

**Subject Matter Expert Report: POACHING. Evaluation of Cause -
Decline in Upper Fording River Westslope Cutthroat Trout Population**



Prepared For:

Teck Coal Limited
Sparwood, BC

Prepared By:

Denis Dean BSc, RPBio, P Biol
VAST Resource Solutions Inc.
304 Industrial Road G
Cranbrook, BC V1C 7J4

February 2021

Project # 20.0013.01

Cover photo: Viewing upstream from Teck Coal’s FR_FR4 monitoring location at the upper Fording River. Photo taken on July 8, 2020 by Steavie-Ann Syer (Nupqu Development Corporation).

EXECUTIVE SUMMARY

The upper Fording River (UFR) contains westslope cutthroat trout (WCT) which is the only fish species occurring in this river system. The adult WCT population in the UFR has experienced a 93% decline between September 2017 and September 2019. An investigation was initiated into the UFR fish population decline, and one of the potential stressors identified was fish poaching. This report provides a summary of literature reviewed, discussions with Teck Coal environmental personnel and regulatory agencies, as well as a review of trail camera data from Teck Coal's wildlife monitoring program that may have captured human anglers. The UFR and its tributaries upstream of Josephine Falls have been closed to sport fishing since 2010. Literature reviews revealed anecdotal observations of poaching activity along the UFR. Teck personnel were aware of one instance where people were incidentally documented with fishing gear near the UFR based on trail camera data, while other trail camera data identified an additional two potential instances of poaching activities. The British Columbia Conservation Officer Service do not have any records of poaching violations along the UFR. Based on the findings from the information reviewed and the discussions completed, poaching is not likely to be either the cause or a contributor to the UFR fish population decline.

Table of Contents

Reader’s Note	vii
What is the Evaluation of Cause and what is its purpose?	vii
Background	vii
Evaluation of Cause.....	vii
How the Evaluation of Cause was approached	viii
Participation, Engagement & Transparency	x
Citation for the Evaluation of Cause Report	x
Citations for Subject Matter Expert Reports	x
1.0 INTRODUCTION.....	1
1.1 Objective	1
2.0 METHODS.....	1
2.1 Requisite Conditions	2
3.0 RESULTS AND DISCUSSION.....	2
4.0 REQUISITE CONDITIONS AND UNCERTAINTIES.....	5
5.0 CONCLUSION.....	7
6.0 LITERATURE CITED	8
APPENDIX A: Upper Fording River Fish Periodicity Table	9
APPENDIX B: Golder Associates Ltd. Technical Memorandum.....	11

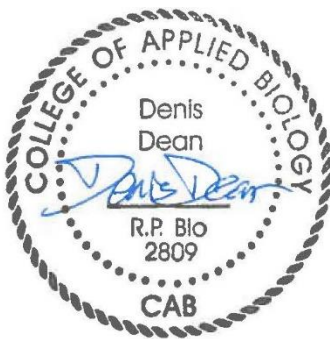
ACRONYMS AND ABBREVIATIONS

BCCOS	British Columbia Conservation Officer Service
FRO	Fording River Operation
GHO	Greenhills Operations
LCO	Line Creek Operations
SME	Subject Matter Expert
UFR	upper Fording River
WCT	westslope cutthroat trout

QUALIFICATIONS

Denis Dean is a Senior Wildlife Biologist with VAST Resource Solutions Inc. and has over 20 years' experience working in the environmental field. During his career, Denis has completed angler creel surveys for watercourses in southern Alberta and is familiar with various fishing methods and activities. Denis' experience in the ecological and environmental sector also includes completing literature reviews, conducting interviews with various stakeholders, completing field surveys to collect various types of data, compiling and analyzing data, and report preparation. Denis is a Registered Professional Biologist with British Columbia's College of Applied Biology, and a Professional Biologist with the Alberta Society of Professional Biologists.

I certify that the work described herein fulfills standards acceptable of a Professional Biologist.



Denis Dean BSc, RPBio, P Biol

Date: February 26, 2021

USE & LIMITATIONS OF THIS REPORT

Services provided by VAST Resource Solutions Inc. (VAST) for this report have been conducted in a manner consistent with the level of skill, care and competence ordinarily exercised by members of the profession currently practising under similar conditions and like circumstances in the same jurisdiction in which the services were provided. Professional judgment has been applied to developing the conclusions in this report. No warranties, expressed or implied, are made as to the professional services provided under the terms of the agreement and included in this report.

The conclusions and/or recommendations provided in this report do not relieve Teck Coal Limited or their agents or representatives of the responsibility to comply with applicable Acts, regulations, bylaws and/or decisions of any authorities that have jurisdiction under an enactment.

To properly understand the information expressed within this report, reference must be made to the whole report. VAST cannot be responsible for the use of portions of the report by Teck Coal Limited or any party without reference to the whole report.

The information, opinion and professional judgment presented in this report were acquired, compiled and interpreted exclusively for the sole benefit of Teck Coal Limited for the purposes described in this report. No other party may use or rely upon the report or any portion thereof without VAST's written consent. VAST will consent to any reasonable request by Teck Coal Limited to approve the use of this report by other parties as "approved users". The contents of the report remain VAST's copyright property and VAST authorizes Teck Coal Limited and approved users to copy the report only in such quantities as are reasonably necessary for use by those parties. Teck Coal Limited and approved users may not give, lend, sell or otherwise make the report, or any portion thereof, available to any party without our written permission. Any use which an unauthorized third party makes of the report or any portion thereof is the sole responsibility of such third parties. VAST accepts no responsibility to any third party resulting from the unauthorized use of the report.

