2-50	0.00	0.00	0.00
2021	Cp	HENR2	HENR2-75	0.00	0.00	0.00
2021	Cp	HENR3	HENR3-25	0.00	0.00	0.00
2021	Cp	HENR3	HENR3-50	0.00	0.01	0.01
2021	Cp	HENR3	HENR3-75	0.00	0.00	0.00
2021	Cp	KILM1	KILM1-25	1.97	1.00	2.97
2021	Cp	KILM1	KILM1-50	1.80	0.98	2.78
2021	Cp	KILM1	KILM1-75	0.78	0.49	1.27
2021	Cp	LMOU1	LMOU1-0	0.00	0.61	0.61
2021	Cp	RG_LE1	RG_LE1-25	0.00	0.00	0.00
2021	Cp	RG_LE1	RG_LE1-50	0.00	0.00	0.00
2021	Cp	RG_LE1	RG_LE1-75	0.00	0.00	0.00
2021	Cp	LEAS2	LEAS2-18.2	1.99	1.00	2.99
2021	Cp	LEAS2	LEAS2-25	1.43	1.00	2.43
2021	Cp	LEAS2	LEAS2-9.1	1.65	0.99	2.64
2021	Cp	LIND1	LIND1-25	0.00	0.15	0.15
2021	Cp	LIND1	LIND1-50	0.00	0.02	0.02
2021	Cp	LIND1	LIND1-75	0.00	0.00	0.00
2021	Cp	LINE1	LINE1-25	0.00	0.39	0.39
2021	Cp	LINE1	LINE1-50	0.01	0.51	0.52
2021	Cp	LINE1	LINE1-75	0.01	0.67	0.68
2021	Cp	LINE2	LINE2-25	0.00	0.37	0.37
2021	Cp	LINE2	LINE2-50	0.00	0.29	0.29
2021	Cp	LINE2	LINE2-75	0.00	0.17	0.17
2021	Cp	LINE3	LINE3-25	0.00	0.22	0.22
2021	Cp	LINE3	LINE3-50	0.00	0.54	0.54
2021	Cp	LINE3	LINE3-75	0.00	0.32	0.32
2021	Cp	LINE4	LINE4-25	0.00	1.00	1.00
2021	Cp	LINE4	LINE4-50	0.00	0.97	0.97
2021	Cp	LINE4	LINE4-75	0.00	0.86	0.86
2021	Cp	LINE7	LINE7-50	0.00	0.00	0.00
2021	Cp	LINE7	LINE7-75	0.00	0.00	0.00
2021	Cp	LIVE1	LIVE1-0	1.55	1.00	2.55
2021	Cp	LIZA1	LIZA1-25	0.00	0.26	0.26
2021	Cp	LIZA1	LIZA1-50	0.00	0.10	0.10

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	LIZA1	LIZA1-75	0.00	0.00	0.00
2021	Cp	MCOO1	MCOO1-25	0.15	0.35	0.50
2021	Cp	MCOO1	MCOO1-50	0.00	0.03	0.03
2021	Cp	MCOO1	MCOO1-75	0.00	0.04	0.04
2021	Cp	MICH1	MICH1-25	0.00	0.04	0.04
2021	Cp	MICH1	MICH1-50	0.00	0.02	0.02
2021	Cp	MICH1	MICH1-75	0.00	0.00	0.00
2021	Cp	MICH2	MICH2-25	0.00	0.08	0.08
2021	Cp	MICH2	MICH2-50	0.00	0.33	0.33
2021	Cp	MICH2	MICH2-75	0.00	0.47	0.47
2021	Cp	MICH3	MICH3-25	0.00	0.00	0.00
2021	Cp	MICH3	MICH3-50	0.00	0.08	0.08
2021	Cp	MICH3	MICH3-75	0.00	0.00	0.00
2021	Cp	MICH4	MICH4-25	0.00	0.16	0.16
2021	Cp	MICH4	MICH4-50	0.00	0.03	0.03
2021	Cp	MICH4	MICH4-75	0.00	0.13	0.13
2021	Cp	MICH5	MICH5-25	0.00	0.10	0.10
2021	Cp	MICH5	MICH5-50	0.00	0.03	0.03
2021	Cp	MICH5	MICH5-75	0.00	0.00	0.00
2021	Cp	MICK1	MICK1-75	0.37	0.82	1.19
2021	Cp	MICK2	MICK2-25	0.48	0.98	1.46
2021	Cp	MICK2	MICK2-50	0.87	1.00	1.87
2021	Cp	MICK2	MICK2-75	0.80	0.95	1.75
2021	Cp	MILL2	MILL2-0	1.19	1.00	2.19
2021	Cp	MORI1	MORI1-25	0.00	0.00	0.00
2021	Cp	MORI1	MORI1-50	0.00	0.00	0.00
2021	Cp	MORI1	MORI1-75	0.00	0.00	0.00
2021	Cp	NTHO1	NTHO1-25	0.37	0.90	1.27
2021	Cp	NTHO1	NTHO1-50	1.41	0.91	2.32
2021	Cp	NTHO1	NTHO1-75	1.24	1.00	2.24
2021	Cp	WILN2	WILN2-25	0.00	0.01	0.01
2021	Cp	WILN2	WILN2-50	0.00	0.00	0.00
2021	Cp	NWOL1	NWOL1-25	1.68	0.96	2.64
2021	Cp	OTTO1	OTTO1-0	0.01	0.48	0.49
2021	Cp	PORT1	PORT1-0	0.00	0.98	0.98
2021	Cp	PORT3a	PORT3a-12.5	0.00	0.39	0.39
2021	Cp	PORT3a	PORT3a-25	0.02	0.79	0.81
2021	Cp	PORT3a	PORT3a-37.5	0.00	0.26	0.26

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	PORT3b	PORT3b-50	0.73	0.83	1.56
2021	Cp	PORT3b	PORT3b-62.5	1.41	1.00	2.41
2021	Cp	PORT3b	PORT3b-75	1.73	0.97	2.70
2021	Cp	RG_UCWER1	RG_UCWER1-25	0.00	0.00	0.00
2021	Cp	RG_UCWER1	RG_UCWER1-50	0.00	0.00	0.00
2021	Cp	RG_UCWER1	RG_UCWER1-75	0.00	0.00	0.00
2021	Cp	SAWM1	SAWM1-0	0.00	0.00	0.00
2021	Cp	SAWM1	SAWM1-50	0.00	0.01	0.01
2021	Cp	SAWM2	SAWM2-25	0.00	0.00	0.00
2021	Cp	SAWM2	SAWM2-50	0.00	0.00	0.00
2021	Cp	SITE	SITE-18	1.49	1.00	2.49
2021	Cp	SIXM1	SIXM1-25	0.10	0.84	0.94
2021	Cp	SIXM1	SIXM1-50	0.00	0.30	0.30
2021	Cp	SIXM1	SIXM1-75	0.06	0.67	0.73
2021	Cp	SPOU1	SPOU1-0	1.35	1.00	2.35
2021	Cp	SLINE2	SLINE2-25	0.00	0.34	0.34
2021	Cp	SLINE2	SLINE2-50	0.00	0.17	0.17
2021	Cp	SLINE2	SLINE2-75	0.00	0.03	0.03
2021	Cp	SPIT1	SPIT1-0	1.15	1.00	2.15
2021	Cp	WILS1	WILS1-25	0.00	0.00	0.00
2021	Cp	WILS1	WILS1-50	0.10	0.31	0.41
2021	Cp	SWOL1	SWOL1-25	1.63	0.99	2.62
2021	Cp	SWOL1	SWOL1-32.1	1.65	0.95	2.60
2021	Cp	SWOL1	SWOL1-7.5	1.18	0.76	1.94
2021	Cp	SPRI1	SPRI1-0	0.00	0.01	0.01
2021	Cp	STR02	STR02-50	0.00	0.00	0.00
2021	Cp	STR02	STR02-75	0.00	0.00	0.00
2021	Cp	STR14	STR14-25	0.00	0.46	0.46
2021	Cp	THOM2	THOM2-25	0.08	0.85	0.93
2021	Cp	THOM2	THOM2-50	0.24	0.95	1.19
2021	Cp	THOM2	THOM2-75	0.26	0.83	1.09
2021	Cp	THOM3	THOM3-25	1.03	0.90	1.93
2021	Cp	THOM3	THOM3-50	0.88	0.96	1.84
2021	Cp	THOM3	THOM3-75	1.02	0.92	1.94
2021	Cp	THOM4	THOM4-25	0.00	0.41	0.41
2021	Cp	THOM4	THOM4-50	0.00	0.14	0.14

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp	THOM4	THOM4-75	0.00	0.02	0.02
2021	Cp	TODH1	TODH1-25	0.00	0.11	0.11
2021	Cp	TODH1	TODH1-50	0.00	0.09	0.09
2021	Cp	TODH1	TODH1-75	0.00	0.11	0.11
2021	Cp	USOS1	USOS1-25	0.00	0.00	0.00
2021	Cp	USOS1	USOS1-50	0.00	0.00	0.00
2021	Cp	USOS1	USOS1-75	0.00	0.00	0.00
2021	Cp	UTHO1	UTHO1-25	0.56	0.79	1.35
2021	Cp	UTHO1	UTHO1-50	0.19	0.88	1.07
2021	Cp	UTHO1	UTHO1-75	1.12	0.99	2.11
2021	Cp	UTPO1	UTPO1-0	0.00	0.58	0.58
2021	Cp	WEIG1	WEIG1-25	0.00	0.04	0.04
2021	Cp	WEIG1	WEIG1-50	0.00	0.05	0.05
2021	Cp	WEIG1	WEIG1-75	0.00	0.00	0.00
2021	Cp	WOL1	WOL1-25	0.00	0.03	0.03
2021	Cp	WOL1	WOL1-50	0.00	0.12	0.12
2021	Cp	WOLF2	WOLF2-75	1.81	0.99	2.80
2021	Cp	WOLF3	WOLF3-25	1.98	1.00	2.98
2021	Cp	WOLF3	WOLF3-50	1.80	1.00	2.80
2021	Cp	WOLF3	WOLF3-75	1.95	1.00	2.95
2021	Cp'	ALDR1	ALDR1-25	0.00	0.00	0.00
2021	Cp'	ALDR1	ALDR1-50	0.00	0.00	0.00
2021	Cp'	ALDR1	ALDR1-75	0.00	0.00	0.00
2021	Cp'	ALEX1	ALEX1-25	0.00	0.00	0.00
2021	Cp'	ALEX1	ALEX1-50	0.01	0.01	0.02
2021	Cp'	ALEX1	ALEX1-75	0.00	0.00	0.00
2021	Cp'	ALEX3	ALEX3-25	0.00	0.01	0.01
2021	Cp'	ALEX3	ALEX3-50	0.00	0.00	0.00
2021	Cp'	ALEX3	ALEX3-75	0.00	0.00	0.00
2021	Cp'	ALEX8	ALEX8-25	0.00	0.00	0.00
2021	Cp'	ALEX8	ALEX8-50	0.00	0.00	0.00
2021	Cp'	ALEX8	ALEX8-75	0.00	0.00	0.00
2021	Cp'	ANDY1	ANDY1-25	0.00	0.00	0.00
2021	Cp'	ANDY1	ANDY1-50	0.00	0.00	0.00
2021	Cp'	ANDY1	ANDY1-75	0.00	0.02	0.02
2021	Cp'	AQUE1	AQUE1-0	0.00	0.00	0.00
2021	Cp'	AQUE2	AQUE2-0	0.00	0.00	0.00
2021	Cp'	AQUE2	AQUE2-50	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	AQUE3	AQUE3-25	0.00	0.00	0.00
2021	Cp'	AQUE3	AQUE3-50	0.00	0.02	0.02
2021	Cp'	AQUE3	AQUE3-75	0.00	0.17	0.17
2021	Cp'	BALM1	BALM1-25	0.00	0.00	0.00
2021	Cp'	BALM1	BALM1-50	0.00	0.00	0.00
2021	Cp'	BALM1	BALM1-75	0.00	0.00	0.00
2021	Cp'	BING1	BING1-25	0.00	0.00	0.00
2021	Cp'	BING1	BING1-50	0.00	0.00	0.00
2021	Cp'	BING1	BING1-75	0.00	0.00	0.00
2021	Cp'	BODI1	BODI1-25	0.00	0.42	0.42
2021	Cp'	BODI1	BODI1-50	0.88	0.99	1.87
2021	Cp'	BODI1	BODI1-75	0.18	1.00	1.18
2021	Cp'	BODI3	BODI3-25	1.48	0.99	2.47
2021	Cp'	BODI3	BODI3-50	1.35	0.96	2.31
2021	Cp'	BODI3	BODI3-75	1.81	1.00	2.81
2021	Cp'	CHAU1	CHAU1-25	0.00	0.02	0.02
2021	Cp'	CHAU1	CHAU1-50	0.01	0.03	0.04
2021	Cp'	CHAU1	CHAU1-75	0.00	0.06	0.06
2021	Cp'	COUT1	COUT1-0	0.48	0.73	1.21
2021	Cp'	CLOW1	CLOW1-0	0.00	0.50	0.50
2021	Cp'	CLOW1	CLOW1-50	0.00	0.18	0.18
2021	Cp'	CORB1	CORB1-25	1.70	1.00	2.70
2021	Cp'	CORB1	CORB1-50	1.79	1.00	2.79
2021	Cp'	CORB1	CORB1-75	1.67	1.00	2.67
2021	Cp'	CORB2	CORB2-25	1.90	1.00	2.90
2021	Cp'	CORB2	CORB2-50	1.99	1.00	2.99
2021	Cp'	CORB2	CORB2-75	1.98	1.00	2.98
2021	Cp'	DRIN1	DRIN1-25	0.00	0.00	0.00
2021	Cp'	DRIN1	DRIN1-50	0.00	0.00	0.00
2021	Cp'	DRIN1	DRIN1-75	0.00	0.00	0.00
2021	Cp'	DRYE1	DRYE1-0	1.52	1.00	2.52
2021	Cp'	DRYE3	DRYE3-25	1.90	1.00	2.90
2021	Cp'	DRYE3	DRYE3-50	1.78	0.96	2.74
2021	Cp'	DRYE3	DRYE3-75	1.34	0.86	2.20
2021	Cp'	DRYE4	DRYE4-25	1.57	0.98	2.55
2021	Cp'	DRYL1	DRYL1-25	0.00	0.18	0.18
2021	Cp'	DRYL1	DRYL1-50	0.00	0.29	0.29
2021	Cp'	DRYL1	DRYL1-75	0.00	0.14	0.14

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	DRYL2	DRYL2-25	0.00	0.20	0.20
2021	Cp'	DRYL2	DRYL2-50	0.00	0.19	0.19
2021	Cp'	DRYL2	DRYL2-75	0.00	0.19	0.19
2021	Cp'	DRYL3	DRYL3-25	0.00	0.14	0.14
2021	Cp'	DRYL3	DRYL3-50	0.00	0.06	0.06
2021	Cp'	DRYL3	DRYL3-75	0.00	0.05	0.05
2021	Cp'	DRYL4	DRYL4-25	0.00	0.13	0.13
2021	Cp'	DRYL4	DRYL4-50	0.00	0.03	0.03
2021	Cp'	DRYL4	DRYL4-75	0.00	0.10	0.10
2021	Cp'	ETRI1	ETRI1-0	0.00	0.00	0.00
2021	Cp'	ETRI1	ETRI1-50	0.00	0.00	0.00
2021	Cp'	ELKR10	ELKR10-25	0.00	0.01	0.01
2021	Cp'	ELKR10	ELKR10-50	0.00	0.04	0.04
2021	Cp'	ELKR10	ELKR10-75	0.00	0.08	0.08
2021	Cp'	ELKR11	ELKR11-25	0.00	0.22	0.22
2021	Cp'	ELKR11	ELKR11-50	0.00	0.00	0.00
2021	Cp'	ELKR11	ELKR11-75	0.00	0.00	0.00
2021	Cp'	ELKR12	ELKR12-25	0.00	0.00	0.00
2021	Cp'	ELKR12	ELKR12-50	0.00	0.00	0.00
2021	Cp'	ELKR12	ELKR12-75	0.00	0.00	0.00
2021	Cp'	ELKR15	ELKR15-25	0.00	0.00	0.00
2021	Cp'	ELKR15	ELKR15-50	0.00	0.00	0.00
2021	Cp'	ELKR15	ELKR15-75	0.00	0.00	0.00
2021	Cp'	ELKR8	ELKR8-25	0.00	0.03	0.03
2021	Cp'	ELKR8	ELKR8-50	0.00	0.00	0.00
2021	Cp'	ELKR8	ELKR8-75	0.00	0.08	0.08
2021	Cp'	ELKR9	ELKR9-25	0.00	0.03	0.03
2021	Cp'	ELKR9	ELKR9-50	0.00	0.02	0.02
2021	Cp'	ELKR9	ELKR9-75	0.00	0.00	0.00
2021	Cp'	ERIC1	ERIC1-0	1.43	1.00	2.43
2021	Cp'	ERIC1	ERIC1-50	1.98	1.00	2.98
2021	Cp'	ERIC2	ERIC2-0	1.91	0.96	2.87
2021	Cp'	ERIC3	ERIC3-0	1.94	1.00	2.94
2021	Cp'	ERIC4	ERIC4-25	1.75	0.94	2.69
2021	Cp'	ERIC4	ERIC4-50	0.04	0.41	0.45
2021	Cp'	ERIC4	ERIC4-75	0.00	0.12	0.12
2021	Cp'	EWIN1	EWIN1-25	0.00	0.08	0.08
2021	Cp'	EWIN1	EWIN1-50	0.00	0.07	0.07

