

ELK RIVER ALLIANCE

COMMUNITY-BASED WATER MONITORING

CABIN REPORT

2024

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TC Energy Build Strong

The ERA Community



Land Acknowledgment

The Elk River Alliance recognizes that our work takes place on the traditional land and waters of Yaq̓l tʔa-k nuq̓ti 'it 'ʔakanuxunik ʔamakʔis the People from where the water comes out, within Qukin ʔamakʔis - 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 2024 sampling data indicated that the downstream site on Boivin Creek (BOI001) is in similar condition to associated reference sites, based on benthic macroinvertebrate communities, meaning that the site likely contain healthy aquatic habitats. Upstream, the other Boivin Creek site (BOI002) was found to be "mildly divergent", which may indicate declining health, but may also be the result of natural variability or small-scale disturbance within the creek. Conversely, sites on lower Coal Creek (COL001), lower Morrissey Creek (MOR001), and Lizard Creek locations (LIZ001, LIZ003) remained deviated significantly from "reference condition" indicating potentially degraded aquatic systems. The newly established Lizard Creek site (LIZ009) was comparable to LIZ001 and also deviated significantly from "reference condition". Although there has been some fluctuation in the upper Coal Creek site, 2024 sampling indicated that the upper Coal Creek (COL003) and upper Morrissey Creek (MOR002) sites were parting further from reference condition and were "divergent". As of 2024, both sites on Alexander Creek continue to show some variability, with the upstream site (ALX003) returning to "reference condition" and the downstream site (ALX001) retaining its "mildly divergent" status. 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.



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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>

The **TC Energy Build Strong** is a social impact program that invests in organizations that are vital to their communities and crucial for their business. Their goal is to help build mutually beneficial relationships that address their biggest social challenges, while building strong communities. Build Strong aims to ensure sensitive lands and their inhabitants are restored and conserved, and that potential impacts are mitigated, to protect and enhance the environment for today and tomorrow.

<https://www.tcenergy.com/community-giving/build-strong/>

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 46 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-Kootenai/y 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 Credentials

Fynley Kuijt, Community-based Water Monitoring Coordinator (CABIN Project Manager)

Chad Hughes, Executive Director (CABIN Technician)

Sarai Ramirez Saldaña, Environmental Technician (CABIN Technician)

Finlay Thomson, Environmental Technician

Staff were trained through the Canadian Rivers Institute and Living Lakes Canada (LLC).

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 watershed 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, the 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 Koochanusa, 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 2024, the CABIN program assessed eleven 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. An additional site was added on Lizard Creek in 2024 to address creek-specific concerns. 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.

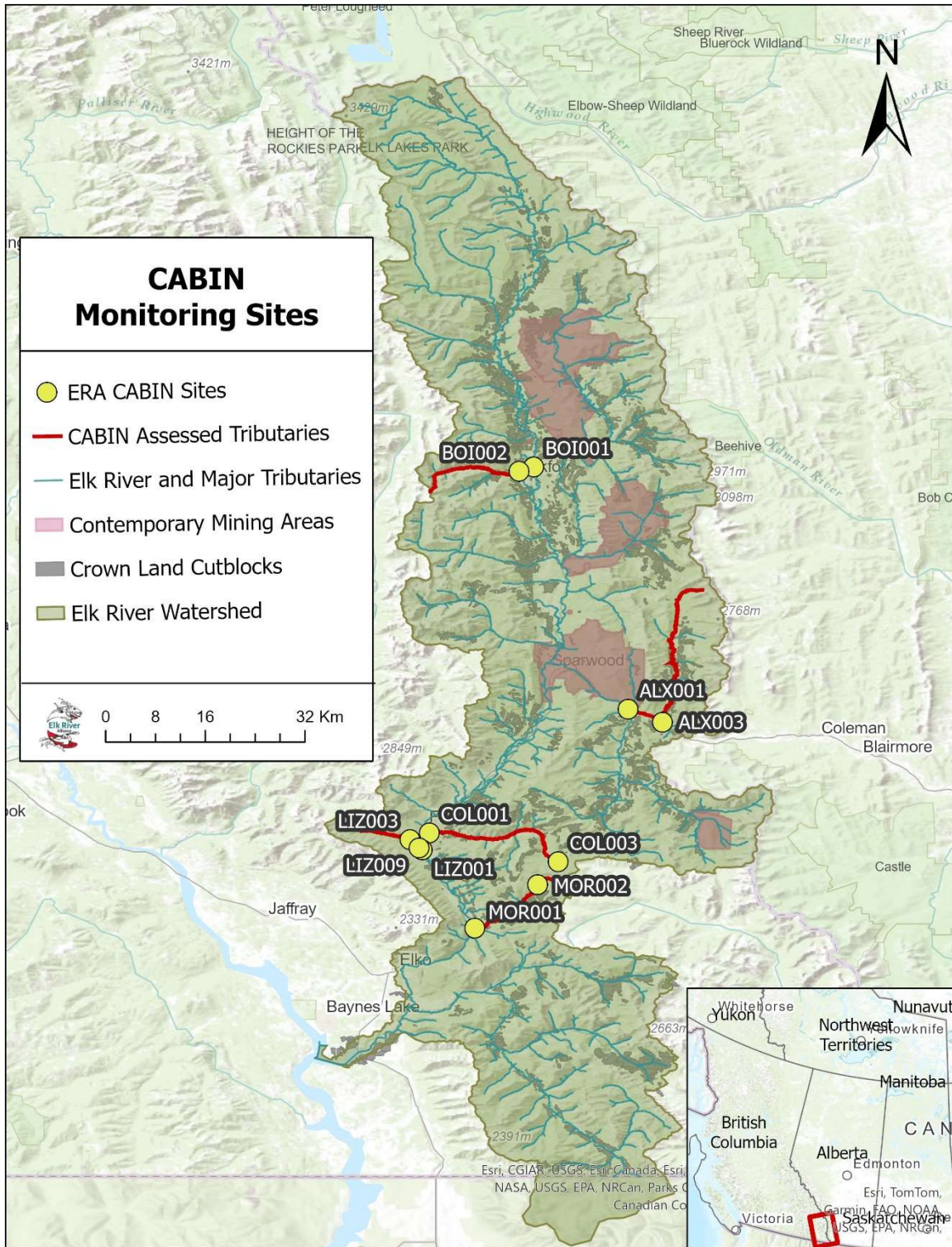


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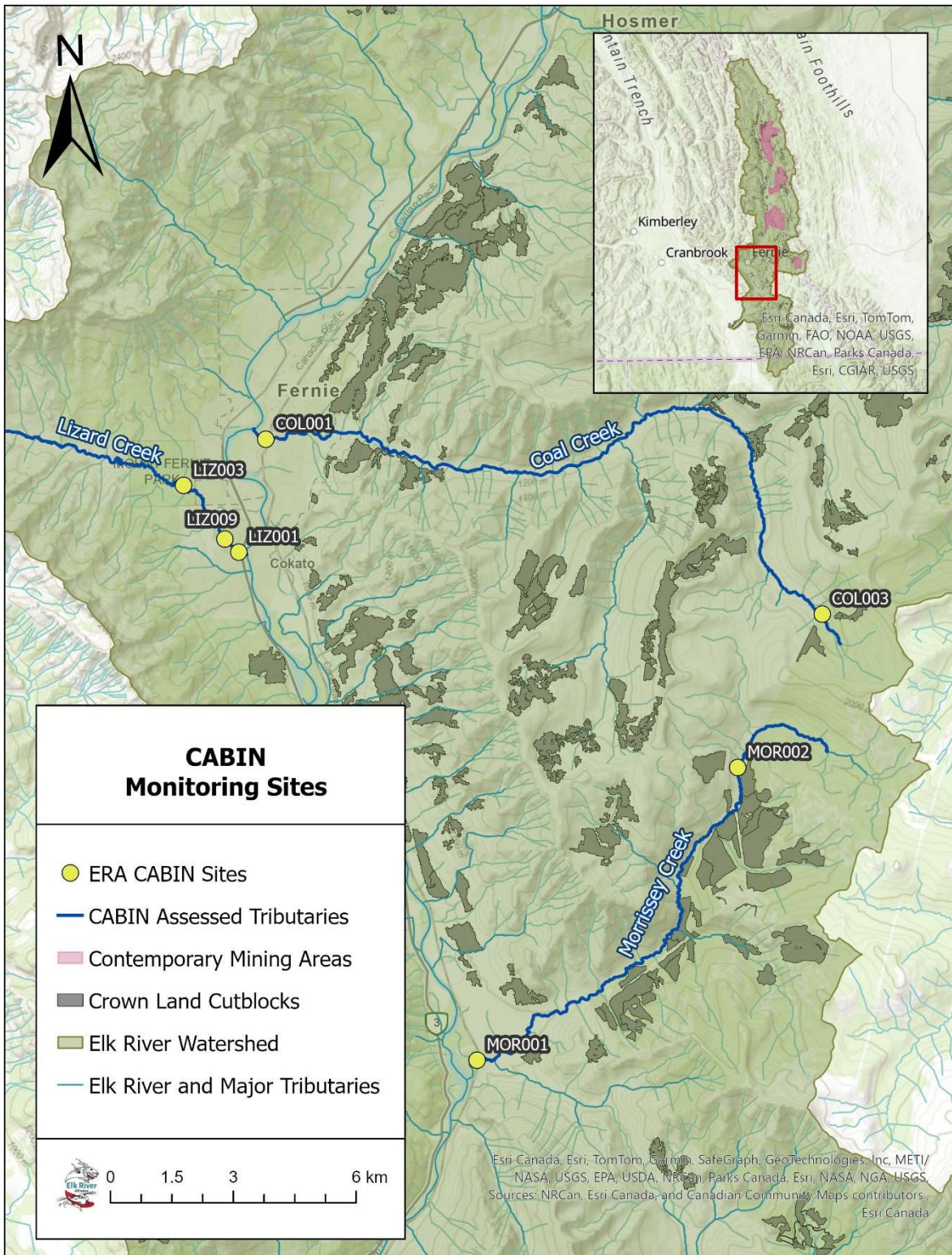


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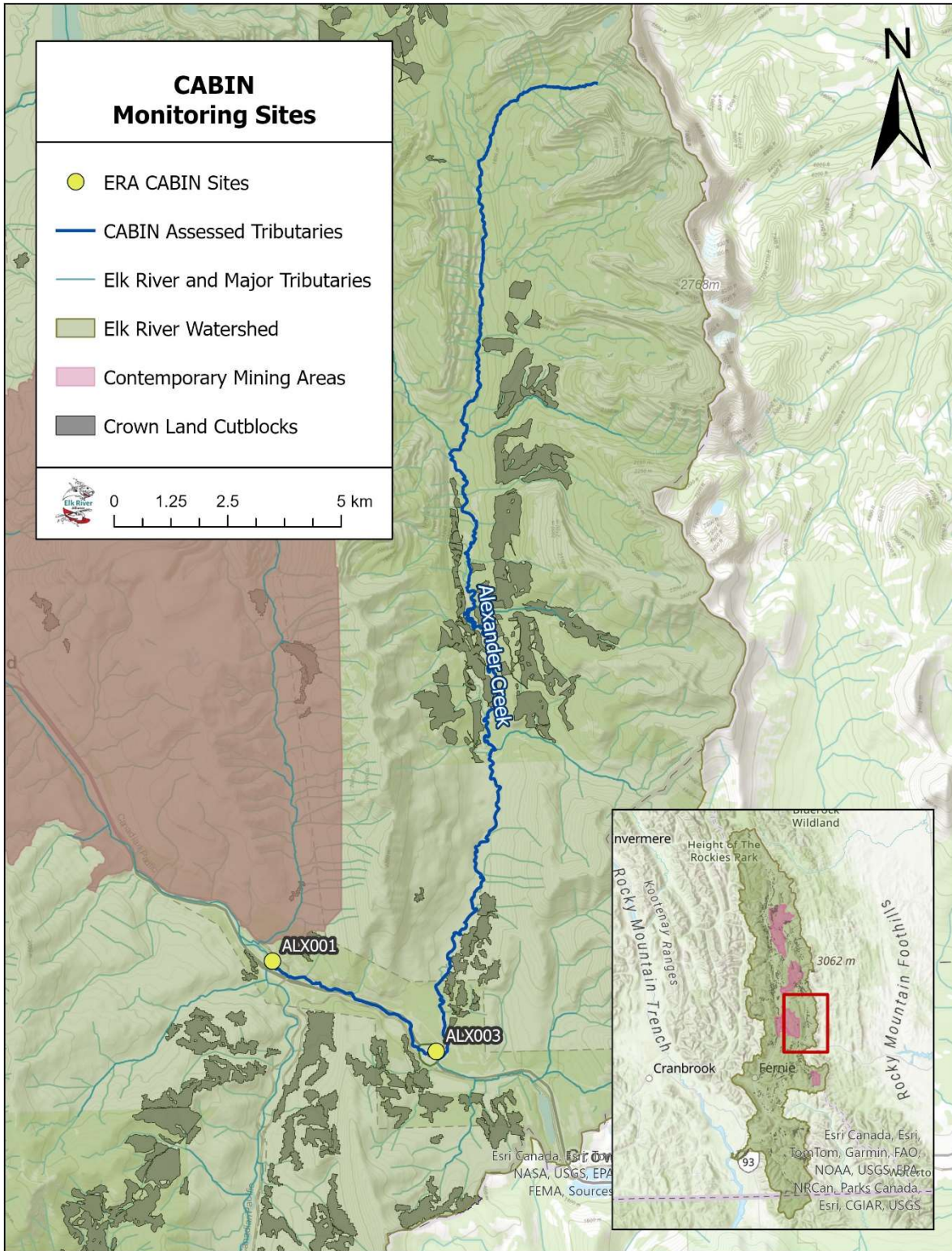


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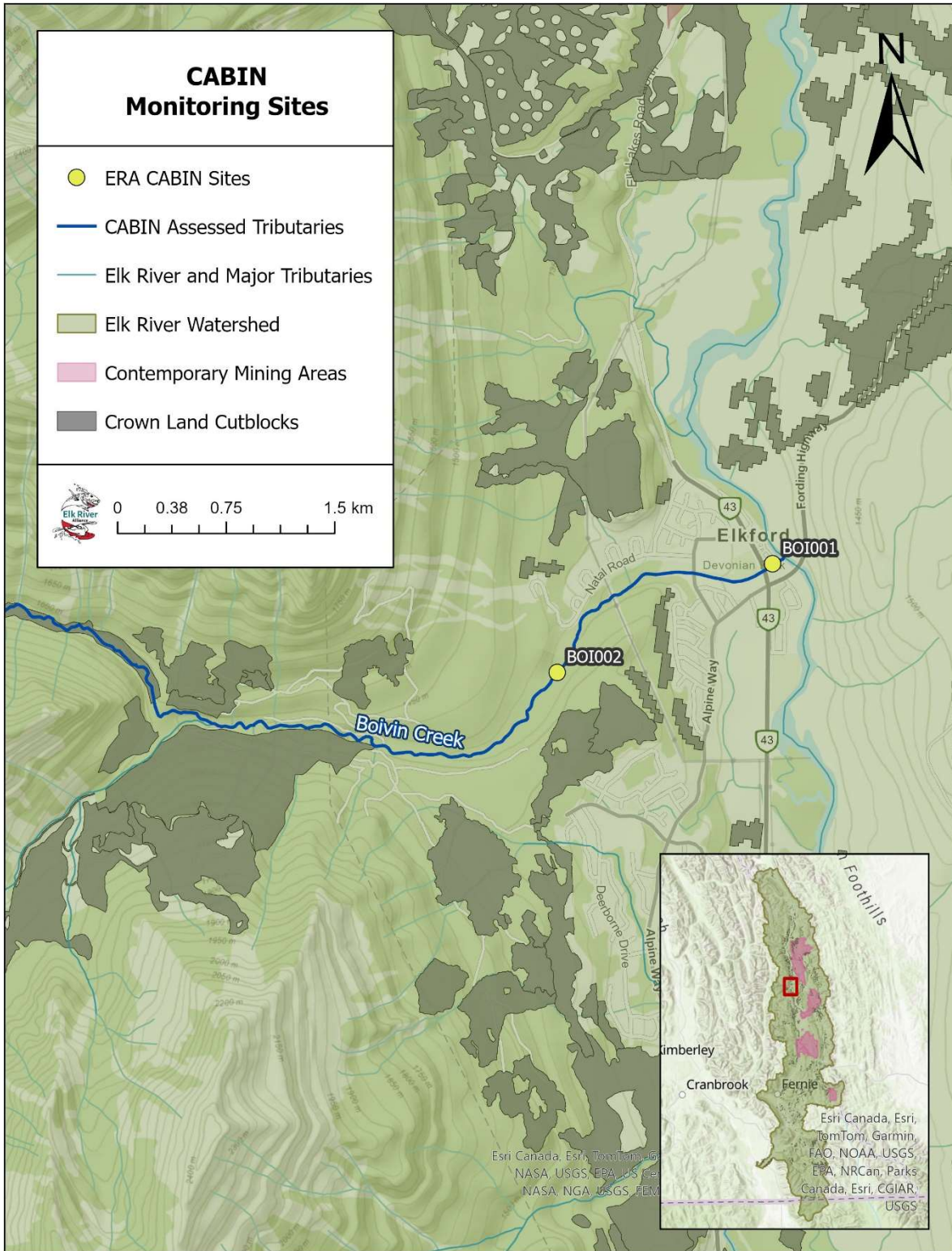


Figure 4. CABIN sites (BOI001, BOI002) on Boivin Creek in Elkford.

Lizard Creek

Lizard Creek, located approximately 5 km south of Fernie, was the first Elk River tributary chosen 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. An additional site (LIZ009) was added 1 km upstream from the lowest Lizard Creek site (LIZ001) in 2024 due to concerns about increasing clay presence at LIZ001. Clay exposure is likely a result of streambed scouring during fall high flow events in 2021, and again in 2023.

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. The rain on snow event of December 2023 resulted in further scouring, with some sections of streambed in upstream sections of the LIZ001 CABIN site becoming entirely clay and a clay shelf being exposed along the left bank as of 2024. Clay is visible under substrate throughout site and extends upstream about 300m.

LIZ003



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

LIZ009



Figure 7. Images of LIZ009: upstream, across the stream, downstream. No clay or scouring is present at this site in 2024.

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

ALX003



Figure 9. 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 10. BOI001: upstream, across the stream and downstream.

BOI002



Figure 11. 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 12. COL001: upstream, across the stream and downstream.

COL003



Figure 13. COL003: upstream, across the stream and downstream.

Morrissey Creek

The Morrissey Creek sites were 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 14. MOR001: upstream, across the stream and downstream.

MOR002



Figure 15. 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 conditions 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 16 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).

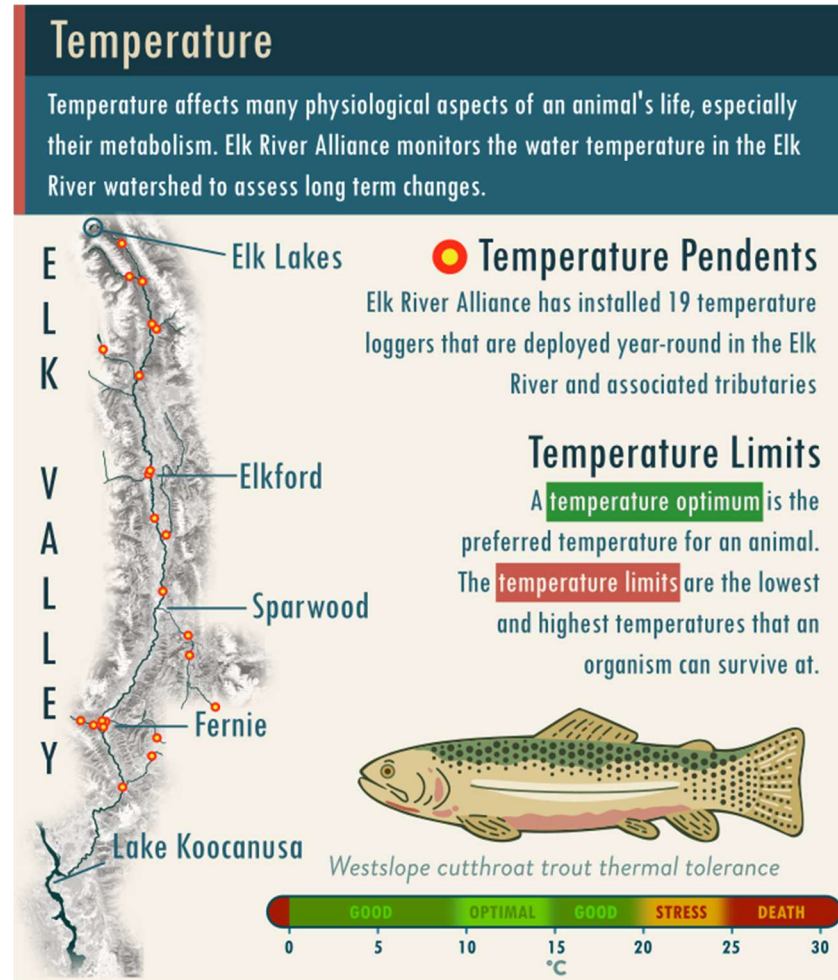


Figure 16. ERA Infographic outlining the importance of temperature to aquatic systems.

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 by reducing the amount of sunlight reaching aquatic plants and organisms and settling on the bottom of the stream, limiting habitat for benthic invertebrates and safe spaces for fish eggs (Figure 17).

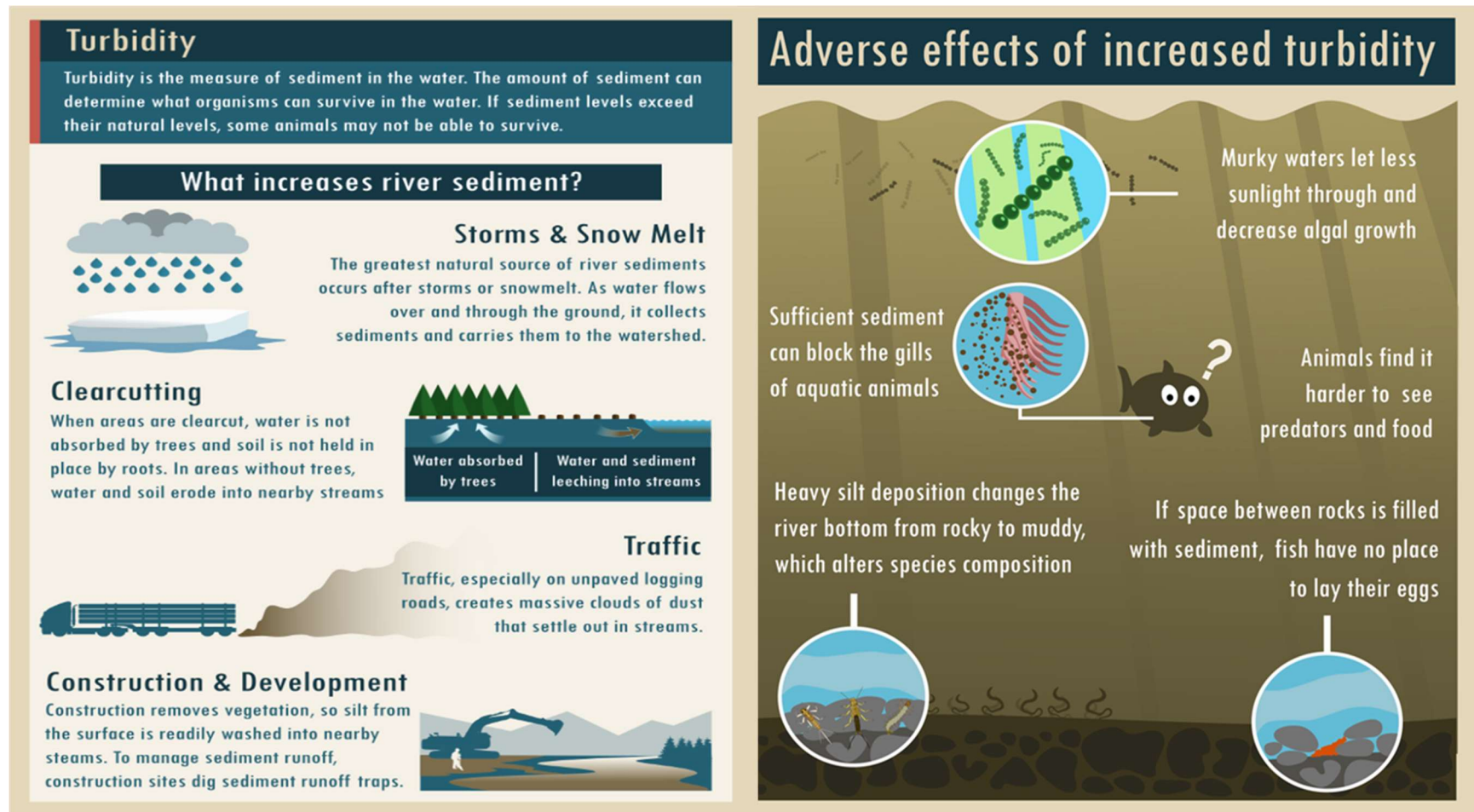


Figure 17. ERA CABIN infographic explaining turbidity and its importance.

