Site C Clean Energy Project

Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program (Mon-1b)

Task 2c – Site C Reservoir Tributaries Fish Population Indexing Survey

Construction Year 8 (2022)

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REPORT

2022 Annual Report

Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c)

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EXECUTIVE SUMMARY

In accordance with Provincial Environmental Assessment Certificate Condition No. 7[1] and Federal Decision Statement Condition Nos. 8.4.3[2] and 8.4.4[3] for BC Hydro's Site C Clean Energy Project (the Project), BC Hydro has developed the Site C Fisheries and Aquatic Habitat Monitoring and Follow-up Program (FAHMFP[4]). The Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program (Mon-1b) represents one component of the FAHMFP that is designed to monitor the responses, using before and after comparisons, of target Peace River fish populations to the construction and operation of the Project. Target species include Arctic Grayling (*Thymallus arcticus*), Bull Trout (*Salvelinus confluentus*), and Rainbow Trout (*Oncorhynchus mykiss*) because these species spend portions of their life cycle in Peace River tributaries and migrate past the Project to fulfill their life history requirements.

Under the Site C Reservoir Tributaries Fish Population Indexing Survey (Task 2c of Mon-1b), annual surveys are conducted to monitor target fish species, and in 2022, population assessments were conducted in the Moberly River for Arctic Grayling, the Chowade River and Cypress and Fiddes creeks for Bull Trout, and in Colt, Farrell, Kobes, and Maurice creeks for Rainbow Trout. Sampling conducted in 2022 represents the second year of sampling after the commencement of the river diversion phase of Project construction (3 October 2020).

Backpack electrofishing was the primary sampling method for all streams, except the Moberly River, where a combination of backpack electrofishing, small-fish boat electroshocking, and angling was used. In 2022, field methods, target species, and sampled streams were identical to the 2017, 2018, and 2019 surveys, with the addition of sampling for Rainbow Trout in Maurice Creek in 2020 and 2021. Tissue and ageing structure samples were also collected from select species at some locations for potential genetic and microchemistry analyses in support of the FAHMFP; however, these samples were not analyzed as part of the current study.

The primary objective of the study was to monitor the above three species; however, a secondary objective for sampling in the Chowade River and Cypress Creek was to implant passive integrated transponder (PIT) tags into Bull Trout. Tagged Bull Trout are also monitored by PIT detector arrays installed in the Chowade River and Cypress Creek as part of the Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b). To increase the likelihood of deploying more PIT tags into Bull Trout, the upstream areas of these streams were specifically targeted, as greater densities of immature Bull Trout were recorded in these areas during reconnaissance surveys conducted in 2016. Although multiple sites were sampled in the Chowade River and Cypress Creek, sampling in Fiddes Creek was limited to portions of the stream that were accessible by helicopter and assumed representative of Fiddes Creek. Key results from the 2022 survey are summarized as follows:

[1] The EAC Holder must develop a Fisheries and Aquatic Habitat Monitoring and Follow-up Program to assess the effectiveness of measures to mitigate Project effects on healthy fish populations in the Peace River and tributaries, and, if recommended by a QEP or FLNR, to assess the need to adjust those measures to adequately mitigate the Project's effects.

[2] "The plan shall include: an approach to monitor changes to fish and fish habitat baseline conditions in the Local Assessment Area."

[3] "The plan shall include: an approach to monitor and evaluate the effectiveness of mitigation or offsetting measures and to verify the accuracy of the predictions made during the environmental assessment on fish and fish habitat."

[4] Site C Fisheries and Aquatic Habitat Monitoring and Follow-up Program available at https://www.sitecproject.com/document-library/environmental-management-plans-and-reports.

Tributaries Targeting Bull Trout (Chowade River, Cypress and Fiddes creeks)

- A total of 1076 Bull Trout were captured in the Chowade River, and Cypress and Fiddes creeks combined. Of this total, 755 Bull Trout were implanted with PIT tags, representing the highest number of PIT tags deployed in these streams in one year as part of the Mon-1b, Task 2c study. Captured Bull Trout included Young-of-the-Year (YOY) and immature life stages.
- Two immature Bull Trout captured in Fiddes Creek were recaptures that were initially captured and tagged in 2021 in Fiddes Creek. Inter-year recaptured Bull Trout were not encountered in 2022 in the Chowade River or Cypress Creek. When comparing Bull Trout catch rates in the Chowade River and Cypress and Fiddes creeks among years, catch per unit effort (CPUE) for YOY and immature Bull Trout increased year-over-year between 2019 and 2021 with a slight decrease in 2022 in Chowade River and Fiddes Creek. Overall, the findings of 2022 indicate that Bull Trout successfully spawned within these systems in 2021, and recruitment to the immature Bull Trout population has been strong in the Chowade River and Cypress and Fiddes creeks in recent years.
- Consistent with results from 2017 to 2021, Arctic Grayling were not recorded in the Chowade River or in Cypress or Fiddes creeks. No Rainbow Trout were recorded in Chowade River and Cypress and Fiddes creeks.

Tributaries Targeting Rainbow Trout (Colt, Farrell, Kobes, and Maurice creeks)

- A total of 265 Rainbow Trout were captured in Colt, Farrell, Kobes, and Maurice creeks combined. Of this total, 200 were implanted with PIT tags. Seventeen tagged immature Rainbow Trout were captured in 2022 that were originally captured in 2020 and 2021. Recaptured Rainbow Trout were encountered in all the tributaries sampled in 2022. One recaptured Rainbow Trout in Maurice Creek was originally captured and tagged in 2020, recaught in 2021 and then again in 2022.
- In 2022, YOY Rainbow Trout were captured in Colt and Farrell creeks providing evidence of successful spawning within these tributaries in the spring of 2022. Immature Rainbow Trout were captured in all surveyed tributaries.
- YOY Rainbow Trout were not captured in Colt and Maurice creeks in 2022, suggesting low recruitment. This finding is consistent with previous years (2017 to 2021) where total catch of YOY Rainbow Trout in all tributaries (n = 112) sampled have been low (range = 0 to 29). The low total catch rates may be more an artefact of the capture method than actual low numbers.
- Whether Rainbow Trout from Farrell and Maurice creeks are a local resident population or are offspring of the Peace River Rainbow Trout population remains unknown. Since 2017, PIT tagged Rainbow Trout originally captured in Farrell or Maurice creeks have not been identified in the Peace River during the Peace River Large Fish Indexing Survey (Mon-2, Task 2a). Furthermore, Rainbow Trout originally PIT tagged in the Peace River have not been identified in Farrell or Maurice creeks. However, radio telemetry tagged adult Rainbow Trout have been detected as far as 95.5 km upstream in Farrell Creek and as far as 1.9 km upstream in Maurice Creek as part of the Site C Fish Movement Assessment (Mon-1b, Task 2d), indicating the use of these systems by the Peace River Rainbow Trout population.

Tributaries Targeting Arctic Grayling (Moberly River)

- A total of 29 Arctic Grayling were captured in the Moberly River in 2022. Of this total, 22 were implanted with PIT tags. Captured Arctic Grayling included YOY and immature life stages.
- The majority of Arctic Grayling captured in 2022 were found in Sections 1A and 7, with the highest densities of Arctic Grayling occurring within a 4.0-km section of river between River Km 117.9 and 113.9 and a 2.0-km section of river between River Km 38.0 and 36.0. The habitat in both of these sections of the Moberly River were identified as irregular meandering channels. Section 7 was highly braided with multiple side channels and there is evidence of groundwater upwelling within some side channels.
- In 2022, two immature Bull Trout and one immature Rainbow Trout were captured in the Moberly River. Both species have been previously captured in the Moberly River but the overall abundance of these species is low and likely limited to individuals using the stream for feeding purposes.

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LIST OF ACRONYMS AND ABBREVATIONS

Acronym	Description
BTIPM	Bull Trout Integrated Population Model
CPUE	Catch per unit effort
EAC	Environmental Assessment Certificate
EIS	Environmental Impact Statement
FAHMFP	Fisheries and Aquatic Habitat Monitoring and Follow-up Program
FL	Fork Length
HDX	Half-Duplex
Mon-1b	Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program
Mon-2	Peace River Fish Community Monitoring Program
Mon-15	Site C Small Fish Translocation Monitoring Program
PCD	Peace Canyon Dam
PIT	Passive Integrated Transponder
Project	Site C Clean Energy Project
Task 2a	Peace River Large Fish Indexing Survey
Task 2b	Peace River Bull Trout Spawning Assessment
Task 2c	Site C Reservoir Tributaries Fish Population Indexing Survey
Task 2d	Site C Fish Movement Assessment
TUF	Temporary Upstream Fish Passage Facility
YOY	Young-of-the-year

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1.0 INTRODUCTION

In accordance with Provincial Environmental Assessment Certificate (EAC) Condition No. 7 and Federal Decision Statement Condition Nos. 8.4.3 and 8.4.4 for BC Hydro's Site C Clean Energy Project (the Project), BC Hydro developed the Site C Fisheries and Aquatic Habitat Monitoring and Follow-up Program (FAHMFP). The Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program (Mon-1b) represents one component of the FAHMFP that is designed to monitor Peace River fish populations that use tributaries in the future inundation zone of the Site C reservoir to fulfil portions of their life cycle. Most notably, these species include Arctic Grayling (*Thymallus arcticus*), Bull Trout (*Salvelinus confluentus*), and Rainbow Trout (*Oncorhynchus mykiss*). The Site C Reservoir Tributaries Fish Population Indexing Survey (Task 2c) is one component of Mon-1b that intends to monitor the populations of Arctic Grayling, Bull Trout, and Rainbow Trout that are known to spawn in Site C reservoir tributaries and how these populations are impacted by the construction and operation of the Project. This report summarizes the 2022 findings of Task 2c.

This is the seventh year of a multi-year study, and the data collected in 2022 represents the second year of sampling conducted after the Project entered the diversion phase of construction, which commenced on 3 October 2020. After this date, the entire flow of the Peace River was diverted into two tunnels routed along the left (looking downstream) bank of the Peace River, to allow for further construction activities associated with the Project. The diversion tunnels allow for downstream fish movement, but do not allow for upstream movement due to high water velocities within the tunnels. Upstream fish movement is facilitated by the temporary upstream fish passage facility (TUF) operated by BC Hydro from 1 April to 31 October each year (McMillen and BC Hydro 2021).

During Task 2c's 2016 survey, reconnaissance surveys were conducted that consisted of a broad spatial scope within each of the sampled tributaries (Golder 2017). During the 2017 to 2022 surveys (Golder 2018, 2019, 2020a, 2021a, 2022a), methods were similar and focused on key areas that were identified during the 2016 reconnaissance surveys.

1.1 Bull Trout

A key uncertainty identified in the Project's Environmental Impact Statement (EIS) relates to the movement of Peace River Bull Trout during and after construction of the Project, which in turn, influences the number of spawning Bull Trout expected to be present in the Halfway River[5]. The Halfway River is known to be an important watershed for spawning by Peace River Bull Trout (Geraldes and Taylor 2020; Putt et al. 2021; AMEC and LGL 2008a, 2008b, 2010a, 2010b; BC MELP 2000; Burrows et al. 2001; Pattenden et al. 1991). The objective of the Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b) is to monitor Bull Trout spawner and redd abundance in select tributaries of the Halfway River watershed to monitor the population's response to the construction and operation of the Project (Putt et al. 2023). The abundance of adult Bull Trout in the Halfway River watershed, as monitored under Task 2b, may be influenced by changes in the abundance of immature Bull Trout in tributaries of the Halfway River and by changes in the abundance of the Halfway River's resident Bull Trout population. Therefore, Task 2c is designed, in part, to monitor immature Bull Trout abundance in Halfway River tributaries to test Hypothesis #3 within the Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program:

H_3: Bull Trout juvenile abundance in the Halfway River will not decline relative to baseline estimates.

[5] Site C Clean Energy Project Environmental Impact Statement, Volume 2, Appendix Q3.

A program dedicated to monitoring immature Bull Trout abundance in the Halfway River watershed had not been implemented prior to 2016, although incidental catches were noted during some studies (e.g., Mainstream 2009a, 2010, 2011a, 2013). The current year (2022) represented the second year of the study since the onset of river diversion associated with the Project. However, the current year is the first year in which the young-of-the-year (YOY) Bull Trout captured during the study would have been the offspring of adult Bull Trout that migrated into the Halfway River watershed after river diversion had started (i.e., even though the YOY Bull Trout captured in 2021 would have hatched after the start of river diversion, they would have been the offspring of adult Bull Trout that migrated into the Halfway River before river diversion started).

The objective of the study was to deploy passive integrated transponder (PIT) tags into captured immature Bull Trout. The data collected from PIT-tagged immature Bull Trout will be incorporated (along with data from other FAHMFP studies) into the Bull Trout Integrated Population Model (BTIPM; ESSA et al. 2020) to evaluate juvenile-to-adult survival and to generate population abundance estimates. The outputs from the BTIPM will be used to monitor changes in the Halfway River Bull Trout population over time and address the above uncertainty. Furthermore, the movements of PIT-tagged Bull Trout will be monitored using PIT detector arrays installed in the Chowade River and Cypress Creek (Appendix A, Figure A1) as a component of Mon-1b, Task 2b (Ramos-Espinoza et al. 2018, 2019; Putt et al. 2020, 2021, 2022, 2023). Having a thorough understanding of the movement patterns of both adult and immature Bull Trout in the study area will provide insight into this species' life history characteristics. Most notably, movement data will help confirm the presence or absence of resident populations, the timing of both pre- and post-spawn movements by adults, the residence time of immature life stages, the timing of downstream immature dispersal, and the extent of skipped-spawning by adults.

The portions of the Chowade River and Cypress and Fiddes creeks that were sampled in 2022 were selected based on locations sampled in previous years where catches of Bull Trout were high (Golder 2017, 2018, 2019, 2020a, 2021a, 2022a) and sections previously identified as important for spawning Bull Trout (Euchner and Mainstream 2013). Sampling effort from 2017 to 2022 focused on the portions of each tributary where densities of immature Bull Trout were expected to be high and densities of adult, pre-spawning Bull Trout that would be sensitive to capture and handling were expected to be low.

1.2 Rainbow Trout

The Project's EIS identified uncertainties regarding the continued use of Maurice and Lynx creeks for spawning and rearing by Peace River Rainbow Trout populations. Sampling in Maurice Creek was not conducted under Task 2c from 2017 to 2019 due to site access limitations associated with sampling crew safety and security. Sampling in Lynx Creek was not conducted under Task 2c during any study year due to ongoing high turbidity levels[6] precluding fish sampling. Landslides in the Lynx Creek watershed have reduced the quality of Rainbow Trout spawning and rearing habitat through increased sediment deposition. Based on these factors, Lynx Creek was not considered as a candidate index stream for monitoring the long-term status of the Peace River Rainbow Trout population.

[6] The source of the high turbidity in Lynx Creek has been associated with an upstream landslide in Brenot Creek, a tributary to Lynx Creek.: https://hudsonshope.ca/district-office/public-works/water-services/water-advisories/.

Prior to 2017, Farrell, Colt, and Kobes creeks were selected, in consultation with BC Hydro[7], as alternative tributaries to monitor local Rainbow Trout populations. The sites established in Farrell, Colt, and Kobes creeks in 2017 were replicated in study years 2018 to 2022. In 2020, sampling was conducted in Maurice Creek for the first time under the FAHMFP. Sampling in Maurice Creek was repeated at the same locations in 2021 and 2022.

Farrell and Maurice creeks both flow directly into the Peace River. Farrell Creek flows into the Peace River approximately 23.5 km downstream of Peace Canyon Dam (PCD) and Maurice Creek flows into the Peace River approximately 7 km downstream of PCD. Sampling in Farrell and Maurice creeks provides data to test Hypothesis #3 from the Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program:

H_3: Rainbow Trout from Site C Reservoir will continue to spawn and rear in Maurice and Lynx creeks upstream of the Site C Reservoir inundation zone.

The presence of YOY Rainbow Trout in Farrell Creek during summer surveys would be taken as confirmation that Rainbow Trout spawned in the system in the spring of the same year. Furthermore, the subsequent detection of Rainbow Trout, that were initially tagged as YOY or immature fish in Farrell or Maurice creeks, in the Peace River mainstem will provide confirmation that these systems are used for spawning by the Peace River Rainbow Trout population.

Rainbow Trout populations in Kobes and Colt creeks were also assessed in 2022. Kobes Creek is a tributary to the Halfway River, flowing into the Halfway River at River Km 76, as measured upstream from the Halfway River's confluence with the Peace River. Colt Creek is a tributary to the Graham River, flowing into the Graham River at River Km 11.5, as measured upstream from the Graham River's confluence with the Halfway River. The Graham River flows into the Halfway River 90 km upstream from the Halfway River's confluence with the Peace River. Rainbow Trout data from Colt and Kobes creeks will be used to provide an index of relative Rainbow Trout abundance and to gather information regarding movements between sites and between study years in the Halfway River watershed.

1.3 Arctic Grayling

The Project's EIS describes key uncertainties for the Peace River Arctic Grayling population upstream of the Project[8]. These include the species' ability to overwinter in the Moberly River and its response to the Project's creation of reservoir habitat. Annual sampling in the Moberly River under Task 2c between 2016 and 2022 was conducted to add to the existing dataset (e.g., Mainstream 2013) to further describe the fish community located within and upstream of the Site C reservoir inundation zone and improve understanding of the Moberly River Arctic Grayling population. Collected data will be used to test Hypothesis #5 from the Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program:

H_5: A self-sustained population of Arctic Grayling will remain in the Moberly River.

To test the above hypothesis, the presence of YOY Arctic Grayling in the Moberly River during the summer surveys would be taken as confirmation that Arctic Grayling spawned in the system in the spring of the same year, and that a self-sustained population of Arctic Grayling remains in the Moberly River.

[7] BC Hydro also reviewed the streams to sample for Rainbow Trout with the Project's Fisheries and Aquatic Habitat Mitigation and Monitoring Technical Committee.

[8] Site C Clean Energy Project Environmental Impact Statement, Volume 2, Appendix Q3.

2.0 METHODS

2.1 Study Area

The Task 2c study area includes tributaries that were previously identified as having key habitats for migratory Peace River Bull Trout, Rainbow Trout, and Arctic Grayling populations (Appendix A, Figures A1 to A10). Sections of each tributary that were sampled depended on sampling logistics and the species-specific hypotheses being tested. Results from the six previous years of the survey (2016 to 2021) were used to guide sample site selection with a focus on reaches and habitat types with higher densities of the target fish species. Target fish species within the tributaries sampled in 2022 are summarized in Table 1.

Table 1: Summary of target species by watershed for the Site C Reservoir Tributaries Fish Population Indexing Survey, 2022.

Species	Watershed							
	Chowade River	Cypress Creek	Fiddes Creek	Colt Creek	Farrell Creek	Kobes Creek	Maurice Creek	Moberly River
Arctic Grayling	-[a]	-	-	o	o	o	-	x
Bull Trout	x	x	x	o	-	o	-	-
Rainbow Trout	o	o	-	x	x	x	x	-

[a] "x" denotes main target species for the tributary; "o" denotes secondary target species for the tributary; "-" denotes not a target species for the tributary.

River Km values presented in this report were based on the Government of Canada's CanVec series of hydrograph features[9]. For each tributary, the different line segments of the same stream were merged into a single line feature. River Km 0.0 (i.e., the tributary's confluence) was set at the lowest elevation of the line feature, and 1 km intervals were established along the line feature using the Create Station Points tool (ArcGIS© extension ET GeoWizards).

2.1.1 Tributaries Targeting Bull Trout

Tributaries sampled in 2022 included the Chowade River and Cypress and Fiddes creeks (Table 1). Sampling in the Chowade River was conducted between River Km 36.4 and River Km 52.7, as measured upstream from the Chowade River's confluence with the Halfway River (Appendix A, Figure A4). For Cypress Creek, sampling was conducted between River Km 29.2 and River Km 41.1, as measured upstream from Cypress Creek's confluence with the Halfway River (Appendix A, Figure A3). Sampling in 2022 within Fiddes Creek was conducted between River Km 5.0 and River Km 12.0 as measured upstream from Fiddes Creek's confluence with the Halfway River (Appendix A, Figure A2).

UTMs of sample site locations in the Chowade River, and Cypress and Fiddes creeks are provided in Appendix A, Table A1. Individual sites were identified during an aerial survey conducted at the start of the field program. This survey allowed the crew to identify sites within potentially suitable immature Bull Trout habitat that were close to safe landing locations.

[9] Available for download at https://open.canada.ca/data/en/dataset/9d96e8c9-22fe-4ad2-b5e8-94a6991b744b.

2.1.1.1 PIT Detector Arrays on Tributaries Targeting Bull Trout

In addition to the identification of recaptured fish within and among study years, fish implanted with PIT tags as part of the current survey (Mon-1b, Task 2c) were also intended to be detected by the Chowade River and Cypress Creek PIT detector arrays installed as part of Mon-1b, Task 2b (Appendix A, Figure A1) (Putt et al. 2023). These arrays were also intended to detect fish captured and implanted with PIT tags deployed during additional FAHMFP studies including:

- Peace River Large Fish Indexing Survey (Mon-2, Task 2a; e.g., Golder 2022b)
- Offset Effectiveness Monitoring (Mon-2, Task 2d; e.g., Golder 2020b)
- Fish Composition and Abundance Survey (Mon-2, Task 2b; Triton 2021)
- Operation of the temporary upstream fish passage facility (McMillen and BC Hydro 2021)
- Site C Contingent Boat Electroshocking (WSP 2023)

Summaries of fish movements based on PIT tag detections at the Chowade River and Cypress Creek PIT detector arrays are not presented in this report; however, these data are provided under Mon-1b, Task 2b (e.g., Putt et al. 2023).

2.1.2 Tributaries Targeting Rainbow Trout

Sample locations within Farrell Creek (Appendix A, Figure A7) were at locations previously established by Mainstream (2011a) and Golder (2018) to allow comparisons with historical data when possible. To maintain a consistent site-naming convention between tributaries within Task 2c, Mainstream Site FA03 was renamed FAC63.3, Site FA04 was renamed FAC65.7, and Site FA05 was renamed FAC102.1.

Sample locations within Colt Creek (Appendix A, Figure A5) and Kobes Creek (Appendix A, Figure A6) were established in 2017 (Golder 2018) based on ease of access and the quality of fish habitat available (i.e., expected use by immature Rainbow Trout). Sampling was conducted at the same locations in Colt and Kobes creeks each year from 2018 to 2022.

Sample locations within Maurice Creek (Appendix A, Figure A8) were established during the 2020 survey (Golder 2021a). Eight sample locations were assessed between River Km 0.6 and River Km 2.0 as measured upstream from Maurice Creek's confluence with the Peace River. The sample locations were selected based on the quality of fish habitat available. Four of the sites were established upstream of the expected inundation zone of the reservoir and four of the sites were established downstream of the expected inundation zone of the reservoir. Sampling was conducted at the same sites in Maurice Creek from 2020 to 2022.

UTMs of sample site locations in Farrell, Colt, Kobes, and Maurice creeks are provided in Appendix A, Table A1.

2.1.3 Moberly River

The Moberly River study area was defined as the portion of the Moberly River from the outlet of Moberly Lake (River Km 123 as measured upstream from the Moberly River's confluence with the Peace River) downstream to the Moberly River confluence (River Km 0.0; Appendix A, Figures A9 and A10).

Previous baseline studies (e.g., Mainstream 2011b) delineated river sections within the Moberly River; these section breaks were implemented in 2022 to maintain consistency with these baseline datasets (Appendix A, Table A2). The habitat classifications used by Mainstream (2011b) to delineate individual sections were as follows:

1) Irregular meanders; frequent riffle complexes interspersed with extended runs with some flats; and
2) Tortuous meanders dominated by low water velocities; flats with few riffle sections.

UTMs of sample site locations in the Moberly River are provided in Appendix A, Table A1.

2.2 Study Period

In 2022, 29 days of sampling were conducted from mid July to early August (all watersheds combined; Table 2). Previous studies had documented a downstream migration of immature Bull Trout out of the Halfway River watershed in mid-August (R.L.&L. 1995); therefore, to facilitate capture of immature Bull Trout prior to the onset of their downstream migration, sampling in the Chowade River and Cypress Creek was conducted over eight days between 21 and 29 July. One day of sampling was conducted in Fiddes Creek on 2 August. The 2022 study periods for the Chowade River and Cypress and Fiddes creeks surveys were similar to the timing of the 2016 to 2021 study periods.

Farrell, Colt, Kobes, and Maurice creeks were sampled over nine days between 20 July and 6 August (Table 2).

The Moberly River was sampled over 11 days from 25 July to 4 August (Table 2). Rather than aligning with historical surveys conducted on the Moberly River (e.g., Mainstream 2011b; Golder 2017, 2018, 2019, 2020a, 2021a) or a specific calendar date, the 2022 survey was conducted similar to the 2021 survey (Golder 2022a) and aligned with appropriate flow conditions for the sampling methods to increase the likelihood of encountering Arctic Grayling. Based on the results of previous study years, Moberly River discharges between 15 and 17 m^3/s are preferred.

Table 2: Sampling schedule by tributary for the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Tributary	Sample Dates	Number of Sampling Days
Chowade River	21, 22, 23, 25 and 29 July	5
Cypress Creek	26, 27, and 28 July	3
Fiddes Creek	2 August	1
Farrell Creek	4 and 6 August	2
Colt Creek	30 July and 1 August	2
Kobes Creek	3 and 5 August	2
Maurice Creek	20, 24 and 31 July	3
Moberly River	25 July to 4 August	11

2.3 Discharge

Discharge data are not available for the Chowade River or Colt, Cypress, Farrell, Fiddes, Kobes, or Maurice creeks. The Water Survey of Canada's Halfway River Above Graham River station (Station Number 07FA003)[10] is located approximately 0.5 km upstream of the Graham River's confluence with the Halfway River. Data from this station were considered representative of tributaries in the Halfway River drainage and the general region based on correlations of station data and Chowade River water surface elevation data collected by Putt et al. (2023).

Discharge data for the Moberly River are from the Water Survey of Canada's Moberly River station (Station Number 07FB008)[11], which is located approximately 2.5 km upstream of the North Monias Road bridge near River Km 45.0 (Appendix A; Figure A10).

Unless stated otherwise, discharge values are daily average values presented in cubic metres per second (m^3/s). Daily averages from 2022 were plotted with descriptive statistics (mean, minimum, and maximum) of daily average discharge from all historical years when data were available for the two gauging stations described above.

2.4 Fish Capture

2.4.1 Halfway River Watershed and Farrell and Maurice Creeks

Backpack electrofishing was used to capture fish in the Chowade River and Colt, Cypress, Farrell, Fiddes, Kobes, and Maurice creeks. All sampling consisted of a single pass in open sites.

For the Chowade River and Cypress and Fiddes creeks, where Bull Trout were the primary target species, sites were located in wadeable areas where immature Bull Trout densities were expected to be high. These areas were typically located in side-channels or braided sections of the stream that had abundant physical cover, channel widths less than approximately 5 m, mean water depths less than 0.7 m, and water velocities less than 1.0 m/s. Most sites in the Chowade River and Cypress and Fiddes creeks were dominated by cobble and gravel substrates providing abundant interstitial habitat. Within each site, sampling effort was also focused on areas where the capture of immature Bull Trout was expected to be greatest (e.g., crews focused additional effort around root wads or large boulders if they were present in a site). Backpack electrofishing sites ranged in length from approximately 25 to 360 m. Differences in water elevations and habitat suitability at specific locations among study years reduced the feasibility of repeatedly sampling the same locations year-over-year; however, in some situations, crews were able to sample the same locations as previous study years.

In Farrell, Colt, and Kobes creeks, where Rainbow Trout were the primary target species, the sites sampled in 2022 were also sampled in study years 2017 to 2021. Three of the four sites (FAC63.3, FAC65.7, and FAC102.1) situated on Farrell Creek were previously sampled by Mainstream (2011b). All sites on Farrell, Colt, and Kobes creeks were in mainstem high quality habitats that were conducive for backpack electrofishing, and where Rainbow Trout densities were expected to be high. The sites sampled on Maurice Creek in 2022, were also sampled in 2020 and 2021. These sites were selected based on the quality of fish habitat available and were situated upstream and downstream of the expected reservoir inundation level.

[10] https://wateroffice.ec.gc.ca/report/real_t2ime_e.html?stn=07FA003.

[11] https://wateroffice.ec.gc.ca/report/real_time_e.html?stn=07FB008.

Backpack electrofishing was conducted with one person operating the electrofisher and one person netting fish. Electrofishing occurred with each crew walking in an upstream direction. Captured fish were netted and transferred to 20 L water-filled buckets equipped with battery-operated aerators (Marine Metal, Clearwater, Florida, USA). Smith-Root™ Model 12, Model 12B, and LR24 backpack electrofishers (Smith-Root, Vancouver, WA, USA) were used, depending on the crew. Electrofisher settings were adjusted as needed to minimize injuries to fish while efficiently capturing the target size and species. Voltage ranged from 190 to 500 V, frequency was set at 60 Hz, and pulse width was 6 ms.

Habitat variables recorded at each site in 2022 (Table 3) were consistent with previous study years (Golder 2017, 2018, 2019, 2020a, 2021a, 2022a) and baseline studies (e.g., Mainstream 2011b) and were primarily collected to identify differences in sampling conditions and habitat types sampled within and among study years.

Table 3: Habitat variables recorded at each site sampled as part of the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2021.

Variable	Description
Date	The date the site was sampled
Time	The time the site was sampled
Air Temp	Air temperature at the time of sampling (to the nearest 1°C)
Water Temp	Water temperature at the time of sampling (to the nearest 0.1°C)
Conductivity	Water conductivity at the time of sampling (to the nearest 10 µS/cm)
Secchi Bar Depth	The Secchi Bar depth recorded at the time of sampling (to the nearest 0.1 m)
Cloud Cover	A categorical ranking of cloud cover (Clear = 0-10% cloud cover; Partly Cloudy = 10-50% cloud cover; Mostly Cloudy = 50-90% cloud cover; Overcast = 90-100% cloud cover)
Weather	A general description of the weather at the time of sampling (e.g., comments regarding wind, rain, smoke, or fog)
Electrofisher Model	The model of electrofisher used during sampling
Percent	The estimated duty cycle (as a percent) used during sampling
Amperes	The average amperes used during sampling
Mode	The mode (AC or DC) and frequency (in Hz) of current used during sampling
Volts	The voltage (V) used during sampling
Length Sampled	The length of shoreline sampled (to the nearest 1 m)
Time Sampled	The duration of electrofisher operation (to the nearest 1 second)
Mean Depth	The mean water depth sampled (to the nearest 0.1 m)
Maximum Depth	The maximum water depth sampled (to the nearest 0.1 m)
Instream Velocity	A categorical ranking of water velocity (High = greater than 1.0 m/s; Medium = 0.5 to 1.0 m/s; Low = less than 0.5 m/s)
Instream Cover	The type (i.e., Interstices; Woody Debris; Cutbank; Turbulence; Flooded Terrestrial Vegetation; Aquatic Vegetation; Shallow Water; Deep Water) and amount (as a percent) of available cover
Crew	The field crew that conducted the sampling
Sample Comments	Any additional comments regarding the sample site or sampling conditions

The type and amount of instream cover for fish were qualitatively estimated at all sites. Water velocities were visually estimated and categorized at each site as low (less than 0.5 m/s), medium (0.5 to 1.0 m/s), or high (greater than 1.0 m/s). Where water depths were adequate, water clarity was estimated using a “Secchi Bar” that was manufactured based on the description provided by Mainstream and Gazey (2014). Most sites (73%) had low turbidity at the time of sampling and Secchi depths were greater than the maximum water depths encountered. Mean and maximum sample depths were visually estimated at each site.

2.4.2 Moberly River

The study plan for the Moberly River survey consisted of crews travelling by inflatable boats down the length of the Moberly River from Moberly Lake to the river’s confluence with the Peace River. The six-person team worked as three separate crews: an angling crew, a small-fish boat electroshocking crew, and a backpack electrofishing crew. To mitigate the potential of water levels becoming too low to effectively navigate, the survey started at the North Monias Road bridge (River Km 45.0) and crews travelled downstream over five days to the Moberly River’s confluence (River Km 0.0). On 30 July crews took out at the Moberly River confluence and transferred all boats and sampling equipment to Moberly Lake Provincial Park (River Km 123.0). From there, crews travelled downstream for an additional five days to the takeout at the North Monias Road bridge. Over the 11-day trip, sampling was conducted in Sections MR-S1A to MR-S10 (Appendix A, Table A2). In 2021, sampling in Section MR-S7 was prioritized since crews identified groundwater-fed side channels in this section during the 2020 survey (Golder 2021a), which provided rearing habitat for YOY Arctic Grayling.

Small-fish boat electroshocking was conducted out of a white-water-style raft (Avon™ 13 Pathmaker; 4 m long by 1.75 m wide; AVON Marine, Port Moody, BC, Canada). Sites were located in main channel habitats where water depths were great enough, and channel widths were wide enough to allow the crew to effectively maneuver the boat. The raft was equipped with a Smith-Root™ 2.5 Generated Powered Pulsator (GPP 2.5; Smith-Root, Vancouver, WA, USA) and a generator contained in a waterproof tub. The electroshocker was connected to a cathode array curtain placed on the stern of the raft and two anode pole arrays extended approximately 1.5 m in front of the raft. The anode poles were angled between 20° and 40° off either side of the bow. While sampling, a single crew member was positioned at the bow of the boat. This crew member netted stunned fish and transferred them to a water-filled holding tank equipped with an aerator positioned behind the bow but in front of the rower. The netter attempted to capture all stunned fish, but priority was given to Arctic Grayling if more than one species was observed at the same time. The rower sat in an elevated chair behind the holding tank and maneuvered the boat with oars braced in oar locks. Electroshocker settings were adjusted at each site, depending on local conditions and the size and species of fish observed, to minimize injury to fish. The electroshocker was operated at 30 Hz pulsed direct current (PDC) and the high output voltage range (50-1000 V) was selected during sampling. The output voltage and pulse width were adjusted by the operator using the Percent of Power control to attain the desired response in fish, which was galvanotaxis (forced swimming) without immediate tetany. The response typically corresponded to a Percent of Power between 35% and 60%. Habitat conditions, as summarized in Table 3, were recorded at each site. Small-fish boat electroshocking sites ranged between 360 and 1800 m in length. The above methods were similar to those employed during the 2017 to 2021 surveys (Golder 2018, 2019, 2020a, 2021a, 2022a).

Backpack electrofishing was used in locations where water depths were shallow enough and water velocities were low enough to allow safe wading and efficient fish capture using this technique. These sites were often side channel or braided areas. Electrofishing was conducted using a Smith-Root™ Model LR24 (Smith-Root, Vancouver, WA, USA), and settings were adjusted as needed to minimize injuries to fish while allowing efficient capture of the target size and species. Voltage ranged from 190 to 500 V, frequency was 60 Hz, and pulse width ranged from 2 to 4 ms. Backpack electrofishing was conducted with one person operating the

electrofisher and one person netting fish. Captured fish were netted and transferred to 20 L buckets of water equipped with aerators and set along the side of the sample site. Habitat conditions, as summarized in Table 3, were recorded at each site. Backpack electrofishing sites ranged in length from 70 to 330 m. One isolated pool (2 m x 4 m) at the mouth of an ephemeral creek was sampled; however, fish were not captured in this pool. The above methods were similar to those employed during the 2016 to 2021 surveys (Golder 2017, 2018, 2019, 2020a, 2021a, 2022a).

Angling occurred at sites where fish were observed feeding on the surface of the water or other habitats that looked suitable for Arctic Grayling (i.e., upstream/downstream of riffles, near tributary inflows, along eddy lines, and near submerged woody debris). Both spin-casting and fly-fishing equipment were used, and tackle (primarily small spinners and dry flies) was selected to target Arctic Grayling. To potentially increase the catch of target species, angling also occurred opportunistically while the boats travelled between sites and any fish that were captured while in transit were processed at the site of capture. During each angling effort, total time spent angling was recorded and multiplied by the number of anglers to calculate total angling effort in angler-minutes. Angling effort per site ranged from 1 to 360 angler-minutes.

2.5 Fish Processing

All captured fish were identified to species, counted, weighed to the nearest 1 g, and measured for fork length (FL) to the nearest 1 mm. Total lengths (TL) were recorded for Burbot (*Lota lota*) and sculpin species to the nearest 1 mm. When catches of species other than Arctic Grayling, Bull Trout, or Rainbow Trout exceeded 30 individuals per site, only the first 30 individuals of each species were measured; all other individuals were enumerated and released. Arctic Grayling, Burbot, Bull Trout, Rainbow Trout, and Northern Pike in good condition following processing were implanted with half-duplex (HDX) PIT tags (ISO 11784/11785 compliant) (Oregon RFID, Portland, OR, USA). Tags were implanted within the left axial muscle below the dorsal fin origin and oriented parallel with the anteroposterior axis of the fish. Tagging criteria are summarized as follows:

- Fish between 80 and 119 mm FL received 12 mm long HDX PIT tags (12.0 mm x 2.12 mm HDX+)
- Fish between 120 and 199 mm FL received 14 mm long HDX PIT tags (14.0 mm x 3.00 mm HDX+)
- Fish between 200 and 299 mm FL received 23 mm long HDX PIT tags (23.0 mm x 3.65 mm HDX+)
- Fish greater than 300 mm FL received 32 mm long HDX PIT tags (32.0 mm x 3.65 mm HDX+)

After processing, all fish were released at the downstream end of their capture site.

Scale samples were collected from all captured Arctic Grayling and Rainbow Trout. Scales were collected from above the lateral line and posterior to the dorsal fin. The first leading fin ray of the left pectoral fin was collected from all Bull Trout longer than 120 mm FL. Scale and fin ray samples were stored in appropriately labelled coin envelopes.

