



ELK RIVER ALLIANCE

COMMUNITY-BASED WATER MONITORING

2023 CABIN REPORT

2023

PREPARED BY:

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The Real Estate Foundation of British Columbia

The ERA Community



Land Acknowledgment

The Elk River Alliance recognizes that our work takes place on the traditional land and waters of Yaql t?a·k nuq+i 'it '?akanuxunik' ?amak?is the People from where the water comes out, within Qukin ?amak?is - the Land of the Raven in the Ktunaxa language.



Executive Summary

The Elk River Alliance's (ERA) Community-based Monitoring program (CBWM) was established in 2012 as a response to rising community concern over the health of the Elk River Watershed. The primary purpose of the program is to fill in gaps in currently available watershed data, and to make these data accessible to the wider community. In 2020, ERA's CBWM program transitioned into a fully CABIN (Canadian Aquatic Biomonitoring Network) based program, adopting these nationally recognized protocols to assess 10 sites across 5 tributaries of the Elk River, all affected by different types of land-use and development.

The Elk Valley has a long history of resource development following European arrival more than 100 years ago. At the time of reporting, the Elk Valley is home to 4 active metallurgical coal mines, with two additional mines and a mine extension either currently submitted or pending submission for regulatory review. Following a long period of moderate timber extraction over the past century, the valley is experiencing a rapid increase in the rate and volume of clearcut timber harvesting by a private logging operation. Growing population and expanding urban centers and linear development such as road, rail, power, and natural gas also have their impacts on the Elk River and its tributaries. As government and industry water monitoring programs focus on the effects of mining operations, the Elk River Alliance's CABIN program focuses on streams impacted by other land uses, which are not directly affected by current mining operations.

Analysis of 2023 sampling data indicated that sites on Boivin Creek (BOI001, BOI002) are in similar condition to their associated reference sites, based on their benthic macroinvertebrate communities, meaning that these streams likely contain healthy aquatic habitats. Conversely, sites on lower Coal Creek (COL001), lower Morrissey Creek (MOR001), and both Lizard Creek locations (LIZ001, LIZ003) remained deviated significantly from "reference condition" indicating potentially degraded aquatic systems. Although there has been some fluctuation in the upper Coal Creek site, 2023 sampling indicated that the upper Coal Creek (COL003) and upper Morrissey Creek (MOR002) sites were both "mildly divergent" from "reference condition". As of 2023, both sites on Alexander Creek (ALX001, ALX003) have been newly assessed as "mildly divergent" and may be moving away from "reference condition". Initial investigations have not identified a clear cause for these shifts. Further in-depth research is needed to determine the accuracy of these results and potential stressors affecting these tributaries.



Table of Contents

Contents

Land Acknowledgment	1
Executive Summary	2
List of Figures	5
List of Tables	6
Acknowledgements - 2023	7
Introduction	9
The Elk River Alliance	9
Advisor Credentials	9
Staff and Volunteer Credentials	9
Canadian Aquatic Biomonitoring Network (CABIN)	10
Study Area	10
Lizard Creek	15
Alexander Creek	16
Boivin Creek	17
Coal Creek	18
Morrissey Creek	19
Background Information	20
CABIN	20
Habitat Variables	20
Physical Properties of Water	21
Water Chemistry	23
Benthic Invertebrates	25
STREAM e-DNA	26
Methods	26
Site Selection	26
Aquatic Habitat Assessment	26
Laboratory Analysis	27
Water Chemistry	27
Benthic Invertebrate Taxonomy	27
Data Analysis	27
Results & Discussion	29
Lizard Creek	30



Alexander Creek	37
Boivin Creek	38
Coal Creek	40
Morrissey Creek	42
Benthic Macroinvertebrate Communities	43
Water Quality Trends	47
Study Limitations	55
Conclusion & Recommended Actions	56
Literature Cited	58
Appendix A: CABIN Reports	61
Appendix B: Raw CABIN Datasheets	62
Appendix C: CARO Reports	63
Appendix D: Benthic Macroinvertebrate Taxonomy Report	64
Appendix E: Stream Report	65



List of Figures

Figure 1. Elk River watershed (British Columbia) and CABIN site locations. ERA sites are chosen based on	
community input and focus largely on non-mine-affected tributaries. 2023 study locations include Boivin Creek,	
Alexander Creek, Lizard Creek, Coal Creek and Morrissey Creek.	11
Figure 2. Close-up of Lizard Creek (LIZ001, LIZ003), Coal Creek (COL001, COL003) and Morrissey Creek (MOR001,	
MOR002), the southern-most study sites in the CABIN program.	12
Figure 3. Alexander Creek site locations (ALX001, ALX003), just East of Sparwood, BC.	13
Figure 4. CABIN sites (BOI001, BOI002) on Boivin Creek in Elkford.	14
Figure 5. Images of LIZ001: upstream across the stream and downstream. The major flooding event in November	•
2021 left sections of Lizard Creek scoured down to the clay bed. Exposed clay sections were first noticed in	
streambed in 2022 and continue to be present along the side of the left bank. Clay sections are larger in 2023.	15
Figure 6. Images of LIZ003: upstream, across the stream and downstream.	15
Figure 7. Images of ALX001: upstream, across the stream and downstream.	16
Figure 8. Images of ALX003: upstream, across the stream and downstream.	16
Figure 9. BOI001: upstream, across the stream and downstream.	17
Figure 10. BOI002: upstream, across the stream and downstream.	17
Figure 11. COL001: upstream, across the stream and downstream.	18
Figure 12. COL003: upstream, across the stream and downstream.	18
Figure 13. MOR001: upstream, across the stream and downstream.	19
Figure 14. MOR002: upstream, across the stream and downstream.	19
Figure 15. ERA Infographic outlining the importance of temperature to aquatic systems.	21
Figure 16. ERA CABIN infographic explaining turbidity and its importance.	22
Figure 17. ERA infographic on chemical parameters associated with the CABIN program.	23
Figure 18. ERA infographic outlining the biological parameters associated with the CABIN program.	24
Figure 19. CABIN analysis results for Lizard Creek sites from 2012 – 2023 using the Columbia 2020 CABIN model.	30
Figure 20. Plot of benthic macroinvertebrate community composition based on taxonomic order of samples	
collected at LIZ001 during CABIN sampling over time. The cool colours (blues, greens) represent orders that are	
generally sensitive to pollution (Ephemeroptera, Plecoptera, Tricoptera), while the orders in warm colours (yellow	w,
orange, red) are more tolerant to pollutants. The numbers along the top of the graph are the raw individual coun	
of all benthic macroinvertebrates found at this site in each year.	32
Figure 21. Land use in the Lizard Creek Catchment as of 2023.	33
Figure 22. Total hardness (as CaCO3), total calcium and total magnesium in samples at ERA CABIN sites between	
2012 and 2023. Note that Lizard Creek sites have levels higher than the other monitored sites. All these	
parameters are likely a reflection of the limestone-based geology in the region and an increased groundwater	
	35
Figure 23. Total phosphorus (as P) and total sulfate at ERA CABIN sites between 2012 and 2023. Lizard Creek	
consistently has higher values within these parameters across years. Phosphorus levels below detection were	
	36
Figure 24. Total alkalinity (as CaCO3) over time. The plot on the left focuses on the Lizard Creek sites, while the	
graph on the right allows for comparison across sites. Although alkalinity is usually a result of the local geology,	
	36
Figure 25. CABIN community ellipses for LIZ001 and LIZ003, respectively, in 2023. Note that in the LIZ001 diagram	n,
the site is divergent to the point where the ellipses is the green dot in the bottom right of the diagram, while the	
point representing LIZ001 is to the top left, partially covered by the diagram's legend.	37
Figure 26. CABIN analysis results for Alexander Creek sites from 2012 - 2023. Both sites experienced a decline in	
condition, going from reference condition to mildly divergent in 2023. Continued monitoring will allow ERA to	
	38
Figure 27. CABIN community ellipses for Alexander Creek sites (ALX001 & ALX003) in 2023, showing both sites ha	
	38



Figure 28. CABIN results for Boivin Creek sites in 2019 - 2023. The upstream (BOI002) site has remained in a sim	ilar
state to reference condition, while the downstream site (BOI001) has experienced some fluctuation in state.	
Continued monitoring will allow for ERA to assess any developing patterns.	39
Figure 29. CABIN community ellipses for Boivin Creek sites (BOI001, BOI002) in 2023, showing both sites to be	
"similar to reference".	40
Figure 30. CABIN results for Coal Creek sites in 2019 – 2023.	41
Figure 31. 2023 CABIN analysis community ellipses for Coal Creek sites, showing COL001 highly divergent from	
reference condition (left) and COL003 mildly divergent from reference condition (right).	41
Figure 32. Results of CABIN assessment for Morrissey Creek sites in 2020-2023. This year, MOR001 was again	
classified as "highly divergent" while MOR002 was again classified as "mildly divergent."	43
Figure 33. 2023 CABIN analysis community ellipses for the Morrissey Creek sites, showing MOR001 significantly	
diverging from reference condition (left) and MOR002 beginning to diverge from reference condition (right).	43
Figure 34. Graph representing the proportions of different taxonomic orders of benthic macroinvertebrates at	
each CABIN site. The three cool-coloured bars (greens, blues) represent pollution-sensitive taxa (Ephemeropters	
Plecoptera, Trichoptera), while the warm-coloured bars (red, orange, yellow) represent more pollution-tolerant	
taxa. Higher % EPT is generally considered to equate to healthier streams. The numbers along the top of the gra	aph
are the raw counts of all benthic macroinvertebrate individuals found at each site.	44
Figure 35. pH values for CABIN sites from 2012-2023. All sites remain within the range of limits outlined within t	:he
BC Water Quality Guidelines.	47
Figure 36. September water temperature values for CABIN sites from 2012-2023.	48
Figure 37. The amount of dissolved oxygen at CABIN sites in mg/L from 2012-2023. Site values do not fall below	
BC water Quality Long-term Guideline minimum for Freshwater Aquatic Life (8 mg/L).	49
Figure 38. The turbidity (NTU) measured at CABIN sites from 2014-2023.	50
Figure 39. Conductivity levels measured at CABIN sites from 2012-2023.	51
Figure 40. Discharge measurements calculated for CABIN sites from 2012- 2023.	52
Figure 41. Total selenium concentrations at CABIN sites from 2012 to 2023. All concentrations are well below the	ıe
BC water quality guideline of 0.002 mg/L (2μg/L).	54
Figure 42. Total selenium in the Elk River mainstem at the outflow to Lake Koocanusa. Approximate concentrati	
at CABIN tributaries are included to the right and coincides with Elk River concentrations in the 1990s.	54

List of Tables

Table 1. A comparison of CABIN sites, their classification according to 2023 CABIN assessments, and additional	
statistical measures that address the classification – RIVPACS, Bray-Curtis dissimilarity, and the percent EPT	
(Ephemeroptera, Plecoptera, Trichoptera). Highlighted cells indicate values that differ from what is expected for	a
reference site in good condition.	45
Table 2. Outline of the potential limitations of ERA's Community-based Water Monitoring program	55



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The **Province of BC** provides \$140 million annually through the BC Community Gaming Grant to not-for-profit organizations throughout B.C., to support their delivery of ongoing programs and services that meet the needs of their communities.

https://strongerbc.gov.bc.ca

The **Columbia Basin Trust** supports projects that benefit the broad community and public good through community-based decision-making and ensuring an opportunity for resident input on projects through Resident Directed Grants (Regional District of East Kootenay). These grants are funded by the Trust and delivered in partnership with local governments and First Nations in the Basin.

https://ourtrust.org/

The **Real Estate Foundation of BC** is a philanthropic organization that works to advance sustainable land use and real estate practices in British Columbia. Since 1988, the REFBC has granted more than \$90 million for research, education, and policy projects that strengthen BC communities and protect our land and water.

https://refbc.com



Introduction

The Elk River Alliance

Operating since 2010, the Elk River Alliance (ERA) is a community-based water charity that connects people to the Elk River using science, education and community collaboration to ensure sustainable stewardship of the Elk River watershed. ERA aims to improve and preserve watershed health through projects that raise watershed literacy, inform sustainable water decision-making, collect scientific data to prioritize restoration opportunities, and promote safe and sustainable river recreation. ERA is a registered charity that is governed by a volunteer board consisting of board members from various backgrounds.

ERA has four guiding principles: (1) Stimulate conversation, share information, and facilitate community input to encourage sustainable water decision-making in the Elk Valley; (2) Promote a new era in watershed thinking by coordinating a community voice to contribute to watershed planning and management activities, regulatory processes, and other regional water initiatives; (3) Bring together diverse points of view and offer a safe place to dialogue about the Elk River, and; (4) Unite, not divide.

Advisor Credentials

Stella Swanson, Ph.D. Limnology (ERA Director)

Stella is an aquatic biologist whose 45 year-career has included management of the Aquatic Biology Group at the Saskatchewan Research Council and consulting with SENTAR Consultants and Golder Associates, Ltd. She has owned and operated Swanson Environmental Strategies since 2007, where she focuses on environmental risk management, Indigenous and community engagement, and cumulative effects. Stella has contributed to dozens of environmental impact assessments, ecological risk assessments and human health risk assessments. She provides strategic advice regarding the regulatory requirements for resource development projects and facilitates multidisciplinary teams working on a wide range of environmental issues. She led the development of a new generation of monitoring design approaches for Terrestrial Biological Monitoring, focused on monitoring for cumulative effects within the Oil Sands Monitoring Program and served on the Nuclear Waste Management Advisory Council from 2020-2024 to provide advice on siting a high-level nuclear waste facility in Canada. More locally, she led the original development of the Elk Valley Cumulative Effects Management Framework and was the chair of the Strategic Advisory Panel for Selenium Management. Stella is currently a member of the International Joint Commission Elk-Kootenaily Study Board, which is tasked with conducting transparent and coordinated transboundary data and knowledge sharing; synthesizing and analysing data and information to support a common understanding of pollution within the Kootenai/y watershed and the impacts of that pollution on people and species; and, reporting results and making recommendations in a transparent and publicly available format.

Staff and Volunteer Credentials

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Staff were trained and received CABIN Field Technician (Chris Bush) and Project Manager level certification (Kaileigh McCallum), through the Canadian Rivers Institute and Living Lakes Canada (LLC). LLC also provided training on the STREAM e-DNA program.

Canadian Aquatic Biomonitoring Network (CABIN)

The Elk River Alliance's Canadian Aquatic Biomonitoring Network (CABIN) program collects baseline data on aquatic habitat health to inform community water literacy in the Elk River Watershed, located in the East Kootenay Region of the Province. The program was created to fill gaps in watershed data, with findings creating an opportunity for community and industry discussion on watershed health and providing contextual information to decision makers. Trained staff and volunteers conduct monitoring and research on targeted Elk River tributaries and share relevant findings with the community.

The Elk Valley's long-standing relationship with coal mining has resulted in the formation of extensive government and industry water monitoring programs covering a large extent of mine-affected areas. However, aquatic health of non-mine-affected tributaries is not monitored despite impacts from other forms of land use. The Elk River Alliance's Community Based Water Monitoring program began monitoring the effects of land use on non-mine-affected Elk River tributaries to allow for a more well-rounded assessment of the state of the watershed. This program has expanded to now include five Elk River tributaries.

Study Area

ERA's CABIN program is located in the Elk River watershed, within the East Kootenay region of British Columbia (Figure 1). This watershed begins at the Elk Lakes near the Continental Divide and extends to Lake Koocanusa, which continues across the Canada-US border. The communities of Elkford, Sparwood, Hosmer, Fernie and Elko are located along the river as well as rural properties in the Regional District of East Kootenay.

In 2023, the CABIN program assessed ten sites across five major tributaries – Lizard Creek, Alexander Creek, Coal Creek, Boivin Creek and Morrissey Creek (Figure 1). These sites were chosen as they are areas of community interest and/or contain good aquatic habitat that ERA identified as important to monitor, preserve, or restore. Other CABIN sites implemented by environmental consultant companies, industry and government bodies also exist in the Elk River Watershed but are focused on monitoring mine-impacted tributaries of the Elk River.



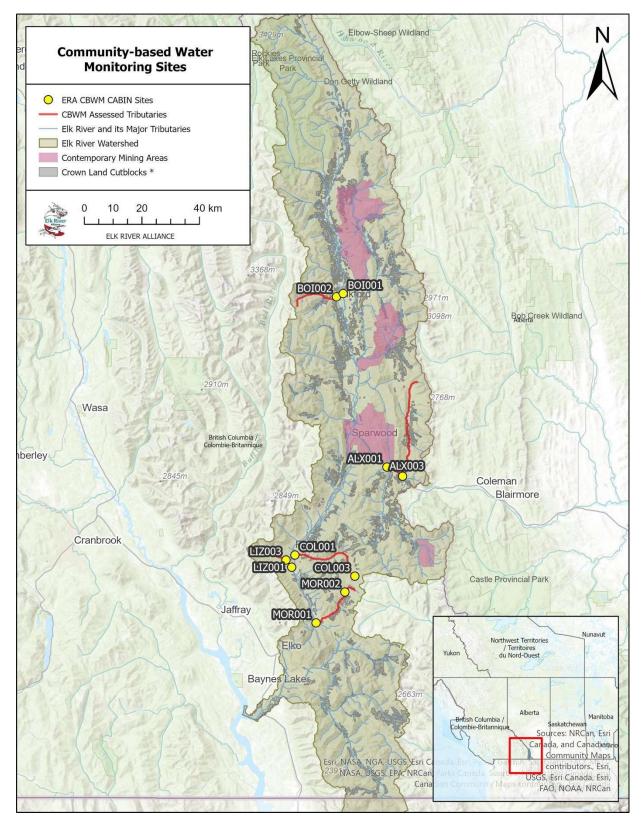


Figure 1. Elk River watershed (British Columbia) and CABIN site locations. ERA sites are chosen based on community input and focus largely on non-mine-affected tributaries. 2023 study locations include Boivin Creek, Alexander Creek, Lizard Creek, Coal Creek and Morrissey Creek.



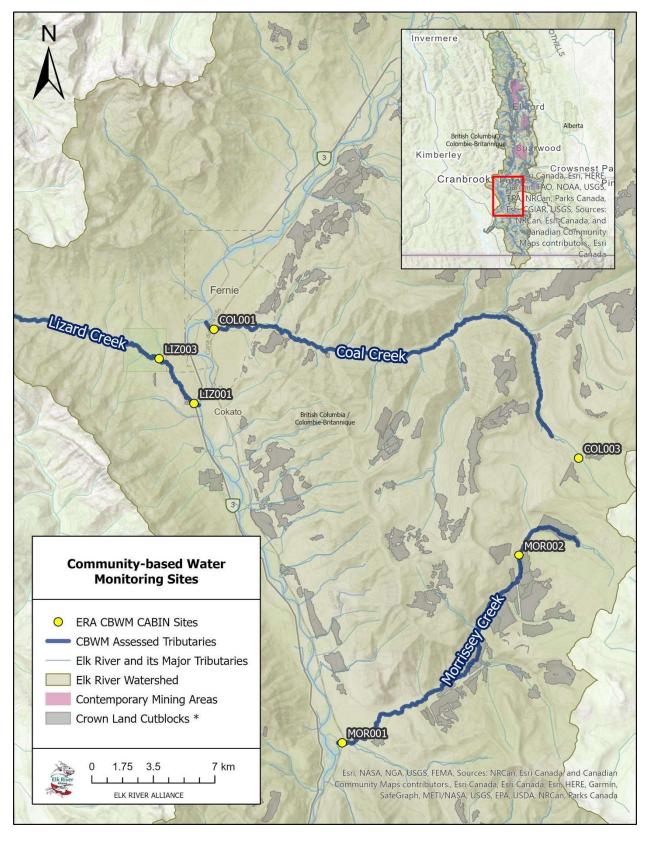


Figure 2. Close-up of Lizard Creek (LIZ001, LIZ003), Coal Creek (COL001, COL003) and Morrissey Creek (MOR001, MOR002), the southern-most study sites in the CABIN program.



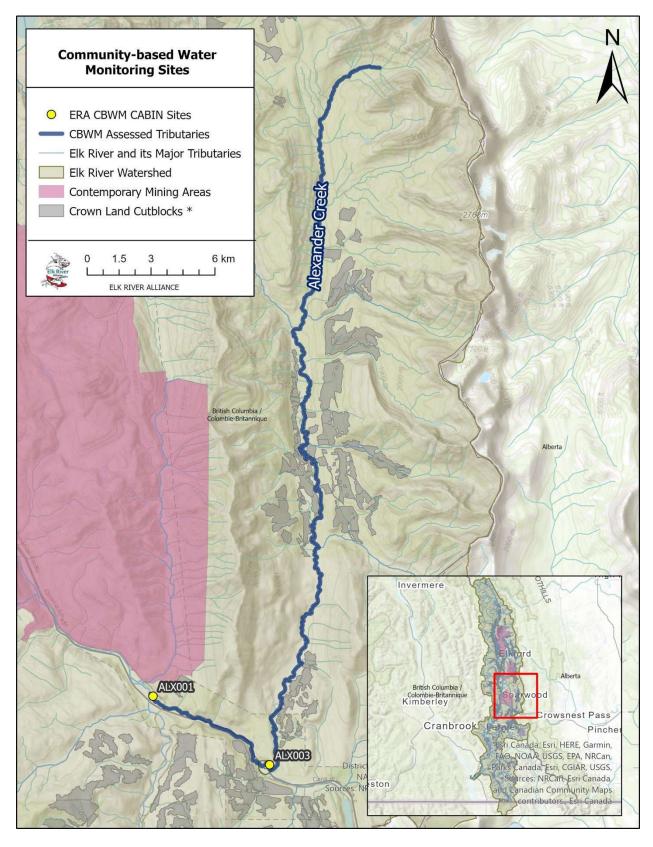


Figure 3. Alexander Creek site locations (ALX001, ALX003), just East of Sparwood, BC.



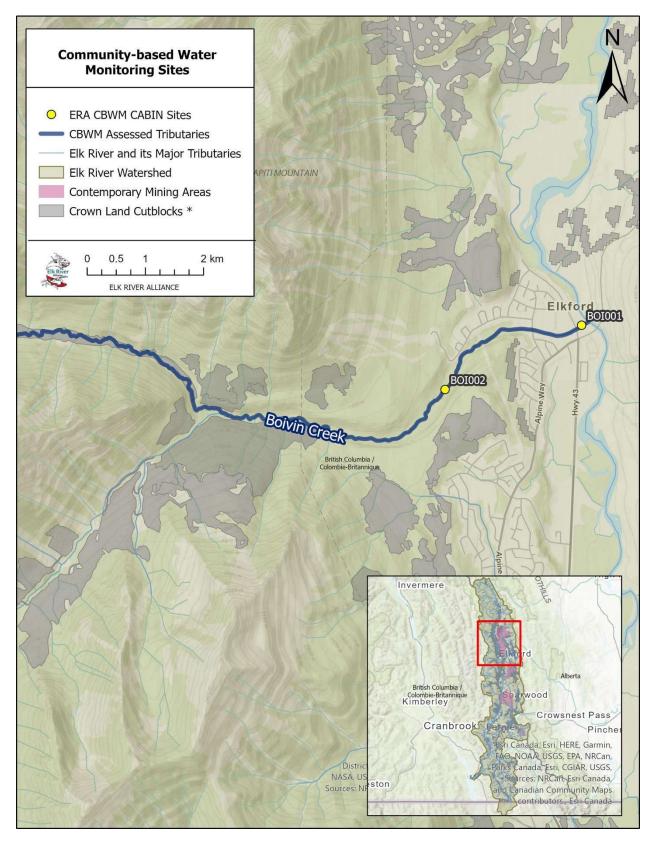


Figure 4. CABIN sites (BOI001, BOI002) on Boivin Creek in Elkford.



Lizard Creek

Lizard Creek, located approximately 5 km south of Fernie, was the first Elk River tributary for ERA's CABIN program. It was initially assessed as a 'reference site' in 2011 since at the time, the creek and its catchment had relatively little residential development and no active industrial activity (although logging had occurred historically). A large amount of the lower portion of this creek falls within Mount Fernie Provincial Park and is protected. Upstream of the Provincial Park is Island Lake, a hotel and cat skiing area with gravel access roads. Residential development in the Lizard Creek Catchment downstream of the provincial park began in 2018. Lizard Creek has continued to be monitored as it contains important spawning grounds for Westslope cutthroat trout (Elk River Alliance, 2020; Hocking *et al.*, 2021).

Since 2018, the Lizard Creek catchment downstream of the provincial park has seen increasing urban, road and trail development, including the Galloway Lands Development area. ERA continues to pay special attention to these sites as the surrounding land-use changes.

LIZ001







Figure 5. Images of LIZ001: upstream across the stream and downstream. The major flooding event in November 2021 left sections of Lizard Creek scoured down to the clay bed. Exposed clay sections were first noticed in streambed in 2022 and continue to be present along the side of the left bank. Clay sections are larger in 2023.

LIZ003







Figure 6. Images of LIZ003: upstream, across the stream and downstream.



Alexander Creek

In 2012, sites were established along Alexander Creek. This creek was identified as important due to its role as a significant tributary into Michel Creek, as well as the absence of effects from mining and urban development. The placement of sites along Alexander Creek allowed ERA to expand monitoring efforts into the Sparwood area. Sites along the creek were established to monitor effects related to stream proximity to the Crowsnest Highway, local logging and cattle grazing leases in the area.

The proposed Crown Mountain coal mine in the upper reaches of Alexander Creek poses an additional source of stressors, and continued monitoring here will provide baseline data for pre-mining conditions (NWP Coal Canada Ltd., 2014).

ALX001







Figure 7. Images of ALX001: upstream, across the stream and downstream.

ALX003







Figure 8. Images of ALX003: upstream, across the stream and downstream.



Boivin Creek

In 2018, Boivin Creek was selected to include Elkford in CABIN activities, and to contribute to a greater understanding of tributaries further upstream in the watershed. Boivin Creek was chosen for its undeveloped upstream catchment and to understand the effects of urban development and extensive riprap in its lower reaches.

BOI001







Figure 9. BOI001: upstream, across the stream and downstream.

BO1002







Figure 10. BOI002: upstream, across the stream and downstream.



Coal Creek

Coal Creek was added to the CABIN program in 2019. According to community discussions, this creek purportedly contained good quality habitat for Westslope cutthroat trout in the past; however, few spawning sites were identified by ERA in a 2019 redd survey (Elk River Alliance, 2020). Historical mining, logging, forestry, access roads, recreational trails/activities, and the old Fernie landfill are all likely stressors on this catchment. In recent years, increased clearcut logging activity and associated road development along Coal Creek continues to alter the waterways in this catchment area.

COL001







Figure 11. COL001: upstream, across the stream and downstream.

COL003







Figure 12. COL003: upstream, across the stream and downstream.



Morrissey Creek

The Morrissey Creek sites are the newest additions to ERA's CABIN monitoring locations, added in 2020 due to the presence of good quality trout spawning habitat coupled with logging, resource road use and cattle grazing activities in the catchment. Monitoring this creek is essential in understanding and potentially mitigating the effects of logging, linear development (forestry roads, gas lines), recreational use (vehicle and ATV access), agriculture, and natural erosion that may degrade Morrissey Creek.

These Morrissey Creek locations may also allow ERA to monitor the effects of short-term developments. In 2022, TC Energy began pipeline work in the Morrissey area - this included the expansion and increased use of roadways that run alongside Morrissey Creek. The pipeline development was completed in the early summer of 2024, and no further development is planned at the time of writing this report.

MOR001







Figure 13. MOR001: upstream, across the stream and downstream.

MOR002







Figure 14. MOR002: upstream, across the stream and downstream.



Background Information

CABIN

2020 marked the completion of ERA's transition from Streamkeepers-based protocols to CABIN (Canadian Aquatic Biomonitoring Network) protocols for the assessment of aquatic health. CABIN is a nationally recognized program that uses a "reference system approach" to assess aquatic ecosystem condition and was designed with community-based water monitoring in mind (Carter, 2012). ERA staff and volunteers have been trained by certified CABIN trainers.

The reference system approach to assessment means study sites or "test sites" are compared to sites in pristine condition, without the presence of human impact, called "reference sites". CABIN uses a combination of physical, chemical and biological parameters, to statistically categorize a test site and analyze it based on benthic macroinvertebrate (aquatic insects, worms, etc. – see "Benthic Invertebrates" section below for more details) assemblages, in comparison to reference sites with similar hydrologic (amounts and quality of water), geomorphic (stream bed, channel features and bank forms) and geographic (topography, geology, climate, vegetation, and human setting) characteristics. The assumption is that a test site in good condition will have similarly assessed values to the associated reference sites, and the more polluted or poor quality the site is, the farther it will diverge from reference site conditions.

The use of CABIN protocols has greatly improved ERA's ability to produce data comparable to monitoring data collected by other organizations, government, and industry, increasing the validity of ERA's work, and facilitating better data sharing.

In 2020, a new statistical CABIN model for the Columbia Basin was released (Strachan, 2020). Beginning in 2021, ERA's CABIN program upgraded from using the older Okanagan-Columbia 2010 model to the Columbia Basin 2020 model, which is tailored to a smaller, more specific region in BC, and includes the use of different criteria for site organization and assessment.

Habitat Variables

Geology, topography, stream morphology, climate and vegetation cover all play a critical role in stream health. The CABIN approach uses these characteristics to categorize and then assess test sites for similarities with reference sites. The physical characteristics of a test site are used to assign the site to a reference group for comparison.

These characteristics are important because the natural "pristine" state of a site is dependant upon these traits. If the CABIN test site was not compared to a suitable group of reference sites with similar physical variables, results would not accurately assess the health of an area. For example, a creek with limestone as the primary underlying rock will naturally have a higher pH than a stream dominated by sandstone, resulting in assemblages of benthic macroinvertebrates reflective of these respective natural conditions. If a limestone-based creek was compared to a sandstone-based "reference site", the different benthic macroinvertebrate community may be misinterpreted as a sign of an unhealthy aquatic system due to a pollutant causing a higher pH, rather than a natural occurrence.



Physical Properties of Water

The physical properties of water – colour, temperature, turbidity, taste and odour - are useful indicators of what is occurring within a stream. The CABIN program assesses both temperature and turbidity to better understand the condition of studied sites.

The *temperature* of a stream needs to remain within certain limits for healthy aquatic life, and many species take their life stage cues from temperature changes in the water. For example, Westslope cutthroat trout (WCT) begin migration to spawning grounds when the temperature is between 7-10 degrees Celsius (Bear, McMahon and Zale, 2007). Figure 15 includes a visual representation of temperature limits for the survival of adult WCT. In green is the optimal temperature range for this species, with the orange showing the sub-optimal, or increased stress range. The bright red colour signifies the range at which the temperature increase becomes lethal for WCT. Outside of these temperatures, WCT do not survive.

Temperature is closely correlated with dissolved oxygen levels. Colder water contains higher oxygen levels, which are critical for most stream life in the Rockies. Elevated water temperatures during WCT life stages such as embryo development (when oxygen requirements are particularly high) may result in embryo death or high mortality of alevins (a very young life stage, just after emergence from the egg). For example, if an early spring heat wave occurs and water temperature rises above 12°C, oxygen levels will fall below the guideline for protection of embryos and alevins (British Columbia Ministry of Environment and Climate Change Strategy, 2021).

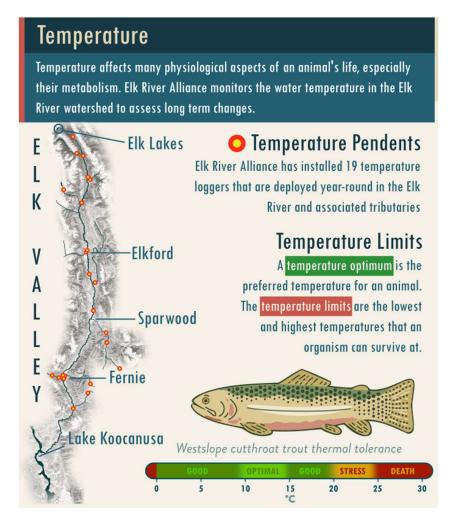


Figure 15. ERA Infographic outlining the importance of temperature to aquatic systems.



Turbidity is a measure of the ability of light to pass through water and is usually a reflection of the amount of sediment (B.C. Ministry of Environment and Climate Change Strategy, 2021b). Excess sediment can negatively affect aquatic life - reduces the amount of sunlight reaching aquatic plants and organisms, settles on the bottom of the stream reducing habitat for benthic invertebrates and smothering fish eggs (Figure 16).

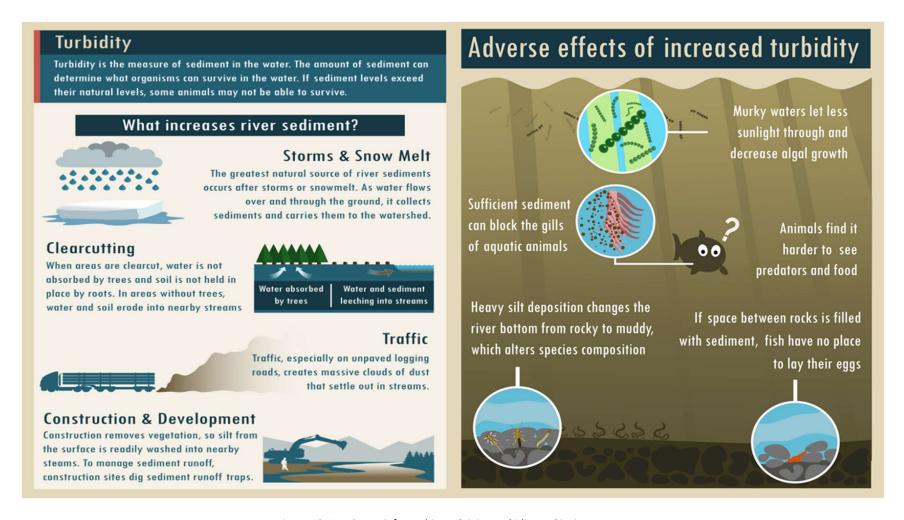


Figure 16. ERA CABIN infographic explaining turbidity and its importance.



Water Chemistry

Water chemistry parameters are important indicators of water quality. These parameters provide insight into the processes happening within a stream and the health of aquatic systems. Changes in water chemistry variables can signify landscape level changes or the introduction of new pollutants.

Dissolved oxygen, pH and conductivity are fundamental parameters measured as part of CABIN protocols. Aquatic life can only survive in water that falls within a specific range of water quality parameters. Unusually high or low measurements for any of these variables may suggest a problem in the stream.

Aquatic animals require enough dissolved oxygen for them to breathe easily. Oxygen levels depend on whether water is flowing or still, whether there are rocks or other obstacles for water to flow over, how many plants are growing in the water, and water temperature. Common causes of low dissolved oxygen are increases in temperature, decaying organic matter and weather (i.e. cloudy days reduce oxygen production from aquatic plants and algae). Excess nutrients added to the water stormwater via sewage or discharges, agricultural runoff or mine water discharges can cause excessive algae growth which then decompose, using up oxygen. The amount of dissolved oxygen in water affects the types and health of aquatic life present. The lower the oxygen content, the less life that can persist in the water.

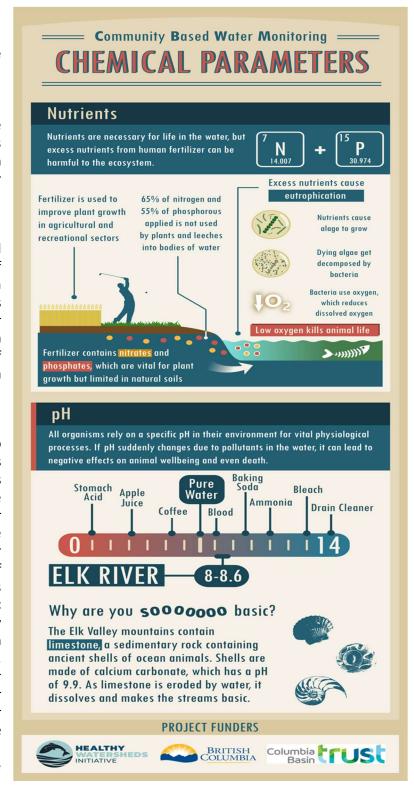


Figure 17. ERA infographic on chemical parameters associated with the CABIN program.



The pH range for freshwater aquatic life set by BC water quality guidelines is 6.5-9.0. Pure distilled water has a neutral pH of 7. The local geology of an area can result in water that is alkaline or acidic. In the Elk River watershed, streams are more alkaline due to a limestone-based geology, and aquatic organisms have adapted to these conditions. When pH levels deviate from natural ambient conditions, there may be

direct or indirect effects on the health of aquatic organisms and partial or complete changes in species composition. The pH of water affects the solubility (amount that be dissolved in water) bioavailability (amount that can be used by aquatic life) of chemicals in water such as metals or nutrients (Government of British Columbia, 2023). Low pH increases the solubility of metals, meaning that a decrease in the pH of a stream causes an increase in the amount of dissolved metals in that water. These high amounts of dissolved metal can attach to the surface of fish gills, damaging the gills and reducing oxygen uptake. Increases in pH can also increase the concentration of the more toxic forms of chemicals, like ammonia, in the water, killing fish quickly (B.C. Ministry of Environment and Climate Change Strategy, 2021a). Significant changes in pH can be caused by historic mine wastes, landfill leachate, runoff from cattle feedlots, recent draining wetlands, asphalt production or disposal, and limestone gravel roads (US EPA, 2003).

Conductivity is another measure that can indicate changes in aquatic health. It is a measure of the ability of water to pass an electrical current. Conductivity increases when there are more dissolved mineral sodium, salts such as potassium, magnesium, chloride and sulphate (Chapman, 1996). Significant changes in conductivity can be indicative of increased or decreased mineral salts dissolved in the water. In the Elk Valley, high conductivity in stream water is often associated with groundwater influence (because groundwater naturally has higher concentrations of salts); however, an increase in conductivity may point to

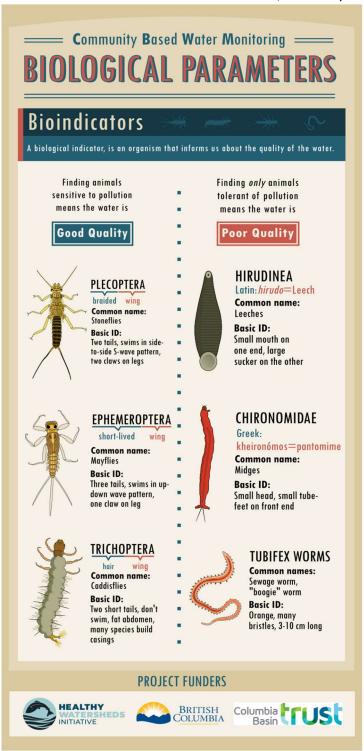


Figure 18. ERA infographic outlining the biological parameters associated with the CABIN program.



increased human disturbance. Mining commonly causes increased sulphate concentrations in surface waters. Sodium, calcium, or potassium chloride runoff due to road salting is another common source of increased conductivity.

In addition to measurement of dissolved oxygen, pH and conductivity, the CABIN program includes water samples collected for laboratory analysis of nutrients, total and dissolved metals, and major ions (salts).

Changes in physical and chemical parameters which fall outside of the range of natural variability can cause a cascade of effects on the diversity and productivity of aquatic life. If such changes are observed, further monitoring should be initiated to explore different local stressors as potential causes. From here, additional required mitigation and management measures can be identified. For example, if elevated water temperatures in areas known to be important for WCT spawning are shown to be connected to less vegetation along the streambanks providing shade, mitigation may include planting of fast-growing riparian species such as willow.

If CABIN analyses show a test site in poor condition, water chemistry results can provide vital insight into what is occurring in the system. Often, consistent, long-term monitoring is needed to detect unusual changes to a specific water chemistry parameter and identify the underlying reasons for the change.

Benthic Invertebrates

A "biological indicator" is an organism that can be used to monitor the health of an ecosystem. CABIN uses benthic macroinvertebrates (small aquatic insects and other species such as aquatic worms) as biological indicators of stream health. While water chemistry variables can provide a "snapshot" of what is happening at a distinct moment in time within an aquatic system, benthic organisms experience the cumulative effects of all the physical and chemical stressors interacting within this system over time. Benthic organisms tend to remain in one general location and can be an indicator of the effects of activities associated with land uses in that area. Changes in the health of aquatic systems are reflected in the structure of the communities of these organisms within it.

In general, aquatic communities consist of groups (taxa) that are tolerant to pollution and those that are sensitive to it. By comparing the amount of tolerant versus intolerant groups in a community, assumptions can be made about the overall health of a system. For example, mayflies (*Ephemeroptera*), stoneflies (*Plectoptera*) and caddisflies (*Trichoptera*) are all, generally, considered to be sensitive to pollution, while groups like midges (*Chironomidae*), leeches (*Hirudinea*) and worms (*Naididae*) are more tolerant to pollutants. A high number of midges, leeches and worms and little of anything else is a likely indication of a stream in poor condition (Figure 18).

CABIN assessments use the composition of the benthic macroinvertebrate community (at the taxonomic level of family) within the stream, and their sensitivities, to make assumptions about the health of the system.



STREAM e-DNA

In 2020, the CABIN program was further expanded to include participating in STREAM e-DNA sampling; a trial for a future phase of CABIN monitoring, where additional benthic invertebrate samples are collected and analyzed to a finer taxonomic resolution using DNA analysis (Wright, Robinson and Hajibabaei, 2020). This means benthic organisms can be identified to the species level. STREAM e-DNA is not currently part of the CABIN analysis process, and the aim of these trials is to potentially incorporate this feature in future monitoring efforts.

Although DNA analysis only produces data on presence versus absence of benthic species, it allows for the examination of benthic communities at a finer taxonomic resolution and may prove helpful for the early identification of pathogenic species. For example, the *Tubifex tubifex* species of worm can host whirling disease (*Myxobolus cerebralis*), and the presence of *T. tubifex* may indicate a reach is vulnerable to whirling disease infection.

Methods

Site Selection

The Elk River Alliance's CABIN sites are chosen based on community input and/or the presence of important habitat that warrants monitoring. Areas of interest are identified using a combination of GIS (Geographic Information System) and in-person assessments. Representative sites along a creek are chosen to capture the effects of different types of land-use or disturbance. Typically, sites are placed upstream and downstream of suspected impacts or a stressor source point. Sites may also be placed just above the confluence of tributaries to gain an overall idea of water quality and stream habitat health within a catchment.

Aquatic Habitat Assessment

Test sites were assessed using the techniques outlined in the Canadian Aquatic Biomonitoring Network (CABIN) Field Manual for Wadeable Streams (Carter, 2012).

At each site, a detailed site description, including GPS location, surrounding land-use, site drawing, photographs, and reach characteristics are recorded. This includes information on habitat types, canopy coverage, streamside vegetation and the amount of macrophyte (aquatic plants) and periphyton (organisms growing on submerged surfaces – i.e. algae, cyanobacteria, etc.) coverage.

Water chemistry measurements and water samples are taken at the lower end of the reach to avoid disturbing benthic macroinvertebrate communities. This includes the collection of on-site water quality parameters (temperature, dissolved oxygen, pH, conductivity, ORP, turbidity), and any samples that need to be taken for laboratory analysis of metals, nutrients, and major ions.

Next, the benthic macroinvertebrates are collected using the "kick-net" method, which includes 3 minutes of travelling backwards upstream, with a large net placed on the bottom of the stream, and aggressively kicking rocks to send any insects hanging on into the kick-net. Organisms and material collected in the net during these 3 minutes are moved into a sample jar and preserved with the appropriate chemicals.



When STREAM protocols are included, 3 additional "kick-net" samples are collected, prior to the standard CABIN "kick-net" sampling, using the same protocol but with full decontaminations of the equipment and sampler before each round (Wright, Robinson and Hajibabaei, 2020). Since STREAM focuses on taxonomic identification through DNA, proper decontamination is necessary to avoid tainting the samples. Benthic invertebrate sampling is always performed beginning downstream and moving upstream. STREAM samples are collected in sampling jars and preserved according to STREAM protocols. Only the lower site on each creek (near the mouth) were included in the STREAM program (i.e., COL001, MOR001 etc.).

CABIN requires the sampler to collect information on substrate characteristics. This includes following the kick-net path while counting and measuring 100 pebbles from the bottom of the stream and assessing every 10th pebble for embeddedness. The surrounding substrate, or streambed, material is also assessed based on size and consistency.

Finally, the study site channel characteristics are measured. The width of the stream during high flow (estimated based on bank structure and changes in vegetation) and current flow are measured, as well as the slope, depth, velocity, and overall discharge of the stream.

For more details on CABIN and STREAM protocols, please see the *Canadian Aquatic Biomonitoring Network (CABIN) Field Manual for Wadeable Streams*, and *STREAM: Procedure for collecting benthic macroinvertebrate DNA samples in wadeable streams* (Carter, 2012; Wright, Robinson and Hajibabaei, 2020).

Laboratory Analysis

Basic water quality parameters – temperature, pH, conductivity, dissolved oxygen, and turbidity – were tested on site by trained ERA staff and volunteers. Samples acquired during site assessments were preserved appropriately and shipped to independent laboratories for further analysis.

Water Chemistry

CARO Analytical Services in Kelowna, BC was responsible for water chemistry analyses. Typically, ERA CABIN sites are assessed for total and dissolved metals, nutrients, cations and anions (e.g. chloride, sulphate, carbonate) (Appendix C: CARO Reports).

Benthic Invertebrate Taxonomy

ERA contracted Summerland-based, CABIN-approved, aquatic invertebrate taxonomist, Scott Finlayson (B.Sc. Freshwater Science, SFS) to assess benthic macroinvertebrate samples for the CABIN program. He sorted, identified, and performed data entry for benthic invertebrate samples, following CABIN laboratory protocols (Environment and Climate Change Canada, 2020).

Data Analysis

As per CABIN Wadeable Streams Protocols, all data collected was entered into the Environment and Climate Change Canada (ECCC) national CABIN database, under "CBWQ – Elk study".

In 2021, ERA shifted from using the older Okanagan-Columbia 2010 preliminary model to the new Columbia Basin 2020 model, to perform CABIN assessments. The new model includes 156 reference sites across the Columbia Basin, with 11 of these falling within the Elk River Watershed, an additional 4 in the



neighbouring Flathead area, and 1 within the Bull River basin (Strachan, 2020).

To prepare site data for CABIN analysis, characteristics based on GIS data were assembled. Catchments for each site were delineated using GIS software and analysed for model requirements: drainage area (km²); % grassland; % low shrubland; % water; mean precipitation for October; minimum temperature for December; % sedimentary rock; and maximum slope.

From here the CABIN database sorts sites into smaller groups based on similarities in characteristics to designated groups of reference sites, then performs a BEAST (Benthic Assessment of Sediment) analysis to assess the health of a site, in comparison to similar reference sites, based on the benthic community structure, the functional responses of these invertebrates, and selected habitat variables. These analyses produce "community ellipses" for each site, which is an ordination plot that visually represents how similar reference sites are to each other and where a test site fits into the comparison among sites. The center ellipse represents reference condition. The further out from the center ellipse a test site appears, the more it has diverged from the reference condition and the more likely it is to be in poor condition.

Where sites appeared to be diverging from reference condition, data were further explored to investigate patterns associated with these sites. Water chemistry parameters were assessed for any notable results. RIVPACS, Bray-Curtis dissimilarities, and metrics related to the presence and abundance of specific invertebrates (i.e. EPT, *Diptera* and non-insects) were used to explore potential issues with benthic community structure.

RIVPACS (River Invertebrate Prediction and Classification System) is an aquatic biomonitoring system used to assess water quality. It measures taxa richness (presence/absence but not abundance), based on expected taxa according to reference sites versus what is observed at a test site. A value of 1, indicates the test site is similar to the reference sites, while values above 1 indicate increasing differences from the reference sites (and more taxa), and values below 1 indicate increasing differences but less taxa, and likely poorer conditions.

Bray-Curtis dissimilarity is a statistical assessment to measure the dissimilarity between sites based on numbers within groups at each site. In CABIN, the Bray-Curtis dissimilarity is used to measure both richness and abundance of test sites compared to the mean values of the reference sites. A value of 0 means that the sites are in good condition, similar to the mean values of the reference sites, while a value of 1 indicates complete dissimilarity.



Results & Discussion

In 2023, 10 sites were assessed across 5 tributaries – Lizard Creek, Alexander Creek, Boivin Creek, Coal Creek and Morrissey Creek. CABIN analyses tools generally yielded similar results to the previous year (see ERA's 2022 Report for details), with sites along Boivin Creek (BOI001, BOI002) having similar benthic community structures to their associated reference sites and upper Morrissey (MOR002) maintaining its condition of mildly divergent, while lower Coal Creek (COL001), lower Morrissey Creek (MOR001), and both Lizard Creek sites (LIZ001, LIZ003) diverge significantly from the designated 'reference condition'. This year, however, both the Alexander Creek (ALX001, ALX003) sites appear to have diverged from reference condition and were assessed as mildly divergent while the upper Coal (COL003) has reverted to its 2021 state of mildly divergent.

ERA is concerned about these results and what they could mean for the health of these streams. However, the reason for these results is still uncertain. In 2020, CABIN introduced a new statistical model for aquatic habitat assessments in the Columbia Basin – Columbia 2020 model. The use of this model saw unexpected shifts in assessment results for ERA's test sites. This new model is generally considered more accurate and more sensitive to potential stressors – it is tailored more specifically to the region, focusing on the Columbia Basin rather than the previous model's focus on both the Columbia and Okanagan Basins, and features double the amount of reference sites than the previous model (Gaber, 2012; Strachan, 2020). Due to these unexpected shifts in assessment results, ERA is recommending further investigations on "divergent" streams to examine potential unknown stressors on these systems and eliminate the possibility of inaccurate or exaggerated results related to the model's ability to represent test sites in the Elk Valley, BC.

The composition of the benthic macroinvertebrate communities at many of these sites appears to align with these new assessment results. Water chemistry sampling results at all sites consistently remain below BC Water Quality Guideline limits for aquatic life and although some elevated levels of certain water quality parameters were observed at Morrisey sites in 2023, there are no obvious trends to lend support to any specific cause for divergence at Morrisey or any other site. ERA will continue the long-term monitoring of these sites into 2024, and is recommending further investigation, outside of CABIN assessments, to explore potential reasons for these results.



Lizard Creek

In 2023, Lizard Creek sites – LIZ001, LIZ003 – were assessed as "highly divergent" from reference condition based on the Columbia 2020 CABIN model (Figure 19). Year to year changes using the new model continue to indicate a steady shift at LIZ001 from reference condition to highly divergent from 2014 to 2017, then remaining highly divergent from 2017-2023.

Although this appears to suggest a potential trend of site degradation over time, it is worth noting that this CABIN model sorted the LIZ001 site for comparison with a different set reference groups for 2012, 2014 and 2015, compared to the rest of the assessment years. Generally, sites are expected to be compared with the same reference group from year to year (based on the assumption that the fundamental geological, topographic, climate, stream morphological and vegetation cover characteristics remain the same). Capturing the full range of ecological variation of reference sites using an adequate number of sites sampled with sufficient frequency is critical for confident interpretation of CABIN data (Strachan and Reynolds, 2014). The changing assignment of the reference group for the LIZ001 site may indicate a technician error or model issue rather than a truly changing site condition. Looking at the variables used to sort test sites into model reference site, only four changed between years - latitude, altitude, channel slope and % canopy cover. Of these predictor variables, only % canopy coverage had an obvious pattern between years sorted into the model's Reference Group 3 (2012, 2014 and 2015) which were all assessed as having 26-50% canopy coverage and Reference Group 2 (2013, 2016-2023), which were assessed as having 1-25% canopy coverage. Changing the canopy coverage in the data for the years sorted into Group 3 results in new assessments for these monitoring events, with 2012 changing to "Mildly Divergent", while 2014 and 2015 both become "Divergent". Essentially, by changing a single variable, and having all the LIZ001 site visits compared to the same set of reference sites, the pattern of increasing divergence that can be seen from 2014 to 2017 changes significantly. This may point to an issue with this CABIN model's ability to sort LIZ001 into a group with appropriate reference sites.

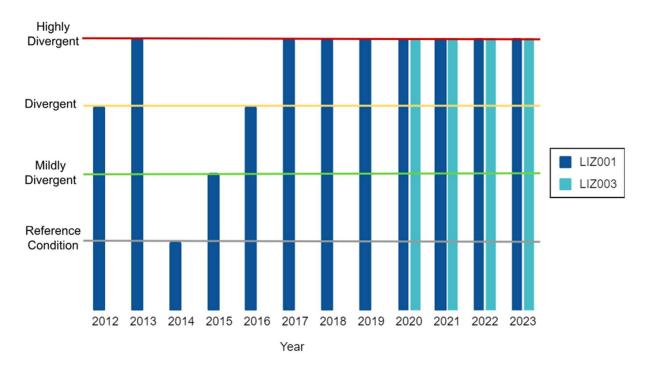


Figure 19. CABIN analysis results for Lizard Creek sites from 2012 – 2023 using the Columbia 2020 CABIN model.



Further examination into 2023 data, suggests that both Lizard Creek sites differ from reference sites according to the Bray-Curtis dissimilarity, which uses taxa richness and abundance for comparison (LIZ001: 0.96, LIZ003: 0.92); however, RIVPACS analysis, which take an exclusive presence/absence approach to assessment (LIZ001: 1.05, LIZ003: 1.05) suggests that these sites still have relatively good taxa richness. This difference may be in part due to the larger number of taxa present at Lizard Creek sites, compared to reference sites (Table 1).

Taking a closer look at the benthic macroinvertebrate community composition, the percentage of EPT individuals (Ephemeroptera, Plecoptera, Trichoptera - typically pollutant-sensitive taxa) for LIZ001 and LIZ003 (28.79% and 60.16%, respectively) is lower than what would be expected based on the reference site means (88.13% ±9.26; 91.94% ±7.29). Though in the past LIZ003 had EPT values similar to the values seen at Alexander Creek and Boivin Creek, which both have a history of being near "reference condition", this appears to no longer be the case, with both LIZ001 and LIZ001 showing EPT declines of around 20% from 2022 to 2023. Total abundance of benthic macroinvertebrates was significantly higher than expected according to mean reference site values which may contribute to the unexpected significant divergence from reference condition (i.e. LIZ003, the upper Lizard Creek site's abundance for 2023 was almost 20,000 higher than that of associated reference sites' mean) (Table 1). Although ERA is currently unsure of the cause, total abundance of benthic macroinvertebrates at Lizard Creek has been increasing over time - the data available for LIZ001 show a distinct pattern of increasing abundance since 2012 (LIZ003 has not been monitored long enough to begin confidently assessing any trends within this data) (Figure 20). Unfortunately, decreasing EPT appears to be accompanying this increase in abundance (Figure 20). There also continues to be a noticeable increase in the amount of Tubifida, a pollution-tolerant taxonomic order of worms, at LIZ001, which further suggests the introduction of a pollutant or disturbance affecting this site.

The high abundance with lower diversity (and low EPT) within the populations at LIZ001 likely suggests the introduction of a pollutant to the system and may signify the declining health of this site; however, further investigation of this area is needed to confirm and explore potential causation.



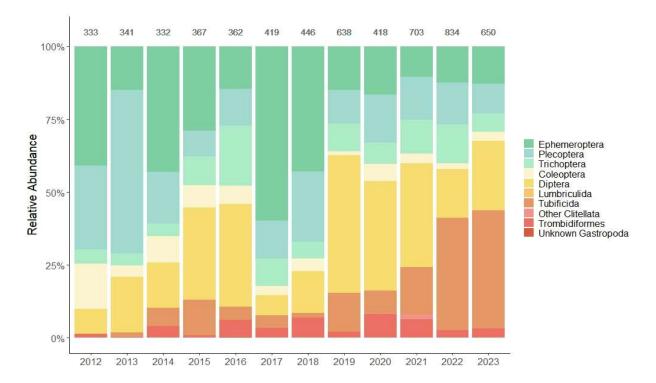


Figure 20. Plot of benthic macroinvertebrate community composition based on taxonomic order of samples collected at LIZ001 during CABIN sampling over time. The cool colours (blues, greens) represent orders that are generally sensitive to pollution (Ephemeroptera, Plecoptera, Tricoptera), while the orders in warm colours (yellow, orange, red) are more tolerant to pollutants. The numbers along the top of the graph are the raw individual counts of all benthic macroinvertebrates found at this site in each year.

Based on ERA's understanding of Lizard Creek, poor aquatic health at LIZ003 is unexpected. The LIZ003 site is within Mount Fernie provincial park and Island Lake Lodge is located near the headwaters of the creek (cat skiing, hotel, and restaurant operations). There is a resource road that runs alongside Lizard Creek for approximately 9.5 kilometers from Highway 3 to Island Lake Lodge and comes within 300 meters of the creek at different points along the way (See Figure 21 for more details on land use within the Lizard Creek catchment). There are also several tributaries that cross over this road and eventually feed into Lizard Creek. Recreational use is moderate-to-high depending on the time of year, with many formal and informal trails used for skiing, biking, hiking, and horseback riding. Anecdotal observations indicate the presence of fish in good condition in Lizard Creek as well as spawning redd and fry and fingerling rearing area. However, regular visitors to the creek have noted increasing algae growth (particularly filamentous algae). Increased algae growth may indicate increased nutrient inputs to the creek.

LIZ001 is closer to the Lizard Creek confluence into the Elk River (Figure 21). This site is downstream from the provincial park and has greater potential to be affected by human disturbance from residential development adjacent to the stream as well as recreational uses in the provincial park and adjacent private lands. Proposed future residential development adjacent to Lizard Creek including the Galloway Lands development, with associated access roads, water withdrawals from aquifers (which contribute to baseflow in the creek), and increased access for recreational uses may contribute additional impacts to those which may already be occurring. ERA is committed to continued monitoring of Lizard Creek as human activities in the catchment increase.



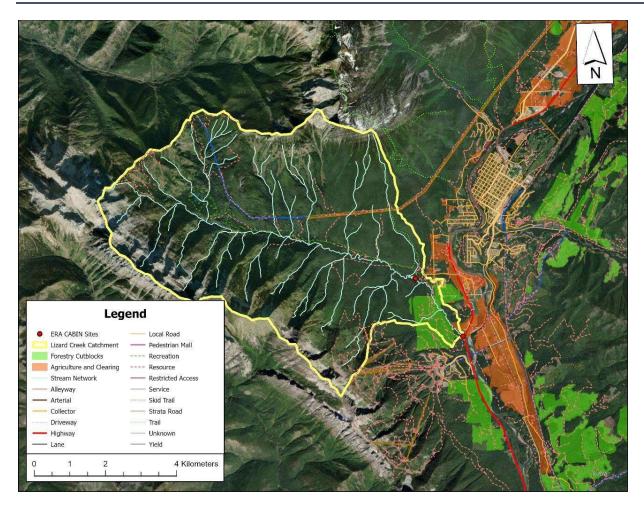


Figure 21. Land use in the Lizard Creek Catchment as of 2023.

Preliminary investigations into water quality parameters have not identified a clear cause - all measured water quality variables met BC guidelines for the protection of aquatic life and there have been no notable trends in water quality parameters (See Water Quality Trends section). However, trends cannot reliably be determined by "snapshot" sampling.

Initial examinations of water quality parameters in 2021 allowed ERA to begin flagging specific water quality parameters for continued monitoring. Although there were no exceedances of BC Water Quality Guidelines, LIZ001 and LIZ001 continue to have consistently higher amounts of sulfate, total phosphorus (as P), hardness (as CaCO3), conductivity, total calcium and total magnesium than other CABIN monitored creeks (Figure 22; Figure 23; Figure 39).

Although high amounts of some of these parameters, namely, hardness, calcium, magnesium and conductivity, can, in the right conditions, result in the precipitation of calcite on rocks within a stream, naturally elevated levels are not a concern. In this case, these elevated levels can likely be attributed to the limestone-based geology of the area and increased groundwater influence (more interaction with the limestone) at Lizard Creek – as water erodes the limestone, minerals like calcium and magnesium are deposited into the stream, thereby also increasing the conductivity and hardness, but further investigation is needed to confirm this. If these levels are natural, further assessment of the ability of this CABIN model to accurately assess these sites is recommended, with associated reference samples



containing significantly lower levels of many of these parameters – hardness (E100 \pm 77.36 mg/L), magnesium (E9 \pm 7.544 mg/L), and conductivity (E120 \pm 104.00 uS/cm).

Anecdotal observations of algal growth, led to an exploration of nutrient levels within Lizard Creek – both phosphorus and sulfate levels were flagged in 2021, and noted to be regularly higher than the other CABIN monitored creeks. Although there is currently no Water Quality Guideline for phosphorus in streams in BC, the long-term chronic limit within lakes is 0.015mg/L, which Lizard Creek sites regularly meet and/or exceed. Initial data investigations in 2021, also flagged sulfate as another parameter to watch. Although sulfate measurements at Lizard Creek sites are higher than ERA's other CABIN sites, they are all well below limits outlined in the BC Water Quality Guidelines (429 mg/L). It may be worth noting that ERA's Coal Creek sites (COL001, COL003), which have also been diverging significantly from reference condition, are the only other ERA test sites that reach similar phosphorus levels. Unfortunately, in 2022 the lab analyzing samples was unable to perform the test necessary to quantify total phosphorus (as P) or sulfate, so ERA was unable to complete a 2022 assessment, but assessments were resumed in 2023. ERA will continue to monitor these parameters and recommend that it be considered for future examinations.

As noted in the 2022 report, a potential pattern of increasing alkalinity continued to occur in 2023 at Lizard Creek sites. This pattern seems to be shared amongst all of ERA's CABIN test sites. Similar to hardness, calcium and magnesium, elevated alkalinity is usually a result of the limestone-based geology of the local area. ERA will continue to monitor this parameter over time to continue to assess emerging trends (Figure 24).

In-depth investigations outside of CABIN assessments are needed to better understand what is occurring at Lizard Creek.



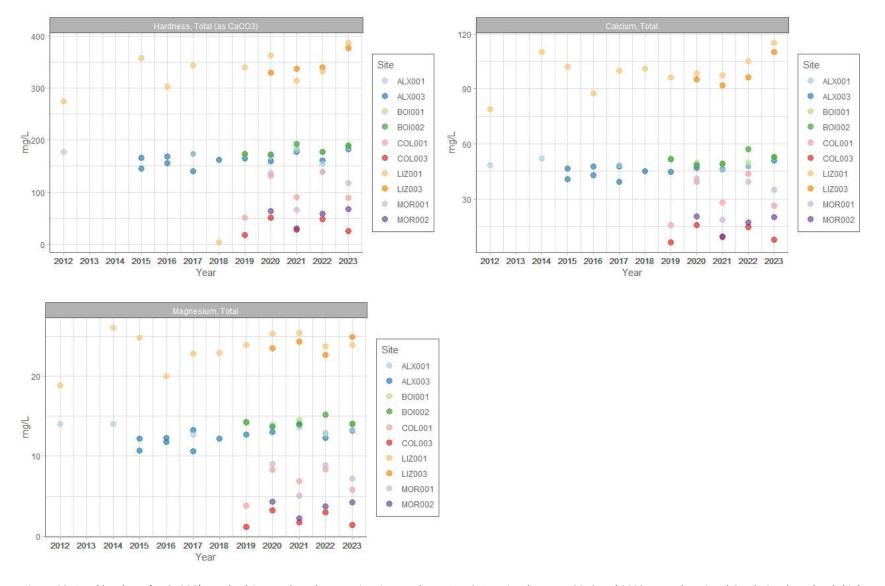


Figure 22. Total hardness (as CaCO3), total calcium and total magnesium in samples at ERA CABIN sites between 2012 and 2023. Note that Lizard Creek sites have levels higher than the other monitored sites. All these parameters are likely a reflection of the limestone-based geology in the region and an increased groundwater influence at Lizard Creek.



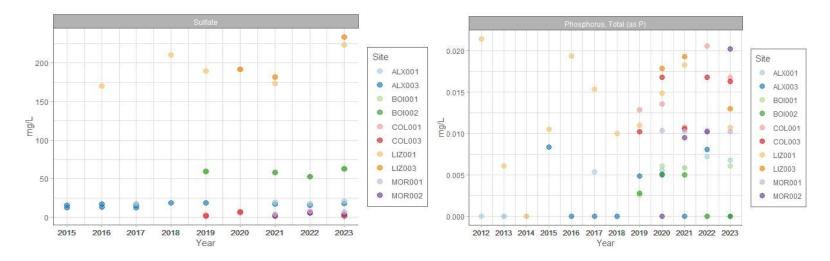


Figure 23. Total phosphorus (as P) and total sulfate at ERA CABIN sites between 2012 and 2023. Lizard Creek consistently has higher values within these parameters across years.

Phosphorus levels below detection were assumed to be zero to control for different detection limits over different years.

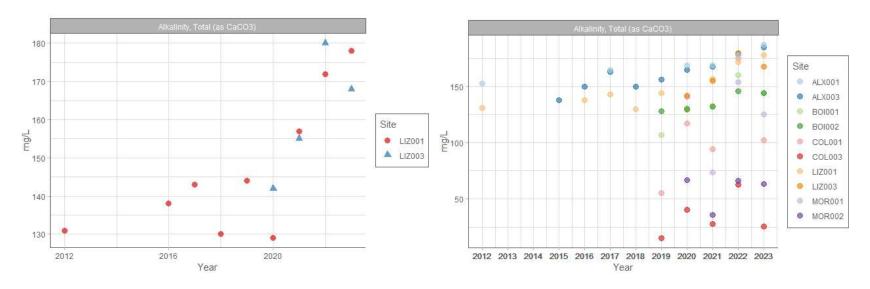


Figure 24. Total alkalinity (as CaCO3) over time. The plot on the left focuses on the Lizard Creek sites, while the graph on the right allows for comparison across sites. Although alkalinity is usually a result of the local geology, this analyte appears to be increasing over time.



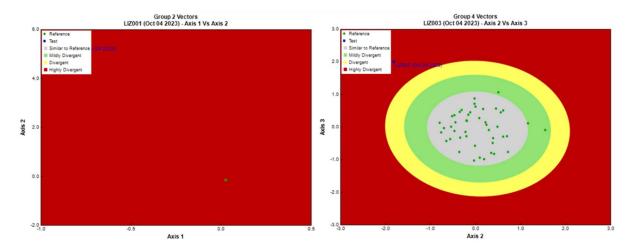


Figure 25. CABIN community ellipses for LIZ001 and LIZ003, respectively, in 2023. Note that in the LIZ001 diagram, the site is divergent to the point where the ellipses is the green dot in the bottom right of the diagram, while the point representing LIZ001 is to the top left, partially covered by the diagram's legend.

Alexander Creek

Both the upstream (ALX003) and downstream (ALX001) sites showed a move away from reference condition, becoming mildly divergent in 2023 according to CABIN analysis (Figure 26). Despite these changes, water chemistry variables remained consistent with good health, with all measurements for both sites meeting the BC guidelines for the protection of aquatic life. There have been no consistent trends in dissolved oxygen, pH, conductivity, turbidity, or temperature (see the Water Quality Trends section below). However, trends cannot reliably be determined by "snapshot" sampling. ERA has now implemented a network of real-time discharge and temperature monitoring in CABIN streams, which will allow for better monitoring.

Prior to 2023, CABIN results from Alexander Creek sites have been relatively consistent over time, generally remaining in reference condition, however ALX001 was found to be highly divergent in 2012 and divergent in 2017. Further statistical testing (Bray-Curtis, RIVPACS, % EPT) indicates that sites on Alexander Creek were similar to reference sites in taxa diversity, although ALX003 exhibited slightly lower species richness (Bray-Curtis: 0.69). With both Alexander Creek sites showing a departure from reference condition, the ERA will continue to monitor ALX001 and ALX003 to confirm CABIN results and explore if this divergence is part of a trend or instead related to an intermittent disturbance. If the sites continue to diverge from reference sites, ERA will seek to investigate further, as there were no major land-use changes to the stream area in 2023, and declining conditions are not expected.

Alexander Creek runs alongside the Crowsnest highway for about 4 kilometers, is crossed by the CP Rail mainline, and passes a gun range and local logging roads. Fluctuations in CABIN assessment may result from intermittent disturbances caused by the use of these areas, combined with events such as runoff from heavy or prolonged rain causing erosion of disturbed areas. Proposed mining development in the upper catchment may increase stressors on Alexander Creek. If mining development goes forward, ongoing monitoring of Alexander Creek will become increasingly important to track changes in stream health.



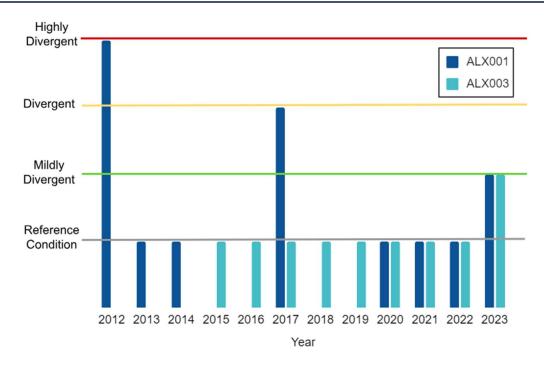


Figure 26. CABIN analysis results for Alexander Creek sites from 2012 - 2023. Both sites experienced a decline in condition, going from reference condition to mildly divergent in 2023. Continued monitoring will allow ERA to assess if this is a developing pattern.

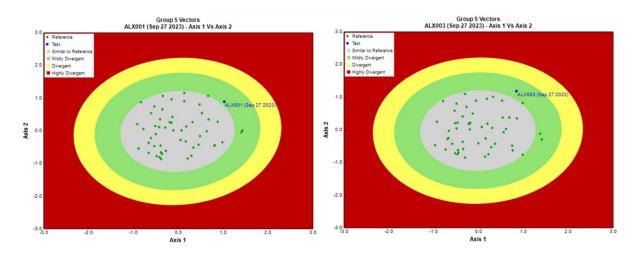


Figure 27. CABIN community ellipses for Alexander Creek sites (ALX001 & ALX003) in 2023, showing both sites have become "mildly divergent".

Boivin Creek

In the five years (2019 to 2023) of monitoring on Boivin Creek, sites have remained in relatively good, stable condition (Figure 28). 2023 CABIN analysis showed that both Boivin Creek sites were in similar condition to their associated reference sites. The shift to a "mildly divergent" condition seen in 2021 at the lower Boivin Creek site (BOI001) was likely a result of the natural variability of benthic invertebrate communities, or a smaller disturbance. Further analysis of metrics associated with benthic invertebrate community structure suggested that in 2021, BOI001 may have been experiencing a slightly lower



species richness (RIVPACS) which could have contributed to this assessment. While there have been some fluctuations in monitoring results year to year for both BOI001 and BOI002, species richness and diversity metrics such as RIVPACS, Bray-Curtis and %EPT continue to remain relatively steady, other than BOI002 exhibiting a lower RIVPACS value (0.85) in 2023, which may impact results if it continues in future years (Table 1).

ERA began monitoring this site to assess the impacts of artificial riprap that stretches along large sections of the creek as it passes through Elkford. CABIN results at the lower site (BOI001) with rip rap present and at the upstream site (BOI002) with no rip rap both show that the creek is similar to comparable reference sites to date. Since monitoring began after the rip rap was installed, it is unclear how the rip rap may have altered the downstream site (BOI001). Continued monitoring efforts, including implementation of real-time monitoring of discharge and temperature will allow for more long-term assessments of the creek and potential impacts of local urban developments. All measured water quality variables met BC guidelines for the protection of aquatic life.

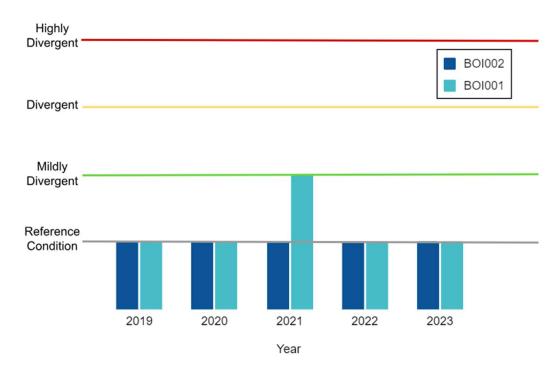


Figure 28. CABIN results for Boivin Creek sites in 2019 - 2023. The upstream (BOI002) site has remained in a similar state to reference condition, while the downstream site (BOI001) has experienced some fluctuation in state. Continued monitoring will allow for ERA to assess any developing patterns.



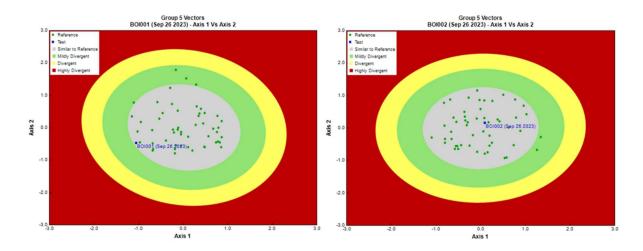


Figure 29. CABIN community ellipses for Boivin Creek sites (BOI001, BOI002) in 2023, showing both sites to be "similar to reference".

Coal Creek

Coal Creek was added to the CABIN assessments in 2019. Results indicate the creek is divergent from reference condition, with more dramatic results seen at the site near the mouth (COL001) (Figure 30). According to additional analyses, the lower site of Coal Creek (COL001) exhibited species diversity diverging from reference sites (Bray-Curtis: 0.88), and COL003 had low taxa richness when compared with reference sites (RIVPACS) (Table 1). Total abundance of individuals was much higher than expected for the lower Coal Creek site (more than 7,000 above what would be expected based on CABIN reference sites) which may push results to a more divergent classification, although total abundance was less than in 2022.

Further analyses revealed low numbers of EPT individuals (generally sensitive to pollutants and their abundance is considered an indicator of good health) compared with Diptera and non-insects (generally pollutant-tolerant) - 44% of the benthic invertebrates sampled at COL001 were EPT individuals while 56% belonged to Diptera or non-insect groups, and COL003 having 51% EPT and 49% Diptera and non-insects.

All measured water quality variables met BC guidelines for the protection of aquatic life. The Coal Creek sites were established too recently to enable comparison of water quality results over time. Furthermore, as noted for the other creeks in the CABIN program, one-time sampling for water quality is not sufficient for indicating true trends.

The COL001 site is downstream of historic mining sites, a decommissioned landfill, cattle grazing, recreational ATV trails, and current clear-cut logging practices. The final kilometer stretch flows through a portion of Fernie before arriving at the sampling site. This urban portion of Coal Creek is confined by riprap and concrete armoring along the sides of the channel. Recreational use of the lower portion of the creek sometimes includes the construction of weirs in the streambed with large rocks and cobble to create swimming or wading areas. There have also been increasing anecdotal observations of algal growth in the lower regions of Coal Creek, which may warrant further investigation into stream nutrient levels.

The highly divergent results for the COL001 site are not unexpected, given the multiple historic and current stressors in the catchment. Benthic invertebrates integrate the effects of these multiple



stressors, particularly flow, turbidity, and temperature, but may also be responding to short and long-term changes in water quality parameters such as nutrients. The consistent categorization of COL001 as "highly divergent" from reference condition over the four years it has been monitored, along with the list of known stressors affecting this stream, give ERA confidence in these results.

ERA will continue to monitor COL001 and COL003 to confirm CABIN results and acquire sufficient data to begin to evaluate trends. Although COL003 returned to being classified as "mildly divergent" in 2023, if the site continues to diverge from reference sites, ERA will seek to investigate further, as this site is within the headwaters, and poor conditions are not expected at this location.

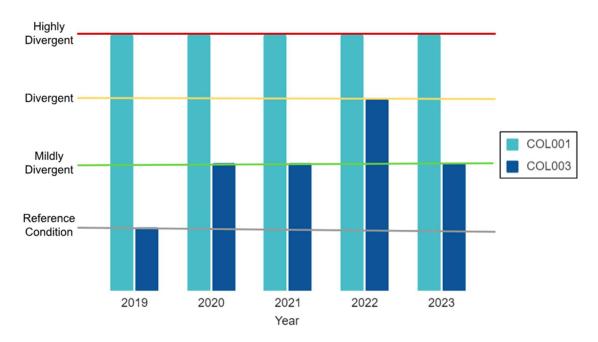


Figure 30. CABIN results for Coal Creek sites in 2019 – 2023.

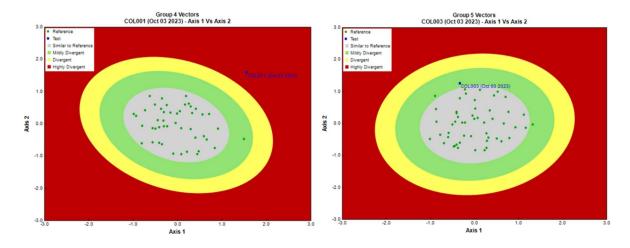


Figure 31. 2023 CABIN analysis community ellipses for Coal Creek sites, showing COL001 highly divergent from reference condition (left) and COL003 mildly divergent from reference condition (right).



Morrissey Creek

2023 was the fourth year of CABIN assessments for Morrissey Creek. The upstream site, MOR002, maintained its 2022 shift to "mildly divergent", while the downstream site, MOR001, remained highly divergent (Figure 32). Although the RIVPACS ratio suggests both Morrisey sites were in good condition, the Bray-Curtis scores (MOR001: 0.70, MOR002: 0.90) indicate the taxa diversity at both sites was low. As in 2022, EPT values for MOR001 remained significantly lower this year than in 2021 (54% compared to 86% in 2021) (Table 1). Like all sites in 2023, both Morrissey Creek sites also had very high total individual abundance numbers (13,360.00 compared to a mean reference site abundance of 1449.38 ± 859.74 for MOR001).

While there were no exceedances of BC Water Quality Guidelines, some water quality parameters showed a sudden increase at one or both Morrisey sites in 2023, which may be related to the TC Energy Pipeline work that was ongoing in the area throughout 2023. Parameters impacted included total aluminum, total ammonia (as N), chloride, manganese, total phosphorus (as P) total titanium and turbidity. Turbidity values showed the most radical jump, with values going from consistently below 1 NTU prior to 2023, to 11.85 NTU (MOR002) and 44 NTU (MOR001) in 2023 (Figure 38). The Morrissey Creek sites were established too recently to enable any valuable comparison of water quality results over time, but the ERA will continue to observe these parameters following TC Energy pipeline construction completion in 2024. Furthermore, as noted for the other creeks in the CABIN program, one-time sampling for water quality is not sufficient for indicating trends. Morrissey Creek is part of ERA's continuous temperature and discharge monitoring network, which is continuing to be implemented.

Morrissey Creek originates from a geographically similar location to Coal Creek, with similar historical logging in the upstream reaches. MOR001 is downstream of active logging roads, ATV trails, cattle grazing, and an active farming area. Previously, MOR002 was above most potential disturbance, but has been exposed to significant disturbance through the construction of the TC Energy pipeline starting late 2022, with the bulk of work occurring during 2023. Pipeline work caused significant traffic and construction on roadways and bridges directly upstream of the MOR002 location and MOR001 to a much lesser extent. Pipeline and roadway construction has been completed at the time of writing this report, and clean-up and monitoring is underway. Results in 2023 do not show significant changes to the benthic invertebrate community at MOR002 (other than the maintained decrease in *Trichoptera*, leaving *Ephemeroptera* and *Plecoptera* to dominate the EPT portion of individuals in the stream). The total abundance of individuals sampled at MOR002 has continued to increase between years and has now surpassed the range of the associated reference mean (Table 1).

The downstream sites in both Coal and Morrissey Creeks have multiple land use-related stressors in their catchments. Therefore, divergence from reference condition is not unexpected in either. Continued monitoring over time should begin to reveal patterns in site characteristics that may help identify the cause of these results. Further investigation, outside of CABIN monitoring, will be needed in future to fully understand the dynamics of this stream and the stressors affecting it.



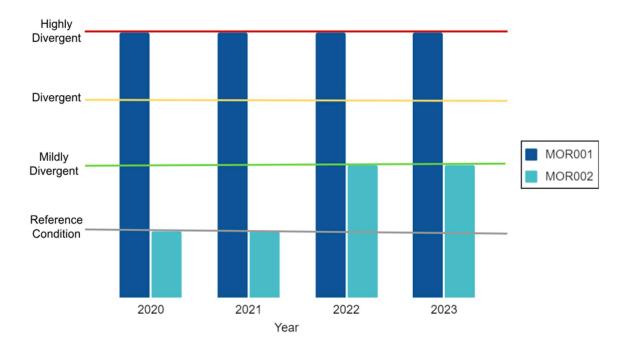


Figure 32. Results of CABIN assessment for Morrissey Creek sites in 2020-2023. This year, MOR001 was again classified as "highly divergent" while MOR002 was again classified as "mildly divergent."

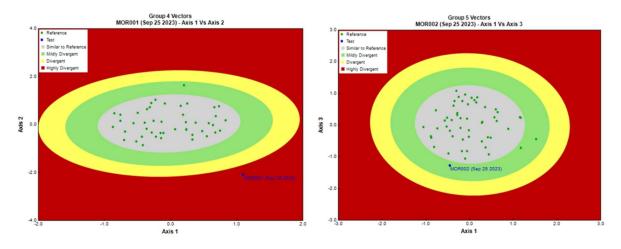


Figure 33. 2023 CABIN analysis community ellipses for the Morrissey Creek sites, showing MOR001 significantly diverging from reference condition (left) and MOR002 beginning to diverge from reference condition (right).

Benthic Macroinvertebrate Communities

CABIN assessments assign test sites a condition based on the structure of the benthic macroinvertebrate community. Figure 34 shows the general diversity in each CABIN test stream, based on the proportion of individuals belonging to each taxonomic order. Sites with a higher proportion of EPT (pollution sensitive taxa) coincide with those deemed less divergent from reference condition through CABIN assessments, and sites with the lowest proportion of EPT are those that have been assessed as the most divergent. Of the sites assessed as most divergent, LIZ001 and COL001, have significantly smaller proportions of



pollution-sensitive individuals, as well as higher numbers Tubifida (an order of pollution-tolerant worms).

The exceptions are the upper Lizard Creek site (LIZ003) and the lower Morrissey Creek site (MOR001), which were assessed as "Highly Divergent", yet a majority of the taxa present are part of the pollution sensitive group (EPT). In past years, MOR002 has exhibited much lower proportions of EPT individuals, similar to the LIZ001 and COL001 sites, so the shift towards pollution-sensitive taxa is unexpected. It is also worth noting that despite the upper Coal Creek site (COL003) has been assessed as being only mildly divergent, there was a marked decrease in the proportion of EPT taxa for 2023. Different levels of species-specific sensitivity are seen within these EPT groups, with some exhibiting higher tolerances and even thriving in certain disturbed environments (Houghtona, 2004). It is unclear what might have caused these changes in proportions in 2023, and further exploration is needed to fully understand these results.

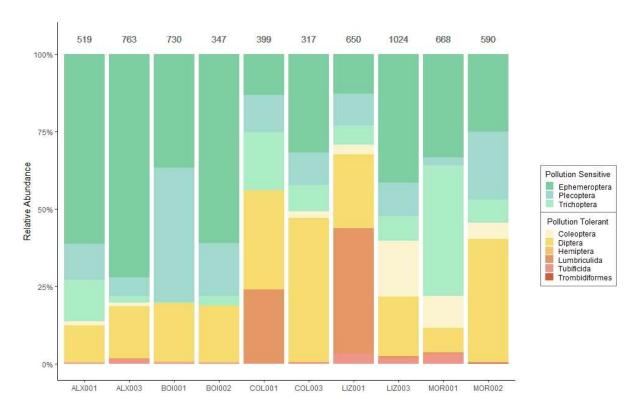


Figure 34. Graph representing the proportions of different taxonomic orders of benthic macroinvertebrates at each CABIN site. The three cool-coloured bars (greens, blues) represent pollution-sensitive taxa (Ephemeroptera, Plecoptera, Trichoptera), while the warm-coloured bars (red, orange, yellow) represent more pollution-tolerant taxa. Higher % EPT is generally considered to equate to healthier streams. The numbers along the top of the graph are the raw counts of all benthic macroinvertebrate individuals found at each site.

Table 1 takes a closer look at these results within benthic communities at each CABIN site using RIVPACS, Bray-Curtis Dissimilarity, %EPT and total abundance. The highlighted cells indicate values that differ significantly (i.e. 2 x standard deviation from the mean) from what is expected from a site in "reference condition".



Table 1. A comparison of CABIN sites, their classification according to 2023 CABIN assessments, and additional statistical measures that address the classification – RIVPACS, Bray-Curtis dissimilarity, and the percent EPT (Ephemeroptera, Plecoptera, Trichoptera). Highlighted cells indicate values that differ from what is expected for a reference site in good condition.

Stream Name	Site ID	CABIN Analysis	RIVPACS O:E (P>0.5)	Bray-Curtis Dissimilarity*	% EPT	Total Abundance
Alexander	ALX001	Mildly Divergent	1.13	0.64ª	86.32ª	10,380.00ª
Creek	ALX003	Mildly Divergent	1.04	0.69ª	80.29ª	15,260.00ª
Boivin	BOI001	Reference	1.06	0.61ª	80.52ª	14,600.00ª
Creek	BOI002	Reference	0.85	0.34ª	81.27ª	4,337.00 ^a
Coal	COL001	Highly Divergent	0.93	0.88 ^b	43.97 ^b	7,980.00 ^b
Creek	COL003	Mildly Divergent	0.87	0.60ª	50.79ª	6,340.00°
Lizard	LIZ001	Highly Divergent	1.05	0.96°	28.79°	13,000.00°
Creek	LIZ003	Highly Divergent	1.05	0.92 ^b	60.16 ^b	20,480.00 ^b
Morrissey	MOR001	Highly Divergent	0.89	0.70 ^b	78.38 ^b	13,360.00 ^b
Creek	MOR002	Mildly Divergent	0.96	0.90ª	54.39ª	11,800.00ª
	Reference Mean			(a) 0.40 ±0.14 (b) 0.34 ±0.10 (c) 0.34 ±0.10	(a) 89.20 ±10.03 (b) 91.94 ±7.29 (c) 88.13 ±9.26	(a) 4,661.00 ±3,118.98 (b) 1,449.38 ±859.74 (c) 1,083.09 ±932.35

^{*} The average dissimilarity value between individual reference sites and the "Reference Mean" that all test sites were measured against.



STREAM e-DNA

STREAM e-DNA analysis presents a list of species present at each sampled site, including general information on the species' ability to tolerate stressors and information regarding species richness at each site.

ERA's inclusion of STREAM e-DNA monitoring allowed for the identification of *Tubifex tubifex*, one of the two host species necessary for the presence of whirling disease, caused by the *Myxobolus cerebralis* parasite at ERA CABIN monitoring sites, leading to the creation of ERA's Whirling Disease Education and Monitoring program.

Tubifex tubifex was identified in Alexander, Coal and Lizard Creek in 2023. Tubifex tubifex was identified at Alexander, Coal and Lizard Creek in 2023, and has been identified at Morrissey, Lizard and Boivin Creeks in previous years, meaning that each of the five monitored creeks has had its presence confirmed at some point in time. In December of 2023, the first case of whirling disease in British Columbia was confirmed in Yoho National Park, part of the Columbia River Watershed (Canadian Food Inspection Agency, 2024). More recently, the presence of whirling disease was confirmed in the southern arm of Kootenay Lake in December of 2024 (Ministry of Water, Land and Resource Stewardship, 2024).

The Columbia River watershed has been declared an "infected" area and the rest of British Columbia has been classified as a "buffer" zone, meaning disease may occur due to links with infected areas (Canadian Food Inspection Agency, 2024). With whirling disease already widespread in the neighbouring parts of Alberta, including the Oldman watershed which borders the Elk River watershed (Veillard and James, 2020), the Elk River watershed is now a high-risk area for a whirling disease outbreak. The initial identification of this species at Boivin Creek led to the creation of a new ERA program, the 'Elk Valley Whirling Disease Project', an outreach and monitoring initiative within the Elk Valley to identify potentially high-risk locations for future spread and educate the community and visitors to prevent the introduction of this disease.

The detailed STREAM report is available in (Appendix E: Stream Report).



Water Quality Trends

ERA's CABIN program monitors water quality parameters over time to assess long-term trends. Data on pH, temperature, turbidity, dissolved oxygen concentration, conductivity and discharge are available as far back as 2012.

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PH levels at all sites have been relatively consistent over time (Figure 35). All areas assessed remained within the 6.5 to 9 pH BC Water Quality Guideline limits for freshwater aquatic life (B.C. Ministry of Environment and Climate Change Strategy, 2021a). Stream pH is primarily a function of surrounding geology, so the Elk Valley's predominantly limestone formations result in high pH values. Aquatic life in these areas has adapted to high pH conditions. If values deviate outside of these limits, damage to current aquatic communities and changes to the species composition of the stream can occur (B.C. Ministry of Environment and Climate Change Strategy, 2021a).

In 2022, Boivin Creek (BOI001, BOI002) sites had a noticeably lower pH value than the other CABIN monitoring locations. This drop in pH in Boivin Creek remains exclusive to 2022 results. Further years of monitoring are necessary to begin to decipher between natural variation and patterns indicative of disturbance or permanent changes to aquatic habitats. Similarly, results appear to suggest a pattern of increasing pH over time at the upper Coal Creek site (COL003), although this site exhibited noticeably lower pH than other CABIN locations in 2023.

There is not yet enough year-to-year data to draw any concrete conclusions and ERA will continue to monitor for any potential patterns through yearly CABIN sampling.

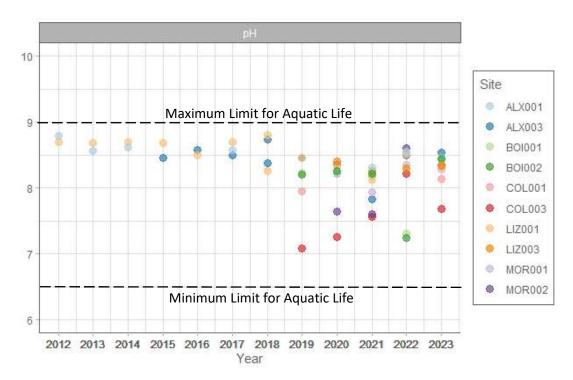


Figure 35. pH values for CABIN sites from 2012-2023. All sites remain within the range of limits outlined within the BC Water Quality Guidelines.



Temperature

In light of the potential effects of climate change on the Elk River system and key species such as Westslope cutthroat trout (WCT), understanding long-term temperature trends is a priority for ERA. Typically, aquatic life can only survive within specific ranges of temperatures. For example, WCT can only survive in waters between $0-25^{\circ}$ C (Bear, McMahon and Zale, 2007), with WCT beginning to experience thermal stress around $20-25^{\circ}$ C and acute mortality in water temperatures above 25° C.

Temperatures measured during CABIN monitoring varied considerably between sampling years at all sites (Figure 36). However, this can be attributed to natural climatic variability and sampling date. Although all sites in CABIN are monitored during low flow conditions between the end of August and the beginning of November, relatively large fluctuations are expected during this period, and a single annual measurement is insufficient to understand long term trends. Temperatures remained within the critical limit for important local species like the WCT and bull trout (DFO, 2017).

In depth analysis of temperature is only possible with ongoing, frequent monitoring using instream logging equipment. To this end, as part of its broader monitoring program, ERA has developed a separate hydrometric monitoring program to examine stream temperature throughout the Elk Valley in more detail.

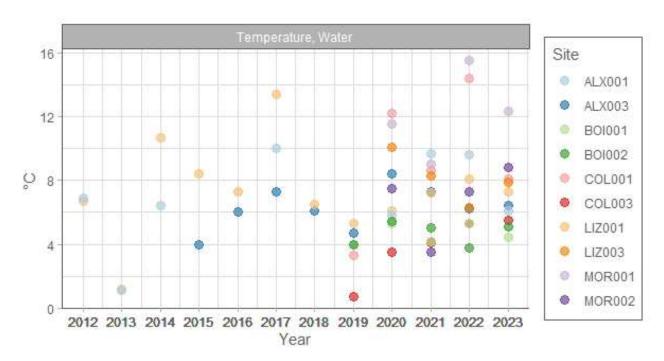


Figure 36. September water temperature values for CABIN sites from 2012-2023.



Dissolved Oxygen

The concentration of dissolved oxygen (DO) at all CABIN sites has remained stable over time and is consistently above the BC Water Quality Guideline long-term minimum level of 8 mg/L (Figure 37) (British Columbia Ministry of Environment and Climate Change Strategy, 2021). Dissolved oxygen measurements are more consistent across sites since 2021, this is likely due to the use of new, more accurate equipment (YSI ProDSS). This consistency amongst these measurements is expected to be observed in future.

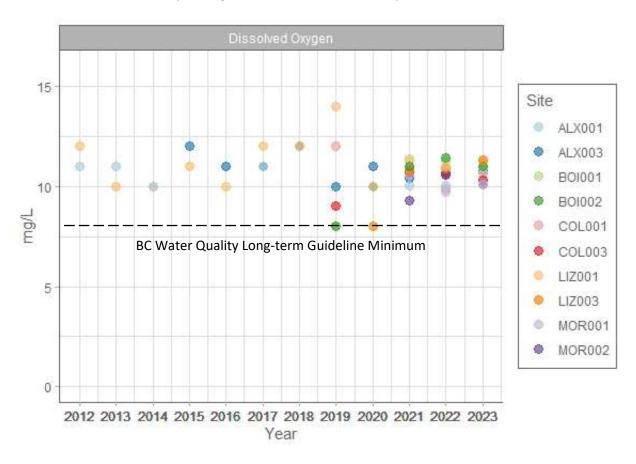


Figure 37. The amount of dissolved oxygen at CABIN sites in mg/L from 2012-2023. Site values do not fall below the BC water Quality Long-term Guideline minimum for Freshwater Aquatic Life (8 mg/L).

Turbidity

Canadian Water Quality guidelines suggest that environmental samples vary within the normal range of 1 to 1000 NTU. High turbidity has been shown to negatively affect fish and turbidity levels as low as 25 NTU can impact fish growth (Canadian Council of Ministers of the Environment, 1999). Since 2012, CABIN site turbidity readings have remained below 4 NTU, with most readings below 2 NTU.

ERA staff and community observations indicate all tributaries in the Elk River watershed experience significant turbidity spikes during rainfall events and spring freshet. However, all monitored creeks tend to have low turbidity readings during low-flow conditions, with turbidity spikes generally being indicative of upstream disturbance coupled with high rainfall/snowmelt events, particularly during the May-July freshet. In 2023, turbidity readings in Morrissey Creek (MOR001: 11.89 NTU, MOR002: 44 NTU) were



noticeably higher than in past years and higher than the turbidity readings of all other creeks. The turbid conditions in Morrisey Creek in 2023 are likely related to the significant traffic and construction on roads and bridges directly upstream of sampling locations as part of the TC Energy Pipeline project, which was ongoing at the time of sampling. This impact is especially apparent for the upper Morrissey (MOR002) site.

According to the BC Water Quality Guidelines, turbidity is a concern when the value changes by 8 or more NTU for 24 hours from the ambient turbidity level, or 2 NTU for 30 days (British Columbia Ministry of Environment and Climate Change Strategy, 2021). Annual single occurrence sampling is not sufficient to detect these changes. In 2023, ERA began phase 2 of its Sedimentation program, working with Ed Clayton, a PhD candidate from the University of Auckland, to explore the use of a low-cost sensor that hopes to enable continuous turbidity measurements throughout the year in Lizard Creek. Phase 2 of this sediment exploration is ongoing.