The report is based on and limited by, circumstances, conditions and information available at the time the work was completed. The recommendations of this report are based in part on information provided by others. VAST believes this information is accurate but cannot guarantee or warrant its accuracy or completeness.

READER'S NOTE

What is the Evaluation of Cause and what is its purpose?

The Evaluation of Cause is the process used to investigate, evaluate and report on the reasons the Westslope Cutthroat Trout population declined in the upper Fording River between fall 2017 and fall 2019.

Background

The Elk Valley is located in the southeast corner of British Columbia (BC), Canada. It contains the main stem of the Elk River (220 km long) and many tributaries, including the Fording River (70 km long). This report focuses on the upper Fording River, which starts 20 km upstream from its confluence with the Elk River at Josephine Falls. The Ktunaxa First Nation has occupied lands in the region for more than 10,000 years. Rivers and streams of the region provide culturally important sources of fish and plants.

The upper Fording River watershed is at a high elevation and is occupied by only one fish species, a genetically pure population of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) — an iconic fish species that is highly valued in the area. This population is physically isolated because Josephine Falls is a natural barrier to fish movement. The species is protected under the federal Fisheries Act and the Species at Risk Act. In BC, the Conservation Data Center categorized Westslope Cutthroat Trout as “imperiled or of special concern, vulnerable to extirpation or extinction.” Finally, it has been identified as a priority sport fish species by the Province of BC.

The upper Fording River watershed is influenced by various human-caused disturbances including roads, a railway, a natural gas pipeline, forest harvesting and coal mining. Teck Coal Limited (Teck Coal) operates the three surface coal mines within the upper Fording River watershed, upstream of Josephine Falls: Fording River Operations, Greenhills Operations and Line Creek Operations.

Monitoring conducted for Teck Coal in the fall of 2019 found that the abundance of Westslope Cutthroat Trout adults and sub-adults in the upper Fording River had declined significantly since previous sampling

Evaluation of Cause

Following identification of the decline in the Westslope Cutthroat Trout population, Teck Coal initiated an Evaluation of Cause process. The overall results of this process are reported in a separate document (Evaluation of Cause Team, 2021) and are supported by a series of Subject Matter Expert reports.

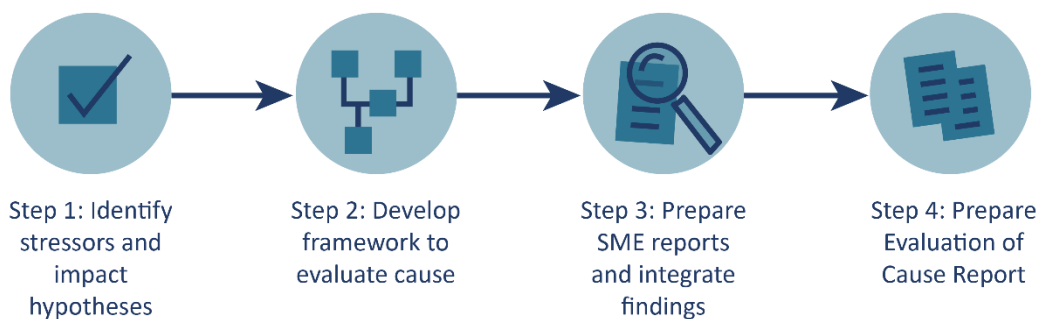
The report that follows this Reader's Note is one of those Subject Matter Expert Reports.

in fall 2017. In addition, there was evidence that juvenile fish density had decreased. Teck Coal initiated an *Evaluation of Cause* process. The overall results of this process are reported separately (Evaluation of Cause Team, 2021) and are supported by a series of Subject Matter Expert reports such as this one. The full list of SME reports follows at the end of this Reader's Note.

Building on and in addition to the Evaluation of Cause, there are ongoing efforts to support fish population recovery and implement environmental improvements in the upper Fording River.

How the Evaluation of Cause was approached

When the fish decline was identified, Teck Coal established an *Evaluation of Cause Team* (the Team), composed of *Subject Matter Experts* and coordinated by an *Evaluation of Cause Team Lead*. Further details about the Team are provided in the Evaluation of Cause report. The Team developed a systematic and objective approach (see figure below) that included developing a Framework for Subject Matter Experts to apply in their specific work. All work was subjected to rigorous peer review.



Conceptual approach to the Evaluation of Cause for the decline in the upper Fording River Westslope Cutthroat Trout population.

With input from representatives of various regulatory agencies and the Ktunaxa Nation Council, the Team initially identified potential stressors and impact hypotheses that might explain the cause(s) of the population decline. Two overarching hypotheses (essentially, questions for the Team to evaluate) were used:

- Overarching Hypothesis #1: The significant decline in the upper Fording River Westslope Cutthroat Trout population was a result of a single acute stressor¹ or a single chronic stressor².
- Overarching Hypothesis #2: The significant decline in the upper Fording River Westslope Cutthroat Trout population was a result of a combination of acute and/or chronic stressors,

¹ Implies September 2017 to September 2019.