Small sections of caudal fin tissue were collected for DNA analysis from Arctic Grayling, Bull Trout, and Rainbow Trout that the crew deemed large enough to not be adversely affected by the collection procedure. Tissue samples were also collected from Longnose Dace (*Rhinichthys cataractae*), Redside Shiner (*Richardsonius balteatus*), and Slimy Sculpin (*Cottus cognatus*) captured in the Moberly River to support the Site C Small Fish Translocation Monitoring Program (Mon-15) (Geraldes and Taylor 2020, 2021, 2022). Samples were preserved in 95% non-denatured ethyl alcohol and provided to BC Hydro. The samples were not analyzed as part of the current study.

Fin rays (and otoliths from individuals that succumbed to sampling) were collected from a subset of Rainbow Trout, Arctic Grayling, and Bull Trout. A selection of these samples were submitted to BC Hydro for potential microchemistry analysis (TrichAnalytics Inc. 2022). The findings of these analyses are not presented in this report.

2.6 Fish Ageing

All Rainbow Trout and Arctic Grayling were aged by scale analysis. Scales were aged by counting the number of growth annuli present on the fish scale following methods outlined in Mackay et al. (1990) and RISC (1997). Scales were temporarily mounted between two slides and examined using a trinocular microscope equipped with a digital camera. If needed, several scales were examined, and the highest quality scale was photographed using the microscope's integrated 3.1-megapixel digital macro camera and saved as a JPEG-type picture file. All scales were examined independently by two experienced individuals (i.e., "agers") and ages assigned. For each scale sample, the agers had access to the species and the date of capture but no other information about the sampled fish (e.g., fork length or capture history). If the two assigned ages did not agree, a third ager assigned an age. If two out of three agers agreed on the age, then this age was used for analysis. If two out of three agers did not agree on an age, then the sample was not used for analysis purposes.

The scale age estimates for Rainbow Trout were cross-checked with the separation of modes in length-frequency histograms of all Rainbow Trout captured in each stream. When the scale age estimates were compared to length-frequency histograms it became apparent that for Rainbow Trout captured in Farrell, Colt, and Kobes creeks, the agers were commonly unable to recognize the first annulus in age-1 fish. As a result, the scale age estimates for these systems were generally one year younger than length-frequency histograms indicated. To rectify this discrepancy, the scale age estimates from these streams were increased by one for all fish originally estimated as age-0. Rainbow Trout scale age estimates from Maurice Creek were not adjusted, as the estimates generally aligned with the length-frequency histogram. Additionally, a total of 11 age estimates across all Rainbow Trout streams were adjusted based on the stream-specific length-frequency histograms. Finally, age estimates for Rainbow Trout captured in previous study years were evaluated against their earlier catch data to better inform their estimated age in 2022.

Bull Trout were aged based on fork lengths and the separation of modes in length-frequency histograms of all fish captured in each stream. This methodology was first implemented during the 2020 study year (Golder 2021a).

2.7 Data Analysis

All data collected during field surveys were entered and stored in a custom MS-Access© database that conforms to BC Hydro's established Site C data standards. Data on field sheets were entered into an MS-Excel spreadsheet, which were then verified by a second person before being uploaded to the database. Before data analysis, a Quality Control / Quality Assurance (QA/QC) review of the database was conducted to identify possible errors. The database QA/QC used histograms and bivariate plots to check the range and format of all variables. Once identified, outliers and erroneous data were reviewed and either corrected or removed from the database. Error screening and data proofing were conducted using both Excel® and the statistical environment R, v. 4.1.2 (R Core Team 2020). Data analyses and tabular data summaries were performed in R. Graphical plots were produced in R using the package ggplot2 (Wickham 2009).

Catch was summarized by sample method, species, life stage, watercourse, and section (where applicable) and presented in tabular format. Catch per unit effort (CPUE) for electrofishing was calculated by dividing the summed total number of fish in a stream captured at all sites by the sum of effort at all sites. Sampling effort was measured in seconds of electrofisher operation, and CPUE was expressed as the number of fish per hour. Length of site was not used to represent sampling effort for CPUE because sampling in the Chowade River and Cypress Creek focused only on optimal habitats and the amount of habitat available and site length sampled was dependent on sampling conditions.

Length-frequency histograms were plotted for the three target species (Bull Trout, Rainbow Trout, and Arctic Grayling) by tributary. Length-frequency histograms were also plotted for Burbot and Mountain Whitefish (*Prosopium williamsoni*) for the Moberly River.

Fish were assigned a life stage of YOY, immature, or adult based on their length. The maximum length for the YOY class was determined for each species based on the difference between the first and second modes in the species' length-frequency distribution. These assignments were corroborated with scale age data where applicable. The immature life stage included fish larger than the YOY group up to 249 mm FL. Fish larger than or equal to 250 mm FL were classified as adult for all target species. Although some individuals larger than 250 mm FL for some species were likely not mature adults and some individuals smaller than 250 mm FL for some species were likely mature adults, 250 mm FL was used as a consistent cut-off to summarize data by length-class.

Backpack electrofishing was the only capture method used in the Halfway River watershed and Farrell and Maurice creeks and is more effective at capturing small-bodied fish than large-bodied fish. As such, incidental catches of adult Bull Trout and adult Rainbow Trout were not considered reliable indicators of adult abundance in these streams.

3.0 RESULTS

Sampling conducted in tributaries to the Peace and Halfway rivers in 2022 was initiated in late July when a gradual decrease in the hydrograph in each drainage was expected. Flows generally decreased within all systems throughout the sampling period and were considered adequate for sampling.

3.1 Halfway River Discharge and Temperature

An aerial reconnaissance of the study area in the Halfway River watershed and its tributaries was conducted on 20 July prior to the start of sampling. During the reconnaissance, the discharge in the Halfway River was 39 m³/s and approximately 43% below the historical mean discharge level (69 m³/s; 1977-1995, 2012-2014, and 2018-2021) (Figure 1). When sampling began in the Halfway River watershed (21 July 2022), the discharge in the Halfway River was 36 m^3/s. Flows decreased for the first half of the sampling period and then increased through the remainder of the sample period. On the last day of sampling, discharge in the Halfway River was 68 m^3/s. Flows were below the historical average (range = 55 to 79 m^3/s) during the study period.

Average water temperatures at the time of sampling were higher in Cypress Creek (11.6ºC) than in the Chowade River (7.0ºC) and Fiddes Creek (7.6ºC) (Appendix C, Table C1).

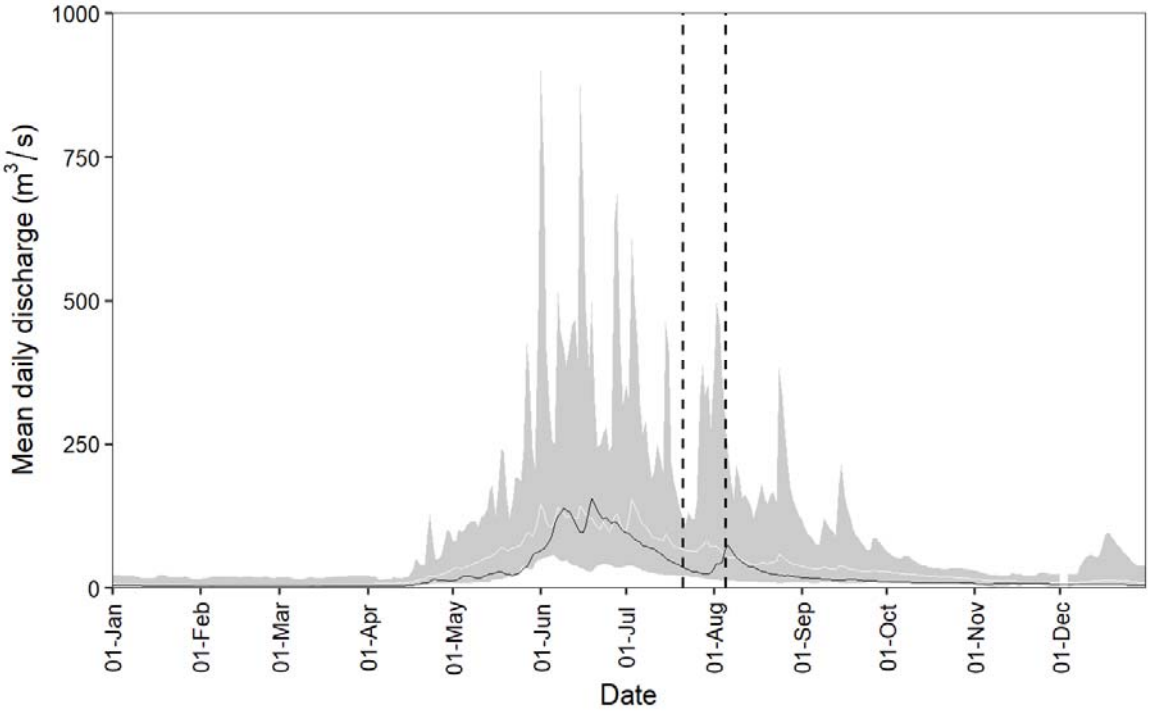

Figure 1: Mean daily discharge in the Halfway River above the Graham River (station 07FA003) in 2022 (black line). The white line shows the mean daily discharge, and the grey ribbon shows the range of minimum to maximum from historical daily discharge data (1977–1995, 2012–2014, and 2018–2021). The vertical dashed lines represent the timing of 2022 study period.

3.2 Tributaries Targeting Bull Trout

3.2.1 Sample Effort

In total, 63 sites were surveyed in tributaries targeting Bull Trout. These included 42 sites in the Chowade River, 15 sites in Cypress Creek, and 6 sites in Fiddes Creek. Approximately 25 hours of backpack electrofishing effort was conducted over 10,200 m of habitat (Table 4). A detailed summary of effort is provided in Appendix B, Table B1.

Table 4: Summary of backpack electrofishing effort employed to target Bull Trout in Halfway River tributaries during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Tributary	Number of Sites	Electrofishing Effort (s)	Electrofishing Effort (h)	Length of Survey (m)
Chowade River	42	52,616	14.6	6,275
Cypress Creek	15	24,843	6.9	2,725
Fiddes Creek	6	12,948	3.6	1200
Total	**63**	**90,407**	**25.1**	**10,200**

3.2.2 Catch and Life History

Of the 1076 Bull Trout captured in the Chowade River and Cypress and Fiddes creeks combined (Appendix B, Table B4), 755 fish (70.2%) were implanted with new PIT tags and two were recaptures that were originally tagged in 2021 (i.e., 757 unique tags were encountered in 2022). All remaining Bull Trout (n = 319) were not tagged because they were either too small to receive a PIT tag (i.e., less than 80 mm FL; n = 308), incidental mortalities (n = 8), or unhealthy (i.e., unlikely to survive the tagging process; n = 3) (Table 5).

Table 5: Number of fish caught and tagged by life stage, and corresponding CPUE (number of fish per hour), in the Chowade River and Cypress and Fiddes creeks recorded during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Species	Life Stage[a]	Chowade River			Cypress Creek			Fiddes Creek			Total		
		# Caught	# Tagged	CPUE (#/h)	# Caught	# Tagged	CPUE (#/h)	# Caught	# Tagged	CPUE (#/h)	# Caught	# Tagged	CPUE (#/h)
Bull Trout	Immature	326	283	22.3	381	351	55.2	153	121	42.5	860	755	34.3
	YOY	133	-	9.1	73	-	10.6	10	-	2.8	216	-	8.6
Slimy Sculpin	All	248	-	17.0	279	-	40.4	-	-	-	527	-	12.4
Sculpin Unidentified	All	-	-	-	6	-	<1.0	-	-	-	6	-	<1.0

[a]Life stage was assigned based on fork length. Fish were classified as adult when longer than 249 mm FL, and immature when less than 250 mm FL but greater than the maximum size of YOY. The maximum size of YOY fish varied by species and location and was selected based on modes observed in length-frequency histograms and corroborated with length-at-age data when possible.

Two immature Bull Trout captured in Fiddes Creek were recaptures that were originally captured and tagged in 2021 in Fiddes Creek. In 2021, the first recaptured Bull Trout was captured at River Km 5.5 and measured 130 mm FL (age-1). In 2022, this same Bull Trout was captured at River Km 5.2 and measured 157 mm FL (age-2). The second recaptured Bull Trout was initially captured in 2021 at River Km 7.9 and measured 138 mm FL (age-1). In 2022, this same Bull Trout was captured at River Km 7.3 and measured 166 mm FL (age-2).

Bull Trout YOY (fish with fork lengths less than approximately 70 mm FL) were recorded in all three systems. The CPUE of YOY Bull Trout in Chowade River (9.1 fish/h) was similar to the CPUE of YOY Bull Trout in Cypress Creek (10.6 fish/h; Table 5). The CPUE of YOY Bull Trout in Fiddes Creek was the lowest (2.8 fish/h). The CPUE of immature Bull Trout (fish with fork lengths larger than approximately 70 mm FL) was highest in Cypress Creek (55.2 fish/h) followed by Fiddes Creek (42.5 fish/h) and the Chowade River (22.3 fish/h).

Length-frequency histograms for Bull Trout (Figure 2) show a mode between approximately 25 and 50 mm FL, and between approximately 60 and 115 mm FL, which correspond to the age-0 (YOY) and age-1 cohorts, respectively. These two modes were evident in all three of the sampled tributaries. A third mode from approximately 120 to 200 mm FL likely corresponds to age-2 and older fish. The length-frequency histograms indicate that age-1 and age-2 Bull Trout are generally larger in Cypress Creek compared to the Chowade River and Fiddes Creek. This apparent growth difference corresponds with warmer water temperatures throughout June and July in Cypress Creek compared to the Chowade River and Fiddes Creek (Golder 2022c). Consistent with previous study years (e.g., Golder 2022a), Bull Trout larger than 120 mm FL (i.e., likely age-2 and age-3 individuals) were more abundant in Fiddes Creek than in the Chowade River and Cypress Creek.

All Bull Trout captured and tagged in 2022 were less than 200 mm FL and were implanted with either a 12 mm PIT tag (n = 668) or a 14 mm PIT tag (n = 87).

In 2022, 948 of the 1076 Bull Trout encountered (88%) were assigned ages based on their fork lengths (Figure 3 and Table 6). Age-1 fish comprised 80% of all assigned Bull Trout ages. The low number of older Bull Trout in the catch was expected and can be attributed to two main reasons: 1) the study specifically targeted immature life stages through backpack electrofishing; and 2) based on the life history of Bull Trout, it is expected that most individuals migrate downstream and out of the study area by age-2 to age-3[12].

[12] Site C Clean Energy Project Environmental Impact Statement, Volume 2, Appendix Q3.

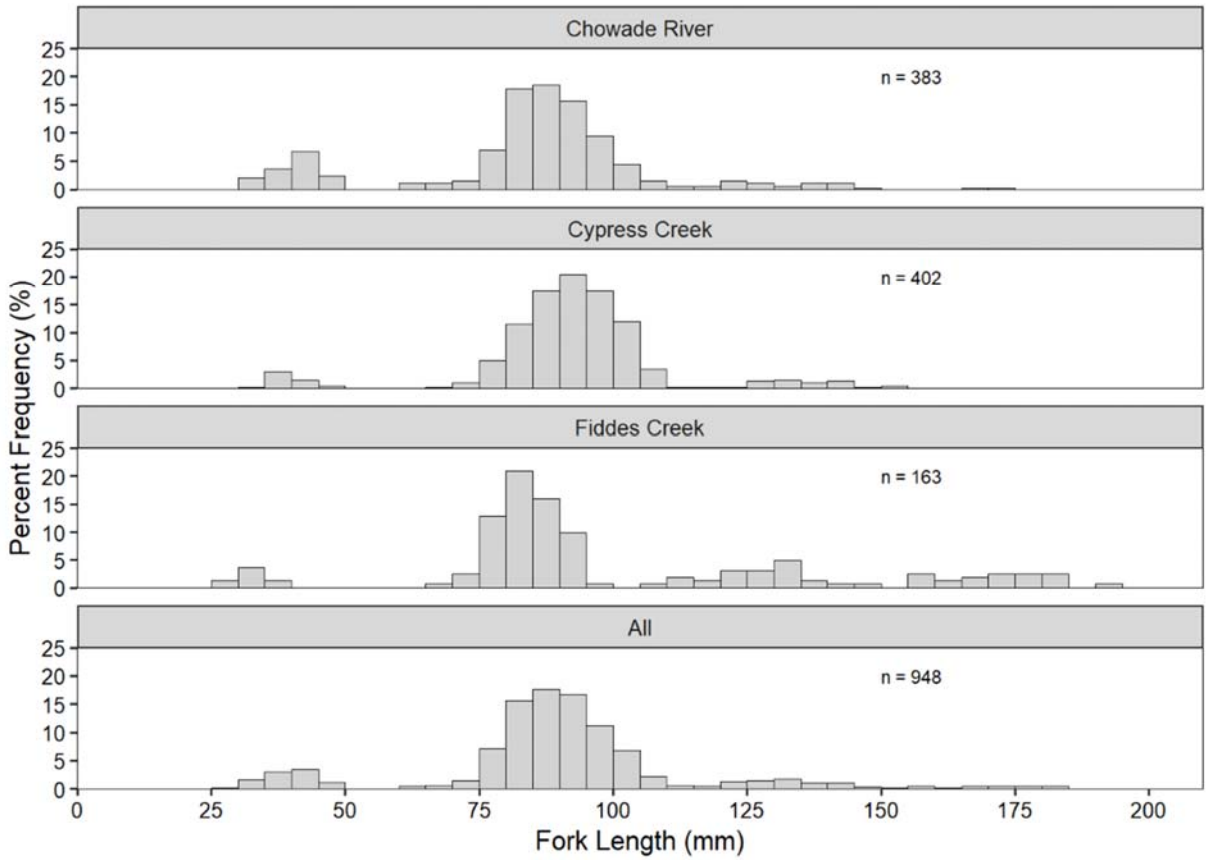

Figure 2: Length-frequency distribution for Bull Trout captured by backpack electrofishing in the Chowade River and Cypress and Fiddes creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022. Analysis does not include Bull Trout that were captured but not processed.

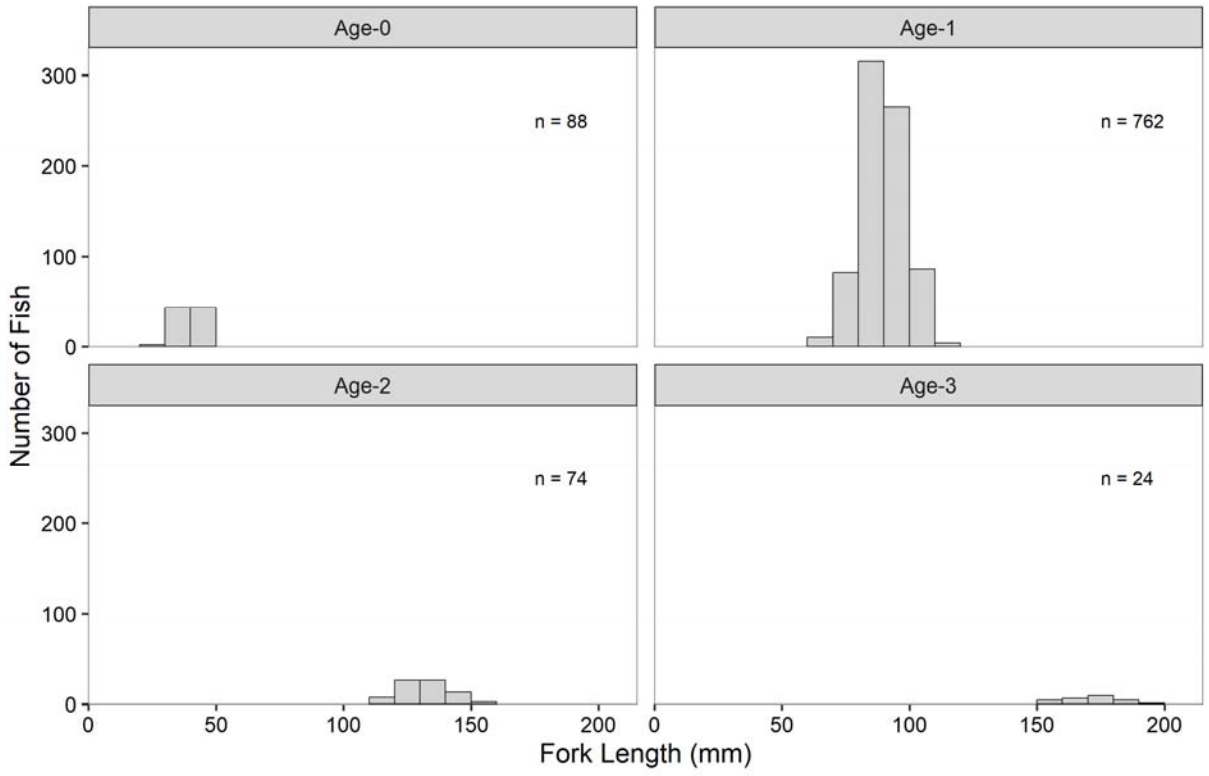

Figure 3: Length-frequency distribution by age class for Bull Trout captured in the Chowade River and Cypress and Fiddes creeks combined, during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Table 6: Descriptive statistics of fork length by age for Bull Trout captured in the Chowade River and Cypress and Fiddes creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022. Ages were assigned based on fork length.

Age	Chowade River			Cypress Creek			Fiddes Creek		
	Average FL ± SD (mm)	Range (mm)	*n*	Average FL ± SD (mm)	Range (mm)	*n*	Average FL ± SD (mm)	Range (mm)	*n*
0	40 ± 4	30 - 46	57	39 ± 4	34 - 49	21	32 ± 2	29 - 35	10
1	88 ± 9	61 - 111	301	92 ± 8	68 - 119	357	84 ± 6	68 - 108	104
2	131 ± 9	116 - 149	23	136 ± 8	124 - 154	24	127 ± 8	112 - 145	27
3	168 ± 4	165 - 170	2	-	-	-	172 ± 10	157 - 193	22

Bull Trout were the only target species captured in 2022 (Appendix B, Table B4). Captured non-target species included 527 Slimy Sculpin and 6 sculpin that were not identified to species (Appendix B, Table B4).
Non-target species were only captured in the Chowade River and Cypress Creek; non-target species were not encountered in Fiddes Creek in 2022.

3.2.2.1 Summary of Subsequent Site C FAHMFP Encounters

A single immature Bull Trout that was initially tagged in 2018 as part of Task 2c was subsequently encountered in 2022 during the Peace River Large Fish Indexing Survey (Mon-2, Task 2a). On 23 July 2018, a Bull Trout was captured in Cypress Creek at River Km 29.2. At that time, it had a fork length of 101 mm, weighed 11 g, and was implanted with a PIT tag (tag number: 900226000980835). It was subsequently recaptured on 25 August 2022 in a side channel of the Peace River near River Km 26 (as measured downstream from WAC Bennett Dam). At that time, it had a fork length of 398 mm, weighed 651 g, and was surgically implanted with a radio telemetry tag (tag frequency: 149.400; tag code: 469). Over the approximately 4 years between capture and recapture, this fish travelled a minimum of 214 km and grew 297 mm. This fish was recaptured at the same Peace River location on both 5 and 26 September 2022 during subsequent surveys associated with the Peace River Large Fish Indexing Survey.

3.2.3 Interannual Comparison

A comparison of YOY and immature Bull Trout CPUE from 2017 to 2022 indicated similar trends in both the Chowade River and Cypress Creek (Figure 4). In both systems, CPUE for YOY Bull Trout was highest in 2018, followed by low CPUE values in 2019; however, over the past four years (2019 to 2022) CPUE for YOY Bull Trout in Cypress Creek increased year-over-year. The Chowade River showed a similar increase in CPUE for YOY Bull Trout over the years 2019 to 2021, followed by a slight decrease in 2022. Similarly, the CPUE for immature Bull Trout in the Chowade River increased year-over-year between 2018 and 2021, but decreased in 2022. The CPUE for immature Bull Trout in Cypress Creek increased year-over-year. In 2022, the CPUE for immature Bull Trout in Cypress Creek (55.2 fish/h) was higher than all previous study years, and continued the trend of year-over-year increases since 2019.

In Fiddes Creek, the CPUE recorded for YOY Bull Trout in 2022 (2.8 fish/h) was higher than the previous three years (Figure 4). In 2022, the CPUE for immature Bull Trout (42.5 fish/h) was lower than the previous year (65.4 fish/h) but was within the range of historical CPUE values recorded for this stream and life stage. During all previous sample years, CPUE for YOY Bull Trout has been lower than CPUE for immature Bull Trout in Fiddes Creek.

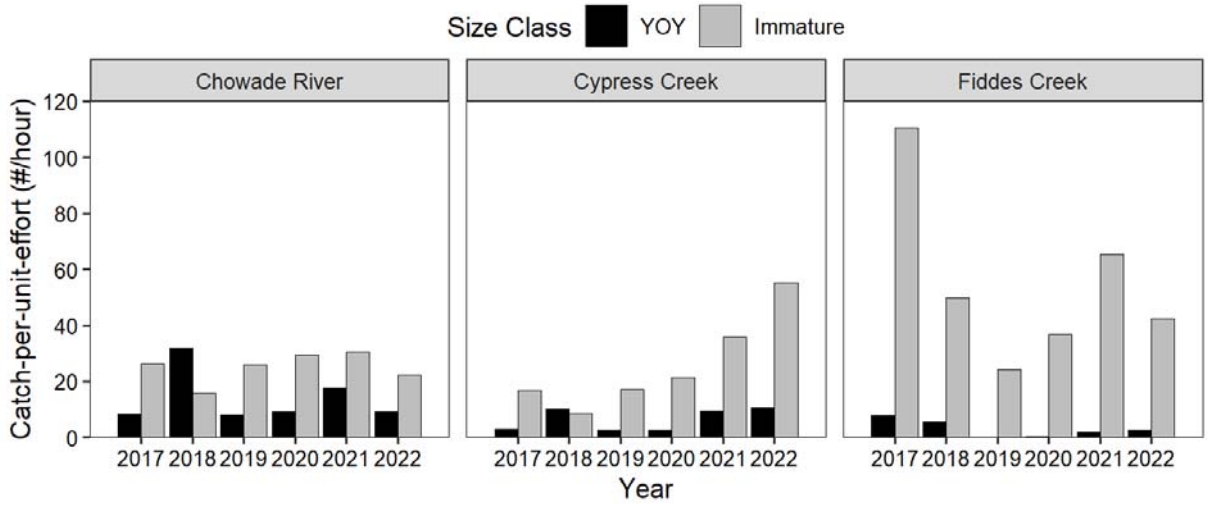

Figure 4: Interannual comparison of catch per unit effort (fish/h) for Bull Trout captured by backpack electrofishing in the Chowade River and Cypress and Fiddes creeks, during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2017–2022.

3.3 Tributaries Targeting Rainbow Trout

3.3.1 Sample Effort

In 2022, targeted sampling for Rainbow Trout was conducted in Colt Creek (8 sites), Farrell Creek (6 sites), Kobes Creek (8 sites), and Maurice Creek (8 sites). Approximately 17.5 hours of backpack electrofishing effort were conducted over 6,295 m of habitat. A summary of backpack electrofishing effort by the number of sites surveyed, length of habitat sampled, and seconds of backpack electrofisher operation is provided for each tributary in Table 7 and in Appendix B, Table B1.

Table 7: Summary of backpack electrofishing effort employed in Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Stream	Number of Sites	Electrofishing Effort (s)	Electrofishing Effort (h)	Length of Survey (m)
Colt Creek	8	17,218	4.8	1,560
Farrell Creek	6	11,876	3.3	1,275
Kobes Creek	8	19,342	5.4	1,685
Maurice Creek	8	14,408	4.0	1,775
Total	**30**	**62,844**	**17.5**	**6,295**

3.3.2 Catch and Life History

The Rainbow Trout populations in Colt and Kobes creeks are suspected resident populations, while Farrell and Maurice creeks are suspected recruitment sources for the Peace River Rainbow Trout population (Mainstream 2012). Of the 265 Rainbow Trout captured in Colt, Farrell, Kobes, and Maurice creeks combined, 201 fish (76.8 %) were implanted with new PIT tags, and 17 were recaptures that were implanted with PIT tags during a previous study year (i.e., 218 unique tags were encountered in 2022 (Table 8; Appendix B, Table B5). Rainbow Trout that were not tagged (n = 47) were either too small to receive a PIT tag (i.e., less than 80 mm FL; n = 35), incidental mortalities (n = 10), or were unhealthy and unlikely to survive the tagging process (n = 2).

In 2022, as in previous years, immature Rainbow Trout were the dominant size class, accounting for 97% of all Rainbow Trout captured (Table 8). YOY Rainbow Trout were captured in Farrell and Kobes creeks only.

Of the 17 Rainbow Trout recaptured in 2022, 10 were originally captured in 2021 and seven were originally captured in 2020 (Table 9). One recaptured Rainbow Trout in Maurice Creek was originally captured and tagged in 2020, recaught in 2021, and caught again in 2022. Previously tagged Rainbow Trout were encountered in all tributaries in 2022, and most (n = 13) individuals were recaptured within approximately 200 m of their original capture location. Four Rainbow Trout were recaptured within 400 m of their original capture site. Recaptured fish were age-2 to age-5 and ranged in length between 139 and 224 mm FL.

Table 8: Number of fish caught and tagged in Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Species	Life Stage[a]	Colt Creek			Farrell Creek			Kobes Creek			Maurice Creek			Total		
		# Captured	# Tagged	CPUE (#/h)	# Captured	# Tagged	CPUE (#/h)	# Captured	# Tagged	CPUE (#/h)	# Captured	# Tagged	CPUE (#/h)	# Captured	# Tagged	CPUE (#/h)
Target Species																
Arctic Grayling	Adult	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Imm.	3	3	0.6	-	-	-	-	-	-	-	-	-	3	3	0.2
	YOY	1	0	0.2	-	-	-	-	-	-	-	-	-	1	0	<0.1
Bull Trout	Adult	1	1	0.2	-	-	-	1	1	0.2	1	1	0.3	3	3	0.2
	Imm.	12	12	2.5	-	-	-	-	-	-	3	3	0.8	15	15	0.9
	YOY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Trout	Adult	-	-	-	-	-	-	1	1	0.2	-	-	-	1	1	<0.1
	Imm.	110	72	23.0	33	27	10.0	75	72	14.0	42	29	10.5	260	200	14.9
	YOY	-	-	-	1	0	0.3	3	0	0.6	-	-	-	4	0	0.2
Non-Target Species																
Lake Chub	All	-	-	-	55	-	16.7	98	-	18.2	-	-	-	153	-	3.6
Largescale Sucker	All	-	-	-	25	-	7.6	11	-	2.1	1	-	0.3	37	-	0.9
Longnose Dace	All	51	-	10.7	69	-	20.9	75	-	14.0	365	-	91.2	560	-	13.2
Longnose Sucker	All	2	-	0.4	109	-	33.0	41	-	7.6	192	-	48.0	344	-	8.1
Mountain Whitefish	All	19	-	4.0	-	-	-	12	-	2.2	3	-	0.2	34	-	0.8
Northern	All	-	-	-	1	-	0.3	-	-	-	-	-	-	1	-	<0.1
Prickly Sculpin	All	-	-	-	-	-	-	-	-	-	5	-	1.3	5	-	0.1
Redside Shiner	All	-	-	-	182	-	55.2	17	-	3.2	23	-	5.8	222	-	5.2
Slimy Sculpin	All	133	-	27.8	92	-	27.9	264	-	49.1	98	-	24.5	587	-	13.8
Sculpin spp.	All	-	-	-	-	-	-	-	-	-	10	-	2.5	10	-	0.2
Sucker spp.	All	-	-	-	-	-	-	-	-	-	5	-	1.3	5	-	0.1
Trout-perch	All	-	-	-	11	-	3.3	-	-	-	-	-	-	11	-	0.3
White Sucker	All	-	-	-	15	-	4.6	1	-	0.2	-	-	-	16	-	0.4

[a] Life stage was assigned based on fork length. Fish were classified as adult when longer than 249 mm FL, and immature when less than 250 mm FL and larger than the YOY maximum size. YOY maximum size was approximately 50 mm FL based on Rainbow Trout captured in previous sample years (Golder 2018, 2019, 2020a, 2021a, 2022a).

Table 9: Details of recaptured Rainbow Trout from Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Stream	PIT tag number	Original Capture Details				Recapture Details			
		Date	River Km	Fork Length (mm)	Age	Date	River Km	Fork Length (mm)	Age
Colt Creek	900226001221685	22-Jul-2021	14.3	120	2	1-Aug-2022	14.3	164	3
Farrell Creek	900226000980953	2-Aug-2020	101.7	92	1	4-Aug-2022	102.1	156	3
	900226001222234	17-Jul-2021	63.0	197	4	4-Aug-2022	63.0	213	5
	900226001222220	17-Jul-2021	63.0	128	2	4-Aug-2022	63.0	184	3
	900226001221053	23-Jul-2021	102.1	107	2	4-Aug-2022	102.1	155	3
	900226001221664	23-Jul-2021	102.1	98	1	4-Aug-2022	101.7	140	2
Kobes Creek	900226001617095	13-Aug-2021	55.3	101	1	5-Aug-2022	55.3	182	3
	900226001220558	23-Jul-2021	11.7	107	1	3-Aug-2022	11.7	139	2
	900226001617539	1-Aug-2021	55.3	162	2	5-Aug-2022	55.5	201	3
Maurice Creek	900226001617238	6-Aug-2020	1.2	115	1	24-Jul-2022	1.3	207	3
	900226001617178	7-Aug-2020	1.7	105	1	28-Jul-2021	1.5	161	2
						24-Jul-2022	1.5	182	3
	900226001617211	6-Aug-2020	1.7	101	1	20-Jul-2022	1.8	184	3
	900226001617070	6-Aug-2020	1.7	106	1	24-Jul-2022	1.3	189	3
	900226001617235	6-Aug-2020	2.0	104	1	20-Jul-2022	2.0	188	3
	900226001617571	28-Jul-2021	1.2	195	3	24-Jul-2022	1.2	210	4
	900228000461078	3-Aug-2021	2.0	221	2	20-Jul-2022	2.0	225	3
	900226001221148	3-Aug-2021	1.8	148	1	20-Jul-2022	2.0	169	2

Length-frequency histograms for Rainbow Trout (Figure 5) showed distinct modes for different age cohorts. In Farrell and Kobes creeks, there were modes present between 20 and 50 mm FL corresponding to age-0 (YOY) fish. The capture of these individuals provides evidence of successful recruitment for the 2022 cohort. Age-0 fish were not captured in Colt or Maurice creeks in 2022.

Modes for immature Rainbow Trout were also apparent in the length-frequency histograms; however, these modes differed between tributaries, indicating different growth rates between creeks. Colt and Farrell creeks had similar modes for estimated age-1 Rainbow Trout, between approximately 60 and 100 mm FL, slightly lower than those in Kobes and Maurice creeks. In Kobes and Maurice creeks, modes for age-1 Rainbow Trout were evident between approximately 70 and 130 mm FL.

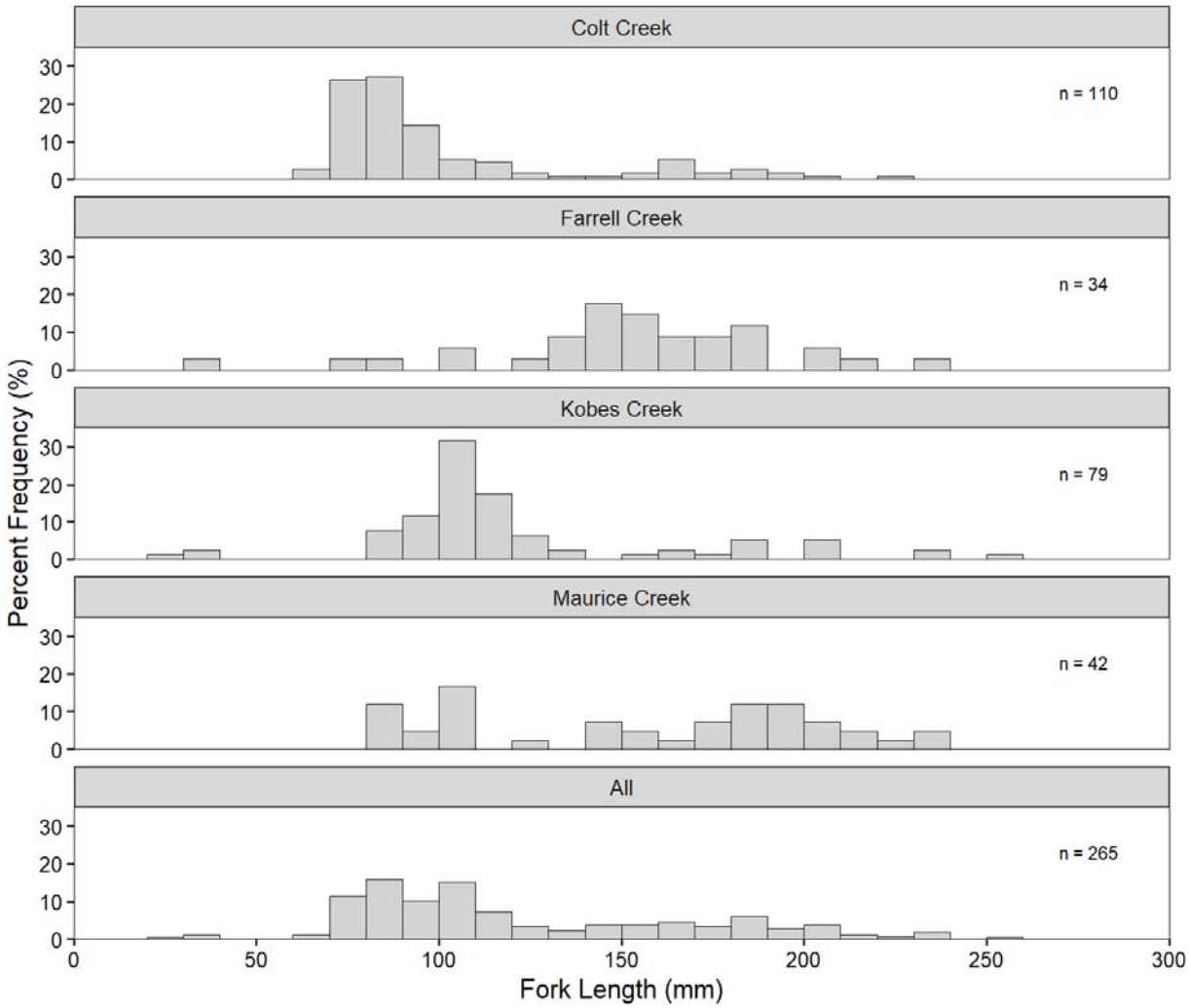

Figure 5: Length-frequency distribution for Rainbow Trout captured by backpack electrofishing in Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Ages were assigned to 264 of the 265 Rainbow Trout captured in 2022 (Table 10). These fish ranged in age from age-0 to age-5 and were included in all age-related analyses (Figure 6 and Table 10). Due to differences in growth for Rainbow Trout among streams, overlapping length distributions were apparent for all age-classes greater than age-0 (Figure 6).