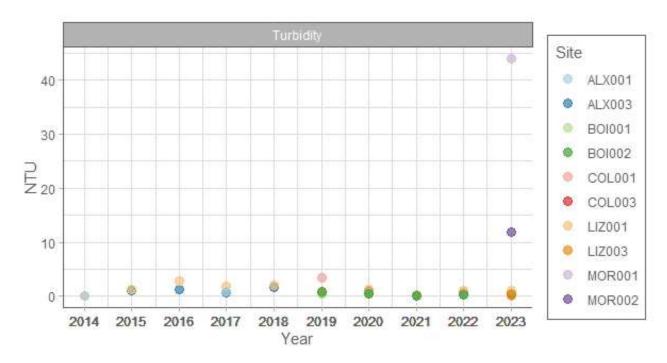


Figure 38. The turbidity (NTU) measured at CABIN sites from 2014-2023.



Conductivity

In general, conductivity levels for a freshwater river system range between 0 and 1000 uS/cm – conductivity levels above this are usually indicative of a saltwater system. Although all monitored sites fall within this range, the Lizard Creek sites have significantly higher conductivity levels than the other sites, likely due to high groundwater influence at this stream. This plot also shows a steep decrease in conductivity levels at LIZ001 between 2013 and 2014, followed by levels more than doubling in 2016. Although conductivity levels can fluctuate, the large change may have been a result of some added stressor.

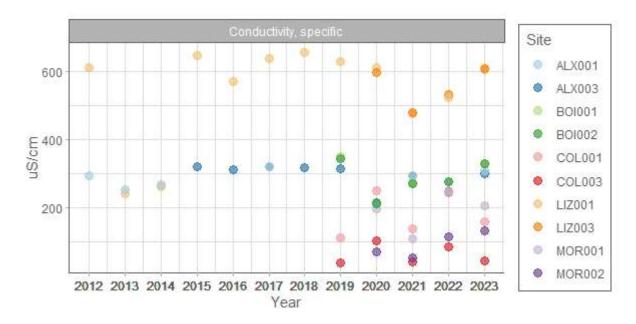


Figure 39. Conductivity levels measured at CABIN sites from 2012-2023.



Discharge

Discharge, referring to the volume of water flowing through a section of stream at a given time, was assessed during low flow conditions for each site (Figure 40). Discharge measurements at all sites remained relatively stable, fluctuating within site-specific ranges between years.

Like other measured parameters, discharge can fluctuate from day to day (and within the day). A single annual measurement is not sufficient to detect long term trends. In depth analysis of discharge is only possible with ongoing, frequent monitoring (e.g. hourly logging). To address this, ERA has begun implementing a hydrometric monitoring program to examine discharge in more detail.

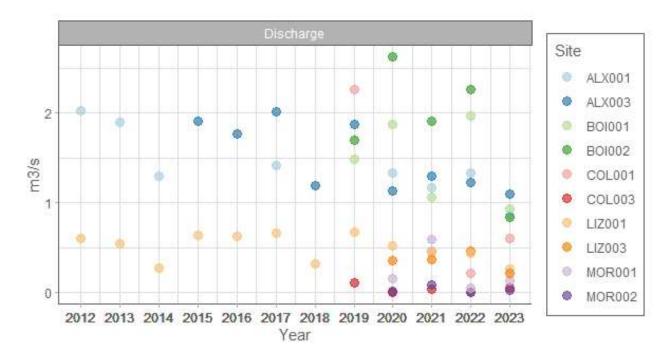


Figure 40. Discharge measurements calculated for CABIN sites from 2012- 2023.

Metals & Nutrients

Water chemistry data collected during the 2023 sampling period indicates there were no exceedances in metals or nutrients based on BC Water Quality Guidelines and no notable overall trends were observed.

Selenium and Calcite

The Elk Valley has a long history of mining, and its residents are very aware of the associated environmental issues with this industry. Selenium and calcite are two constituents of serious concern in this region. At the time of this report, the International Joint Commission is beginning to look into the transboundary effects of selenium and potential impacts to downstream cross-boundary watersheds, which speaks to the scale of concern surrounding selenium and the importance of monitoring efforts.

Selenium (Se) is a naturally occurring element and low levels are essential for the health of both humans and animals (Janz et al., 2010). Unfortunately, selenium actively bioaccumulates in tissues, and in higher concentrations, begins to become toxic, eventually causing reproductive issues and deformities (Teck



Resources Ltd., 2015). Waste rock, resulting from coal mining operations, contains selenium. During the mining process, this rock is broken into smaller pieces, creating more opportunity for air and water to interact with the rock. This results in the conversion of selenium into its soluble form (selenate), which is then released in water seeping through these waste rock piles into local waterways (Teck Resources Ltd., 2015). The BC water quality guideline for the protection of aquatic life is 0.002 mg/L (milligrams/litre). The BC human drinking water consumption guideline is 0.01 mg/L (British Columbia Ministry of Environment and Climate Change Strategy, 2021). It is worth noting that selenium bioavailability is impacted by the form of selenium. Selenate is less prone to bioaccumulation in fish, but upon uptake by plants, algae, or microbes, selenate can be converted to selenite. Selenite is more likely to be bioaccumulated and turn into organoselenium, increasing toxicity potential (Arnold, 2015; ADEPT Environmental Sciences Ltd., Samuel N Luoma, and TKB Ecosystem Health Services Ltd., 2022; Foster *et al.*, 2024). These different forms of selenium can also impact how, and how fast selenium moves through a watershed.

Calcite (CaCO3) is also naturally occurring and is formed when calcium (Ca) and carbonate (CO3) ions react under saturated conditions (Janz et al., 2010). Calcite concretion in streambeds, specifically downstream of local coal mining operations, has become an increasing concern in the Elk Valley. Although calcite precipitates occur naturally, the waste rock produced from mining has high concentrations of both calcium and carbonate which can solidify on large stretches of stream. Supersaturated conditions cause concretion of the streambed which can negatively affect aquatic life by actively eliminating benthic invertebrate habitat (Barrett, Weech and Orr, 2016). High amounts of calcite precipitate correlate with decreased %EPT and %Ephemeroptera (Golder Associates Ltd., 2014). There are no water quality guidelines associated with calcite in rivers, and as the Elk River watershed is primarily calcite-rich limestone, local rivers are naturally high in this substance (Golder Associates Ltd., 2014). Assessments of calcite usually measure the amount of solidified deposits within a stream through pebble counts (Barrett, Weech and Orr, 2016). CABIN monitoring includes a pebble count which should allow ERA to see any major deposits, if present. To date, no major calcite deposits have been seen during monitoring.

Tributary catchments assessed with ERA's CABIN program are not affected by contemporary mining activities and are not expected to exhibit associated contaminant issues. Selenium concentrations at the CABIN sites do not exceed reference levels and remain below the water quality guideline for freshwater aquatic life (Figure 41) (British Columbia Ministry of Environment and Climate Change Strategy, 2021). For comparison, Figure 42 displays selenium concentrations in the Elk River mainstem near the outflow to Lake Koocanusa, (the Elk receives selenium loadings from upstream mines) and compares the levels found in ERA's CABIN assessed tributaries in 2020. The concentrations at these tributaries are well below what is now observed in the Elk River mainstem and are similar to those in the Elk River in the 1990s.



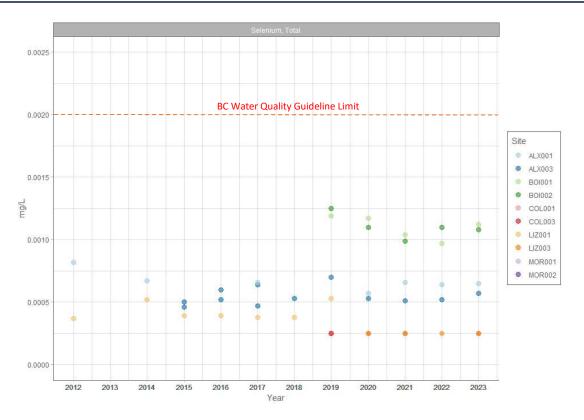


Figure 41. Total selenium concentrations at CABIN sites from 2012 to 2023. All concentrations are well below the BC water quality guideline of 0.002 mg/L (2μg/L).

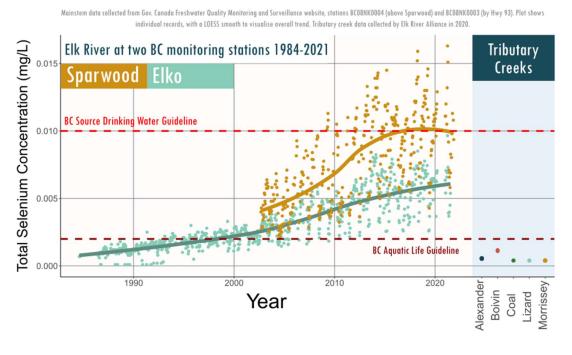


Figure 42. Total selenium in the Elk River mainstem at the outflow to Lake Koocanusa. Approximate concentrations at CABIN tributaries are included to the right and coincides with Elk River concentrations in the 1990s.



Study Limitations

A breakdown of some of the potential limitations for the 2023 CABIN sampling season.

Table 2. Outline of the potential limitations of ERA's Community-based Water Monitoring program

Aspect	Constraint	Comments on Limitations
Team competency/ experience	No	Staff members performing site assessments are trained in CABIN protocols through the Canadian Rivers Institute, ECCC and/or Living Lakes Canada. Individuals in these teams have varying levels of experience practicing CABIN protocols, however field teams are led by a more experienced ERA staff member certified in CABIN protocol. Tasks such as kicking are only completed by certified staff.
Timing / weather / seasonality	No	All monitoring is completed during low flow conditions, typically between August and November. Site visits are rescheduled if weather is not conducive to CABIN sampling (i.e. heavy rains that may change stream flow or benthic invertebrate communities).
CABIN Model	Maybe	In 2020 a new CABIN model was produced for the Columbia Basin which when applied to ERA sites, yielded substantially different results than with the previous model. ERA is currently investigating these issues to explore whether they are a result of unknown stressors on the aquatic systems, issues with the new model's ability to sort and assess ERA's sites, GIS, or field technician error.
Scope	No	The scope was clearly defined and realistically achievable within the designated time-frame.
Proportion of task achieved, and further work which might be needed	Maybe	All sites were successfully sampled and assessed, but there is room for improvement and expansion. The CABIN program aims to create a better understanding of watershed health. Increasing the number of sites across different watershed areas and incorporating a greater variety of habitats may be necessary to better understand overall ecosystem health.
Resources	No	Through the ERA board of directors and local partnerships, ERA staff have access to a diverse group of experts in various scientific fields. With the development of the Elk River Watershed Monitoring Collaborative, ERA's CABIN program focus will aim to align with the initiatives of this group and will gain further expertise in several different fields through its involvement in this program.
		In the past, ERA has had limited access to industry-standard equipment. In 2021, ERA was able to begin upgrading equipment. Physical water quality parameters are being assessed using the YSI ProDSS which increases the accuracy of measurements.
Access	No	All sites were accessible. Initial CABIN site selection includes evaluating the accessibility of a site prior to inclusion in the program.



Conclusion & Recommended Actions

ERA's CABIN program is an ongoing program used to assess streams of concern identified through research and community input. Methodology in 2023 continued to center around CABIN-based assessments and included STREAM e-DNA sampling.

While study sites on Boivin Creek appear to be in healthy condition, the lower Coal Creek site (COL001), the lower Morrisey Creek site (MOR001), and both Lizard Creek sites (LIZ001 and LIZ003), are being assessed as "highly divergent" from reference condition, which suggests that these sites may not be in good health. Previously in healthy condition, both Alexander sites are now also assessed as "mildly divergent" according to CABIN assessments and may beginning to experience a decline in health similar to COL003 and MOR002, which continue to be assessed as "mildly divergent".

Both Coal Creek and Morrissey Creek have large amounts of current and historical upstream development, including recent work related to the TC Energy Pipeline in the Morrisey area, which is why the poor assessment results at the lower sites (COL001, MOR001) were not entirely unexpected. Analysis of water quality parameters associated with these sites does not indicate any obvious red flags due to exceedances of water quality guidelines that would point to causes for divergence, but the diversity of the benthic communities at these locations appears abnormal compared to reference condition sites. Additionally, Morrissey sites showed a sudden increase in some water quality parameters, especially turbidity, which is likely related to the TC Energy pipeline road construction and road use. The potential decline in health of Alexander Creek sites is unexpected since there have been no major changes along this stream and neither water quality, nor benthic parameters indicate any trends that might have caused this divergence. Continuing to monitor these sites and watching for patterns in water quality parameters over time is a priority going forward.

The unexpected results for the Lizard Creek sites are a concern given the creek's importance in Westslope cutthroat trout population recruitment (Elk River Alliance, 2020). Although there are no specific exceedances of any water quality parameters based on BC guidelines, the benthic communities differ from what is expected from a typical healthy aquatic habitat, with numbers of pollutant-tolerant families becoming more prominent.

For each of these sites that have been assessed as "highly divergent", the total abundance of benthic invertebrates has been significantly higher than at associated reference sites. Furthermore, based on several measured water quality parameters, Lizard Creek may have unique conditions that are not captured by assigned reference sites (elevated alkalinity, hardness, calcium, magnesium, etc.). Due to the nature of CABIN models, which match a test site with a collection of specific reference sites and then compare the benthic communities, its possible that these high abundances have exaggerated how different the sites are, and produced these more extreme results, or that the differences in the natural state of this creek and reference creeks is too great to compare, yielding inaccurate results.

Understanding why these shifts in state have occurred, whether it is a data error, CABIN model issue, or a sign of a quickly degrading important aquatic habitat, is a high priority. ERA is recommending further investigations into potential stressors affecting these "highly divergent" CABIN monitoring sites. Lizard Creek is a high priority creek for more in-depth monitoring in future.



ERA has established and continues to engage with the Elk River Watershed Collaborative Monitoring Program (ERWCMP). With the growth of new partnerships, the development of new research questions and access to previously inaccessible data, ERA hopes to continue to expand the CABIN program in the coming years and better integrate ERA CABIN sites with other regional work and ERWCMP's partner input to improve our understanding of watershed health. The primary focus will continue to be filling in current data gaps and finding answers to the local community's environmental concerns. ERA will seek to engage the ERWCMP on the potential issues with Lizard Creek and hopes to enlist this group to take a leading role in new monitoring efforts on this Creek.



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Appendix A: CABIN Reports

Site Description

Cité Décéripaien	
Study Name	CBWQ-Elk
Site	ALX001
Sampling Date	Sep 27 2023
Know Your Watershed Basin	Central Kootenay
Province / Territory	British Columbia
Terrestrial Ecological Classification	Montane Cordillera EcoZone
	Northern Continental Divide EcoRegion
Coordinates (decimal degrees)	49.67424 N, 114.78019 W
Altitude	1219
Local Basin Name	Alexander Creek
	Elk River
Stream Order	4



Figure 1. Location Map

Cabin Assessment Results

	Reference Model Summary					
Model	Columbia Basin 2020					
Analysis Date	November 20, 2024					
Taxonomic Level	Family					
Predictive Model Variables	Altitude					
	Drainage-Area					
	Longitude					
	Natl-Grassland					
	Natl-ShrubLow					
	Nati-Water					
	Precip10_Oct					
	Reach-%CanopyCoverage					
	Sedimentary					
	Slope					
	SlopeMax					
	Temp12_DECmin					
D-f						

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	3.3%	4.3%	2.8%	4.3%	84.1%	1.2%
CABIN Assessment of ALX001 on Sep 27,			Mildly D	ivergent		
2023						

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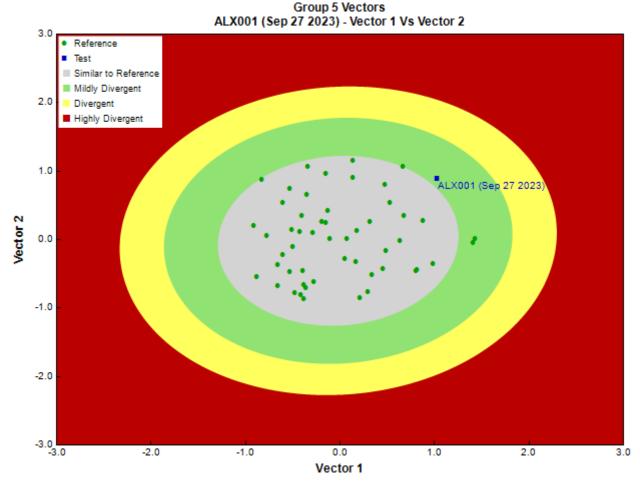


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Arthropoda	Arachnida	Trombidiformes	Lebertiidae	1	20.0
			Sperchontidae	1	20.0
	Insecta	Coleoptera	Elmidae	7	140.0
		Diptera	Chironomidae	41	820.0
			Empididae	4	80.0
			Psychodidae	16	320.0
			Tipulidae	1	20.0
		Ephemeroptera	Ameletidae	1	20.0
			Baetidae	199	3,980.0
			Ephemerellidae	78	1,560.0
			Heptageniidae	40	800.0
		Plecoptera	Chloroperlidae	7	140.0
			Leuctridae	1	20.0
			Nemouridae	38	760.0
			Perlidae	3	60.0
			Perlodidae	10	200.0

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Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Taeniopterygidae	1	20.0
		Trichoptera	Apataniidae	3	60.0
			Brachycentridae	5	100.0
			Glossosomatidae	27	540.0
			Hydropsychidae	2	40.0
			Rhyacophilidae	24	480.0
			Uenoidae	9	180.0
			Total	519	10,380.0

Metrics

Name	ALX001	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.64	0.4 ± 0.1
	Indices	
Hilsenhoff Family index (Mid-Atlantic)	3.9	3.4 ± 0.4
Hilsenhoff Family index (North-West)	3.9	3.1 ± 0.5
Intolerant taxa		1.0 ± 0.0
Long-lived taxa	4.0	1.7 ± 1.2
Tolerant individuals (%)		0.3 ± 0.0
Functiona	l Measures	
% Filterers		
% Gatherers	38.3	45.8 ± 14.9
% Predatores	17.5	14.8 ± 9.8
% Scrapers	55.5	59.4 ± 19.6
% Shredder	10.8	30.7 ± 17.4
No. Clinger Taxa	34.0	19.8 ± 4.0
	Individuals	
% Chironomidae	7.9	7.5 ± 8.6
% Coleoptera	1.3	0.1 ± 0.3
% Diptera + Non-insects	12.3	10.7 ± 9.9
% Ephemeroptera	61.3	47.2 ± 15.8
% Ephemeroptera that are Baetidae	62.6	25.4 ± 20.8
% EPT Individuals	86.3	89.2 ± 10.0
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	53.4	58.3 ± 10.6
% of 5 dominant taxa	76.3	83.6 ± 6.3
% of dominant taxa	38.3	37.8 ± 11.1
% Plecoptera	11.6	36.3 ± 16.7
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	2.9	25.4 ± 24.6
% Tricoptera	13.5	5.7 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 ± 0.1
Total Abundance	10380.0	4661.0 ± 3119.0
	nness	
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1
Coleoptera taxa	1.0	0.1 ± 0.3
Diptera taxa	4.0	2.8 ± 1.0
Ephemeroptera taxa	4.0	3.7 ± 0.5
EPT Individuals (Sum)	8960.0	4035.4 ± 2618.4
EPT taxa (no)	16.0	12.3 ± 1.9
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.7	0.7 ± 0.1
Plecoptera taxa	6.0	5.5 ± 1.1
Shannon-Wiener Diversity	2.1	1.9 ± 0.3
Simpson's Diversity	0.8	0.8 ± 0.1
Simpson's Evenness	0.2	0.3 ± 0.1
Total No. of Taxa	23.0	17.0 ± 3.1
Trichoptera taxa	6.0	3.1 ± 1.2

Frequency and Probability of Taxa Occurrence

		ites	Probability Of Occurrence at	
Group Group Group 1 2 3	Group Group 5	Group 6	ALX001	
1 2 3	4 3			

RIVPACS	Ratios
---------	--------

RIVPACS : Expected taxa P>0.50	12.44
RIVPACS : Observed taxa P>0.50	14.00
RIVPACS : 0:E (p > 0.5)	1.13
RIVPACS : Expected taxa P>0.70	9.51
RIVPACS : Observed taxa P>0.70	10.00
RIVPACS : 0:E (p > 0.7)	1.05

Variable	ALX001	Predicted Group Reference Mean ±SD
Bedroo	ck Geology	
Sedimentary (%)	100.00000	98.46051 ± 8.10999
	nannel	
Depth-Avg (cm)	27.0	20.0 ± 8.6
Depth-BankfullMinusWetted (cm)	35.90	46.71 ± 35.00
Depth-Max (cm)	32.0	28.8 ± 13.7
Discharge (m^3/s)	0.142	0.682
Macrophyte (PercentRange)	0	0 ± 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 ± 0.95
Reach-%Logging (PercentRange)	0	0 ± 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 ± 1
Reach-Pools (Binary)	0	1 ± 0
Reach-Rapids (Binary)	0	0 ± 0
Reach-Riffles (Binary)	1	1 ± 0
Reach-StraightRun (Binary)	1	1 ± 0
Slope (m/m)	0.0695000	0.0270638 ± 0.0257534
Veg-Coniferous (Binary)	1	1 ± 0
Veg-Deciduous (Binary)	1	1 ± 0
Veg-GrassesFerns (Binary)	1	1 ± 0
Veg-Shrubs (Binary)	1	1 ± 0
Velocity-Avg (m/s)	0.52	0.58 ± 0.20
Velocity-Max (m/s)	0.82	0.85 ± 0.27
Width-Bankfull (m)	13.6	16.1 ± 13.1
Width-Wetted (m)	6.1	9.8 ± 7.7
XSEC-VelInstrumentDirect (Category(1-3))	2	3 ± 0
XSEC-VelMethod (Category(1-3))	3	2 ± 1
	limate	2 - 1
Precip10_OCT (mm)	44.44840	64.42223 ± 33.96544
Temp12_DECmin (Degrees Celsius)	-14.37000	-12.74810 ± 1.73767
	drology	12.74010 ± 1.75707
Drainage-Area (km^2)	179.83405	100.09787 ± 132.80561
	ndcover	100.05707 = 152.00501
Nati-Grassland (%)	4.13231	7.47766 ± 6.29880
Nati-ShrubLow (%)	0.08024	1.80492 ± 1.50412
Nati-Water (%)	0.00024	0.32077 ± 0.59001
Reg-Ice (%)	0.00000	$\frac{0.32077 \pm 0.39001}{1.28005 \pm 3.54484}$
	trate Data	1.20003 ± 3.34404
%Bedrock (%)	0	0 ± 0
%Boulder (%)	5	6 ± 6
%Cobble (%)	63	57 ± 15
%Cobble (%) %Gravel (%)	2	$\frac{37 \pm 13}{2 \pm 3}$
%Pebble (%)	30	2 ± 3 34 ± 16
%Sand (%)	0	0 ± 0
%Silt+Clay (%)	0	0 ± 0 0 ± 1
D50 (cm)	8.05	24.05 ± 35.66
Dg (cm)	7.9	23.0 ± 33.8
Dominant-1st (Category(0-9))	6	6 ± 1
Dominant-2nd (Category(0-9))	5	6 ± 1
Embeddedness (Category(1-5))	4	4 ± 1

Habitat Description		
Variable	ALX001	Predicted Group Reference Mean ±SD
PeriphytonCoverage (Category(1-5))	2	2 ± 1
SurroundingMaterial (Category(0-9))	2	3 ± 1
	opography	20.61224 1 7 41112
Reg-SlopeLT30% (%)	39.74502	20.01334 ± 7.41149
SlopeMax (%)	353.26163	488.94077 ± 542.32910
Ag (mg/L)	er Chemistry 0.0000250	0.0000018 ± 0.0000013
Al (mg/L)	0.0025000	0.0078031 ± 0.0090962
As (mg/L)	0.0002500	0.0002735 ± 0.0001787
B (mg/L)	0.0250000	0.0127286 ± 0.0135802
Ba (mg/L)	0.0721000	0.0677069 ± 0.0514113
Be (mg/L)	0.0000500	0.0000043 ± 0.0000039
Bi (mg/L)	0.0000500	0.0000018 ± 0.0000013
Br (mg/L)	0.0500000	0.0303333 ± 0.0788597
Ca (mg/L)	52.4000000	28.2142857 ± 13.7707094
Cd (mg/L)	0.0000050	0.0000100 ± 0.0000293
Chloride-Total (mg/L)	1.0200000	0.0000000 ± 0.0000000
Co (mg/L)	0.0000500	0.0000075 ± 0.0000060
Cr (mg/L)	0.0002500	0.0001514 ± 0.0001361
Cu (mg/L)	0.0002000	0.0001604 ± 0.0001447
F (mg/L)	0.1600000	0.0876667 ± 0.0847823
Fe (mg/L)	0.0050000	0.0101789 ± 0.0111495
General-Alkalinity (mg/L)	187.0000000	98.9704545 ± 43.8308301
General-CarbonDOC (mg/L)	1.5300000	0.8383333 ± 0.4040008
General Conductivity (US (cm)	1.1600000 309.0000000	0.5586957 ± 0.6229060 $173.5150000 \pm 86.2502071$
General-Conductivity (μS/cm) General-DO (mg/L)	10.8900000	10.7243478 ± 0.8596502
General-Hardness (mg/L)	186.0000000	109.1853659 ± 48.3470504
General-pH (pH)	8.5	8.0 ± 0.6
General-SolidsTSS (mg/L)	1.0000000	5.2717002 ± 27.1908288
General-SpCond (µS/cm)	309.0000000	196.0710526 ± 116.3908975
General-TempAir (Degrees Celsius)	8.0	7.2 ± 5.7
General-TempWater (Degrees Celsius)	6.1000000	6.2042553 ± 2.0993816
General-Turbidity (NTU)	0.3300000	0.4347619 ± 0.5563328
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000
K (mg/L)	0.4100000	0.3312424 ± 0.1572675
Li (mg/L)	0.0043100	0.0009183 ± 0.0003795
Mg (mg/L)	13.3000000	7.8748571 ± 3.9958945
Mn (mg/L)	0.0008500	0.0007721 ± 0.0008518
Mo (mg/L) Na (mg/L)	0.0007800 1.8100000	0.0012835 ± 0.0042333 0.7930303 ± 0.4756164
Ni (mg/L)	0.0002000	0.0001266 ± 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0001200 ± 0.0001131 0.0049953 ± 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0287300 ± 0.0357249
Nitrogen-NO3 (mg/L)	0.0050000	0.0336397 ± 0.0328125
Nitrogen-TKN (mg/L)	0.0770000	0.0352941 ± 0.0299453
Nitrogen-TN (mg/L)	0.0770000	0.0675581 ± 0.0509763
Pb (mg/L)	0.0001000	0.0000179 ± 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 ± 0.5208890
Phosphorus-TP (mg/L)	0.0068000	0.0031912 ± 0.0087929
S (mg/L)	7.1000000	3.6625000 ± 1.5619928
Sb (mg/L)	0.0001000	0.0000337 ± 0.0000157
Se (mg/L)	0.0006500	0.0002782 ± 0.0002859
Si (mg/L)	2.4000000	2.0400303 ± 0.8510321
Sn (mg/L)	0.0001000	0.0000300 ± 0.0000407
S04 (mg/L)	20.6000000	13.3070732 ± 13.0883468
Sr (mg/L) Te (mg/L)	0.1210000 0.0002500	$\begin{array}{c} 0.0893414 \pm 0.0805860 \\ 0.0000000 \pm 0.0000000 \end{array}$
Th (mg/L)	0.0002500	0.0000000 ± 0.0000000
Ti (mg/L)	0.000500	0.0000000 ± 0.0000000 0.0003150 ± 0.0001205
TI (mg/L)	0.0023000	0.0003130 ± 0.0001203 0.0000040 ± 0.0000067
U (mg/L)	0.0006280	0.0000340 ± 0.0000007 0.0003872 ± 0.0002299
C (mg/ L)	0.000280	0.0003072 ± 0.0002299

Date: January 17, 2025 3:13 PM

Variable	ALX001	Predicted Group Reference Mean ±SD		
V (mg/L)	0.0025000	0.0001617 ± 0.0001537		
Zn (mg/L)	0.0020000	0.0003724 ± 0.0003377		
Zr (mg/L)	0.0000500	0.0000500 ± 0.0000000		

Date: January 17, 2025 3:13 PM

Site Description

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Study Name	CBWQ-Elk
Site	ALX003
Sampling Date	Sep 27 2023
Know Your Watershed Basin	Central Kootenay
Province / Territory	British Columbia
Terrestrial Ecological Classification	Montane Cordillera EcoZone
	Northern Continental Divide EcoRegion
Coordinates (decimal degrees)	49.65563 N, 114.73078 W
Altitude	1311
Local Basin Name	Alexander Creek
	Elk River Watershed
Stream Order	4



Figure 1. Location Map

Cabin Assessment Results

	Reference Model Summary	
Model	Columbia Basin 2020	
Analysis Date	November 20, 2024	
Taxonomic Level	Family	
Predictive Model Variables	Altitude	
	Drainage-Area	
	Longitude	
	Natl-Grassland	
	Natl-ShrubLow	
	Natl-Water	
	Precip10_Oct	
	Reach-%CanopyCoverage	
	Sedimentary	
	Slope	
	SlopeMax	
	Temp12_DECmin	

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate			39.	4%		
Probability of Group Membership	1.3%	2.0%	3.8%	6.9%	85.1%	0.9%
CABIN Assessment of ALX003 on Sep 27,	Mildly Divergent					
2023						

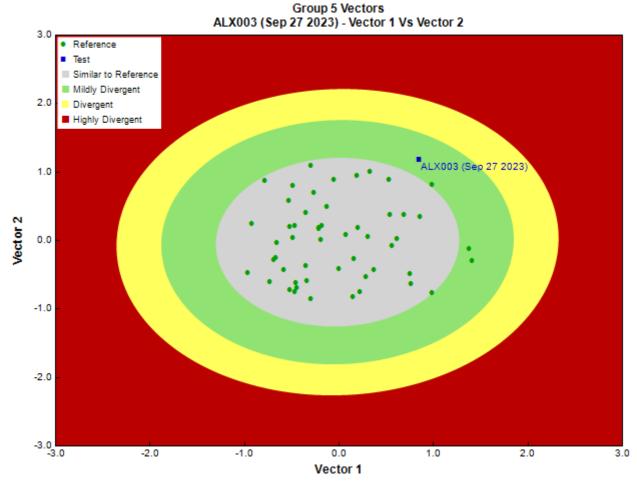


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	2	40.0
Arthropoda	Arachnida	Trombidiformes	Aturidae	1	20.0
			Lebertiidae	4	80.0
			Sperchontidae	5	100.0
			Torrenticolidae	1	20.0
	Insecta	Coleoptera	Elmidae	8	160.0
		Diptera	Chironomidae	61	1,220.0
			Empididae	4	80.0
			Psychodidae	60	1,200.0
			Simuliidae	4	80.0
		Ephemeroptera	Ameletidae	1	20.0
			Baetidae	334	6,680.0
			Ephemerellidae	132	2,640.0
			Heptageniidae	83	1,660.0
		Plecoptera		2	40.0
			Chloroperlidae	4	80.0

Date: January 17, 2025 3:13 PM

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Nemouridae	35	700.0
			Perlodidae	2	40.0
			Taeniopterygidae	3	60.0
		Trichoptera	Brachycentridae	2	40.0
			Glossosomatidae	2	40.0
			Hydropsychidae	2	40.0
			Rhyacophilidae	10	200.0
			Uenoidae	1	20.0
			Total	763	15,260.0

Metrics

Name	ALX003	Predicted Group Reference				
· · · · · · · · · · · · · · · · · · ·	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Mean ±SD				
Bray-Curtis Distance	0.69	0.4 ± 0.1				
Biotic Indices						
Hilsenhoff Family index (Mid-Atlantic)	4.1	3.4 ± 0.4				
Hilsenhoff Family index (North-West)	4.1	3.1 ± 0.5				
Intolerant taxa		1.0 ± 0.0				
Long-lived taxa	2.0	1.7 ± 1.2				
Tolerant individuals (%)		0.3 ± 0.0				
Functiona	l Measures					
% Filterers						
% Gatherers	41.0	45.8 ± 14.9				
% Predatores	12.6	14.8 ± 9.8				
% Scrapers	57.3	59.4 ± 19.6				
% Shredder	6.3	30.7 ± 17.4				
No. Clinger Taxa	31.0	19.8 ± 4.0				
	Individuals					
% Chironomidae	8.0	7.5 ± 8.6				
% Coleoptera	1.1	0.1 ± 0.3				
% Diptera + Non-insects	18.7	10.7 ± 9.9				
% Ephemeroptera	72.3	47.2 ± 15.8				
% Ephemeroptera that are Baetidae	60.7	25.4 ± 20.8				
% EPT Individuals	80.3	89.2 ± 10.0				
% Odonata		0.0 ± 0.0				
% of 2 dominant taxa	61.2	58.3 ± 10.6				
% of 5 dominant taxa	88.0	83.6 ± 6.3				
% of dominant taxa	43.9	37.8 ± 11.1				
% Plecoptera	5.8	36.3 ± 16.7				
% Tribe Tanyatarisini						
% Trichoptera that are Hydropsychida	11.8	25.4 ± 24.6				
% Tricoptera	2.2	5.7 ± 3.9				
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 ± 0.1				
Total Abundance	15260.0	4661.0 ± 3119.0				
	iness					
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1				
Coleoptera taxa	1.0	0.1 ± 0.3				
Diptera taxa	4.0	2.8 ± 1.0				
Ephemeroptera taxa	4.0	3.7 ± 0.5				
EPT Individuals (Sum)	12220.0	4035.4 ± 2618.4				
EPT taxa (no)	13.0	12.3 ± 1.9				
Odonata taxa		0.0 ± 0.0				
Pielou's Evenness	0.6	0.7 ± 0.1				
Plecoptera taxa	4.0	5.5 ± 1.1				
Shannon-Wiener Diversity	1.8	1.9 ± 0.3				
Simpson's Diversity	0.8	0.8 ± 0.1				
Simpson's Evenness	0.2	0.3 ± 0.1				
Total No. of Taxa	23.0	17.0 ± 3.1				
Trichoptera taxa	5.0	3.1 ± 1.2				

Frequency and Probability of Taxa Occurrence

Group Group Group Group Group	
Group Group Group Group Group	ALX003
1 2 3 4 5 6	

RIV	ΈΔ	റട	Rat	ine
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RIVPACS : Expected taxa P>0.50	12.47
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS: 0:E (p > 0.5)	1.04
RIVPACS : Expected taxa P>0.70	9.54
RIVPACS : Observed taxa P>0.70	10.00
RIVPACS: 0:E (p > 0.7)	1.05

Variable	ALX003	Predicted Group Reference Mean ±SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 ± 8.10999
Channel		
Depth-Avg (cm)	27.7	20.0 ± 8.6
Depth-BankfullMinusWetted (cm)	15.50	46.71 ± 35.00
Depth-Max (cm)	44.0	28.8 ± 13.7
Discharge (m^3/s)	0.115	0.682
Macrophyte (PercentRange)	0	0 ± 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 ± 0.95
Reach-%Logging (PercentRange)	0	0 ± 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 ± 1
Reach-Pools (Binary)	1	1 ± 0
Reach-Rapids (Binary)	0	0 ± 0
Reach-Riffles (Binary)	1	1 ± 0
Reach-StraightRun (Binary)	1	1 ± 0
Slope (m/m)	0.0155400	0.0270638 ± 0.0257534
Veg-Coniferous (Binary)	1	1 ± 0
Veg-Deciduous (Binary)	1	1 ± 0
Veg-GrassesFerns (Binary)	1	1 ± 0
Veg-Shrubs (Binary)	1	1 ± 0
Velocity-Avg (m/s)	0.42	0.58 ± 0.20
Velocity-Max (m/s)	0.55	0.85 ± 0.27
Width-Bankfull (m)	10.9	16.1 ± 13.1
Width-Wetted (m)	9.5	9.8 ± 7.7
XSEC-VelInstrumentDirect (Category(1-3))	3	3 ± 0
XSEC-VelMethod (Category(1-3))	3	2 ± 1
Climate		
Precip10_OCT (mm)	43.56508	64.42223 ± 33.96544
Temp12_DECmin (Degrees Celsius)	-14.37000	-12.74810 ± 1.73767
-	drology	
Drainage-Area (km^2)	145.66791	100.09787 ± 132.80561
	ndcover	
Nati-Grassland (%)	2.54675	7.47766 ± 6.29880
Nati-ShrubLow (%)	0.09901	1.80492 ± 1.50412
Nati-Water (%)	0.00000	0.32077 ± 0.59001
Reg-Ice (%)	0.00000	1.28005 ± 3.54484
	strate Data	0.1.0
%Bedrock (%)	0	0 ± 0
%Boulder (%)	4	6 ± 6
%Cobble (%)	71	57 ± 15
%Gravel (%) %Pebble (%)	5	2 ± 3 34 ± 16
	20	
%Sand (%) %Silt+Clay (%)	0	0 ± 0 0 ± 1
D50 (cm)	8.75	24.05 ± 35.66
Dg (cm)	8.2	23.0 ± 33.8
Dominant-1st (Category(0-9))	6	6 ± 1
Dominant-2nd (Category(0-9))	7	6 ± 1
Embeddedness (Category(1-5))	3	4 ± 1

Habitat Description		
Variable	ALX003	Predicted Group Reference Mean ±SD
PeriphytonCoverage (Category(1-5))	2	2 ± 1
SurroundingMaterial (Category(0-9))	² Topography	3 ± 1
Reg-SlopeLT30% (%)	37.52888	20.01334 ± 7.41149
SlopeMax (%)	353.26163	488.94077 ± 542.32910
	ter Chemistry	400.94077 ± 342.92910
Ag (mg/L)	0.0000250	0.0000018 ± 0.0000013
Al (mg/L)	0.0070000	0.0078031 ± 0.0090962
As (mg/L)	0.0002500	0.0002735 ± 0.0001787
B (mg/L)	0.0250000	0.0127286 ± 0.0135802
Ba (mg/L)	0.0709000	0.0127280 ± 0.0133802 0.0677069 ± 0.0514113
Be (mg/L)	0.0000500	0.0000043 ± 0.0000039
Bi (mg/L)	0.0000500	0.0000043 ± 0.0000033
		0.0303333 ± 0.0788597
Br (mg/L)	0.0500000	
Ca (mg/L)	51.1000000	$28.2142857 \pm 13.7707094$
Cd (mg/L)	0.000050	0.0000100 ± 0.0000293
Chloride-Total (mg/L)	0.7700000	0.0000000 ± 0.0000000
Co (mg/L)	0.000500	0.0000075 ± 0.0000060
Cr (mg/L)	0.0002500	0.0001514 ± 0.0001361
Cu (mg/L)	0.0002000	0.0001604 ± 0.0001447
F (mg/L)	0.1400000	0.0876667 ± 0.0847823
Fe (mg/L)	0.0150000	0.0101789 ± 0.0111495
General-Alkalinity (mg/L)	185.0000000	$98.9704545 \pm 43.8308301$
General-CarbonDOC (mg/L)	1.7900000	0.8383333 ± 0.4040008
General-CarbonTOC (mg/L)	1.6800000	0.5586957 ± 0.6229060
General-Conductivity (µS/cm)	299.7000000	$173.5150000 \pm 86.2502071$
General-DO (mg/L)	10.8500000	10.7243478 ± 0.8596502
General-Hardness (mg/L)	182.0000000	$109.1853659 \pm 48.3470504$
General-pH (pH)	8.5	8.0 ± 0.6
General-SolidsTSS (mg/L)	1.0000000	5.2717002 ± 27.1908288
General-SpCond (µS/cm)	299.7000000	196.0710526 ± 116.3908975
General-TempAir (Degrees Celsius)	12.0	7.2 ± 5.7
General-TempWater (Degrees Celsius)	6.4000000	6.2042553 ± 2.0993816
General-Turbidity (NTU)	0.4300000	0.4347619 ± 0.5563328
Hg (ng/L)	0.000050	0.0000000 ± 0.0000000
K (mg/L)	0.4000000	0.3312424 ± 0.1572675
Li (mg/L)	0.0039400	0.0009183 ± 0.0003795
Mg (mg/L)	13.2000000	7.8748571 ± 3.9958945
Mn (mg/L)	0.0013700	0.0007721 ± 0.0008518
Mo (mg/L)	0.0006600	0.0012835 ± 0.0042333
Na (mg/L)	1.6000000	0.7930303 ± 0.4756164
Ni (mg/L)	0.0002000	0.0001266 ± 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 ± 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0287300 ± 0.0357249
Nitrogen-NO3 (mg/L)	0.0050000	0.0336397 ± 0.0328125
Nitrogen-TKN (mg/L)	0.0250000	0.0352941 ± 0.0299453
Nitrogen-TN (mg/L)	0.0250000	0.0675581 ± 0.0509763
Pb (mg/L)	0.0001000	0.0000179 ± 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 ± 0.5208890
Phosphorus-TP (mg/L)	0.0025000	0.0031912 ± 0.0087929
S (mg/L)	6.2000000	3.6625000 ± 1.5619928
Sb (mg/L)	0.0001000	0.0000337 ± 0.0000157
Se (mg/L)	0.0005700	0.0002782 ± 0.0002859
Si (mg/L)	2.2000000	2.0400303 ± 0.8510321
Sn (mg/L)	0.0001000	0.0000300 ± 0.0000407
S04 (mg/L)	18.2000000	13.3070732 ± 13.0883468
Sr (mg/L)	0.1170000	0.0893414 ± 0.0805860
Te (mg/L)	0.0002500	0.0000000 ± 0.0000000
Th (mg/L)	0.0000500	0.0000000 ± 0.0000000
Ti (mg/L)	0.0025000	0.0003150 ± 0.0001205
TI (mg/L)	0.000100	0.0003130 ± 0.0001203 0.0000040 ± 0.0000067
U (mg/L)	0.0005670	0.0003872 ± 0.0002299
U (III9/L)	0.0005670	0.00030/2 ± 0.0002299

Variable	ALX003	Predicted Group Reference Mean ±SD					
V (mg/L)	0.0025000	0.0001617 ± 0.0001537					
Zn (mg/L)	0.0020000	0.0003724 ± 0.0003377					
Zr (mg/L)	0.0000500	0.0000500 ± 0.0000000					

Site Description

Cité Décomption		
Study Name	CBWQ-Elk	
Site	BOI001	
Sampling Date	Sep 26 2023	
Know Your Watershed Basin	Central Kootenay	
Province / Territory	British Columbia	
Terrestrial Ecological Classification	Montane Cordillera EcoZone	
	Northern Continental Divide EcoRegion	
Coordinates (decimal degrees)	50.02314 N, 114.91614 W	
Altitude	1261	
Local Basin Name	Elk River	
	Boivin Creek	
Stream Order	4	



Figure 1. Location Map

Cabin Assessment Results

Cabiii Assessineiit Results						
	Reference Model Summary					
Model	Columbia Basin 2020					
Analysis Date	November 20, 2024					
Taxonomic Level	Family					
Predictive Model Variables	Altitude					
	Drainage-Area					
	Longitude					
	Natl-Grassland					
	Natl-ShrubLow					
	Natl-Water					
	Precip10_Oct					
	Reach-%CanopyCoverage					
	Sedimentary					
	Slope					
	SlopeMax					
	Temp12_DECmin					

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	5.6%	9.0%	4.7%	18.9%	57.7%	4.1%
CABIN Assessment of BOI001 on Sep 26,	Similar to Reference					
2023						

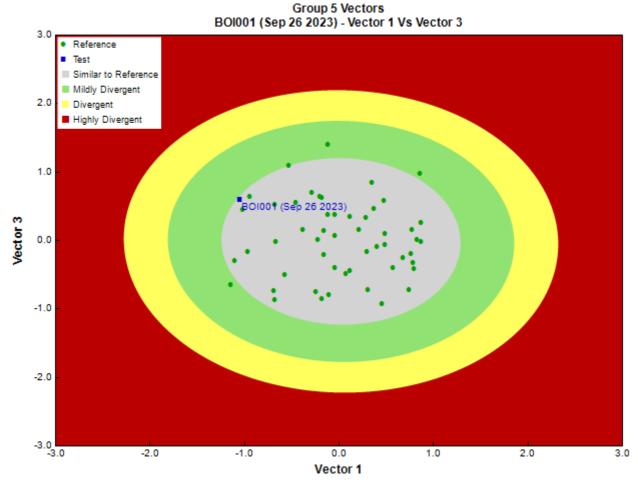


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Lumbriculida	Lumbriculidae	2	40.0
Arthropoda	Arachnida	Trombidiformes	Lebertiidae	1	20.0
			Sperchontidae	2	40.0
	Insecta	Diptera		2	40.0
			Chironomidae	117	2,340.0
			Empididae	1	20.0
			Psychodidae	5	100.0
			Simuliidae	13	260.0
		Ephemeroptera	Ameletidae	7	140.0
			Baetidae	25	500.0
			Ephemerellidae	16	320.0
			Heptageniidae	220	4,400.0
		Plecoptera		3	60.0
			Capniidae	3	60.0
			Chloroperlidae	8	160.0
			Leuctridae	1	20.0

Community Structure

Community Chacte	41.0					
Phylum	lum Class		Family	Raw Count	Total Count	
			Nemouridae	82	1,640.0	
			Peltoperlidae	1	20.0	
			Perlodidae	17	340.0	
			Taeniopterygidae	201	4,020.0	
		Trichoptera		1	20.0	
			Apataniidae	1	20.0	
			Rhyacophilidae	1	20.0	
			Total	730	14,600.0	

Metrics

Name	BOI001	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.61	0.4 ± 0.1
	Indices	
Hilsenhoff Family index (Mid-Atlantic)	3.2	3.4 ± 0.4
Hilsenhoff Family index (North-West)	3.2	3.1 ± 0.5
Intolerant taxa		1.0 ± 0.0
Long-lived taxa		1.7 ± 1.2
Tolerant individuals (%)		0.3 ± 0.0
Functiona	l Measures	
% Filterers		
% Gatherers	60.7	45.8 ± 14.9
% Predatores	20.8	14.8 ± 9.8
% Scrapers	63.0	59.4 ± 19.6
% Shredder	39.6	30.7 ± 17.4
No. Clinger Taxa	26.0	19.8 ± 4.0
Number Of	Individuals	
% Chironomidae	16.2	7.5 ± 8.6
% Coleoptera	0.0	0.1 ± 0.3
% Diptera + Non-insects	19.5	10.7 ± 9.9
% Ephemeroptera	37.0	47.2 ± 15.8
% Ephemeroptera that are Baetidae	9.3	25.4 ± 20.8
% EPT Individuals	80.5	89.2 ± 10.0
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	58.1	58.3 ± 10.6
% of 5 dominant taxa	89.1	83.6 ± 6.3
% of dominant taxa	30.4	37.8 ± 11.1
% Plecoptera	43.2	36.3 ± 16.7
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	0.0	25.4 ± 24.6
% Tricoptera	0.3	5.7 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.8	0.9 ± 0.1
Total Abundance	14600.0	4661.0 ± 3119.0
	ness	
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1
Coleoptera taxa	0.0	0.1 ± 0.3
Diptera taxa	4.0	2.8 ± 1.0
Ephemeroptera taxa	4.0	3.7 ± 0.5
EPT Individuals (Sum)	11660.0	4035.4 ± 2618.4
EPT taxa (no)	13.0	12.3 ± 1.9
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.6	0.7 ± 0.1
Plecoptera taxa	7.0	5.5 ± 1.1
Shannon-Wiener Diversity	1.9	1.9 ± 0.3
Simpson's Diversity	0.8	0.8 ± 0.1
Simpson's Evenness	0.2	0.3 ± 0.1
Total No. of Taxa	20.0	17.0 ± 3.1
Trichoptera taxa	2.0	3.1 ± 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	quency o	f Occurre	Probability Of Occurrence at			
	Group Group Gro		Group	Group	Group	Group	BOI001
	1	2	3	4	5	6	
Baetidae	100%	100%	100%	100%	100%	100%	1.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	11.28
RIVPACS : Observed taxa P>0.50	12.00
RIVPACS : 0:E (p > 0.5)	1.06
RIVPACS : Expected taxa P>0.70	9.42
RIVPACS : Observed taxa P>0.70	9.00
RIVPACS : 0:E (p > 0.7)	0.96

Habitat Description

Variable	BOI001		Predicted Group Reference Mean ±SD	
Be	drock Geology		ricuii 130	
Sedimentary (%)		.00000	98.46051 ± 8.10999	
	Channel			
Depth-Avg (cm)		25.8	20.0 ± 8.6	
Depth-BankfullMinusWetted (cm)		7.00	46.71 ± 35.00	
Depth-Max (cm)		35.0	28.8 ± 13.7	
Discharge (m^3/s)		0.138	0.682	
Macrophyte (PercentRange)		0	0 ± 0	
Reach-%CanopyCoverage (PercentRange)		0.00	1.04 ± 0.95	
Reach-%Logging (PercentRange)		0	0 ± 0	
Reach-DomStreamsideVeg (Category(1-4))		1	3 ± 1	
Reach-Pools (Binary)		0	1 ± 0	
Reach-Rapids (Binary)		1	0 ± 0	
Reach-Riffles (Binary)		1	1 ± 0	
Reach-StraightRun (Binary)		1	1 ± 0	
Slope (m/m)	0.02	219000	0.0270638 ± 0.0257534	
Veg-Coniferous (Binary)		1	1 ± 0	
Veg-Deciduous (Binary)		0	1 ± 0	
Veg-GrassesFerns (Binary)		1	1 ± 0	
Veg-Shrubs (Binary)		1	1 ± 0	
Velocity-Avg (m/s)		0.54	0.58 ± 0.20	
Velocity-Max (m/s)		1.17	0.85 ± 0.27	
Width-Bankfull (m)		6.8	16.1 ± 13.1	
Width-Wetted (m)		9.2	9.8 ± 7.7	
XSEC-VelInstrumentDirect (Category(1-3))		2	3 ± 0	
XSEC-VelMethod (Category(1-3))		3	2 ± 1	
	Climate			
Precip10_OCT (mm)		.44750	64.42223 ± 33.96544	
Temp12_DECmin (Degrees Celsius)		.85000	-12.74810 ± 1.73767	
	Hydrology			
Drainage-Area (km^2)		.55090	100.09787 ± 132.80561	
	Landcover			
Natl-Grassland (%)		.92278	7.47766 ± 6.29880	
Natl-ShrubLow (%)		.38854	1.80492 ± 1.50412	
Nati-Water (%)		.00000	0.32077 ± 0.59001	
Reg-Ice (%)		.00000	1.28005 ± 3.54484	
	ıbstrate Data			
%Bedrock (%)		0	0 ± 0	
%Boulder (%)		3	6 ± 6	
%Cobble (%)		47	57 ± 15	
%Gravel (%)		3	2 ± 3	
%Pebble (%)		46	34 ± 16	
%Sand (%)		0	0 ± 0	
%Silt+Clay (%)		0	0 ± 1	
D50 (cm)		6.35	24.05 ± 35.66	
Dg (cm)		5.9	23.0 ± 33.8	

Habitat Description						
Variable	BOI001	Predicted Group Reference Mean ±SD				
Dominant-1st (Category(0-9))	5	6 ± 1				
Dominant-2nd (Category(0-9))	6	6 ± 1				
Embeddedness (Category(1-5))	4	4 ± 1				
PeriphytonCoverage (Category(1-5))	3	2 ± 1				
SurroundingMaterial (Category(0-9))	2	3 ± 1				
	ppography	22 24 22 4 4 4 4 2				
Reg-SlopeLT30% (%)	18.45671	20.01334 ± 7.41149				
SlopeMax (%)	317.63962	488.94077 ± 542.32910				
	er Chemistry 0.0000250	0.0000018 ± 0.0000013				
Ag (mg/L) Al (mg/L)	0.0005000	0.0078031 ± 0.0090962				
As (mg/L)	0.0002500	0.0002735 ± 0.0001787				
B (mg/L)	0.0250000	0.0127286 ± 0.0135802				
Ba (mg/L)	0.0284000	0.0677069 ± 0.0514113				
Be (mg/L)	0.0000500	0.0000043 ± 0.0000039				
Bi (mg/L)	0.0000500	0.0000018 ± 0.0000013				
Br (mg/L)	0.0500000	0.0303333 ± 0.0788597				
Ca (mg/L)	53.1000000	28.2142857 ± 13.7707094				
Cd (mg/L)	0.0000240	0.0000100 ± 0.0000293				
Chloride-Total (mg/L)	0.1000000	0.0000000 ± 0.0000000				
Co (mg/L)	0.0000500	0.0000075 ± 0.0000060				
Cr (mg/L)	0.0002500	0.0001514 ± 0.0001361				
Cu (mg/L)	0.0002000	0.0001604 ± 0.0001447				
F (mg/L)	0.2400000	0.0876667 ± 0.0847823				
Fe (mg/L)	0.0050000	0.0101789 ± 0.0111495				
General-Alkalinity (mg/L)	144.0000000	98.9704545 ± 43.8308301				
General-CarbonDOC (mg/L)	3.5200000	0.8383333 ± 0.4040008				
General-CarbonTOC (mg/L)	3.0100000	0.5586957 ± 0.6229060				
General-Conductivity (μS/cm)	329.9000000	173.5150000 ± 86.2502071				
General-DO (mg/L)	11.1900000	10.7243478 ± 0.8596502				
General-Hardness (mg/L)	191.0000000	109.1853659 ± 48.3470504				
General-pH (pH)	8.4	8.0 ± 0.6				
General-SolidsTSS (mg/L)	1.0000000	5.2717002 ± 27.1908288				
General-SpCond (μS/cm) General-TempAir (Degrees Celsius)	329.9000000	196.0710526 ± 116.3908975 7.2 ± 5.7				
General-TempWater (Degrees Celsius)	7.0 4.4000000	6.2042553 ± 2.0993816				
General-Turbidity (NTU)	0.400000	0.2042333 ± 2.0993810 0.4347619 ± 0.5563328				
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000				
K (mg/L)	0.3000000	0.3312424 ± 0.1572675				
Li (mg/L)	0.0015300	0.0009183 ± 0.0003795				
Mg (mg/L)	14.1000000	7.8748571 ± 3.9958945				
Mn (mg/L)	0.0001000	0.0007721 ± 0.0008518				
Mo (mg/L)	0.0014800	0.0012835 ± 0.0042333				
Na (mg/L)	0.6100000	0.7930303 ± 0.4756164				
Ni (mg/L)	0.0007200	0.0001266 ± 0.0001131				
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 ± 0.0199967				
Nitrogen-NO2+NO3 (mg/L)	0.0288000	0.0287300 ± 0.0357249				
Nitrogen-NO3 (mg/L)	0.0290000	0.0336397 ± 0.0328125				
Nitrogen-TKN (mg/L)	0.1540000	0.0352941 ± 0.0299453				
Nitrogen-TN (mg/L)	0.1830000	0.0675581 ± 0.0509763				
Pb (mg/L)	0.0001000	0.0000179 ± 0.0000156				
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 ± 0.5208890				
Phosphorus-TP (mg/L)	0.0061000	0.0031912 ± 0.0087929				
S (mg/L)	21.7000000	3.6625000 ± 1.5619928				
Sb (mg/L)	0.0001000	0.0000337 ± 0.0000157				
Se (mg/L)	0.0011200	0.0002782 ± 0.0002859				
Si (mg/L) Sn (mg/L)	2.2000000 0.0001000	2.0400303 ± 0.8510321 0.0000300 ± 0.0000407				
S04 (mg/L)	63.1000000	13.3070732 ± 13.0883468				
Sr (mg/L)	0.6650000	0.0893414 ± 0.0805860				
Te (mg/L)	0.0002500	0.0000000 ± 0.0000000				
Th (mg/L)	0.0002500	0.0000000 ± 0.0000000				
· · · · · · · · · · · · · · · · · · ·	0.0000300	0.000000 ± 0.0000000				

Variable	BOI001	Predicted Group Reference Mean ±SD					
Ti (mg/L)	0.0025000	0.0003150 ± 0.0001205					
TI (mg/L)	0.0000100	0.0000040 ± 0.0000067					
U (mg/L)	0.0010100	0.0003872 ± 0.0002299					
V (mg/L)	0.0025000	0.0001617 ± 0.0001537					
Zn (mg/L)	0.0020000	0.0003724 ± 0.0003377					
Zr (mg/L)	0.0000500	0.0000500 ± 0.0000000					

Site Description

CBWQ-EIk			
BOI002			
Sep 26 2023			
Central Kootenay			
British Columbia			
n Montane Cordillera EcoZone			
Northern Continental Divide EcoRegion			
50.01693 N, 114.93698 W			
1316			
Elk River			
Boivin Creek			
4			



Figure 1. Location Map

Cabin Assessment Results

Cabili Assessifietii Results						
	Reference Model Summary					
Model	Columbia Basin 2020					
Analysis Date	November 20, 2024					
Taxonomic Level	Family					
Predictive Model Variables	Altitude					
	Drainage-Area					
	Longitude					
	Natl-Grassland					
	Natl-ShrubLow					
	Natl-Water					
	Precip10_Oct					
	Reach-%CanopyCoverage					
	Sedimentary					
	Slope					
	SlopeMax					
	Temp12_DECmin					

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	4.6%	5.3%	7.1%	12.0%	68.8%	2.2%
CABIN Assessment of BOI002 on Sep 26,	Similar to Reference					
2023						

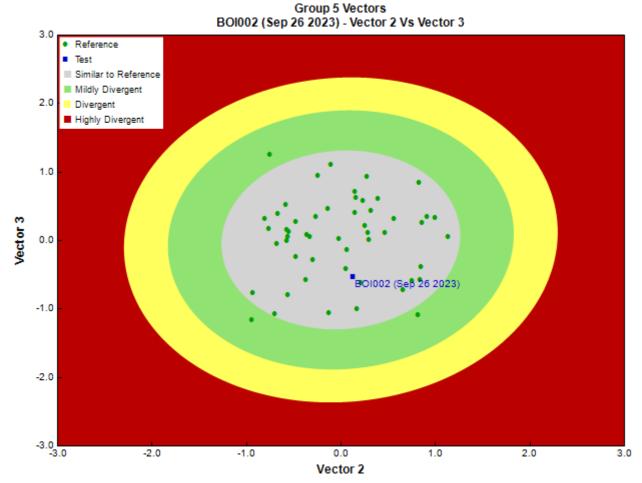


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	8/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Arthropoda	Arachnida	Trombidiformes	Hydryphantidae	1	12.5
	Insecta	Diptera	Chironomidae	42	525.0
			Psychodidae	1	12.5
			Simuliidae	18	225.0
			Tipulidae	3	37.5
		Ephemeroptera	Ameletidae	2	25.0
			Baetidae	62	775.0
			Ephemerellidae	78	975.0
			Heptageniidae	70	875.0
		Plecoptera	Chloroperlidae	10	125.0
			Nemouridae	10	125.0
			Peltoperlidae	1	12.5
			Perlodidae	13	162.5
			Taeniopterygidae	25	312.5
		Trichoptera	Rhyacophilidae	10	125.0
			Uenoidae	1	12.5

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Total	347	4,337.5

Metrics

Metrics Name	BOI002	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.34	0.4 ± 0.1
Biotic I		
Hilsenhoff Family index (Mid-Atlantic)	3.8	3.4 ± 0.4
Hilsenhoff Family index (North-West)	3.8	3.1 ± 0.5
Intolerant taxa		1.0 ± 0.0
Long-lived taxa		1.7 ± 1.2
Tolerant individuals (%)		0.3 ± 0.0
Functional	Measures	
% Filterers		
% Gatherers	51.9	45.8 ± 14.9
% Predatores	24.2	14.8 ± 9.8
% Scrapers	50.7	59.4 ± 19.6
% Shredder	11.2	30.7 ± 17.4
No. Clinger Taxa	22.0	19.8 ± 4.0
Number Of I		15.0 = 1.0
% Chironomidae	12.1	7.5 ± 8.6
% Coleoptera	0.0	0.1 ± 0.3
% Diptera + Non-insects	18.7	10.7 ± 9.9
% Ephemeroptera	61.1	47.2 ± 15.8
% Ephemeroptera that are Baetidae	29.2	25.4 ± 20.8
% EPT Individuals	81.3	89.2 ± 10.0
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	42.7	58.3 ± 10.6
% of 5 dominant taxa	79.8	83.6 ± 6.3
% of dominant taxa	22.5	37.8 ± 11.1
% Plecoptera	17.0	36.3 ± 16.7
% Tribe Tanyatarisini		30.5 ± 10.7
% Trichoptera that are Hydropsychida	0.0	25.4 ± 24.6
% Tricoptera	3.2	5.7 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 ± 0.1
Total Abundance	4337.5	4661.0 ± 3119.0
Richn		4001.0 ± 3119.0
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1
Coleoptera taxa	0.0	0.1 ± 0.3
Diptera taxa	4.0	$\frac{0.1 \pm 0.3}{2.8 \pm 1.0}$
Ephemeroptera taxa	4.0	$\frac{2.8 \pm 1.0}{3.7 \pm 0.5}$
EPT Individuals (Sum)	3525.0	4035.4 ± 2618.4
EPT taxa (no)	11.0	12.3 ± 1.9
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.8	0.0 ± 0.0
Plecoptera taxa	5.0	$\frac{0.7 \pm 0.1}{5.5 \pm 1.1}$
Shannon-Wiener Diversity	2.1	$\frac{3.5 \pm 1.1}{1.9 \pm 0.3}$
Simpson's Diversity	0.9	0.8 ± 0.3
Simpson's Evenness	0.9	0.8 ± 0.1 0.3 ± 0.1
Total No. of Taxa	16.0	0.3 ± 0.1 17.0 ± 3.1
		$\frac{17.0 \pm 3.1}{3.1 \pm 1.2}$
Trichoptera taxa	2.0	3.1 ± 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	quency o	f Occurre	Probability Of Occurrence at			
	Group	Group	Group	Group	Group	Group	BOI002
	1	2	3	4	5	6	
Baetidae	100%	100%	100%	100%	100%	100%	1.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	11.82

RIVPACS Ratios

RIVPACS : Observed taxa P>0.50	10.00
RIVPACS : 0:E (p > 0.5)	0.85
RIVPACS : Expected taxa P>0.70	9.45
RIVPACS : Observed taxa P>0.70	9.00
RIVPACS : 0:E (p > 0.7)	0.95

Habitat Description

Habitat Description		
Variable	BOI002	Predicted Group Reference Mean ±SD
	rock Geology	
Sedimentary (%)	100.0000	98.46051 ± 8.10999
	Channel	20.0 + 0.6
Depth-Avg (cm)	28	
Depth-BankfullMinusWetted (cm)	19.5	
Depth-Max (cm)	34	
Discharge (m^3/s)	0.13	
Macrophyte (PercentRange)	1.0	$0 \qquad 0 \pm 0$
Reach-%CanopyCoverage (PercentRange)	1.0	
Reach-%Logging (PercentRange)		$0 \qquad 0 \pm 0$
Reach-DomStreamsideVeg (Category(1-4))		2 3 ± 1
Reach-Pools (Binary)		$0 1 \pm 0$
Reach-Rapids (Binary)		$\begin{array}{c c} 1 & 0 \pm 0 \end{array}$
Reach-Riffles (Binary)		1 1 ± 0
Reach-StraightRun (Binary)		0 1 ± 0
Slope (m/m)	0.050570	
Veg-Coniferous (Binary)		$\begin{array}{c c} 1 & 1 \pm 0 \end{array}$
Veg-Deciduous (Binary)		$\begin{array}{c c} 1 & 1 \pm 0 \end{array}$
Veg-GrassesFerns (Binary)		$\begin{array}{c c} 1 & 1 \pm 0 \end{array}$
Veg-Shrubs (Binary)		$1 \qquad \qquad 1 \pm 0$
Velocity-Avg (m/s)	0.4	0.58 ± 0.20
Velocity-Max (m/s)	0.7	0.85 ± 0.27
Width-Bankfull (m)	9	.7 16.1 ± 13.1
Width-Wetted (m)	6	.2 9.8 ± 7.7
XSEC-VelInstrumentDirect (Category(1-3))		$2 3 \pm 0$
XSEC-VelMethod (Category(1-3))		3 2 ± 1
	Climate	
Precip10_OCT (mm)	45.5819	64.42223 ± 33.96544
Temp12_DECmin (Degrees Celsius)	-14.8500	00 -12.74810 ± 1.73767
	Hydrology	·
Drainage-Area (km^2)	59.4423	35 100.09787 ± 132.80561
	Landcover	
Natl-Grassland (%)	0.6764	7.47766 ± 6.29880
Natl-ShrubLow (%)	0.2848	
Nati-Water (%)	0.0000	
Reg-Ice (%)	0.0000	
	bstrate Data	2.2000 0.01.01
%Bedrock (%)		$0 0 \pm 0$
%Boulder (%)		0 6 ± 6
%Cobble (%)	-	58 57 ± 15
%Gravel (%)		2 2 ± 3
%Pebble (%)	,	$\frac{2}{10}$ 34 ± 16
%Sand (%)		$\begin{array}{c c} \hline 0 & \hline & 0 \pm 0 \\ \hline \end{array}$
%Silt+Clay (%)		0 0 ± 1
D50 (cm)	6.9	
Dg (cm)		.6 23.0 ± 33.8
Dominant-1st (Category(0-9))	6	i
Dominant-2nd (Category(0-9))		
Embeddedness (Category(1-5))		4 ± 1
PeriphytonCoverage (Category(1-5))		2 2 ± 1
SurroundingMaterial (Category(0-9))		2 3 ± 1
	opography	20.01001 1 7 11110
Reg-SlopeLT30% (%)	16.5526	
SlopeMax (%)	317.6396	52 488.94077 ± 542.32910

Habitat Description						
Variable	BOI002	Predicted Group Reference Mean ±SD				
Wat	ter Chemistry					
Ag (mg/L)	0.0000250	0.0000018 ± 0.0000013				
Al (mg/L)	0.0025000	0.0078031 ± 0.0090962				
As (mg/L)	0.0002500	0.0002735 ± 0.0001787				
B (mg/L)	0.0250000	0.0127286 ± 0.0135802				
Ba (mg/L)	0.0284000	0.0677069 ± 0.0514113				
Be (mg/L)	0.0000500	0.0000043 ± 0.0000039				
Bi (mg/L)	0.0000500	0.0000018 ± 0.0000013				
Br (mg/L)	0.0500000	0.0303333 ± 0.0788597				
Ca (mg/L)	52.600000	28.2142857 ± 13.7707094				
Cd (mg/L)	0.0000280	0.0000100 ± 0.0000293				
Chloride-Total (mg/L)	0.0500000	0.0000100 ± 0.0000293 0.0000000 ± 0.0000000				
Co (mg/L)	0.0000500	0.0000075 ± 0.0000060				
Cr (mg/L)	0.0002500	0.0001514 ± 0.0001361				
Cu (mg/L)	0.0002000	0.0001604 ± 0.0001447				
F (mg/L)	0.2600000	0.0876667 ± 0.0847823				
Fe (mg/L)	0.0050000	0.0101789 ± 0.0111495				
General-Alkalinity (mg/L)	144.0000000	98.9704545 ± 43.8308301				
General-CarbonDOC (mg/L)	1.6500000	0.8383333 ± 0.4040008				
General-CarbonTOC (mg/L)	1.6500000	0.5586957 ± 0.6229060				
General-Conductivity (µS/cm)	328.7000000	173.5150000 ± 86.2502071				
General-DO (mg/L)	11.0100000	10.7243478 ± 0.8596502				
General-Hardness (mg/L)	189.0000000	109.1853659 ± 48.3470504				
General-pH (pH)	8.4	8.0 ± 0.6				
General-SolidsTSS (mg/L)	1.0000000	5.2717002 ± 27.1908288				
General-SpCond (μS/cm)	328.7000000	196.0710526 ± 116.3908975				
General-TempAir (Degrees Celsius)	11.0	7.2 ± 5.7				
General-TempWater (Degrees Celsius)	5.1000000	6.2042553 ± 2.0993816				
General-Turbidity (NTU)	0.4500000	0.2042333 ± 2.0993810 0.4347619 ± 0.5563328				
Hg (ng/L)	0.0000050	0.4347619 ± 0.3363328 $0.00000000 \pm 0.00000000$				
	0.3000000					
K (mg/L)		0.3312424 ± 0.1572675				
Li (mg/L)	0.0013900	0.0009183 ± 0.0003795				
Mg (mg/L)	14.0000000	7.8748571 ± 3.9958945				
Mn (mg/L)	0.0001000	0.0007721 ± 0.0008518				
Mo (mg/L)	0.0015300	0.0012835 ± 0.0042333				
Na (mg/L)	0.6000000	0.7930303 ± 0.4756164				
Ni (mg/L)	0.0002000	0.0001266 ± 0.0001131				
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 ± 0.0199967				
Nitrogen-NO2+NO3 (mg/L)	0.0228000	0.0287300 ± 0.0357249				
Nitrogen-NO3 (mg/L)	0.0230000	0.0336397 ± 0.0328125				
Nitrogen-TKN (mg/L)	0.1300000	0.0352941 ± 0.0299453				
Nitrogen-TN (mg/L)	0.1530000	0.0675581 ± 0.0509763				
Pb (mg/L)	0.0001000	0.0000179 ± 0.0000156				
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 ± 0.5208890				
Phosphorus-TP (mg/L)	0.0025000	0.0031912 ± 0.0087929				
S (mg/L)	21.7000000	3.6625000 ± 1.5619928				
Sb (mg/L)	0.0001000	0.0000337 ± 0.0000157				
Se (mg/L)	0.0010800	0.0002782 ± 0.0002859				
Si (mg/L)	2.2000000	2.0400303 ± 0.8510321				
Sn (mg/L)	0.0001000	0.0000300 ± 0.0000407				
S04 (mg/L)	62.6000000	$13.3070732 \pm 13.0883468$				
Sr (mg/L)	0.6420000	0.0893414 ± 0.0805860				
Te (mg/L)	0.0002500	0.0000000 ± 0.0000000				
Th (mg/L)	0.0000500	0.0000000 ± 0.0000000				
Ti (mg/L)	0.0025000	0.0003150 ± 0.0001205				
TI (mg/L)	0.0000100	0.0000040 ± 0.0000067				
U (mg/L)	0.0010100	0.0003872 ± 0.0002299				
V (mg/L)	0.0025000	0.0001617 ± 0.0001537				
Zn (mg/L)	0.0020000	0.0003724 ± 0.0003377				
Zr (mg/L)	0.0000500	0.0000500 ± 0.0000000				

Site Description

Study Name	CBWQ-Elk			
Site	COL001			
Sampling Date	Oct 03 2023			
Know Your Watershed Basin	Central Kootenay			
Province / Territory	British Columbia			
Terrestrial Ecological Classification	Montane Cordillera EcoZone			
	Northern Continental Divide EcoRegion			
Coordinates (decimal degrees)	49.49574 N, 115.06643 W			
Altitude	999			
Local Basin Name	Elk River			
	Coal Creek			
Stream Order	3			



Figure 1. Location Map

Cabin Assessment Results

	Reference Model Summary
Model	Columbia Basin 2020
Analysis Date	November 20, 2024
Taxonomic Level	Family
Predictive Model Variables	Altitude Drainage-Area Longitude Natl-Grassland Natl-ShrubLow Natl-Water Precip10_Oct Reach-%CanopyCoverage Sedimentary Slope SlopeMax Temp12_DECmin
Reference Groups	1 2 3 4 5 6

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	2.6%	13.2%	11.9%	48.4%	21.6%	2.2%
CABIN Assessment of COL001 on Oct 03,	Highly Divergent					
2023						

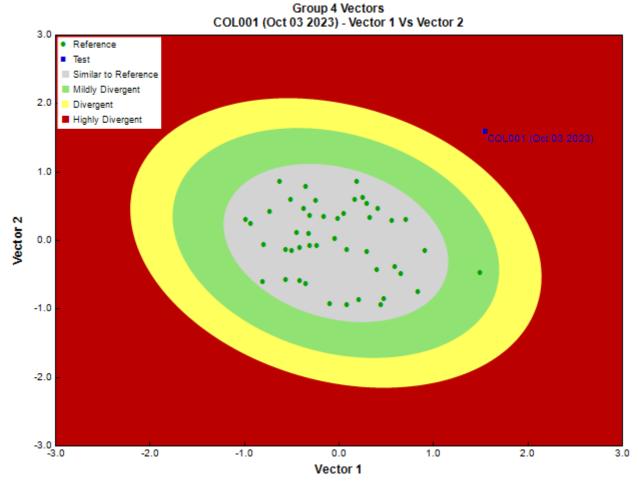


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata		Enchytraeidae	9	180.0
		Tubificida	Naididae	86	1,720.0
Arthropoda	Arachnida	Trombidiformes	Lebertiidae	1	20.0
	Insecta	Diptera	Athericidae	1	20.0
			Chironomidae	114	2,280.0
			Empididae	4	80.0
			Tipulidae	8	160.0
		Ephemeroptera	Ameletidae	10	200.0
			Baetidae	13	260.0
			Ephemerellidae	9	180.0
			Heptageniidae	13	260.0
			Leptophlebiidae	8	160.0
		Plecoptera		1	20.0
		·	Capniidae	42	840.0
			Leuctridae	1	20.0
			Nemouridae	2	40.0

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Perlodidae	2	40.0
		Trichoptera	Brachycentridae	1	20.0
			Hydropsychidae	3	60.0
			Hydroptilidae	4	80.0
			Lepidostomatidae	67	1,340.0
			Total	399	7,980.0

Metrics

Name	COL001	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.88	0.3 ± 0.1
Biotic	Indices	
Hilsenhoff Family index (Mid-Atlantic)	6.2	3.2 ± 0.4
Hilsenhoff Family index (North-West)	6.2	2.9 ± 0.3
Intolerant taxa		1.0 ± 0.0
Long-lived taxa		1.9 ± 1.0
Tolerant individuals (%)	0.3	0.5 ± 0.4
Functiona	l Measures	
% Filterers		0.3
% Gatherers	85.2	47.1 ± 15.4
% Predatores	31.6	12.9 ± 7.3
% Scrapers	8.3	68.3 ± 16.1
% Shredder	30.3	36.7 ± 14.6
No. Clinger Taxa	17.0	20.2 ± 4.4
Number Of	[†] Individuals	
% Chironomidae	28.6	5.2 ± 5.7
% Coleoptera	0.0	0.6 ± 2.2
% Diptera + Non-insects	53.8	7.4 ± 7.0
% Ephemeroptera	13.3	45.8 ± 15.1
% Ephemeroptera that are Baetidae	24.5	28.9 ± 20.8
% EPT Individuals	44.0	91.9 ± 7.3
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	50.3	59.5 ± 11.3
% of 5 dominant taxa	80.9	85.1 ± 6.5
% of dominant taxa	28.6	37.7 ± 10.4
% Plecoptera	11.8	40.5 ± 13.3
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	4.0	23.9 ± 23.6
% Tricoptera	18.8	5.6 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.6	0.9 ± 0.1
Total Abundance	7980.0	1449.4 ± 859.7
Rich	ness	
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.2
Coleoptera taxa	0.0	0.2 ± 0.5
Diptera taxa	4.0	2.6 ± 1.1
Ephemeroptera taxa	5.0	3.7 ± 0.6
EPT Individuals (Sum)	3500.0	1352.9 ± 804.6
EPT taxa (no)	13.0	12.2 ± 2.1
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.7	0.7 ± 0.1
Plecoptera taxa	4.0	5.4 ± 1.2
Shannon-Wiener Diversity	2.1	1.9 ± 0.3
Simpson's Diversity	0.8	0.8 ± 0.1
Simpson's Evenness	0.3	0.3 ± 0.1
Total No. of Taxa	20.0	16.4 ± 3.5
Trichoptera taxa	4.0	3.2 ± 1.3

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	quency o	f Occurre	Probability Of Occurrence at			
	Group	Group Group Group Group Group				COL001	
	1	2	3	4	5	6	

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	11.84
RIVPACS : Observed taxa P>0.50	11.00
RIVPACS : 0:E (p > 0.5)	0.93
RIVPACS : Expected taxa P>0.70	10.12
RIVPACS : Observed taxa P>0.70	8.00
RIVPACS: 0:E (p > 0.7)	0.79

Habitat Description

Variable	COL001	Predicted Group Reference Mean ±SD
	k Geology	
Sedimentary (%)	100.00000	90.78003 ± 16.48787
	annel	27.7.42.4
Depth-Avg (cm)	24.7	27.7 ± 12.1
Depth-BankfullMinusWetted (cm)	125.00	48.41 ± 32.00
Depth-Max (cm)	28.0	41.6 ± 18.0
Discharge (m^3/s)	0.050	4.100
Macrophyte (PercentRange)	1 1 22	0 ± (
Reach-%CanopyCoverage (PercentRange)	1.00	1.20 ± 0.86
Reach-%Logging (PercentRange)	0	0 ± (
Reach-DomStreamsideVeg (Category(1-4)) Reach-Pools (Binary)	3 0	3 ± 1 1 ± 1
		1 ± 1 1 ± 1
Reach-Rapids (Binary)	0	1 ± 1 1 ± (
Reach-Riffles (Binary)	1	1 ± (1 ± (
Reach-StraightRun (Binary)		
Slope (m/m)	0.0043750	0.0302442 ± 0.0225320 1 ± 0
Veg-Coniferous (Binary) Veg-Deciduous (Binary)	0	1 ± (
	1	1 ± (1 ± (
Veg-GrassesFerns (Binary)	1	
Veg-Shrubs (Binary)	0.19	1 ± 0 0.65 ± 0.30
Velocity-Avg (m/s) Velocity-Max (m/s)		$\begin{array}{c} 0.65 \pm 0.30 \\ 1.02 \pm 0.40 \end{array}$
	0.30	
Width-Bankfull (m)	19.6	22.0 ± 20.4 14.4 ± 14.2
Width-Wetted (m)	12.0	
XSEC-VelInstrumentDirect (Category(1-3))	2	2 ± 1
XSEC-VelMethod (Category(1-3))	mate 3	Z ±]
Precip10_OCT (mm)	52.84964	101.93711 ± 37.08464
Temp12_DECmin (Degrees Celsius)	-13.25000	-12.60285 ± 1.55807
	rology	-12.00203 ± 1.33007
Drainage-Area (km^2)	117.65190	153.19859 ± 249.47160
	dcover	155.19859 ± 249.47100
Nati-Grassland (%)	0.08905	4.14423 ± 3.51761
Nati-ShrubLow (%)	2.06878	$\frac{4.14423 \pm 3.31701}{4.00461 \pm 2.77104}$
Nati-Water (%)	0.00000	0.26551 ± 0.58793
Reg-Ice (%)	0.00000	2.39543 ± 4.09623
	rate Data	2.33343 ± 4.03023
%Bedrock (%)	0	0 ± 0
%Boulder (%)	3	8 ± 8
%Cobble (%)	52	53 ± 15
%Gravel (%)	4	4 ± 6
%Pebble (%)	41	33 ± 14
%Sand (%)	0	0 ± (
%Silt+Clay (%)	0	0 ± 0
D50 (cm)	6.75	14.48 ± 20.33
Dg (cm)	6.2	13.1 ± 19.3
Dominant-1st (Category(0-9))	6	6 ± 1
Dominant-2nd (Category(0-9))	5	6 ± 1
Embeddedness (Category(1-5))	3	4 ± 1
PeriphytonCoverage (Category(1-5))	3	2 ± 1
SurroundingMaterial (Category(0-9))	2	3 ± 2
	graphy	3 + 2
Reg-SlopeLT30% (%)	44.43454	17.11832 ± 8.21512

Ag (mg/L) Ag (mg/L) Ag (mg/L) 0.0000250 0.0000028 ± 0.0000028 Al (mg/L) 0.0183000 0.0136410 ± 0.0183000 0.0136410 ± 0.0183000 0.000175 ± 0.0001818 B (mg/L) 0.025000 0.0305833 ± 0.037001818 Ba (mg/L) 0.0250000 0.0305833 ± 0.037001818 Ba (mg/L) 0.0000500 0.0000556 ± 0.0000058 Ba (mg/L) 0.0000500 0.0000556 ± 0.0000038 Br (mg/L) 0.0500000 0.0268750 ± 0.05871949 Ba (mg/L) 0.05000000 0.0268750 ± 0.05871949 Br (mg/L) 2.61,000000 0.0268750 ± 0.05871949 Br (mg/L) 2.61,000000 0.0268750 ± 0.05871949 Br (mg/L) 2.61,000000 0.0300005 ± 0.0000003 0.000015 ± 0.000010 0.03000000 0.030000000 0.030000000 0.00000000	SlopeMax (%) Water Ch	161.32619	Mean ±SD
Ag (mg/L) Ag (mg/L) 0.0000250 Al (mg/L) 0.0183000 0.0136410 ± 0.0108000 Al (mg/L) 0.0002500 0.000175 ± 0.00001818 B (mg/L) 0.0250000 0.0305813 ± 0.0307814 0.0250000 0.0305813 ± 0.03778 ± 0.0001818 B (mg/L) 0.0250000 0.0305813 ± 0.03778 ± 0.00571949 Be (mg/L) 0.0000500 0.0000556 ± 0.0577949 Be (mg/L) 0.0000500 0.0000556 ± 0.0577949 Be (mg/L) 0.0000500 0.0000056 ± 0.0000078 Br (mg/L) 0.0500000 0.0000556 ± 0.0577949 Be (mg/L) 0.0500000 0.0568750 ± 0.05878 Ce (mg/L) 26.1000000 0.0568750 ± 0.05878 Ce (mg/L) 26.1000000 0.0368750 ± 0.05878 Ce (mg/L) 0.0000330 0.0000115 ± 0.0000130 0.0000155 ± 0.0000115 ± 0.0000149 Ce (mg/L) 0.0000330 0.000015 ± 0.0000015 ± 0.0000115 ± 0.0000149 Ce (mg/L) 0.0000500 0.00002500 0.0000298 ± 0.00000285 Ce (mg/L) 0.0000500 0.0000298 ± 0.00000285 Ce (mg/L) 0.00007500 0.0000298 ± 0.00002985 Ce (mg/L) 0.0007500 0.0000298 ± 0.00002985 Ce (mg/L) 0.0007500 0.0002212 ± 0.0001878 Fe (mg/L) 1.0000000 0.0442667 ± 0.0385181 Fe (mg/L) 1.0000000 0.0442667 ± 0.0385181 Fe (mg/L) 1.0000000 0.0442667 ± 0.0385181 Fe (mg/L) 1.0000000 0.0444267 ± 0.0385181 Fe (mg/L) 1.000000 0.044446 ± 0.31577 Fe (mg/L) 1.000000 0.04446 ± 0.31574 Fe (mg/L) 1.0000000 0.04446 ± 0.31574 Fe (mg/L) 1.0000000 0.04446 ± 0.0355181 Fe (mg/L) 1.0000000 0.04446 ± 0.0355181 Fe (mg/L) 1.0000000 0.04446 ± 0.0355181 Fe (mg/L) 1.0000000 0.000444 ± 0.0355181 Fe (mg/L) 1.0000000 0.000444 ± 0.0355181 Fe (mg/L) 1.000000 0.000444 ± 0.00	Water Ch Ag (mg/L)		
Ag (mg/L) Al (mg/L) Al (mg/L) Al (mg/L) Al (mg/L) Al (mg/L) Bl (mg/L) Al (m	Ag (mg/L)		386.22536 ± 140.72382
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Mo (mg/L) 0.0006700 0.0006660 ± 0.0004339 Na (mg/L) 2.7600000 0.9945806 ± 0.9373003 Ni (mg/L) 0.0002000 0.000298 ± 0.0001811 Nitrogen-NO2 (mg/L) 0.0050000 0.042917 ± 0.0108893 Nitrogen-NO2+NO3 (mg/L) 0.0050000 0.0732400 ± 0.0567225 Nitrogen-NO3 (mg/L) 0.0050000 0.0865111 ± 0.0538993 Nitrogen-TKN (mg/L) 0.1520000 97.0987778 ± 290.9629753 Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.031194 ± 0.0039854 S (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.003912 Si (mg/L) 0.0002500 0.000288 ± 0.0001602 Sn (mg/L) 0.0001000 0.1493500 ± 0.1276611 Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.00025			
Na (mg/L) 2.7600000 0.9945806 ± 0.9373003 Ni (mg/L) 0.0002000 0.0002298 ± 0.0001811 Nitrogen-NO2 (mg/L) 0.0050000 0.0042917 ± 0.0108893 Nitrogen-NO3 (mg/L) 0.0050000 0.0732400 ± 0.0567225 Nitrogen-NO3 (mg/L) 0.0050000 0.0865111 ± 0.0538993 Nitrogen-TKN (mg/L) 0.1520000 97.0987778 ± 290.9629753 Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.0000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 0.0001000 0.0002800 ± 803.7224104 Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 0.0001000 0.000988 ± 0.0001605 Sn (mg/L) 0.0001000 0.000988 ± 0.0001605 Sn (mg/L) 0.0001000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0002500			0.0006660 ± 0.0004339
Ni (mg/L) 0.0002000 0.0002298 ± 0.0001811 Nitrogen-NO2 (mg/L) 0.0050000 0.0042917 ± 0.0108893 Nitrogen-NO3 (mg/L) 0.0050000 0.0732400 ± 0.0567225 Nitrogen-NO3 (mg/L) 0.0050000 0.0865111 ± 0.0538993 Nitrogen-TKN (mg/L) 0.1520000 97.0987778 ± 290.9629753 Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.0000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 362.2600000 ± 803.7224104 Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 0.0001000 0.000988 ± 0.0001602 SO4 (mg/L) 4.0000000 18.1942857 ± 18.0693910 Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0002500 0.00000000 ± 0.0000000 Ti (mg/L)			0.9945806 ± 0.9373003
Nitrogen-NO2 (mg/L) 0.0050000 0.0042917 ± 0.0108893 Nitrogen-NO2+NO3 (mg/L) 0.0050000 0.0732400 ± 0.0567225 Nitrogen-NO3 (mg/L) 0.0050000 0.0865111 ± 0.0538993 Nitrogen-TKN (mg/L) 0.1520000 97.0987778 ± 290.9629753 Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.0000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 362.2600000 ± 803.7224104 Sb (mg/L) 0.0001000 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 0.0002500 0.0002422 ± 0.0003912 0.0002500 0.0000988 ± 0.0001602 SO4 (mg/L) 0.0001000 0.0009988 ± 0.0001602 SO4 (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 0.0000000 ± 0.0000000 0.0000000 ± 0.0000000 Th (mg/L) 0.00025000 0.000843 ± 0.0009290 Tl (mg/L) 0.0001940 0.0005805 ± 0.0003882			0.0002298 ± 0.0001811
Nitrogen-NO2+NO3 (mg/L) 0.0050000 0.0732400 ± 0.0567225 Nitrogen-NO3 (mg/L) 0.0050000 0.0865111 ± 0.0538993 Nitrogen-TKN (mg/L) 0.1520000 97.0987778 ± 290.9629753 Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.0008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 362.2600000 ± 803.7224104 Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.0000988 ± 0.0001602 SO4 (mg/L) 0.0001000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Ti (mg/L) 0.00025000 0.0008433 ± 0.0009290 Ti (mg/L) 0.0000100 0.000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382			0.0042917 ± 0.0108893
Nitrogen-TKN (mg/L) 0.1520000 97.0987778 ± 290.9629753 Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.0000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.0008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 362.2600000 ± 803.7224104 Sb (mg/L) 0.0001000 0.0000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.0000988 ± 0.0001602 So4 (mg/L) 4.0000000 18.1942857 ± 18.0693910 Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.000500 0.0008433 ± 0.0009290 Ti (mg/L) 0.000100 0.0000580 ± 0.0000382 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0732400 ± 0.0567225
Nitrogen-TN (mg/L) 0.1520000 24.3739167 ± 145.4787822 Pb (mg/L) 0.0001000 0.0000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.0008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 362.2600000 ± 803.7224104 Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.0000988 ± 0.0001602 Sr (mg/L) 4.0000000 18.1942857 ± 18.0693910 Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0025000 0.0008433 ± 0.0009290 Ti (mg/L) 0.0001000 0.0005805 ± 0.0003882 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Nitrogen-NO3 (mg/L)	0.0050000	0.0865111 ± 0.0538993
Pb (mg/L) 0.0001000 0.000559 ± 0.0000496 Phosphorus-OrthoP (mg/L) 0.0025000 0.0008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 $362.2600000 \pm 803.7224104$ Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.0000988 ± 0.0001602 SO4 (mg/L) 4.0000000 $18.1942857 \pm 18.0693910$ Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.00025000 0.0000000 ± 0.0000000 Ti (mg/L) 0.00025000 0.00008433 ± 0.0009290 TI (mg/L) 0.0000100 0.0000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Nitrogen-TKN (mg/L)	0.1520000	97.0987778 ± 290.9629753
Phosphorus-OrthoP (mg/L) 0.0025000 0.0008667 ± 0.0013292 Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 $362.2600000 \pm 803.7224104$ Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.000988 ± 0.0001602 SO4 (mg/L) 4.0000000 $18.1942857 \pm 18.0693910$ Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.000500 0.0000000 ± 0.0000000 Ti (mg/L) 0.0005000 0.0008433 ± 0.0009290 TI (mg/L) 0.0000100 0.000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Nitrogen-TN (mg/L)	0.1520000	24.3739167 ± 145.4787822
Phosphorus-TP (mg/L) 0.0168000 0.0031194 ± 0.0039854 S (mg/L) 1.5000000 $362.2600000 \pm 803.7224104$ Sb (mg/L) 0.0001000 0.000288 ± 0.0000136 Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.0000988 ± 0.0001602 SO4 (mg/L) 4.0000000 $18.1942857 \pm 18.0693910$ Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0005000 0.0000000 ± 0.0000000 Ti (mg/L) 0.0005000 0.0000001 ± 0.0000000 Ti (mg/L) 0.0005000 0.0000001 ± 0.00000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Pb (mg/L)	0.0001000	0.0000559 ± 0.0000496
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		0.0025000	0.0008667 ± 0.0013292
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Phosphorus-TP (mg/L)	0.0168000	0.0031194 ± 0.0039854
Se (mg/L) 0.0002500 0.0002422 ± 0.0003912 Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.000988 ± 0.0001602 SO4 (mg/L) 4.0000000 $18.1942857 \pm 18.0693910$ Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0005000 0.0000000 ± 0.0000000 Ti (mg/L) 0.0025000 0.0008433 ± 0.0009290 TI (mg/L) 0.0000100 0.0000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	S (mg/L)	1.5000000	$362.2600000 \pm 803.7224104$
Si (mg/L) 1.5000000 1.9070000 ± 0.6500353 Sn (mg/L) 0.0001000 0.0000988 ± 0.0001602 SO4 (mg/L) 4.0000000 $18.1942857 \pm 18.0693910$ Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0025000 0.0008433 ± 0.0009290 Tl (mg/L) 0.0000100 0.0000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Sb (mg/L)	0.0001000	0.0000288 ± 0.0000136
$\begin{array}{llllllllllllllllllllllllllllllllllll$	Se (mg/L)	0.0002500	
SO4 (mg/L) 4.0000000 $18.1942857 \pm 18.0693910$ Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0005000 0.0000000 ± 0.0000000 Ti (mg/L) 0.0025000 0.0008433 ± 0.0009290 Tl (mg/L) 0.0000100 0.0000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Si (mg/L)	1.5000000	1.9070000 ± 0.6500353
Sr (mg/L) 0.0912000 0.1493500 ± 0.1276611 Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.000500 0.0000000 ± 0.0000000 Ti (mg/L) 0.0025000 0.0008433 ± 0.0009290 Tl (mg/L) 0.0000100 0.0000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Sn (mg/L)		0.0000988 ± 0.0001602
Te (mg/L) 0.0002500 0.0000000 ± 0.0000000 Th (mg/L) 0.0000500 0.0000000 ± 0.0000000 Ti (mg/L) 0.0025000 0.0008433 ± 0.0009290 Tl (mg/L) 0.0000100 0.000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382		4.0000000	18.1942857 ± 18.0693910
Th (mg/L) 0.0000500 0.0000000 ± 0.0000000 Ti (mg/L) 0.0025000 0.0008433 ± 0.0009290 Tl (mg/L) 0.0000100 0.000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Sr (mg/L)		0.1493500 ± 0.1276611
Ti (mg/L) 0.0025000 0.0008433 ± 0.0009290 Tl (mg/L) 0.0000100 0.000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Te (mg/L)		
TI (mg/L) 0.0000100 0.0000031 ± 0.0000048 U (mg/L) 0.0001940 0.0005805 ± 0.0003382			0.0000000 ± 0.0000000
U (mg/L) 0.0001940 0.0005805 ± 0.0003382	Ti (mg/L)		0.0008433 ± 0.0009290
	TI (mg/L)		0.0000031 ± 0.0000048
V (mg/L) 0.0025000 0.0001220 ± 0.0001369	U (mg/L)		0.0005805 ± 0.0003382
0.0000000	V (mg/L)	0.0025000	0.0001220 ± 0.0001369
Zn (mg/L) 0.0020000 0.0009430 ± 0.0009518	Zn (mg/L)		0.0009430 ± 0.0009518
Zr (mg/L) 0.0000500 0.0000900 ± 0.0000894	Zr (mg/L)	0.0000500	0.0000900 ± 0.0000894

Site Description

Study Name	CBWQ-Elk	
Site	COL003	
Sampling Date	Oct 03 2023	
Know Your Watershed Basin	Central Kootenay	
Province / Territory	British Columbia	
Terrestrial Ecological Classification	Montane Cordillera EcoZone	
-	Northern Continental Divide EcoRegion	
Coordinates (decimal degrees)	49.45285 N, 114.87999 W	
Altitude	1737	
Local Basin Name	Elk River	
	Coal Creek	
Stream Order	1	



Figure 1. Location Map

Cabin Assessment Results

Cabin Assessment Results						
	Reference Model Summary					
Model	Columbia Basin 2020					
Analysis Date	November 20, 2024					
Taxonomic Level	Family					
Predictive Model Variables	Altitude					
	Drainage-Area					
	Longitude					
	Natl-Grassland					
	Natl-ShrubLow					
	Natl-Water					
Precip10_Oct						
	Reach-%CanopyCoverage					
	Sedimentary					
	Slope					
	SlopeMax					
	Temp12_DECmin					

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	0.3%	0.0%	1.7%	1.1%	96.9%	0.0%
CABIN Assessment of COL003 on Oct 03,	Mildly Divergent					
2023						