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	EWIN1	EWIN1-75	0.00	0.02	0.02
2021	Cp'	FELT1	FELT1-25	0.00	0.00	0.00
2021	Cp'	FELT1	FELT1-50	0.00	0.00	0.00
2021	Cp'	FELT1	FELT1-75	0.00	0.00	0.00
2021	Cp'	FENN1	FENN1-50	0.00	0.00	0.00
2021	Cp'	FPON1	FPON1-25	0.00	0.16	0.16
2021	Cp'	FPON1	FPON1-50	0.00	0.16	0.16
2021	Cp'	FPON1	FPON1-75	0.00	0.07	0.07
2021	Cp'	FORD1	FORD1-25	0.00	0.11	0.11
2021	Cp'	FORD1	FORD1-50	0.01	0.19	0.20
2021	Cp'	FORD1	FORD1-75	0.00	0.18	0.18
2021	Cp'	FORD10	FORD10-25	0.00	0.06	0.06
2021	Cp'	FORD10	FORD10-50	0.00	0.06	0.06
2021	Cp'	FORD10	FORD10-75	0.00	0.22	0.22
2021	Cp'	FORD10	FORD10-86	0.00	0.25	0.25
2021	Cp'	FORD10	FORD10-89	0.00	0.07	0.07
2021	Cp'	FORD11	FORD11-25	0.00	0.05	0.05
2021	Cp'	FORD11	FORD11-50	0.00	0.02	0.02
2021	Cp'	FORD11	FORD11-75	0.00	0.00	0.00
2021	Cp'	FORD12	FORD12-25	0.00	0.05	0.05
2021	Cp'	FORD12	FORD12-50	0.00	0.04	0.04
2021	Cp'	FORD12	FORD12-75	0.00	0.02	0.02
2021	Cp'	FORD2	FORD2-25	0.00	0.31	0.31
2021	Cp'	FORD2	FORD2-50	0.12	0.46	0.58
2021	Cp'	FORD2	FORD2-75	0.39	0.71	1.10
2021	Cp'	FORD3	FORD3-25	0.08	0.57	0.65
2021	Cp'	FORD3	FORD3-50	0.10	0.23	0.33
2021	Cp'	FORD3	FORD3-75	0.35	0.25	0.60
2021	Cp'	FORD4	FORD4-25	0.18	0.90	1.08
2021	Cp'	FORD4	FORD4-50	0.01	0.77	0.78
2021	Cp'	FORD5	FORD5-12.5	0.00	0.46	0.46
2021	Cp'	FORD5	FORD5-25	0.16	0.49	0.65
2021	Cp'	FORD5	FORD5-50	0.00	0.72	0.72
2021	Cp'	FORD5	FORD5-75	0.16	0.36	0.52
2021	Cp'	FORD6	FORD6-25	0.24	0.36	0.60
2021	Cp'	FORD6	FORD6-50	0.87	0.74	1.61
2021	Cp'	FORD6	FORD6-75	0.12	0.46	0.58
2021	Cp'	FORD7	FORD7-25	0.19	0.81	1.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	FORD7	FORD7-50	0.14	0.54	0.68
2021	Cp'	FORD7	FORD7-75	0.15	0.81	0.96
2021	Cp'	FORD8	FORD8-25	0.00	0.25	0.25
2021	Cp'	FORD8	FORD8-50	0.00	0.47	0.47
2021	Cp'	FORD8	FORD8-75	0.00	0.49	0.49
2021	Cp'	FORD9a	FORD9a-12.5	0.03	0.08	0.11
2021	Cp'	FORD9a	FORD9a-25	0.19	0.22	0.41
2021	Cp'	FORD9a	FORD9a-37.5	0.19	0.15	0.34
2021	Cp'	FORD9a	FORD9a-50	0.02	0.09	0.11
2021	Cp'	FORD9b	FORD9b-62.5	0.00	0.02	0.02
2021	Cp'	FORD9b	FORD9b-75	0.00	0.02	0.02
2021	Cp'	FORS1	FORS1-25	0.00	0.00	0.00
2021	Cp'	FORS1	FORS1-50	0.00	0.00	0.00
2021	Cp'	FORS1	FORS1-75	0.00	0.00	0.00
2021	Cp'	GARD1	GARD1-25	1.17	0.78	1.95
2021	Cp'	GARD1	GARD1-50	0.00	0.00	0.00
2021	Cp'	GARD1	GARD1-75	0.00	0.00	0.00
2021	Cp'	GATE2	GATE2-25	0.22	0.46	0.68
2021	Cp'	GATE2	GATE2-50	0.82	0.80	1.62
2021	Cp'	GATE2	GATE2-75	0.56	0.70	1.26
2021	Cp'	GODD1	GODD1-0	0.00	0.01	0.01
2021	Cp'	GODD3	GODD3-25	1.82	0.91	2.73
2021	Cp'	GODD3	GODD3-50	1.90	0.95	2.85
2021	Cp'	GODD3	GODD3-75	1.77	0.90	2.67
2021	Cp'	GRAC1	GRAC1-25	0.00	0.04	0.04
2021	Cp'	GRAC1	GRAC1-50	0.00	0.04	0.04
2021	Cp'	GRAC1	GRAC1-75	0.00	0.01	0.01
2021	Cp'	GRAS1	GRAS1-25	0.00	0.17	0.17
2021	Cp'	GRAS1	GRAS1-50	0.00	0.04	0.04
2021	Cp'	GRAS1	GRAS1-75	0.00	0.01	0.01
2021	Cp'	GRAV1	GRAV1-25	0.00	0.01	0.01
2021	Cp'	GRAV1	GRAV1-50	0.01	0.03	0.04
2021	Cp'	GRAV1	GRAV1-75	0.00	0.04	0.04
2021	Cp'	GRAV2	GRAV2-25	0.00	0.01	0.01
2021	Cp'	GRAV2	GRAV2-50	0.00	0.02	0.02
2021	Cp'	GRAV2	GRAV2-75	0.00	0.00	0.00
2021	Cp'	GRAV3	GRAV3-25	0.00	0.00	0.00
2021	Cp'	GRAV3	GRAV3-50	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	GRAV3	GRAV3-75	0.00	0.00	0.00
2021	Cp'	GREE1	GREE1-25	0.05	0.59	0.64
2021	Cp'	GREE1	GREE1-50	0.00	0.13	0.13
2021	Cp'	GREE1	GREE1-75	0.18	0.50	0.68
2021	Cp'	GREE3	GREE3-25	1.44	0.90	2.34
2021	Cp'	GREE3	GREE3-50	1.87	0.98	2.85
2021	Cp'	GREE3	GREE3-75	1.72	0.97	2.69
2021	Cp'	GREE4	GREE4-25	1.63	0.92	2.55
2021	Cp'	GREE4	GREE4-50	1.79	1.00	2.79
2021	Cp'	GREE4	GREE4-75	1.68	0.98	2.66
2021	Cp'	GSCH1	GSCH1-25	0.00	0.62	0.62
2021	Cp'	GSCH1	GSCH1-50	0.00	0.56	0.56
2021	Cp'	GSCH1	GSCH1-75	0.00	0.10	0.10
2021	Cp'	HARM1	HARM1-25	0.00	0.21	0.21
2021	Cp'	HARM1	HARM1-50	0.00	0.30	0.30
2021	Cp'	HARM1	HARM1-75	0.00	0.28	0.28
2021	Cp'	HARM3	HARM3-25	0.00	0.01	0.01
2021	Cp'	HARM3	HARM3-50	0.00	0.01	0.01
2021	Cp'	HARM3	HARM3-75	0.00	0.00	0.00
2021	Cp'	HARM4	HARM4-25	0.00	0.01	0.01
2021	Cp'	HARM4	HARM4-50	0.00	0.04	0.04
2021	Cp'	HARM4	HARM4-75	0.00	0.09	0.09
2021	Cp'	HARM5	HARM5-25	0.00	0.18	0.18
2021	Cp'	HARM5	HARM5-50	0.00	0.09	0.09
2021	Cp'	HARM5	HARM5-75	0.00	0.00	0.00
2021	Cp'	HART2	HART2-25	0.00	0.00	0.00
2021	Cp'	HART2	HART2-50	0.00	0.01	0.01
2021	Cp'	HART2	HART2-75	0.00	0.00	0.00
2021	Cp'	HENR1	HENR1-25	0.00	0.32	0.32
2021	Cp'	HENR1	HENR1-50	0.00	0.14	0.14
2021	Cp'	HENR1	HENR1-75	0.00	0.14	0.14
2021	Cp'	HENR2	HENR2-25	0.00	0.01	0.01
2021	Cp'	HENR2	HENR2-50	0.00	0.00	0.00
2021	Cp'	HENR2	HENR2-75	0.00	0.00	0.00
2021	Cp'	HENR3	HENR3-25	0.00	0.00	0.00
2021	Cp'	HENR3	HENR3-50	0.00	0.00	0.00
2021	Cp'	HENR3	HENR3-75	0.00	0.00	0.00
2021	Cp'	KILM1	KILM1-25	1.97	1.00	2.97

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	KILM1	KILM1-50	1.80	0.96	2.76
2021	Cp'	KILM1	KILM1-75	0.78	0.42	1.20
2021	Cp'	LMOU1	LMOU1-0	0.00	0.34	0.34
2021	Cp'	RG_LE1	RG_LE1-25	0.00	0.00	0.00
2021	Cp'	RG_LE1	RG_LE1-50	0.00	0.02	0.02
2021	Cp'	RG_LE1	RG_LE1-75	0.00	0.00	0.00
2021	Cp'	LEAS2	LEAS2-18.2	1.99	1.00	2.99
2021	Cp'	LEAS2	LEAS2-25	1.43	1.00	2.43
2021	Cp'	LEAS2	LEAS2-9.1	1.65	0.99	2.64
2021	Cp'	LIND1	LIND1-25	0.00	0.03	0.03
2021	Cp'	LIND1	LIND1-50	0.00	0.00	0.00
2021	Cp'	LIND1	LIND1-75	0.00	0.00	0.00
2021	Cp'	LINE1	LINE1-25	0.00	0.07	0.07
2021	Cp'	LINE1	LINE1-50	0.01	0.11	0.12
2021	Cp'	LINE1	LINE1-75	0.01	0.15	0.16
2021	Cp'	LINE2	LINE2-25	0.00	0.08	0.08
2021	Cp'	LINE2	LINE2-50	0.00	0.06	0.06
2021	Cp'	LINE2	LINE2-75	0.00	0.05	0.05
2021	Cp'	LINE3	LINE3-25	0.00	0.04	0.04
2021	Cp'	LINE3	LINE3-50	0.00	0.11	0.11
2021	Cp'	LINE3	LINE3-75	0.00	0.09	0.09
2021	Cp'	LINE4	LINE4-25	0.00	0.80	0.80
2021	Cp'	LINE4	LINE4-50	0.00	0.63	0.63
2021	Cp'	LINE4	LINE4-75	0.00	0.45	0.45
2021	Cp'	LINE7	LINE7-50	0.00	0.00	0.00
2021	Cp'	LINE7	LINE7-75	0.00	0.00	0.00
2021	Cp'	LIVE1	LIVE1-0	1.55	0.97	2.52
2021	Cp'	LIZA1	LIZA1-25	0.00	0.04	0.04
2021	Cp'	LIZA1	LIZA1-50	0.00	0.02	0.02
2021	Cp'	LIZA1	LIZA1-75	0.00	0.00	0.00
2021	Cp'	MCOO1	MCOO1-25	0.15	0.15	0.30
2021	Cp'	MCOO1	MCOO1-50	0.00	0.01	0.01
2021	Cp'	MCOO1	MCOO1-75	0.00	0.01	0.01
2021	Cp'	MICH1	MICH1-25	0.00	0.01	0.01
2021	Cp'	MICH1	MICH1-50	0.00	0.00	0.00
2021	Cp'	MICH1	MICH1-75	0.00	0.00	0.00
2021	Cp'	MICH2	MICH2-25	0.00	0.01	0.01
2021	Cp'	MICH2	MICH2-50	0.00	0.08	0.08

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	MICH2	MICH2-75	0.00	0.08	0.08
2021	Cp'	MICH3	MICH3-25	0.00	0.00	0.00
2021	Cp'	MICH3	MICH3-50	0.00	0.01	0.01
2021	Cp'	MICH3	MICH3-75	0.00	0.00	0.00
2021	Cp'	MICH4	MICH4-25	0.00	0.03	0.03
2021	Cp'	MICH4	MICH4-50	0.00	0.01	0.01
2021	Cp'	MICH4	MICH4-75	0.00	0.03	0.03
2021	Cp'	MICH5	MICH5-25	0.00	0.02	0.02
2021	Cp'	MICH5	MICH5-50	0.00	0.01	0.01
2021	Cp'	MICH5	MICH5-75	0.00	0.00	0.00
2021	Cp'	MICK1	MICK1-75	0.37	0.48	0.85
2021	Cp'	MICK2	MICK2-25	0.48	0.68	1.16
2021	Cp'	MICK2	MICK2-50	0.87	0.85	1.72
2021	Cp'	MICK2	MICK2-75	0.80	0.67	1.47
2021	Cp'	MILL2	MILL2-0	1.19	0.99	2.18
2021	Cp'	MORI1	MORI1-25	0.00	0.00	0.00
2021	Cp'	MORI1	MORI1-50	0.00	0.00	0.00
2021	Cp'	MORI1	MORI1-75	0.00	0.00	0.00
2021	Cp'	NTHO1	NTHO1-25	0.37	0.88	1.25
2021	Cp'	NTHO1	NTHO1-50	1.41	0.91	2.32
2021	Cp'	NTHO1	NTHO1-75	1.24	1.00	2.24
2021	Cp'	WILN2	WILN2-25	0.00	0.00	0.00
2021	Cp'	WILN2	WILN2-50	0.00	0.00	0.00
2021	Cp'	NWOL1	NWOL1-25	1.68	0.96	2.64
2021	Cp'	OTTO1	OTTO1-0	0.01	0.27	0.28
2021	Cp'	PORT1	PORT1-0	0.00	0.81	0.81
2021	Cp'	PORT3a	PORT3a-12.5	0.00	0.11	0.11
2021	Cp'	PORT3a	PORT3a-25	0.02	0.44	0.46
2021	Cp'	PORT3a	PORT3a-37.5	0.00	0.05	0.05
2021	Cp'	PORT3b	PORT3b-50	0.73	0.73	1.46
2021	Cp'	PORT3b	PORT3b-62.5	1.41	1.00	2.41
2021	Cp'	PORT3b	PORT3b-75	1.73	0.97	2.70
2021	Cp'	UCWE1	UCWE1-25	0.00	0.00	0.00
2021	Cp'	UCWE1	UCWE1-50	0.00	0.00	0.00
2021	Cp'	UCWE1	UCWE1-75	0.00	0.00	0.00
2021	Cp'	SAWM1	SAWM1-0	0.00	0.00	0.00
2021	Cp'	SAWM1	SAWM1-50	0.00	0.00	0.00
2021	Cp'	SAWM2	SAWM2-25	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	SAWM2	SAWM2-50	0.00	0.00	0.00
2021	Cp'	SITE	SITE-18	1.49	1.00	2.49
2021	Cp'	SIXM1	SIXM1-25	0.10	0.37	0.47
2021	Cp'	SIXM1	SIXM1-50	0.00	0.06	0.06
2021	Cp'	SIXM1	SIXM1-75	0.06	0.29	0.35
2021	Cp'	SPOU1	SPOU1-0	1.35	1.00	2.35
2021	Cp'	SLINE2	SLINE2-25	0.00	0.08	0.08
2021	Cp'	SLINE2	SLINE2-50	0.00	0.06	0.06
2021	Cp'	SLINE2	SLINE2-75	0.00	0.00	0.00
2021	Cp'	SPIT1	SPIT1-0	1.15	1.00	2.15
2021	Cp'	WILS1	WILS1-25	0.00	0.00	0.00
2021	Cp'	WILS1	WILS1-50	0.10	0.15	0.25
2021	Cp'	SWOL1	SWOL1-25	1.63	0.94	2.57
2021	Cp'	SWOL1	SWOL1-32.1	1.65	0.94	2.59
2021	Cp'	SWOL1	SWOL1-7.5	1.18	0.75	1.93
2021	Cp'	SPRI1	SPRI1-0	0.00	0.00	0.00
2021	Cp'	STRO2	STRO2-50	0.00	0.33	0.33
2021	Cp'	STRO2	STRO2-75	0.00	0.00	0.00
2021	Cp'	STR14	STR14-25	0.00	0.33	0.33
2021	Cp'	THOM2	THOM2-25	0.08	0.35	0.43
2021	Cp'	THOM2	THOM2-50	0.24	0.48	0.72
2021	Cp'	THOM2	THOM2-75	0.26	0.48	0.74
2021	Cp'	THOM3	THOM3-25	1.03	0.68	1.71
2021	Cp'	THOM3	THOM3-50	0.88	0.73	1.61
2021	Cp'	THOM3	THOM3-75	1.02	0.70	1.72
2021	Cp'	THOM4	THOM4-25	0.00	0.08	0.08
2021	Cp'	THOM4	THOM4-50	0.00	0.02	0.02
2021	Cp'	THOM4	THOM4-75	0.00	0.00	0.00
2021	Cp'	TODH1	TODH1-25	0.00	0.02	0.02
2021	Cp'	TODH1	TODH1-50	0.00	0.02	0.02
2021	Cp'	TODH1	TODH1-75	0.00	0.03	0.03
2021	Cp'	USOS1	USOS1-25	0.00	0.00	0.00
2021	Cp'	USOS1	USOS1-50	0.00	0.00	0.00
2021	Cp'	USOS1	USOS1-75	0.00	0.00	0.00
2021	Cp'	UTHO1	UTHO1-25	0.56	0.50	1.06
2021	Cp'	UTHO1	UTHO1-50	0.19	0.42	0.61
2021	Cp'	UTHO1	UTHO1-75	1.12	0.97	2.09
2021	Cp'	UTPO1	UTPO1-0	0.00	0.35	0.35