Thirteen Bull Trout were captured in Colt Creek with fork lengths between 111 and 280 mm, one Bull Trout was captured in Kobes Creek with a fork length of 278 mm, and four Bull Trout were captured in Maurice Creek with fork lengths between 184 and 252 mm. All captured Bull Trout were implanted with PIT tags except for one recaptured Bull Trout in Colt Creek which was originally captured and tagged in 2021 as part of the Task 2c study. Bull Trout were not captured in Farrell Creek.

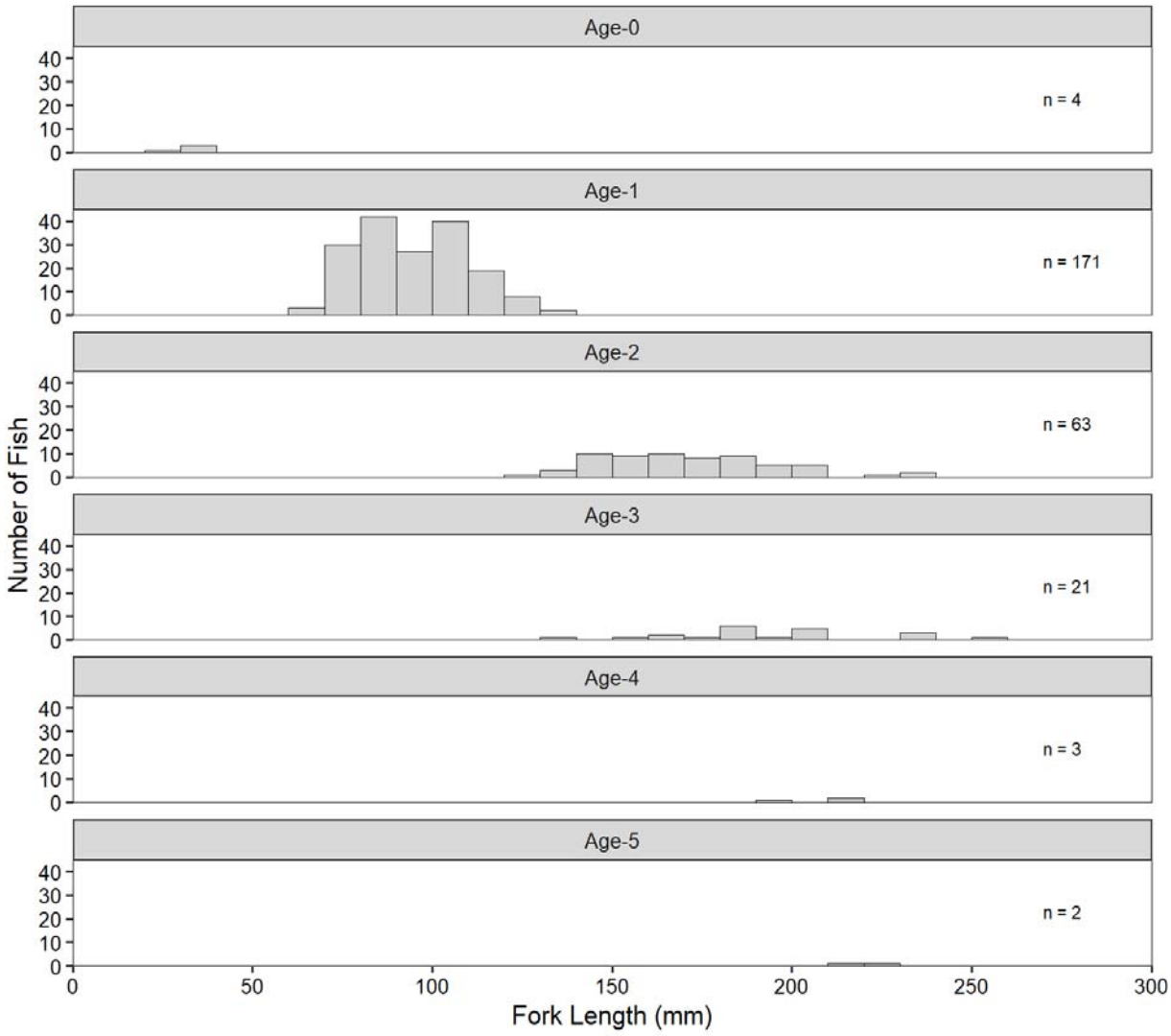

Figure 6: Length-frequency by age-class for Rainbow Trout captured in Colt, Farrell, Kobes, and Maurice creeks combined during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

One YOY Arctic Grayling (40 mm FL) was captured in Colt Creek, providing evidence of a spawning population of Arctic Grayling within this system. Three immature Arctic Grayling were also captured in Colt Creek, with fork lengths ranging between 132 and 203 mm. All three of the immature Arctic Grayling were implanted with PIT tags. Arctic Grayling were not captured in Farrell, Kobes, or Maurice creeks in 2022.

Table 10: Descriptive statistics of fork length by age for Rainbow Trout captured in Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Age	Colt Creek			Farrell Creek			Kobes Creek			Maurice Creek		
	Mean FL ± SD	Range	*n*	Mean FL ± SD	Range	*n*	Mean FL ± SD	Range	*n*	Mean FL ± SD	Range	*n*
0	-	-	-	37	n/a	1	29 ± 3	26 - 31	3	-	-	-
1	87 ± 14	63 - 133	92	124 ± 28	78 - 109	4	105 ± 11	83 - 130	60	98 ± 12	81 - 122	15
2	176 ± 20	148 - 222	17	162 ± 27	127 - 234	24	179 ± 16	157 - 202	10	173 ± 27	144 - 236	12
3	164	n/a	1	169 ± 15	155-184	3	212 ± 40	139 – 251	6	195 ± 16	174 – 235	11
4	-	-	-	-	-	-	-	-	-	205 ± 11	192 - 212	3
5	-	-	-	213	n/a	1	-	-	-	225	n/a	1

In 2022, non-target fish species captured in Colt, Farrell, Kobes, and Maurice creeks, in declining order of abundance, included Slimy Sculpin (*n* = 587), Longnose Dace (*n* = 560), Longnose Sucker (*Catostomus catostomus; n* = 344), Redside Shiner (*n* = 222), Lake Chub (*Couesius plumbeus*; *n* = 153), Largescale Sucker (*Catostomus macrocheilus; n* = 37), Mountain Whitefish (*n* = 34), White Sucker (*Catostomus commersonii; n* = 16), Trout-perch (*Percopsis omiscomaycus; n* = 11), Sculpin not identified to species (*Cottus spp. ; n* = 10), Prickly Sculpin (*Cottus asper; n* = 5), Sucker not identified to species (*Castosomus spp.; n* = 5) and Northern Pikeminnow (*Ptychocheilus oregonensis; n* = 1).

Mountain Whitefish were the only non-target salmonid species encountered, and they were captured in Colt (*n* = 19), Kobes (*n* = 12), and Maurice (*n* = 3) creeks. Fork lengths of Mountain Whitefish ranged between 56 and 195 mm FL.

3.3.2.1 Summary of Subsequent Site C FAHMFP Encounters

A single immature Rainbow Trout that was initially tagged in 2021 as part of Task 2c was subsequently encountered in 2022 during the Peace River Large Fish Indexing Survey (Mon-2, Task 2a).
On 3 August 2021, a Rainbow Trout was captured in Maurice Creek at River Km 2.0. At that time, it had a fork length of 107 mm, weighed 16 g, and was implanted with a PIT tag (tag number: 900226001617706).
It was subsequently recaptured on 29 August 2022 in the Peace River near River Km 31. At that time, it had a fork length of 199 mm and weighed 88 g. Over the approximately 1 year between capture and recapture, this fish travelled a minimum of 6 km and grew 92 mm.

3.3.3 Interannual Comparison

In 2022, YOY Rainbow Trout were captured in Farrell and Kobes creeks but in very low numbers (one YOY in Farrell Creek and three YOY in Kobes Creek). YOY were not captured in 2022 in Colt or Maurice creeks. CPUE for immature Rainbow Trout in 2022 was relatively high in Colt Creek (23.0 fish/h), suggesting successful Rainbow Trout recruitment in Colt Creek in 2021. Only one YOY Rainbow Trout has been captured

in Maurice Creek since sampling began in that system in 2020. CPUE for immature Rainbow Trout decreased year-over-year in Farrell, Kobes, and Maurice creeks between 2020 and 2022; however, over this three-year period, CPUE remained within the range of CPUE values recorded between 2017 and 2020.

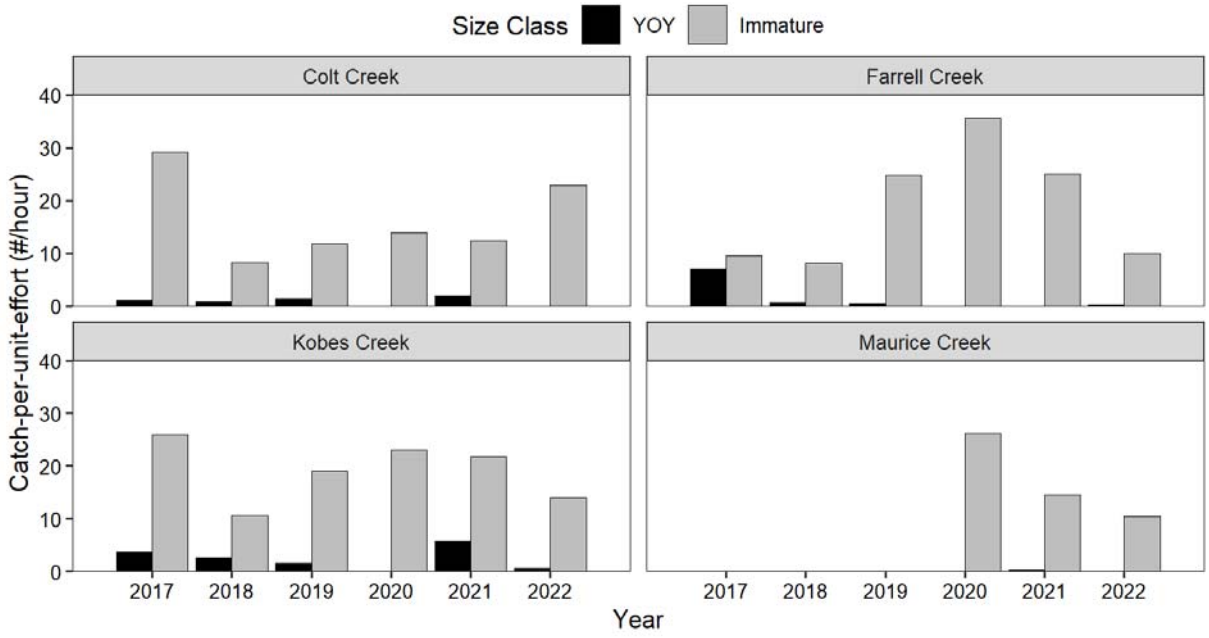

Figure 7: Interannual comparison of catch per unit effort (fish/h) for Rainbow Trout captured by backpack electrofishing in the Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2017–2022. Maurice Creek was not sampled prior to 2020.

3.4 Moberly River

3.4.1 Moberly River Discharge and Temperature

Moberly River discharge typically decreases from June to September (Water Survey of Canada Station 07FB008; Figure 8). In 2022, sampling in the Moberly River was conducted from 25 July to 4 August (similar timing as the 2021 study, and approximately 1 week earlier than the 2020 study). During the 2022 study period, Moberly River discharge remained below the historical average, with a mean discharge of 10.0 m^3/s. Over the 10-day study period, discharge in the Moberly River decreased from 12.8 to 8.7 m^3/s (Figure 8).

During the 2022 study period, water temperatures in the Moberly River ranged between 8.2°C and 25.6°C (mean = 19.9°C) (Appendix C, Table C1). The coldest water temperatures (i.e., 8.2°C) were recorded near locations where groundwater upwelling was observed.

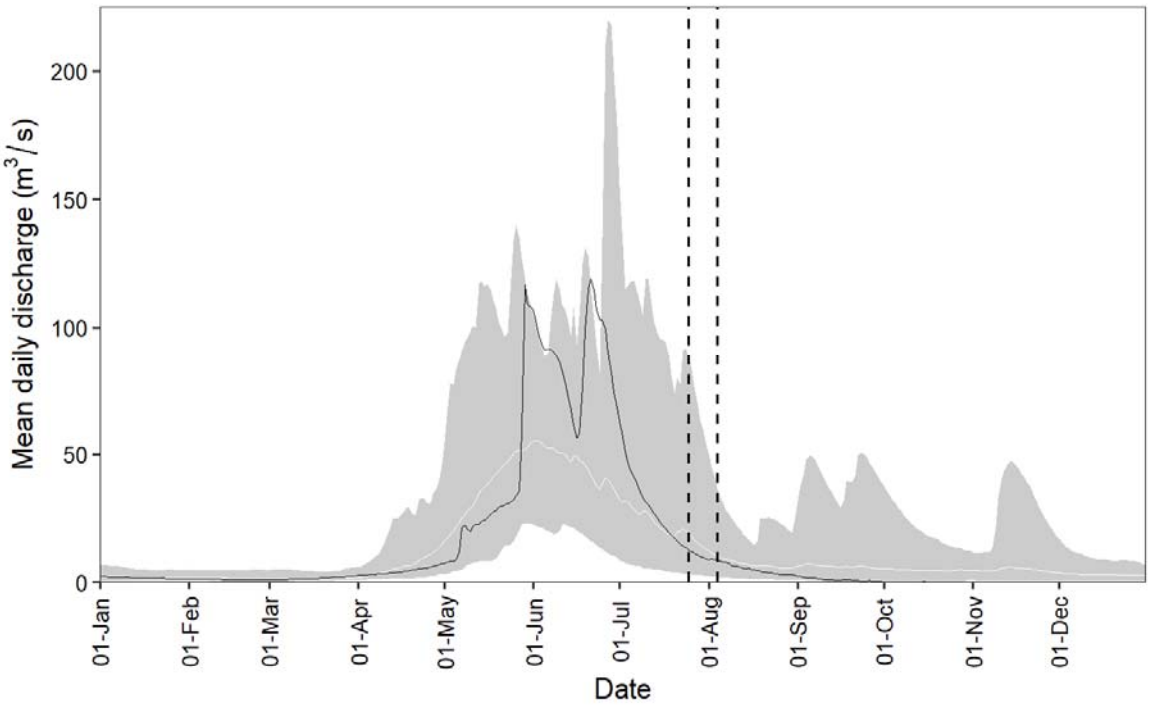

Figure 8: Mean daily discharge in the Moberly River near Fort St. John (station 07FB008) in 2022 (black line). The white line shows the mean daily discharge and grey ribbon shows the range from minimum to maximum from historical daily discharge data from 2001 to 2021. Vertical dashed lines show the 2022 study period.

3.4.2 Sample Effort

Sampling was conducted at 41 backpack electrofishing sites and 50 boat electrofishing sites over 11 sections of the Moberly River. In total, 44.9 hours of angling effort was conducted at 79 angling sites (Table 11)[13]. Summaries of effort employed during the Moberly River survey by section and capture method are provided in Appendix B, Tables B1 to B3.

[13] To increase potential catch of target species, angling also occurred opportunistically while the boats were travelling between sites and any fish captured while in transit were processed at the location of capture. The level of effort employed during this opportunistic sampling is not included in the effort summaries presented in this report.

Table 11: Summary of sampling effort employed in the Moberly River by section during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Section	Backpack Electrofishing			Small Boat Electroshocking			Angling	
	Number of Sites	Effort (s)	Effort (m)	Number of Sites	Effort (s)	Effort (m)	Number of Sites	Effort (h)
MR-S1A	6	6,625	735	7	4,578	6,241	12	22.2
MR-S1	2	860	167	2	2,459	2,300	5	1.0
MR-S2	3	1,558	200	1	1,230	1,680	6	0.9
MR-S3	1	742	71	2	2,179	3,420	0	0.0
MR-S4	2	1,875	240	2	1,581	2,240	6	2.2
MR-S5	2	1,344	287	3	3,212	4,760	2	0.9
MR-S6	2	1,234	179	3	3,082	4,350	4	2.7
MR-S7	15	14,331	2,443	18	11,959	17,051	28	10.4
MR-S8	3	2,507	593	4	1,954	3,330	7	1.5
MR-S9	3	3,454	582	6	3,453	5,846	5	2.1
MR-S10	2	1,524	201	2	2,048	2,760	4	1.0
Total	**41**	**36,054**	**5,698**	**50**	**37,735**	**53,978**	**79**	**44.9**

3.4.3 Catch and Life History

In total, 29 Arctic Grayling were captured in the Moberly River in 2022. Life history and capture data are provided in Appendix B, Table B7. Sections MR-1A and MR-S7 accounted for 53% and 30% of the total Arctic Grayling catch, respectively. No more than two Arctic Grayling were captured in each of the remaining sections of the Moberly River. Similar to 2019 and 2020, angling was the most effective method for capturing Arctic Grayling, accounting for 67% of the total Arctic Grayling catch in 2022.

Of the 29 Arctic Grayling captured in the Moberly River, 22 (76%) were implanted with PIT tags (Table 12). All remaining Arctic Grayling were not tagged because they were too small to receive a PIT Tag (i.e., less than 80 mm FL; n = 5), incidental mortalities (n = 2), or were unhealthy and unlikely to survive the tagging process (n = 1).

The total catch of Arctic Grayling has varied across the seven years of the Mon-1b, Task 2c study in the Moberly River. When total catch is compared to sample timing, Moberly River discharge, and water temperature values, relationships are not apparent (Table 13), suggesting variable abundance and catch efficiency.

Table 12: Number of FAHMFP indicator species fish caught and tagged in the Moberly River during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Species	Life Stage[a]	Angling			Backpack Electrofishing			Small-Fish Boat Electroshocking			Total		
		# Caught	# Tagged	CPUE (#/h)	# Caught	# Tagged	CPUE (#/h)	# Caught	#Tagged	CPUE (#/h)	# Caught	# Tagged	CPUE (#/h)
Arctic Grayling	Immature	19	17	0.4	2	2	0.2	4	3	0.4	25	22	0.4
	YOY	-	-	-	4	-	0.4	-	-	-	4	-	<0.1
Bull Trout	Immature	-	-	-	-	-	-	2	2	0.2	2	2	<0.1
Burbot	Adult	-	-	-	5	5	0.5	11	10	1.0	16	15	0.2
	Immature	-	-	-	30	28	3.0	15	14	1.4	45	42	0.7
	YOY	-	-	-	8	-	0.8	2	0	0.2	10	0	0.2
Mountain Whitefish	Adult	-	-	-	-	-	-	143	-	13.6	143	-	2.2
	Immature	-	-	-	4	-	0.4	547	-	52.1	551	-	8.4
	YOY	-	-	-	21	-	2.1	30	-	2.9	51	-	0.8
Northern Pike	Adult	-	-	-	-	-	-	4	4	0.4	4	4	<0.1
	Immature	-	-	-	7	6	0.7	-	-	-	7	6	0.1
Rainbow Trout	Immature	-	-	-	1	1	0.1	-	-	-	1	1	<0.1

[a] Life stage was assigned based on fork length. Fish were classified as adult when longer than 249 mm FL and immature when between approximately 60 and 250 mm FL. The maximum size of YOY fish varied by species and was selected based on modes observed in length-frequency histograms and corroborated with length-at-age data when possible.

Two immature Bull Trout were captured in 2022. Bull Trout were also captured in low numbers (2 to 4 individuals/year) in 2016, 2018, 2019, and 2020. Both of the Bull Trout captured in 2022 were captured by small-fish boat electroshocking in MR-S7 and implanted with PIT tags. One Bull Trout had a fork length of 217 mm and the second Bull Trout had a fork length of 210 mm.

Non-target species comprised the majority of the Moberly River catch (all methods combined). Captured species by section are presented in Appendix B, Table B6. A summary of catch by capture method for target species is provided in Table 12. All YOY Arctic Grayling were captured by backpack electrofishing (n = 4). Angling captured the greatest number of immature Arctic Grayling (n = 19). CPUE for immature Arctic Grayling was less than 1 fish/hour for all three methods. Small-fish boat electroshocking caught more fish than all other methods for most species and life stages.

Table 13: Number of Arctic Grayling captured in the Moberly River (total and YOY) during each study year of the Site C Reservoir Tributary Fish Population Indexing Survey in relation to mean river discharge and mean and maximum water temperature values recorded at the time of sampling.

Study Year	Sample Period	Mean Discharge (m^3/s)	Mean Water Temperature (°C)	Maximum Water Temperature (°C)	Total Arctic Grayling Catch (# of fish)	Total YOY Arctic Grayling Catch (# of fish)
2016	8 – 18 Sep	35.1	13.2	14.9	105	87
2017	30 Aug – 8 Sep	1.1	15.8	18.8	2	0
2018	13 – 31 Aug	10.9	17.9	20.4	8	4
2019	22 Jul – 2 Aug	11.1	18.4	23.4	36	4
2020	28 Jul – 8 Aug	11.6	18.5	23.1	134	42
2021	21 – 30 Jul	7.0	17.6	23.6	42	24
2022	25 Jul – 4 Aug	10.0	19.9	25.6	29	4

As in previous years, Arctic Grayling length-frequency data from 2022 indicate that a range of size classes use the Moberly River (Figure 9). Distinct modes were apparent in the length-frequency data, with age-0 Arctic Grayling occurring between 40 and 70 mm FL, age-1 individuals between 120 and 170 mm FL, and age-2 individuals between 200 and 240 mm FL. Arctic Grayling > 250 mm FL (age-3 or older) were not captured in 2022.

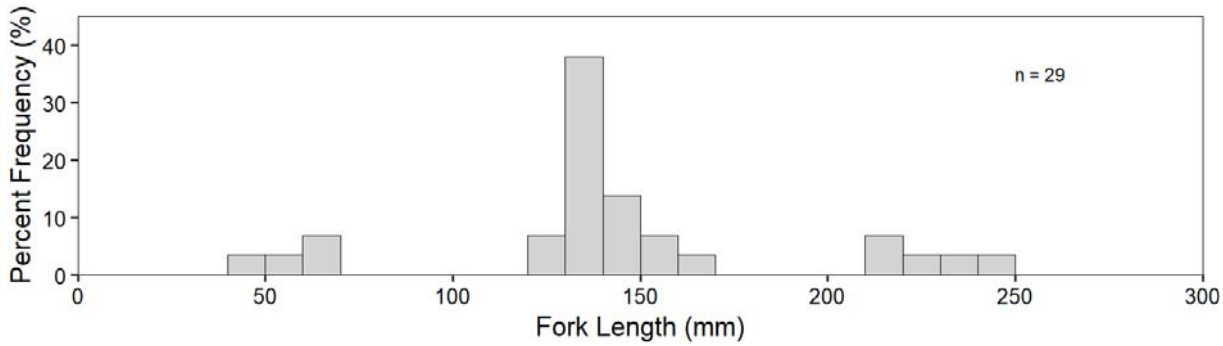

Figure 9: Length-frequency distribution for Arctic Grayling captured in the Moberly River (all capture methods combined) during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Ages were assigned to all 29 Arctic Grayling captured in 2022 and ranged between age-0 and age-2 (Figure 10 and Table 14). Age data supported the age assignments based on length-frequency modes detailed above and inter-year mark-recapture data. The majority (69%) of Arctic Grayling captured in 2022 were age-1.

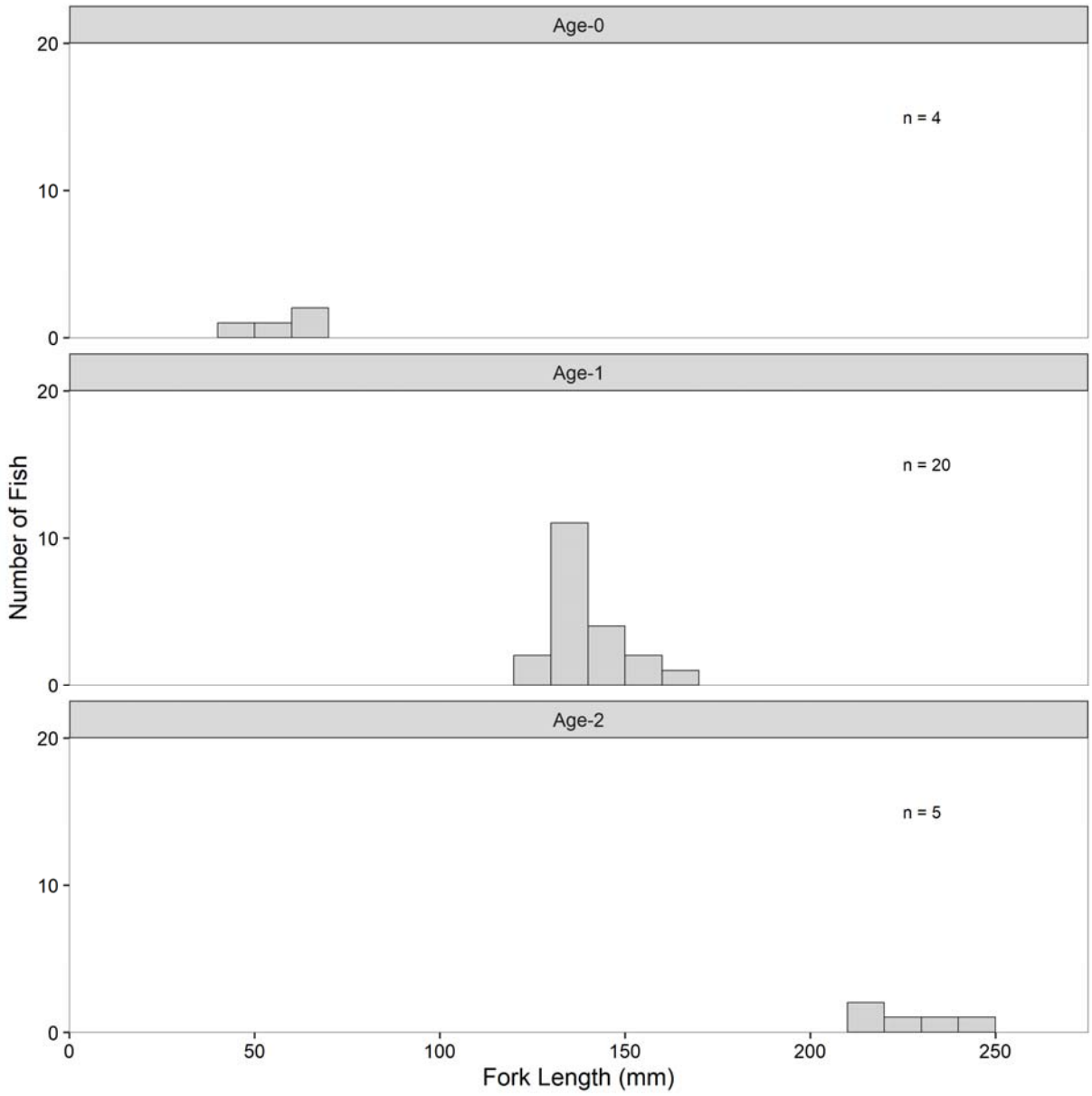

Figure 10: Length-frequency distribution by age class for Arctic Grayling captured in the Moberly River during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Table 14: Descriptive statistics of fork length and weight by age for Arctic Grayling captured in the Moberly River during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022. Ages were assigned based on scale samples.

Age	Fork Length			Weight		
	Average ± SD (mm)	Range (mm)	*n*	Average ± SD (g)	Range (g)	*n*
0	56 ± 7	46 – 61	4	-	-	4
1	139 ± 10	127 – 168	20	32 ± 7	20 – 50	20
2	225 ± 15	211 – 246	5	120 ± 15	100 – 135	5

The length-frequency histogram for Burbot, a FAHMFP indicator species, suggests a mode representing age-0 individuals from approximately 40 to 70 mm TL, age-1 individuals from approximately 120 to 170 mm TL, and age-2 and older fish starting at approximately 170 mm FL; however, the distribution of individual cohorts overlapped after age-1 (Figure 11).

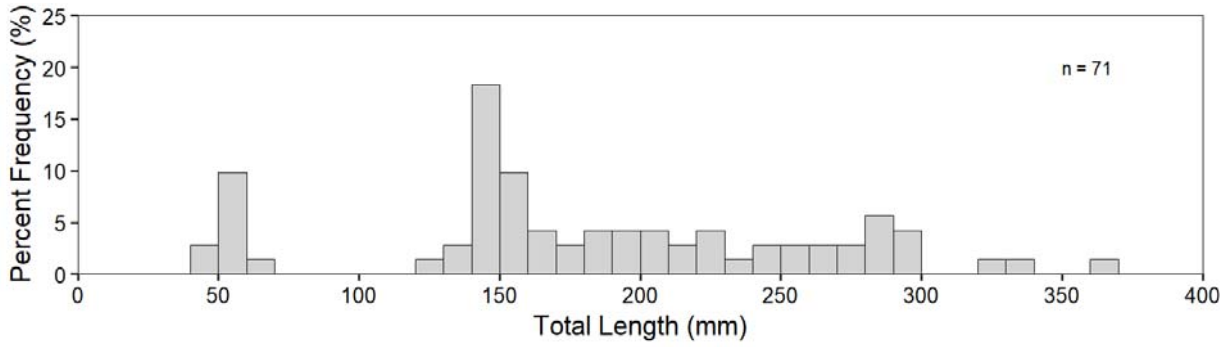

Figure 11: Length-frequency distribution for Burbot captured in the Moberly River (all capture methods combined) during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

The length-frequency histogram for Mountain Whitefish suggests a mode representing age-0 fish from 50 to 90 mm FL, age-1 fish from 90 to 160 mm FL, and age-2 and older fish starting at approximately 170 mm FL; however, the distribution of individual cohorts overlapped after age-1 (Figure 12). The modes apparent for Mountain Whitefish captured in the Moberly River in 2022 align closely with previous study years (Golder 2019, 2020a, 2021a, 2022a), suggesting similar annual growth rates.

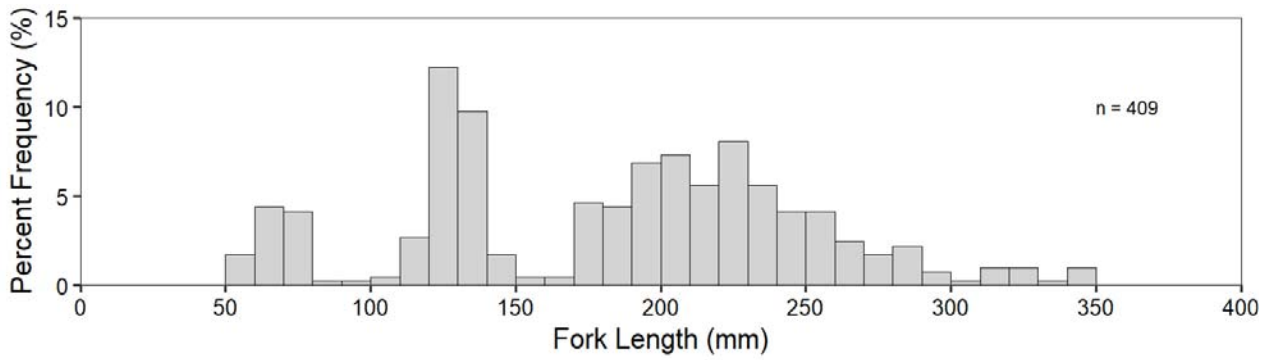

Figure 12: Length-frequency distribution for Mountain Whitefish captured in the Moberly River (all capture methods combined) during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

3.4.4 Interannual Comparison

In 2022, YOY Arctic Grayling were only captured in the Moberly River during backpack electrofishing surveys; angling and small-fish boat electroshocking were not effective at capturing this cohort. During most study years, backpack electrofishing was the most effective method for capturing YOY fish and all three methods were effective at capturing immature Arctic Grayling. Catch rates for all methods generally declined between 2020 and 2022 for both YOY and immature Arctic Grayling (Figure 13). The presence of YOY Arctic Grayling in the Moberly River each year between 2018 and 2022 indicates successful Arctic Grayling spawning and recruitment for each of these years.

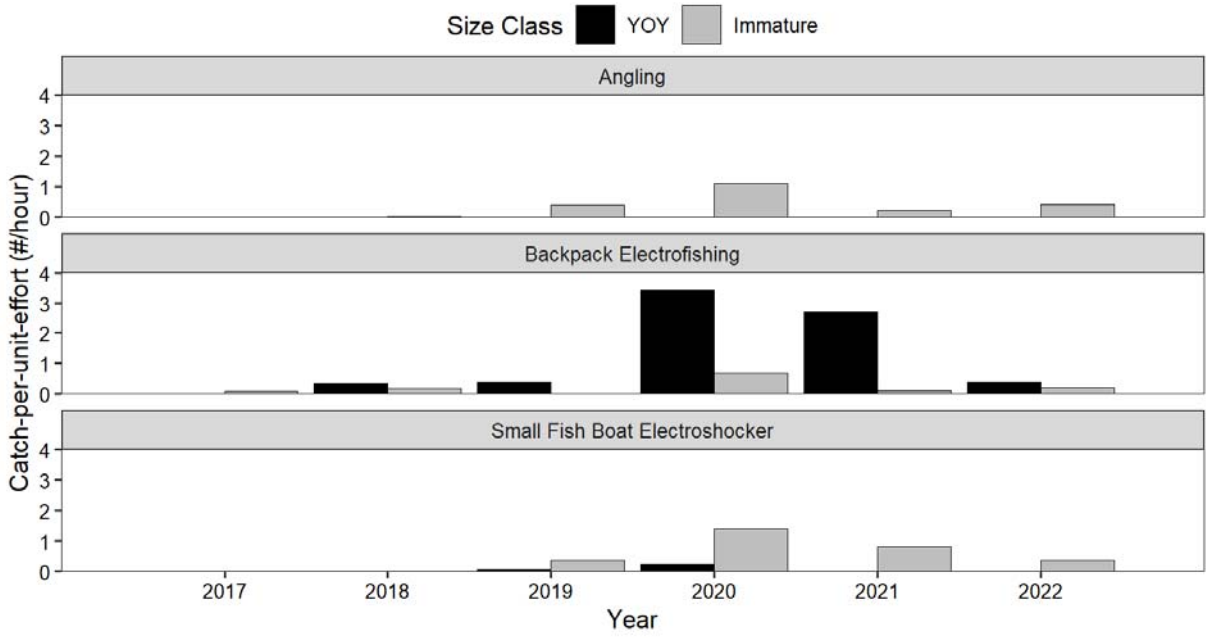

Figure 13: Interannual comparison of catch per unit effort (fish/h) for Arctic Grayling captured by angling, backpack electrofishing, and small-fish boat electroshocking in the Moberly River during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2017–2022.

3.5 Genetic and Microchemistry Tissue Sample Collection

In 2022, small pieces of fin tissue for DNA analysis were collected from 29 Arctic Grayling, 777 Bull Trout, and 217 Rainbow Trout (Table 15). Fin tissue samples were also collected from Redside Shiner (*n* = 17), Longnose Dace (*n* = 20), and Slimy Sculpin (*n* = 20) in support of the Site C Small Fish Translocation Monitoring Program (Mon-15). All tissue samples were preserved in 95% non-denatured ethyl alcohol and provided to BC Hydro.

Table 15: Summary of genetic samples collected as part of the Site C Reservoir Tributary Fish Population Indexing Survey, 2022.

Location	Arctic Grayling	Bull Trout	Rainbow Trout
Chowade River	-	282	-
Cypress Creek	-	354	-
Fiddes Creek	-	122	-
Colt Creek	3	12	81
Kobes Creek	-	1	73
Farrell Creek	-	-	27
Maurice Creek	-	4	36
Moberly River	26	2	-
Total	**29**	**777**	**217**

During the 2022 study period, fin rays (and otoliths if individuals succumbed to sampling) were collected from target species for potential microchemistry analysis. In 2022, fin rays and/or otoliths were collected from 2 Arctic Grayling, 108 Bull Trout, and 13 Rainbow Trout (Table 16). Fin rays and otoliths were provided to BC Hydro. The results of these analysis are not presented in this report.