² Implies a chronic, slow change in the stressor (using 2012–2019 timeframe, data dependent).

which individually may not account for reduced fish numbers, but cumulatively caused the decline.

The Evaluation of Cause examined numerous stressors in the UFR to determine if and to what extent those stressors and various conditions played a role in the Westslope Cutthroat Trout's decline. Given that the purpose was to evaluate the cause of the decline in abundance from 2017 to 2019³, it was important to identify stressors or conditions that changed or were different during that period. It was equally important to identify the potential stressors or conditions that did not change during the decline window but may, nevertheless, have been important constraints on the population with respect to their ability to respond to or recover from the stressors. Finally, interactions between stressors and conditions had to be considered in an integrated fashion. Where an *impact hypothesis* depended on or may have been exacerbated by interactions among stressors or conditions, the interaction mechanisms were also considered.

The Evaluation of Cause process produced two types of deliverables:

1. **Individual Subject Matter Expert (SME) reports** (such as the one that follows this Note): These reports mostly focus on impact hypotheses under Overarching Hypothesis #1 (see list, following). A Framework was used to align SME work for all the potential stressors, and, for consistency, most SME reports have the same overall format. The format covers: (1) rationale for impact hypotheses, (2) methods, (3) analysis and (4) findings, particularly whether the requisite conditions⁴ were met for the stressor(s) to be the sole cause of the fish population decline, or a contributor to it. In addition to the report, each SME provided a summary table of findings, generated according to the Framework. These summaries were used to integrate information for the Evaluation of Cause report. Note that some SME reports did not investigate specific stressors; instead, they evaluated other information considered potentially useful for supporting SME reports and the overall Evaluation of Cause, or added context (such as in the SME report that describes climate (Wright et al., 2021).
2. **The Evaluation of Cause report** (prepared by a subset of the Team, with input from SMEs): This overall report summarizes the findings of the SME reports and further considers interactions between stressors (Overarching Hypothesis #2). It describes the reasons that most likely account for the decline in the Westslope Cutthroat Trout population in the upper Fording River.

³ Abundance estimates for adults/sub-adults are based on surveys in September of each year, while estimates for juveniles are based on surveys in August.

⁴ These are the conditions that would need to have occurred for the impact hypothesis to have resulted in the observed decline of Westslope Cutthroat Trout population in the upper Fording River.

Participation, Engagement & Transparency

To support transparency, the Team engaged frequently throughout the Evaluation of Cause process. Participants in the Evaluation of Cause process, through various committees, included:

Ktunaxa Nation Council
BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development
BC Ministry Environment & Climate Change Strategy
Ministry of Energy, Mines and Low Carbon Innovation
Environmental Assessment Office

Citation for the Evaluation of Cause Report

When citing the Evaluation of Cause Report use:

Evaluation of Cause Team, (2021). *Evaluation of Cause — Decline in upper Fording River Westslope Cutthroat Trout population*. Report prepared for Teck Coal Limited by Evaluation of Cause Team.

Citations for Subject Matter Expert Reports

Focus	Citation for Subject Matter Expert Reports
Climate, temperature, and streamflow	Wright, N., Greenacre, D., & Hatfield, T. (2021). <i>Subject Matter Expert Report: Climate, temperature, and streamflow trends. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population</i> . Report prepared for Teck Coal Limited. Prepared by Ecofish Research Ltd.
Ice	Hatfield, T., & Whelan, C. (2021). <i>Subject Matter Expert Report: Ice. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population</i> . Report prepared for Teck Coal Ltd. Report Prepared by Ecofish Research Ltd.
Habitat availability (instream flow)	Healey, K., Little, P., & Hatfield, T. (2021). <i>Subject Matter Expert Report: Habitat availability. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population</i> . Report prepared for Teck Coal Limited by Ecofish Research Ltd.

Focus	Citation for Subject Matter Expert Reports
Stranding – ramping	Faulkner, S., Carter, J., Sparling, M., Hatfield, T., & Nicholl, S. (2021). <i>Subject Matter Expert Report: Ramping and stranding. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited by Ecofish Research Ltd.
Stranding – channel dewatering	Hatfield, T., Ammerlaan, J., Regehr, H., Carter, J., & Faulkner, S. (2021). <i>Subject Matter Expert Report: Channel dewatering. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited by Ecofish Research Ltd.
Stranding – mainstem dewatering	Hocking M., Ammerlaan, J., Healey, K., Akaoka, K., & Hatfield T. (2021). <i>Subject Matter Expert Report: Mainstem dewatering. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Ltd. by Ecofish Research Ltd. and Lotic Environmental Ltd. Zathey, N., & Robinson, M.D. (2021). <i>Summary of ephemeral conditions in the upper Fording River Watershed. In Hocking et al. (2021). Subject Matter Expert Report: Mainstem dewatering. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Ltd. by Ecofish Research Ltd. and Lotic Environmental Ltd.
Calcite	Hocking, M., Tamminga, A., Arnett, T., Robinson M., Larratt, H., & Hatfield, T. (2021). <i>Subject Matter Expert Report: Calcite. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Ltd. by Ecofish Research Ltd., Lotic Environmental Ltd., and Larratt Aquatic Consulting Ltd.
Total suspended solids	Durstun, D., Greenacre, D., Ganshorn, K & Hatfield, T. (2021). <i>Subject Matter Expert Report: Total suspended solids. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Ecofish Research Ltd.
Fish passage (habitat connectivity)	Harwood, A., Suzanne, C., Whelan, C., & Hatfield, T. (2021). <i>Subject Matter Expert Report: Fish passage. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Ltd. by Ecofish Research Ltd.