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2021	Cp'	WEIG1	WEIG1-25	0.00	0.01	0.01
2021	Cp'	WEIG1	WEIG1-50	0.00	0.01	0.01
2021	Cp'	WEIG1	WEIG1-75	0.00	0.00	0.00
2021	Cp'	WOL1	WOL1-25	0.00	0.01	0.01
2021	Cp'	WOL1	WOL1-50	0.00	0.02	0.02
2021	Cp'	WOLF2	WOLF2-75	1.81	0.99	2.80
2021	Cp'	WOLF3	WOLF3-25	1.98	1.00	2.98
2021	Cp'	WOLF3	WOLF3-50	1.80	1.00	2.80
2021	Cp'	WOLF3	WOLF3-75	1.95	1.00	2.95
2022	Cp	ALEX3	ALEX3-25	0.01	0.49	0.50
2022	Cp	ALEX3	ALEX3-50	0.05	0.40	0.45
2022	Cp	ALEX3	ALEX3-75	0.00	0.20	0.20
2022	Cp	ANDY1	ANDY1-25	0.00	0.00	0.00
2022	Cp	ANDY1	ANDY1-50	0.00	0.00	0.00
2022	Cp	ANDY1	ANDY1-75	0.00	0.02	0.02
2022	Cp	AQUE1	AQUE1-0	0.00	0.00	0.00
2022	Cp	AQUE2	AQUE2-0	0.00	0.00	0.00
2022	Cp	AQUE2	AQUE2-50	0.00	0.00	0.00
2022	Cp	AQUE3	AQUE3-25	0.00	0.00	0.00
2022	Cp	AQUE3	AQUE3-50	0.00	0.04	0.04
2022	Cp	AQUE3	AQUE3-75	0.00	0.63	0.63
2022	Cp	BALM1	BALM1-25	0.00	0.09	0.09
2022	Cp	BALM1	BALM1-50	0.00	0.00	0.00
2022	Cp	BALM1	BALM1-75	0.00	0.00	0.00
2022	Cp	BING1	BING1-25	0.00	0.00	0.00
2022	Cp	BING1	BING1-50	0.00	0.00	0.00
2022	Cp	BING1	BING1-75	0.00	0.00	0.00
2022	Cp	BODI1	BODI1-25	0.00	0.68	0.68
2022	Cp	BODI1	BODI1-50	0.86	1.00	1.86
2022	Cp	BODI1	BODI1-75	0.74	1.00	1.74
2022	Cp	BODI3	BODI3-25	1.80	1.00	2.80
2022	Cp	BODI3	BODI3-50	1.77	1.00	2.77
2022	Cp	BODI3	BODI3-75	1.92	1.00	2.92
2022	Cp	CHAU1	CHAU1-25	0.00	0.20	0.20
2022	Cp	CHAU1	CHAU1-50	0.00	0.26	0.26
2022	Cp	CHAU1	CHAU1-75	0.00	0.14	0.14
2022	Cp	COUT1	COUT1-0	0.18	0.92	1.10
2022	Cp	CLOW1	CLOW1-0	0.00	0.84	0.84

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	CLOW1	CLOW1-50	0.00	0.82	0.82
2022	Cp	CORB1	CORB1-25	1.81	1.00	2.81
2022	Cp	CORB1	CORB1-50	1.75	1.00	2.75
2022	Cp	CORB1	CORB1-75	1.67	1.00	2.67
2022	Cp	CORB2	CORB2-25	1.94	1.00	2.94
2022	Cp	CORB2	CORB2-50	1.98	1.00	2.98
2022	Cp	CORB2	CORB2-75	1.91	1.00	2.91
2022	Cp	DRYE1	DRYE1-0	1.07	1.00	2.07
2022	Cp	DRYE3	DRYE3-25	1.87	1.00	2.87
2022	Cp	DRYE3	DRYE3-50	1.82	1.00	2.82
2022	Cp	DRYE3	DRYE3-75	1.42	1.00	2.42
2022	Cp	DRYE4	DRYE4-25	1.64	1.00	2.64
2022	Cp	DRYL1	DRYL1-25	0.00	0.37	0.37
2022	Cp	DRYL1	DRYL1-50	0.00	0.65	0.65
2022	Cp	DRYL1	DRYL1-75	0.00	0.49	0.49
2022	Cp	DRYL2	DRYL2-25	0.00	0.66	0.66
2022	Cp	DRYL2	DRYL2-50	0.00	0.66	0.66
2022	Cp	DRYL2	DRYL2-75	0.00	0.15	0.15
2022	Cp	DRYL3	DRYL3-25	0.00	0.55	0.55
2022	Cp	DRYL3	DRYL3-50	0.00	0.61	0.61
2022	Cp	DRYL3	DRYL3-75	0.00	0.09	0.09
2022	Cp	DRYL4	DRYL4-25	0.00	0.53	0.53
2022	Cp	DRYL4	DRYL4-50	0.00	0.54	0.54
2022	Cp	DRYL4	DRYL4-75	0.00	0.47	0.47
2022	Cp	ETRI1	ETRI1-0	0.00	0.00	0.00
2022	Cp	ETRI1	ETRI1-50	0.00	0.01	0.01
2022	Cp	ELKR10	ELKR10-25	0.00	0.00	0.00
2022	Cp	ELKR10	ELKR10-50	0.00	0.37	0.37
2022	Cp	ELKR10	ELKR10-75	0.00	0.04	0.04
2022	Cp	ELKR11	ELKR11-25	0.00	0.49	0.49
2022	Cp	ELKR11	ELKR11-50	0.00	0.02	0.02
2022	Cp	ELKR11	ELKR11-75	0.00	0.00	0.00
2022	Cp	ELKR12	ELKR12-25	0.00	0.03	0.03
2022	Cp	ELKR12	ELKR12-50	0.00	0.00	0.00
2022	Cp	ELKR12	ELKR12-75	0.00	0.00	0.00
2022	Cp	ELKR15	ELKR15-25	0.00	0.00	0.00
2022	Cp	ELKR15	ELKR15-50	0.00	0.01	0.01
2022	Cp	ELKR15	ELKR15-75	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	ELKR8	ELKR8-25	0.00	0.09	0.09
2022	Cp	ELKR8	ELKR8-50	0.00	0.03	0.03
2022	Cp	ELKR8	ELKR8-75	0.00	0.49	0.49
2022	Cp	ELKR9	ELKR9-25	0.00	0.04	0.04
2022	Cp	ELKR9	ELKR9-50	0.00	0.11	0.11
2022	Cp	ELKR9	ELKR9-75	0.00	0.02	0.02
2022	Cp	ERIC1	ERIC1-0	1.85	1.00	2.85
2022	Cp	ERIC1	ERIC1-50	1.98	0.99	2.97
2022	Cp	ERIC2	ERIC2-0	1.89	1.00	2.89
2022	Cp	ERIC3	ERIC3-0	1.94	1.00	2.94
2022	Cp	ERIC4	ERIC4-25	1.79	1.00	2.79
2022	Cp	ERIC4	ERIC4-50	0.23	0.90	1.13
2022	Cp	ERIC4	ERIC4-75	0.00	0.69	0.69
2022	Cp	EWIN1	EWIN1-25	0.00	0.21	0.21
2022	Cp	EWIN1	EWIN1-50	0.00	0.27	0.27
2022	Cp	EWIN1	EWIN1-75	0.00	0.03	0.03
2022	Cp	FELT1	FELT1-25	0.00	0.00	0.00
2022	Cp	FELT1	FELT1-50	0.00	0.00	0.00
2022	Cp	FELT1	FELT1-75	0.00	0.00	0.00
2022	Cp	FPON1	FPON1-25	0.00	0.75	0.75
2022	Cp	FPON1	FPON1-50	0.01	0.88	0.89
2022	Cp	FPON1	FPON1-75	0.00	0.49	0.49
2022	Cp	FORD1	FORD1-25	0.00	0.24	0.24
2022	Cp	FORD1	FORD1-50	0.00	0.59	0.59
2022	Cp	FORD1	FORD1-75	0.00	0.21	0.21
2022	Cp	FORD10	FORD10-25	0.00	0.52	0.52
2022	Cp	FORD10	FORD10-50	0.00	0.44	0.44
2022	Cp	FORD10	FORD10-75	0.00	0.64	0.64
2022	Cp	FORD10	FORD10-86	0.01	0.43	0.44
2022	Cp	FORD10	FORD10-89	0.00	0.23	0.23
2022	Cp	FORD11	FORD11-25	0.00	0.30	0.30
2022	Cp	FORD11	FORD11-50	0.00	0.11	0.11
2022	Cp	FORD11	FORD11-75	0.00	0.23	0.23
2022	Cp	FORD12	FORD12-25	0.00	0.19	0.19
2022	Cp	FORD12	FORD12-50	0.00	0.21	0.21
2022	Cp	FORD12	FORD12-75	0.00	0.04	0.04
2022	Cp	FORD2	FORD2-25	0.09	0.63	0.72
2022	Cp	FORD2	FORD2-50	0.08	0.70	0.78

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	FORD2	FORD2-75	0.27	0.80	1.07
2022	Cp	FORD3	FORD3-25	0.00	0.84	0.84
2022	Cp	FORD3	FORD3-50	0.00	0.77	0.77
2022	Cp	FORD3	FORD3-75	0.00	0.77	0.77
2022	Cp	FORD4	FORD4-25	0.06	0.86	0.92
2022	Cp	FORD4	FORD4-50	0.00	0.83	0.83
2022	Cp	FORD4	FORD4-75	0.00	0.61	0.61
2022	Cp	FORD5	FORD5-12.5	0.00	0.67	0.67
2022	Cp	FORD5	FORD5-25	0.00	0.57	0.57
2022	Cp	FORD5	FORD5-50	0.00	0.97	0.97
2022	Cp	FORD5	FORD5-75	0.22	0.75	0.97
2022	Cp	FORD6	FORD6-25	0.14	0.95	1.09
2022	Cp	FORD6	FORD6-50	0.58	0.97	1.55
2022	Cp	FORD6	FORD6-75	0.00	0.95	0.95
2022	Cp	FORD7	FORD7-25	0.12	0.70	0.82
2022	Cp	FORD7	FORD7-50	0.17	0.81	0.98
2022	Cp	FORD7	FORD7-75	0.07	0.89	0.96
2022	Cp	FORD8	FORD8-25	0.00	0.58	0.58
2022	Cp	FORD8	FORD8-50	0.00	0.61	0.61
2022	Cp	FORD8	FORD8-75	0.00	0.92	0.92
2022	Cp	FORD9a	FORD9a-12.5	0.00	0.67	0.67
2022	Cp	FORD9a	FORD9a-25	0.00	0.62	0.62
2022	Cp	FORD9a	FORD9a-37.5	0.00	0.46	0.46
2022	Cp	FORD9a	FORD9a-50	0.00	0.59	0.59
2022	Cp	FORD9b	FORD9b-62.5	0.00	0.42	0.42
2022	Cp	FORD9b	FORD9b-75	0.00	0.13	0.13
2022	Cp	FORS1	FORS1-25	0.00	0.01	0.01
2022	Cp	FORS1	FORS1-50	0.00	0.00	0.00
2022	Cp	FORS1	FORS1-75	0.00	0.04	0.04
2022	Cp	GARD1	GARD1-25	0.74	0.95	1.69
2022	Cp	GARD1	GARD1-50	0.00	0.00	0.00
2022	Cp	GARD1	GARD1-75	0.00	0.00	0.00
2022	Cp	GATE2	GATE2-25	0.10	0.97	1.07
2022	Cp	GATE2	GATE2-50	0.61	0.99	1.60
2022	Cp	GATE2	GATE2-75	0.50	0.97	1.47
2022	Cp	GODD1	GODD1-0	0.00	0.03	0.03
2022	Cp	GODD3	GODD3-25	1.61	0.96	2.57
2022	Cp	GODD3	GODD3-50	1.71	0.97	2.68

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	GODD3	GODD3-75	1.67	0.99	2.66
2022	Cp	GRAC1	GRAC1-25	0.00	0.09	0.09
2022	Cp	GRAC1	GRAC1-50	0.00	0.14	0.14
2022	Cp	GRAC1	GRAC1-75	0.00	0.11	0.11
2022	Cp	GRAS1	GRAS1-25	0.00	0.20	0.20
2022	Cp	GRAS1	GRAS1-50	0.00	0.09	0.09
2022	Cp	GRAS1	GRAS1-75	0.00	0.13	0.13
2022	Cp	GRAV1	GRAV1-25	0.00	0.25	0.25
2022	Cp	GRAV1	GRAV1-50	0.00	0.17	0.17
2022	Cp	GRAV1	GRAV1-75	0.00	0.11	0.11
2022	Cp	GRAV2	GRAV2-25	0.00	0.15	0.15
2022	Cp	GRAV2	GRAV2-50	0.00	0.09	0.09
2022	Cp	GRAV2	GRAV2-75	0.00	0.01	0.01
2022	Cp	GRAV3	GRAV3-25	0.00	0.00	0.00
2022	Cp	GRAV3	GRAV3-50	0.00	0.00	0.00
2022	Cp	GRAV3	GRAV3-75	0.00	0.00	0.00
2022	Cp	GREE1	GREE1-25	0.00	1.00	1.00
2022	Cp	GREE1	GREE1-50	0.00	1.00	1.00
2022	Cp	GREE1	GREE1-75	0.28	1.00	1.28
2022	Cp	GREE3	GREE3-25	1.33	1.00	2.33
2022	Cp	GREE3	GREE3-50	1.73	1.00	2.73
2022	Cp	GREE3	GREE3-75	1.85	1.00	2.85
2022	Cp	GREE4	GREE4-25	1.81	1.00	2.81
2022	Cp	GREE4	GREE4-50	1.84	1.00	2.84
2022	Cp	GREE4	GREE4-75	1.56	1.00	2.56
2022	Cp	GSCH1	GSCH1-25	0.00	0.96	0.96
2022	Cp	GSCH1	GSCH1-50	0.00	0.96	0.96
2022	Cp	GSCH1	GSCH1-75	0.00	0.33	0.33
2022	Cp	HARM1	HARM1-25	0.00	0.83	0.83
2022	Cp	HARM1	HARM1-50	0.01	0.88	0.89
2022	Cp	HARM1	HARM1-75	0.00	0.99	0.99
2022	Cp	HARM3	HARM3-25	0.00	0.05	0.05
2022	Cp	HARM3	HARM3-50	0.00	0.05	0.05
2022	Cp	HARM3	HARM3-75	0.00	0.08	0.08
2022	Cp	HARM4	HARM4-25	0.00	0.02	0.02
2022	Cp	HARM4	HARM4-50	0.00	0.11	0.11
2022	Cp	HARM4	HARM4-75	0.00	0.19	0.19
2022	Cp	HARM5	HARM5-25	0.00	0.54	0.54

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	HARM5	HARM5-50	0.00	0.42	0.42
2022	Cp	HARM5	HARM5-75	0.00	0.22	0.22
2022	Cp	HENR1	HENR1-25	0.06	0.78	0.84
2022	Cp	HENR1	HENR1-50	0.00	0.41	0.41
2022	Cp	HENR1	HENR1-75	0.00	0.62	0.62
2022	Cp	HENR2	HENR2-25	0.00	0.37	0.37
2022	Cp	HENR2	HENR2-50	0.00	0.28	0.28
2022	Cp	HENR2	HENR2-75	0.00	0.43	0.43
2022	Cp	HENR3	HENR3-25	0.00	0.02	0.02
2022	Cp	HENR3	HENR3-50	0.00	0.03	0.03
2022	Cp	HENR3	HENR3-75	0.00	0.00	0.00
2022	Cp	KILM1	KILM1-25	1.95	1.00	2.95
2022	Cp	KILM1	KILM1-50	1.84	1.00	2.84
2022	Cp	LMOU1	LMOU1-0	0.00	0.87	0.87
2022	Cp	RG_LE1	RG_LE1-25	0.00	0.00	0.00
2022	Cp	RG_LE1	RG_LE1-50	0.00	0.03	0.03
2022	Cp	RG_LE1	RG_LE1-75	0.00	0.00	0.00
2022	Cp	LEAS2	LEAS2-18.2	1.69	1.00	2.69
2022	Cp	LEAS2	LEAS2-25	1.76	1.00	2.76
2022	Cp	LEAS2	LEAS2-9.1	1.34	1.00	2.34
2022	Cp	LIND1	LIND1-25	0.00	0.39	0.39
2022	Cp	LIND1	LIND1-50	0.00	0.47	0.47
2022	Cp	LIND1	LIND1-75	0.00	0.00	0.00
2022	Cp	LINE1	LINE1-25	0.00	0.43	0.43
2022	Cp	LINE1	LINE1-50	0.00	0.20	0.20
2022	Cp	LINE1	LINE1-75	0.00	0.43	0.43
2022	Cp	LINE2	LINE2-25	0.00	0.41	0.41
2022	Cp	LINE2	LINE2-50	0.00	0.38	0.38
2022	Cp	LINE2	LINE2-75	0.00	0.21	0.21
2022	Cp	LINE3	LINE3-25	0.00	0.34	0.34
2022	Cp	LINE3	LINE3-50	0.00	0.59	0.59
2022	Cp	LINE3	LINE3-75	0.00	0.60	0.60
2022	Cp	LINE4	LINE4-25	0.00	0.97	0.97
2022	Cp	LINE4	LINE4-50	0.00	0.92	0.92
2022	Cp	LINE4	LINE4-75	0.00	0.86	0.86
2022	Cp	LINE7	LINE7-50	0.00	0.00	0.00
2022	Cp	LINE7	LINE7-75	0.00	0.00	0.00
2022	Cp	MICH1	MICH1-25	0.00	0.53	0.53