Table 16: Summary of microchemistry samples collected as part of the Site C Reservoir Tributary Fish Population Indexing Survey, 2022.

Location	Arctic Grayling	Bull Trout	Rainbow Trout
Chowade River	-	21	-
Cypress Creek	-	27	-
Fiddes Creek	-	43	-
Colt Creek	-	10	9
Kobes Creek	-	1	1
Farrell Creek	-	-	-
Maurice Creek	-	4	3
Moberly River	2	2	-
Total	**2**	**108**	**13**

4.0 DISCUSSION

The principal objective of the program is to collect data from Peace River fish populations that use tributaries situated within the future inundation zone of the Site C reservoir to fulfil portions of their life cycles. These data will be used to monitor population-level responses to the construction and operation of the Project. The 2022 study was the seventh year of a multi-year monitoring program and represents the second year of data collected after the river diversion phase of Project construction, which occurred on 3 October 2020. Two years of data has been collected post-river diversion; however, analyses intended to answer the management questions of Task 2c were not conducted during the present study. Like previous survey years, a secondary objective in 2022 was to deploy PIT tags into target species to allow their movements to be monitored by other components of the FAHMFP.

4.1 Tributaries Targeting Bull Trout

The 2022 study design was developed to capture and tag immature Bull Trout in identified Halfway River tributaries. The study design was unchanged from 2017 to 2022 and is based on results of the 2016 reconnaissance study design (Golder 2017) and input by the Site C Fisheries and Aquatic Habitat Mitigation and Monitoring Technical Committee (BC Hydro 2017). The study design is intended to produce high catch rates of immature Bull Trout that are large enough (i.e., greater than 80 mm FL) to receive PIT tags. The mark-recapture data from PIT tagged Bull Trout will be incorporated into the BTIPM (ESSA et al. 2020) to generate population abundance estimates to monitor changes in the Halfway River Bull Trout population.

Immature Bull Trout tagged as part of the current study that are subsequently encountered at the PIT detector arrays in the Chowade River and Cypress Creek, or encountered in the Peace River mainstem under other components of the FAHMFP (see Section 3.2.2.1), will be taken as evidence that the fish is the offspring of a migratory Bull Trout population. Combined, this information will further BC Hydro's understanding of resident and migrant Bull Trout populations in Halfway River tributaries. The PIT detector arrays will also monitor the upstream migrations of these same fish in subsequent years when they return to the Halfway River watershed as adults to spawn. As such, these data will be used by the BTIPM (ESSA et al. 2020) to estimate juvenile to adult survival of Halfway River Bull Trout.

In 2022, 1076 Bull Trout were captured in the Chowade River and Cypress and Fiddes creeks, and 755 individuals were implanted with PIT tags. In 2022, fork lengths were used to assign ages to all YOY and immature Bull Trout captured, with age-1 Bull Trout representing the largest cohort (n = 762), which was consistent with previous study years (Golder 2017, 2018, 2019, 2020a, 2021a, 2022a).

CPUE values among years were compared to provide a coarse assessment of Bull Trout abundance in the Chowade River and Cypress and Fiddes creeks. In 2022 in the Chowade River, CPUE for YOY Bull Trout decreased for the first time since 2019, and CPUE for immature Bull Trout decreased for the first time since 2018. In Cypress Creek, the CPUE for immature Bull Trout increased year-over-year between 2018 and 2022, providing evidence of a strong immature Bull Trout population within this system. In Cypress and Fiddes creeks, CPUE for YOY Bull Trout increased between 2019 and 2022, providing evidence of successful recruitment within these tributaries in recent years.

The Bull Trout assemblage in Fiddes Creek differs from that of the Chowade River and Cypress Creek. In Fiddes Creek, there is a greater abundance of age-2 and older fish (i.e., fish greater than approximately 100 mm FL), compared to the Chowade River and Cypress Creek, which may indicate there are some Bull Trout within this system that are resident fish. Alternatively, migration downstream may occur later compared to other systems. Although the CPUE for YOY Bull Trout in Fiddes Creek is low compared to the Chowade River and Cypress Creek, the CPUE for immature Bull Trout in Fiddes Creek is typically higher than

in the Chowade River and Cypress Creek during most study years. The CPUE for immature Bull Trout in Fiddes Creek increased year-over-year between 2019 and 2021 and remained high in 2022, suggesting successful recruitment in recent years despite low YOY catch in 2019 (n = 0) and 2020 (n = 1).

YOY Bull Trout captured in 2022 are the offspring of the 2021 spawning population. If the spawning population was from the Peace River, these fish would have migrated from the Peace River into the spawning tributaries after the onset of river diversion.

4.2 Tributaries Targeting Rainbow Trout

Sampling in Farrell and Maurice creeks is intended to test the Mon-1b hypothesis regarding Peace River Rainbow Trout continuing to spawn and rear in tributaries of the Site C reservoir upstream of the inundation zone. Sampling in Farrell Creek has been conducted annually for the past six years (2017 to 2022) and sampling in Maurice Creek has been conducted for the past three years (2020 to 2022). YOY were captured in Farrell Creek between 2017 and 2019, and this age cohort was absent in the 2020 and 2021 catches; however, a single individual was captured in 2022. This finding suggests there have been three years of low recruitment in Farrell Creek. This result may be compounded by limitations of sampling methods. Capturing YOY Rainbow Trout using backpack electrofishing is challenging, as the effectiveness of backpack electrofishing is reduced due to the small size of YOY fish (e.g., larger bodied fish cross a greater potential gradient along the electrical current between the anode and the cathode and as a result, galvanotaxis is more effectively induced). YOY have consistently comprised a small proportion of the total Rainbow Trout catch for all creeks and years (range = 0 to 42%). In 2022, no YOY Rainbow Trout were captured in Maurice Creek.

Rainbow Trout encountered in Farrell and Maurice creeks may be individuals from a resident population within each tributary or the offspring of Peace River Rainbow Trout. Since 2017, a total of 514 immature Rainbow Trout have been tagged in Farrell and Maurice creeks; however, only one of these Rainbow Trout have been captured in the Peace River under other components of the FAHMFP (see Section 3.3.2.1). Additionally, none of the adult Rainbow Trout that have received PIT tags under other components of the FAHMFP have been observed in Farrell or Maurice creeks. Radio telemetry data provides some insight into the use of Farrell and Maurice creeks by the Peace River Rainbow Trout population (Hatch et al. 2021, 2022; LGL 2020). In 2022, 12 radio-tagged Rainbow Trout were detected in Maurice and Farrell creeks (Hatch et al. In prep.).

Sampling in Colt and Kobes creeks is intended to collect additional baseline data for Rainbow Trout within the Halfway River watershed. Data collected as part of these surveys will not be used to specifically test any hypotheses under the FAHMFP but will contribute to the regional Rainbow Trout dataset and contribute to BC Hydro's understanding of potential changes to Rainbow Trout populations in Peace River tributaries and the Site C reservoir. In 2022, YOY Rainbow Trout were captured in Kobes Creek indicating successful spawning within this system in the spring of 2022.

In 2021, a mode was present in Colt Creek between approximately 100 and 150 mm FL (Golder 2022a), likely corresponding to age-2 individuals, however this mode was noticeably absent in 2022. Instead, a small mode was present between approximately 145 – 200 mm FL, indicating either a shift in growth rates or potentially increased catch of age-3 fish and decreased catch of age-2 fish. A similar, albeit smaller, modal shift was also present in Farrell Creek, with the mode increasing slightly in 2022 (approximately 120 and 170 mm FL) relative to 2021 (range = 90 to 150 mm FL; Golder 2022a).

4.3 Moberly River

In 2022, 29 Arctic Grayling were captured in the Moberly River, with the immature cohort representing the highest proportion of the catch (76%; *n* = 25). The presence of YOY fish in 2022 (*n* = 4) provides evidence that Arctic Grayling spawned in the Moberly River in the spring of 2022.

The present study year was the second year of sampling for Arctic Grayling in the Moberly River since the onset of river diversion associated with the Project. As a result of river diversion, Arctic Grayling within the Peace River downstream of the Project cannot migrate upstream into the Moberly River to spawn without assisted transport from the operation of the TUF (e.g., BC Hydro 2022a) or the activities of Site C Contingent Boat Electroshocking (e.g., WSP 2023). Of six radio tagged Arctic Grayling that were detected in the Moberly River during the 2021 spawning season, five were situated downstream of the Project immediately prior to the spawning season and were transported to upstream of the Project as part of TUF or during Site C Contingent Boat Electroshocking. The remaining radio tagged Arctic Grayling that was detected in the Moberly River during the 2021 spawning season was one of two radio tagged Arctic Grayling situated upstream of the Project in the spring of 2021 (Hatch et al. 2023). During the 2022 spawning season, two radio tagged Arctic Grayling were detected in the Moberly River; both fish were in the Peace River upstream of the Project in the spring of 2022 (Hatch et al. 2023).

McPhail (2007) states that Arctic Grayling spawn in northern British Columbia between early and late May. Radio telemetry data indicate that adult Arctic Grayling migrate into the Moberly River as early as mid-March and migrate out of the Moberly River as late as mid-June (Hatch et al. 2022, 2023). In 2022, fish transport activities commenced on 1 April and between 9 April and 31 May, 26 adult Arctic Grayling were transported from downstream of the Project to the Project forebay release location (BC Hydro 2022a, 2022b; WSP 2023). An additional 38 Arctic Grayling were transported upstream between 1 June and 31 July (BC Hydro 2022c, 2022d).

The number of Arctic Grayling captured in 2022 was similar to the low numbers encountered in 2017, 2018, and 2019 (Table 13; Golder 2018, 2019, 2020a, 2021a, 2022a). The higher number of YOY Arctic Grayling in 2020 and 2021 compared to the previous three years may reflect an increase in Arctic Grayling abundance or may, in part, reflect variations in sampling efficiency.

In 2020, the majority of Arctic Grayling were captured in Section 7. As a result, this section was an area where increased effort was employed in 2021 and 2022. In 2021, Section 7 accounted for 71% of the total Arctic Grayling catch and 71% of the YOY captured. In 2022, 31% of Arctic Grayling were captured in Section 7; however, all YOY fish were captured in Section 7. Within Section 7, all Arctic Grayling were captured within a 3.4 km section of the river between River Km 36.0 and 39.4. As described in Golder 2021a, this section of the Moberly River is highly braided with multiple side channels, and evidence of groundwater upwelling within the side channels was observed. The findings of the 2022 study program provide further evidence that this area provides preferred rearing habitat for YOY Arctic Grayling in the Moberly River. Furthermore, the relatively high density of YOY Arctic Grayling within this small area of the Moberly River indicates that Arctic Grayling spawning likely occurs at or near these locations.

5.0 CLOSURE

We trust the information contained in this report is sufficiently detailed for your review purposes. Please do not hesitate to contact us should you have any questions or require clarification.

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https://golderassociates.sharepoint.com/sites/124588/project files/6 deliverables/2022_trib_indexing_final/20136472-008-r-rev0-2022_trib_index 07jul_23.docx

6.0 LITERATURE CITED

AMEC and LGL (AMEC Earth & Environmental and LGL Limited). 2008a. Peace River fish and aquatics investigations - Peace River and tributary summer fish distribution, habitat assessment and radio telemetry studies 2006. Prepared for BC Hydro. 181 pages.

AMEC and LGL (AMEC Earth & Environmental and LGL Limited). 2008b. Peace River fisheries investigation - Peace River and Pine River radio telemetry study 2007. Prepared for BC Hydro. 148 pages.

AMEC and LGL (AMEC Earth & Environmental and LGL Limited). 2010a. Further analysis and assessment of the Ministry of Environment's Peace River Bull Trout and Arctic Grayling radio telemetry database 1996 to 1999. Prepared for BC Hydro. 48 pages.

AMEC and LGL (AMEC Earth & Environmental and LGL Limited). 2010b. Peace River fisheries investigation - Peace River and Pine River radio telemetry study 2009. Prepared for BC Hydro. 135 pages + appendices

BC Hydro. 2017. Evaluation of the effect of number of tags to detect trends in juvenile-to-adult survival for Bull Trout tagging in Halfway River tributaries. Inter-office memo. Memo written by Brent Mossop, Eric Parkinson, Brian Ma, and Eduardo Martins. Submitted to the Site C Fisheries and Aquatic Habitat Mitigation and Monitoring Technical Committee – Working Group for Tributary Sampling on 24 May 2017. 12 pages + appendices.

BC Hydro. 2022a. Temporary Upstream Fish Passage Operations Report. Reporting Period: April 1 to 30, 2022. Report prepared by BC Hydro. Submitted May 9, 2022: 22 pages.

BC Hydro. 2022b. Temporary Upstream Fish Passage Operations Report. Reporting Period: May 1 to 31, 2022. Report prepared for BC Hydro. Submitted June 6, 2022. 22 pages

BC Hydro. 2022c. Temporary Upstream Fish Passage Operations Report. Reporting Period: June 1 to 30, 2022. Report prepared for BC Hydro. Submitted July 21, 2022. 20 pages.

BC Hydro. 2022d. Temporary Upstream Fish Passage Operations Report. Reporting Period: July 1 to 31, 2022. Report prepared for BC Hydro. Submitted August 21, 2022. 18 pages.

BC MELP (BC Ministry of Environment, Lands and Parks). 2000. Peace-Halfway watershed bull trout telemetry data. Ministry of Environment, Lands and Parks, Fort St. John, B.C. Unpublished data files.

Burrows J, Euchner T, Baccante N. 2001. Bull trout movement patterns: Halfway River and Peace River. Pages 153 to 157 in Brewin MK, Paul AJ, Monita M, editors. Bull Trout II Conference Proceedings. 2001. Trout Unlimited Canada, Calgary, AB.

ESSA (ESSA Technologies Ltd.), BC Hydro, and Golder Associates Ltd. 2020. Synthesis Review of the Fisheries and Aquatic Habitat Monitoring and Follow-Up Program (FAHMFP). Prepared for BC Hydro. 66 pages + 3 appendices.

Euchner and Mainstream (Euchner T and Mainstream Aquatics Ltd.). 2013. Site C Fisheries Study – Upper Halfway River watershed Bull Trout spawning survey – 2012. Prepared by T. Euchner, Diversified Environmental Services, Fort St. John, BC in association with Mainstream Aquatics Ltd., Edmonton, AB, for BC Hydro, Vancouver, BC. 48 pages.

Geraldes A, Taylor E. 2020. Site C Fish Genetics Study. 2019 Status Report for Bull trout, Arctic Grayling and Rainbow Trout. Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 44 pages.

Geraldes A, Taylor E. 2021. Site C Fish Genetics Study. 2020 Status Report for Bull Trout, Arctic Grayling and Rainbow Trout. Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 51 pages.

Geraldes A, Taylor E. 2022. Site C Fish Genetics Study. 2021 Status Report for Bull Trout, Arctic Grayling and Rainbow Trout. Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 55 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2017. Site C reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c) – 2016 investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 1650533: 28 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2018. Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c) – 2017 investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 1650533: 38 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2019. Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c) – 2018 investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 1650533: 49 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2020a. Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c) – 2019 investigations. Report Prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 19121765: 52 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2020b. Site C Clean Energy Project – Offset Effectiveness Monitoring. River Road Rock Spurs and Upper Site 109L – 2019 investigations. Report prepared for BC hydro, Vancouver, British Columbia. Golder Report No. 19121769F: 50 pages + 4 appendices.

Golder (Golder Associates Ltd.). 2021a. Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c) – 2020 investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 20136472: 44 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2021b. Peace River Large Fish Indexing Survey – 2020 Investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 20136470-015. 98 pages + 6 appendices.

Golder (Golder Associates Ltd.). 2022a. Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c) – 2021 investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 20136472: 45 pages + 3 appendices.

Golder (Golder Associates Ltd.). 2022b. Peace River Large Fish Indexing Survey – 2021 Investigations. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 20136470-023. 100 pages + 6 appendices.

Golder (Golder Associated Ltd.). 2022c. Peace River and Site C Reservoir Water and Sediment Quality Monitoring Program (Mon8/9) – Water Temperature Monitoring (Task 2b) – 2021. Report prepared for BC Hydro, Vancouver, British Columbia. Golder Report No. 19121767: 35 pages + 2 appendices.

Hatch K, Robichaud D, Fitzgerald C. 2021. Site C Fish Movement Assessment (Mon-1b, Task 2d) – 2020. Report prepared for BC hydro – Site C Clean Energy Project – Vancouver, BC. 57 pages + 4 appendices.

Hatch K, Robichaud D, Cox B, Crawford S. 2022. Site C Fish Movement Assessment (Mon-1b, Task 2d) – 2021. Report prepared for BC hydro – Site C Clean Energy Project – Vancouver, BC. 62 pages + 5 appendices.

Hatch K, Robichaud D, Cox B, Crawford S. 2023. Site C Clean Energy Project – Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program (Mon-1b) Task 2a – Peace River Arctic Grayling and Bull Trout Movement Assessment; and Task 2d – Site C Fish Movement Assessment – Construction Year 8 (2022). Report for BC Hydro, Vancouver BC.

LGL (LGL Ltd.). 2020. Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program – Site C Fish Movement Assessment (Mon-1b, Task 2d). Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 25 pages + 2 appendices.

Mackay WC, Ash GR, Norris HJ, editors. 1990. Fish ageing methods for Alberta. R.L. & L. Environmental Services Ltd. in association with Alberta Fish and Wildlife Division and University of Alberta, Edmonton. 113 pages.

McMillen LLC & BC Hydro. 2021. Site C Clean Energy Project – Temporary Upstream Fish Passage Facility – Manual of Operational Parameters and Procedures – Rev 2 February 2021. Submitted to BC Hydro. 39 pages + 1 appendix.

Mainstream (Mainstream Aquatics Ltd.). 2009a. Site C fisheries studies – Baseline Peace River tributaries fish use assessments in spring and fall 2008. Prepared for B.C. Hydro. Report No. 08008BF: 64 pages. + appendices.

Mainstream (Mainstream Aquatics Ltd.). 2010. Halfway River and Moberly River summer fish survey – 2009. Prepared for BC Hydro Engineering Services. Report No. 09008BF: 61 pages + plates + appendices.

Mainstream (Mainstream Aquatics Ltd.). 2011a. Site C Fisheries Studies – 2010 Coldwater Species Fish Survey. Prepared for B.C. Hydro, Site C, Corporate Affairs. Report No. 10015F: 34 pages + appendices.

Mainstream (Mainstream Aquatics Ltd.). 2011b. Site C Fisheries studies – 2010 Moberly River and Halfway River summer fish inventory. Report No. 10006F: 59 pages + plates + appendices.

Mainstream (Mainstream Aquatics Ltd.). 2012. Site C Clean Energy Project – fish and fish habitat technical data report. Prepared for BC Hydro Site C Project, Corporate Affairs Report No. 12002F: 239 pages.

Mainstream (Mainstream Aquatics Ltd.). 2013. Site C Fisheries studies – 2011 Moberly River and Halfway River summer fish inventory. Report No. 11006F: 51 pages + appendices.

Mainstream and Gazey (Mainstream Aquatics Ltd. and W.J. Gazey Research). 2014. Peace River Fish Index Project – 2013 studies. Prepared for B.C. Hydro. Report No. 13011F: 82 pages + appendices.

McPhail JD. 2007. The freshwater fishes of British Columbia. The University of Alberta Press. Edmonton, Alberta.

Pattenden R, McLeod C, Ash G, English K. 1991. Peace River Site C Hydro Development preconstruction fisheries studies. Fish movements and population status. 1990 studies. Report prepared for BC Hydro by R.L. & L. Environmental Services Ltd., Edmonton, Alberta, in association with K. English of LGL Ltd., Sidney, B.C. 121 pages + appendices.

Putt A, Ramos-Espinoza D, Wilson LJ, Middleton C, Buchanan J, Chung M, Martin C. 2020. Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program – 2019 Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b). Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 46 pages + 4 appendices.

Putt A, Ramos-Espinoza D, Chung M. 2021. Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program – 2020 Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b). Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 67 pages + 6 appendices.

Putt A, Ramos-Espinoza D, Chung M. 2022. Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program – 2021 Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b). report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. 69 pages + 6 appendices.

Putt A, Ramos-Espinoza D, Chung M. 2023. Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program – 2022 Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b). Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC, 66 pages and 5 appendices.

R Core Team. 2020. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

R.L.& L. (R.L.& L. Environmental Services Ltd.). 1995. Fish migrations in the Chowade River, B.C. fall 1994. Prepared for Ministry of Environment, Lands and Parks, Fish and Wildlife Branch Fort St. John, B.C. March 1995. 35 pages + 4 appendices.

Ramos-Espinoza D, Burnett NJ, Buchanan J, Putt A. 2018. Peace River Bull Trout Spawning Assessment - Resistivity counter and passive integrated transponder arrays in the Chowade River and Cypress Creek (Mon-1b, Task 2b). Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. InStream Fisheries Research, Vancouver, BC. 65 pages.

Ramos-Espinoza D, Putt A, Wilson LJ, Martin C, Buchanan J, Lingard S, and Middleton C. 2019. Site C Reservoir Tributaries Fish Community and Spawning Monitoring Program – Peace River Bull Trout Spawning Assessment (Mon-1b, Task 2b). Report prepared for BC Hydro – Site C Clean Energy Project – Vancouver, BC. InStream Fisheries Research, Vancouver, BC. 96 pages + 5 appendices.

RISC (Resource Inventory Standards Committee). 1997. Fish collection methods and standards. B.C. Ministry of Environment, Lands and Parks, Fish Inventory Unit for the Aquatic Ecosystems Task Force, Resources Inventory Committee. Version 4.0. 58 pages (two subsequent errata).

TrichAnalytics Inc. 2022. Fish Otolith and Fin Ray Microchemistry Study – Construction Years 5 and 6 (2019 and 2020). Site C Clean Energy Project Fisheries and Aquatic Habitat Monitoring and Follow-up Program. Report prepared for BC Hydro. 129 pages + 7 appendices.

Triton (Triton Environmental Consultants Ltd.) 2021. Peace River Fish Composition and Abundance Survey Mon-2, Task 2b – Construction Year 6 (2020) Annual Report. Report prepared for BC Hydro, Vancouver, British Columbia. Report No. 10584/P5047: 107 pages + 6 appendices.

Wickham H. 2009. ggplot2: elegant graphics for data analysis. Springer New York

WSP (WSP Canada Inc.). 2023. Summary of Site C Contingent Boat Electroshocking Activities – 2022. Technical Memorandum Prepared for BC Hydro, Vancouver, British Columbia. Golder Report No.

APPENDIX A

Maps and UTM Locations

Table A1 Locations of sites sampled during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

River	Upstream River Km[a]	Site Name	Sample Method	Upstream UTM[b]			Downstream UTM[b]		
				Zone	Easting	Northing	Zone	Easting	Northing
Chowade River	52.7	CHR-EF-052.7-2022-07-25	Backpack Electrofishing	10V	491341	6285358	10V	491479	6285272
	52.6	CHR-EF-052.4-2022-07-25	Backpack Electrofishing	10V	491708	6285222	10V	491817	6285110
	52.6	CHR-EF-052.6-2022-07-25	Backpack Electrofishing	10V	491492	6285267	10V	491657	6285233
	51.5	CHR-EF-051.5-2022-07-25	Backpack Electrofishing	10V	492375	6284893	10V	492426	6284903
	51.4	CHR-EF-051.4-2022-07-25	Backpack Electrofishing	10V	492425	6284867	10V	492529	6284890
	51.2	CHR-EF-051.0-2022-07-25	Backpack Electrofishing	10V	492642	6284881	10V	492670	6284684
	51.2	CHR-EF-051.1-2022-07-29	Backpack Electrofishing	10V	492689	6284764	10V	492665	6284734
	51.1	CHR-EF-051.1-2022-07-29-SC	Backpack Electrofishing	10V	492711	6284632	10V	492814	6284685
	51.1	CHR-EF-051.0-2022-07-29	Backpack Electrofishing	10V	492679	6284614	10V	492721	6284546
	51.0	CHR-EF-051.0-2022-07-23	Backpack Electrofishing	10V	492635	6284683	10V	492724	6284545
	50.7	CHR-EF-050.5-2022-07-23	Backpack Electrofishing	10V	492977	6284585	10V	493143	6284521
	50.7	CHR-EF-050.7-2022-07-23	Backpack Electrofishing	10V	492875	6284702	10V	492922	6284672
	50.1	CHR-EF-050.0-2022-07-22	Backpack Electrofishing	10V	493738	6284407	10V	493759	6284407
	49.9	CHR-EF-049.7-2022-07-22	Backpack Electrofishing	10V	493940	6284366	10V	493759	6284407
	49.8	CHR-EF-049.8-2022-07-22	Backpack Electrofishing	10V	493837	6284413	10V	493918	6284401
	49.7	CHR-EF-049.7-2022-07-23	Backpack Electrofishing	10V	493950	6284371	10V	494080	6284247
	49.4	CHR-EF-049.4-2022-07-23	Backpack Electrofishing	10V	494039	6284290	10V	494202	6284195
	48.8	CHR-EF-048.6-2022-07-22	Backpack Electrofishing	10V	494700	6284048	10V	494835	6284054
	48.8	CHR-EF-048.8-2022-07-22	Backpack Electrofishing	10V	494581	6284073	10V	494696	6284047
	48.7	CHR-EF-048.7-2022-07-22	Backpack Electrofishing	10V	494472	6284186	10V	494594	6284117
	48.6	CHR-EF-048.4-2022-07-21	Backpack Electrofishing	10V	494991	6284110	10V	495152	6284101
	48.5	CHR-EF-048.5-2022-07-21	Backpack Electrofishing	10V	494859	6284064	10V	495064	6284015
	46.7	CHR-EF-046.5-2022-07-22	Backpack Electrofishing	10V	496404	6283568	10V	496604	6283590
	46.3	CHR-EF-046.3-2022-07-22	Backpack Electrofishing	10V	496696	6283587	10V	496731	6283556
	46.0	CHR-EF-046.0-2022-07-22	Backpack Electrofishing	10V	496725	6283458	10V	496886	6283435
	44.7	CHR-EF-044.7-2022-07-22	Backpack Electrofishing	10V	497800	6284040	10V	498057	6284087
	44.1	CHR-EF-044.1-2022-07-21	Backpack Electrofishing	10V	498499	6283929	10V	498717	6283768
	44.1	CHR-EF-044.1-2022-07-22	Backpack Electrofishing	10V	498225	6284045	10V	498488	6283929
	43.9	CHR-EF-043.9-2022-07-21	Backpack Electrofishing	10V	498768	6283718	10V	498825	6283568
	43.4	CHR-EF-043.4-2022-07-29	Backpack Electrofishing	10V	498711	6283591	10V	498826	6283435
	42.1	CHR-EF-041.9-2022-07-25	Backpack Electrofishing	10V	499707	6282975	10V	499854	6283003
	41.5	CHR-EF-041.5-2022-07-25	Backpack Electrofishing	10V	499940	6282855	10V	499995	6282768
	40.7	CHR-EF-040.7-2022-07-23	Backpack Electrofishing	10V	500654	6282430	10V	500684	6282333
	40.4	CHR-EF-040.2-2022-07-23	Backpack Electrofishing	10V	500797	6282523	10V	500908	6282406
	40.4	CHR-EF-040.4-2022-07-23	Backpack Electrofishing	10V	500893	6282355	10V	500914	6282354
	40.2	CHR-EF-040.0-2022-07-23	Backpack Electrofishing	10V	500957	6282375	10V	501135	6282376
	39.9	CHR-EF-039.9-2022-07-23	Backpack Electrofishing	10V	501259	6282357	10V	510085	6282431
	39.3	CHR-EF-039.3-2022-07-21	Backpack Electrofishing	10V	501550	6282359	10V	501750	6282180
	39.0	CHR-EF-039.0-2022-07-21	Backpack Electrofishing	10V	501874	6282335	10V	502087	6282407
	38.1	CHR-EF-038.0-2022-07-29	Backpack Electrofishing	10V	502690	6282384	10V	502799	6282347
	37.3	CHR-EF-037.1-2022-07-29	Backpack Electrofishing	10V	502991	6281846	10V	503160	6281818
	36.4	CHR-EF-036.4-2022-07-29	Backpack Electrofishing	10V	504114	6282170	10V	504275	6282303
Colt Creek	30.4	COC-EF-030.4-2022-08-01	Backpack Electrofishing	10V	521153	6258201	10V	521235	6258382
	30.2	COC-EF-030.2-2022-08-01	Backpack Electrofishing	10V	521240	6258378	10V	521401	6258481

[a] Upstream River Km of each site as measured upstream from the stream's confluence.

[b] NAD83.

continued…

Table A1 Continued.

River	Upstream River Km[a]	Site Name	Sample Method	Upstream UTM[b]			Downstream UTM[b]		
				Zone	Easting	Northing	Zone	Easting	Northing
Colt Creek	29	COC-EF-029.0-2022-08-01	Backpack Electrofishing	10V	522204	6258989	10V	522342	6259127
	28.8	COC-EF-028.8-2022-08-01	Backpack Electrofishing	10V	522336	6259092	10V	522480	6259170
	14.3	COC-EF-014.3-2022-08-01	Backpack Electrofishing	10V	531632	6280286	10V	531804	6260336
	14.1	COC-EF-014.1-2022-08-01	Backpack Electrofishing	10V	531806	6260337	10V	532005	6260315
	3.7	COC-EF-003.7-2022-07-30	Backpack Electrofishing	10V	538108	6258692	10V	538266	6258627
	3.5	COC-EF-003.5-2022-07-30	Backpack Electrofishing	10V	538344	6258447	10V	538274	6258623
Cypress Creek	41.1	CYC-EF-040.9-2022-07-27	Backpack Electrofishing	10V	495621	6302576	10V	495796	6302661
	41.1	CYC-EF-041.1-2022-07-27	Backpack Electrofishing	10V	495404	6302481	10V	495574	6302576
	40.5	CYC-EF-040.5-2022-07-26	Backpack Electrofishing	10V	495766	6302872	10V	495828	6302959
	40.3	CYC-EF-040.1-2022-07-26	Backpack Electrofishing	10V	495915	6302947	10V	496080	6303012
	38.6	CYC-EF-038.6-2022-07-27	Backpack Electrofishing	10V	497283	6303391	10V	497203	6303496
	38.5	CYC-EF-038.5-2022-07-27	Backpack Electrofishing	10V	497281	6303405	10V	497183	6303490
	38.4	CYC-EF-038.2-2022-07-27	Backpack Electrofishing	10V	497152	6303532	10V	497266	6303682
	35.4	CYC-EF-035.4-2022-07-28	Backpack Electrofishing	10V	498760	6303778	10V	498901	6303799
	35.2	CYC-EF-035.2-2022-07-28	Backpack Electrofishing	10V	498745	6303719	10V	498998	6303842
	34.6	CYC-EF-034.6-2022-07-26	Backpack Electrofishing	10V	499343	6303859	10V	499608	6304015
	34.4	CYC-EF-034.2-2022-07-26	Backpack Electrofishing	10V	499590	6304055	10V	499458	6303925
	30.7	CYC-EF-030.7-2022-07-26	Backpack Electrofishing	10V	501603	6305701	10V	501664	6305592
	30.7	CYC-EF-030.5-2022-07-26	Backpack Electrofishing	10V	501667	6305587	10V	501861	6305582
	29.5	CYC-EF-029.5-2022-07-28	Backpack Electrofishing	10V	502359	6305446	10V	502576	6305458
	29.4	CYC-EF-029.2-2022-07-28	Backpack Electrofishing	10V	502636	6305464	10V	502829	6305494
Farrell Creek	102.1	FAC-EF-102.1-2022-08-04	Backpack Electrofishing	10V	560901	6238239	10V	560983	6238340
	101.7	FAC-EF-101.7-2022-08-04	Backpack Electrofishing	10V	560997	6238340	10V	561085	6238166
	65.7	FAC-EF-065.7-2022-08-06	Backpack Electrofishing	10V	573208	6238263	10V	573022	6238381
	65.5	FAC-EF-065.5-2022-08-06	Backpack Electrofishing	10V	573002	6238453	10V	572931	6238564
	63.3	FAC-EF-063.3-2022-08-04	Backpack Electrofishing	10V	572191	6239741	10V	572375	6239986
	63.0	FAC-EF-063.0-2022-08-04	Backpack Electrofishing	10V	572379	6239982	10V	572498	6240098
Fiddes Creek	12.0	FIC-EF-012.0-2022-08-02	Backpack Electrofishing	10V	478248	6306994	10V	478283	6307150
	11.8	FIC-EF-011.8-2022-08-02	Backpack Electrofishing	10V	478284	6307148	10V	478274	6307334
	7.3	FIC-EF-007.3-2022-08-02	Backpack Electrofishing	10V	479534	6310751	10V	479644	6310889
	7.1	FIC-EF-007.1-2022-08-02	Backpack Electrofishing	10V	479644	6310887	10V	479820	6310983
	5.2	FIC-EF-005.2-2022-08-02	Backpack Electrofishing	10V	480391	6312442	10V	480335	6312552
	5.0	FIC-EF-005.0-2022-08-02	Backpack Electrofishing	10V	480291	6312735	10V	480328	6312552
Kobes Creek	55.5	KOC-EF-055.5-2022-08-05	Backpack Electrofishing	10V	544213	6243313	10V	544080	6243446
	55.3	KOC-EF-055.3-2022-08-05	Backpack Electrofishing	10V	544235	6243106	10V	544211	6243317
	46.7	KOC-EF-046.7-2022-08-05	Backpack Electrofishing	10V	543199	6248222	10V	543337	6248298
	46.5	KOC-EF-046.5-2022-08-05	Backpack Electrofishing	10V	543327	6248310	10V	543406	6248499
	40.4	KOC-EF-040.4-2022-08-03	Backpack Electrofishing	10V	544003	6252165	10V	544123	6252327
	40.2	KOC-EF-040.2-2022-08-03	Backpack Electrofishing	10V	544132	6252327	10V	543974	6252556
	11.7	KOC-EF-011.7-2022-08-03	Backpack Electrofishing	10V	555130	6256414	10V	555218	6256202
	11.5	KOC-EF-011.5-2022-08-03	Backpack Electrofishing	10V	555224	6256194	10V	555407	6256114
Maurice Creek	2.0	MAC-EF-002.0-2022-07-20	Backpack Electrofishing	10V	569816	6208573	10V	569623	6208557
	1.8	MAC-EF-001.8-2022-07-20	Backpack Electrofishing	10V	569541	6208605	10V	569420	6208767
	1.5	MAC-EF-001.5-2022-07-24	Backpack Electrofishing	10V	569414	6208777	10V	569403	6208992
	1.3	MAC-EF-001.3-2022-07-24	Backpack Electrofishing	10V	569404	6208992	10V	569211	6208984

[a] Upstream River Km of each site as measured upstream from the stream's confluence.

[b] NAD83.

continued…

Table A1 Continued.