Focus	Citation for Subject Matter Expert Reports
	Akaoka, K., & Hatfield, T. (2021). Telemetry Movement Analysis. In Harwood et al. (2021). <i>Subject Matter Expert Report: Fish passage. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Ltd. by Ecofish Research Ltd.
Cyanobacteria	Larratt, H., & Self, J. (2021). <i>Subject Matter Expert Report: Cyanobacteria, periphyton and aquatic macrophytes. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Larratt Aquatic Consulting Ltd.
Algae / macrophytes	
Water quality (all parameters except water temperature and TSS [Ecofish])	Costa, EJ., & de Bruyn, A. (2021). <i>Subject Matter Expert Report: Water quality. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Golder Associates Ltd. Healey, K., & Hatfield, T. (2021). <i>Calculator to assess Potential for cryoconcentration in upper Fording River.</i> In Costa, EJ., & de Bruyn, A. (2021). <i>Subject Matter Expert Report: Water quality. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Golder Associates Ltd.
Industrial chemicals, spills and unauthorized releases	Van Geest, J., Hart, V., Costa, EJ., & de Bruyn, A. (2021). <i>Subject Matter Expert Report: Industrial chemicals, spills and unauthorized releases. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Golder Associates Ltd. Branton, M., & Power, B. (2021). <i>Stressor Evaluation – Sewage.</i> In Van Geest et al. (2021). <i>Subject Matter Expert Report: Industrial chemicals and unintended releases. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Golder Associates Ltd.
Wildlife predators	Dean, D. (2021). <i>Subject Matter Expert Report: Wildlife predation. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by VAST Resource Solutions Inc.

Focus	Citation for Subject Matter Expert Reports
Poaching	Dean, D. (2021). <i>Subject Matter Expert Report: Poaching. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by VAST Resource Solutions Inc.
Food availability	Orr, P., & Ings, J. (2021). <i>Subject Matter Expert Report: Food availability. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Minnow Environmental Inc.
Fish handling	Cope, S. (2020). <i>Subject Matter Expert Report: Fish handling. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Westslope Fisheries Ltd.
	Korman, J. (2021). <i>Effects of capture and handling on Westslope Cutthroat Trout in the upper Fording River: A brief review of Cope (2020) and additional calculations.</i> Report prepared for Teck Coal Limited. Prepared by Ecometric Research.
Infectious disease	Bollinger, T. (2021). <i>Subject Matter Expert Report: Infectious disease. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by TKB Ecosystem Health Services Ltd.
Pathophysiology	Bollinger, T. (2021). <i>Subject Matter Expert Report: Pathophysiology of stressors on fish. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by TKB Ecosystem Health Services Ltd.
Coal dust and sediment quality	DiMauro, M., Branton, M., & Franz, E. (2021). <i>Subject Matter Expert Report: Coal dust and sediment quality. Evaluation of Cause – Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report prepared for Teck Coal Limited. Prepared by Azimuth Consulting Group Inc.
Groundwater quality and quantity	Henry, C., & Humphries, S. (2021). <i>Subject Matter Expert Report: Hydrogeological stressors. Evaluation of Cause - Decline in upper Fording River Westslope Cutthroat Trout population.</i> Report Prepared for Teck Coal Limited. Prepared by SNC-Lavalin Inc.

1.0 INTRODUCTION

The upper Fording River (UFR) is the portion of the Fording River watershed located upstream of Josephine Falls. Westslope cutthroat trout (WCT) (*Oncorhynchus clarki lewisi*) is the only known fish species occurring within the UFR. The UFR adult fish population declined by 93% based on comparisons of population estimates from snorkel survey data between September 2017 and September 2019 (Cope 2020). This period has been identified as the Westslope Cutthroat Trout Population Decline Window (hereafter referred to as the 'Decline Window').

Teck Coal Limited (Teck Coal) has active mining operations within and adjacent to the UFR valley. The Fording River Operation (FRO), located within the UFR valley just south of the headwaters, includes mining activities on either side of the UFR. The northern extent of the Greenhills Operation (GHO) adjoins the southwest boundary of the FRO. GHO's mining activities occur on portions of the UFR valley's east-facing slopes. Teck Coal's Line Creek Operation (LCO) is located south of the UFR valley; however, the northern extent of LCO occurs within the Dry Creek drainage, which flows into the UFR.

Teck Coal has approached a number of subject matter experts (SMEs) to investigate the Evaluation of Cause (EoC) into the UFR Westslope Cutthroat Trout (WCT) population decline. VAST Resource Solutions Inc. (VAST) was retained to assess the hypothesis that human activity related to illegal fishing (poaching) in the UFR and its tributaries is the cause of or a contributing factor to the decline in the UFR fish population decline.

At the start of the investigation, the Decline Window was identified as the period when snorkel surveys were completed to estimate the UFR fish population status (i.e., September 2017 – September 2019). It was recognized at the start of this investigation into the EoC that further evaluations would occur to better define the Decline Window, as well as the WCT life stages impacted.