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	MICH1	MICH1-50	0.00	0.50	0.50
2022	Cp	MICH1	MICH1-75	0.00	0.31	0.31
2022	Cp	MICH2	MICH2-25	0.00	0.46	0.46
2022	Cp	MICH2	MICH2-50	0.00	0.34	0.34
2022	Cp	MICH2	MICH2-75	0.00	0.31	0.31
2022	Cp	MICH3	MICH3-25	0.00	0.02	0.02
2022	Cp	MICH3	MICH3-50	0.00	0.06	0.06
2022	Cp	MICH3	MICH3-75	0.00	0.03	0.03
2022	Cp	MICH4	MICH4-25	0.00	0.06	0.06
2022	Cp	MICH4	MICH4-50	0.00	0.05	0.05
2022	Cp	MICH4	MICH4-75	0.00	0.10	0.10
2022	Cp	MICH5	MICH5-25	0.00	0.26	0.26
2022	Cp	MICH5	MICH5-50	0.00	0.03	0.03
2022	Cp	MICH5	MICH5-75	0.00	0.00	0.00
2022	Cp	MICK1	MICK1-25	0.02	0.83	0.85
2022	Cp	MICK1	MICK1-50	0.00	0.92	0.92
2022	Cp	MICK1	MICK1-75	0.18	0.99	1.17
2022	Cp	MILL1	MILL1-0	0.23	1.00	1.23
2022	Cp	NTHO1	NTHO1-25	0.55	0.95	1.50
2022	Cp	NTHO1	NTHO1-50	1.16	0.97	2.13
2022	Cp	NTHO1	NTHO1-75	1.48	1.00	2.48
2022	Cp	WILN2	WILN2-25	0.00	0.00	0.00
2022	Cp	WILN2	WILN2-50	0.00	0.00	0.00
2022	Cp	NWOL1	NWOL1-25	1.94	1.00	2.94
2022	Cp	OTTO1	OTTO1-0	0.00	0.44	0.44
2022	Cp	OTTO3	OTTO3-25	0.00	0.00	0.00
2022	Cp	OTTO3	OTTO3-50	0.00	0.00	0.00
2022	Cp	OTTO3	OTTO3-75	0.00	0.00	0.00
2022	Cp	PORT1	PORT1-0	0.00	0.97	0.97
2022	Cp	PORT3a	PORT3a-12.5	0.00	0.33	0.33
2022	Cp	PORT3a	PORT3a-25	0.17	0.95	1.12
2022	Cp	PORT3a	PORT3a-37.5	0.00	0.48	0.48
2022	Cp	PORT3b	PORT3b-50	1.01	0.95	1.96
2022	Cp	PORT3b	PORT3b-62.5	1.55	1.00	2.55
2022	Cp	PORT3b	PORT3b-75	1.89	1.00	2.89
2022	Cp	UCWE1	UCWE1-25	0.00	0.00	0.00
2022	Cp	UCWE1	UCWE1-50	0.00	0.00	0.00
2022	Cp	UCWE1	UCWE1-75	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	SAWM1	SAWM1-0	0.00	0.00	0.00
2022	Cp	SAWM1	SAWM1-50	0.00	0.00	0.00
2022	Cp	SAWM2	SAWM2-25	0.00	0.09	0.09
2022	Cp	SAWM2	SAWM2-50	0.00	0.02	0.02
2022	Cp	SITE	SITE-18	1.85	1.00	2.85
2022	Cp	SIXM1	SIXM1-25	0.00	0.35	0.35
2022	Cp	SIXM1	SIXM1-50	0.00	0.06	0.06
2022	Cp	SIXM1	SIXM1-75	0.00	0.04	0.04
2022	Cp	SPOU1	SPOU1-0	1.83	1.00	2.83
2022	Cp	SLINE2	SLINE2-25	0.00	0.29	0.29
2022	Cp	SLINE2	SLINE2-50	0.00	0.08	0.08
2022	Cp	SLINE2	SLINE2-75	0.00	0.07	0.07
2022	Cp	SPIT1	SPIT1-0	1.59	1.00	2.59
2022	Cp	WILS1	WILS1-25	0.00	0.00	0.00
2022	Cp	WILS1	WILS1-50	0.00	0.01	0.01
2022	Cp	SWOL1	SWOL1-25	1.42	1.00	2.42
2022	Cp	SWOL1	SWOL1-32.1	1.78	1.00	2.78
2022	Cp	SWOL1	SWOL1-7.5	1.52	1.00	2.52
2022	Cp	SPRI1	SPRI1-0	0.00	0.05	0.05
2022	Cp	STR02	STR02-50	0.00	0.02	0.02
2022	Cp	THOM2	THOM2-25	0.04	0.90	0.94
2022	Cp	THOM2	THOM2-50	0.00	0.97	0.97
2022	Cp	THOM2	THOM2-75	1.01	0.99	2.00
2022	Cp	THOM3	THOM3-25	0.76	0.94	1.70
2022	Cp	THOM3	THOM3-50	0.81	0.99	1.80
2022	Cp	THOM3	THOM3-75	0.80	0.99	1.79
2022	Cp	THOM4	THOM4-25	0.00	0.52	0.52
2022	Cp	THOM4	THOM4-50	0.00	0.11	0.11
2022	Cp	THOM4	THOM4-75	0.00	0.13	0.13
2022	Cp	THRE1	THRE1-25	0.00	0.00	0.00
2022	Cp	THRE1	THRE1-50	0.00	0.00	0.00
2022	Cp	TODH1	TODH1-25	0.00	0.05	0.05
2022	Cp	TODH1	TODH1-50	0.00	0.06	0.06
2022	Cp	TODH1	TODH1-75	0.00	0.06	0.06
2022	Cp	USOS1	USOS1-25	0.00	0.00	0.00
2022	Cp	USOS1	USOS1-50	0.00	0.00	0.00
2022	Cp	USOS1	USOS1-75	0.00	0.00	0.00
2022	Cp	UTHO1	UTHO1-25	0.00	0.73	0.73

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp	UTHO1	UTHO1-50	0.13	0.66	0.79
2022	Cp	UTHO1	UTHO1-75	0.83	0.94	1.77
2022	Cp	UTPO1	UTPO1-0	0.00	0.65	0.65
2022	Cp	WEIG1	WEIG1-25	0.00	0.00	0.00
2022	Cp	WEIG1	WEIG1-50	0.01	0.03	0.04
2022	Cp	WEIG1	WEIG1-75	0.00	0.01	0.01
2022	Cp	WOL1	WOL1-25	0.00	0.00	0.00
2022	Cp	WOL1	WOL1-50	0.00	0.00	0.00
2022	Cp	WOLF2	WOLF2-75	1.55	1.00	2.55
2022	Cp	WOLF3	WOLF3-25	1.96	1.00	2.96
2022	Cp	WOLF3	WOLF3-50	1.98	1.00	2.98
2022	Cp	WOLF3	WOLF3-75	1.95	1.00	2.95
2022	Cp'	ALEX3	ALEX3-25	0.01	0.22	0.23
2022	Cp'	ALEX3	ALEX3-50	0.05	0.16	0.21
2022	Cp'	ALEX3	ALEX3-75	0.00	0.08	0.08
2022	Cp'	ANDY1	ANDY1-25	0.00	0.01	0.01
2022	Cp'	ANDY1	ANDY1-50	0.00	0.00	0.00
2022	Cp'	ANDY1	ANDY1-75	0.00	0.00	0.00
2022	Cp'	AQUE1	AQUE1-0	0.00	0.00	0.00
2022	Cp'	AQUE2	AQUE2-0	0.00	0.00	0.00
2022	Cp'	AQUE2	AQUE2-50	0.00	0.00	0.00
2022	Cp'	AQUE3	AQUE3-25	0.00	0.00	0.00
2022	Cp'	AQUE3	AQUE3-50	0.00	0.02	0.02
2022	Cp'	AQUE3	AQUE3-75	0.00	0.30	0.30
2022	Cp'	BALM1	BALM1-25	0.00	0.01	0.01
2022	Cp'	BALM1	BALM1-50	0.00	0.00	0.00
2022	Cp'	BALM1	BALM1-75	0.00	0.00	0.00
2022	Cp'	BING1	BING1-25	0.00	0.00	0.00
2022	Cp'	BING1	BING1-50	0.00	0.00	0.00
2022	Cp'	BING1	BING1-75	0.00	0.00	0.00
2022	Cp'	BODI1	BODI1-25	0.00	0.67	0.67
2022	Cp'	BODI1	BODI1-50	0.86	1.00	1.86
2022	Cp'	BODI1	BODI1-75	0.74	1.00	1.74
2022	Cp'	BODI3	BODI3-25	1.80	1.00	2.80
2022	Cp'	BODI3	BODI3-50	1.77	0.99	2.76
2022	Cp'	BODI3	BODI3-75	1.92	1.00	2.92
2022	Cp'	CHAU1	CHAU1-25	0.00	0.02	0.02
2022	Cp'	CHAU1	CHAU1-50	0.00	0.04	0.04

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	CHAU1	CHAU1-75	0.00	0.02	0.02
2022	Cp'	COUT1	COUT1-0	0.18	0.74	0.92
2022	Cp'	CLOW1	CLOW1-0	0.00	0.62	0.62
2022	Cp'	CLOW1	CLOW1-50	0.00	0.35	0.35
2022	Cp'	CORB1	CORB1-25	1.81	1.00	2.81
2022	Cp'	CORB1	CORB1-50	1.75	1.00	2.75
2022	Cp'	CORB1	CORB1-75	1.67	1.00	2.67
2022	Cp'	CORB2	CORB2-25	1.94	1.00	2.94
2022	Cp'	CORB2	CORB2-50	1.98	1.00	2.98
2022	Cp'	CORB2	CORB2-75	1.91	1.00	2.91
2022	Cp'	DRYE3	DRYE3-25	1.87	1.00	2.87
2022	Cp'	DRYE3	DRYE3-50	1.82	1.00	2.82
2022	Cp'	DRYE3	DRYE3-75	1.42	0.96	2.38
2022	Cp'	DRYE4	DRYE4-25	1.64	0.98	2.62
2022	Cp'	DRYL1	DRYL1-25	0.00	0.08	0.08
2022	Cp'	DRYL1	DRYL1-50	0.00	0.16	0.16
2022	Cp'	DRYL1	DRYL1-75	0.00	0.13	0.13
2022	Cp'	DRYL2	DRYL2-25	0.00	0.22	0.22
2022	Cp'	DRYL2	DRYL2-50	0.00	0.21	0.21
2022	Cp'	DRYL2	DRYL2-75	0.00	0.02	0.02
2022	Cp'	DRYL3	DRYL3-25	0.00	0.14	0.14
2022	Cp'	DRYL3	DRYL3-50	0.00	0.18	0.18
2022	Cp'	DRYL3	DRYL3-75	0.00	0.02	0.02
2022	Cp'	DRYL4	DRYL4-25	0.00	0.14	0.14
2022	Cp'	DRYL4	DRYL4-50	0.00	0.14	0.14
2022	Cp'	DRYL4	DRYL4-75	0.00	0.14	0.14
2022	Cp'	ETRI1	ETRI1-0	0.00	0.00	0.00
2022	Cp'	ETRI1	ETRI1-50	0.00	0.00	0.00
2022	Cp'	ELKR10	ELKR10-25	0.00	0.00	0.00
2022	Cp'	ELKR10	ELKR10-50	0.00	0.12	0.12
2022	Cp'	ELKR10	ELKR10-75	0.00	0.01	0.01
2022	Cp'	ELKR11	ELKR11-25	0.00	0.25	0.25
2022	Cp'	ELKR11	ELKR11-50	0.00	0.00	0.00
2022	Cp'	ELKR11	ELKR11-75	0.00	0.00	0.00
2022	Cp'	ELKR12	ELKR12-25	0.00	0.00	0.00
2022	Cp'	ELKR12	ELKR12-50	0.00	0.00	0.00
2022	Cp'	ELKR12	ELKR12-75	0.00	0.00	0.00
2022	Cp'	ELKR15	ELKR15-25	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	ELKR15	ELKR15-50	0.00	0.00	0.00
2022	Cp'	ELKR15	ELKR15-75	0.00	0.00	0.00
2022	Cp'	ELKR8	ELKR8-25	0.00	0.02	0.02
2022	Cp'	ELKR8	ELKR8-50	0.00	0.01	0.01
2022	Cp'	ELKR8	ELKR8-75	0.00	0.12	0.12
2022	Cp'	ELKR9	ELKR9-25	0.00	0.01	0.01
2022	Cp'	ELKR9	ELKR9-50	0.00	0.02	0.02
2022	Cp'	ELKR9	ELKR9-75	0.00	0.00	0.00
2022	Cp'	ERIC1	ERIC1-0	1.85	1.00	2.85
2022	Cp'	ERIC1	ERIC1-50	1.98	0.99	2.97
2022	Cp'	ERIC2	ERIC2-0	1.89	1.00	2.89
2022	Cp'	ERIC3	ERIC3-0	1.94	1.00	2.94
2022	Cp'	ERIC4	ERIC4-25	1.79	1.00	2.79
2022	Cp'	ERIC4	ERIC4-50	0.23	0.60	0.83
2022	Cp'	ERIC4	ERIC4-75	0.00	0.26	0.26
2022	Cp'	EWIN1	EWIN1-25	0.00	0.07	0.07
2022	Cp'	EWIN1	EWIN1-50	0.00	0.09	0.09
2022	Cp'	EWIN1	EWIN1-75	0.00	0.01	0.01
2022	Cp'	FELT1	FELT1-25	0.00	0.00	0.00
2022	Cp'	FELT1	FELT1-50	0.00	0.00	0.00
2022	Cp'	FELT1	FELT1-75	0.00	0.00	0.00
2022	Cp'	FPON1	FPON1-25	0.00	0.33	0.33
2022	Cp'	FPON1	FPON1-50	0.01	0.48	0.49
2022	Cp'	FPON1	FPON1-75	0.00	0.16	0.16
2022	Cp'	FORD1	FORD1-25	0.00	0.05	0.05
2022	Cp'	FORD1	FORD1-50	0.00	0.15	0.15
2022	Cp'	FORD1	FORD1-75	0.00	0.04	0.04
2022	Cp'	FORD10	FORD10-25	0.00	0.09	0.09
2022	Cp'	FORD10	FORD10-50	0.00	0.13	0.13
2022	Cp'	FORD10	FORD10-75	0.00	0.21	0.21
2022	Cp'	FORD10	FORD10-86	0.01	0.12	0.13
2022	Cp'	FORD10	FORD10-89	0.00	0.06	0.06
2022	Cp'	FORD11	FORD11-25	0.00	0.06	0.06
2022	Cp'	FORD11	FORD11-50	0.00	0.01	0.01
2022	Cp'	FORD11	FORD11-75	0.00	0.03	0.03
2022	Cp'	FORD12	FORD12-25	0.00	0.04	0.04
2022	Cp'	FORD12	FORD12-50	0.00	0.05	0.05
2022	Cp'	FORD12	FORD12-75	0.00	0.01	0.01

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	FORD2	FORD2-25	0.09	0.33	0.42
2022	Cp'	FORD2	FORD2-50	0.08	0.30	0.38
2022	Cp'	FORD2	FORD2-75	0.27	0.37	0.64
2022	Cp'	FORD3	FORD3-25	0.00	0.48	0.48
2022	Cp'	FORD3	FORD3-50	0.00	0.25	0.25
2022	Cp'	FORD3	FORD3-75	0.00	0.29	0.29
2022	Cp'	FORD4	FORD4-25	0.06	0.55	0.61
2022	Cp'	FORD4	FORD4-50	0.00	0.32	0.32
2022	Cp'	FORD4	FORD4-75	0.00	0.14	0.14
2022	Cp'	FORD5	FORD5-12.5	0.00	0.28	0.28
2022	Cp'	FORD5	FORD5-25	0.00	0.11	0.11
2022	Cp'	FORD5	FORD5-50	0.00	0.79	0.79
2022	Cp'	FORD5	FORD5-75	0.22	0.57	0.79
2022	Cp'	FORD6	FORD6-25	0.14	0.70	0.84
2022	Cp'	FORD6	FORD6-50	0.58	0.83	1.41
2022	Cp'	FORD6	FORD6-75	0.00	0.64	0.64
2022	Cp'	FORD7	FORD7-25	0.12	0.43	0.55
2022	Cp'	FORD7	FORD7-50	0.17	0.55	0.72
2022	Cp'	FORD7	FORD7-75	0.07	0.53	0.60
2022	Cp'	FORD8	FORD8-25	0.00	0.40	0.40
2022	Cp'	FORD8	FORD8-50	0.00	0.18	0.18
2022	Cp'	FORD8	FORD8-75	0.00	0.34	0.34
2022	Cp'	FORD9a	FORD9a-12.5	0.00	0.16	0.16
2022	Cp'	FORD9a	FORD9a-25	0.00	0.14	0.14
2022	Cp'	FORD9a	FORD9a-37.5	0.00	0.09	0.09
2022	Cp'	FORD9a	FORD9a-50	0.00	0.15	0.15
2022	Cp'	FORD9b	FORD9b-62.5	0.00	0.10	0.10
2022	Cp'	FORD9b	FORD9b-75	0.00	0.03	0.03
2022	Cp'	FORS1	FORS1-25	0.00	0.00	0.00
2022	Cp'	FORS1	FORS1-50	0.00	0.00	0.00
2022	Cp'	FORS1	FORS1-75	0.00	0.01	0.01
2022	Cp'	GARD1	GARD1-25	0.74	0.87	1.61
2022	Cp'	GARD1	GARD1-50	0.00	0.00	0.00
2022	Cp'	GARD1	GARD1-75	0.00	0.00	0.00
2022	Cp'	GATE2	GATE2-25	0.10	0.60	0.70
2022	Cp'	GATE2	GATE2-50	0.61	0.82	1.43
2022	Cp'	GATE2	GATE2-75	0.50	0.74	1.24
2022	Cp'	GODD1	GODD1-0	0.00	0.02	0.02

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	GODD3	GODD3-25	1.61	0.96	2.57
2022	Cp'	GODD3	GODD3-50	1.71	0.97	2.68
2022	Cp'	GODD3	GODD3-75	1.67	0.99	2.66
2022	Cp'	GRAC1	GRAC1-25	0.00	0.03	0.03
2022	Cp'	GRAC1	GRAC1-50	0.00	0.04	0.04
2022	Cp'	GRAC1	GRAC1-75	0.00	0.03	0.03
2022	Cp'	GRAS1	GRAS1-25	0.00	0.05	0.05
2022	Cp'	GRAS1	GRAS1-50	0.00	0.09	0.09
2022	Cp'	GRAS1	GRAS1-75	0.00	0.03	0.03
2022	Cp'	GRAV1	GRAV1-25	0.00	0.05	0.05
2022	Cp'	GRAV1	GRAV1-50	0.00	0.04	0.04
2022	Cp'	GRAV1	GRAV1-75	0.00	0.02	0.02
2022	Cp'	GRAV2	GRAV2-25	0.00	0.14	0.14
2022	Cp'	GRAV2	GRAV2-50	0.00	0.04	0.04
2022	Cp'	GRAV2	GRAV2-75	0.00	0.00	0.00
2022	Cp'	GRAV3	GRAV3-25	0.00	0.00	0.00
2022	Cp'	GRAV3	GRAV3-50	0.00	0.00	0.00
2022	Cp'	GRAV3	GRAV3-75	0.00	0.00	0.00
2022	Cp'	GREE1	GREE1-25	0.00	0.30	0.30
2022	Cp'	GREE1	GREE1-50	0.00	0.22	0.22
2022	Cp'	GREE1	GREE1-75	0.28	0.91	1.19
2022	Cp'	GREE3	GREE3-25	1.33	0.93	2.26
2022	Cp'	GREE3	GREE3-50	1.73	1.00	2.73
2022	Cp'	GREE3	GREE3-75	1.85	1.00	2.85
2022	Cp'	GREE4	GREE4-25	1.81	0.99	2.80
2022	Cp'	GREE4	GREE4-50	1.84	1.00	2.84
2022	Cp'	GREE4	GREE4-75	1.56	1.00	2.56
2022	Cp'	GSCH1	GSCH1-25	0.00	0.70	0.70
2022	Cp'	GSCH1	GSCH1-50	0.00	0.58	0.58
2022	Cp'	GSCH1	GSCH1-75	0.00	0.25	0.25
2022	Cp'	HARM1	HARM1-25	0.00	0.40	0.40
2022	Cp'	HARM1	HARM1-50	0.01	0.57	0.58
2022	Cp'	HARM1	HARM1-75	0.00	0.77	0.77
2022	Cp'	HARM3	HARM3-25	0.00	0.02	0.02
2022	Cp'	HARM3	HARM3-50	0.00	0.02	0.02
2022	Cp'	HARM3	HARM3-75	0.00	0.04	0.04
2022	Cp'	HARM4	HARM4-25	0.00	0.01	0.01
2022	Cp'	HARM4	HARM4-50	0.00	0.02	0.02