River	Upstream River Km[a]	Site Name	Sample Method	Upstream UTM[b]			Downstream UTM[b]		
				Zone	Easting	Northing	Zone	Easting	Northing
Maurice Creek	1.2	MAC-EF-001.2-2022-07-24	Backpack Electrofishing	10V	568941	6208913	10V	568767	6209001
	1.0	MAC-EF-001.0-2022-07-31	Backpack Electrofishing	10V	568767	6209001	10V	568556	6209029
	0.8	MAC-EF-000.8-2022-07-31	Backpack Electrofishing	10V	568556	6209029	10V	568383	6209077
	0.6	MAC-EF-000.6-2022-07-31	Backpack Electrofishing	10V	568383	6209077	10V	568190	6209122
Moberly River	118.5	MOR-ES-118.5-2022-07-30	Small Fish Boat Electroshocker	10U	587714	6189280	10U	588280	6189493
	118.2	MOR-EF-118.2-2022-07-31	Backpack Electrofishing	10U	587798	6189301	10U	587975	6189384
	117.9	MOR-AN-117.9-2022-07-31	Angling	10U	588068	6189399	10U	588085	6189399
	117.9	MOR-AN-117.9-2022-07-30	Angling	10U	587920	6189354	10U	588068	6189399
	117.8	MOR-AN-117.8-2022-07-31	Angling	10U	588268	6189478	10U	588372	6189557
	117.8	MOR-AN-117.8-2022-07-30	Angling	10U	588348	6189474	10U	588377	6189557
	117.7	MOR-AN-117.7-2022-07-31	Angling	10U	588478	6189510	10U	588519	6189548
	117.7	MOR-ES-117.7-2022-07-31	Small Fish Boat Electroshocker	10U	588346	6189496	10U	588612	6189804
	117.1	MOR-ES-117.1-2022-07-31	Small Fish Boat Electroshocker	10U	588623	6189802	10U	588380	6190753
	117.1	MOR-EF-117.1-2022-07-31	Backpack Electrofishing	10U	588587	6189836	10U	588551	6189904
	117	MOR-AN-117.0-2022-07-31	Angling	10U	588606	6189853	10U	588556	6190037
	116.5	MOR-AN-116.5-2022-07-31	Angling	10U	588522	6190405	10U	588544	6190494
	116.1	MOR-ES-116.1-2022-07-31	Small Fish Boat Electroshocker	10U	588371	6190772	10U	588525	6191174
	115.9	MOR-AN-115.9-2022-07-31	Angling	10U	588364	6190798	10U	588313	6190972
	115.6	MOR-ES-115.6-2022-08-01	Small Fish Boat Electroshocker	10U	588649	6191189	10U	589285	6191914
	115.6	MOR-EF-115.6-2022-07-31	Backpack Electrofishing	10U	588585	6191179	10U	588649	6191186
	115.5	MOR-AN-115.5-2022-07-31	Angling	10U	588561	6191172	10U	588644	619198
	115.5	MOR-EF-115.5-2022-07-31	Backpack Electrofishing	10U	588694	6191212	10U	588786	6191251
	114.7	MOR-EF-114.7-2022-08-01	Backpack Electrofishing	10U	589165	6191648	10U	589158	6191765
	114.5	MOR-AN-114.5-2022-08-01	Angling	10U	589151	6191839	10U	589151	6191839
	114.3	MOR-ES-114.3-2022-08-01	Small Fish Boat Electroshocker	10U	589284	6191907	10U	589310	6192651
	113.9	MOR-AN-113.9-2022-08-01	Angling	10U	589457	6192061	10U	589460	6192221
	113.4	MOR-ES-113.4-2022-08-01	Small Fish Boat Electroshocker	10U	589309	6192652	10U	589431	6193414
	113.3	MOR-AN-113.3-2022-08-01	Angling	10U	589301	6192659	10U	589214	6192959
	113.1	MOR-EF-113.1-2022-08-01	Backpack Electrofishing	10U	589232	6192814	10U	589237	6192944
	107.3	MOR-AN-107.3-2022-08-01	Angling	10U	590421	6196047	10U	590421	6196047
	103.2	MOR-ES-103.2-2022-08-01	Small Fish Boat Electroshocker	10U	590480	6198435	10U	590656	6198830
	102.5	MOR-AN-102.5-2022-08-01	Angling	10U	590549	6198752	10U	590584	6198737
	102.4	MOR-EF-102.4-2022-08-01	Backpack Electrofishing	10U	590703	6198617	10U	590771	6198607
	101.4	MOR-ES-101.4-2022-08-01	Small Fish Boat Electroshocker	10U	590617	6199203	10U	591457	6200076
	101.2	MOR-AN-101.2-2022-08-01	Angling	10U	590703	6199169	10U	590741	6199160
	101	MOR-AN-101.0-2022-08-01	Angling	10U	590954	6199321	10U	590954	6199321
	100.4	MOR-AN-100.4-2022-08-01	Angling	10U	591235	6199737	10U	591284	6199729
	100.4	MOR-EF-100.4-2022-08-01	Backpack Electrofishing	10U	591225	6199728	10U	591294	6199726
	90.4	MOR-AN-090.4-2022-08-02	Angling	10U	588589	6202668	10U	588573	6202691
	87.8	MOR-AN-087.8-2022-08-02	Angling	10U	586504	6203394	10U	586499	6203405
	87.8	MOR-EF-087.8-2022-08-02	Backpack Electrofishing	10U	586494	6203385	10U	586496	6203394
	87.6	MOR-EF-087.6-2022-08-02	Backpack Electrofishing	10U	586510	6203522	10U	586569	6203575
	86.8	MOR-ES-086.8-2022-08-02	Small Fish Boat Electroshocker	10U	586877	6204216	10U	587890	6204314
	86.7	MOR-AN-086.7-2022-08-02	Angling	10U	586731	6204139	10U	586743	6204148

[a] Upstream River Km of each site as measured upstream from the stream's confluence.

[b] NAD83.

continued…

Table A1 Continued.

River	Upstream River Km[a]	Site Name	Sample Method	Upstream UTM[b]			Downstream UTM[b]		
				Zone	Easting	Northing	Zone	Easting	Northing
Moberly River	86.3	MOR-AN-086.3-2022-08-02	Angling	10U	587177	6204050	10U	587207	6203971
	86.3	MOR-EF-086.3-2022-08-02	Backpack Electrofishing	10U	587190	6204042	10U	587202	6203937
	85.8	MOR-AN-085.8-2022-08-02	Angling	10U	587436	6204086	10U	587409	6204174
	84.0	MOR-AN-084.0-2022-08-02	Angling	10U	588808	6204603	10U	588861	6204642
	83.1	MOR-ES-083.1-2022-08-02	Small Fish Boat Electroshocker	10U	589363	6205333	10U	589648	6206121
	79.9	MOR-EF-079.9-2022-08-02	Backpack Electrofishing	10U	589671	6206896	10U	589742	6206888
	72.5	MOR-ES-072.5-2022-08-03	Small Fish Boat Electroshocker	10V	590906	6210769	10V	591597	6211506
	71.4	MOR-EF-071.4-2022-08-03	Backpack Electrofishing	10V	591036	6210967	10V	590995	6211098
	71.2	MOR-AN-071.2-2022-08-03	Angling	10V	591031	6211050	10V	591000	6211095
	70.3	MOR-ES-070.3-2022-08-03	Small Fish Boat Electroshocker	10V	591610	6211518	10V	592536	6211392
	69.9	MOR-AN-069.9-2022-08-03	Angling	10V	591827	6211254	10V	591933	6211227
	69.5	MOR-AN-069.5-2022-08-03	Angling	10V	592075	6211161	10V	592168	6211176
	68.9	MOR-AN-068.9-2022-08-03	Angling	10V	592522	6211379	10V	592570	6211381
	67.8	MOR-AN-067.8-2022-08-03	Angling	10V	593727	6211401	10V	593823	6211134
	67.5	MOR-ES-067.5-2022-08-03	Small Fish Boat Electroshocker	10V	593733	6211223	10V	594469	6211198
	67.5	MOR-EF-067.5-2022-08-03	Backpack Electrofishing	10V	593731	6211326	10V	593740	6211220
	61.1	MOR-AN-061.1-2022-08-03	Angling	10V	594767	6212801	10V	594856	6212999
	57.7	MOR-ES-057.7-2022-08-03	Small Fish Boat Electroshocker	10V	596420	6215059	10V	597161	6215307
	57.5	MOR-EF-057.5-2022-08-03	Backpack Electrofishing	10V	596364	6215332	10V	596316	6215453
	56.9	MOR-EF-056.9-2022-08-03	Backpack Electrofishing	10V	596603	6215531	10V	596733	6215485
	56.0	MOR-AN-056.0-2022-08-03	Angling	10V	597134	6215391	10V	597772	6215202
	56.0	MOR-ES-056.0-2022-08-03	Small Fish Boat Electroshocker	10V	597159	6215306	10V	598574	6215553
	54.3	MOR-ES-054.3-2022-08-03	Small Fish Boat Electroshocker	10V	598573	6215564	10V	598501	6214647
	54.1	MOR-AN-054.1-2022-08-03	Angling	10V	598654	6215497	10V	598703	6215478
	51.0	MOR-ES-051.0-2022-08-04	Small Fish Boat Electroshocker	10V	599449	6215329	10V	599261	6216037
	50.4	MOR-AN-050.4-2022-08-04	Angling	10V	599427	6215330	10V	599427	6215330
	50.0	MOR-EF-050.0-2022-08-04	Backpack Electrofishing	10V	599277	6215679	10V	599215	6215697
	49.4	MOR-AN-049.4-2022-08-04	Angling	10V	599254	6216038	10V	599305	6216078
	49.3	MOR-ES-049.3-2022-08-04	Small Fish Boat Electroshocker	10V	599252	6216042	10V	600290	6216448
	48.9	MOR-EF-048.9-2022-08-04	Backpack Electrofishing	10V	599354	6216481	10V	599434	6216548
	48.6	MOR-AN-048.6-2022-08-04	Angling	10V	599667	6216597	10V	599943	6216471
	48.0	MOR-AN-048.0-2022-08-04	Angling	10V	600413	6216707	10V	600413	6216707
	48.0	MOR-ES-048.0-2022-08-04	Small Fish Boat Electroshocker	10V	600301	6216454	10V	600947	6217144
	46.6	MOR-ES-046.6-2022-08-04	Small Fish Boat Electroshocker	10V	600949	6217146	10V	601622	6217585
	46.4	MOR-AN-046.4-2022-08-04	Angling	10V	600992	6217161	10V	601045	6217240
	45.9	MOR-EF-045.9-2022-08-04	Backpack Electrofishing	10V	601328	6217434	10V	601314	6217535
	45.8	MOR-AN-045.8-2022-08-04	Angling	10V	601275	6217619	10V	601234	6217677
	45.2	MOR-ES-045.2-2022-08-04	Small Fish Boat Electroshocker	10V	601623	6217587	10V	602888	6217820
	45.1	MOR-AN-045.1-2022-08-04	Angling	10V	604616	6217593	10V	601847	6217610
	44.6	MOR-EF-044.6-2022-08-04	Backpack Electrofishing	10V	602224	6217914	10V	602305	6217937
	43.7	MOR-ES-043.7-2022-08-04	Small Fish Boat Electroshocker	10V	602888	6217820	10V	603453	6217891
	43.0	MOR-AN-043.0-2022-08-04	Angling	10V	603181	6217836	10V	603216	6217799
	42.8	MOR-ES-042.8-2022-07-25	Small Fish Boat Electroshocker	10V	603452	6217892	10V	603782	6217980
	42.7	MOR-EF-042.7-2022-07-25	Backpack Electrofishing	10V	603489	6217944	10V	603649	6218019

[a] Upstream River Km of each site as measured upstream from the stream's confluence.

[b] NAD83.

continued…

Table A1 Continued.

River	Upstream River Km[a]	Site Name	Sample Method	Upstream UTM[b]			Downstream UTM[b]		
				Zone	Easting	Northing	Zone	Easting	Northing
Moberly River	42.3	MOR-ES-042.3-2022-07-25	Small Fish Boat Electroshocker	10U	603780	6217975	10U	604386	6218405
	42.0	MOR-AN-042.0-2022-07-25	Angling	10V	603978	6218087	10V	604019	6218108
	41.8	MOR-AN-041.8-2022-07-25	Angling	10V	604263	6218193	10V	604446	6218327
	41.5	MOR-AN-041.5-2022-07-25	Angling	10V	604279	6218429	10V	604301	6218545
	41.5	MOR-ES-041.5-2022-07-25	Small Fish Boat Electroshocker	10V	604261	6218427	10V	604882	6218834
	41.4	MOR-EF-041.4-2022-07-25	Backpack Electrofishing	10V	604694	6218895	10V	604811	6218881
	40.9	MOR-AN-040.9-2022-07-25	Angling	10V	604537	6218777	10V	604646	6218831
	40.8	MOR-AN-040.8-2022-07-25	Angling	10V	604838	6218964	10V	604890	6218827
	40.7	MOR-ES-040.7-2022-07-25	Small Fish Boat Electroshocker	10V	604881	6218835	10V	606047	6219517
	40.0	MOR-AN-040.0-2022-07-25	Angling	10V	605274	6219104	10V	605237	6219051
	38.7	MOR-AN-038.7-2022-07-26	Angling	10V	606049	6219785	10V	606181	6219927
	38.7	MOR-EF-038.7-2022-07-26	Backpack Electrofishing	10V	606056	6219825	10V	606168	6219840
	38.5	MOR-ES-038.8-2022-07-26	Small Fish Boat Electroshocker	10U	606181	6219820	10V	606209	6220226
	38.5	MOR-EF-038.5-2022-07-26	Backpack Electrofishing	10V	606113	6220025	10V	606165	6220199
	38.0	MOR-AN-038.0-2022-07-26	Angling	10V	606261	6220268	10V	606466	6220326
	38.0	MOR-EF-038.0-2022-07-26	Backpack Electrofishing	10V	606285	6220193	10V	606452	6220320
	37.9	MOR-AN-037.9-2022-07-26	Angling	10V	606458	6220363	10V	606524	6220415
	37.9	MOR-ES-037.9-2022-07-26	Small Fish Boat Electroshocker	10V	606425	6220319	10V	606551	6221023
	37.7	MOR-EF-037.7-2022-07-26	Backpack Electrofishing	10V	606595	6220429	10V	606622	6220578
	37.5	MOR-AN-037.5-2022-07-26	Angling	10V	606574	6220526	10V	606587	6220828
	37.1	MOR-EF-037.1-2022-07-26	Backpack Electrofishing	10V	606369	6220964	10U	606522	6221171
	37.0	MOR-AN-037.0-2022-07-26	Angling	10V	606529	6221164	10V	606524	6221171
	37.0	MOR-ES-037.0-2022-07-26	Small Fish Boat Electroshocker	10V	606548	6221019	10U	606606	6221666
	36.9	MOR-AN-036.9-2022-07-26	Angling	10V	606539	6221254	10V	606622	6221374
	36.6	MOR-EF-036.6-2022-07-26	Backpack Electrofishing	10V	606604	6221393	10V	606653	6221542
	36.5	MOR-AN-036.5-2022-07-26	Angling	10V	606660	6221322	10V	606667	6221487
	36.4	MOR-EF-036.4-2022-07-26	Backpack Electrofishing	10V	606592	6221615	10V	606523	6221757
	36.3	MOR-AN-036.3-2022-07-26	Angling	10V	606611	6221662	10V	606578	6221699
	36.2	MOR-AN-036.2-2022-07-26	Angling	10V	606613	6221853			
	36.1	MOR-ES-036.1-2022-07-27	Small Fish Boat Electroshocker	10V	606657	6221874	10V	606842	6222306
	36.0	MOR-AN-036.0-2022-07-26	Angling	10V	606947	6221876	10V	606980	6221949
	36.0	MOR-EF-036.0-2022-07-27	Backpack Electrofishing	10V	606853	6221820	10V	606971	6221933
	35.9	MOR-EF-035.9-2022-07-27	Backpack Electrofishing	10V	607031	6221652	10V	607019	6221884
	35.4	MOR-ES-035.4-2022-07-27	Small Fish Boat Electroshocker	10V	606832	6222311	10V	607550	6222867
	34.5	MOR-AN-034.5-2022-07-27	Angling	10V	607213	6222650	10V	607258	6222654
	34.1	MOR-AN-034.1-2022-07-27	Angling	10V	607391	6222729	10V	607440	6222792
	34.0	MOR-ES-034.0-2022-07-27	Small Fish Boat Electroshocker	10V	607550	6222866	10V	607433	6223353
	33.6	MOR-AN-033.6-2022-07-27	Angling	10V	607848	6222699	10V	607954	6222696
	33.1	MOR-AN-033.1-2022-07-27	Angling	10V	607799	6222986	10V	607757	6223041
	32.1	MOR-ES-032.1-2022-07-27	Small Fish Boat Electroshocker	10U	607433	6223353	10U	607705	6223528
	32.1	MOR-EF-032.1-2022-07-27	Backpack Electrofishing	10V	607571	6223545	10V	607571	6223545
	32.0	MOR-ES-032.0-2022-07-27	Small Fish Boat Electroshocker	10U	607707	6223529	10U	608576	6223430
	31.5	MOR-AN-031.5-2022-07-27	Angling	10V	608008	6223497	10V	608160	6223496
	31.0	MOR-AN-031.0-2022-07-27	Angling	10V	608589	6223478	10V	608464	6223372

[a] Upstream River Km of each site as measured upstream from the stream's confluence.

[b] NAD83.

continued…

Table A1 Concluded.

River	Upstream River Km[a]	Site Name	Sample Method	Upstream UTM[b]			Downstream UTM[b]		
				Zone	Easting	Northing	Zone	Easting	Northing
Moberly River	31.0	MOR-ES-031.0-2022-07-27	Small Fish Boat Electroshocker	10U	609192	6224373	10U	609192	6224373
	29.9	MOR-ES-029.9-2022-07-27	Small Fish Boat Electroshocker	10U	609210	6224322	10V	609571	6224326
	28.9	MOR-AN-028.9-2022-07-27	Angling	10V	609768	6224089	10V	609768	6224089
	28.9	MOR-EF-028.9-2022-07-27	Backpack Electrofishing	10V	609751	6224217	10V	609682	6224267
	28.8	MOR-AN-028.8-2022-07-27	Angling	10V	609677	6224248	10V	609633	6224321
	28.3	MOR-ES-028.3-2022-07-27	Small Fish Boat Electroshocker	10V	609644	6224610	10V	610236	6224900
	27.7	MOR-AN-027.7-2022-07-27	Angling	10V	610108	6224845	10V	610241	6224906
	27.7	MOR-ES-027.7-2022-07-27	Small Fish Boat Electroshocker	10U	610235	6224897	10U	609655	6225157
	24.8	MOR-EF-024.8-2022-07-28	Backpack Electrofishing	10V	610837	6226137	10V	611136	6226294
	24.6	MOR-ES-024.6-2022-07-28	Small Fish Boat Electroshocker	10V	611072	6226232	10V	611534	6226697
	24.4	MOR-AN-024.4-2022-07-28	Angling	10V	611274	6226293	10V	611493	6226340
	23.6	MOR-AN-023.6-2022-07-28	Angling	10V	611549	6226642	10V	611478	6226739
	23.3	MOR-EF-023.3-2022-07-28	Backpack Electrofishing	10V	611602	6227001	10V	611771	6226978
	23.1	MOR-ES-023.1-2022-07-28	Small Fish Boat Electroshocker	10U	611711	6227125	10V	612180	6227169
	23.0	MOR-AN-023.0-2022-07-28	Angling	10V	611739	6227096	10V	611736	6227072
	22.8	MOR-AN-022.8-2022-07-28	Angling	10V	612044	6227290	10V	612220	6227050
	22.5	MOR-ES-022.5-2022-07-28	Small Fish Boat Electroshocker	10V	612196	6227148	10V	612427	6227099
	22	MOR-AN-022.0-2022-07-28	Angling	10V	612472	6227121	10V	612559	6227126
	20.9	MOR-EF-020.9-2022-07-28	Backpack Electrofishing	10V	613213	6227568	10V	613292	6227600
	19.5	MOR-AN-019.5-2022-07-28	Angling	10V	614122	6227929	10V	614580	6227930
	17.1	MOR-ES-017.1-2022-07-28	Small Fish Boat Electroshocker	10V	616178	6228737	10V	616824	6229061
	16.4	MOR-AN-016.4-2022-07-28	Angling	10V	616443	6229067	10V	616912	6228995
	16.3	MOR-EF-016.3-2022-07-28	Backpack Electrofishing	10V	616642	6229107	10V	616748	6229080
	15.5	MOR-AN-015.5-2022-07-29	Angling	10V	617046	6228936	10V	617046	6228936
	14.9	MOR-ES-014.9-2022-07-29	Small Fish Boat Electroshocker	10V	617460	6228626	10V	617748	6228796
	14.7	MOR-EF-014.7-2022-07-29	Backpack Electrofishing	10V	617599	6228764	10V	617783	6228811
	14.2	MOR-AN-014.2-2022-07-29	Angling	10V	617759	6228774	10V	617862	6228761
	13.7	MOR-EF-013.7-2022-07-29	Backpack Electrofishing	10V	618537	6228830	10V	618778	6228767
	13.5	MOR-ES-013.5-2022-07-29	Small Fish Boat Electroshocker	10V	617747	6228793	10V	618558	6228859
	13.4	MOR-AN-013.4-2022-07-29	Angling	10V	618620	6228846	10V	618622	6228841
	13.4	MOR-ES-013.4-2022-07-29	Small Fish Boat Electroshocker	10V	618559	6228860	10V	619347	6228708
	12.6	MOR-ES-012.6-2022-07-29	Small Fish Boat Electroshocker	10V	619347	6228708	10V	619950	6228352
	11.9	MOR-AN-011.9-2022-07-29	Angling	10V	619951	6228352	10V	619951	6228352
	11.9	MOR-ES-011.9-2022-07-29	Small Fish Boat Electroshocker	10V	619956	6228366	10V	620927	6228312
	11.5	MOR-AN-011.5-2022-07-29	Angling	10V	620185	6228019	10V	620185	6228019
	10.8	MOR-AN-010.8-2022-07-29	Angling	10V	620955	6228315	10V	620855	6228276
	10.7	MOR-AN-010.7-2022-07-29	Angling	10V	621656	6227879	10V	621700	6227887
	9.9	MOR-EF-009.9-2022-07-29	Backpack Electrofishing	10V	621601	6227821	10V	621657	6227881
	9.8	MOR-ES-009.8-2022-07-29	Small Fish Boat Electroshocker	10U	621672	6227890	10U	622888	6227760
	8.7	MOR-AN-008.7-2022-07-29	Angling	10V	623332	6227336	10V	622512	6228091
	6.2	MOR-EF-006.2-2022-07-29	Backpack Electrofishing	10V	624172	6227384	10V	624284	6227359
	5.8	MOR-ES-005.8-2022-07-29	Small Fish Boat Electroshocker	10V	624726	6227267	10V	625918	6228183

[a] Upstream River Km of each site as measured upstream from the stream's confluence.

[b] NAD83.

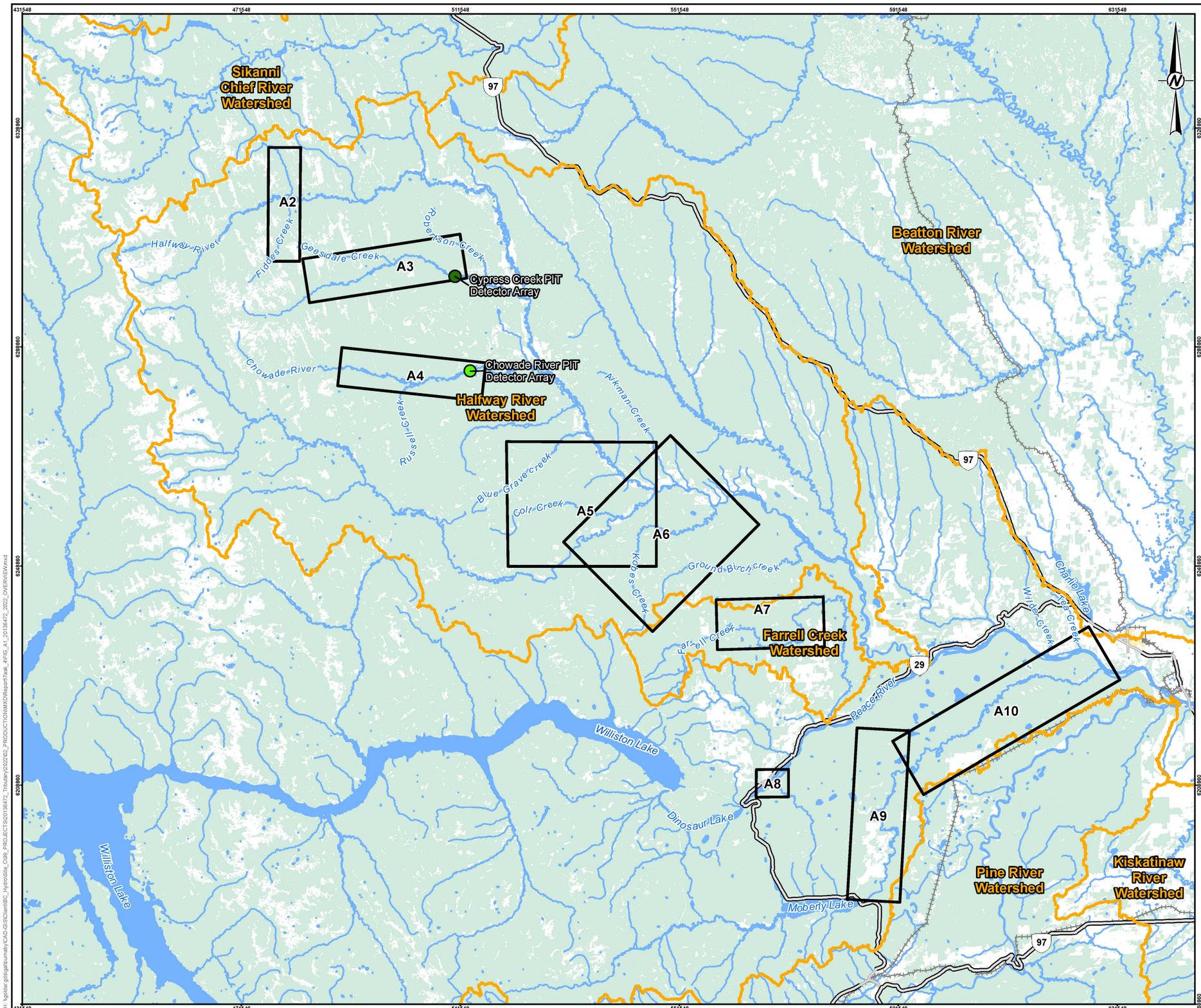
Table A2 Location information for Moberly River sections sampled during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

River	Section	Habitat Type[a]	Length (km)	River Km[b]	Upstream UTM[c]			River Km[b]	Downstream UTM[c]		
					Zone	Easting	Northing		Zone	Easting	Northing
Moberly River	MR-S1A	Irregular Meanders	5.8	118.2	10U	587890	6189345	112.4	10U	589439	6193416
	MR-S1	Tortuous Meanders	4.3	103.9	10U	590194	6198180	99.6	10U	591248	6200259
	MR-S2	Tortuous Meanders	15.8	99.6	10U	591248	6200259	83.8	10U	589031	6204822
	MR-S3	Tortuous Meanders	11.6	83.1	10U	589407	6205349	71.4	10V	591076	6210858
	MR-S4	Tortuous Meanders	11.5	71.4	10V	591076	6210858	60.0	10V	595402	6213268
	MR-S5	Tortuous Meanders	9.0	60.0	10V	595402	6213268	51.0	10V	599325	6214944
	MR-S6	Tortuous Meanders	4.3	51.0	10V	599325	6214944	46.7	10V	600924	6217136
	MR-S7	Irregular meandering; Braided; Frequently Confined	18.4	46.7	10V	600924	6217136	28.2	10V	609657	6224625
	MR-S8	Irregular meandering; Braided; Frequently Confined	11.0	28.2	10V	609657	6224625	17.2	10V	616182	6228657
	MR-S9	Irregular meandering; Braided; Frequently Confined	5.5	17.2	10V	616182	6228657	11.7	10V	619999	6228240
	MR-S10	Irregular meandering; Braided; Frequently Confined	11.7	11.7	10V	619999	6228240	0.0	10V	628556	6230023

[a] Habitat types and section breaks for the Moberly River were established by Mainstream (2011b).

[b] River Km as measured upstream from the Moberly River confluence with the Peace River.

[c] NAD83.



LEGEND

- CHOWADE RIVER PIT DETECTOR ARRAY
- CYPRESS CREEK PIT DETECTOR ARRAY
- MAJOR WATERSHED

BASEMAP FEATURE

- HIGHWAY
- MAJOR ROAD
- RAILWAY
- WATERCOURSE
- RESIDENTIAL AREA
- WATERBODY
- WOODED AREA

0 15 30

1:700,000 KILOMETRES

REFERENCES

1. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA
2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESR I JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY
(Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) STUDY AREA, 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-04-13
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	**A1**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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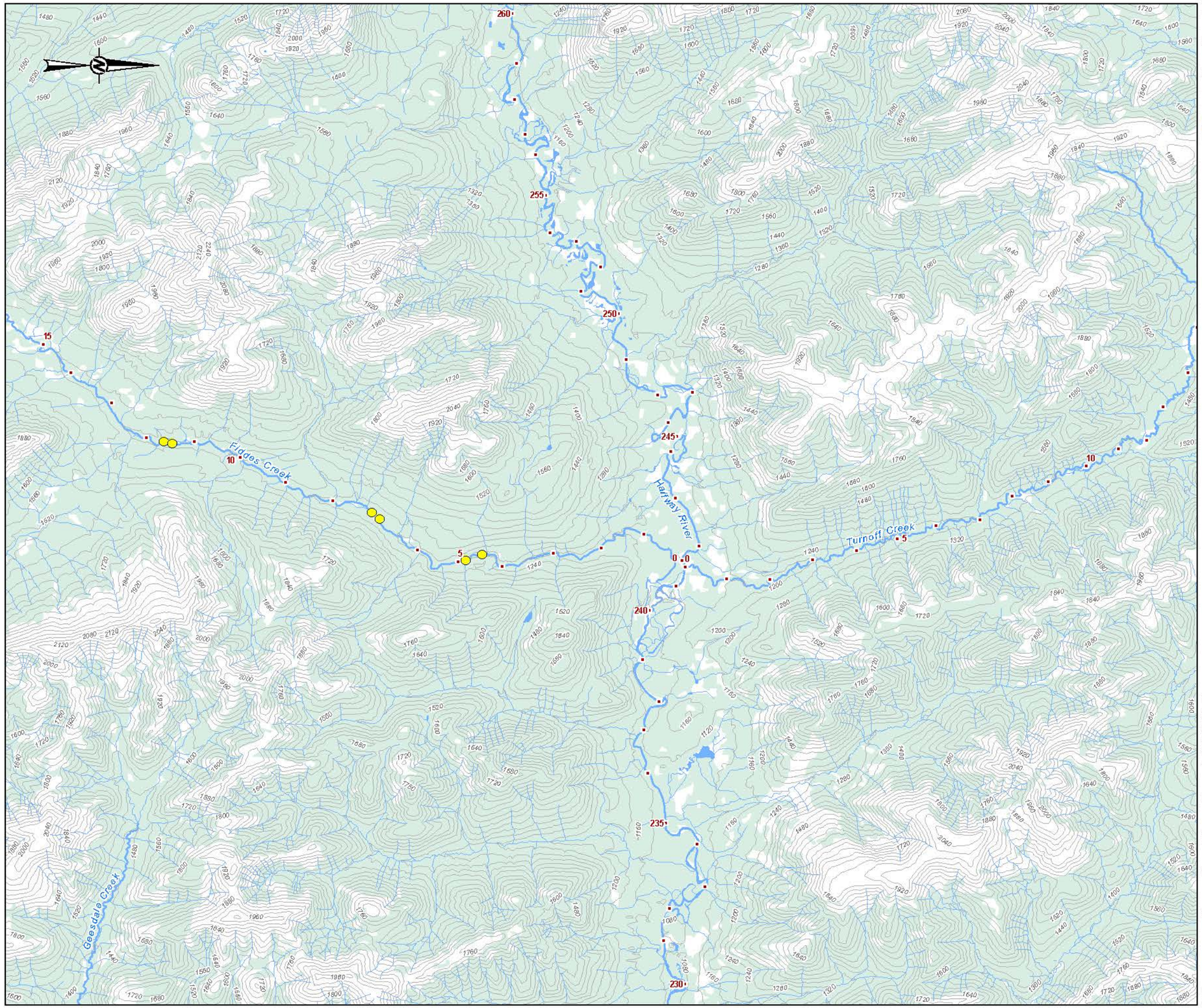


LEGEND

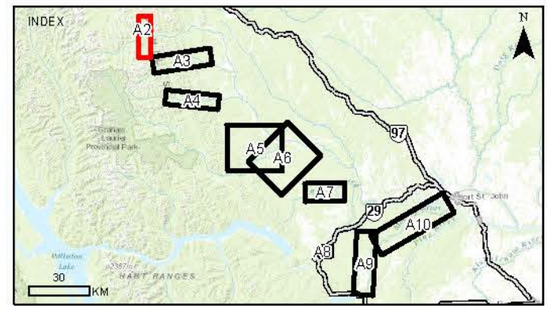
- RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

- BACKPACK ELECTROFISHING

BASEMAP FEATURE

- CONTOUR (100m)
- WATERCOURSE
- WATERBODY
- WOODED AREA



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2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c), FIDDES CREEK STUDY AREA, 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	A2

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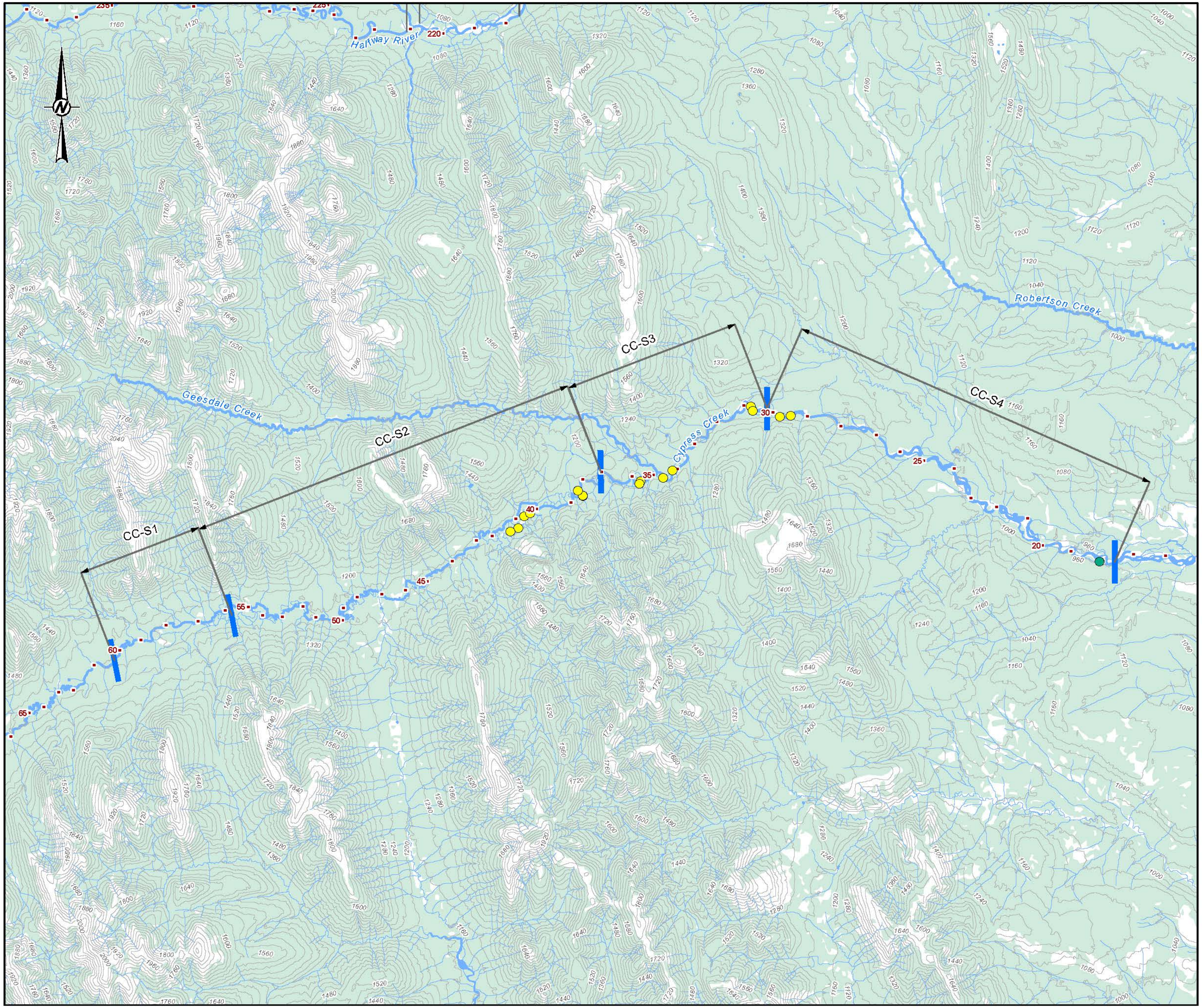


LEGEND

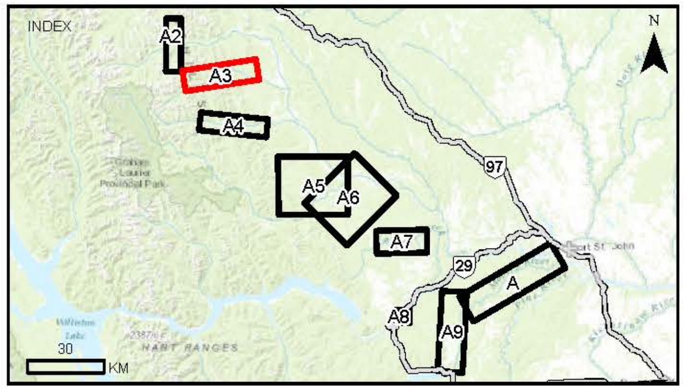
- RIVER KILOMETRE POSTS
- CYPRESS CREEK PIT DETECTOR ARRAY

UPSTREAM EXTENT OF EACH SAMPLE SITE

- BACKPACK ELECTROFISHING
- SECTION BREAK

BASEMAP FEATURE

- CONTOUR (20 m)
- WATERCOURSE
- WATERBODY
- WOODED AREA



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REFERENCES

1. ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. WATERSHED DATA OBTAINED FROM THE GOVERNMENT OF BRITISH COLUMBIA
3. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) CYPRESS CREEK STUDY AREA, 2022