This document is one of a series of subject matter expert (SME) reports that support the overall EoC into the UFR Westslope Cutthroat Trout population decline. For general information, see the preceding Reader's Note.

1.1 Objective

The objective of this report is to evaluate and summarize available information of known or suspected fish poaching activities from the UFR as either the cause or contributor to the UFR fish population decline. The specific impact hypothesis evaluated was:

- Can illegal fishing (poaching) activities along the UFR cause or contribute to the UFR fish population decline during the Decline Window?

Poaching activities have the potential to impact both adult and juvenile life stages of WCT.

2.0 METHODS

The following methods were used to assess the poaching hypothesis:

- As part of its ongoing regional wildlife monitoring program, Teck Coal has game/trail cameras deployed throughout the UFR valley, including in the vicinity of GHO and FRO. Photographs from

these trail cameras were reviewed by Golder Associates Ltd. for any signs of human angler occurrence within the UFR valley (see Appendix B).

- Enquiries were made with the British Columbia Conservation Officer Service (BCCOS) regarding documented fish poaching violations on the UFR during the Decline Window.
- Enquiries were made with GHO and FRO environmental site personnel, as well as environmental consultants working for Teck Coal regarding any known poaching activities along the UFR or its tributaries.
- Literature reviews from fish studies completed along the UFR were evaluated to understand historic fish occurrence and distribution, and to identify any anecdotal observations of fishing activity along the UFR.
- A review of fish capture methods that may be used in poaching activities and evaluate the plausibility of them used to explain the UFR fish population decline.

2.1 Requisite Conditions

As identified in the preceding Reader's Note, requisite conditions are defined as the conditions that would need to have occurred for the impact hypothesis to have resulted in the observed decline of the WCT population in the UFR. The requisite conditions took into consideration both spatial and temporal aspects, as well as the intensity of the poaching activities that would be needed to explain the WCT decline (i.e., the cause of the decline). Each of the requisite conditions must be met to support poaching as the cause of the WCT population decline. The requisite conditions for poaching are:

Spatial Extent – poaching activities on the WCT population occurred throughout the UFR and its associated tributaries.

Duration – poaching activities on the WCT population must occur during the Decline Window (i.e., Sept 2017 – Sept 2019).

Location – poaching activities would target specific areas where WCT are known to congregate (e.g., spawning areas, over-wintering areas, barriers to fish passage), making it easier to harvest large numbers of fish.

Timing – poaching activities occurred during time periods when WCT were congregated (i.e., during the over-wintering and spawning periods as identified in the WCT periodicity table [see Appendix A]);

Intensity – poaching activities were at a high enough rate to substantially decrease the UFR fish population.

3.0 RESULTS AND DISCUSSION

Teck Coal completes a number of mine-related activities along the UFR associated with monitoring programs for surface water, groundwater, calcite occurrence, benthic invertebrate sampling, sediment sampling, and in-stream flow measurements. Many of these activities occur from Crown land access to the UFR located outside of Teck Coal's properties, which the general public also has access to. It is assumed that any poaching activities would occur via Crown land access to the UFR and not from within Teck Coal's properties, as the general public is not supposed to have access to mine properties (and the subsequent

portions of the UFR that flows through mine properties). Teck Coal's records identified at least 1,579 potential occurrences when personnel were completing monitoring work located outside of mine properties during the Decline Window. During these potential occurrences, there were no documented incidents of suspected poaching activities identified by Teck personnel or its consultants.

Consultants working for Teck Coal did identify signs of fishing activity along the UFR during the Decline Window. In May 2019, some old fishing line was identified at a campsite located near the Fording River Road bridge across the UFR (Orr, pers. comm. 2020). Outside of the Decline Window, people have been identified angling at a UFR roadside pool; however, in these instances, the anglers were informed that the river was closed to fishing, and the angling activity subsequently ceased (Robinson, pers. comm. 2020). The combination and magnitude of mine-related traffic and monitoring activity along the UFR and its tributaries, it is assumed that people with knowledge of the angling restrictions who may have observed illegal angling activities at the UFR and its tributaries would have either informed the anglers of the violation with angling subsequently ceasing, or reported these observations to the appropriate authorities.

FRO personnel identified potential poaching activity from trail camera footage on Crown land near the Chauncey Creek confluence, outside of the Decline Window (Wilm, pers. comm. 2020). On June 27, 2017, three people were identified carrying fishing rods, as well as another person wearing a fishing vest. However, no fish were identified with the people captured on the trail camera footage. GHO personnel were not aware of any fish poaching activities occurring within or outside of their operational boundaries (Leigh Stickney, pers. comm. 2020). Teck Coal's game/trail cameras data from the UFR valley revealed two (2) possible instances of human anglers being detected during the Decline Window on lands outside of mine properties; one at Fording Critical Riffle #1 and one at Fording Critical Riffle #3 (see Appendix B). Angling at any of the mine operations is not permissible due to the prohibitions enacted in 2010; however, angling is permissible for approved sampling and research programs (Wilm, pers. comm. 2020). The people captured on trail camera footage were not anglers affiliated with a Teck approved sampling and research program. Public access is not allowed to the portions of the UFR located within Teck Coal's mining operations.