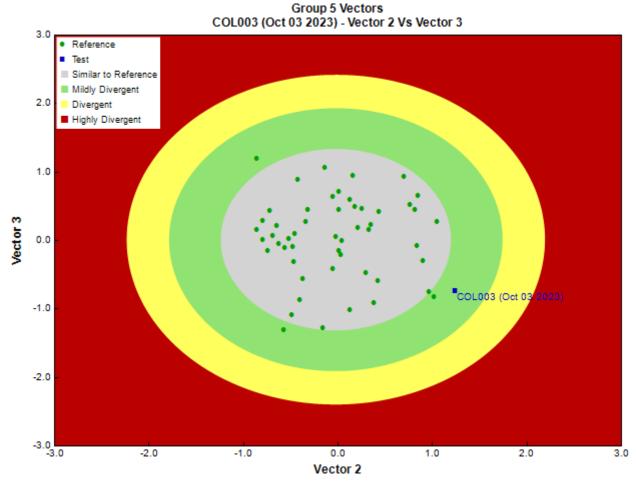


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Arthropoda	Arachnida	Trombidiformes	Sperchontidae	2	40.0
	Insecta	Coleoptera	Elmidae	7	140.0
		Diptera	Ceratopogonidae	1	20.0
			Chironomidae	145	2,900.0
			Empididae	1	20.0
		Ephemeroptera	Ameletidae	34	680.0
			Baetidae	13	260.0
			Ephemerellidae	26	520.0
			Heptageniidae	27	540.0
			Leptophlebiidae	1	20.0
		Plecoptera	Capniidae	3	60.0
			Chloroperlidae	11	220.0
			Nemouridae	14	280.0
			Perlidae	2	40.0
			Perlodidae	3	60.0
		Trichoptera	Brachycentridae	22	440.0

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Limnephilidae	1	20.0
			Rhyacophilidae	4	80.0
			Total	317	6,340.0

Metrics

Metrics						
Name	COL003	Predicted Group Reference Mean ±SD				
Bray-Curtis Distance	0.6	0.4 ± 0.1				
	Indices					
Hilsenhoff Family index (Mid-Atlantic)	3.1	3.4 ± 0.4				
Hilsenhoff Family index (North-West)	3.1	3.1 ± 0.5				
Intolerant taxa		1.0 ± 0.0				
Long-lived taxa	4.0	1.7 ± 1.2				
Tolerant individuals (%)		0.3 ± 0.0				
Functiona	l Measures					
% Filterers						
% Gatherers	78.5	45.8 ± 14.9				
% Predatores	56.5	14.8 ± 9.8				
% Scrapers	15.1	59.4 ± 19.6				
% Shredder	14.8	30.7 ± 17.4				
No. Clinger Taxa	24.0	19.8 ± 4.0				
	Individuals					
% Chironomidae	45.7	7.5 ± 8.6				
% Coleoptera	2.2	0.1 ± 0.3				
% Diptera + Non-insects	47.0	10.7 ± 9.9				
% Ephemeroptera	31.9	47.2 ± 15.8				
% Ephemeroptera that are Baetidae	12.9	25.4 ± 20.8				
% EPT Individuals	50.8	89.2 ± 10.0				
% Odonata		0.0 ± 0.0				
% of 2 dominant taxa	56.5	58.3 ± 10.6				
% of 5 dominant taxa	80.1	83.6 ± 6.3				
% of dominant taxa	45.7	37.8 ± 11.1				
% Plecoptera	10.4	36.3 ± 16.7				
% Tribe Tanyatarisini		25.4.1.24.6				
% Trichoptera that are Hydropsychida	0.0	25.4 ± 24.6				
% Tricoptera	8.5	5.7 ± 3.9				
No. EPT individuals/Chironomids+EPT Individuals Total Abundance	0.5 6340.0	0.9 ± 0.1				
	6340.0 Iness	4661.0 ± 3119.0				
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1				
Coleoptera taxa	1.0	0.1 ± 0.3				
Diptera taxa	3.0	$\frac{0.1 \pm 0.5}{2.8 \pm 1.0}$				
Ephemeroptera taxa	5.0	$\frac{2.6 \pm 1.0}{3.7 \pm 0.5}$				
EPT Individuals (Sum)	3220.0	4035.4 ± 2618.4				
EPT taxa (no)	13.0	$\frac{4035.4 \pm 2018.4}{12.3 \pm 1.9}$				
Odonata taxa		0.0 ± 0.0				
Pielou's Evenness	0.7	0.0 ± 0.0				
Plecoptera taxa	5.0	$\frac{0.7 \pm 0.1}{5.5 \pm 1.1}$				
Shannon-Wiener Diversity	1.9	$\frac{3.3 \pm 1.1}{1.9 \pm 0.3}$				
Simpson's Diversity	0.8	0.8 ± 0.1				
Simpson's Evenness	0.8	0.3 ± 0.1				
Total No. of Taxa	18.0	$\frac{0.3 \pm 0.1}{17.0 \pm 3.1}$				
Trichoptera taxa	3.0	$\frac{17.0 \pm 3.1}{3.1 \pm 1.2}$				
THUMPIEI a taxa	3.0	J.1 - 1.2				

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	quency o	f Occurre	Probability Of Occurrence at			
	Group	Group Group Group Group Group				COL003	
	1	2	3	4	5	6	

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.58
RIVPACS : Observed taxa P>0.50	11.00
RIVPACS : 0:E (p > 0.5)	0.87
RIVPACS : Expected taxa P>0.70	9.58
RIVPACS : Observed taxa P>0.70	8.00
RIVPACS : 0:E (p > 0.7)	0.83

Habitat Description

Variable	COL003	Predicted Group Reference Mean ±SD	
	k Geology		
Sedimentary (%)	100.00000	98.46051 ± 8.10999	
	annel		
Depth-Avg (cm)	12.0	20.0 ± 8.6	
Depth-BankfullMinusWetted (cm)	16.00	46.71 ± 35.00	
Depth-Max (cm)	16.0	28.8 ± 13.7	
Discharge (m^3/s)	0.014	0.682	
Macrophyte (PercentRange)	0	0 ± 0	
Reach-%CanopyCoverage (PercentRange)	2.00	1.04 ± 0.95	
Reach-%Logging (PercentRange)	0	0 ± (
Reach-DomStreamsideVeg (Category(1-4))	2	3 ± 1	
Reach-Pools (Binary)	1	1 ± (
Reach-Rapids (Binary)	0	0 ± 0	
Reach-Riffles (Binary)	1	1 ± (
Reach-StraightRun (Binary)	1	1 ± (
Slope (m/m)	0.0194000	0.0270638 ± 0.0257534	
Veg-Coniferous (Binary)	1	1 ± (
Veg-Deciduous (Binary)	0	1 ± 0	
Veg-GrassesFerns (Binary)	1	1 ± (
Veg-Shrubs (Binary)	1	1 ± (
Velocity-Avg (m/s)	0.11	0.58 ± 0.20	
Velocity-Max (m/s)	0.15	0.85 ± 0.27	
Width-Bankfull (m)	5.1	16.1 ± 13.1	
Width-Wetted (m)	4.0	9.8 ± 7.7	
XSEC-VelInstrumentDirect (Category(1-3))	2	3 ± (
XSEC-VelMethod (Category(1-3))	3	2 ± 1	
	imate		
Precip10_OCT (mm)	52.73000	64.42223 ± 33.96544	
Temp12_DECmin (Degrees Celsius)	-13.00000	-12.74810 ± 1.73767	
	Irology		
Drainage-Area (km^2)	5.65737	100.09787 ± 132.80561	
	dcover		
Nati-Grassland (%)	0.00000	7.47766 ± 6.29880	
Natl-ShrubLow (%)	0.14265	1.80492 ± 1.50412	
Natl-Water (%)	0.00000	0.32077 ± 0.59001	
Reg-Ice (%)	0.00000	1.28005 ± 3.54484	
	rate Data		
%Bedrock (%)	0	0 ± 0	
%Boulder (%)	3	6 ± 6	
%Cobble (%)	38	57 ± 15	
%Gravel (%)	3	2 ± 3	
%Pebble (%)	56	34 ± 16	
%Sand (%)	0	0 ± 0	
%Silt+Clay (%)	0	0 ± 1	
D50 (cm)	5.60	24.05 ± 35.66	
Dg (cm)	5.8	23.0 ± 33.8	
Dominant-1st (Category(0-9))	5	6 ± 1	
Dominant-2nd (Category(0-9))	6	6 ± 1	
Embeddedness (Category(1-5))	4	4 ± 1	
PeriphytonCoverage (Category(1-5))	1	2 ± 1	
SurroundingMaterial (Category(0-9))	3	3 ± 1	
	ography		
Reg-SlopeLT30% (%)	73.39946	20.01334 ± 7.41149	

Habitat Description						
Variable	COL003	Predicted Group Reference Mean ±SD				
SlopeMax (%)	101.76495	488.94077 ± 542.32910				
Wate	er Chemistry					
Ag (mg/L)	0.0000250	0.0000018 ± 0.0000013				
Al (mg/L)	0.0891000	0.0078031 ± 0.0090962				
As (mg/L)	0.0002500	0.0002735 ± 0.0001787				
B (mg/L)	0.0250000	0.0127286 ± 0.0135802				
Ba (mg/L)	0.0494000	0.0677069 ± 0.0514113				
Be (mg/L)	0.0000500	0.0000043 ± 0.0000039				
Bi (mg/L)	0.0000500	0.0000018 ± 0.0000013				
Br (mg/L)	0.0500000	0.0303333 ± 0.0788597				
Ca (mg/L)	7.9100000	28.2142857 ± 13.7707094				
Cd (mg/L)	0.0000660	0.0000100 ± 0.0000293				
Chloride-Total (mg/L)	0.3500000	0.0000000 ± 0.0000000				
Co (mg/L)	0.0000500	0.0000075 ± 0.0000060				
Cr (mg/L)	0.0002500	0.0001514 ± 0.0001361				
Cu (mg/L)	0.0006300	0.0001604 ± 0.0001447				
F (mg/L)	0.0500000	0.0876667 ± 0.0847823				
Fe (mg/L)	0.0350000	0.0101789 ± 0.0111495				
General-Alkalinity (mg/L)	25.1000000	98.9704545 ± 43.8308301				
General-CarbonDOC (mg/L)	5.4800000	0.8383333 ± 0.4040008				
General-CarbonTOC (mg/L)	4.4300000	0.5586957 ± 0.6229060				
General PO (mg/L)	43.9000000	173.5150000 ± 86.2502071				
General-DO (mg/L) General-Hardness (mg/L)	10.3000000 25.6000000	10.7243478 ± 0.8596502 $109.1853659 \pm 48.3470504$				
General-pH (pH)	23.8000000	$\frac{109.1853639 \pm 48.3470304}{8.0 \pm 0.6}$				
General-SolidsTSS (mg/L)	1.0000000	5.2717002 ± 27.1908288				
General-SpCond (µS/cm)	43.9000000	196.0710526 ± 116.3908975				
General-TempAir (Degrees Celsius)	8.0	7.2 ± 5.7				
General-TempWater (Degrees Celsius)	5.5000000	6.2042553 ± 2.0993816				
General-Turbidity (NTU)	0.2800000	0.4347619 ± 0.5563328				
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000				
K (mg/L)	0.2600000	0.3312424 ± 0.1572675				
Li (mg/L)	0.0001800	0.0009183 ± 0.0003795				
Mg (mg/L)	1.4200000	7.8748571 ± 3.9958945				
Mn (mg/L)	0.0007600	0.0007721 ± 0.0008518				
Mo (mg/L)	0.0001800	0.0012835 ± 0.0042333				
Na (mg/L)	0.1900000	0.7930303 ± 0.4756164				
Ni (mg/L)	0.0006200	0.0001266 ± 0.0001131				
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 ± 0.0199967				
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0287300 ± 0.0357249				
Nitrogen-NO3 (mg/L)	0.0050000	0.0336397 ± 0.0328125				
Nitrogen-TKN (mg/L)	0.2280000	0.0352941 ± 0.0299453				
Nitrogen-TN (mg/L)	0.2280000	0.0675581 ± 0.0509763				
Pb (mg/L)	0.0001000	0.0000179 ± 0.0000156				
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 ± 0.5208890				
Phosphorus-TP (mg/L)	0.0163000	0.0031912 ± 0.0087929				
S (mg/L)	1.5000000	3.6625000 ± 1.5619928				
Sb (mg/L)	0.0001000	0.0000337 ± 0.0000157				
Se (mg/L)	0.0002500	0.0002782 ± 0.0002859				
Si (mg/L)	1.5000000	2.0400303 ± 0.8510321				
Sn (mg/L)	0.0001000	0.0000300 ± 0.0000407				
SO4 (mg/L)	1.8000000	13.3070732 ± 13.0883468				
Sr (mg/L)	0.0120000	0.0893414 ± 0.0805860				
Te (mg/L)	0.0002500	0.0000000 ± 0.0000000				
Th (mg/L)	0.0000500	0.0000000 ± 0.0000000				
Ti (mg/L)	0.0025000	0.0003150 ± 0.0001205				
TI (mg/L)	0.0000100	0.0000040 ± 0.0000067				
U (mg/L)	0.0000420	0.0003872 ± 0.0002299				
V (mg/L)	0.0025000	0.0001617 ± 0.0001537				
Zn (mg/L)	0.0020000	0.0003724 ± 0.0003377				
Zr (mg/L)	0.0003000	0.0000500 ± 0.0000000				

Site Description

Cité Bécéription		
Study Name	CBWQ-Elk	
Site	LIZ001	
Sampling Date	Oct 04 2023	
Know Your Watershed Basin	Central Kootenay	
Province / Territory	British Columbia	
Terrestrial Ecological Classification	Montane Cordillera EcoZone	
	Northern Continental Divide EcoRegion	
Coordinates (decimal degrees)	49.47116 N, 115.07716 W	
Altitude	994	
Local Basin Name	Lizard Creek	
	Elk River	
Stream Order	3	



Figure 1. Location Map

Cabin Assessment Results

	Reference Model Summary				
Model	Columbia Basin 2020				
Analysis Date	November 20, 2024				
Taxonomic Level	Family				
Predictive Model Variables	Altitude				
	Drainage-Area				
	Longitude				
	Natl-Grassland				
	Natl-ShrubLow				
	Natl-Water				
	Precip10_Oct				
	Reach-%CanopyCoverage				
	Sedimentary				
	Slope				
	SlopeMax				
	Temp12_DECmin				
Peference Groups	1 2 3 4 5 6				

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	5.2%	35.1%	17.4%	28.1%	8.6%	5.7%
CABIN Assessment of LIZ001 on Oct 04,	Highly Divergent					
2023						

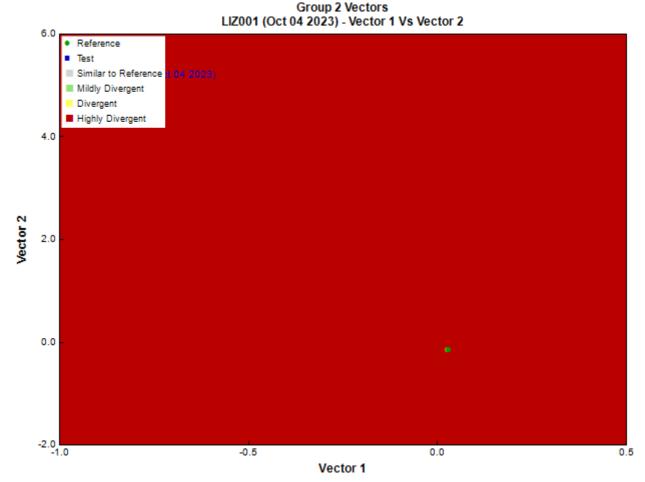


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	263	5,260.0
Arthropoda	Arachnida	Trombidiformes	Feltriidae	1	20.0
·			Lebertiidae	17	340.0
			Sperchontidae	2	40.0
			Torrenticolidae	1	20.0
	Insecta	Coleoptera	Elmidae	21	420.0
		Diptera	Chironomidae	90	1,800.0
			Empididae	20	400.0
			Psychodidae	42	840.0
			Tipulidae	3	60.0
		Ephemeroptera	Baetidae	63	1,260.0
			Ephemerellidae	17	340.0
			Heptageniidae	3	60.0
		Plecoptera		3	60.0
			Capniidae	24	480.0
			Chloroperlidae	1	20.0

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Nemouridae	31	620.0
			Perlidae	2	40.0
			Perlodidae	6	120.0
		Trichoptera		1	20.0
			Brachycentridae	8	160.0
			Hydropsychidae	20	400.0
			Hydroptilidae	3	60.0
			Lepidostomatidae	5	100.0
			Rhyacophilidae	3	60.0
			Total	650	13,000.0

Metrics

Metrics	1.77004	D
Name	LIZ001	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.96	0.3 ± 0.1
	Indices	
Hilsenhoff Family index (Mid-Atlantic)	8.3	3.6 ± 0.4
Hilsenhoff Family index (North-West)	8.3	3.2 ± 0.3
Intolerant taxa		1.0 ± 0.0
Long-lived taxa	3.0	2.7 ± 1.5
Tolerant individuals (%)		0.9 ± 0.2
Function	al Measures	
% Filterers		0.6 ± 0.3
% Gatherers	117.1	38.1 ± 14.1
% Predatores	26.0	15.8 ± 9.1
% Scrapers	16.9	60.8 ± 14.6
% Shredder	14.2	23.9 ± 11.1
No. Clinger Taxa	25.0	22.0 ± 5.6
	f Individuals	
% Chironomidae	13.9	6.0 ± 5.6
% Coleoptera	3.3	1.7 ± 4.1
% Diptera + Non-insects	68.0	10.1 ± 7.7
% Ephemeroptera	12.8	53.4 ± 13.8
% Ephemeroptera that are Baetidae	75.9	29.5 ± 17.8
% EPT Individuals	28.8	88.1 ± 9.3
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	54.6	54.4 ± 11.4
% of 5 dominant taxa	75.7	81.6 ± 8.1
% of dominant taxa	40.7	35.2 ± 11.4
% Plecoptera	9.9	28.8 ± 11.6
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	51.3	28.7 ± 28.3
% Tricoptera	6.0	6.0 ± 5.0
No. EPT individuals/Chironomids+EPT Individuals	0.7	0.9 ± 0.1
Total Abundance	13000.0	1083.1 ± 932.3
Ric	hness	
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1
Coleoptera taxa	1.0	0.3 ± 0.5
Diptera taxa	4.0	3.1 ± 1.3
Ephemeroptera taxa	3.0	3.8 ± 0.6
EPT Individuals (Sum)	3720.0	941.8 ± 766.3
EPT taxa (no)	13.0	12.4 ± 2.4
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.7	0.7 ± 0.1
Plecoptera taxa	5.0	5.3 ± 1.3
Shannon-Wiener Diversity	2.1	2.0 ± 0.3
Simpson's Diversity	0.8	0.8 ± 0.1
Simpson's Evenness	0.2	0.3 ± 0.1
Total No. of Taxa	23.0	18.2 ± 4.7
Trichoptera taxa	5.0	3.3 ± 1.5
	3.0	

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	Frequency of Occurrence in Reference Sites					Probability Of Occurrence at
	Group	Group	Group	Group	Group	Group	LIZ001
	1	2	3	4	5	6	
Baetidae	100%	100%	100%	100%	100%	100%	1.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.35
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS : 0:E (p > 0.5)	1.05
RIVPACS : Expected taxa P>0.70	10.05
RIVPACS : Observed taxa P>0.70	10.00
RIVPACS: 0:E (p > 0.7)	0.99

Habitat Description

Variable	LIZ001	Predicted Group Reference Mean ±SD					
Bedrock Geology							
Sedimentary (%)	100.00000	91.25558 ± 24.81348					
Channel							
Depth-Avg (cm)	20.3	31.4 ± 15.4					
Depth-BankfullMinusWetted (cm)	44.00	54.15 ± 36.59					
Depth-Max (cm)	24.0	46.8 ± 23.7					
Discharge (m^3/s)	0.051	0.000 ± 0.000					
Macrophyte (PercentRange)	0	0 ± 0					
Reach-%CanopyCoverage (PercentRange)	1.00	1.00 ± 0.96					
Reach-%Logging (PercentRange)	0	0 ± 0					
Reach-DomStreamsideVeg (Category(1-4))	1	3 ± 1					
Reach-Pools (Binary)	1	1 ± 1					
Reach-Rapids (Binary)	0	0 ± 0					
Reach-Riffles (Binary)	1	1 ± 0					
Reach-StraightRun (Binary)	1	1 ± 1					
Slope (m/m)	0.0227000	0.0435622 ± 0.0544263					
Veg-Coniferous (Binary)	1	1 ± 0					
Veg-Deciduous (Binary)	1	1 ± 0					
Veg-GrassesFerns (Binary)	1	1 ± 0					
Veg-Shrubs (Binary)	1	1 ± 0					
Velocity-Avg (m/s)	0.25	0.63 ± 0.23					
Velocity-Max (m/s)	0.38	0.95 ± 0.33					
Width-Bankfull (m)	10.4	23.6 ± 18.9					
Width-Wetted (m)	5.3	14.0 ± 9.6					
XSEC-VelInstrumentDirect (Category(1-3))	2	2 ± 0					
XSEC-VelMethod (Category(1-3))	3	2 ± 1					
	nate						
Precip10_OCT (mm)	48.29762	93.78954 ± 37.73803					
Temp12_DECmin (Degrees Celsius)	-13.15000	-12.77499 ± 1.90440					
•	rology						
Drainage-Area (km^2)	45.25148	267.49128 ± 347.95771					
	lcover						
Natl-Grassland (%)	3.20456	4.84000 ± 3.39798					
Natl-ShrubLow (%)	6.94321	4.94988 ± 4.53147					
Natl-Water (%)	0.16023	0.22026 ± 0.32058					
Reg-Ice (%)	0.00000	4.18114 ± 6.57069					
	ate Data	0.1.1					
%Bedrock (%)	0	0 ± 1					
%Boulder (%)	1	6 ± 7					
%Cobble (%)	41	51 ± 23					
%Gravel (%)	9	4 ± 6					
%Pebble (%)	48	39 ± 23					
%Sand (%)	0	0 ± 0 0 ± 0					
%Silt+Clay (%) D50 (cm)	5.45	8.79 ± 6.32					
Dg (cm)	5.45	8.79 ± 6.32 7.7 ± 3.1					
Dy (CIII)	5.1	/./ ± 3.1					

Habitat Description		
Variable	LIZ001	Predicted Group Reference Mean ±SD
Dominant-1st (Category(0-9))	5	6 ± 1
Dominant-2nd (Category(0-9))	6	6 ± 1
Embeddedness (Category(1-5))	3	4 ± 1
PeriphytonCoverage (Category(1-5))	4	2 ± 1
SurroundingMaterial (Category(0-9))	2	3 ± 1
	pography	
Reg-SlopeLT30% (%)	35.05430	22.23150 ± 8.61518
SlopeMax (%)	223.55025	475.68167 ± 413.51912
	r Chemistry	0.0000030 1.0.0000010
Ag (mg/L)	0.0000250	0.0000038 ± 0.0000018
Al (mg/L)	0.0236000	0.0064450 ± 0.0021850
As (mg/L)	0.0002500	0.0002615 ± 0.0000120
B (mg/L)	0.0250000 0.0796000	0.0262500 ± 0.0335876 0.0683500 ± 0.0002121
Ba (mg/L)		0.0083300 ± 0.0002121 0.0000075 ± 0.0000035
Be (mg/L)	0.0000500	
Bi (mg/L)	0.0000500	0.0000038 ± 0.0000018
Br (mg/L)	0.0500000 115.0000000	0.0140909 ± 0.0253375
Ca (mg/L) Cd (mg/L)	0.0000160	
Chloride-Total (mg/L)	0.2600000	0.0000038 ± 0.0000018 $0.00000000 \pm 0.00000000$
	0.0000500	0.0000000 ± 0.0000000 0.0000114 ± 0.0000019
Co (mg/L) Cr (mg/L)	0.000300	0.0000114 ± 0.0000019 0.0000750 ± 0.0000354
Cu (mg/L)	0.0002300	0.0000730 ± 0.0000334 0.0001155 ± 0.0000219
F (mg/L)	0.0500000	0.0001133 ± 0.0000219 0.0633810 ± 0.0630004
Fe (mg/L)	0.0260000	0.0033810 ± 0.0030004 0.0105500 ± 0.0036062
General-Alkalinity (mg/L)	178.0000000	74.2125000 ± 53.9915558
General-CarbonDOC (mg/L)	1.8900000	0.0000000 ± 0.0000000
General-CarbonTOC (mg/L)	1.8100000	0.9750000 ± 0.4596194
General-Conductivity (µS/cm)	604.0000000	121.7600000 ± 104.0053005
General-DO (mg/L)	10.9600000	11.0129630 ± 0.8955266
General-Hardness (mg/L)	386.0000000	95.8956522 ± 77.3576081
General-pH (pH)	8.3	7.7 ± 0.8
General-SolidsTSS (mg/L)	11.4000000	5.9463636 ± 8.6422279
General-SpCond (μS/cm)	604.0000000	165.1777778 ± 128.4575336
General-TempAir (Degrees Celsius)	12.0	11.5 ± 5.9
General-TempWater (Degrees Celsius)	7.3000000	6.4451852 ± 2.2997548
General-Turbidity (NTU)	1.0600000	5.7154545 ± 6.9690564
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000
K (mg/L)	0.4600000	0.4604091 ± 0.2737828
Li (mg/L)	0.0042600	0.0011000 ± 0.0000000
Mg (mg/L)	23.9000000	8.6045455 ± 7.5439965
Mn (mg/L)	0.0025100	0.0007470 ± 0.0001937
Mo (mg/L)	0.0017500	0.0006780 ± 0.0000170
Na (mg/L)	1.8200000	1.0881818 ± 0.7163042
Ni (mg/L)	0.0002000	0.0001625 ± 0.0001945
Nitrogen-NO2 (mg/L)	0.0050000	0.0034091 ± 0.0048394
Nitrogen-NO2+NO3 (mg/L)	0.0187000	0.0789333 ± 0.0140433
Nitrogen-NO3 (mg/L)	0.0190000	0.0719000 ± 0.0408583
Nitrogen-TKN (mg/L)	0.0580000	0.0200000
Nitrogen-TN (mg/L)	0.0767000	0.0929091 ± 0.0373336
Pb (mg/L)	0.0001000	0.0000337 ± 0.0000259
Phosphorus TR (mg/L)	0.0025000	0.0005167 ± 0.0006974
Phosphorus-TP (mg/L)	0.0107000 81.7000000	0.0049864 ± 0.0043795 5.0000000
S (mg/L)	0.0001000	0.0000635 ± 0.0000092
Sb (mg/L)		
Se (mg/L) Si (mg/L)	0.0002500 2.6000000	0.0001105 ± 0.0000134 2.5681818 ± 1.4562562
	0.0001000	$\frac{2.3681818 \pm 1.4362362}{0.0000075 \pm 0.0000035}$
Sn (mg/L) SO4 (mg/L)	223.0000000	$\frac{0.0000075 \pm 0.0000035}{23.3522727 \pm 29.9414845}$
Sr (mg/L)	1.7900000	$\frac{23.3322727 \pm 29.9414643}{0.0445000 \pm 0.0002828}$
Te (mg/L)	0.0002500	0.0000000 ± 0.0002828 $0.00000000 \pm 0.00000000$
Th (mg/L)	0.0002500	0.0000000 ± 0.00000000 $0.00000000 \pm 0.00000000$
III (IIIg/L)	0.0000500	0.0000000 ± 0.0000000

Trabitat Boothption				
Variable	LIZ001	Predicted Group Reference Mean ±SD		
Ti (mg/L)	0.0025000	0.0005000		
TI (mg/L)	0.0000100	0.0000015 ± 0.0000007		
U (mg/L)	0.0004180	0.0012050 ± 0.0000495		
V (mg/L)	0.0025000	0.0001500 ± 0.0000707		
Zn (mg/L)	0.0020000	0.0006400 ± 0.0005091		
Zr (mg/L)	0.0000500	0.0000000 ± 0.0000000		

Site Description

0.10 2 000. pt. 0.1		
Study Name	CBWQ-Elk	
Site	LIZ003	
Sampling Date	Oct 04 2023	
Know Your Watershed Basin	Central Kootenay	
Province / Territory	British Columbia	
Terrestrial Ecological Classification	Montane Cordillera EcoZone	
	Northern Continental Divide EcoRegion	
Coordinates (decimal degrees)	49.48569 N, 115.09432 W	
Altitude	1022	
Local Basin Name	Lizard Creek	
	Central Kootenay	
Stream Order	3	



Figure 1. Location Map

Cabin Assessment Results

	Reference Model Summary					
Model	Columbia Basin 2020					
Analysis Date	November 20, 2024					
Taxonomic Level	Family					
Predictive Model Variables	Altitude					
	Drainage-Area					
	Longitude					
	Natl-Grassland					
	Natl-ShrubLow					
	Natl-Water					
	Precip10_Oct					
	Reach-%CanopyCoverage					
	Sedimentary					
	Slope					
	SlopeMax					
	Temp12_DECmin					
Peference Groups	1 2 3 4 5 6					

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate	39.4%					
Probability of Group Membership	4.0%	27.9%	18.0%	33.1%	11.3%	5.7%
CABIN Assessment of LIZ003 on Oct 04,	Highly Divergent					
2023						

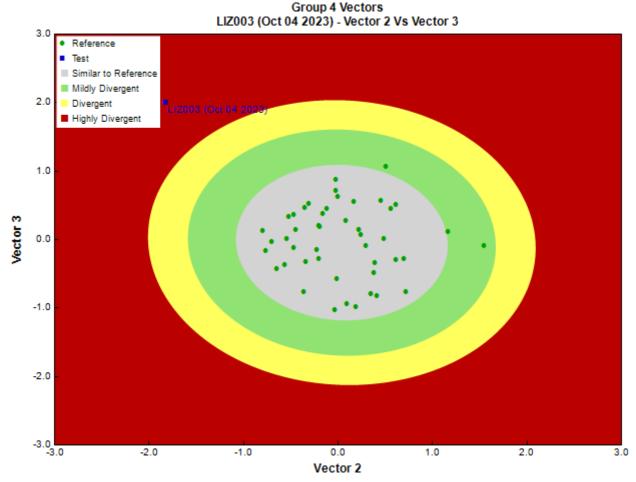


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	7	140.0
Arthropoda	Arachnida	Trombidiformes	Lebertiidae	8	160.0
			Torrenticolidae	10	200.0
	Insecta	Coleoptera	Elmidae	186	3,720.0
		Diptera		1	20.0
			Ceratopogonidae	1	20.0
			Chironomidae	15	300.0
			Empididae	3	60.0
			Pelecorhynchidae	1	20.0
			Psychodidae	164	3,280.0
			Tipulidae	11	220.0
		Ephemeroptera	Baetidae	197	3,940.0
			Ephemerellidae	184	3,680.0
			Heptageniidae	45	900.0
		Plecoptera		4	80.0
			Capniidae	16	320.0

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Chloroperlidae	10	200.0
			Nemouridae	56	1,120.0
			Perlidae	16	320.0
			Perlodidae	5	100.0
			Taeniopterygidae	3	60.0
		Trichoptera	Apataniidae	4	80.0
			Brachycentridae	19	380.0
			Hydropsychidae	35	700.0
			Limnephilidae	1	20.0
			Rhyacophilidae	15	300.0
			Uenoidae	7	140.0
			Total	1,024	20,480.0

Metrics

Name	LIZ003	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.92	0.3 ± 0.1
	Indices	
Hilsenhoff Family index (Mid-Atlantic)	3.9	3.2 ± 0.4
Hilsenhoff Family index (North-West)	3.9	2.9 ± 0.3
Intolerant taxa		1.0 ± 0.0
Long-lived taxa	5.0	1.9 ± 1.0
Tolerant individuals (%)		0.5 ± 0.4
	al Measures	
% Filterers		0.3
% Gatherers	67.8	47.1 ± 15.4
% Predatores	12.4	12.9 ± 7.3
% Scrapers	46.7	68.3 ± 16.1
% Shredder	28.9	36.7 ± 14.6
No. Clinger Taxa	32.0	20.2 ± 4.4
	f Individuals	
% Chironomidae	1.5	5.2 ± 5.7
% Coleoptera	18.3	0.6 ± 2.2
% Diptera + Non-insects	21.6	7.4 ± 7.0
% Ephemeroptera	41.8	45.8 ± 15.1
% Ephemeroptera that are Baetidae	46.2	28.9 ± 20.8
% EPT Individuals	60.2	91.9 ± 7.3
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	37.6	59.5 ± 11.3
% of 5 dominant taxa	77.2	85.1 ± 6.5
% of dominant taxa	19.3	37.7 ± 10.4
% Plecoptera	10.4	40.5 ± 13.3
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	43.2	23.9 ± 23.6
% Tricoptera	7.9	5.6 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	1.0	0.9 ± 0.1
Total Abundance	20480.0	1449.4 ± 859.7
Ric	hness	
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.2
Coleoptera taxa	1.0	0.2 ± 0.5
Diptera taxa	6.0	2.6 ± 1.1
Ephemeroptera taxa	3.0	3.7 ± 0.6
EPT Individuals (Sum)	12260.0	1352.9 ± 804.6
EPT taxa (no)	15.0	12.2 ± 2.1
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.7	0.7 ± 0.1
Plecoptera taxa	6.0	5.4 ± 1.2
Shannon-Wiener Diversity	2.3	1.9 ± 0.3
Simpson's Diversity	0.9	0.8 ± 0.1
Simpson's Evenness	0.3	0.3 ± 0.1
Total No. of Taxa	25.0	16.4 ± 3.5
Trichoptera taxa	6.0	3.2 ± 1.3

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	Frequency of Occurrence in Reference Sites					Probability Of Occurrence at
	Group	Group	Group	Group	Group	Group	LIZ003
	1	2	3	4	5	6	
Baetidae	100%	100%	100%	100%	100%	100%	1.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.33
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS : 0:E (p > 0.5)	1.05
RIVPACS : Expected taxa P>0.70	10.06
RIVPACS : Observed taxa P>0.70	11.00
RIVPACS: 0:E (p > 0.7)	1.09

Habitat Description

Variable		LIZ003	Predicted Group Reference Mean ±SD
В	edrock Geolog	У	
Sedimentary (%)		100.00000	90.78003 ± 16.48787
	Channel		
Depth-Avg (cm)		17.5	27.7 ± 12.1
Depth-BankfullMinusWetted (cm)		16.00	48.41 ± 32.00
Depth-Max (cm)		22.0	41.6 ± 18.0
Discharge (m^3/s)		0.042	4.100
Macrophyte (PercentRange)		0	0 ± 0
Reach-%CanopyCoverage (PercentRange)		1.00	1.20 ± 0.86
Reach-%Logging (PercentRange)		0	0 ± 0
Reach-DomStreamsideVeg (Category(1-4))		2	3 ± 1
Reach-Pools (Binary)		1	1 ± 1
Reach-Rapids (Binary)		0	1 ± 1
Reach-Riffles (Binary)		1	1 ± 0
Reach-StraightRun (Binary)		1	1 ± 0
Slope (m/m)		0.0073700	0.0302442 ± 0.0225320
Veg-Coniferous (Binary)		1	1 ± 0
Veg-Deciduous (Binary)		1	1 ± 0
Veg-GrassesFerns (Binary)		1	1 ± 0
Veg-Shrubs (Binary)		1	1 ± 0
Velocity-Avg (m/s)		0.24	0.65 ± 0.30
Velocity-Max (m/s)		0.50	1.02 ± 0.40
Width-Bankfull (m)		8.0	22.0 ± 20.4
Width-Wetted (m)		5.0	14.4 ± 14.2
XSEC-VelInstrumentDirect (Category(1-3))		2	2 ± 1
XSEC-VelMethod (Category(1-3))		3	2 ± 1
	Climate		
Precip10_OCT (mm)		50.00611	101.93711 ± 37.08464
Temp12_DECmin (Degrees Celsius)		-13.15000	-12.60285 ± 1.55807
	Hydrology		
Drainage-Area (km^2)		41.13000	153.19859 ± 249.47160
	Landcover		
Nati-Grassland (%)		3.33072	4.14423 ± 3.51761
Natl-ShrubLow (%)		6.54389	4.00461 ± 2.77104
Nati-Water (%)		0.17633	0.26551 ± 0.58793
Reg-Ice (%)		0.00000	2.39543 ± 4.09623
	Substrate Data	1	
%Bedrock (%)		0	0 ± 0
%Boulder (%)		1	8 ± 8
%Cobble (%)		43	53 ± 15
%Gravel (%)		2	4 ± 6
%Pebble (%)		54	33 ± 14
%Sand (%)		0	0 ± 0
%Silt+Clay (%)		0	0 ± 0
D50 (cm)		5.75	14.48 ± 20.33
Dg (cm)		5.5	13.1 ± 19.3

Habitat Description						
Variable	LIZ003	Predicted Group Reference Mean ±SD				
Dominant-1st (Category(0-9))	5	6 ± 1				
Dominant-2nd (Category(0-9))	6	6 ± 1				
Embeddedness (Category(1-5))	4	4 ± 1				
PeriphytonCoverage (Category(1-5))	2	2 ± 1				
SurroundingMaterial (Category(0-9))	2	3 ± 2				
	ography					
Reg-SlopeLT30% (%)	30.96964	17.11832 ± 8.21512				
SlopeMax (%)	223.55025	386.22536 ± 140.72382				
	Chemistry					
Ag (mg/L)	0.0000250	0.0000028 ± 0.0000036				
Al (mg/L)	0.0144000	0.0136410 ± 0.0145846				
As (mg/L)	0.0002500	0.0001754 ± 0.0001818				
B (mg/L)	0.0250000	0.0305833 ± 0.0370084				
Ba (mg/L)	0.0767000	0.0435560 ± 0.0571949				
Be (mg/L)	0.0000500	0.0000056 ± 0.0000072				
Bi (mg/L)	0.0000500	0.0000028 ± 0.0000036				
Br (mg/L)	0.0500000	0.0268750 ± 0.0585132				
Ca (mg/L)	110.0000000	20.8384848 ± 13.6841012				
Cd (mg/L)	0.0000210	0.0000115 ± 0.0000149				
Chloride-Total (mg/L)	0.2600000	0.0000000 ± 0.0000000				
Co (mg/L)	0.0000500	0.0000298 ± 0.0000226 0.0000900 ± 0.0000889				
Cr (mg/L)	0.0005000					
Cu (mg/L)	0.0002000	0.0003212 ± 0.0001572				
F (mg/L)	0.1000000	0.0484615 ± 0.0355181				
Fe (mg/L)	0.0210000 168.0000000	0.0442667 ± 0.0348579				
General-Alkalinity (mg/L) General-CarbonDOC (mg/L)	2.1800000	$59.4800000 \pm 43.9851975$ 0.6500000 ± 0.3535534				
General-CarbonTOC (mg/L)	1.5000000	0.3944444 ± 0.3157179				
General-Conductivity (µS/cm)	607.000000	$\frac{0.3944444 \pm 0.3137179}{117.1461538 \pm 96.2732948}$				
General-DO (mg/L)	11.3100000	12.6802381 ± 11.2165934				
General-Hardness (mg/L)	377.000000	76.7342857 ± 54.3511564				
General-pH (pH)	8.3	7.9 ± 0.4				
General-SolidsTSS (mg/L)	1.0000000	1.9034611 ± 3.0161707				
General-SpCond (µS/cm)	607.0000000	153.2777778 ± 120.2707781				
General-TempAir (Degrees Celsius)	16.0	10.6 ± 5.4				
General-TempWater (Degrees Celsius)	7.9000000	6.4219048 ± 2.3475813				
General-Turbidity (NTU)	0.3000000	2.7965000 ± 4.1415171				
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000				
K (mg/L)	0.4600000	0.4511613 ± 0.2901093				
Li (mg/L)	0.0043900	0.0016910 ± 0.0023918				
Mg (mg/L)	24.9000000	5.1886364 ± 5.0072212				
Mn (mg/L)	0.0038000	0.0028572 ± 0.0019872				
Mo (mg/L)	0.0017400	0.0006660 ± 0.0004339				
Na (mg/L)	1.9500000	0.9945806 ± 0.9373003				
Ni (mg/L)	0.0002000	0.0002298 ± 0.0001811				
Nitrogen-NO2 (mg/L)	0.0050000	0.0042917 ± 0.0108893				
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0732400 ± 0.0567225				
Nitrogen-NO3 (mg/L)	0.0050000	0.0865111 ± 0.0538993				
Nitrogen-TKN (mg/L)	0.0570000	97.0987778 ± 290.9629753				
Nitrogen-TN (mg/L)	0.0570000	24.3739167 ± 145.4787822				
Pb (mg/L)	0.0001000	0.0000559 ± 0.0000496				
Phosphorus-OrthoP (mg/L)	0.0025000	0.0008667 ± 0.0013292				
Phosphorus-TP (mg/L)	0.0130000 77.9000000	0.0031194 ± 0.0039854				
S (mg/L)		362.2600000 ± 803.7224104				
Sb (mg/L)	0.0001000	0.0000288 ± 0.0000136				
Se (mg/L)	0.0002500	0.0002422 ± 0.0003912				
Si (mg/L) Sn (mg/L)	2.8000000	1.9070000 ± 0.6500353				
	0.0001000	0.0000988 ± 0.0001602 $18.1942857 \pm 18.0693910$				
SO4 (mg/L) Sr (mg/L)	1.7800000	0.1493500 ± 0.1276611				
Te (mg/L)	0.0002500	0.1493500 ± 0.1276611 $0.00000000 \pm 0.00000000$				
Th (mg/L)	0.0002500	0.0000000 ± 0.0000000 $0.00000000 \pm 0.00000000$				
in (my/L)	0.0000500	0.0000000 ± 0.0000000				

Trabitat Boothption				
Variable	LIZ003	Predicted Group Reference		
		Mean ±SD		
Ti (mg/L)	0.0025000	0.0008433 ± 0.0009290		
TI (mg/L)	0.0000100	0.0000031 ± 0.0000048		
U (mg/L)	0.0003960	0.0005805 ± 0.0003382		
V (mg/L)	0.0025000	0.0001220 ± 0.0001369		
Zn (mg/L)	0.0020000	0.0009430 ± 0.0009518		
Zr (mg/L)	0.0000500	0.0000900 ± 0.0000894		

Site Description

Study Name	CBWQ-Elk				
Site	MOR001				
Sampling Date	Sep 25 2023				
Know Your Watershed Basin	Central Kootenay				
Province / Territory	British Columbia				
Terrestrial Ecological Classification	Montane Cordillera EcoZone				
-	Northern Continental Divide EcoRegion				
Coordinates (decimal degrees)	49.35832 N, 115.00067 W				
Altitude	948				
Local Basin Name	Morrissey Creek				
	Central Kootenay				
Stream Order	4				



Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary							
Model	Columbia Basin 2020						
Analysis Date	November 20, 2024	November 20, 2024					
Taxonomic Level	Family						
Predictive Model Variables	Altitude						
	Drainage-Area						
	Longitude						
	Natl-Grassland						
	Natl-ShrubLow						
	Natl-Water						
	Precip10_Oct						
	Reach-%CanopyCoverage						
	Sedimentary						
	Slope						
	SlopeMax						
	Temp12_DECmin						

Reference Groups	1	2	3	4	5	6	
Number of Reference Sites	13	24	28	35	32	15	
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%	
Overall Model Error Rate	39.4%						
Probability of Group Membership	2.9%	22.6%	14.6%	47.8%	9.6%	2.5%	
CABIN Assessment of MOR001 on Sep 25,	Highly Divergent						
2023							

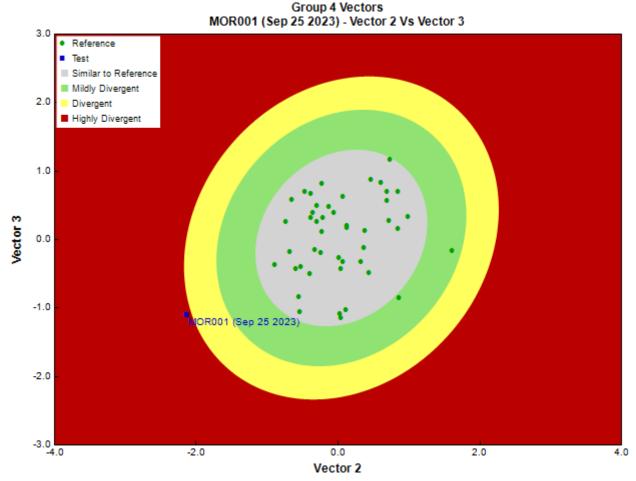


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	4	80.0
Arthropoda	Arachnida	Trombidiformes	Hydryphantidae	1	20.0
			Lebertiidae	9	180.0
			Sperchontidae	7	140.0
			Torrenticolidae	4	80.0
	Insecta	Coleoptera	Elmidae	69	1,380.0
		Diptera		2	40.0
			Chironomidae	37	740.0
			Psychodidae	3	60.0
			Tipulidae	10	200.0
		Ephemeroptera	Baetidae	15	300.0
			Ephemerellidae	40	800.0
			Heptageniidae	115	2,300.0
			Leptophlebiidae	53	1,060.0
		Plecoptera	Capniidae	2	40.0
			Chloroperlidae	1	20.0

Community Structure

·					
Phylum	Class	Order	Family	Raw Count	Total Count
			Leuctridae	3	60.0
			Nemouridae	7	140.0
			Perlodidae	4	80.0
		Trichoptera	Apataniidae	1	20.0
			Brachycentridae	7	140.0
			Hydropsychidae	34	680.0
			Lepidostomatidae	240	4,800.0
			Total	668	13,360.0

Metrics

Name	MOR001	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.9	0.3 ± 0.1
Biotic	Indices	
Hilsenhoff Family index (Mid-Atlantic)	2.2	3.2 ± 0.4
Hilsenhoff Family index (North-West)	2.2	2.9 ± 0.3
Intolerant taxa		1.0 ± 0.0
Long-lived taxa	4.0	1.9 ± 1.0
Tolerant individuals (%)		0.5 ± 0.4
Functiona	l Measures	
% Filterers		0.3
% Gatherers	40.1	47.1 ± 15.4
% Predatores	15.4	12.9 ± 7.3
% Scrapers	35.0	68.3 ± 16.1
% Shredder	50.7	36.7 ± 14.6
No. Clinger Taxa	22.0	20.2 ± 4.4
	Individuals	
% Chironomidae	5.6	5.2 ± 5.7
% Coleoptera	10.4	0.6 ± 2.2
% Diptera + Non-insects	11.3	7.4 ± 7.0
% Ephemeroptera	33.5	45.8 ± 15.1
% Ephemeroptera that are Baetidae	6.7	28.9 ± 20.8
% EPT Individuals	78.4	91.9 ± 7.3
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	53.3	59.5 ± 11.3
% of 5 dominant taxa	77.6	85.1 ± 6.5
% of dominant taxa	36.0	37.7 ± 10.4
% Plecoptera	2.6	40.5 ± 13.3
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	12.1	23.9 ± 23.6
% Tricoptera	42.3	5.6 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 ± 0.1
Total Abundance	13360.0	1449.4 ± 859.7
	ness	10100
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.2
Coleoptera taxa	1.0	0.2 ± 0.5
Diptera taxa	3.0	2.6 ± 1.1
Ephemeroptera taxa	4.0	3.7 ± 0.6
EPT Individuals (Sum)	10440.0	1352.9 ± 804.6
EPT taxa (no)	13.0	12.2 ± 2.1
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.7	0.7 ± 0.1
Plecoptera taxa	5.0	5.4 ± 1.2
Shannon-Wiener Diversity	2.1	1.9 ± 0.3
Simpson's Diversity	0.8	0.8 ± 0.1
Simpson's Evenness	0.2	0.3 ± 0.1
Total No. of Taxa	22.0	16.4 ± 3.5
Trichoptera taxa	4.0	3.2 ± 1.3

Frequency and Probability of Taxa Occurrence

Group Group Group Group Group MOR001 1 2 3 4 5 6	Reference Model Taxa	Fre	quency o	f Occurre	nce in Ref	ference Si	tes	Probability Of Occurrence at
1 2 3 4 5 0		Group	Group	Group	Group	Group	Group	MOR001
				<u> </u>	7		U	

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.35
RIVPACS : Observed taxa P>0.50	11.00
RIVPACS : 0:E (p > 0.5)	0.89
RIVPACS : Expected taxa P>0.70	10.11
RIVPACS : Observed taxa P>0.70	9.00
RIVPACS : 0:E (p > 0.7)	0.89

Habitat Description

Variable	MOR001	Predicted Group Reference Mean ±SD
Bedro	ck Geology	-
Sedimentary (%)	100.00000	90.78003 ± 16.48787
	nannel	
Depth-Avg (cm)	27.4	27.7 ± 12.1
Depth-BankfullMinusWetted (cm)	54.00	48.41 ± 32.00
Depth-Max (cm)	32.0	41.6 ± 18.0
Discharge (m^3/s)	0.023	4.100
Macrophyte (PercentRange)	0	0 ± 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.20 ± 0.86
Reach-%Logging (PercentRange)	0	0 ± 0
Reach-DomStreamsideVeg (Category(1-4))	4	3 ± 1
Reach-Pools (Binary)	1	1 ± 1
Reach-Rapids (Binary)	0	1 ± 1
Reach-Riffles (Binary)	1	1 ± 0
Reach-StraightRun (Binary)	1	1 ± 0
Slope (m/m)	0.0080400	0.0302442 ± 0.0225320
Veg-Coniferous (Binary)	1	1 ± 0
Veg-Deciduous (Binary)	1	1 ± 0
Veg-GrassesFerns (Binary)	1	1 ± 0
Veg-Shrubs (Binary)	1	1 ± 0
Velocity-Avg (m/s)	0.08	0.65 ± 0.30
Velocity-Max (m/s)	0.12	1.02 ± 0.40
Width-Bankfull (m)	19.9	22.0 ± 20.4
Width-Wetted (m)	5.6	14.4 ± 14.2
XSEC-VelInstrumentDirect (Category(1-3))	2	2 ± 1
XSEC-VelMethod (Category(1-3))	3	2 ± 1
· · · · · · · · · · · · · · · · · · ·	limate	
Precip10_OCT (mm)	51.55424	101.93711 ± 37.08464
Temp12_DECmin (Degrees Celsius)	-13.00000	-12.60285 ± 1.55807
	drology	12.00203 ± 1.33007
Drainage-Area (km^2)	81.94000	153.19859 ± 249.47160
	ndcover	155.15055 ± 245.47100
Nati-Grassland (%)	0.00000	4.14423 ± 3.51761
Nati-ShrubLow (%)	4.53336	4.00461 ± 2.77104
Nati-Water (%)	0.00000	0.26551 ± 0.58793
Reg-Ice (%)	0.00000	$\frac{0.20331 \pm 0.38793}{2.39543 \pm 4.09623}$
	trate Data	2.35343 ± 4.05023
%Bedrock (%)	0	0 ± 0
%Boulder (%)	0	8 ± 8
%Cobble (%)	67	53 ± 15
%Gravel (%)	6	$\frac{33 \pm 13}{4 \pm 6}$
%Pebble (%)	27	$\frac{4 \pm 6}{33 \pm 14}$
%Sand (%)	0	0 ± 0
%Silt+Clay (%)	0	0 ± 0
D50 (cm)	8.00	14.48 ± 20.33
Dg (cm)	5.9	13.1 ± 19.3
Dominant-1st (Category(0-9))	6	6 ± 1
Dominant-2nd (Category(0-9))	5	6 ± 1
Embeddedness (Category(1-5))	4	4 ± 1

Habitat Description

Habitat Description		
Variable	MOR001	Predicted Group Reference Mean ±SD
PeriphytonCoverage (Category(1-5))	1	2 ± 1
SurroundingMaterial (Category(0-9))	2	3 ± 2
	opography	474.676
Reg-SlopeLT30% (%)	50.32512	17.11832 ± 8.21512
SlopeMax (%)	209.87454	386.22536 ± 140.72382
Ag (mg/L)	ter Chemistry 0.0000250	0.0000028 ± 0.0000036
Al (mg/L)	0.0242000	0.0136410 ± 0.0145846
As (mg/L)	0.0002500	0.0001754 ± 0.0001818
B (mg/L)	0.0250000	0.0305833 ± 0.0370084
Ba (mg/L)	0.1430000	0.0435560 ± 0.0571949
Be (mg/L)	0.0000500	0.0000056 ± 0.0000072
Bi (mg/L)	0.0000500	0.0000028 ± 0.0000036
Br (mg/L)	0.0500000	0.0268750 ± 0.0585132
Ca (mg/L)	35.0000000	20.8384848 ± 13.6841012
Cd (mg/L)	0.0000220	0.0000115 ± 0.0000149
Chloride-Total (mg/L)	3.0400000	0.0000000 ± 0.0000000
Co (mg/L)	0.0000500	0.0000298 ± 0.0000226
Cr (mg/L)	0.0002500	0.0000900 ± 0.0000889
Cu (mg/L)	0.0005000	0.0003212 ± 0.0001572
F (mg/L)	0.0500000	0.0484615 ± 0.0355181
Fe (mg/L)	0.0290000	0.0442667 ± 0.0348579
General-Alkalinity (mg/L)	125.0000000	59.4800000 ± 43.9851975
General-CarbonDOC (mg/L)	3.7300000	0.6500000 ± 0.3535534
General-CarbonTOC (mg/L)	3.3900000	0.3944444 ± 0.3157179
General-Conductivity (μS/cm)	205.3000000	117.1461538 ± 96.2732948
General-DO (mg/L)	10.1100000	12.6802381 ± 11.2165934
General-Hardness (mg/L)	117.0000000	76.7342857 ± 54.3511564
General-pH (pH)	1.0000000	7.9 ± 0.4 1.9034611 ± 3.0161707
General-SolidsTSS (mg/L) General-SpCond (µS/cm)	205.3000000	$\frac{1.9034611 \pm 3.0161707}{153.2777778 \pm 120.2707781}$
General-TempAir (Degrees Celsius)	15.0	$\frac{133.277778 \pm 120.2707781}{10.6 \pm 5.4}$
General-TempWater (Degrees Celsius)	12.3000000	6.4219048 ± 2.3475813
General-Turbidity (NTU)	44.0000000	2.7965000 ± 4.1415171
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000
K (mg/L)	0.5500000	0.4511613 ± 0.2901093
Li (mg/L)	0.0030100	0.0016910 ± 0.0023918
Mg (mg/L)	7.2400000	5.1886364 ± 5.0072212
Mn (mg/L)	0.0112000	0.0028572 ± 0.0019872
Mo (mg/L)	0.0006600	0.0006660 ± 0.0004339
Na (mg/L)	1.9600000	0.9945806 ± 0.9373003
Ni (mg/L)	0.0002000	0.0002298 ± 0.0001811
Nitrogen-NO2 (mg/L)	0.0050000	0.0042917 ± 0.0108893
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0732400 ± 0.0567225
Nitrogen-NO3 (mg/L)	0.0050000	0.0865111 ± 0.0538993
Nitrogen-TKN (mg/L)	0.1160000	97.0987778 ± 290.9629753
Nitrogen-TN (mg/L)	0.1160000	24.3739167 ± 145.4787822
Pb (mg/L)	0.0001000	0.0000559 ± 0.0000496
Phosphorus-OrthoP (mg/L)	0.0025000	0.0008667 ± 0.0013292
Phosphorus-TP (mg/L)	0.0102000	0.0031194 ± 0.0039854
S (mg/L)	1.5000000	362.2600000 ± 803.7224104
Sb (mg/L) Se (mg/L)	0.0001000 0.0002500	0.0000288 ± 0.0000136 0.0002422 ± 0.0003912
	1.7000000	
Si (mg/L) Sn (mg/L)	0.0001000	$\begin{array}{c} 1.9070000 \pm 0.6500353 \\ 0.0000988 \pm 0.0001602 \end{array}$
SO4 (mg/L)	6.9000000	$\frac{0.0000988 \pm 0.0001602}{18.1942857 \pm 18.0693910}$
Sr (mg/L)	0.1230000	0.1493500 ± 0.1276611
Te (mg/L)	0.0002500	0.0000000 ± 0.0000000
Th (mg/L)	0.0002300	0.0000000 ± 0.00000000
Ti (mg/L)	0.0025000	0.0000000 ± 0.0000000 0.0008433 ± 0.0009290
TI (mg/L)	0.000100	0.0000433 ± 0.0009290 0.0000031 ± 0.0000048
U (mg/L)	0.0002480	0.0000031 ± 0.0000048 0.0005805 ± 0.0003382
~ (····ʒ/ =)	0.0002700	0.0003003 ± 0.0003302

Habitat Description

Variable	MOR001	Predicted Group Reference Mean ±SD
V (mg/L)	0.0025000	0.0001220 ± 0.0001369
Zn (mg/L)	0.0020000	0.0009430 ± 0.0009518
Zr (mg/L)	0.0000500	0.0000900 ± 0.0000894

Site Description

Study Name	CBWQ-Elk
Site	MOR002
Sampling Date	Sep 25 2023
Know Your Watershed Basin	Central Kootenay
Province / Territory	British Columbia
Terrestrial Ecological Classification	Montane Cordillera EcoZone
	Northern Continental Divide EcoRegion
Coordinates (decimal degrees)	49.42056 N, 114.91069 W
Altitude	1544
Local Basin Name	Morrissey Creek
	Central Kootenay
Stream Order	3



Figure 1. Location Map

Cabin Assessment Results

	Reference Model Summary	
Model	Columbia Basin 2020	
Analysis Date	November 20, 2024	
Taxonomic Level	Family	
Predictive Model Variables	Altitude	
	Drainage-Area	
	Longitude	
	Natl-Grassland	
	Natl-ShrubLow	
	Natl-Water	
	Precip10_Oct	
	Reach-%CanopyCoverage	
	Sedimentary	
	Slope	
	SlopeMax	
	Temp12_DECmin	

Reference Groups	1	2	3	4	5	6
Number of Reference Sites	13	24	28	35	32	15
Group Error Rate	53.8%	55.2%	34.1%	52.2%	23.1%	29.4%
Overall Model Error Rate			39.	4%		
Probability of Group Membership	1.2% 0.5% 9.0% 6.3% 82.8% 0.1%					0.1%
CABIN Assessment of MOR002 on Sep 25,	Mildly Divergent					
2023						

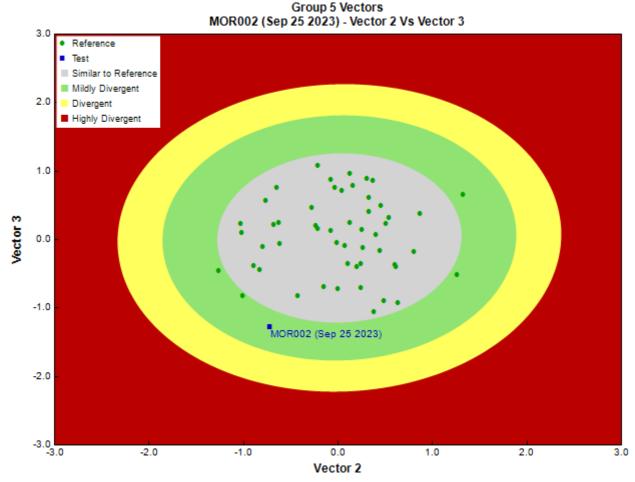


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	5/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	1	20.0
Arthropoda	Arachnida	Trombidiformes		1	20.0
	Insecta	Coleoptera	Elmidae	30	600.0
		Diptera		1	20.0
			Chironomidae	225	4,500.0
			Tipulidae	9	180.0
		Ephemeroptera	Ameletidae	13	260.0
			Baetidae	60	1,200.0
			Ephemerellidae	11	220.0
			Heptageniidae	47	940.0
			Leptophlebiidae	17	340.0
		Hemiptera		1	20.0
		Plecoptera		6	120.0
		·	Capniidae	42	840.0
			Chloroperlidae	60	1,200.0
			Nemouridae	3	60.0

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Perlidae	6	120.0
			Perlodidae	11	220.0
			Taeniopterygidae	1	20.0
		Trichoptera	Brachycentridae	29	580.0
			Hydropsychidae	1	20.0
			Hydroptilidae	1	20.0
			Leptoceridae	1	20.0
			Limnephilidae	2	40.0
			Rhyacophilidae	8	160.0
			Uenoidae	3	60.0
			Total	590	11,800.0

Metrics

Name	MOR002	Predicted Group Reference Mean ±SD
Bray-Curtis Distance	0.7	0.4 ± 0.1
Biotic	Indices	
Hilsenhoff Family index (Mid-Atlantic)	2.8	3.4 ± 0.4
Hilsenhoff Family index (North-West)	2.8	3.1 ± 0.5
Intolerant taxa		1.0 ± 0.0
Long-lived taxa	4.0	1.7 ± 1.2
Tolerant individuals (%)		0.3 ± 0.0
Function	al Measures	
% Filterers		
% Gatherers	58.6	45.8 ± 14.9
% Predatores	47.5	14.8 ± 9.8
% Scrapers	24.6	59.4 ± 19.6
% Shredder	19.8	30.7 ± 17.4
No. Clinger Taxa	33.0	19.8 ± 4.0
	of Individuals	
% Chironomidae	38.7	7.5 ± 8.6
% Coleoptera	5.2	0.1 ± 0.3
% Diptera + Non-insects	40.4	10.7 ± 9.9
% Ephemeroptera	25.5	47.2 ± 15.8
% Ephemeroptera that are Baetidae	40.5	25.4 ± 20.8
% EPT Individuals	54.4	89.2 ± 10.0
% Odonata		0.0 ± 0.0
% of 2 dominant taxa	49.1	58.3 ± 10.6
% of 5 dominant taxa	74.7	83.6 ± 6.3
% of dominant taxa	38.7	37.8 ± 11.1
% Plecoptera	21.2	36.3 ± 16.7
% Tribe Tanyatarisini		
% Trichoptera that are Hydropsychida	2.2	25.4 ± 24.6
% Tricoptera	7.7	5.7 ± 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.6	0.9 ± 0.1
Total Abundance	11800.0	4661.0 ± 3119.0
	hness	10101
Chironomidae taxa (genus level only)	1.0	1.0 ± 0.1
Coleoptera taxa	1.0	0.1 ± 0.3
Diptera taxa	2.0	2.8 ± 1.0
Ephemeroptera taxa	5.0	3.7 ± 0.5
EPT Individuals (Sum)	6320.0	4035.4 ± 2618.4
EPT taxa (no)	18.0	12.3 ± 1.9
Odonata taxa		0.0 ± 0.0
Pielou's Evenness	0.7	$0.7 \pm 0.1 \\ 5.5 \pm 1.1$
Plecoptera taxa Shannon-Wiener Diversity	2.2	5.5 ± 1.1 1.9 ± 0.3
Simpson's Diversity Simpson's Evenness	0.8	0.8 ± 0.1
Total No. of Taxa	0.2	$0.3 \pm 0.1 \\ 17.0 \pm 3.1$
	22.0	
Trichoptera taxa	7.0	3.1 ± 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Fre	quency o	f Occurre	nce in Ref	ference Si	ites	Probability Of Occurrence at
	Group	Group	Group	Group	Group	Group	MOR002
	1	2	3	4	5	6	

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.45
RIVPACS : Observed taxa P>0.50	12.00
RIVPACS : 0:E (p > 0.5)	0.96
RIVPACS : Expected taxa P>0.70	9.52
RIVPACS : Observed taxa P>0.70	10.00
RIVPACS: 0:E (p > 0.7)	1.05

Habitat Description

Variable	MOR002	Predicted Group Reference Mean ±SD
Bedrock	Geology	Mean 13b
Sedimentary (%)	100.00000	98.46051 ± 8.10999
Cha	nnel	
Depth-Avg (cm)	18.8	20.0 ± 8.6
Depth-BankfullMinusWetted (cm)	51.00	46.71 ± 35.00
Depth-Max (cm)	26.0	28.8 ± 13.7
Discharge (m^3/s)	0.017	0.682
Macrophyte (PercentRange)	1	0 ± 0
Reach-%CanopyCoverage (PercentRange)	2.00	1.04 ± 0.95
Reach-%Logging (PercentRange)	0	0 ± 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 ± 1
Reach-Pools (Binary)	0	1 ± 0
Reach-Rapids (Binary)	0	0 ± 0
Reach-Riffles (Binary)	1	1 ± 0
Reach-StraightRun (Binary)	1	1 ± 0
Slope (m/m)	0.0217500	0.0270638 ± 0.0257534
Veg-Coniferous (Binary)	1	1 ± 0
Veg-Deciduous (Binary)	0	1 ± 0
Veg-GrassesFerns (Binary)	1	1 ± 0
Veg-Shrubs (Binary)	1	1 ± 0
Velocity-Avg (m/s)	0.09	0.58 ± 0.20
Velocity-Max (m/s)	0.23	0.85 ± 0.27
Width-Bankfull (m)	8.6	16.1 ± 13.1
Width-Wetted (m)	2.4	9.8 ± 7.7
XSEC-VelInstrumentDirect (Category(1-3))	2	3 ± 0
XSEC-VelMethod (Category(1-3))	3	2 ± 1
	nate	
Precip10_OCT (mm)	54.52875	64.42223 ± 33.96544
Temp12_DECmin (Degrees Celsius)	-13.00000	-12.74810 ± 1.73767
	ology	100 00707 1 100 00561
Drainage-Area (km^2)	17.89000 cover	100.09787 ± 132.80561
Natl-Grassland (%)	0.00000	7.47766 ± 6.29880
Nati-ShrubLow (%)	2.38954	1.80492 ± 1.50412
Nati-Water (%)	0.00000	0.32077 ± 0.59001
Reg-Ice (%)	0.00000	1.28005 ± 3.54484
	ate Data	
%Bedrock (%)	0	0 ± 0
%Boulder (%)	2	6 ± 6
%Cobble (%)	38	57 ± 15
%Gravel (%)	8	2 ± 3
%Pebble (%)	51	34 ± 16
%Sand (%)	0	0 ± 0
%Silt+Clay (%)	1	0 ± 1
D50 (cm)	5.40	24.05 ± 35.66
Dg (cm)	4.4	23.0 ± 33.8
Dominant-1st (Category(0-9))	6	6 ± 1
Detai January 17, 2025 2:14 DM		

Habitat Description

Habitat Description		
Variable	MOR002	Predicted Group Reference Mean ±SD
Dominant-2nd (Category(0-9))	5	6 ± 1
Embeddedness (Category(1-5))	4	4 ± 1
PeriphytonCoverage (Category(1-5))	3	2 ± 1
SurroundingMaterial (Category(0-9))	2	3 ± 1
Reg-SlopeLT30% (%)	73.39946	20.01334 ± 7.41149
SlopeMax (%)	97.94038	488.94077 ± 542.32910
	r Chemistry	488.94077 ± 342.32910
Ag (mg/L)	0.0000250	0.0000018 ± 0.0000013
Al (mg/L)	0.5580000	0.0078031 ± 0.0090962
As (mg/L)	0.0002500	0.0002735 ± 0.0001787
B (mg/L)	0.0250000	0.0127286 ± 0.0135802
Ba (mg/L)	0.1910000	0.0677069 ± 0.0514113
Be (mg/L)	0.0000500	0.0000043 ± 0.0000039
Bi (mg/L)	0.0000500	0.0000018 ± 0.0000013
Br (mg/L)	0.0500000	0.0303333 ± 0.0788597
Ca (mg/L)	20.2000000	28.2142857 ± 13.7707094
Cd (mg/L)	0.0000450	0.0000100 ± 0.0000293
Chloride-Total (mg/L)	11.7000000	0.0000000 ± 0.0000000
Co (mg/L)	0.0001800	0.0000075 ± 0.0000060
Cr (mg/L)	0.0007100	0.0001514 ± 0.0001361
Cu (mg/L)	0.0008300	0.0001604 ± 0.0001447
F (mg/L)	0.0500000	0.0876667 ± 0.0847823
Fe (mg/L)	0.3970000	0.0101789 ± 0.0111495
General-Alkalinity (mg/L)	63.1000000	98.9704545 ± 43.8308301
General-CarbonDOC (mg/L)	3.3300000	0.8383333 ± 0.4040008
General-CarbonTOC (mg/L)	2.7200000	0.5586957 ± 0.6229060
General-Conductivity (µS/cm)	132.9000000	173.5150000 ± 86.2502071
General-DO (mg/L)	10.1000000	10.7243478 ± 0.8596502
General-Hardness (mg/L)	67.8000000	109.1853659 ± 48.3470504
General-pH (pH)	8.4	8.0 ± 0.6
General-SolidsTSS (mg/L)	7.0000000	5.2717002 ± 27.1908288
General-SpCond (µS/cm)	132.9000000	196.0710526 ± 116.3908975
General-TempAir (Degrees Celsius)	11.0	7.2 ± 5.7
General-TempWater (Degrees Celsius)	8.8000000	6.2042553 ± 2.0993816
General-Turbidity (NTU)	11.8500000	0.4347619 ± 0.5563328
Hg (ng/L)	0.0000050	0.0000000 ± 0.0000000
K (mg/L)	0.6900000	0.3312424 ± 0.1572675
Li (mg/L)	0.0017700	0.0009183 ± 0.0003795
Mg (mg/L)	4.2100000	7.8748571 ± 3.9958945
Mn (mg/L)	0.0064500	0.0007721 ± 0.0008518
Mo (mg/L)	0.0005200	0.0012835 ± 0.0042333
Na (mg/L)	1.5900000	0.7930303 ± 0.4756164
Ni (mg/L)	0.0008200	0.0001266 ± 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 ± 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0287300 ± 0.0357249
Nitrogen-NO3 (mg/L)	0.0050000	0.0336397 ± 0.0328125
Nitrogen-TKN (mg/L)	0.1220000	0.0352941 ± 0.0299453
Nitrogen-TN (mg/L)	0.1220000	0.0675581 ± 0.0509763
Pb (mg/L)	0.0002400	0.0000179 ± 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 ± 0.5208890
Phosphorus-TP (mg/L)	0.0202000	0.0031912 ± 0.0087929
S (mg/L)	1.5000000	3.6625000 ± 1.5619928
Sb (mg/L)	0.0001000	0.0000337 ± 0.0000157
Se (mg/L)	0.0002500	0.0002782 ± 0.0002859
Si (mg/L)	2.0000000	2.0400303 ± 0.8510321
Sn (mg/L)	0.0001000	0.0000300 ± 0.0000407
S04 (mg/L)	3.6000000	$13.3070732 \pm 13.0883468$
Sr (mg/L)	0.1180000	0.0893414 ± 0.0805860
Te (mg/L)	0.0002500	0.0000000 ± 0.0000000
	0.0002500 0.0000500 0.0100000	$\begin{array}{c} 0.0000000 \pm 0.0000000 \\ 0.00000000 \pm 0.0000000 \\ 0.0003150 \pm 0.0001205 \end{array}$

Habitat Description

Variable	MOR002	Predicted Group Reference Mean ±SD
TI (mg/L)	0.0000100	0.0000040 ± 0.0000067
U (mg/L)	0.0001490	0.0003872 ± 0.0002299
V (mg/L)	0.0025000	0.0001617 ± 0.0001537
Zn (mg/L)	0.0020000	0.0003724 ± 0.0003377
Zr (mg/L)	0.0002400	0.0000500 ± 0.0000000



Appendix B: Raw CABIN Datasheets

Elk River Alliance 62

Ø Occı	upational Health & Safety: Site Inspection Sheet completed (see page 6)
PRIMAR	Y SITE DATA
CABIN Stu	dy Name: CBWQ - EIK Local Basin Name: EIK BYEK
River/Strea	m Name: Alexander Creek Stream Order: (map scale 1:50,000)4
Select one:	Test Site Potential Reference Site
Surrounding	thical Description/Notes: It turnoff from they 3 before wichel Crv. bridge (Spanwood dirt road through forest-stay right + parte @ river. Our wichel to aix confluence. Site is 570m u/s of confluence. Site is 570m u/s of confluence. Logger) Land Use: (check those present) Information Source: visual, maps, local wi
≥ rorest	Li Field/Pasture Li Adriculture
_ Logging	Mining Commercial/Industrial Other Co Railway
ominant Su	rrounding Land Use: (check one) Information Source: Visual, maps
	☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban
Logging	☐ Mining ☐ Commercial/Industrial ☐ Other
itude: 49 vation: 12	19.0 (fasl or masl) GPS Datum: GRS80 (NAD83/WGS84) Other:
e Locatio	on Map Drawing
Rucod 1	
L	→ A/
12	
	PARXANDER
	ALEXANDER CALL

Page 1 of 6

W

10.01	Q MA 70 AM	Site Code	e: ALXOOI
Field Crew: 100 CB BI Sampling Date (DD/MM/YY	rri: 27/09/20	23	
		H. & Saloty: Story Links	Stant Innogeneous B
Photos ☐ Field Sheet ☐ Upstre ☐ Substrate (exposed)	am Downstream Substrate (aquatic)	Across Site	Aerial View
REACH DATA (represents	6 times bankfull width)		
1. Habitat Types: (check those Rapid	present) ds Straight run	☐ Pool/Back Eddy	The transfer
2. Canopy Coverage: (stand in 1-25		up, check one) 1 51-75 %	76-100 %
3. Macrophyte Coverage: (not a 0 % 1-25		□ 51-75 % □	76-100 %
4. Streamside Vegetation: (che	ck those present) shrubs Adecid	uous trees Konifer	ous trees
5. Dominant Streamside Vegeta		uous trees	rous trees
6. Periphyton Coverage on Sub	ostrate: (benthic algae, not	moss, check one)	
	obvious colour (< 0.5 mm th		
	o light green colour (0.5-1		
	ker green to brown algae (
	e clumps of green to dark		ick)
	tly obscured by algal mat,		to black algal mass may ha
Note: 1 through 5 represent cate		IIN database.	
ENTHIC MACROINVER		traight mus	
bitat sampled (check one):	☑ Tiffle ☐ rapids ☐ S	traight run	2/6
μm mesh Kick Net *		Preservative used: 18	0 11
son sampling	C.Bush	Sampled sieved on sit	
npling time (i.e. 3 min.)	3 mins	"Bucket Swirling Meth	
of sample jars			
cal depth in kick area (cm)	15000	If YES, debris collect	ed for QA/QC LI
	13011	1 1 100	and the same of th

* Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used

CHANNEL DATA

G

Slope - Indicate how slope was measured: (check one)

Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate)

☐ Calculated from map Scale: (Note: small scale map recommended if field measurement is not possible - i.e. 1:20,000). contour interval (vertical distance) (m), distance between contour intervals (horizontal distance) _ slope = vertical distance/horizontal distance =

Note: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments

Other Amions

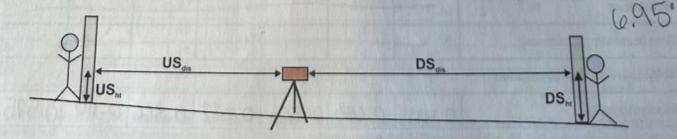
Measured in field

Gircle device used and fill out table according to device:

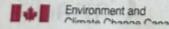
a. Survey Equipment b. Hand Level & Measuring Tape Measurements Upstream (U/S) Downstream(D/S) Calculation ^aTop Hairline (T) aMid Hairline (ht) OR

.043 1.499 bHeight of rod ^aBottom Hairline (B) ^bDistance (dis) OR USdis+DSdis= 18.3m 18.3n aUSdis=T-B aT-B x 100 aDSdis=T-B

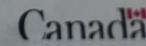
Change in height (Δht) Slope (Aht/total dis)



Page 3 of 6



Field Crew: VON, CB, C Sampling Date (DD/MM/YY)			0.7	0.1	6.2	MPHO 93	
Widths and Depth Location at site: 4 S OF V A - Bankfull Width: 13.62 C - Bankfull-Wetted Depth (height	(m)	B - We	tted Stream	Width:	each, ex. d	/s of kick are (m) (cm)	a)
	V1 V2	V3 D3	V4 V5	В	ATI	AG JEVI	AYS
Wetted widths < 5 m, measure 3-4 e					Name		
Velocity and Depth Check appropriate velocity meas	uring device and	d fill out the	appropriate	section in	chart belov	v. Distance	from
shore and depth are required reg	gardiess of moun	Terrenti					
Velocity Head Rod (or ruler): Velocity Equa	tion (m/s) -	V [Z (ADITO	0, 0.0.1			0-8
		-lles (Defea	to aposific me	ster convers	ion chart for	r calculation)	
☐ Rotary meters: Gurley/Price/	/Mini-Price/Prop	eller (Refer	to specific me	eter convers	ion chart for	r calculation)	1
Rotary meters: Gurley/Price/ Direct velocity measurement	/Mini-Price/Prop	cBirney 🙉	to specific me Sontek or □ 2. ☐1	Other F	10W Tr	5.32	,
Rotary meters: Gurley/Price/	/Mini-Price/Prop nts: ☐ Marsh-M 0.97	cBirney 🔼	to specific me Sontek or □ 2. 11 3	Other F	4.45 5	5.32	AVG
Rotary meters: Gurley/Price/	/Mini-Price/Prop nts: ☐ Marsh-M	cBirney 🙉	to specific me Sontek or □ 2. ☐1	Other F	10W Tr	5.32 6	,
☐ Rotary meters: Gurley/Price/ ☐ Direct velocity measuremen	/Mini-Price/Prop nts: ☐ Marsh-M 0.97	cBirney 🔼	to specific me Sontek or □ 2. 11 3	Other F	4.45 5	5.32	,
Direct velocity measurement Distance from Shore (m)	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
Distance from Shore (m) Rotary meters: Gurley/Price/ Direct velocity measurement O.\ Distance from Shore (m)	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
Direct velocity measurement Distance from Shore (m) Depth (D) (cm) Velocity Head Rod (ruler)	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
Direct velocity measurement Distance from Shore (m) Depth (D) (cm) Velocity Head Rod (ruler) Flowing water Depth (D1) (cm)	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
Direct velocity measurement Distance from Shore (m) Depth (D) (cm) Velocity Head Rod (ruler) Flowing water Depth (D1) (cm) Depth of Stagnation (D2) (cm)	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
Direct velocity measurement Distance from Shore (m) Depth (D) (cm) Velocity Head Rod (ruler) Flowing water Depth (D₁) (cm) Depth of Stagnation (D₂) (cm) Change in depth (ΔD=D₂-D₁) (cm)	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
□ Rotary meters: Gurley/Price/ □ Direct velocity measurement □ Distance from Shore (m) □ Depth (D) (cm) □ Velocity Head Rod (ruler) □ Flowing water Depth (D₁) (cm) □ Depth of Stagnation (D₂) (cm) □ Change in depth (ΔD=D₂-D₁) (cm) □ ary meter	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,
□ Rotary meters: Gurley/Price/ □ Direct velocity measurement □ Distance from Shore (m) □ Depth (D) (cm) □ Velocity Head Rod (ruler) □ Flowing water Depth (D₁) (cm) □ Depth of Stagnation (D₂) (cm) □ Change in depth (ΔD=D₂-D₁) (cm) □ ary meter □ evolutions	/Mini-Price/Proports: ☐ Marsh-M	celler (Refer	Sontek or 2.71	Other F 3.58 4 3.48	4.45 5 4.35	5.32 6	,



Field Crew: WM CR BB MC, 2C, AM
Sampling Date (DD/MM/YYYY): 27/09/2023

Site Code: MXOO

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E):
 Completely embedded = 1

75% embedded = 3/4

50% embedded= 1/2

, 25% embedded = 1/4

Unembedded = 0

2. Surrounding/Interstitial Material Circle the substrate size category for the

surrounding material.

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	(2')
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

	Diameter (cm)	E	18891	Diameter (cm)	E		Diameter (cm)	E	WE 19	Diameter (cm)	E
1	7.9		26	13.5	P. Carlot	51	2.1		76	13.5	
2	7.2		27	2.6		52	4.8		77	12.4	
3	6.9		28	7.3		53	2.0		78	12.6	
4	7.6		29	6.3		54	15.8		79	8.3	
5	3.6		(30)	11.4	0	55	17.6		(80)	4.8	0
6	8.2		31	4.2		56	15.5		81	5.8	100
7	8.5		32	15.8		57	11.9		82	12.2	
8	3.9		33	20.2		58	7.4		83	7.5	
9	2.0		34	5.6		59	7.5		84	7.6	
(10)	59.0	75	35	1.9		(60)	9.1	0	85	15.6	
11	8.2		36	11.8		61	4.2		86	4.4	
12	3.3		37	9.0		62	6.7	March 1	87	4.9	
13	7.0		38	15.4		63	12.0		88	10.1	
14	7.8		39	7.9		64	5.7		89	14.5	
15	1.1		(40)	8.8	50	65	4.0		(90)	17.8	50
16	8.4		41	4.5		66	37.6		91	22.3	
17	29.0		42	8.5		67	5.9		92	1.9	
18	5.6		43	6.0		68	15.0	1000	93	8.2	
19	2.4		44	5.5		69	8.2		94	7.8	
20)	8.4	50	45	25.6	1000	(70)	9.8	22	5 95	8.2	
21	15.0		46	7.3		71	11,9		96	(0.3	
2	10.4		47	1.9		72	15.4		97	6.9	
3	18.0		48	3.1		73	6.6		98	5.3	
1	8.3	The said	49	5.8		74	9.5		9	101	8
	34.6		(50)	8.2	25	75	7.5		(1	00) 12.	6

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.



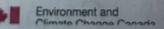


2

Field Crew: YM, CB, ZC, AM, BB, MC Site Code: A Sampling Date (DD/MM/YYYY): 27/09/2023
SITE INSPECTION
Site Inspected by: K. McCallum
Communication Information
Itinerary left with contact person (include contact numbers)
Contact Person: A.C. Kroeger Time checked-in: 9:00 Form of communication: □ radio □ cell □ satellite □ hotel/pay phone □ SPOT
Form of communication: radio cell satellite hotel/pay phone SPOT
Phone number: (514) 664-6815
Phone number. (5)4) were
Vehicle Safety
Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)
Equipment and chemicals safely secured for transport
Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary
Notes:
Shore & Wading Safety
The war at the set Analysis good by all field stoff
☑ Wading Task Hazard Analysis read by all field staff
Wading Safe Work Procedures read by all field staff
Instream hazards identified (i.e. log jams, deep pools, slippery rocks)
□ PFD worn
ZAppropriate footwear, waders, wading belt

CABIN Field Sheet April 2023

X001

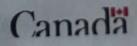


Environnement et

☐ Belay used

Notes:





Occupational Health & Safety: Site Inspection	Sheet completed (see page 6)
PRIMARY SITE DATA	The Part of the Pa
CABIN Study Name: CBWQ - ENC Local I	Basin Name: Elk River
River/Stream Name: Alexander Creek Stream	m Order: (map scale 1:50,000)
Select one Test Site Potential Reference Site	
From they 3 (Spanwood + Alberta) take coad (turnoff beforeverigh station) to use (past campaneura) to the Cree from rithe range (check those present) Information of Forest Africal Mining Commercial/Industrial Commercial/Industrial Commercial/Industrial	n Source: Visual, map Residential/Urban Other rifle range campg
Forest Field/Pasture Agriculture Logging Mining Commercial/Industri Location Data atitude: 41.65630 N Longitude: -114.73076 W	Residential/Urban ial Other (DMS or DD)
Forest Field/Pasture Agriculture Logging Mining Commercial/Industri Location Data atitude: 41.65630 N Longitude: -114.73076 W	Residential/Urban ial Other (DMS or DD)
Forest	Residential/Urban ial Other (DMS or DD)
Forest	Residential/Urban ial Other (DMS or DD)
Forest Field/Pasture Agriculture Logging Mining Commercial/Industri	Residential/Urban Other Other Other: N N PISCHARGE RIFLE RANGE
Forest Field/Pasture Agriculture Logging Mining Commercial/Industri	Residential/Urban Other Other Other: N N N N N N N N N
Location Data Latitude: 131 O (fasl or masl) GPS Datum: GRSE Site Location Map Drawing	Residential/Urban Other

er/gr

0

Page 1 of 6

		Site Code: ALXOG 3
Field Crew: LCC CB Sampling Date (DD/MM/	MC, ZC, AM, BF	7023
Sampling Date (DD/MM/	YYYY): 27/041	
Photos Field Sheet Ups	tream Downstre	Other
☑ Substrate (exposed)	Substrate (aquati	
REACH DATA (represent	s 6 times bankfull width)	
1. Habitat Types: (check those	e present) bids	Pool/Back Eddy
2. Canopy Coverage: (stand in 1-2	m middle of stream and lo	ok up, check one) □ 51-75 % □ 76-100 %
3. Macrophyte Coverage: (not 0 % 1-2		e)
4. Streamside Vegetation: (che ferns/grasses	eck those present)	ciduous trees coniferous trees
5. Dominant Streamside Veget fems/grasses		ciduous trees
6. Periphyton Coverage on Sub		
	obvious colour (< 0.5 mm o light green colour (0.5-	
	er green to brown algae	
		brown algae (5-20 mm thick)
L 5 - Rocks are mostl long strands (> 20 r	y obscured by algal mat	t, extensive green, brown to black algal mass may have
Note: 1 through 5 represent cate		BIN database
SENTHIC MACROINVERT		
abitat sampled (check one):	☐ riffle ☐ rapids ☐ s	straight run
00 μm mesh Kick Net *		Preservative used: 99% ISOPROPYL
erson sampling	10. h	
mpling time (i.e. 3 min.)	C.RIVE P	Sampled sieved on site using the
of sample jars	3 min.	"Bucket Swirling Method": YES NO
pical depth in kick area (cm)	28000	If YES, debris collected for QA/QC □
ote: Indicate if a sampling method	NI NI	

* No other than the recommended 400 µm mesh kick net is used.

tand b we

100

Field Crew: KM, CR, M, ZC, FM, RB Site Code: ALX CO3
Sampling Date (DD/MM/YYYY): 27/09/2023

a-5 1410 1 10 10

WATER CHEMISTRY DATA Time: 12:30 (24 hr cld	ock) Time zone: MD	To seem to be a seem of the
Air Temp: (°C) Water Temp: 6, 4 (°C) pH: 8.53	Marie and American
Specific Conductance: <u>299.7 (µs/cm)</u> DO: <u>10.85 (m</u>	ng/L) Turbidity: 0.43	(NTU)
Check if water samples were collected for the following analyses: TSS (Total Suspended Solids)	D0%: 88.2	ORP:130
Nitrogen (i.e. Total, Nitrate, Nitrite, Dissolved, and/or Ammonia)		
Phosphorus (Total, Ortho, and/or Dissolved)		
Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate)	Other_	
Note: Determining alkalinity is recommended, as are other analyses, but not	required for CARIN assessm	ents

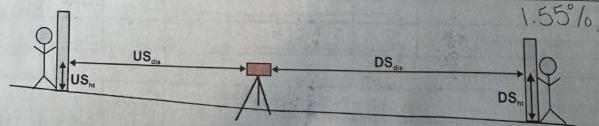
CHANNEL DATA

Slope - Indicate how slope was measured: (check one)

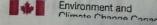
☐ Calculated from map			
Scale:	(Note: small scale map recor	mmended if field measure	ement is not possible - i.e. 1:20,000).
contour interval (vertical di	stance) (m	n),	
distance between contour slope = vertical distance/ho	ntervals (horizontal distar prizontal distance =	nce)	(m)
OR,			
Measured in field		* 17 10 10 10 10 10 10	

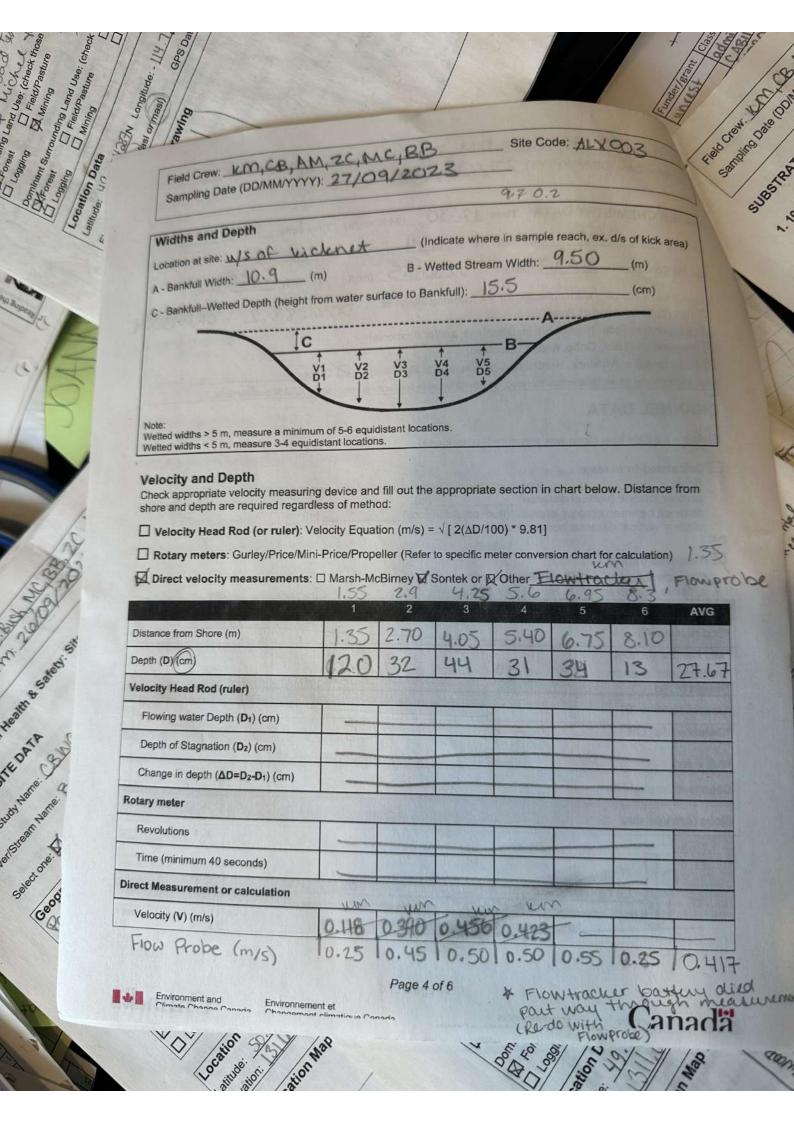
eircle device used and fill out table according to device:
a. Survey Equipment b. Hand Level & Measuring Tape

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
^a Top Hairline (T)			
^a Mid Hairline (ht) OR			
^b Height of rod	0.879	1.765m	(C) (N)
^a Bottom Hairline (B)			
^b Distance (dis) OR	28.5	28.5	USdis+DSdis=
^a T-B x 100	aUSdis=T-B	aDSdis=T-B	57
Change in height (Δht)			DSht-USht=
Slope (Δht/total dis)			0.01554



Page 3 of 6





the Code. HIT TO

vict area

Funder/grant Field odmin o ABIN Field Crew: KCM, CB, AM, 2C, MC, RB Sampling Date (DD/MM/YYYY): 27/09/2023

Class

Date Role

Site Code: MX.003

Wed

Tue

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E): Completely embedded = 1 75% embedded = 3/4 50% embedded= 1/2 25% embedded = 1/4 Unembedded = 0

2. Surrounding/Interstitial Material

Circle the substrate size category for the

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	(2)
0,2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

	Diameter (cm)	E		Diameter (cm)	E	200	Diameter (cm)	E	Catto	Diameter (cm)	E
	10 3		26	13 4		51	10.0		76	12.5	
2	10.5		27	4.0		52	7.5		77	13.0	THE PO
3	13.5		28	89		53	5.2		78	26.3	
4	50		29	21.4.		54	5.6		79	0.4	
5	9.0		30	9.4	1/25	55	8.5	FOUR	80	6.9	1/4
6	84	THE REAL PROPERTY.	31	5.3	1 12	56	8.2		81	11.0	
7	12.2	HALL	32	7.8	6	57	13.3		82	10.	
8	35	I HA	33	140		58	8.1	N. Water	83	8-5	Manager St
9	52		34	9.9		59	8.3	100	84	11.6	£
10)	7.0	1/4	35	7-0	No. 1860	(60)	187	1/2	85	16.1	4
11	5-0		36	12.5		61	15.0		86	8.1	
12	240		37	1.0		62	8.0		87	51	
13	15 0	1 19	38	3.3		63	8.0		88	79 -	3 194
14	29.2		39	9.4		64	4.5	The Late	89	4.1	
15	201		(40)	13.7	3/4	65	99	-	90	116	3/4
16	07		41	7-0	3	66	370	1000	91	65	
17	7-0		42	91		67	141		92	1	3 3 9 9
18	12.9		43	118		68	911		93	109	E PUD
19	1 2		44	11.0		69	11.60		94	9 0	
20	- 8	3/4	45	117		70	115	Y2	95	6	
21	100	74	46	25		71	111	12	96	17	3 115
22	10:5		47	3.3		72	19.1		97	0 ~	
23	1.0		48	29	100000	73	13.2	HANGE OF	98	0.0	5 101
24	4.0		49	8.7			4.2	73.02	99	6.9	
25	0.0		1	7.5	1	74	15.4	in the second	100	10.9	21
20	4.1	179.674	(50)	5.4	1/2	75	124	2119	100	10.8	3/4

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Page 5 of 6



Field Crew: LUM, CB, AM, 2C, MC, BB Site Code: AUXOO 3
Sampling Date (DD/MM/YYYY): 27/09/2023

SITE INSPECTION

Site Inspected by: K.MCCallum

Communication Information

Litinerary left with contact person (include contact numbers)

Contact Person: A.C. kroegen Time checked-in: 12:00

Form of communication: aradio cell satellite hotel/pay phone SPOT

Phone number: (514) 664-6815

Vehicle Safety

Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)

Equipment and chemicals safely secured for transport

Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary

Notes:

Funde

Shore & Wading Safety

☑ Wading Task Hazard Analysis read by all field staff

Wading Safe Work Procedures read by all field staff

☐ Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

Environnement et

PFD worn

Appropriate footwear, waders, wading belt

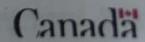
☐ Belay used

Notes:

CABIN Field Sheet April 2023

DIRECTO	ational Health & Safety: Site Inspection Sheet completed (see page 6)
PRIMARY	SITE DATA
CABIN Study	Name: CBWM-Elk Local Basin Name: Elk River
River/Stream	Name: Stream Order: (map scale 1:50,000)
Select one:	Fest Site ☐ Potential Reference Site
Geographi Bolvin C brid	cal Description/Notes: The above confluence into Elk, below in town ge
Surrounding L	and Use: (check those present) Information Source:
Forest	☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban
Logging	☐ Mining ☐ Commercial/Industrial ☐ Other
	rounding Land Use: (check one) Information Source:
Forest	☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban ☐ Mining ☐ Commercial/Industrial ☐ Other
Logging	☐ Mining ☐ Commercial/Industrial ☐ Other
titude: 50.	M Longitude: - 14.116138 W (DMS or DD) (fasl of masl) GPS Datum: GRS80 (NAD83/WGS84) D Other:
te Locatio	n Map Drawing BOWN CX ELK RIVER
te Locatio	n Map Drawing

Page 1 of 6



Substrate (exposed) Substrate (exposed) Substrate (exposed) REACH DATA (represents 6 times bankfull videous present)	width)
Habitat Types: (check those present)	A REPLACE OF THE PROPERTY OF T
Riffle Rapids Straig	ght run Pool/Back Eddy
2. Canopy Coverage: (stand in middle of stream 0 % 1-25 % 26-50	
3. Macrophyte Coverage: (not algae or moss, ch	T 70.400.0/
4. Streamside Vegetation: (check those present) ferns/grasses shrubs	deciduous trees Coniferous trees
5. Dominant Streamside Vegetation: (check one)	e) deciduous trees coniferous trees
6. Periphyton Coverage on Substrate: (benthic at 1 - Thin layer, no obvious colour (<	0.5 mm thick)
3 - Patches of thicker green to brow	
	n to dark brown algae (5-20 mm thick)
	algal mat, extensive green, brown to black algal mass may
Note: 1 through 5 represent categories entered into	to the CABIN database.
ENTINO MA ODOINI/EDTERRATE DA	TA
ENTHIC MACROINVERTEBRATE DA	
abitat sampled (check one): I riffle I rapid	ds 🗆 straight run
0 μm mesh Kick Net *	Preservative used: ISOPROPUL
son sampling C.Bush	Sampled sieved on site using the
npling time (i.e. 3 min.)	"Bucket Swirling Method":
of sample jars	YES M NO
cal depth in kick area (cm)	If YES, debris collected for QA/QC □

* Note: Indicate if a sampling method other than the recommended 400 μm mesh kick net is used

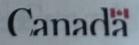
Environment and

Environnement et

Canada

Page 2 of 6

WATER CHEMISTRY	Y DATA Time: 04:3	(24 hr clock) Time zone	MOT
Air Temp: 7.0 ·	(°C) Water Temp:	4.4 (°C) pH: 8.0	THE RESERVE THE PROPERTY OF THE PARTY OF THE
Check if water samples we TSS (Total Suspended Nitrogen (i.e. Total, Nit Phosphorus (Total, Ord Major Ions (i.e. Alkalini	ere collected for the following d Solids) trate, Nitrite, Dissolved, and tho, and/or Dissolved) ity, Hardness, Chloride, and	/or Ammonia)	Nions
	pe was measured: (check o	nal	
Calculated from map Scale: contour interval (vertice distance between cont	(Note; small scale map re cal distance) tour intervals (horizontal dis		t possible - i.e. 1:20,000).
Calculated from map Scale: contour interval (vertical distance between containships = vertical distance R Measured in field Circle device used and a. Survey Equipment	(Note: small scale map restal distance) tour intervals (horizontal distance = I fill out table according to d b. Hand Level & Measurin	evice:	The party series of the party o
Calculated from map Scale; contour interval (vertical distance between contact slope = vertical distance) Measured in field Circle device used and a. Survey Equipment Measurements	(Note; small scale map re cal distance) tour intervals (horizontal dis ce/horizontal distance =	evice:	calculation
Calculated from map Scale: contour interval (vertice distance between cont slope = vertical distance Measured in field Circle device used and a. Survey Equipment Measurements Op Hairline (T)	(Note: small scale map restal distance) tour intervals (horizontal distance = I fill out table according to d b. Hand Level & Measurin	evice:	The party series of the party o
Calculated from map Scale: contour interval (vertice distance between context slope = vertical distance Measured in field Circle device used and a. Survey Equipment Measurements Dep Hairline (T) id Hairline (ht) OR	(Note: small scale map restal distance) tour intervals (horizontal distance = I fill out table according to d b. Hand Level & Measurin	evice:	The party series of the party o
Calculated from map Scale: contour interval (vertical distance between contastance between contastance) R Measured in field Circle device used and a. Survey Equipment	(Note: small scale map restal distance) tour intervals (horizontal distance =	evice: ng Tape Downstream(D/S)	The party series of the party o
Calculated from map Scale: contour interval (vertical distance between cont slope = vertical distance R Measured in field Circle device used and a. Survey Equipment Measurements op Hairline (T) id Hairline (ht) OR eight of rod ottom Hairline (B)	(Note: small scale map restal distance) tour intervals (horizontal distance =	device: Downstream(D/S)	The party series of the party o
Calculated from map Scale: contour interval (vertice distance between content slope = vertical distance) Measured in field Circle device used and a. Survey Equipment Measurements Op Hairline (T) id Hairline (ht) OR eight of rod ottom Hairline (B) stance (dis) OR	(Note: small scale map restal distance) tour intervals (horizontal distance =	evice: ng Tape Downstream(D/S)	Calculation
Calculated from map Scale: contour interval (vertice distance between cont slope = vertical distance Measured in field Circle device used and a. Survey Equipment Measurements Op Hairline (T) id Hairline (ht) OR eight of rod ottom Hairline (B) stance (dis) OR	(Note: small scale map restal distance) tour intervals (horizontal distance =	device: ng Tape Downstream(D/S) 1.388	Calculation
Calculated from map Scale: contour interval (vertical distance between cont slope = vertical distance Measured in field Circle device used and a. Survey Equipment Measurements Op Hairline (T) lid Hairline (ht) OR eight of rod	(Note: small scale map restal distance) tour intervals (horizontal distance =	device: ng Tape Downstream(D/S) 1.388	Calculation USdis+DSdis=



Field Crew: VM.CB, M Sampling Date (DD/MM/YYYY)	C,88,7 Y): 25/0°	1/202	3		le: <u>8610</u>		
Widths and Depth Location at site: Lot Need 50 A - Bankfull Width:	(m)	B - W	etted Stream	in sample m Width:	reach, ex.	d/s of kick a (m) (cm)	irea)
Note: Wetted widths > 5 m, measure a minim Wetted widths < 5 m, measure 3-4 equ	V1 V2 D2 D2 mum of 5-6 equic	distant location	V4 V5 D4 D5	В	AT	AG JEW	AASS
/elocity and Depth		CU	appropriate	section in	chart below	w. Distance	from
Check appropriate velocity measure hore and depth are required regard velocity Head Rod (or ruler): Rotary meters: Gurley/Price/M Direct velocity measurements	rdless of method Velocity Equationi-Price/Propositions: ☐ Marsh-Me	od: tion (m/s) = eller (Refer cBirney 🖬 S	√ [2(∆D/10 to specific m Sontek or □	00) * 9.81] leter convers	sion chart fo	r calculation)
Check appropriate velocity measur hore and depth are required regar Velocity Head Rod (or ruler): Rotary meters: Gurley/Price/M	Velocity Equa	od: tion (m/s) = eller (Refer	$\sqrt{[2(\Delta D/1)]}$ to specific m	00) * 9.81] neter convers	sion chart fo	r calculation)
Check appropriate velocity measure hore and depth are required regard Velocity Head Rod (or ruler): Rotary meters: Gurley/Price/M Direct velocity measurements	Velocity Equalini-Price/Proposition Marsh-More 2.39	od: tion (m/s) = eller (Refer cBirney 🗷 \$	√[2(∆D/10 to specific m Sontek or □	00) * 9.81] neter convers 1 Other <u>F</u> 5.24	sion chart fo	r calculation)
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Page 4 of 6



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Environment and

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D

Field Crew: KMCB, MC, BB, ZC, AM Sampling Date (DD/MM/YYYY): 26/09/2023

Site Code: 80100

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

 Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.

Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.

Embededness categories (E):

Completely embedded = 1 75% embedded = 3/4

50% embedded= 1/2 25% embedded = 1/4

Unembedded = 0

2. Surrounding/Interstitial Material

Circle the substrate size category for the

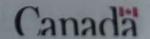
Substrate Size Class	Category
Organic Cover	Category
< 0.1 cm (fine sand, silt or clay)	The same of the sa
0.1-0.2 cm (coarse sand)	102
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

								Section 1		DESCRIPTION OF THE PROPERTY OF	
	Diameter (cm)		E	Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E
1	2 H Cn	и	26	3.8		51	3.9		76	4.6	
2	9,0	A CO	27	6.		52	4.6	J 1	77	5.8	rods
3	1.6		28	7.9	MARK	53	14.4		78	5.8	
4	4		29	7.5	Make	54	4.5		79	3.4	
5	2.1		30	27.3	75	55	11.3		80	12.9	25
6	10.6		31	3.3		56	2.6		81	9.6	- Bull
7	11.1		32	8.8		57	18		82	9.7	PER LET
8	11.3		33	2.3		58	5.6	0.400	83	6.4	
9	15.2		34	3.6		59	0.5		84	272	all yes
10	8.60	25	35	a	400 Y-0	60	10.5	50	85	3.4	
11	5.5		36	6.4		61	4.4		86	29.5	
12	8		37	4	PATA IN	62	3.5	- AND	87	0.9	1
13	7.2		38	9.3		63	6.3		88	60	1 200
14	6.8		39	14		64	1		89	0.0	
15	49		40	9.4	0	65	57		90	29	1
16	0		41	11.3		66	12.1		91	12	-
17	175		42	ua	3/10	67	111	The state of	92	03	
18	177		43	25		68	177		93	0.3	
19	44		44	()		69	11.6	B LESS		9.9	
20	2 (1	100	45	100			9.6		94	Organica	4
21	3,7	2016		13.6		70	10.4	25	95	5.4	
	25		46	3.5		71	13		96	14	
2	10.3	War F	47	9		72	11.7	N Elle	97	19	18
3	2.4		48	U'		73	2	DI NOT	98	91	
1	3.5		49	u		74	2 11		99	07	254 II
	11		50	1	8		2.4			8.0	
	7.1		50	5.1	D	75	12	1000	10	0 13.1	

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Page 5 of 6





Field Crew: KM, CB, MC, BB, AM, ZC Site Code: BOLO Sampling Date (DD/MM/YYYY): 26/09/2023
SITE INSPECTION
Site Inspected by: K.McCallum
Communication Information
Hinerary left with contact person (include contact numbers)
Contact Person: A.C. Kroeger Time checked-in: 9:00
Form of communication: ☑ radio ☑ cell ☑ satellite ☐ hotel/pay phone ☐ SPOT Phone number: (514) <u>1664 - 68 5</u>
/ehicle Safety
Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)
Equipment and chemicals safely secured for transport
Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary
otes:
ore & Wading Safety
Wading Task Hazard Analysis read by all field staff

Sh

9

Wading Safe Work Procedures read by all field staff

Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

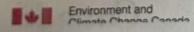
PFD worn

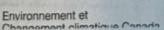
Appropriate footwear, waders, wading belt

☐ Belay used

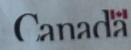
Notes:

CABIN Field Sheet April 2023





Page 6 of 6

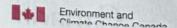


Dominant Surrounding Land Use: (check one) Information Source:	CABIN Study Name: CBWG-CIK Local Basin Name: Ely River River/Stream Name: Boivin Creek Stream Order: (map scale 1:50,000) Select one: Test Site Potential Reference Site Geographical Description/Notes: Park & XC-Ski trails (on Noval Rd), follow path to bridge, Stoy on LWB, Ntld U/S writi 'nightman bejore christmas title Surrounding Land Use: (check those present) Information Source: Vi Skal na ps, local Forest Field/Pasture Agriculture Residential/Urban Logging Mining Commercial/Industrial Other recreational (XC, ATV Trails Commercial/Industrial Other recreational trails Location Data Location Data Location Data Location Map Drawing GPS Datum: GRS80 (NAD83WGS84) Other: Difference of the control of the cont		Date (DD/MM/YYYY): 26/09/2023
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Select one: Test Site Potential Reference Site Geographical Description/Notes: Park & XC - Ski + rails (on Natal Rd), follow path to bridge, stay on LWB, Ndd u/s until "nightman before christmas tall" Surrounding Land Use: (check those present) Information Source: VI Skal maps, local Forest Field/Pasture Agriculture Residential/Urban Commercial/Industrial Other recreational (xc, 4T) Dominant Surrounding Land Use: (check one) Information Source: Residential/Urban Resi	Select one: Test Site Potential Reference Site Geographical Description/Notes: Pank @ XC-Ski trails (on Notal Rd), follow path to bridge, stay on LWB, read up until "nightman before christman tree." Surrounding Land Use: (check those present) Information Source: Visual naps, local profest Field/Pasture Agriculture Residential/Urban Commercial/Industrial Pother recreational (XC, AT) Dominant Surrounding Land Use: (check one) Information Source: Residential/Urban Commercial/Industrial Other recreational trails Logging Mining Commercial/Industrial Other recreational trails Logging Mining Commercial/Industrial Other recreational trails Logging Mining GPS Datum: GPS GR880 (NAD89WGS84) Other: Itel Location Map Drawing Commercial/Industrial Other recreations	PRIMARY	SITE DATA
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Page 1 of 6

	C Site Code: 1301002
Field Crew: LCB, MC, BB, AM, 2 Sampling Date (DD/MM/YYYY): 26/09/2	020
Field Crew: LLM CP/YYYY): 26/09/2 Sampling Date (DD/MM/YYYY): 26/09/2	
Sampling	
Photos	Across Site
Upstream	Other
Substrate (exposed) Substrate (aquatic)	Outer
REACH DATA (represents 6 times bankfull width)	
1. Habitat Types: (check those present)	☐ Pool/Back Eddy
Riffle Rapids Li Straight full	
2. Canopy Coverage: (stape in middle of stream and look	up, check one) □ 51-75 % □ 76-100 %
□ 0 % □ 1-25 % □ 26-50 %	31-73 %
3. Macrophyte Coverage: (not algae or moss, check one)	□ 51-75 % □ 76-100 %
□ 0% □ 1-25% □ 26-50%	☐ 51-75 % ☐ 76-100 %
4. Streamside Vegetation: (check those present)	
ferns/grasses shrubs decid	uous trees Coniferous trees
5. Dominant Streamside Vegetation: (check one)	
☐ ferns/grasses ☐ shrubs ☐ decid	uous trees
6. Periphyton Coverage on Substrate: (benthic algae, not	moss, check one)
☐ 1 - Thin layer, no obvious colour (< 0.5 mm th	
2 - Yellow-brown to light green colour (0.5-1)	
3 - Patches of thicker green to brown algae (
4 - Numerous large clumps of green to dark b	prown algae (5-20 mm thick)
5 - Rocks are mostly obscured by algal mat, long strands (> 20 mm thick)	extensive green, brown to black algal mass may have
Note: 1 through 5 represent categories entered into the CAB	IN database.
BENTHIC MACROINVERTEBRATE DATA	
Habitat sampled (check one): ☐ riffle ☐ rapids ☐ st	raight run
400 μm mesh Kick Net *	Preservative used: 99% 150
Pomon - "	
L. DUSN	Sampled sieved on site using the "Bucket Swiding Method":
Sampling time (i.e. 3 min.)	"Bucket Swirling Method": YES NO NO
No. of sample jars	
Typical depth in kick area (cm) 25cm	If YES, debris collected for QA/QC □
* Note: Indicate if a sampling method other than the recommend	led 400 um mesh kick net is used
a sampling method other than the recommend	ou to a fair thou the to dood.

Page 2 of 6



Environnement et

Canada

WATER CHEMISTRY	DATA Time: 12:40	(24 hr clock) Time zon	e: MDT
		5.1 (°C) pH: 8.4	
		(mg/L) Turbidity	
Check if water samples wer		DAOLAL	
TSS (Total Suspended	Solids)		
Nitrogen (i.e. Total, Nitra Phosphorus (Total, Orth			
Major Ions (i.e. Alkalinity	, Hardness, Chloride, and		
Note: Determining alkalinity is	recommended, as are other a	nalyses, but not required for CAB	IN assessments.
CHANNEL DATA			
Slope - Indicate how slope	e was measured: (check o	ne)	
☐ Calculated from map			
Scale:	(Note: small scale map re	commended if field measurement is n	ot possible - i.e. 1:20,000).
contour interval (vertica		(m)	
contour interval (vertical distance between contour	l distance) our intervals (horizontal dis	(m), tance)(m)	
distance between conto	I distance)	tance)(m)	
distance between conto slope = vertical distance OR Measured in field	l distance) our intervals (horizontal dis e/horizontal distance =	tance) (m)	The contract of the Co
distance between conto slope = vertical distance OR Measured in field	I distance) our intervals (horizontal distance = fill out table according to d.b. Hand Level & Measurin	evice:	The contract of the Contract C
distance between contour slope = vertical distance OR Measured in field Circle device used and	I distance) our intervals (horizontal dis e/horizontal distance = fill out table according to d	evice:	Calculation
distance between contour slope = vertical distance OR Measured in field Circle device used and a Survey Equipment Measurements aTop Hairline (T)	I distance) our intervals (horizontal distance = fill out table according to d.b. Hand Level & Measurin	evice:	Calculation
distance between contour slope = vertical distance or	I distance) our intervals (horizontal distance = fill out table according to d b. Hand Level & Measurin Upstream (U/S)	evice: ng Tape Downstream(D/S)	Calculation
distance between contour slope = vertical distance OR Measured in field Circle device used and a Survey Equipment Measurements aTop Hairline (T)	I distance) our intervals (horizontal distance = fill out table according to d.b. Hand Level & Measurin	evice:	Calculation
distance between contour slope = vertical distance on the slope =	I distance) our intervals (horizontal distance = fill out table according to d b. Hand Level & Measurin Upstream (U/S)	evice: ng Tape Downstream(D/S)	
distance between contour slope = vertical distance OR Measured in field Circle device used and a. Survey Equipment Measurements aTop Hairline (T) aMid Hairline (ht) OR bHeight of rod	I distance) our intervals (horizontal distance = fill out table according to d b. Hand Level & Measurin Upstream (U/S)	evice: ng Tape Downstream(D/S)	Calculation USdis+DSdis=
distance between contour slope = vertical distance OR Measured in field Circle device used and a. Survey Equipment Measurements aTop Hairline (T) aMid Hairline (ht) OR bHeight of rod aBottom Hairline (B)	I distance) our intervals (horizontal distance = fill out table according to d b. Hand Level & Measurin Upstream (U/S) O. STS	evice: ng Tape Downstream(D/S)	USdis+DSdis=
distance between contour slope = vertical distance or or slope = vertical distance or	I distance) our intervals (horizontal distance = fill out table according to db. Hand Level & Measurin Upstream (U/S) O. STS I \$,50	evice: ng Tape Downstream(D/S)	
distance between contour slope = vertical distance OR Measured in field Circle device used and a. Survey Equipment Measurements a Top Hairline (T) a Mid Hairline (ht) OR b Height of rod a Bottom Hairline (B) b Distance (dis) OR	I distance) our intervals (horizontal distance = fill out table according to db. Hand Level & Measurin Upstream (U/S) O. STS I \$,50	evice: ng Tape Downstream(D/S)	USdis+DSdis= QQ DSht-USht=
distance between contous lope = vertical distance or contous long Measured in field	I distance) our intervals (horizontal distance = fill out table according to db. Hand Level & Measurin Upstream (U/S) O. STS I \$,50	evice: ng Tape Downstream(D/S)	USdis+DSdis= QQ DSht-USht=
distance between contous lope = vertical distance or or slope = vertical distance or	I distance) our intervals (horizontal distance = fill out table according to db. Hand Level & Measurin Upstream (U/S) O. STS I \$,50	evice: ng Tape Downstream(D/S)	USdis+DSdis= 210 DShi-UShi= 1.002 0.05057
distance between contous lope = vertical distance or slope = vertical distance and a. Survey Equipment Measurements a Top Hairline (T) a Mid Hairline (ht) OR b Height of rod a Bottom Hairline (B) b Distance (dis) OR a T-B x 100 Change in height (\(\Delta ht \)) Slope (\(\Delta ht / total dis \)	I distance) our intervals (horizontal distance = fill out table according to db. Hand Level & Measurin Upstream (U/S) O. STS I \$,50	evice: ng Tape Downstream(D/S)	USdis+DSdis= 210 DShi-UShi= 1.002 0.05057

Site Code: BOTOOZ

Field Crew: KM CB ZC AM MC BB Sampling Date (DD/MM/YYYY): 26 /09/2023

Widths and Depth	u - + kick area)
(Indicate where in sample reach, ex. of	(m)
B - Wetted Stream Width: 10.11	_ (cm)
C - Bankfull-Wetted Depth (height from water surface to Bankfull):	
↓c A A A B	
V1 V2 V3 V4 V5 D1 D2 D3 D4 D5	
Note: Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations. Wetted widths < 5 m, measure 3-4 equidistant locations.	F 150 - 100

Velocity and Depth

Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:

- □ Velocity Head Rod (or ruler): Velocity Equation (m/s) = $\sqrt{(2(\Delta D/100) * 9.81)}$
- ☐ Rotary meters: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)
- ☑ Direct velocity measurements: ☐ Marsh-McBirney ☑ Sontek or ☐ Other Flow Tracker 1

0.45	1.33	2.21	3.09	3.97	4.85	5.73	AVG
Distance from Shore (m)	0.88	1.76	2.64	3.52	4.40	5.28	
Depth (D) (cm) wh (m)	0.18	0.30	0.22	0.32	0.34	0.34	0.283
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)							
Depth of Stagnation (D ₂) (cm)	-						
Change in depth (△D=D₂-D₁) (cm)	_				To Marie		
Rotary meter						10.74	
Revolutions			47-07/2				
Time (minimum 40 seconds)			COMMITTION AND ADDRESS OF THE PARTY OF THE P				

Direct Measurement or calculation

Velocity (V) (m/s)

0.480

0.411 0.459 0.615 0.761 0.164 0.482

0.88

Field Crew: V.m. CB, ZC, MC,
Sampling Date (DD/MM/YYYY): Z6/09/2023

Site Code: BO1002

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E): Completely embedded = 1 75% embedded = 1/4

50% embedded= 1/2 25% embedded = 1/4

Unembedded = 0

dei

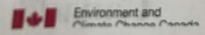
2. Surrounding/Interstitial Material Circle the substrate size category for the

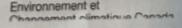
Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	(2)
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

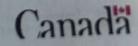
	Diameter (cm)	E	Diameter (cm)	E		Diameter (cm)	E	D	iameter (cm)	E
	1 6.5	26	15.2		51	4.7		76	5.0	
	2 8.0	27	4.4		52	8.0	1013	77	6.0	The sale
	3 8.7	28	8.6		53	5.1	1018	78	1.9	A FIRE
	4 23.5	29	9.5		54	6.9		79	3.4	
1	0,	30	7.3	(6)	55	5.5		80	15.5 (50
6	2,0	31	5.0		56	4.2	Nak	81	15.2	
1	4 7	32	9.5		57	11.5		82	7.2	
8	0410	33	22.1		58	6.8		83	5.5	655
9	17.0	34	4.7		59	9.0		84	12.3	
1	0 3-0	35	10.2		60	15.3	(75)	85	4.7	BIT
1	1 6.0	36	11.5		61	5.1		86	8.5	
1:	2 9.0	37	6.3		62	5.5		87	2.4	
13	8.5	38	23.4		63	10,2		88	4.0	
14		39	6.5		64	0.9		89	7.3	10
15	7.9	40	3.5	(24)	65	8.5		90	7.0	(0
16	8.7	41	8		66	7.0		91	4.5	MIN
17	7.5	42	5-7		67	7.3		92	6.8	
18	4.0	43	11,8		68	10.5		93	6.5	10 10
19	15.1	44	11.5		69	3.7		94	3.0	
20	17.3	75% 45	0.7	WHAT I	70	7.5	(25	95	2.6	
21	7,0	46	5		71	4.2		96	4.7	
22	8.4	47	8.9	REPERT	72	2.7		97	5.5	
3	14.8	48	5.5	N WAR	73	2.0		98	7.0	Signal.
1	8.2	49	3.2		74	9.1	MAIN	99	4.8	
5	1.6	50	4.1	(95%	75	8.1		10	0 6.0	

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Page 5 of 6



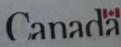




Field Crew: KM, CJB, 2C, AM, MC, BB Site Code: BO 100 2 Sampling Date (DD/MM/YYYY): 26/09/2023 SITE INSPECTION Site Inspected by: KMCCollun Communication Information Itinerary left with contact person (include contact numbers) kroeger Time checked-in: 9:00 Contact Person: Form of communication: radio cell satellite hotel/pay phone SPOT Phone number: (514) 664 - 6815 Vehicle Safety Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle) Equipment and chemicals safely secured for transport Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary Notes: Shore & Wading Safety Mading Task Hazard Analysis read by all field staff Wading Safe Work Procedures read by all field staff Instream hazards identified (i.e. log jams, deep pools, slippery rocks) PFD worn Appropriate footwear, waders, wading belt ☐ Belay used

CABIN Field Sheet April 2023

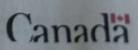




Notes:

Page 6 of 6

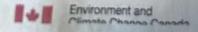
D Occu	pational Health & Safety: Site Inspection Sheet completed (see page 6)
PRIMARY	SITE DATA
CABIN Stud	Ny Name: CBWQ-EIK Local Basin Name: EIK RIVER
River/Stream	Name: Cool Creek Stream Order: (map scale 1:50,000)
Select one:	☐ Potential Reference Site
Geographi	ical Description/Notes:
SHE BY	w/ Park Ave + train bridge (across from wskis giard red house)
Jowps	making drang Led Honse)
Surrounding L	and Use: (check those present) Information Source:
Forest	☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban
Logging	☐ Mining ☐ Commercial/Industrial ☐ Other Recreational trail/tra
Dominant Sur	rounding Land Use: (check one) Information Source:
	Contenio Edito OSE (Circle Unite) Information Source
_ Forest	
	☐ Field/Pasture ☐ Agriculture ☐ Residential/Urban
☐ Logging ocation Da	Field/Pasture
Ocation Da	Field/Pasture Agriculture Residential/Urban Mining Commercial/Industrial Other Ata 195144 N Longitude: - 115.066434 W (DMS or DD)
Ocation Da	Field/Pasture
ocation Da	Field/Pasture Agriculture Residential/Urban Mining Commercial/Industrial Other Ata 195144 N Longitude: - 115.066434 W (DMS or DD)
evation: 90	Field/Pasture
ocation Da	Field/Pasture
ocation Da	Field/Pasture
Logging ocation Da atitude: 49.4 evation: 90	Field/Pasture
Logging ocation Da atitude: 49.4 evation: 90	Field/Pasture
Logging ocation Da atitude: 49.4 evation: 90	Field/Pasture
Logging ocation Da atitude: 49.4 evation: 90	Field/Pasture
ocation Da	Field/Pasture
Logging ocation Da atitude: 49.4 evation: 90	Field/Pasture



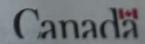
Field Crew: KM, CB Sampling Date (DD/MN	MC, AM, ZC, BA	Site Code: COLOO1
Photos	resolumbe respectati	and the unity of good is relieved that office up to 19
☐ Field Sheet ☐ Up ☐ Substrate (exposed)	ostream Downstre Substrate (aquation	
REACH DATA (represe	nts 6 times bankfull width)	
1. Hebitat Types: (check the	ese present) tapids Straight run	☐ Pool/Back Eddy
2. Canopy Coverage: (stand	in middle of stream and lo	ok up, check one) □ 51-75 % □ 76-100 %
3. Macrophyte Coverage: (n	ot algae or moss, check or -25 % 26-50 %	(P) 51-75% 76-100% NEW THIS YELL
 Streamside Vegetation: (d) ferns/grasses 		ciduous trees Coniferous trees
5. Dominant Streamside Veg		
☐ ferns/grasses		ciduous trees
6. Periphyton Coverage on S		nt to the same of
	o obvious colour (< 0.5 mr	
	to light green colour (0.5	e (1-5 mm thick) SEARRY GROUTH
	TO ME STATE OF THE PARTY OF THE	rk brown algae (5-20 mm thick)
long strands (> 20		at, extensive green, brown to black algal mass may have
Note: 1 through 5 represent ca	tegories entered into the C	ABIN database.
ENTHIC MACROINVER	TEBRATE DATA	
bitat sampled (check one):		straight run
		99%
μm mesh Kick Net *		Preservative used: 150 PROPYL
son sampling	C.Bush	Sampled sieved on site using the
	7	"Bucket Swirling Method":
pling time (i.e. 3 min.)	OMIC	
of sample jars	3 min	YES NO

* Not

Page 2 of 6



D



Field Crew: LCM.CB, MC, BB, ZCAM Site Code: COLOO |
Sampling Date (DD/MM/YYYY): 03/10/2023

VATER CHEMISTRY DATA Time: 09:10 (24 hr clock) Time zone:
r Temp: 9.0 (°C) Water Temp: 8.13
Decific Conductance: 100.3 (µs/cm) DO: 10.70 (mg/L) Turbidity: 0.10 (NTU) Do: 10.70 (mg/L) Turbidity: 0.10 (NTU) Do: 10.70 (mg/L) Turbidity: 0.10 (NTU)
JSS (Total Suspended Solids)
Nitrogen (i.e. Total, Nitrate, Nitrite, Dissolved, and/or Ammonia)
Phosphorus (Total, Ortho, and/or Dissolved)
Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate)
e: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.

CHANNEL DATA

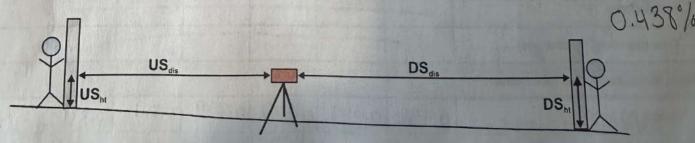
Slope - Indicate how slope was measured: (check one)

☐ Calculated from maj				
Scale:	(Note: small scale map recommended	if field mea	asurement is not po	ossible - i.e. 1:20,000)
contour interval (verti				
	tour intervals (horizontal distance)	72	(m)	
	ce/horizontal distance =	William P.		
OR				

Measured in field

Circle device used and fill out table according to device:

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
^a Top Hairline (T)		1.483	
^a Mid Hairline (ht) OR ^b Height of rod	1.168	1.483	
^a Bottom Hairline (B)			
^b Distance (dis) OR	36	36	USdis+DSdis=
^a T-B x 100	aUSdis=T-B	aDSdis=T-B	72m
Change in height (Δht)			DSht-USht=
Slope (Δht/total dis)			0.004375



Page 3 of 6



1,483 35

Field Crew: VM CBBB, WC, 2C, AM
Sampling Date (DD/MM/YYYY): 03/09/2023

Site Code: COLOO [

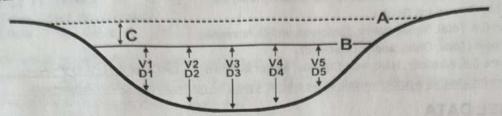
The second second			
Widths	and	Depth	

Location at site: U/S of wickeld (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 4.60 (m)

B - Wetted Stream Width: /2 ,00 (m

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 1, 75 m (cm)



Note:

D

Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations.

Wetted widths < 5 m, measure 3-4 equidistant locations

Velocity and Depth

Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:

□ Velocity Head Rod (or ruler): Velocity Equation (m/s) = $\sqrt{[2(\Delta D/100) * 9.81]}$

Rotary meters: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)

Direct velocity measurements:
Marsh-McBirney Sontek or Other Flowtrack

THE RESIDENCE OF THE PARTY OF T	1	2	3	4	5	6	AVG
Distance from Shore (m)	2.0	3.7	5.4	7.1	8.8	10.5	
Depth (D) (cm)	20 19	22	26	26	28	27	24.67
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)						30	In State
Depth of Stagnation (D ₂) (cm)			No.				
Change in depth (△D=D₂-D₁) (cm)	-						_
Cotary meter							Holles
Revolutions	-						
Time (minimum 40 seconds)	-						
rect Measurement or calculation							
Velocity (V) (m/s)	0.132	0.042	0.207	0.2	19 0.3	01 0	1.225 0.7

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.

 Embeddeness categories (E):

 First September Coverner

ROCKS

Embededness categories (E): Completely embedded = 1 75% embedded = 1/4 50% embedded = 1/2

25% embedded = 1/4 Unembedded = 0

ler/g

2. Surrounding/Interstitial Material Circle the substrate size category for the surrounding material.

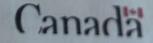
Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	(2)
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

	Diameter (cn	n)	E	LEN'S	Diameter (cm)	E	TO DO	Diameter (cm)	E		Diameter (cm)	Е
1	3.7			26	4.4		51	4.1		76	7.0	
2				27	6.0		52	5.4	1 4	77	55	Ray or
3	616			28	30.2		53	13.5		78	3.6	
4	3.2			29	6.2		54	4.5		79	4.3	
5	6.6		Ohn.	(30)	5.0	1/2	55	10.7		(80)	8.5	1/2
6	11.2			31	5,6		56	8.0		81	1.8	
7	12.5			32	8.4		57	8.4	Printer of the last of the las	82	9.2	
8	21.0			33	6.0		58	7.2		83	9.2	
9	4.7			34	7.0		59	8.2		84	7.5	1
10)	27.0	3	14	35	4.5	and the same	(60)	13.0	1/2	85	6.4	
11	8.0			36	3.4		61	36	The same	86	10.4	
12	6.6		MU	37	6.5		62	9.2		87	3.4	(ea)
3	8.8			38	4.5	Victorial I	63	3.7		88	4.6	1000
4	8.7			39	10.2	1000	64	8.3	1989	89	5.9	
5	7.3		1	40)	8.3	0	65	4.7		90		1
	0.9			41	8.3		66				10.2	3/4
	2.5		1	42	9,8		67	1.4		91	25.0	12 1383
1	11.5			13			Andrew Control	9.0	Bull	92	6.8	
+		1000			10.2		68	1.6	687	93	6.0	1 30
+	7.0		1 2	4	3.9		69	3.1	100 10	94	3.3	
_	5.0	1/4	4	5	60		70)	5.3	1/2	95	10.6	
1	9.2		46	6	6.7		71	6.2		96		
9	2.3	W S	47	7	6.2		72	Maria Company of the		97	9.1	-
5	.5	Maria	48		AND RESIDENCE OF THE PARTY OF T		73	10.0	4		9.1	
1-1-17-19	17		49		10.8			3.4	400	98	1.9	ghapa
			-		2.5		74	4.6		99	7.0	AT I
6	8	9	50	8	0.5	0	75	0.9	W CRAN	(100		EN SUR

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Page 5 of 6





Field Crew: K.M.CB, MC, BB, AM, 2C Site Code: 0000)
Sampling Date (DD/MM/YYYY): 03/09 /2023

SITE INSPECTION

Site Inspected by: K. M.Callum

Communication Information

(include contact numbers)

Contact Person: E.Matveev Time checked-in: 9:08

Form of communication aradio sell satellite hotel/pay phone SPOT

Phone number: (709) 7103 - 9678

Vehicle Safety

Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)

Equipment and chemicals safely secured for transport

Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary

Notes:

Shore & Wading Safety

Wading Task Hazard Analysis read by all field staff

Wading Safe Work Procedures read by all field staff

Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

PFD worn

Appropriate footwear, waders, wading belt

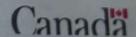
Belay used

Notes:

CABIN Field Sheet April 2023

Page 6 of 6



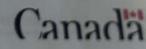


THE RESERVE		Safety: Site Inspection Sheet completed (see page 6)
	SITE DATA	safety. Site inspection short completed (see page 6)
	y Name: CBWQ -	- Elle Local Basin Name: Elle River
	Name: Coal C	
	Test Site Pote	
left pul Coming of which the right (p Surrounding L	now before ro now Morrissey and with sign for and right-side two and Use: (check those	otes: It Pd: Take Coal Crk. Rol to Paiges Draw. Park (and gets windy. I: Head up Morrissey, past FWA, past MOROOZ cont Coal Creek. FOllow to left. Continue to pulidist moff to Morrissey). Pollow flagging to present) Information Source: Visual, large pulled
☑ Forest	☐ Field/Pasture	☐ Agriculture ☐ Residential/Urban
Logging	☐ Mining	Commercial/Industrial Other hunding
ominant Surr	ounding Land Use: (ch	neck one) Information Source: Visual
Forest	Field/Pasture	
Logging		☐ Commercial/Industrial ☐ Other
2099.19		D Other
CONTRACTOR LANG		
vation: 1 13	52853 N Longitu	More is sen
itude: 49.43 vation: 173	2853 N Longitu 7. O(fasl or masl)	GPS Datum: GRS80 (NAD83/WGS84) Other:

Page 1 of 6

Note:

D



Field Crew: vm, CE	3, AM, ZC		e: <u>COLU03</u>
Sampling Date (DD/MM/)	MYY): 03/10/2	023	
			VAN TO THE REAL PROPERTY OF THE PERSON OF TH
Photos ☐ Field Sheet ☐ Upst	ream Downstre		☐ Aerial View
☐ Substrate (exposed)	Substrate (aquation	Other	7772
REACH DATA (represent	s 6 times bankfull width)		
1. Habitat Types: (check those Riffle Rap	oids Straight run	Pool/Back Eddy	
	5 % 26-50 %	□ 51-75 % □	76-100 %
3. Macrophyte Coverage: (not 0 % 1-2		⁹⁾ □ 51-75 % □	76-100 %
4. Streamside Vegetation: (che ferns/grasses	eck those present) shrubs	ciduous trees	rous trees
5. Dominant Streamside Veget ferns/grasses		ciduous trees	rous trees
6. Periphyton Coverage on Sul	ostrate: (benthic algae, n	ot moss, check one)	
1 - Thin layer, no	obvious colour (< 0.5 mm	thick)	
2 - Yellow-brown to	o light green colour (0.5-	1 mm thick)	
☐ 3 - Patches of thick	ker green to brown algae	(1-5 mm thick)	
4 - Numerous large	e clumps of green to dar	k brown algae (5-20 mm thi	ck)
5 - Rocks are most long strands (> 20	rly obscured by algal ma mm thick)	t, extensive green, brown to	o black algal mass may ha
Note: 1 through 5 represent cate	egories entered into the Ca	ABIN database.	
BENTHIC MACROINVERT	EBRATE DATA	7.	
abitat sampled (check one):		straight run	10
0 μm mesh Kick Net *		Preservative used: 15	
rson sampling	C.Rush		
mpling time (i.e. 3 min.)	3 min	Sampled sieved on site "Bucket Swirling Metho"	e using the od":
of sample jars	J / WI /	☐ YES ☑ N	0
cal depth in kick area (cm)	5cm	If YES, debris collecte	ed for QA/QC
: Indicate if a sampling method		anded 100	

D

WATER CHEMISTRY	DATA Time: 13:5	(24 hr clock) Time zone:	MDT
Air Temp: 8.0	(°C) Water Temp:	5.5 (°C) pH: 7.(68
Specific Conductance:	13.9 (µs/cm) DO: 10	(mg/L) Turbidity:	0.28 (NTU)
Nitrogen (i.e. Total, Nitr Phosphorus (Total, Ort Major Ions (i.e. Alkalinii	Solids) rate, Nitrite, Dissolved, and/o tho, and/or Dissolved) ty, Hardness, Chloride, and/	or Sulphate) Other Annalyses, but not required for CABIN	iona
CHANNEL DATA			
	no wee managered; (chack or		
Calculated from map	(Note: small scale map red	commended if field measurement is no	ot possible - i.e. 1:20,000).
Calculated from map Scale: contour interval (vertice distance between cont slope = vertical distance OR Measured in field Circle device used and	(Note: small scale map red al distance) tour intervals (horizontal dist ce/horizontal distance = fill out table according to do b. Hand Level & Measurin	evice:	145 a series con 1
Calculated from map Scale: contour interval (vertical distance between contact slope = vertical distance) Measured in field Circle device used and	(Note: small scale map red al distance) tour intervals (horizontal dist ce/horizontal distance =	(m), eance) (m) evice:	
Scale: contour interval (vertical distance between contained slope = vertical distance) Measured in field Circle device used and a. Survey Equipment ((Note: small scale map red al distance) tour intervals (horizontal dist ce/horizontal distance = fill out table according to do b. Hand Level & Measurin	(m), eance) (m) evice: g Tape	145 a series con 1
Calculated from map Scale: contour interval (vertical distance between contained bet	(Note: small scale map red al distance) tour intervals (horizontal dist ce/horizontal distance = fill out table according to do b. Hand Level & Measurin	(m), eance) (m) evice: g Tape	145 a series con 1
Calculated from map Scale: contour interval (vertical distance between contained processing) Correctly distance of the contained of the contai	(Note: small scale map red al distance) tour intervals (horizontal dist ce/horizontal distance = if fill out table according to do b. Hand Level & Measurin Upstream (U/S)	evice: g Tape Downstream(D/S)	Calculation
Calculated from map Scale: contour interval (vertice distance between contour slope = vertical distance) Measured in field Circle device used and a. Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR Pheight of rod Bottom Hairline (B)	(Note: small scale map red al distance) tour intervals (horizontal dist ce/horizontal distance = if fill out table according to do b. Hand Level & Measurin Upstream (U/S)	evice: g Tape Downstream(D/S)	145 a series con 1
Calculated from map Scale: contour interval (vertice distance between contslope = vertical distance) Measured in field Circle device used and a. Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR Pleight of rod Bottom Hairline (B) Distance (dis) OR	(Note: small scale map red al distance) tour intervals (horizontal distance) ce/horizontal distance = I fill out table according to do b. Hand Level & Measurin Upstream (U/S)	evice: g Tape Downstream(D/S)	Calculation USdis+DSdis= 24
Calculated from map Scale: contour interval (vertical distance between contained and and and and and and and and and an	(Note: small scale map red al distance) tour intervals (horizontal distance) I fill out table according to do b. Hand Level & Measurin Upstream (U/S)	evice: g Tape Downstream(D/S) 1.745	Calculation
Calculated from map Scale: contour interval (vertice distance between contsolope = vertical distance) Measured in field Circle device used and a. Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR Pheight of rod Bottom Hairline (B) Distance (dis) OR	(Note: small scale map red al distance) tour intervals (horizontal distance) I fill out table according to do b. Hand Level & Measurin Upstream (U/S)	evice: g Tape Downstream(D/S) 1.745	Calculation USdis+DSdis= 24

Field Crew: VM CB, AM, 2C	Site Code: COLO	03
Sampling Date (DD/MM/YYYY): 03/10/2	2023	
	11.20	0.2
Widths and Depth	LALAL MAN ATAG YELGE	
ocation at site: u/s wichen	(Indicate where in sample reach, ex. d/s	s of kick area)
A - Bankfull Width 5. 13 (m)	B - Wetted Stream Width: 4.0	_ (m)
C - Bankfull-Wetted Depth (height from water surfa	ace to Bankfull): 16.0	_ (cm)
	Α	
1c	A A B	
V1 V2 D1 D2	V3 V4 V5 D3 D4 D5	
ote: /etted widths > 5 m, measure a minimum of 5-6 equidist /etted widths < 5 m, measure 3-4 equidistant locations.	stant locations.	Carlo San Association

Velocity and Depth
 Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:
 □ Velocity Head Rod (or ruler): Velocity Equation (m/s) = √ [2(ΔD/100) * 9.81]
 □ Rotary meters: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)
 □ Direct velocity measurements: □ Marsh-McBirney □ Sontek or □ Other □ Plow Propeller

1	2	3	4	5	6	AVG
8.0	1.60	2.40	3.2			
16.0	15.0	10.0	7.0			12.0
-			Wall to			
					Line	
0.05	0.15	0,10	0.15			0.1125
		D.8 1.60 16.0 15.0	0.8 1.60 2.40 16.0 15.0 10.0	0.8 1.60 2.40 3.2 16.0 15.0 10.0 7.0	0.8 1.60 2.40 3.2	0.8 1.60 2.40 3.2 16.0 15.0 10.0 7.0



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page dowr

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E):

Completely embedded = 1

75% embedded = 3/4

50% embedded= 1/2

25% embedded = 1/4

Unembedded = 0

2. Surrounding/Interstitial Material

Circle the substrate size category for the

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	2
0.2-1.6 cm (gravel)	(3)
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

							E CONTRACTOR OF THE PARTY OF TH	War wall	10000	ALCOHOLD TO THE	
	Diameter (cm)	E		Diameter (cm)	Е	augin.	Diameter (cm)	E	THE P	Diameter (cm)	E
1	3.3		26	8.0		51	25.6		76	7.8	
2	3.9		27	4.0		52	(0,0)		77	3.0	100
3	2.2		28	32		53	5.7		78	9.5	
4	3.9		29	5.8		54	4.0		79	2.9	
5	10.5		30	15.9	1/2	55	21.0	(80)	9-8'	0
6	310,0		31	5.2		56	10.5		81	4.0	1
7	3.0		32	4.1		57	4.3		82	6.2	
8	5.3		33	5.5		58	1.8	The same	83	3.4	A PARTY
9	19.8		34	4.9		59	9,0	1	84	6.3	
10	0.8	3/4	35	7.2	(60)	2.7	0	85	5.	1000
11	5.5		36	5.4		61	4.8		86	6-9	
12	5.3		37	(1,8		62	2.2	1 600	87	12.6	
13	1.2		38	13.A		63	7.3	High	88	3-1	
14	6.5		39	4.7		64	6.5		89	13.6	
15	1.1		40)	7.3		65	8.4		(90	(6.0	1/4
16	50		41	4.0		66	28.7		91	5.3	
17	<0		42	1-12	1-23	67	600		92	7.9	
18	171		43	50		68	6.4		93	1.8	Mary My
9	1115		44	4.0	A PERSON	69	90	30 48	94	6.2	
0)	60	3/4	45	50	11800	70	2 4	1/	25 9		
1	N'S	9/4	46	7.8		71	70		9	6 12 <	5
	40		47	2.8	6.5	72	110		0	7 90	
2	7.1			d.e			410			8 8	1
	4.0		48	0.5		73	6.0			0.0	
	28		49	5.5	A	74	0.8		1	99 8.0	2
	Ch 6 99	1	50	7		75				100	1

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Page 5 of 6



Field Crew: K.M. CB. MC. BB. AM. 2C Site Code: CO LOO3
Sampling Date (DD/MM/YYYY): 03/09/2023

SITE INSPECTION

Site Inspected by:	K.MC(allum	
one moperted by	1.1.1.	WILL	The second secon

Communication Information

. /			
Atinerary left with	contact nerson	(include contact numbers)	ĕ
IL Turiciary left with	contact person	(Include contact Harriso.s)	

Contact Person: f. Matveev Time checked-in: 9:00

Form of communication: Aradio Acell Satellite hotel/pay phone SPOT

Phone number: (709) 763-9678

Vehicle Safety

- Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)
- Equipment and chemicals safely secured for transport
- ☑ Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary

Notes:

Shore & Wading Safety

- Wading Task Hazard Analysis read by all field staff
- ☐ Wading Safe Work Procedures read by all field staff
- ☑ Instream hazards identified (i.e. log jams, deep pools, slippery rocks)
- PFD worn
- Appropriate footwear, waders, wading belt
- ☐ Belay used

Notes:

CABIN Field Sheet April 2023

Page 6 of 6



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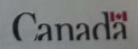
Occup	ational Health & Safety: Site Inspection Sheet completed (see page 6)
PRIMARY	SITE DATA
CABIN Study	Name: CBWQ - EIK Local Basin Name: Elk River
River/Stream	Name: Lizard Creek Stream Order: (map scale 1:50,000)
Select one:	Test Site Potential Reference Site
Geographi ≥100 m	ical Description/Notes: n u/s from hwy 3 L1z. Creek bridge, above scoured portion
	Land Use: (check those present) Information Source: VISUAL LOCAL
Forest	Field/Pasture Agriculture Residential/Urban
☐ Logging	☐ Mining ☐ Commercial/Industrial ☐ Other recreational (910v. park)
Dominant Sur	rrounding Land Use: (check one) Information Source:
Forest	Field/Pasture
Logging	☐ Mining ☐ Commercial/Industrial ☐ Other
evation: <u>M</u>	WILLIAM Longitude: - 115.074159W (DMS or DD) GPS Datum: DI GRS80 (NAD83/WGS84) Other: On Map Drawing FERNIE LIZ CRY LIZ CRY
1	LEVEL LOGGIER LERANBRI

H

Field Crew: VMCP Sampling Date (DD/MM	, 2C, BB, MC,	AM Site 2/2023	Code: 112001
Sampling Date (DD/MIN	VIIII). <u>~ 17 13</u>		
Photos Field Sheet Up Substrate (exposed)	ostream Down		Aerial View
DEAGUIDATA			
REACH DATA (represe	nts 6 times bankfull wid	atn)	
1. Habitat Types: (check the	ose present) tapids Straight	run Pool/Back Eddy	
2. Canopy Coverage: (stand	d in middle of stream ar	The state of the s	☐ 76-100 %
3. Macrophyte Coverage: (r	not algae or moss, ched		☐ 76-100 %
Streamside Vegetation: (ferns/grasses		deciduous trees con	iferous trees
5. Dominant Streamside Ver ferns/grasses		deciduous trees acon	iferous trees
6. Periphyton Coverage on S	Substrate: (benthic alga	ae. not moss. check one)	
	o obvious colour (< 0.5		
	n to light green colour		
	nicker green to brown a		
		dark brown algae (5-20 mm	thick)
	ostly obscured by alga		to black algal mass may hav
Note: 1 through 5 represent c	ategories entered into th	e CABIN database.	
BENTHIC MACROINVE	TERRATE DAT		
dabitat sampled (check one):	и гіпіе Ц rapids	☐ straight run	
00 μm mesh Kick Net *		Preservative used: 0	9% ISOPROPYL
erson sampling	C. Bush	Sampled sieved on si	
mpling time (i.e. 3 min.)	3 min.	"Bucket Swirling Meth	nod":
of sample jars	1	319	10
cal depth in kick area (cm)	15cm	If YES, debris collec	ted for QA/QC L

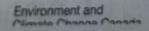
* Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used.

nt



Air Temp: 12.0	DATA Time: 01:00	(24 hr clock)	TOM
		0.94 (mg/L) Turbidity:	
Check if water samples well TSS (Total Suspended Nitrogen (i.e. Total, Nitr Phosphorus (Total, Orth Major Ions (i.e. Alkalinit	re collected for the following Solids) rate, Nitrite, Dissolved, and/or no, and/or Dissolved) y, Hardness, Chloride, and/o	Ammonia)	ions
contour interval (vertical distance between contour slope = vertical distance	al distance)(lour intervals (horizontal dista	ommended if field measurement is not pm), nce) (m)	possible - i.e. 1:20,000).
Measured in field Circle device used and	fill out table according to de	vice:	
Measured in field Circle device used and		vice:	Calculation
Measured in field Circle device used and a Survey Equipment Measurements	fill out table according to dev b. Hand Level & Measuring	vice:	Calculation
Measured in field Circle device used and a Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR	fill out table according to dev b. Hand Level & Measuring	vice:	Calculation
Measured in field Circle device used and a Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR Height of rod	fill out table according to de- b. Hand Level & Measuring Upstream (U/S)	vice: Tape Downstream(D/S)	Calculation
Measured in field Circle device used and it a. Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR Height of rod ottom Hairline (B) istance (dis) OR	fill out table according to det b. Hand Level & Measuring Upstream (U/S)	Downstream(D/S) 1.964 m	Calculation USdis+DSdis=
Measured in field Circle device used and a Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR deight of rod ottom Hairline (B) istance (dis) OR	fill out table according to det b. Hand Level & Measuring Upstream (U/S)	vice: Tape Downstream(D/S)	USdis+DSdis= 3\.500
Measured in field Circle device used and a Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR deight of rod ottom Hairline (B) istance (dis) OR	fill out table according to det b. Hand Level & Measuring Upstream (U/S)	Downstream(D/S) 1.964 m	
Measured in field Circle device used and a Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR deight of rod ottom Hairline (B) stance (dis) OR 8 x 100 nge in height (Δht)	fill out table according to det b. Hand Level & Measuring Upstream (U/S)	Downstream(D/S) 1.964 m	USdis+DSdis= 3\.500
a. Survey Equipment	fill out table according to det b. Hand Level & Measuring Upstream (U/S)	Downstream(D/S) 1.964 1.964 1S.75 aDSdis=T-B	USdis+DSdis= 3\.500 DSnt-USnt= 0.7\S
Measured in field Circle device used and a Survey Equipment Measurements Top Hairline (T) Mid Hairline (ht) OR Height of rod ottom Hairline (B) istance (dis) OR B x 100 Inge in height (Δht)	fill out table according to det b. Hand Level & Measuring Upstream (U/S) 1.249 \(\text{N} \) 15.75 \(\text{N} \) aUSdis=T-B	Downstream(D/S) 1.964 m	USdis+DSdis= 3\.500 DSnt-USnt= 0.7\S

Page 3 of 6



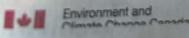
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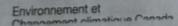
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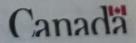
	OF THEORY						
Location at site: Ws of Vic			licate where				rea)
A - Bankfull Width: 10,40 (n			etted Stream	100000000000000000000000000000000000000	5.25	_ (m)	and the same
C - Bankfull-Wetted Depth (height fr	om water su	face to Ban	kfull):	14.0	25 10 /2 11 12	(cm)	No.
				A		97.00.000	
1c	† †	1	tt.	-B-			
	V1 V2 D1 D2	V3 D3	V4 V5	/			NO. U.S.
	1	.					KARIS
Note: Wetted widths > 5 m, measure a minimu Wetted widths < 5 m, measure 3-4 equic			ons.				8000
					. 00	1.7	
Velocity and Depth							
Check appropriate velocity measuring shore and depth are required regard	ng device and lless of meth	d fill out the od:	appropriate	section in	chart below	THE RESERVE AND ADDRESS.	7.5
☐ Velocity Head Rod (or ruler): ∨	elocity Equa	tion (m/s) =	√ [2(ΔD/10	00) * 9.811		landa or	23
☐ Rotary meters: Gurley/Price/Mir					ion chart for	calculation)	
Direct velocity measurements:							
La Direct velocity measurements.	LI IVIAI SII-IVI	Colliney w	SULLER OF L	1 Office		West of	
	2.45	3.26	3.95	4.78	5.45	6.20	mis(a)
		3.26	3.95	4-18	5.45	6.20	AVG
BURNING AND ADDRESS OF THE PARTY OF THE PART		3.26	3.95	3.0	5.45 3.75	6.20	AVG
Distance from Shore (m)	3.43	3.26	3.45	3.0	3.75 16.0	6.20	AVG
Distance from Shore (m) epth (D) (cm)	3.43	3.26	3.45	3.0	3.75	6.20	20.32
Distance from Shore (m) epth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D ₁) (cm)	3.43	3.26	3.45	3.0	3.75	6.20	AVG
Distance from Shore (m) epth (D) (cm) elocity Head Rod (ruler)	3.43	3.26	3.45	3.0	3.75	6.20	20.32
Distance from Shore (m) epth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D ₁) (cm)	3.43	3.26	3.45	3.0	3.75	6.20	20.32
epth (D) (cm) locity Head Rod (ruler) Flowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm)	3.43	3.26	3.45	3.0	3.75	6.20	20.3 ²
istance from Shore (m) epth (D) (cm) locity Head Rod (ruler) Flowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm) hange in depth (AD=D ₂ -D ₁) (cm)	3.43	3.26	3.45	3.0	3.75	6.20	20.32
istance from Shore (m) spth (D) (cm) locity Head Rod (ruler) Flowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm) hange in depth (ΔD=D ₂ -D ₁) (cm) ry meter volutions	3.43	3.26	3.45	3.0	3.75	6.20	20.32
istance from Shore (m) epth (D) (cm) locity Head Rod (ruler) Flowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm) hange in depth (ΔD=D ₂ -D ₁) (cm) ry meter	3.43	3.26 2 1.50 22.0	3.45 2.25 22.0	3.0	3.75	4.5	20.33

Page 4 of 6



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SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E):

Completely embedded = 1 75% embedded = 3/4 50% embedded= 1/2

25% embedded = 1/4

Unembedded = 0

2. Surrounding/Interstitial Material Circle the substrate size category for the

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	(2)
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

	Diameter (cm)	E	188.4	Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E
1	11.2		26	5.1		51	7.9		76	5.5	
2	13.1		27	5.0		52	8.0	19-23	77	9.2	Phone
3	10.2		28	14.0		53	1.8		78	5.0	
4	13.4		29	4.4		54	9.0		79	9.2	
5	5.0		30	2.2	1/2	55	7.7	(80	4.2	1/2
6	7.9		31	0.5		56	9.7	7	81	1.3	
7	4.0		32	8.9		57	5.6		82	7.0	
8	0.8		33	12.0		58	30	ALC: NO.	83	10.3	1-35
9	37.1		34	3.8		59	5.4		84	6.6	
10)	2.2	1/4	35	3.4	10000	60/	11.0	1/2	85	8.1	Maria .
11	4.8		36	6.5		61	11.10	W	86	122	
12	1.3		37	4.6		62	2.4	,	87	3.6	BUCK
13	3.2		38	12.7		63	5.7		88	10.7	
4	8.0		39	4.3		64	3.10		89	1.4	
5	<.5	1 (40)	5.5	1/4	65	11.1		90	25.5	1/
3	0.4		41	23.4		66	3.1	0000	91	1.5	
	101		42	40	MANA	67	7.9		92	10.3	1
	00		43	72		68	75	30000	93	17.8	181 00
	56		44	< n	water	69	2 -		94	160	
)	40	1/2	45	20	1800	70	33	1/	25 9	5 100	
4	71	A Book	46	3.4		71	10	-	9	18.	3
1	1.6	/ SHOT I		6.6		1990	1.0			011	2
	1.1	- 2	47	45		72	6.3			7 4	5
-	7.6	4	48	4.3		73	4.5	BE W.	3	18	3
-	17	4	19	32	WK 18	74	3.1			99 4	0
1		1/5	0	30	1/7	75	000		V	100 12	7

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Page 5 of 6

Shore & Wading Safety

Instream hazards identified (i.e. log jams, deep pools, slippery rocks)

PFD worn

Appropriate footwear, waders, wading belt

☐ Belay used

Notes:

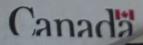
CABIN Field Sheet April 2023

Page 6 of 6



Environment and

Environnement et



Field Crew Sampling D	EXMCallum, C.1	Bush 2C AM 04/10/2023	Site Code:	L12003
				(
Occupa	tional Health & Si	afety: Site Inspection SI	leet completed	(see page 6)
PRIMARY S		The state of the s	the Manager	The state of the s
CABIN Study N	Jame: OBWQ	Local Bas	in Name: EIV	River
River/Stream N	ame: Lizard	Creek Stream O	rder: (map scale 1:	50,000)
				or Co
Select one:	Test Site LI Poter	ntial Reference Site		
Geographica Pank at the follow until (site dis of	Description/No e visiter park old ERA sign bank restor	ites: ing (big one beside h n. Head down to axion).	lordic carter	i), take trail us,
Surrounding Lan	d Use: (check those	present) Information S	Source: local,	visual
Forest	☐ Field/Pasture	☐ Agriculture	Residentia	
Logging	Mining	☐ Commercial/Industrial	Other rec	reation listand take, prov. pank) trails
V		neck one) Information	Source:	O de la
_	☐ Field/Pasture		Residentia	al/Urban
Logging	☐ Mining	☐ Commercial/Industrial	Other	
levation: 1027	N Longit	ude: - 115.69 432 W (DN GPS Datum: GRS80	(NAD83/WGS84)	Carl Street Constitution
Site Location	Map Drawing		W N	VISITOR PARKING
X615-				
1	LOG			1
	7	TRAIL		1
0.01	LEEL-WEIGH	SHRUBS	03-	1/
THE POPE		Wa Thousand	112.00	RN.
		NO KICKNET		
	/ /	2010		A STATE OF THE PARTY OF THE PAR
te: Indicate nort	n	HRUBS.		

Page 1 of 6

Field Crew: LM CB, BB, ZC, AM, MC Site Code: L12003 Sampling Date (DD/MM/YYYY): 04/10/2023
Photos Field Sheet Dupstream Downstream Across Site Aerial View Substrate (exposed) Substrate (aquatic) Other
REACH DATA (represents 6 times bankfull width)
1. Habitat Types: (check those present) Riffle Rapids Straight run Pool/Back Eddy
2. Canopy Coverage: (stand in middle of stream and look up, check one) 0 %
3. Macrophyte Coverage: (not algae or moss, check one) 0 %
4. Streamside Vegetation: (check those present) ferns/grasses shrubs deciduous trees coniferous trees 5. Dominant Streamside Vegetation: (check one) ferns/grasses shrubs deciduous trees coniferous trees 6. Periphyton Coverage on Substrato: (benthis place net recent short and short
6. Periphyton Coverage on Substrate: (benthic algae, not moss, check one) 1 - Thin layer, no obvious colour (< 0.5 mm thick)
2 - Yellow-brown to light green colour (0.5-1 min thick)
☐ 3 - Patches of thicker green to brown algae (1-5 mm thick)
4 - Numerous large clumps of green to dark brown algae (5-20 mm thick)
5 - Rocks are mostly obscured by algal mat, extensive green, brown to black algal mass may have long strands (> 20 mm thick)
Note: 1 through 5 represent categories entered into the CABIN database.
BENTHIC MACROINVERTEBRATE DATA
Habitat sampled (check one): ☐ riffle ☐ rapids ☐ straight run
400 μm mesh Kick Net * Preservative used: 99% ISOPROPIL
Person sampling C. Bush Sampled sieved on site using the "Bucket Swirling Method": No. of sample jars Sampled sieved on site using the "Bucket Swirling Method": U YES NO
Typical depth in kick area (cm)
* Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used.

10 Clain 27 28

Date Role

N

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Field Crew: LCM CB, 2C, AM, BB, MC Sampling Date (DD/MM/YYYY): 04/10/2023

Site Code: UZO63

WATER CHEMISTRY DATA Time: 2 (10) (24 hr clock) Time Town
Air Temp: (24 hr clock) Time zone: MDT
Air Temp: 16.0 (°C) Water Temp: 7.9 (°C) pH; 8.33
(°C) water temp:
Specific Conductance: (407.0 (µs/cm) DO:\\3\) (mg/L) Turbidity: 0.30 (NTU)
TSS (Total Suspended Salita)
Phosphorus (Total, Ortho, and/or Dissolved, and/or Ammonia)
Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate) Other Annual Other Note: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.
and a start attained at the traduited for owner assessments.

CHANNEL DATA

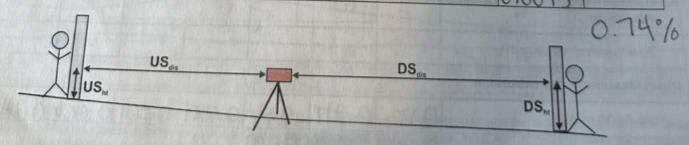
Slope - Indicate how slope was measured: (check one)

☐ Calculated from ma	ID.		
Scale:			0000
contour interval (ver	(Note: small scale map recommended if field tical distance) (m).	d measurement is not possible - i.e. 1:2	20,000).
distance between co	ntour intervals (horizontal distance)	THE CHIEF THE CHIEF OF STREET	
slope = vertical dista	nce/horizontal distance =	(m)	
OB		The state of the s	

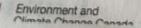
Measured in field

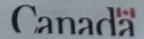
Circle device used and fill out table according to device:

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
^a Top Hairline (T)			THE REAL PROPERTY.
^a Mid Hairline (ht) OR			
^b Height of rod	0.979m	1.20 m	
^a Bottom Hairline (B)			
^b Distance (dis) OR	1500		US _{dis} +DS _{dis} =
°T-B x 100	15.0 m aUSdis=T-B	15.0m aDSdis=T-B	30 m
Change in height (Δht)			DSht-USht=
lope (Δht/total dis)			0.231
-ps (Antibiotal dis)			0.00737



Page 3 of 6





Field Clew.	B, MC, 1	2632	1.100	Site Co	uo		del
Sampling Date (DD/MM/YYY	Y):	09	110/202	2			
Widths and Depth	Mark Day	969	7.57	rg At	ASEVATA	EIMBHAR	HAY
Location at site: 0/S of	leide 8	ite (In	dicate wher	e in sample	reach, ex.	d/s of kick	area)
A - Bankfull Width: 80	(m)	B-W	etted Strea	m Width: _	5.0	(m)	
C - Bankfull-Wetted Depth (height	from water s	urface to Ba	nkfull): 1	0.0		(cm)	
				A		_	80.1
10	}	+	+ +	-B-/	NUIS N		-
	V1 V2	V3 D3	V4 V5	/			
			<u>.</u>				MANIE
Note: Wetted widths > 5 m, measure a minin			ons.				
Wetted widths < 5 m, measure 3-4 equ	uidistant locatio	ns.		Paperson III	N ROOM V	S	- 0.0004
Velocity and Depth				0.71	200	4151	
Check appropriate velocity measur shore and depth are required regar	ing device an dless of meth	d fill out the nod:	appropriate	e section in	chart belo	w. Distance	trom
☐ Velocity Head Rod (or ruler):	Velocity Equa	ation (m/s) =	√ [2(ΔD/1	00) * 9.81]			
☐ Rotary meters: Gurley/Price/Mi					sion chart fo	r calculation)
☐ Direct velocity measurements							
	2.45	3.15	3.85	4.55	5.25	5.95	rist of
		2	3	4	5	6	AVG
	0.7	1.4	2.1	2.8	3.5	4.2	AVG
	0.7	是是五个的特征	2.1	2.8	3.5	4.2	AVG
Depth (D) (cm)		1.4	2.1	2.8	3.5	4.2	AVG
Depth (D) (cm)		1.4	2.1	2.8	3.5	18	AVG
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D1) (cm)		1.4	2.1	2.8	3.5	18	AVG
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm)		1.4	2.1	2.8	3.5	18	AVG
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D₁) (cm) Depth of Stagnation (D₂) (cm) hange in depth (ΔD=D₂-D₁) (cm)		1.4	2.1	2.8	3.5	18	AVG
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D₁) (cm) Depth of Stagnation (D₂) (cm) hange in depth (ΔD=D₂-D₁) (cm) y meter		1.4	2.1	2.8	3.5	18	AVG
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D₁) (cm) Depth of Stagnation (D₂) (cm) hange in depth (ΔD=D₂-D₁) (cm) y meter		1.4	2.1	2.8	3.5	18	AVG
Depth of Stagnation (D ₂) (cm) hange in depth ($\Delta D = D_2 - D_1$) (cm) y meter volutions e (minimum 40 seconds)		1.4	2.1	2.8	3.5	18	AVG 17-5
Depth (D) (cm) Plowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm) hange in depth (ΔD=D ₂ -D ₁) (cm) y meter volutions e (minimum 40 seconds)		1.4	2.1	2.8	3.5	6 4.2 18	AVG 17-5
Depth (D) (cm) Plowing water Depth (D ₁) (cm) Depth of Stagnation (D ₂) (cm) hange in depth (ΔD=D ₂ -D ₁) (cm) y meter volutions e (minimum 40 seconds)		1.4	2.1	2.8	3.5	18	17.9
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D1) (cm) Depth of Stagnation (D2) (cm) hange in depth (\D=D2-D1) (cm) y meter foliutions for (minimum 40 seconds) leasurement or calculation ty (V) (m/s)		1.4	2.1 22	2.8	3.5 18 mos	5010.	17.9
Depth (D) (cm) elocity Head Rod (ruler) Flowing water Depth (D1) (cm) Depth of Stagnation (D2) (cm) thange in depth (\D=D2-D1) (cm) y meter volutions e (minimum 40 seconds) leasurement or calculation ty (V) (m/s)	0.46	1.4	2.1	2.8	3.5 18 mos	18	17.9

Field Crew: V Site Code: Sampling Date (DD/MM/YY

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- · Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E): Completely embedded = 1 75% embedded = 3/4 50% embedded= 1/2

25% embedded = 1/4 Unembedded = 0

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	1
0.1-0.2 cm (coarse sand)	(2)
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8

2. Surrounding/Interstitial Material

Circle the substrate size category for the

surrounding material.

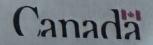
Bedrock

-	Diameter (cm)	Е		Diameter (cm)	E	ALC: N	Diameter (cm)	Е	20213	Diameter (cm)	E
1	10.0		26	12.1		51	9.0		76	9.0	
2	2.3		27	8.9		52	4.3		77	5.	
3	4.)		28	9.1		53	4.0		78	26.0	
4	6.8		29	111.4		54	3.3		79	8.0	
5	11.0		30"	5.6	3/4	55	7.7	C. F.	80	6.0	1/2
6	5.4		31	5.0		56	7.0	1	81	4.5	
7	1.5		32	5.0	TV/Is	57	6.0		82	0	
8	(0.0		33	4.9		58	2.0		83	10.5	
9	a.8		34	3.6		59	3.3		84	6.9	
10)	7.5	3/4	35	4.1	1	60	7.0	0	85	5.4	
11	4.0		36	4.0		61	9.8		86	5.8	
12	7.0		37	8.5		62	23		87	7.2	11/20/20
13	6.9		38	7.2		63	9.5		88	5.7	
14	4.5		39	3.2		64	44	111111	89	10.7	10 21 (28)
15	36		40	6.5	1/2	65	11.0	100	90	3.5	0
16	3:5		41	12.8	-	66	42		91	19.3	
17	7.1	la de	42	105	THE SE	67	18		92	116	
18	4.2		43	< 2		68	80	1	93	25	
19	<1		44	0.		69	6.4		94	9.5	
20	51	42	45	5.6		70	11 10	11		0.7	
7	50	12	46	8.0		71	7.0	1	50	0.	0
2	0.0			8.4			1.0		96	4.	1
	4.9		47	8.5		72	5.0		9	1 30)
3	4.1	1900	48	37		73	240	W.	9	8 11 1	1
	2.2		49	10	77/09	74	90		9	9 10	7
	1.5		50	510	0	75	41		1	100	0
	0.0	1		שיכ	U		7.0		(4,4	6

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

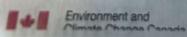
Page 5 of 6





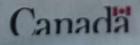
Field Crew: WM, CB, BB, AM, ZC, MC Site Code: Site Code: Sampling Date (DD/MM/YYYY): 04/10/2023
SITE INSPECTION
Site Inspected by:
Communication Information
Itinerary left with contact person (include contact numbers)
Contact Person: 6. Matulet Time checked-in: 17:00
Form of communication: a radio cell satellite hotel/pay phone SPOT
Phone number: (706) 763 - 9678
Vehicle Safety
Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)
Equipment and chemicals safely secured for transport
Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary
Notes:
Shore & Wading Safety
Wading Task Hazard Analysis read by all field staff
☑ Wading Safe Work Procedures read by all field staff
Instream hazards identified (i.e. log jams, deep pools, slippery rocks)
© PFD worn
□ Appropriate footwear, waders, wading belt

CABIN Field Sheet April 2023



☐ Belay used

Notes:



	Field Crev	v: K.M.CO.II	
5	Sampling	Date (DD/MM)	C. Bush, AM, Z.C. Site Code: MOROO!): 25/09/2023
D	Occup	ational Health & c	Cofety City Inc. 24
PR	MARY	SITE DATA	safety: Site Inspection Sheet completed (see page 6)
CA	BIN Study	Name: CBWM-	EIN Local Basin Name: EIN River
KIV	er/Stream	Name: Morris	Stream Order: (map scale 1:50,000)
Sele	ect one:	Pote Pote	ntial Reference Site
Ge	ographic	cal Description/No	otes:
A	orrissa	ey FSK to Lo	on left). Drive to railway, park + walk
-01	uma	15 to site	THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COL
Surre	ounding La	and Use: (check those	present) Information Source: Viaul, mask
	OLEST	☐ Field/Pasture	Agriculture D D : 1 11 11 11
EL	ogging	☐ Mining	Commercial/Industrial Other <u>Pipeline</u> hunting,
Domi	nant Surro	ounding Land Use: (ch	eck one) Information Source:
□ F	orest	☐ Field/Pasture	☐ Agriculture ☐ Residential/Urban
	ogging	☐ Mining	Commercial/Industrial Other
Loca	tion Dat	а	
			ide: - 113-00066W (DMS or QD)
Elevat	ion: 948	(fasl of masl)	GPS Datum: GRS80 (NAD83/WGS84) Other:
Site	ocation	Map Drawing	
			MORRISSA
			(E) B
		1 RAILWAY	BRIDGE \
-	- waste		((1))
			4 3
		WQ	- kidnet
		10.444	
		ISLAND	G-d-DISCHARGT
Note: Indic	ate north		

Page 1 of 6

Field Crew: CM	BZC, AM	160	de: MOROO!
Sampling Date (DD/MN	17444): <u>25/09/</u>	2025	A CONTRACTOR OF THE PARTY OF TH
Photos Dield Sheet Up Substrate (exposed)	ostream Downstre		☐ Aerial View
REACH DATA (represe	nts 6 times bankfull width)		
Habitat Types: (check the Riffle □ R		Pool/Back Eddy	
2. Canopy Coverage: (stand	in middle of stream and lo		76-100 %
3. Macrophyte Coverage: (ne 0 %	ot algae or moss, check on 25 % 26-50 %		76-100 %
4. Streamside Vegetation: (c		ciduous trees	ous trees
5. Dominant Streamside Veg		ciduous trees conifer	rous trees
6. Periphyton Coverage on S	ubstrate: (benthic algae, no obvious colour (< 0.5 mm		
	to light green colour (0.5-		
	cker green to brown algae		
		k brown algae (5-20 mm thic	ASSESSED BY
	stly obscured by algal mat	t, extensive green, brown to	
Note: 1 through 5 represent ca		BIN database.	
NTUIC MACROINVER	TERRATE DATA		10 B
INTHIC MACROINVER Ditat sampled (check one):		straight run	
μm mesh Kick Net *		Preservative used: 100	(Lucion)
son sampling	00.00		
opling time (i.e. 3 min.)	C.Bush	Sampled sieved on site u "Bucket Swirling Method"	sing the
of sample jars	Smins	☐ YES ☑ NO	
ical depth in kick area (cm)	10	If YES, debris collected f	or QA/QC
te: Indicate if a sampling metho	10cm	ALL AND IN PROPERTY.	

Page 2 of 6

Funder/grai

Vanc.

	141
Field Crew: KM, CB, AM, ZC Sampling Date (DD/MM/YYYY): 25/09/7073 Site Code: MOROO/	DHG
WATER CHEMISTRY DATA Time: 12:30 PM (24 hr clock) Time zone: MDT Air Temp: 15 0 °C (°C) Water Temp: 17.3 (°C) pH: 8.28 PH Specific Conductance: 905.3 (µs/cm) DO: 94.4 (mg/L) Turbidity: 94.5 Check if water samples were collected for the following analyses: Nitrogen (i.e. Total, Nitrate, Nitrite, Dissolved, and/or Ammonia) Phosphorus (Total, Ortho, and/or Dissolved) Major Ions (i.e. Alkalinity, Hardness, Chloride, and/or Sulphate) Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.	ORP: 165.2
HANNEL DATA ope - Indicate how slope was measured: (check one)	
Calculated from map Scale:(Note; small scale map recommended if field measurement is not possible - i.e. 1:20,000). contour interval (vertical distance)(m), distance between contour intervals (horizontal distance)(m) slope = vertical distance/horizontal distance =	ExcleV ExcleV ExcleV ExcleV

Measured in field

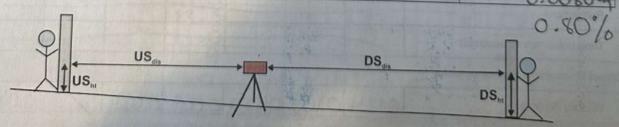
OR

Funde

Circle device used and fill out table according to device:

a. Survey Equipment b. Hand Level & Measuring Tap

Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
^a Top Hairline (T)		To the second	
^a Mid Hairline (ht) OR			The state of the s
^b Height of rod	1.340m	1.541 m	
^a Bottom Hairline (B)		76.	
^b Distance (dis) OR	12.5 m	12.5m	USdis+DSdis=
^a T-B x 100	aUSdis=T-B	aDSdis=T-B	25.0m
Change in height (∆ht)			DSht-USht=
Slope (Δht/total dis)			0.201 m



Page 3 of 6



Site Code: MOROCI Field Crew: KM, CB, AM, ZC. Sampling Date (DD/MM/YYYY): 25/09/2023 Widths and Depth (Indicate where in sample reach, ex. d/s of kick area) Location at site: DIS of kicknet 0.65 A - Bankfull Width: 19 9 B - Wetted Stream Width: C - Bankfull-Wetted Depth (height from water surface to Bankfull): V5 D5 Note: Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations. Wetted widths < 5 m, measure 3-4 equidistant locations. Velocity and Depth Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method: □ Velocity Head Rod (or ruler): Velocity Equation (m/s) = $\sqrt{[2(\Delta D/100) * 9.81]}$ Rotary meters: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation) Direct velocity measurements: ☐ Marsh-McBirney ☐ Sontek or ☐ Other Flowtyceher 2 AVG Distance from Shore (m) Depth (D) (cm) Velocity Head Rod (ruler) Flowing water Depth (D1) (cm) Depth of Stagnation (D2) (cm) Change in depth ($\Delta D=D_2-D_1$) (cm) Rotary meter Revolutions Time (minimum 40 seconds) **Direct Measurement or calculation** 0.124 0.105 0.105 0.063 0.024 Velocity (V) (m/s)

ield Crew: Van OR 30 ALA	
empling Date (Dr. CB, ZC, AM	_ Site Code: MOROOI
ampling Date (DD/MM/YYYY): 25/09/2023	The management of the property of the party

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm) and O for organic material.
- Embededness categories (E):
 Completely embedded = 1
 75% embedded = 34
 50% embedded = 1/2
 25% embedded = 1/4
 Unembedded = 0

2. Surrounding/Interstitial Material Circle the substrate size category for the

Circle the substrate size category for the surrounding material.

Substrate Size Class	Category
Organic Cover	0
< 0.1 cm (fine sand, silt or clay)	11
0.1-0.2 cm (coarse sand)	(2)
0.2-1.6 cm (gravel)	3
1.6-3.2 cm (small pebble)	4
3.2-6.4 cm (large pebble)	5
6.4-12.8 cm (small cobble)	6
12.8-25.6 cm (cobble)	7
> 25.6 cm (boulder)	8
Bedrock	9

*fine sediment rocket rocket (settled trem, u.15)

	Diameter (cm)	E	Wiles	Diameter (cm)	E		Diameter (cm)	E		Diameter (cm)	E
1	3.4		26	1.0		51	Diameter (CIII)		76	0 2	
2	100		27	0.0		52	0.0		77	,00	
3	4.0		28	11.5		53	8.3		78	9.0	Maio I
4	8.0		29	85		54	0.5	W. 1970	79	90	
5	12.0		30	150 0	(7)	55	15 0	3975	80	Ø 12 0	(1)
6	14.6		31	103	Ling	56	75	1000	81	23.1	() L
7	5.0		32	90	1	57	3.5		82	120	
8	8.5		33	15 0		58	7.0		83	11.0	
9	8.5		34	7.0		59	0.6	1000	84	91	5
10	0.3	0	35	10.0	AN SEC	60	13.6	(7)	85	1.3	
11	8.0		36	55		61	11.0	-	86	8.0	
12	5.5	1 1111	37	< <		62	4.9	1000	87	< 0	- Della
13	10.5	N SEW	38	15.7		63	11.0	120	88	70	
14	8.0	1950	39	11.2		64	0	(46) FE	89	03	
15	4.5		40	8.3	(3/4)	65	9.3		90	7.0	(1)
16	9.3		41	62	1	66	7.4	000	91	7.3	79
17	9.6		42	82	10	67	150	100 T	92	5 4	
18	4.0	1.0	43	18 0		68	90		93	3.6	2000
19	70		44	7.0		69	70		94	9.0	
20	17.6	(7)	45	72	7-0/60	70	6.8	100	95	1.1	
21	70	14	46	1.6		71	0.8	(24)		0	10
22	220		47	7.5			9.9	1	96	3.8	September 1
23	15.0			13.5		72	8.0	120	97	1.8	3000
24	0.4		48	13.0	1000 300	73	5.9	1937	98	5.2	151 515
	4.0		49	17.9		74	9.0	17	99	0.5	1
25	3.8		50	90	011	75	HIA	1000	100	1.8	17/2

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Site Code: MOROO Field Crew: <u>LCM</u>, <u>CB</u>, <u>AM</u>, <u>ZC</u>.

Sampling Date (DD/MM/YYYY): <u>25/09/2623</u> SITE INSPECTION Site Inspected by: K. McCallum Communication Information Itinerary left with contact person (include contact numbers) Contact Person: A.C. Kvoeger Time checked-in: 9:00 Form of communication:

radio

satellite

hotel/pay phone

SPOT Phone number: 6/4) 6604-6815 Vehicle Safety Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle) Equipment and chemicals safely secured for transport Dehicle parked in safe location; pylons, hazard light, reflective vests if necessary Notes: Shore & Wading Safety Wading Task Hazard Analysis read by all field staff Wading Safe Work Procedures read by all field staff Instream hazards identified (i.e. log jams, deep pools, slippery rocks) DIPFD worn Appropriate footwear, waders, wading belt Belay used

CABIN Field Sheet April 2023

Page 6 of 6

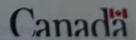


Notes:

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Field Crew: K.M.C.Collum, C.Bush, A.M. Z.C. Site Code: MOROO2. Sampling Date (DD/MM/YYYY): 25/09/2023
Occupational Health & Safety: Site Inspection Sheet completed (see page 6)
PRIMARY SITE DATA
CABIN Study Name: CBWM-Elk Local Basin Name: Elk River
River/Stream Name: Movicissey Stream Order: (map scale 1:50,000)
Select one: Test Site Potential Reference Site
Geographical Description/Notes: Drive Morvissey FSR until 3rd bridge, Walk 250m d/s to with
Surrounding Land Use: (check those present) Information Source: VISUAL, MAPS Forest Field/Pasture
□ Logging □ Mining □ Commercial/Industrial □ Other pipelin
Location Data Latitude: 49.42055 N Longitude: - 114.910/087W (DMS or DD) Elevation: 1544 0 (fasl or masl) GPS Datum: GRS80 (NAD83/WGS84) Other:
Site Location Map Drawing
BRIDGE , MING MAN
HORRISSEY FERNIES ADVENTUR
* WQ ricknet
giantical, DiscHARGE
Note: Indicate north

Page 1 of 6

3884

Field Crew: K. MCCallu	10 25/09/2023 Site Code: MOROOZ
Sampling Date (DD/MM/YYYY): <u>1870 1</u>
Photos	
Field Sheet Upstream	Downstream Across Site Aerial View Substrate (aquatic) Other ears
REACH DATA (represents 6 tir	nes bankfull width)
Habitat Types: (check those pres Riffle ☐ Rapids	ent) Straight run Pool/Back Eddy
2. Canopy Coverage: (stand in mide	tlle of stream and look up, check one) 26-50 %
3. Macrophyte Coverage: (not algae 0 % 1-25 %	or moss, check one) 26-50 %
4. Streamside Vegetation: (check the ferns/grasses	ose present) shrubs
5. Dominant Streamside Vegetation Grans/grasses	check one) shrubs
	e: (benthic algae, not moss, check one) us colour (< 0.5 mm thick)
	t green colour (0.5-1 mm thick)
	een to brown algae (1-5 mm thick)
	nps of green to dark brown algae (5-20 mm thick)
	scured by algal mat, extensive green, brown to black algal mass may have
Note: 1 through 5 represent categorie	s entered into the CABIN database.
BENTHIC MACROINVERTEB	RATE DATA
Habitat sampled (check one): I rif	
400 μm mesh Kick Net *	Preservative used: 99% (SO
Person sampling	P. al
Sampling time (i.e. 3 min.)	Sampled sieved on site using the "Bucket Swirling Method":
No. of sample jars	☐ YES ☑ NO
ypical depth in kick area (cm)	If YES, debris collected for QA/QC □
Note: Indicate if a sampling method other	than the recommended 400 um mash kick net is used

* No

Air Temp:	(°C) Water Temp:	(24 hr clock) Time zo	35 020 1425
Specific Conductance: Check if water samples we TSS (Total Suspended Nitrogen (i.e. Total, Nitr Phosphorus (Total, Ort Major Ions (i.e. Alkalinit	ere collected for the following Solids) rate, Nitrite, Dissolved, and tho, and/or Dissolved) ty, Hardness, Chloride, and	ig analyses: DO% 86.9	H-85 Anions
CHANNEL DATA		analyses, but not required for G	ADIN assessments.
Slope - Indicate how slop	pe was measured: (check o	one)	
☐ Calculated from map			diagra to a Criscola
Scale:	(Note: small scale map re	commended if field measurement i	is not possible - i.e. 1:20,000).
	al distance)		
contour interval (vertical distance between contour interval)	al distance) our intervals (horizontal dis	(m), tance) (m)	
contour interval (vertical distance between contour interval)	al distance)	(m), tance) (m)	our set bad bridge streets
contour interval (vertical distance between contour slope = vertical distance OR Measured in field	al distance) our intervals (horizontal dis e/horizontal distance =	(m), tance) (m)	
contour interval (vertical distance between contour slope = vertical distance OR Measured in field Circle device used and in	al distance) our intervals (horizontal dis e/horizontal distance = fill out table according to d	(m), tance) (m)	
contour interval (vertical distance between contour slope = vertical distance OR Measured in field Circle device used and in	al distance) our intervals (horizontal dis e/horizontal distance =	(m), tance) (m)	Calculation
contour interval (vertical distance between contour slope = vertical distance or cont	al distance) our intervals (horizontal dis e/horizontal distance = fill out table according to d b. Hand Level & Measurin	evice:	Calculation
contour interval (vertical distance between contour slope = vertical distance OR Measured in field Circle device used and to a. Survey Equipment	al distance) our intervals (horizontal disterior intervals (horizontal distance = fill out table according to d. b. Hand Level & Measurin Upstream (U/S)	evice: Downstream(D/S)	Calculation
contour interval (vertical distance between contour slope = vertical distance of the contour slope = vertical distance	al distance) our intervals (horizontal dis e/horizontal distance = fill out table according to d b. Hand Level & Measurin	evice:	Calculation
contour interval (vertical distance between contour slope = vertical distance of the contour slope = vertical distance	al distance) our intervals (horizontal disterior intervals (horizontal distance = fill out table according to d. b. Hand Level & Measurin Upstream (U/S)	evice: Downstream(D/S)	Calculation
contour interval (vertical distance between contour slope = vertical distance of the contour slope = vertical distance	al distance) our intervals (horizontal distance = fill out table according to d.b. Hand Level & Measurin Upstream (U/S)	evice: Downstream(D/S)	
contour interval (vertical distance between contour slope = vertical distance of the slope = vertic	al distance) our intervals (horizontal disterior intervals (horizontal distance = fill out table according to d. b. Hand Level & Measurin Upstream (U/S)	evice: Downstream(D/S)	Calculation USdis+DSdis=
contour interval (vertical distance between contour slope = vertical distance of the slope = vertic	al distance) our intervals (horizontal distance = fill out table according to d.b. Hand Level & Measurin Upstream (U/S)	evice: ng Tape Downstream(D/S)	USdis+DSdis=
contour interval (vertical distance between contour slope = vertical distance of the contour slope = vertical distance	al distance)	evice: ng Tape Downstream(D/S)	
contour interval (vertical distance between contour slope = vertical distance of the slope = verti	al distance)	evice: ng Tape Downstream(D/S)	USdis+DSdis=
contour interval (vertical distance between contour slope = vertical distance of the slope = verti	al distance)	evice: ng Tape Downstream(D/S)	USdis+DSdis=
contour interval (vertical distance between contour slope = vertical distance of the slope = verti	al distance)	evice: ng Tape Downstream(D/S)	USdis+DSdis=
contour interval (vertical distance between contour slope = vertical distance of the slope	al distance)	evice: ng Tape Downstream(D/S)	USdis+DSdis=

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Environment and Change Canada Changement all Changement all materials and Changement all materials and

Field Crew: KMCBAM	2C	Site Code: MORCOZ
Sampling Date (DD/MM/YYYY):		

Widths and Depth	
Location at site: near top of vicknet (Indicate where in sample reach, ex. of	d/s of kick area)
A - Bankfull Width: 8.6 (m) B - Wetted Stream Width: 2.4	(m)
C - Bankfull–Wetted Depth (height from water surface to Bankfull):	(cm)
Α	
IC B	
V1 V2 V3 V4 V5 D1 D2 D3 D4 D5	
ote: /etted widths > 5 m, measure a minimum of 5-6 equidistant locations. /etted widths < 5 m, measure 3-4 equidistant locations.	

Velocity and Depth

Check appropriate velocity measuring device and fill out the appropriate section in chart below. Distance from shore and depth are required regardless of method:

☐ Velocity Head Ro	d (or ruler):	Velocity	Equation	(m/s) =	[2(\D/100)	* 9.811
--------------------	---------------	----------	----------	---------	------------	---------

Rotary meters: Gurley/Price/Mini-Price/Propeller (Refer to specific meter conversion chart for calculation)

Direct velocity measurements: ☐ Marsh-McBirney ☐ Sontek or ☐ Other Flowtracture

	1	2	3	4	5	6	AVG
Distance from Shore (m)	0.5	1.0	1,5	2.0			
Depth (D) (cm)	20	26	14	15			12.5
Velocity Head Rod (ruler)						A SECTION AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON ADDRES	
Flowing water Depth (D ₁) (cm)						-	
Depth of Stagnation (D2) (cm)							
Change in depth (△D=D₂-D₁) (cm)						193	
Rotary meter	70						A STATE OF THE PARTY OF THE PAR
Revolutions					all to		
Time (minimum 40 seconds)		-		The same			
Direct Measurement or calculation	100	100	No. of Contract of			-	
Velocity (V) (m/s)	0.105	0.017	6.230	0.009			0.090



6 ATTO TOO SEE SUIT TO

Sampling Date (DD/MM/YYYY): 25 | 09 | 2023

Site Code: MOROOZ

nd.

SUBSTRATE DATA

1. 100 Pebble Count & Substrate Embeddedness

- Measure the intermediate axis (100 rocks) and embeddedness (10 rocks) of substrate in the stream bed.
- Indicate B for bedrock, S for sand/silt/clay (particles < 0.2 cm)
 and O for organic material.
- Embededness categories (E):
 Completely embedded = 1
 75% embedded = 3/4
 50% embedded= 1/2
 25% embedded = 1/4

Unembedded = 0

2. Surrounding/Interstitial Material Circle the substrate size category for the

surrounding material Substrate Size Class Category Organic Cover 0 < 0.1 cm (fine sand, silt or clay) 0.1-0.2 cm (coarse sand) (2) 0.2-1.6 cm (gravel) 3 1.6-3.2 cm (small pebble) 4 3.2-6.4 cm (large pebble) 5 6.4-12.8 cm (small cobble) 6 12.8-25.6 cm (cobble) 7 > 25.6 cm (boulder) 8 Bedrock

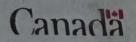
			1154				Bedrock	1 1		9	
1	Diameter (cm)	E	Ē	Diameter (cm)	E	1201	Diameter (cm)	E	-	Diameter (cm)	E
2	1,2	-	26	15.8		51	7.2		76	Diameter (CIII)	
3	60)		27	7.1		52	6.3		7.7	27	
4	17 -		28	4.5		53	5.4		78	6.4	
5	13.2		29	3.6		54	6.4		79	2 4	
6	1,4	-	30	5.6	3/4	55	11.2	100	(80)	3.5	0
7	501		31	3.2		56	70.9		81	11	
8	600		32	37		57	10		82	1.2	
9	6.8		33	5.2		58	3.4	MAL	83	7.9	
10	10	1	34	2		59	10.8		84	9	
11	10.5	0	35	8.4		60	3.4	0	85	6	TO STATE OF THE PARTY OF THE PA
12	2.3		36	300		61	18	N. W.	86	8	
13	2.9		37	S		62	2		87	7.7	
- 37	31.5		38	7.5		63	2.4		88	Li +	
14	8.4		39	1.7		64	7	1000	89	7.3	
15	2.4		40	2.9	42	65	7.4		90	21	0
16	6.2		41	4.7	3	66	49		91	11 +	0
17	8		42	7.1		67	4		92	1100	
18			43	7.5		68	(93	7.4	1
19	3.7		44	7.8		69	2.3		94	5.8	
(20)	1.7	九	45	0	12019	70	200	71.	95	79	
21	17	1	46	158		71	6	3/4		8	100
22	9x: 5		47	13.0	-	72	0.4		96	22	42
23	7.9		48	1.6		73	8,3		97	7.4	
24	07	- 5	49	4.9	-		5.2		98	6	
25	2.5		50	0.1	1	74	8	200	99	2.9	
	613		8	1.4	14	75	23.5		100	3.3	0

Note: The Wolman D50 (i.e. median diameter), Wolman Dg (i.e. geometric mean diameter) and the % composition of the substrate classes will be calculated automatically in the CABIN database using the 100 pebble data. All 100 pebbles must be measured in order for the CABIN database tool to perform substrate calculations.