CONSULTANT

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	A3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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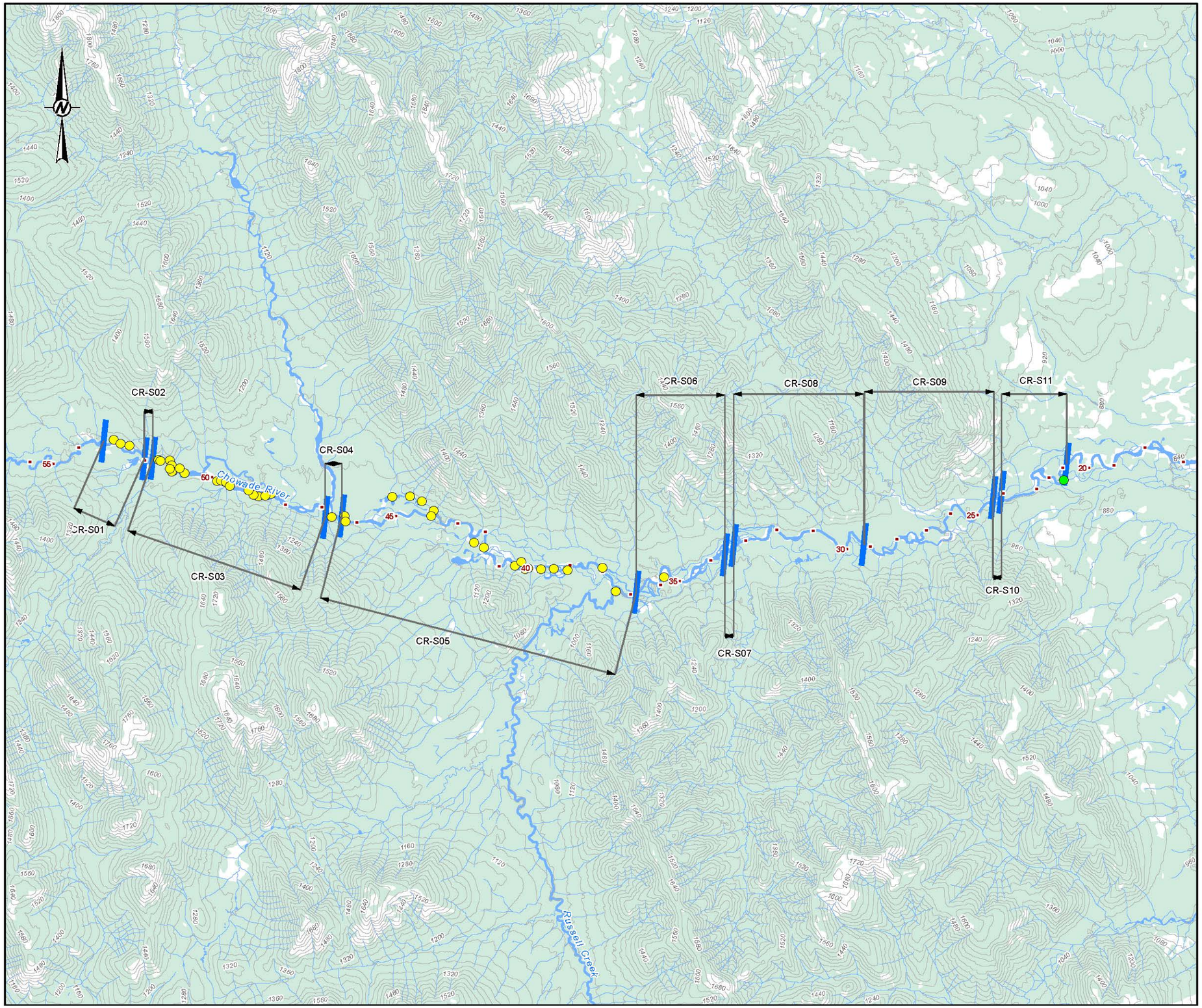


LEGEND

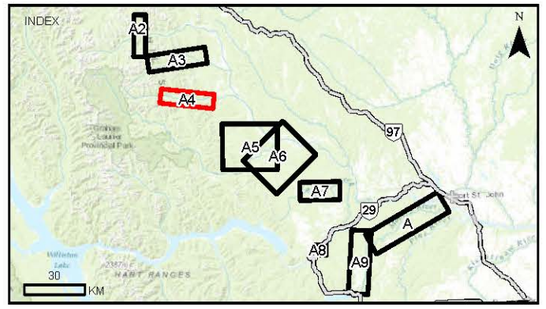
- RIVER KILOMETRE POSTS
- CHOWADE RIVER PIT DETECTOR ARRAY

UPSTREAM EXTENT OF EACH SAMPLE SITE

- BACKPACK ELECTROFISHING
- SECTION BREAK

BASEMAP FEATURE

- CONTOUR (20 m)
- WATERCOURSE
- WATERBODY
- WOODED AREA



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REFERENCES

1. ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. WATERSHED DATA OBTAINED FROM THE GOVERNMENT OF BRITISH COLUMBIA
3. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESR I JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY
(Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATI0N INDEXING SURVEY (Mon-1b, Task 2c) CHOWADE RIVER STUDY AREA, 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	**A4**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

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LEGEND

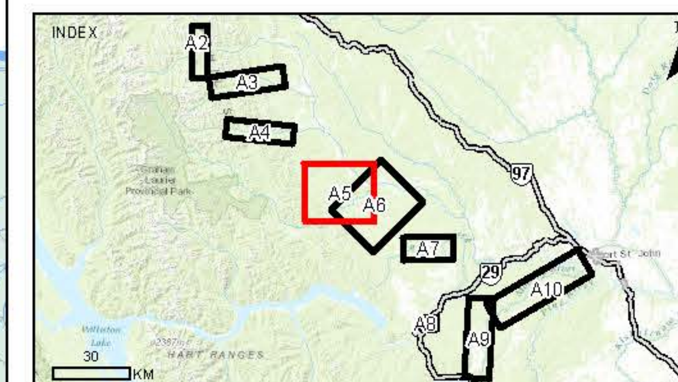
- RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

- BACKPACK ELECTROFISHING

BASEMAP FEATURE

- CONTOUR (100m)
- ROAD - MAJOR
- ROAD - LOCAL
- WATERCOURSE
- WATERBODY
- WOODED AREA



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REFERENCES
1. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA
2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) COLT CREEK STUDY AREA, 2022

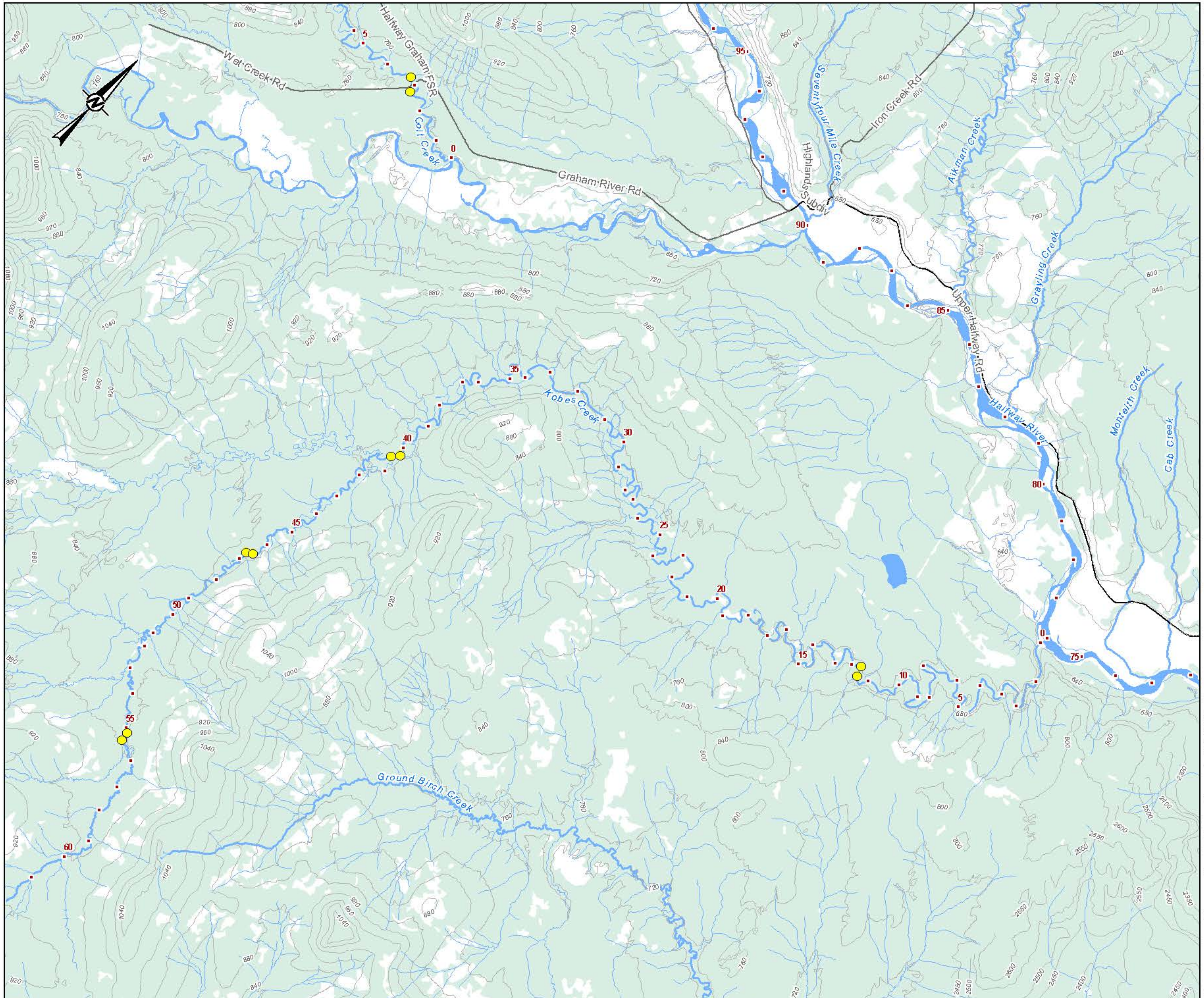
CONSULTANT

wsp

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	A5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

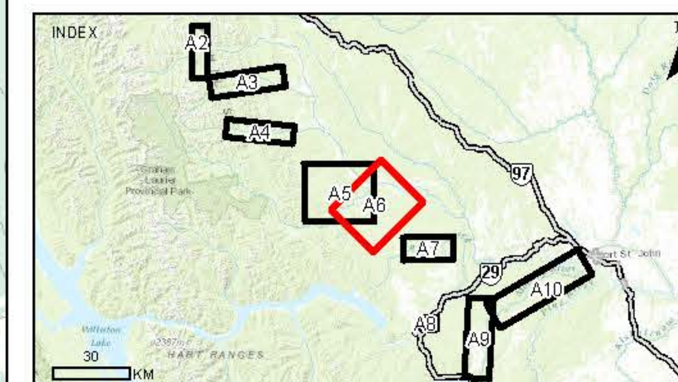
- RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

- BACKPACK ELECTROFISHING

BASEMAP FEATURE

- CONTOUR (100m)
- ROAD - MAJOR
- ROAD - LOCAL
- WATERCOURSE
- WATERBODY
- WOODED AREA



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REFERENCES

1. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA
2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) KOBES CREEK STUDY AREA, 2022

CONSULTANT

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	A6

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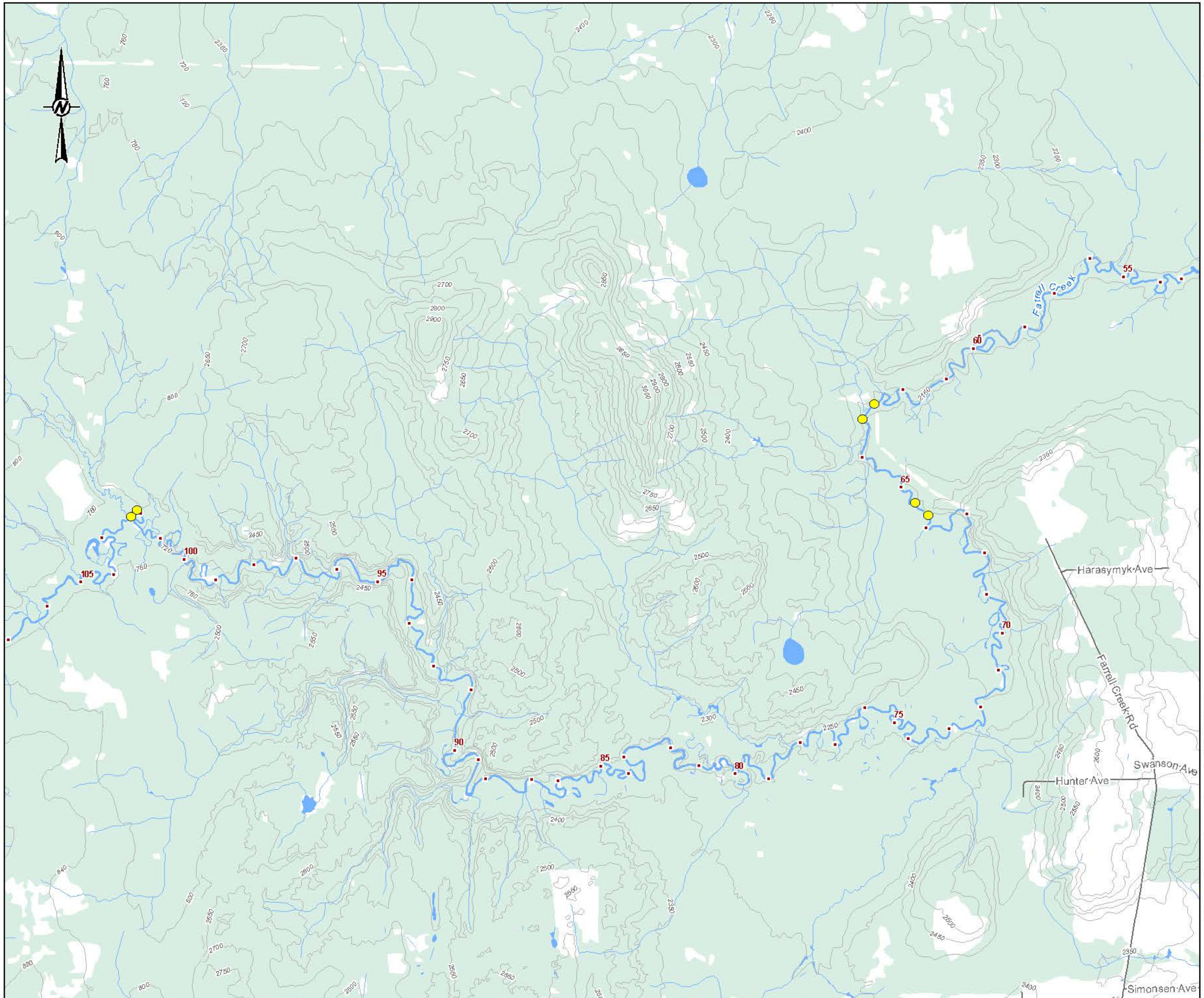


LEGEND

RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

BACKPACK ELECTROFISHING

BASEMAP FEATURE

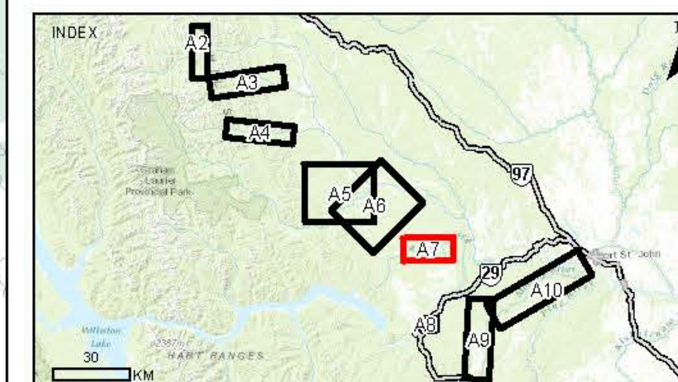
CONTOUR (100m)

ROAD - LOCAL

WATERCOURSE

WATERBODY

WOODED AREA



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REFERENCES

1. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA
2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT

BC HYDRO

PROJECT

SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE

OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) FARRELL CREEK STUDY AREA, 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	A7

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

LEGEND

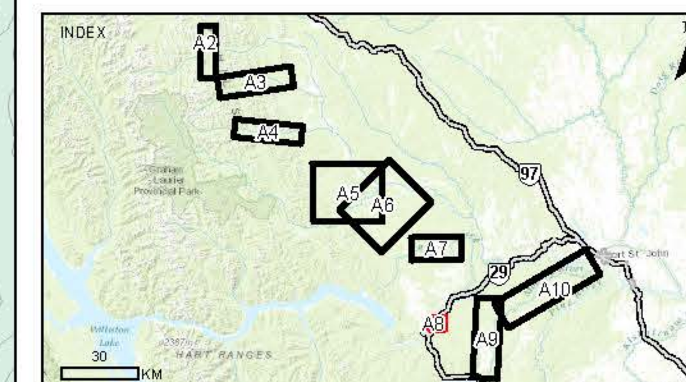
- RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

- BACKPACK ELECTROFISHING

BASEMAP FEATURE

- CONTOUR (100m)
- HIGHWAY
- ROAD - MAJOR
- ROAD - LOCAL
- WATERCOURSE
- WATERBODY
- WOODED AREA
- RESIDENTIAL AREA



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2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT

BC HYDRO

PROJECT

SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE

OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) MAURICE CREEK STUDY AREA, 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG/CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
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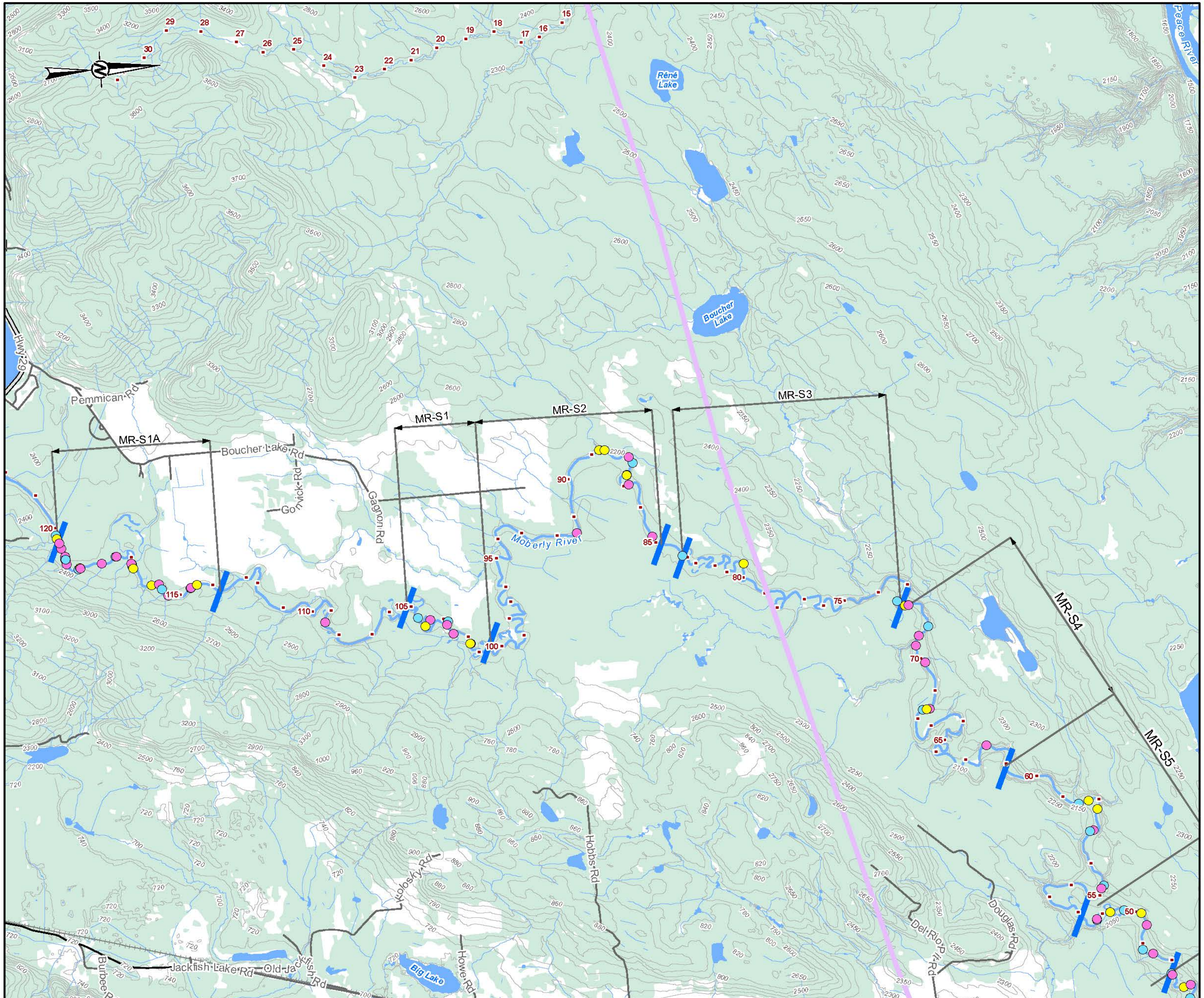


LEGEND

- RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

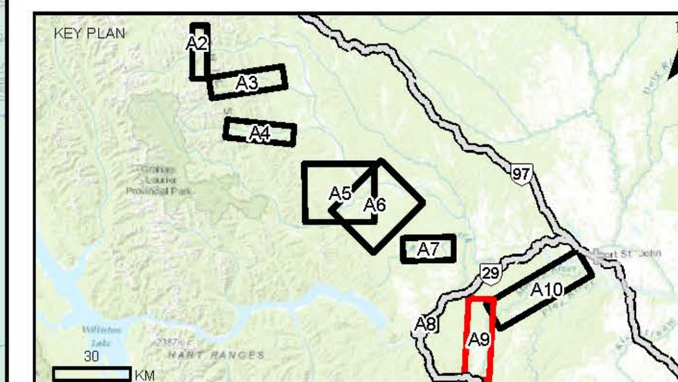
- ANGLING
- BACKPACK ELECTROFISHING
- SMALL FISH BOAT ELECTROSHOCKER
- SECTION BREAK

BASEMAP FEATURE

- CONTOUR (20 m)
- RAILWAY
- HIGHWAY
- ROAD - MAJOR
- ROAD - LOCAL
- WATERBODY
- WOODED AREA

TRANSMISSION LINE RIGHT OF WAY (ROW)

- BC HYDRO EXISTING ROW



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REFERENCES

1. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA
2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.
3. ROW PROVIDED BY BCHYDRO, DATED 2017-07-13.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT

BC HYDRO

PROJECT

SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c)

TITLE

OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY (Mon-1b, Task 2c) MOBERLY RIVER STUDY AREA, 2022

CONSULTANT

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG\CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	A9

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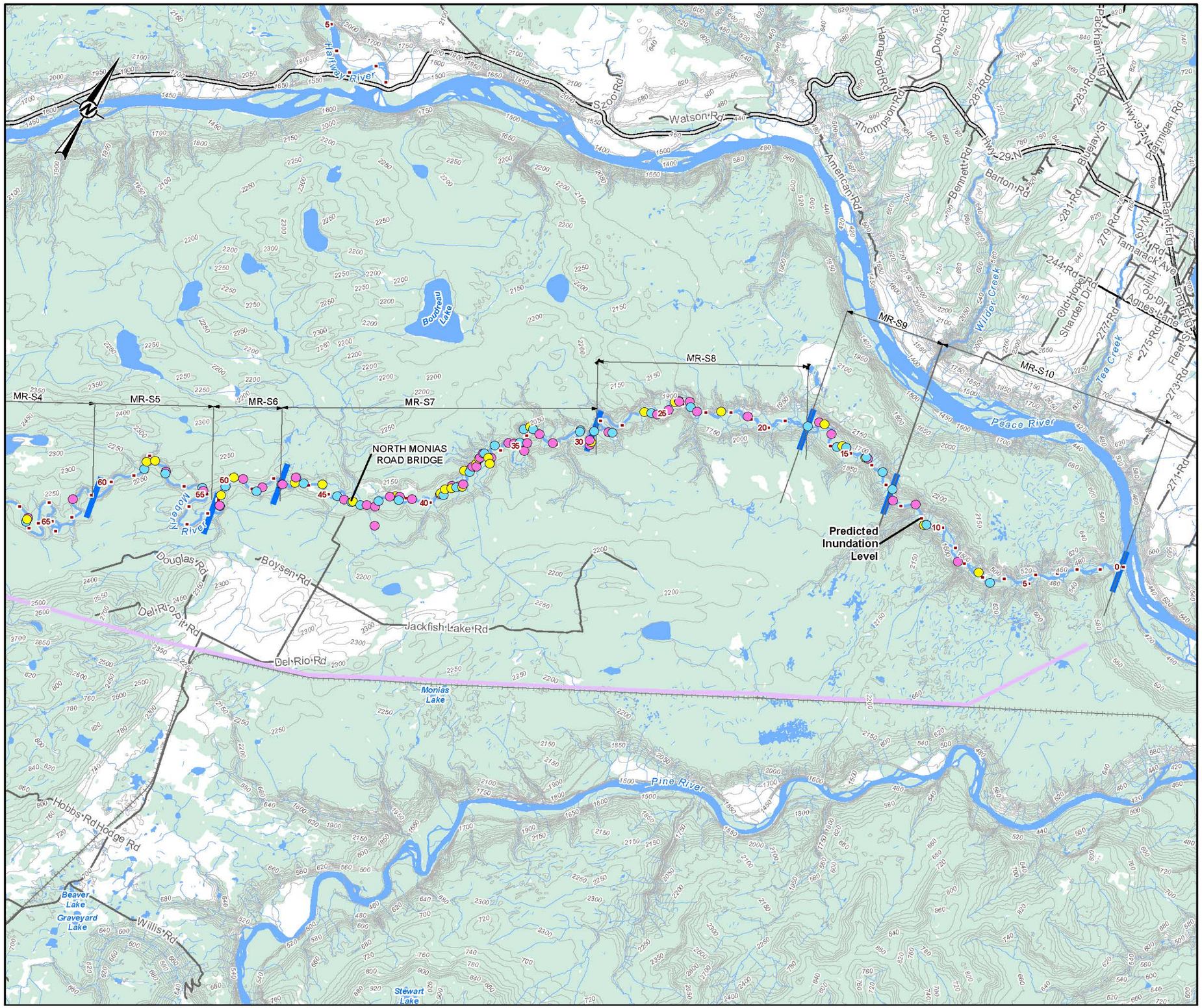


LEGEND

- RIVER KILOMETRE POSTS

UPSTREAM EXTENT OF EACH SAMPLE SITE

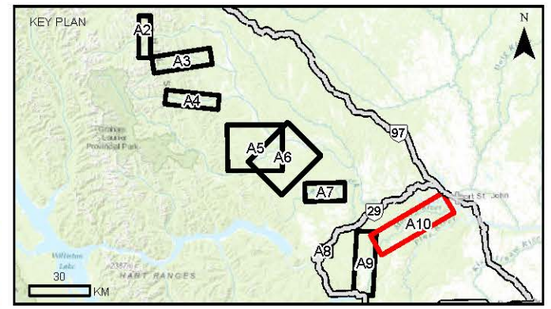
- ANGLING
- BACKPACK ELECTROFISHING
- SMALL FISH BOAT ELECTROSHOCKER
- SECTION BREAK

BASEMAP FEATURE

- CONTOUR (20 m)
- RAILWAY
- HIGHWAY
- ROAD - MAJOR
- ROAD - LOCAL
- WATERBODY
- WOODED AREA

TRANSMISSION LINE RIGHT OF WAY (ROW)

- BC HYDRO EXISTING ROW



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REFERENCES

1. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA.
2. BASEDATA SOURCES: ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY.
3. ROW PROVIDED BY BCHYDRO, DATED 2017-07-13.
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
BC HYDRO

PROJECT
SITE C RESERVOIR TRIBUTARIES FISH POPULATION INDEXING SURVEY
(Mon-1b, Task 2c)

TITLE
OVERVIEW OF THE SITE C RESERVOIR TRIBUTARIES FISH POPULATI0N INDEXING SURVEY (Mon-1b, Task 2c) MOBERLY RIVER STUDY AREA, 2022

CONSULTANT
wsp

YYYY-MM-DD	2023-04-26
DESIGNED	KL
PREPARED	JG\CD
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
20136472	2022/4	0	**A10**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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APPENDIX B

Catch and Effort Data

Table B1 **Summary of backpack electrofishing sites sampled during the Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.**

River	Section[a]	River Km[b]	Site Name	Sample Date	Sample Length (m)	Sample Time (s)
Chowade River		52.7	CHR-EF-052.7-2022-07-25	25-Jul-2022	125	769
		52.6	CHR-EF-052.4-2022-07-25	25-Jul-2022	170	1745
		52.6	CHR-EF-052.6-2022-07-25	25-Jul-2022	100	493
		51.5	CHR-EF-051.5-2022-07-25	25-Jul-2022	50	363
		51.4	CHR-EF-051.4-2022-07-25	25-Jul-2022	100	1227
		51.2	CHR-EF-051.0-2022-07-25	25-Jul-2022	200	1638
		51.2	CHR-EF-051.1-2022-07-29	29-Jul-2022	50	277
		51.1	CHR-EF-051.1-2022-07-29-SC	29-Jul-2022	100	1014
		51.1	CHR-EF-051.0-2022-07-29	29-Jul-2022	80	257
		51.0	CHR-EF-051.0-2022-07-23	23-Jul-2022	200	675
		50.7	CHR-EF-050.5-2022-07-23	23-Jul-2022	180	1442
		50.7	CHR-EF-050.7-2022-07-23	23-Jul-2022	100	624
		50.1	CHR-EF-050.0-2022-07-22	22-Jul-2022	200	1038
		49.9	CHR-EF-049.7-2022-07-22	22-Jul-2022	200	1801
		49.8	CHR-EF-049.8-2022-07-22	22-Jul-2022	100	552
		49.7	CHR-EF-049.7-2022-07-23	23-Jul-2022	170	1330
		49.4	CHR-EF-049.4-2022-07-23	23-Jul-2022	200	1541
		48.8	CHR-EF-048.6-2022-07-22	22-Jul-2022	200	1838
		48.8	CHR-EF-048.8-2022-07-22	22-Jul-2022	125	943
		48.7	CHR-EF-048.7-2022-07-22	22-Jul-2022	70	705
		48.6	CHR-EF-048.4-2022-07-21	21-Jul-2022	170	1965
		48.5	CHR-EF-048.5-2022-07-21	21-Jul-2022	200	1409
		46.7	CHR-EF-046.5-2022-07-22	22-Jul-2022	200	1379
		46.3	CHR-EF-046.3-2022-07-22	22-Jul-2022	50	858
		46.0	CHR-EF-046.0-2022-07-22	22-Jul-2022	150	797
		44.7	CHR-EF-044.7-2022-07-22	22-Jul-2022	100	1075
		44.1	CHR-EF-044.1-2022-07-21	21-Jul-2022	200	1744
		44.1	CHR-EF-044.1-2022-07-22	22-Jul-2022	300	2328
		43.9	CHR-EF-043.9-2022-07-21	21-Jul-2022	150	1,887
		43.4	CHR-EF-043.4-2022-07-29	29-Jul-2022	200	2230
		42.1	CHR-EF-041.9-2022-07-25	25-Jul-2022	150	1195
		41.5	CHR-EF-041.5-2022-07-25	25-Jul-2022	125	1263
		40.7	CHR-EF-040.7-2022-07-23	23-Jul-2022	100	622
		40.4	CHR-EF-040.2-2022-07-23	23-Jul-2022	160	1,774
		40.4	CHR-EF-040.4-2022-07-23	23-Jul-2022	25	120
		40.2	CHR-EF-040.0-2022-07-23	23-Jul-2022	175	1932
		39.9	CHR-EF-039.9-2022-07-23	23-Jul-2022	200	1538

[a] only applicable to Moberly River sites.

…continued.

[b] As measured upstream from the Moberly River's confluence with the Peace River.

Table B1 Continued.

River	Section[a]	River Km[b]	Site Name	Sample Date	Sample Length (m)	Sample Time (s)
Chowade River		39.3	CHR-EF-039.3-2022-07-21	21-Jul-2022	300	2309
		39.0	CHR-EF-039.0-2022-07-21	21-Jul-2022	200	2634
		38.1	CHR-EF-038.0-2022-07-29	29-Jul-2022	100	1027
		37.3	CHR-EF-037.1-2022-07-29	29-Jul-2022	200	1675
		36.4	CHR-EF-036.4-2022-07-29	29-Jul-2022	100	583
Chowade River Total					**6,275**	**52,616**
Colt Creek		30.4	COC-EF-030.4-2022-08-01	1-Aug-2022	200	1784
		30.2	COC-EF-030.2-2022-08-01	1-Aug-2022	200	1924
		29.0	COC-EF-029.0-2022-08-01	1-Aug-2022	200	2103
		28.8	COC-EF-028.8-2022-08-01	1-Aug-2022	200	1,730
		14.3	COC-EF-014.3-2022-08-01	1-Aug-2022	200	2808
		14.1	COC-EF-014.1-2022-08-01	1-Aug-2022	200	1274
		3.7	COC-EF-003.7-2022-07-30	30-Jul-2022	160	2459
		3.5	COC-EF-003.5-2022-07-30	30-Jul-2022	200	3136
Colt Creek Total					**1,560**	**17,218**
Cypress Creek		41.1	CYC-EF-040.9-2022-07-27	27-Jul-2022	200	1254
		41.1	CYC-EF-041.1-2022-07-27	27-Jul-2022	200	1,669
		40.5	CYC-EF-040.5-2022-07-26	26-Jul-2022	120	1253
		40.3	CYC-EF-040.1-2022-07-26	26-Jul-2022	200	2110
		38.6	CYC-EF-038.6-2022-07-27	27-Jul-2022	75	1018
		38.5	CYC-EF-038.5-2022-07-27	27-Jul-2022	100	1244
		38.4	CYC-EF-038.2-2022-07-27	27-Jul-2022	200	1999
		35.4	CYC-EF-035.4-2022-07-28	28-Jul-2022	150	839
		35.2	CYC-EF-035.2-2022-07-28	28-Jul-2022	200	1767
		34.6	CYC-EF-034.6-2022-07-26	26-Jul-2022	360	2616
		34.4	CYC-EF-034.2-2022-07-26	26-Jul-2022	200	3125
		30.7	CYC-EF-030.7-2022-07-26	26-Jul-2022	120	1376
		30.7	CYC-EF-030.5-2022-07-26	26-Jul-2022	200	2050
		29.5	CYC-EF-029.5-2022-07-28	28-Jul-2022	200	852
		29.4	CYC-EF-029.2-2022-07-28	28-Jul-2022	200	1671
Cypress Creek Total					**2,725**	**24,843**
Farrell Creek		102.1	FAC-EF-102.1-2022-08-04	4-Aug-2022	200	1813
		101.7	FAC-EF-101.7-2022-08-04	4-Aug-2022	200	2657
		65.7	FAC-EF-065.7-2022-08-06	6-Aug-2022	225	1621
		65.5	FAC-EF-065.5-2022-08-06	6-Aug-2022	150	1380

[a] only applicable to Moberly River sites.

…continued.

[b] As measured upstream from the Moberly River's confluence with the Peace River.

Table B1 Continued.

River	Section[a]	River Km[b]	Site Name	Sample Date	Sample Length (m)	Sample Time (s)
Farrell Creek		63.3	FAC-EF-063.3-2022-08-04	4-Aug-2022	300	2412
		63.0	FAC-EF-063.0-2022-08-04	4-Aug-2022	200	1993
Farrell Creek Total					**1,275**	**11,876**
Fiddes Creek		12.0	FIC-EF-012.0-2022-08-02	2-Aug-2022	200	2296
		11.8	FIC-EF-011.8-2022-08-02	2-Aug-2022	200	1655
		7.3	FIC-EF-007.3-2022-08-02	2-Aug-2022	200	1773
		7.1	FIC-EF-007.1-2022-08-02	2-Aug-2022	200	3272
		5.2	FIC-EF-005.2-2022-08-02	2-Aug-2022	200	2138
		5.0	FIC-EF-005.0-2022-08-02	2-Aug-2022	200	1814
Fiddes Creek Total					**1,200**	**12,948**
Kobes Creek		55.5	KOC-EF-055.5-2022-08-05	5-Aug-2022	200	1914
		55.3	KOC-EF-055.3-2022-08-05	5-Aug-2022	220	2143
		46.7	KOC-EF-046.7-2022-08-05	5-Aug-2022	200	2168
		46.5	KOC-EF-046.5-2022-08-05	5-Aug-2022	200	2855
		40.4	KOC-EF-040.4-2022-08-03	3-Aug-2022	200	2677
		40.2	KOC-EF-040.2-2022-08-03	3-Aug-2022	265	2978
		11.7	KOC-EF-011.7-2022-08-03	3-Aug-2022	200	2796
		11.5	KOC-EF-011.5-2022-08-03	3-Aug-2022	200	1811
Kobes Creek Total					**1,685**	**19,342**
Maurice Creek		2	MAC-EF-002.0-2022-07-20	20-Jul-2022	400	2174
		1.8	MAC-EF-001.8-2022-07-20	20-Jul-2022	200	2286
		1.5	MAC-EF-001.5-2022-07-24	24-Jul-2022	200	1979
		1.3	MAC-EF-001.3-2022-07-24	24-Jul-2022	200	2637
		1.2	MAC-EF-001.2-2022-07-24	24-Jul-2022	200	1086
		1	MAC-EF-001.0-2022-07-31	31-Jul-2022	200	1786
		0.8	MAC-EF-000.8-2022-07-31	31-Jul-2022	175	650
		0.6	MAC-EF-000.6-2022-07-31	31-Jul-2022	200	1810
Maurice Creek Total					**1,775**	**14,408**
Moberly River	MR-S1A	118.2	MOR-EF-118.2-2022-07-31	31-Jul-2022	208	1605
	MR-S1A	117.1	MOR-EF-117.1-2022-07-31	31-Jul-2022	78	824
	MR-S1A	115.6	MOR-EF-115.6-2022-07-31	31-Jul-2022	77	964
	MR-S1A	115.5	MOR-EF-115.5-2022-07-31	31-Jul-2022	104	738
	MR-S1A	114.7	MOR-EF-114.7-2022-08-01	1-Aug-2022	118	891
	MR-S1A	113.1	MOR-EF-113.1-2022-08-01	1-Aug-2022	150	1603
	MR-S1	102.4	MOR-EF-102.4-2022-08-01	1-Aug-2022	73	332
	MR-S1	100.4	MOR-EF-100.4-2022-08-01	1-Aug-2022	94	528
	MR-S2	87.8	MOR-EF-087.8-2022-08-02	2-Aug-2022	8	178
	MR-S2	87.6	MOR-EF-087.6-2022-08-02	2-Aug-2022	77	673

[a] only applicable to Moberly River sites.

…continued.

[b] As measured upstream from the Moberly River's confluence with the Peace River.

Table B1 Concluded.