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 via sewage or stormwater 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.

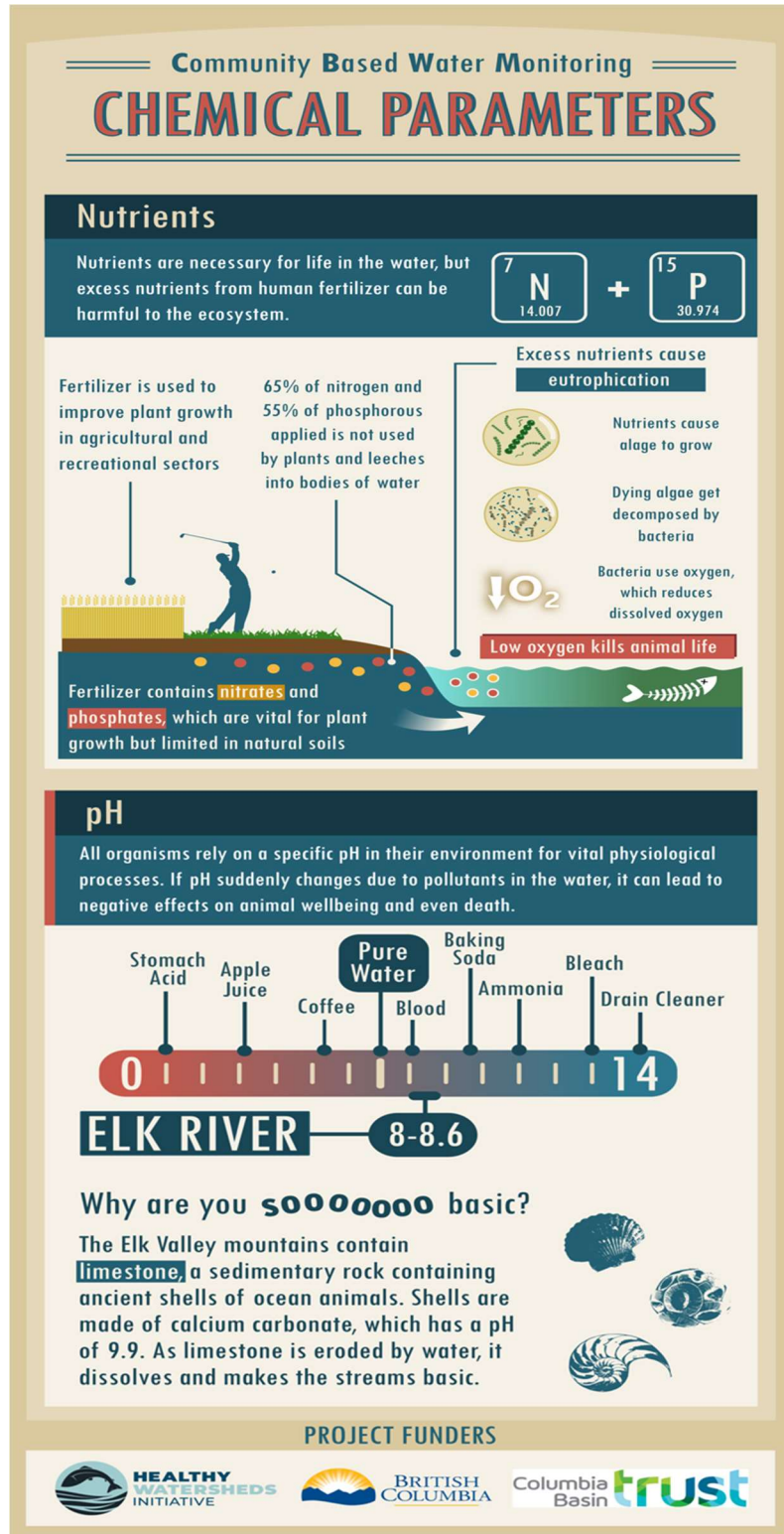


Figure 18. ERA infographic on chemical parameters associated with the CABIN program.

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 can be dissolved in water) and 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 of 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 salts such as sodium, 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

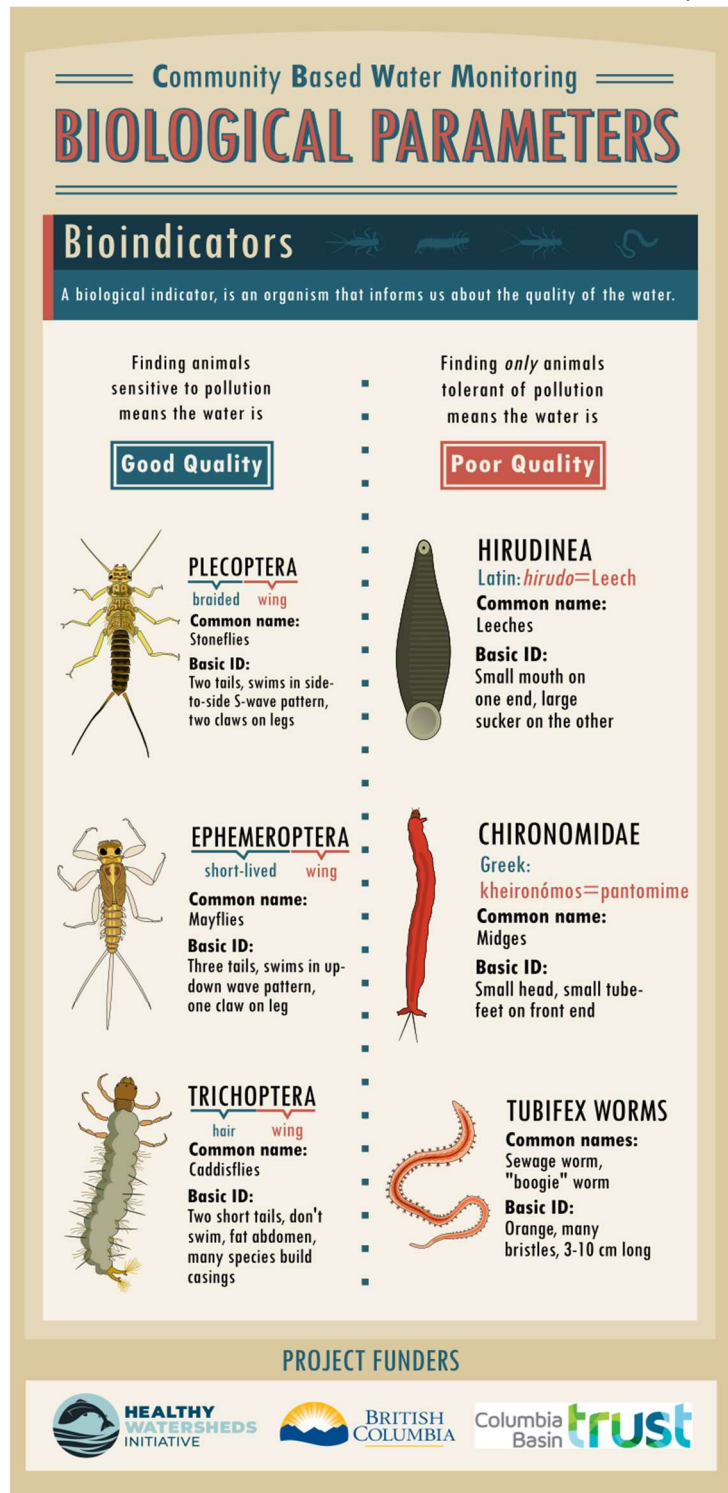


Figure 19. ERA infographic outlining the biological parameters associated with the CABIN program.

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 (*Plecoptera*) 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 19).

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; additional benthic invertebrate samples were 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. Although STREAM e-DNA is not part of the CABIN analysis process, the aim of these trials was to potentially incorporate this feature in future monitoring efforts. In 2024, STREAM e-DNA sampling was discontinued due to the Hajibabaei Lab no longer being able to analyse samples. See past reports for STREAM data and results.

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. An additional site was added in Lizard Creek in 2024 to address concerns related to clay dominated streambed sections (caused by erosion during a December 2023 rain-on-snow event) in the kilometer above the confluence.

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.

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. Benthic invertebrate sampling is always performed beginning downstream and moving upstream to sample undisturbed areas. Organisms and material collected in the net during these 3 minutes are moved into a sample jar and preserved with the appropriate chemicals.

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.

Water chemistry measurements and water samples are taken at the upper end of the reach to avoid collecting water impacted by monitoring activities that have occurred at the site. 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.

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 protocols, please see the *Canadian Aquatic Biomonitoring Network (CABIN) Field Manual for Wadeable Streams* (Carter, 2012).

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; maximum slope and % slope less than 30 degrees.

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 2024, 11 sites were assessed across 5 tributaries – Lizard Creek, Alexander Creek, Boivin Creek, Coal Creek and Morrissey Creek. While CABIN analyses tools yielded generally similar results to the previous year for Alexander, Boivin Creeks and Lizard Creeks, upper Coal (COL003) and Morrissey (MOR002) creeks were both found to be continuing to diverge from the designated ‘reference condition’. Additionally, the new site added in Lizard Creek (LIZ009) was found to be comparable to the historical lower Lizard Creek site (LIZ001) and will provide a comparison point against the now clay impacted site of LIZ001.

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 Morrissey sites in 2023, these elevated levels were not seen in 2024. There are no obvious trends to lend support to any specific cause for divergence at upper Morrissey or Coal creeks or any other site. ERA will continue the long-term monitoring of these sites into 2025, and is recommending further investigation, outside of CABIN assessments, to explore potential reasons for these results.

Lizard Creek

In 2024, Lizard Creek sites – LIZ001, LIZ003 and LIZ009 – were all assessed as “highly divergent” from reference condition based on the Columbia 2020 CABIN model (Figure 20). Year to year changes for LIZ001 and LIZ003 indicate a steady shift from reference condition to highly divergent from 2014 to 2017, then remaining highly divergent from 2017-2024. New to the CABIN program in 2024, LIZ009 is intended to provide a clay-free comparison point for LIZ001 and overall patterns cannot yet be assessed for this site, though it does appear to be comparable to LIZ001.

Although this suggests a trend of creek degradation over time, it is worth noting that there are a few years where the 2020 CABIN model has sorted either the LIZ001 or LIZ003 site into a different reference group. 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. Previously, ERA has found that assessing canopy coverage as being 26-50% (instead of 1-25%) in some CABIN sampling years (2012, 2014 & 2015) could have significantly influenced the sorting of sites into Group 3, as opposed to Group 2, which has been the dominant group for Lizard creek sites during all other years. It is also worth noting that in 2024, there was only a 0.4-4% difference between Group 2 and Group 4 for all Lizard Creek sites, and LIZ003 did sort into Group 4, while both other sites remained in Group 2. This may point to an issue with this CABIN model’s ability to sort LIZ001 into a group with appropriate reference sites.

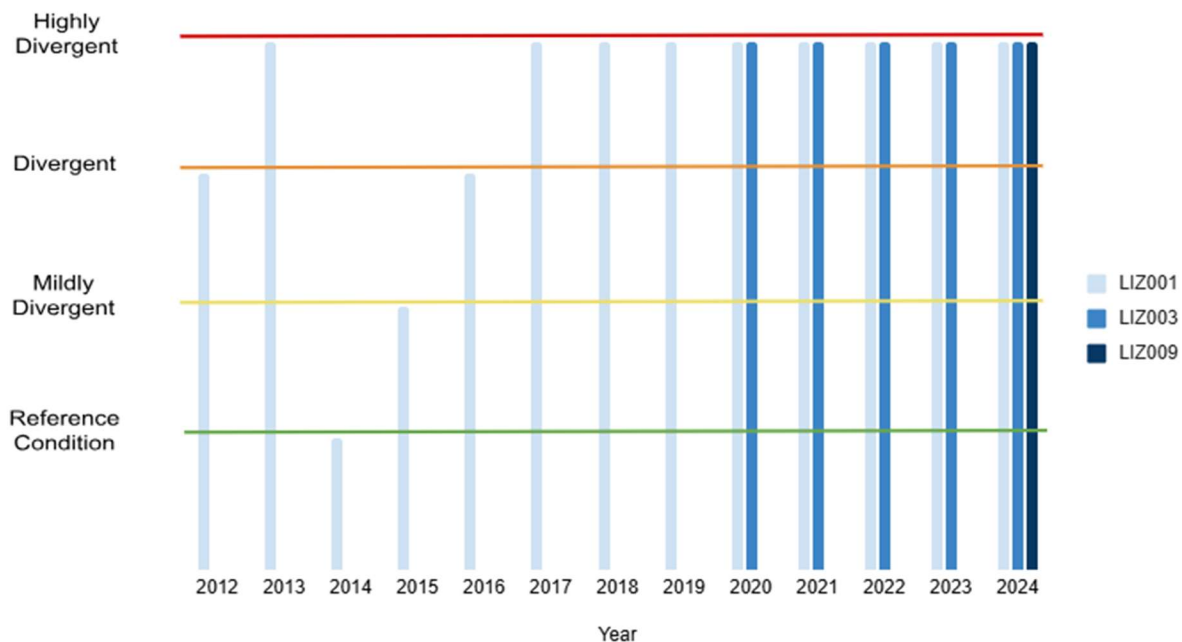


Figure 20. CABIN analysis results for Lizard Creek sites from 2012 – 2024 using the Columbia 2020 CABIN model.

Further examination into 2024 data, suggests that all Lizard Creek sites differ from reference sites according to the Bray-Curtis dissimilarity, which uses taxa richness and abundance for comparison (LIZ001: 0.91, LIZ003: 0.87, LIZ009: 0.88); however, RIVPACS analysis, which take an exclusive presence/absence approach to assessment (LIZ001: 1.05, LIZ003: 1.05, LIZ009: 1.05) suggests that these sites still have relatively good taxa richness. Previously, ERA noted that the difference may be in part due to the larger number of taxa present at Lizard Creek sites, compared to reference sites, however in 2024, the number of taxa at all sites dropped substantially compared to previous years (Table 1).

Overall, LIZ001 and LIZ003 show declines in the percentage of EPT individuals (*Ephemeroptera*, *Plecoptera*, *Trichoptera* - typically pollutant-sensitive taxa). 2024 marks a slight increase in EPT at LIZ001 for the first time in five years, however due to the snapshot nature of CABIN sampling, the overall declining EPT trends are more of a concern. Despite lower totals in 2024, total abundance of benthic macroinvertebrates continues to be significantly higher than expected according to mean reference site values which may contribute to the unexpected significant divergence from reference condition (Table 1). Although ERA is currently unsure of the cause, total abundance of benthic macroinvertebrates at Lizard Creek has been generally increasing over time - the data available for LIZ001 shows a pattern of increasing abundance since 2012 (LIZ003 has not been monitored long enough to begin confidently assessing any trends within this data) (Figure 21). Unfortunately, decreasing EPT appears to be accompanying this increase in abundance (Figure 21).

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.

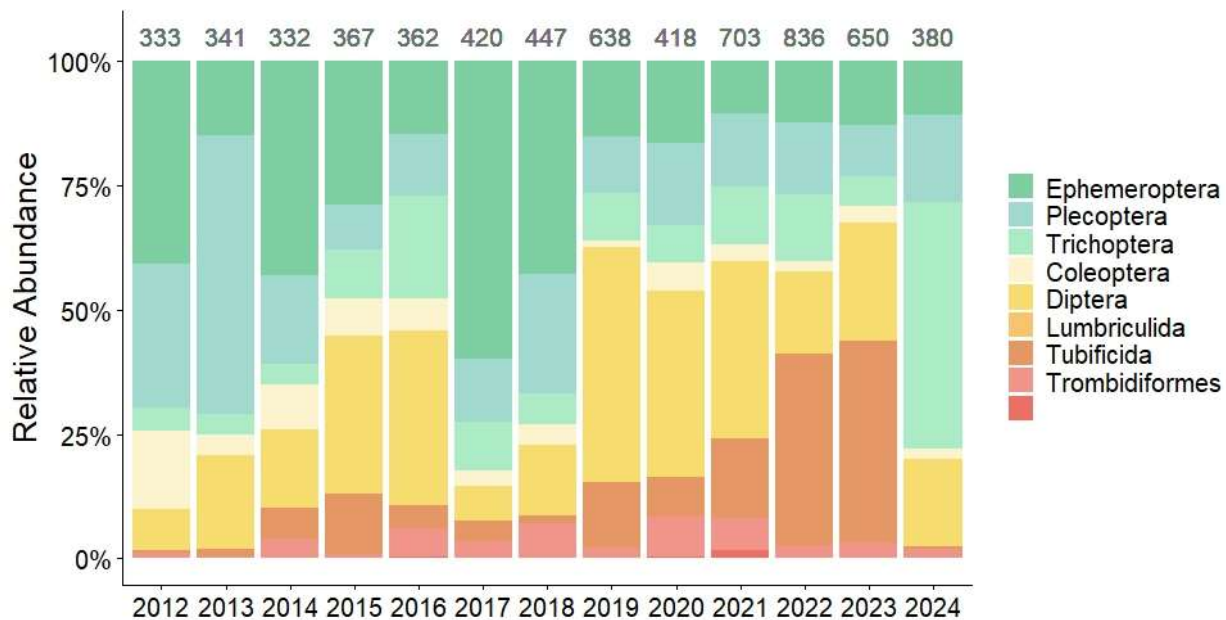


Figure 21. Plot of benthic macroinvertebrate community composition based on taxonomic order of samples collected at LIZ001 during CABIN sampling over time. The cool colours (blues, greens) represent orders that are generally sensitive to pollution (*Ephemeroptera*, *Plecoptera*, *Trichoptera*), while 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 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 22 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 continue to note 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 22). 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.

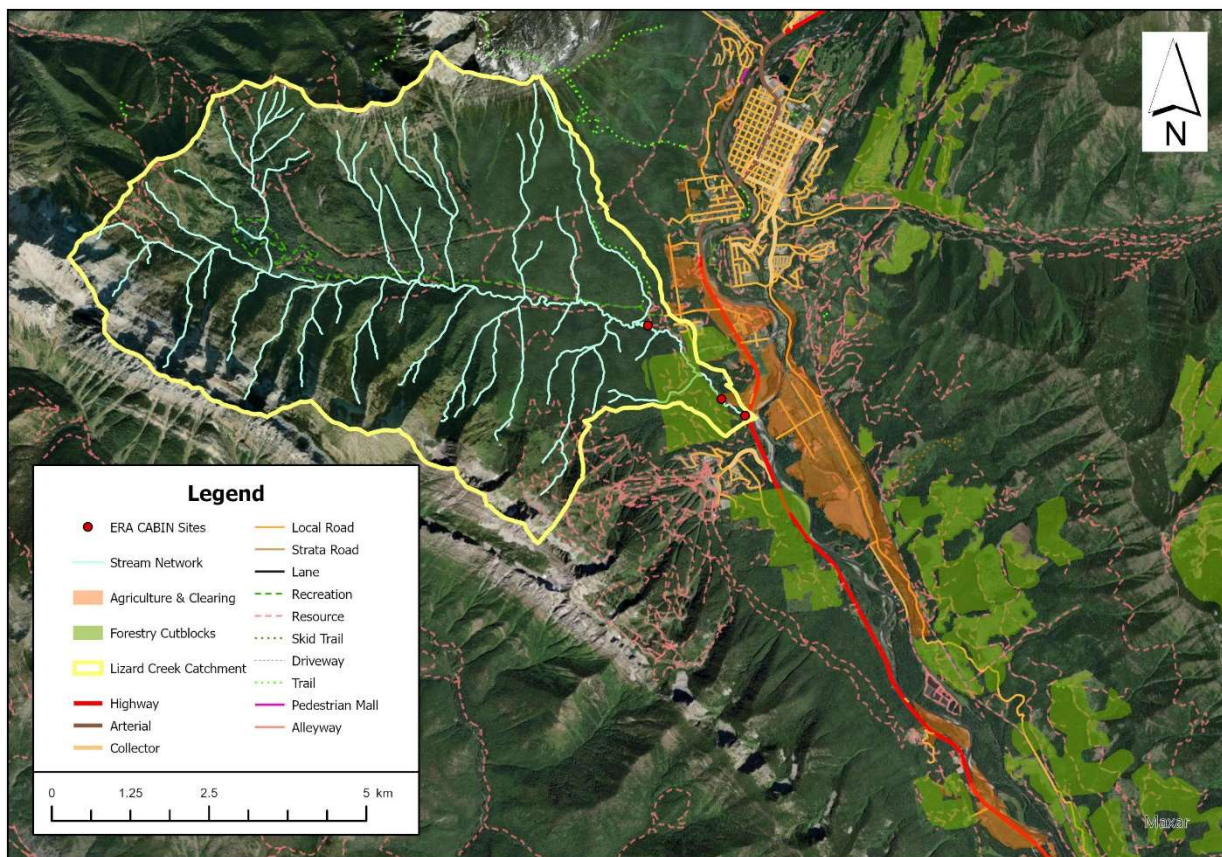


Figure 22. Land use in the Lizard Creek Catchment as of 2024.

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 23; Figure 24; Figure 40). However, trends cannot reliably be determined by “snapshot” sampling.

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 ± 77.36 mg/L), magnesium (E9 ± 7.544 mg/L), and conductivity (E120 ± 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 of ERA’s test sites that reach similar phosphorus levels. ERA will continue to monitor these parameters and recommend that it be considered for future examinations.

As noted in the 2023 report, a pattern of increasing alkalinity is occurring 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 25).