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	HARM4	HARM4-75	0.00	0.05	0.05
2022	Cp'	HARM5	HARM5-25	0.00	0.16	0.16
2022	Cp'	HARM5	HARM5-50	0.00	0.09	0.09
2022	Cp'	HARM5	HARM5-75	0.00	0.06	0.06
2022	Cp'	HENR1	HENR1-25	0.06	0.37	0.43
2022	Cp'	HENR1	HENR1-50	0.00	0.07	0.07
2022	Cp'	HENR1	HENR1-75	0.00	0.15	0.15
2022	Cp'	HENR2	HENR2-25	0.00	0.05	0.05
2022	Cp'	HENR2	HENR2-50	0.00	0.04	0.04
2022	Cp'	HENR2	HENR2-75	0.00	0.05	0.05
2022	Cp'	HENR3	HENR3-25	0.00	0.00	0.00
2022	Cp'	HENR3	HENR3-50	0.00	0.02	0.02
2022	Cp'	HENR3	HENR3-75	0.00	0.00	0.00
2022	Cp'	KILM1	KILM1-25	1.95	1.00	2.95
2022	Cp'	KILM1	KILM1-50	1.84	0.98	2.82
2022	Cp'	LMOU1	LMOU1-0	0.00	0.32	0.32
2022	Cp'	RG_LE1	RG_LE1-25	0.00	0.00	0.00
2022	Cp'	RG_LE1	RG_LE1-50	0.00	0.00	0.00
2022	Cp'	RG_LE1	RG_LE1-75	0.00	0.00	0.00
2022	Cp'	LEAS2	LEAS2-18.2	1.69	1.00	2.69
2022	Cp'	LEAS2	LEAS2-25	1.76	1.00	2.76
2022	Cp'	LEAS2	LEAS2-9.1	1.34	1.00	2.34
2022	Cp'	LIND1	LIND1-25	0.00	0.08	0.08
2022	Cp'	LIND1	LIND1-50	0.00	0.11	0.11
2022	Cp'	LIND1	LIND1-75	0.00	0.00	0.00
2022	Cp'	LINE1	LINE1-25	0.00	0.09	0.09
2022	Cp'	LINE1	LINE1-50	0.00	0.03	0.03
2022	Cp'	LINE1	LINE1-75	0.00	0.10	0.10
2022	Cp'	LINE2	LINE2-25	0.00	0.14	0.14
2022	Cp'	LINE2	LINE2-50	0.00	0.14	0.14
2022	Cp'	LINE2	LINE2-75	0.00	0.06	0.06
2022	Cp'	LINE3	LINE3-25	0.00	0.11	0.11
2022	Cp'	LINE3	LINE3-50	0.00	0.20	0.20
2022	Cp'	LINE3	LINE3-75	0.00	0.16	0.16
2022	Cp'	LINE4	LINE4-25	0.00	0.53	0.53
2022	Cp'	LINE4	LINE4-50	0.00	0.45	0.45
2022	Cp'	LINE4	LINE4-75	0.00	0.39	0.39
2022	Cp'	LINE7	LINE7-50	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	LINE7	LINE7-75	0.00	0.00	0.00
2022	Cp'	MICH1	MICH1-25	0.00	0.12	0.12
2022	Cp'	MICH1	MICH1-50	0.00	0.15	0.15
2022	Cp'	MICH1	MICH1-75	0.00	0.07	0.07
2022	Cp'	MICH2	MICH2-25	0.00	0.12	0.12
2022	Cp'	MICH2	MICH2-50	0.00	0.09	0.09
2022	Cp'	MICH2	MICH2-75	0.00	0.09	0.09
2022	Cp'	MICH3	MICH3-25	0.00	0.00	0.00
2022	Cp'	MICH3	MICH3-50	0.00	0.01	0.01
2022	Cp'	MICH3	MICH3-75	0.00	0.00	0.00
2022	Cp'	MICH4	MICH4-25	0.00	0.01	0.01
2022	Cp'	MICH4	MICH4-50	0.00	0.01	0.01
2022	Cp'	MICH4	MICH4-75	0.00	0.03	0.03
2022	Cp'	MICH5	MICH5-25	0.00	0.05	0.05
2022	Cp'	MICH5	MICH5-50	0.00	0.00	0.00
2022	Cp'	MICH5	MICH5-75	0.00	0.00	0.00
2022	Cp'	MICK1	MICK1-25	0.02	0.47	0.49
2022	Cp'	MICK1	MICK1-50	0.00	0.57	0.57
2022	Cp'	MICK1	MICK1-75	0.18	0.86	1.04
2022	Cp'	MILL1	MILL1-0	0.23	0.99	1.22
2022	Cp'	NTHO1	NTHO1-25	0.55	0.93	1.48
2022	Cp'	NTHO1	NTHO1-50	1.16	0.97	2.13
2022	Cp'	NTHO1	NTHO1-75	1.48	1.00	2.48
2022	Cp'	WILN2	WILN2-25	0.00	0.00	0.00
2022	Cp'	WILN2	WILN2-50	0.00	0.00	0.00
2022	Cp'	NWOL1	NWOL1-25	1.94	1.00	2.94
2022	Cp'	OTTO1	OTTO1-0	0.00	0.17	0.17
2022	Cp'	OTTO3	OTTO3-25	0.00	0.00	0.00
2022	Cp'	OTTO3	OTTO3-50	0.00	0.00	0.00
2022	Cp'	OTTO3	OTTO3-75	0.00	0.00	0.00
2022	Cp'	PORT1	PORT1-0	0.00	0.64	0.64
2022	Cp'	PORT3a	PORT3a-12.5	0.00	0.08	0.08
2022	Cp'	PORT3a	PORT3a-25	0.17	0.51	0.68
2022	Cp'	PORT3a	PORT3a-37.5	0.00	0.18	0.18
2022	Cp'	PORT3b	PORT3b-50	1.01	0.84	1.85
2022	Cp'	PORT3b	PORT3b-62.5	1.55	1.00	2.55
2022	Cp'	PORT3b	PORT3b-75	1.89	1.00	2.89
2022	Cp'	UCWE1	UCWE1-25	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	UCWE1	UCWE1-50	0.00	0.00	0.00
2022	Cp'	UCWE1	UCWE1-75	0.00	0.00	0.00
2022	Cp'	SAWM1	SAWM1-0	0.00	0.00	0.00
2022	Cp'	SAWM1	SAWM1-50	0.00	0.00	0.00
2022	Cp'	SAWM2	SAWM2-25	0.00	0.02	0.02
2022	Cp'	SAWM2	SAWM2-50	0.00	0.00	0.00
2022	Cp'	SITE	SITE-18	1.85	1.00	2.85
2022	Cp'	SIXM1	SIXM1-25	0.00	0.15	0.15
2022	Cp'	SIXM1	SIXM1-50	0.00	0.02	0.02
2022	Cp'	SIXM1	SIXM1-75	0.00	0.02	0.02
2022	Cp'	SPOU1	SPOU1-0	1.83	1.00	2.83
2022	Cp'	SLINE2	SLINE2-25	0.00	0.09	0.09
2022	Cp'	SLINE2	SLINE2-50	0.00	0.02	0.02
2022	Cp'	SLINE2	SLINE2-75	0.00	0.03	0.03
2022	Cp'	SPIT1	SPIT1-0	1.59	1.00	2.59
2022	Cp'	WILS1	WILS1-25	0.00	0.00	0.00
2022	Cp'	WILS1	WILS1-50	0.00	0.00	0.00
2022	Cp'	SWOL1	SWOL1-25	1.42	1.00	2.42
2022	Cp'	SWOL1	SWOL1-32.1	1.78	1.00	2.78
2022	Cp'	SWOL1	SWOL1-7.5	1.52	1.00	2.52
2022	Cp'	SPRI1	SPRI1-0	0.00	0.02	0.02
2022	Cp'	STR02	STR02-50	0.00	0.00	0.00
2022	Cp'	THOM2	THOM2-25	0.04	0.41	0.45
2022	Cp'	THOM2	THOM2-50	0.00	0.68	0.68
2022	Cp'	THOM2	THOM2-75	1.01	0.97	1.98
2022	Cp'	THOM3	THOM3-25	0.76	0.90	1.66
2022	Cp'	THOM3	THOM3-50	0.81	0.92	1.73
2022	Cp'	THOM3	THOM3-75	0.80	0.89	1.69
2022	Cp'	THOM4	THOM4-25	0.00	0.14	0.14
2022	Cp'	THOM4	THOM4-50	0.00	0.02	0.02
2022	Cp'	THOM4	THOM4-75	0.00	0.02	0.02
2022	Cp'	THRE1	THRE1-25	0.00	0.00	0.00
2022	Cp'	THRE1	THRE1-50	0.00	0.00	0.00
2022	Cp'	TODH1	TODH1-25	0.00	0.01	0.01
2022	Cp'	TODH1	TODH1-50	0.00	0.01	0.01
2022	Cp'	TODH1	TODH1-75	0.00	0.02	0.02
2022	Cp'	USOS1	USOS1-25	0.00	0.00	0.00
2022	Cp'	USOS1	USOS1-50	0.00	0.00	0.00

Year	Cp_type	Reach	Site Code	Cc	Cp or Cp'	CI
2022	Cp'	USOS1	USOS1-75	0.00	0.00	0.00
2022	Cp'	UTHO1	UTHO1-25	0.00	0.57	0.57
2022	Cp'	UTHO1	UTHO1-50	0.13	0.46	0.59
2022	Cp'	UTHO1	UTHO1-75	0.83	0.86	1.69
2022	Cp'	UTPO1	UTPO1-0	0.00	0.55	0.55
2022	Cp'	WEIG1	WEIG1-25	0.00	0.00	0.00
2022	Cp'	WEIG1	WEIG1-50	0.01	0.01	0.02
2022	Cp'	WEIG1	WEIG1-75	0.00	0.00	0.00
2022	Cp'	WOL1	WOL1-25	0.00	0.00	0.00
2022	Cp'	WOL1	WOL1-50	0.00	0.00	0.00
2022	Cp'	WOLF2	WOLF2-75	1.55	1.00	2.55
2022	Cp'	WOLF3	WOLF3-25	1.96	1.00	2.96
2022	Cp'	WOLF3	WOLF3-50	1.98	1.00	2.98
2022	Cp'	WOLF3	WOLF3-75	1.95	1.00	2.95

Appendix 11. 2023 Study Design.

LOTIC ENVIRONMENTAL

Teck Coal Ltd.
Regional Calcite Monitoring Program

2023 Study Design

April 2023

Prepared by

Lotic Environmental Ltd.
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Suggested citation

Gordon, S. 2023. Regional Calcite Monitoring Program 2023 Study Design. Prepared for Teck Coal Ltd. by Lotic Environmental Ltd. 8 pp + appendices.

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1 Introduction

The Regional Calcite Monitoring Program has been documenting the degree and extent of calcite downstream of Teck's four open-pit coal mine operations and one mine in *Care and Maintenance* in the Elk Valley since 2013. This program has developed a comprehensive regional database of calcite in the Elk Valley and has been designed to satisfy the requirements for *Environmental Management Act* Permit 107517. Data and results generated by the regional program are used by Teck to monitor change, inform management decisions, describe efficacy of calcite treatment options, and report Teck's progress on calcite management to external agencies. This document provides the study design for 2023 and is based on recommendations in the 2022 Regional Calcite Monitoring Program report (Smit and Robinson 2023).

1.1 *Overview*

The Regional Calcite Monitoring Program uses a hierarchical approach to systematically break-down the large study areas, extending from Fernie, British Columbia upstream to the reference watersheds beyond each of Teck's five coal mining areas. Within the study area are Teck's five Management Units; distinct operational areas that loosely follow sub-watersheds. Within these, specific streams (mainstem versus tributary) are selected for monitoring and those are further differentiated into reaches. A stream reach is a relatively homogeneous section of stream in terms of channel morphology, riparian cover, and flow. Reaches are classified as exposed or reference relative to the presence or absence of upstream mining, respectively. In some instances, morphologic reaches are further broken based on differences in calcite observation and therefore the suspected drivers of calcite deposition. The degree of calcite is primarily reported at a reach scale as it links most-closely with the scale at which Teck's management tools can be applied. Reaches also link well to biological assessments as these uses are often tied closely to habitat type.

Calcite is sampled at three sites within a reach greater than 300 m to address the within-reach variability of calcite. One site is completed in reaches less than 300 m in length. A sample of 100 rocks is used to quantify the degree of calcification at each site. Data are recorded from the individual rock to the full study area to provide Teck with a robust dataset capable of discussing issues from local biological effects to watershed-scale trends in both exposed and reference areas. The program uses three key metrics to describe calcite. 2023 will be the year that proportional calcite presence will be the primary presence metric used in analysis and reporting (Zathey et al. 2021; Table 1). This also means calcite index will be reported as the proportional calcite index (CI').

$$Cp' = \text{proportional } Calcite\ Presence\ = \frac{Sum\ of\ proportional\ calcite\ precence\ scores}{Number\ of\ \text{stones}\ counted}$$

$$Cc = Calcite\ Concretion = \frac{Sum\ of\ stones\ concretion\ scores}{Number\ of\ stones\ counted}$$

$$CI' = Calcite\ Index = Cp' + Cc$$

Table 1. Cross-referencing between the calcite presence metric (Cp) and the modified proportional calcite presence (Cp') scores.

Cp	Cp'	Percent of particle area covered
0	0	0%
1	0.1	10%
	0.2	20%
	0.3	30%
	0.4	40%
	0.5	50%
	0.6	60%
	0.7	70%
	0.8	80%
	0.9	90%
	1	100%

1.2 *Program Objectives*

Key objectives of the Elk Valley Calcite Monitoring Program are to:

1. Document the extent and degree of calcite deposition in streams downstream of Teck's coal operations (e.g., streams influenced by mining, calcite management, and in reference streams).
2. Satisfy the requirements for annual calcite monitoring in *Environmental Management Act* Permit 107517.
3. Provide data to support the re-evaluation of Management Question 4 ("*Is calcite being managed effectively to meet site performance objectives and protect aquatic ecosystem health?*") and Key Uncertainties in Permit 107517 as they relate to calcite.

Additional focus areas carried forward from 2022 or based on recommendations in the 2022 report, to be included in 2023 :

- In absence of a major hydrological event, are calcite metrics returning to a pre-2013 state as proposed by Robinson et al. (2022)?
- Is calcite treatment effective at limiting additional calcite precipitation?
- Do calcite training workshops reduce inter-crew and inter-program variability?
- Investigate a back calculation of Cp' from a relationship between various calcite metrics and rerun trend analysis to determine if Cp' can be the sole presence indicator going forward.

- Has detection of concretion in some reaches of the Fording mainstem been increasing, and is the monitoring data representative of within reach variability in longer mainstem reaches?
- Do reaches with lower site density (i.e., mainstem reaches) exhibit more inter-site variability?
- Data summary of calcite monitoring stations in areas with physical calcite remediation

Additional focus areas not carried forward from 2022 are:

- Does using Cp' reduce observer variability relative to Cp? The 2022 report provided a third year of confirming Cp' is effective at reducing observer efficiency (Smit and Robinson 2023).
- Does Cp' predict Cc accurately enough to be used as an early indicator? The 2022 report provided a third year of confirming Cp' more accurately predicts the onset of Cc (Smit and Robinson 2023).
- The effect of habitat type on calcite deposition. This has been assessed in several annual reports with repeated results suggesting a weak to no effect of habitat unit type on Cp or CI.

2 Methods

2.1 *Study area and sample locations*

The Study Area proposed for 2023 will reflect that core area used from 2013-2022. The core area remains the Elk River watershed upstream of Fernie, BC, including each of Teck's four mining operations in the Elk Valley, namely Fording River Operations (FRO), Greenhills Operations (GHO), Line Creek Operations (LCO), Elkview Operations (EVO), as well as Coal Mountain Mine (CMm transferred into Care and Maintenance in 2019).

The 2023 Program will using the reach-based sampling approach consistent with 2021 and 2022 sampling programs. Sampling within a reach will follow the standardization of three sites per reach where reach length is >300 m, one site per reach <300 m. Sampling locations proposed for 2022 are provided in Appendix 1.

Modifications to the 2023 Program:

- Movement of Thompson Creek Reaches 1 to 3 to reflect the lower pond on Thompson Creek. Currently the lower pond on Thompson Creek falls within reach THOM2 with one site below and two sites above the pond. Reach 1 would be from the Elk River side-channel to the pond, then Reach 2 would be the pond, and Reach 3 would be from the pond to the fish barrier.
- Addition of a site into the physical treatment area in Greenhills Creek Reach 3 completed in 2022 to monitor change over time.

- Increase of sites within exposed reaches of the upper Fording River (FORD5, FORD6, FORD7, FORD8, FORD9, FORD10, FORD11) to six sites per reach. The increase in the number of sites (sites/km) within the Upper Fording River is to further evaluate the spatial variability of calcite concretion with these exposed reaches.

2.2 *Calcite training workshop*

A pre-field training workshop will be conducted to allow regional calcite crew members, as well as members of RAEMP and LAEMP monitoring programs to meet in the field to review methods and field manual updates. Focus is given to potential sources of variability and the standardization of correctly identifying calcite. A list of attendees will be provided in the annual report.

2.3 *Field methods*

Field methods will follow those used in 2022. The sampling program will be completed between mid August and early November to avoid sites freezing. Field methods are based on the 2021 updated field manual (Gordon and Robinson 2021), provided in Appendix 2. In summary, calcite is measured at each site using a modified Wolman Pebble Count (Wolman 1954). This uses a standard of 100 rocks per sample to derive the Calcite Index metrics.