Potential poaching activities have been previously identified along the UFR outside of the Decline Window. Cope's (2016) report identified evidence of fishing activity in the UFR in 2015. Specifically, discarded bait bags were identified along the UFR shoreline in April and May 2015. Fish entrails were also identified at the Chauncey Creek confluence. It was postulated that the fish entrails were from the illegal harvest of fish from either the UFR or Chauncey Creek; however, this was not confirmed and the number of individual fish represented in the entrail pile was not known.

Sport fishing at the UFR and its tributaries has been prohibited since 2010. The BCCOS reviewed their database and did not identify any documented poaching violations in the UFR during the Decline Window (Melenka 2020a). Limited public access to the UFR coupled with vehicular traffic along the Fording River highway that parallels the UFR may result in public observation and possible reporting of poaching activities. However, the BCCOS patrols the UFR area for many reasons throughout a given year, and completes visual checks along the river for any non-compliant activities (Melenka 2020b).

Poaching activities required to remove a substantial number of fish from the UFR would likely require a large, coordinated effort. For example, poaching via angling methods would require multiple visits by numerous anglers over a wide range of the UFR to remove a substantial number of fish. These activities

likely would have been identified by personnel working on Teck Coal's monitoring programs along the UFR, as many of these program sites are visited on a frequent basis. There may be an increased chance of an interaction or signs of activity between anglers and personnel working on Teck's monitoring programs. While angling activities were identified by personnel working for Teck along the UFR, these occurrences were sporadic and uncommon, involving a few anglers. Additionally, poaching activities may leave residual evidence of the poaching event taking place. As angling (poaching) effort increases in a waterbody, so too may the amount of discarded/lost angling gear. Snorkel surveys completed on the UFR in September 2020 identified discarded angling gear in one location only: beneath the Highway bridge (Meunier pers. comm. 2020). This indirect evidence supports a low frequency of poaching occurrences on the UFR via angling methods.

A more effective means of poaching (in terms of the quantity of fish harvested) involves the use of gill nets. Gill nets are used in commercial fishing as well as for research purposes. To harvest a large number of fish, gill nets would need to be strung across the UFR in various locations along its entire length in places having little to no measureable flow (to prevent the current from displacing nets) in attempts to capture fish. However, this poaching method at the UFR is likely not realistic for a number of reasons:

First – Public access is restricted to portions of the UFR enveloped by mine properties; therefore, fish occurring in the portions of the UFR enveloped by FRO mine properties would not interact with theoretical poaching gill nets placed in the UFR accessed via Crown lands. Cope (2016) identified the WCT home range within the UFR averaged 11.54 km +/- 1.51 km (range between 0.68 km and 31.59 km), with some fish showing very small overall movements. FRO envelops approximately 12 kilometres of UFR channel. As such, any fish whose home range does not include movements downstream of FRO mine boundaries would not have the potential to interact with theoretical gillnets placed in the UFR accessed via Crown lands. Therefore, for poaching activities via gill netting to have a profound effect on fish removal from the UFR (i.e., a magnitude contributing to or exceeding that inside the Decline Window), nets would need to be placed throughout the entire length of the UFR. As mentioned earlier, mine property boundaries may prevent public access to portions of the UFR. Nets were not deployed at FRO during the Decline Window (Wilm pers comm. 2021).

Second – the UFR receives an abundance of woody debris based on the presence of numerous log jams. Existing woody debris has the potential to become adrift during spring freshet and large runoff events, or new woody debris becoming adrift. Any nets within the UFR would be at risk of entanglement with floating or suspended woody debris. Following entanglement, there is a risk that such nets could potentially set adrift and become lost downstream. Lost gill nets in an aquatic ecosystem can cause substantial ecological impacts from ghost fishing removals of a fish population (Gilman et al. 2016). Snorkel surveys completed in 2017, 2019, and 2020 did not identify lost or abandoned gill nets within the UFR, so it is unlikely this potential vector to poaching occurred.

Third – To remove a substantial number of fish, nets would be most effectively deployed at time periods when fish congregate/aggregate in specific locations (i.e., spawning grounds, over-wintering areas, and barriers to fish passage) and/or along a persistently used movement corridor. Cope (2016) identified fish aggregations in specific locations along the UFR at different time periods. Approximately 40% of radio-tagged fish were found to over-winter in portions of the UFR enveloped by mine properties. Spawning activities were identified in areas surrounded by Crown land (i.e., S6 groundwater upwelling area and side channels, S6 Fording River oxbow, log jam sites between S3 and S5, the Dry Creek confluence to the

Fording River mainstem, log jams between Josephine Falls and the Fording River highway bridge, and Greenhills Creek) and in Clode Flats and its associated remnant tributary habitat (within the Fording River Operation [FRO]). From these sites, the highest occupancy rates of spawning fish based on redds distribution and telemetry locations were primarily at Clode Flats and associated remnant tributary habitat. Barriers to fish passage were identified for portions of the UFR and its tributaries located within the FRO and were associated with specifically constructed fish barriers and/or inadequately designed culverts (Cope et al. 2016). Based on these fish aggregation summaries, a substantial proportion of fish aggregations occur on portions of the UFR enveloped by mine properties. Given restrictions on access by members of the general public to these properties, it is unlikely that any potential poaching activities occurred in these areas. As such, there is limited evidence to support that poaching activities occurred in areas where fish are known to congregate.