Field Crew: VM CB AM ZC Site Code: MOROG Z Sampling Date (DD/MM/YYYY): Z5/09/2023
SITE INSPECTION
Site Inspected by: K.M.C.Callum
Communication Information
☐ Itinerary left with contact person (include contact numbers)
Contact Person: A.C. Kvolger Time checked-in: 9:00
Form of communication: Fradio Fell Fatellite hotel/pay phone SPOT Phone number: (514) 49 48 15
Vehicle Safety
Safety equipment (first aid, fire extinguisher, blanket, emergency kit in vehicle)
Equipment and chemicals safely secured for transport
☐ Vehicle parked in safe location; pylons, hazard light, reflective vests if necessary
Notes:
Shore & Wading Safety
Wading Task Hazard Analysis read by all field staff
Wading Safe Work Procedures read by all field staff
Instream hazards identified (i.e. log jams, deep pools, slippery rocks)
PFD worn
Appropriate footwear, waders, wading belt
□ Belay used
Notes:

CABIN Field Sheet April 2023

Page 6 of 6





Appendix C: CARO Reports

Elk River Alliance 63





REPORTED TO Elk River Alliance

PO Box 2095, 1111 2nd Ave

Fernie, BC V0B1M0

ATTENTION Kaileigh McCallum

PO NUMBER

PROJECT CBWM-2023

PROJECT INFO [info]

WORK ORDER 2313752

RECEIVED / TEMP 2023-09-29 14:09 / 7.3°C

REPORTED 2023-10-17 14:07

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



We've Got Chemistry



Ahead of the Curve



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO

Client Service Representative

1-888-311-8846 | www.caro.ca



REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23l3752 2023-10-1	7 14:07
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
ALX001_2023092	7_0945 (23l3752-01) M	atrix: Water Sam _l	pled: 2023-09-27	09:45			
Anions							
Bromide		< 0.10	N/A	0.10	mg/L	2023-10-01	
Chloride		1.02	AO ≤ 250		mg/L	2023-10-01	
Fluoride		0.16	MAC = 1.5		mg/L	2023-10-01	
Nitrate (as N)		< 0.010	MAC = 10	0.010		2023-10-01	HT1
Nitrite (as N)		< 0.010	MAC = 1	0.010		2023-10-01	HT1
Phosphate (as P)		< 0.0050	N/A	0.0050		2023-10-01	HT1
Sulfate		20.6	AO ≤ 500		mg/L	2023-10-01	
BCMOE Aggregate	Hydrocarbons						
EPHw10-19	-	< 250	N/A	250	μg/L	2023-10-06	
EPHw19-32		< 250	N/A	250		2023-10-06	
Surrogate: 2-Meth	ylnonane (EPH/F2-4)	91		60-140		2023-10-06	
Calculated Parame	ters						
Hardness, Dissolv		187	N/A	0.500	ma/l	N/A	
Nitrate+Nitrite (as		< 0.0100	N/A	0.0100		N/A	
Nitrogen, Total	111)	0.0770	N/A	0.0500		N/A	
Dissolved Metals Aluminum, dissolv	od	< 0.0050	N/A	0.0050	ma/l	2023-10-07	
Antimony, dissolve		< 0.0050	N/A N/A	0.0030		2023-10-07	
Arsenic, dissolved		< 0.00020	N/A	0.00020		2023-10-07	
Barium, dissolved		0.00050	N/A	0.0050		2023-10-07	
Beryllium, dissolved		< 0.0010	N/A	0.00010			
Bismuth, dissolved		< 0.00010	N/A	0.00010		2023-10-07	
Boron, dissolved	1	< 0.0500	N/A	0.0500		2023-10-07	
Cadmium, dissolved		< 0.000010	N/A	0.000010		2023-10-07	
Calcium, dissolved		50.8	N/A		mg/L	2023-10-07	
Chromium, dissolved		< 0.00050	N/A	0.00050		2023-10-07	
Cobalt, dissolved	- Cu	< 0.00010	N/A	0.00010		2023-10-07	
Copper, dissolved		< 0.00040	N/A	0.00040		2023-10-07	
Iron, dissolved		< 0.010	N/A	0.010		2023-10-07	
Lead, dissolved		< 0.00020	N/A	0.00020		2023-10-07	
Lithium, dissolved		0.00438	N/A	0.00010		2023-10-07	
Magnesium, disso		14.6	N/A	0.010		2023-10-07	
Manganese, disso		0.00052	N/A	0.00020		2023-10-07	
Mercury, dissolved		< 0.000010	N/A	0.000010		2023-10-06	
Molybdenum, diss		0.00074	N/A	0.00010		2023-10-07	
Nickel, dissolved		< 0.00040	N/A	0.00040		2023-10-07	
Phosphorus, disso	olved	< 0.050	N/A	0.050		2023-10-07	
Potassium, dissolv		0.44	N/A		mg/L	2023-10-07	
Selenium, dissolve		0.00071	N/A	0.00050		2023-10-07	
Silicon, dissolved		2.3	N/A		mg/L	2023-10-07	
Silver, dissolved		< 0.000050	N/A	0.000050		2023-10-07	



Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
ALX001_20230927_0945 (23l3752-01) N	latrix: Water Sam	pled: 2023-09-27 0	9:45, Contin	neq		
Dissolved Metals, Continued						
Sodium, dissolved	1.87	N/A	0.10	mg/L	2023-10-07	
Strontium, dissolved	0.130	N/A	0.0010		2023-10-07	
Sulfur, dissolved	6.6	N/A	3.0	mg/L	2023-10-07	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-07	
Thallium, dissolved	< 0.000020	N/A	0.000020		2023-10-07	
Thorium, dissolved	< 0.00010	N/A	0.00010		2023-10-07	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-07	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-07	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2023-10-07	
Uranium, dissolved	0.000631	N/A	0.000020	mg/L	2023-10-07	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-07	
Zinc, dissolved	< 0.0040	N/A	0.0040		2023-10-07	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-07	
General Parameters						
Alkalinity, Total (as CaCO3)	187	N/A	1.0	mg/L	2023-10-05	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-05	
Alkalinity, Bicarbonate (as CaCO3)	187	N/A	1.0		2023-10-05	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0		2023-10-05	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0		2023-10-05	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-10-03	
BOD, 5-day	< 4.6	N/A	2.0	mg/L	2023-10-05	
Carbon, Total Organic	1.53	N/A	0.50	mg/L	2023-10-09	
Carbon, Dissolved Organic	1.16	N/A	0.50	mg/L	2023-10-09	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2023-10-04	
Nitrogen, Total Kjeldahl	0.077	N/A	0.050	mg/L	2023-10-06	
Phosphorus, Total (as P)	0.0068	N/A	0.0050	mg/L	2023-10-05	
Solids, Total Suspended	< 2.3	N/A	2.0	mg/L	2023-10-06	HT1
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-10-07	
Antimony, total	< 0.00020	MAC = 0.006	0.00020		2023-10-07	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050		2023-10-07	
Barium, total	0.0721	MAC = 2	0.0050		2023-10-07	
Beryllium, total	< 0.00010	N/A	0.00010		2023-10-07	
Bismuth, total	< 0.00010	N/A	0.00010		2023-10-07	
Boron, total	< 0.0500	MAC = 5	0.0500		2023-10-07	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010		2023-10-07	
Calcium, total	52.4	None Required	0.20	mg/L	2023-10-07	
Chromium, total	< 0.00050	MAC = 0.05	0.00050		2023-10-07	
Cobalt, total	< 0.00010	N/A	0.00010		2023-10-07	
Copper, total	< 0.00040	MAC = 2	0.00040		2023-10-07	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2023-10-07	
Lead, total	< 0.00020	MAC = 0.005	0.00020		2023-10- <u>07</u>	



REPORTED TO	Elk River Alliance	WORK ORDER	2313752
PROJECT	CBWM-2023	REPORTED	2023-10-17 14:07

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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
ALX001_20230927_0945 (23l3752-01) N	Matrix: Water San	npled: 2023-09-27 0	9:45, Continu	ued		
otal Metals, Continued						
Lithium, total	0.00431	N/A	0.00010	mg/L	2023-10-07	
Magnesium, total	13.3	None Required	0.010	mg/L	2023-10-07	
Manganese, total	0.00085	MAC = 0.12	0.00020	mg/L	2023-10-07	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-06	
Molybdenum, total	0.00078	N/A	0.00010	mg/L	2023-10-07	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-07	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-07	
Potassium, total	0.41	N/A	0.10	mg/L	2023-10-07	
Selenium, total	0.00065	MAC = 0.05	0.00050	mg/L	2023-10-07	
Silicon, total	2.4	N/A	1.0	mg/L	2023-10-07	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-07	
Sodium, total	1.81	AO ≤ 200	0.10	mg/L	2023-10-07	
Strontium, total	0.121	MAC = 7	0.0010	mg/L	2023-10-07	
Sulfur, total	7.1	N/A	3.0	mg/L	2023-10-07	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-07	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-10-07	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-07	
Tin, total	< 0.00020	N/A	0.00020		2023-10-07	
Titanium, total	< 0.0050	N/A	0.0050		2023-10-07	
Tungsten, total	< 0.0010	N/A	0.0010		2023-10-07	
Uranium, total	0.000628	MAC = 0.02	0.000020		2023-10-07	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-07	
Zinc, total	< 0.0040	AO ≤ 5	0.0040		2023-10-07	
Zirconium, total	< 0.00010	N/A	0.00010		2023-10-07	
LX003_20230927_1230 (23l3752-02) N	-				0000 40 04	
Bromide	< 0.10	N/A		mg/L	2023-10-01	
Chloride	0.77	AO ≤ 250		mg/L	2023-10-01	
Fluoride	0.14	MAC = 1.5		mg/L	2023-10-01	LIT4
Nitrate (as N)	< 0.010	MAC = 10	0.010		2023-10-01	HT1
Nitrite (as N)	< 0.010 < 0.0050	MAC = 1	0.010		2023-10-01	HT1
Phosphate (as P)	< 0.0050	N/A	0.0050		2023-10-01	HT1
015-4-	40.0	A A Z E A A		mg/L	2023-10-01	
Sulfate	18.2	AO ≤ 500	1.0			
	18.2	AO ≤ 500	1.0			
	18.2 < 250	AO ≤ 500 N/A	250	μg/L	2023-10-06	
SCMOE Aggregate Hydrocarbons			250		2023-10-06 2023-10-06	
BCMOE Aggregate Hydrocarbons EPHw10-19	< 250	N/A	250	μg/L μg/L		
BCMOE Aggregate Hydrocarbons EPHw10-19 EPHw19-32	< 250 < 250	N/A	250 250	μg/L μg/L	2023-10-06	



REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER

2313752

REPORTED 2023-10-17 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
ALX003_20230927_1230 (23l3752-02)	Matrix: Water Sam	pled: 2023-09-27	12:30, Continu	ued		
Calculated Parameters, Continued						
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	< 0.0500	N/A	0.0500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-07	
Antimony, dissolved	< 0.00020	N/A	0.00020		2023-10-07	
Arsenic, dissolved	< 0.00050	N/A	0.00050		2023-10-07	
Barium, dissolved	0.0784	N/A	0.0050		2023-10-07	
Beryllium, dissolved	< 0.00010	N/A	0.00010		2023-10-07	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-07	
Boron, dissolved	< 0.0500	N/A	0.0500		2023-10-07	
Cadmium, dissolved	< 0.000010	N/A	0.000010	mg/L	2023-10-07	
Calcium, dissolved	49.6	N/A		mg/L	2023-10-07	
Chromium, dissolved	< 0.00050	N/A	0.00050		2023-10-07	
Cobalt, dissolved	< 0.00010	N/A	0.00010		2023-10-07	
Copper, dissolved	< 0.00040	N/A	0.00040		2023-10-07	
Iron, dissolved	< 0.010	N/A	0.010		2023-10-07	
Lead, dissolved	< 0.00020	N/A	0.00020		2023-10-07	
Lithium, dissolved	0.00417	N/A	0.00010		2023-10-07	
Magnesium, dissolved	14.3	N/A	0.010		2023-10-07	
Manganese, dissolved	0.00094	N/A	0.00020		2023-10-07	
Mercury, dissolved	< 0.000010	N/A	0.000010		2023-10-06	
Molybdenum, dissolved	0.00062	N/A	0.00010		2023-10-07	
Nickel, dissolved	< 0.00040	N/A	0.00040		2023-10-07	
Phosphorus, dissolved	< 0.050	N/A	0.050		2023-10-07	
Potassium, dissolved	0.43	N/A		mg/L	2023-10-07	
Selenium, dissolved	0.00058	N/A	0.00050		2023-10-07	
Silicon, dissolved	2.2	N/A		mg/L	2023-10-07	
Silver, dissolved	< 0.000050	N/A	0.000050		2023-10-07	
Sodium, dissolved	1.65	N/A		mg/L	2023-10-07	
Strontium, dissolved	0.124	N/A	0.0010		2023-10-07	
Sulfur, dissolved	5.9	N/A		mg/L	2023-10-07	
Tellurium, dissolved	< 0.00050	N/A	0.00050		2023-10-07	
Thallium, dissolved	< 0.000020	N/A	0.000020		2023-10-07	
Thorium, dissolved	< 0.00010	N/A	0.00010		2023-10-07	
Tin, dissolved	< 0.00010	N/A	0.00010		2023-10-07	
Titanium, dissolved	< 0.0050	N/A	0.0050		2023-10-07	
Tungsten, dissolved	< 0.0030	N/A	0.0030		2023-10-07	
Uranium, dissolved		N/A	0.000020		2023-10-07	
Vanadium, dissolved	0.000572 < 0.0050	N/A N/A				
·			0.0050		2023-10-07	
Zinc, dissolved	< 0.0040	N/A	0.0040		2023-10-07	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-07	



REPORTED TO	Elk River Alliance	WORK ORDER	2313752
PROJECT	CBWM-2023	REPORTED	2023-10-17 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
ALX003_20230927_1230 (23I3752-02) M	atrix: Water San	npled: 2023-09-27 1	2:30, Continu	ued		
General Parameters, Continued						
Alkalinity, Total (as CaCO3)	185	N/A	1.0	mg/L	2023-10-05	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-05	
Alkalinity, Bicarbonate (as CaCO3)	185	N/A	1.0	mg/L	2023-10-05	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-05	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-05	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-10-03	
BOD, 5-day	< 4.6	N/A	2.0	mg/L	2023-10-05	
Carbon, Total Organic	1.79	N/A	0.50	mg/L	2023-10-11	
Carbon, Dissolved Organic	1.68	N/A	0.50	mg/L	2023-10-09	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2023-10-04	
Nitrogen, Total Kjeldahl	< 0.050	N/A	0.050	mg/L	2023-10-06	
Phosphorus, Total (as P)	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Solids, Total Suspended	< 2.2	N/A	2.0	mg/L	2023-10-06	HT1
otal Metals						
Aluminum, total	0.0070	OG < 0.1	0.0050	mg/L	2023-10-07	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-10-07	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050		2023-10-07	
Barium, total	0.0709	MAC = 2	0.0050		2023-10-07	
Beryllium, total	< 0.00010	N/A	0.00010		2023-10-07	
Bismuth, total	< 0.00010	N/A	0.00010		2023-10-07	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-10-07	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2023-10-07	
Calcium, total	51.1	None Required		mg/L	2023-10-07	
Chromium, total	< 0.00050	MAC = 0.05	0.00050		2023-10-07	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-10-07	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2023-10-07	
Iron, total	0.015	AO ≤ 0.3	0.010	mg/L	2023-10-07	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-10-07	
Lithium, total	0.00394	N/A	0.00010	mg/L	2023-10-07	
Magnesium, total	13.2	None Required	0.010	mg/L	2023-10-07	
Manganese, total	0.00137	MAC = 0.12	0.00020		2023-10-07	
Mercury, total	< 0.000010	MAC = 0.001	0.000010		2023-10-06	
Molybdenum, total	0.00066	N/A	0.00010		2023-10-07	
Nickel, total	< 0.00040	N/A	0.00040		2023-10-07	
Phosphorus, total	< 0.050	N/A	0.050		2023-10-07	
Potassium, total	0.40	N/A		mg/L	2023-10-07	
Selenium, total	0.00057	MAC = 0.05	0.00050		2023-10-07	
Silicon, total	2.2	N/A		mg/L	2023-10-07	
Silver, total	< 0.000050	None Required	0.000050		2023-10-07	
Sodium, total	1.60	AO ≤ 200		mg/L	2023-10-07	
Strontium, total	0.117	MAC = 7	0.0010		2023-10-07	
Sulfur, total	6.2	N/A		mg/L	2023-10-07	



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23l3752

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-17 14:07

Analyte	Result	Guideline	RL Units	Analyzed Qualifie
ALX003_20230927_1230 (23l375	i2-02) Matrix: Water San	npled: 2023-09-27	12:30, Continued	
Total Metals, Continued				
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2023-10-07
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2023-10-07
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2023-10-07
Tin, total	< 0.00020	N/A	0.00020 mg/L	2023-10-07
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2023-10-07
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2023-10-07
Uranium, total	0.000567	MAC = 0.02	0.000020 mg/L	2023-10-07
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2023-10-07
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2023-10-07
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2023-10-07

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance **PROJECT** CBWM-2023

WORK ORDER

2313752

REPORTED 2023-10-17 14:07

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2019)	Dissolved Oxygen Meter	✓	Kelowna
Carbon, Dissolved Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Carbon, Total Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2022)	Closed Reflux, Colorimetry	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2021)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL Reporting Limit (default)

Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors

AO Aesthetic Objective

MAC Maximum Acceptable Concentration (health based)

mg/L Milligrams per litre

OG Operational Guideline (treated water)

μg/L Micrograms per litre

EPA United States Environmental Protection Agency Test Methods

SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER

2313752

REPORTED 2023-10-17 14:07

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do <u>not</u> take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: TeamCaro@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.



REPORTED TOElk River AllianceWORK ORDER23l3752PROJECTCBWM-2023REPORTED2023-10-17 14:07

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
 Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Second S	Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier		
Bromide	Anions, Batch B3J0010											
Chloride	Blank (B3J0010-BLK1)			Prepared	d: 2023-10-0)1, Analyze	ed: 2023-	10-01				
Fluoride	Bromide	< 0.05	0.05 mg/L									
Nitrate (as N) < 0.010 0.010 mg/L Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L Blank (B3J0010-BLK2) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L 0.05 mg/L Chloride < 0.05 0.05 mg/L 0.010 mg/L Fluoride < 0.05 0.010 0.010 mg/L 0.010 mg/L Nitrate (as N) < 0.010 0.010 mg/L 0.010 mg/L Phosphate (as P) < 0.050 0.050 mg/L 0.050 mg/L Sulfate < 0.05 0.05 mg/L 0.050 mg/L Chloride < 0.05 0.05 mg/L 0.050 mg/L Promide < 0.05 0.05 mg/L 0.010 mg/L Shrinte (as N) < 0.010 0.010 mg/L 0.010 mg/L Phosphate (as P) < 0.05 0.05 mg/L 0.05 mg/L Shrinte (as N) < 0.010 0.010 mg/L 0.010 mg/L Phosphate (as P) < 0.05 0.05 mg/L 0.010 mg/L Nitrate (as N) < 0.010 0.010 mg/L 4.00 100 85-115 LCS (B3J0010-BS1) <th <="" colspan="2" td=""><td>Chloride</td><td>< 0.10</td><td>0.10 mg/L</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>Chloride</td> <td>< 0.10</td> <td>0.10 mg/L</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Chloride	< 0.10	0.10 mg/L							
Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0505 0.0505 mg/L Sulfate < 0.5 0.05 mg/L Blank (B3J0010-BLK2) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.10 0.010 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Nitrate (as N) < 0.010 0.010 mg/L Viloride < 0.05 0.05 mg/L Sulfate < 0.05 0.05 mg/L Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.10 0.010 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 mg/L Nitrate (as N) < 0.010 mg/L Nitrate (as N) < 0.010 mg/L LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 mg/L 4.00 mg/L 8-115	Fluoride											
Phosphate (as P)	Nitrate (as N)	< 0.010	0.010 mg/L									
Sulfate < 0.5 0.5 mg/L Blank (B3J0010-BLK2) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.10 0.10 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Nitrite (as N) < 0.010 0.0050 mg/L Sulfate < 0.05 0.05 mg/L Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.010 0.010 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Viliate (as N) < 0.010 0.010 mg/L Sulfate < 0.05 0.05 mg/L LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.0	Nitrite (as N)	< 0.010	0.010 mg/L									
Blank (B3J0010-BLK2)	Phosphate (as P)	< 0.0050	0.0050 mg/L									
Bromide	Sulfate	< 0.5	0.5 mg/L									
Chloride	Blank (B3J0010-BLK2)			Prepared	d: 2023-10-0)1, Analyze	ed: 2023-	10-01				
Chloride < 0.10 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Nitrite (as N) < 0.005 0.0050 mg/L Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.05 0.5 mg/L Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.10 0.10 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.010 0.010 mg/L Sulfate < 0.05 0.5 mg/L LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.05 mg/L 4.00 100 85-15 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Bromide 3.93 0.05 mg/L 4.00 100 85-15 Chloride 16.0 0.10 mg/L 16.0 10	Bromide	< 0.05	0.05 mg/L			-						
Nitrate (as N) < 0.010 0.010 mg/L Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.01 0.10 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Nitrate (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L 4.00 85-115 Chloride 16.0 0.10 mg/L 4.00 96 88-108 Chloride 16.0 0.10 mg/L 4.00 98 88-108 Chloride 3.93 0.05 mg/L 4.00 98 88-108 Chloride 16.0 0.10 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.01 mg/L 4.00 <th< td=""><td>Chloride</td><td>< 0.10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Chloride	< 0.10										
Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.01 0.01 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.05 mg/L 4.00 98 89-110 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 89-110 Nitrate (as N) 3.93 0.	Fluoride	< 0.05	0.05 mg/L									
Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050 mg/L Sulfate < 0.5 mg/L Prepared: 2023-10-01, Analyzed: 2023-10-01 Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 mg/L Chloride < 0.010 mg/L Fluoride < 0.05 mg/L Nitrate (as N) < 0.010 mg/L Vhosphate (as P) < 0.0050 mg/L Sulfate < 0.5 mg/L LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 mg/L 4.00 mg/L 85-115 Chloride 16.0 mg/L 4.00 mg/L 96-115 Chloride 16.0 mg/L 4.00 mg/L 98 mg-110 Nitrate (as N) 3.93 mg/L 4.00 mg/L 98 mg-110 Nitrate (as N) 3.93 mg/L 4.00 mg/L 98 mg-110 Nitrate (as N) 2.01 mg/L 4.00 mg/L 98 mg-110 Nitrate (as N) 2.01 mg/	Nitrate (as N)	< 0.010	0.010 mg/L									
Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride Chloride < 0.010 0.010 mg/L Chloride Chloride Chloride Chloride (as N) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide (as N) 3.99 0.05 mg/L (ab N) 4.00 100 85-115 Chloride (as N) 3.93 0.05 mg/L (ab N) 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L (ab N) 4.00 98 90-110 Nitrite (as N) 3.93 0.010 mg/L (ab N) 4.00 98 90-110 Nitrite (as N) 3.93 0.010 mg/L (ab N) 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L (ab N) 4.00 98 90-110 <td></td> <td>< 0.010</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		< 0.010										
Blank (B3J0010-BLK3) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide < 0.05 0.05 mg/L Chloride < 0.01 0.10 mg/L Fluoride < 0.05 0.05 mg/L Nitrate (as N) < 0.010 0.010 mg/L Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 3.93 0.010 mg/L 4.00 98 90-110 Phosphate (as P) 0.964 0.0050 mg/L 1.0	Phosphate (as P)	< 0.0050	0.0050 mg/L									
Bromide < 0.05 0.05 mg/L Chloride < 0.10	Sulfate	< 0.5	0.5 mg/L									
Bromide < 0.05 0.05 mg/L Chloride < 0.10	Blank (B3J0010-BLK3)			Prepared	d: 2023-10-0)1, Analyze	ed: 2023-	10-01				
Chloride < 0.10 0.10 mg/L Fluoride < 0.05	Bromide	< 0.05	0.05 mg/L	· · · · · · · · · · · · · · · · · · ·								
Nitrate (as N) < 0.010 0.010 mg/L Nitrite (as N) < 0.010	Chloride	< 0.10										
Nitrite (as N) < 0.010 0.010 mg/L Phosphate (as P) < 0.0050	Fluoride	< 0.05	0.05 mg/L									
Phosphate (as P) < 0.0050 0.0050 mg/L Sulfate < 0.5 0.5 mg/L Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2) Prepared: 2023-10-01, Analyzed: 2023-10-01	Nitrate (as N)	< 0.010	0.010 mg/L									
Sulfate < 0.5 0.5 mg/L Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 Prepared: 2023-10-01, Analyzed: 2023-10-01	Nitrite (as N)	< 0.010	0.010 mg/L									
LCS (B3J0010-BS1) Prepared: 2023-10-01, Analyzed: 2023-10-01 Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2)	Phosphate (as P)	< 0.0050	0.0050 mg/L									
Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 Prepared: 2023-10-01, Analyzed: 2023-10-01	Sulfate	< 0.5	0.5 mg/L									
Bromide 3.99 0.05 mg/L 4.00 100 85-115 Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 Prepared: 2023-10-01, Analyzed: 2023-10-01	LCS (B3J0010-BS1)			Prepared	d: 2023-10-0)1, Analyze	ed: 2023-	10-01				
Chloride 16.0 0.10 mg/L 16.0 100 90-110 Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2) Prepared: 2023-10-01, Analyzed: 2023-10-01		3,99	0.05 ma/L									
Fluoride 3.93 0.05 mg/L 4.00 98 88-108 Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2)												
Nitrate (as N) 3.93 0.010 mg/L 4.00 98 90-110 Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2) Prepared: 2023-10-01, Analyzed: 2023-10-01												
Nitrite (as N) 2.01 0.010 mg/L 2.00 101 85-115 Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2) Prepared: 2023-10-01, Analyzed: 2023-10-01												
Phosphate (as P) 0.964 0.0050 mg/L 1.00 96 80-120 Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2) Prepared: 2023-10-01, Analyzed: 2023-10-01	, ,											
Sulfate 16.0 0.5 mg/L 16.0 100 90-110 LCS (B3J0010-BS2) Prepared: 2023-10-01, Analyzed: 2023-10-01	,											
	. , ,											
	LCS (B3J0010-BS2)			Prepared	d: 2023-10-0)1, Analvze	ed: 2023-	10-01				
		4.04	0.05 mg/l			•						



REPORTED TO Elk River Alliano PROJECT CBWM-2023						WORK REPOR	ORDER RTED	2313 2023	752 3-10-17	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B3.	J0010, Continued									
LCS (B3J0010-BS	2), Continued			Prepared	I: 2023-10-0	1, Analyze	ed: 2023-1	0-01		
Chloride	•	15.8	0.10 mg/L	16.0		98	90-110			
Fluoride		4.03	0.05 mg/L	4.00		101	88-108			
Nitrate (as N)		4.03	0.010 mg/L	4.00		101	90-110			
Nitrite (as N)		2.01	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)		0.950	0.0050 mg/L	1.00		95	80-120			
Sulfate		15.4	0.5 mg/L	16.0		96	90-110			
LCS (B3J0010-BS	3)			Prepared	I: 2023-10-0	1, Analyze	ed: 2023-1	0-01		
Bromide		4.01	0.05 mg/L	4.00		100	85-115			
Chloride		15.9	0.10 mg/L	16.0		99	90-110			
Fluoride		4.00	0.05 mg/L	4.00		100	88-108			
Nitrate (as N)		4.00	0.010 mg/L	4.00		100	90-110			
Nitrite (as N)		2.01	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)		0.936	0.0050 mg/L	1.00		94	80-120			
Sulfate		15.8	0.5 mg/L	16.0		99	90-110			
Blank (B3J0458-B EPHw10-19	LK1)	< 250	250 μg/L	Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
EPHw19-32		< 250	250 µg/L							
Surrogate: 2-Methylr	nonane (EPH/F2-4)	1990	μg/L	2200		90	60-140			
LCS (B3J0458-BS	2)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
EPHw10-19		15200	250 µg/L	15400		98	70-130			
EPHw19-32		22700	250 µg/L	22200		102	70-130			
Surrogate: 2-Methylr	nonane (EPH/F2-4)	1710	μg/L	2200		78	60-140			
LCS Dup (B3J045	8-BSD2)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
EPHw10-19		15800	250 μg/L	15400		102	70-130	4	20	
EPHw19-32		23700	250 μg/L	22200		107	70-130	4	20	
Surrogate: 2-Methylr	nonane (EPH/F2-4)	2000	μg/L	2200		91	60-140			
Dissolved Metals,				Droporod	I. 2022 40 0	F Anglyza	od: 2022 1	0.06		
Blank (B3J0462-B	LNI)	< 0.000010	0.000010//	Frepared	l: 2023-10-0	o, Analyze	c u. ∠∪∠3- l	0-00		
Mercury, dissolved		< 0.000010	0.000010 mg/L							
Blank (B3J0462-B	LK2)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		< 0.000010	0.000010 mg/L							
Blank (B3J0462-B	LK3)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		< 0.000010	0.000010 mg/L							
LCS (B3J0462-BS	1)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		0.000251	0.000010 mg/L	0.000250		100	80-120			
LCS (B3J0462-BS	2)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		0.000224	0.000010 mg/L	0.000250		90	80-120			
LCS (B3J0462-BS	3)			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved	•	0.000238	0.000010 mg/L	0.000250		95	80-120	-		

Dissolved Metals, Batch B3J0628



PROJECT Analyte Dissolved Metals, Bata Blank (B3J0628-BLK1 Aluminum, dissolved Antimony, dissolved Arsenic, dissolved Barium, dissolved Beryllium, dissolved Bismuth, dissolved	Resu tch B3J0628, Continued < 0.005	lt RL	. Units	Spike Level	Source	WORK REPOR	ORDER RTED		-10-17	14:07
Dissolved Metals, Bate Blank (B3J0628-BLK1 Aluminum, dissolved Antimony, dissolved Arsenic, dissolved Barium, dissolved Beryllium, dissolved Bismuth, dissolved	tch B3J0628, Continued	lt RL	. Units	•		% REC	REC			
Blank (B3J0628-BLK1 Aluminum, dissolved Antimony, dissolved Arsenic, dissolved Barium, dissolved Beryllium, dissolved Bismuth, dissolved	1)				Result		Limit	% RPD	RPD Limit	Qualifie
Aluminum, dissolved Antimony, dissolved Arsenic, dissolved Barium, dissolved Beryllium, dissolved Bismuth, dissolved	•									
Antimony, dissolved Arsenic, dissolved Barium, dissolved Beryllium, dissolved Bismuth, dissolved	< 0.005			Prepared	: 2023-10-0	7, Analyze	d: 2023-1	0-07		
Arsenic, dissolved Barium, dissolved Beryllium, dissolved Bismuth, dissolved		0.0050	mg/L							
Barium, dissolved Beryllium, dissolved Bismuth, dissolved	< 0.0002	0.00020	mg/L							
Beryllium, dissolved Bismuth, dissolved	< 0.0005									
Bismuth, dissolved	< 0.005									
· · · · · · · · · · · · · · · · · · ·	< 0.0001									
	< 0.0001									
Boron, dissolved	< 0.050									
Calaium, dissolved	< 0.00001									
Calcium, dissolved Chromium, dissolved	< 0.2 < 0.0005		mg/L							
Cobalt, dissolved	< 0.0003									
Copper, dissolved	< 0.0001									
Iron, dissolved	< 0.01		mg/L							
Lead, dissolved	< 0.0002									
Lithium, dissolved	< 0.0001									
Magnesium, dissolved	< 0.01	0.010	mg/L							
Manganese, dissolved	< 0.0002	0.00020	mg/L							
Molybdenum, dissolved	< 0.0001	0.00010	mg/L							
Nickel, dissolved	< 0.0004	0.00040	mg/L							
Phosphorus, dissolved	< 0.05	0.050	mg/L							
Potassium, dissolved	< 0.1		mg/L							
Selenium, dissolved	< 0.0005									
Silicon, dissolved	< 1.		mg/L							
Silver, dissolved	< 0.00005									
Sodium, dissolved	< 0.1		mg/L							
Strontium, dissolved Sulfur, dissolved	< 0.001 < 3.		mg/L							
Tellurium, dissolved	< 0.0005									
Thallium, dissolved	< 0.0003									
Thorium, dissolved	< 0.0002									
Tin, dissolved	< 0.0002									
Titanium, dissolved	< 0.005									
Tungsten, dissolved	< 0.001									
Uranium, dissolved	< 0.00002									
Vanadium, dissolved	< 0.005	0.0050	mg/L							
Zinc, dissolved	< 0.004	0.0040	mg/L							
Zirconium, dissolved	< 0.0001	0.00010	mg/L							
LCS (B3J0628-BS1)				Prepared	: 2023-10-0	7, Analyze	d: 2023-1	0-07		
Aluminum, dissolved	4.1	0.0050	mg/L	4.00		102	80-120			_
Antimony, dissolved	0.041			0.0400		104	80-120			
Arsenic, dissolved	0.41			0.400		103	80-120			
Barium, dissolved	0.041	7 0.0050	mg/L	0.0400		104	80-120			
Beryllium, dissolved	0.041	0.00010	mg/L	0.0400		103	80-120			
Bismuth, dissolved	0.041			0.0400		104	80-120			
Boron, dissolved	0.40			0.400		101	80-120			
Cadmium, dissolved	0.041			0.0400		103	80-120			
Calcium, dissolved	4.2		mg/L	4.00		105	80-120			
Chromium, dissolved	0.042			0.0400		105	80-120			
Cobalt, dissolved	0.041			0.0400		103	80-120			
Copper, dissolved	0.041			0.0400		103	80-120			
Iron, dissolved	4.1		mg/L	4.00		104	80-120			
Lead, dissolved	0.041			0.0400		104	80-120			
Lithium, dissolved Magnesium, dissolved	0.041 4.1		mg/L mg/L	0.0400 4.00		103 105	80-120 80-120			
Manganese, dissolved	0.041			0.0400		105	80-120			



REPORTED TO	Elk River Alliance	WORK ORDER	2313752
PROJECT	CBWM-2023	REPORTED	2023-10-17 14:07

Analyte	Result	RL Units	Spike Level	Source % F Result	REC REC Limi	% KPD	RPD Limit	Qualifier
Dissolved Metals, Batch B3J0628, Con	tinued							
LCS (B3J0628-BS1), Continued			Prepared	l: 2023-10-07, An	alyzed: 2023	3-10-07		
Molybdenum, dissolved	0.0401	0.00010 mg/L	0.0400	10	00 80-12	0		
Nickel, dissolved	0.0411	0.00040 mg/L	0.0400	10	03 80-12	0		
Phosphorus, dissolved	4.11	0.050 mg/L	4.00	10	03 80-12	0		
Potassium, dissolved	4.17	0.10 mg/L	4.00	10	04 80-12	0		
Selenium, dissolved	0.399	0.00050 mg/L	0.400	10	00 80-12	0		
Silicon, dissolved	4.2	1.0 mg/L	4.00	10	04 80-12	0		
Silver, dissolved	0.0412	0.000050 mg/L	0.0400	10	03 80-12	0		
Sodium, dissolved	4.23	0.10 mg/L	4.00	10	06 80-12	0		
Strontium, dissolved	0.0414	0.0010 mg/L	0.0400	10	04 80-12	0		
Sulfur, dissolved	40.8	3.0 mg/L	40.0	10	02 80-12	0		
Tellurium, dissolved	0.0406	0.00050 mg/L	0.0400	10	02 80-12	0		
Thallium, dissolved	0.0411	0.000020 mg/L	0.0400	10	03 80-12	0		
Thorium, dissolved	0.0421	0.00010 mg/L	0.0400	10	05 80-12	0		
Tin, dissolved	0.0414	0.00020 mg/L	0.0400	10	04 80-12	0		
Titanium, dissolved	0.0417	0.0050 mg/L	0.0400	10	04 80-12	0		
Tungsten, dissolved	0.0422	0.0010 mg/L	0.0400	10	05 80-12	0		
Uranium, dissolved	0.0416	0.000020 mg/L	0.0400	10	04 80-12	0		
Vanadium, dissolved	0.0413	0.0050 mg/L	0.0400	10	03 80-12	0		
Zinc, dissolved	0.412	0.0040 mg/L	0.400	10	03 80-12	0		
Zirconium, dissolved	0.0430	0.00010 mg/L	0.0400	10	07 80-12	0		

Dissolved Metals, Batch B3J0629

Blank (B3J0629-BLK1)			Prepared: 2023-10-07, Analyzed: 2023-10-07
Aluminum, dissolved	< 0.0050	0.0050 mg/L	

Arsenic, dissolved	Antimony, dissolved	< 0.00020	0.00020 mg/L	
Beryllium, dissolved	Arsenic, dissolved	< 0.00050	0.00050 mg/L	
Bismuth, dissolved	Barium, dissolved	< 0.0050	0.0050 mg/L	
Boron, dissolved	Beryllium, dissolved	< 0.00010	0.00010 mg/L	
Cadmium, dissolved < 0.00010	Bismuth, dissolved	< 0.00010	0.00010 mg/L	
Calcium, dissolved < 0.20	Boron, dissolved	< 0.0500	0.0500 mg/L	
Chromium, dissolved < 0.00050	Cadmium, dissolved	< 0.000010	0.000010 mg/L	
Cobalt, dissolved < 0.00010	Calcium, dissolved	< 0.20	0.20 mg/L	
Copper, dissolved < 0.00040	Chromium, dissolved	< 0.00050	0.00050 mg/L	
Iron, dissolved	Cobalt, dissolved	< 0.00010	0.00010 mg/L	
Lead, dissolved < 0.00020	Copper, dissolved	< 0.00040	0.00040 mg/L	
Lithium, dissolved < 0.00010	Iron, dissolved	< 0.010	0.010 mg/L	
Magnesium, dissolved < 0.010	Lead, dissolved	< 0.00020	0.00020 mg/L	
Manganese, dissolved < 0.00020	Lithium, dissolved	< 0.00010	0.00010 mg/L	
Molybdenum, dissolved < 0.00010	Magnesium, dissolved			
Nickel, dissolved < 0.00040	Manganese, dissolved	< 0.00020	0.00020 mg/L	
Phosphorus, dissolved < 0.050	Molybdenum, dissolved	< 0.00010	0.00010 mg/L	
Potassium, dissolved < 0.10	Nickel, dissolved	< 0.00040	0.00040 mg/L	
Selenium, dissolved < 0.00050	Phosphorus, dissolved	< 0.050	0.050 mg/L	
Silicon, dissolved < 1.0	Potassium, dissolved	< 0.10	0.10 mg/L	
Silver, dissolved < 0.000050	Selenium, dissolved	< 0.00050	0.00050 mg/L	
Sodium, dissolved < 0.10	Silicon, dissolved	< 1.0	1.0 mg/L	
Strontium, dissolved < 0.0010	Silver, dissolved	< 0.000050	0.000050 mg/L	
Sulfur, dissolved < 3.0	Sodium, dissolved	< 0.10	0.10 mg/L	
Tellurium, dissolved < 0.00050	Strontium, dissolved	< 0.0010	0.0010 mg/L	
Thallium, dissolved < 0.000020	Sulfur, dissolved	< 3.0	3.0 mg/L	
Thorium, dissolved < 0.00010	Tellurium, dissolved	< 0.00050	0.00050 mg/L	
Tin, dissolved < 0.00020 0.00020 mg/L Titanium, dissolved < 0.0050	Thallium, dissolved	< 0.000020	0.000020 mg/L	
Titanium, dissolved < 0.0050 0.0050 mg/L	Thorium, dissolved	< 0.00010	0.00010 mg/L	
	Tin, dissolved	< 0.00020	0.00020 mg/L	
	Titanium, dissolved	< 0.0050	0.0050 mg/L	



Blank (B3J0629-BLK1), Continued Co.0010 Uranium, dissolved Co.000020 Vanadium, dissolved Co.0050 Zinc, dissolved Co.0040 Zirconium, dissolved Co.00010 Co.	0.0010 mg/L 0.00020 mg/L 0.0050 mg/L 0.0040 mg/L	•	urce % REC	REC	0/ DDD		
Tungsten, dissolved	0.000020 mg/L 0.0050 mg/L			Limit	% RPD	RPD Limit	Qualifier
Tungsten, dissolved < 0.000020	0.000020 mg/L 0.0050 mg/L						
Tungsten, dissolved < 0.000020	0.000020 mg/L 0.0050 mg/L	Prepared: 202	3-10-07, Analyze	d: 2023-1	0-07		
Uranium, dissolved < 0.00020	0.000020 mg/L 0.0050 mg/L	· · · · · · · · · · · · · · · · · · ·					
Vanadium, dissolved < 0.0050	0.0050 mg/L						
Zinc, dissolved < 0.0040							
Aluminum, dissolved							
Aluminum, dissolved 4.20 Antimony, dissolved 0.0420 Arsenic, dissolved 0.414 Barium, dissolved 0.0410 Beryllium, dissolved 0.0418 Bismuth, dissolved 0.0416 Boron, dissolved 0.0413 Cadmium, dissolved 0.0416 Calcium, dissolved 0.0412 Cobalt, dissolved 0.0422 Cobalt, dissolved 0.0412 Copper, dissolved 0.0417 Iron, dissolved 0.0417 Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0416 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 4.18 Selenium, dissolved 0.0365 Silicon, dissolved 4.3 Silver, dissolved 0.0415 Sulfur, dissolved 0.0415	0.00010 mg/L						
Aluminum, dissolved		Prepared: 202:	3-10-07, Analyze	d: 2023-1	0-07		
Antimony, dissolved 0.0420 Arsenic, dissolved 0.414 Barium, dissolved 0.0410 Beryllium, dissolved 0.0418 Bismuth, dissolved 0.0418 Boron, dissolved 0.0413 Cadmium, dissolved 0.0416 Calcium, dissolved 0.0412 Cobalt, dissolved 0.0412 Copper, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0415 Lithium, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0416 Phosphorus, dissolved 0.0416 Phosphorus, dissolved 4.18 Selenium, dissolved 4.3 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0412 Thorium, dissolved 0.0412 </td <td>0.0050 mg/L</td> <td>4.00</td> <td>105</td> <td>80-120</td> <td></td> <td></td> <td></td>	0.0050 mg/L	4.00	105	80-120			
Arsenic, dissolved 0.414 Barium, dissolved 0.0410 Beryllium, dissolved 0.0418 Bismuth, dissolved 0.0416 Boron, dissolved 0.413 Cadmium, dissolved 0.0416 Calcium, dissolved 0.0412 Chromium, dissolved 0.0422 Cobalt, dissolved 0.0412 Copper, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0416 Phosphorus, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.30 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0412 Thorium, dissolved 0.0410	0.00020 mg/L	0.0400	105	80-120			
Barium, dissolved 0.0418 Beryllium, dissolved 0.0418 Bismuth, dissolved 0.0416 Boron, dissolved 0.0413 Cadmium, dissolved 0.0416 Calcium, dissolved 0.0412 Chromium, dissolved 0.0422 Cobalt, dissolved 0.0412 Copper, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0418 Malganese, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0416 Phosphorus, dissolved 4.18 Selenium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0416 Thorium, dissolved 0.0410 </td <td>0.00050 mg/L</td> <td>0.400</td> <td>104</td> <td>80-120</td> <td></td> <td></td> <td></td>	0.00050 mg/L	0.400	104	80-120			
Beryllium, dissolved 0.0416 Bismuth, dissolved 0.0416 Boron, dissolved 0.413 Cadmium, dissolved 0.0416 Calcium, dissolved 0.0416 Calcium, dissolved 0.0422 Cobalt, dissolved 0.0412 Copper, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0415 Lithium, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Pelenium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 40.4 Tellurium, dissolved 0.0415 Sulfur, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 <td>0.0050 mg/L</td> <td>0.0400</td> <td>103</td> <td>80-120</td> <td></td> <td></td> <td></td>	0.0050 mg/L	0.0400	103	80-120			
Bismuth, dissolved 0.0416 Boron, dissolved 0.413 Cadmium, dissolved 0.0416 Calcium, dissolved 4.00 Chromium, dissolved 0.0422 Cobalt, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0418 Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.30 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0415 Thallium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 <	0.00010 mg/L	0.0400	105	80-120			
Boron, dissolved 0.413 Cadmium, dissolved 0.0416 Calcium, dissolved 4.00 Chromium, dissolved 0.0422 Cobalt, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0417 Iron, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0418 Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0416 Phosphorus, dissolved 0.0416 Phosphorus, dissolved 4.18 Selenium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418	0.00010 mg/L	0.0400	104	80-120			
Cadmium, dissolved 0.0416 Calcium, dissolved 4.00 Chromium, dissolved 0.0422 Cobalt, dissolved 0.0417 Copper, dissolved 0.0417 Iron, dissolved 4.22 Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Potassium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0410 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Titanium, dissolved 0.0412	0.0500 mg/L	0.400	103	80-120			
Calcium, dissolved 4.00 Chromium, dissolved 0.0422 Cobalt, dissolved 0.0417 Copper, dissolved 0.0417 Iron, dissolved 4.22 Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Petassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 4.3 Silver, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0412 Vanadium, dissolved 0.0412 Vanadium, dissolved 0.0412	0.000010 mg/L	0.0400	104	80-120			
Chromium, dissolved 0.0422 Cobalt, dissolved 0.0417 Copper, dissolved 0.0417 Iron, dissolved 4.22 Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.0419 <tr< td=""><td>0.20 mg/L</td><td>4.00</td><td>100</td><td>80-120</td><td></td><td></td><td></td></tr<>	0.20 mg/L	4.00	100	80-120			
Copper, dissolved 0.0417 Iron, dissolved 4.22 Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Siliver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.042 Thorium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Tugsten, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00050 mg/L	0.0400	105	80-120			
Iron, dissolved 4.22 Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 4.21 Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Siliver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0418 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.0412 Vanadium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou <td>0.00010 mg/L</td> <td>0.0400</td> <td>103</td> <td>80-120</td> <td></td> <td></td> <td></td>	0.00010 mg/L	0.0400	103	80-120			
Lead, dissolved 0.0415 Lithium, dissolved 0.0418 Magnesium, dissolved 4.21 Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0418 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.0412 Vanadium, dissolved 0.0419 Zinc, dissolved 0.0410 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00040 mg/L	0.0400	104	80-120			
Lithium, dissolved 0.0418 Magnesium, dissolved 4.21 Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0412 Vanadium, dissolved 0.0412 Vanadium, dissolved 0.0419 Zinc, dissolved 0.0412 Vanadium, dissolved 0.0419 Duplicate (B3J0629-DUP1) Sou	0.010 mg/L	4.00	105	80-120			
Magnesium, dissolved 4.21 Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00020 mg/L	0.0400	104	80-120			
Manganese, dissolved 0.0419 Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.0413 Zinc, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00010 mg/L	0.0400	104	80-120			
Molybdenum, dissolved 0.0404 Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0415 Sulfur, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.010 mg/L	4.00	105	80-120			
Nickel, dissolved 0.0416 Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 0.0372 Tellurium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00020 mg/L	0.0400	105	80-120			
Phosphorus, dissolved 4.18 Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00010 mg/L	0.0400	101	80-120			
Potassium, dissolved 4.18 Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00040 mg/L	0.0400	104	80-120			
Selenium, dissolved 0.398 Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.050 mg/L 0.10 mg/L	4.00	105 105	80-120 80-120			
Silicon, dissolved 4.3 Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00050 mg/L	0.400	99	80-120			
Silver, dissolved 0.0365 Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	1.0 mg/L	4.00	106	80-120			
Sodium, dissolved 4.30 Strontium, dissolved 0.0415 Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.000050 mg/L	0.0400	91	80-120			
Sulfur, dissolved 40.4 Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.10 mg/L	4.00	108	80-120			
Tellurium, dissolved 0.0372 Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.0010 mg/L	0.0400	104	80-120			
Thallium, dissolved 0.0402 Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	3.0 mg/L	40.0	101	80-120			
Thorium, dissolved 0.0410 Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00050 mg/L	0.0400	93	80-120			
Tin, dissolved 0.0418 Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.000020 mg/L	0.0400	100	80-120			
Titanium, dissolved 0.0418 Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00010 mg/L	0.0400	103	80-120			
Tungsten, dissolved 0.0416 Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.00020 mg/L	0.0400	104	80-120			
Uranium, dissolved 0.0412 Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.0050 mg/L	0.0400	104	80-120			
Vanadium, dissolved 0.0413 Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.0010 mg/L	0.0400	104	80-120			
Zinc, dissolved 0.414 Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.000020 mg/L	0.0400	103	80-120			
Zirconium, dissolved 0.0429 Duplicate (B3J0629-DUP1) Sou Aluminum, dissolved < 0.0050	0.0050 mg/L	0.0400	103	80-120			
Duplicate (B3J0629-DUP1)SouAluminum, dissolved< 0.0050	0.0040 mg/L 0.00010 mg/L	0.400	104 107	80-120 80-120			
Aluminum, dissolved < 0.0050 Antimony, dissolved < 0.00020 Arsenic, dissolved < 0.00050							
Antimony, dissolved < 0.00020 Arsenic, dissolved < 0.00050	rce: 23l3752-02	· · · · · · · · · · · · · · · · · · ·	3-10-07, Analyze	d: 2023-1	ე-07		
Arsenic, dissolved < 0.00050	0.0050 mg/L		.0050			20	
· · · · · · · · · · · · · · · · · · ·	0.00020 mg/L		00020			20	
			00050			20	
Barium, dissolved 0.0785	0.00050 mg/L)784		< 1	20	
Beryllium, dissolved < 0.00010	0.0050 mg/L		00010			20	
Bismuth, dissolved < 0.00010	0.0050 mg/L 0.00010 mg/L		00010			20	
Boron, dissolved < 0.0500 Cadmium, dissolved < 0.000010	0.0050 mg/L 0.00010 mg/L 0.00010 mg/L		0500			20	
Calcium, dissolved 49.8	0.0050 mg/L 0.00010 mg/L 0.00010 mg/L 0.0500 mg/L		9.6		< 1	20	
Chromium, dissolved 49.0 < 0.00050	0.0050 mg/L 0.00010 mg/L 0.00010 mg/L 0.0500 mg/L 0.000010 mg/L					20	
Cobalt, dissolved < 0.00010	0.0050 mg/L 0.00010 mg/L 0.00010 mg/L 0.0500 mg/L	49	9.6 00050				



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED		752 3-10-17	14:07
Analyte		Result	RL Uni	ts Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, L	Batch B3J0629, Contil	nued								
Duplicate (B3J0629	9-DUP1), Continued	Sc	ource: 23l3752-0	2 Prepared	: 2023-10-0	7, Analyze	ed: 2023-	10-07		
Copper, dissolved		< 0.00040	0.00040 mg/l	_	< 0.00040				20	
Iron, dissolved		< 0.010	0.010 mg/l		< 0.010				20	
Lead, dissolved		< 0.00020	0.00020 mg/l		< 0.00020				20	
Lithium, dissolved	1	0.00409	0.00010 mg/l		0.00417			2	20	
Magnesium, dissolved		14.4	0.010 mg/l		14.3			1	20	
Manganese, dissolved Molybdenum, dissolved		0.00088	0.00020 mg/l 0.00010 mg/l		0.00094			< 1	20	
Nickel, dissolved	5 u	< 0.00040	0.00040 mg/l		< 0.00040				20	
Phosphorus, dissolved	d	< 0.050	0.050 mg/l		< 0.050				20	
Potassium, dissolved	<u> </u>	0.42	0.10 mg/l		0.43				20	
Selenium, dissolved		0.00059	0.00050 mg/l		0.00058				20	
Silicon, dissolved		2.2	1.0 mg/l		2.2				20	
Silver, dissolved		< 0.000050	0.000050 mg/l	_	< 0.000050				20	
Sodium, dissolved		1.65	0.10 mg/l	_	1.65			< 1	20	
Strontium, dissolved		0.124	0.0010 mg/l	_	0.124			< 1	20	
Sulfur, dissolved		6.1	3.0 mg/l	_	5.9				20	
Tellurium, dissolved		< 0.00050	0.00050 mg/l		< 0.00050				20	
Thallium, dissolved		< 0.000020	0.000020 mg/l		< 0.000020				20	
Thorium, dissolved		< 0.00010	0.00010 mg/l		< 0.00010				20	
Tin, dissolved		< 0.00020	0.00020 mg/l		< 0.00020				20	
Titanium, dissolved		< 0.0050	0.0050 mg/l		< 0.0050				20	
Tungsten, dissolved		< 0.0010	0.0010 mg/l		< 0.0010				20	
Uranium, dissolved		0.000549	0.000020 mg/l		0.000572			4	20	
Vanadium, dissolved		< 0.0050	0.0050 mg/l		< 0.0050				20	
Zinc, dissolved Zirconium, dissolved		< 0.0040 < 0.00010	0.0040 mg/l 0.00010 mg/l		< 0.0040 < 0.00010				20	
General Parameters	s, Batch B3l3034									
Blank (B3l3034-BL	K1)			Prepared	: 2023-09-2	9, Analyze	ed: 2023-	10-05		
BOD, 5-day		< 2.0	2.0 mg/	-						
LCS (B3I3034-BS1)				Prepared	: 2023-09-2	9, Analyze	ed: 2023-	10-05		
BOD, 5-day		219	38.2 mg/l	_ 198		111	85-115			
General Parameters	s, Batch B3J0057									
Blank (B3J0057-BL	.K1)			'	: 2023-10-0	3, Analyze	ed: 2023-	10-03		
Ammonia, Total (as N))	< 0.050	0.050 mg/l	_						
Blank (B3J0057-BL	-K2)				: 2023-10-0	3, Analyze	ed: 2023-	10-03		
Ammonia, Total (as N))	< 0.050	0.050 mg/l	_						
Blank (B3J0057-BL	-K3)			· · ·	: 2023-10-0	3, Analyze	ed: 2023-1	10-03		
Ammonia, Total (as N))	< 0.050	0.050 mg/l	-						
Blank (B3J0057-BL	-K4)				: 2023-10-0	3, Analyze	ed: 2023-	10-03		
Ammonia, Total (as N))	< 0.050	0.050 mg/l	-						
Blank (B3J0057-BL	•				: 2023-10-0	3, Analyze	ed: 2023-	10-03		
· · · · · · · · · · · · · · · · · · ·	١	< 0.050	0.050 mg/l	_						
Ammonia, Total (as N))	* 0.000								
Ammonia, Total (as N) Blank (B3J0057-BL Ammonia, Total (as N)	-K6)	< 0.050	0.050 mg/l	· · · · · · · · · · · · · · · · · · ·	: 2023-10-0	3, Analyze	ed: 2023-1	10-03		



	Elk River Alliance CBWM-2023					WORK (752 -10-17	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters,	Batch B3J0057, Con	tinued								
LCS (B3J0057-BS1)				Prepared:	2023-10-03	B, Analyzed	d: 2023-	10-03		
Ammonia, Total (as N)		0.992	0.050 mg/L	1.00		99	85-115			
LCS (B3J0057-BS2)				Prepared:	2023-10-03	B, Analyzed	d: 2023-	10-03		
Ammonia, Total (as N)		0.983	0.050 mg/L	1.00		98	85-115			
LCS (B3J0057-BS3)				Prepared:	2023-10-03	3, Analyzed	d: 2023-	10-03		
Ammonia, Total (as N)		0.988	0.050 mg/L	1.00		99	85-115			
LCS (B3J0057-BS4)				Prepared:	2023-10-03	3, Analyzed	d: 2023-	10-03		
Ammonia, Total (as N)		1.00	0.050 mg/L	1.00		100	85-115			
LCS (B3J0057-BS5)					2023-10-03			10-03		
Ammonia, Total (as N)		0.998	0.050 mg/L	1.00		100	85-115			
LCS (B3J0057-BS6)		0.000	0.050		2023-10-03			10-03		
Ammonia, Total (as N)		0.988	0.050 mg/L	1.00		99	85-115			
General Parameters,	Batch B3J0149									
Blank (B3J0149-BLK	•			Prepared:	2023-10-04	l, Analyzed	d: 2023-	10-04		
Chemical Oxygen Dema	and	< 20	20 mg/L							
LCS (B3J0149-BS1) Chemical Oxygen Dema		520	20 mg/L	Prepared: 500	2023-10-04	I, Analyzed	d: 2023- ⁻ 89-115	10-04		
General Parameters, Blank (B3J0305-BLK				Prepared:	: 2023-10-04	I, Analyzed	d: 2023-	10-05		
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B3J0305-BLK	(2)			Prepared:	2023-10-04	l, Analyzed	d: 2023-	10-05		
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B3J0305-BLK	•			Prepared:	2023-10-04	I, Analyzed	d: 2023-	10-05		
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B3J0305-BLK				Prepared:	2023-10-04	I, Analyzed	d: 2023-	10-05		
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B3J0305-BS1)	\	0.105	0.0050 mg/l	<u> </u>	: 2023-10-04			10-05		
Phosphorus, Total (as P)	0.105	0.0050 mg/L	0.100	0000 40 04	105	85-115	10.05		
LCS (B3J0305-BS2) Phosphorus, Total (as P)	0.106	0.0050 mg/L	0.100	: 2023-10-04	I, Analyzed	85-115	10-05		
	<i>J</i>	0.100	0.0000 Hig/L		: 2023-10-04			10 05		
LCS (B3J0305-BS3) Phosphorus, Total (as P)	0.105	0.0050 mg/L	0.100	. 2023-10-04	105	85-115	10-00		
LCS (B3J0305-BS4)	,	300			: 2023-10-04			10-05		
Phosphorus, Total (as P)	0.106	0.0050 mg/L	0.100	0_0-10-04	106	85-115			
General Parameters,	Batch B3J0359									
Blank (B3J0359-BLK				Prepared:	: 2023-10-05	5, Analyzeo	d: 2023-	10-05		
Alkalinity, Total (as CaC		< 1.0	1.0 mg/L	-		-				
Alkalinity, Phenolphthale	ein (as CaCO3)	< 1.0	1.0 mg/L						-	go 16 of



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED		752 -10-17	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters,	, Batch B3J0359, Cont	tinued								
Blank (B3J0359-BLI	K1), Continued			Prepared	I: 2023-10-0	5, Analyze	d: 2023-	10-05		
Alkalinity, Bicarbonate	(as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (a	as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (a	s CaCO3)	< 1.0	1.0 mg/L							
Blank (B3J0359-BLI	K2)			Prepared	I: 2023-10-0	5, Analyze	d: 2023-	10-05		
Alkalinity, Total (as CaC	CO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthal	lein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	,	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (a		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (a	is CaCO3)	< 1.0	1.0 mg/L							
Blank (B3J0359-BLI	K3)			Prepared	I: 2023-10-0	5, Analyze	d: 2023-	10-05		
Alkalinity, Total (as CaC		< 1.0	1.0 mg/L							
Alkalinity, Phenolphtha		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (a	· ,	< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Hydroxide (a	,	< 1.0	1.0 mg/L							
LCS (B3J0359-BS1)	· · · · · · · · · · · · · · · · · · ·	-		Drenared	I: 2023-10-0	15 Analyze	4· 2023-	10-05		
		100	1.0 mg/l		. 2023-10-0			10-03		
Alkalinity, Total (as CaC Alkalinity, Phenolphthal		109 55.2	1.0 mg/L 1.0 mg/L	100 50.0		109 110	80-120 0-200			
Alkalinity, i nenoiphtna	leiii (as GaGGS)	55.2	1.0 Hig/L							
LCS (B3J0359-BS2)					I: 2023-10-0	5, Analyze	d: 2023-	10-05		
Alkalinity, Total (as CaC		111	1.0 mg/L	100		111	80-120			
Alkalinity, Phenolphtha	lein (as CaCO3)	52.8	1.0 mg/L	50.0		106	0-200			
LCS (B3J0359-BS3)				Prepared	I: 2023-10-0	5, Analyze	d: 2023-	10-05		
Alkalinity, Total (as CaC		110	1.0 mg/L	100		110	80-120			
Alkalinity, Phenolphtha	lein (as CaCO3)	49.5	1.0 mg/L	50.0		99	0-200			
General Parameters,	, Batch B3J0389									
Blank (B3J0389-BLI	K1)			Prepared	I: 2023-10-0)5, Analyze	d: 2023-	10-06		
Nitrogen, Total Kjeldah	I	< 0.050	0.050 mg/L							
Blank (B3J0389-BLI	K2)			Prepared	I: 2023-10-0)5. Analvze	d: 2023-	10-06		
Nitrogen, Total Kjeldah		< 0.050	0.050 mg/L			· ·				
LCS (B3J0389-BS1)			J	Drenared	I: 2023-10-0	15 Analyze	4· 2023-	10-06		
Nitrogen, Total Kjeldah		0.999	0.050 mg/L	1.00	. 2023-10-0	100	85-115	10-00		
		0.999	0.030 Hig/L							
LCS (B3J0389-BS2)				Prepared	I: 2023-10-0	5, Analyze	d: 2023-	10-06		
Nitrogen, Total Kjeldah	I	0.993	0.050 mg/L	1.00		99	85-115			
General Parameters,	, Batch B3J0521									
Blank (B3J0521-BLI	K1)			Prepared	I: 2023-10-0)6. Analyze	d: 2023-	10-06		
Solids, Total Suspende	•	< 2.0	2.0 mg/L			, ,				
LCS (B3J0521-BS1)		-		Prenared	I: 2023-10-0	16 Analyze	4. 2023-	10-06		
Solids, Total Suspende		103	10.0 mg/L	100	. 2020 10 0	103	85-115	10 00		
			<u> </u>			-				
General Parameters,				Dur '	ı. 2022 42 C	00 Am - !- :-	٠, ٥٥٥٥	10.00		
				Uronorod		^ ^ ^ \ / / /	ヘ・フロフマー			
Blank (B3J0603-BLI Carbon, Total Organic	K1)	< 0.50	0.50 mg/L	Flepaleu	I: 2023-10-0	9, Allalyze	u. 2023-	10-09		



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED		752 3-10-17	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameter	s, Batch B3J0603, Cor	ntinued								
Blank (B3J0603-Bl	LK1), Continued			Prepared	: 2023-10-0	09, Analyze	ed: 2023-	10-09		
Carbon, Dissolved Or	rganic	< 0.50	0.50 mg/L							
Blank (B3J0603-Bl	I K2)			Prenared	: 2023-10-0	19 Analyze	d 2023-	10-09		
Carbon, Total Organic		< 0.50	0.50 mg/L	Troparou	. 2020 10 (50, 7 thaiy20		10 00		
Carbon, Dissolved Or		< 0.50	0.50 mg/L							
Blank (B3J0603-Bl	LK3)			Prepared	: 2023-10-0)9 Analyze	ed: 2023-	10-09		
Carbon, Total Organic	•	< 0.50	0.50 mg/L	1 Toparou	. 2020 10 (50,7 thaiy20	, u. 2020	10 00		
Carbon, Dissolved Or		< 0.50	0.50 mg/L							
·				D	. 2022 40 (00 A = -l. = -	٦. ٥٥٥٥	10.00		
LCS (B3J0603-BS1	•		0.50 "		: 2023-10-0			10-09		
Carbon, Total Organic Carbon, Dissolved Or		9.24 9.02	0.50 mg/L 0.50 mg/L	10.0		92 90	78-116 78-116			
·		9.02	0.50 mg/L							
LCS (B3J0603-BS2	2)			•	: 2023-10-0	09, Analyze		10-09		
Carbon, Total Organic		9.42	0.50 mg/L	10.0		94	78-116			
Carbon, Dissolved Or	rganic	11.0	0.50 mg/L	10.0		110	78-116			
LCS (B3J0603-BS3	3)			Prepared	: 2023-10-0	09, Analyze	ed: 2023-	10-09		
Carbon, Total Organio	С	9.40	0.50 mg/L	10.0		94	78-116			
Carbon, Dissolved Or	rganic	9.09	0.50 mg/L	10.0		91	78-116			
Duplicate (B3J060	3-DUP2)	So	ource: 23l3752-01	Prepared	: 2023-10-0	09, Analyze	ed: 2023-	10-09		
Carbon, Total Organic		1.80	0.50 mg/L		1.53				16	
Carbon, Dissolved Or		1.20	0.50 mg/L		1.16				15	
Matrix Spike (B3J0	0603-MS2)	So	ource: 23l3752-01	Prepared	: 2023-10-0	09. Analvze	ed: 2023-	10-09		
Carbon, Total Organic	•	10.7	0.50 mg/L	10.0	1.53	92	70-130			
Carbon, Dissolved Or		10.1	0.50 mg/L	10.0	1.16	89	70-130			
Total Metals, Batch Blank (B3J0454-Bl Aluminum, total		< 0.0050	0.0050 mg/L	Prepared	: 2023-10-(05, Analyz€	ed: 2023-	10-07		
Antimony, total		< 0.00020	0.00000 mg/L							
Arsenic, total		< 0.00050	0.00050 mg/L							
Barium, total		< 0.0050	0.0050 mg/L							
Beryllium, total		< 0.00010	0.00010 mg/L							
Bismuth, total Boron, total		< 0.00010 < 0.0500	0.00010 mg/L 0.0500 mg/L							
Cadmium, total		< 0.000010	0.000010 mg/L							
Calcium, total		< 0.20	0.20 mg/L							
Chromium, total		< 0.00050	0.00050 mg/L							
Cobalt, total		< 0.00010	0.00010 mg/L	-						
Copper, total		< 0.00040	0.00040 mg/L							
Iron, total		< 0.010 < 0.00020	0.010 mg/L 0.00020 mg/L							
Lead, total Lithium, total		< 0.00020	0.00020 mg/L 0.00010 mg/L							
Magnesium, total		< 0.010	0.010 mg/L							
Manganese, total		< 0.00020	0.00020 mg/L							
Molybdenum, total		< 0.00010	0.00010 mg/L							
Nickel, total		< 0.00040	0.00040 mg/L							
Phosphorus, total		< 0.050	0.050 mg/L							
Potassium, total		< 0.10	0.10 mg/L 0.00050 mg/L							
Selenium, total Silicon, total		< 0.00050 < 1.0	1.0 mg/L							
Silver total		< 0.000050	0.000050 mg/L							

0.000050 mg/L

< 0.000050

Silver, total



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED		752 3-10-17	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0454, Continued									
Blank (B3J0454-BL	K1), Continued			Prepared	I: 2023-10-0	5, Analyze	ed: 2023-	10-07		
Sodium, total		< 0.10	0.10 mg/L							
Strontium, total		< 0.0010	0.0010 mg/L							
Sulfur, total		< 3.0	3.0 mg/L							
Tellurium, total		< 0.00050	0.00050 mg/L							
Thallium, total		< 0.000020	0.000020 mg/L							
Thorium, total		< 0.00010	0.00010 mg/L							
Tin, total		< 0.00020	0.00020 mg/L							
Titanium, total		< 0.0050	0.0050 mg/L							
Tungsten, total		< 0.0010	0.0010 mg/L							
Uranium, total Vanadium, total		< 0.000020 < 0.0050	0.000020 mg/L							
Zinc, total		< 0.0030	0.0050 mg/L 0.0040 mg/L							
Zirconium, total		< 0.0040	0.00010 mg/L							
·		0.00010	0.00010g, _	Proparac	I: 2023-10-0)5 Analyza	M· 2023 ·	10.07		
LCS (B3J0454-BS1)		0.05	0.0050	•	1. 2023-10-0	•		10-07		
Aluminum, total		3.95	0.0050 mg/L	4.00		99	80-120			
Antimony, total		0.0401	0.00020 mg/L	0.0400		100	80-120			
Arsenic, total Barium, total		0.389	0.00050 mg/L	0.400		97	80-120			
Beryllium, total		0.0393	0.0050 mg/L 0.00010 mg/L	0.0400		98 101	80-120 80-120			
Bismuth, total		0.0398	0.00010 mg/L	0.0400		100	80-120			
Boron, total		0.407	0.0500 mg/L	0.400		102	80-120			
Cadmium, total		0.0396	0.000010 mg/L	0.0400		99	80-120			
Calcium, total		4.00	0.20 mg/L	4.00		100	80-120			
Chromium, total		0.0396	0.00050 mg/L	0.0400		99	80-120			
Cobalt, total		0.0395	0.00010 mg/L	0.0400		99	80-120			
Copper, total		0.0396	0.00040 mg/L	0.0400		99	80-120			
Iron, total		3.90	0.010 mg/L	4.00		97	80-120			
Lead, total		0.0397	0.00020 mg/L	0.0400		99	80-120			
Lithium, total		0.0401	0.00010 mg/L	0.0400		100	80-120			
Magnesium, total		4.13	0.010 mg/L	4.00		103	80-120			
Manganese, total		0.0398	0.00020 mg/L	0.0400		99	80-120			
Molybdenum, total		0.0393	0.00010 mg/L	0.0400		98	80-120			
Nickel, total		0.0390	0.00040 mg/L	0.0400		97	80-120			
Phosphorus, total		3.92	0.050 mg/L	4.00		98	80-120			
Potassium, total		3.89	0.10 mg/L	4.00		97	80-120			
Selenium, total		0.395	0.00050 mg/L	0.400		99	80-120			
Silicon, total		4.2	1.0 mg/L	4.00		105	80-120			
Silver, total		0.0385	0.000050 mg/L	0.0400		96	80-120			
Sodium, total		3.85 0.0394	0.10 mg/L 0.0010 mg/L	4.00 0.0400		96 99	80-120 80-120			
Strontium, total Sulfur, total		40.5	3.0 mg/L	40.0		101	80-120			
Tellurium, total		0.0387	0.00050 mg/L	0.0400		97	80-120			
Thallium, total		0.0402	0.00030 mg/L	0.0400		100	80-120			
Thorium, total		0.0401	0.000020 mg/L	0.0400		100	80-120			
Tin, total		0.0410	0.00020 mg/L	0.0400		102	80-120			
Titanium, total		0.0403	0.0050 mg/L	0.0400		101	80-120			
Tungsten, total		0.0408	0.0010 mg/L	0.0400		102	80-120			
Uranium, total		0.0407	0.000020 mg/L	0.0400		102	80-120			
Vanadium, total		0.0389	0.0050 mg/L	0.0400		97	80-120			
Zinc, total		0.388	0.0040 mg/L	0.400		97	80-120			
Zirconium, total		0.0404	0.00010 mg/L	0.0400		101	80-120			
Matrix Spike (B3J04	154-MS1)	Sc	ource: 23l3752-01	Prepared	I: 2023-10-0	5, Analyze	ed: 2023-	10-07		
Aluminum, total		3.19	0.0050 mg/L	4.00	< 0.0050	80	70-130			
Antimony, total		0.0311	0.00020 mg/L	0.0400	< 0.00020	78	70-130			
Arsenic, total		0.335	0.00050 mg/L	0.400	< 0.00050	84	70-130			ge 19 of



REPORTED TO	Elk River Alliance	WORK ORDER	2313752
PROJECT	CBWM-2023	REPORTED	2023-10-17 14:07

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B3J0454, Continued									
Matrix Spike (B3J0454-MS1), Continued	Sc	ource: 23l3752-01	Prepared	d: 2023-10-0	5, Analyze	d: 2023-1	10-07		
Barium, total	0.107	0.0050 mg/L	0.0400	0.0721	87	70-130			
Beryllium, total	0.0285	0.00010 mg/L	0.0400	< 0.00010	71	70-130			
Bismuth, total	0.0318	0.00010 mg/L	0.0400	< 0.00010	79	70-130			
Boron, total	0.308	0.0500 mg/L	0.400	< 0.0500	75	70-130			
Cadmium, total	0.0325	0.000010 mg/L	0.0400	< 0.000010	81	70-130			
Calcium, total	53.9	0.20 mg/L	4.00	52.4	38	70-130			MS2
Chromium, total	0.0323	0.00050 mg/L	0.0400	< 0.00050	80	70-130			
Cobalt, total	0.0317	0.00010 mg/L	0.0400	< 0.00010	79	70-130			
Copper, total	0.0312	0.00040 mg/L	0.0400	< 0.00040	78	70-130			
Iron, total	3.14	0.010 mg/L	4.00	< 0.010	78	70-130			
Lead, total	0.0334	0.00020 mg/L	0.0400	< 0.00020	84	70-130			
Lithium, total	0.0340	0.00010 mg/L	0.0400	0.00431	74	70-130			
Magnesium, total	16.1	0.010 mg/L	4.00	13.3	71	70-130			
Manganese, total	0.0332	0.00020 mg/L	0.0400	0.00085	81	70-130			
Molybdenum, total	0.0369	0.00010 mg/L	0.0400	0.00078	90	70-130			
Nickel, total	0.0312	0.00040 mg/L	0.0400	< 0.00040	78	70-130			
Phosphorus, total	3.34	0.050 mg/L	4.00	< 0.050	83	70-130			
Potassium, total	3.95	0.10 mg/L	4.00	0.41	88	70-130			
Selenium, total	0.309	0.00050 mg/L	0.400	0.00065	77	70-130			
Silicon, total	5.9	1.0 mg/L	4.00	2.4	88	70-130			
Silver, total	0.0334	0.000050 mg/L	0.0400	< 0.000050	83	70-130			
Sodium, total	5.20	0.10 mg/L	4.00	1.81	85	70-130			
Strontium, total	0.153	0.0010 mg/L	0.0400	0.121	82	70-130			
Sulfur, total	39.1	3.0 mg/L	40.0	7.1	80	70-130			
Tellurium, total	0.0322	0.00050 mg/L	0.0400	< 0.00050	80	70-130			
Thallium, total	0.0362	0.000000 mg/L	0.0400	< 0.00000	91	70-130			
Thorium, total	0.0298	0.00010 mg/L	0.0400	< 0.000020	75	70-130			
Tin, total	0.0230	0.00010 mg/L	0.0400	< 0.00010	92	70-130			
Titanium, total	0.0377	0.0050 mg/L	0.0400	< 0.0050	93	70-130			
Tungsten, total	0.0372	0.0030 mg/L	0.0400	< 0.0030	93	70-130			
Uranium, total	0.0373	0.000020 mg/L	0.0400	0.000628	81	70-130			
Vanadium, total	0.0332	0.000020 mg/L	0.0400	< 0.0050	82	70-130			
Zinc, total	0.0328	0.0030 mg/L 0.0040 mg/L	0.400	< 0.0030	80	70-130			
Zirici, total	0.0366	0.0040 mg/L	0.400	< 0.0040	91	70-130			

Total Metals, Batch B3J0455

Blank (B3J0455-BLK1)			Prepared: 2023-10-05, Analyzed: 2023-10-07
Aluminum, total	< 0.0050	0.0050 mg/L	
Antimony, total	< 0.00020	0.00020 mg/L	
Arsenic, total	< 0.00050	0.00050 mg/L	
Barium, total	< 0.0050	0.0050 mg/L	
Beryllium, total	< 0.00010	0.00010 mg/L	
Bismuth, total	< 0.00010	0.00010 mg/L	
Boron, total	< 0.0500	0.0500 mg/L	
Cadmium, total	< 0.000010	0.000010 mg/L	
Calcium, total	< 0.20	0.20 mg/L	
Chromium, total	< 0.00050	0.00050 mg/L	
Cobalt, total	< 0.00010	0.00010 mg/L	
Copper, total	< 0.00040	0.00040 mg/L	
Iron, total	< 0.010	0.010 mg/L	
Lead, total	< 0.00020	0.00020 mg/L	
Lithium, total	< 0.00010	0.00010 mg/L	
Magnesium, total	< 0.010	0.010 mg/L	
Manganese, total	< 0.00020	0.00020 mg/L	
Molybdenum, total	< 0.00010	0.00010 mg/L	D 00 100



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR			752 -10-17	14:07
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0455, Continued										
Blank (B3J0455-BL	.K1), Continued				Prepared	: 2023-10-0	5, Analyze	d: 2023-	10-07		
Nickel, total		< 0.00040	0.00040	mg/L							
Phosphorus, total		< 0.050		mg/L							
Potassium, total		< 0.10	0.10	mg/L							
Selenium, total		< 0.00050	0.00050	mg/L							
Silicon, total		< 1.0		mg/L							
Silver, total		< 0.000050	0.000050								
Sodium, total		< 0.10		mg/L							
Strontium, total		< 0.0010	0.0010								
Sulfur, total		< 3.0		mg/L							
Tellurium, total		< 0.00050	0.00050								
Thallium, total		< 0.000020	0.000020								
Thorium, total Tin, total		< 0.00010 < 0.00020	0.00010								
Titanium, total		< 0.0050	0.00020 0.0050								
Tungsten, total		< 0.0010	0.0030								
Uranium, total		< 0.000020	0.000020								
Vanadium, total		< 0.0050	0.0050								
Zinc, total		< 0.0040	0.0040								
Zirconium, total		< 0.00010	0.00010								
LCS (B3J0455-BS1)				Prepared	: 2023-10-0)5, Analyze	d: 2023-	10-07		
Aluminum, total		3.97	0.0050	mg/L	4.00		99	80-120			
Antimony, total		0.0393	0.00020		0.0400		98	80-120			
Arsenic, total		0.395	0.00050		0.400		99	80-120			
Barium, total		0.0381	0.0050		0.0400		95	80-120			
Beryllium, total		0.0400	0.00010		0.0400		100	80-120			
Bismuth, total		0.0388	0.00010		0.0400		97	80-120			
Boron, total		0.402	0.0500		0.400		100	80-120			
Cadmium, total		0.0390	0.000010		0.0400		97	80-120			
Calcium, total Chromium, total		3.96 0.0402		mg/L	4.00 0.0400		99 101	80-120 80-120			
Cobalt, total		0.0397	0.00050 0.00010		0.0400		99	80-120			
Copper, total		0.0395	0.00010		0.0400		99	80-120			
Iron, total		3.91	0.00040		4.00		98	80-120			
Lead, total		0.0391	0.00020		0.0400		98	80-120			
Lithium, total		0.0399	0.00010		0.0400		100	80-120			
Magnesium, total		4.09		mg/L	4.00		102	80-120			
Manganese, total		0.0398	0.00020		0.0400		100	80-120			
Molybdenum, total		0.0387	0.00010		0.0400		97	80-120			
Nickel, total		0.0397	0.00040		0.0400		99	80-120			
Phosphorus, total		3.90	0.050	mg/L	4.00		97	80-120			
Potassium, total	·	3.90		mg/L	4.00		98	80-120			
Selenium, total	·	0.396	0.00050		0.400		99	80-120			
Silicon, total		4.2		mg/L	4.00		105	80-120			
Silver, total		0.0380	0.000050		0.0400		95	80-120			
Sodium, total		3.99		mg/L	4.00		100	80-120			
Strontium, total		0.0399	0.0010		0.0400		100	80-120			
Sulfur, total		40.9		mg/L	40.0		102	80-120			
Tellurium, total		0.0379	0.00050		0.0400		95	80-120			
Thallium, total		0.0394 0.0385	0.000020		0.0400		98	80-120			
Thorium, total Tin, total		0.0385	0.00010 0.00020		0.0400		96	80-120 80-120			
Titanium, total		0.0405	0.00020		0.0400		101 105	80-120			
Tungsten, total		0.0419	0.0050		0.0400		105	80-120			
		0.0402	0.000020		0.0400		100	80-120			
Uranium, total				111(1/)			11.11.1	00-170			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED		752 3-10-17	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0455, Continued									
LCS (B3J0455-BS1), Continued			Prepared: 2023-10-05, Analyzed: 2023-10-07						
Zinc, total		0.392	0.0040 mg/L	0.400		98	80-120			
7:		0.0398	0.00010 mg/L	0.0400		99	80-120			
Zirconium, total Total Metals, Batch	n B3J0461									
Zirconium, total Total Metals, Batch Blank (B3J0461-Bl			<u> </u>	Prepared	l: 2023-10-0)5, Analyze	d: 2023-1	0-06		
Total Metals, Batch		< 0.000010	0.000010 mg/L	Prepared	l: 2023-10-0	05, Analyze	d: 2023-1	0-06		
Total Metals, Batch Blank (B3J0461-Bl	-K1)	< 0.000010	0.000010 mg/L	,	l: 2023-10-0 l: 2023-10-0					
Total Metals, Batch Blank (B3J0461-BL Mercury, total	-K1)	< 0.000010 < 0.000010	0.000010 mg/L	,						
Total Metals, Batch Blank (B3J0461-Bl Mercury, total Blank (B3J0461-Bl	_K1) _K2)		Ţ.	Prepared)5, Analyze	d: 2023-1	0-06		
Fotal Metals, Batch Blank (B3J0461-BL Mercury, total Blank (B3J0461-BL Mercury, total	_K1) _K2)		Ţ.	Prepared	l: 2023-10-0)5, Analyze	d: 2023-1	0-06		
Fotal Metals, Batch Blank (B3J0461-BL Mercury, total Blank (B3J0461-BL Mercury, total LCS (B3J0461-BS1	_K1) _K2)	< 0.000010	0.000010 mg/L	Prepared Prepared 0.000250	l: 2023-10-0	05, Analyze 05, Analyze 96	d: 2023-1 d: 2023-1 80-120	0-06 0-06		

QC Qualifiers:

MS2 The native sample concentration is greater than the spike concentration hence the matrix spike limits do not apply.





REPORTED TO Elk River Alliance

PO Box 2095, 1111 2nd Ave

Fernie, BC V0B1M0

ATTENTION Kaileigh McCallum

PO NUMBER

PROJECT CBWM-2023

PROJECT INFO

WORK ORDER 2313653

RECEIVED / TEMP 2023-09-28 13:36 / 8.8°C

REPORTED 2023-10-11 14:37

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



We've Got Chemistry



Ahead of the Curve



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO

Client Service Representative



REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23l3653 2023-10-	11 14:37
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
B01001_20230926	5_ (23l3653-01) Matrix:	Water Sampled:	2023-09-26 13:36				
Anions							
Bromide		< 0.10	N/A	0.10	mg/L	2023-10-01	
Chloride		0.10	AO ≤ 250	0.10	mg/L	2023-10-01	
Fluoride		0.24	MAC = 1.5		mg/L	2023-10-01	
Nitrate (as N)		0.029	MAC = 10	0.010	mg/L	2023-10-01	HT1
Nitrite (as N)		< 0.010	MAC = 1	0.010	mg/L	2023-10-01	HT1
Phosphate (as P)		< 0.0050	N/A	0.0050	mg/L	2023-10-01	HT1
Sulfate		63.1	AO ≤ 500	1.0	mg/L	2023-10-01	
BCMOE Aggregate	Hydrocarbons						
EPHw10-19		< 250	N/A	250	μg/L	2023-10-06	
EPHw19-32		< 250	N/A	250		2023-10-06	
Surrogate: 2-Methy	/Inonane (EPH/F2-4)	86	-	60-140	10	2023-10-06	
Calculated Paramet	ers						
Hardness, Dissolve	ed (as CaCO3)	193	N/A	0.500	ma/l	N/A	
Nitrate+Nitrite (as I		0.0288	N/A	0.0100		N/A	
Nitrogen, Total	'	0.183	N/A	0.0500		N/A	
Dissolved Metals					<u> </u>		
Aluminum, dissolve	ed	0.0052	N/A	0.0050	ma/L	2023-10-05	
Antimony, dissolve		< 0.00020	N/A	0.00020		2023-10-05	
Arsenic, dissolved		< 0.00050	N/A	0.00050		2023-10-05	
Barium, dissolved		0.0281	N/A	0.0050		2023-10-05	
Beryllium, dissolve	d	< 0.00010	N/A	0.00010		2023-10-05	
Bismuth, dissolved		< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, dissolved		< 0.0500	N/A	0.0500	mg/L	2023-10-05	
Cadmium, dissolve	ed .	0.000028	N/A	0.000010	mg/L	2023-10-05	
Calcium, dissolved		53.1	N/A	0.20	mg/L	2023-10-05	
Chromium, dissolve	ed	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Cobalt, dissolved		< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Copper, dissolved		< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Iron, dissolved		< 0.010	N/A	0.010		2023-10-05	
Lead, dissolved		< 0.00020	N/A	0.00020		2023-10-05	
Lithium, dissolved		0.00158	N/A	0.00010		2023-10-05	
Magnesium, dissol		14.7	N/A	0.010		2023-10-05	
Manganese, dissol		< 0.00020	N/A	0.00020		2023-10-05	
Mercury, dissolved		< 0.000010	N/A	0.000010		2023-10-06	
Molybdenum, disso	olved	0.00149	N/A	0.00010		2023-10-05	
Nickel, dissolved	hd	< 0.00040	N/A	0.00040		2023-10-05	
Phosphorus, disso		< 0.050	N/A	0.050		2023-10-05	
Potassium, dissolv		0.29	N/A		mg/L	2023-10-05	
Selenium, dissolve	u	0.00117	N/A	0.00050		2023-10-05	
Silicon, dissolved		2.1	N/A	0.000050	mg/L	2023-10-05	
Silver, dissolved		< 0.000050	N/A	0.000030	my/L	2023-10-05	Page 2 of 1



REPORTED TO Elk River Alliance PROJECT CBWM-2023				WORK ORDER REPORTED	23l3653 2023-10-1	1 14:37
Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
B01001_20230926_ (23l3653-01) Matrix:	Water Sampled	2023-09-26 13:36,	Continued			
Dissolved Metals, Continued						
Sodium, dissolved	0.63	N/A	0.10	mg/L	2023-10-05	
Strontium, dissolved	0.667	N/A	0.0010	mg/L	2023-10-05	
Sulfur, dissolved	20.9	N/A	3.0	mg/L	2023-10-05	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2023-10-05	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Tungsten, dissolved	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, dissolved	0.000998	N/A	0.000020	mg/L	2023-10-05	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2023-10-05	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
General Parameters						
Alkalinity, Total (as CaCO3)	144	N/A	1.0	mg/L	2023-10-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A		mg/L	2023-10-03	
Alkalinity, Bicarbonate (as CaCO3)	144	N/A		mg/L	2023-10-03	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A		mg/L	2023-10-03	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A		mg/L	2023-10-03	
Ammonia, Total (as N)	< 0.050	None Required	0.050		2023-10-03	
BOD, 5-day	< 6.5	N/A		mg/L	2023-10-04	
Carbon, Total Organic	3.52	N/A		mg/L	2023-10-09	
Carbon, Dissolved Organic	3.01	N/A		mg/L	2023-10-09	
Chemical Oxygen Demand	< 20	N/A		mg/L	2023-10-02	
Nitrogen, Total Kjeldahl	0.154	N/A	0.050		2023-10-05	
Phosphorus, Total (as P)	0.0061	N/A	0.0050		2023-10-03	
Solids, Total Suspended	< 4.0	N/A		mg/L	2023-10-05	HT1
Total Metals				-		
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-10-06	
Antimony, total	< 0.00020	MAC = 0.006	0.00020		2023-10-06	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050		2023-10-06	
Barium, total	0.0284	MAC = 2	0.0050		2023-10-06	
Beryllium, total	< 0.00010	N/A	0.00010		2023-10-06	
Bismuth, total	< 0.00010	N/A	0.00010		2023-10-06	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-10-06	
Cadmium, total	0.000024	MAC = 0.007	0.000010		2023-10-06	
Calcium, total	53.1	None Required		mg/L	2023-10-06	
Chromium, total	< 0.00050	MAC = 0.05	0.00050		2023-10-06	
Cobalt, total	< 0.00010	N/A	0.00010		2023-10-06	
Copper, total	< 0.00040	MAC = 2	0.00040		2023-10-06	
Iron, total	< 0.010	AO ≤ 0.3		mg/L	2023-10-06	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-10-06	2000 2 of 1



Total Metals, Continued Lithium, total Magnesium, total Manganese, total Mercury, total Molybdenum, total Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Tellurium, total Thallium, total Tin, total Titanium, total Tungsten, total Vanadium, total Zinc, total Zirconium, total	Result 0.00153 14.1 < 0.00020 < 0.000010 0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.000050 < 0.000020 < 0.00010 < 0.00010 < 0.00020	N/A None Required MAC = 0.12 MAC = 0.001 N/A N/A N/A N/A N/A N/A N/A N/	0.00010 0.010 0.00020 0.000010 0.00040 0.050 0.10 0.00050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	Qualifie
Lithium, total Magnesium, total Magnese, total Mercury, total Molybdenum, total Phosphorus, total Potassium, total Selenium, total Silicon, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Uranium, total Vanadium, total Zirconium, total Zirconium, total	0.00153 14.1 < 0.00020 < 0.000010 0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A None Required MAC = 0.12 MAC = 0.001 N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A N/A N/A N/A	0.00010 0.010 0.00020 0.000010 0.00040 0.050 0.10 0.00050 0.10 0.00050 0.10 0.00050 0.10 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Lithium, total Magnesium, total Manganese, total Mercury, total Molybdenum, total Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Zinc, total Zirconium, total Zirconium, total	14.1 < 0.00020 < 0.000010 0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	None Required MAC = 0.12 MAC = 0.001 N/A N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A N/A	0.010 0.00020 0.000010 0.00040 0.050 0.10 0.00050 0.10 0.00050 0.10 0.0010 3.0 0.00050 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Magnesium, total Manganese, total Mercury, total Molybdenum, total Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zirconium, total Zirconium, total	14.1 < 0.00020 < 0.000010 0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	None Required MAC = 0.12 MAC = 0.001 N/A N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A N/A	0.010 0.00020 0.000010 0.00040 0.050 0.10 0.00050 0.10 0.00050 0.10 0.0010 3.0 0.00050 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Manganese, total Mercury, total Molybdenum, total Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Titanium, total Uranium, total Vanadium, total Zirconium, total Zirconium, total	< 0.00020 < 0.00010 0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.00050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00020	MAC = 0.12 MAC = 0.001 N/A N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A N/A	0.00020 0.00010 0.00010 0.00040 0.050 0.10 0.00050 0.10 0.00050 0.10 0.0010 3.0 0.00050 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Manganese, total Mercury, total Molybdenum, total Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Titanium, total Tungsten, total Uranium, total Zinc, total Zirconium, total Zirconium, total	< 0.000010 0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	MAC = 0.001 N/A N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A	0.000010 0.00010 0.00040 0.050 0.10 0.00050 1.0 0.000050 0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Molybdenum, total Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Titanium, total Tungsten, total Uranium, total Zinc, total Zirconium, total Zirconium, total	0.00148 0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A	0.00010 0.00040 0.050 0.10 0.00050 1.0 0.000050 0.10 0.0010 3.0 0.00050 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Nickel, total Phosphorus, total Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Titanium, total Tungsten, total Uranium, total Zinc, total Zirconium, total Zirconium, total	0.00072 < 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A	0.00040 0.050 0.10 0.00050 1.0 0.00050 0.10 0.0010 3.0 0.00050 0.00050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Phosphorus, total Potassium, total Selenium, total Silicon, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (2313653)	< 0.050 0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A N/A N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A	0.050 0.10 0.00050 1.0 0.000050 0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Potassium, total Selenium, total Silicon, total Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Titanium, total Uranium, total Uranium, total Zinc, total Zirconium, total Zirconium, total 301002_20230926_ (2313653	0.30 0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A	0.10 0.00050 1.0 0.000050 0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Selenium, total Silicon, total Silver, total Sodium, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Tin, total Titanium, total Titanium, total Uranium, total Uranium, total Zinc, total Zirconium, total Zirconium, total	0.00112 2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00050 < 0.00020 < 0.00010 < 0.00020	MAC = 0.05 N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A	0.00050 1.0 0.000050 0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Silicon, total Silver, total Sodium, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (2313653)	2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A N/A	1.0 0.000050 0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653)	2.2 < 0.000050 0.61 0.665 21.7 < 0.00050 < 0.00020 < 0.00010 < 0.00020	None Required AO ≤ 200 MAC = 7 N/A N/A N/A N/A N/A	0.000050 0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Silver, total Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653)	0.61 0.665 21.7 < 0.00050 < 0.00020 < 0.00010 < 0.00020	AO ≤ 200 MAC = 7 N/A N/A N/A N/A	0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06 2023-10-06	
Sodium, total Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653	0.665 21.7 < 0.00050 < 0.00020 < 0.00010 < 0.00020	AO ≤ 200 MAC = 7 N/A N/A N/A N/A	0.10 0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06	
Strontium, total Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653)	0.665 21.7 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A N/A N/A N/A	0.0010 3.0 0.00050 0.000020	mg/L mg/L mg/L	2023-10-06 2023-10-06 2023-10-06	
Sulfur, total Tellurium, total Thallium, total Thorium, total Tin, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23I3653	21.7 < 0.00050 < 0.00020 < 0.00010 < 0.00020	N/A N/A N/A N/A	3.0 0.00050 0.000020	mg/L mg/L	2023-10-06 2023-10-06	
Tellurium, total Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653)	< 0.00050 < 0.000020 < 0.00010 < 0.00020	N/A N/A N/A	0.00050 0.000020	mg/L	2023-10-06	
Thallium, total Thorium, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653	< 0.000020 < 0.00010 < 0.00020	N/A N/A	0.000020			
Thorium, total Tin, total Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653	< 0.00010 < 0.00020	N/A				
Tin, total Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653	< 0.00020				2023-10-06	
Titanium, total Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653		IN/A	0.00020		2023-10-06	
Tungsten, total Uranium, total Vanadium, total Zinc, total Zirconium, total	< 0.0050	N/A	0.0050		2023-10-06	
Uranium, total Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653	< 0.0010	N/A	0.0010		2023-10-06	
Vanadium, total Zinc, total Zirconium, total 301002_20230926_ (23l3653	0.00101	MAC = 0.02	0.000020	-	2023-10-06	
Zinc, total Zirconium, total 301002_20230926_ (23l3653	< 0.0050	N/A	0.0050		2023-10-06	
Zirconium, total 301002_20230926_ (23l3653	< 0.0040	AO ≤ 5	0.0040		2023-10-06	
B01002_20230926_ (23l3653	< 0.00010	N/A	0.00010		2023-10-06	
Amons	8-02) Matrix: Water Sample	d: 2023-09-26 12:40				
Bromide	< 0.10	N/A	0.10	mg/L	2023-10-01	
Chloride	< 0.10	AO ≤ 250	0.10	mg/L	2023-10-01	
Fluoride	0.26	MAC = 1.5	0.10	mg/L	2023-10-01	
Nitrate (as N)	0.023	MAC = 10	0.010	mg/L	2023-10-01	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-10-01	HT1
Phosphate (as P)	< 0.0050	N/A	0.0050	mg/L	2023-10-01	HT1
Sulfate	62.6	AO ≤ 500	1.0	mg/L	2023-10-01	
BCMOE Aggregate Hydrocarbo	ons					
EPHw10-19	< 250	N/A	250	μg/L	2023-10-05	
EPHw19-32	< 250	N/A	250	μg/L	2023-10-05	
Surrogate: 2-Methylnonane (E	PH/F2-4) 11		60-140		2023-10-05	S09a
Calculated Parameters						
Hardness, Dissolved (as CaCo	D3) 195	N/A	0.500	mg/L	N/A	



REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER

2313653

REPORTED 2023-10-11 14:37

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
B01002_20230926_ (23l3653-02) Ma	trix: Water Sampled:	2023-09-26 12:40	, Continued			
Calculated Parameters, Continued						
Nitrate+Nitrite (as N)	0.0228	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.153	N/A	0.0500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Antimony, dissolved	< 0.00020	N/A	0.00020		2023-10-05	
Arsenic, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Barium, dissolved	0.0280	N/A	0.0050		2023-10-05	
Beryllium, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Bismuth, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Boron, dissolved	< 0.0500	N/A	0.0500		2023-10-05	
Cadmium, dissolved	0.000024	N/A	0.000010		2023-10-05	
Calcium, dissolved	53.5	N/A		mg/L	2023-10-05	
Chromium, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Cobalt, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Copper, dissolved	< 0.00040	N/A	0.00040		2023-10-05	
Iron, dissolved	< 0.010	N/A	0.010		2023-10-05	
Lead, dissolved	< 0.0020	N/A	0.00020		2023-10-05	
Lithium, dissolved	0.00159	N/A	0.00020		2023-10-05	
Magnesium, dissolved	14.9	N/A	0.010		2023-10-05	
Manganese, dissolved	< 0.00020	N/A	0.00020		2023-10-05	
Mercury, dissolved	< 0.00020	N/A	0.00020		2023-10-06	
Molybdenum, dissolved	0.00152	N/A	0.00010		2023-10-05	
Nickel, dissolved	< 0.00132	N/A				
Phosphorus, dissolved	< 0.050	N/A	0.00040		2023-10-05	
•		N/A	0.050		2023-10-05	
Potassium, dissolved	0.29			mg/L	2023-10-05	
Selenium, dissolved	0.00113	N/A	0.00050		2023-10-05	
Silicon, dissolved	2.1	N/A		mg/L	2023-10-05	
Silver, dissolved	< 0.000050	N/A	0.000050		2023-10-05	
Sodium, dissolved	0.62	N/A		mg/L	2023-10-05	
Strontium, dissolved	0.660	N/A	0.0010		2023-10-05	
Sulfur, dissolved	20.8	N/A		mg/L	2023-10-05	
Tellurium, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Thallium, dissolved	< 0.000020	N/A	0.000020		2023-10-05	
Thorium, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Tin, dissolved	< 0.00020	N/A	0.00020		2023-10-05	
Titanium, dissolved	< 0.0050	N/A	0.0050		2023-10-05	
Tungsten, dissolved	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, dissolved	0.000998	N/A	0.000020		2023-10-05	
Vanadium, dissolved	< 0.0050	N/A	0.0050		2023-10-05	
Zinc, dissolved	0.0126	N/A	0.0040	mg/L	2023-10-05	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	



REPORTED TO	Elk River Alliance	WORK ORDER	2313653
PROJECT	CBWM-2023	REPORTED	2023-10-11 14:37

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
B01002_20230926_ (23l3653-02) Matrix	: Water Sampled	: 2023-09-26 12:40,	Continued			
General Parameters, Continued						
Alkalinity, Total (as CaCO3)	144	N/A	1.0	mg/L	2023-10-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-03	
Alkalinity, Bicarbonate (as CaCO3)	144	N/A	1.0	mg/L	2023-10-03	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-03	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-03	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-10-03	
BOD, 5-day	< 6.5	N/A	2.0	mg/L	2023-10-04	
Carbon, Total Organic	1.65	N/A	0.50	mg/L	2023-10-09	
Carbon, Dissolved Organic	1.65	N/A	0.50	mg/L	2023-10-09	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2023-10-02	
Nitrogen, Total Kjeldahl	0.130	N/A	0.050	mg/L	2023-10-05	
Phosphorus, Total (as P)	< 0.0050	N/A	0.0050	mg/L	2023-10-03	
Solids, Total Suspended	< 4.0	N/A	2.0	mg/L	2023-10-05	HT1
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-10-06	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-10-06	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2023-10-06	
Barium, total	0.0284	MAC = 2	0.0050	mg/L	2023-10-06	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-06	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-10-06	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-10-06	
Cadmium, total	0.000028	MAC = 0.007	0.000010	mg/L	2023-10-06	
Calcium, total	52.6	None Required	0.20	mg/L	2023-10-06	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-06	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-10-06	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2023-10-06	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2023-10-06	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-10-06	
Lithium, total	0.00139	N/A	0.00010	mg/L	2023-10-06	
Magnesium, total	14.0	None Required	0.010	mg/L	2023-10-06	
Manganese, total	< 0.00020	MAC = 0.12	0.00020	mg/L	2023-10-06	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-06	
Molybdenum, total	0.00153	N/A	0.00010	mg/L	2023-10-06	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-06	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-06	
Potassium, total	0.30	N/A	0.10	mg/L	2023-10-06	
Selenium, total	0.00108	MAC = 0.05	0.00050	mg/L	2023-10-06	
Silicon, total	2.2	N/A	1.0	mg/L	2023-10-06	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-06	
Sodium, total	0.60	AO ≤ 200	0.10	mg/L	2023-10-06	
Strontium, total	0.642	MAC = 7	0.0010	mg/L	2023-10-06	
Sulfur, total	21.7	N/A	3.0	mg/L	2023-10-06	



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 23l3653

 PROJECT
 CBWM-2023
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 2023-10-11 14:37

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
B01002_20230926_ (23l3653-	02) Matrix: Water Sampled:	2023-09-26 12:40	, Continued			
Total Metals, Continued						
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-06	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-10-06	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-06	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-10-06	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-06	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-10-06	
Uranium, total	0.00101	MAC = 0.02	0.000020	mg/L	2023-10-06	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-06	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-10-06	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-06	

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

S09a The surrogate recovery for this sample is outside of established control limits wide mouth data, not data affected



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance **PROJECT** CBWM-2023

WORK ORDER

2313653

REPORTED 2023-10-11 14:37

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2019)	Dissolved Oxygen Meter	✓	Kelowna
Carbon, Dissolved Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Carbon, Total Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2022)	Closed Reflux, Colorimetry	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2021)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL Reporting Limit (default)

Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors

AO Aesthetic Objective

MAC Maximum Acceptable Concentration (health based)

mg/L Milligrams per litre

OG Operational Guideline (treated water)

μg/L Micrograms per litre

EPA United States Environmental Protection Agency Test Methods

SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER REPORTED 2313653

2023-10-11 14:37

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted red. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do <u>not</u> take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:TeamCaro@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.