The 2015 and 2020 programs assessed the effect of sample size (i.e., the number of rocks) on CI by calculating the percent difference from a CI score obtained from randomly selecting between 10-99 rocks relative to that obtained from the full 100 rock sample. This assessment found that reducing the number of rocks sampled has an immediate effect on accuracy. As such, the 2023 program will continue sampling 100 rocks per site.

2.4 *Quality Assurance*

Data quality assurance procedures will follow those outlined in the 2021 field sampling manual. As per Gordon and Robinson (2021):

1. Crews will attend the annual calcite training course held at the beginning of the field season. At a minimum, all crew leads who will be conducting calcite sampling will attend the annual calcite training course. All crew members will be encouraged to attend the training course. This will ensure each crew is familiar with different types of calcite and sampling procedures. As well, a crew calibration day will occur at the start of the regional program. Attendance will be documented in the annual regional calcite monitoring report.
2. To assess inter-crew variability, 10% of sites will be randomly selected for duplicate sampling by second crew. Results were compared following 2020 methods.
3. Encourage communication between crew members completing different tasks (sampling versus recording) over the course of the entire project. Doing so is likely to reduce crew member variability, thereby resulting in improved data quality and consistency.
4. Data collection forms will be reviewed for completeness before leaving the sampling location and signed off at the end of each field day by the crew lead.

5. Data collection forms will be scanned and submitted to the Project Manager or designate daily. These data will be used to calculate a preliminary calcite index score and compare to previous records. Large deviations from previous years (>0.5 CI difference) will be investigated and potentially resampled by a second crew.
6. Following data entry into Lotic's digital form, values will be assessed for accuracy using a computer script developed from R Programming Language. This will check that cells contain acceptable values (e.g., calcite presence score can only be 0, 0.1, 0.2…. 1); concreted scores can only be 0, 1, or 2; concreted score must be 0 if calcite presence is 0); habitat unit type can only be R (riffle), P (pool), G (glide), C (cascade). Cells that had errors or were blank were flagged and corrected.

2.5 *Data analysis*

Data analyses will follow methods used in 2022 (Smit and Robinson 2023). Traditional analyses to be included are:

- General trend analysis including graphs presented in the KPI format
- Trend analysis by reach (linear and step-wise)
- Trends in reaches with water treatment
- Inter-program comparison

In addition to those listed above, the 2023 report will assess the roles of environmental (e.g., streamflow, geochemistry) and mine-related (level of disturbance, water treatment) variable on calcite deposition in regard to the flow hypothesis presented. Should the region experience a larger freshet, then monitoring will be used to directly determine if it results in reduction of calcite deposition. In absence of this, this Program should continue to try and explain the trends that are being observed through continued learning (e.g., multivariate analysis) and the potential/likelihood that calcite deposition may be returning to a post-2013 equilibrium.

The 2023 report will also compare the spatial variability of calcite within the upper Fording River reaches using three sites versus six sites. The number of sites was increased from 3 to 6 in 2023 to address uncertainty around if 3 sites were adequately describing calcite variability in these longer reaches that are starting to show concretion.

3 Literature Cited

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4 Appendices

Appendix 1. Sampling locations by reach and site.

Type	Stream	Reach	Site	Easting	Northing	Mine
Reference	Alexander	ALEX3	ALEX3-25	663890	5504520	r
Reference	Alexander	ALEX3	ALEX3-50	664614	5505892	r
Reference	Alexander	ALEX3	ALEX3-75	664909	5507398	r
Reference	Andy Good	ANDY1	ANDY1-25	667658	5488753	r
Reference	Andy Good	ANDY1	ANDY1-50	668301	5488765	r
Reference	Andy Good	ANDY1	ANDY1-75	668923	5488725	r
Exposed	Aqueduct	AQUE1	AQUE1-0	653565	5511559	e
Exposed	Aqueduct	AQUE2	AQUE2-0	653571	5511673	e
Exposed	Aqueduct	AQUE2	AQUE2-50	653786	5511652	e
Exposed	Aqueduct	AQUE3	AQUE3-25	654037	5511426	e
Exposed	Aqueduct	AQUE3	AQUE3-50	654198	5511306	e
Exposed	Aqueduct	AQUE3	AQUE3-75	654270	5511163	e
Exposed	Balmer	BALM1	BALM1-25	653305	5517471	e
Exposed	Balmer	BALM1	BALM1-50	653938	5517633	e
Exposed	Balmer	BALM1	BALM1-75	654605	5517616	e
Reference	Bingay	BING1	BING1-25	644393	5562154	r
Reference	Bingay	BING1	BING1-50	643801	5562310	r
Reference	Bingay	BING1	BING1-75	643243	5562547	r
Exposed	Bodie	BODI1	BODI1-25	655429	5509654	e
Exposed	Bodie	BODI1	BODI1-50	655507	5509636	e
Exposed	Bodie	BODI1	BODI1-75	655571	5509554	e
Exposed	Bodie	BODI3	BODI3-25	655915	5509557	e
Exposed	Bodie	BODI3	BODI3-50	656006	5509632	e
Exposed	Bodie	BODI3	BODI3-75	656073	5509727	e
Reference	Chauncey	CHAU1	CHAU1-25	655564	5552702	r
Reference	Chauncey	CHAU1	CHAU1-50	655745	5552787	r
Reference	Chauncey	CHAU1	CHAU1-75	655970	5552882	r
Exposed	Clode West Infiltration	CLOW1	CLOW1-0	650854	5563993	f
Exposed	Clode West Infiltration	CLOW1	CLOW1-50	650895	5564101	f
Exposed	Corbin	CORB1	CORB1-25	668315	5487124	c
Exposed	Corbin	CORB1	CORB1-50	668437	5487182	c
Exposed	Corbin	CORB1	CORB1-75	668479	5487325	c
Exposed	Corbin	CORB2	CORB2-25	669113	5487472	c
Exposed	Corbin	CORB2	CORB2-50	669572	5487393	c
Exposed	Corbin	CORB2	CORB2-75	669937	5486943	c
Exposed	Clode Pond Outlet	COUT1	COUT1-0	650788	5564242	f
Exposed	Dry (EVO)	DRYE1	DRYE1-0	659427	5517591	e
Exposed	Dry (EVO)	DRYE3	DRYE3-25	659340	5517342	e
Exposed	Dry (EVO)	DRYE3	DRYE3-50	659273	5517241	e

Type	Stream	Reach	Site	Easting	Northing	Mine
Exposed	Dry (EVO)	DRYE3	DRYE3-75	659206	5517141	e
Exposed	Dry (EVO)	DRYE4	DRYE4-25	659013	5516858	e
Exposed	Dry (LCO)	DRYL1	DRYL1-25	656119	5545115	l
Exposed	Dry (LCO)	DRYL1	DRYL1-50	656350	5544856	l
Exposed	Dry (LCO)	DRYL1	DRYL1-75	656585	5544432	l
Exposed	Dry (LCO)	DRYL2	DRYL2-25	656897	5543858	l
Exposed	Dry (LCO)	DRYL2	DRYL2-50	656945	5543659	l
Exposed	Dry (LCO)	DRYL2	DRYL2-75	657012	5543459	l
Exposed	Dry (LCO)	DRYL3	DRYL3-25	657273	5543029	l
Exposed	Dry (LCO)	DRYL3	DRYL3-50	657403	5542815	l
Exposed	Dry (LCO)	DRYL3	DRYL3-75	657423	5542553	l
Exposed	Dry (LCO)	DRYL4	DRYL4-25	657746	5542094	l
Exposed	Dry (LCO)	DRYL4	DRYL4-50	657870	5541803	l
Exposed	Dry (LCO)	DRYL4	DRYL4-75	657998	5541531	l
Exposed	Elk	ELKR10	ELKR10-25	652969	5517209	r
Exposed	Elk	ELKR10	ELKR10-50	653185	5520698	r
Exposed	Elk	ELKR10	ELKR10-75	653273	5524306	r
Exposed	Elk	ELKR11	ELKR11-25	651334	5531833	r
Exposed	Elk	ELKR11	ELKR11-50	649911	5535787	r
Exposed	Elk	ELKR11	ELKR11-75	649341	5539043	r
Exposed	Elk	ELKR12	ELKR12-25	649449	5547389	r
Exposed	Elk	ELKR12	ELKR12-50	647786	5550118	r
Exposed	Elk	ELKR12	ELKR12-75	647889	5553073	r
Reference	Elk	ELKR15	ELKR15-25	648340	5580657	r
Reference	Elk	ELKR15	ELKR15-50	647626	5583455	r
Reference	Elk	ELKR15	ELKR15-75	646900	5586535	r
Exposed	Elk	ELKR8	ELKR8-25	645756	5491857	r
Exposed	Elk	ELKR8	ELKR8-50	648445	5498835	r
Exposed	Elk	ELKR8	ELKR8-75	651965	5504752	r
Exposed	Elk	ELKR9	ELKR9-25	652003	5512334	r
Exposed	Elk	ELKR9	ELKR9-50	652355	5512773	r
Exposed	Elk	ELKR9	ELKR9-75	652458	5513391	r
Exposed	Erickson	ERIC1	ERIC1-0	659865	5505136	e
Exposed	Erickson	ERIC1	ERIC1-50	659974	5505174	e
Exposed	Erickson	ERIC2	ERIC2-0	660119	5505190	e
Exposed	Erickson	ERIC3	ERIC3-0	660283	5505338	e
Exposed	Erickson	ERIC4	ERIC4-25	660663	5505716	e
Exposed	Erickson	ERIC4	ERIC4-50	660821	5506062	e
Exposed	Erickson	ERIC4	ERIC4-75	660804	5506443	e
Reference	East Dry	ETRI1	ETRI1-0	658130	5541263	l
Reference	East Dry	ETRI1	ETRI1-50	658233	5541290	l
Reference	Ewin	EWIN1	EWIN1-25	657402	5547542	r

Type	Stream	Reach	Site	Easting	Northing	Mine
Reference	Ewin	EWIN1	EWIN1-50	657128	5547584	r
Reference	Ewin	EWIN1	EWIN1-75	656864	5547469	r
Exposed	Feltham	FELT1	FELT1-25	654231	5515897	e
Exposed	Feltham	FELT1	FELT1-50	654391	5515943	e
Exposed	Feltham	FELT1	FELT1-75	654517	5515977	e
Exposed	Fennelon	FENN1	FENN1-25	653451	5516226	e
Exposed	Fennelon	FENN1	FENN1-50	653825	5516301	e
Exposed	Fennelon	FENN1	FENN1-75	654164	5516506	e
Exposed	Fording River	FORD10	FORD10-12.5	TBD		f
Exposed	Fording River	FORD10	FORD10-25	651234	5560464	f
Exposed	Fording River	FORD10	FORD10-37.5	TBD		f
Exposed	Fording River	FORD10	FORD10-50	650841	5561087	f
Exposed	Fording River	FORD10	FORD10-62.5	TBD		f
Exposed	Fording River	FORD10	FORD10-75	651169	5561863	f
Exposed	Fording River	FORD10	FORD10-86	651126	5562228	f
Exposed	Fording River	FORD10	FORD10-89	651122	5562331	f
Exposed	Fording River	FORD11	FORD11-12.5	TBD		f
Exposed	Fording River	FORD11	FORD11-25	651010	5563479	f
Exposed	Fording River	FORD11	FORD11-37.5	TBD		f
Exposed	Fording River	FORD11	FORD11-50	650766	5564527	f
Exposed	Fording River	FORD11	FORD11-62.5	TBD		f
Exposed	Fording River	FORD11	FORD11-75	651138	5565396	f
Reference	Fording River	FORD12	FORD12-25	651641	5567502	f
Reference	Fording River	FORD12	FORD12-50	652623	5568590	r
Reference	Fording River	FORD12	FORD12-75	653069	5570106	f
Exposed	Fording River	FORD1	FORD1-25	652795	5528319	r
Exposed	Fording River	FORD1	FORD1-50	652964	5528900	r
Exposed	Fording River	FORD1	FORD1-75	653423	5529184	r
Exposed	Fording River	FORD2	FORD2-25	654505	5530357	r
Exposed	Fording River	FORD2	FORD2-50	654493	5531343	r
Exposed	Fording River	FORD2	FORD2-75	654427	5532316	r
Exposed	Fording River	FORD3	FORD3-25	653949	5535464	r
Exposed	Fording River	FORD3	FORD3-50	654047	5537217	r
Exposed	Fording River	FORD3	FORD3-75	653031	5538820	r
Exposed	Fording River	FORD4	FORD4-25	652121	5541888	r
Exposed	Fording River	FORD4	FORD4-50	652229	5543405	r
Exposed	Fording River	FORD4	FORD4-75	652202	5545149	r
Exposed	Fording River	FORD5	FORD5-12.5	653931	5545033	r
Exposed	Fording River	FORD5	FORD5-25	654497	5544154	r
Exposed	Fording River	FORD5	FORD5-37.5	TBD		r
Exposed	Fording River	FORD5	FORD5-50	655852	5544822	r
Exposed	Fording River	FORD5	FORD5-62.5	TBD		r

Type	Stream	Reach	Site	Easting	Northing	Mine
Exposed	Fording River	FORD5	FORD5-75	656565	5546902	r
Exposed	Fording River	FORD6	FORD6-12.5	TBD		r
Exposed	Fording River	FORD6	FORD6-25	657109	5549627	r
Exposed	Fording River	FORD6	FORD6-37.5	TBD		r
Exposed	Fording River	FORD6	FORD6-50	656989	5550053	r
Exposed	Fording River	FORD6	FORD6-62.5	TBD		r
Exposed	Fording River	FORD6	FORD6-75	656554	5550902	r
Exposed	Fording River	FORD7	FORD7-12.5	TBD		r
Exposed	Fording River	FORD7	FORD7-25	656017	5551826	r
Exposed	Fording River	FORD7	FORD7-37.5	TBD		r
Exposed	Fording River	FORD7	FORD7-50	655710	5551934	r
Exposed	Fording River	FORD7	FORD7-62.5	TBD		r
Exposed	Fording River	FORD7	FORD7-75	655484	5552321	r
Exposed	Fording River	FORD8	FORD8-12.5	TBD		r
Exposed	Fording River	FORD8	FORD8-25	654789	5553493	r
Exposed	Fording River	FORD8	FORD8-37.5	TBD		r
Exposed	Fording River	FORD8	FORD8-50	654374	5554251	r
Exposed	Fording River	FORD8	FORD8-62.5	TBD		r
Exposed	Fording River	FORD8	FORD8-75	653939	5555078	r
Exposed	Fording River	FORD9a	FORD9a-12.5	653234	5556331	f
Exposed	Fording River	FORD9a	FORD9a-25	652958	5556915	f
Exposed	Fording River	FORD9a	FORD9a-37.5	652672	5557481	f
Exposed	Fording River	FORD9a	FORD9a-50	652461	5557992	f
Exposed	Fording River	FORD9b	FORD9b-62.5	652231	5558537	f
Exposed	Fording River	FORD9b	FORD9b-75	651944	5559027	f
Reference	Forsythe	FORS1	FORS1-25	644950	5566299	r
Reference	Forsythe	FORS1	FORS1-50	644953	5567343	r
Reference	Forsythe	FORS1	FORS1-75	644572	5568439	r
Exposed	Fish Pond	FPON1	FPON1-25	650858	5564610	f
Exposed	Fish Pond	FPON1	FPON1-50	650939	5564716	f
Exposed	Fish Pond	FPON1	FPON1-75	651009	5564888	f
Exposed	Gardine	GARD1	GARD1-25	653928	5548090	g
Exposed	Gardine	GARD1	GARD1-50	653641	5548601	g
Exposed	Gardine	GARD1	GARD1-75	653316	5549076	g
Exposed	Gate	GATE2	GATE2-25	655999	5509284	e
Exposed	Gate	GATE2	GATE2-50	656077	5509289	e
Exposed	Gate	GATE2	GATE2-75	656203	5509420	e
Exposed	Goddard	GODD1	GODD1-0	652898	5514092	e
Exposed	Goddard	GODD3	GODD3-25	654225	5514162	e
Exposed	Goddard	GODD3	GODD3-50	654458	5514243	e
Exposed	Goddard	GODD3	GODD3-75	654673	5514366	e
Reference	Grace	GRAC1	GRAC1-25	653571	5538708	r

Type	Stream	Reach	Site	Easting	Northing	Mine
Reference	Grace	GRAC1	GRAC1-50	653553	5539148	r
Reference	Grace	GRAC1	GRAC1-75	653774	5539780	r
Exposed	Grassy	GRAS1	GRAS1-25	650968	5563655	f
Exposed	Grassy	GRAS1	GRAS1-50	650976	5563754	f
Exposed	Grassy	GRAS1	GRAS1-75	650985	5563839	f
Exposed	Grave	GRAV1	GRAV1-25	653634	5523373	r
Exposed	Grave	GRAV1	GRAV1-50	653929	5523365	r
Exposed	Grave	GRAV1	GRAV1-75	654260	5523398	r
Exposed	Grave	GRAV2	GRAV2-25	655167	5523686	r
Exposed	Grave	GRAV2	GRAV2-50	655637	5523150	r
Exposed	Grave	GRAV2	GRAV2-75	655993	5522591	r
Reference	Grave	GRAV3	GRAV3-25	657424	5522824	r
Reference	Grave	GRAV3	GRAV3-50	658310	5523477	r
Reference	Grave	GRAV3	GRAV3-75	659403	5523739	r
Exposed	Greenhills	GREE1	GREE1-25	653381	5545512	g
Exposed	Greenhills	GREE1	GREE1-50	653475	5545576	g
Exposed	Greenhills	GREE1	GREE1-75	653539	5545668	g
Exposed	Greenhills	GREE3	GREE3-25	653915	5546482	g
Exposed	Greenhills	GREE3	GREE3-XX	TBD		g
Exposed	Greenhills	GREE3	GREE3-50	653988	5546884	g
Exposed	Greenhills	GREE3	GREE3-75	654171	5547244	g
Exposed	Greenhills	GREE4	GREE4-25	654511	5548366	g
Exposed	Greenhills	GREE4	GREE4-50	654335	5549134	g
Exposed	Greenhills	GREE4	GREE4-75	654151	5549910	g
Exposed	Greenhouse side channel	GSCH1	GSCH1-25	653639	5556339	f
Exposed	Greenhouse side channel	GSCH1	GSCH1-50	653555	5556519	f
Exposed	Greenhouse side channel	GSCH1	GSCH1-75	653513	5556884	f
Exposed	Harmer	HARM1	HARM1-25	656651	5522087	e
Exposed	Harmer	HARM1	HARM1-50	656793	5522099	e
Exposed	Harmer	HARM1	HARM1-75	656925	5522139	e
Exposed	Harmer	HARM3	HARM3-25	657722	5521573	e
Exposed	Harmer	HARM3	HARM3-50	658099	5521124	e
Exposed	Harmer	HARM3	HARM3-75	658277	5520623	e
Exposed	Harmer	HARM4	HARM4-25	658707	5519704	e
Exposed	Harmer	HARM4	HARM4-50	658972	5519294	e
Exposed	Harmer	HARM4	HARM4-75	659085	5518866	e
Exposed	Harmer	HARM5	HARM5-25	659214	5518150	e
Exposed	Harmer	HARM5	HARM5-50	659338	5517973	e
Exposed	Harmer	HARM5	HARM5-75	659403	5517756	e
Exposed	Henretta	HENR1	HENR1-25	651880	5566241	f