Fourth – Cope (2016) found fish distributed throughout the UFR: some fish exhibited migration movements, while others remained relatively confined to a localized area. Gill nets are dependent on capturing fish from their movements through a waterbody. A lack of movement by some individuals may reduce the chance of interactions with nets that may have been deployed by poaching activities, thereby reducing the likelihood of being captured.

Lastly – gill nets are typically designed to capture a certain size of fish based on the mesh size of the net. Large mesh sizes capture larger fish when they attempt to swim through the mesh, getting entangled around the gill plate. Smaller fish can typically swim through the larger mesh and avoid capture. However, with a smaller mesh size designed to capture smaller fish, the larger fish would most often ‘bounce’ off the smaller mesh and rarely become entangled. Cope et al. (2020) found a 93% decline in the adult fish population based on snorkel survey data, and a 74% decline in annual density estimates for fry and juvenile age classes. As the population decline was identified across fish age classes, poaching activities associated with gill nets are likely not a viable technique explaining the fish population decline: this technique focusses on capturing certain age/size classes of fish.

Estimating the impact that poaching may have on a fishery is inherently difficult due to the covert nature of purposeful poaching activity, which limits the availability of reliable data on the intensity, timing, and spatial distribution of poaching events. However, unintentional poaching activities are usually easier to identify due to people being uninformed of fishing prohibitions for a waterbody. Unintentional poaching activities are anticipated to result in a small number of fish harvested.

4.0 REQUISITE CONDITIONS AND UNCERTAINTIES

The summary of reviewed information identified limited evidence of poaching activities at the UFR and its tributaries. A summary of the evaluation of the requisite conditions based on the findings from the investigation on fish poaching activities are:

Spatial extent – this requisite condition was not met, as evidence of poaching activities was limited to specific locations along the UFR. Portions of the UFR are enveloped by mining operations where angling is not allowed. Fishing activities are mining operation is only permissible for approved sampling and research programs which have not involved using gill nets for sampling purposes. Fish congregations at certain time periods are found to primarily occur on mine-related properties; this may explain why poaching activities using gill nets likely did not contribute to the fish population decline. Gill netting would

have had to occur on mine-related properties during the Decline Window to explain the fish population decline via poaching.

Duration – this requisite condition was not met as there was limited evidence of fish poaching activities during the Decline Window. The evidence found identified people with fishing roads near the confluence of Chauncey Creek, but did not identify actual fish harvested.

Location: this requisite condition was not met, as there was no evidence of poaching activities occurring where fish are known to congregate, making them easier to catch. Fish congregated in areas of the UFR enveloped by mine properties. This should have prevented the means of removing large numbers of fish from the UFR by the general public (or by nefarious activities such as gill netting) during the Decline Window.

Timing: poaching activities were not identified during time periods when fish are known to congregate (i.e., spawning period, overwintering period); therefore, this requisite condition was not met.

Intensity: there was no evidence of poaching activities which would have resulted in a substantial decrease in the UFR fish population. As such, this requisite condition was not met.

Confirming poaching activities requires regulatory agencies like the BCCOS to be informed of activities occurring and catching people completing this activity. This requires either regulatory personnel completing reconnaissance of the UFR for poaching activities on a consistent basis or relying on the general public to report poaching activities to the BCCOS that can enforce and cease any future poaching activities. These conditions were not identified to have occurred from this investigation.

The results of this investigation into poaching activities at the UFR does not support the hypothesis that poaching activities resulted in a substantial decrease in the UFR fish population. Access to the UFR for fishing is limited to a few locations between Josephine Falls and the FRO. Environmental personnel at both the GHO and FRO are not aware of any poaching activities within each mine site during the Decline Window. There is limited evidence of any poaching activities during the Decline Window.

Evaluating the Illegal harvest of fish as a stressor responsible for the decline in the UFR WCT population is difficult due to high levels of uncertainty resulting from the complex nature of poaching activity. While there is supporting evidence that illegal fishing did occur during the Decline Window, there is no evidence that a substantial number of fish had been harvested as a result of potential fish poaching activities. For fish poaching activities to have a measurable impact on the UFR fish population would either require extensive fishing activity by anglers (which was not identified during the Decline Window), or for poachers to strategically place gill nets in areas where fish congregate to facilitate the removal of large quantities of fish. Neither of these instances were identified from this investigation into fish poaching activities. The summarized locations of fish congregations along the UFR identified occurrences within mine properties, which should inhibit access by the general public. In addition, gill netting did not occur within mine properties for Teck-related monitoring during the Decline Window. Given the BCCOS did not identify any reported violations of poaching activities, this also reduces the likelihood that poaching activities caused a substantial removal of fish from the UFR. As such, it is unlikely that poaching activities have impacted the UFR fish population to the degree as the identified population decrease.

5.0 CONCLUSION

Based on the results of the game/trail camera data review, enquires with the BCCOS and Teck Coal personnel, and other available information, there is insufficient evidence to support the hypothesis that poaching activities had a substantial impact on the UFR fish population during the Decline Window. Given the frequency and intensity of fish poaching activities required to remove 93% of the adult fish population during the Decline Window, it is likely that at least some fish poaching activities would have been observed and reported, especially if large numbers of harvested fish had been identified. In conclusion, there is insufficient evidence that fish poaching activities could have been a contributing factor to the UFR fish population decline.