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The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire
 analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
 Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B3J0010									
Blank (B3J0010-BLK1)			Prepared	d: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	< 0.05	0.05 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.05	0.05 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
Blank (B3J0010-BLK2)			Prepared	d: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	< 0.05	0.05 mg/L			-				
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.05	0.05 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
Blank (B3J0010-BLK3)			Prepared	d: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	< 0.05	0.05 mg/L	· · · · · · · · · · · · · · · · · · ·						
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.05	0.05 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
LCS (B3J0010-BS1)			Prepared	d: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	3.99	0.05 mg/L	4.00		100	85-115			
Chloride	16.0	0.10 mg/L	16.0		100	90-110			
Fluoride	3.93	0.05 mg/L	4.00		98	88-108			
Nitrate (as N)	3.93	0.010 mg/L	4.00		98	90-110			
Nitrite (as N)	2.01	0.010 mg/L	2.00		101	85-115			
Phosphate (as P)	0.964	0.0050 mg/L	1.00		96	80-120			
Sulfate	16.0	0.5 mg/L	16.0		100	90-110			
LCS (B3J0010-BS2)			Prepared	d: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	4.01	0.05 mg/L	4.00		100	85-115	-		



REPORTED TO Elk River Alliand PROJECT CBWM-2023	ce				WORK REPOR	ORDER TED	2313 2023	653 3-10-11	14:37
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
Anions, Batch B3J0010, Continued									
LCS (B3J0010-BS2), Continued			Prepared	: 2023-10-0	1, Analyze	d: 2023-1	0-01		
Chloride	15.8	0.10 mg/L	16.0		98	90-110			
Fluoride	4.03	0.05 mg/L	4.00		101	88-108			
Nitrate (as N)	4.03	0.010 mg/L	4.00		101	90-110			
Nitrite (as N)	2.01	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)	0.950	0.0050 mg/L	1.00		95	80-120			
Sulfate	15.4	0.5 mg/L	16.0		96	90-110			
LCS (B3J0010-BS3)			Prepared	: 2023-10-0	1, Analyze	d: 2023-1	0-01		
Bromide	4.01	0.05 mg/L	4.00		100	85-115			
Chloride	15.9	0.10 mg/L	16.0		99	90-110			
Fluoride	4.00	0.05 mg/L	4.00		100	88-108			
Nitrate (as N)	4.00	0.010 mg/L	4.00		100	90-110			
Nitrite (as N)	2.01	0.010 mg/L	2.00		100	85-115			
Phosphate (as P) Sulfate	0.936 15.8	0.0050 mg/L	1.00 16.0		94 99	80-120 90-110			
BCMOE Aggregate Hydrocarbons, Ba		0.5 mg/L	10.0			00 110			
Blank (B3J0347-BLK1)	11011 1550547		Prepared	: 2023-10-0	5, Analyze	ed: 2023-1	0-05		
EPHw10-19	< 250	250 μg/L			<u> </u>				
EPHw19-32	< 250	250 μg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	1640	μg/L	2200		74	60-140			
LCS (B3J0347-BS2)		, J		: 2023-10-0			0-05		
EPHw10-19	17000	250 µg/L	15400		110	70-130			
EPHw19-32	24200	250 μg/L	22200		109	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	902	μg/L	2200		41	60-140			S09
LCS Dup (B3J0347-BSD2)				: 2023-10-0			0-05		
EPHw10-19	16800	417 µg/L	15400		109	70-130	1	20	
EPHw19-32	24300	417 µg/L	22200		110	70-130	< 1	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	938	μg/L	2200		43	60-140			S09
BCMOE Aggregate Hydrocarbons, Ba	atch B3J0458								
Blank (B3J0458-BLK1)			Prepared	: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
	< 250	250 μg/L							
EPHw19-32	< 250	250 μg/L							
EPHw19-32			2200		90	60-140			
EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2)	< 250 1990	250 μg/L μg/L	Prepared	: 2023-10-0	5, Analyze	d: 2023-1	0-06		
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19	< 250 1990 15200	250 μg/L μg/L 250 μg/L	Prepared	: 2023-10-0	98	d: 2023-1 70-130	0-06		
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32	< 250 1990 15200 22700	250 µg/L µg/L 250 µg/L 250 µg/L	Prepared 15400 22200	: 2023-10-0	95, Analyze 98 102	d: 2023-1 70-130 70-130	0-06		
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19	< 250 1990 15200	250 μg/L μg/L 250 μg/L	Prepared 15400 22200 2200		98 102 78	ed: 2023-1 70-130 70-130 60-140			
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS Dup (B3J0458-BSD2)	< 250 1990 15200 22700 1710	250 µg/L µg/L 250 µg/L 250 µg/L µg/L	Prepared 15400 22200 2200 Prepared	: 2023-10-0 : 2023-10-0	98 102 78 5, Analyze	ed: 2023-1 70-130 70-130 60-140 ed: 2023-1	0-06		
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS Dup (B3J0458-BSD2) EPHw10-19	< 250 1990 15200 22700 1710	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400		95, Analyze 98 102 78 95, Analyze	rd: 2023-1 70-130 70-130 60-140 rd: 2023-1 70-130	0-06	20	
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS Dup (B3J0458-BSD2) EPHw10-19 EPHw10-19 EPHw19-32	<250 1990 15200 22700 1710 15800 23700	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400 22200		98 102 78 15, Analyze 102 102	rd: 2023-1 70-130 70-130 60-140 rd: 2023-1 70-130 70-130	0-06	20 20	
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS Dup (B3J0458-BSD2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4)	< 250 1990 15200 22700 1710	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400		95, Analyze 98 102 78 95, Analyze	rd: 2023-1 70-130 70-130 60-140 rd: 2023-1 70-130	0-06		
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS Dup (B3J0458-BSD2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) Dissolved Metals, Batch B3J0401	<250 1990 15200 22700 1710 15800 23700	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400 22200 2200 2200	: 2023-10-0	98 102 78 15, Analyze 102 107 91	rd: 2023-1 70-130 70-130 60-140 rd: 2023-1 70-130 70-130 60-140	0-06 4 4		
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS (B3J0458-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) LCS Dup (B3J0458-BSD2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4)	<250 1990 15200 22700 1710 15800 23700	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400 22200 2200 2200		98 102 78 15, Analyze 102 107 91	rd: 2023-1 70-130 70-130 60-140 rd: 2023-1 70-130 70-130 60-140	0-06 4 4		



Molybdenum, dissolved

Nickel, dissolved

APPENDIX 2: QUALITY CONTROL RESULTS

								1		
REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED	23130 2023	653 3-10-11	14:37
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
Dissolved Metals,	Batch B3J0401, Contir	nued								
Blank (B3J0401-B	LK1), Continued			Prepared	d: 2023-10-0)5, Analyze	d: 2023-1	0-05		
Arsenic, dissolved		< 0.00050	0.00050 mg/L							
Barium, dissolved		< 0.0050	0.0050 mg/L							
Beryllium, dissolved		< 0.00010	0.00010 mg/L							
Bismuth, dissolved		< 0.00010	0.00010 mg/L							
Boron, dissolved		< 0.0500	0.0500 mg/L							
Cadmium, dissolved		< 0.000010	0.000010 mg/L							
Calcium, dissolved		< 0.20	0.20 mg/L							
Chromium, dissolved		< 0.00050	0.00050 mg/L							
Cobalt, dissolved		< 0.00010	0.00010 mg/L							
Copper, dissolved		< 0.00040	0.00040 mg/L							
Iron, dissolved		< 0.010	0.010 mg/L							
Lead, dissolved		< 0.00020	0.00020 mg/L							
Lithium, dissolved Magnesium, dissolve	<u>ــــــــــــــــــــــــــــــــــــ</u>	< 0.00010	0.00010 mg/L							
Manganese, dissolve		< 0.010	0.010 mg/L 0.00020 mg/L							
Molybdenum, dissolve		< 0.00020	0.00020 Hig/L 0.00010 mg/L							
Nickel. dissolved	eu	< 0.00010	0.00010 mg/L							
Phosphorus, dissolve	nd	< 0.050	0.00040 mg/L							
Potassium, dissolved		< 0.10	0.10 mg/L							
Selenium, dissolved		< 0.00050	0.00050 mg/L							
Silicon, dissolved		< 1.0	1.0 mg/L							
Silver, dissolved		< 0.000050	0.000050 mg/L							
Sodium, dissolved		< 0.10	0.10 mg/L							
Strontium, dissolved		< 0.0010	0.0010 mg/L							
Sulfur, dissolved		< 3.0	3.0 mg/L							
Tellurium, dissolved		< 0.00050	0.00050 mg/L							
Thallium, dissolved		< 0.000020	0.000020 mg/L							
Thorium, dissolved		< 0.00010	0.00010 mg/L							
Tin, dissolved		< 0.00020	0.00020 mg/L							
Titanium, dissolved		< 0.0050	0.0050 mg/L							
Tungsten, dissolved		< 0.0010	0.0010 mg/L							
Uranium, dissolved		< 0.000020	0.000020 mg/L							
Vanadium, dissolved		< 0.0050	0.0050 mg/L							
Zinc, dissolved		< 0.0040	0.0040 mg/L							
Zirconium, dissolved		< 0.00010	0.00010 mg/L							
LCS (B3J0401-BS	1)			Prepared	d: 2023-10-0)5, Analyze	d: 2023-1	0-05		
Aluminum, dissolved		4.24	0.0050 mg/L	4.00		106	80-120			
Antimony, dissolved		0.0413	0.00020 mg/L	0.0400		103	80-120			
Arsenic, dissolved		0.404	0.00050 mg/L	0.400		101	80-120			
Barium, dissolved		0.0417	0.0050 mg/L	0.0400		104	80-120			
Beryllium, dissolved		0.0427	0.00010 mg/L	0.0400		107	80-120			
Bismuth, dissolved		0.0413	0.00010 mg/L	0.0400		103	80-120			
Boron, dissolved		0.425	0.0500 mg/L	0.400		106	80-120			
Cadmium, dissolved		0.0407	0.000010 mg/L	0.0400		102	80-120			
Calcium, dissolved		4.20	0.20 mg/L	4.00		105	80-120			
Chromium, dissolved		0.0410	0.00050 mg/L	0.0400		102	80-120			
Cobalt, dissolved		0.0403	0.00010 mg/L	0.0400		101	80-120			
Copper, dissolved	<u> </u>	0.0401	0.00040 mg/L	0.0400		100	80-120			
Iron, dissolved		4.14	0.010 mg/L	4.00		103	80-120			
Lead, dissolved		0.0413	0.00020 mg/L	0.0400		103	80-120			
Lithium, dissolved		0.0434	0.00010 mg/L	0.0400		108	80-120			
Magnesium, dissolve		4.17	0.010 mg/L	4.00		104	80-120			
Manganese, dissolve		0.0421	0.00020 mg/L	0.0400		105	80-120			
Molybdenum dissolv	ed	0 0393	0.00010 ma/l	0.0400		98	80-120			

0.0400

0.0400

98

80-120

80-120

0.00010 mg/L

0.00040 mg/L

0.0393

0.0405



Result Rel Units Spike Soute Variety Rel Continued Rel Units Spike Result Variety Rel Continued Rel Units Rel Un	REPORTED TO Elk River Alliance PROJECT CBWM-2023						_	WORK ORDER REPORTED		653 8-10-11	14:37
Prepared: 2023-10-05, Analyzud: 2023-10-05 Prosporus, dissolved	Analyte		Result	RL Units	•		% REC		% RPD		Qualifie
Prosphorus, dissolved	Dissolved Metals,	Batch B3J0401, Contil	nued								
Potestami, dissolved	LCS (B3J0401-BS	1), Continued			Prepared	l: 2023-10-05	5, Analyze	d: 2023-1	10-05		
Selentini, dissolved	Phosphorus, dissolve	ed	4.21	0.050 mg/L	4.00		105	80-120			
Silcon, dissolved 4.5 1.0 mg/L 4.00 111 80-120	Potassium, dissolved		4.20	0.10 mg/L	4.00		105	80-120			
Silver, dissolved	Selenium, dissolved		0.402	0.00050 mg/L	0.400		100	80-120			
Sodium, dissolved 4.19	Silicon, dissolved		4.5	1.0 mg/L	4.00		111	80-120			
Strontium, dissolved	Silver, dissolved		0.0389	0.000050 mg/L	0.0400		97	80-120			
Sulfur, dissolved 42.4 3.0 mg/L 40.0 166 80-120 Tellurium, dissolved 0.0407 0.00950 mg/L 0.0400 103 80-120 Thallum, dissolved 0.0411 0.000020 mg/L 0.0400 103 80-120 Thorium, dissolved 0.0417 0.000020 mg/L 0.0400 104 80-120 Tranium, dissolved 0.0416 0.00000 mg/L 0.0400 104 80-120 Tranium, dissolved 0.0416 0.00000 mg/L 0.0400 103 80-120 Uranium, dissolved 0.0412 0.000000 mg/L 0.0400 103 80-120 Varandium, dissolved 0.0421 0.000000 mg/L 0.0400 105 80-120 Varandium, dissolved 0.0409 0.00000 mg/L 0.0400 105 80-120 Zirc, dissolved 0.0422 0.00010 mg/L 0.0400 105 80-120 Dissolved Metals, Batch B3/0462 Blank (B3.0462-BLK1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010	Sodium, dissolved		4.19	0.10 mg/L	4.00		105	80-120			
Tellurin, dissolved	Strontium, dissolved		0.0431	0.0010 mg/L	0.0400		108	80-120			
Thallum, dissolved	Sulfur, dissolved		42.4	3.0 mg/L	40.0		106	80-120			
Thorium, dissolved	Tellurium, dissolved		0.0407	0.00050 mg/L	0.0400		102	80-120			
Tin. dissolved 0.0417 0.00020 mg/L 0.0400 104 80-120 17 Tatanium, dissolved 0.0416 0.0050 mg/L 0.0400 104 80-120 17 Tatanium, dissolved 0.0413 0.0010 mg/L 0.0400 103 80-120 17 Tatanium, dissolved 0.0413 0.0010 mg/L 0.0400 103 80-120 17 Tatanium, dissolved 0.0410 0.00020 mg/L 0.0400 103 80-120 17 Tatanium, dissolved 0.0410 0.00050 mg/L 0.0400 103 80-120 17 Tatanium, dissolved 0.0499 0.0040 mg/L 0.400 102 80-120 17 Tatanium, dissolved 0.0420 0.0022 0.00010 mg/L 0.400 102 80-120 17 Tatanium, dissolved 0.0422 0.00010 mg/L 0.400 105 80-120 17 Tatanium, dissolved 1.000020 105 80-120 17 Tatanium, dissolved 1.000020 105 80-120 17 Tatanium, dissolved 1.000020 105 80-120 17 Tatanium, dissolved 1.000010 18 Tatanium, dissolved 1.000010											
Taniun, dissolved	· · · · · · · · · · · · · · · · · · ·										
Tungsten, dissolved 0.0413 0.0010 mg/L 0.0400 103 80-120 Vanadium, dissolved 0.0410 0.00020 mg/L 0.0400 105 80-120 Vanadium, dissolved 0.0410 0.0050 mg/L 0.0400 102 80-120 Zirco, dissolved 0.0492 0.00010 mg/L 0.0400 105 80-120 Dissolved Metals, Batch B3J0462 Blank (B3J0462-BLK1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010											
Uralnium, dissolved 0.0421 0.000020 mg/L 0.0400 105 80-120 Vanadium, dissolved 0.0499 0.0909 mg/L 0.0400 103 80-120 Zirconium, dissolved 0.0499 0.0040 mg/L 0.0400 105 80-120 Dissolved Metals, Batch B3J0462 Blank (B3J0462-BLK1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010											
Manadum, dissolved											
Zinc, dissolved 0.409 0.0040 mg/L 0.400 0.0400 102 80-120 Zirconium, dissolved 0.0422 0.00010 mg/L 0.0400 0.0400 105 80-120 Dissolved Metals, Batch B3J0462 Blank (B3.0462-BLK1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010 mg/L Prepared: 2023-10-05, Analyzed: 2023-10-06 Blank (B3.0462-BLK3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010 mg/L Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010 mg/L Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000251 0.00010 mg/L 0.000250 100 80-120 Repared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000251 0.000010 mg/L 0.000250 100 80-120 Prepared: 2023-10-05, Analyzed: 2023-10-06 LCS (B3.0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.00024 0.000010 mg/L 0.000250 90 80-120 80-120 LCS (B3.0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.00024 0.000010 mg/L 0.000250 95 80-120<											
Dissolved Dis											
Dissolved Metals, Batch B3J0462 Blank (B3J0462-BLK1)											
Prepared: 2023-10-05, Analyzed: 2023-10-06	•	LK1)	< 0.000010	0.000010 mg/l	Prepared	1: 2023-10-05	5, Analyze	d: 2023-1	10-06		
Mercury, dissolved < 0.000010	Mercury, dissolved		< 0.000010	0.000010 mg/L							
Blank (B3J0462-BLK3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved < 0.000010 mg/L LCS (B3J0462-BS1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000251 0.000010 mg/L 0.000250 100 80-120 LCS (B3J0462-BS2) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000224 0.000010 mg/L 0.000250 90 80-120 LCS (B3J0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000238 0.000010 mg/L 0.000250 95 80-120 General Parameters, Batch B3/2942 Blank (B3/2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day 203 53.9 mg/L 198 103 85-115 General Parameters, Batch B3/0025 Blank (B3/30025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3/30025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Blank (B3J0462-B	LK2)			Prepared	1: 2023-10-05	5, Analyze	d: 2023-1	10-06		
Mercury, dissolved < 0.000010 0.000010 mg/L LCS (B3J0462-BS1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000251 0.000010 mg/L 0.000250 100 80-120 LCS (B3J0462-BS2) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000224 0.000010 mg/L 0.000250 90 80-120 LCS (B3J0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000238 0.000010 mg/L 0.000250 95 80-120 General Parameters, Batch B3/2942 Blank (B3l2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L 198 103 85-115 General Parameters, Batch B3/J0025 Blank (B3,J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3,J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Mercury, dissolved		< 0.000010	0.000010 mg/L							
LCS (B3J0462-BS1) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000251 0.000010 mg/L 0.000250 100 80-120 LCS (B3J0462-BS2) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000224 0.000010 mg/L 0.000250 90 80-120 LCS (B3J0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000238 0.000010 mg/L 0.000250 95 80-120 General Parameters, Batch B3/2942 Blank (B312942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L LCS (B312942-BS1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day 203 53.9 mg/L 198 103 85-115 General Parameters, Batch B3/0025 Blank (B3/30025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3/30025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Blank (B3J0462-B	LK3)			Prepared	l: 2023-10-05	5, Analyze	d: 2023-1	10-06		
Mercury, dissolved 0.000251 0.000010 mg/L 0.000250 100 80-120 LCS (B3J0462-BS2) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000224 0.000010 mg/L 0.000250 90 80-120 LCS (B3J0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000238 0.000010 mg/L 0.000250 95 80-120 General Parameters, Batch B3I2942 Blank (B3I2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L 198 103 85-115 General Parameters, Batch B3J0025 Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Mercury, dissolved		< 0.000010	0.000010 mg/L							
Prepared: 2023-10-05, Analyzed: 2023-10-06	LCS (B3J0462-BS	1)			Prepared	l: 2023-10-05	5, Analyze	d: 2023-1	10-06		
Mercury, dissolved 0.000224 0.000010 mg/L 0.000250 90 80-120 LCS (B3J0462-BS3) Prepared: 2023-10-05, Analyzed: 2023-10-06 Mercury, dissolved 0.000238 0.000010 mg/L 0.000250 95 80-120 General Parameters, Batch B3/2942 Blank (B3I2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day 203 53.9 mg/L 198 103 85-115 General Parameters, Batch B3J0025 Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Mercury, dissolved		0.000251	0.000010 mg/L	0.000250		100	80-120			
Prepared: 2023-10-05, Analyzed: 2023-10-06	LCS (B3J0462-BS	2)				: 2023-10-05	5, Analyze	d: 2023-1	10-06		
Mercury, dissolved 0.000238 0.000010 mg/L 0.000250 95 80-120 General Parameters, Batch B3I2942 Blank (B3I2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day 203 53.9 mg/L 198 103 85-115 General Parameters, Batch B3J0025 Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Mercury, dissolved		0.000224	0.000010 mg/L	0.000250		90	80-120			
Blank (B3I2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0 2.0 mg/L LCS (B3I2942-BS1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day 203 53.9 mg/L 198 103 85-115 Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	LCS (B3J0462-BS	3)				: 2023-10-05	5, Analyze	d: 2023-1	10-06		
Blank (B3I2942-BLK1) Prepared: 2023-09-29, Analyzed: 2023-10-04 BOD, 5-day < 2.0	Mercury, dissolved		0.000238	0.000010 mg/L	0.000250		95	80-120			
SOD, 5-day < 2.0 2.0 mg/L	General Parameter	s, Batch B3l2942									
SOD, 5-day < 2.0 2.0 mg/L	Blank (B3I2942-BL	.K1)			Prepared	l: 2023-09-29), Analyze	d: 2023-1	10-04		
BOD, 5-day 203 53.9 mg/L 198 103 85-115 General Parameters, Batch B3J0025 Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L Prepared: 2023-10-02, Analyzed: 2023-10-02	•		< 2.0	2.0 mg/L	•		•				
General Parameters, Batch B3J0025 Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	LCS (B3I2942-BS1)			Prepared	1: 2023-09-29), Analyze	d: 2023-1	10-04		
Blank (B3J0025-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-02 Chemical Oxygen Demand < 20 20 mg/L LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	BOD, 5-day		203	53.9 mg/L	198		103	85-115			
Chemical Oxygen Demand < 20	General Parameter	s, Batch B3J0025									
LCS (B3J0025-BS1) Prepared: 2023-10-02, Analyzed: 2023-10-02	Blank (B3J0025-B	LK1)			Prepared	l: 2023-10-02	2, Analyze	d: 2023-1	10-02		
	•	· · · · · · · · · · · · · · · · · · ·	< 20	20 mg/L	· ·						
Chemical Oxygen Demand 500 20 mg/L 500 100 89-115	LCS (B3J0025-BS	1)			Prepared	l: 2023-10-02	2, Analyze	d: 2023-1	10-02		
· · · · · · · · · · · · · · · · · · ·	Chemical Oxygen De	mand	500	20 mg/L	500		100	89-115			



	Elk River Alliance CBWM-2023					WORK REPOR	_		653 3-10-11	14:37
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters,	Batch B3J0045									
Blank (B3J0045-BLK1	1)			Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC	03)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalei	, ,	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (a		< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as Alkalinity, Hydroxide (as		< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Blank (B3J0045-BLK2	•	1.0	1.0 mg/L	Prenared	I: 2023-10-0	nalvze	d. 2023 -	10-03		
Alkalinity, Total (as CaCC	•	< 1.0	1.0 mg/L	Troparoc	1. 2020 10 0	50, 7 triary 20	u. 2020	10 00		
Alkalinity, Phenolphthalei		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (a	s CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as	CaCO3)	< 1.0	1.0 mg/L							
Blank (B3J0045-BLK3	3)			Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC		< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalei		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (a Alkalinity, Carbonate (as		< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Hydroxide (as		< 1.0	1.0 mg/L							
Blank (B3J0045-BLK4	1)			Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC	•	< 1.0	1.0 mg/L	•						
Alkalinity, Phenolphthalei	n (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (a		< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as Alkalinity, Hydroxide (as		< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
LCS (B3J0045-BS1)	,		<u> </u>	Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC	03)	120	1.0 mg/L	100		120	80-120			
Alkalinity, Phenolphthalei	n (as CaCO3)	79.6	1.0 mg/L	50.0		159	0-200			
LCS (B3J0045-BS2)				Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC	03)	110	1.0 mg/L	100		110	80-120			
Alkalinity, Phenolphthalei	n (as CaCO3)	45.0	1.0 mg/L	50.0		90	0-200			
LCS (B3J0045-BS3)				Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC	03)	107	1.0 mg/L	100		107	80-120			
Alkalinity, Phenolphthalei	n (as CaCO3)	53.7	1.0 mg/L	50.0		107	0-200			
LCS (B3J0045-BS4)				Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Alkalinity, Total (as CaCC	<u>'</u>	110	1.0 mg/L	100		110	80-120			
Alkalinity, Phenolphthalei	n (as CaCO3)	53.9	1.0 mg/L	50.0		108	0-200			
General Parameters,	Batch B3J0051									
Blank (B3J0051-BLK1	1)			Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Phosphorus, Total (as P)		< 0.0050	0.0050 mg/L							
Blank (B3J0051-BLK2	2)			Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Phosphorus, Total (as P)		< 0.0050	0.0050 mg/L							
LCS (B3J0051-BS1)				Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Phosphorus, Total (as P)		0.104	0.0050 mg/L	0.100		104	85-115			
LCS (B3J0051-BS2)				Prepared	I: 2023-10-0	03, Analyze	d: 2023-	10-03		
Phosphorus, Total (as P)		0.104	0.0050 mg/L	0.100	· · · · · · · · · · · · · · · · · · ·	104	85-115			· ·



	lk River Alliance BWM-2023						WORK REPOR			653 3-10-11	14:37
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, I	Batch B3J0057										
Blank (B3J0057-BLK1)				Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		< 0.050	0.050	mg/L							
Blank (B3J0057-BLK2)				Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		< 0.050	0.050	mg/L							
Blank (B3J0057-BLK3)				Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		< 0.050	0.050	mg/L							
Blank (B3J0057-BLK4)				Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		< 0.050	0.050	mg/L							
Blank (B3J0057-BLK5	5)				Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		< 0.050	0.050	mg/L							
Blank (B3J0057-BLK6)				Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)	-	< 0.050	0.050	mg/L							
LCS (B3J0057-BS1)					Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		0.992	0.050	mg/L	1.00		99	85-115			
LCS (B3J0057-BS2)					Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		0.983	0.050	mg/L	1.00		98	85-115			
LCS (B3J0057-BS3)					Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		0.988	0.050	mg/L	1.00		99	85-115			
LCS (B3J0057-BS4)					Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		1.00	0.050	mg/L	1.00		100	85-115			
LCS (B3J0057-BS5)					Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		0.998	0.050	mg/L	1.00		100	85-115			
LCS (B3J0057-BS6)					Prepared	: 2023-10-0	3, Analyze	d: 2023-	10-03		
Ammonia, Total (as N)		0.988	0.050	mg/L	1.00		99	85-115			
General Parameters, I	Batch B3J0253										
Blank (B3J0253-BLK1)				Prepared	: 2023-10-0)4, Analyze	d: 2023-	10-05		
Nitrogen, Total Kjeldahl	,	< 0.050	0.050	mg/L	-		-				
Blank (B3J0253-BLK2)				Prepared	: 2023-10-0)4, Analyze	d: 2023-	10-05		
Nitrogen, Total Kjeldahl	,	< 0.050	0.050	mg/L	,		•				
LCS (B3J0253-BS1)					Prepared	: 2023-10-0)4, Analyze	d: 2023-	10-05		
Nitrogen, Total Kjeldahl		1.07	0.050	mg/L	1.00		107	85-115			
LCS (B3J0253-BS2)					Prepared	: 2023-10-0)4, Analyze	d: 2023-	10-05		
Nitrogen, Total Kjeldahl		1.08	0.050	mg/L	1.00		108	85-115			
General Parameters, I	Batch B3J0360										
Blank (B3J0360-BLK1)				Prepared	: 2023-10-0)5, Analyze	d: 2023-	10-05		
Solids, Total Suspended	<u> </u>	< 2.0	2.0	mg/L	· · · · · · · · · · · · · · · · · · ·						
LCS (B3J0360-BS1)					Prepared	: 2023-10-0)5, Analyze	d: 2023-	10-05		
Solids, Total Suspended		98.0	10.2	mg/L	100		98	85-115			



REPORTED TO	Elk River Alliance	WORK ORDER	2313653
PROJECT	CBWM-2023	REPORTED	2023-10-11 14:37

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B3J0603									
Blank (B3J0603-BLK1)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-	10-09		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0603-BLK2)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-	10-09		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0603-BLK3)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-	10-09		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B3J0603-BS1)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-	10-09		
Carbon, Total Organic	9.24	0.50 mg/L	10.0		92	78-116			
Carbon, Dissolved Organic	9.02	0.50 mg/L	10.0		90	78-116			
LCS (B3J0603-BS2)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-	10-09		
Carbon, Total Organic	9.42	0.50 mg/L	10.0		94	78-116			
Carbon, Dissolved Organic	11.0	0.50 mg/L	10.0		110	78-116			
LCS (B3J0603-BS3)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-	10-09		
Carbon, Total Organic	9.40	0.50 mg/L	10.0		94	78-116			
Carbon, Dissolved Organic	9.09	0.50 mg/L	10.0		91	78-116			

Total Metals, Batch B3J0453

		Prepared: 2023-10-05, Analyzed: 2023-10-06
< 0.0050	0.0050 mg/L	
< 0.00020	0.00020 mg/L	
< 0.00050	0.00050 mg/L	
< 0.0050	0.0050 mg/L	
< 0.00010	0.00010 mg/L	
< 0.00010	0.00010 mg/L	
< 0.0500	0.0500 mg/L	
< 0.000010	0.000010 mg/L	
< 0.20	0.20 mg/L	
< 0.00050	0.00050 mg/L	
< 0.00010	0.00010 mg/L	
< 0.00040	0.00040 mg/L	
< 0.010	0.010 mg/L	
< 0.00020	0.00020 mg/L	
< 0.00010	0.00010 mg/L	
< 0.010	0.010 mg/L	
< 0.00020	0.00020 mg/L	
< 0.00010	0.00010 mg/L	
< 0.00040	0.00040 mg/L	
< 0.050	0.050 mg/L	
< 0.10	0.10 mg/L	
< 0.00050	0.00050 mg/L	
< 1.0	1.0 mg/L	
< 0.000050	0.000050 mg/L	
< 0.10	0.10 mg/L	
< 0.0010	0.0010 mg/L	
< 3.0	3.0 mg/L	
< 0.00050	0.00050 mg/L	
< 0.000020	0.000020 mg/L	
< 0.00010	0.00010 mg/L	
	< 0.00020 < 0.00050 < 0.00050 < 0.00010 < 0.00010 < 0.00010 < 0.000010 < 0.00050 < 0.000050 < 0.000050 < 0.00040 < 0.00020 < 0.00010 < 0.00020 < 0.00010 < 0.00050 < 0.00050 < 0.00010 < 0.00050 < 0.00010 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.00050 < 0.000050 < 0.000050 < 0.000050 < 0.000050	< 0.00020



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR	ORDER TED		653 3-10-11	14:37
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
otal Metals, Batc	h B3J0453, Continued										
Blank (B3J0453-B	LK1), Continued				Prepared	: 2023-10-0)5, Analyze	d: 2023-1	10-06		
Tin, total	•	< 0.00020	0.00020	mg/L							
Titanium, total		< 0.0050	0.0050								
Tungsten, total		< 0.0010	0.0010								
Uranium, total		< 0.000020	0.000020	mg/L							
Vanadium, total		< 0.0050	0.0050	mg/L							
Zinc, total		< 0.0040	0.0040								
Zirconium, total		< 0.00010	0.00010	mg/L							
LCS (B3J0453-BS	1)				Prepared	2023-10-0)5, Analyze	d: 2023-1	10-06		
Aluminum, total		3.94	0.0050	mg/L	4.00		98	80-120			
Antimony, total		0.0404	0.00020		0.0400		101	80-120			
Arsenic, total		0.406	0.00050		0.400		102	80-120			
Barium, total		0.0399	0.0050		0.0400		100	80-120			
Beryllium, total		0.0375	0.00010		0.0400		94	80-120			
Bismuth, total		0.0403	0.00010	mg/L	0.0400		101	80-120			
Boron, total		0.383	0.0500	mg/L	0.400		96	80-120			
Cadmium, total		0.0397	0.000010	mg/L	0.0400		99	80-120			
Calcium, total		3.75	0.20	mg/L	4.00		94	80-120			
Chromium, total		0.0399	0.00050	mg/L	0.0400		100	80-120			
Cobalt, total		0.0402	0.00010	mg/L	0.0400		101	80-120			
Copper, total		0.0399	0.00040	mg/L	0.0400		100	80-120			
Iron, total		3.99	0.010	mg/L	4.00		100	80-120			
Lead, total		0.0401	0.00020	mg/L	0.0400		100	80-120			
Lithium, total		0.0362	0.00010		0.0400		90	80-120			
Magnesium, total		4.04		mg/L	4.00		101	80-120			
Manganese, total		0.0399	0.00020		0.0400		100	80-120			
Molybdenum, total		0.0388	0.00010		0.0400		97	80-120			
Nickel, total		0.0400	0.00040	mg/L	0.0400		100	80-120			
Phosphorus, total		4.06		mg/L	4.00		101	80-120			
Potassium, total		4.04		mg/L	4.00		101	80-120			
Selenium, total		0.401	0.00050		0.400		100	80-120			
Silicon, total		4.2		mg/L	4.00		105	80-120			
Silver, total		0.0404	0.000050		0.0400		101	80-120			
Sodium, total		3.98		mg/L	4.00		99	80-120			
Strontium, total		0.0404	0.0010		0.0400		101	80-120			
Sulfur, total		40.8		mg/L	40.0		102	80-120			
Tellurium, total		0.0390	0.00050		0.0400		98	80-120			
Thallium, total		0.0396	0.000020		0.0400		99	80-120			
Thorium, total		0.0414	0.00010		0.0400		104	80-120			
Tin, total		0.0406	0.00020		0.0400		101	80-120			
Titanium, total		0.0406	0.0050		0.0400		102	80-120			
Tungsten, total		0.0404	0.0010		0.0400		101	80-120			
Uranium, total		0.0409	0.000020		0.0400		102	80-120			
Vanadium, total Zinc, total		0.0397	0.0050 0.0040		0.0400		99	80-120 80-120			
Ziric, iolai Zirconium, total		0.399	0.0040		0.400		100	80-120			
otal Metals, Batc		3.0110	2.00010	···ə· <u>-</u>		: 2023-10-0			10-06		
•	/	< 0.000010	0.000010	ma/l			-,,, 20				
Mercury, total		< 0.000010	0.000010	ilig/L							
Blank (B3J0461-B	LK2)				Prepared	2023-10-0	5, Analyze	d: 2023-1	10-06		
Mercury, total		< 0.000010	0.000010	mg/L							



REPORTED TOElk River AllianceWORK ORDER23l3653PROJECTCBWM-2023REPORTED2023-10-11 14:37

PROJECT CDVVIVI-2023					KEPUK	IED	2023	-10-11	14.37
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B3J0461, Continued	ı								
LCS (B3J0461-BS1)			Prepared	I: 2023-10-0)5, Analyze	d: 2023-	10-06		
Mercury, total	0.000240	0.000010 mg/L	0.000250		96	80-120			
LCS (B3J0461-BS2)			Prepared	I: 2023-10-0)5, Analyze	d: 2023-	10-06		
Mercury, total	0.000226	0.000010 mg/L	0.000250		90	80-120			

QC Qualifiers:

S09 The surrogate recovery for this sample is outside of established control limits Suspected matrix interference, data not affected





CERTIFICATE OF ANALYSIS

You know that the sample you collected after

snowshoeing to site, digging 5 meters, and

REPORTED TO Elk River Alliance

PO Box 2095, 1111 2nd Ave

Fernie, BC V0B1M0

ATTENTION Kaileigh McCallum **WORK ORDER** 23J0772

PO NUMBER

2023-10-06 09:10 / 16.4°C **RECEIVED / TEMP** CBWM-2023 2023-10-18 14:09 **PROJECT REPORTED**

No Number **PROJECT INFO** [info] **COC NUMBER**

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

We've Got Chemistry

It's simple. We figure the more you with our fun working enjoy and engaged team the more members;

Ahead of the Curve

research, Through regulation and instrumentation, knowledge, are your analytical centre the knowledge you BEFORE you need it, so you can stay

racing to get it on a plane so you can submit it to the lab for time sensitive results needed to likely you are to give us continued technical opportunities to support you. make important and expensive decisions (whew) is VERY important. We know that too. up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO

Client Service Representative



COL001_20231003_0910 (23J0772-01) Matrix: Water Sampled: 2023-10-03 09:10 Anions Bromide	REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23J0772 2023-10-1	8 14:09
## Branide	Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
Bromide	COL001_20231003	_0910 (23J0772-01) N	latrix: Water Sam	pled: 2023-10-03	09:10			
Chloride	Anions							
Fluoride	Bromide		< 0.10	N/A	0.10	mg/L	2023-10-08	
Nitrate (as N)	Chloride		0.46	AO ≤ 250	0.10	mg/L	2023-10-08	
Nitrate (as N)	Fluoride		< 0.10	MAC = 1.5			2023-10-08	
Nitrite (as N)	Nitrate (as N)		< 0.010	MAC = 10			2023-10-06	
Phosphate (as P)			< 0.010	MAC = 1			2023-10-06	
Sulfate 4.0 AO ≤ 500 1.0 mg/L 2023-10-08			< 0.0050	N/A			2023-10-08	HT1
BCMOE Aggregate Hydrocarbons EPHw10-19			4.0	AO ≤ 500			2023-10-08	
EPH-W10-19	BCMOE Aggregate H	lvdrocarbons	-					
EPHw19-32		•	< 250	N/A	250	μg/L	2023-10-11	
Calculated Parameters Hardness, Dissolved (as CaCO3) 92.1 N/A 0.500 mg/L N/A Nitrate+Nitrite (as N) < 0.0100	EPHw19-32		< 250	N/A	250		2023-10-11	
Hardness, Dissolved (as CaCO3) 92.1 N/A 0.500 mg/L N/A Nitrate+Nitrite (as N) < 0.0100 N/A 0.0100 mg/L N/A Nitrate+Nitrite (as N) < 0.0152 N/A 0.0500 mg/L N/A N/A Nitrogen, Total N/A N	Surrogate: 2-Methyl	nonane (EPH/F2-4)	73		60-140		2023-10-11	
Nitrate+Nitrite (as N) < 0.0100 N/A 0.0100 mg/L N/A Nitrogen, Total 0.152 N/A 0.0500 mg/L N/A Nitrogen, Total 0.152 N/A 0.0500 mg/L N/A Nitrogen, Total Nitrogen, To	Calculated Paramete	ers						
Nitrate+Nitrite (as N) < 0.0100 N/A 0.0100 mg/L N/A Nitrogen, Total 0.152 N/A 0.0500 mg/L N/A Nitrogen, Total 0.152 N/A 0.0500 mg/L N/A Nitrogen, Total Nitrogen, To	Hardness Dissolve	d (as CaCO3)	92.1	N/A	0.500	ma/l	N/A	
Nitrogen, Total 0.152 N/A 0.0500 mg/L N/A Dissolved Metals Aluminum, dissolved 0.0065 N/A 0.0050 mg/L 2023-10-11 Antimony, dissolved < 0.00020		<u> </u>		<u> </u>				
Dissolved Metals		1						
Aluminum, dissolved 0.0065 N/A 0.0050 mg/L 2023-10-11 Antimony, dissolved < 0.00020			002		0.0000	9/=		
Antimony, dissolved < 0.00020 N/A 0.00020 mg/L 2023-10-11 Arsenic, dissolved < 0.00050		4	0.0065	NI/A	0.0050	ma/l	2023-10-11	
Arsenic, dissolved < 0.00050 N/A 0.00050 mg/L 2023-10-11 Barium, dissolved 0.216 N/A 0.0050 mg/L 2023-10-11 Beryllium, dissolved < 0.00010	·							
Barium, dissolved 0.216 N/A 0.0050 mg/L 2023-10-11 Beryllium, dissolved < 0.00010								
Beryllium, dissolved < 0.00010 N/A 0.00010 mg/L 2023-10-11 Bismuth, dissolved < 0.00010				<u> </u>				
Bismuth, dissolved < 0.00010 N/A 0.00010 mg/L 2023-10-11 Boron, dissolved < 0.0500	· · · · · · · · · · · · · · · · · · ·			<u> </u>				
Boron, dissolved < 0.0500 N/A 0.0500 mg/L 2023-10-11 Cadmium, dissolved 0.000029 N/A 0.000010 mg/L 2023-10-11 Calcium, dissolved 27.0 N/A 0.20 mg/L 2023-10-11 Chromium, dissolved < 0.00050 N/A 0.00050 mg/L 2023-10-11 Chromium, dissolved < 0.00010 N/A 0.00010 mg/L 2023-10-11 Cobalt, dissolved < 0.00064 N/A 0.00010 mg/L 2023-10-11 Copper, dissolved < 0.010 N/A 0.00040 mg/L 2023-10-11 Iron, dissolved < 0.010 N/A 0.010 mg/L 2023-10-11 Iron, dissolved < 0.010 N/A 0.010 mg/L 2023-10-11 Iron, dissolved < 0.010 N/A 0.010 mg/L 2023-10-11 Iron, dissolved < 0.010 N/A 0.0010 mg/L 2023-10-11 Lead, dissolved < 0.00020 N/A 0.00020 mg/L 2023-10-11 Lead, dissolved < 0.00020 N/A 0.00010 mg/L 2023-10-11 <td></td> <td></td> <td></td> <td><u> </u></td> <td></td> <td></td> <td></td> <td></td>				<u> </u>				
Cadmium, dissolved 0.000029 N/A 0.000010 mg/L 2023-10-11 Calcium, dissolved 27.0 N/A 0.20 mg/L 2023-10-11 Chromium, dissolved < 0.00050								
Calcium, dissolved 27.0 N/A 0.20 mg/L 2023-10-11 Chromium, dissolved < 0.00050		\						
Chromium, dissolved < 0.00050 N/A 0.00050 mg/L 2023-10-11 Cobalt, dissolved < 0.00010								
Cobalt, dissolved < 0.00010 N/A 0.00010 mg/L 2023-10-11 Copper, dissolved 0.00064 N/A 0.00040 mg/L 2023-10-11 Iron, dissolved < 0.010								
Copper, dissolved 0.00064 N/A 0.00040 mg/L 2023-10-11 Iron, dissolved < 0.010		u .						
Iron, dissolved < 0.010 N/A 0.010 mg/L 2023-10-11 Lead, dissolved < 0.00020								
Lead, dissolved < 0.00020 N/A 0.00020 mg/L 2023-10-11 Lithium, dissolved 0.0102 N/A 0.00010 mg/L 2023-10-11 Magnesium, dissolved 5.99 N/A 0.010 mg/L 2023-10-11 Manganese, dissolved 0.00113 N/A 0.00020 mg/L 2023-10-11 Mercury, dissolved < 0.000010								
Lithium, dissolved 0.0102 N/A 0.00010 mg/L 2023-10-11 Magnesium, dissolved 5.99 N/A 0.010 mg/L 2023-10-11 Manganese, dissolved 0.00113 N/A 0.00020 mg/L 2023-10-11 Mercury, dissolved < 0.000010								
Magnesium, dissolved 5.99 N/A 0.010 mg/L 2023-10-11 Manganese, dissolved 0.00113 N/A 0.00020 mg/L 2023-10-11 Mercury, dissolved < 0.000010								
Manganese, dissolved 0.00113 N/A 0.00020 mg/L 2023-10-11 Mercury, dissolved < 0.000010	·	 ed						
Mercury, dissolved < 0.000010 N/A 0.000010 mg/L 2023-10-14 Molybdenum, dissolved 0.00061 N/A 0.00010 mg/L 2023-10-11 Nickel, dissolved < 0.00040								
Molybdenum, dissolved 0.00061 N/A 0.00010 mg/L 2023-10-11 Nickel, dissolved < 0.00040		<u> </u>						
Nickel, dissolved < 0.00040 N/A 0.00040 mg/L 2023-10-11 Phosphorus, dissolved < 0.050		ved						
Phosphorus, dissolved < 0.050 N/A 0.050 mg/L 2023-10-11 Potassium, dissolved 0.59 N/A 0.10 mg/L 2023-10-11 Selenium, dissolved < 0.00050								
Potassium, dissolved 0.59 N/A 0.10 mg/L 2023-10-11 Selenium, dissolved < 0.00050		ved						
Selenium, dissolved < 0.00050 N/A 0.00050 mg/L 2023-10-11 Silicon, dissolved 1.5 N/A 1.0 mg/L 2023-10-11								
Silicon, dissolved 1.5 N/A 1.0 mg/L 2023-10-11								
		<u> </u>						
Silver, dissolved < 0.000050 N/A 0.000050 mg/L 2023-10-11								



REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23J0772 2023-10-1	8 14:09
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
COL001_2023100)3_0910 (23J0772-01) N	latrix: Water Sar	mpled: 2023-10-03	09:10, Contir	nued		
Dissolved Metals, (Continued						
Sodium, dissolved	i	2.80	N/A	0.10	mg/L	2023-10-11	
Strontium, dissolv	ed	0.0936	N/A	0.0010	mg/L	2023-10-11	
Sulfur, dissolved		< 3.0	N/A	3.0	mg/L	2023-10-11	
Tellurium, dissolve	ed	< 0.00050	N/A	0.00050	mg/L	2023-10-11	
Thallium, dissolve	d	< 0.000020	N/A	0.000020	mg/L	2023-10-11	
Thorium, dissolved	d	< 0.00010	N/A	0.00010	mg/L	2023-10-11	
Tin, dissolved		< 0.00020	N/A	0.00020	mg/L	2023-10-11	
Titanium, dissolve	d	< 0.0050	N/A	0.0050	mg/L	2023-10-11	
Tungsten, dissolve	ed	< 0.0010	N/A	0.0010		2023-10-11	
Uranium, dissolve	d	0.000183	N/A	0.000020	mg/L	2023-10-11	
Vanadium, dissolv	red	< 0.0050	N/A	0.0050	mg/L	2023-10-11	
Zinc, dissolved		< 0.0040	N/A	0.0040	mg/L	2023-10-11	
Zirconium, dissolv	red	< 0.00010	N/A	0.00010		2023-10-11	
General Parameter	's						
Alkalinity, Total (as	s CaCO3)	102	N/A	1.0	mg/L	2023-10-11	
	ohthalein (as CaCO3)	< 1.0	N/A		mg/L	2023-10-11	
Alkalinity, Bicarbo		102	N/A		mg/L	2023-10-11	
Alkalinity, Carbona		< 1.0	N/A		mg/L	2023-10-11	
Alkalinity, Hydroxid	,	< 1.0	N/A		mg/L	2023-10-11	
Ammonia, Total (a		< 0.050	None Required	0.050		2023-10-10	
BOD, 5-day	10 11)	< 6.3	N/A		mg/L	2023-10-11	
Chemical Oxygen	Demand	< 20	N/A	20		2023-10-12	
Nitrogen, Total Kje		0.152	N/A	0.050		2023-10-14	
Phosphorus, Total		0.0168	N/A	0.0050		2023-10-14	
Solids, Total Susp		< 2.0	N/A		mg/L	2023-10-12	HT1
Solius, Iolai Susp	ended	~ 2.0	IN/A	2.0	mg/L	2023-10-14	11111
Total Metals							
Aluminum, total		0.0183	OG < 0.1	0.0050	mg/L	2023-10-11	
Antimony, total		< 0.00020	MAC = 0.006	0.00020		2023-10-11	
Arsenic, total		< 0.00050	MAC = 0.01	0.00050		2023-10-11	
Barium, total		0.214	MAC = 2	0.0050		2023-10-11	
Beryllium, total		< 0.00010	N/A	0.00010		2023-10-11	
Bismuth, total		< 0.00010	N/A	0.00010		2023-10-11	
Boron, total		< 0.0500	MAC = 5	0.0500		2023-10-11	
Cadmium, total		0.000033	MAC = 0.007	0.000010		2023-10-11	
Calcium, total		26.1	None Required		mg/L	2023-10-11	
Chromium, total		< 0.00050	MAC = 0.05	0.00050		2023-10-11	
Cobalt, total		< 0.00010	N/A	0.00010		2023-10-11	
Copper, total		0.00073	MAC = 2	0.00040		2023-10-11	
Iron, total		0.0073	AO ≤ 0.3	0.00040		2023-10-11	
Lead, total		< 0.00020	MAC = 0.005	0.00020		2023-10-11	
Lithium, total		0.00955	N/A	0.00020		2023-10-11	
Magnesium, total		5.77	None Required	0.010	mg/L	2023-10-11	



Analyte

REPORTED TO	Elk River Alliance	WORK ORDER	23J0772
PROJECT	CBWM-2023	REPORTED	2023-10-18 14:09

Guideline

Result

Analyzed

Qualifier

RL Units

otal Metals, Continued						
Manganese, total	0.00142	MAC = 0.12	0.00020	mg/L	2023-10-11	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-12	
Molybdenum, total	0.00067	N/A	0.00010	mg/L	2023-10-11	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-11	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-11	
Potassium, total	0.58	N/A	0.10	mg/L	2023-10-11	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-11	
Silicon, total	1.5	N/A	1.0	mg/L	2023-10-11	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-11	
Sodium, total	2.76	AO ≤ 200	0.10	mg/L	2023-10-11	
Strontium, total	0.0912	MAC = 7	0.0010	mg/L	2023-10-11	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2023-10-11	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-11	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-10-11	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-11	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-10-11	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-11	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-10-11	
Uranium, total	0.000194	MAC = 0.02	0.000020	mg/L	2023-10-11	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-11	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-10-11	
			0.00040	ma/l	2022 10 11	
	< 0.00010	N/A	0.00010	IIIg/L	2023-10-11	
			3:57	mg/L	2023-10-11	
COL003_20231003_1357 (23J0772-02)	Matrix: Water Sar	mpled: 2023-10-03 1	3:57 0.10			
COL003_20231003_1357 (23J0772-02) Anions Bromide	Matrix: Water Sar	mpled: 2023-10-03 1 N/A	0.10 0.10	mg/L	2023-10-08	
COL003_20231003_1357 (23J0772-02) Inions Bromide Chloride	Matrix: Water Sar < 0.10 0.35	npled: 2023-10-03 1 N/A AO ≤ 250	0.10 0.10	mg/L mg/L mg/L	2023-10-08 2023-10-08	
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride	<pre>Matrix: Water Sar</pre>	N/A AO ≤ 250 MAC = 1.5	0.10 0.10 0.10 0.10	mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08	
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N)	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10	0.10 0.10 0.10 0.10 0.010	mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06	HT1
COL003_20231003_1357 (23J0772-02) Inions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N)	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1	0.10 0.10 0.10 0.010 0.010 0.010 0.0050	mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-06	HT1
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A	0.10 0.10 0.10 0.010 0.010 0.010 0.0050	mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08	HT1
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A	0.10 0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08	НТ1
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08 2023-10-08 2023-10-08	HT1
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons EPHw10-19	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08 2023-10-08 2023-10-08	HT1
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4)	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08 2023-10-08 2023-10-11	HT1
COL003_20231003_1357 (23J0772-02) Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4)	<pre>< 0.10</pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08 2023-10-08 2023-10-11	HT1
Anions Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons EPHw10-19 EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4) Calculated Parameters	<pre></pre>	N/A AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500 N/A N/A	0.10 0.10 0.10 0.010 0.010 0.0050 1.0 250 250 60-140	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-08 2023-10-08 2023-10-08 2023-10-06 2023-10-08 2023-10-08 2023-10-11 2023-10-11 2023-10-11	HT1



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0772

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-18 14:09

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
COL003_20231003_1357 (23J0772-02) I	Matrix: Water Sam	npled: 2023-10-03	13:57, Contin	ued		
Dissolved Metals						
Aluminum, dissolved	0.0732	N/A	0.0050	mg/L	2023-10-11	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-11	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-11	
Barium, dissolved	0.0490	N/A	0.0050	mg/L	2023-10-11	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-11	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-11	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2023-10-11	
Cadmium, dissolved	0.000086	N/A	0.000010	mg/L	2023-10-13	RE2
Calcium, dissolved	7.65	N/A	0.20	mg/L	2023-10-11	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-11	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-11	
Copper, dissolved	0.00062	N/A	0.00040	mg/L	2023-10-11	
Iron, dissolved	0.024	N/A	0.010	mg/L	2023-10-11	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-11	
Lithium, dissolved	0.00015	N/A	0.00010	mg/L	2023-10-11	
Magnesium, dissolved	1.47	N/A	0.010	mg/L	2023-10-11	
Manganese, dissolved	0.00058	N/A	0.00020	mg/L	2023-10-11	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2023-10-14	
Molybdenum, dissolved	0.00014	N/A	0.00010	mg/L	2023-10-11	
Nickel, dissolved	0.00059	N/A	0.00040	mg/L	2023-10-11	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2023-10-11	
Potassium, dissolved	0.27	N/A	0.10	mg/L	2023-10-11	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-11	
Silicon, dissolved	1.5	N/A	1.0	mg/L	2023-10-11	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2023-10-11	
Sodium, dissolved	0.21	N/A	0.10	mg/L	2023-10-11	
Strontium, dissolved	0.0119	N/A	0.0010	mg/L	2023-10-11	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2023-10-11	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-11	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2023-10-11	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-11	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-11	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-11	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2023-10-11	
Uranium, dissolved	0.000040	N/A	0.000020		2023-10-11	
Vanadium, dissolved	< 0.0050	N/A	0.0050		2023-10-11	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2023-10-11	
Zirconium, dissolved	0.00030	N/A	0.00010	mg/L	2023-10-11	
General Parameters						
Alkalinity, Total (as CaCO3)	25.1	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Bicarbonate (as CaCO3)	25.1	N/A	1.0	mg/L	2023-10-11	



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0772

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-18 14:09

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
COL003_20231003_1357 (23J0772-02)	Matrix: Water Sai	mpled: 2023-10-03	13:57, Contin	ued		
General Parameters, Continued						
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-11	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-10-10	
BOD, 5-day	< 6.3	N/A	2.0	mg/L	2023-10-11	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2023-10-12	
Nitrogen, Total Kjeldahl	0.228	N/A	0.050	mg/L	2023-10-14	
Phosphorus, Total (as P)	0.0163	N/A	0.0050		2023-10-12	
Solids, Total Suspended	< 2.0	N/A		mg/L	2023-10-14	HT1
otal Metals						
Aluminum, total	0.0891	OG < 0.1	0.0050	mg/L	2023-10-12	
Antimony, total	< 0.00020	MAC = 0.006	0.00020		2023-10-12	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050		2023-10-12	
Barium, total	0.0494	MAC = 2	0.0050		2023-10-12	
Beryllium, total	< 0.00010	N/A	0.00010		2023-10-12	
Bismuth, total	< 0.00010	N/A	0.00010		2023-10-12	
Boron, total	< 0.0500	MAC = 5	0.0500		2023-10-12	
Cadmium, total	0.000066	MAC = 0.007	0.000010		2023-10-12	
Calcium, total	7.91	None Required		mg/L	2023-10-12	
Chromium, total	< 0.00050	MAC = 0.05	0.00050		2023-10-12	
Cobalt, total	< 0.00010	N/A	0.00010		2023-10-12	
Copper, total	0.00063	MAC = 2	0.00040		2023-10-12	
Iron, total	0.035	AO ≤ 0.3	0.010		2023-10-12	
Lead, total	< 0.00020	MAC = 0.005	0.00020		2023-10-12	
Lithium, total	0.00018	N/A	0.00010		2023-10-12	
Magnesium, total	1.42	None Required	0.010		2023-10-12	
Manganese, total	0.00076	MAC = 0.12	0.00020		2023-10-12	
Mercury, total	< 0.000010	MAC = 0.001	0.000010		2023-10-12	
Molybdenum, total	0.00018	N/A	0.00010		2023-10-12	
Nickel, total	0.00062	N/A	0.00040	mg/L	2023-10-12	
Phosphorus, total	< 0.050	N/A	0.050		2023-10-12	
Potassium, total	0.26	N/A		mg/L	2023-10-12	
Selenium, total	< 0.00050	MAC = 0.05	0.00050		2023-10-12	
Silicon, total	1.5	N/A		mg/L	2023-10-12	
Silver, total	< 0.000050	None Required	0.000050		2023-10-12	
Sodium, total	0.19	AO ≤ 200		mg/L	2023-10-12	
Strontium, total	0.0120	MAC = 7	0.0010		2023-10-12	
Sulfur, total	< 3.0	N/A		mg/L	2023-10-12	
Tellurium, total	< 0.00050	N/A	0.00050		2023-10-12	
Thallium, total	< 0.000020	N/A	0.000020		2023-10-12	
Thorium, total	< 0.00010	N/A	0.00010		2023-10-12	
Tin, total	< 0.00020	N/A	0.00020		2023-10-12	
Titanium, total	< 0.0050	N/A	0.0050		2023-10-12	



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0772

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-18 14:09

Analyte	Result	Guideline	RL Units	Analyzed Qualifier
COL003_20231003_1357 (23J07	72-02) Matrix: Water Sam	pled: 2023-10-03	13:57, Continued	
Total Metals, Continued				
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2023-10-12
Uranium, total	0.000042	MAC = 0.02	0.000020 mg/L	2023-10-12
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2023-10-12
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2023-10-12
Zirconium, total	0.00030	N/A	0.00010 mg/L	2023-10-12

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

RE2 Result was confirmed by re-analysis prior to reporting.



APPENDIX 1: SUPPORTING INFORMATION

 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0772

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-18 14:09

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2019)	Dissolved Oxygen Meter	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2022)	Closed Reflux, Colorimetry	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2021)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL Reporting Limit (default)

Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors

AO Aesthetic Objective

MAC Maximum Acceptable Concentration (health based)

mg/L Milligrams per litre

OG Operational Guideline (treated water)

μg/L Micrograms per litre

EPA United States Environmental Protection Agency Test Methods

SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER REPORTED 23J0772

2023-10-18 14:09

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do <u>not</u> take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:TeamCaro@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0772

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-18 14:09

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
 Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B3J0541									
Blank (B3J0541-BLK1)			Prepared	I: 2023-10-0	06, Analyze	d: 2023-1	10-06		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 1.0	1.0 mg/L							
Blank (B3J0541-BLK2)			Prepared	I: 2023-10-0	08, Analyze	d: 2023-1	10-08		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 1.0	1.0 mg/L							
Blank (B3J0541-BLK3)			Prepared	I: 2023-10-0	08, Analyze	d: 2023-1	10-08		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 1.0	1.0 mg/L							
LCS (B3J0541-BS1)			Prepared	I: 2023-10-0	06, Analyze	d: 2023-1	10-06		
Bromide	3.91	0.10 mg/L	4.00		98	85-115			
Chloride	16.3	0.10 mg/L	16.0		102	90-110			
Fluoride	4.02	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)	3.88	0.010 mg/L	4.00		97	90-110			
Nitrite (as N)	2.00	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)	1.08	0.0050 mg/L	1.00		108	80-120			
Sulfate	16.1	1.0 mg/L	16.0		101	90-110			
LCS (B3J0541-BS2)			Prepared	I: 2023-10-0	08, Analyze	d: 2023-1	10-08		
Bromide	3.54	0.10 mg/L	4.00		88	85-115			



	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED	23J0 2023	772 3-10-18	14:09
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
Anions, Batch B3J0	541, Continued									
LCS (B3J0541-BS2),	, Continued			Prepared	: 2023-10-0	8, Analyze	d: 2023-1	0-08		
Chloride		15.7	0.10 mg/L	16.0		98	90-110			
Fluoride		3.95	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)		3.63	0.010 mg/L	4.00		91	90-110			
Nitrite (as N)		1.99	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)		0.859	0.0050 mg/L	1.00		86	80-120			
Sulfate		15.4	1.0 mg/L	16.0		96	90-110			
LCS (B3J0541-BS3)				Prepared	: 2023-10-0	8, Analyze	d: 2023-1	0-08		
Bromide		3.54	0.10 mg/L	4.00		88	85-115			
Chloride		15.7	0.10 mg/L	16.0		98	90-110			
Fluoride		3.95	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)		3.63 1.99	0.010 mg/L 0.010 mg/L	4.00		91	90-110			
Nitrite (as N) Phosphate (as P)		0.859	0.0050 mg/L	2.00 1.00		86	85-115 80-120			
Sulfate		15.4	1.0 mg/L	16.0		96	90-110			
Duplicate (B3J0541-	DUP3)		ırce: 23J0772-02	Prepared	: 2023-10-0	8, Analyze	d: 2023-1	0-08		
Bromide		< 0.10	0.10 mg/L		< 0.10				10	
Chloride		0.35	0.10 mg/L		0.35				10	
Fluoride		< 0.10 < 0.010	0.10 mg/L		< 0.10 < 0.010				10	
Nitrate (as N) Nitrite (as N)		< 0.010	0.010 mg/L 0.010 mg/L		< 0.010				15	
Phosphate (as P)		< 0.0050	0.0050 mg/L		< 0.0050				20	
Sulfate		1.8	1.0 mg/L		1.8				10	
Matrix Spike (B3J05	/1_MS3\	Sou	ırce: 23J0772-02	Drenared	: 2023-10-0	8 Analyzo	d· 2023_1	 ∩_∩8		
Bromide	-1-11100)	3.66	0.10 mg/L	4.00	< 0.10	92	80-120	0-00		
Chloride		17.3	0.10 mg/L	16.0	0.35	106	75-125			
Fluoride		4.15	0.10 mg/L	4.00	< 0.10	103	75-125			
Nitrate (as N)		3.70	0.010 mg/L	4.00	< 0.010	93	75-125			
Nitrite (as N)		2.05	0.010 mg/L	2.00	< 0.010	102	80-120			
Phosphate (as P)		0.742	0.0050 mg/L	1.00	< 0.0050	74	70-130			
Sulfate		18.2	1.0 mg/L	16.0	1.8	102	75-125			
BCMOE Aggregate H	lydrocarbons, Batch l									
33 3	•			Prepared	: 2023-10-1	0, Analyze	d: 2023-1	0-11		
Blank (B3J0831-BL	•		250 μg/L	Prepared	: 2023-10-1	0, Analyze	d: 2023-1	0-11		
Blank (B3J0831-BLK EPHw10-19 EPHw19-32	(1)	B3J0831	250 µg/L 250 µg/L	Prepared	: 2023-10-1	0, Analyze	d: 2023-1	0-11		
Blank (B3J0831-BLK EPHw10-19 EPHw19-32	(1)	B3J0831 < 250		Prepared	: 2023-10-1	0, Analyze 78	d: 2023-1 60-140	0-11		
Blank (B3J0831-BLK EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor	(1) nane (EPH/F2-4)	83J0831 < 250 < 250	250 µg/L	2200	: 2023-10-1 : 2023-10-1	78	60-140			
Blank (B3J0831-BLK EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2)	(1) nane (EPH/F2-4)	83J0831 < 250 < 250	250 µg/L	2200		78	60-140			
Blank (B3J0831-BLK EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19	(1) nane (EPH/F2-4)	< 250 < 250 1730	250 μg/L μg/L	2200 Prepared		78 0, Analyze	<i>60-140</i> d: 2023-1			
Blank (B3J0831-BLE EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32	(1) nane (EPH/F2-4)	< 250 < 250 1730	250 μg/L μg/L 250 μg/L	2200 Prepared		78 0, Analyze 109	60-140 d: 2023-1 70-130			
Blank (B3J0831-BLF EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor	nane (EPH/F2-4)	< 250 < 250 1730 16800 19600	250 µg/L µg/L 250 µg/L 250 µg/L	2200 Prepared 15400 22200 2200		78 0, Analyze 109 88 61	60-140 d: 2023-1 70-130 70-130 60-140	0-11		
Blank (B3J0831-BLF EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-I	nane (EPH/F2-4)	< 250 < 250 1730 16800 19600	250 µg/L µg/L 250 µg/L 250 µg/L	2200 Prepared 15400 22200 2200	: 2023-10-1	78 0, Analyze 109 88 61	60-140 d: 2023-1 70-130 70-130 60-140	0-11	20	
Blank (B3J0831-BLF EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-BEPHw10-19	nane (EPH/F2-4)	 < 250 < 250 < 250 1730 16800 19600 1360 	250 μg/L μg/L 250 μg/L 250 μg/L μg/L	2200 Prepared 15400 22200 2200 Prepared	: 2023-10-1	78 0, Analyze 109 88 61 0, Analyze	60-140 d: 2023-1 70-130 70-130 60-140 d: 2023-1	0-11 0-11	20 20	
BIANK (B3J0831-BLK EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-I EPHw10-19 EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor	nane (EPH/F2-4) nane (EPH/F2-4) nane (EPH/F2-4)	 < 250 < 250 < 250 1730 16800 19600 1360 17000	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L	2200 Prepared 15400 22200 2200 Prepared 15400	: 2023-10-1	78 0, Analyze 109 88 61 0, Analyze	60-140 d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130	0-11 0-11 1		
Blank (B3J0831-BLK EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-BEPHw10-19 EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor	nane (EPH/F2-4) mane (EPH/F2-4) BSD2) mane (EPH/F2-4)	 < 250 < 250 < 250 1730 16800 19600 1360 17000 19700 	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L	2200 Prepared 15400 22200 2200 Prepared 15400 22200	: 2023-10-1	78 0, Analyze 109 88 61 0, Analyze 110 89	60-140 d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130 70-130	0-11 0-11 1		
Blank (B3J0831-BLK) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-EPHw10-19 EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor Dissolved Metals, Ba	nane (EPH/F2-4) BSD2) nane (EPH/F2-4) atch B3J0799	 < 250 < 250 < 250 1730 16800 19600 1360 17000 19700 	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L	2200 Prepared 15400 22200 2200 Prepared 15400 22200 2200 2200	: 2023-10-1 : 2023-10-1	78 0, Analyze 109 88 61 0, Analyze 110 89 69	60-140 d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130 70-130 60-140	0-11 0-11 1 < 1		
Blank (B3J0831-BLK EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-BEPHw10-19 EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor Dissolved Metals, Balank (B3J0799-BLK	nane (EPH/F2-4) BSD2) nane (EPH/F2-4) atch B3J0799	83J0831 < 250 < 250 1730 16800 19600 1360 17000 19700 1530	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L µg/L	2200 Prepared 15400 22200 2200 Prepared 15400 22200 2200 2200	: 2023-10-1	78 0, Analyze 109 88 61 0, Analyze 110 89 69	60-140 d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130 70-130 60-140	0-11 0-11 1 < 1		
Blank (B3J0831-BLF EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS (B3J0831-BS2) EPHw10-19 EPHw19-32 Surrogate: 2-Methylnor LCS Dup (B3J0831-EPHw10-19 EPHw10-19 EPHw10-32	nane (EPH/F2-4) BSD2) nane (EPH/F2-4) atch B3J0799	 < 250 < 250 < 250 1730 16800 19600 1360 17000 19700 	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L	2200 Prepared 15400 22200 2200 Prepared 15400 22200 2200 2200	: 2023-10-1 : 2023-10-1	78 0, Analyze 109 88 61 0, Analyze 110 89 69	60-140 d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130 70-130 60-140	0-11 0-11 1 < 1		



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR	_		772 3-10-18	14:09
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals,	Batch B3J0799, Contin	nued									
Blank (B3J0799-B	LK1), Continued				Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Arsenic, dissolved		< 0.00050	0.00050	mg/L							
Barium, dissolved		< 0.0050	0.0050	mg/L							
Beryllium, dissolved		< 0.00010	0.00010	mg/L							
Bismuth, dissolved		< 0.00010	0.00010								
Boron, dissolved		< 0.0500	0.0500								
Cadmium, dissolved		< 0.000010	0.000010								
Calcium, dissolved		< 0.20		mg/L							
Chromium, dissolved		< 0.00050	0.00050								
Copper dissolved		< 0.00010	0.00010								
Copper, dissolved Iron, dissolved		< 0.00040 < 0.010	0.00040								
Lead, dissolved		< 0.00020	0.00020								
Lithium, dissolved		< 0.00020	0.00020								
Magnesium, dissolve	ed	< 0.010	0.010								
Manganese, dissolve		< 0.00020	0.00020								
Molybdenum, dissolv		< 0.00010	0.00010								
Nickel, dissolved		< 0.00040	0.00040	mg/L							
Phosphorus, dissolve	ed	< 0.050	0.050	mg/L							
Potassium, dissolved	1	< 0.10	0.10	mg/L							
Selenium, dissolved		< 0.00050	0.00050	mg/L							
Silicon, dissolved		< 1.0		mg/L							
Silver, dissolved		< 0.000050	0.000050								
Sodium, dissolved		< 0.10		mg/L							
Strontium, dissolved		< 0.0010	0.0010								
Sulfur, dissolved		< 3.0	0.00050	mg/L							
Tellurium, dissolved Thallium, dissolved		< 0.00050 < 0.000020	0.00000								
Thorium, dissolved		< 0.000020	0.000020								
Tin, dissolved		< 0.00010	0.00010								
Titanium, dissolved		< 0.0050	0.0050								
Tungsten, dissolved		< 0.0010	0.0010								
Uranium, dissolved		< 0.000020	0.000020								
Vanadium, dissolved		< 0.0050	0.0050								
Zinc, dissolved		< 0.0040	0.0040	mg/L							
Zirconium, dissolved		< 0.00010	0.00010	mg/L							
LCS (B3J0799-BS	1)				Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Aluminum, dissolved		4.00	0.0050	mg/L	4.00		100	80-120			
Antimony, dissolved		0.0397	0.00020		0.0400		99	80-120			
Arsenic, dissolved		0.402	0.00050	mg/L	0.400		101	80-120			
Barium, dissolved		0.0391	0.0050		0.0400		98	80-120			
Beryllium, dissolved		0.0403	0.00010		0.0400		101	80-120			
Bismuth, dissolved		0.0402	0.00010		0.0400		101	80-120			
Boron, dissolved		0.391	0.0500		0.400		98	80-120			
Cadmium, dissolved		0.0391	0.000010		0.0400		98	80-120			
Chromium dissolved	1	3.85		mg/L	4.00		96	80-120			
Cabalt dissolved	Ĭ	0.0399	0.00050 0.00010		0.0400		100	80-120			
Cobalt, dissolved Copper, dissolved		0.0400 0.0403	0.00010		0.0400		100 101	80-120 80-120			
Iron, dissolved		3.98	0.00040		4.00		99	80-120			
Lead, dissolved		0.0403	0.00020		0.0400		101	80-120			
Lithium, dissolved		0.0403	0.00020		0.0400		101	80-120			
Magnesium, dissolve	ed	4.11	0.00010		4.00		103	80-120			
Manganese, dissolve		0.0402	0.00020		0.0400		100	80-120			
Molybdenum, dissolv		0.0381	0.00010		0.0400		95	80-120			
Nickel, dissolved		0.0402	0.00040		0.0400		101	80-120			
Nickel, dissolved		0.0402	0.00040	mg/L	0.0400		101	80-120			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR	ORDER TED	23J0 2023	772 -10-18	14:09
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals,	Batch B3J0799, Continu	ied									
LCS (B3J0799-BS1	I), Continued				Prepared	d: 2023-10-1	1, Analyze	d: 2023-1	0-11		
Phosphorus, dissolve	d	3.96	0.050	mg/L	4.00		99	80-120			
Potassium, dissolved		3.97	0.10	mg/L	4.00		99	80-120			
Selenium, dissolved		0.399	0.00050	mg/L	0.400		100	80-120			
Silicon, dissolved		4.1	1.0	mg/L	4.00		103	80-120			
Silver, dissolved		0.0378	0.000050		0.0400		95	80-120			
Sodium, dissolved		4.06		mg/L	4.00		101	80-120			
Strontium, dissolved		0.0402	0.0010		0.0400		100	80-120			
Sulfur, dissolved		38.6		mg/L	40.0		97	80-120			
Tellurium, dissolved		0.0391	0.00050		0.0400		98	80-120			
Thallium, dissolved		0.0390	0.000020		0.0400		98	80-120			
Thorium, dissolved		0.0400	0.00010		0.0400		100	80-120			
Tin, dissolved		0.0397	0.00020		0.0400		99	80-120			
Titanium, dissolved		0.0408	0.0050		0.0400		102	80-120			
Tungsten, dissolved		0.0403	0.0010		0.0400		101	80-120			
Uranium, dissolved		0.0397	0.000020		0.0400		99	80-120			
Vanadium, dissolved		0.0388	0.0050		0.0400		97	80-120			
Zinc, dissolved		0.400	0.0040		0.400		100	80-120			
Zirconium, dissolved		0.0401	0.00010	mg/L	0.0400		100	80-120			
Matrix Spike (B3J0)799-MS1)		ource: 23J0			d: 2023-10-1			0-11		
Aluminum, dissolved		3.93	0.0050		4.00	0.0732	96	70-130			
Antimony, dissolved		0.0383	0.00020		0.0400	< 0.00020	96	70-130			
Arsenic, dissolved		0.411	0.00050		0.400	< 0.00050	103	70-130			
Barium, dissolved		0.0916	0.0050		0.0400	0.0490	106	70-130			
Beryllium, dissolved		0.0395	0.00010		0.0400	< 0.00010	99	70-130			
Bismuth, dissolved		0.0340	0.00010		0.0400	< 0.00010	85	70-130			
Boron, dissolved		0.379	0.0500		0.400	< 0.0500	94	70-130			
Cadmium, dissolved		0.0417	0.000010		0.0400	0.000086	104	70-130			
Calcium, dissolved		11.4		mg/L	4.00	7.65	94 99	70-130 70-130			
Chromium, dissolved Cobalt, dissolved		0.0398 0.0401	0.00050 0.00010		0.0400	< 0.00050 < 0.00010	100	70-130			
Copper, dissolved		0.0401	0.00010		0.0400	0.00062	101	70-130			
Iron, dissolved		4.01	0.00040		4.00	0.00002	100	70-130			
Lead, dissolved		0.0420	0.00020		0.0400	< 0.00020	105	70-130			
Lithium, dissolved		0.0395	0.00020		0.0400	0.00020	98	70-130			
Magnesium, dissolve	d	5.41	0.010		4.00	1.47	98	70-130			
Manganese, dissolve		0.0411	0.00020		0.0400	0.00058	101	70-130			
Molybdenum, dissolve		0.0382	0.00010		0.0400	0.00014	95	70-130			
Nickel, dissolved		0.0399	0.00040		0.0400	0.00059	98	70-130			
Phosphorus, dissolve	d	3.92		mg/L	4.00	< 0.050	98	70-130			
Potassium, dissolved		4.29		mg/L	4.00	0.27	100	70-130			
Selenium, dissolved		0.412	0.00050		0.400	< 0.00050	103	70-130			
Silicon, dissolved		5.5	1.0	mg/L	4.00	1.5	100	70-130			
Silver, dissolved		0.0327	0.000050	mg/L	0.0400	< 0.000050	82	70-130			
Sodium, dissolved		4.22	0.10	mg/L	4.00	0.21	100	70-130			
Strontium, dissolved		0.0523	0.0010	mg/L	0.0400	0.0119	101	70-130			
Sulfur, dissolved		38.9		mg/L	40.0	< 3.0	97	70-130			
Tellurium, dissolved		0.0413	0.00050	mg/L	0.0400	< 0.00050	103	70-130			
Thallium, dissolved		0.0412	0.000020	mg/L	0.0400	< 0.000020	103	70-130			
Thorium, dissolved		0.0411	0.00010	mg/L	0.0400	< 0.00010	103	70-130			
Tin, dissolved		0.0416	0.00020	mg/L	0.0400	< 0.00020	104	70-130			
		0.0419	0.0050	mg/L	0.0400	< 0.0050	102	70-130			
Titanium, dissolved		0.0413									
		0.0413	0.0010		0.0400	< 0.0010	103	70-130			
Titanium, dissolved		0.0413 0.0408	0.0010 0.000020	mg/L	0.0400 0.0400	< 0.0010 0.000040	103 102	70-130 70-130			
Titanium, dissolved Tungsten, dissolved		0.0413	0.0010	mg/L							



REPORTED TO Elk River Alliance PROJECT CBWM-2023					WORK REPOR	ORDER TED		772 3-10-18	14:09
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B3J0799, Contin	nued								
Matrix Spike (B3J0799-MS1), Continued	Se	ource: 23J0772-02	Prepared	l: 2023-10-1	1, Analyze	d: 2023-	10-11		
Zirconium, dissolved	0.0434	0.00010 mg/L	0.0400	0.00030	108	70-130			
Dissolved Metals, Batch B3J1084									
Blank (B3J1084-BLK1)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B3J1084-BLK2)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B3J1084-BLK3)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B3J1084-BLK4)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B3J1084-BLK5)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	< 0.000010	0.000010 mg/L							
LCS (B3J1084-BS1)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	0.000237	0.000010 mg/L	0.000250		95	80-120			
LCS (B3J1084-BS2)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	0.000229	0.000010 mg/L	0.000250		91	80-120			
LCS (B3J1084-BS3)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	0.000245	0.000010 mg/L	0.000250		98	80-120			
LCS (B3J1084-BS4)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	0.000251	0.000010 mg/L	0.000250		101	80-120			
LCS (B3J1084-BS5)			Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-15		
Mercury, dissolved	0.000229	0.000010 mg/L	0.000250		92	80-120			
Duplicate (B3J1084-DUP2)	S	ource: 23J0772-01	Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-14		
Mercury, dissolved	< 0.000010	0.000010 mg/L		< 0.000010				20	
Matrix Spike (B3J1084-MS2)	S	ource: 23J0772-02	Prepared	l: 2023-10-1	2, Analyze	d: 2023-	10-15		
Mercury, dissolved	0.000197	0.000010 mg/L	0.000250	< 0.000010	77	70-130			
General Parameters, Batch B3J0533									
Blank (B3J0533-BLK1)			Prepared	l: 2023-10-0	6, Analyze	d: 2023-	10-11		
BOD, 5-day	< 2.0	2.0 mg/L	·						
LCS (B3J0533-BS1)			Prepared	l: 2023-10-0	6, Analyze	d: 2023-	10-11		
BOD, 5-day	213	52.6 mg/L	198		108	85-115			
General Parameters, Batch B3J0735									
Blank (B3J0735-BLK1)			Prepared	l: 2023-10-1	0, Analyze	d: 2023-	10-10		
Ammonia, Total (as N)	< 0.050	0.050 mg/L			<u> </u>				
Blank (B3J0735-BLK2)			Prepared	l: 2023-10-1	0, Analyze	d: 2023-	10-10		
Ammonia, Total (as N)	< 0.050	0.050 mg/L	<u> </u>						



	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED)772 3-10-18	14:09
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters,	Batch B3J0735, Cont	tinued								
Blank (B3J0735-BLK	3)			Prepared	: 2023-10-1	0, Analyze	d: 2023-	10-10		
Ammonia, Total (as N)		< 0.050	0.050 mg/L							
LCS (B3J0735-BS1)				Prepared	: 2023-10-1	0, Analyze	d: 2023-	10-10		
Ammonia, Total (as N)		1.07	0.050 mg/L	1.00		107	85-115			
LCS (B3J0735-BS2)				Prepared	: 2023-10-1	0, Analyze	d: 2023-1	10-10		
Ammonia, Total (as N)		1.11	0.050 mg/L	1.00		111	85-115			
LCS (B3J0735-BS3)				Prepared	: 2023-10-1	0, Analyze	d: 2023-	10-10		
Ammonia, Total (as N)		1.04	0.050 mg/L	1.00		104	85-115			
General Parameters,	Batch B3J0863									
Blank (B3J0863-BLK	1)			Prepared	: 2023-10-1	1, Analyze	d: 2023-1	0-11		
Alkalinity, Total (as CaCo		< 1.0	1.0 mg/L							
Alkalinity, Phenolphthale Alkalinity, Bicarbonate (a	, ,	< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Carbonate (as		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as	CaCO3)	< 1.0	1.0 mg/L							
Blank (B3J0863-BLK	2)			Prepared	: 2023-10-1	1, Analyze	d: 2023-1	0-11		
Alkalinity, Total (as CaCo	03)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthale		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (a Alkalinity, Carbonate (as	·	< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Hydroxide (as		< 1.0	1.0 mg/L							
LCS (B3J0863-BS1)				Prepared	: 2023-10-1	1, Analyze	d: 2023-1	0-11		
Alkalinity, Total (as CaCo		107	1.0 mg/L	100		107	80-120			
Alkalinity, Phenolphthale	in (as CaCO3)	48.3	1.0 mg/L	50.0		97	0-200			
LCS (B3J0863-BS2)				Prepared	: 2023-10-1	1, Analyze	d: 2023-1	0-11		
Alkalinity, Total (as CaCo		107	1.0 mg/L	100		107	80-120			
Alkalinity, Phenolphthale	,	43.5	1.0 mg/L	50.0		87	0-200			
General Parameters, Blank (B3J0991-BLK				Prepared	: 2023-10-1	1 Analyze	d: 2023-1	0-12		
Phosphorus, Total (as P)	•	< 0.0050	0.0050 mg/L			·,·				
Blank (B3J0991-BLK			<u>J</u> -	Prepared	: 2023-10-1	1. Analvze	d: 2023-1	0-12		
Phosphorus, Total (as P)	•	< 0.0050	0.0050 mg/L			,,220		•		
Blank (B3J0991-BLK				Prepared	: 2023-10-1	1. Analvze	d: 2023-1	0-12		
Phosphorus, Total (as P)	•	< 0.0050	0.0050 mg/L	. repared	0_0 10-1	.,	0_0	- · <u>-</u>		
Blank (B3J0991-BLK				Prepared	: 2023-10-1	1. Analyze	d: 2023-1	0-12		
Phosphorus, Total (as P)	,	< 0.0050	0.0050 mg/L	. repured		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0_0	- · <u>-</u>		
Blank (B3J0991-BLK				Prepared	: 2023-10-1	1. Analyze	d: 2023-1	0-12		
Phosphorus, Total (as P)		< 0.0050	0.0050 mg/L			.,,,20				
LCS (B3J0991-BS1)	·			Prenared	: 2023-10-1	1 Analyzo	d- 2023. 1	0-12		
Phosphorus, Total (as P)	<u> </u>	0.101	0.0050 mg/L	0.100	. 2020-10-1	1, Analyze 101	85-115	U- 12		
	1	0.101	0.0000 Hig/L		. 2022 42 4			0.10		
Phoenhorus Total (as P)	<u> </u>	0.101	0.0050 mg/L		: 2023-10-1	· · · · · ·		U-12		
Phosphorus, Total (as P)		0.101	0.0000 mg/L	0.100		101	85-115			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED		772 3-10-18	14:09
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters	s, Batch B3J0991, Cor	ntinued								
LCS (B3J0991-BS3	3)			Prepared	: 2023-10-1	1, Analyze	d: 2023-	10-12		
Phosphorus, Total (as	s P)	0.103	0.0050 mg/L	0.100		103	85-115			
LCS (B3J0991-BS4	4)			Prepared	: 2023-10-1	1. Analvze	d: 2023-	10-12		
Phosphorus, Total (as	•	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B3J0991-BS	5)			Dranarad	: 2023-10-1	1 Analyza	4· 2023-	10 ₋ 12		
Phosphorus, Total (as	•	0.104	0.0050 mg/L	0.100	. 2020-10-1	104	85-115	10-12		
General Parameters	s, Batch B3J1025									
Blank (B3J1025-Bl	LK1)			Prepared	: 2023-10-1	2, Analyze	d: 2023-	10-12		
Chemical Oxygen De	•	< 20	20 mg/L	•		· ·				
LCS (B3J1025-BS1				Prepared	: 2023-10-1	2. Analyze	d: 2023-	10-12		
Chemical Oxygen De	•	527	20 mg/L	500	. 2020 10 1	105	89-115	10 12		
General Parameters	s, Batch B3J1200									
Blank (B3J1200-Bl	LK2)			Prepared	: 2023-10-1	3, Analyze	d: 2023-	10-14		
Nitrogen, Total Kjelda	hl	< 0.050	0.050 mg/L			•				
LCS (B3J1200-BS2	2)			Prepared	: 2023-10-1	3, Analyze	d: 2023-	10-14		
Nitrogen, Total Kjelda	,	0.986	0.050 mg/L	1.00		99	85-115			
General Parameters	s, Batch B3J1287									
Blank (B3J1287-Bl	LK1)			Prepared	: 2023-10-1	4, Analyze	d: 2023-	10-14		
Solids, Total Suspend	led	< 2.0	2.0 mg/L							
LCS (B3J1287-BS1	1)			Prepared	: 2023-10-1	4, Analyze	d: 2023-	10-14		
Solids, Total Suspend	led	115	10.0 mg/L	100		115	85-115			
Total Metals, Batch	h B3J0840									
Blank (B3J0840-Bl	LK1)			Prepared	: 2023-10-1	0, Analyze	d: 2023-	10-11		
Aluminum, total		< 0.0050	0.0050 mg/L							
Antimony, total Arsenic, total		< 0.00020 < 0.00050	0.00020 mg/L 0.00050 mg/L							
Barium, total		< 0.0050	0.00050 mg/L 0.0050 mg/L							
Beryllium, total		< 0.00010	0.0000 mg/L							
Bismuth, total		< 0.00010	0.00010 mg/L							
Boron, total		< 0.0500	0.0500 mg/L							
Cadmium, total		< 0.000010	0.000010 mg/L							
Calcium, total		< 0.20	0.20 mg/L							
Chromium, total		< 0.00050 < 0.00010	0.00050 mg/L 0.00010 mg/L							
Cobalt, total Copper, total		< 0.00010	0.00010 mg/L 0.00040 mg/L							
Iron, total		< 0.00040	0.00040 mg/L							
Lead, total		< 0.00020	0.00020 mg/L							
Lithium, total		< 0.00010	0.00010 mg/L							
Magnesium, total		< 0.010	0.010 mg/L							
Manganese, total		< 0.00020	0.00020 mg/L							
Molybdenum, total		< 0.00010	0.00010 mg/L							
Nickel, total		< 0.00040	0.00040 mg/L							
Phosphorus, total		< 0.050	0.050 mg/L							



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR			772 3-10-18	14:09
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batc	h B3J0840, Continued										
Blank (B3J0840-B	LK1), Continued				Prepared	l: 2023-10- 1	0, Analyze	d: 2023-	10-11		
Potassium, total		< 0.10	0.10	mg/L							
Selenium, total		< 0.00050	0.00050	mg/L							
Silicon, total		< 1.0		mg/L							
Silver, total		0.000061	0.000050	mg/L							BLK
Sodium, total		< 0.10	0.10	mg/L							
Strontium, total		< 0.0010	0.0010								
Sulfur, total		< 3.0		mg/L							
Tellurium, total		< 0.00050	0.00050								
Thallium, total		< 0.000020	0.000020								
Thorium, total		< 0.00010	0.00010								
Tin, total		< 0.00020	0.00020								
Titanium, total		< 0.0050	0.0050								
Tungsten, total Uranium, total		< 0.0010 < 0.000020	0.0010								
Vanadium, total		< 0.000020	0.000020								
Zinc, total		< 0.0030	0.0030								
Zirconium, total		< 0.00010	0.00010								
·	4\	10.00010	0.00010	mg/L	Dranarad	. 2022 40 4	0 Analyza	4. 2023	10 10		
Aluminum, total	1)	2.00	0.0050	ma/l	•	l: 2023-10-1	*		10-12		
		3.80 0.0390	0.0050 0.00020		4.00 0.0400		95 97	80-120 80-120			
Antimony, total Arsenic, total		0.399	0.00020		0.400		100	80-120			
Barium, total		0.0399	0.0050		0.400		100	80-120			
Beryllium, total		0.0386	0.00010		0.0400		97	80-120			
Bismuth, total		0.0384	0.00010		0.0400		96	80-120			
Boron, total		0.398	0.0500		0.400		99	80-120			
Cadmium, total		0.0389	0.000010		0.0400		97	80-120			
Calcium, total		4.26		mg/L	4.00		106	80-120			
Chromium, total		0.0394	0.00050	mg/L	0.0400		98	80-120			
Cobalt, total		0.0399	0.00010	mg/L	0.0400		100	80-120			
Copper, total		0.0399	0.00040	mg/L	0.0400		100	80-120			
Iron, total		3.95		mg/L	4.00		99	80-120			
Lead, total		0.0389	0.00020		0.0400		97	80-120			
Lithium, total		0.0359	0.00010		0.0400		90	80-120			
Magnesium, total		3.92		mg/L	4.00		98	80-120			
Manganese, total		0.0401	0.00020		0.0400		100	80-120			
Molybdenum, total		0.0393	0.00010		0.0400		98	80-120			
Nickel, total		0.0400	0.00040	mg/L mg/L	0.0400		100	80-120			
Phosphorus, total Potassium, total		3.90 3.87		mg/L	4.00		98 97	80-120 80-120			
Selenium, total		0.402	0.00050		0.400		100	80-120			
Silicon, total		4.1		mg/L	4.00		100	80-120			
Silver, total		0.0384	0.000050		0.0400		96	80-120			
Sodium, total		3.88		mg/L	4.00		97	80-120			
Strontium, total		0.0405	0.0010		0.0400		101	80-120			
Sulfur, total		41.5		mg/L	40.0		104	80-120			
Tellurium, total		0.0384	0.00050		0.0400		96	80-120			
Thallium, total		0.0387	0.000020		0.0400		97	80-120			
Thorium, total		0.0384	0.00010		0.0400		96	80-120			
Tin, total		0.0396	0.00020		0.0400		99	80-120			
Titanium, total		0.0436	0.0050		0.0400		109	80-120			
Tungsten, total		0.0399	0.0010		0.0400		100	80-120			
Uranium, total		0.0389	0.000020	mg/L	0.0400		97	80-120			
Vanadium, total		0.0390	0.0050		0.0400		97	80-120			
Zinc, total		0.391	0.0040		0.400		98	80-120			
Zirconium, total		0.0407	0.00010	mg/L	0.0400		102	80-120			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR			772 -10-18	14:09
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0842										
Blank (B3J0842-BL	_K1)				Prepared	: 2023-10-1	0, Analyze	d: 2023-	10-11		
Aluminum, total		< 0.0050	0.0050	mg/L							
Antimony, total		< 0.00020	0.00020								
Arsenic, total		< 0.00050	0.00050	mg/L							
Barium, total		< 0.0050	0.0050	mg/L							
Beryllium, total		< 0.00010	0.00010								
Bismuth, total		< 0.00010	0.00010								
Boron, total		< 0.0500	0.0500								
Cadmium, total		< 0.000010	0.000010								
Calcium, total		< 0.20		mg/L							
Chromium, total		< 0.00050	0.00050								
Cobalt, total		< 0.00010	0.00010								
Copper, total		< 0.00040	0.00040								
Iron, total Lead, total		< 0.010		mg/L							
Lithium, total		< 0.00020 < 0.00010	0.00020 0.00010								
Magnesium, total		< 0.010		mg/L							
Manganese, total		< 0.00020	0.00020								
Molybdenum, total		< 0.00010	0.00020								
Nickel, total		< 0.00010	0.00040								
Phosphorus, total		< 0.050		mg/L							
Potassium, total		< 0.10		mg/L							
Selenium, total		< 0.00050	0.00050								
Silicon, total		< 1.0		mg/L							
Silver, total		< 0.000050	0.000050								
Sodium, total		< 0.10	0.10	mg/L							
Strontium, total		< 0.0010	0.0010	mg/L							
Sulfur, total		< 3.0		mg/L							
Tellurium, total		< 0.00050	0.00050	mg/L							
Thallium, total		< 0.000020	0.000020								
Thorium, total		< 0.00010	0.00010	mg/L							
Tin, total		< 0.00020	0.00020								
Titanium, total		< 0.0050	0.0050								
Tungsten, total		< 0.0010	0.0010								
Uranium, total		< 0.000020	0.000020								
Vanadium, total		< 0.0050	0.0050								
Zinc, total		< 0.0040	0.0040								
Zirconium, total		< 0.00010	0.00010	mg/L							
LCS (B3J0842-BS1)				Prepared	: 2023-10-1	0, Analyze	d: 2023-	10-11		
Aluminum, total		3.94	0.0050		4.00		98	80-120			
Antimony, total		0.0393	0.00020		0.0400		98	80-120			
Arsenic, total		0.396	0.00050		0.400		99	80-120			
Barium, total		0.0389	0.0050		0.0400		97	80-120			
Beryllium, total		0.0372	0.00010		0.0400		93	80-120			
Bismuth, total		0.0385	0.00010		0.0400		96	80-120			
Boron, total		0.378	0.0500		0.400		95	80-120			
Cadmium, total		0.0394	0.000010		0.0400		98	80-120			
Chromium total		3.80		mg/L	4.00		95	80-120			
Chromium, total		0.0409	0.00050		0.0400		102	80-120			
Copper total		0.0406	0.00010		0.0400		102	80-120			
Copper, total Iron, total		0.0408 4.05	0.00040	mg/L mg/L	0.0400		102 101	80-120 80-120			
Lead, total		0.0385	0.00020		4.00 0.0400		96	80-120			
Lithium, total		0.0363	0.00020		0.0400		90	80-120			
· · · · · · · · · · · · · · · · · · ·		3.87	0.00010								
Magnesium, total		/	()()()	ma/i	4.00		97	80-120			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED	23J0 2023	772 3-10-18	14:09
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
Total Metals, Batc	h B3J0842, Continued									
LCS (B3J0842-BS	1), Continued			Prepared	l: 2023-10-1	I0, Analyze	d: 2023-1	0-11		
Molybdenum, total		0.0386	0.00010 mg/L	0.0400		97	80-120			
Nickel, total		0.0406	0.00040 mg/L	0.0400		101	80-120			
Phosphorus, total		3.87	0.050 mg/L	4.00		97	80-120			
Potassium, total		3.90	0.10 mg/L	4.00		97	80-120			
Selenium, total		0.397	0.00050 mg/L	0.400		99	80-120			
Silicon, total		4.1	1.0 mg/L	4.00		102	80-120			
Silver, total		0.0388	0.000050 mg/L	0.0400		97	80-120			
Sodium, total		4.13	0.10 mg/L	4.00		103	80-120			
Strontium, total		0.0399	0.0010 mg/L	0.0400		100	80-120			
Sulfur, total		38.8	3.0 mg/L	40.0		97	80-120			
Tellurium, total		0.0374	0.00050 mg/L	0.0400		93	80-120			
Thallium, total		0.0393	0.000020 mg/L	0.0400		98	80-120			
Thorium, total		0.0395	0.00010 mg/L	0.0400		99	80-120			
Tin, total		0.0395	0.00020 mg/L	0.0400		99	80-120			
Titanium, total		0.0398	0.0050 mg/L	0.0400		100	80-120			
Tungsten, total		0.0402	0.0010 mg/L	0.0400		101	80-120			
Uranium, total		0.0396	0.000020 mg/L	0.0400		99	80-120			
Vanadium, total		0.0409	0.0050 mg/L	0.0400		102	80-120			
Zinc, total		0.394	0.0040 mg/L	0.400		99	80-120			
Zirconium, total		0.0404	0.00010 mg/L	0.0400		101	80-120			
Total Metals, Batc Blank (B3J0947-B Mercury, total		< 0.000010	0.000010 mg/L	Prepared	l: 2023-10-1	I1, Analyze	d: 2023-1	0-12		
Blank (B3J0947-B	ILK2)			Prepared	l: 2023-10-1	I1, Analyze	d: 2023-1	0-12		
Mercury, total		< 0.000010	0.000010 mg/L							
Blank (B3J0947-B	SLK3)			Prepared	l: 2023-10-1	I1, Analyze	d: 2023-1	0-12		
Mercury, total		< 0.000010	0.000010 mg/L							
LCS (B3J0947-BS	1)			Prepared	l: 2023-10-1	I1, Analyze	d: 2023-1	0-12		
Mercury, total		0.000247	0.000010 mg/L	0.000250		99	80-120			
LCS (B3J0947-BS	2)			Prepared	l: 2023-10-1	I1, Analyze	d: 2023-1	0-12		
Mercury, total		0.000235	0.000010 mg/L	0.000250		94	80-120			
LCS (B3J0947-BS	3)			Prepared	l: 2023-10-1	I1, Analyze	d: 2023-1	0-12		
Mercury, total		0.000224	0.000010 mg/L	0.000250		89	80-120			
••			<u>_</u>							

QC Qualifiers:

BLK Analyte concentration in the Method Blank is above the Reporting Limit (RL).