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

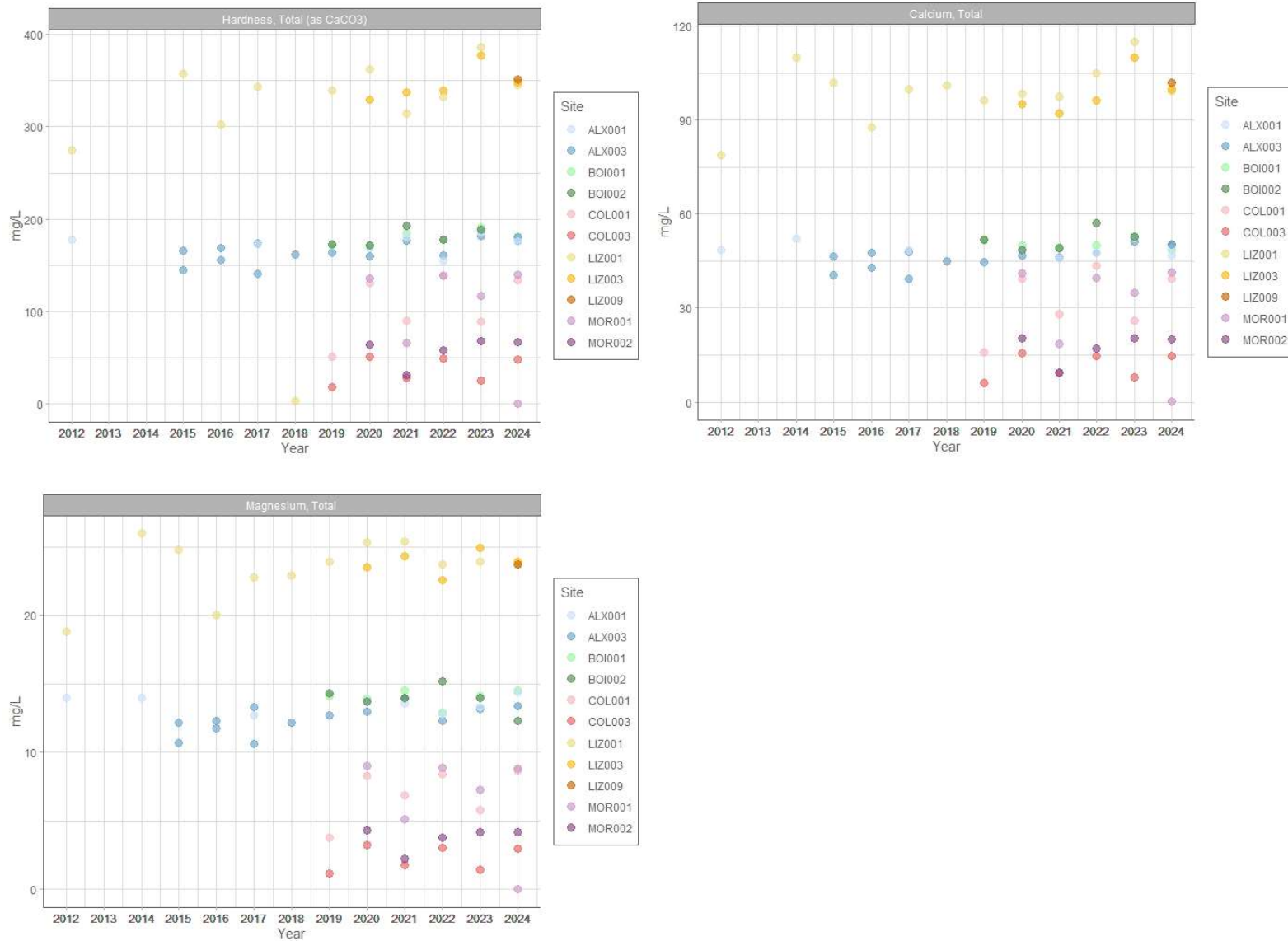


Figure 23. Total hardness (as CaCO₃), total calcium and total magnesium in samples at ERA CABIN sites between 2012 and 2024. Note that Lizard Creek sites have levels higher than the other monitored sites. All these parameters are likely a reflection of the limestone-based geology in the region and an increased groundwater influence at Lizard Creek.

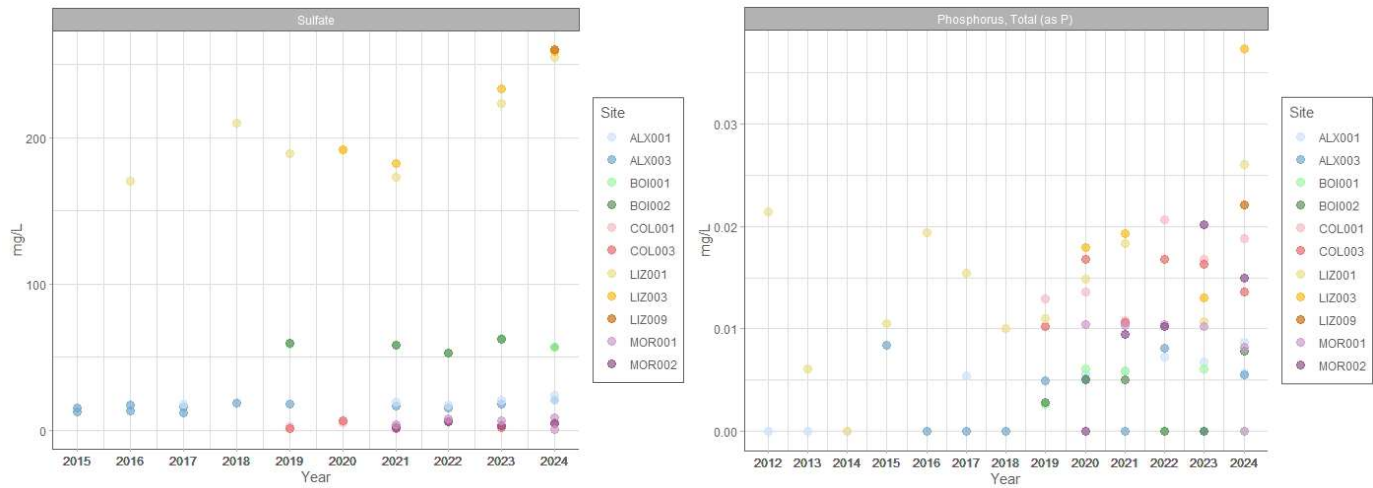


Figure 24. Total phosphorus (as P) and total sulfate at ERA CABIN sites between 2012 and 2024. Lizard Creek consistently has higher values within these parameters across years. Phosphorus levels below detection were assumed to be zero to control for different detection limits over different years.

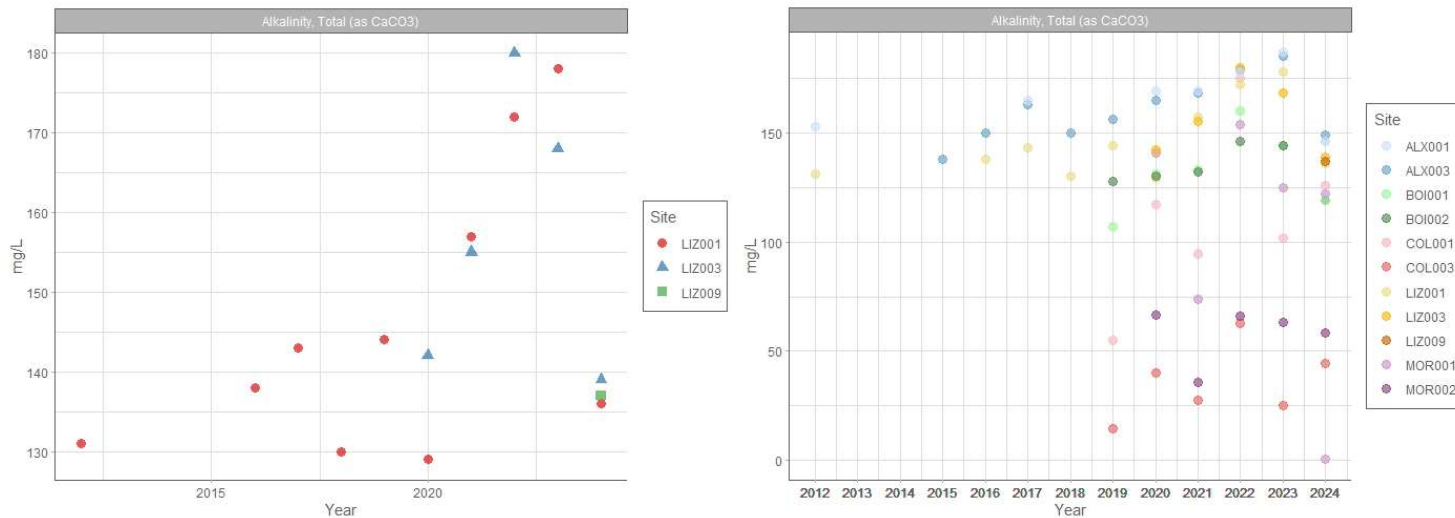


Figure 25. Total alkalinity (as CaCO₃) over time. The plot on the left focuses on the Lizard Creek sites, while the graph on the right allows for comparison across sites. Although alkalinity is usually a result of the local geology, this analyte appears to be generally increasing over time.

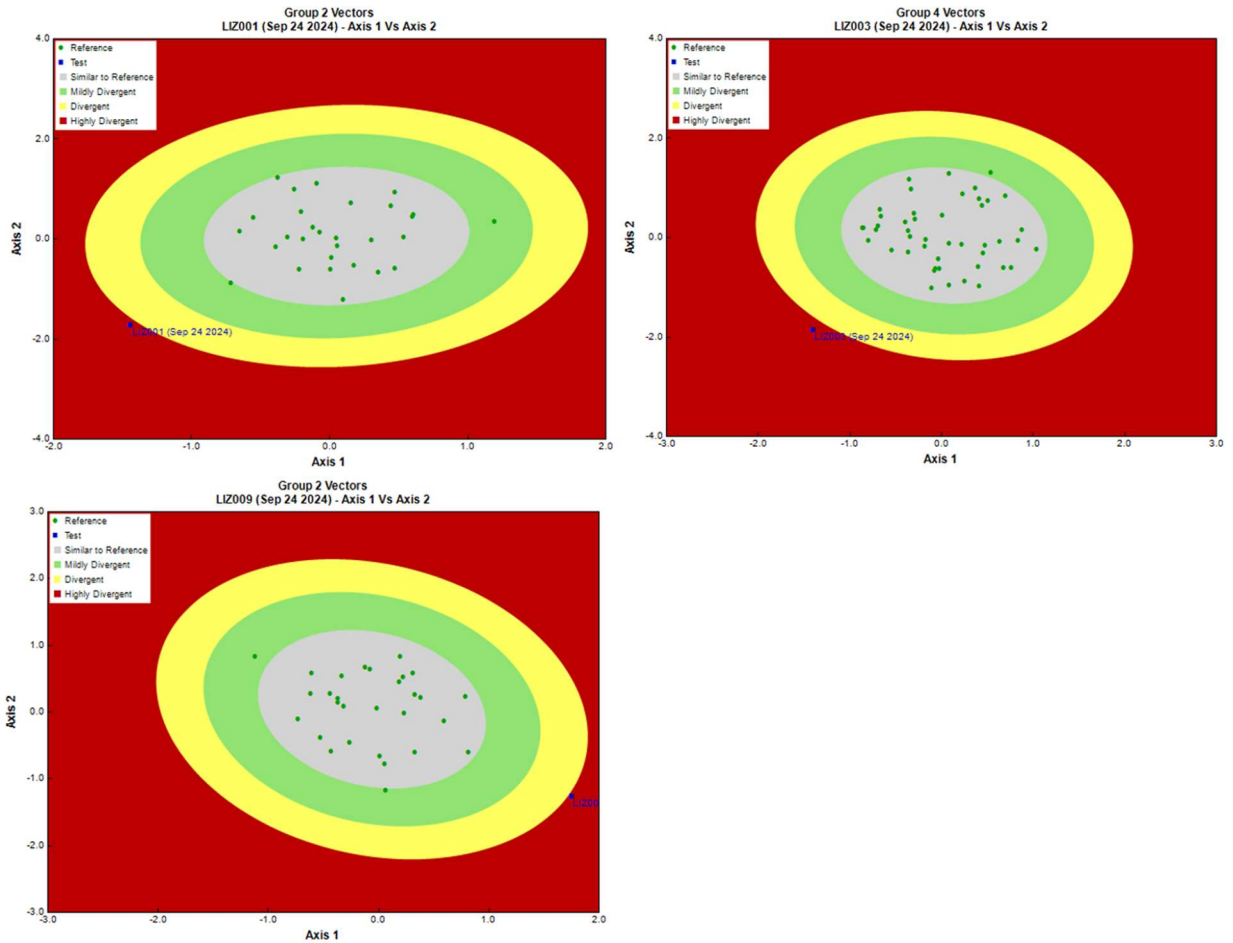


Figure 26. CABIN community ellipses for LIZ001, LIZ003 and LIZ009, respectively, in 2024. All sites are “highly divergent”. Note that unlike previous years, the ellipses are fully visible, as opposed to being a distant green dot.

Alexander Creek

The downstream (ALX001) site maintained its shift away from reference condition in 2024, while the upstream site (ALX003) returned to reference condition (Figure 27). This marks the first time that an Alexander Creek site has shown more than one year out of reference condition since monitoring began. 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. In the past ALX001 has shown some fluctuation but has always returned to reference condition. Further statistical testing (Bray-Curtis, RIVPACS, % EPT) indicates that sites on Alexander Creek were relatively similar to reference sites in taxa diversity, although ALX001

showed a slightly larger difference between site and reference site richness, and likely poorer stream conditions (RIVPACS: 0.72). With the downstream site maintaining its departure from reference condition, the ERA will continue to monitor Alexander Creek 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 2024, 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. A wildlife fence was installed along the length of the Crowsnest highway in 2024, with construction equipment concentrated on the highway itself. Fluctuations in CABIN assessment may result from intermittent disturbances caused by land-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 also 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.

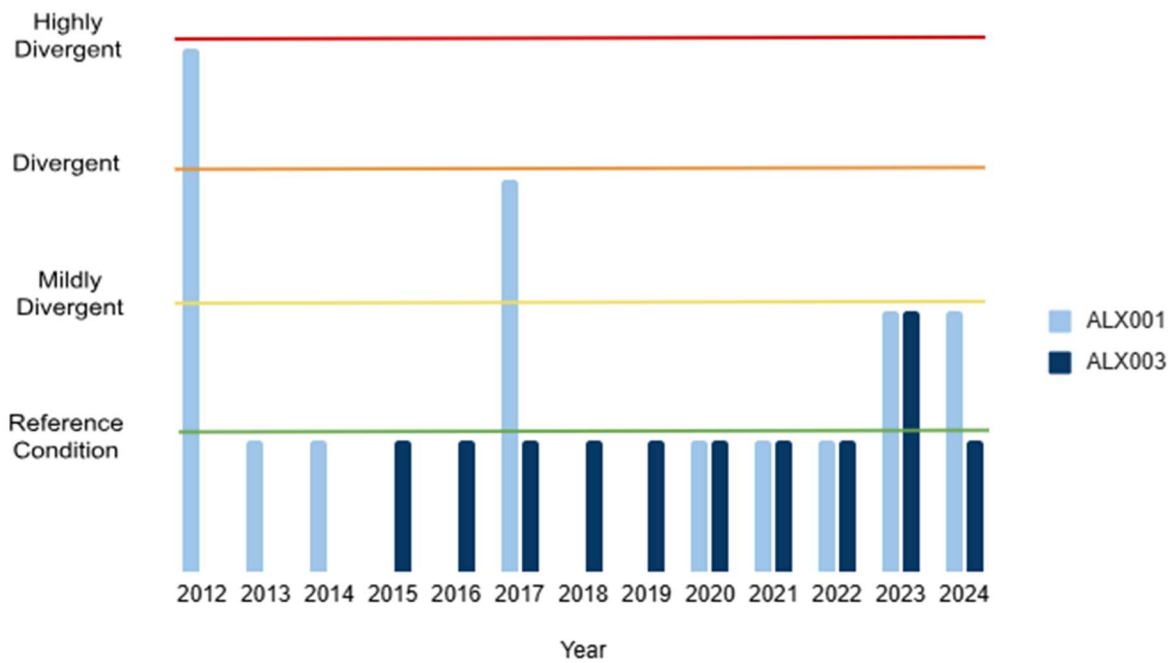


Figure 27. CABIN analysis results for Alexander Creek sites from 2012 - 2024. The downstream site maintained its condition of mildly divergent, while the upstream site returned to reference condition. Continued monitoring will allow ERA to assess if this creek is developing a pattern of decline.

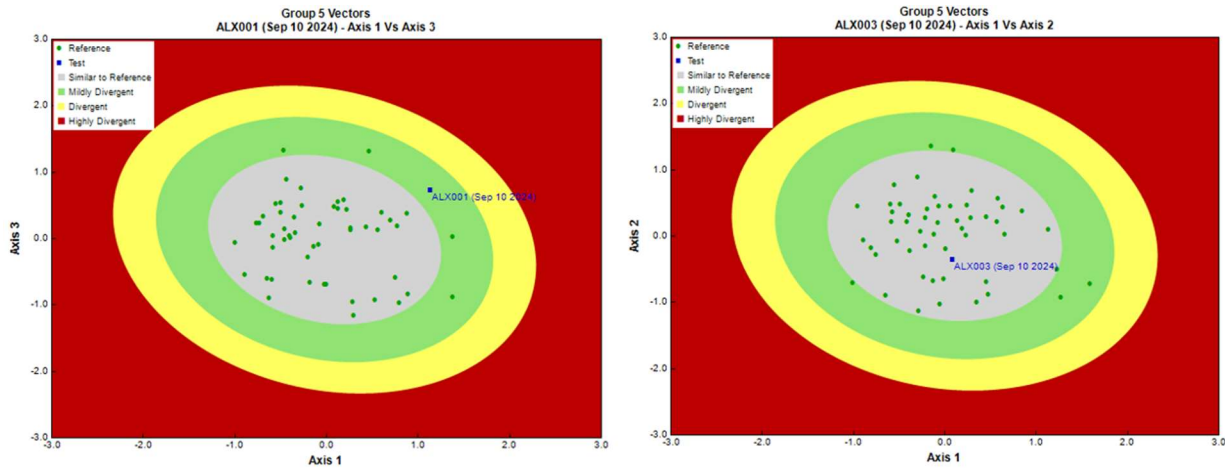


Figure 28. CABIN community ellipses for Alexander Creek sites (ALX001 & ALX003) in 2024, showing the upstream site (ALX003) in reference condition and the downstream site (ALX001) as “mildly divergent”.

Boivin Creek

In the six years (2019 to 2024) of monitoring on Boivin Creek, sites have remained in relatively good, stable condition (Figure 29). 2024 CABIN analysis showed that the upstream site (BOI002) had shifted to “mildly divergent”. A similar shift was seen in 2021 at the lower Boivin Creek site (BOI001) and was likely a result of the natural variability of benthic invertebrate communities, or a smaller disturbance. 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. The exception is that both in 2023 (0.85) and now in 2024 (0.76), BOI002 exhibited a lower RIVPACS value (Table 1). A similar low RIVPACS value was demonstrated by BOI001 in 2021, and in both cases it could have contributed to sites being assessed as mildly divergent.

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 comparable to 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.

If either of the Boivin Creek sites continue to exhibit divergence, ERA will seek to investigate further because there have been no noted land-use changes and declining conditions are not expected at these sites.

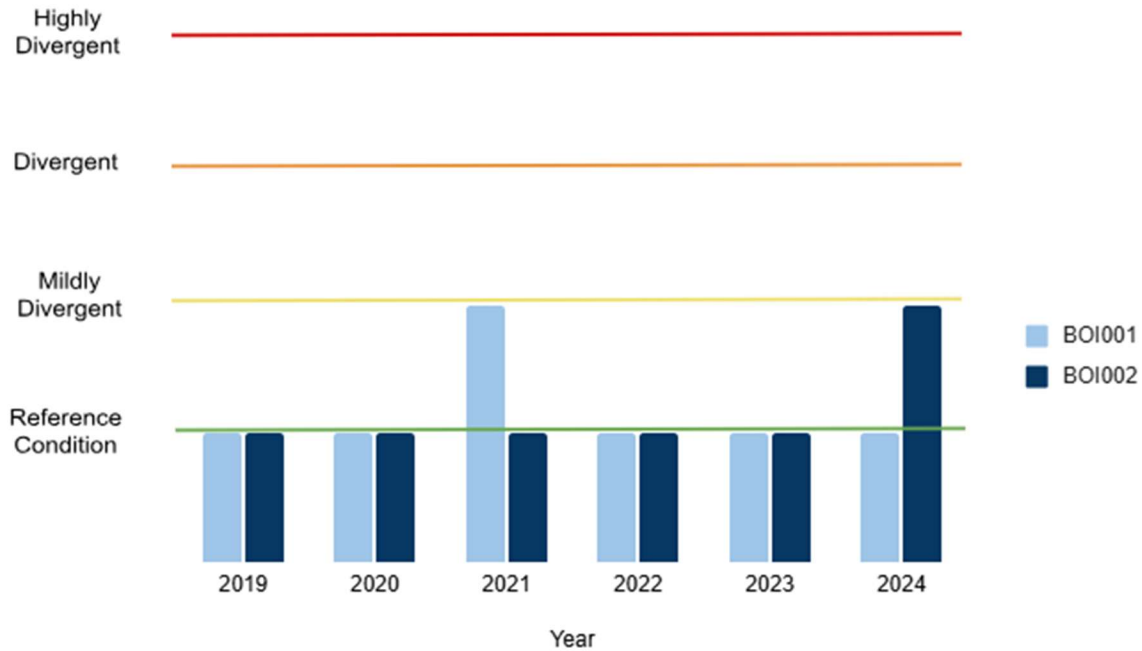


Figure 29. CABIN results for Boivin Creek sites in 2019 - 2024. Both sites have experienced some fluctuation in state but have so far shown a tenancy to return to reference condition. Continued monitoring will allow for ERA to assess any developing patterns.

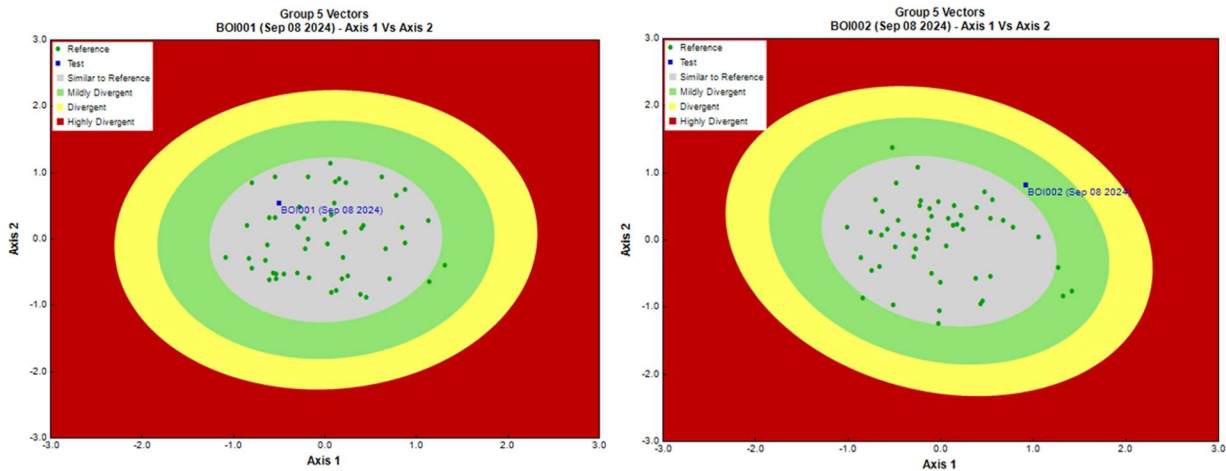


Figure 30. CABIN community ellipses for Boivin Creek sites (BOI001, BOI002) in 2024, showing the upstream site (BOI002) as “mildly divergent” and the downstream site (BOI001) as “similar to reference”.