River	Section[a]	River Km[b]	Site Name	Sample Date	Sample Length (m)	Sample Time (s)
Moberly River	MR-S2	86.3	MOR-EF-086.3-2022-08-02	2-Aug-2022	115	707
	MR-S3	79.9	MOR-EF-079.9-2022-08-02	2-Aug-2022	71	742
	MR-S4	71.4	MOR-EF-071.4-2022-08-03	3-Aug-2022	137	918
	MR-S4	67.5	MOR-EF-067.5-2022-08-03	3-Aug-2022	103	957
	MR-S5	57.5	MOR-EF-057.5-2022-08-03	3-Aug-2022	135	611
	MR-S5	56.9	MOR-EF-056.9-2022-08-03	3-Aug-2022	152	733
	MR-S6	50.0	MOR-EF-050.0-2022-08-04	4-Aug-2022	70	418
	MR-S6	48.9	MOR-EF-048.9-2022-08-04	4-Aug-2022	109	816
	MR-S7	45.9	MOR-EF-045.9-2022-08-04	4-Aug-2022	102	728
	MR-S7	44.6	MOR-EF-044.6-2022-08-04	4-Aug-2022	96	616
	MR-S7	42.7	MOR-EF-042.7-2022-07-25	25-Jul-2022	177	1174
	MR-S7	41.4	MOR-EF-041.4-2022-07-25	25-Jul-2022	118	606
	MR-S7	38.7	MOR-EF-038.7-2022-07-26	26-Jul-2022	130	724
	MR-S7	38.5	MOR-EF-038.5-2022-07-26	26-Jul-2022	222	1800
	MR-S7	38.0	MOR-EF-038.0-2022-07-26	26-Jul-2022	220	1650
	MR-S7	37.7	MOR-EF-037.7-2022-07-26	26-Jul-2022	126	890
	MR-S7	37.1	MOR-EF-037.1-2022-07-26	26-Jul-2022	280	1066
	MR-S7	36.6	MOR-EF-036.6-2022-07-26	26-Jul-2022	156	699
	MR-S7	36.4	MOR-EF-036.4-2022-07-26	26-Jul-2022	158	730
	MR-S7	36	MOR-EF-036.0-2022-07-27	27-Jul-2022	161	1146
	MR-S7	35.9	MOR-EF-035.9-2022-07-27	27-Jul-2022	221	837
	MR-S7	32.1	MOR-EF-032.1-2022-07-27	27-Jul-2022	190	943
	MR-S7	28.9	MOR-EF-028.9-2022-07-27	27-Jul-2022	86	722
	MR-S8	24.8	MOR-EF-024.8-2022-07-28	28-Jul-2022	334	1070
	MR-S8	23.3	MOR-EF-023.3-2022-07-28	28-Jul-2022	175	887
	MR-S8	20.9	MOR-EF-020.9-2022-07-28	28-Jul-2022	84	550
	MR-S9	16.3	MOR-EF-016.3-2022-07-28	28-Jul-2022	127	578
	MR-S9	14.7	MOR-EF-014.7-2022-07-29	29-Jul-2022	205	1,366
	MR-S9	13.7	MOR-EF-013.7-2022-07-29	29-Jul-2022	250	1510
	MR-S10	9.9	MOR-EF-009.9-2022-07-29	29-Jul-2022	80	735
	MR-S10	6.2	MOR-EF-006.2-2022-07-29	29-Jul-2022	121	789
Moberly River Total					**5,698**	**36,054**

[a] only applicable to Moberly River sites.

[b] As measured upstream from the Moberly River's confluence with the Peace River.

...concluded.

Table B2 Summary of angling sites sampled in the Moberly River during the Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

River	Section	River Km[a]	Site Name	Sample Date	Number of Rods	Angler-Minutes
Moberly River	MR-S1A	117.9	MOR-AN-117.9-2022-07-31	31-Jul-2022	1	60
	MR-S1A	117.9	MOR-AN-117.9-2022-07-30	30-Jul-2022	3	40
	MR-S1A	117.8	MOR-AN-117.8-2022-07-31	31-Jul-2022	4	360
	MR-S1A	117.8	MOR-AN-117.8-2022-07-30	30-Jul-2022	3	55
	MR-S1A	117.7	MOR-AN-117.7-2022-07-31	31-Jul-2022	2	90
	MR-S1A	117.0	MOR-AN-117.0-2022-07-31	31-Jul-2022	2	50
	MR-S1A	116.5	MOR-AN-116.5-2022-07-31	31-Jul-2022	1	10
	MR-S1A	115.9	MOR-AN-115.9-2022-07-31	31-Jul-2022	2	153
	MR-S1A	115.5	MOR-AN-115.5-2022-07-31	31-Jul-2022	1	340
	MR-S1A	114.5	MOR-AN-114.5-2022-08-01	1-Aug-2022	2	30
	MR-S1A	113.9	MOR-AN-113.9-2022-08-01	1-Aug-2022	2	104
	MR-S1A	113.3	MOR-AN-113.3-2022-08-01	1-Aug-2022	2	42
	MR-S1	107.3	MOR-AN-107.3-2022-08-01	1-Aug-2022	1	1
	MR-S1	102.5	MOR-AN-102.5-2022-08-01	1-Aug-2022	2	15
	MR-S1	101.2	MOR-AN-101.2-2022-08-01	1-Aug-2022	2	14
	MR-S1	101.0	MOR-AN-101.0-2022-08-01	1-Aug-2022	1	25
	MR-S1	100.4	MOR-AN-100.4-2022-08-01	1-Aug-2022	1	5
	MR-S2	90.4	MOR-AN-090.4-2022-08-02	2-Aug-2022	1	5
	MR-S2	87.8	MOR-AN-087.8-2022-08-02	2-Aug-2022	1	4
	MR-S2	86.7	MOR-AN-086.7-2022-08-02	2-Aug-2022	1	7
	MR-S2	86.3	MOR-AN-086.3-2022-08-02	2-Aug-2022	2	8
	MR-S2	85.8	MOR-AN-085.8-2022-08-02	2-Aug-2022	2	8
	MR-S2	84.0	MOR-AN-084.0-2022-08-02	2-Aug-2022	2	21
	MR-S4	71.2	MOR-AN-071.2-2022-08-03	3-Aug-2022	1	5
	MR-S4	69.9	MOR-AN-069.9-2022-08-03	3-Aug-2022	2	18
	MR-S4	69.5	MOR-AN-069.5-2022-08-03	3-Aug-2022	2	39
	MR-S4	68.9	MOR-AN-068.9-2022-08-03	3-Aug-2022	1	5
	MR-S4	67.8	MOR-AN-067.8-2022-08-03	3-Aug-2022	2	43
	MR-S4	61.1	MOR-AN-061.1-2022-08-03	3-Aug-2022	3	20
	MR-S5	56.0	MOR-AN-056.0-2022-08-03	3-Aug-2022	3	44
	MR-S5	54.1	MOR-AN-054.1-2022-08-03	3-Aug-2022	2	10
	MR-S6	50.4	MOR-AN-050.4-2022-08-04	4-Aug-2022	2	4
	MR-S6	49.4	MOR-AN-049.4-2022-08-04	4-Aug-2022	2	12
	MR-S6	48.6	MOR-AN-048.6-2022-08-04	4-Aug-2022	2	34
	MR-S6	48.0	MOR-AN-048.0-2022-08-04	4-Aug-2022	2	114
	MR-S7	46.4	MOR-AN-046.4-2022-08-04	4-Aug-2022	2	19
	MR-S7	45.8	MOR-AN-045.8-2022-08-04	4-Aug-2022	2	15
	MR-S7	45.1	MOR-AN-045.1-2022-08-04	4-Aug-2022	2	78

…continued.

[a] As measured upstream from the Moberly River's confluence with the Peace River.

Table B2 Concluded.

River	Section	River Km[a]	Site Name	Sample Date	Number of Rods	Angler-Minutes
Moberly River	MR-S7	43.0	MOR-AN-043.0-2022-08-04	4-Aug-2022	1	11
	MR-S7	42.0	MOR-AN-042.0-2022-07-25	25-Jul-2022	1	5
	MR-S7	41.8	MOR-AN-041.8-2022-07-25	25-Jul-2022	2	17
	MR-S7	41.5	MOR-AN-041.5-2022-07-25	25-Jul-2022	1	21
	MR-S7	40.9	MOR-AN-040.9-2022-07-25	25-Jul-2022	1	17
	MR-S7	40.8	MOR-AN-040.8-2022-07-25	25-Jul-2022	1	127
	MR-S7	40.0	MOR-AN-040.0-2022-07-25	25-Jul-2022	2	10
	MR-S7	38.7	MOR-AN-038.7-2022-07-26	26-Jul-2022	1	9
	MR-S7	38.0	MOR-AN-038.0-2022-07-26	26-Jul-2022	2	32
	MR-S7	37.9	MOR-AN-037.9-2022-07-26	26-Jul-2022	2	28
	MR-S7	37.5	MOR-AN-037.5-2022-07-26	26-Jul-2022	2	31
	MR-S7	37.0	MOR-AN-037.0-2022-07-26	26-Jul-2022	1	15
	MR-S7	36.9	MOR-AN-036.9-2022-07-26	26-Jul-2022	1	23
	MR-S7	36.5	MOR-AN-036.5-2022-07-26	26-Jul-2022	2	29
	MR-S7	36.3	MOR-AN-036.3-2022-07-26	26-Jul-2022	2	16
	MR-S7	36.2	MOR-AN-036.2-2022-07-26	26-Jul-2022	1	7
	MR-S7	36.0	MOR-AN-036.0-2022-07-26	26-Jul-2022	3	36
	MR-S7	34.5	MOR-AN-034.5-2022-07-27	27-Jul-2022	2	5
	MR-S7	34.1	MOR-AN-034.1-2022-07-27	27-Jul-2022	1	8
	MR-S7	33.6	MOR-AN-033.6-2022-07-27	27-Jul-2022	2	13
	MR-S7	33.1	MOR-AN-033.1-2022-07-27	27-Jul-2022	1	11
	MR-S7	31.5	MOR-AN-031.5-2022-07-27	27-Jul-2022	2	18
	MR-S7	31.0	MOR-AN-031.0-2022-07-27	27-Jul-2022	1	14
	MR-S7	28.9	MOR-AN-028.9-2022-07-27	27-Jul-2022	1	7
	MR-S7	28.8	MOR-AN-028.8-2022-07-27	27-Jul-2022	1	
	MR-S8	27.7	MOR-AN-027.7-2022-07-27	27-Jul-2022	2	11
	MR-S8	24.4	MOR-AN-024.4-2022-07-28	28-Jul-2022	2	10
	MR-S8	23.6	MOR-AN-023.6-2022-07-28	28-Jul-2022	2	8
	MR-S8	23.0	MOR-AN-023.0-2022-07-28	28-Jul-2022	2	11
	MR-S8	22.8	MOR-AN-022.8-2022-07-28	28-Jul-2022	1	20
	MR-S8	22.0	MOR-AN-022.0-2022-07-28	28-Jul-2022	1	16
	MR-S8	19.5	MOR-AN-019.5-2022-07-28	28-Jul-2022	1	14
	MR-S9	16.4	MOR-AN-016.4-2022-07-28	28-Jul-2022	2	12
	MR-S9	15.5	MOR-AN-015.5-2022-07-29	29-Jul-2022	1	7
	MR-S9	14.2	MOR-AN-014.2-2022-07-29	29-Jul-2022	2	24
	MR-S9	13.4	MOR-AN-013.4-2022-07-29	29-Jul-2022	2	70
	MR-S9	11.9	MOR-AN-011.9-2022-07-29	29-Jul-2022	1	14
	MR-S10	11.5	MOR-AN-011.5-2022-07-29	29-Jul-2022	1	7
	MR-S10	10.8	MOR-AN-010.8-2022-07-29	29-Jul-2022	2	20
	MR-S10	10.7	MOR-AN-010.7-2022-07-29	29-Jul-2022	2	16
	MR-S10	8.7	MOR-AN-008.7-2022-07-29	29-Jul-2022	1	16
Total						**2,693**

…concluded.

[a] As measured upstream from the Moberly River's confluence with the Peace River.

Table B3 **Summary of small fish boat electroshocking sites sampled during the Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.**

River	Section	River Km[a]	Site Name	Sample Date	Sample Length (m)	Sample Time (s)
Moberly River	MR-S1A	118.5	MOR-ES-118.5-2022-07-30	30-Jul-2022	630	625
	MR-S1A	117.7	MOR-ES-117.7-2022-07-31	31-Jul-2022	586	480
	MR-S1A	117.1	MOR-ES-117.1-2022-07-31	31-Jul-2022	1110	674
	MR-S1A	116.1	MOR-ES-116.1-2022-07-31	31-Jul-2022	625	376
	MR-S1A	115.6	MOR-ES-115.6-2022-08-01	1-Aug-2022	1410	903
	MR-S1A	114.3	MOR-ES-114.3-2022-08-01	1-Aug-2022	1030	868
	MR-S1A	113.4	MOR-ES-113.4-2022-08-01	1-Aug-2022	850	652
	MR-S1	103.2	MOR-ES-103.2-2022-08-01	1-Aug-2022	800	1219
	MR-S1	101.4	MOR-ES-101.4-2022-08-01	1-Aug-2022	1500	1240
	MR-S2	86.8	MOR-ES-086.8-2022-08-02	2-Aug-2022	1680	1230
	MR-S3	83.1	MOR-ES-083.1-2022-08-02	2-Aug-2022	1800	1130
	MR-S3	72.5	MOR-ES-072.5-2022-08-03	3-Aug-2022	1620	1049
	MR-S4	70.3	MOR-ES-070.3-2022-08-03	3-Aug-2022	1260	874
	MR-S4	67.5	MOR-ES-067.5-2022-08-03	3-Aug-2022	980	707
	MR-S5	57.7	MOR-ES-057.7-2022-08-03	3-Aug-2022	1560	1218
	MR-S5	56.0	MOR-ES-056.0-2022-08-03	3-Aug-2022	1700	1083
	MR-S5	54.3	MOR-ES-054.3-2022-08-03	3-Aug-2022	1500	911
	MR-S6	51.0	MOR-ES-051.0-2022-08-04	4-Aug-2022	1500	1152
	MR-S6	49.3	MOR-ES-049.3-2022-08-04	4-Aug-2022	1420	1019
	MR-S6	48.0	MOR-ES-048.0-2022-08-04	4-Aug-2022	1430	911
	MR-S7	46.6	MOR-ES-046.6-2022-08-04	4-Aug-2022	1480	1050
	MR-S7	45.2	MOR-ES-045.2-2022-08-04	4-Aug-2022	1390	1115
	MR-S7	43.7	MOR-ES-043.7-2022-08-04	4-Aug-2022	500	906
	MR-S7	42.8	MOR-ES-042.8-2022-07-25	25-Jul-2022	380	200
	MR-S7	42.3	MOR-ES-042.3-2022-07-25	25-Jul-2022	760	743
	MR-S7	41.5	MOR-ES-041.5-2022-07-25	25-Jul-2022	675	1350
	MR-S7	40.7	MOR-ES-040.7-2022-07-25	25-Jul-2022	1580	1003
	MR-S7	38.5	MOR-ES-038.8-2022-07-26	26-Jul-2022	400	317
	MR-S7	37.9	MOR-ES-037.9-2022-07-26	26-Jul-2022	870	534
	MR-S7	37.0	MOR-ES-037.0-2022-07-26	26-Jul-2022	700	368
	MR-S7	36.1	MOR-ES-036.1-2022-07-27	27-Jul-2022	780	456
	MR-S7	35.4	MOR-ES-035.4-2022-07-27	27-Jul-2022	1270	687
	MR-S7	34.0	MOR-ES-034.0-2022-07-27	27-Jul-2022	1280	731
	MR-S7	32.1	MOR-ES-032.1-2022-07-27	27-Jul-2022	420	327
	MR-S7	32.0	MOR-ES-032.0-2022-07-27	27-Jul-2022	980	526
	MR-S7	31.0	MOR-ES-031.0-2022-07-27	27-Jul-2022	1270	615

…continued.

[a] As measured upstream from the Moberly River's confluence with the Peace River.

Table B3 Concluded.

River	Section	River Km[a]	Site Name	Sample Date	Sample Length (m)	Sample Time (s)
Moberly River	MR-S7	29.9	MOR-ES-029.9-2022-07-27	27-Jul-2022	1100	657
	MR-S7	28.3	MOR-ES-028.3-2022-07-27	27-Jul-2022	1216	374
	MR-S8	27.7	MOR-ES-027.7-2022-07-27	27-Jul-2022	955	446
	MR-S8	24.6	MOR-ES-024.6-2022-07-28	28-Jul-2022	975	476
	MR-S8	23.1	MOR-ES-023.1-2022-07-28	28-Jul-2022	930	738
	MR-S8	22.5	MOR-ES-022.5-2022-07-28	28-Jul-2022	470	294
	MR-S9	17.1	MOR-ES-017.1-2022-07-28	28-Jul-2022	1200	501
	MR-S9	14.9	MOR-ES-014.9-2022-07-29	29-Jul-2022	356	577
	MR-S9	13.5	MOR-ES-013.5-2022-07-29	29-Jul-2022	1220	612
	MR-S9	13.4	MOR-ES-013.4-2022-07-29	29-Jul-2022	875	510
	MR-S9	12.6	MOR-ES-012.6-2022-07-29	29-Jul-2022	920	535
	MR-S9	11.9	MOR-ES-011.9-2022-07-29	29-Jul-2022	1275	718
	MR-S10	9.8	MOR-ES-009.8-2022-07-29	29-Jul-2022	1260	1008
	MR-S10	5.8	MOR-ES-005.8-2022-07-29	29-Jul-2022	1500	1040
Moberly River Total					**53,978**	**37,735**

…concluded.

[a] As measured upstream from the Moberly River's confluence with the Peace River.

Table B4 Number of fish captured by backpack electrofishing and their frequency of occurrence in the Chowade River and Cypress and Fiddes creeks during the Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Species	Life Stage	River						All Rivers	
		Chowade River		Cypress Creek		Fiddes Creek			
		n	%[a]	n	%[a]	n	%[a]	n	%[a]
Target Species									
Bull Trout	Immature	326	46.1	381	51.6	153	93.9	860	53.4
	YOY	133	18.8	73	9.9	10	6.1	216	13.4
All Bull Trout		**459**	**64.9**	**454**	**61.4**	**163**	**100.0**	**1076**	**66.9**
Target Species Subtotal		**459**	**64.9**	**454**	**61.4**	**163**	**100.0**	**1076**	**66.9**
Non-Target Species									
Slimy Sculpin	All	248	35.1	279	37.8			527	32.8
Sculpin Unidentified	All			6	0.8			6	<1
Non-Target Species Subtotal		**248**	**35.1**	**285**	**38.6**	**0**	**0.0**	**533**	**33.1**
All species		**707**	**100.0**	**739**	**100.0**	**163**	**100.0**	**1,609**	**100.0**

[a] Percent composition of the total catch.

Table B5 Number of fish caught by backpack electrofishing and their frequency of occurrence in Colt, Farrell, Kobes, and Maurice creeks during the Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

Species	Life Stage	River								All Rivers	
		Colt Creek		Farrell Creek		Kobes Creek		Maurice Creek			
		n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]
Target Species											
Arctic Grayling	Immature	3	0.9							3	
	YOY	1	<1							1	<1
All Arctic Grayling		**4**	**0.0**	**0**	**0.0**	**0**	**0.0**	**0**	**0.0**	**4**	**<1**
Bull Trout	Adult	1	<1			1	<1	1	<1	3	<1
	Immature	12	3.6					3	<1	15	0.7
All Bull Trout		**13**	**3.9**	**0**	**0.0**	**1**	**0.0**	**4**	**2.8**	**18**	**0.8**
Rainbow Trout	Adult					1	<1			1	
	Immature	110	33.1	33	5.6	75	12.5	42	5.7	260	11.5
	YOY			1	<1	3	0.5			4	<1
All Rainbow Trout		**110**	**33.1**	**34**	**5.7**	**79**	**13.2**	**42**	**5.7**	**265**	**11.7**
Target Species Subtotal		**127**	**38.3**	**34**	**5.7**	**80**	**13.4**	**46**	**6.3**	**287**	**12.7**
Non-Target Species											
Lake Chub	All			55	9.3	98	16.4			153	6.8
Largescale Sucker	All			25	4.2	11	1.8	1	<1	37	1.6
Longnose Dace	All	51	15.4	69	11.6	75	12.5	365	49.8	560	24.8
Longnose Sucker	All	2	0.6	109	18.4	41	6.8	192	26.2	344	15.2
Mountain Whitefish	All	19	5.7			12	2.0	3	<1	34	1.5
Northern Pikeminnow	All			1	<1					1	<1
Prickly Sculpin	All							5	0.7	5	<1
Redside Shiner	All			182	30.7	17	2.8	23	3.1	222	9.8
Slimy Sculpin	All	133	40.1	92	15.5	264	44.1	98	13.4	587	26.0
Trout-perch	All			11	1.9					11	<1
White Sucker	All			15	2.5	1	<1			16	0.7
Non-Target Species Subtotal		**205**	**61.7**	**559**	**94.3**	**519**	**86.6**	**687**	**93.7**	**1970**	**87.3**
All species		**332**	**100.0**	**593**	**100.0**	**599**	**100.0**	**733**	**100.0**	**2,257**	**100.0**

[a] Percent composition of the total catch.

Table B6 **Number of fish captured and their frequency of occurrence for all sample methods combined in sampled sections of the Moberly River during the Site C Reservoir Tributary Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.**

Species	Section																				All Sections	
	1A		1		2		3		4		5		6		7		8		9		10			
	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]
Arctic Grayling	16	3.7	1	1.8							1	0.8	1	1.3	9	1.4	1	0.5					29	1.4
Bull Trout															2	<1							2	<1
Burbot	26	6.0	1	1.8	3	4.0			6	3.8	2	1.7	2	2.5	13	2.0	1	0.5	10	6.9	7	11.1	71	3.5
Lake Chub									1	0.6					4	0.6	4	2.1	28	19.3	5	7.9	42	2.1
Largescale Sucker	1	<1							1	0.6	3	2.5	2	2.5	3	<1			4	2.8	5	7.9	19	0.9
Longnose Dace	70	16.2	2	3.5	30	40.0	15	18.8	65	41.7	29	24.6	12	15.2	123	18.9	78	41.3	52	35.9	25	39.7	501	24.5
Longnose Sucker	13	3.0	7	12.3	9	12.0	22	27.5	16	10.3	43	36.4	30	38.0	126	19.4	56	29.6	14	9.7	13	20.6	349	17.1
Mountain Whitefish	254	58.9	44	77.2	23	30.7	34	42.5	52	33.3	32	27.1	26	32.9	234	35.9	23	12.2	22	15.2	1	1.6	745	36.4
Northern Pike	4	0.9			1	1.3					2	1.7			4	0.6							11	0.5
Northern Pikeminnow													1	1.3	2	<1			5	3.4	4	6.3	12	0.6
Rainbow Trout	1	<1																					1	<1
Redside Shiner	7	1.6	2	3.5	5	6.7	2	2.5	7	4.5	4	3.4			11	1.7	22	11.6	10	6.9			70	3.4
Sculpin Unidentified	3	0.7			1	1.3																	4	<1
Slimy Sculpin	34	7.9			1	1.3	7	8.8	7	4.5	2	1.7	4	5.1	85	13.1	4	2.1			1	1.6	145	7.1
Sucker Unidentified					2	2.7			1	0.6			1	1.3	19	2.9					1	1.6	24	1.2
Unidentifed															8	1.2							8	<1
White Sucker	2	<1													8	1.2					1	1.6	11	0.5
All species	**431**	**21.1**	**57**	**2.8**	**75**	**3.7**	**80**	**3.9**	**156**	**7.6**	**118**	**5.8**	**79**	**3.9**	**651**	**31.8**	**189**	**9.2**	**145**	**7.1**	**63**	**3.1**	**2044**	**100.0**

[a] Percent composition of the total catch.

Table B7 **Capture and life history information for Arctic Grayling caught in the Moberly River during Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.**

Capture Date	Method	Section	River km[a]	Fork Length (mm)	Weight (g)	Age	Tagged
03-Aug-2022	MOR-ES-057.7-2022-08-03	5	57.7	233	135	3	Yes
01-Aug-2022	MOR-ES-101.4-2022-08-01	1	101.4	139	30	1	Yes
01-Aug-2022	MOR-ES-115.6-2022-08-01	1A	115.6	142	20	1	Yes
31-Jul-2022	MOR-AN-117.9-2022-07-31	1A	117.9	136	30	1	Yes
27-Jul-2022	MOR-ES-027.7-2022-07-27	8	27.7	211	100	3	
26-Jul-2022	MOR-EF-037.1-2022-07-26	7	37.1	60		0	
26-Jul-2022	MOR-EF-037.1-2022-07-26	7	37.1	59		0	
26-Jul-2022	MOR-EF-037.1-2022-07-26	7	37.1	246	135	3	Yes
26-Jul-2022	MOR-EF-038.0-2022-07-26	7	38.0	46		0	
04-Aug-2022	MOR-AN-048.0-2022-08-04	6	48.0	155	45	1	Yes
01-Aug-2022	MOR-AN-107.3-2022-08-01	1A	107.3	145	35	1	Yes
01-Aug-2022	MOR-AN-113.9-2022-08-01	1A	113.9	148	39.5	1	Yes
01-Aug-2022	MOR-AN-113.9-2022-08-01	1A	113.9	151	39.5	1	Yes
01-Aug-2022	MOR-AN-114.5-2022-08-01	1A	114.5	127	26.5	1	Yes
31-Jul-2022	MOR-AN-115.5-2022-07-31	1A	115.5	132	32.5	1	Yes
31-Jul-2022	MOR-AN-115.5-2022-07-31	1A	115.5	135	34	1	Yes
31-Jul-2022	MOR-AN-115.5-2022-07-31	1A	115.5	141	32.5	1	Yes
31-Jul-2022	MOR-AN-115.9-2022-07-31	1A	115.9	168	49.5	1	
31-Jul-2022	MOR-AN-117.7-2022-07-31	1A	117.7	134	27.5	1	Yes
31-Jul-2022	MOR-AN-117.7-2022-07-31	1A	117.7	133	26	1	Yes
31-Jul-2022	MOR-AN-117.9-2022-07-31	1A	117.9	133	26.2	1	Yes
31-Jul-2022	MOR-AN-117.9-2022-07-31	1A	117.9	130	25.5	1	Yes
31-Jul-2022	MOR-AN-117.9-2022-07-31	1A	117.9	128	24.3	1	Yes
31-Jul-2022	MOR-AN-117.8-2022-07-31	1A	117.8	132	23.5	1	
26-Jul-2022	MOR-AN-036.2-2022-07-26	7	36.2	138	36	1	Yes
26-Jul-2022	MOR-AN-036.2-2022-07-26	7	36.2	136	30.9	1	Yes
26-Jul-2022	MOR-AN-036.2-2022-07-26	7	36.2	221	113	3	Yes
27-Jul-2022	MOR-EF-036.0-2022-07-27	7	36.0	61	1.9	0	
26-Jul-2022	MOR-EF-037.7-2022-07-26	7	37.7	212	116.2	3	Yes

APPENDIX C

Habitat Data

Table C1 Habitat variables measured during the Site C Reservoir Tributaries Fish Population Indexing Survey (Mon-1b, Task 2c), 2022.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)									
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Chowade River	42.1	CHR-EF-041.9-2022-07-25	25-Jul-2022	6.9	350	to bottom	-	0.20	1.00	Gravel	Silt	56	25	5	1	1	1	5	5	1	
	52.6	CHR-EF-052.4-2022-07-25	25-Jul-2022	5.5	330	to bottom	Medium	0.20	1.00	Gravel	Cobble	66	15	5	1	1	1	5	5	1	
	51.2	CHR-EF-051.0-2022-07-25	25-Jul-2022	6.6	330	to bottom	Medium	0.70	1.40	Gravel	Sand	64	20	5	2	1	1	1	1	5	
	44.7	CHR-EF-044.7-2022-07-22	22-Jul-2022	6.0	370	to bottom	Low	0.60	1.00	Gravel	Silt	73	10	2	2	5	1		2	5	
	48.8	CHR-EF-048.6-2022-07-22	22-Jul-2022	7.4	340	to bottom	Low	-	-	Gravel	Cobble	85	3	3	2	2	3	2			
	46.7	CHR-EF-046.5-2022-07-22	22-Jul-2022	6.8	340	to bottom	Medium	0.30	0.70	Gravel	Cobble	74	5	2	2	3	2		5	5	
	49.9	CHR-EF-049.7-2022-07-22	22-Jul-2022	5.5	330	to bottom	Low	0.30	1.20	Gravel	Cobble	50	23	10	5	2	2	1	5	2	
	48.6	CHR-EF-048.4-2022-07-21	21-Jul-2022	8.2	350	to bottom	Low	0.60	1.50	-	-	20	20	10	15	10	10		5	10	
	44.1	CHR-EF-044.1-2022-07-21	21-Jul-2022	9.7	360	to bottom	Low	0.20	1.20	Gravel	Cobble	40	5	5	15	1	5		20	9	
	39.0	CHR-EF-039.0-2022-07-21	21-Jul-2022	7.3	330	to bottom	Low	0.40	1.30	Gravel	Silt	30	20	10	10		5		30	5	
	48.8	CHR-EF-048.8-2022-07-22	22-Jul-2022	7.5	330	>2.0	Low	0.35	0.70	Gravel	Sand	5	35	20	5		20	15			
	40.4	CHR-EF-040.2-2022-07-23	23-Jul-2022	6.2	350	to bottom	-	0.30	0.70	Gravel	Cobble	80	2	5	5	2	2	2		2	
	49.7	CHR-EF-049.7-2022-07-23	23-Jul-2022	7.5	340	to bottom	Low	0.30	1.20	Cobble	Silt	70	5	5	5	2	5	2	5	1	
	50.7	CHR-EF-050.5-2022-07-23	23-Jul-2022	6.5	360	to bottom	Low	0.20	0.80	Cobble	Sand	91	2	1	1	2	1	1	1		
	40.2	CHR-EF-040.0-2022-07-23	23-Jul-2022	6.2	350	to bottom	-	0.50	1.00	Gravel	Cobble	78	5	2	3	2	2	2		2	
	50.7	CHR-EF-050.7-2022-07-23	23-Jul-2022	6.5	360	to bottom	Low	0.10	0.40	Cobble	Gravel	45	5	5		10	5	15	15		
	51.0	CHR-EF-051.0-2022-07-23	23-Jul-2022	6.5	360	to bottom	-	0.20	0.40	Boulder	Cobble	50	1	2	2			20	25		
	39.9	CHR-EF-039.9-2022-07-23	23-Jul-2022	6.2	350	to bottom	Low	0.20	0.75	Sand	Gravel	10	20	25	10		15	10	5	5	
	49.4	CHR-EF-049.4-2022-07-23	23-Jul-2022	7.5	340	to bottom	Medium	-	-	Cobble	Gravel	49	2	3	10	1	1	4	25	5	
	40.7	CHR-EF-040.7-2022-07-23	23-Jul-2022	5.5	350	to bottom	Low	0.10	0.40	Gravel	Sand	10	3	3	2		1	5	75	1	
	40.4	CHR-EF-040.4-2022-07-23	23-Jul-2022	6.2	350	to bottom	Low	0.12	0.40	Gravel	Cobble	30	5	10	15	5	20	5	10		
	44.1	CHR-EF-044.1-2022-07-22	22-Jul-2022	7.6	370	>2.0	Medium	0.40	0.90	Cobble	Gravel	50	2	13	5			5	15	10	
	48.7	CHR-EF-048.7-2022-07-22	22-Jul-2022	7.5	340	to bottom	Low	0.20	0.50	Cobble	Gravel	83	1	1	5			5		5	
	46.0	CHR-EF-046.0-2022-07-22	22-Jul-2022	7.8	330	>2.0	Medium	0.50	0.80	Cobble	Gravel	50	15	15			10			10	
	46.3	CHR-EF-046.3-2022-07-22	22-Jul-2022	7.8	330	>2.0		0.65	1.00	Gravel	Sand	5	40	20		10	5			20	
	49.8	CHR-EF-049.8-2022-07-22	22-Jul-2022	6.8	340	>2.0	Low	0.15	0.70	Gravel	Sand	10	30	25	5		20		5	5	
	50.1	CHR-EF-050.0-2022-07-22	22-Jul-2022	5.0	340	to bottom	Medium	0.20	0.50	Cobble	Boulder	50	1	1		2		14	30	2	
	48.5	CHR-EF-048.5-2022-07-21	21-Jul-2022	7.1	340	to bottom	-	0.20	0.50	Gravel	Sand	40	5	10	10		5		30		
	39.3	CHR-EF-039.3-2022-07-21	21-Jul-2022	7.3	330	2	Low	0.20	0.80	Gravel	Sand	15	25	15	10		15	10	5	5	
	43.9	CHR-EF-043.9-2022-07-21	21-Jul-2022	8.5	340	>2.0	Low	0.33	0.75	Gravel	Sand	10	20	30	5	5	10	10	5	5	
	41.5	CHR-EF-041.5-2022-07-25	25-Jul-2022	7.8	350	to bottom	Low	0.40	0.60	Cobble	Organics	50	5	10	1			5	25	4	
	51.4	CHR-EF-051.4-2022-07-25	25-Jul-2022	5.5	330	>2.0	Low	0.25	0.80	Gravel	Cobble	25	15	20		10	15	10		5	

…continued.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

Table C1 Continued.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)								
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Chowade River	51.5	CHR-EF-051.5-2022-07-25	25-Jul-2022	5.5	330	>2.0	Low	0.10	0.30	Cobble	Sand	45	1	1	2			10	40	1	
	52.6	CHR-EF-052.6-2022-07-25	25-Jul-2022	5.5	330	>2.0	Low	0.35	0.75	Silt	Organics		40	25	5		20	5		10	
	52.7	CHR-EF-052.7-2022-07-25	25-Jul-2022	5.5	330	>2.0	Medium	0.30	0.85	Cobble	Gravel	35	20	10	10	15	5	5			
	37.3	CHR-EF-037.1-2022-07-29	29-Jul-2022	8.1	380	to bottom	Medium	0.40	1.20	Gravel	Cobble	62	10	15	1	2	5	1	2	2	
	43.4	CHR-EF-043.4-2022-07-29	29-Jul-2022	7.4	360	to bottom	-	-	-	Gravel	Cobble	39	20	15	2	2	2	5	5	10	
	51.1	CHR-EF-051.1-2022-07-29-SC	29-Jul-2022	6.9	350	to bottom	Low	0.20	0.30	Cobble	Gravel	50	2	3	5		15		25		
	51.1	CHR-EF-051.0-2022-07-29	29-Jul-2022	5.6	380	to bottom	Low	0.20	0.50	Gravel	Cobble	77	1	5	1		5	1	10		
	51.2	CHR-EF-051.1-2022-07-29	29-Jul-2022	7.0	330	to bottom	Medium	0.70	1.50	Silt	Gravel	61	10	10	5	2	1	1		10	
	36.4	CHR-EF-036.4-2022-07-29	29-Jul-2022	10.7	380	to bottom	Low	0.20	0.30	Gravel	Organics	5		20					75		
	38.1	CHR-EF-038.0-2022-07-29	29-Jul-2022	9.6	370	to bottom	Medium	0.80	1.50	Gravel	Sand	23	33	10	5	2	5	1	1	10	
Colt Creek	14.1	COC-EF-014.1-2022-08-01	1-Aug-2022	11.7	210	0.25	High	0.3	-	Cobble	Sand	12	10	5	2	10	5	1	2	3	50
	14.3	COC-EF-014.3-2022-08-01	1-Aug-2022	12.4	210	-	High	0.5	1.3	Cobble	Gravel	50	5	4	5			1	15	10	10
	3.5	COC-EF-003.5-2022-07-30	30-Jul-2022	16.4	310	to bottom	Medium	0.3	1.2	Cobble	Gravel	50	2	7	5			1	25	10	
	3.7	COC-EF-003.7-2022-07-30	30-Jul-2022	16.4	310	0.65	Low	0.45	1.25	Gravel	Cobble	20	20	10	10	10	3	2	5	10	10
	28.8	COC-EF-028.8-2022-08-01	1-Aug-2022	8.4	300	to bottom	High	0.3	1	Cobble	Boulder	62	5	5	2	20	2	1	1	2	
	29	COC-EF-029.0-2022-08-01	1-Aug-2022	8.4	300	to bottom	-	0.3	0.7	Cobble	Boulder	85	3	5	2	3		1		1	
	30.4	COC-EF-030.4-2022-08-01	1-Aug-2022	7.9	290	to bottom	-	0.3	0.8	Boulder	Cobble	40	2	8	5	20	10	5	5	5	
	30.2	COC-EF-030.2-2022-08-01	1-Aug-2022	7.9	290	to bottom	High	0.2	0.7	Cobble	Gravel	67	5	5	5	10	5	1	2		
Cypress Creek	41.1	CYC-EF-040.9-2022-07-27	27-Jul-2022	12.5	400	to bottom	High	0.30	1.40	Silt	Cobble	52	25	2	1	10	5	1	2	2	
	38.4	CYC-EF-038.2-2022-07-27	27-Jul-2022	11.1	410	to bottom	Medium	0.30	1.40	Silt	Cobble	53	15	5	10	2	5		5	5	
	40.5	CYC-EF-040.5-2022-07-26	26-Jul-2022	12.6	400	to bottom	-	0.40	0.80	Cobble	Gravel	55	4	5	5			1	20	10	
	34.6	CYC-EF-034.6-2022-07-26	26-Jul-2022	10.1	410	to bottom	Medium	0.30	0.50	Cobble	Boulder	80	3	3	1	1		1	10	1	
	30.7	CYC-EF-030.7-2022-07-26	26-Jul-2022	8.1	380	to bottom	Low	0.20	0.40	Cobble	Sand	50	2	3				2	40	3	
	40.3	CYC-EF-040.1-2022-07-26	26-Jul-2022	12.6	400	to bottom	-	0.40	1.00	Cobble	Gravel	85	3	2	3	2	1		2	2	
	30.7	CYC-EF-030.5-2022-07-26	26-Jul-2022	9.4	370	to bottom	Low	0.20	0.80	Silt	Cobble	63	10	5	1	1	5	5	10		
	34.4	CYC-EF-034.2-2022-07-26	26-Jul-2022	10.6	280	to bottom	Medium	0.80	1.40	Silt	Cobble	42	20	5	5	5	10	1	2	10	
	41.1	CYC-EF-041.1-2022-07-27	27-Jul-2022	12.5	400	to bottom	Medium	0.30	0.90	Cobble	Sand	60	2	3	5	1		1	23	5	
	38.5	CYC-EF-038.5-2022-07-27	27-Jul-2022	11.1	410	>2.0	Medium	0.42	1.25	Gravel	Sand	5	30	20	10	5	10		10	10	
	38.6	CYC-EF-038.6-2022-07-27	27-Jul-2022	11.1	410	to bottom	Low	0.15	0.75	Gravel	Cobble	25	10	15	10	3	20	2	10	5	
	35.2	CYC-EF-035.2-2022-07-28	28-Jul-2022	15.0	410	to bottom	Medium	0.20	0.85	Gravel	Cobble	30	5	10	25	1		1	32	1	
	35.4	CYC-EF-035.4-2022-07-28	28-Jul-2022	15.0	410	to bottom	Low	0.40		Cobble	Gravel	66	10	5	5	5	2	1	5	1	
	29.5	CYC-EF-029.5-2022-07-28	28-Jul-2022	11.4	390	to bottom	Medium	0.30	0.60	Boulder	Sand	75	1	1	1	1		1	10	10	
	29.4	CYC-EF-029.2-2022-07-28	28-Jul-2022	11.4	390	to bottom	Medium	0.20	0.70	Cobble	Boulder	35	10	10	5	15	13	2	10		
Farrell Creek	65.7	FAC-EF-065.7-2022-08-06	6-Aug-2022	16.5	470	1.00	Low	0.65	1.20	Sand	Gravel	5	30	15	5		3	5	2	30	5
	65.5	FAC-EF-065.5-2022-08-06	6-Aug-2022	16.5	470	1.00	-	0.40	1.50	Sand	Gravel	10	10	15	2	2	2	2	17	15	30
	102.1	FAC-EF-102.1-2022-08-04	4-Aug-2022	14.4	330	0.21	Low	0.50	1.00	Sand	Gravel	4	2	5	3			1	5	40	40
	63.3	FAC-EF-063.3-2022-08-04	4-Aug-2022	17.5	490	0.40	Low	0.30	1.20	Cobble	Gravel	40	1	1	0			15	40	5	3