REPORTED TO Elk River Alliance

PO Box 2095, 1111 2nd Ave

Fernie, BC V0B1M0

ATTENTION Kaileigh McCallum WOI

PO NUMBER

PROJECT CBWM-2023

PROJECT INFO [info]

WORK ORDER 23J0884

RECEIVED / TEMP 2023-10-06 14:30 / 11.5°C

REPORTED 2023-10-17 09:51

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



We've Got Chemistry



Ahead of the Curve



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO

Client Service Representative

1-888-311-8846 | www.caro.ca



TEST RESULTS

Phosphorus, dissolved

Potassium, dissolved

Selenium, dissolved

Silicon, dissolved

Silver, dissolved

REPORTED TO Elk River A PROJECT CBWM-20				WORK ORDER REPORTED	23J0884 2023-10-1	7 09:51
Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
L12001_20231004_0900 (23J	0884-01) Matrix: Water Sam	pled: 2023-10-04 (9:00			
Anions						
Bromide	< 0.10	N/A	0.10	mg/L	2023-10-10	
Chloride	0.26	AO ≤ 250		mg/L	2023-10-10	
Fluoride	< 0.10	MAC = 1.5		mg/L	2023-10-10	
Nitrate (as N)	0.019	MAC = 10	0.010		2023-10-10	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010		2023-10-10	HT1
Phosphate (as P)	< 0.0050	N/A	0.0050		2023-10-10	HT1
Sulfate	223	AO ≤ 500		mg/L	2023-10-10	
BCMOE Aggregate Hydrocarbor	ns			-		
EPHw10-19	< 250	N/A	250	μg/L	2023-10-11	
EPHw19-32	< 250	N/A	250		2023-10-11	
Surrogate: 2-Methylnonane (EF		·	60-140		2023-10-11	
Calculated Parameters	,					
Hardness, Dissolved (as CaCO	3) 381	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0187	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.0767	N/A	0.0500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	ma/l	2023-10-12	
Antimony, dissolved	< 0.00020	N/A	0.00020		2023-10-12	
Arsenic, dissolved	< 0.00050	N/A	0.00050		2023-10-12	
Barium, dissolved	0.0852	N/A	0.0050		2023-10-12	
Beryllium, dissolved	< 0.00010	N/A	0.00010		2023-10-12	
Bismuth, dissolved	< 0.00010	N/A	0.00010		2023-10-12	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2023-10-12	
Cadmium, dissolved	0.000016	N/A	0.000010	mg/L	2023-10-12	
Calcium, dissolved	107	N/A		mg/L	2023-10-12	
Chromium, dissolved	< 0.00050	N/A	0.00050		2023-10-12	
Cobalt, dissolved	< 0.00010	N/A	0.00010		2023-10-12	
Copper, dissolved	< 0.00040	N/A	0.00040		2023-10-12	
Iron, dissolved	< 0.010	N/A	0.010		2023-10-12	
Lead, dissolved	< 0.00020	N/A	0.00020		2023-10-12	
Lithium, dissolved	0.00482	N/A	0.00010		2023-10-12	
Magnesium, dissolved	27.4	N/A	0.010		2023-10-12	
Manganese, dissolved	0.00129	N/A	0.00020		2023-10-12	
Mercury, dissolved	< 0.00010	N/A	0.00020		2023-10-12	
Molybdenum, dissolved	0.00165	N/A	0.00010		2023-10-12	
Nickel, dissolved	< 0.00040	N/A	0.00010		2023-10-12	
	· 0.00040	14//\	0.00040	mg/L	2020-10-12	

2023-10-12

2023-10-12

2023-10-12

2023-10-12

2023-10-12

N/A

N/A

N/A

N/A

N/A

0.050 mg/L

0.10 mg/L

1.0 mg/L

0.00050 mg/L

0.000050 mg/L

< 0.050

< 0.00050

< 0.000050

0.45

2.8



	River Alliance VM-2023				WORK ORDER REPORTED	23J0884 2023-10-1	17 09:51
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifie
L12001_20231004_090	0 (23J0884-01) Matrix: W	ater Saı	mpled: 2023-10-04 (09:00, Continu	ued		
Dissolved Metals, Contin	ued						
Sodium, dissolved		1.99	N/A	0.10	mg/L	2023-10-12	
Strontium, dissolved		1.88	N/A	0.0010	mg/L	2023-10-12	
Sulfur, dissolved		79.2	N/A	3.0	mg/L	2023-10-12	
Tellurium, dissolved	<	0.00050	N/A	0.00050	mg/L	2023-10-12	
Thallium, dissolved	< 0	.000020	N/A	0.000020	mg/L	2023-10-12	
Thorium, dissolved	<	0.00010	N/A	0.00010	mg/L	2023-10-12	
Tin, dissolved	<	0.00020	N/A	0.00020	mg/L	2023-10-12	
Titanium, dissolved	<	0.0050	N/A	0.0050	mg/L	2023-10-12	
Tungsten, dissolved	<	< 0.0010	N/A	0.0010	mg/L	2023-10-12	
Uranium, dissolved	0	.000389	N/A	0.000020	mg/L	2023-10-12	
Vanadium, dissolved	<	< 0.0050	N/A	0.0050	mg/L	2023-10-12	
Zinc, dissolved	<	0.0040	N/A	0.0040	mg/L	2023-10-12	
Zirconium, dissolved	<	0.00010	N/A	0.00010	mg/L	2023-10-12	
General Parameters							
Alkalinity, Total (as CaCC)3)	178	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Phenolphthale	·	< 1.0	N/A		mg/L	2023-10-11	
Alkalinity, Bicarbonate (a	· · · · · · · · · · · · · · · · · · ·	178	N/A		mg/L	2023-10-11	
Alkalinity, Carbonate (as	· · · · · · · · · · · · · · · · · · ·	< 1.0	N/A		mg/L	2023-10-11	
Alkalinity, Hydroxide (as	· · · · · · · · · · · · · · · · · · ·	< 1.0	N/A		mg/L	2023-10-11	
Ammonia, Total (as N)	ouo oo,	< 0.050	None Required	0.050		2023-10-10	
BOD, 5-day		< 7.0	N/A		mg/L	2023-10-12	
Carbon, Total Organic		1.89	N/A		mg/L	2023-10-16	
Carbon, Dissolved Organ	nic	1.81	N/A		mg/L	2023-10-16	
Chemical Oxygen Dema		< 20	N/A		mg/L	2023-10-12	
Nitrogen, Total Kjeldahl	nu e	0.058	N/A	0.050		2023-10-14	
Phosphorus, Total (as P)		0.0107	N/A	0.0050		2023-10-12	
Solids, Total Suspended		11.4	N/A		mg/L	2023-10-11	
Total Metals					··· ·9 /=		
Aluminum, total		0.0236	OG < 0.1	0.0050	ma/l	2023-10-13	
Antimony, total	-	0.00230	MAC = 0.006	0.00020		2023-10-13	
Arsenic, total		0.00050	MAC = 0.000	0.00020		2023-10-13	
Barium, total		0.0796	MAC = 2	0.0050		2023-10-13	
· · · · · · · · · · · · · · · · · · ·		0.00010	N/A	0.0030		2023-10-13	
Beryllium, total Bismuth, total		0.00010	N/A	0.00010		2023-10-13	
· · · · · · · · · · · · · · · · · · ·							
Boron, total		0.0500	MAC = 5	0.0500 0.000010		2023-10-13	
Cadmium, total	U	.000016	MAC = 0.007			2023-10-13	
Calcium, total		115	None Required	0.00050	mg/L	2023-10-13	
Chromium, total		0.00050	MAC = 0.05	0.00050		2023-10-13	
Cobalt, total		0.00010	N/A			2023-10-13	
Copper, total	<	0.00040	MAC = 2	0.00040		2023-10-13	
Iron, total		0.026	AO ≤ 0.3		mg/L	2023-10-13	
Lead, total	<	0.00020	MAC = 0.005	0.00020	mg/L	2023-10-13	Page 3 of



REPORTED TO	Elk River Alliance	WORK ORDER	23J0884
PROJECT	CBWM-2023	REPORTED	2023-10-17 09:51

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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
.12001_20231004_0900 (23J0884-01) N	latrix: Water Sam	pled: 2023-10-04 0	9:00, Continu	ıed		
otal Metals, Continued						
Lithium, total	0.00426	N/A	0.00010	mg/L	2023-10-13	
Magnesium, total	23.9	None Required	0.010	mg/L	2023-10-13	
Manganese, total	0.00251	MAC = 0.12	0.00020	mg/L	2023-10-13	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-12	
Molybdenum, total	0.00175	N/A	0.00010	mg/L	2023-10-13	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-13	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-13	
Potassium, total	0.46	N/A	0.10	mg/L	2023-10-13	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-13	
Silicon, total	2.6	N/A	1.0	mg/L	2023-10-13	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-13	
Sodium, total	1.82	AO ≤ 200	0.10	mg/L	2023-10-13	
Strontium, total	1.79	MAC = 7	0.0010	mg/L	2023-10-13	
Sulfur, total	81.7	N/A	3.0	mg/L	2023-10-13	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-13	
Thallium, total	< 0.000020	N/A	0.000020		2023-10-13	
Thorium, total	< 0.00010	N/A	0.00010		2023-10-13	
Tin, total	< 0.00020	N/A	0.00020		2023-10-13	
Titanium, total	< 0.0050	N/A	0.0050		2023-10-13	
Tungsten, total	< 0.0010	N/A	0.0010		2023-10-13	
Uranium, total	0.000418	MAC = 0.02	0.000020		2023-10-13	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-13	
Zinc, total	< 0.0040	AO ≤ 5	0.0040		2023-10-13	
Zirconium, total	< 0.00010	N/A	0.00010		2023-10-13	
12003_20231004_1210 (23J0884-02) N	· · · · · ·					
Bromide	< 0.10	N/A	0.10	mg/L	2023-10-10	
011 11		A 0 : 0==		//		
Chloride	0.26	AO ≤ 250		mg/L	2023-10-10	
Fluoride	0.10	MAC = 1.5	0.10	mg/L	2023-10-10	
Fluoride Nitrate (as N)	0.10 < 0.010	MAC = 1.5 MAC = 10	0.10 0.010	mg/L mg/L	2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N)	0.10 < 0.010 < 0.010	MAC = 1.5 MAC = 10 MAC = 1	0.10 0.010 0.010	mg/L mg/L mg/L	2023-10-10 2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P)	0.10 < 0.010 < 0.010 < 0.0050	MAC = 1.5 MAC = 10 MAC = 1 N/A	0.10 0.010 0.010 0.0050	mg/L mg/L mg/L mg/L	2023-10-10 2023-10-10 2023-10-10 2023-10-10	
Fluoride Nitrate (as N) Nitrite (as N)	0.10 < 0.010 < 0.010	MAC = 1.5 MAC = 10 MAC = 1	0.10 0.010 0.010 0.0050	mg/L mg/L mg/L	2023-10-10 2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P)	0.10 < 0.010 < 0.010 < 0.0050	MAC = 1.5 MAC = 10 MAC = 1 N/A	0.10 0.010 0.010 0.0050	mg/L mg/L mg/L mg/L	2023-10-10 2023-10-10 2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate	0.10 < 0.010 < 0.010 < 0.0050	MAC = 1.5 MAC = 10 MAC = 1 N/A	0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L	2023-10-10 2023-10-10 2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons	0.10 < 0.010 < 0.010 < 0.0050 233	MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L	2023-10-10 2023-10-10 2023-10-10 2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons EPHw10-19	0.10 < 0.010 < 0.010 < 0.0050 233	MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L µg/L	2023-10-10 2023-10-10 2023-10-10 2023-10-10 2023-10-10	HT1
Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons EPHw10-19 EPHw19-32	0.10 < 0.010 < 0.010 < 0.0050 233 < 250 < 250	MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.010 0.010 0.0050 1.0 250	mg/L mg/L mg/L mg/L mg/L mg/L µg/L	2023-10-10 2023-10-10 2023-10-10 2023-10-10 2023-10-10 2023-10-11 2023-10-11	HT1



REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER REPORTED 23J0884

EPORTED 2023-10-17 09:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
L12003_20231004_1210 (23J0884	-02) Matrix: Water Sam	pled: 2023-10-04	12:10, Continu	ıed		
Calculated Parameters, Continued						
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.0570	N/A	0.0500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-12	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-12	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-12	
Barium, dissolved	0.0794	N/A	0.0050	mg/L	2023-10-12	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-12	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-12	
Boron, dissolved	< 0.0500	N/A	0.0500		2023-10-12	
Cadmium, dissolved	0.000011	N/A	0.000010		2023-10-12	
Calcium, dissolved	114	N/A		mg/L	2023-10-12	
Chromium, dissolved	< 0.00050	N/A	0.00050		2023-10-12	
Cobalt, dissolved	< 0.00010	N/A	0.00010		2023-10-12	
Copper, dissolved	< 0.00040	N/A	0.00040		2023-10-12	
Iron, dissolved	< 0.010	N/A	0.010		2023-10-12	
Lead, dissolved	< 0.00020	N/A	0.00020		2023-10-12	
Lithium, dissolved	0.00469	N/A	0.00010		2023-10-12	
Magnesium, dissolved	27.2	N/A	0.010		2023-10-12	
Manganese, dissolved	0.00299	N/A	0.00020		2023-10-12	
Mercury, dissolved	< 0.000010	N/A	0.000010		2023-10-12	
Molybdenum, dissolved	0.00168	N/A	0.00010		2023-10-12	
Nickel, dissolved	< 0.00040	N/A	0.00040		2023-10-12	
Phosphorus, dissolved	< 0.050	N/A	0.050		2023-10-12	
Potassium, dissolved	0.46	N/A		mg/L	2023-10-12	
Selenium, dissolved	< 0.00050	N/A	0.00050		2023-10-12	
Silicon, dissolved	3.0	N/A		mg/L	2023-10-12	
Silver, dissolved	< 0.000050	N/A	0.000050		2023-10-12	
Sodium, dissolved	1.92	N/A		mg/L	2023-10-12	
Strontium, dissolved	1.97	N/A	0.0010		2023-10-12	
Sulfur, dissolved	82.3	N/A		mg/L	2023-10-12	
Tellurium, dissolved	< 0.00050	N/A	0.00050		2023-10-12	
Thallium, dissolved	< 0.000020	N/A	0.000020		2023-10-12	
Thorium, dissolved	< 0.00010	N/A	0.00010		2023-10-12	
Tin, dissolved	< 0.00020	N/A	0.00020		2023-10-12	
Titanium, dissolved	< 0.0050	N/A	0.0050		2023-10-12	
Tungsten, dissolved	< 0.0010	N/A	0.0010		2023-10-12	
Uranium, dissolved	0.000391	N/A	0.000020		2023-10-12	
Vanadium, dissolved	< 0.0050	N/A	0.0050		2023-10-12	
Zinc, dissolved	< 0.0040	N/A	0.0040		2023-10-12	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-12	



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0884

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-17 09:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
L12003_20231004_1210 (23J0884-02) M	atrix: Water San	npled: 2023-10-04 1	2:10, Continu	neq		
General Parameters, Continued						
Alkalinity, Total (as CaCO3)	168	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Bicarbonate (as CaCO3)	168	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-11	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-10-11	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-10-10	
BOD, 5-day	< 7.0	N/A	2.0	mg/L	2023-10-12	
Carbon, Total Organic	2.18	N/A	0.50	mg/L	2023-10-16	
Carbon, Dissolved Organic	1.50	N/A	0.50	mg/L	2023-10-16	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2023-10-12	
Nitrogen, Total Kjeldahl	0.057	N/A	0.050	mg/L	2023-10-14	
Phosphorus, Total (as P)	0.0130	N/A	0.0050	mg/L	2023-10-12	
Solids, Total Suspended	< 2.0	N/A	2.0	mg/L	2023-10-11	
Total Metals						
Aluminum, total	0.0144	OG < 0.1	0.0050	mg/L	2023-10-12	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-10-12	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2023-10-12	
Barium, total	0.0767	MAC = 2	0.0050	mg/L	2023-10-12	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-12	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-10-12	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-10-12	
Cadmium, total	0.000021	MAC = 0.007	0.000010	mg/L	2023-10-12	
Calcium, total	110	None Required	0.20	mg/L	2023-10-12	
Chromium, total	0.00050	MAC = 0.05	0.00050	mg/L	2023-10-12	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-10-12	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2023-10-12	
Iron, total	0.021	AO ≤ 0.3	0.010	mg/L	2023-10-12	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-10-12	
Lithium, total	0.00439	N/A	0.00010	mg/L	2023-10-12	
Magnesium, total	24.9	None Required	0.010	mg/L	2023-10-12	
Manganese, total	0.00380	MAC = 0.12	0.00020	mg/L	2023-10-12	
Mercury, total	< 0.000010	MAC = 0.001	0.000010		2023-10-12	
Molybdenum, total	0.00174	N/A	0.00010	mg/L	2023-10-12	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-12	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-12	
Potassium, total	0.46	N/A	0.10	mg/L	2023-10-12	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-12	
Silicon, total	2.8	N/A	1.0	mg/L	2023-10-12	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-12	
Sodium, total	1.95	AO ≤ 200	0.10	mg/L	2023-10-12	
Strontium, total	1.78	MAC = 7	0.0010	mg/L	2023-10-12	
Sulfur, total	77.9	N/A	3.0	mg/L	2023-10-12	



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23J0884

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-17 09:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
L12003_20231004_1210 (23J0884	1-02) Matrix: Water Sam	pled: 2023-10-04 1	l2:10, Continι	ied		
Total Metals, Continued						
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-12	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-10-12	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-12	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-10-12	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-12	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-10-12	
Uranium, total	0.000396	MAC = 0.02	0.000020	mg/L	2023-10-12	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-12	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-10-12	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-12	

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance **PROJECT** CBWM-2023

WORK ORDER

23J0884

REPORTED 2023-10-17 09:51

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2019)	Dissolved Oxygen Meter	✓	Kelowna
Carbon, Dissolved Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Carbon, Total Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2022)	Closed Reflux, Colorimetry	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2021)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL Reporting Limit (default)

Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors

AO Aesthetic Objective

MAC Maximum Acceptable Concentration (health based)

mg/L Milligrams per litre

OG Operational Guideline (treated water)

μg/L Micrograms per litre

EPA United States Environmental Protection Agency Test Methods

SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER REPORTED 23J0884

2023-10-17 09:51

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted red. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do <u>not</u> take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:TeamCaro@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.



REPORTED TOElk River AllianceWORK ORDER23J0884PROJECTCBWM-2023REPORTED2023-10-17 09:51

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- Method Blank (Blk): A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- Duplicate (Dup): An additional or second portion of a randomly selected sample in the analytical run carried through the entire
 analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
 Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B3J0723									
Blank (B3J0723-BLK1)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-1	10-09		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 1.0	1.0 mg/L							
Blank (B3J0723-BLK2)			Prepared	I: 2023-10-1	I0, Analyze	d: 2023-1	10-10		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 1.0	1.0 mg/L							
Blank (B3J0723-BLK3)			Prepared	I: 2023-10-1	I0, Analyze	d: 2023-1	10-10		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 1.0	1.0 mg/L							
LCS (B3J0723-BS1)			Prepared	I: 2023-10-0	9, Analyze	d: 2023-1	10-09		
Bromide	3.92	0.10 mg/L	4.00		98	85-115			
Chloride	15.8	0.10 mg/L	16.0		99	90-110			
Fluoride	3.83	0.10 mg/L	4.00		96	88-108			
Nitrate (as N)	4.00	0.010 mg/L	4.00		100	90-110			
Nitrite (as N)	1.96	0.010 mg/L	2.00		98	85-115			
Phosphate (as P)	0.846	0.0050 mg/L	1.00		85	80-120			
Sulfate	15.4	1.0 mg/L	16.0		96	90-110			
LCS (B3J0723-BS2)			Prepared	I: 2023-10-1	I0, Analyze	d: 2023-1	10-10		
Bromide	3.83	0.10 mg/L	4.00		96	85-115			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED		884 8-10-17	09:51
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
Anions, Batch B3J	0723, Continued									
LCS (B3J0723-BS2	2), Continued			Prepared	I: 2023-10-1	0, Analyze	d: 2023-1	10-10		
Chloride		15.8	0.10 mg/L	16.0		99	90-110			
Fluoride		3.86	0.10 mg/L	4.00		97	88-108			
Nitrate (as N)		3.96	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)		1.96	0.010 mg/L	2.00		98	85-115			
Phosphate (as P)		0.919	0.0050 mg/L	1.00		92	80-120			
Sulfate		16.1	1.0 mg/L	16.0		101	90-110			
LCS (B3J0723-BS3	3)			Prepared	I: 2023-10-1	0, Analyze	d: 2023-1	10-10		
Bromide		3.99	0.10 mg/L	4.00		100	85-115			
Chloride		15.8	0.10 mg/L	16.0		99	90-110			
Fluoride		3.97	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)		4.09	0.010 mg/L	4.00		102	90-110			
Nitrite (as N)		1.96	0.010 mg/L	2.00		98	85-115			
Phosphate (as P)		1.07	0.0050 mg/L	1.00		107	80-120			
Sulfate		15.7	1.0 mg/L	16.0		98	90-110			
Duplicate (B3J072	3-DUP3)	Sc	urce: 23J0884-02	Prepared	I: 2023-10-1	0, Analyze	d: 2023-1	10-10		
Bromide		< 0.10	0.10 mg/L		< 0.10				10	
Chloride		0.26	0.10 mg/L		0.26				10	
Fluoride		0.10	0.10 mg/L		0.10				10	
Nitrate (as N)		< 0.010	0.010 mg/L		< 0.010				10	
Nitrite (as N)		< 0.010	0.010 mg/L		< 0.010				15	
Phosphate (as P)		< 0.0050	0.0050 mg/L		< 0.0050			. 4	20	
Sulfate		233	1.0 mg/L		233			< 1	10	
Matrix Spike (B3J0	1723-MS3)		ource: 23J0884-02		I: 2023-10-1			10-10		
Bromide		3.94	0.10 mg/L	4.00	< 0.10	99	80-120			
Chloride		16.4	0.10 mg/L	16.0	0.26	101	75-125			
Fluoride		3.97	0.10 mg/L	4.00	0.10	97	75-125			
Nitrate (as N)		4.18	0.010 mg/L	4.00	< 0.010	105	75-125			
Nitrite (as N) Phosphate (as P)		1.98 0.717	0.010 mg/L 0.0050 mg/L	2.00 1.00	< 0.010 < 0.0050	99 72	80-120 70-130			
	Hydrocarbons, Batch		0.0000 mg/2		0.0000		70.00			
	K1)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	0-11		
Blank (B3J0984-Bl	-1(1)									
•		< 250	250 μg/L							
EPHw10-19 EPHw19-32	,	< 250	250 μg/L 250 μg/L							
EPHw10-19 EPHw19-32	,			2200		73	60-140			
EPHw19-32 Surrogate: 2-Methyln	onane (EPH/F2-4)	< 250	250 µg/L		I: 2023-10-1			0-11		
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19	onane (EPH/F2-4)	< 250	250 μg/L μg/L 250 μg/L	Prepared	l: 2023-10-1			0-11		
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32	onane (EPH/F2-4)	< 250 1600	250 μg/L μg/L	Prepared	l: 2023-10-1	1, Analyze	d: 2023-1	0-11		
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32	onane (EPH/F2-4)	< 250 1600	250 μg/L μg/L 250 μg/L	Prepared	l: 2023-10-1	1, Analyze 103	d: 2023-1 70-130	0-11		
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni	onane (EPH/F2-4) 2) onane (EPH/F2-4)	< 250 1600 15800 17800	250 µg/L µg/L 250 µg/L 250 µg/L	Prepared 15400 22200 2200	l: 2023-10-1 l: 2023-10-1	1, Analyze 103 80 64	d: 2023-1 70-130 70-130 60-140			
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS Dup (B3J0984 EPHw10-19	onane (EPH/F2-4) 2) onane (EPH/F2-4)	<250 1600 15800 17800 1400	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400		1, Analyze 103 80 64	d: 2023-1 70-130 70-130 <i>60-140</i> d: 2023-1 70-130	0-11	20	
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS Dup (B3J0984	onane (EPH/F2-4) 2) onane (EPH/F2-4)	< 250 1600 15800 17800 1400	250 µg/L µg/L 250 µg/L 250 µg/L µg/L	Prepared 15400 22200 2200 Prepared		1, Analyze 103 80 64 1, Analyze	d: 2023-1 70-130 70-130 <i>60-140</i> d: 2023-1	0-11	20 20	
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS Dup (B3J0984 EPHw10-19	onane (EPH/F2-4) 2) onane (EPH/F2-4) 1-BSD2)	<250 1600 15800 17800 1400	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400		1, Analyze 103 80 64 1, Analyze 103	d: 2023-1 70-130 70-130 <i>60-140</i> d: 2023-1 70-130	0-11		
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS Dup (B3J0984 EPHw10-19 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni EPHw19-32	onane (EPH/F2-4) onane (EPH/F2-4) I-BSD2) onane (EPH/F2-4)	<250 1600 15800 17800 1400 15900 18300	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400 22200		1, Analyze 103 80 64 1, Analyze 103 82	d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130 70-130	0-11		
EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS (B3J0984-BS2 EPHw10-19 EPHw19-32 Surrogate: 2-Methylni LCS Dup (B3J0984 EPHw10-19 EPHw10-19 EPHw10-19 EPHw10-32	onane (EPH/F2-4) conane (EPH/F2-4) display="block" in the content of the conten	<250 1600 15800 17800 1400 15900 18300	250 µg/L µg/L 250 µg/L 250 µg/L µg/L 250 µg/L 250 µg/L 250 µg/L	Prepared 15400 22200 2200 Prepared 15400 22200 2200		1, Analyze 103 80 64 1, Analyze 103 82 72	d: 2023-1 70-130 70-130 60-140 d: 2023-1 70-130 70-130 60-140	0-11 < 1 2		



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK (_	23J0 2023)884 3-10-17	09:51
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals,	Batch B3J0948, Contir	nued								
Blank (B3J0948-Bl	LK2)			Prepared:	2023-10-1	1, Analyzed	d: 2023-1	0-12		
Mercury, dissolved	·	< 0.000010	0.000010 mg/L	<u> </u>						
Blank (B3J0948-Bl	I K3\			Prenared:	2023-10-1	1 Analyze	H- 2023_1	∩ ₋ 13		
Mercury, dissolved	LNO	< 0.000010	0.000010 mg/L	i lepaieu.	2023-10-1	i, Allalyze	1. 2025-1	0-13		
		< 0.000010	0.000010 Ilig/L							
LCS (B3J0948-BS1	1)			-	2023-10-1			0-12		
Mercury, dissolved		0.000235	0.000010 mg/L	0.000250		94	80-120			
LCS (B3J0948-BS2	2)			Prepared:	2023-10-1	1, Analyzed	d: 2023-1	0-12		
Mercury, dissolved		0.000248	0.000010 mg/L	0.000250		99	80-120			
LCS (B3J0948-BS3	3)			Prenared:	2023-10-1	1 Analyze	H· 2023 - 1	0-13		
Mercury, dissolved	<u> </u>	0.000266	0.000010 mg/L	0.000250	2020 10 1	106	80-120	0 10		
Dissolved Metals, Blank (B3J0982-Bl				Prepared:	2023-10-1	2, Analyze	d: 2023-1	0-12		
Aluminum, dissolved	-	< 0.0050	0.0050 mg/L	·		-				
Antimony, dissolved		< 0.00020	0.00020 mg/L							
Arsenic, dissolved		< 0.00050	0.00050 mg/L							
Barium, dissolved		< 0.0050	0.0050 mg/L							
Beryllium, dissolved Bismuth, dissolved		< 0.00010 < 0.00010	0.00010 mg/L 0.00010 mg/L							
Boron, dissolved		< 0.0500	0.0500 mg/L							
Cadmium, dissolved		< 0.000010	0.000010 mg/L							
Calcium, dissolved		< 0.20	0.20 mg/L							
Chromium, dissolved		< 0.00050	0.00050 mg/L							
Cobalt, dissolved		< 0.00010	0.00010 mg/L							
Copper, dissolved Iron, dissolved		< 0.00040 < 0.010	0.00040 mg/L							
Lead, dissolved		< 0.00020	0.010 mg/L 0.00020 mg/L							
Lithium, dissolved		< 0.00010	0.00010 mg/L							
Magnesium, dissolve	d	< 0.010	0.010 mg/L							
Manganese, dissolve	d	< 0.00020	0.00020 mg/L							
Molybdenum, dissolve	ed	< 0.00010	0.00010 mg/L							
Nickel, dissolved		< 0.00040	0.00040 mg/L							
Phosphorus, dissolve Potassium, dissolved		< 0.050 < 0.10	0.050 mg/L 0.10 mg/L							
Selenium, dissolved	•	< 0.00050	0.00050 mg/L							
Silicon, dissolved		< 1.0	1.0 mg/L							
Silver, dissolved		< 0.000050	0.000050 mg/L							
Sodium, dissolved		< 0.10	0.10 mg/L							
Strontium, dissolved		< 0.0010	0.0010 mg/L							
Sulfur, dissolved		< 3.0	3.0 mg/L							
Tellurium, dissolved Thallium, dissolved		< 0.00050 < 0.000020	0.00050 mg/L 0.000020 mg/L							
Thorium, dissolved		< 0.00010	0.000020 mg/L							
Tin, dissolved		< 0.00020	0.00020 mg/L							
		< 0.0050	0.0050 mg/L							
Titanium, dissolved										
Tungsten, dissolved		< 0.0010	0.0010 mg/L							
Tungsten, dissolved Uranium, dissolved		< 0.000020	0.000020 mg/L							
Tungsten, dissolved										



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED		884 3-10-17	09:51
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals,	Batch B3J0982, Continu	ıed								
LCS (B3J0982-BS1	1)			Prepared	I: 2023-10-1	2, Analyze	ed: 2023-	10-12		
Aluminum, dissolved		3.98	0.0050 mg/L	4.00		100	80-120			
Antimony, dissolved		0.0408	0.00020 mg/L	0.0400		102	80-120			
Arsenic, dissolved		0.411	0.00050 mg/L	0.400		103	80-120			
Barium, dissolved		0.0414	0.0050 mg/L	0.0400		103	80-120			
Beryllium, dissolved		0.0431	0.00010 mg/L	0.0400		108	80-120			
Bismuth, dissolved		0.0401	0.00010 mg/L	0.0400		100	80-120			
Boron, dissolved		0.424	0.0500 mg/L	0.400		106	80-120			
Calaium, dissolved		0.0408	0.000010 mg/L	0.0400		102 108	80-120 80-120			
Calcium, dissolved Chromium, dissolved		4.33 0.0408	0.20 mg/L 0.00050 mg/L	4.00 0.0400		108	80-120			
Cobalt, dissolved		0.0406	0.00050 mg/L	0.0400		102	80-120			
Copper, dissolved		0.0411	0.00040 mg/L	0.0400		103	80-120			
Iron, dissolved		3.98	0.010 mg/L	4.00		100	80-120			
Lead, dissolved		0.0400	0.00020 mg/L	0.0400		100	80-120			
Lithium, dissolved		0.0442	0.00010 mg/L	0.0400		111	80-120			
Magnesium, dissolve	d	4.03	0.010 mg/L	4.00		101	80-120			
Manganese, dissolve	d	0.0409	0.00020 mg/L	0.0400		102	80-120			
Molybdenum, dissolve	ed	0.0392	0.00010 mg/L	0.0400		98	80-120			
Nickel, dissolved		0.0415	0.00040 mg/L	0.0400		104	80-120			
Phosphorus, dissolve	d	3.93	0.050 mg/L	4.00		98	80-120			
Potassium, dissolved		4.02	0.10 mg/L	4.00		101	80-120			
Selenium, dissolved		0.405	0.00050 mg/L	0.400		101	80-120			
Silicon, dissolved		4.3	1.0 mg/L	4.00		109	80-120			
Silver, dissolved		0.0396	0.000050 mg/L	0.0400		99	80-120			
Sodium, dissolved		4.19	0.10 mg/L	4.00		105	80-120			
Strontium, dissolved		0.0432 42.6	0.0010 mg/L 3.0 mg/L	0.0400 40.0		108 107	80-120 80-120			
Sulfur, dissolved Tellurium, dissolved		0.0407	0.00050 mg/L	0.0400		107	80-120			
Thallium, dissolved		0.0407	0.00000 mg/L	0.0400		102	80-120			
Thorium, dissolved		0.0412	0.000020 mg/L	0.0400		103	80-120			
Tin, dissolved		0.0395	0.00020 mg/L	0.0400		99	80-120			
Titanium, dissolved		0.0408	0.0050 mg/L	0.0400		102	80-120			
Tungsten, dissolved		0.0430	0.0010 mg/L	0.0400		108	80-120			
Uranium, dissolved		0.0401	0.000020 mg/L	0.0400		100	80-120			
Vanadium, dissolved		0.0408	0.0050 mg/L	0.0400		102	80-120			
Zinc, dissolved		0.414	0.0040 mg/L	0.400		104	80-120			
Zirconium, dissolved		0.0406	0.00010 mg/L	0.0400		101	80-120			
General Parameters Blank (B3J0673-Bl				Prepared	I: 2023-10-0)7, Analyze	ed: 2023-1	10-12		
BOD, 5-day		< 2.0	2.0 mg/L							
LCS (B3J0673-BS1	1)			Prepared	I: 2023-10-0	7, Analyze	ed: 2023-	10-12		
BOD, 5-day		200	50.7 mg/L	198		101	85-115			
General Parameters Blank (B3J0735-Bl Ammonia, Total (as N	LK1)	< 0.050	0.050 mg/L	Prepared	l: 2023-10-1	0, Analyze	ed: 2023-	10-10		
Blank (B3J0735-Bl	 LK2)			Prepared	I: 2023-10-1	0, Analyze	ed: 2023-	10-10		
Ammonia, Total (as N		< 0.050	0.050 mg/L	•		. ,				
Blank (B3J0735-Bl				Prepared	I: 2023-10-1	0, Analvze	ed: 2023-	10-10		
Ammonia, Total (as N	•	< 0.050	0.050 mg/L	- - - - - - - - - - - -	. = • 1	,,20				
incina, rotal (de 14	7	- 3.000	5.550 mg/L						Pa	ae 13 o



REPORTED TO Elk River Alliance PROJECT CBWM-2023	•				WORK REPOR	ORDER RTED	23J0 2023	884 -10-17	09:51
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B3J0735, 0	Continued								
LCS (B3J0735-BS1)			Prepared	I: 2023-10-	10, Analyze	ed: 2023-10)-10		
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00		107	85-115			
LCS (B3J0735-BS2)			Prepared	I: 2023-10-	10, Analyze	ed: 2023-10)-10		
Ammonia, Total (as N)	1.11	0.050 mg/L	1.00		111	85-115			
LCS (B3J0735-BS3)			Prepared	I: 2023-10-	10, Analyze	ed: 2023-10)-10		
Ammonia, Total (as N)	1.04	0.050 mg/L	1.00		104	85-115			
General Parameters, Batch B3J0757									
Blank (B3J0757-BLK1)			Prepared	I: 2023-10-	16, Analyze	ed: 2023-10)-16		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0757-BLK2)			Prepared	I: 2023-10-	16, Analyze	ed: 2023-10)-16		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0757-BLK3)			Prepared	I: 2023-10-	16, Analyze	ed: 2023-10)-16		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0757-BLK4)			Prepared	l: 2023-10-	16, Analyze	ed: 2023-10)-16		
Carbon, Total Organic Carbon, Dissolved Organic	< 0.50 < 0.50	0.50 mg/L 0.50 mg/L							
	10.00	0.00 mg/L	Dranarad	. 2022 40	16 Analyza	ad. 2022 10	16		
LCS (B3J0757-BS1)	9.36	0.50 mg/l	10.0	1. 2023-10-		ed: 2023-10 78-116	J- 10		
Carbon, Total Organic Carbon, Dissolved Organic	10.4	0.50 mg/L 0.50 mg/L	10.0		94	78-116			
LCS (B3J0757-BS2)		<u> </u>	Prepared	l· 2023-10-	16 Analyze	ed: 2023-10)-16		
Carbon, Total Organic	8.27	0.50 mg/L	10.0	1. 2020-10-	83	78-116	7-10		
Carbon, Dissolved Organic	9.42	0.50 mg/L	10.0		94	78-116			
LCS (B3J0757-BS3)			Prepared	I: 2023-10-	16. Analvze	ed: 2023-10)-16		
Carbon, Total Organic	9.32	0.50 mg/L	10.0		93	78-116			
Carbon, Dissolved Organic	9.20	0.50 mg/L	10.0		92	78-116			
LCS (B3J0757-BS4)			Prepared	I: 2023-10-	16, Analyze	ed: 2023-10)-16		
Carbon, Total Organic	8.98	0.50 mg/L	10.0		90	78-116			
Carbon, Dissolved Organic	9.33	0.50 mg/L	10.0		93	78-116			
Duplicate (B3J0757-DUP4)	Soui	rce: 23J0884-01	Prepared	I: 2023-10-	17, Analyze	ed: 2023-10)-17		
Carbon, Total Organic	1.86	0.50 mg/L		1.89				16	
Carbon, Dissolved Organic	1.77	0.50 mg/L		1.81				15	
Matrix Spike (B3J0757-MS4)	Sour	rce: 23J0884-01	Prepared	I: 2023-10-	17, Analyze	ed: 2023-10)-17		
Carbon, Total Organic	10.7	0.50 mg/L	10.0	1.89	88	70-130			
Carbon, Dissolved Organic General Parameters, Batch B3J0957	9.63	0.50 mg/L	10.0	1.81	78	70-130			
Blank (B3J0957-BLK1)			Prepared	ı: 2023-10-	11, Analyze	ed: 2023-10)-11		
Solids, Total Suspended	< 2.0	2.0 mg/L							
Blank (B3J0957-BLK2)			Prepared	I: 2023-10-	11, Analyze	ed: 2023-10)-11		
Solids, Total Suspended	< 2.0	2.0 mg/L						Pa	ge 14 of 2



Analyte	REPORTED TO Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED)884 3-10-17	09:51
Prepared: 2023-10-11, Analyzed: 2023-10-11 Solids: Stall Suspended 94.9 10.1 mg/L 100 85 85-115 Prepared: 2023-10-11, Analyzed: 2023-10-11 Solids: Stall Suspended 94.0 10.0 mg/L 100 94 85-115 Solids: Stall Suspended 94.0 10.0 mg/L 100 94 85-115 Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (an CaCO3) 4.10 10.0 mg/L Alkalinity, Total (an CaCO3) 4.10 10.0 mg/L Alkalinity, Total (an CaCO3) 4.10 10.0 mg/L Alkalinity, Broatconate (an CaCO3) 4.10 10.0 mg/L Alkalinity, Broatconate (an CaCO3) 4.10 10.0 mg/L Alkalinity, Hydroxide (an CaCO3)	Analyte	Result	RL Units	•		% REC		% RPD		Qualifier
Solids, Total Suspended 94.8 10.1 mg/L 100 95 85-115	General Parameters, Batch B3J0957, Co	ontinued								
Prepared: 2023-10-11, Analyzed: 2023-10-11	LCS (B3J0957-BS1)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Solids, Total Suspended S4.0 10.0 mg/L 100 94 85-115	Solids, Total Suspended	94.9	10.1 mg/L	100		95	85-115			
Solids, Total Suspended S4.0 10.0 mg/L 100 94 85-115	LCS (B3J0957-BS2)			Prepared	l· 2023-10-1	1 Analyze	d: 2023-1	10-11		
Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3)		94.0	10.0 mg/L							
Akkalinity, Total (as CaCO3)	General Parameters, Batch B3J0967									
Alkalinity, Phenolphthalein (as CaCO3)	Blank (B3J0967-BLK1)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Alkalinity, Bicarbonate (as CaCO3)	· · · · · · · · · · · · · · · · · · ·	< 1.0	1.0 mg/L	· · · · · · · · · · · · · · · · · · ·						
Alkalinity, Carbonate (as CaCO3)		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CacCo3)										
Blank (B3.0967-BLK2)										
Alkalinity, Total (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Akkalinity, Phenoiphthalein (as CaCO3)	Blank (B3J0967-BLK2)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Akkalinity, Phenoiphthalein (as CaCO3)	Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)		< 1.0								
Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Blank (B3J0967-BLK3)										
Alkalinity, Total (as CaCO3) < 1.0	Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Akkalinity, Phenolphthalein (as CaCO3)	Blank (B3J0967-BLK3)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Alkalinity, Bicarbonate (as CaCO3) < 1.0 1.0 mg/L Alkalinity, Bicarbonate (as CaCO3) < 1.0 1.0 mg/L Alkalinity, Hydroxide (as CaCO3) < 1.0 1.0 mg/L LCS (B3J0967-BS1) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 50.5 1.0 mg/L 50.0 101 0-200 LCS (B3J0967-BS2) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 110 1.0 mg/L 100 110 80-120 Alkalinity, Phenolphthalein (as CaCO3) 42.6 1.0 mg/L 50.0 85 0-200 LCS (B3J0967-BS3) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12		< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)										
Alkalinity, Hydroxide (as CaCO3)										
Description										
Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 50.5 1.0 mg/L 50.0 101 0-200 LCS (B3J0967-BS2) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 110 1.0 mg/L 100 110 80-120 Alkalinity, Phenolphthalein (as CaCO3) 42.6 1.0 mg/L 50.0 85 0-200 LCS (B3J0967-BS3) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12	Alkalifity, Hydroxide (as CaCO3)	<u> </u>	1.0 Hig/L							
Alkalinity, Phenolphthalein (as CaCO3) 50.5 1.0 mg/L 50.0 101 0-200 LCS (B3J0967-BS2) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 110 1.0 mg/L 100 110 80-120 Alkalinity, Phenolphthalein (as CaCO3) 42.6 1.0 mg/L 50.0 85 0-200 LCS (B3J0967-BS3) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	LCS (B3J0967-BS1)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Description										
Alkalinity, Total (as CaCO3) 110 1.0 mg/L 100 110 80-120 Alkalinity, Phenolphthalein (as CaCO3) 42.6 1.0 mg/L 50.0 85 0-200 LCS (B3J0967-BS3) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	Alkalinity, Phenolphthalein (as CaCO3)	50.5	1.0 mg/L	50.0		101	0-200			
Alkalinity, Phenolphthalein (as CaCO3) 42.6 1.0 mg/L 50.0 85 0-200 LCS (B3J0967-BS3) Prepared: 2023-10-11, Analyzed: 2023-10-11 Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	LCS (B3J0967-BS2)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Description	Alkalinity, Total (as CaCO3)	110	1.0 mg/L	100		110	80-120			
Alkalinity, Total (as CaCO3) 109 1.0 mg/L 100 109 80-120 Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	Alkalinity, Phenolphthalein (as CaCO3)	42.6	1.0 mg/L	50.0		85	0-200			
Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	LCS (B3J0967-BS3)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-11		
Alkalinity, Phenolphthalein (as CaCO3) 37.7 1.0 mg/L 50.0 75 0-200 General Parameters, Batch B3J0991 Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	Alkalinity, Total (as CaCO3)	109	1.0 mg/L	100		109	80-120			
Blank (B3J0991-BLK1) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK2) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050 0.0050 mg/L Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12		37.7	1.0 mg/L	50.0		75	0-200			
Phosphorus, Total (as P) < 0.0050	General Parameters, Batch B3J0991									
Phosphorus, Total (as P) < 0.0050	Blank (B3J0991-BLK1)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-12		
Phosphorus, Total (as P) < 0.0050		< 0.0050	0.0050 mg/L							
Phosphorus, Total (as P) < 0.0050	Blank (B3J0991-BLK2)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-12		
Blank (B3J0991-BLK3) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050		< 0.0050	0.0050 mg/L							
Phosphorus, Total (as P) < 0.0050	Blank (B3J0991-BLK3)			Prepared	I: 2023-10-1	1. Analyze	d: 2023-1	10-12		
Blank (B3J0991-BLK4) Prepared: 2023-10-11, Analyzed: 2023-10-12 Phosphorus, Total (as P) < 0.0050	·	< 0.0050	0.0050 mg/l		0_0 10-1	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0_0-			
Phosphorus, Total (as P) < 0.0050		2.0000	o.oooo mg/L	Prenared	I- 2022_10_1	1 Analyza	4· 3033 ·	In_12		
Blank (B3J0991-BLK5) Prepared: 2023-10-11, Analyzed: 2023-10-12	·	< 0.0050	0.0050 ==-"	Fiepaieu	1. 2023-10-1	i, Ailaiy2e	u. 2023-	10-12		
	Priosphorus, Iotal (as P)	< 0.0050	0.0050 mg/L							
Phosphorus, Total (as P) < 0.0050 0.0050 mg/L	Blank (B3J0991-BLK5)			Prepared	I: 2023-10-1	1, Analyze	d: 2023-1	10-12		
	Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED)884 3-10-17	09:51
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters	s, Batch B3J0991, Col	ntinued								
LCS (B3J0991-BS1)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Phosphorus, Total (as	P)	0.101	0.0050 mg/L	0.100		101	85-115			
LCS (B3J0991-BS2	2)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Phosphorus, Total (as	P)	0.101	0.0050 mg/L	0.100		101	85-115			
LCS (B3J0991-BS3	3)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Phosphorus, Total (as	P)	0.103	0.0050 mg/L	0.100		103	85-115			
LCS (B3J0991-BS4	·)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Phosphorus, Total (as	P)	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B3J0991-BS5	5)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Phosphorus, Total (as	P)	0.104	0.0050 mg/L	0.100		104	85-115			
General Parameters	s, Batch B3J1025									
Blank (B3J1025-BL	.K1)			Prepared	: 2023-10-1	2, Analyze	ed: 2023-	10-12		
Chemical Oxygen Der	•	< 20	20 mg/L	· ·		· ·				
LCS (B3J1025-BS1)			Prepared	: 2023-10-1	2, Analyze	ed: 2023-	10-12		
Chemical Oxygen Der	•	527	20 mg/L	500		105	89-115			
General Parameters	s, Batch B3J1200									
Blank (B3J1200-BL	-K2)			Prepared	: 2023-10-1	3, Analyze	ed: 2023-	10-14		
Nitrogen, Total Kjeldal	hl	< 0.050	0.050 mg/L							
LCS (B3J1200-BS2	2)			Prepared	: 2023-10-1	3, Analyze	ed: 2023-	10-14		
Nitrogen, Total Kjeldal	hl	0.986	0.050 mg/L	1.00		99	85-115			
Total Metals, Batch	B3J0947									
Blank (B3J0947-BL	.K1)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Mercury, total		< 0.000010	0.000010 mg/L							
Blank (B3J0947-BL	-K2)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Mercury, total		< 0.000010	0.000010 mg/L							
Blank (B3J0947-BL	_K3)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Mercury, total		< 0.000010	0.000010 mg/L							
LCS (B3J0947-BS1)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Mercury, total		0.000247	0.000010 mg/L	0.000250		99	80-120			
LCS (B3J0947-BS2	2)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Mercury, total		0.000235	0.000010 mg/L	0.000250		94	80-120			
LCS (B3J0947-BS3	3)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Mercury, total		0.000224	0.000010 mg/L	0.000250		89	80-120			
Total Metals, Batch	B3J0950									
Blank (B3J0950-BL	-K1)			Prepared	: 2023-10-1	1, Analyze	ed: 2023-	10-12		
Aluminum, total		< 0.0050	0.0050 mg/L							
Antimony, total Arsenic, total		< 0.00020 < 0.00050	0.00020 mg/L 0.00050 mg/L							
AISCIIIO, IUIAI	_	~ U.UUU3U	0.00030 Hig/L						Pa	ge 16 of 2



REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK ORDER REPORTED				
Analyte		Result	RL Ur	nits	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0950, Continued										
Blank (B3J0950-BL	K1), Continued				Prepared	: 2023-10-1	1, Analyze	d: 2023-1	0-12		
Barium, total		< 0.0050	0.0050 mg	g/L							
Beryllium, total		< 0.00010	0.00010 mg	g/L							
Bismuth, total		< 0.00010	0.00010 mg	g/L							
Boron, total		< 0.0500	0.0500 mg								
Cadmium, total		< 0.000010	0.000010 mg								
Calcium, total		< 0.20	0.20 mg								
Chromium, total		< 0.00050	0.00050 mg								
Cobalt, total		< 0.00010	0.00010 mg								
Copper, total		< 0.00040	0.00040 mg								
Iron, total		< 0.010	0.010 mg								
Lead, total Lithium, total		< 0.00020 < 0.00010	0.00020 mg								
Magnesium, total		< 0.00010	0.00010 mg								
Manganese, total		< 0.00020	0.00020 mg								
Molybdenum, total		< 0.00020	0.00020 mg								
Nickel, total		< 0.00040	0.00040 mg								
Phosphorus, total		< 0.050	0.050 mg								
Potassium, total		< 0.10	0.10 mg								
Selenium, total		< 0.00050	0.00050 mg								
Silicon, total		< 1.0	1.0 mg								
Silver, total		< 0.000050	0.000050 mg	-							
Sodium, total		< 0.10	0.10 mg	g/L							
Strontium, total		< 0.0010	0.0010 mg	g/L							
Sulfur, total		< 3.0	3.0 mg	g/L							
Tellurium, total		< 0.00050	0.00050 mg								
Thallium, total		< 0.000020	0.000020 mg	g/L							
Thorium, total		< 0.00010	0.00010 mg								
Tin, total		< 0.00020	0.00020 mg								
Titanium, total		< 0.0050	0.0050 mg								
Tungsten, total		< 0.0010	0.0010 mg								
Uranium, total		< 0.000020	0.000020 mg								
Vanadium, total		< 0.0050	0.0050 mg								
Zinc, total Zirconium, total		< 0.0040 < 0.00010	0.0040 mg								
Zircoriium, totai		< 0.00010	0.00010 1110	g/L							
LCS (B3J0950-BS1))				Prepared	: 2023-10-1	1, Analyze	d: 2023-1	0-12		
Aluminum, total		3.94	0.0050 mg	g/L	4.00		98	80-120			
Antimony, total		0.0392	0.00020 mg		0.0400		98	80-120			
Arsenic, total		0.400	0.00050 mg		0.400		100	80-120			
Barium, total		0.0391	0.0050 mg		0.0400		98	80-120			
Beryllium, total		0.0379	0.00010 mg		0.0400		95	80-120			
Bismuth, total		0.0387	0.00010 mg		0.0400		97	80-120			
Boron, total		0.390	0.0500 mg		0.400		97	80-120			
Cadmium, total		0.0391	0.000010 mg	•	0.0400		98	80-120			
Calcium, total		3.91	0.20 mg	<u> </u>	4.00		98	80-120			
Chromium, total		0.0410	0.00050 mg		0.0400		102	80-120			
Copper total		0.0406 0.0410	0.00010 mg		0.0400		102 102	80-120 80-120			
Copper, total		4.08	0.00040 mg		0.0400 4.00		102	80-120			
Lead, total		0.0389	0.010 mg		0.0400		97	80-120			
Lithium, total		0.0369	0.00020 mg		0.0400		93	80-120			
Magnesium, total		3.91	0.000 TO THE		4.00		98	80-120			
Manganese, total		0.0406	0.00020 mg		0.0400		102	80-120			
Molybdenum, total		0.0384	0.00020 mg		0.0400		96	80-120			
Nickel, total		0.0413	0.00040 mg		0.0400		103	80-120			
Phosphorus, total		3.92	0.050 mg	-	4.00		98	80-120			



REPORTED TO

Tin, total

Titanium, total

Tungsten, total

Uranium, total

Zinc, total

Vanadium, total

Zirconium, total

APPENDIX 2: QUALITY CONTROL RESULTS

0.0393

0.0404

0.0403

0.0396

0.0404

0.398

0.0403

Elk River Alliance

PROJECT CBWM-2023						REPOR	TED	2023	-10-17	09:51
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0950, Continued									
LCS (B3J0950-BS1), Continued			Prepared	I: 2023-10- 1	1, Analyze	d: 2023-1	10-12		
Potassium, total		3.89	0.10 mg/L	4.00		97	80-120			
Selenium, total		0.398	0.00050 mg/L	0.400		99	80-120			
Silicon, total		4.0	1.0 mg/L	4.00		101	80-120			
Silver, total		0.0388	0.000050 mg/L	0.0400		97	80-120			
Sodium, total		4.03	0.10 mg/L	4.00		101	80-120			
Strontium, total		0.0397	0.0010 mg/L	0.0400		99	80-120			
Sulfur, total		38.7	3.0 mg/L	40.0		97	80-120			
Tellurium, total		0.0363	0.00050 mg/L	0.0400		91	80-120			
Thallium, total		0.0395	0.000020 mg/L	0.0400		99	80-120			
Thorium, total		0.0399	0.00010 mg/L	0.0400		100	80-120			
T		0.0000	0.00000 "	0.0400			00.400			

0.0400

0.0400

0.0400

0.0400

0.0400

0.400

0.0400

0.00020 mg/L

0.0050 mg/L

0.0010 mg/L

0.0050 mg/L 0.0040 mg/L

0.00010 mg/L

0.000020 mg/L

WORK ORDER

98

101

101

99

101

99

101

80-120

80-120

80-120

80-120

80-120

80-120

80-120

23J0884

Total Metals, Batch B3J1199

Blank (B3J1199-BLK1)			Prepared: 2023-10-13, Analyzed: 2023-10-13
Aluminum, total	< 0.0050	0.0050 mg/L	
Antimony, total	< 0.00020	0.00020 mg/L	
Arsenic, total	< 0.00050	0.00050 mg/L	
Barium, total	< 0.0050	0.0050 mg/L	
Beryllium, total	< 0.00010	0.00010 mg/L	
Bismuth, total	< 0.00010	0.00010 mg/L	
Boron, total	< 0.0500	0.0500 mg/L	
Cadmium, total	< 0.000010	0.000010 mg/L	
Calcium, total	< 0.20	0.20 mg/L	
Chromium, total	< 0.00050	0.00050 mg/L	
Cobalt, total	< 0.00010	0.00010 mg/L	
Copper, total	< 0.00040	0.00040 mg/L	
Iron, total	< 0.010	0.010 mg/L	
Lead, total	< 0.00020	0.00020 mg/L	
Lithium, total	< 0.00010	0.00010 mg/L	
Magnesium, total	< 0.010	0.010 mg/L	
Manganese, total	< 0.00020	0.00020 mg/L	
Molybdenum, total	< 0.00010	0.00010 mg/L	
Nickel, total	< 0.00040	0.00040 mg/L	
Phosphorus, total	< 0.050	0.050 mg/L	
Potassium, total	< 0.10	0.10 mg/L	
Selenium, total	< 0.00050	0.00050 mg/L	
Silicon, total	< 1.0	1.0 mg/L	
Silver, total	< 0.000050	0.000050 mg/L	
Sodium, total	< 0.10	0.10 mg/L	
Strontium, total	< 0.0010	0.0010 mg/L	
Sulfur, total	< 3.0	3.0 mg/L	
Tellurium, total	< 0.00050	0.00050 mg/L	
Thallium, total	< 0.000020	0.000020 mg/L	
Thorium, total	< 0.00010	0.00010 mg/L	
Tin, total	< 0.00020	0.00020 mg/L	
Titanium, total	< 0.0050	0.0050 mg/L	
Tungsten, total	< 0.0010	0.0010 mg/L	
Uranium, total	< 0.000020	0.000020 mg/L	
Vanadium, total	< 0.0050	0.0050 mg/L	
			Dama 10 of 00



Total Martals, Batch B3J1199, Continued Prepared: 2023-10-13, Analyzed: 2023-10-13 Prepared: 2023-10-13, Analyzed: 2023-10-13 Prepared: 2023-10-13 Pre	REPORTED TO PROJECT	Elk River Alliance CBWM-2023						WORK REPOR	ORDER TED		884 8-10-17	09:51
Prepared 2023-10-13, Analyzed 2023-10-13 2023-10-	Analyte		Result	RL	Units	-		% REC		% RPD		Qualifier
Zenci	Total Metals, Batc	h B3J1199, Continued										
	Blank (B3J1199-B	LK1), Continued				Prepared	: 2023-10-1	3, Analyze	d: 2023-1	10-13		
Aluminum, total 3.95	Zinc, total		< 0.0040	0.0040	mg/L							
Authanne, total 0.0599	Zirconium, total		< 0.00010	0.00010	mg/L							
Anthrony, total 0.399 0.00020 mg/L 0.400 99 80-120 Barlum, total 0.0395 0.00020 mg/L 0.000 99 80-120 Barlum, total 0.0391 0.00050 mg/L 0.000 99 80-120 Bernyllkum, total 0.0398 0.00010 mg/L 0.000 116 80-120 Bernyllkum, total 0.0398 0.00010 mg/L 0.000 196 80-120 Bernyllkum, total 0.0398 0.00010 mg/L 0.000 197 80-120 Cadminim, total 0.0388 0.000010 mg/L 0.000 175 80-120 Cadminim, total 0.0388 0.000010 mg/L 0.000 175 80-120 Cadminim, total 0.0388 0.000010 mg/L 0.000 176 80-120 Cadminim, total 0.0407 0.00050 mg/L 0.000 178 80-120 Chromium, total 0.0407 0.00050 mg/L 0.000 178 80-120 Chromium, total 0.0407 0.00050 mg/L 0.000 172 80-120 Copper, total 0.0407 0.000010 mg/L 0.0000 172 80-120 Copper, total 0.0392 0.00020 mg/L 0.0000 174 80-120 Copper, total 0.0393 0.000000 mg/L 0.0000 174 80-120 Copper, total 0.0407 0.00000 mg/L 0.0000 174 80-120 Copper, total 0.0408 0.00000 mg/L 0.0000 174 80-120 Copper, total 0.0409 0.00000 mg/L 0.0000 174 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 175 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 175 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 170 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 170 70-130 Copper, total 0.0412 0.0001 mg/L 0.0000 170 70-130 Copper, total	LCS (B3J1199-BS	1)				Prepared	: 2023-10-1	3, Analyze	d: 2023-1	10-13		
Anthrony, total 0.399 0.00020 mg/L 0.400 99 80-120 Barlum, total 0.0395 0.00020 mg/L 0.000 99 80-120 Barlum, total 0.0391 0.00050 mg/L 0.000 99 80-120 Bernyllkum, total 0.0398 0.00010 mg/L 0.000 116 80-120 Bernyllkum, total 0.0398 0.00010 mg/L 0.000 196 80-120 Bernyllkum, total 0.0398 0.00010 mg/L 0.000 197 80-120 Cadminim, total 0.0388 0.000010 mg/L 0.000 175 80-120 Cadminim, total 0.0388 0.000010 mg/L 0.000 175 80-120 Cadminim, total 0.0388 0.000010 mg/L 0.000 176 80-120 Cadminim, total 0.0407 0.00050 mg/L 0.000 178 80-120 Chromium, total 0.0407 0.00050 mg/L 0.000 178 80-120 Chromium, total 0.0407 0.00050 mg/L 0.000 172 80-120 Copper, total 0.0407 0.000010 mg/L 0.0000 172 80-120 Copper, total 0.0392 0.00020 mg/L 0.0000 174 80-120 Copper, total 0.0393 0.000000 mg/L 0.0000 174 80-120 Copper, total 0.0407 0.00000 mg/L 0.0000 174 80-120 Copper, total 0.0408 0.00000 mg/L 0.0000 174 80-120 Copper, total 0.0409 0.00000 mg/L 0.0000 174 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 175 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 175 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 170 80-120 Copper, total 0.0412 0.0001 mg/L 0.0000 170 70-130 Copper, total 0.0412 0.0001 mg/L 0.0000 170 70-130 Copper, total	Aluminum, total	•	3.95	0.0050	mg/L	4.00		99	80-120			
Barlum, total 0.0391 0.0950 mg/L 0.0400 98 80-120	· · · · · · · · · · · · · · · · · · ·											
Beryllim, total 0.0462 0.00010 mg/L 0.0400 116 80-120			0.395			0.400		99	80-120			
Barmut, Istal	Barium, total		0.0391	0.0050	mg/L	0.0400		98	80-120			
Boron, total	Beryllium, total		0.0462	0.00010	mg/L	0.0400		116	80-120			
Cadminn, total	Bismuth, total			0.00010	mg/L	0.0400		99	80-120			
Calcium, total	Boron, total											
Chromium, total												
Cobat, Itolal												
Copper, total 0.0407 0.00040 mg/L 0.0400 102 80-120 101 102												
Iron, total												
Lead, total												
Lithium, total 0.0456 0.00010 mg/L 0.0400 114 80-120 Magnesiun, total 4.03 0.010 mg/L 0.0400 101 80-120 Manganese, total 0.0402 0.00020 mg/L 0.0400 101 80-120 Molydenum, total 0.0382 0.00010 mg/L 0.0400 101 80-120 Nickel, total 0.0402 0.00040 mg/L 0.0400 101 80-120 Phosphorus, total 3.93 0.050 mg/L 4.00 98 80-120 Sleenium, total 4.27 7.010 mg/L 4.00 101 80-120 Sleinum, total 4.68 1.0 mg/L 4.00 101 80-120 Sliver, total 0.430 0.00050 mg/L 0.0400 98 80-120 Sliver, total 4.20 0.101 mg/L 4.00 105 80-120 Siver, total 4.51 3.0 mg/L 0.0400 198 80-120 Siver, total 4.51 3.0 mg/L 0.0400 103 80-120 <td></td>												
Magnesium, total 4.03 0.010 mg/L 4.00 101 80-120 Manganese, total 0.0402 0.00020 mg/L 0.0400 101 80-120 Mickel, total 0.0402 0.00004 mg/L 0.0400 101 80-120 Nickel, total 0.0402 0.00004 mg/L 0.0400 101 80-120 Plossphorus, total 3.93 0.050 mg/L 4.00 107 80-120 Potassium, total 4.27 0.10 mg/L 4.00 107 80-120 Silicon, total 4.6 1.0 mg/L 4.00 115 80-120 Silicon, total 4.6 1.0 mg/L 4.00 115 80-120 Silver, total 0.0393 0.000050 mg/L 0.0400 105 80-120 Silver, total 4.20 0.010 mg/L 0.0400 103 80-120 Storitum, total 0.412 0.0010 mg/L 0.0400 103 80-120 Stuffer, total 0.512 3.00050 mg/L 0.0400 93 80-120												
Manganese, total 0.0402 0.00020 mg/L 0.0400 101 80-120 Nickel, total 0.0382 0.00010 mg/L 0.0400 96 80-120 Nickel, total 0.0402 0.00040 mg/L 0.0400 101 80-120 Phosphorus, total 3.93 0.050 mg/L 4.00 98 80-120 Potassium, total 4.27 0.10 mg/L 4.00 101 80-120 Selenium, total 4.6 0.00050 mg/L 0.400 101 80-120 Silicon, total 4.6 1.0 mg/L 4.00 115 80-120 Silver, total 0.0333 0.000050 mg/L 0.0400 105 80-120 Stoffun, total 4.20 0.010 mg/L 4.00 105 80-120 Stuffur, total 0.0412 0.0010 mg/L 0.0400 133 80-120 Tallurium, total 0.0373 0.00050 mg/L 0.0400 98 80-120 Tallurium, total 0.0412 0.00010 mg/L 0.0400 98 80-1												
Molybatenum, total 0.0382 0.00010 mg/L 0.0400 96 80-120												
Nicket, Istal												
Phosphorus, total 4.27												
Potassium, total 4.27 0.10 mg/L 4.00 107 mg/L 80-120 Selenium, total 0.406 0.00050 mg/L 0.400 101 mg/L 80-120 Silver, total 0.408 no.00050 mg/L 0.4040 mg/L 98 mg/L 80-120 Silver, total 0.0393 no.000050 mg/L 0.0400 mg/L 98 mg/L 80-120 Strontium, total 4.20 no.010 mg/L 0.0400 mg/L 103 mg/L 80-120 Strontium, total 0.0412 no.0000 mg/L 0.0400 mg/L 93 mg/L 80-120 Suffur, total 0.0373 no.00050 mg/L 0.0400 mg/L 93 mg/L 80-120 Thallum, total 0.0373 no.00050 mg/L 0.0400 mg/L 98 mg/L 80-120 Thallum, total 0.0390 no.000020 mg/L 0.0400 mg/L 98 mg/L 80-120 Tincorium, total 0.0412 no.00010 mg/L 0.0400 mg/L 98 mg/L 80-120 Tincorium, total 0.0452 no.0005 mg/L 0.0400 mg/L 0.0400 mg/L 103 mg/L 80-120 Tungsten, total 0.0499 no.000000 mg/L 0.0400 no.0000 mg/L 0.0400 no.0000 mg/L												
Selenium, total 0.406 0.00050 mg/L 0.400 101 80-120	· · · · · · · · · · · · · · · · · · ·											
Silicon, total 4.6												
Silver, total 0.0393 0.000050 mg/L 0.0400 98 80-120 Sodium, total 4.20 0.10 mg/L 4.00 105 80-120 Strontium, total 0.0412 0.0010 mg/L 0.0400 103 80-120 Sulfur, total 45.1 3.0 mg/L 40.0 113 80-120 Tellurium, total 0.0373 0.00050 mg/L 0.0400 93 80-120 Thallium, total 0.0390 0.000020 mg/L 0.0400 98 80-120 Thorium, total 0.0412 0.00010 mg/L 0.0400 98 80-120 Thorium, total 0.0412 0.000020 mg/L 0.0400 98 80-120 Tin, total 0.0391 0.00020 mg/L 0.0400 98 80-120 Tinapium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 100 <												
Strontium, total 0.0412 0.0010 mg/L 0.0400 103 80-120	Silver, total		0.0393			0.0400		98	80-120			
Sulfur, total 45.1 3.0 mg/L 40.0 113 80-120 Tellurium, total 0.0373 0.00050 mg/L 0.0400 93 80-120 Thallium, total 0.0390 0.000020 mg/L 0.0400 98 80-120 Thorium, total 0.0412 0.00010 mg/L 0.0400 103 80-120 Tin, total 0.0391 0.0020 mg/L 0.0400 98 80-120 Tinalium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Tungsten, total 0.0409 0.0010 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.00020 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 99 80-120 Zinc, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Zinc, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13	Sodium, total		4.20	0.10	mg/L	4.00		105	80-120			
Tellurium, total 0.0373 0.00050 mg/L 0.0400 93 80-120 Thallium, total 0.0390 0.000020 mg/L 0.0400 98 80-120 Thorium, total 0.0412 0.00010 mg/L 0.0400 103 80-120 Tin, total 0.0391 0.00020 mg/L 0.0400 98 80-120 Titanium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Tingsten, total 0.0409 0.00020 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.00020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0050 mg/L 0.0400 102 80-120 Zirco, total 0.399 0.0000 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 0.0400 100 80-120 Aluminum, total 0.0410 0.0050 mg/L 0.0400 0.0236 <	Strontium, total		0.0412	0.0010	mg/L	0.0400		103	80-120			
Thallium, total 0.0390 0.000020 mg/L 0.0400 98 80-120 Thorium, total 0.0412 0.00010 mg/L 0.0400 103 80-120 Tin, total 0.0391 0.00020 mg/L 0.0400 98 80-120 Titanium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Tungsten, total 0.0409 0.0010 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0050 mg/L 0.0400 102 80-120 Zinc, total 0.399 0.0040 mg/L 0.0400 100 80-120 Zirconium, total 0.0399 0.0040 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimory, total 0.410 0.00050 mg/L 0.0400	Sulfur, total		45.1			40.0		113	80-120			
Thorium, total 0.0412 0.00010 mg/L 0.0400 103 80-120 Tin, total 0.0391 0.00020 mg/L 0.0400 98 80-120 Titanium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Tungsten, total 0.0409 0.0010 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.00020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0500 mg/L 0.0400 99 80-120 Zircotal 0.0399 0.0040 mg/L 0.0400 100 80-120 Zirconium, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimony, total 4.19 0.0050 mg/L 0.0400 < 0.00020	Tellurium, total		0.0373			0.0400		93	80-120			
Tin, total 0.0391 0.00020 mg/L 0.0400 98 80-120 Titanium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Tungsten, total 0.0409 0.0010 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0050 mg/L 0.0400 99 80-120 Zinc, total 0.399 0.0040 mg/L 0.400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.050 mg/L 4.00 0.0236 104 70-130 Arsenic, total 0.0410 0.00020 mg/L 4.00 0.0236 104 70-130 Arsenic, total 0.0428 0.00050 mg/L 0.0400 <0.00050				0.000020	mg/L	0.0400						
Titanium, total 0.0452 0.0050 mg/L 0.0400 113 80-120 Tungsten, total 0.0409 0.0010 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0050 mg/L 0.0400 99 80-120 Zinc, total 0.399 0.0040 mg/L 0.0400 100 80-120 Zirconium, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.050 mg/L 4.00 0.0236 104 70-130 Arsenic, total 0.0410 0.00020 mg/L 0.0400 < 0.00020												
Tungsten, total 0.0409 0.0010 mg/L 0.0400 102 80-120 Uranium, total 0.0409 0.000020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0050 mg/L 0.0400 99 80-120 Zirac, total 0.399 0.0040 mg/L 0.400 100 80-120 Zirconium, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Arsenic, total 0.0410 0.00020 mg/L 0.0400 < 0.00020												
Uranium, total 0.0409 0.000020 mg/L 0.0400 102 80-120 Vanadium, total 0.0398 0.0050 mg/L 0.0400 99 80-120 Zinc, total 0.399 0.0040 mg/L 0.400 100 80-120 Zirconium, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.00050 mg/L 4.00 0.0236 104 70-130 Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020												
Vanadium, total 0.0398 0.0050 mg/L 0.0400 99 80-120 Zinc, total 0.399 0.0040 mg/L 0.400 100 80-120 Zirconium, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020												
Zinc, total 0.399 0.0040 mg/L 0.400 100 80-120 Zirconium, total 0.0399 0.0010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020 102 70-130 Arsenic, total 0.428 0.00050 mg/L 0.400 < 0.00050 107 70-130 Barium, total 0.123 0.0050 mg/L 0.0400 < 0.00010 110 70-130 Beryllium, total 0.0440 0.00010 mg/L 0.0400 < 0.00010 110 70-130 Bismuth, total 0.0413 0.00010 mg/L 0.0400 < 0.00010 110 70-130 Boron, total 0.449 0.0500 mg/L 0.400 < 0.00010 103 70-130 Cadmium, total 0.0432 0.000010 mg/L 0.0400 < 0.00010												
Zirconium, total 0.0399 0.00010 mg/L 0.0400 100 80-120 Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020 102 70-130 Arsenic, total 0.428 0.00050 mg/L 0.400 < 0.00050 107 70-130 Barium, total 0.123 0.0050 mg/L 0.0400 < 0.00010 110 70-130 Beryllium, total 0.0440 0.00010 mg/L 0.0400 < 0.00010 110 70-130 Bismuth, total 0.0413 0.00010 mg/L 0.0400 < 0.00010 103 70-130 Boron, total 0.449 0.0500 mg/L 0.0400 < 0.0500 109 70-130 Calcium, total 0.0432 0.000010 mg/L 0.0400 < 0.00016 108 70-130 Chromium, total 0.0432 0.00050 mg/L 0.0400												
Matrix Spike (B3J1199-MS1) Source: 23J0884-01 Prepared: 2023-10-13, Analyzed: 2023-10-13 Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020												
Aluminum, total 4.19 0.0050 mg/L 4.00 0.0236 104 70-130 Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020							0000 10 1			10.10		
Antimony, total 0.0410 0.00020 mg/L 0.0400 < 0.00020 102 70-130 Arsenic, total 0.428 0.00050 mg/L 0.400 < 0.00050		1199-MS1)				•				10-13		
Arsenic, total 0.428 0.00050 mg/L 0.400 < 0.00050 107 70-130 Barium, total 0.123 0.0050 mg/L 0.0400 0.0796 108 70-130 Beryllium, total 0.0440 0.00010 mg/L 0.0400 < 0.00010												
Barium, total 0.123 0.0050 mg/L 0.0400 0.0796 108 70-130 Beryllium, total 0.0440 0.00010 mg/L 0.0400 < 0.00010	•											
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Bismuth, total 0.0413 0.00010 mg/L 0.0400 < 0.00010 103 70-130 Boron, total 0.449 0.0500 mg/L 0.400 < 0.0500												
Boron, total 0.449 0.0500 mg/L 0.400 < 0.0500 109 70-130 Cadmium, total 0.0432 0.000010 mg/L 0.0400 0.000016 108 70-130 Calcium, total 116 0.20 mg/L 4.00 115 31 70-130 MS2 Chromium, total 0.0432 0.00050 mg/L 0.0400 < 0.00050												
Cadmium, total 0.0432 0.000010 mg/L 0.0400 0.00016 108 70-130 Calcium, total 116 0.20 mg/L 4.00 115 31 70-130 MS2 Chromium, total 0.0432 0.00050 mg/L 0.0400 < 0.00050												
Calcium, total 116 0.20 mg/L 4.00 115 31 70-130 MS2 Chromium, total 0.0432 0.00050 mg/L 0.0400 < 0.00050												
Chromium, total 0.0432 0.00050 mg/L 0.0400 < 0.00050 107 70-130 Cobalt, total 0.0420 0.00010 mg/L 0.0400 < 0.00010												MS2
Cobalt, total 0.0420 0.00010 mg/L 0.0400 < 0.00010 105 70-130 Copper, total 0.0414 0.00040 mg/L 0.0400 < 0.00040												
Copper, total 0.0414 0.00040 mg/L 0.0400 < 0.00040 103 70-130 Iron, total 4.30 0.010 mg/L 4.00 0.026 107 70-130 Lead total 0.0414 0.00020 mg/L 0.0400 < 0.0020												
Iron, total 4.30 0.010 mg/L 4.00 0.026 107 70-130 Lead total 0.0414 0.00020 mg/L 0.0400 < 0.00020												
Lead, total 0.0414 0.00020 mg/L 0.0400 < 0.00020 104 70-130								107				
	Lead, total		0.0414	0.00020	mg/L	0.0400	< 0.00020	104	70-130			ae 19 of 2



REPORTED TOElk River AllianceWORK ORDER23J0884PROJECTCBWM-2023REPORTED2023-10-17 09:51

			Cmiles	Cauras		DEC		DDD	
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B3J1199, Continued									
Matrix Spike (B3J1199-MS1), Continued	Sc	ource: 23J0884-01	Prepared	d: 2023-10-1	3, Analyze	d: 2023-1	0-13		
Lithium, total	0.0507	0.00010 mg/L	0.0400	0.00426	116	70-130			
Magnesium, total	29.1	0.010 mg/L	4.00	23.9	131	70-130			MS2
Manganese, total	0.0449	0.00020 mg/L	0.0400	0.00251	106	70-130			
Molybdenum, total	0.0447	0.00010 mg/L	0.0400	0.00175	107	70-130			
Nickel, total	0.0410	0.00040 mg/L	0.0400	< 0.00040	102	70-130			
Phosphorus, total	4.38	0.050 mg/L	4.00	< 0.050	109	70-130			
Potassium, total	4.97	0.10 mg/L	4.00	0.46	113	70-130			
Selenium, total	0.433	0.00050 mg/L	0.400	< 0.00050	108	70-130			
Silicon, total	7.2	1.0 mg/L	4.00	2.6	115	70-130			
Silver, total	0.0410	0.000050 mg/L	0.0400	< 0.000050	103	70-130			
Sodium, total	6.39	0.10 mg/L	4.00	1.82	114	70-130			
Strontium, total	1.82	0.0010 mg/L	0.0400	1.79	60	70-130			MS2
Sulfur, total	123	3.0 mg/L	40.0	81.7	104	70-130			
Tellurium, total	0.0431	0.00050 mg/L	0.0400	< 0.00050	108	70-130			
Thallium, total	0.0417	0.000020 mg/L	0.0400	< 0.000020	104	70-130			
Thorium, total	0.0439	0.00010 mg/L	0.0400	< 0.00010	110	70-130			
Tin, total	0.0431	0.00020 mg/L	0.0400	< 0.00020	108	70-130			
Titanium, total	0.0466	0.0050 mg/L	0.0400	< 0.0050	116	70-130			
Tungsten, total	0.0441	0.0010 mg/L	0.0400	< 0.0010	110	70-130			
Uranium, total	0.0454	0.000020 mg/L	0.0400	0.000418	112	70-130			
Vanadium, total	0.0434	0.0050 mg/L	0.0400	< 0.0050	108	70-130			
Zinc, total	0.415	0.0040 mg/L	0.400	< 0.0040	104	70-130			
Zirconium, total	0.0446	0.00010 mg/L	0.0400	< 0.00010	111	70-130			

QC Qualifiers:

MS2 The native sample concentration is greater than the spike concentration hence the matrix spike limits do not apply.





REPORTED TO Elk River Alliance

PO Box 2095, 1111 2nd Ave

Fernie, BC V0B1M0

ATTENTION Kaileigh McCallum

PO NUMBER

PROJECT CBWM-2023

PROJECT INFO

WORK ORDER 2

2313535

RECEIVED / TEMP 2023-09-27 13:24 / 1.4°C

REPORTED 2023-10-11 14:07

COC NUMBER No #

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



We've Got Chemistry



Ahead of the Curve



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here: https://www.caro.ca/terms-conditions

If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO

Client Service Representative



REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23l3535 2023-10-1	1 14:07
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
MOR001-2023092	25-1230 (23l3535-01) M	atrix: Water Samp	oled: 2023-09-25	12:30			
Anions							
Bromide		< 0.10	N/A	0.10	mg/L	2023-10-01	
Chloride		3.04	AO ≤ 250		mg/L	2023-10-01	
Fluoride		< 0.10	MAC = 1.5		mg/L	2023-10-01	
Nitrate (as N)		< 0.010	MAC = 10	0.010		2023-10-01	HT1
Nitrite (as N)		< 0.010	MAC = 1	0.010		2023-10-01	HT1
Phosphate (as P)		< 0.0050	N/A	0.0050		2023-10-01	HT1
Sulfate		6.9	AO ≤ 500		mg/L	2023-10-01	
BCMOE Aggregate	Hydrocarbons	0.0	7.0 = 000	1.0	9/=	2020 10 01	
EPHw10-19	Tiyarocarbons	< 250	N/A	250	μg/L	2023-10-03	
EPHw19-32		< 250	N/A	250		2023-10-03	
	nylnonane (EPH/F2-4)	66		60-140	10	2023-10-03	
Calculated Parame	, ,			00 770			
Hardness, Dissolv		118	N/A	0.500	ma/L	N/A	
Nitrate+Nitrite (as	,	< 0.0100	N/A	0.0100		N/A	
Nitrogen, Total	••,	0.116	N/A	0.0500		N/A	
Dissolved Metals							
Aluminum, dissolv	red	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Antimony, dissolve	ed	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Arsenic, dissolved		< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Barium, dissolved		0.146	N/A	0.0050	mg/L	2023-10-05	
Beryllium, dissolve	ed	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Bismuth, dissolved	d	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, dissolved		< 0.0500	N/A	0.0500	mg/L	2023-10-05	
Cadmium, dissolv	ed	0.000017	N/A	0.000010	mg/L	2023-10-05	
Calcium, dissolved	d	34.5	N/A	0.20	mg/L	2023-10-05	
Chromium, dissolv	/ed	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Cobalt, dissolved		< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Copper, dissolved		0.00047	N/A	0.00040	mg/L	2023-10-05	
Iron, dissolved		< 0.010	N/A	0.010	mg/L	2023-10-05	
Lead, dissolved		< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Lithium, dissolved		0.00291	N/A	0.00010	mg/L	2023-10-05	
Magnesium, disso	lved	7.70	N/A	0.010	mg/L	2023-10-05	
Manganese, disso	olved	0.00956	N/A	0.00020	mg/L	2023-10-05	
Mercury, dissolved	t	< 0.000010	N/A	0.000010	mg/L	2023-10-06	
Molybdenum, diss	olved	0.00068	N/A	0.00010	mg/L	2023-10-05	
Nickel, dissolved		< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Phosphorus, disso	olved	< 0.050	N/A	0.050	mg/L	2023-10-05	
Potassium, dissolv	ved	0.54	N/A	0.10	mg/L	2023-10-05	
Selenium, dissolve	ed	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Silicon, dissolved		1.6	N/A	1.0	mg/L	2023-10-05	
Silver, dissolved		< 0.000050	N/A	0.000050	mg/L	2023-10-05	



REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23l3535 2023-10-1	11 14:07
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
MOR001-2023092	25-1230 (23l3535-01) M	atrix: Water Sam	pled: 2023-09-25 1	2:30, Continu	ıed		
Dissolved Metals,	Continued						
Sodium, dissolved	i	2.06	N/A	0.10	mg/L	2023-10-05	
Strontium, dissolv	ed	0.128	N/A	0.0010		2023-10-05	
Sulfur, dissolved		< 3.0	N/A	3.0	mg/L	2023-10-05	
Tellurium, dissolve	ed	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, dissolve	d	< 0.000020	N/A	0.000020	mg/L	2023-10-05	
Thorium, dissolve	d	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Tin, dissolved		< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Titanium, dissolve	d	< 0.0050	N/A	0.0050		2023-10-05	
Tungsten, dissolve	ed	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, dissolve		0.000251	N/A	0.000020		2023-10-05	
Vanadium, dissolv	red	< 0.0050	N/A	0.0050		2023-10-05	
Zinc, dissolved		< 0.0040	N/A	0.0040		2023-10-05	
Zirconium, dissolv	red	< 0.00010	N/A	0.00010		2023-10-05	
General Parameter	rs .						
Alkalinity, Total (as	s CaCO3)	125	N/A	1.0	mg/L	2023-09-30	
	ohthalein (as CaCO3)	< 1.0	N/A		mg/L	2023-09-30	
Alkalinity, Bicarbo	· · · · · · · · · · · · · · · · · · ·	125	N/A		mg/L	2023-09-30	
Alkalinity, Carbona		< 1.0	N/A		mg/L	2023-09-30	
Alkalinity, Hydroxid		< 1.0	N/A		mg/L	2023-09-30	
Ammonia, Total (a	· · · · · · · · · · · · · · · · · · ·	0.051	None Required	0.050		2023-10-02	
BOD, 5-day	10 14)	< 7.0	N/A		mg/L	2023-10-03	
Carbon, Total Org	anic	3.73	N/A		mg/L	2023-10-03	
Carbon, Dissolved		3.39	N/A		mg/L	2023-10-03	
Chemical Oxygen	<u> </u>	< 20	N/A		mg/L	2023-10-03	
Nitrogen, Total Kje		0.116	N/A	0.050		2023-09-29	
Phosphorus, Total		0.0102	N/A	0.0050		2023-10-03	
Solids, Total Susp	` '	< 2.0	N/A		mg/L	2023-10-04	HT1
Total Metals	crided		19/74	2.0	mg/L	2020-10-04	
Aluminum, total		0.0242	OG < 0.1	0.0050	ma/l	2023-10-05	
Antimony, total		< 0.0020	MAC = 0.006	0.0030		2023-10-05	
Arsenic, total		< 0.00050	MAC = 0.00	0.00020		2023-10-05	
Barium, total		0.143	MAC = 2	0.0050		2023-10-05	
Beryllium, total		< 0.00010	N/A	0.0030		2023-10-05	
Bismuth, total		< 0.00010	N/A	0.00010		2023-10-05	
Boron, total		< 0.0500	MAC = 5	0.0500		2023-10-05	
Cadmium, total		0.000022	MAC = 0.007	0.000010		2023-10-05	
Calcium, total		35.0	None Required		mg/L	2023-10-05	
Chromium, total		< 0.00050	MAC = 0.05	0.00050		2023-10-05	
Cobalt, total		< 0.00030	N/A	0.00030		2023-10-05	
Copper, total		0.00050	MAC = 2	0.00010		2023-10-05	
Iron, total		0.0030	AO ≤ 0.3	0.00040		2023-10-05	
Lead, total		< 0.00020	MAC = 0.005	0.00020		2023-10-05	
		0.03020		3.30020	· ɔ· =		Page 3 of 2



REPORTED TO	Elk River Alliance	WORK ORDER	2313535
PROJECT	CBWM-2023	REPORTED	2023-10-11 14:07

Analysia	Decult	Cuidalina		Unito	Analysed	Qualifi
Analyte	Result	Guideline	- KL	Units	Analyzed	Qualiii
IOR001-20230925-1230 (23l3535-01) M	atrix: Water Sam	pled: 2023-09-25 12	2:30, Continu	ıed		
otal Metals, Continued						
Lithium, total	0.00301	N/A	0.00010	mg/L	2023-10-05	
Magnesium, total	7.24	None Required	0.010	mg/L	2023-10-05	
Manganese, total	0.0112	MAC = 0.12	0.00020	mg/L	2023-10-05	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-06	
Molybdenum, total	0.00066	N/A	0.00010	mg/L	2023-10-05	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-05	
Potassium, total	0.55	N/A	0.10	mg/L	2023-10-05	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-05	
Silicon, total	1.7	N/A	1.0	mg/L	2023-10-05	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-05	
Sodium, total	1.96	AO ≤ 200	0.10	mg/L	2023-10-05	
Strontium, total	0.123	MAC = 7	0.0010	mg/L	2023-10-05	
Sulfur, total	< 3.0	N/A		mg/L	2023-10-05	
Tellurium, total	< 0.00050	N/A	0.00050		2023-10-05	
Thallium, total	< 0.000020	N/A	0.000020		2023-10-05	
Thorium, total	< 0.00010	N/A	0.00010		2023-10-05	
Tin, total	< 0.00020	N/A	0.00020		2023-10-05	
Titanium, total	< 0.0050	N/A	0.0050		2023-10-05	
Tungsten, total	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, total	0.000248	MAC = 0.02	0.000020		2023-10-05	
Vanadium, total	< 0.0050	N/A	0.0050		2023-10-05	
Zinc, total	< 0.0040	AO ≤ 5	0.0040		2023-10-05	
Zirconium, total	< 0.00010	N/A	0.00010		2023-10-05	
IOR002-20230925-1630 (23l3535-02) M	atrix: Water Sam	pled: 2023-09-25 16	6:30			
nions						
	< 0.10	N/A	0.10	mg/L	2023-10-01	
Bromide	< 0.10 11.7	N/A AO ≤ 250		mg/L mg/L	2023-10-01 2023-10-01	
Bromide Chloride		•	0.10			
Bromide Chloride Fluoride	11.7	AO ≤ 250	0.10	mg/L mg/L	2023-10-01	HT1
Bromide Chloride Fluoride Nitrate (as N)	11.7 < 0.10	AO ≤ 250 MAC = 1.5	0.10 0.10	mg/L mg/L mg/L	2023-10-01 2023-10-01	HT1 HT1
Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N)	11.7 < 0.10 < 0.010	AO ≤ 250 MAC = 1.5 MAC = 10	0.10 0.10 0.010	mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01	
Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P)	11.7 < 0.10 < 0.010 < 0.010	AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1	0.10 0.10 0.010 0.010 0.0050	mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01 2023-10-01	HT1
Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate	11.7 < 0.10 < 0.010 < 0.010 < 0.0050	AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A	0.10 0.10 0.010 0.010 0.0050	mg/L mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01	HT1
Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate BCMOE Aggregate Hydrocarbons	11.7 < 0.10 < 0.010 < 0.010 < 0.0050	AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01	HT1
Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate CCMOE Aggregate Hydrocarbons EPHw10-19	11.7 < 0.10 < 0.010 < 0.010 < 0.0050 3.6	AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01	HT1
Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate CMOE Aggregate Hydrocarbons EPHw10-19 EPHw19-32	11.7 < 0.10 < 0.010 < 0.010 < 0.0050 3.6 < 250 < 250	AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.010 0.010 0.0050 1.0 250	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01	HT1
Bromide Chloride Fluoride Nitrate (as N) Nitrite (as N) Phosphate (as P) Sulfate CMOE Aggregate Hydrocarbons EPHw10-19	11.7 < 0.10 < 0.010 < 0.010 < 0.0050 3.6	AO ≤ 250 MAC = 1.5 MAC = 10 MAC = 1 N/A AO ≤ 500	0.10 0.10 0.010 0.010 0.0050 1.0	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-01 2023-10-05 2023-10-05	HT1



REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER

2313535

REPORTED 2023-10-11 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MOR002-20230925-1630 (23l3535-02	2) Matrix: Water Samp	oled: 2023-09-25	16:30, Continւ	ıed		
Calculated Parameters, Continued						
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.122	N/A	0.0500	mg/L	N/A	
Dissolved Metals						
Aluminum, dissolved	0.0141	N/A	0.0050	mg/L	2023-10-05	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Barium, dissolved	0.184	N/A	0.0050	mg/L	2023-10-05	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2023-10-05	
Cadmium, dissolved	0.000028	N/A	0.000010		2023-10-05	
Calcium, dissolved	20.8	N/A		mg/L	2023-10-05	
Chromium, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Cobalt, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Copper, dissolved	0.00044	N/A	0.00040		2023-10-05	
Iron, dissolved	< 0.010	N/A	0.010		2023-10-05	
Lead, dissolved	< 0.00020	N/A	0.00020		2023-10-05	
Lithium, dissolved	0.00134	N/A	0.00010		2023-10-05	
Magnesium, dissolved	4.32	N/A	0.010		2023-10-05	
Manganese, dissolved	0.00144	N/A	0.00020		2023-10-05	
Mercury, dissolved	< 0.000010	N/A	0.000010		2023-10-06	
Molybdenum, dissolved	0.00050	N/A	0.00010		2023-10-05	
Nickel, dissolved	< 0.00040	N/A	0.00040		2023-10-05	
Phosphorus, dissolved	< 0.050	N/A	0.050		2023-10-05	
Potassium, dissolved	0.54	N/A		mg/L	2023-10-05	
Selenium, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Silicon, dissolved	1.1	N/A		mg/L	2023-10-05	
Silver, dissolved	< 0.000050	N/A	0.000050		2023-10-05	
Sodium, dissolved	1.65	N/A		mg/L	2023-10-05	
Strontium, dissolved	0.123	N/A	0.0010		2023-10-05	
Sulfur, dissolved	< 3.0	N/A		mg/L	2023-10-05	
Tellurium, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Thallium, dissolved	< 0.000020	N/A	0.000020		2023-10-05	
Thorium, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Tin, dissolved	< 0.00020	N/A	0.00020		2023-10-05	
Titanium, dissolved	< 0.0050	N/A	0.0050		2023-10-05	
Tungsten, dissolved	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, dissolved	0.000132	N/A	0.000020		2023-10-05	
Vanadium, dissolved	< 0.0050	N/A	0.0050		2023-10-05	
Zinc, dissolved	< 0.0040	N/A	0.0040		2023-10-05	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23/3535

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-11 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MOR002-20230925-1630 (23I3535-02) M	atrix: Water Sam	pled: 2023-09-25 10	6:30, Continu	ıed		
General Parameters, Continued						
Alkalinity, Total (as CaCO3)	63.1	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Bicarbonate (as CaCO3)	63.1	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-09-30	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-10-02	
BOD, 5-day	< 7.0	N/A	2.0	mg/L	2023-10-03	
Carbon, Total Organic	3.33	N/A	0.50	mg/L	2023-10-09	
Carbon, Dissolved Organic	2.72	N/A	0.50	mg/L	2023-10-09	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2023-09-29	
Nitrogen, Total Kjeldahl	0.122	N/A	0.050	mg/L	2023-10-03	
Phosphorus, Total (as P)	0.0202	N/A	0.0050	mg/L	2023-09-29	
Solids, Total Suspended	7.0	N/A	2.0	mg/L	2023-10-04	HT1
Total Metals						
Aluminum, total	0.558	OG < 0.1	0.0050	mg/L	2023-10-05	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-10-05	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2023-10-05	
Barium, total	0.191	MAC = 2	0.0050	mg/L	2023-10-05	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-10-05	
Cadmium, total	0.000045	MAC = 0.007	0.000010	mg/L	2023-10-05	
Calcium, total	20.2	None Required	0.20	mg/L	2023-10-05	
Chromium, total	0.00071	MAC = 0.05	0.00050	mg/L	2023-10-05	
Cobalt, total	0.00018	N/A	0.00010	mg/L	2023-10-05	
Copper, total	0.00083	MAC = 2	0.00040	mg/L	2023-10-05	
Iron, total	0.397	AO ≤ 0.3	0.010	mg/L	2023-10-05	
Lead, total	0.00024	MAC = 0.005	0.00020	mg/L	2023-10-05	
Lithium, total	0.00177	N/A	0.00010	mg/L	2023-10-05	
Magnesium, total	4.21	None Required	0.010	mg/L	2023-10-05	
Manganese, total	0.00645	MAC = 0.12	0.00020	mg/L	2023-10-05	
Mercury, total	< 0.000010	MAC = 0.001	0.000010		2023-10-06	
Molybdenum, total	0.00052	N/A	0.00010		2023-10-05	
Nickel, total	0.00082	N/A	0.00040		2023-10-05	
Phosphorus, total	< 0.050	N/A	0.050		2023-10-05	
Potassium, total	0.69	N/A	0.10	mg/L	2023-10-05	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-05	
Silicon, total	2.0	N/A		mg/L	2023-10-05	
Silver, total	< 0.000050	None Required	0.000050		2023-10-05	
Sodium, total	1.59	AO ≤ 200		mg/L	2023-10-05	
Strontium, total	0.118	MAC = 7	0.0010	mg/L	2023-10-05	
Sulfur, total	< 3.0	N/A		mg/L	2023-10-05	