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), though 2024 results also reaffirmed the decline in health in being seen at the headwater site (COL003) (Figure 31).

Further analyses revealed that both Coal Creek sites are showing signs of degradation in all metrics used to describe stream biological health: both sites have declining percentages of EPT individuals (generally sensitive to pollutants), decreasing diversity (measured through high Bray-Curtis values) and lower

richness (RIVPACS values) (Table 1). Additionally, total abundance of benthic individuals remains much higher than expected for the lower Coal Creek site (more than 3,000 above what would be expected based on CABIN reference sites) which may push results to a more divergent classification, although total abundance has been declining since 2022.

While, the Coal Creek sites were established too recently to enable comparison of water quality results over time, all measured water quality variables met BC guidelines for the protection of aquatic life. 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 lower COL001 as “highly divergent” from reference condition over the six years it has been monitored, along with the list of known stressors affecting this stream, give ERA confidence in these results.

The COL003 site is within the headwaters of Coal Creek, and there have been no major land-use changes, so poor conditions are not expected at this location. The return to “divergent” classification at this site is concerning; ERA will continue to monitor Coal Creek to confirm CABIN results and acquire sufficient data to evaluate trends.

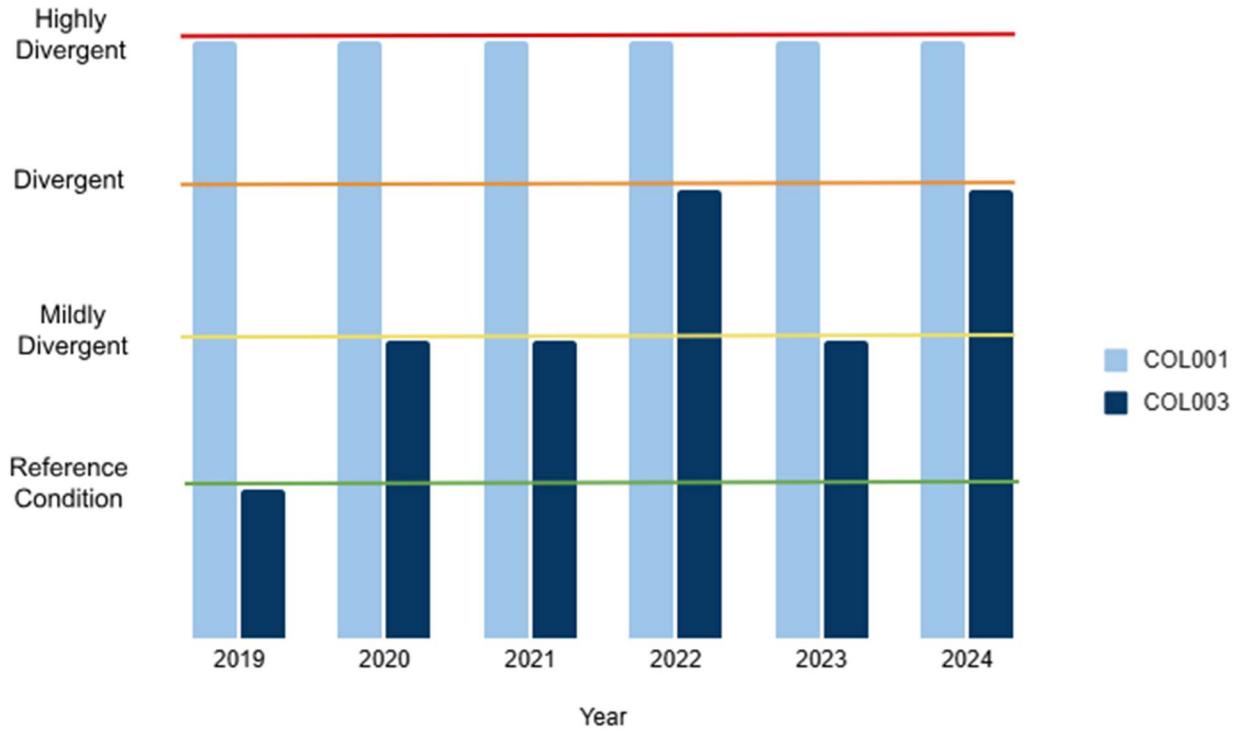


Figure 31. CABIN results for Coal Creek sites in 2019 – 2024.

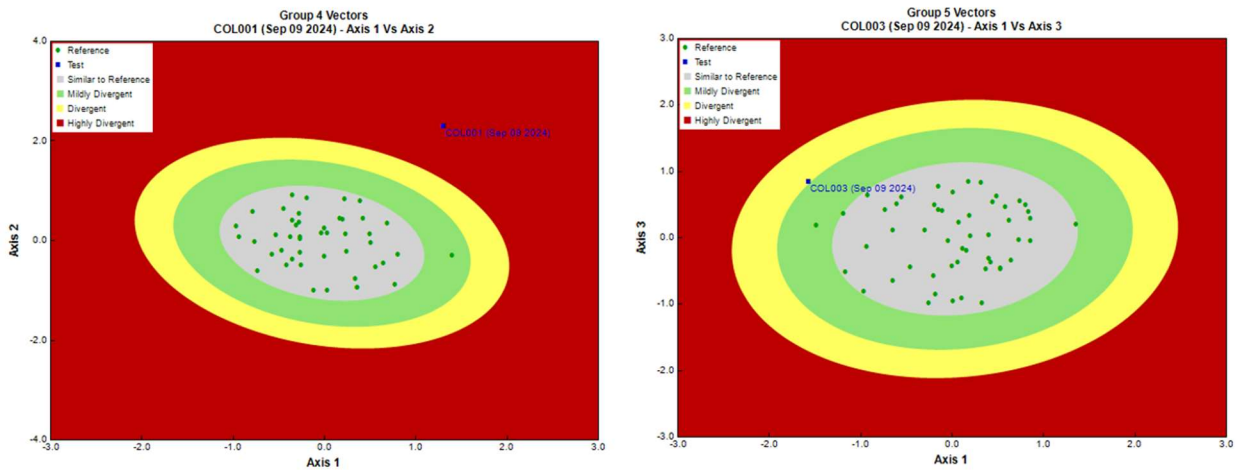


Figure 32. 2024 CABIN analysis community ellipses for Coal Creek sites, showing COL001 highly divergent from reference condition (left) and COL003 divergent from reference condition (right).

Morrissey Creek

Morrissey Creek’s upstream site, MOR002, declined further to “divergent”, while the downstream site, MOR001, remained highly divergent (Figure 33). Upper Morrissey’s (MOR002) Bray-Curtis and RIVPACS ratio scores have fluctuated often over the five years of monitoring, though RIVPACS suggests that the site richness has declined since 2023. The only other change noted for MOR002 was that the total

abundance of individuals sampled, which previously was quite high and increasing between years, was less than the range of the associated reference mean in 2024 (

Table 1). In contrast, lower Morrissey Creek once again had very high total individual abundance numbers (8,980.00 compared to a mean reference site abundance of 1449.38 ± 859.74 for MOR001).

There were no exceedances of BC Water Quality Guidelines and water quality parameters that had shown sudden increases in 2023 (included total aluminum, total ammonia (as N), chloride, manganese, total phosphorus (as P) total titanium and turbidity) returned to historical levels in 2024, confirming these jumps were likely a result of TC Energy Pipeline work.

The Morrissey Creek sites were established too recently to enable any valuable comparison of water quality results over time, however it is worth noting that lower Morrissey, like lower Coal Creek, is continuing to experience much water temperature values than most other monitored creeks. 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, through which ERA is investigating water temperature trends more continuously. Increased algal growth was also observed anecdotally, which may be linked to water stream temperatures.

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 and ending in 2024. Pipeline work caused significant traffic and construction on roadways and bridges directly upstream of the MOR002 location and MOR001 to a much lesser extent.

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. Divergence in the upper Morrissey Creek site is unexpected, however, and site health appears to be continuing to deteriorate. 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.

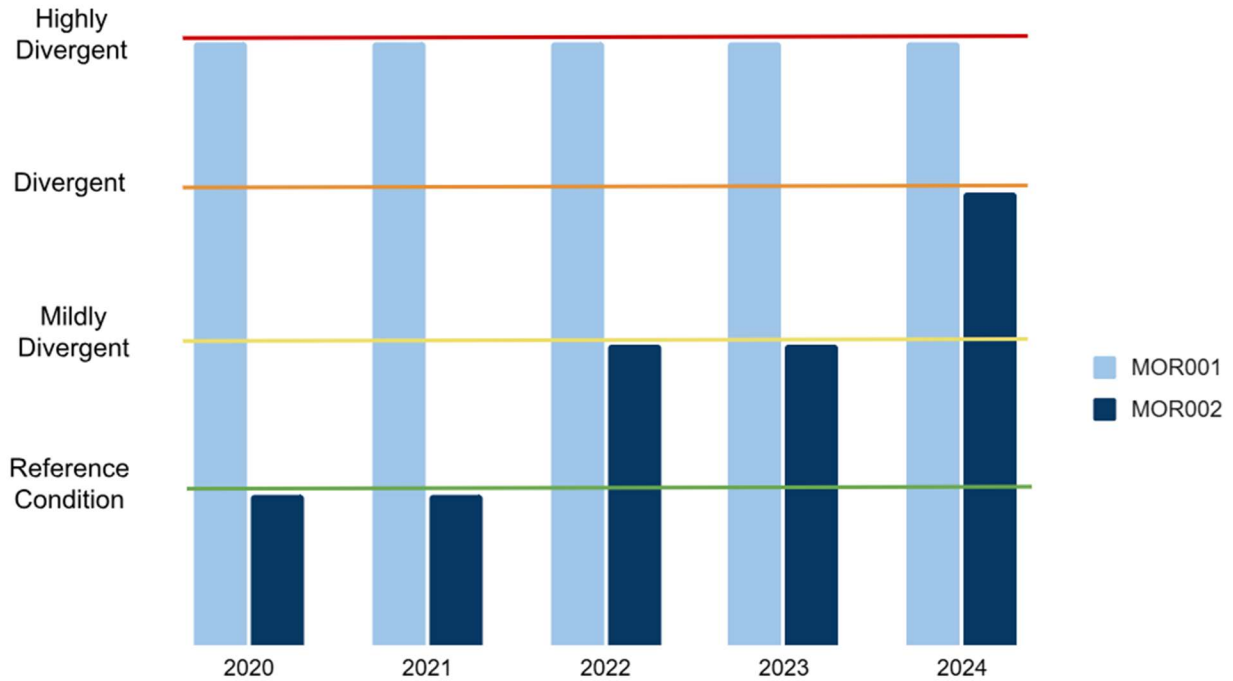


Figure 33. Results of CABIN assessment for Morrissey Creek sites in 2020-2024. MOR001 was again classified as “highly divergent” while MOR002 showed further decline and was classified as “divergent.”

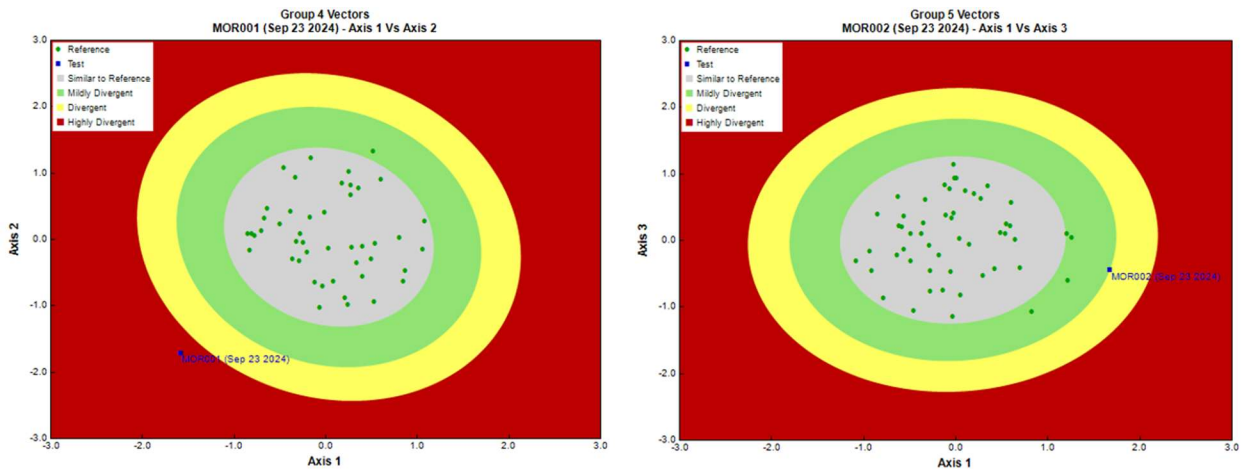


Figure 34. 2024 CABIN analysis community ellipses for the Morrissey Creek sites, showing MOR001 significantly diverging from reference condition (left) and MOR002 continuing to further diverge from reference condition (right).

Benthic Macroinvertebrate Communities

CABIN assessments assign test sites a condition based on the structure of the benthic macroinvertebrate community. Figure 35 shows the general diversity in each CABIN test stream, based on the proportion of individuals belonging to each taxonomic order. Typically, 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. In 2024, this relationship did not hold true for most sites. MOR002, COL001, COL003 and

BOI001 were found to have significantly smaller proportions of pollution-sensitive individuals, despite BOI001 being in “reference condition”. EPT proportions at LIZ001 and MOR001 were at record highs since ERA began monitoring these streams, despite their “highly divergent” status. Lower Coal Creek (COL001) was the only site that had invertebrate proportions as expected, with low %EPT, as well as a higher percentage of Tubificida (an order of pollution-tolerant worms).

It is worth noting that COL003 has been experiencing decreasing EPT proportions for multiple years, which could be contributing to its shift towards divergence. 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 uncharacteristic changes in proportions in 2024 and further exploration is needed to fully understand these results.

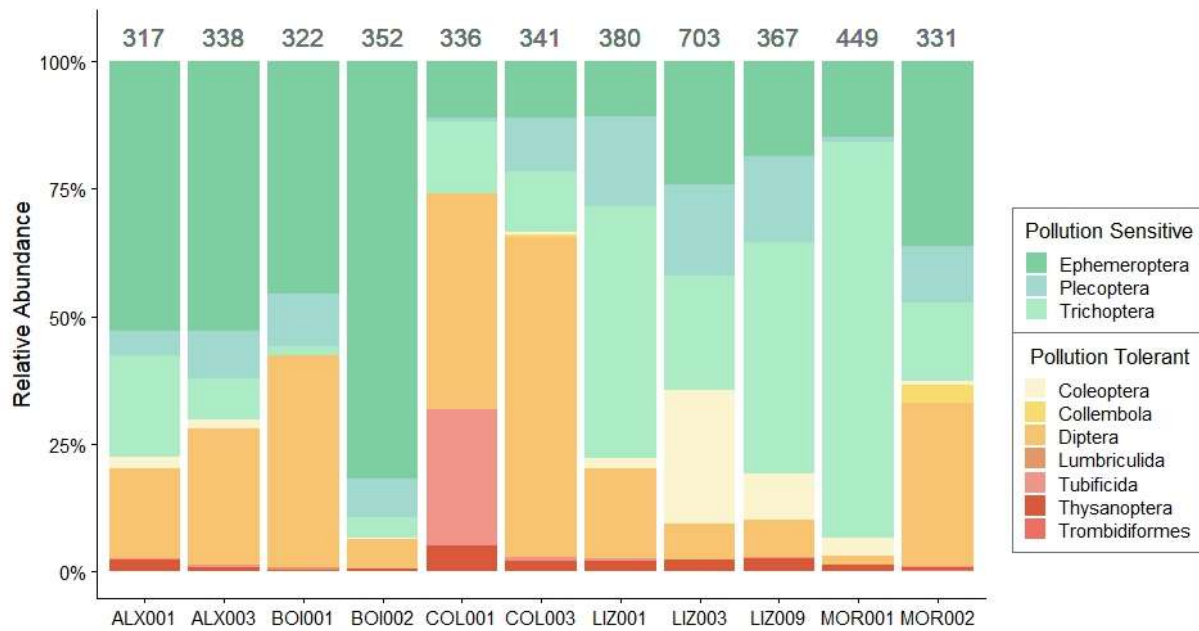


Figure 35. Graph representing the proportions of different taxonomic orders of benthic macroinvertebrates at each CABIN site. The three cool-coloured bars (greens, blues) represent pollution-sensitive taxa (Ephemeroptera, Plecoptera, Trichoptera), while the warm-coloured bars (red, orange, yellow) represent 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. A comparison of CABIN sites, their classification according to 2024 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 Creek	ALX001	Mildly Divergent	0.72	0.59 ^a	77.39 ^a	3,962.50 ^a
	ALX003	Reference	1.04	0.54 ^a	70.41 ^a	6,760.00 ^a
Boivin Creek	BOI001	Reference	1.06	0.38 ^a	57.63 ^a	4,600.00 ^a
	BOI002	Mildly Divergent	0.76	0.51 ^a	93.47 ^a	3,520.00 ^a
Coal Creek	COL001	Highly Divergent	0.76	0.94 ^b	25.89 ^b	4,800.00 ^b
	COL003	Divergent	0.87	0.73 ^a	33.43 ^a	3,788.89 ^a
Lizard Creek	LIZ001	Highly Divergent	1.05	0.91 ^c	77.78 ^c	7,600.00 ^c
	LIZ003	Highly Divergent	1.05	0.87 ^b	64.03 ^b	14,060.00 ^b
	LIZ009	Highly Divergent	1.05	0.88 ^c	80.87 ^c	4,587.50 ^c
Morrissey Creek	MOR001	Highly Divergent	0.81	0.86 ^b	93.51 ^b	8,980.00 ^b
	MOR002	Divergent	0.87	0.62 ^a	65.41 ^a	1,379.17 ^a
	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.

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.

pH

PH levels at all sites have been relatively consistent over time (Figure 36). 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. Results also 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.

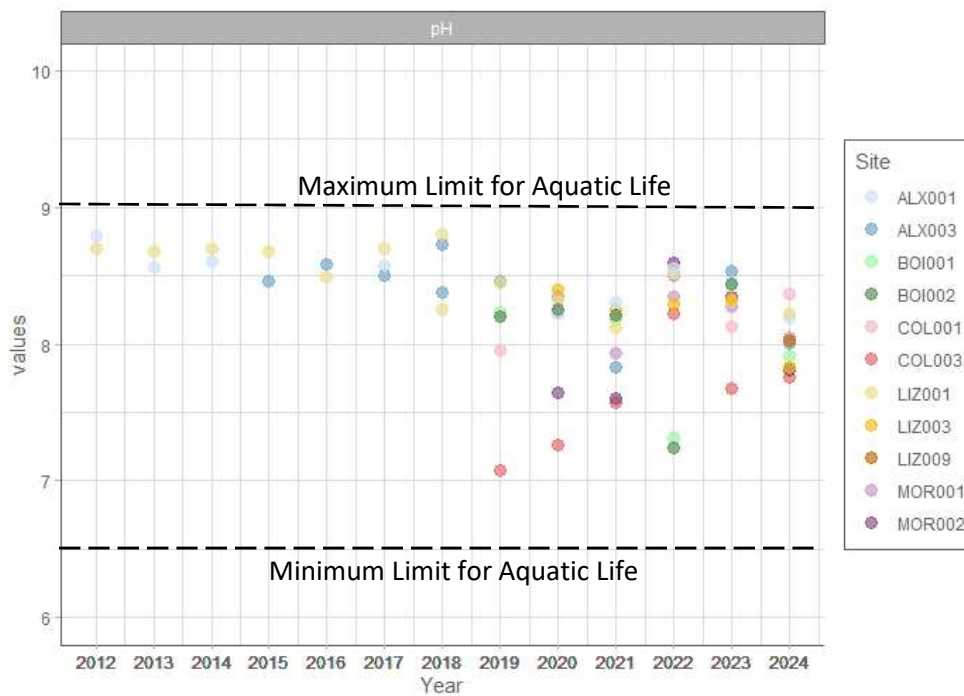


Figure 36. pH values for CABIN sites from 2012-2024. All sites remain within the range of limits outlined within the BC Water Quality Guidelines.

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°C (Bear, McMahon and Zale, 2007), with WCT beginning to experience thermal stress around 20-25°C and acute mortality in water temperatures above 25°C.

Temperatures measured during CABIN monitoring varied considerably between sampling years at all sites (Figure 37). 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. Despite temperatures measured during CABIN sampling remaining within the critical limit for important local species like the WCT and bull trout (DFO, 2017), the lower Coal Creek site was assessed at 17.5°C in 2024, which is approaching thermal stress temperatures for WCT. At 14.2°C, Lower Morrissey Creek was also found to be much warmer than all other CABIN sites.

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.

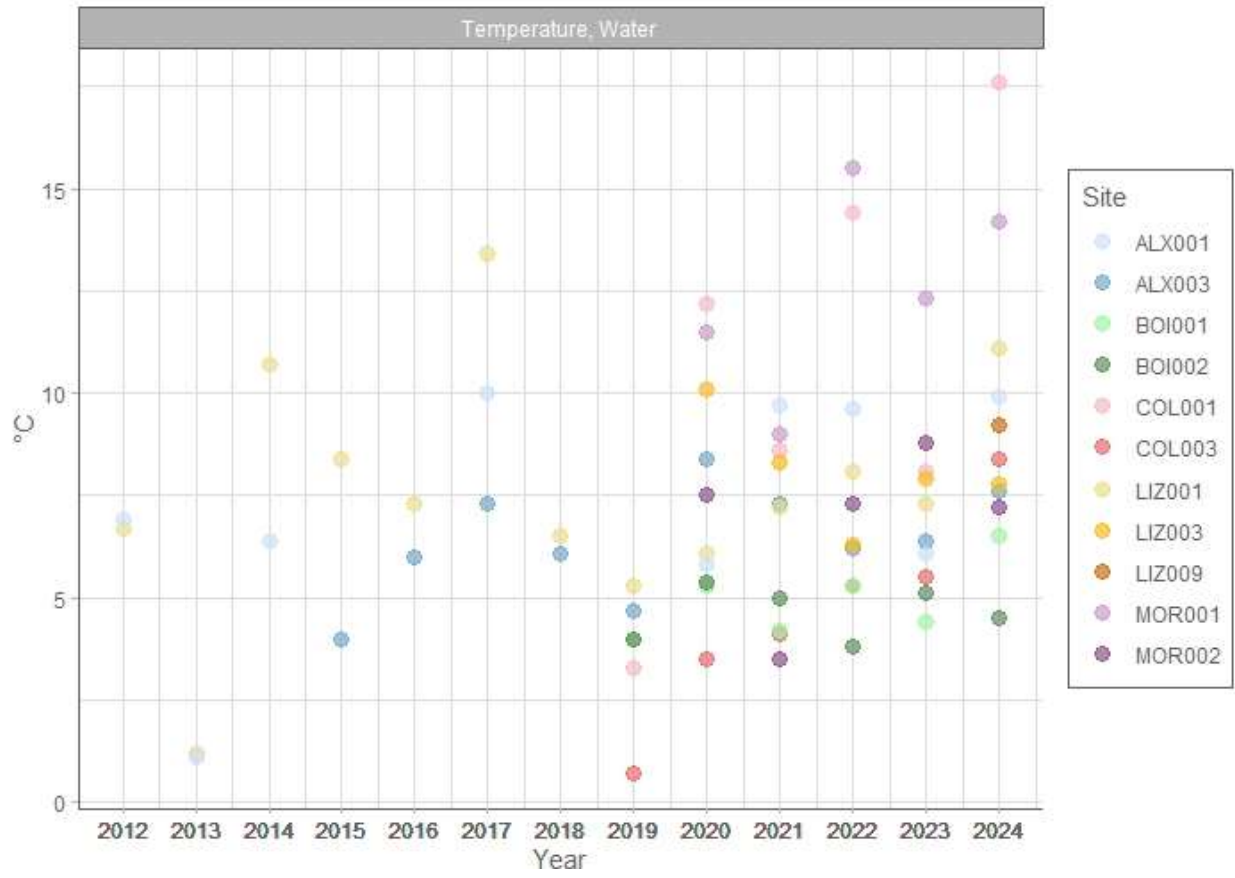


Figure 37. September water temperature values for CABIN sites from 2012-2024.