Type	Stream	Reach	Site	Easting	Northing	Mine
Exposed	Henretta	HENR1	HENR1-50	651960	5566273	f
Exposed	Henretta	HENR1	HENR1-75	652038	5566303	f
Exposed	Henretta	HENR2	HENR2-25	652398	5566393	f
Exposed	Henretta	HENR2	HENR2-50	652652	5566399	f
Exposed	Henretta	HENR2	HENR2-75	652962	5566521	f
Reference	Henretta	HENR3	HENR3-25	654604	5567433	f
Reference	Henretta	HENR3	HENR3-50	656044	5567916	f
Reference	Henretta	HENR3	HENR3-75	656970	5569295	f
Exposed	Kilmamock	KILM1	KILM1-25	652207	5559256	f
Exposed	Kilmamock	KILM1	KILM1-50	652442	5559534	f
Exposed	Kilmamock	KILM1	KILM1-75	652704	5559764	f
Exposed	Leask	LEAS2	LEAS2-18.2	648605	5552845	g
Exposed	Leask	LEAS2	LEAS2-25	648763	5552881	g
Exposed	Leask	LEAS2	LEAS2-9.1	648387	5552832	g
Exposed	Lindsay	LIND1	LIND1-25	654526	5515017	e
Exposed	Lindsay	LIND1	LIND1-50	654687	5515222	e
Exposed	Lindsay	LIND1	LIND1-75	654887	5515370	e
Exposed	Line	LINE1	LINE1-25	654200	5529047	l
Exposed	Line	LINE1	LINE1-50	654711	5528956	l
Exposed	Line	LINE1	LINE1-75	655213	5529091	l
Exposed	Line	LINE2	LINE2-25	656502	5529046	l
Exposed	Line	LINE2	LINE2-50	657254	5529214	l
Exposed	Line	LINE2	LINE2-75	657925	5529475	l
Exposed	Line	LINE3	LINE3-25	658973	5530185	l
Exposed	Line	LINE3	LINE3-50	659309	5530587	l
Exposed	Line	LINE3	LINE3-75	659578	5531063	l
Exposed	Line	LINE4	LINE4-25	659869	5531736	l
Exposed	Line	LINE4	LINE4-50	660002	5531934	l
Exposed	Line	LINE4	LINE4-75	660130	5532092	l
Exposed	Line	LINE7	LINE7-25	661895	5538290	l
Exposed	Line	LINE7	LINE7-50	661921	5538388	l
Exposed	Line	LINE7	LINE7-75	661960	5538485	l
Exposed	Lake Mountain	LMOU1	LMOU1-0	650888	5563279	f
Exposed	Michel	MICH1	MICH1-25	652366	5511653	r
Exposed	Michel	MICH1	MICH1-50	653083	5511691	r
Exposed	Michel	MICH1	MICH1-75	653644	5511239	r
Exposed	Michel	MICH2	MICH2-25	655772	5509086	r
Exposed	Michel	MICH2	MICH2-50	656991	5507317	r
Exposed	Michel	MICH2	MICH2-75	658602	5506054	r
Exposed	Michel	MICH3	MICH3-25	660364	5502437	r
Exposed	Michel	MICH3	MICH3-50	659705	5499439	r
Exposed	Michel	MICH3	MICH3-75	659464	5496940	r

Type	Stream	Reach	Site	Easting	Northing	Mine
Exposed	Michel	MICH4	MICH4-25	661761	5493058	r
Exposed	Michel	MICH4	MICH4-50	663664	5490968	r
Exposed	Michel	MICH4	MICH4-75	665768	5488794	r
Reference	Michel	MICH5	MICH5-25	667899	5485586	r
Reference	Michel	MICH5	MICH5-50	667933	5484333	r
Reference	Michel	MICH5	MICH5-75	668277	5482458	r
Exposed	Mickelson	MICK1	MICK1-25	648023	5553511	g
Exposed	Mickelson	MICK1	MICK1-50	648108	5553683	g
Exposed	Mickelson	MICK1	MICK1-75	648194	5553850	g
Exposed	Milligan	MILL1	MILL1-0	658611	5506095	e
Exposed	North Thompson	NTHO1	NTHO1-25	649721	5551307	g
Exposed	North Thompson	NTHO1	NTHO1-50	649911	5551430	g
Exposed	North Thompson	NTHO1	NTHO1-75	650306	5551596	g
Exposed	North Wolfram	NWOL1	NWOL1-25	649038	5552684	g
Exposed	Otto	OTTO1	OTTO1-0	652232	5512622	e
Exposed	Otto	OTTO3	OTTO3-25	653068	5513282	e
Exposed	Otto	OTTO3	OTTO3-50	653125	5513353	e
Exposed	Otto	OTTO3	OTTO3-75	653206	5513415	e
Exposed	Porter	PORT1	PORT1-0	653615	5555194	g
Exposed	Porter	PORT3a	PORT3a-12.5	653368	5555369	g
Exposed	Porter	PORT3a	PORT3a-25	653209	5555304	g
Exposed	Porter	PORT3a	PORT3a-37.5	653152	5555134	g
Exposed	Porter	PORT3b	PORT3b-50	653073	5554975	g
Exposed	Porter	PORT3b	PORT3b-62.5	652974	5554824	g
Exposed	Porter	PORT3b	PORT3b-75	652907	5554661	g
Reference	Leach	RG_LE1	RG_LE1-25	659551	5492634	r
Reference	Leach	RG_LE1	RG_LE1-50	659571	5491207	r
Reference	Leach	RG_LE1	RG_LE1-75	658996	5489824	r
Reference	RG_UCWER	RG_UCWER1	RG_UCWER1-25	646812	5554543	r
Reference	RG_UCWER	RG_UCWER1	RG_UCWER1-50	646178	5554949	r
Reference	RG_UCWER	RG_UCWER1	RG_UCWER1-75	645586	5555477	r
Exposed	Sawmill	SAWM1	SAWM1-0	658675	5519883	e
Exposed	Sawmill	SAWM1	SAWM1-50	658571	5519764	e
Exposed	Sawmill	SAWM2	SAWM2-25	657943	5519719	e
Exposed	Sawmill	SAWM2	SAWM2-50	657620	5519352	e
Exposed	Site18	SITE	SITE-18	654705	5509835	e
Exposed	Six Mile	SIXM1	SIXM1-25	653333	5519956	e
Exposed	Six Mile	SIXM1	SIXM1-50	653478	5519864	e
Exposed	Six Mile	SIXM1	SIXM1-75	653636	5520034	e
Reference	South Line	SLINE2	SLINE2-25	661087	5531406	l

Type	Stream	Reach	Site	Easting	Northing	Mine
Reference	South Line	SLINE2	SLINE2-50	661290	5531166	l
Reference	South Line	SLINE2	SLINE2-75	661554	5530979	l
Exposed	South Pit	SPIT1	SPIT1-0	659445	5505512	e
Exposed	Smith Pond Outlet	SPOU1	SPOU1-0	650995	5560576	f
Exposed	Spring	SPRI1	SPRI1-0	653915	5511551	e
Exposed	Stream 02	STR02	STR02-25	654826	5509741	e
Exposed	Stream 02	STR02	STR02-50	654583	5509554	e
Exposed	Stream 02	STR02	STR02-75	654373	5509281	e
Exposed	Stream 14	STR14	STR14-25	655013	5509686	e
Exposed	Stream 14	STR14	STR14-50	654852	5509231	e
Exposed	Stream 14	STR14	STR14-75	654582	5508918	e
Exposed	South Wolfram	SWOL1	SWOL1-25	648958	5552508	g
Exposed	South Wolfram	SWOL1	SWOL1-32.1	648798	5552497	g
Exposed	South Wolfram	SWOL1	SWOL1-7.5	649063	5552425	g
Exposed	Thompson	THOM1	THOM1-25	TBD		g
Exposed	Thompson	THOM1	THOM1-50	TBD		g
Exposed	Thompson	THOM1	THOM1-75	TBD		g
Exposed	Thompson	THOM2	THOM2-25	TBD		g
Exposed	Thompson	THOM2	THOM2-50	TBD		g
Exposed	Thompson	THOM2	THOM2-75	TBD		g
Exposed	Thompson	THOM3	THOM3-25	TBD		g
Exposed	Thompson	THOM3	THOM3-50	TBD		g
Exposed	Thompson	THOM3	THOM3-75	TBD		g
Exposed	Thompson	THOM4	THOM4-25	649985	5550640	g
Exposed	Thompson	THOM4	THOM4-50	650222	5550335	g
Exposed	Thompson	THOM4	THOM4-75	650482	5550041	g
Exposed	Thresher	THRE1	THRE1-25	658067	5506957	e
Exposed	Thresher	THRE1	THRE1-50	657721	5507593	e
Reference	Toddhunter	TODH1	TODH1-25	657848	5548196	r
Reference	Toddhunter	TODH1	TODH1-50	658306	5548888	r
Reference	Toddhunter	TODH1	TODH1-75	658691	5549673	r
Exposed	Unnamed Trib South of Sawmill	USOS1	USOS1-25	658493	5518730	e
Exposed	Unnamed Trib South of Sawmill	USOS1	USOS1-50	658010	5518284	e
Exposed	Unnamed Trib South of Sawmill	USOS1	USOS1-75	657355	5518032	e
Exposed	Upper Thompson	UTHO1	UTHO1-25	651047	5550175	g
Exposed	Upper Thompson	UTHO1	UTHO1-50	651209	5550395	g
Exposed	Upper Thompson	UTHO1	UTHO1-75	651349	5550629	g
Exposed	Upper Thompson Pond Outlet	UTPO1	UTPO1-0	650869	5549673	g
Reference	Weigert	WEIG1	WEIG1-25	650687	5532266	r
Reference	Weigert	WEIG1	WEIG1-50	650377	5532130	r

Type	Stream	Reach	Site	Easting	Northing	Mine
Reference	Weigert	WEIG1	WEIG1-75	650019	5531962	r
Exposed	North Willow	WILN2	WILN2-25	648087	5556563	g
Exposed	North Willow	WILN2	WILN2-50	648492	5557047	g
Exposed	South Willow	WILS1	WILS1-25	648116	5556067	g
Exposed	South Willow	WILS1	WILS1-50	648531	5556368	g
Exposed	Wolf	WOL1	WOL1-25	647825	5557063	g
Exposed	Wolf	WOL1	WOL1-50	648140	5557483	g
Exposed	Wolfram	WOLF2	WOLF2-75	648246	5552373	g
Exposed	Wolfram	WOLF3	WOLF3-25	648377	5552264	g
Exposed	Wolfram	WOLF3	WOLF3-50	648437	5552260	g
Exposed	Wolfram	WOLF3	WOLF3-75	648508	5552324	g

Appendix 2. Calcite Field Sampling Manual (Gordon and Robinson 2021).

Teck Coal Ltd
Regional Calcite Monitoring Plan

Field Manual

2021 Version
May 2021

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1 Purpose and Scope

This document provides details on the field sampling protocol developed for Teck Coal Ltd. (Teck) Regional Calcite Monitoring Program (2021 update). This monitoring program has been completed annually as part of Teck's overall calcite management strategy since 2013. The results are used to describe the degree and extent of calcite deposition downstream of Teck Coal mine operations and to inform Teck's adaptive management of calcite.

This manual describes how calcite surveys are completed in the field under the Regional Calcite Monitoring program. Annual work plans provide additional detail on what streams/reaches to sample, how many sites to sample within each reach, and where to locate sites within each reach. This manual is intended to act as a reference for field crews. Information on site locations, data analysis, and reporting are not discussed here.

2 Background

There are three metrics pertaining to calcite assessment – calcite presence, calcite concretion, and calcite index. Calcite presence is the amount of calcite on a rock and is currently described by calcite present = 1 or calcite absent = 0. A new method of calcite presence is being trialed, where presence will be described by 10% increments of surficial coverage (0.1, 0.2, 0.3, etc.). For instance, a rock with 50% surficial coverage of calcite on all surfaces would get a score of 0.5. Calcite concretion is the amount of resistance due to calcite formation when picking up a rock from the streambed. Resistance is relative to a reasonable amount of effort an observer uses to remove a rock from the streambed by hand. A score of 0 indicates no resistance, 1 indicates some resistance but still movable, and 2 is non-movable or in other words fully concreted to the streambed. The calcite index score for each rock is the addition of calcite presence and calcite concretion scores and can range from 0-3.

The Regional Calcite Monitoring program has undergone continuous assessment and evaluation to improve its function in describing the degree, extent, and trends of calcite deposition. This has occurred in each annual report, as well as with one major assessment after Year 3 of conducting the program (i.e., 2013-2015 review). The 2021 calcite monitoring protocol manual builds from the existing methods developed in 2013 and 2016. Key updates to the 2021 protocol include:

1. Trial of new calcite presence metric (Cp') – Calcite presence will be recorded using bins representing 10% increments of surficial calcite coverage of an individual particle. These data are collected in a way that allows for this proportional method to be trialed for a second year, while remaining the ability to report as the binary "yes/no" presence as done in all years prior to 2020. See Zathey et al. (2021)[1] for a more comprehensive discussion on this trial;
2. Replacement of an initial calcite inspection with a mandatory 100-particle pebble count at each site;

[1] Zathey, N., Mitchell, S., and M.D. Robinson. 2021. Teck Coal Ltd. 2020 Calcite Monitoring Program Annual Report. Prepared for Teck Coal Ltd. by Lotic Environmental Ltd. 55 pp + appendices.

3. Clarification of how fines, pure calcite, and moss are treated when selected during a pebble count; and,
4. Updates following 2020 Calcite Program audit:
    a. Standardization of the number of sites per reach, three (3) sites where reach length is >300 m, one (1) site when reach length is <300 m. Robinson and Atherton (2016) suggested a variable number of sites per reach (i.e., 1, 3, or 6). The increase to 6 at intermediate Calcite Index values has not produced the intended improvements in monitoring of trends.
    b. Change of site sketch to optional where the sampler requires additional means of conveying a notable field observation.
    c. Continued standardization of collection methods as documented in Section 3 of this manual.
    d. Updated QA/QC to include:
        i. Field sampler training and documentation of attendance.
        ii. Duplicate sampling of 10% of sites.
        iii. Preliminary entry and review of current year's data against previous years to identify potential anomalies.

3 Procedures

These procedures outline the protocol a sampling crew will follow. In some instances, additional analyses of program components were required specifically for this year's update. In particular, the number of rocks sampled per site and the number of sites sampled per reach required additional analyses. The results of these are included in Appendix 2.

All sampling must be completed under a current, approved safe work plan (Teck's EHSC) specific to the mine operation or Teck's regional operating area. Equipment required for this sampling includes:

- Blank Calcite Index Data Sheet, printed on waterproof paper (Appendix 1)
- A calcite scratcher – this could be a rock hammer, a metal ruler, or a small metal ruler.
- Rubber boots or hip/chest waders appropriate to the stream conditions
- Camera and GPS
- Gloves of a suitable length appropriate to the temperature conditions
- Other PPE as appropriate to the field conditions and safety plan

3.1 Site selection

The initial calcite monitoring program proposed a target of three sites sampled per reach, those being at 25, 50, and 75% of the reach length. To address higher within-reach variability at intermediate calcite index score, Robinson and Atherton (2016)[2] proposed increasing the number of sites to six between CI 1-2. Upon reassessment of this requirement, the need for a variable number of sites per reach is now considered unnecessary and produces more inconsistency in data collection than providing benefit (see Appendix 2). As such, sampling in 2021 will return to a

[2] Robinson, M.D. and K. Atherton. 2016. Teck Coal Ltd – 2016-2018 Calcite Monitoring Program. Prepared by Lotic Environmental Ltd. and Teck Coal Ltd.

standard of three sites sampled per reach where the reach length is long enough to permit this without the risk of overlapping sites. This was defined as 300 m long. Reaches less than 300 m long will be sampled with one site.