6.0 LITERATURE CITED

- Cope, S. 2020. Upper fording river westslope cutthroat trout population monitoring project: 2019. Report prepared for Teck Coal Limited, Sparwood, BC. Report prepared by Westslope Fisheries Ltd., Cranbrook, BC. 48 p. + 2 app.
- Cope, S., C.J. Schwarz, A. Prince and J. Bisset. 2016. Upper fording river westslope cutthroat trout population assessment and telemetry project: final report. Report prepared for Teck Coal Limited, Sparwood, BC. Report prepared by Westslope Fisheries Ltd., Cranbrook, BC. 266 p.
- Gilman, E., F. Chopin, P. Suuronen, and B. Kuemlangan. 2016. Abandoned, lost and discarded gillnets and trammel nets – methods to estimate ghost fishing mortality, and the status of regional monitoring and management. Food and Agriculture Organization of the United Nations, Rome. FAO Fisheries and Aquaculture Technical Paper 600. 96 pp.
- Jensen, C. 2020. Environmental Technician. Teck Resources Limited – Fording River Operation, British Columbia. Telephone conversation. June 16, 2020.
- Melenka, J. 2020a. Acting Sargeant, East Kootenay Zone, Conservation Officer, Ministry of Environment. Email correspondence. June 16, 2020.
- Melenka, J. 2020b. Acting Sargeant, East Kootenay Zone, Conservation Officer, Ministry of Environment. Email correspondence. November 18, 2020.
- Meunier, B. 2020. Fisheries Biologist – VAST Resource Solutions. Telephone conversation. October 6, 2020.
- Stickney, L. 2020. Water Management Lead. Teck Resources Limited – Greenhills Operation, British Columbia. Telephone conversations. June 16, 2020.
- Wilm, L. 2020. Senior Environmental Coordinator. Teck Resources Limited – Fording River Operation, British Columbia. Email correspondence. July 9 and August 17, 2020.
- Wood, J.A., and R.J. Berdusco. 1999. Fording River revisited a review of environmental projects at fording coal limited's operations at Fording River over the last 25 years. Proceedings of the 23rd Annual British Columbia Mine Reclamation Symposium, Kamloops, BC. 13 pp.

APPENDIX A: UPPER FORDING RIVER FISH PERIODICITY TABLE

Fording River																																																					
Species/Ecosystem	Life Stage	Jan				Feb				Mar				Apr				May				Jun				Jul				Aug				Sep				Oct				Nov				Dec							
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Westslope Cutthroat Trout	Spawning migration													■	■	■	■	■	■	■	■																																
	Spawning													■	■	■	■	■	■	■	■																																
	Incubation (egg & alevin)																	■	■	■	■	■	■	■	■																												
	Summer Rearing (≥7° C)																					■	■	■	■	■	■	■	■																								
	Over-wintering migration																																																				
	Over-wintering																																																				
	Juvenile migration																																																				
	Icing Days																																																				
	Channel Formation																	■	■	■	■																																
	Off-Channel Connectivity																																																				

APPENDIX B: GOLDR ASSOCIATES LTD. TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM

DATE March 1, 2021

Project No. 19136042/TM01

TO Michael Moore
Teck Coal Limited

CC Christine Deynaka, Emily-Jane Costa

FROM Kyle Knopff

EMAIL kyle_knopff@golder.com

HYPOTHESIS #3: PREDATION AND POACHING

Teck Coal Limited (Teck) retained Golder Associates Ltd. (Golder) to review photographs collected as part of Teck's regional wildlife monitoring program and Teck's fish offset monitoring in the vicinity of Teck's Greenhills Operation (GHO) and Fording River Operation (FRO) and identify potential predators of fish that may have been captured in the images. Golder's review focused on identifying the following:

- River otter (*Lontra canadensis*)
- Birds that prey on fish, such as bald eagles (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*)
- Human anglers

The review included images from 61 cameras deployed as part of Teck's regional wildlife monitoring program in the vicinity of GHO and FRO and 9 cameras from Teck's fish offset monitoring (i.e., Fording Critical Riffle camera numbers 1-5 and Fording Piezometer camera numbers 1, 2, 3, and 5).

No native fish predators were detected on any of the cameras included in this analysis, and only 2 possible instances of anglers were detected, one at Fording Critical Riffle #1 and one at Fording Critical Riffle #3.

Importantly, none of the cameras used in this analysis was deployed specifically to detect native predators of fish, such as river otters. Cameras deployed for the regional wildlife monitoring program were deployed primarily in terrestrial ecosystems away from where river otters might be expected to commonly occur and focused on detecting the following five target species of large mammals: Bighorn sheep (*Ovis canadensis*) Elk (*Cervus elaphus*) Moose (*Alces alces*) Grizzly bear (*Ursus arctos*) Canada lynx (*Lynx canadensis*). Cameras deployed to monitor fish offset sites were deployed in areas where river otters and other predators of fish were likely to occur, but these cameras were programmed to take pictures hourly to monitor conditions at the offset site, not to detect wildlife.

Because cameras did not target fish predators, these data cannot be conclusively used to demonstrate absence of predators of fish in the vicinity of GHO and FRO.

Should you have any questions about the finding presented in this memorandum, please do not hesitate to contact the undersigned.

A handwritten signature in black ink, appearing to read "Kyle Knopff". The signature is written in a cursive, somewhat stylized font.

Kyle Knopff (PhD, PBIOL, RPBIO)
Associate, Senior Wildlife Biologist