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 38) (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.

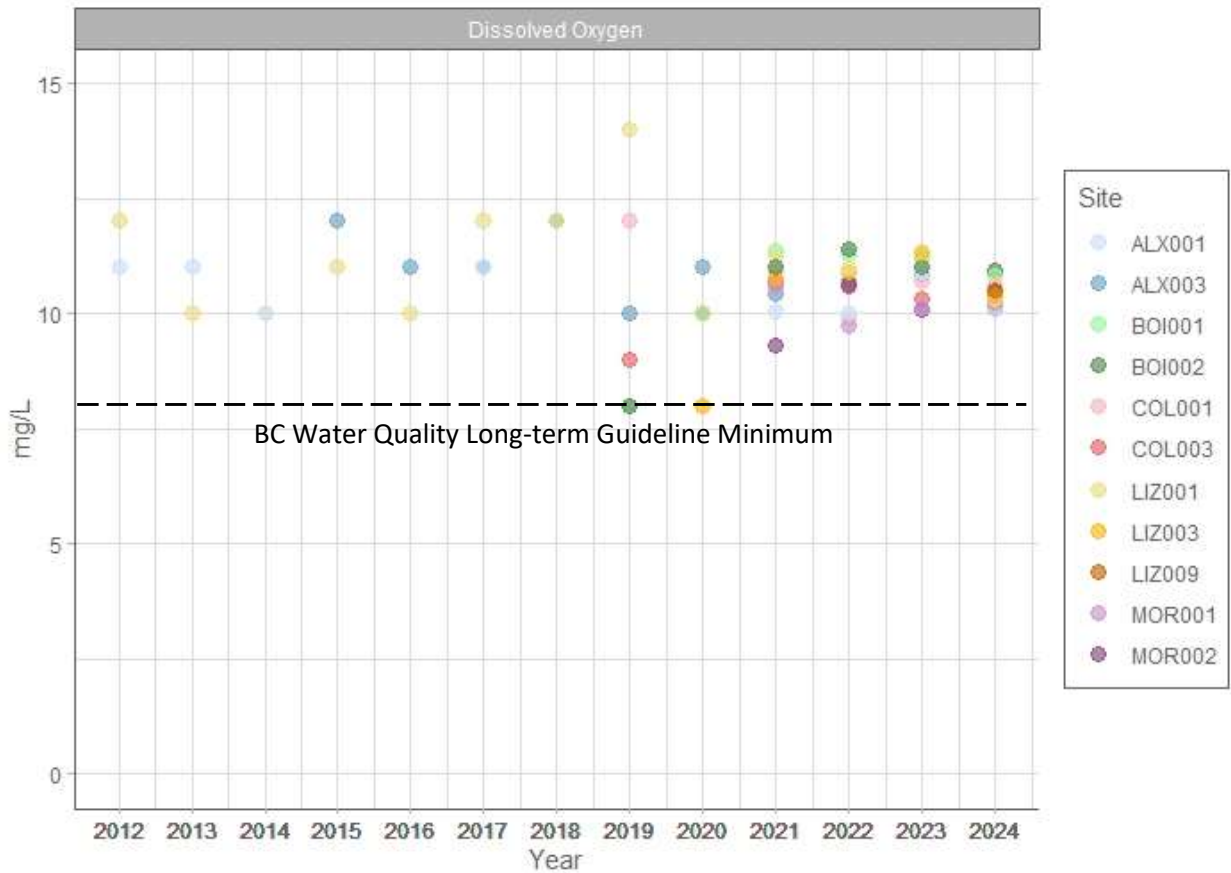


Figure 38. The amount of dissolved oxygen at CABIN sites in mg/L from 2012-2024. Site values do not fall below the BC water Quality Long-term Guideline minimum for Freshwater Aquatic Life (8 mg/L).

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 mostly remained below 4 NTU, with readings typically 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 were noticeably higher than in past years and

higher than the turbidity readings of all other creeks, especially at the upper Morrissey (MOR002) site. The turbid conditions in Morrissey Creek in 2023 were 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. Pipeline work concluded in early 2024, and turbidity for Morrissey sites was found to have returned to previous levels during 2024 CABIN sampling.

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.

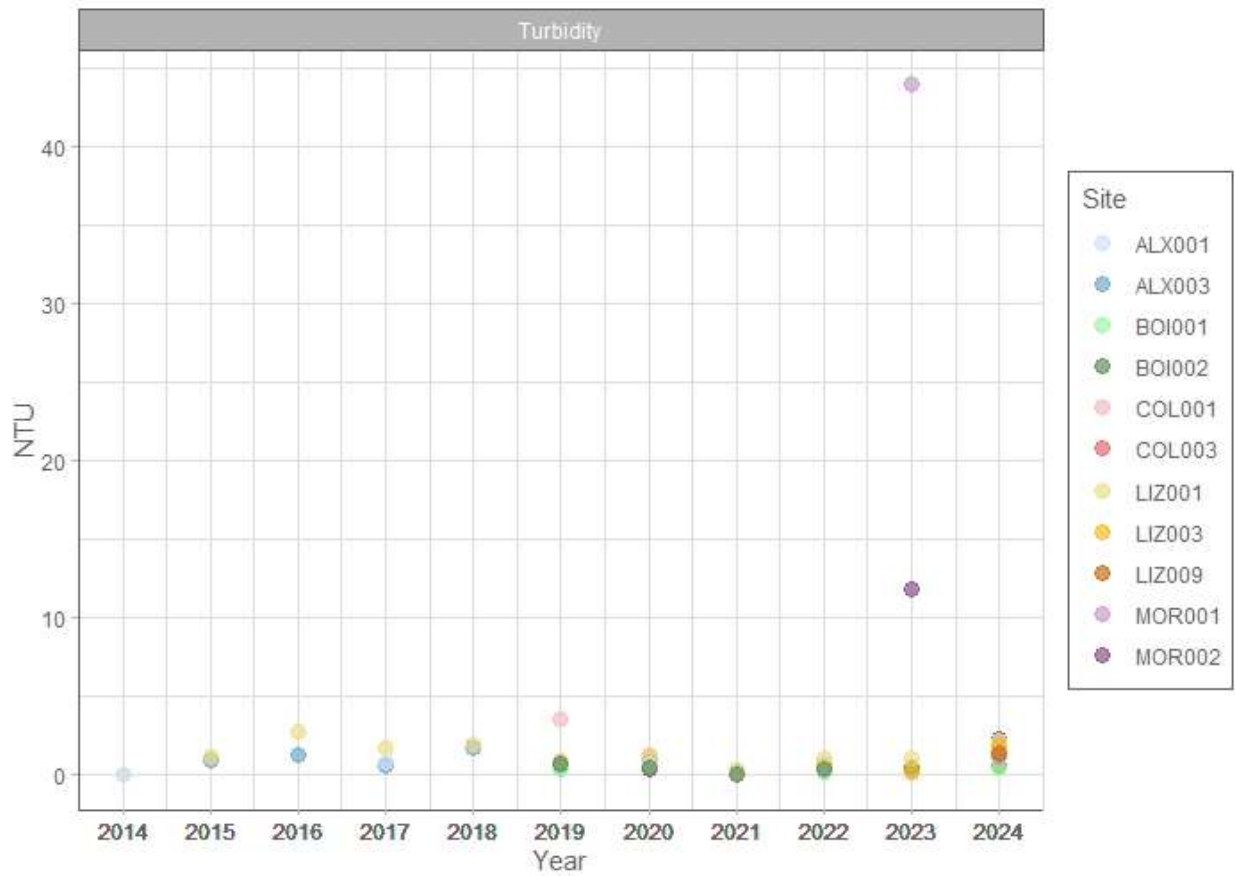


Figure 39. The turbidity (NTU) measured at CABIN sites from 2014-2024.

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 increase in conductivity levels for all Lizard Creek sites over the last four years. Although conductivity levels can fluctuate, large change may be a result of some added stressor.

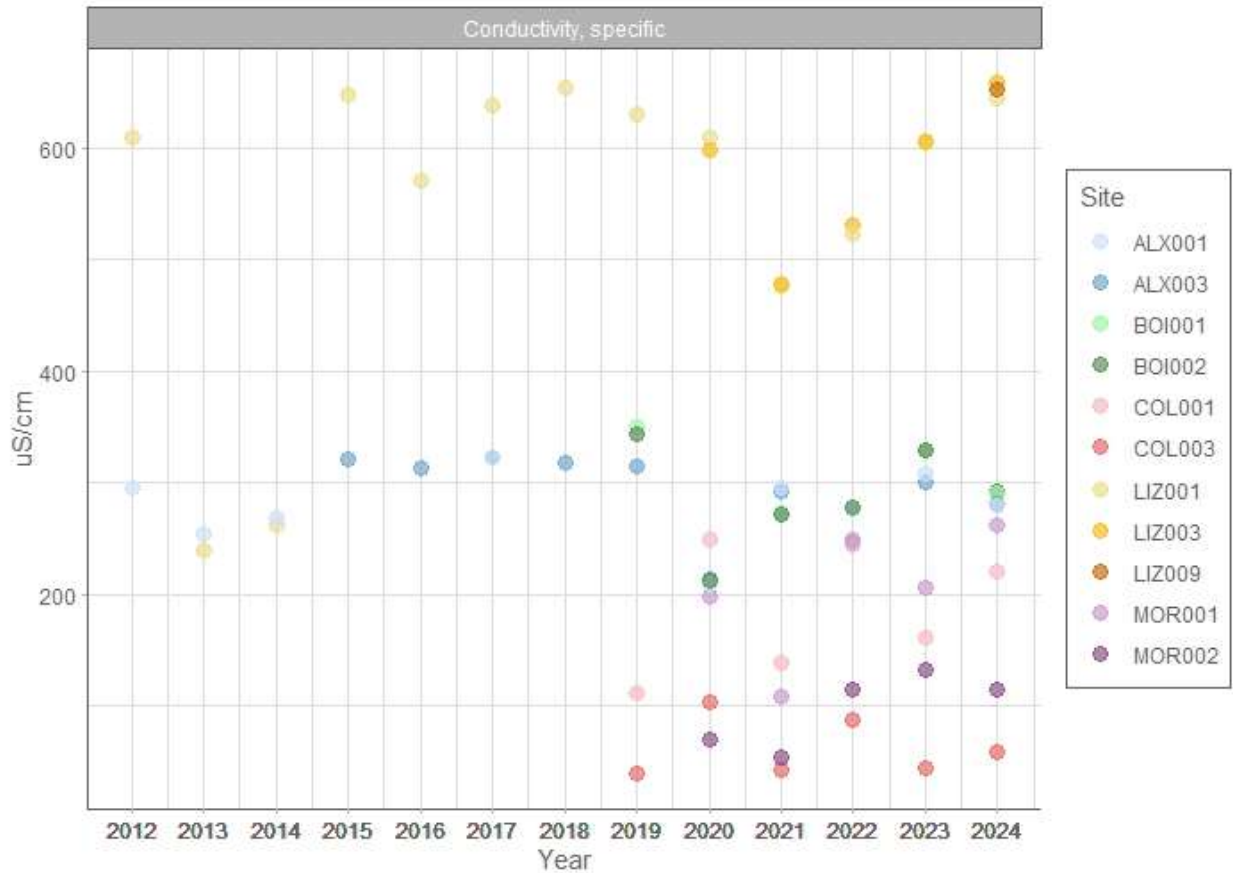


Figure 40. Conductivity levels measured at CABIN sites from 2012-2024.

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 41). 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 implemented a hydrometric monitoring program to examine discharge in more detail.

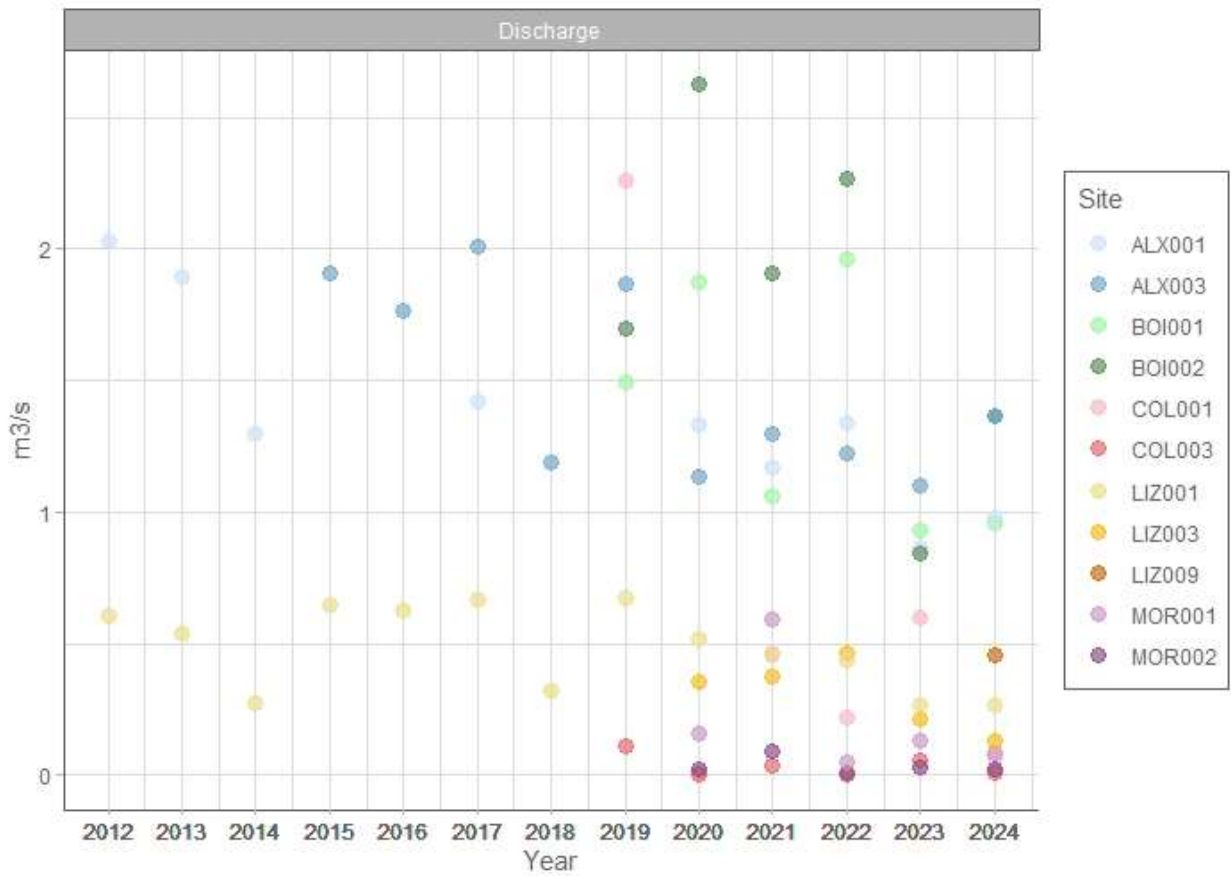


Figure 41. Discharge measurements calculated for CABIN sites from 2012- 2024.

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 (CaCO_3) is also naturally occurring and is formed when calcium (Ca) and carbonate (CO_3) 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 42) (British Columbia Ministry of Environment and Climate Change Strategy, 2021). For comparison, Figure 43 displays selenium concentrations in the Elk River mainstem near the outflow to Lake Koochanusa, (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.

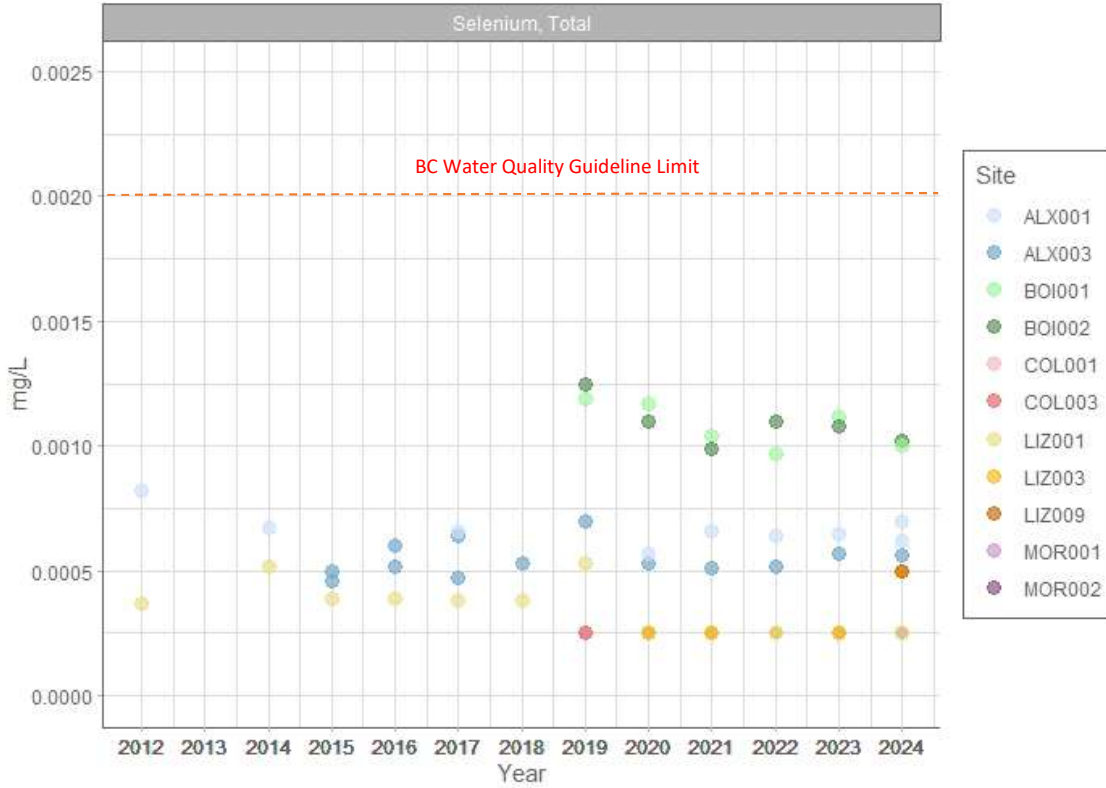


Figure 42. Total selenium concentrations at CABIN sites from 2012 to 2024. All concentrations are well below the BC water quality guideline of 0.002 mg/L (2µg/L).

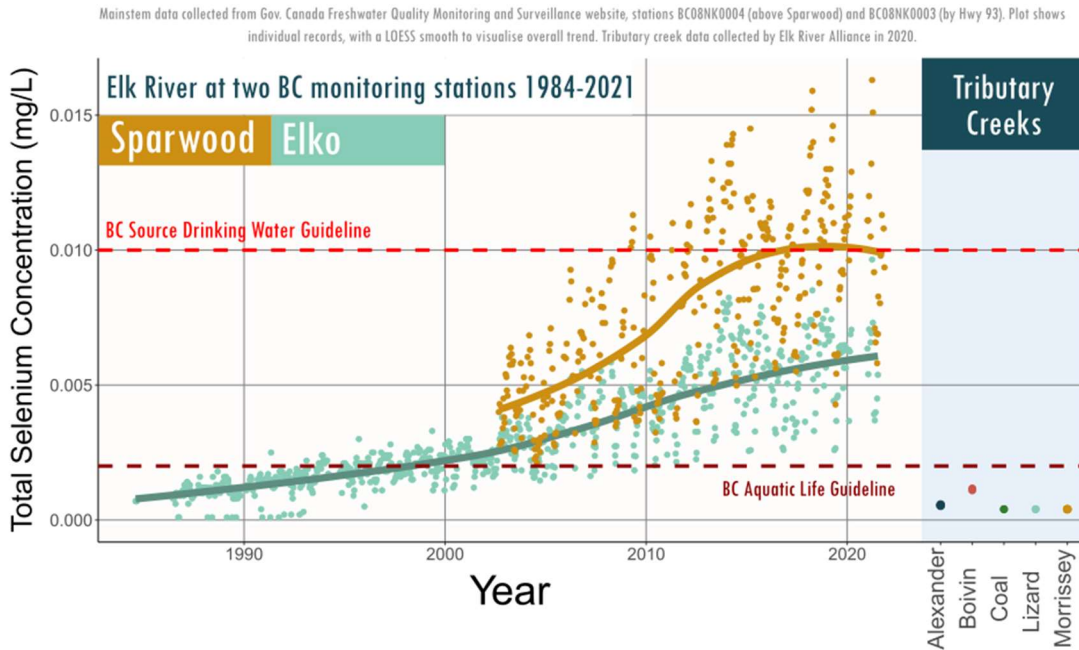


Figure 43. Total selenium in the Elk River mainstem at the outflow to Lake Koocanusa. Approximate concentrations at CABIN tributaries are included to the right and coincides with Elk River concentrations in the 1990s.

Study Limitations

A breakdown of some of the potential limitations for the 2024 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	Possible	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 continues to investigate 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 timeframe.
Proportion of task achieved, and further work which might be needed	Possible	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 2024 continued to center around CABIN-based assessments but no longer included STREAM e-DNA sampling.

While study sites on Boivin Creek appear to be in relatively healthy condition, the lower Coal Creek site (COL001), the lower Morrissey Creek site (MOR001), and both Lizard Creek sites (LIZ001 and LIZ003), continue to be assessed as "highly divergent" from reference condition, which suggests that these sites may not be in good health. More concerning is the trend towards divergence observed in the upper Morrissey (MOR002) and Coal Creek (COL003) sites.

Previously in healthy condition, Alexander sites have experienced some fluctuation in recent years and may be beginning to experience a decline in health, especially downstream (ALX001). Further monitoring is required to establish trends.

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 Morrissey 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. Morrissey sites that showed sudden increases in some water quality parameters in 2023, likely related to the TC Energy pipeline road construction and road use, returned to previous levels in 2024.

The decline in health of upper Morrissey and Coal 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 persistent divergent 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 generally more prominent.