3.2 Field procedure

Pebble counts will be completed by a two-person crew. Each crew will be led by a person experienced in conducting aquatic habitat surveys. Both crew members will be trained in all tasks of this sampling protocol and may complete any of these throughout the field program. One crew member will be instream sampling rocks (100 in total) and one crew member will be onshore as a recorder. See Appendix 2 for additional information on the need to sample 100 rocks per site. These roles will be identified on the field sampling forms. The following steps will be completed:

1. Familiarize yourself with the location. Review prior site descriptions and calcite score if available. Use maps and GPS coordinates to find the start location to ensure the data is collected from the same location.
2. Examine the stream prior to entering it to conduct the pebble count. Identify the different habitat types[3] (riffle, cascade, pool, and glide) present. Determine the sampling path, a zig zag transect through the stream should cover the entire cross section and all habitat types present. Sampling representative habitat and habitat variability is important. While no minimum sampling distance is required, a sampling path typically covers approximately 100 m.
3. Beginning at the downstream end, the sampler is to enter the stream and haphazardly select substrate to sample by touching the stream bed at the end of their toe with their index finger. The sampler will select substrate within the wetted width of the stream only, dry particles will not be sampled. If the substrate is within the wetted width but exposed to air sample the particle if presence can confidently be determined. Sampling depth is limited to safely wadable water approximately an arm's length deep. The sampler is to determine the substrate type (i.e., rock, fines, moss, calcite) and if:
    a. Rock, and movable, proceed to step 4.
    b. Rock, and too large to remove, determine if calcite is present by attempting to collect scraping from the surface. If calcite presence/absence can be confidently obtained, then proceed to step 4. If the sampler cannot confidently assess calcite presence or concretion, then abandon and proceed to next particle.
    c. Rock with moss coverage, If the shape of the rock can be visually determined through the moss sample the rock, proceed to step 4. If the shape of the underlying substrate cannot be visually determined sample the moss, proceed to Step 3f.
    d. Fines (silt, sand, clay), if there is a thin layer (less than ~1 cm) of sediment on top of a rock, select the underlying rock.
    e. Fines (silt, sand, clay), calcite presence in fines is scored by Cp (0 or 1). If there is a thick layer (greater than ~1 cm) of sediment particle, pinch the fines between thumb and forefinger. If the fines contain obvious calcified conglomerates in loose sediment, then assign sore of = 0 (no concretion) and 1 (presence). If not obviously present, assign 0 (concretion) and 0 (presence). Fines will not be examined for

[3] Habitat units will follow definitions provided in a level 1 fish habitat assessment (Johnston and Slaney 1996).

individual flakes of calcite. Examine the material for a top layer of concreted particles (calcite crust[4]). If crust present, then assign score of = 1 (partial concretion) and 1 (presence). If fines are unable to be removed, then assign = 2 (full concretion) and 1 (presence).

f. Moss, remove portion of moss and determine if calcite is present. Calcite presence in moss is scored by Cp (0 or 1) If calcite deposit is present, then assign score of = 0 (no concretion) and 1 (presence). If not present, assign = 0 (concretion) and 0 (presence). If the moss was removed with calcite-induced resistance assign score of = 1 (partial concretion) and 1 (presence) If moss is fully encrusted and is unable to be removed, assign score of = 2 (full concretion) and 1 (presence).

g. Calcite deposit/pure calcite (mobile or concreted), treat as rock and proceed to step 4

4. The following observations are recorded for each particle (rock or pure calcite) on the pebble count form (Appendix 1):

   a. **Calcite concretion** – Was the particle removed without calcite-induced resistance (0)? Was the particle removed with any noticeable amount of force to overcome calcite-induced resistance (1)? Was the particle non-movable or fully concreted by calcite (2)? Resistance may be caused from factors other than calcite (e.g., embeddedness in fines). Each rock with resistance noted will have the underside of the rock examined for evidence of concretion in the form of a calcite deposit "ring" or smaller particles still attached (Figure 1). For rocks too large to move, examination for concretion can be accomplished by attempts to remove the adjacent movable particles.

Figure 1. Partially Concreted Sample. Note calcite on the left side edge, which has extended beyond the substrate sample.

   b. **Calcite presence** – Examine all sides of the particle selected. Does the individual particle have calcite deposition? No = 0, if yes, record the percent of the rock

[4] A calcite crust is a detectable hardened outer shell that the observer feels their finger break through before touching the underlying fines. A crust can often be extracted by slipping your finger underneath and pinching while lifted up. Once extracted, it can easily be confirmed as calcite crust by being a thin, brittle layer.

surface area covered as a decimal to the nearest 10th percentile (0.1, 0.2 0.3, etc.). If calcite breaks off of the particle while being removed, calcite presence will be determined by the remaining coverage on the particle. Moss and thick deposits of fines are scored as discussed in Step 3.

Calcite presence can be challenging to detect. The most effective measure to address this is for the surveyor to attend annual training hosted by Teck and to have an experienced observer assist with initial surveys to calibrate records of presence. Refer to Section 4 for additional information on determining calcite presence.

c. **Habitat type** – Record habitat type choosing between pool, riffle, glide or cascade. Acceptable habitat unit categories are pool (P), riffle (R), cascade (C), and glide (G). Refer to the level 1 Fish Habitat Assessment Procedure definitions for more clarity (Johnston and Slaney 1996).

5. Complete the calcite field form to document date, site location, coordinates, photo numbers, and type of calcite observed:

   a. Photos are taken facing upstream and downstream of the site sampled. Take two photos of rocks/substrate sampled, one rock with calcite present and one rock with calcite absent (if possible), that best describe conditions of this site. For example, in a site with low levels of calcite, do not choose the rock with highest coverage of calcite, but one that best reflects an average rock. If all rocks have calcite present, chose a variety of calcite coverage. If different forms of calcite are encountered, take additional photos.

   b. Record the dominant and co-dominant types of calcite. Section 5 Forms of calcite, further describes each type of calcite that may be encountered.

6. Calculate the mean for the totals of all 100 rocks to get the site average calcite concretion, calcite presence and calcite index scores. Report the results at the end of each field day for office verification relative to data collected from previous years. If a large discrepancy (i.e. >0.5) is found in the calcite index score compared to previous years a second crew will visit the site for QA/QC to confirm calcite index score.

$$Cp = Calcite\ Presence\ = \frac{Sum\ of\ stones\ presence\ scores}{Number\ of\ \text{stones}\ counted}$$

$$Cc = Calcite\ Concretion = \frac{Sum\ of\ stones\ concretion\ scores}{Number\ of\ stones\ counted}$$

$$CI = Calcite\ Index = Cp + Cc$$

4 General guidelines for calcite presence

Calcite training has been completed for each annual monitoring program since 2013 and more recently, crew leads of the regional program are providing training to other Teck calcite programs. Calcite presence has routinely provided the most variability between crew members and becomes most challenging at low levels of calcite deposition. The following are some general guidelines used to assess whether calcite is present on the surface of the rock being sampled. These are guidelines and no one item is diagnostic:

1. Before sampling, does the streambed have an “orange”, oxidized colour? Most calcite deposits have this colour. However, some can be grey to black.
2. Scratch rock with a metal tool to see if a crust can be removed. Calcite is a brittle mineral that will tend to hold its shape, and will typically leave a white scratch, showing a scale breakup. Many rocks will also scratch but will show minimal depth and lack a scale breakup. Algae is soft and malleable. Calcite and algae are most often confused. Silty conditions can also prove to be confusing. Some rocks will scratch even without calcite present. A scratch alone does not confirm calcite.

Figure 2. (Left) Light thin scratches, no discernible depth or material. No calcite present. (Right) Thick, chalky scratch with depth. Calcified algae

3. Does an appreciable amount of material scrape off the surface? Is there enough to roll between fingers to assess texture? If not, it is unlikely that calcite is present.
4. If you could only choose one, does the material scraped off feel like plant-matter (i.e., smooth, slippery, will roll or form into a ball) or mineral (i.e., gritty, chalky, brittle and/or flakey)?
5. Does the rock possess a firm, elevated “ring” at the interface between the surface exposed to water and the point where the rock entered the interstitial material? Calcite will form a ring here as it becomes more extensive.

5 Forms of calcite

The dominant form of calcite must be recorded on the pebble count form. Below are descriptions and photos of all the types of calcite that may be encountered (forms and definitions from Vast 2013[5]):

[5] Vast. 2013. Calcite Monitoring Program – 2012 Field Assessment (Elk Valley). Prepared for Teck Coal Ltd. Prepared by VAST Resource Solutions. 131 pp.


Calcified algae - lumpy, soft, chalky coating on the substrate of a stream.


Calcareous laminate - an advanced stage of calcified algae. The streambed is hardened into a uniform surface.


Calcified moss/tufa - can range from soft easily broken apart to a solidified mass of moss tufa.

Barrage tufa - barrier-like growths extending cross-channel to block normal water flow.

Calcite scale - a relatively thin, crystalline coating, which is homogenous in texture.

Insect tufa - formed by encrustation of the larval caddis fly cases by calcite precipitation.

6 Training

Anyone collecting calcite index data for the first time is, at a minimum, to review calcite conditions in the field with a more experienced person; to review what calcite is, the diversity of calcite deposits, and how to complete a count. It is recommended for all personnel collecting calcite data to attend the annual training session hosted by Teck. Lotic Environmental will lead the training session on behalf of Teck and will document all attendees in the annual Regional Calcite Monitoring report.

In addition to this, Lotic Environmental will hold its own crew calibration day at the onset of the Regional Calcite Monitoring program. Attendance here will also be documented in the annual Regional Calcite Monitoring report.

7 Quality assurance and quality control (QA/QC)

Data quality will be controlled during the field program by:

1. Attending the annual calcite training course held at the beginning of the field season. At a minimum, all crew leads who will be conducting calcite sampling will attend the annual calcite training course. All crew members will be encouraged to attend the training course. This will ensure each crew is familiar with different types of calcite and sampling procedures. As well, a crew calibration day will occur at the start of the regional program. Attendance will be documented in the annual regional calcite monitoring report.
2. To assess inter-crew variability, 10% of sites will be randomly selected for duplicate sampling by second crew. Results will be compared in the annual report following 2020 methods.
3. Encourage communication between crew members completing different tasks (sampling versus recording) over the course of the entire project. Doing so is likely to reduce crew member variability, thereby resulting in improved data quality and consistency.
4. Data collection forms will be reviewed for completeness before leaving the sampling location and signed off at the end of each field day by the crew lead.
5. Data collection forms will be scanned and submitted to the Project Manager or designate daily. These data will be used to calculate a preliminary calcite index score and compare to previous records. Large deviations from previous years (>0.5 CI difference) will be investigated and potentially resampled by a second crew.
6. Following data entry into Lotic's digital form, values will be assessed for accuracy using a computer script developed from R Programming Language. This will check that cells contain acceptable values (e.g., calcite presence score can only be 0, 0.1, 0.2…. 1); concreted scores can only be 0, 1, or 2; concreted score must be 0 if calcite presence is 0); habitat unit type can only be R, P, G, C. Cells that had errors or were blank were flagged and corrected.

8 Appendices

Appendix 1. Pebble count form.

Appendix 2. Assessment of key protocol components

As part of developing this 2021 field manual, we investigated two specific components of the sampling protocol employed in recent years. These were the number of rocks sampled per site and the number of sites per reach.

Robinson et al. (2016)[6] investigated the effect of reducing the number of rocks sampled by randomly selecting a subset of rock from 10-99 rocks out of the full 100 rock counts. They compared the calcite metric scores of the subsample to the metric scores of the full sample and plotted as the absolute difference versus number of rocks sampled. This was repeated in 2021. The results in 2021 agreed well with Robinson et al. (2016) in showing that the absolute difference increases as the number of rocks sampled decreases (). For each of calcite index, calcite concretion, and calcite presence, reducing the number of rocks sampled to 75 results in approximately 8% difference relative to the full count scores. Reducing the number of rocks sampled to 50 produces between a 12-15% difference. The effect of reducing the number of rocks sampled is considered large and adverse. As such, the number of rocks to be sampled per site should remain as 100 rocks per count.

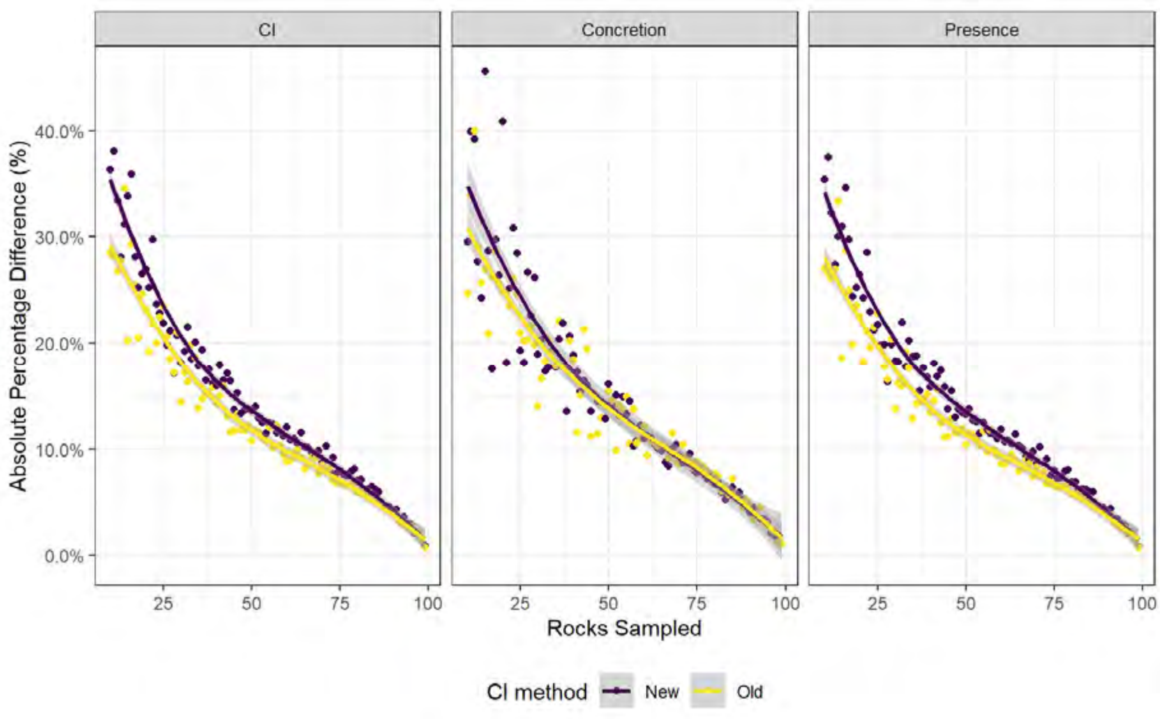

Figure 3. Absolute percentage difference of calcite metric scores by number of rocks subsampled from full 100-rock pebble counts (New = Cp', Old = Cp).

[6] Robinson, M.D. M. Chernos, K. Baranowska, and R.J. MacDonald. 2016. Teck Coal Ltd – Elk Valley 2015 Calcite Monitoring Program Annual Report and Program Assessment. Prepared for Teck Coal Ltd by Lotic Environmental Ltd. 17 pp + appendices.

Also following assessment methods of Robinson et al. (2016), we investigated the relationship of intra-reach variability of Calcite Index (CI) over the range of CI scores (0-3). Similar to 2016, the assessment indicated that within-reach variability of CI to be highest at intermediate CI values. Standard deviation of CI at the reach level was again lowest at the low (i.e., 0) and high (i.e., 3) ends of the CI range. However, different to the previous assessment was the magnitude of this variability (Figure 4). Plotting standard deviation by year shows a continual decrease (i.e., improvement) in standard deviation at the intermediate CI values. This was not able to be detected in the previous assessment give limitations in the length of dataset. This improvement is considered to be substantial enough that the need to increase the number of sites per reach where CI scores were intermediate (i.e., 1-2) is no longer needed. It is recommended that the program return to a standard of three sites per reach where the reach length is long enough to permit this without the risk of overlapping sites. This was defined as 300 m long. Reaches less than 300 m long will be sampled with one site.

The reason for the sequential reduction in within-reach variability over time has not been investigated. One potential explanation is that within-reach variability has decreased as the stream systems return to a pre-2013 flood state. It is possible that in addition to reducing the degree of calcite, the 2013 flood also produced a patchier distribution. Another potential factor is the continued training, standardization, and QA of sampling crews. By continuing to assess and identify sources are observer variability, it is expected that accurate of measurements should have improved in this program that was unique and first trialed in just 2013.

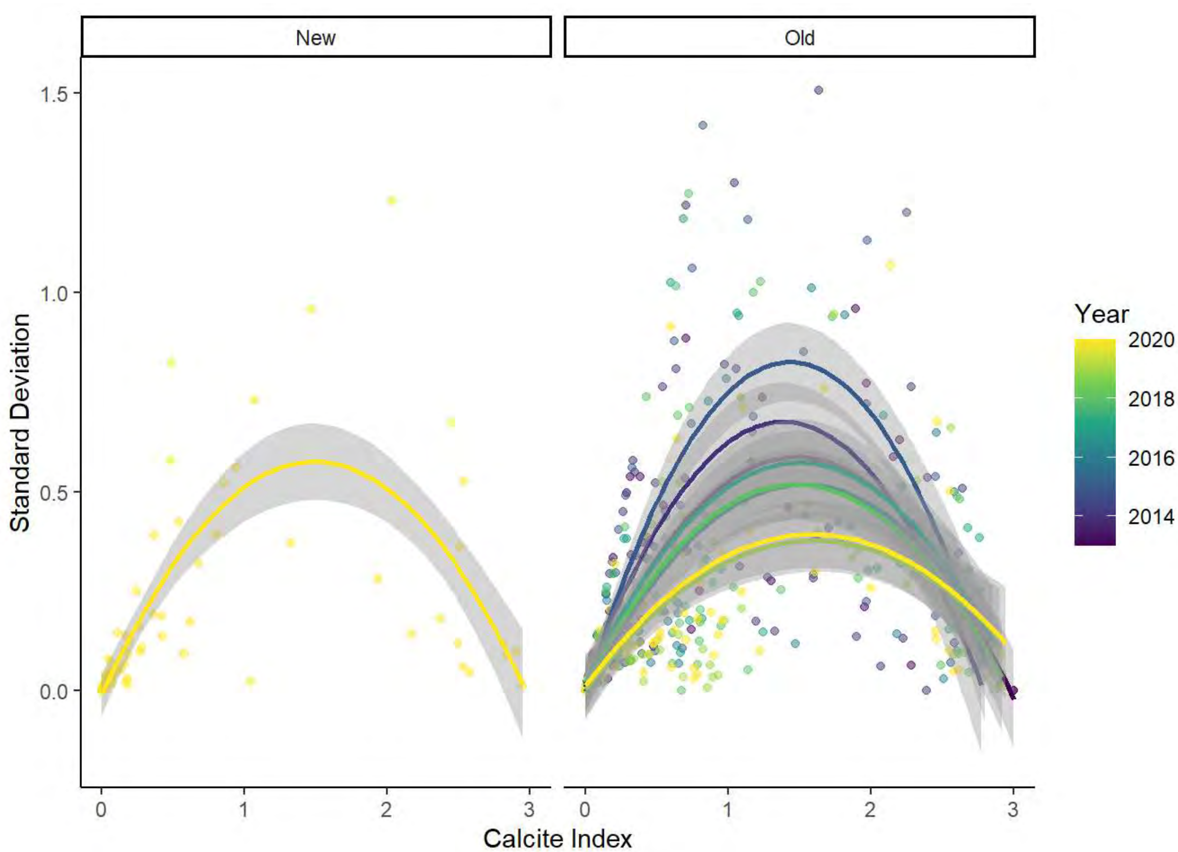

Figure 4. Standard deviation of within-reach calcite index versus calcite index scores.