Cobalt, dissolved

REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23l3535 2023-10-1	1 14:07
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifie
MOR002-2023092	25-1630 (23l3535-02) Ma	atrix: Water Sam	pled: 2023-09-25 1	6:30, Continu	ıed		
Total Metals, Conti	inued						
Tellurium, total		< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, total		< 0.000020	N/A	0.000020		2023-10-05	
Thorium, total		< 0.00010	N/A	0.00010		2023-10-05	
Tin, total		< 0.00020	N/A	0.00020		2023-10-05	
Titanium, total		0.0100	N/A	0.0050		2023-10-05	
Tungsten, total		< 0.0010	N/A	0.0010		2023-10-05	
Uranium, total		0.000149	MAC = 0.02	0.000020		2023-10-05	
Vanadium, total		< 0.0050	N/A	0.0050		2023-10-05	
Zinc, total		< 0.0040	AO ≤ 5	0.0040		2023-10-05	
Zirconium, total		0.00024	N/A	0.00010		2023-10-05	
Anions	5-1630 (23l3535-03) Ma	unx. Water Samp	leu. 2023-03-23 TC	5.50			
Bromide		< 0.10	N/A	0.10	mg/L	2023-10-01	
Chloride		0.12	AO ≤ 250		mg/L	2023-10-01	
Fluoride		< 0.10	MAC = 1.5		mg/L	2023-10-01	
Nitrate (as N)		< 0.010	MAC = 10	0.010		2023-10-01	HT1
Nitrite (as N)		< 0.010	MAC = 1	0.010		2023-10-01	HT1
Phosphate (as P)		< 0.0050	N/A	0.0050		2023-10-01	HT1
Sulfate		< 1.0	AO ≤ 500		mg/L	2023-10-01	
BCMOE Aggregate	e Hydrocarbons						
EPHw10-19		< 250	N/A	250	μg/L	2023-10-03	
EPHw19-32		< 250	N/A		μg/L	2023-10-03	
Surrogate: 2-Meth	hylnonane (EPH/F2-4)	84		60-140	%	2023-10-03	
Calculated Parame	eters						
Hardness, Dissolv	ved (as CaCO3)	< 0.500	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as	N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	•	0.0680	N/A	0.0500	mg/L	N/A	
Dissolved Metals							
Aluminum, dissolv	ved	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Antimony, dissolve	ed	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Arsenic, dissolved	d	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Barium, dissolved	<u> </u>	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Beryllium, dissolv	ed	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Bismuth, dissolve	d	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, dissolved		< 0.0500	N/A	0.0500	mg/L	2023-10-05	
Cadmium, dissolv	red	0.000014	N/A	0.000010	mg/L	2023-10-06	RE2
Calcium, dissolve	d	< 0.20	N/A	0.20	mg/L	2023-10-05	
Chromium, dissol	ved	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Cobalt dissolved		< 0.00010	NI/A	0.00010	ma/I	2023 10 05	

2023-10-05

N/A

0.00010 mg/L

< 0.00010



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23/3535

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-11 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
FLD001-20230925-1630 (23l3535-03) Ma	atrix: Water Samp	oled: 2023-09-25 16	:30, Continu	ed		
Dissolved Metals, Continued						
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2023-10-05	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Lithium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Magnesium, dissolved	< 0.010	N/A	0.010	mg/L	2023-10-05	
Manganese, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2023-10-06	
Molybdenum, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2023-10-05	
Potassium, dissolved	< 0.10	N/A	0.10	mg/L	2023-10-05	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Silicon, dissolved	< 1.0	N/A	1.0	mg/L	2023-10-05	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2023-10-05	
Sodium, dissolved	< 0.10	N/A		mg/L	2023-10-05	
Strontium, dissolved	< 0.0010	N/A	0.0010		2023-10-05	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2023-10-05	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, dissolved	< 0.000020	N/A	0.000020		2023-10-05	
Thorium, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Tungsten, dissolved	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, dissolved	< 0.000020	N/A	0.000020		2023-10-05	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2023-10-05	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
General Parameters						
Alkalinity, Total (as CaCO3)	< 1.0	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A		mg/L	2023-09-30	
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	N/A		mg/L	2023-09-30	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A		mg/L	2023-09-30	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A		mg/L	2023-09-30	
Ammonia, Total (as N)	< 0.050	None Required	0.050		2023-10-02	
BOD, 5-day	< 7.0	N/A		mg/L	2023-10-03	
Carbon, Total Organic	1.67	N/A		mg/L	2023-10-09	
Carbon, Dissolved Organic	1.59	N/A		mg/L	2023-10-09	
Chemical Oxygen Demand	< 20	N/A		mg/L	2023-09-29	
Nitrogen, Total Kjeldahl	0.068	N/A	0.050		2023-10-03	
Phosphorus, Total (as P)	< 0.0050	N/A	0.0050		2023-09-29	
Solids, Total Suspended	< 2.0	N/A		mg/L	2023-10-04	HT1



 REPORTED TO
 Elk River Alliance
 WORK ORDER
 23/3535

 PROJECT
 CBWM-2023
 REPORTED
 2023-10-11 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
FLD001-20230925-1630 (23l35	35-03) Matrix: Water San	npled: 2023-09-25 1	6:30, Continu	ed		
Total Metals, Continued						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2023-10-05	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2023-10-05	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2023-10-05	
Barium, total	< 0.0050	MAC = 2	0.0050	mg/L	2023-10-05	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2023-10-05	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2023-10-05	
Calcium, total	< 0.20	None Required	0.20	mg/L	2023-10-05	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-05	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2023-10-05	
Iron, total	< 0.010	AO ≤ 0.3	0.010		2023-10-05	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2023-10-05	
Lithium, total	< 0.00010	N/A	0.00010		2023-10-05	
Magnesium, total	< 0.010	None Required	0.010		2023-10-05	
Manganese, total	< 0.00020	MAC = 0.12	0.00020		2023-10-05	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-06	
Molybdenum, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-05	
Potassium, total	< 0.10	N/A		mg/L	2023-10-05	
Selenium, total	< 0.00050	MAC = 0.05	0.00050		2023-10-05	
Silicon, total	< 1.0	N/A		mg/L	2023-10-05	
Silver, total	< 0.000050	None Required	0.000050		2023-10-05	
Sodium, total	< 0.10	AO ≤ 200		mg/L	2023-10-05	
Strontium, total	< 0.0010	MAC = 7	0.0010	mg/L	2023-10-05	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2023-10-05	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-10-05	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Tin, total	< 0.00020	N/A	0.00020		2023-10-05	
Titanium, total	< 0.0050	N/A	0.0050		2023-10-05	
Tungsten, total	< 0.0010	N/A	0.0010		2023-10-05	
Uranium, total	< 0.000020	MAC = 0.02	0.000020		2023-10-05	
Vanadium, total	< 0.0050	N/A	0.0050		2023-10-05	
Zinc, total	< 0.0040	AO ≤ 5	0.0040		2023-10-05	
Zirconium, total	< 0.00010	N/A	0.00010		2023-10-05	
	3.33010		3.00010	···	==== .0 .0	

DUP001-20230925-1230 (23I3535-04) | Matrix: Water | Sampled: 2023-09-25 12:30

Anions

Bromide < 0.10 N/A 0.10 mg/L 2023-10-01



REPORTED TO	Elk River Alliance	WORK ORDER	2313535
PROJECT	CBWM-2023	REPORTED	2023-10-11 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
DUP001-20230925-1230 (23l3535-04) Ma	atrix: Water Samp	led: 2023-09-25 1	2:30, Continu	ed		
Anions, Continued						
Chloride	3.04	AO ≤ 250	0.10	mg/L	2023-10-01	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2023-10-01	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2023-10-01	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-10-01	HT1
Phosphate (as P)	< 0.0050	N/A	0.0050	mg/L	2023-10-01	HT1
Sulfate	6.9	AO ≤ 500	1.0	mg/L	2023-10-01	
BCMOE Aggregate Hydrocarbons						
EPHw10-19	< 250	N/A	250	μg/L	2023-10-03	
EPHw19-32	< 250	N/A	250	µg/L	2023-10-03	
Surrogate: 2-Methylnonane (EPH/F2-4)	76		60-140	%	2023-10-03	
Calculated Parameters						
Hardness, Dissolved (as CaCO3)	119	N/A	0.500	ma/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100		N/A	
Nitrogen, Total	0.0980	N/A	0.0500		N/A	
Dissolved Metals						
Aluminum, dissolved	< 0.0050	N/A	0.0050	ma/l	2023-10-05	
Antimony, dissolved	< 0.00020	N/A	0.00020		2023-10-05	
Arsenic, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Barium, dissolved	0.145	N/A	0.0050		2023-10-05	
Beryllium, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Bismuth, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Boron, dissolved	< 0.0500	N/A	0.0500		2023-10-05	
Cadmium, dissolved	0.000014	N/A	0.000010		2023-10-05	
Calcium, dissolved	34.9	N/A	0.20	mg/L	2023-10-05	
Chromium, dissolved	< 0.00050	N/A	0.00050		2023-10-05	
Cobalt, dissolved	< 0.00010	N/A	0.00010		2023-10-05	
Copper, dissolved	0.00047	N/A	0.00040		2023-10-05	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2023-10-05	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Lithium, dissolved	0.00286	N/A	0.00010	mg/L	2023-10-05	
Magnesium, dissolved	7.68	N/A	0.010	mg/L	2023-10-05	
Manganese, dissolved	0.00953	N/A	0.00020		2023-10-05	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2023-10-06	
Molybdenum, dissolved	0.00074	N/A	0.00010	mg/L	2023-10-05	
Nickel, dissolved	< 0.00040	N/A	0.00040		2023-10-05	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2023-10-05	
Potassium, dissolved	0.52	N/A	0.10	mg/L	2023-10-05	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Silicon, dissolved	1.6	N/A	1.0	mg/L	2023-10-05	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2023-10-05	
Sodium, dissolved	2.19	N/A	0.10	mg/L	2023-10-05	



REPORTED TO PROJECT	Elk River Alliance CBWM-2023				WORK ORDER REPORTED	23l3535 2023-10-1	1 14:07
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
DUP001-20230925	5-1230 (23l3535-04) Ma	ıtrix: Water Samı	oled: 2023-09-25 12	2:30, Continu	ed		
Dissolved Metals, C	continued						
Strontium, dissolve	ed	0.128	N/A	0.0010	mg/L	2023-10-05	
Sulfur, dissolved		< 3.0	N/A	3.0	mg/L	2023-10-05	
Tellurium, dissolve	t	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, dissolved		< 0.000020	N/A	0.000020	mg/L	2023-10-05	
Thorium, dissolved		< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Tin, dissolved		< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Titanium, dissolved		< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Tungsten, dissolve	d	< 0.0010	N/A	0.0010	mg/L	2023-10-05	
Uranium, dissolved		0.000250	N/A	0.000020	mg/L	2023-10-05	
Vanadium, dissolve	ed	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Zinc, dissolved		< 0.0040	N/A	0.0040	mg/L	2023-10-05	
Zirconium, dissolve	ed	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
General Parameters	;						
Alkalinity, Total (as	CaCO3)	130	N/A	1.0	mg/L	2023-09-30	
· '	nthalein (as CaCO3)	< 1.0	N/A	1.0		2023-09-30	
Alkalinity, Bicarbon	,	130	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Carbona		< 1.0	N/A	1.0	mg/L	2023-09-30	
Alkalinity, Hydroxid	<u> </u>	< 1.0	N/A	1.0	mg/L	2023-09-30	
Ammonia, Total (as	· · · · · · · · · · · · · · · · · · ·	< 0.050	None Required	0.050	mg/L	2023-10-02	
BOD, 5-day	,	< 7.0	N/A	2.0	mg/L	2023-10-03	
Carbon, Total Orga	nic	3.26	N/A	0.50	mg/L	2023-10-09	
Carbon, Dissolved		3.17	N/A	0.50	mg/L	2023-10-09	
Chemical Oxygen		< 20	N/A	20	mg/L	2023-09-29	
Nitrogen, Total Kjel		0.098	N/A	0.050	mg/L	2023-10-03	
Phosphorus, Total	(as P)	0.0096	N/A	0.0050	mg/L	2023-09-29	
Solids, Total Suspe	ended	< 2.0	N/A	2.0	mg/L	2023-10-04	HT1
Total Metals							
Aluminum, total		0.0320	OG < 0.1	0.0050	mg/L	2023-10-05	
Antimony, total		< 0.00020	MAC = 0.006	0.00020		2023-10-05	
Arsenic, total		< 0.00050	MAC = 0.01	0.00050	mg/L	2023-10-05	
Barium, total		0.144	MAC = 2	0.0050		2023-10-05	
Beryllium, total		< 0.00010	N/A	0.00010		2023-10-05	
Bismuth, total		< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Boron, total		< 0.0500	MAC = 5	0.0500	mg/L	2023-10-05	
Cadmium, total		0.000024	MAC = 0.007	0.000010	mg/L	2023-10-05	
Calcium, total		34.4	None Required	0.20	mg/L	2023-10-05	
Chromium, total		< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-05	
Cobalt, total		< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Copper, total		0.00050	MAC = 2	0.00040	mg/L	2023-10-05	
Iron, total		0.034	AO ≤ 0.3	0.010	mg/L	2023-10-05	
Lead, total		< 0.00020	MAC = 0.005	0.00020	mg/L	2023-10-05	
Lithium, total		0.00291	N/A	0.00010	mg/L	2023-10-05	
		Caring Ab	oout Results, Obvi	ously.		P	age 11 of 2



REPORTED TO Elk River Alliance
PROJECT CBWM-2023

WORK ORDER REPORTED 2313535

ORTED 2023-10-11 14:07

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifie
DUP001-20230925-1230 (231353	5-04) Matrix: Water Sam	pled: 2023-09-25 12	:30, Continu	ed		
Total Metals, Continued						
Magnesium, total	7.33	None Required	0.010	mg/L	2023-10-05	
Manganese, total	0.0114	MAC = 0.12	0.00020	mg/L	2023-10-05	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2023-10-06	
Molybdenum, total	0.00067	N/A	0.00010	mg/L	2023-10-05	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2023-10-05	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2023-10-05	
Potassium, total	0.55	N/A	0.10	mg/L	2023-10-05	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2023-10-05	
Silicon, total	1.7	N/A	1.0	mg/L	2023-10-05	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2023-10-05	
Sodium, total	1.97	AO ≤ 200	0.10	mg/L	2023-10-05	
Strontium, total	0.121	MAC = 7	0.0010	mg/L	2023-10-05	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2023-10-05	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-10-05	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2023-10-05	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2023-10-05	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-10-05	
Uranium, total	0.000251	MAC = 0.02	0.000020	mg/L	2023-10-05	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2023-10-05	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2023-10-05	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2023-10-05	

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

RE2 Result was confirmed by re-analysis prior to reporting.



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance **PROJECT** CBWM-2023

WORK ORDER

2313535

REPORTED 2023-10-11 14:07

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Biochemical Oxygen Demand in Water	SM 5210 B (2019)	Dissolved Oxygen Meter	✓	Kelowna
Carbon, Dissolved Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Carbon, Total Organic in Water	SM 5310 B (2022)	Combustion, Infrared CO2 Detection	✓	Kelowna
Chemical Oxygen Demand in Water	SM 5220 D* (2022)	Closed Reflux, Colorimetry	✓	Kelowna
Dissolved Metals in Water	EPA 200.8 / EPA 6020B	0.45 µm Filtration / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
EPH in Water	EPA 3511* / BCMOE EPHw	Hexane MicroExtraction (Base/Neutral) / Gas Chromatography (GC-FID)	✓	Richmond
Hardness in Water	SM 2340 B (2021)	Calculation: 2.497 [diss Ca] + 4.118 [diss Mg]	✓	N/A
Mercury, dissolved in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Phosphorus, Total in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL Reporting Limit (default)

Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors

AO Aesthetic Objective

MAC Maximum Acceptable Concentration (health based)

mg/L Milligrams per litre

OG Operational Guideline (treated water)

μg/L Micrograms per litre

EPA United States Environmental Protection Agency Test Methods

SM Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Health Canada, September 2022)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance PROJECT CBWM-2023

WORK ORDER
REPORTED

2313535

2023-10-11 14:07

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do <u>not</u> take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:TeamCaro@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.



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The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- Blank Spike (BS): A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- Matrix Spike (MS): A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- Reference Material (SRM): A homogenous material of similar matrix to the samples, certified for the parameter(s) listed.
 Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B3l2980									
Blank (B3I2980-BLK1)			Prepared	l: 2023-09-2	29, Analyze	d: 2023-0	09-29		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
Blank (B3I2980-BLK2)			Prepared	l: 2023-09-3	30, Analyze	d: 2023-0	09-30		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
Blank (B3l2980-BLK3)			Prepared	l: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
Blank (B3I2980-BLK4)			Prepared	l: 2023-10-0)1, Analyze	d: 2023-	10-01		
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.010	0.010 mg/L							
Nitrite (as N)	< 0.010	0.010 mg/L							
Phosphate (as P)	< 0.0050	0.0050 mg/L							
Sulfate	< 0.5	0.5 mg/L							
LCS (B3I2980-BS1)			Prepared	l: 2023-09-2	29, Analyze	d: 2023-0	09-29		
Bromide	4.05	0.10 mg/L	4.00		101	85-115			



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REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED	23138 2023	535 -10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
Anions, Batch B3I	2980, Continued									
LCS (B3I2980-BS1), Continued			Prepared	l: 2023-09-2	9, Analyze	d: 2023-0	9-29		
Chloride		15.9	0.10 mg/L	16.0		99	90-110			
Fluoride		3.99	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)		3.94	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)		1.99	0.010 mg/L	2.00		99	85-115			
Phosphate (as P)		1.01	0.0050 mg/L	1.00		101	80-120			
Sulfate		16.3	0.5 mg/L	16.0		102	90-110			
LCS (B312980-BS2	2)			Prepared	: 2023-09-3	0, Analyze	d: 2023-0	9-30		
Bromide		3.92	0.10 mg/L	4.00		98	85-115			
Chloride		15.9	0.10 mg/L	16.0		99	90-110			
Fluoride		3.92	0.10 mg/L	4.00		98	88-108			
Nitrate (as N)		3.86	0.010 mg/L	4.00		96	90-110			
Nitrite (as N)		1.98	0.010 mg/L	2.00		99	85-115			
Phosphate (as P)		0.917	0.0050 mg/L	1.00		92	80-120			
Sulfate		15.4	0.5 mg/L	16.0		96	90-110			
LCS (B312980-BS3	3)			Prepared	: 2023-10-0	1, Analyze		0-01		
Bromide		3.59	0.10 mg/L	4.00		90	85-115			
Chloride		15.8	0.10 mg/L	16.0		99	90-110			
Fluoride		3.99	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)		3.70	0.010 mg/L	4.00		93	90-110			
Nitrite (as N)		2.01	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)		1.01	0.0050 mg/L	1.00		101	80-120			
Sulfate		15.4	0.5 mg/L	16.0		96	90-110			
LCS (B3I2980-BS4	ł)				l: 2023-10-0			0-01		
Bromide		3.77	0.10 mg/L	4.00		94	85-115			
Chloride		15.7	0.10 mg/L	16.0		98	90-110			
Fluoride		3.96	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)		3.93	0.010 mg/L	4.00		98	90-110			
Nitrite (as N)		2.00	0.010 mg/L	2.00		100	85-115			
Phosphate (as P)		0.856	0.0050 mg/L	1.00		86	80-120 90-110			
Sulfate		15.4	0.5 mg/L	16.0		97				
Duplicate (B3I298	0-DUP3)		urce: 23l3535-01	Prepared	1: 2023-10-0	1, Analyze	d: 2023-1	0-01	40	
Bromide Chlorido		< 0.10	0.10 mg/L		< 0.10				10	
Chloride		3.03 < 0.10	0.10 mg/L 0.10 mg/L		3.04 < 0.10			< 1	10	
Fluoride Nitrate (as N)		< 0.10	0.10 mg/L 0.010 mg/L		< 0.10				10	
Nitrite (as N)		< 0.010	0.010 mg/L 0.010 mg/L		< 0.010				15	
Phosphate (as P)		< 0.010	0.0050 mg/L		< 0.0050				20	
Sulfate		6.9	1.0 mg/L		6.9			< 1	10	
Matrix Spike (B3I2	980-MS3)	Soi	urce: 23l3535-01	Prepared	l: 2023-10-0	1. Analyze	d: 2023-1	0-01		
Bromide	,	4.19	0.10 mg/L	4.00	< 0.10	104	80-120	-		
Chloride		19.9	0.10 mg/L	16.0	3.04	105	75-125			
Fluoride		4.15	0.10 mg/L	4.00	< 0.10	103	75-125			
Nitrate (as N)		4.12	0.010 mg/L	4.00	< 0.010	103	75-125			
Nitrite (as N)		2.06	0.010 mg/L	2.00	< 0.010	103	80-120			
		0.927	0.0050 mg/L	1.00	< 0.0050	93	70-130			
Phosphate (as P)		0.927	0.0000 Hig/L	1.00	0.0000					

BCMOE Aggregate Hydrocarbons, Batch B3J0034
Blank (B3J0034-BLK1)

Blank (B3J0034-BLK1) Prepared: 2023-10-02, Analyzed: 2023-10-03

EPHw10-19 < 250 250 µg/L



REPORTED TO Elk River Alliance PROJECT CBWM-2023					WORK REPOR	ORDER RTED	23I3 2023	535 3-10-11	14:07
Analyte	Result	RL Un	ts Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
BCMOE Aggregate Hydrocarbons, Bate	ch B3J0034, Coi	ntinued							
Blank (B3J0034-BLK1), Continued			Prepared	l: 2023-10-0	2, Analyze	ed: 2023-1	0-03		
EPHw19-32	< 250	250 µg/l	_						
Surrogate: 2-Methylnonane (EPH/F2-4)	1860	μg/l	2200		84	60-140			
LCS (B3J0034-BS2)			Prepared	l: 2023-10-0	2, Analyze	ed: 2023-1	0-03		
EPHw10-19	18400	250 µg/l	_ 15400		119	70-130			
EPHw19-32	22000	250 µg/l	22200		99	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1390	μg/I			63	60-140			
LCS Dup (B3J0034-BSD2)			Prepared	l: 2023-10-0	2, Analyze	ed: 2023-1	0-03		
EPHw10-19	17500	250 µg/l	_ 15400		113	70-130	5	20	
EPHw19-32	20600	250 µg/l	22200		93	70-130	6	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1360	μg/l	2200		62	60-140			
BCMOE Aggregate Hydrocarbons, Bate Blank (B3J0307-BLK1)	ch B3J0307		Prepared	l: 2023-10-0	4, Analyz∈	ed: 2023-1	0-05		
EPHw10-19	< 250	250 µg/l							
EPHw19-32	< 250	250 µg/l	-						
Surrogate: 2-Methylnonane (EPH/F2-4)	2030	μg/l	2200		92	60-140			
LCS (B3J0307-BS2)			Prepared	l: 2023-10-0	4, Analyze	ed: 2023-1	0-05		
EPHw10-19	15400	250 µg/l	_ 15400		100	70-130			
EPHw19-32	23100	250 µg/l	_ 22200		104	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1630	μg/l	2200		74	60-140			
LCS Dup (B3J0307-BSD2)			Prepared	l: 2023-10-0	4, Analyze	ed: 2023-1	0-05		
EPHw10-19	15900	250 µg/l			103	70-130	3	20	
EPHw19-32 Surrogate: 2-Methylnonane (EPH/F2-4)	23300 1870	250 μg/l μg/l			105 85	70-130 60-140	1	20	
Dissolved Metals, Batch B3J0401									
Blank (B3J0401-BLK1)			Prepared	l: 2023-10-0	5, Analyze	ed: 2023-1	0-05		
Aluminum, dissolved	< 0.0050	0.0050 mg/							
Antimony, dissolved	< 0.00020	0.00020 mg/							
Arsenic, dissolved	< 0.00050 < 0.0050	0.00050 mg/ 0.0050 mg/							
Barium, dissolved Beryllium, dissolved	< 0.0050	0.0050 mg/							
Bismuth, dissolved	< 0.00010	0.00010 mg/							
Boron, dissolved	< 0.0500	0.0500 mg/							
Cadmium, dissolved	< 0.000010	0.000010 mg/							
Calcium, dissolved	< 0.20	0.20 mg/	L						
Chromium, dissolved	< 0.00050	0.00050 mg/	L						
Cobalt, dissolved	< 0.00010	0.00010 mg/							
Copper, dissolved	< 0.00040	0.00040 mg/							
Iron, dissolved	< 0.010	0.010 mg/							
Lead, dissolved	< 0.00020	0.00020 mg/							
Lithium, dissolved Magnesium, dissolved	< 0.00010 < 0.010	0.00010 mg/ 0.010 mg/							
Manganese, dissolved	< 0.00020	0.00020 mg/							
Molybdenum, dissolved	< 0.00020	0.00020 mg/							
,		g/							
Nickel, dissolved	< 0.00040	0.00040 mg/	L						
Nickel, dissolved Phosphorus, dissolved		0.00040 mg/ 0.050 mg/							
	< 0.00040	0.050 mg/ 0.10 mg/	L L						
Phosphorus, dissolved	< 0.00040 < 0.050	0.050 mg/	L L L						



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER TED	23138 2023	535 3-10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals,	Batch B3J0401, Contil	nued								
Blank (B3J0401-B	LK1), Continued			Prepared	l: 2023-10-0	5, Analyze	d: 2023-1	0-05		
Silver, dissolved	<i>,</i> ,	< 0.000050	0.000050 mg/L	· · · · · · · · · · · · · · · · · · ·						
Sodium, dissolved		< 0.10	0.10 mg/L							
Strontium, dissolved		< 0.0010	0.0010 mg/L							
Sulfur, dissolved		< 3.0	3.0 mg/L							
Tellurium, dissolved		< 0.00050	0.00050 mg/L							
Thallium, dissolved		< 0.000020	0.000020 mg/L							
Thorium, dissolved Tin, dissolved		< 0.00010 < 0.00020	0.00010 mg/L 0.00020 mg/L							
Titanium, dissolved		< 0.0050	0.0050 mg/L							
Tungsten, dissolved		< 0.0010	0.0010 mg/L							
Uranium, dissolved		< 0.000020	0.000020 mg/L							
Vanadium, dissolved		< 0.0050	0.0050 mg/L							
Zinc, dissolved		< 0.0040	0.0040 mg/L							
Zirconium, dissolved		< 0.00010	0.00010 mg/L							
LCS (B3J0401-BS	1)			Prepared	l: 2023-10-0	5, Analyze	d: 2023-1	0-05		
Aluminum, dissolved		4.24	0.0050 mg/L	4.00		106	80-120			
Antimony, dissolved		0.0413	0.00020 mg/L	0.0400		103	80-120			
Arsenic, dissolved		0.404	0.00050 mg/L	0.400		101	80-120			
Barium, dissolved		0.0417	0.0050 mg/L	0.0400		104	80-120			
Beryllium, dissolved		0.0427	0.00010 mg/L	0.0400		107	80-120			
Bismuth, dissolved		0.0413	0.00010 mg/L	0.0400		103	80-120			
Boron, dissolved Cadmium, dissolved		0.425 0.0407	0.0500 mg/L 0.000010 mg/L	0.400 0.0400		106 102	80-120 80-120			
Calcium, dissolved		4.20	0.000010 Hig/L 0.20 mg/L	4.00		102	80-120			
Chromium, dissolved		0.0410	0.00050 mg/L	0.0400		102	80-120			
Cobalt, dissolved		0.0403	0.00010 mg/L	0.0400		101	80-120			
Copper, dissolved		0.0401	0.00040 mg/L	0.0400		100	80-120			
Iron, dissolved		4.14	0.010 mg/L	4.00		103	80-120			
Lead, dissolved		0.0413	0.00020 mg/L	0.0400		103	80-120			
Lithium, dissolved		0.0434	0.00010 mg/L	0.0400		108	80-120			
Magnesium, dissolve		4.17	0.010 mg/L	4.00		104	80-120			
Manganese, dissolve		0.0421	0.00020 mg/L	0.0400		105	80-120			
Molybdenum, dissolv	ed	0.0393	0.00010 mg/L	0.0400		98	80-120			
Nickel, dissolved	. d	0.0405 4.21	0.00040 mg/L	0.0400		101 105	80-120 80-120			
Phosphorus, dissolved Potassium, dissolved		4.21	0.050 mg/L 0.10 mg/L	4.00		105	80-120			
Selenium, dissolved	<u> </u>	0.402	0.00050 mg/L	0.400		100	80-120			
Silicon, dissolved		4.5	1.0 mg/L	4.00		111	80-120			
Silver, dissolved		0.0389	0.000050 mg/L	0.0400		97	80-120			
Sodium, dissolved		4.19	0.10 mg/L	4.00		105	80-120			
Strontium, dissolved		0.0431	0.0010 mg/L	0.0400		108	80-120			
Sulfur, dissolved		42.4	3.0 mg/L	40.0		106	80-120			
Tellurium, dissolved		0.0407	0.00050 mg/L	0.0400		102	80-120			
Thallium, dissolved		0.0411	0.000020 mg/L	0.0400		103	80-120			
Thorium, dissolved		0.0399	0.00010 mg/L	0.0400		100	80-120			
Tin, dissolved		0.0417	0.00020 mg/L	0.0400		104	80-120			
Titanium, dissolved Tungsten, dissolved		0.0416 0.0413	0.0050 mg/L 0.0010 mg/L	0.0400		104 103	80-120 80-120			
Uranium, dissolved		0.0413	0.000020 mg/L	0.0400		105	80-120			
Vanadium, dissolved		0.0421	0.00020 mg/L	0.0400		103	80-120			
Zinc, dissolved		0.409	0.0030 mg/L	0.400		102	80-120			
Zirconium, dissolved		0.0422	0.00010 mg/L	0.0400		105	80-120			
Duplicate (B3J040	1-DUP1)		ource: 23l3535-01		l: 2023-10-0			0-05		
Aluminum, dissolved	· - · · · /	< 0.0050	0.0050 mg/L		< 0.0050	- , , _0			20	
Antimony, dissolved		< 0.0030	0.0000 mg/L		< 0.0000				20	
. and morry, dissolved			aring About Post	ı, O					Pa	ge 18 of 2



REPORTED TO Elk River Alliance PROJECT CBWM-2023					WORK REPOR	ORDER RTED		535 3-10-11	14:07
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B3J0401, Contil	nued								
Duplicate (B3J0401-DUP1), Continued	Sc	ource: 23l3535-01	Prepared	: 2023-10-0	5, Analyze	ed: 2023-	10-05		
Arsenic, dissolved	< 0.00050	0.00050 mg/L		< 0.00050				20	
Barium, dissolved	0.145	0.0050 mg/L		0.146			< 1	20	
Beryllium, dissolved	< 0.00010	0.00010 mg/L		< 0.00010				20	
Bismuth, dissolved	< 0.00010	0.00010 mg/L		< 0.00010				20	
Boron, dissolved	< 0.0500	0.0500 mg/L		< 0.0500				20	
Cadmium, dissolved	0.000021	0.000010 mg/L		0.000017				20	
Calcium, dissolved	34.3	0.20 mg/L		34.5			< 1	20	
Chromium, dissolved	< 0.00050	0.00050 mg/L		< 0.00050				20	
Cobalt, dissolved	< 0.00010	0.00010 mg/L		< 0.00010				20	
Copper, dissolved	0.00048	0.00040 mg/L		0.00047				20	
Iron, dissolved	< 0.010	0.010 mg/L 0.00020 mg/L		< 0.010				20	
Lead, dissolved Lithium, dissolved	< 0.00020 0.00285	0.00020 mg/L 0.00010 mg/L		< 0.00020 0.00291			2	20	
Magnesium, dissolved	7.66	0.00010 mg/L 0.010 mg/L		7.70			< 1	20	
Manganese, dissolved	0.00942	0.00020 mg/L		0.00956			1	20	
Molybdenum, dissolved	0.00042	0.00020 mg/L		0.00068			< 1	20	
Nickel, dissolved	< 0.00040	0.00040 mg/L		< 0.00040				20	
Phosphorus, dissolved	< 0.050	0.050 mg/L		< 0.050				20	
Potassium, dissolved	0.53	0.10 mg/L		0.54			1	20	
Selenium, dissolved	< 0.00050	0.00050 mg/L		< 0.00050				20	
Silicon, dissolved	1.6	1.0 mg/L		1.6				20	
Silver, dissolved	< 0.000050	0.000050 mg/L		< 0.000050				20	
Sodium, dissolved	2.08	0.10 mg/L		2.06			1	20	
Strontium, dissolved	0.128	0.0010 mg/L		0.128			< 1	20	
Sulfur, dissolved	< 3.0	3.0 mg/L		< 3.0				20	
Tellurium, dissolved	< 0.00050	0.00050 mg/L		< 0.00050				20	
Thallium, dissolved	< 0.000020	0.000020 mg/L		< 0.000020				20	
Thorium, dissolved	< 0.00010	0.00010 mg/L		< 0.00010				20	
Tin, dissolved	< 0.00020	0.00020 mg/L		< 0.00020				20	
Titanium, dissolved	< 0.0050	0.0050 mg/L		< 0.0050				20	
Tungsten, dissolved	< 0.0010	0.0010 mg/L		< 0.0010			4	20	
Uranium, dissolved	0.000248	0.000020 mg/L		0.000251			1	20	
Vanadium, dissolved Zinc, dissolved	< 0.0050 < 0.0040	0.0050 mg/L 0.0040 mg/L		< 0.0050 < 0.0040				20	
Ziric, dissolved Zirconium, dissolved	< 0.00010	0.0040 mg/L		< 0.0040				20	
·			Dranarad		E Analyza	.d. 2022 /	10.05	20	
Matrix Spike (B3J0401-MS1) Aluminum, dissolved	4.31	0.0050 mg/L	4.00	0.0141	5, Analyze	70-130	10-03		
Antimony, dissolved	0.0423	0.0000 mg/L	0.0400	< 0.00020	105	70-130			
Arsenic, dissolved	0.411	0.00050 mg/L	0.400	< 0.00050	103	70-130			
Barium, dissolved	0.236	0.0050 mg/L	0.0400	0.184	130	70-130			
Beryllium, dissolved	0.0428	0.00010 mg/L	0.0400	< 0.00010	107	70-130			
Bismuth, dissolved	0.0358	0.00010 mg/L	0.0400	< 0.00010	90	70-130			
Boron, dissolved	0.391	0.0500 mg/L	0.400	< 0.0500	97	70-130			
Cadmium, dissolved	0.0427	0.000010 mg/L	0.0400	0.000028	107	70-130			
Calcium, dissolved	25.2	0.20 mg/L	4.00	20.8	110	70-130			
Chromium, dissolved	0.0408	0.00050 mg/L	0.0400	< 0.00050	102	70-130			
Cobalt, dissolved	0.0390	0.00010 mg/L	0.0400	< 0.00010	97	70-130			
Copper, dissolved	0.0382	0.00040 mg/L	0.0400	0.00044	95	70-130			
Iron, dissolved	4.14	0.010 mg/L	4.00	< 0.010	103	70-130			
Lead, dissolved	0.0426	0.00020 mg/L	0.0400	< 0.00020	106	70-130			
Lithium, dissolved	0.0448	0.00010 mg/L	0.0400	0.00134	109	70-130			
Magnesium, dissolved	8.40	0.010 mg/L	4.00	4.32	102	70-130			
Manganese, dissolved	0.0438	0.00020 mg/L	0.0400	0.00144	106	70-130			
Molybdenum, dissolved	0.0401	0.00010 mg/L	0.0400	0.00050	99	70-130			
Nickel, dissolved	0.0392	0.00040 mg/L	0.0400	< 0.00040	97	70-130			



REPORTED TO Elk River Allian PROJECT CBWM-2023	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED	2313 2023	535 3-10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals,	Batch B3J0401, Contin	nued								
Matrix Spike (B3J	0401-MS1), Continued	S	ource: 23l3535-02	Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-05		
Phosphorus, dissolve	ed	4.41	0.050 mg/L	4.00	< 0.050	110	70-130			
Potassium, dissolved		4.66	0.10 mg/L	4.00	0.54	103	70-130			
Selenium, dissolved		0.412	0.00050 mg/L	0.400	< 0.00050	103	70-130			
Silicon, dissolved		5.4	1.0 mg/L	4.00	1.1	108	70-130			
Silver, dissolved		0.0384	0.000050 mg/L	0.0400	< 0.000050	96	70-130			
Sodium, dissolved		5.78	0.10 mg/L	4.00	1.65	103	70-130			
Strontium, dissolved		0.168	0.0010 mg/L	0.0400	0.123	112	70-130			
Sulfur, dissolved		41.9	3.0 mg/L	40.0	< 3.0	102	70-130			
Tellurium, dissolved		0.0447	0.00050 mg/L	0.0400	< 0.00050	112	70-130			
Thallium, dissolved		0.0426	0.000020 mg/L	0.0400	< 0.000020	107	70-130			
Thorium, dissolved		0.0412	0.00010 mg/L	0.0400	< 0.00010	103	70-130			
Tin, dissolved		0.0432	0.00020 mg/L	0.0400	< 0.00020	108	70-130			
Titanium, dissolved		0.0422	0.0050 mg/L	0.0400	< 0.0050	105	70-130			
Tungsten, dissolved		0.0419	0.0010 mg/L	0.0400	< 0.0010	105	70-130			
Uranium, dissolved		0.0421	0.000020 mg/L	0.0400	0.000132	105	70-130			
Vanadium, dissolved		0.0412	0.0050 mg/L	0.0400	< 0.0050	103	70-130			
Zinc, dissolved		0.420	0.0040 mg/L	0.400	< 0.0040	105	70-130			
Zirconium, dissolved		0.0441	0.00010 mg/L	0.0400	< 0.00010	110	70-130			
Blank (B3J0462-B	LK1)	< 0.000010	0.000010 mg/L	Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		< 0.000010	0.000010 Hig/L							
Blank (B3J0462-B	LK2)			Prepared	1: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		< 0.000010	0.000010 mg/L							
Blank (B3J0462-B	LK3)	. 0 000040	0.000040	Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		< 0.000010	0.000010 mg/L			- ^ .	1 0000 4			
LCS (B3J0462-BS	1)	0.000054	0.000040		d: 2023-10-0			0-06		
Mercury, dissolved		0.000251	0.000010 mg/L	0.000250	L 0000 40 0	100	80-120	0.00		
LCS (B3J0462-BS) Mercury, dissolved	2)	0.000224	0.000010 mg/L	0.000250	d: 2023-10-0	5, Anaiyze	80-120	0-06		
	2)	0.000224	0.000010 Hig/L		d: 2023-10-0			0.06		
LCS (B3J0462-BS	ა)		0.000040 #					0-06		
Mercury, dissolved		0.000238	0.000010 mg/L	0.000250		95	80-120			
Duplicate (B3J046	2-DUP1)		ource: 23l3535-01	Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, dissolved		< 0.000010	0.000010 mg/L		< 0.000010				20	
Matrix Spike (B3J	0462-MS1)		ource: 23l3535-02		d: 2023-10-0	•		0-06		
Mercury, dissolved		0.000239	0.000010 mg/L	0.000250	< 0.000010	96	70-130			
General Parameter	rs, Batch B3l2862									
Blank (B3l2862-BL	_K1)			Prepared	d: 2023-09-2	8, Analyze	ed: 2023-1	0-03		
BOD, 5-day		< 2.0	2.0 mg/L	-						
LCS (B3I2862-BS1)			Prepared	d: 2023-09-2	8, Analyze	ed: 2023-1	0-03		
BOD, 5-day		202	58.6 mg/L	 198		102	85-115			
- , ,										

General Parameters, Batch B3l2913



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK O			535 3-10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters	s, Batch B3l2913, Con	tinued								
Blank (B3I2913-BL	.K1)			Prepared:	: 2023-09-28	, Analyzec	d: 2023-(09-29		
Phosphorus, Total (as	•	< 0.0050	0.0050 mg/L	· · · · · · · · · · · · · · · · · · ·			-		-	
Blank (B3I2913-BL	K2)			Prepared	: 2023-09-28	Analyzec	1. 2023-0	19-29		
Phosphorus, Total (as		< 0.0050	0.0050 mg/L			<u>,</u>				
Blank (B3I2913-BL	•			Prenared:	2023-09-28	Δnalvzer	4. 2023-0	na_2a		
Phosphorus, Total (as	,	< 0.0050	0.0050 mg/L	i iopaicu.	2020-00-20	, Allaly200	1. 2020-0	33-23		
		0.0000	0.0000g/_	Dranarad	2022 00 26	Anglyzos	4. 2022 (20.20		
Blank (B3I2913-BL		< 0.0050	0.0050 mg/L	Prepared.	2023-09-28	, Analyzed	1. 2023-0	J9-29 		
Phosphorus, Total (as		< 0.0050	0.0050 Hig/L							
LCS (B3I2913-BS1					2023-09-28			09-29		
Phosphorus, Total (as	s P)	0.100	0.0050 mg/L	0.100		100	85-115			
LCS (B3I2913-BS2)			Prepared:	2023-09-28	, Analyzec	1: 2023-0	09-29		
Phosphorus, Total (as	s P)	0.100	0.0050 mg/L	0.100		100	85-115			
LCS (B3I2913-BS3)			Prepared:	2023-09-28	, Analyzec	1: 2023-0	09-29		
Phosphorus, Total (as	s P)	0.100	0.0050 mg/L	0.100		100	85-115			
LCS (B3I2913-BS4)			Prepared:	: 2023-09-28	, Analyzec	d: 2023-0	09-29		
Phosphorus, Total (as	·	0.102	0.0050 mg/L	0.100		102	85-115			
General Parameters				Prepared:	: 2023-09-29	ı. Analvzec	d: 2023-(09-29		
Chemical Oxygen De	•	< 20	20 mg/L			, <u>, –</u>				
LCS (B3I2991-BS1				Prenared:	: 2023-09-29	Δnalvzer	4. 3033-(na_2a		
Chemical Oxygen De	,	524	20 mg/L	500	2020-00-20	105	89-115	33-23		
General Parameters				D		A I	1. 0000 /	20.00		
Blank (B3I3065-BL	· ·		4.0	Prepared	2023-09-30	, Analyzed	1: 2023-0	J9-30 		
Alkalinity, Total (as Ca Alkalinity, Phenolphth		< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Bicarbonate		< 1.0	1.0 mg/L							
Alkalinity, Carbonate	· /	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Blank (B3I3065-BL	K2)			Prepared:	2023-09-30	, Analyzed	1: 2023-0	09-30		
Alkalinity, Total (as Ca		< 1.0	1.0 mg/L							
Alkalinity, Phenolphth Alkalinity, Bicarbonate		< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Carbonate		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Blank (B3l3065-BL	K3)			Prepared:	2023-09-30	, Analyzec	l: 2023-(09-30		
Alkalinity, Total (as Ca		< 1.0	1.0 mg/L							
Alkalinity, Phenolphth		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	· · · · · · · · · · · · · · · · · · ·	< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Alkalinity, Hydroxide (,	< 1.0	1.0 mg/L							
	1			Prepared:	: 2023-09-30	. Analyzec	d: 2023-(09-30		
LCS (B3I3065-BS1)										
Alkalinity, Total (as Ca	,	108	1.0 mg/L	100		108	80-120			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED		535 3-10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameter	rs, Batch B3l3065, Cont	inued								
LCS (B3I3065-BS2	2)			Prepared	d: 2023-09-3	30, Analyze	ed: 2023-	09-30		
Alkalinity, Total (as C	aCO3)	93.4	1.0 mg/L	100		93	80-120			
Alkalinity, Phenolphth	nalein (as CaCO3)	44.2	1.0 mg/L	50.0		88	0-200			
LCS (B313065-BS3	3)			Prepared	d: 2023-09-3	30, Analyze	d: 2023-	09-30		
Alkalinity, Total (as C		107	1.0 mg/L	100		107	80-120			
Alkalinity, Phenolphth	nalein (as CaCO3)	47.9	1.0 mg/L	50.0		96	0-200			
General Parameter	rs, Batch B3J0026									
Blank (B3J0026-B	LK1)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-02		
Ammonia, Total (as N	N)	0.024	0.010 mg/L							
Blank (B3J0026-B	LK2)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-02		
Ammonia, Total (as N	١)	< 0.010	0.010 mg/L							
Blank (B3J0026-B	LK3)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-02		
Ammonia, Total (as N	١)	< 0.010	0.010 mg/L							
Blank (B3J0026-B	LK4)			Prepared	d: 2023-10-0)2, Analyze	d: 2023-	10-02		
Ammonia, Total (as N	١)	< 0.010	0.010 mg/L							
Blank (B3J0026-B	LK5)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-02		
Ammonia, Total (as N		0.030	0.010 mg/L							
Blank (B3J0026-B	LK6)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-02		
Ammonia, Total (as N	•	0.029	0.010 mg/L	·						
LCS (B3J0026-BS	1)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-02		
Ammonia, Total (as N	•	0.982	0.010 mg/L	1.00		98	85-115			
LCS (B3J0026-BS	2)			Prepared	d: 2023-10-0)2 Analyze	ed: 2023-	10-02		
Ammonia, Total (as N	•	0.981	0.010 mg/L	1.00	2020 10 (98	85-115	10 02		
LCS (B3J0026-BS	,				d: 2023-10-0			10-02		
Ammonia, Total (as N	•	0.974	0.010 mg/L	1.00	1. 2025-10-0	97	85-115	10-02		
LCS (B3J0026-BS	,	0.011	0.010 mg/L		d: 2023-10-0			10-02		
Ammonia, Total (as N	•	0.993	0.010 mg/L	1.00	1. 2020-10-0	99	85-115	10-02		
		0.000	0.0.0 mg/2		d: 2023-10-0			10.02		
Ammonia, Total (as N	•	0.971	0.010 mg/L	1.00	1. 2023-10-0	97	85-115	10-02		
	,	0.071	0.010 Hig/L		1, 2022 10 (10.02		
LCS (B3J0026-BS	·	0.947	0.010 mg/L		d: 2023-10-0	95 95		10-02		
Ammonia, Total (as N	N)	0.947	0.010 mg/L	1.00		95	85-115			
General Parameter	rs, Batch B3J0036									
Blank (B3J0036-B				Prepared	d: 2023-10-0	02, Analyze	ed: 2023-	10-03		
Nitrogen, Total Kjelda	ahl	< 0.050	0.050 mg/L							
Blank (B3J0036-B	LK2)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-03		
Nitrogen, Total Kjelda	ahl	< 0.050	0.050 mg/L							
LCS (B3J0036-BS	1)			Prepared	d: 2023-10-0)2, Analyze	ed: 2023-	10-03		
Nitrogen, Total Kjelda	ahl	0.858	0.050 mg/L	1.00		86	85-115			



REPORTED TO Elk River Alliance PROJECT CBWM-2023					WORK (535 3-10-11	14:07
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B3J0036, Con	tinued								
LCS (B3J0036-BS2)			Prepared	: 2023-10-0	2, Analyzed	d: 2023-1	10-03		
Nitrogen, Total Kjeldahl	1.01	0.050 mg/L	1.00		101	85-115			
General Parameters, Batch B3J0163									
Blank (B3J0163-BLK1)			Prepared	: 2023-10-0	4, Analyzed	d: 2023-1	10-04		
Solids, Total Suspended	< 2.0	2.0 mg/L	•						
LCS (B3J0163-BS1)			Prepared	: 2023-10-0	4, Analyzed	d: 2023-1	10-04		
Solids, Total Suspended	85.0	10.0 mg/L	100		85	85-115			
General Parameters, Batch B3J0543									
Blank (B3J0543-BLK1)			Prepared	: 2023-10-0	8, Analyzed	d: 2023-1	10-10		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0543-BLK2)			Prepared	: 2023-10-0	9, Analyzed	d: 2023-1	10-10		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B3J0543-BLK3)			Prepared	: 2023-10-0	9, Analyzed	d: 2023-1	10-10		
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B3J0543-BS1)			Prepared	: 2023-10-0	8, Analyzed	d: 2023-1	10-10		
Carbon, Total Organic	8.83	0.50 mg/L	10.0		88	78-116			
Carbon, Dissolved Organic	9.60	0.50 mg/L	10.0		96	78-116			
LCS (B3J0543-BS2)			Prepared	: 2023-10-0	9, Analyzed	d: 2023-1	10-10		
Carbon, Total Organic	8.82	0.50 mg/L	10.0		88	78-116			
Carbon, Dissolved Organic	8.79	0.50 mg/L	10.0		88	78-116			
LCS (B3J0543-BS3)			Prepared	: 2023-10-1	0, Analyzed	d: 2023-1	10-10		
Carbon, Total Organic	9.24	0.50 mg/L	10.0		92	78-116			
Carbon, Dissolved Organic Total Metals, Batch B3J0405	9.02	0.50 mg/L	10.0		90	78-116			
Blank (B3J0405-BLK1)			Prepared	: 2023-10-0	5, Analyzed	d: 2023-1	10-05		
Aluminum, total	< 0.0050	0.0050 mg/L							
Antimony, total	< 0.00020	0.00020 mg/L							
Arsenic, total Barium, total	< 0.00050 < 0.0050	0.00050 mg/L 0.0050 mg/L							
Beryllium, total	< 0.00010	0.0000 mg/L							
Bismuth, total	< 0.00010	0.00010 mg/L							
Boron, total	< 0.0500	0.0500 mg/L							
Cadmium, total Calcium, total	< 0.000010	0.000010 mg/L 0.20 mg/L							
Chromium, total	< 0.00050	0.00050 mg/L							
Cobalt, total	< 0.00010	0.00010 mg/L							
Copper, total	< 0.00040	0.00040 mg/L							
Iron, total	< 0.010	0.010 mg/L							
Lead, total Lithium, total	< 0.00020 < 0.00010	0.00020 mg/L 0.00010 mg/L							
Magnesium, total	< 0.00010	0.000 10 Hig/L 0.010 mg/L							
Manganese, total	< 0.00020	0.00020 mg/L						_	ige 23 of 2



REPORTED TO Elk River Alliance PROJECT CBWM-2023 Analyte						WORK REPOR			535 -10-11	14:07	
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0405, Continued										
Blank (B3J0405-BL	.K1), Continued				Prepared	: 2023-10-0)5, Analyze	d: 2023-	10-05		
Molybdenum, total		< 0.00010	0.00010	mg/L							
Nickel, total		< 0.00040	0.00040	mg/L							
Phosphorus, total		< 0.050	0.050	mg/L							
Potassium, total		< 0.10	0.10	mg/L							
Selenium, total		< 0.00050	0.00050								
Silicon, total		< 1.0		mg/L							
Silver, total		< 0.000050	0.000050								
Sodium, total		< 0.10		mg/L							
Strontium, total		< 0.0010	0.0010								
Sulfur, total		< 3.0		mg/L							
Tellurium, total		< 0.00050	0.00050								
Thallium, total		< 0.000020	0.000020								
Thorium, total Tin, total		< 0.00010 < 0.00020	0.00010								
Titanium, total		< 0.00020	0.00020								
Tungsten, total		< 0.0030	0.0030								
Uranium, total		< 0.000020	0.000020								
Vanadium, total		< 0.0050	0.000020								
Zinc, total		< 0.0040	0.0040								
Zirconium, total		< 0.00010	0.00010								
						2000 10 0			40.05		
LCS (B3J0405-BS1)				Prepared	: 2023-10-0)5, Analyze	d: 2023-	10-05		
Aluminum, total		4.10	0.0050		4.00		103	80-120			
Antimony, total		0.0427	0.00020		0.0400		107	80-120			
Arsenic, total		0.411	0.00050		0.400		103	80-120			
Barium, total		0.0414	0.0050		0.0400		103	80-120			
Beryllium, total		0.0418	0.00010		0.0400		104	80-120			
Bismuth, total		0.0420	0.00010		0.0400		105	80-120			
Boron, total		0.428	0.0500		0.400		107 103	80-120			
Cadmium, total Calcium, total		0.0411 4.19		mg/L	0.0400 4.00		105	80-120 80-120			
Chromium, total		0.0416	0.00050		0.0400		103	80-120			
Cobalt, total		0.0411	0.00030		0.0400		103	80-120			
Copper, total		0.0415	0.00040		0.0400		104	80-120			
Iron, total		4.11		mg/L	4.00		103	80-120			
Lead, total		0.0416	0.00020		0.0400		104	80-120			
Lithium, total		0.0414	0.00010		0.0400		103	80-120			
Magnesium, total		4.11		mg/L	4.00		103	80-120			
Manganese, total		0.0409	0.00020		0.0400		102	80-120			
Molybdenum, total		0.0404	0.00010	mg/L	0.0400		101	80-120			
Nickel, total		0.0414	0.00040	mg/L	0.0400		104	80-120			
Phosphorus, total		4.10		mg/L	4.00		103	80-120			
Potassium, total		4.08		mg/L	4.00		102	80-120			
Selenium, total		0.422	0.00050		0.400		106	80-120			
Silicon, total		4.3		mg/L	4.00		107	80-120			
Silver, total		0.0420	0.000050		0.0400		105	80-120			
Sodium, total		4.04		mg/L	4.00		101	80-120			
Strontium, total		0.0412	0.0010		0.0400		103	80-120			
Sulfur, total		41.4		mg/L	40.0		103	80-120			
Tellurium, total		0.0416	0.00050		0.0400		104	80-120			
Thallium, total		0.0416	0.000020		0.0400		104	80-120			
Thorium, total		0.0441 0.0416	0.00010 0.00020		0.0400		110 104	80-120			
Tin, total Titanium, total		0.0416	0.00020		0.0400		104	80-120 80-120			
Tungsten, total		0.0411	0.0050		0.0400		103	80-120			
rangoton, total		0.0723	0.0010	ing/∟	0.0-00		101	00-120			



REPORTED TO PROJECT	Elk River Alliance CBWM-2023					WORK REPOR	ORDER RTED		535 -10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	B3J0405, Continued									
LCS (B3J0405-BS1). Continued			Prepared	I: 2023-10-0	5. Analyze	ed: 2023-1	10-05		
Vanadium, total	,,	0.0422	0.0050 mg/L	0.0400		105	80-120			
Zinc, total		0.411	0.0040 mg/L	0.400		103	80-120			
Zirconium, total		0.0422	0.00010 mg/L	0.0400		105	80-120			
Duplicate (B3J040	5-DUP1)	So	ource: 23l3535-01	Prepared	I: 2023-10-0	5, Analyze	ed: 2023-1	10-05		
Aluminum, total		0.0239	0.0050 mg/L		0.0242				20	
Antimony, total		< 0.00020	0.00020 mg/L		< 0.00020				20	
Arsenic, total		< 0.00050	0.00050 mg/L		< 0.00050				20	
Barium, total		0.141	0.0050 mg/L		0.143			< 1	20	
Beryllium, total		< 0.00010	0.00010 mg/L		< 0.00010				20	
Bismuth, total		< 0.00010	0.00010 mg/L		< 0.00010				20	
Boron, total		< 0.0500	0.0500 mg/L		< 0.0500				20	
Cadmium, total		0.000025	0.000010 mg/L		0.000022				20	
Calcium, total		34.1	0.20 mg/L		35.0			3	20	
Chromium, total		< 0.00050	0.00050 mg/L		< 0.00050				20	
Coppor total		< 0.00010	0.00010 mg/L		< 0.00010				20	
Copper, total		0.00051	0.00040 mg/L 0.010 mg/L		0.00050				20	
Lead, total		< 0.00020	0.00020 mg/L		< 0.0029				20	
Lithium, total		0.00294	0.00020 mg/L		0.00301			3	20	
Magnesium, total		7.35	0.010 mg/L		7.24			2	20	
Manganese, total		0.0112	0.00020 mg/L		0.0112			<u>-</u> < 1	20	
Molybdenum, total		0.00067	0.00010 mg/L		0.00066			1	20	
Nickel, total		< 0.00040	0.00040 mg/L		< 0.00040			· ·	20	
Phosphorus, total		< 0.050	0.050 mg/L		< 0.050				20	
Potassium, total		0.55	0.10 mg/L		0.55			< 1	20	
Selenium, total		< 0.00050	0.00050 mg/L		< 0.00050				20	
Silicon, total		1.7	1.0 mg/L		1.7				20	
Silver, total		< 0.000050	0.000050 mg/L		< 0.000050				20	
Sodium, total		1.95	0.10 mg/L		1.96			< 1	20	
Strontium, total		0.122	0.0010 mg/L		0.123			< 1	20	
Sulfur, total		< 3.0	3.0 mg/L		< 3.0				20	
Tellurium, total		< 0.00050	0.00050 mg/L		< 0.00050				20	
Thallium, total		< 0.000020	0.000020 mg/L		< 0.000020				20	
Thorium, total		< 0.00010	0.00010 mg/L		< 0.00010				20	
Tin, total		< 0.00020	0.00020 mg/L		< 0.00020				20	
Titanium, total		< 0.0050	0.0050 mg/L		< 0.0050				20	
Tungsten, total Uranium, total		< 0.0010 0.000246	0.0010 mg/L 0.000020 mg/L		< 0.0010 0.000248			< 1	20	
Vanadium, total		< 0.0050	0.000020 mg/L		< 0.0050				20	
Zinc, total		< 0.0040	0.0030 mg/L		< 0.0030				20	
Zirconium, total		< 0.00010	0.0040 mg/L		< 0.00010				20	
Matrix Spike (B3J0	405-MS1)		ource: 23l3535-02	Prepared	I: 2023-10-0	5 Analyze	vq. 3033-1	10-05		
	TUU-IVIU 1)			<u>'</u>				10-00		
Aluminum, total		4.71	0.0050 mg/L	4.00	0.558	104	70-130			
Antimony, total		0.0324	0.00020 mg/L	0.0400	< 0.00020	81	70-130			
Arsenic, total		0.412	0.00050 mg/L	0.400	< 0.00050	103	70-130			
Barium, total		0.238 0.0425	0.0050 mg/L 0.00010 mg/L	0.0400	< 0.00010	119 106	70-130 70-130			
Beryllium, total Bismuth, total		0.0425	0.00010 mg/L	0.0400	< 0.00010	103	70-130			
Boron, total		0.424	0.0500 mg/L	0.400	< 0.0500	105	70-130			
Cadmium, total		0.0414	0.000010 mg/L	0.0400	0.000045	103	70-130			
Calcium, total		24.3	0.20 mg/L	4.00	20.2	103	70-130			
Chromium, total		0.0422	0.00050 mg/L	0.0400	0.00071	104	70-130			
Cobalt, total		0.0407	0.00010 mg/L	0.0400	0.00018	101	70-130			
Copper, total		0.0411	0.00040 mg/L	0.0400	0.00083	101	70-130			
ooppo., tota.										



REPORTED TO PROJECT	PROJECT CBWM-2023					WORK REPOR	ORDER RTED	2313 2023	535 3-10-11	14:07
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batc	h B3J0405, Continued									
Matrix Spike (B3J	0405-MS1), Continued	Sc	ource: 23l3535-02	Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-05		
Lead, total		0.0415	0.00020 mg/L	0.0400	0.00024	103	70-130			
Lithium, total		0.0434	0.00010 mg/L	0.0400	0.00177	104	70-130			
Magnesium, total		8.09	0.010 mg/L	4.00	4.21	97	70-130			
Manganese, total		0.0470	0.00020 mg/L	0.0400	0.00645	101	70-130			
Molybdenum, total		0.0403	0.00010 mg/L	0.0400	0.00052	99	70-130			
Nickel, total		0.0408	0.00040 mg/L	0.0400	0.00082	100	70-130			
Phosphorus, total		4.22	0.050 mg/L	4.00	< 0.050	105	70-130			
Potassium, total		4.91	0.10 mg/L	4.00	0.69	105	70-130			
Selenium, total		0.416	0.00050 mg/L	0.400	< 0.00050	104	70-130			
Silicon, total		6.3	1.0 mg/L	4.00	2.0	107	70-130			
Silver, total		0.0422	0.000050 mg/L	0.0400	< 0.000050	106	70-130			
Sodium, total		5.58	0.10 mg/L	4.00	1.59	100	70-130			
Strontium, total		0.159	0.0010 mg/L	0.0400	0.118	102	70-130			
Sulfur, total		42.9	3.0 mg/L	40.0	< 3.0	104	70-130			
Tellurium, total		0.0416	0.00050 mg/L	0.0400	< 0.00050	104	70-130			
Thallium, total		0.0404	0.000020 mg/L	0.0400	< 0.000020	101	70-130			
Thorium, total		0.0407	0.00010 mg/L	0.0400	< 0.00010	102	70-130			
Tin, total		0.0417	0.00020 mg/L	0.0400	< 0.00020	104	70-130			
Titanium, total		0.0528	0.0050 mg/L	0.0400	0.0100	107	70-130			
Tungsten, total		0.0416	0.0010 mg/L	0.0400	< 0.0010	104	70-130			
Uranium, total		0.0423	0.000020 mg/L	0.0400	0.000149	105	70-130			
Vanadium, total		0.0439	0.0050 mg/L	0.0400	< 0.0050	105	70-130			
Zinc, total		0.418	0.0040 mg/L	0.400	< 0.0040	104	70-130			
Zirconium, total		0.0428	0.00010 mg/L	0.0400	0.00024	106	70-130			
Total Metals, Batc	h B3J0461									
Blank (B3J0461-B	LK1)			Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, total	-	< 0.000010	0.000010 mg/L	-						
Blank (B3J0461-B	LK2)			Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, total		< 0.000010	0.000010 mg/L							
LCS (B3J0461-BS	1)			Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, total		0.000240	0.000010 mg/L	0.000250		96	80-120			
LCS (B3J0461-BS	2)			Prepared	d: 2023-10-0	5, Analyze	ed: 2023-1	0-06		
Mercury, total		0.000226	0.000010 mg/L	0.000250		90	80-120			



Appendix D: Benthic Macroinvertebrate Taxonomy Report

Elk River Alliance 64



Project: Community-based Water Monitoring - 2023

Elk River Alliance

Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca

250-494-7553

Site:	2023	2023	2023	2023	2023	2023	2023	2023	2023	2023
Sample:	ALX001	ALX003	BOI001	BOI002	COL001	COL003	LIZ001	LIZ003	MOR001	MOR002
Sample Collection Date:	27-Sep-23	27-Sep-23	26-Sep-23	26-Sep-23	3-Oct-23	3-Oct-23	4-Oct-23	4-Oct-23	25-Sep-23	25-Sep-23
CC #:	CC241427	CC241428	CC241429	CC241430	CC241431	CC241432	CC241433	CC241434	CC241435	CC241436
Sieve Size:	400	400	400	400	400	400	400	400	400	400
SubSample %:	5	5	5	8	5	5	5	5	5	5
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0
Class: Insecta	0	0	0	0	0	0	0	0	0	0
Order: Coleoptera	0	0	0	0	0	0	0	0	0	0
Family: Elmidae	5	4	0	0	0	3	13	92	38	19
Heterlimnius	2	4	0	0	0	4	8	93	11	11
Optioservus	0	0	0	0	0	0	0	1	14	0
Zaitzevia	0	0	0	0	0	0	0	0	6	0
Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0
Family: Ameletidae	0	0	0	0	0	0	0	0	0	0
Ameletus	1	1	7	2	10	34	0	0	0	13
Family: Baetidae	81	161	12	8	9	9	57	159	12	24
Anafroptilum	0	0	0	0	2	0	0	0	0	0
Baetis	39	78	2	16	2	0	6	17	1	7
Baetis rhodani group	79	95	11	38	0	0	0	21	2	4
Diphetor hageni	0	0	0	0	0	4	0	0	0	25
Family: Ephemerellidae	51	96	9	6	4	18	14	158	18	8
Caudatella	2	15	0	0	0	0	0	0	0	0
Drunella	0	3	1	24	0	0	0	5	0	0
Drunella doddsii	7	5	6	48	0	0	0	18	0	0
Drunella spinifera	0	4	0	0	0	1	1	3	0	1
Ephemerella	18	9	0	0	5	7	2	0	22	2

Sweltsa 4 2 4 0 0 4 1 0 1 Family: Leuctridae 1 0 1 0 1 0 0 0 3 1 Family: Nemouridae 10 20 22 3 0 5 3 41 2 Visoka cataractae 0 0 12 1 0 6 1 0 0 2 2 0 2 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Family: Heptageniidae	21	56	97	37	11	13	3	38	96	39
Rhithrogena	nygmula	7	3	14	2	2	14	0	4	19	5
Family: Leptophlebilidae	eorus	3	18	25	20	0	0	0	0	0	0
Order: Plecoptera 0 0 0 0 1 0 0 0 26 Order: Plecoptera 0 2 3 0 1 0 3 4 0 Family: Capnilidae 0 0 3 0 42 3 24 16 2 Family: Chioroperildae 2 2 3 1 0 4 0 5 0 Plumiperilo 1 0 0 0 0 3 0 5 0 Plumiperilo 0 0 1 9 0 0 0 0 0 Plumiperilo 0 0 1 9 0 0 0 0 0 Pamily: Leuctridae 1 0 1 0 1 0 0 0 0 Family: Leuctridae 1 0 1 0 1 0 0 0 0 Family: Leuctridae 1 0 1 0 1 0 0 0 0 Family: Leuctridae 1 0 1 0 1 0 0 0 0 Family: Leuctridae 1 0 1 0 0 0 0 0 Family: Leuctridae 1 0 1 0 0 0 0 0 3 Family: Leuctridae 1 0 1 0 0 0 0 0 0 Family: Leuctridae 1 0 1 0 0 0 0 0 0 Family: Leuctridae 1 0 1 0 0 0 0 0 0 Family: Leuctridae 1 0 1 0 0 0 0 0 0 Family: Leuctridae 1 0 1 0 1 0 0 0 0 0	nithrogena	9	6	84	11	0	0	0	3	0	3
Order: Pleoptera	Family: Leptophlebiidae	0	0	0	0	7	1	0	0	27	13
Family: Capnildae	eoleptophlebia	0	0	0	0	1	0	0	0	26	4
Family: Capnildae											
Family: Capnildae	Order: Plecoptera	0	2	3	0	1	0	3	4	0	6
Family: Chloroperlidae	<u> </u>				0				16	2	42
Haploperla		2	2		1	0					30
Plumiperla						0	3	0	5	0	5
Family: Leuctridae		0	0	1	9	0	0	0	0	0	0
Family: Nemouridae	veltsa	4	2	4	0	0	4	1	0	1	25
Family: Nemouridae	Family: Leuctridae	1	0	1	0	1	0	0	0	3	0
Visoka cataractae 0 0 12 1 0 6 1 0 0 Zapada 6 8 1 0 0 0 3 2 0 Zapada coclumbiana 2 1 43 6 0 3 0 1 0 Zapada oregonensis group 7 3 1 0 0 0 0 0 1 0 I Family: Pethoperlidae 0		10	20	22	3	0	5	3	41	2	0
Second columbiana Company Comp		0	0	12	1	0	6	1	0	0	0
A	pada	6	8	1	0	0	0	3	2	0	0
Family: Peltoperlidae	pada cinctipes	13	3	3	0	2	0	24	11	5	2
Family: Peltoperlidae	pada columbiana	2	1	43	6	0	3	0	1	0	1
Yoraperla 0 0 1 1 0 0 0 0 0 I Family: Perlidae 1 0 0 0 0 1 0 2 0 Doroneuria 2 0 0 0 0 1 0 2 0 I Family: Perlodidae 4 0 0 0 1 0 2 0 0 Isoperla 0 0 2 0 0 3 0 0 0 Isoperla 0 0 2 0 0 3 0 0 0 Kogotus 4 0 1 0 0 0 0 0 0 0 0 0 0 0 0	pada oregonensis group	7	3	1	0	0	0	0	1	0	0
Family: Perlidae	Family: Peltoperlidae	0	0	0	0	0	0	0	0	0	0
Family: Perlodidae	raperla	0	0	1	1	0	0	0	0	0	0
Family: Perlodidae	Family: Perlidae	1	0	0	0	0	1	0	2	0	1
Soperia	proneuria	2	0	0	0	0	1	2	14	0	5
Kogotus 4 0 0 0 0 0 2 0 Megarcys 2 2 15 13 1 0 0 1 0 Skwala 0 0 0 0 0 0 4 2 4 I Family: Taeniopterygidae 1 3 201 25 0 0 0 3 0 I Order: Trichoptera 0 0 1 0 0 0 0 3 0 I Family: Apataniidae 0 0 0 0 0 0 0 0 0 Apatania 3 0 1 0 0 0 0 0 0 0 I Family: Brachycentridae 0 0 0 0 0 0 0 0 0 0 Brachycentrus 4 2 0 0 0 0 0 0 0 0	Family: Perlodidae	4	0	0	0	1	0	2	0	0	0
Megarcys 2 2 15 13 1 0 0 1 0 Skwala 0 0 0 0 0 0 4 2 4 Family: Taeniopterygidae 1 3 201 25 0 0 0 3 0 Order: Trichoptera 0 0 1 0 0 0 1 0 0 Family: Apataniidae 0 0 0 0 0 0 0 0 0 Apatania 3 0 1 0 0 0 0 0 0 I Family: Brachycentridae 0 0 0 0 0 0 0 0 0 Brachycentrus 4 2 0 0 1 0 0 0 0 0 Microsema 1 0 0 0 0 0 0 0 0 0	pperla	0	0	2	0	0	3	0	0	0	2
Skwala 0 0 0 0 0 0 4 2 4 Family: Taeniopterygidae 1 3 201 25 0 0 0 3 0 Order: Trichoptera 0 0 1 0 0 0 1 0 0 Family: Apataniidae 0 0 0 0 0 0 0 0 0 0 Apatania 3 0 1 0 0 0 0 0 0 0 0 I Family: Brachycentridae 0 0 0 0 0 0 0 0 0 0 Brachycentrus 4 2 0 0 1 0 0 0 0 0 Micrasema 1 0 0 0 0 0 0 0 0 0 Family: Glossosomatidae 2 1 0 0 <	gotus	4	0		0	0	0	0	2	0	2
Family: Taeniopterygidae	egarcys							0		-	7
Order: Trichoptera											0
Family: Apataniidae	Family: Taeniopterygidae	1	3	201	25	0	0	0	3	0	1
Family: Apataniidae											
Family: Apataniidae	Order: Trichoptera	0	0	1	0	0	0	1	0	0	0
Apatania 3 0 1 0 0 0 0 4 1 Family: Brachycentridae 0 0 0 0 0 0 0 0 0 0 Brachycentrus 4 2 0 0 1 0 0 0 0 Micrasema 1 0 0 0 0 22 8 19 7 Family: Glossosomatidae 2 1 0 0 0 0 0 0 0 Glossosoma 25 1 0 0 0 0 0 0 0	•	0	0	0	0	0	0	0	0	0	0
Brachycentrus 4 2 0 0 1 0 0 0 0 Micrasema 1 0 0 0 0 22 8 19 7 I Family: Glossosomatidae 2 1 0 0 0 0 0 0 0 Glossosoma 25 1 0 0 0 0 0 0 0	patania	3	0	1	0	0	0	0	4	1	0
Micrasema 1 0 0 0 0 22 8 19 7 Family: Glossosomatidae 2 1 0	Family: Brachycentridae	0	0	0	0	0	0	0	0	0	0
Family: Glossosomatidae 2 1 0 0 0 0 0 0 0 Glossosoma 25 1 0 0 0 0 0 0 0 0	achycentrus	4	2	0	0	1	0	0	0	0	0
Glossosoma 25 1 0 0 0 0 0 0 0	icrasema	1	0	0	0	0	22	8	19	7	29
	Family: Glossosomatidae	2	1	0	0	0	0	0	0	0	0
	ossosoma	25	1	0	0	0	0	0	0	0	0
Family: Hydropsychidae	Family: Hydropsychidae	1	0	0	0	0	0	1	13	3	1
Arctopsyche 0 0 0 0 0 0 1 0 0	ctopsyche	0	0	0	0	0	0	1	0	0	0
Cheumatopsyche 0 0 0 0 0 0 0 1	eumatopsyche	0	0	0	0	0	0	0	0	1	0

	_			_		_		_	_	
Hydropsyche	0	0	0	0	3	0	18	22	30	0
Parapsyche	1	0	0	0	0	0	0	0	0	0
Parapsyche elsis	0	2	0	0	0	0	0	0	0	0
Family: Hydroptilidae	0	0	0	0	2	0	1	0	0	1
Hydroptila	0	0	0	0	2	0	2	0	0	0
Family: Lepidostomatidae	0	0	0	0	0	0	0	0	0	0
Lepidostoma	0	0	0	0	67	0	5	0	240	0
Family: Leptoceridae	0	0	0	0	0	0	0	0	0	1
Family: Limnephilidae	0	0	0	0	0	1	0	1	0	1
Ecclisomyia	0	0	0	0	0	0	0	0	0	1
Family: Rhyacophilidae	0	0	0	0	0	0	0	0	0	0
Rhyacophila	15	2	1	1	0	3	0	3	0	2
Rhyacophila atrata complex	0	1	0	0	0	0	0	1	0	0
Rhyacophila betteni group	4	5	0	0	0	0	0	1	0	1
Rhyacophila brunnea/vemna group	2	0	0	1	0	0	3	10	0	1
Rhyacophila hyalinata group	3	2	0	0	0	0	0	0	0	1
Rhyacophila narvae	0	0	0	0	0	1	0	0	0	3
Rhyacophila viquaea group	0	0	0	8	0	0	0	0	0	0
Family: Thremmatidae	0	0	0	0	0	0	0	0	0	0
Neophylax	0	0	0	0	0	0	0	0	0	3
Oligophlebodes	9	0	0	1	0	0	0	7	0	0
Family: Uenoidae	0	0	0	0	0	0	0	0	0	0
Neothremma	0	1	0	0	0	0	0	0	0	0
Order: Diptera	0	0	2	0	0	0	0	0	0	1
Family: Athericidae	0	0	0	0	0	0	0	0	0	0
Atherix	0	0	0	0	1	0	0	0	0	0
Family: Ceratopogonidae	0	0	0	0	0	1	0	0	0	0
Mallochohelea	0	0	0	0	0	0	0	1	0	0
Family: Chironomidae	1	4	26	0	13	0	2	0	0	1
Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0
Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0
Polypedilum	13	0	0	0	0	1	4	1	17	30
Stictochironomus	0	0	0	0	6	0	0	0	0	0
Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0
Constempellina sp. C	0	0	0	0	0	0	0	0	0	1
Micropsectra	0	9	7	1	38	47	9	0	7	34
Paratanytarsus	0	0	0	0	6	0	0	0	0	0
Rheotanytarsus	1	0	0	0	0	0	0	1	0	0
Stempellinella	0	0	0	0	0	37	0	0	0	4
Tanytarsus	9	0	0	0	0	0	0	0	0	0
Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0

Pagastia orthogonia	0	0	0	l o	0	l o	0	0	0	2
Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0
Diamesa	0	3	48	19	0	0	5	1	0	7
Pagastia	1	3	0	0	0	1	41	0	1	0
Potthastia longimana group	0	0	0	0	5	0	0	0	0	0
Pseudodiamesa	0	1	0	0	0	0	0	0	0	0
Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0
Brillia	0	0	0	0	0	2	0	1	0	2
Corynoneura	0	0	0	0	0	0	1	1	0	0
Cricotopus (Nostococladius)	1	0	0	0	1	1	1	0	0	11
Eukiefferiella	5	10	15	22	1	5	2	2	0	2
Heterotrissocladius	0	0	0	0	0	1	0	0	0	0
Limnophyes	0	0	2	0	0	0	0	0	0	0
Nanocladius	0	0	0	0	0	1	0	0	0	0
Orthocladius complex	2	14	19	0	9	16	15	0	0	49
Parametriocnemus	0	0	0	0	0	2	0	0	0	1
Parorthocladius	0	0	0	0	0	0	0	0	0	11
Rheocricotopus	2	1	0	0	0	15	0	0	0	55
Thienemanniella	0	0	0	0	1	0	0	0	0	0
Tvetenia	6	16	0	0	0	13	2	0	1	3
Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0
Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0
Thienemannimyia group	0	0	0	0	34	3	8	8	11	12
Family: Empididae	4	3	1	0	1	1	10	2	0	0
Hemerodromia	0	0	0	0	1	0	0	0	0	0
Neoplasta	0	1	0	0	1	0	0	0	0	0
Roederiodes	0	0	0	0	1	0	10	1	0	0
Family: Limoniidae	0	0	0	0	0	0	0	0	0	0
Eloeophila	0	0	0	0	0	0	0	1	2	0
Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0
Glutops	0	0	0	0	0	0	0	1	0	0
Family: Psychodidae	0	30	0	0	0	0	0	0	0	0
Pericoma/Telmatoscopus	16	30	5	1	0	0	42	164	3	0
Family: Simuliidae	0	2	3	2	0	0	0	0	0	0
Prosimulium/Helodon	0	0	3	13	0	0	0	0	0	0
Simulium	0	2	7	3	0	0	0	0	0	0
Family: Tipulidae	0	0	0	3	7	0	0	0	0	1
Antocha	1	0	0	0	0	0	3	10	4	0
Cryptolabis	0	0	0	0	0	0	0	0	2	0
Dicranota	0	0	0	0	0	0	0	1	0	0
Hexatoma	0	0	0	0	0	0	0	0	4	7
Tipula	0	0	0	0	1	0	0	0	0	1

Order: Hemiptera	0	0	0	0	0	0	0	0	0	1
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0
Class: Arachnida	0	0	0	0	0	0	0	0	0	0
Order: Trombidiformes	0	0	0	0	0	0	0	0	0	1
Family: Aturidae	0	0	0	0	0	0	0	0	0	0
Aturus	0	1	0	0	0	0	0	0	0	0
Family: Feltriidae	0	0	0	0	0	0	0	0	0	0
Feltria	0	0	0	0	0	0	1	0	0	0
Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0
Albertathyas	0	0	0	1	0	0	0	0	0	0
Protzia	0	0	0	0	0	0	0	0	1	0
Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0
Lebertia	1	4	1	0	1	0	17	8	9	0
Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0
Sperchon	1	5	2	0	0	2	2	0	7	0
Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0
Testudacarus	0	0	0	0	0	0	1	10	2	0
Torrenticola	0	1	0	0	0	0	0	0	2	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0
Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0
Rhynchelmis	0	0	2	0	0	0	0	0	0	0
Order: Tubificida	0	0	0	0	0	0	0	0	0	0
Family: Enchytraeidae	0	0	0	0	0	0	0	0	0	0
Enchytraeus	0	0	0	0	9	0	0	0	0	0
Family: Naididae	0	0	0	0	0	0	0	0	0	0
Nais	0	2	0	0	86	0	263	7	4	1
Totals:	519	763	730	347	399	317	650	1024	668	590

Taxa present but not included:

Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0

Class: Copepoda	0	0	0	0	1	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0
Class: Ostracoda	1	0	1	1	0	1	1	1	0	1
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0
Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0
Order: Tubificida	0	0	0	0	0	0	0	0	0	0
Family: Lumbricidae	0	0	0	0	0	0	0	1	0	0
Phylum: Nemata	0	0	1	0	0	0	0	0	1	0
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0
Class: Turbellaria	1	1	1	0	0	0	0	0	1	1
Totals:	2	1	3	1	1	1	1	2	2	2



Appendix E: Stream Report

Elk River Alliance 65



Preliminary DNA Data

Elk River Alliance Elk River Watershed, BC October 2024

www.STREAM-DNA.org

Hajibabaei Lab, Centre for Biodiversity Genomics, University of Guelph

Environment and Climate Change Canada Living Lakes Canada

Table of Contents

INTRODUCTION	2
Benthic Macroinvertebrates	2
Background of STREAM	3
Objective of Report	5
METHODOLOGY	5
Study Area	5
DNA Sampling and Processing Methods	5
Measures to Avoid Contamination	5
Benthic Macroinvertebrate Field Sampling Protocol	6
Laboratory Methods	7
RESULTS	7
Overview	7
Taxonomic Coverage	8
Whirling Disease Host Detection	9
REFERENCES	10
APPENDICES	11
GLOSSARY	12

DISCLAIMER: This report is a preliminary report based on the samples and information provided by the corresponding organisation. Identifications of taxa are based on best available information at time of analysis and reporting.

INTRODUCTION

Benthic Macroinvertebrates

Freshwater benthic macroinvertebrates are typically insect orders, as well as crustaceans (e.g. crayfish), gastropods (e.g. snails), bivalves (e.g. freshwater mussels) and oligochaetes (e.g. worms), which are located on or within the benthic substrate of freshwater systems (i.e. streams, rivers, lakes; (Covich et al., 1999; Schmera et al., 2017). Benthic macroinvertebrates occupy important roles in the functioning of freshwater ecosystems, namely nutrient cycling within aquatic food webs and also influence numerous processes including microbial production and release of greenhouse gases (Covich et al., 1999; Schmera et al., 2017).

Biological monitoring (biomonitoring), referring to the collection and identification of particular aquatic species is an effective method for measuring the health status of freshwater systems. Currently, macroinvertebrates are routinely used for biomonitoring studies in freshwater habitats because they are relatively sedentary, have high species richness and a range of responses to different environmental stressors and contaminants, including temperature (Curry et al., 2018; Geest et al., 2010; Rosenberg and Resh, 1993; Sidney et al., 2016). Some groups of macroinvertebrates (mayflies, Ephemeroptera; stoneflies, Plecoptera and caddisflies, Trichoptera), commonly referred to as EPT groups, are more sensitive to change in the aquatic environment and are deemed important bioindicator taxa for assessing freshwater quality (Curry et al., 2018; Hajibabaei et al., 2012, 2011).

Traditionally, macroinvertebrates are identified to family level (**Figure 1**) through morphological identification using microscopy, however there has been a shift from this labour-intensive methodology to a DNA-based approach (Curry et al., 2018; Hajibabaei et al., 2012, 2011). 'Biomonitoring 2.0' combines bulk-tissue DNA collection (i.e. benthos) with next-generation sequencing (NGS), to produce high-quality data in large quantities and allows identification to a finer resolution than traditional methods (Baird and Hajibabaei, 2012; Hajibabaei et al., 2012).

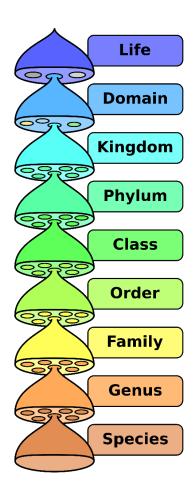


Figure 1. Graphical representation the classification of organisms.

Background of STREAM

STREAM (Sequencing The Rivers for Environmental Assessment and Monitoring), is a biomonitoring project, which involves the combination of community based monitoring and DNA metabarcoding technologies to assess the benthic macroinvertebrate communities in watersheds across Canada (Figure 2). STREAM is a collaboration between Living Lakes Canada (LLC) and Environmental and Climate Change Canada (ECCC), led by the Hajibabaei Lab at Centre for Biodiversity Genomics (University of Guelph, Canada) with World Wildlife Fund Canada as a founding member organization. In 2023 STREAM released a stand-alone field protocol, which was largely modified from the Canadian Aquatic Biomonitoring Network (CABIN) protocol, with a focus on

collection for DNA metabarcoding, though groups trained in the CABIN/STREAM are still able to contribute samples as normal.

A main objective of STREAM is to generate baseline benthic macroinvertebrate DNA data from across Canada. To understand the health status of freshwater systems, we first need to understand the natural fluctuations and trends of benthic macroinvertebrates, especially in locations which are data deficient. By building this baseline, in years to come we can investigate the longer-term trends and begin to understand the impact of issues, such as climate change, on freshwater systems. STREAM was established with the main premise of fast-tracking the generation of benthic macroinvertebrate data from 12-18 months to ~2 months, while increasing the taxonomic resolution of the data produced. To date this timeline has not been regularly met, but steps are being taken to further optimize lab processing and reporting to more regularly meet this timeline.

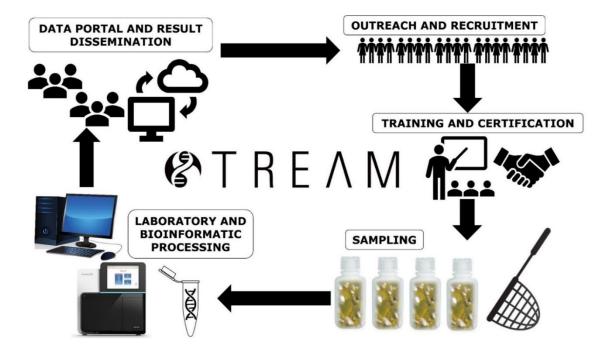


Figure 2. Graphical representation of the STREAM collaborative workflow for DNA biomonitoring of benthic invertebrates.

Objective of Report

Data and information included in this report is a preliminary examination of results collected in the Elk River (Elk River, British Columbia), which consists of a list of the macroinvertebrate taxa detected within the samples submitted. This report aims to highlight the different macroinvertebrate EPT taxa and provide basic richness metrics as a useful contribution for community groups to assess river health.

METHODOLOGY

Study Area

This study was conducted in July through October of 2023 across five pre-determined sampling locations in the Elk River Watershed (BC) (Figure 3). Sampling was conducted by members of the Elk River Alliance. Five additional samples were collected to screen for the presence of the sludgeworm, *Tubifex tubifex*.

Additional site information, including coordinates, and number of samples collected is provided in Appendix A

DNA Sampling and Processing Methods

Measures to Avoid Contamination

Prior to sampling, kick-nets were sanitized in bleach for 5 minutes and kept in clean garbage bags until they were used in the field. Gloves were used when handling all sampling materials to avoid contamination. During the kick-netting, the surveyor in the water wore two pairs of gloves while handling the kick-net. The outer pair of gloves was removed prior to transferring the contents into sampling containers so that the gloves used when contacting the sample were guaranteed to be clean.

Benthic Macroinvertebrate Field Sampling Protocol

Benthic macroinvertebrate DNA samples were collected following the STREAM modifications for collecting benthic macroinvertebrate DNA samples in wadeable streams (v1.0 June 2019) and the CABIN Field Manual for Wadeable Streams (2012). The STREAM procedure outlines steps to minimize DNA contamination and preserve DNA samples and was employed in conjunction with sampling steps outlined in the CABIN manual. All samples collected were transported to the University of Guelph Centre for Biodiversity Genomics.

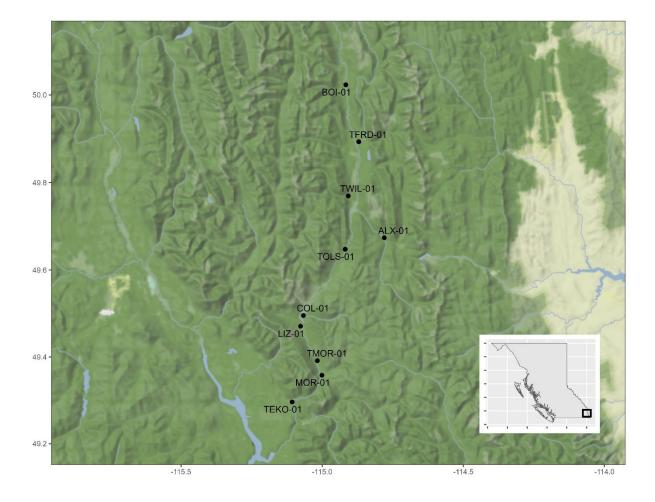


Figure 3. Map of sampling locations in the Elk River Watershed (BC). Inset map (bottom right) shows location of sampling area with respect to British Columbia.

Laboratory Methods

Benthic samples were preserved in Absolute Zero Antifreeze and stored at -20°C until processing. Benthic samples were coarsely homogenized in a sterile blender and DNA was extracted using a DNeasy® PowerSoil® Pro kit (Qiagen, CA) kit. Extracted DNA was then processed following the standard Hajibabaei Lab protocol for Next-Generation Sequencing (NGS). Sequences were then processed through the MetaWorks (v1.13.0) pipeline: https://github.com/terrimporter/MetaWorks.

RESULTS

Overview

The raw data output from NGS produced sequences for a range of taxa. This taxa list was reduced to only sequences that identified macroinvertebrates associated with freshwater and riparian ecosystems, and that were of high enough quality to match reference sequences. These results consisted of **25 Orders**, **83 Families**, **121 Genera**, **and 132 species of macroinvertebrates**. Species richness (number of species present) ranged from a low of 14 in MOR-01-A to a high of 43 in ALX-01-A (**Figure 4**). A full taxonomic list identified to the raw genus and species level for macroinvertebrates is included as a separate Excel spreadsheet (STREAM_ERA_Taxonomic_Results_2023.xlsx).

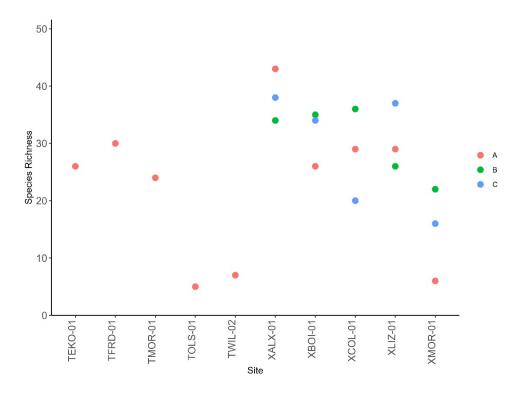


Figure 4. Species richness of each site sampled. Only species taxonomically assigned with high confidence (bootstrap support >= 0.70) are included.

Taxonomic Coverage

A range of macroinvertebrate species were detected. Traditional bioindicator EPT species were detected across the sampling sites, including 26 species of Ephemeroptera (mayflies), 32 Plecoptera (stoneflies), and 22 Trichoptera (caddisflies; **Table 1**). Some families of these EPT groups are typically sensitive to many pollutants in the stream environment and are therefore associated with clean water (Gresens et al., 2009; Laini et al., 2019; Loeb and Spacie, 1994).

Please refer to the 'Macroinvertebrate Bioindicator Families Guide v1.2' attached with your data or visit the corresponding website here for more information on approximate tolerances for the species detected in your sites.

Note: The benthic macroinvertebrate kick-net sample procedure often results in collection of both aquatic and terrestrial taxa, however terrestrial taxa are not identified using the traditional taxonomic identification methods. Due to the nature of DNA metabarcoding, both terrestrial and aquatic macroinvertebrates are identified and described using the DNA approach in this report. Genera included in the CABIN database have been highlighted in blue in the taxonomic results.

Whirling Disease Host Detection

Whirling Disease is a disease caused by *Myxobolus cerebralis*, a microscopic parasite that affects salmonid fish such as trout, salmon and whitefish (Gilbert and Granath, 2003). *M. cerebralis* requires a specific aquatic oligochaete (worm) intermediate host, *Tubifex tubifex* (sludge worm). This species is most commonly associated with poorquality, eutrophic conditions (Gilbert and Granath, 2003).

Several additional samples were collected in more suitable habitat for *T. tubifex* in order to assess the potential spread of whirling disease to these areas based on the presence of the secondary host.

T. tubifex was found at the sites; TEKO, TFRD, TMOR, and TWIL, as well as at ALX-01, COL-01 and LIZ-01 in the standard STREAM samples.

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APPENDICES

Appendix A. Summary table of sample sites, including site name, and site coordinates and project.

Site	Latitude	Longitude	Project
ALX-01	49.6739400	-114.7799000	STREAM
COL-01	49.4955600	-115.0664400	STREAM
LIZ-01	49.4709400	-115.0766000	STREAM
MOR-01	49.3580600	-115.0008800	STREAM
BOI-01	50.0231440	-114.9161380	STREAM
TMOR-01	49.3916230	-115.0169530	Tubifex
TWIL-01	49.7696340	-114.9074810	Tubifex
TEKO-01	49.2963750	-115.1063340	Tubifex
TOLS-01	49.6476899	-114.9182914	Tubifex
TFRD-01	49.8932601	-114.8703798	Tubifex

GLOSSARY

Term	Meaning
Benthic/benthos	The ecological region at the lowest level of a body of water such
	as an ocean, lake, or stream, including the sediment surface
	and some sub-surface layers.
Biomonitoring	The science of inferring the ecological condition of an
	ecosystem (i.e. rivers, lakes, streams, and wetlands) by
	examining the organisms that live there.
Bootstrap support	Statistical methods used to evaluate and distinguish the
	confidence of results produced.
Bulk-tissue DNA	This refers to the collection and removal of a reasonable
sample	quantity of representative material (including organisms such as
	river bugs) from a location (i.e. river bed).
DNA extraction	Isolation of DNA from either the target organism (i.e. DNA from
	an insect leg) or from an environmental sample (i.e. DNA from a
	water or benthos sample).
DNA Metabarcoding	Amplification of DNA using universal barcode primers (e.g.
	universal for invertebrates) to allow sequencing of DNA from
	target organisms (e.g. invertebrates) from environmental
	samples (e.g. river water or benthos).
Environmental DNA	The DNA released into the environment through faeces, urine,
(eDNA)	gametes, mucus, etc. eDNA can result from the decomposition
	of dead organisms. eDNA is characterized by a complex mixture
	of nuclear, mitochondrial or chloroplast DNA, and can be
	intracellular (from living cells) or extracellular. Environmental
	DNA: DNA that can be extracted from environmental samples
	(such as soil, water,
	or air), without first isolating any target organisms.
EPT groups	The three orders of aquatic insects that are common in the
	benthic macroinvertebrate community: Ephemeroptera
	(mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies).
Macroinvertebrate	Organisms that lack a spine and are large enough to be seen
	with the naked eye. Examples of macro- invertebrates include
	flatworms, crayfish, snails, clams and insects, such as
	dragonflies.
Metrics	The method of measuring something, or the results obtained
	from this.
Next-generation	Use of next-generation sequencers (i.e. Illumina) to millions or
sequencing (NGS)	billions of DNA strands in parallel.
Normalizing	The process of rarefying samples down to the smallest library
	size – a common practice in DNA metabarcoding methods.
Richness	The number of species represented in an ecological community,
	landscape or region. Species richness is simply a count of
	species, and it does not take into account the abundances of

	the species or their relative abundance distributions.
Riparian	Relating to or situated on the banks of a river.
Sample	The process of making an environmental sample (i.e. benthos)
homogenization	uniform. For liquid/benthos samples, this often involves mixing
	using a blender so that DNA is evenly distributed within the
	sample.
Taxa	Unit used in the science of biological classification, or
	taxonomy.