Although less prevalent in 2024, for each of these sites that have been assessed as "highly divergent", the total abundance of benthic invertebrates has often been significantly higher than at associated reference sites historically. 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, it's 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 Monitoring Collaborative (ERMC). 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 ERMC'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 ERMC 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

Study Name	CBWQ-Elk
Site	ALX001
Sampling Date	Sep 10 2024
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

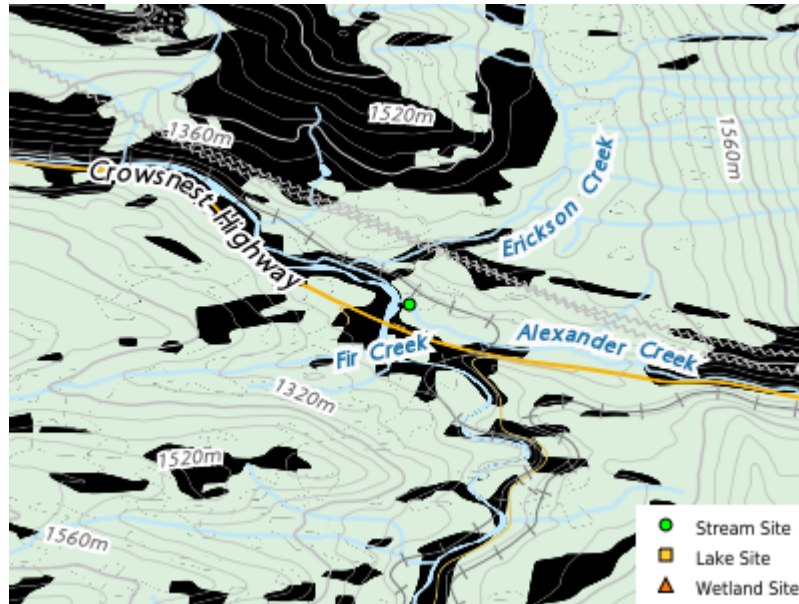


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary							
Model	Columbia Basin 2020						
Analysis Date	May 29, 2025						
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		2.0%	3.7%	3.4%	6.0%	83.4%	1.4%
CABIN Assessment of ALX001 on Sep 10, 2024		Mildly Divergent					

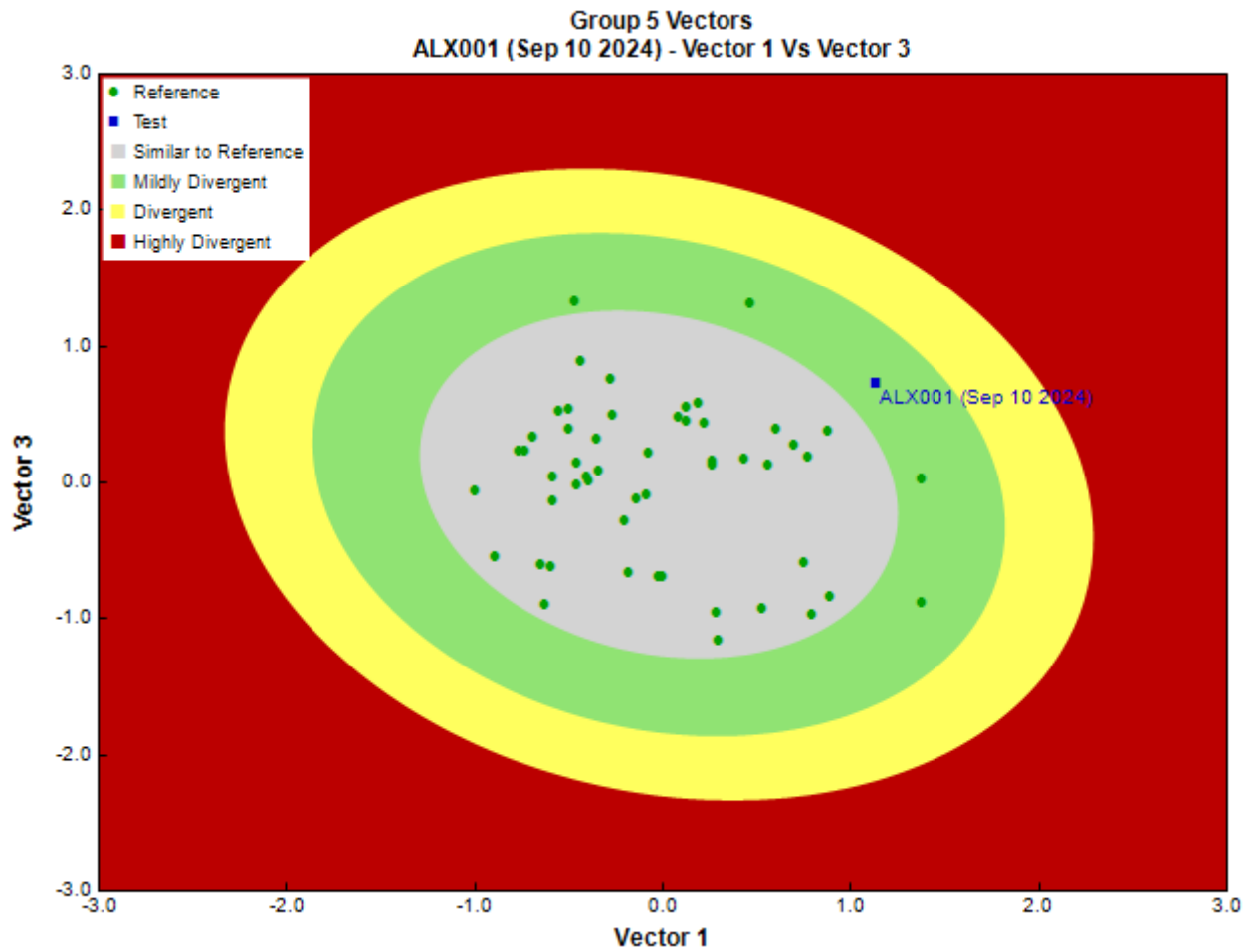


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

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			
Annelida	Clitellata	Tubificida	Naididae	1	12.5			
Arthropoda	Arachnida	Trombidiformes	Hygrobatidae	1	12.5			
			Lebertiidae	3	37.5			
			Sperchontidae	2	25.0			
			Torrenticolidae	1	12.5			
			Insecta	Coleoptera	Elmidae	7	87.5	
					Diptera			
						Ceratopogonidae	1	12.5
						Chironomidae	33	412.5
						Psychodidae	21	262.5
						Simuliidae	1	12.5
				Ephemeroptera	Baetidae	90	1,125.0	
						Ephemerellidae	55	687.5
						Heptageniidae	23	287.5
					Plecoptera			
			Chloroperlidae	1	12.5			
			Nemouridae	10	125.0			

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Perlidae	1	12.5
			Perlodidae	1	12.5
		Trichoptera		1	12.5
			Apataniidae	11	137.5
			Glossosomatidae	26	325.0
			Lepidostomatidae	3	37.5
			Rhyacophilidae	20	250.0
			Uenoidae	2	25.0
			Total	317	3,962.5

Metrics

Name	ALX001	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.59	0.4 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	4.0	3.4 \pm 0.4
Hilsenhoff Family index (North-West)	4.0	3.1 \pm 0.5
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	3.0	1.7 \pm 1.2
Tolerant individuals (%)	--	0.3 \pm 0.0
Functional Measures		
% Filterers	--	
% Gatherers	41.3	45.8 \pm 14.9
% Predatores	19.9	14.8 \pm 9.8
% Scrapers	50.5	59.4 \pm 19.6
% Shredder	9.8	30.7 \pm 17.4
No. Clinger Taxa	27.0	19.8 \pm 4.0
Number Of Individuals		
% Chironomidae	10.5	7.5 \pm 8.6
% Coleoptera	2.2	0.1 \pm 0.3
% Diptera + Non-insects	20.4	10.7 \pm 9.9
% Ephemeroptera	53.5	47.2 \pm 15.8
% Ephemeroptera that are Baetidae	53.6	25.4 \pm 20.8
% EPT Individuals	77.4	89.2 \pm 10.0
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	46.2	58.3 \pm 10.6
% of 5 dominant taxa	72.3	83.6 \pm 6.3
% of dominant taxa	28.7	37.8 \pm 11.1
% Plecoptera	4.1	36.3 \pm 16.7
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	0.0	25.4 \pm 24.6
% Tricoptera	19.7	5.7 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 \pm 0.1
Total Abundance	3962.5	4661.0 \pm 3119.0
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.1 \pm 0.3
Diptera taxa	4.0	2.8 \pm 1.0
Ephemeroptera taxa	3.0	3.7 \pm 0.5
EPT Individuals (Sum)	3037.5	4035.4 \pm 2618.4
EPT taxa (no)	12.0	12.3 \pm 1.9
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.7	0.7 \pm 0.1
Plecoptera taxa	4.0	5.5 \pm 1.1
Shannon-Wiener Diversity	2.3	1.9 \pm 0.3
Simpson's Diversity	0.9	0.8 \pm 0.1
Simpson's Evenness	0.3	0.3 \pm 0.1
Total No. of Taxa	22.0	17.0 \pm 3.1
Trichoptera taxa	5.0	3.1 \pm 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at ALX001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.58
Apataniidae	8%	14%	5%	7%	13%	6%	0.13
Athericidae	0%	7%	0%	4%	0%	0%	0.01
Aturidae	8%	0%	5%	0%	0%	0%	0.00
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.00
Brachycentridae	31%	17%	27%	13%	4%	12%	0.06
Capniidae	77%	79%	63%	74%	63%	76%	0.65
Carabidae	0%	0%	0%	2%	0%	0%	0.00
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.15
Chironomidae	100%	100%	100%	93%	100%	88%	0.99
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.95
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.00
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.00
Elmidae	38%	17%	54%	15%	19%	12%	0.20
Empididae	54%	62%	71%	50%	62%	65%	0.61
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemereidae	85%	97%	98%	98%	98%	82%	0.97
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.02
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.41
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.00
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.78
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.01
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.07
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.14
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.14
Lebertiidae	38%	52%	46%	9%	35%	29%	0.34
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.08
Leuctridae	8%	38%	24%	33%	62%	41%	0.56
Limnephilidae	46%	38%	29%	30%	31%	29%	0.31
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.25
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.11
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.02
Pelecophlebiidae	0%	0%	0%	0%	2%	6%	0.02
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.27
Perlidae	31%	38%	59%	17%	19%	18%	0.21
Perlodidae	77%	97%	85%	83%	90%	82%	0.90
Philopotamidae	8%	3%	12%	2%	0%	6%	0.01
Pisidiidae	8%	7%	10%	0%	0%	0%	0.01
Planorbidae	0%	0%	2%	2%	0%	0%	0.00
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.52
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.00
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.96
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.35
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.45
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.01
Tabanidae	8%	0%	0%	0%	2%	0%	0.02
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.99
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.00

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at ALX001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.43
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.13
Uenoidae	0%	14%	15%	41%	44%	12%	0.41
Valvatidae	0%	0%	0%	0%	2%	0%	0.02

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.45
RIVPACS : Observed taxa P>0.50	9.00
RIVPACS : O:E (p > 0.5)	0.72
RIVPACS : Expected taxa P>0.70	9.52
RIVPACS : Observed taxa P>0.70	8.00
RIVPACS : O:E (p > 0.7)	0.84

Habitat Description

Variable	ALX001	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 \pm 8.10999
Channel		
Depth-Avg (cm)	29.6	20.0 \pm 8.6
Depth-BankfullMinusWetted (cm)	11.40	46.71 \pm 35.00
Depth-Max (cm)	47.0	28.8 \pm 13.7
Discharge (m ³ /s)	0.976	0.682
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 \pm 0.95
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	3	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 0
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0400000	0.0270638 \pm 0.0257534
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	0	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.44	0.58 \pm 0.20
Velocity-Max (m/s)	0.80	0.85 \pm 0.27
Width-Bankfull (m)	12.8	16.1 \pm 13.1
Width-Wetted (m)	8.1	9.8 \pm 7.7
XSEC-VelInstrumentDirect (Category(1-3))	3	3 \pm 0
XSEC-VelMethod (Category(1-3))	3	2 \pm 1
Climate		
Precip10_OCT (mm)	44.44840	64.42223 \pm 33.96544
Temp12_DECmin (Degrees Celsius)	-14.37000	-12.74810 \pm 1.73767
Hydrology		
Drainage-Area (km ²)	179.83405	100.09787 \pm 132.80561
Landcover		
Natl-Grassland (%)	4.13231	7.47766 \pm 6.29880
Natl-ShrubLow (%)	0.08024	1.80492 \pm 1.50412
Natl-Water (%)	0.00000	0.32077 \pm 0.59001
Reg-Ice (%)	0.00000	1.28005 \pm 3.54484
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	2	6 \pm 6
%Cobble (%)	72	57 \pm 15
%Gravel (%)	0	2 \pm 3
%Pebble (%)	26	34 \pm 16
%Sand (%)	0	0 \pm 0

Habitat Description

Variable	ALX001	Predicted Group Reference Mean \pm SD
%Silt+Clay (%)	0	0 \pm 1
D50 (cm)	8.60	24.05 \pm 35.66
Dg (cm)	8.6	23.0 \pm 33.8
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	7	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	1	2 \pm 1
SurroundingMaterial (Category(0-9))	2	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	39.74502	20.01334 \pm 7.41149
SlopeMax (%)	353.26163	488.94077 \pm 542.32910
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000018 \pm 0.0000013
Al (mg/L)	0.0061000	0.0078031 \pm 0.0090962
As (mg/L)	0.0002500	0.0002735 \pm 0.0001787
B (mg/L)	0.0250000	0.0127286 \pm 0.0135802
Ba (mg/L)	0.0722000	0.0677069 \pm 0.0514113
Be (mg/L)	0.0000500	0.0000043 \pm 0.0000039
Bi (mg/L)	0.0000500	0.0000018 \pm 0.0000013
Br (mg/L)	0.5000000	0.0303333 \pm 0.0788597
Ca (mg/L)	49.0000000	28.2142857 \pm 13.7707094
Cd (mg/L)	0.0000050	0.0000100 \pm 0.0000293
Chloride-Total (mg/L)	1.1800000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000075 \pm 0.0000060
Cr (mg/L)	0.0002500	0.0001514 \pm 0.0001361
Cu (mg/L)	0.0002000	0.0001604 \pm 0.0001447
F (mg/L)	0.0500000	0.0876667 \pm 0.0847823
Fe (mg/L)	0.0050000	0.0101789 \pm 0.0111495
General-Alkalinity (mg/L)	146.0000000	98.9704545 \pm 43.8308301
General-CarbonDOC (mg/L)	0.2500000	0.8383333 \pm 0.4040008
General-CarbonTOC (mg/L)	0.7200000	0.5586957 \pm 0.6229060
General-Conductivity (μ S/cm)	280.3000000	173.5150000 \pm 86.2502071
General-DO (mg/L)	10.1000000	10.7243478 \pm 0.8596502
General-Hardness (mg/L)	178.0000000	109.1853659 \pm 48.3470504
General-pH (pH)	8.2	8.0 \pm 0.6
General-SolidsTSS (mg/L)	1.0000000	5.2717002 \pm 27.1908288
General-SpCond (μ S/cm)	280.3000000	196.0710526 \pm 116.3908975
General-TempAir (Degrees Celsius)	21.4	7.2 \pm 5.7
General-TempWater (Degrees Celsius)	9.9000000	6.2042553 \pm 2.0993816
General-Turbidity (NTU)	1.6200000	0.4347619 \pm 0.5563328
K (mg/L)	0.4100000	0.3312424 \pm 0.1572675
Li (mg/L)	0.0042000	0.0009183 \pm 0.0003795
Mg (mg/L)	13.4000000	7.8748571 \pm 3.9958945
Mn (mg/L)	0.0008000	0.0007721 \pm 0.0008518
Mo (mg/L)	0.0007200	0.0012835 \pm 0.0042333
Na (mg/L)	1.7500000	0.7930303 \pm 0.4756164
Ni (mg/L)	0.0002000	0.0001266 \pm 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 \pm 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0153000	0.0287300 \pm 0.0357249
Nitrogen-NO3 (mg/L)	0.0150000	0.0336397 \pm 0.0328125
Nitrogen-TKN (mg/L)	0.0800000	0.0352941 \pm 0.0299453
Nitrogen-TN (mg/L)	0.0953000	0.0675581 \pm 0.0509763
Pb (mg/L)	0.0001000	0.0000179 \pm 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 \pm 0.5208890
Phosphorus-TP (mg/L)	0.0087000	0.0031912 \pm 0.0087929
S (mg/L)	7.0000000	3.6625000 \pm 1.5619928
Sb (mg/L)	0.0001000	0.0000337 \pm 0.0000157
Se (mg/L)	0.0006200	0.0002782 \pm 0.0002859
Si (mg/L)	2.5000000	2.0400303 \pm 0.8510321
Sn (mg/L)	0.0001000	0.0000300 \pm 0.0000407
SO4 (mg/L)	24.0000000	13.3070732 \pm 13.0883468
Sr (mg/L)	0.1210000	0.0893414 \pm 0.0805860

Habitat Description

Variable	ALX001	Predicted Group Reference Mean \pmSD
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0003150 \pm 0.0001205
Tl (mg/L)	0.0000100	0.0000040 \pm 0.0000067
U (mg/L)	0.0005870	0.0003872 \pm 0.0002299
V (mg/L)	0.0025000	0.0001617 \pm 0.0001537
Zn (mg/L)	0.0082000	0.0003724 \pm 0.0003377
Zr (mg/L)	0.0000500	0.0000500 \pm 0.0000000

Site Description

Study Name	CBWQ-Elk
Site	ALX003
Sampling Date	Sep 10 2024
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

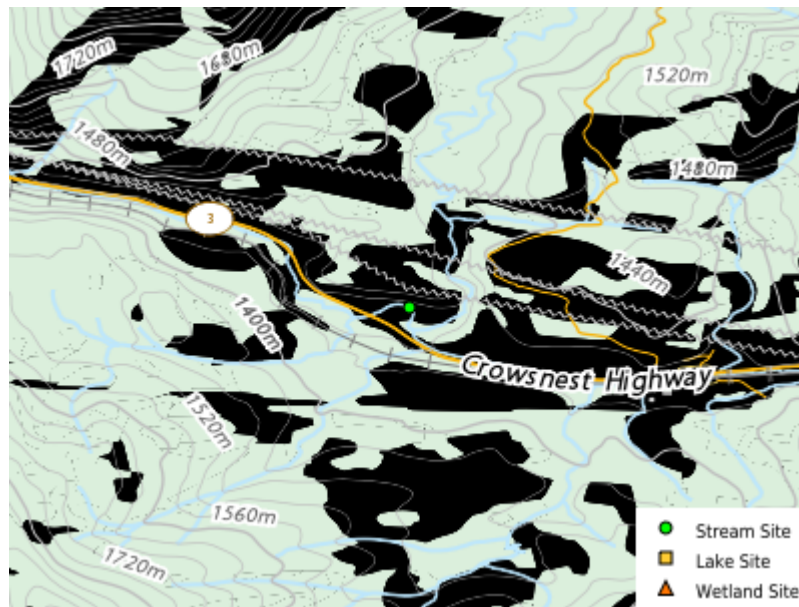


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	1.4% 2.1% 3.7% 6.6% 85.4% 0.9%
CABIN Assessment of ALX003 on Sep 10, 2024	Similar to Reference

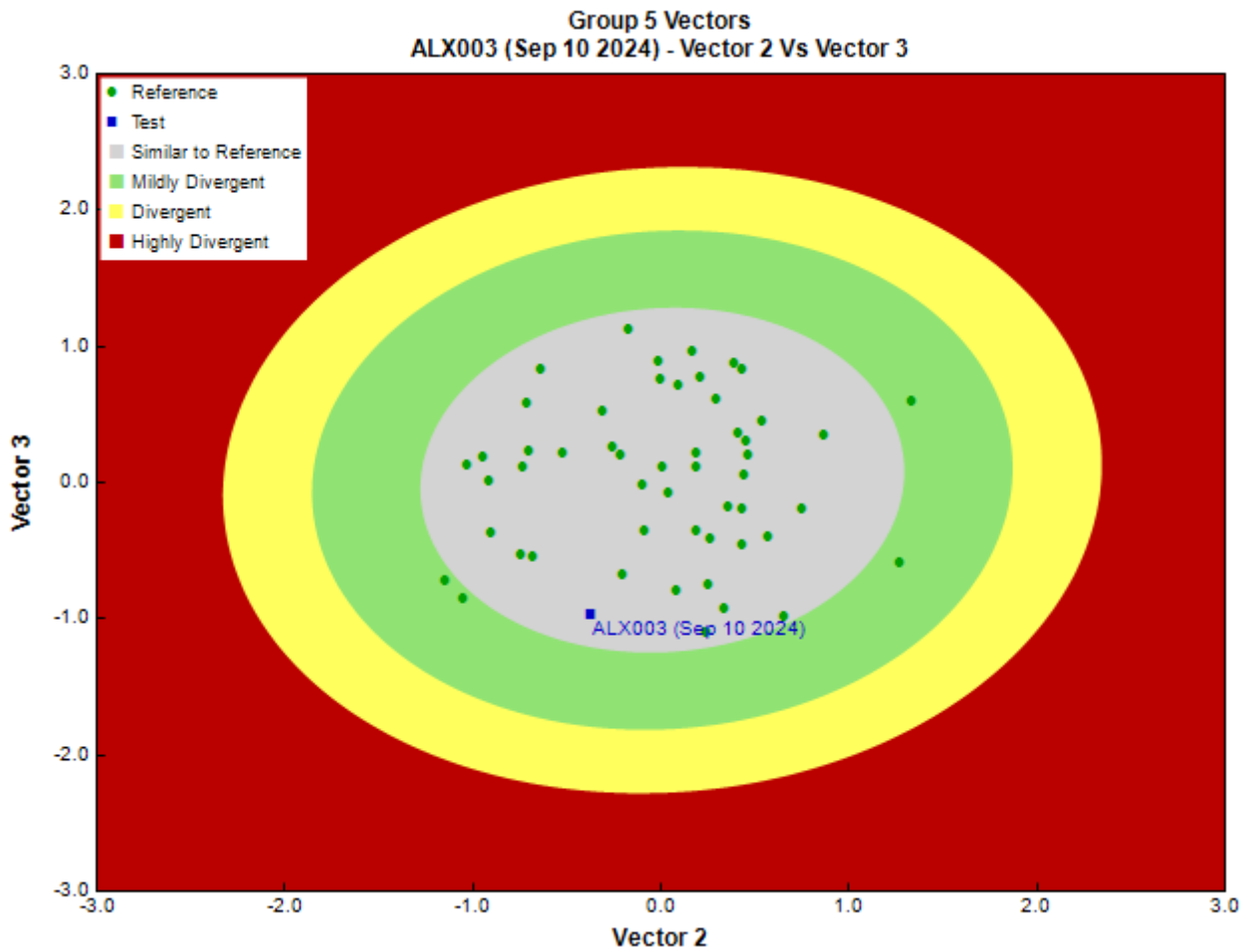


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

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	Lebertiidae	1	20.0	
			Sperchontidae	1	20.0	
	Insecta	Coleoptera	Elmidae	6	120.0	
			Diptera	1	20.0	
		Chironomida	Chironomidae	68	1,360.0	
			Empididae	6	120.0	
			Psychodidae	13	260.0	
			Simuliidae	2	40.0	
			Ephemeroptera	Baetidae	66	1,320.0
				Ephemerellidae	75	1,500.0
		Plecoptera	Plecoptera	Heptageniidae	38	760.0
				Chloroperlidae	4	80.0
				Leuctridae	1	20.0
				Nemouridae	20	400.0
			Perlodidae	5	100.0	