…continued.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

Table C1 Continued.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)									
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Farrell Creek	101.7	FAC-EF-101.7-2022-08-04	4-Aug-2022	14.4	330	0.3	Low	0.30	1.50	Sand	Gravel	34	15	10	2	5	2	2	5	5	20
	63.0	FAC-EF-063.0-2022-08-04	4-Aug-2022	17.5	490	0.4	Low	0.30	1.00	Sand	Gravel	48	10	10	2	5	5	5	5	5	5
Fiddes Creek	7.3	FIC-EF-007.3-2022-08-02	2-Aug-2022	5.9	390	to bottom	High	-	-	Cobble	Boulder	70	2	1	1	14	1		10	1	
	5.2	FIC-EF-005.2-2022-08-02	2-Aug-2022	8.4	380	to bottom	High	0.50	0.80	Boulder	Cobble	50	1	1	5	25	2		11	5	
	5.0	FIC-EF-005.0-2022-08-02	2-Aug-2022	8.4	380	to bottom	High	0.50	1.20	Boulder	Cobble	83	2	3	2	5	2	1	1	1	
	11.8	FIC-EF-011.8-2022-08-02	2-Aug-2022	8.6	390	to bottom	Medium	0.30	1.00	Cobble	Gravel	Not recorded									
	7.1	FIC-EF-007.1-2022-08-02	2-Aug-2022	5.9	390	to bottom	High	0.50	1.10	Cobble	Boulder	72	5	2	1	10	1	1	5	3	
	12.0	FIC-EF-012.0-2022-08-02	2-Aug-2022	8.6	390	to bottom	Medium	0.40	0.50	Cobble	-	50	2	1	5	5	5	0	30	2	
Kobes Creek	46.5	KOC-EF-046.5-2022-08-05	5-Aug-2022	16.8	130	0.5	-	0.15	0.7	Gravel	Cobble	25	10	15	10		15	10	10		5
	46.7	KOC-EF-046.7-2022-08-05	5-Aug-2022	16.8	130	0.6	Low	0.30	1.50	Sand	Gravel	30	15	10	10	5	5	5	10	5	5
	55.3	KOC-EF-055.3-2022-08-05	5-Aug-2022	13.4	90	to bottom	Low	0.12	0.75	Gravel	Cobble	20	20	20	15	2	10	8	5		
	55.5	KOC-EF-055.5-2022-08-05	5-Aug-2022	13.4	90	0.8	Low	0.20	1.30	Sand	Cobble	20	20	15	10	2	10	2	4	2	15
	40.2	KOC-EF-040.2-2022-08-03	3-Aug-2022	14.3	150	0.8	Low	0.40	1.35	Cobble	Silt	10	20	15	5	5	10	5	5	25	
	11.7	KOC-EF-011.7-2022-08-03	3-Aug-2022	15.4	230	0.1	Low	0.40	1.20	Gravel	Boulder	40	1	2		1	1		2	23	30
	40.4	KOC-EF-040.4-2022-08-03	3-Aug-2022	14.3	150	0.8	Low	0.70	1.50	Sand	Cobble	31	10	5	2	10	5	5	2	15	15
	11.5	KOC-EF-011.5-2022-08-03	3-Aug-2022	15.4	230	0.2	Low	0.50	1.50	Sand	Cobble	2		2	1	5	1		1	20	68
Maurice Creek	2.0	MAC-EF-002.0-2022-07-20	20-Jul-2022	17.2	330	0.6	Medium	0.40	1.30	Cobble	Bedrock	34	1			5			40	15	5
	1.8	MAC-EF-001.8-2022-07-20	20-Jul-2022	17.4	340	0.6	Low	0.20	1.00	Cobble	Gravel	50	5	5	10	5	5		5	5	10
	1.2	MAC-EF-001.2-2022-07-24	24-Jul-2022	18.7	340	0.7	High	-	0.70	Bedrock	Cobble	74	2		5	5			2	2	10
	1.5	MAC-EF-001.5-2022-07-24	24-Jul-2022	18.6	360	0.7	Medium	0.40	1.20	Cobble	Gravel	85	3	2	2		3			2	3
	1.3	MAC-EF-001.3-2022-07-24	24-Jul-2022	17.5	360	0.7	Medium	0.3	1	Cobble	Gravel	87	2	2	2		2			2	3
	0.6	MAC-EF-000.6-2022-07-31	31-Jul-2022	18.5	420	to bottom	Low	0.1	0.75	Gravel	Cobble	20		5				5	70		
	0.8	MAC-EF-000.8-2022-07-31	31-Jul-2022	19.5	420	to bottom	Low	0.08	0.4	Bedrock	Gravel	5			15				80		
	1.0	MAC-EF-001.0-2022-07-31	31-Jul-2022	20.5	420	to bottom	-	0.32	0.95	Cobble	Bedrock	40	1	4	5	10			20	20	
Moberly River	118.5	MOR-ES-118.5-2022-07-30	30-Jul-2022	22.0	180	>2.0	Low	0.6	1.5	Cobble	Gravel	85	15								
	118.2	MOR-EF-118.2-2022-07-31	31-Jul-2022	18.2	190	to bottom	Medium	0.35	1.1	Cobble	Gravel	40	5	10	5	40					
	117.9	MOR-AN-117.9-2022-07-31	31-Jul-2022	20.5	-	0.9	Low	-	-	Cobble	Gravel	90							10		
	117.9	MOR-AN-117.9-2022-07-30	30-Jul-2022	20.5	-	0.9	Low	0.5	1.3	Gravel	Cobble	60	20						20		
	117.8	MOR-AN-117.8-2022-07-31	31-Jul-2022	20.5	-	0.9	Low	0.3	0.7	Cobble	Gravel	70							30		
	117.8	MOR-AN-117.8-2022-07-30	30-Jul-2022	20.5	-	0.9	Low	0.4	1.3	Gravel	Cobble	75	5						20		
	117.7	MOR-AN-117.7-2022-07-31	31-Jul-2022	19.0	-	0.90	Medium	0.30	0.60	Cobble	Gravel	60	5	5					15	15	
	117.7	MOR-ES-117.7-2022-07-31	31-Jul-2022	19.1	180	>2.0	Medium	0.70	1.40	Cobble	Boulder	90								10	
	117.1	MOR-ES-117.1-2022-07-31	31-Jul-2022	19.7	170	>2.0	Medium	0.70	1.80	Cobble	Boulder	85								15	
	117.1	MOR-EF-117.1-2022-07-31	31-Jul-2022	18.9	180	to bottom	Low	0.10	0.30	Boulder	Cobble	80		20							
	117	MOR-AN-117.0-2022-07-31	31-Jul-2022	20.0	-	0.9	Low	0.40	1.10	Cobble	Gravel	90	5	5							
	116.5	MOR-AN-116.5-2022-07-31	31-Jul-2022	20.0	-	0.90	Medium	0.30	0.60	Boulder	Cobble	80		5					15		
	116.1	MOR-ES-116.1-2022-07-31	31-Jul-2022	19.1	180	1.5	Medium	0.60	1.50	Gravel	Cobble	90	5							5	

…continued.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

Table C1 Continued.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)								
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Moberly River	115.9	MOR-AN-115.9-2022-07-31	31-Jul-2022	20.0	-	0.9	Medium	0.40	2.00	Cobble	Gravel	70		10					20		
	115.6	MOR-ES-115.6-2022-08-01	1-Aug-2022	20.1	180	>2.0	Medium	0.70	1.40	Cobble	Boulder	70	10							20	
	115.6	MOR-EF-115.6-2022-07-31	31-Jul-2022	19.8	190	to bottom	Low	0.20	1.25	Gravel	Sand		30	30		20			20		
	115.5	MOR-AN-115.5-2022-07-31	31-Jul-2022	19.5	-	0.9	Low	0.50	2.00	Cobble	Gravel		30	30					20	20	
	115.5	MOR-EF-115.5-2022-07-31	31-Jul-2022	19.6	190	to bottom	Medium	0.10	0.30	Gravel	Sand		15	10		65			10		
	114.7	MOR-EF-114.7-2022-08-01	1-Aug-2022	19.6	190	to bottom	Medium	0.30	1.20	Gravel	Sand	15	5	10		60				10	
	114.5	MOR-AN-114.5-2022-08-01	1-Aug-2022	19.5	-	0.9	Low	0.35	0.80	Cobble	Gravel	50	10	10					20	10	
	114.3	MOR-ES-114.3-2022-08-01	1-Aug-2022	20.1	180	>2.0	Medium	0.50	1.50	Cobble	Boulder	75	10							15	
	113.9	MOR-AN-113.9-2022-08-01	1-Aug-2022	20.0	-	0.9	Low	0.35	0.90	Cobble	Gravel	50	5	10					30	5	
	113.4	MOR-ES-113.4-2022-08-01	1-Aug-2022	21.1	180	>2.0	Medium	0.70	1.40	Cobble	Boulder	70	10							20	
	113.3	MOR-AN-113.3-2022-08-01	1-Aug-2022	20.0	-	0.9	Low	0.50	1.70	Gravel	Sand	70	10						20		
	113.1	MOR-EF-113.1-2022-08-01	1-Aug-2022	20.5	190	to bottom	Medium	0.20	0.80	Gravel	Sand	10	5	10		50	5		5	10	5
	107.3	MOR-AN-107.3-2022-08-01	1-Aug-2022	19.6	-	0.9	Medium	0.50	0.50	Cobble	Gravel	100									
	103.2	MOR-ES-103.2-2022-08-01	1-Aug-2022	21.1	190	0.8	Medium	0.80	2.00	Gravel	Silt		30							70	
	102.5	MOR-AN-102.5-2022-08-01	1-Aug-2022	19.7	-	0.9	Medium	0.5	0.9	Gravel	Sand	10		30					60		
	102.4	MOR-EF-102.4-2022-08-01	1-Aug-2022	21.5	190	0.8	Low	0.20	0.80	Gravel	Sand	20							80		
	101.4	MOR-ES-101.4-2022-08-01	1-Aug-2022	21.0	190	0.8	Medium	0.50	1.20	Cobble	Boulder	80	10		10						
	101.2	MOR-AN-101.2-2022-08-01	1-Aug-2022	19.5	-	0.9	Medium	0.40	0.80	Gravel	Sand	70							30		
	101	MOR-AN-101.0-2022-08-01	1-Aug-2022	19.0	-	0.9	Low	0.70	1.00	Gravel	Sand	50								50	
	100.4	MOR-AN-100.4-2022-08-01	1-Aug-2022	19.0	-	0.9	Medium	0.30	0.50	Gravel	Sand		10	10		60			20		
	100.4	MOR-EF-100.4-2022-08-01	1-Aug-2022	21.1	190	0.8	Medium	0.35	1.10	Gravel	Sand		10	15		75					
	90.4	MOR-AN-090.4-2022-08-02	2-Aug-2022	19.5	-	0.7	Low	0.30	0.50	Boulder	Cobble	80							20		
	87.8	MOR-AN-087.8-2022-08-02	2-Aug-2022	20.0	-	-	Low	0.25	0.60	Gravel	Sand	50							50		
	87.8	MOR-EF-087.8-2022-08-02	2-Aug-2022	17.6	670	to bottom	Low	0.10	0.15	Cobble	Gravel	50					50				
	87.6	MOR-EF-087.6-2022-08-02	2-Aug-2022	20.2	190	0.9	Medium	0.15	0.50	Gravel	Cobble	40	10	10		40					
	86.8	MOR-ES-086.8-2022-08-02	2-Aug-2022	20.2	190	0.7	Low	0.40	1.40	Cobble	Boulder	75				5				20	
	86.7	MOR-AN-086.7-2022-08-02	2-Aug-2022	20.0	-	0.9	Medium	0.30	0.50	Cobble	Gravel	60		15					20	5	
	86.3	MOR-AN-086.3-2022-08-02	2-Aug-2022	20.0	-	0.9	Low	0.40	1.00	Gravel	Cobble	60							30	10	
	86.3	MOR-EF-086.3-2022-08-02	2-Aug-2022	20.7	190	0.8	Medium	0.25	0.50	Gravel	Cobble	25				50			25		
	85.8	MOR-AN-085.8-2022-08-02	2-Aug-2022	20.0	-	0.9	Low	0.40	0.90	Gravel	Cobble	70							30		
	84.0	MOR-AN-084.0-2022-08-02	2-Aug-2022	20.0	-	0.9	Medium	0.40	0.90	Cobble	Gravel	70	5	5					20		
	83.1	MOR-ES-083.1-2022-08-02	2-Aug-2022	20.2	190	0.7	Low	0.70	2.00	Gravel	Silt	15	20			5			20	30	10
	79.9	MOR-EF-079.9-2022-08-02	2-Aug-2022	21.1	190	0.8	Low	0.30	0.50	Gravel	Cobble	60	10			30					
	72.5	MOR-ES-072.5-2022-08-03	3-Aug-2022	18.5	190	0.7	Medium	0.50	1.80	Cobble	Gravel	70				10				20	
	71.4	MOR-EF-071.4-2022-08-03	3-Aug-2022	18.4	200	0.8	Low	0.20	0.40	Cobble	Boulder	50				50					
	71.2	MOR-AN-071.2-2022-08-03	3-Aug-2022	18.5	-	0.9	Low	0.30	0.60	Gravel	Cobble	60							40		
	70.3	MOR-ES-070.3-2022-08-03	3-Aug-2022	19.2	190	0.7	Medium	0.60	1.00	Cobble	Boulder	85								15	
	69.9	MOR-AN-069.9-2022-08-03	3-Aug-2022	18.5	-	0.9	Medium	0.30	0.60	Boulder	Cobble	70							30		
	69.5	MOR-AN-069.5-2022-08-03	3-Aug-2022	18.5	-	0.9	Low	0.40	0.90	Cobble	Gravel	80							20		

…continued.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

Table C1 Continued.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)								
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Moberly River	68.9	MOR-AN-068.9-2022-08-03	3-Aug-2022	18.5	-	0.9	Low	0.30	0.70	Gravel	Cobble	70	30								
	67.8	MOR-AN-067.8-2022-08-03	3-Aug-2022	18.5	-	0.9	Low	0.45	0.70	Gravel	Cobble	90							10		
	67.5	MOR-ES-067.5-2022-08-03	3-Aug-2022	19.5	190	0.7	Medium	0.70	1.20	Cobble	Boulder	50							20	30	
	67.5	MOR-EF-067.5-2022-08-03	3-Aug-2022	19.4	200	0.8	Low	0.20	0.50	Cobble	Gravel	40	10	10		40					
	61.1	MOR-AN-061.1-2022-08-03	3-Aug-2022	20.0	-	0.9	Medium	0.40	1.40	Gravel	Gravel	70							30		
	57.7	MOR-ES-057.7-2022-08-03	3-Aug-2022	19.5	190	0.7	Medium	0.70	1.20	Silt	Cobble	80								20	
	57.5	MOR-EF-057.5-2022-08-03	3-Aug-2022	19.7	200	0.4	Low	0.20	0.60	Gravel	Cobble	60				10					30
	56.9	MOR-EF-056.9-2022-08-03	3-Aug-2022	19.7	200	0.4	-	0.15	0.50	Gravel	Sand	30	0			40			30		
	56.0	MOR-AN-056.0-2022-08-03	3-Aug-2022	18.0	-	0.9	Medium	0.50	1.30	Cobble	Boulder	70	10						20		
	56.0	MOR-ES-056.0-2022-08-03	3-Aug-2022	19.6	190	0.7	Medium	0.50	1.20	Cobble	Silt	50				10				40	
	54.3	MOR-ES-054.3-2022-08-03	3-Aug-2022	19.6	190	0.7	-	0.40	1.00	Cobble	Gravel	50							50		
	54.1	MOR-AN-054.1-2022-08-03	3-Aug-2022	18.5	-	0.9	Medium	0.35	0.70	Gravel	Sand	80							20		
	51.0	MOR-ES-051.0-2022-08-04	4-Aug-2022	17.4	200	0.7	Low	0.60	1.50	Cobble	Silt	20							10	70	
	50.4	MOR-AN-050.4-2022-08-04	4-Aug-2022	17.0	-	0.9	Medium	0.30	0.60	Gravel	Sand	70		10					20		
	50.0	MOR-EF-050.0-2022-08-04	4-Aug-2022	17.4	200	0.5	Low	0.40	0.90	Gravel	Cobble	25	5	10		25			10		25
	49.4	MOR-AN-049.4-2022-08-04	4-Aug-2022	17.0	-	0.9	Medium	0.40	0.70	Cobble	Gravel	70	5	5					20		
	49.3	MOR-ES-049.3-2022-08-04	4-Aug-2022	17.5	200	0.7	Medium	0.60	1.50	Cobble	Boulder	80	10							10	
	48.9	MOR-EF-048.9-2022-08-04	4-Aug-2022	17.3	210	0.6	Low	0.20	0.60	Cobble	Gravel	50				50					
	48.6	MOR-AN-048.6-2022-08-04	4-Aug-2022	17.0	-	0.7	Medium	0.40	0.80	Cobble	Gravel	70	5	10					15		
	48.0	MOR-AN-048.0-2022-08-04	4-Aug-2022	17.0	-	0.9	Medium	0.30	0.60	Cobble	Gravel	80	5	5					10		
	48.0	MOR-ES-048.0-2022-08-04	4-Aug-2022	18.4	200	0.7	Medium	0.60	1.10	Cobble	Gravel	75	10							15	
	46.6	MOR-ES-046.6-2022-08-04	4-Aug-2022	18.5	200	0.7	Medium	0.50	1.50	Cobble	Gravel	45				5			20	30	
	46.4	MOR-AN-046.4-2022-08-04	4-Aug-2022	17.0	-	0.7	Medium	0.30	0.60	Gravel	Sand	70		5					25		
	45.9	MOR-EF-045.9-2022-08-04	4-Aug-2022	17.8	210	0.6	-	0.20	0.60	Cobble	Boulder	50				50					
	45.8	MOR-AN-045.8-2022-08-04	4-Aug-2022	17.0	-	0.9	Medium	0.30	0.60	Cobble	Gravel	60	5	10					25		
	45.2	MOR-ES-045.2-2022-08-04	4-Aug-2022	18.5	200	0.7	Medium	0.50	1.00	Cobble	Gravel	50				10			30	10	
	45.1	MOR-AN-045.1-2022-08-04	4-Aug-2022	18.0	-	0.7	Medium	0.30	0.50	Cobble	Gravel	70	5						25		
	44.6	MOR-EF-044.6-2022-08-04	4-Aug-2022	18.2	210	0.6	-	0.25	0.40	Cobble	Gravel	30			20	30	10			10	
	43.7	MOR-ES-043.7-2022-08-04	4-Aug-2022	18.5	200	0.7	-	0.50	1.00	Cobble	Gravel	50				10			20	20	
	43.0	MOR-AN-043.0-2022-08-04	4-Aug-2022	18.0	-	0.7	Low	0.60	1.70	Gravel	Cobble	50								50	
	42.8	MOR-ES-042.8-2022-07-25	25-Jul-2022	21.7	190	1.0	Medium	0.50		Gravel	Boulder	50			20		10				20
	42.7	MOR-EF-042.7-2022-07-25	25-Jul-2022	21.3	200	to bottom	Low	0.40	0.80	Cobble	Gravel	10		20	15	10	15		25		5
	42.3	MOR-ES-042.3-2022-07-25	25-Jul-2022	21.5	190	1.0	Medium	0.50	1.80	Cobble	Gravel	80								20	
	42.0	MOR-AN-042.0-2022-07-25	25-Jul-2022	-	-	0.3	Low	0.20	0.70	Cobble	Gravel	40	10								50
	41.8	MOR-AN-041.8-2022-07-25	25-Jul-2022	-	-	0.3	Low	0.30	0.80	Gravel	Cobble	37	3						30		30
	41.5	MOR-AN-041.5-2022-07-25	25-Jul-2022	21.7	-	0.3	Low	0.30	0.60	Cobble	Gravel	20	5	5		10			30		30
	41.5	MOR-ES-041.5-2022-07-25	25-Jul-2022	21.5	190	1.0	Medium	0.60	2.10	Cobble	Boulder	60	10							30	
	41.4	MOR-EF-041.4-2022-07-25	25-Jul-2022	22.9	200	0.5	Low	0.35	0.80	Cobble	Gravel	30	20			10			20	20	

…continued.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

Table C1 Continued.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)								
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Moberly River	40.9	MOR-AN-040.9-2022-07-25	25-Jul-2022	21.5	-	0.3	Low	0.35	0.70	Cobble	Gravel	70								30
	40.8	MOR-AN-040.8-2022-07-25	25-Jul-2022	21.5	-	0.3	Medium	0.25	0.50	Cobble	Gravel	50							30	20
	40.7	MOR-ES-040.7-2022-07-25	25-Jul-2022	21.5	190	1.0	Medium	0.50	2.00	Cobble	Gravel	50	20							30	
	40.0	MOR-AN-040.0-2022-07-25	25-Jul-2022	21.5	-	0.3	Low	0.30	0.80	Cobble	Gravel	40							30		30
	38.7	MOR-AN-038.7-2022-07-26	26-Jul-2022	19.5	210	-	Medium	0.30	0.75	Cobble	Gravel	30	10	30							30
	38.7	MOR-EF-038.7-2022-07-26	26-Jul-2022	17.8	230	0.5	Low	0.20	1.20	Cobble	-	40	20	10		20			10		
	38.5	MOR-ES-038.8-2022-07-26	26-Jul-2022	19.5	190	1.0	Medium	0.60	2.00	Cobble	Gravel	60	20							20	
	38.5	MOR-EF-038.5-2022-07-26	26-Jul-2022	11.5	370	to bottom	Low	0.10	0.40	Gravel	Gravel	10	10			10			70		
	38.0	MOR-AN-038.0-2022-07-26	26-Jul-2022	19.0	210	0.3	Medium	0.35	0.50	Cobble	Gravel	40	5	30					15		10
	38.0	MOR-EF-038.0-2022-07-26	26-Jul-2022	10.9	300	to bottom	Low	0.15	0.70	Organics	Gravel	10	23	23	10			10	24		
	37.9	MOR-AN-037.9-2022-07-26	26-Jul-2022	19.0	210	0.4	Low	0.35	0.90	Cobble	Gravel	40				10			20	10	20
	37.9	MOR-ES-037.9-2022-07-26	26-Jul-2022	19.5	190	1.0	Medium	1.00	2.00	Cobble	Gravel	10	40		10					40	
	37.7	MOR-EF-037.7-2022-07-26	26-Jul-2022	13.1	370	to bottom	Low	0.20	0.70	Silt	Cobble	10	5	5	10	10	5		55		
	37.5	MOR-AN-037.5-2022-07-26	26-Jul-2022	19.5	210	0.4	Medium	0.25	0.90	Cobble	Gravel	50	5	20					10		15
	37.1	MOR-EF-037.1-2022-07-26	26-Jul-2022	11.6	370	>2.0	Low	0.30	1.00	Silt	Cobble		20	10	10				30	30	
	37.0	MOR-AN-037.0-2022-07-26	26-Jul-2022	19.0	210	0.5	Low	0.30	0.45	sand	Gravel					10			30	30	30
	37.0	MOR-ES-037.0-2022-07-26	26-Jul-2022	19.5	210	1.0	Medium	0.60	1.00	Cobble	Gravel	20	30		30					20	
	36.9	MOR-AN-036.9-2022-07-26	26-Jul-2022	20.0	210	0.4	Low	0.35	0.90	Cobble	Gravel	20	10	10				10		30	20
	36.6	MOR-EF-036.6-2022-07-26	26-Jul-2022	22.3	210	0.4	Low	0.10	0.40	Cobble	Gravel	30	5	15	20	5	5				20
	36.5	MOR-AN-036.5-2022-07-26	26-Jul-2022	21.5	210	0.4	Medium	0.40	1.00	Cobble	Gravel	50	5	50					30		10
	36.4	MOR-EF-036.4-2022-07-26	26-Jul-2022	8.2	440	0.4	Low	0.10	0.80	sand	Gravel		30						50		20
	36.3	MOR-AN-036.3-2022-07-26	26-Jul-2022	21.5	210	0.4	Low	0.25	0.50	Cobble	Gravel	70	30								
	36.2	MOR-AN-036.2-2022-07-26	26-Jul-2022	20.0	210	0.4	Low	0.45	1.40	Gravel	Cobble		70							30	
	36.1	MOR-ES-036.1-2022-07-27	27-Jul-2022	20.8	210	0.7	Medium	0.70	1.80	Cobble	Boulder	70								30	
	36	MOR-AN-036.0-2022-07-26	26-Jul-2022	19.5	210	0.3	Medium	0.30	1.90	Cobble	Gravel	60		15					10	5	10
	36	MOR-EF-036.0-2022-07-27	27-Jul-2022	15.2	340	>1.0	Low	0.20	0.80	Gravel	Cobble	25		25	10	5	5	10	20		
	35.9	MOR-EF-035.9-2022-07-27	27-Jul-2022	21.5	220	0.4	Medium	0.20	1.20	Cobble	Gravel	50	10	5	5	15			15		
	35.4	MOR-ES-035.4-2022-07-27	27-Jul-2022	20.8	210	0.7	Medium	0.60	1.40	Boulder	Cobble	60				20				20	
	34.5	MOR-AN-034.5-2022-07-27	27-Jul-2022	20.0	-	0.3	Medium	0.20	0.35	Cobble	Gravel	40		10					40		10
	34.1	MOR-AN-034.1-2022-07-27	27-Jul-2022	20.5	-	0.3	Low	0.25	0.40	Cobble	Gravel	100									
	34	MOR-ES-034.0-2022-07-27	27-Jul-2022	20.8	210	0.7	Medium	0.80	2.00	Boulder	Cobble	60				10				10	20
	33.6	MOR-AN-033.6-2022-07-27	27-Jul-2022	21.0	-	0.3	Medium	0.60	1.60	Gravel	Sand		40			30				30	
	33.1	MOR-AN-033.1-2022-07-27	27-Jul-2022	21.0	-	0.3	Medium	0.25	0.40	Cobble	Gravel	70							30		
	32.1	MOR-ES-032.1-2022-07-27	27-Jul-2022	22.9	210	0.8	Medium	0.60	2.00	Boulder	Cobble	60								30	10
	32.1	MOR-EF-032.1-2022-07-27	27-Jul-2022	22.4	220	0.4	Medium	0.30	0.70	Cobble	Gravel	70			5	25					
	32	MOR-ES-032.0-2022-07-27	27-Jul-2022	23.9	210	0.8	Medium	0.60	1.50	Cobble	Boulder	70				20				10	
	31.5	MOR-AN-031.5-2022-07-27	27-Jul-2022	23.0	-	0.7	Low	0.40	0.90	Cobble	Gravel	65	5						30		
	31.0	MOR-AN-031.0-2022-07-27	27-Jul-2022	23.0	-	0.7	Medium	0.40	0.95	Cobble	Gravel	70		5					20	5	
	31	MOR-ES-031.0-2022-07-27	27-Jul-2022	23.9	210	0.8	Medium	0.80	1.50	Cobble	Boulder	80								20	
	29.9	MOR-ES-029.9-2022-07-27	27-Jul-2022	23.9	210	0.8	-	0.60	1.50	Cobble	Gravel	60								40	

…continued.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

Table C1 Concluded.

River	River Km	Site Name	Sample Date	Water Temp. (°C)	Water Cond. (µS/cm)	Secchi Depth (m)	Instream Velocity[a]	Mean Water Depth (m)	Maximum Water Depth (m)	Substrate		Cover Type - Percent of Available Cover (%)								
										Dominant	Sub-dominant	Interstices	Large Woody Debris	Small Woody Debris	Cutbank	Turbulence	Terrestrial Vegetation	Aquatic Vegetation	Shallow Water	Deep Water	Turbid Water
Moberly River	28.9	MOR-AN-028.9-2022-07-27	27-Jul-2022	23.0	-	0.7	Low	0.5	1.3	Cobble	Gravel		30							30	40
	28.9	MOR-EF-028.9-2022-07-27	27-Jul-2022	24.2	220	0.4	Low	0.30	1.20	Cobble	Gravel	20	20			20			20		20
	28.8	MOR-AN-028.8-2022-07-27	27-Jul-2022	-	-	-	Medium	0.80	1.80	Cobble	Gravel	40	10	20					15	5	10
	28.3	MOR-ES-028.3-2022-07-27	27-Jul-2022	24.1	220	0.8	Medium	0.70	1.60	Boulder	Cobble	40								60	
	27.7	MOR-AN-027.7-2022-07-27	27-Jul-2022	24.0	-	-	-	0.30	0.50	Gravel	Cobble	100									
	27.7	MOR-ES-027.7-2022-07-27	27-Jul-2022	24.4	210	0.8	Medium	0.70	1.60	Cobble	Boulder	60				10				30	
	24.8	MOR-EF-024.8-2022-07-28	28-Jul-2022	21.2	350	0.5	Low	0.20	0.80	Silt	Gravel	10		10		10			70		
	24.6	MOR-ES-024.6-2022-07-28	28-Jul-2022	20.6	210	0.8	Medium	0.60	1.30	Cobble	Boulder	80								20	
	24.4	MOR-AN-024.4-2022-07-28	28-Jul-2022	20.0	-	0.3	Medium	0.40	0.70	Cobble	Gravel	70		5					25		
	23.6	MOR-AN-023.6-2022-07-28	28-Jul-2022	20.0	-	0.3	Low	0.30	1.40	Cobble	Gravel	70		5					25		
	23.3	MOR-EF-023.3-2022-07-28	28-Jul-2022	21.6	220	0.5	Low	0.10	0.60	Gravel	Cobble	20	20	20	10		20				10
	23.1	MOR-ES-023.1-2022-07-28	28-Jul-2022	22.5	210	0.8	Medium	0.60	1.80	Cobble	Gravel	40	30							30	
	23.0	MOR-AN-023.0-2022-07-28	28-Jul-2022	21.0	-	0.3	Medium	0.30	1.50	Cobble	Gravel	50	15	15					10	10	
	22.8	MOR-AN-022.8-2022-07-28	28-Jul-2022	21.0	-	0.7	-	0.45	1.50	Cobble	Gravel	50	20	10						30	
	22.5	MOR-ES-022.5-2022-07-28	28-Jul-2022	22.5	210	0.8	Medium	0.70	1.50	Cobble	Gravel	30	30				10			30	
	22.0	MOR-AN-022.0-2022-07-28	28-Jul-2022	23.0	-	0.7	Low	0.30	0.70	Cobble	Gravel	60	30	10							
	20.9	MOR-EF-020.9-2022-07-28	28-Jul-2022	23.7	220	to bottom	Low	0.15	0.60	Cobble	Gravel	40	5	15	5				20	15	
	19.5	MOR-AN-019.5-2022-07-28	28-Jul-2022	23.0	-	0.7	Low	0.50	1.50	Gravel	Cobble	50	5	5		10					30
	17.1	MOR-ES-017.1-2022-07-28	28-Jul-2022	25.5	220	0.8	Medium	0.60	0.80	Cobble	Gravel	45	50							5	
	16.4	MOR-AN-016.4-2022-07-28	28-Jul-2022	25.0	-	0.3	Medium	0.60	1.70	Cobble	Gravel	50	10	5					25	10	
	16.3	MOR-EF-016.3-2022-07-28	28-Jul-2022	25.3	230	0.3	Low	0.10	0.45	Gravel	Cobble	20			10				70		
	15.5	MOR-AN-015.5-2022-07-29	29-Jul-2022	20.5	-	0.7	Medium	0.30	0.50	Cobble	Gravel	45	15	15					20	5	
	14.9	MOR-ES-014.9-2022-07-29	29-Jul-2022	21.5	220	0.8	Medium	0.60	0.80	Cobble	Gravel	70	10				10			10	
	14.7	MOR-EF-014.7-2022-07-29	29-Jul-2022	21.7	240	0.3	Low	0.40	1.00	Gravel	Cobble	10		5	10	20	5			10	40
	14.2	MOR-AN-014.2-2022-07-29	29-Jul-2022	20.5	-	0.7	Medium	0.40	0.80	Cobble	Gravel	70		10					20		
	13.7	MOR-EF-013.7-2022-07-29	29-Jul-2022	24.0	230	0.4	Low	0.35	1.20	Gravel	Cobble	30	20		10	20					20
	13.5	MOR-ES-013.5-2022-07-29	29-Jul-2022	22.3	220	0.8	Medium	0.60		Boulder	Cobble	70	10							20	
	13.4	MOR-AN-013.4-2022-07-29	29-Jul-2022	22.0	-	0.7	Low	0.40	0.90	Gravel	Cobble	70							30		
	13.4	MOR-ES-013.4-2022-07-29	29-Jul-2022	22.9	210	0.8	Medium	0.60	1.60	Boulder	Cobble	70	10							20	
	12.6	MOR-ES-012.6-2022-07-29	29-Jul-2022	23.3	220	0.8	Medium	0.70	1.50	Cobble	Gravel	85	5			10					
	11.9	MOR-AN-011.9-2022-07-29	29-Jul-2022	22.0	-	0.7	Low	0.40	0.70	Cobble	Gravel	70							30		
	11.9	MOR-ES-011.9-2022-07-29	29-Jul-2022	24.5	220	0.7	Medium	0.60	1.60	Boulder	Cobble	70	5			10				15	
	11.5	MOR-AN-011.5-2022-07-29	29-Jul-2022	22.0	-	0.7	Low	0.35	0.60	Boulder	Cobble	70				30					
	10.8	MOR-AN-010.8-2022-07-29	29-Jul-2022	23.0	-	0.7	Low			Cobble	Gravel	60	10	10					10	10	
	10.7	MOR-AN-010.7-2022-07-29	29-Jul-2022	23.0	-	0.7	Medium	0.50	1.20	Cobble	Gravel	50	15	10					15	10	
	9.9	MOR-EF-009.9-2022-07-29	29-Jul-2022	24.6	230	0.2	Medium	0.20	1.10	Cobble	Gravel	45	10			45					
	9.8	MOR-ES-009.8-2022-07-29	29-Jul-2022	25.2	220	0.7	Medium	0.60	1.50	Cobble	Boulder	90	10								
	8.7	MOR-AN-008.7-2022-07-29	29-Jul-2022	23.0	-	0.7	Low	0.50	1.00	Cobble	Sand	75	5							10	10
	6.2	MOR-EF-006.2-2022-07-29	29-Jul-2022	25.4	230	0.2	Low	0.15	0.90	Cobble	Gravel	50	10			30				10	
	5.8	MOR-ES-005.8-2022-07-29	29-Jul-2022	25.6	220	0.4	Medium	0.60	2.00	Gravel	Cobble	30	10							10	50

…concluded.

[a] A categorical ranking of water velocity (high = greater than 1.0 m/s; medium = 0.5 to 1.0 m/s; low = less than 0.5 m/s

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