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Taeniopterygidae	1	20.0
		Trichoptera	Apataniidae	2	40.0
			Glossosomatidae	2	40.0
			Hydropsychidae	13	260.0
			Rhyacophilidae	11	220.0
			Total	338	6,760.0

Metrics

Name	ALX003	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.54	0.4 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	4.2	3.4 \pm 0.4
Hilsenhoff Family index (North-West)	4.2	3.1 \pm 0.5
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	2.0	1.7 \pm 1.2
Tolerant individuals (%)	--	0.3 \pm 0.0
Functional Measures		
% Filterers	--	
% Gatherers	59.8	45.8 \pm 14.9
% Predators	31.7	14.8 \pm 9.8
% Scrapers	38.5	59.4 \pm 19.6
% Shredder	8.9	30.7 \pm 17.4
No. Clinger Taxa	30.0	19.8 \pm 4.0
Number Of Individuals		
% Chironomidae	20.1	7.5 \pm 8.6
% Coleoptera	1.8	0.1 \pm 0.3
% Diptera + Non-insects	27.8	10.7 \pm 9.9
% Ephemeroptera	53.0	47.2 \pm 15.8
% Ephemeroptera that are Baetidae	36.9	25.4 \pm 20.8
% EPT Individuals	70.4	89.2 \pm 10.0
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	42.3	58.3 \pm 10.6
% of 5 dominant taxa	79.0	83.6 \pm 6.3
% of dominant taxa	22.2	37.8 \pm 11.1
% Plecoptera	9.2	36.3 \pm 16.7
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	46.4	25.4 \pm 24.6
% Tricoptera	8.3	5.7 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.8	0.9 \pm 0.1
Total Abundance	6760.0	4661.0 \pm 3119.0
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.1 \pm 0.3
Diptera taxa	5.0	2.8 \pm 1.0
Ephemeroptera taxa	3.0	3.7 \pm 0.5
EPT Individuals (Sum)	4760.0	4035.4 \pm 2618.4
EPT taxa (no)	12.0	12.3 \pm 1.9
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.7	0.7 \pm 0.1
Plecoptera taxa	5.0	5.5 \pm 1.1
Shannon-Wiener Diversity	2.2	1.9 \pm 0.3
Simpson's Diversity	0.9	0.8 \pm 0.1
Simpson's Evenness	0.3	0.3 \pm 0.1
Total No. of Taxa	21.0	17.0 \pm 3.1
Trichoptera taxa	4.0	3.1 \pm 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at ALX003
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.58
Apataniidae	8%	14%	5%	7%	13%	6%	0.13
Athericidae	0%	7%	0%	4%	0%	0%	0.00
Aturidae	8%	0%	5%	0%	0%	0%	0.00
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.00
Brachycentridae	31%	17%	27%	13%	4%	12%	0.06
Capniidae	77%	79%	63%	74%	63%	76%	0.65
Carabidae	0%	0%	0%	2%	0%	0%	0.00
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.15
Chironomidae	100%	100%	100%	93%	100%	88%	0.99
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.95
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.00
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.00
Elmidae	38%	17%	54%	15%	19%	12%	0.20
Empididae	54%	62%	71%	50%	62%	65%	0.61
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemereidae	85%	97%	98%	98%	98%	82%	0.98
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.02
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.42
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.00
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.79
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.01
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.07
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.14
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.13
Lebertiidae	38%	52%	46%	9%	35%	29%	0.34
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.07
Leuctridae	8%	38%	24%	33%	62%	41%	0.57
Limnephilidae	46%	38%	29%	30%	31%	29%	0.31
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.25
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.11
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.02
Pelecophychidae	0%	0%	0%	0%	2%	6%	0.02
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.27
Perlidae	31%	38%	59%	17%	19%	18%	0.21
Perlodidae	77%	97%	85%	83%	90%	82%	0.90
Philopotamidae	8%	3%	12%	2%	0%	6%	0.01
Pisidiidae	8%	7%	10%	0%	0%	0%	0.01
Planorbidae	0%	0%	2%	2%	0%	0%	0.00
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.52
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.00
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.97
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.35
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.45
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.00
Tabanidae	8%	0%	0%	0%	2%	0%	0.02
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.99
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.00

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at ALX003
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.43
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.13
Uenoidae	0%	14%	15%	41%	44%	12%	0.41
Valvatidae	0%	0%	0%	0%	2%	0%	0.02

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.47
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS : O:E (p > 0.5)	1.04
RIVPACS : Expected taxa P>0.70	9.54
RIVPACS : Observed taxa P>0.70	10.00
RIVPACS : O:E (p > 0.7)	1.05

Habitat Description

Variable	ALX003	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 \pm 8.10999
Channel		
Depth-Avg (cm)	23.9	20.0 \pm 8.6
Depth-BankfullMinusWetted (cm)	34.50	46.71 \pm 35.00
Depth-Max (cm)	28.0	28.8 \pm 13.7
Discharge (m ³ /s)	1.365	0.682
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 \pm 0.95
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	3	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 0
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0200000	0.0270638 \pm 0.0257534
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.70	0.58 \pm 0.20
Velocity-Max (m/s)	0.90	0.85 \pm 0.27
Width-Bankfull (m)	11.6	16.1 \pm 13.1
Width-Wetted (m)	10.1	9.8 \pm 7.7
XSEC-VelInstrumentDirect (Category(1-3))	3	3 \pm 0
XSEC-VelMethod (Category(1-3))	3	2 \pm 1
Climate		
Precip10_OCT (mm)	43.56508	64.42223 \pm 33.96544
Temp12_DECmin (Degrees Celsius)	-14.37000	-12.74810 \pm 1.73767
Hydrology		
Drainage-Area (km ²)	145.66791	100.09787 \pm 132.80561
Landcover		
Natl-Grassland (%)	2.54675	7.47766 \pm 6.29880
Natl-ShrubLow (%)	0.09901	1.80492 \pm 1.50412
Natl-Water (%)	0.00000	0.32077 \pm 0.59001
Reg-Ice (%)	0.00000	1.28005 \pm 3.54484
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	0	6 \pm 6
%Cobble (%)	58	57 \pm 15
%Gravel (%)	1	2 \pm 3
%Pebble (%)	41	34 \pm 16
%Sand (%)	0	0 \pm 0

Habitat Description

Variable	ALX003	Predicted Group Reference Mean \pm SD
%Silt+Clay (%)	0	0 \pm 1
D50 (cm)	7.25	24.05 \pm 35.66
Dg (cm)	7.2	23.0 \pm 33.8
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	1	2 \pm 1
SurroundingMaterial (Category(0-9))	2	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	37.52888	20.01334 \pm 7.41149
SlopeMax (%)	353.26163	488.94077 \pm 542.32910
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000018 \pm 0.0000013
Al (mg/L)	0.0077000	0.0078031 \pm 0.0090962
As (mg/L)	0.0002500	0.0002735 \pm 0.0001787
B (mg/L)	0.0250000	0.0127286 \pm 0.0135802
Ba (mg/L)	0.0726000	0.0677069 \pm 0.0514113
Be (mg/L)	0.0000500	0.0000043 \pm 0.0000039
Bi (mg/L)	0.0000500	0.0000018 \pm 0.0000013
Br (mg/L)	0.0500000	0.0303333 \pm 0.0788597
Ca (mg/L)	50.3000000	28.2142857 \pm 13.7707094
Cd (mg/L)	0.0000050	0.0000100 \pm 0.0000293
Chloride-Total (mg/L)	0.8900000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000075 \pm 0.0000060
Cr (mg/L)	0.0002500	0.0001514 \pm 0.0001361
Cu (mg/L)	0.0002000	0.0001604 \pm 0.0001447
F (mg/L)	0.0500000	0.0876667 \pm 0.0847823
Fe (mg/L)	0.0130000	0.0101789 \pm 0.0111495
General-Alkalinity (mg/L)	149.0000000	98.9704545 \pm 43.8308301
General-CarbonDOC (mg/L)	0.2500000	0.8383333 \pm 0.4040008
General-CarbonTOC (mg/L)	0.2500000	0.5586957 \pm 0.6229060
General-Conductivity (μ S/cm)	280.6000000	173.5150000 \pm 86.2502071
General-DO (mg/L)	10.4200000	10.7243478 \pm 0.8596502
General-Hardness (mg/L)	181.0000000	109.1853659 \pm 48.3470504
General-pH (pH)	8.0	8.0 \pm 0.6
General-SolidsTSS (mg/L)	1.0000000	5.2717002 \pm 27.1908288
General-SpCond (μ S/cm)	280.6000000	196.0710526 \pm 116.3908975
General-TempAir (Degrees Celsius)	21.3	7.2 \pm 5.7
General-TempWater (Degrees Celsius)	7.6000000	6.2042553 \pm 2.0993816
General-Turbidity (NTU)	1.1800000	0.4347619 \pm 0.5563328
K (mg/L)	0.3900000	0.3312424 \pm 0.1572675
Li (mg/L)	0.0040000	0.0009183 \pm 0.0003795
Mg (mg/L)	13.4000000	7.8748571 \pm 3.9958945
Mn (mg/L)	0.0013800	0.0007721 \pm 0.0008518
Mo (mg/L)	0.0006600	0.0012835 \pm 0.0042333
Na (mg/L)	1.5900000	0.7930303 \pm 0.4756164
Ni (mg/L)	0.0002000	0.0001266 \pm 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 \pm 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0172000	0.0287300 \pm 0.0357249
Nitrogen-NO3 (mg/L)	0.0170000	0.0336397 \pm 0.0328125
Nitrogen-TKN (mg/L)	0.1850000	0.0352941 \pm 0.0299453
Nitrogen-TN (mg/L)	0.2020000	0.0675581 \pm 0.0509763
Pb (mg/L)	0.0001000	0.0000179 \pm 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 \pm 0.5208890
Phosphorus-TP (mg/L)	0.0055000	0.0031912 \pm 0.0087929
S (mg/L)	6.4000000	3.6625000 \pm 1.5619928
Sb (mg/L)	0.0001000	0.0000337 \pm 0.0000157
Se (mg/L)	0.0005600	0.0002782 \pm 0.0002859
Si (mg/L)	2.4000000	2.0400303 \pm 0.8510321
Sn (mg/L)	0.0001000	0.0000300 \pm 0.0000407
SO4 (mg/L)	20.5000000	13.3070732 \pm 13.0883468
Sr (mg/L)	0.1180000	0.0893414 \pm 0.0805860

Habitat Description

Variable	ALX003	Predicted Group Reference Mean ±SD
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
Tl (mg/L)	0.0000100	0.0000040 ± 0.0000067
U (mg/L)	0.0005450	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	BOI001
Sampling Date	Sep 08 2024
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	1260
Local Basin Name	Elk River
	Boivin Creek
Stream Order	4

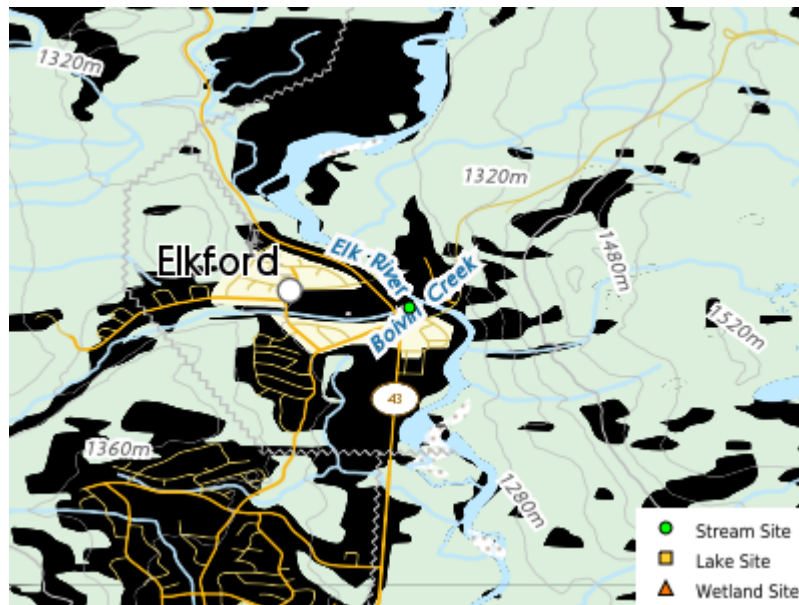


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	
Number of Reference Sites	1 13 2 24 3 28 4 35 5 32 6 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	2.4% 5.7% 8.6% 20.2% 60.0% 3.1%
CABIN Assessment of BOI001 on Sep 08, 2024	Similar to Reference

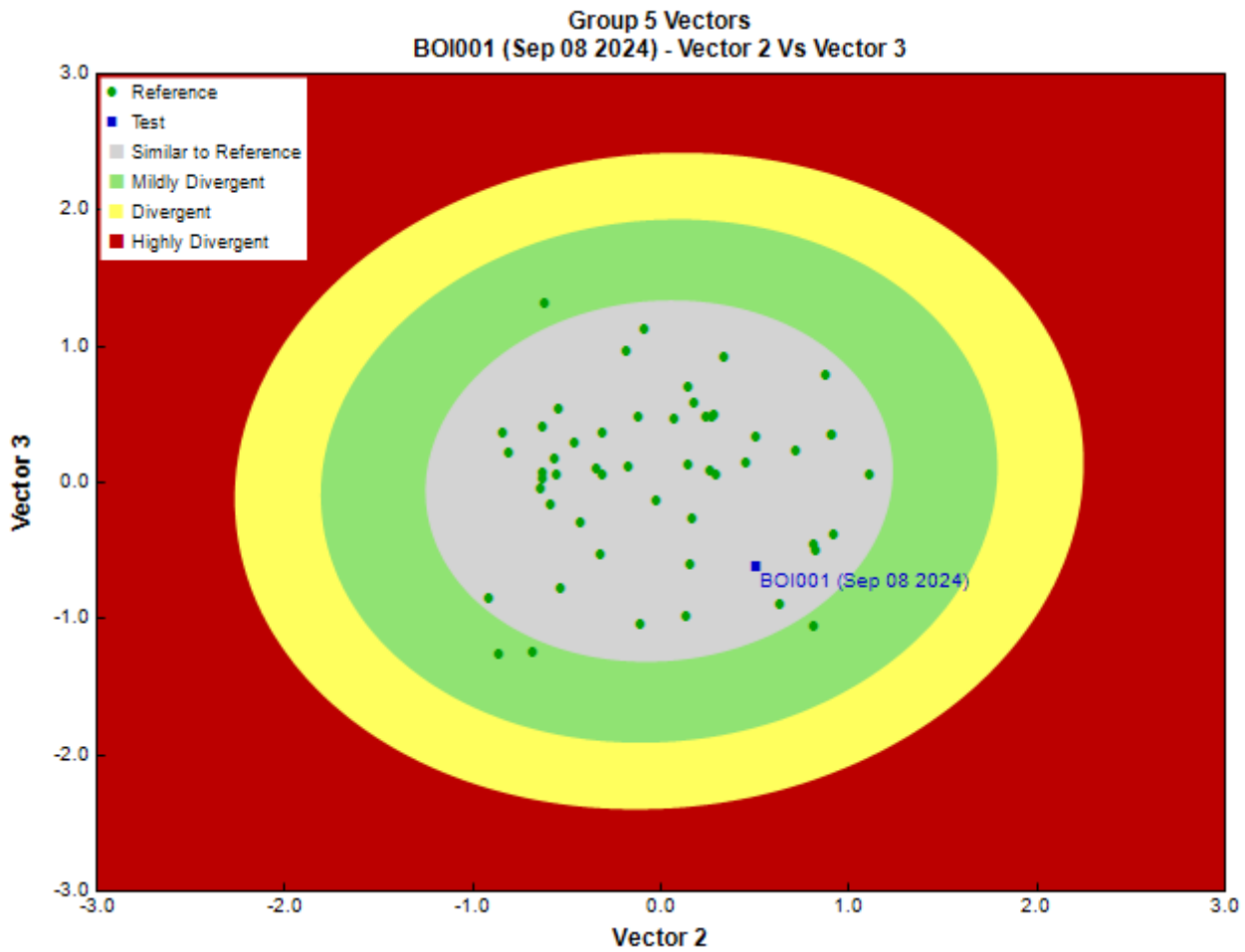


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	7/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Lumbriculida	Lumbriculidae	1	14.3
Arthropoda	Arachnida	Trombidiformes	Feltriidae	1	14.3
	Insecta	Diptera	Chironomidae	127	1,814.2
			Empididae	1	14.3
			Psychodidae	3	42.9
			Simuliidae	2	28.6
			Tipulidae	1	14.3
		Ephemeroptera	Ameletidae	1	14.3
			Baetidae	7	100.0
			Ephemerellidae	38	542.8
			Heptageniidae	101	1,442.8
		Plecoptera		1	14.3
			Capniidae	3	42.9
			Chloroperlidae	3	42.9
			Leuctridae	1	14.3
			Nemouridae	15	214.3

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Perlodidae	1	14.3
			Taeniopterygidae	9	128.6
		Trichoptera	Glossosomatidae	1	14.3
			Limnephilidae	1	14.3
			Rhyacophilidae	4	57.1
			Total	322	4,600.1

Metrics

Name	BOI001	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.38	0.4 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	3.8	3.4 \pm 0.4
Hilsenhoff Family index (North-West)	3.8	3.1 \pm 0.5
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	--	1.7 \pm 1.2
Tolerant individuals (%)	--	0.3 \pm 0.0
Functional Measures		
% Filterers	--	
% Gatherers	61.2	45.8 \pm 14.9
% Predators	41.9	14.8 \pm 9.8
% Scrapers	37.6	59.4 \pm 19.6
% Shredder	9.3	30.7 \pm 17.4
No. Clinger Taxa	23.0	19.8 \pm 4.0
Number Of Individuals		
% Chironomidae	39.6	7.5 \pm 8.6
% Coleoptera	0.0	0.1 \pm 0.3
% Diptera + Non-insects	42.4	10.7 \pm 9.9
% Ephemeroptera	45.8	47.2 \pm 15.8
% Ephemeroptera that are Baetidae	4.8	25.4 \pm 20.8
% EPT Individuals	57.6	89.2 \pm 10.0
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	71.0	58.3 \pm 10.6
% of 5 dominant taxa	90.3	83.6 \pm 6.3
% of dominant taxa	39.6	37.8 \pm 11.1
% Plecoptera	10.0	36.3 \pm 16.7
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	0.0	25.4 \pm 24.6
% Tricoptera	1.9	5.7 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.6	0.9 \pm 0.1
Total Abundance	4600.0	4661.0 \pm 3119.0
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	0.0	0.1 \pm 0.3
Diptera taxa	5.0	2.8 \pm 1.0
Ephemeroptera taxa	4.0	3.7 \pm 0.5
EPT Individuals (Sum)	2642.9	4035.4 \pm 2618.4
EPT taxa (no)	13.0	12.3 \pm 1.9
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.6	0.7 \pm 0.1
Plecoptera taxa	6.0	5.5 \pm 1.1
Shannon-Wiener Diversity	1.7	1.9 \pm 0.3
Simpson's Diversity	0.7	0.8 \pm 0.1
Simpson's Evenness	0.2	0.3 \pm 0.1
Total No. of Taxa	20.0	17.0 \pm 3.1
Trichoptera taxa	3.0	3.1 \pm 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at BOI001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.59
Apataniidae	8%	14%	5%	7%	13%	6%	0.11
Athericidae	0%	7%	0%	4%	0%	0%	0.01
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.01
Brachycentridae	31%	17%	27%	13%	4%	12%	0.09
Capniidae	77%	79%	63%	74%	63%	76%	0.67
Carabidae	0%	0%	0%	2%	0%	0%	0.00
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.13
Chironomidae	100%	100%	100%	93%	100%	88%	0.98
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.94
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.00
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.22
Empididae	54%	62%	71%	50%	62%	65%	0.60
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemereidae	85%	97%	98%	98%	98%	82%	0.97
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.01
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.40
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.00
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.79
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.02
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.07
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.12
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.13
Lebertiidae	38%	52%	46%	9%	35%	29%	0.31
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.09
Leuctridae	8%	38%	24%	33%	62%	41%	0.49
Limnephilidae	46%	38%	29%	30%	31%	29%	0.31
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.21
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.10
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecophlebiidae	0%	0%	0%	0%	2%	6%	0.01
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.23
Perlidae	31%	38%	59%	17%	19%	18%	0.24
Perlodidae	77%	97%	85%	83%	90%	82%	0.88
Philopotamidae	8%	3%	12%	2%	0%	6%	0.02
Pisidiidae	8%	7%	10%	0%	0%	0%	0.01
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.42
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.00
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.94
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.32
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.46
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.01
Tabanidae	8%	0%	0%	0%	2%	0%	0.01
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.98
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.00

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at BOI001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.48
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.12
Uenoidae	0%	14%	15%	41%	44%	12%	0.37
Valvatidae	0%	0%	0%	0%	2%	0%	0.01

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	11.32
RIVPACS : Observed taxa P>0.50	12.00
RIVPACS : O:E (p > 0.5)	1.06
RIVPACS : Expected taxa P>0.70	9.46
RIVPACS : Observed taxa P>0.70	9.00
RIVPACS : O:E (p > 0.7)	0.95

Habitat Description

Variable	BOI001	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 \pm 8.10999
Channel		
Depth-Avg (cm)	20.2	20.0 \pm 8.6
Depth-BankfullMinusWetted (cm)	4.00	46.71 \pm 35.00
Depth-Max (cm)	36.0	28.8 \pm 13.7
Discharge (m ³ /s)	0.961	0.682
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 \pm 0.95
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 0
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0155000	0.0270638 \pm 0.0257534
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.57	0.58 \pm 0.20
Velocity-Max (m/s)	0.70	0.85 \pm 0.27
Width-Bankfull (m)	11.4	16.1 \pm 13.1
Width-Wetted (m)	9.8	9.8 \pm 7.7
XSEC-VelInstrumentDirect (Category(1-3))	2	3 \pm 0
XSEC-VelMethod (Category(1-3))	3	2 \pm 1
Climate		
Precip10_OCT (mm)	45.44750	64.42223 \pm 33.96544
Temp12_DECmin (Degrees Celsius)	-14.85000	-12.74810 \pm 1.73767
Hydrology		
Drainage-Area (km ²)	63.55090	100.09787 \pm 132.80561
Landcover		
Natl-Grassland (%)	0.92278	7.47766 \pm 6.29880
Natl-ShrubLow (%)	0.38854	1.80492 \pm 1.50412
Natl-Water (%)	0.00000	0.32077 \pm 0.59001
Reg-Ice (%)	0.00000	1.28005 \pm 3.54484
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	0	6 \pm 6
%Cobble (%)	38	57 \pm 15
%Gravel (%)	0	2 \pm 3
%Pebble (%)	62	34 \pm 16
%Sand (%)	0	0 \pm 0

Habitat Description

Variable	BOI001	Predicted Group Reference Mean \pm SD
%Silt+Clay (%)	0	0 \pm 1
D50 (cm)	5.00	24.05 \pm 35.66
Dg (cm)	5.1	23.0 \pm 33.8
Dominant-1st (Category(0-9))	5	6 \pm 1
Dominant-2nd (Category(0-9))	6	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	1	2 \pm 1
SurroundingMaterial (Category(0-9))	2	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	18.45671	20.01334 \pm 7.41149
SlopeMax (%)	317.63962	488.94077 \pm 542.32910
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000018 \pm 0.0000013
Al (mg/L)	0.0025000	0.0078031 \pm 0.0090962
As (mg/L)	0.0002500	0.0002735 \pm 0.0001787
B (mg/L)	0.0250000	0.0127286 \pm 0.0135802
Ba (mg/L)	0.0282000	0.0677069 \pm 0.0514113
Be (mg/L)	0.0000500	0.0000043 \pm 0.0000039
Bi (mg/L)	0.0000500	0.0000018 \pm 0.0000013
Br (mg/L)	0.0500000	0.0303333 \pm 0.0788597
Ca (mg/L)	48.5000000	28.2142857 \pm 13.7707094
Cd (mg/L)	0.0000280	0.0000100 \pm 0.0000293
Chloride-Total (mg/L)	0.1500000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000075 \pm 0.0000060
Cr (mg/L)	0.0005200	0.0001514 \pm 0.0001361
Cu (mg/L)	0.0002000	0.0001604 \pm 0.0001447
F (mg/L)	0.1700000	0.0876667 \pm 0.0847823
Fe (mg/L)	0.0050000	0.0101789 \pm 0.0111495
General-Alkalinity (mg/L)	119.0000000	98.9704545 \pm 43.8308301
General-CarbonDOC (mg/L)	0.2500000	0.8383333 \pm 0.4040008
General-CarbonTOC (mg/L)	0.2500000	0.5586957 \pm 0.6229060
General-Conductivity (μ S/cm)	291.2000000	173.5150000 \pm 86.2502071
General-DO (mg/L)	10.8200000	10.7243478 \pm 0.8596502
General-Hardness (mg/L)	181.0000000	109.1853659 \pm 48.3470504
General-pH (pH)	7.9	8.0 \pm 0.6
General-SolidsTSS (mg/L)	1.0000000	5.2717002 \pm 27.1908288
General-SpCond (μ S/cm)	291.2000000	196.0710526 \pm 116.3908975
General-TempAir (Degrees Celsius)	24.0	7.2 \pm 5.7
General-TempWater (Degrees Celsius)	6.5000000	6.2042553 \pm 2.0993816
General-Turbidity (NTU)	0.5300000	0.4347619 \pm 0.5563328
K (mg/L)	0.3000000	0.3312424 \pm 0.1572675
Li (mg/L)	0.0014500	0.0009183 \pm 0.0003795
Mg (mg/L)	14.5000000	7.8748571 \pm 3.9958945
Mn (mg/L)	0.0001000	0.0007721 \pm 0.0008518
Mo (mg/L)	0.0013800	0.0012835 \pm 0.0042333
Na (mg/L)	0.5800000	0.7930303 \pm 0.4756164
Ni (mg/L)	0.0002000	0.0001266 \pm 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 \pm 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0454000	0.0287300 \pm 0.0357249
Nitrogen-NO3 (mg/L)	0.0450000	0.0336397 \pm 0.0328125
Nitrogen-TKN (mg/L)	0.0250000	0.0352941 \pm 0.0299453
Nitrogen-TN (mg/L)	0.0250000	0.0675581 \pm 0.0509763
Pb (mg/L)	0.0001000	0.0000179 \pm 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 \pm 0.5208890
Phosphorus-TP (mg/L)	0.0025000	0.0031912 \pm 0.0087929
S (mg/L)	18.0000000	3.6625000 \pm 1.5619928
Sb (mg/L)	0.0001000	0.0000337 \pm 0.0000157
Se (mg/L)	0.0010000	0.0002782 \pm 0.0002859
Si (mg/L)	2.2000000	2.0400303 \pm 0.8510321
Sn (mg/L)	0.0001000	0.0000300 \pm 0.0000407
SO4 (mg/L)	56.8000000	13.3070732 \pm 13.0883468
Sr (mg/L)	0.5310000	0.0893414 \pm 0.0805860

Habitat Description

Variable	BOI001	Predicted Group Reference Mean \pmSD
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0003150 \pm 0.0001205
Tl (mg/L)	0.0000100	0.0000040 \pm 0.0000067
U (mg/L)	0.0009260	0.0003872 \pm 0.0002299
V (mg/L)	0.0025000	0.0001617 \pm 0.0001537
Zn (mg/L)	0.0020000	0.0003724 \pm 0.0003377
Zr (mg/L)	0.0000500	0.0000500 \pm 0.0000000

Site Description

Study Name	CBWQ-Elk
Site	BOI002
Sampling Date	Sep 08 2024
Know Your Watershed Basin	Central Kootenay
Province / Territory	British Columbia
Terrestrial Ecological Classification	Montane Cordillera EcoZone Northern Continental Divide EcoRegion
Coordinates (decimal degrees)	50.01693 N, 114.93698 W
Altitude	1316
Local Basin Name	Elk River
	Boivin Creek
Stream Order	4

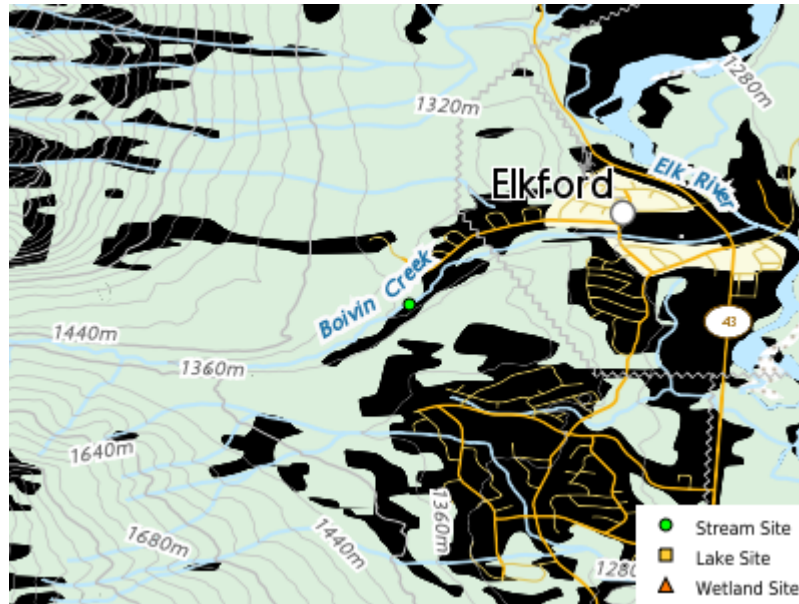


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	
Number of Reference Sites	1 13 2 24 3 28 4 35 5 32 6 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	3.2% 4.7% 7.9% 14.9% 67.0% 2.4%
CABIN Assessment of BOI002 on Sep 08, 2024	Mildly Divergent

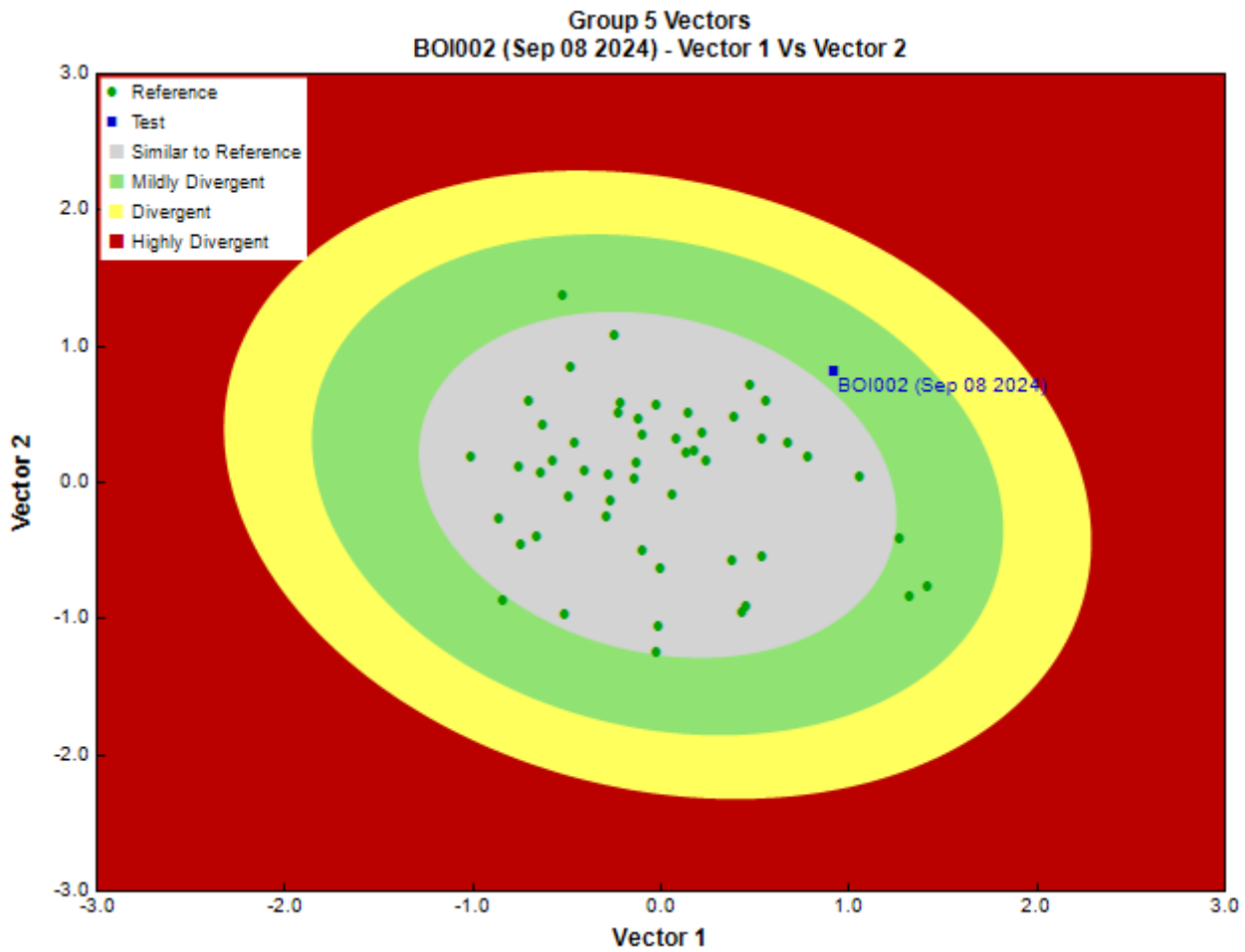


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	10/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count	
Arthropoda	Arachnida	Trombidiformes	Hydryphantidae	2	20.0	
		Insecta	Coleoptera	Elmidae	1	10.0
	Diptera		Chironomidae	19	190.0	
			Simuliidae	1	10.0	
			Ephemeroptera	Baetidae	118	1,180.0
			Ephemerellidae	116	1,160.0	
				Heptageniidae	54	540.0
	Plecoptera		Chloroperlidae	13	130.0	
			Nemouridae	1	10.0	
			Perlodidae	6	60.0	
			Taeniopterygidae	7	70.0	
	Trichoptera	Glossosomatidae	4	40.0		
		Rhyacophilidae	10	100.0		
		Total		352	3,520.0	

Metrics

Name	BOI002	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.51	0.4 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	3.9	3.4 \pm 0.4
Hilsenhoff Family index (North-West)	3.9	3.1 \pm 0.5
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	1.0	1.7 \pm 1.2
Tolerant individuals (%)	--	0.3 \pm 0.0
Functional Measures		
% Filterers	--	
% Gatherers	41.2	45.8 \pm 14.9
% Predatores	10.8	14.8 \pm 9.8
% Scrapers	52.6	59.4 \pm 19.6
% Shredder	2.6	30.7 \pm 17.4
No. Clinger Taxa	19.0	19.8 \pm 4.0
Number Of Individuals		
% Chironomidae	5.4	7.5 \pm 8.6
% Coleoptera	0.3	0.1 \pm 0.3
% Diptera + Non-insects	6.3	10.7 \pm 9.9
% Ephemeroptera	81.8	47.2 \pm 15.8
% Ephemeroptera that are Baetidae	41.0	25.4 \pm 20.8
% EPT Individuals	93.5	89.2 \pm 10.0
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	66.5	58.3 \pm 10.6
% of 5 dominant taxa	90.9	83.6 \pm 6.3
% of dominant taxa	33.5	37.8 \pm 11.1
% Plecoptera	7.7	36.3 \pm 16.7
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	0.0	25.4 \pm 24.6
% Tricoptera	4.0	5.7 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 \pm 0.1
Total Abundance	3520.0	4661.0 \pm 3119.0
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.1 \pm 0.3
Diptera taxa	2.0	2.8 \pm 1.0
Ephemeroptera taxa	3.0	3.7 \pm 0.5
EPT Individuals (Sum)	3290.0	4035.4 \pm 2618.4
EPT taxa (no)	9.0	12.3 \pm 1.9
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.7	0.7 \pm 0.1
Plecoptera taxa	4.0	5.5 \pm 1.1
Shannon-Wiener Diversity	1.7	1.9 \pm 0.3
Simpson's Diversity	0.7	0.8 \pm 0.1
Simpson's Evenness	0.3	0.3 \pm 0.1
Total No. of Taxa	13.0	17.0 \pm 3.1
Trichoptera taxa	2.0	3.1 \pm 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at BOI002
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.59
Apataniidae	8%	14%	5%	7%	13%	6%	0.11
Athericidae	0%	7%	0%	4%	0%	0%	0.01
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.01
Brachycentridae	31%	17%	27%	13%	4%	12%	0.09
Capniidae	77%	79%	63%	74%	63%	76%	0.66
Carabidae	0%	0%	0%	2%	0%	0%	0.00
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.14

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at BOI002
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Chironomidae	100%	100%	100%	93%	100%	88%	0.99
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.94
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.00
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.22
Empididae	54%	62%	71%	50%	62%	65%	0.60
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemerellidae	85%	97%	98%	98%	98%	82%	0.97
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.01
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.40
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.00
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.78
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.02
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.07
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.13
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.13
Lebertiidae	38%	52%	46%	9%	35%	29%	0.32
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.09
Leuctridae	8%	38%	24%	33%	62%	41%	0.51
Limnephilidae	46%	38%	29%	30%	31%	29%	0.31
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.22
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.10
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecophlebiidae	0%	0%	0%	0%	2%	6%	0.01
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.24
Perlidae	31%	38%	59%	17%	19%	18%	0.23
Perlodidae	77%	97%	85%	83%	90%	82%	0.88
Philopotamidae	8%	3%	12%	2%	0%	6%	0.02
Pisidiidae	8%	7%	10%	0%	0%	0%	0.01
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.45
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.00
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.95
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.33
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.45
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.01
Tabanidae	8%	0%	0%	0%	2%	0%	0.02
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.98
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.00
Tipulidae	69%	48%	49%	65%	40%	53%	0.46
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.13
Uenoidae	0%	14%	15%	41%	44%	12%	0.38
Valvatidae	0%	0%	0%	0%	2%	0%	0.01

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	11.83
RIVPACS : Observed taxa P>0.50	9.00

RIVPACS Ratios

RIVPACS : O:E (p > 0.5)	0.76
RIVPACS : Expected taxa P>0.70	9.46
RIVPACS : Observed taxa P>0.70	9.00
RIVPACS : O:E (p > 0.7)	0.95

Habitat Description

Variable	BOI002	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 \pm 8.10999
Channel		
Depth-Avg (cm)	31.0	20.0 \pm 8.6
Depth-BankfullMinusWetted (cm)	12.00	46.71 \pm 35.00
Depth-Max (cm)	46.0	28.8 \pm 13.7
Discharge (m ³ /s)	1.368	0.682
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 \pm 0.95
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 0
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0300000	0.0270638 \pm 0.0257534
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.83	0.58 \pm 0.20
Velocity-Max (m/s)	1.25	0.85 \pm 0.27
Width-Bankfull (m)	8.7	16.1 \pm 13.1
Width-Wetted (m)	6.6	9.8 \pm 7.7
XSEC-VelInstrumentDirect (Category(1-3))	2	3 \pm 0
XSEC-VelMethod (Category(1-3))	3	2 \pm 1
Climate		
Precip10_OCT (mm)	45.58192	64.42223 \pm 33.96544
Temp12_DECmin (Degrees Celsius)	-14.85000	-12.74810 \pm 1.73767
Hydrology		
Drainage-Area (km ²)	59.44235	100.09787 \pm 132.80561
Landcover		
Natl-Grassland (%)	0.67640	7.47766 \pm 6.29880
Natl-ShrubLow (%)	0.28480	1.80492 \pm 1.50412
Natl-Water (%)	0.00000	0.32077 \pm 0.59001
Reg-Ice (%)	0.00000	1.28005 \pm 3.54484
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	0	6 \pm 6
%Cobble (%)	73	57 \pm 15
%Gravel (%)	3	2 \pm 3
%Pebble (%)	24	34 \pm 16
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 1
D50 (cm)	8.15	24.05 \pm 35.66
Dg (cm)	7.6	23.0 \pm 33.8
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	3	4 \pm 1
PeriphytonCoverage (Category(1-5))	1	2 \pm 1
SurroundingMaterial (Category(0-9))	3	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	16.55265	20.01334 \pm 7.41149
SlopeMax (%)	317.63962	488.94077 \pm 542.32910
Water Chemistry		

Habitat Description

Variable	BOI002	Predicted Group Reference Mean \pm SD
Ag (mg/L)	0.0000250	0.0000018 \pm 0.0000013
Al (mg/L)	0.0025000	0.0078031 \pm 0.0090962
As (mg/L)	0.0002500	0.0002735 \pm 0.0001787
B (mg/L)	0.0250000	0.0127286 \pm 0.0135802
Ba (mg/L)	0.0262000	0.0677069 \pm 0.0514113
Be (mg/L)	0.0000500	0.0000043 \pm 0.0000039
Bi (mg/L)	0.0000500	0.0000018 \pm 0.0000013
Br (mg/L)	0.0500000	0.0303333 \pm 0.0788597
Ca (mg/L)	50.4000000	28.2142857 \pm 13.7707094
Cd (mg/L)	0.0000260	0.0000100 \pm 0.0000293
Chloride-Total (mg/L)	0.1700000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000075 \pm 0.0000060
Cr (mg/L)	0.0005100	0.0001514 \pm 0.0001361
Cu (mg/L)	0.0002000	0.0001604 \pm 0.0001447
F (mg/L)	0.1800000	0.0876667 \pm 0.0847823
Fe (mg/L)	0.0050000	0.0101789 \pm 0.0111495
General-Alkalinity (mg/L)	119.0000000	98.9704545 \pm 43.8308301
General-CarbonDOC (mg/L)	0.2500000	0.8383333 \pm 0.4040008
General-CarbonTOC (mg/L)	0.2500000	0.5586957 \pm 0.6229060
General-Conductivity (μ S/cm)	293.0000000	173.5150000 \pm 86.2502071
General-DO (mg/L)	10.9500000	10.7243478 \pm 0.8596502
General-Hardness (mg/L)	177.0000000	109.1853659 \pm 48.3470504
General-pH (pH)	7.8	8.0 \pm 0.6
General-SolidsTSS (mg/L)	1.0000000	5.2717002 \pm 27.1908288
General-SpCond (μ S/cm)	293.0000000	196.0710526 \pm 116.3908975
General-TempAir (Degrees Celsius)	9.0	7.2 \pm 5.7
General-TempWater (Degrees Celsius)	4.5000000	6.2042553 \pm 2.0993816
General-Turbidity (NTU)	0.6300000	0.4347619 \pm 0.5563328
K (mg/L)	0.2700000	0.3312424 \pm 0.1572675
Li (mg/L)	0.0013700	0.0009183 \pm 0.0003795
Mg (mg/L)	12.3000000	7.8748571 \pm 3.9958945
Mn (mg/L)	0.0001000	0.0007721 \pm 0.0008518
Mo (mg/L)	0.0013100	0.0012835 \pm 0.0042333
Na (mg/L)	0.5100000	0.7930303 \pm 0.4756164
Ni (mg/L)	0.0002000	0.0001266 \pm 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 \pm 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0403000	0.0287300 \pm 0.0357249
Nitrogen-NO3 (mg/L)	0.0400000	0.0336397 \pm 0.0328125
Nitrogen-TKN (mg/L)	0.0850000	0.0352941 \pm 0.0299453
Nitrogen-TN (mg/L)	0.1250000	0.0675581 \pm 0.0509763
Pb (mg/L)	0.0001000	0.0000179 \pm 0.0000156
Phosphorus-OrthoP (mg/L)	0.0080000	0.1105304 \pm 0.5208890
Phosphorus-TP (mg/L)	0.0078000	0.0031912 \pm 0.0087929
S (mg/L)	18.0000000	3.6625000 \pm 1.5619928
Sb (mg/L)	0.0001000	0.0000337 \pm 0.0000157
Se (mg/L)	0.0010200	0.0002782 \pm 0.0002859
Si (mg/L)	2.2000000	2.0400303 \pm 0.8510321
Sn (mg/L)	0.0001000	0.0000300 \pm 0.0000407
SO4 (mg/L)	57.2000000	13.3070732 \pm 13.0883468
Sr (mg/L)	0.5010000	0.0893414 \pm 0.0805860
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0003150 \pm 0.0001205
Tl (mg/L)	0.0000100	0.0000040 \pm 0.0000067
U (mg/L)	0.0008630	0.0003872 \pm 0.0002299
V (mg/L)	0.0025000	0.0001617 \pm 0.0001537
Zn (mg/L)	0.0020000	0.0003724 \pm 0.0003377
Zr (mg/L)	0.0000500	0.0000500 \pm 0.0000000

Site Description

Study Name	CBWQ-Elk
Site	COL001
Sampling Date	Sep 09 2024
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

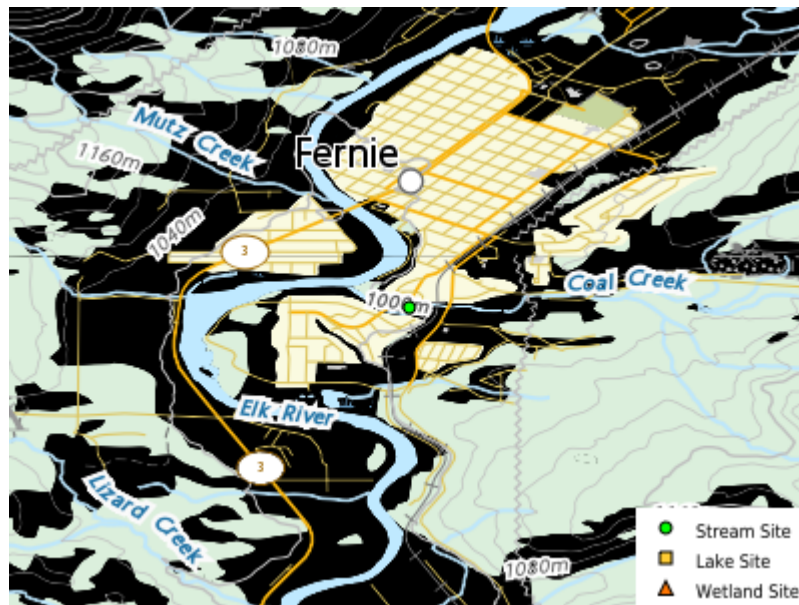


Figure 1. Location Map

Cabin Assessment Results

		Reference Model Summary					
Model		Columbia Basin 2020					
Analysis Date		May 29, 2025					
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%	13.9%	11.8%	47.0%	22.2%	2.2%
CABIN Assessment of COL001 on Sep 09, 2024		Highly Divergent					

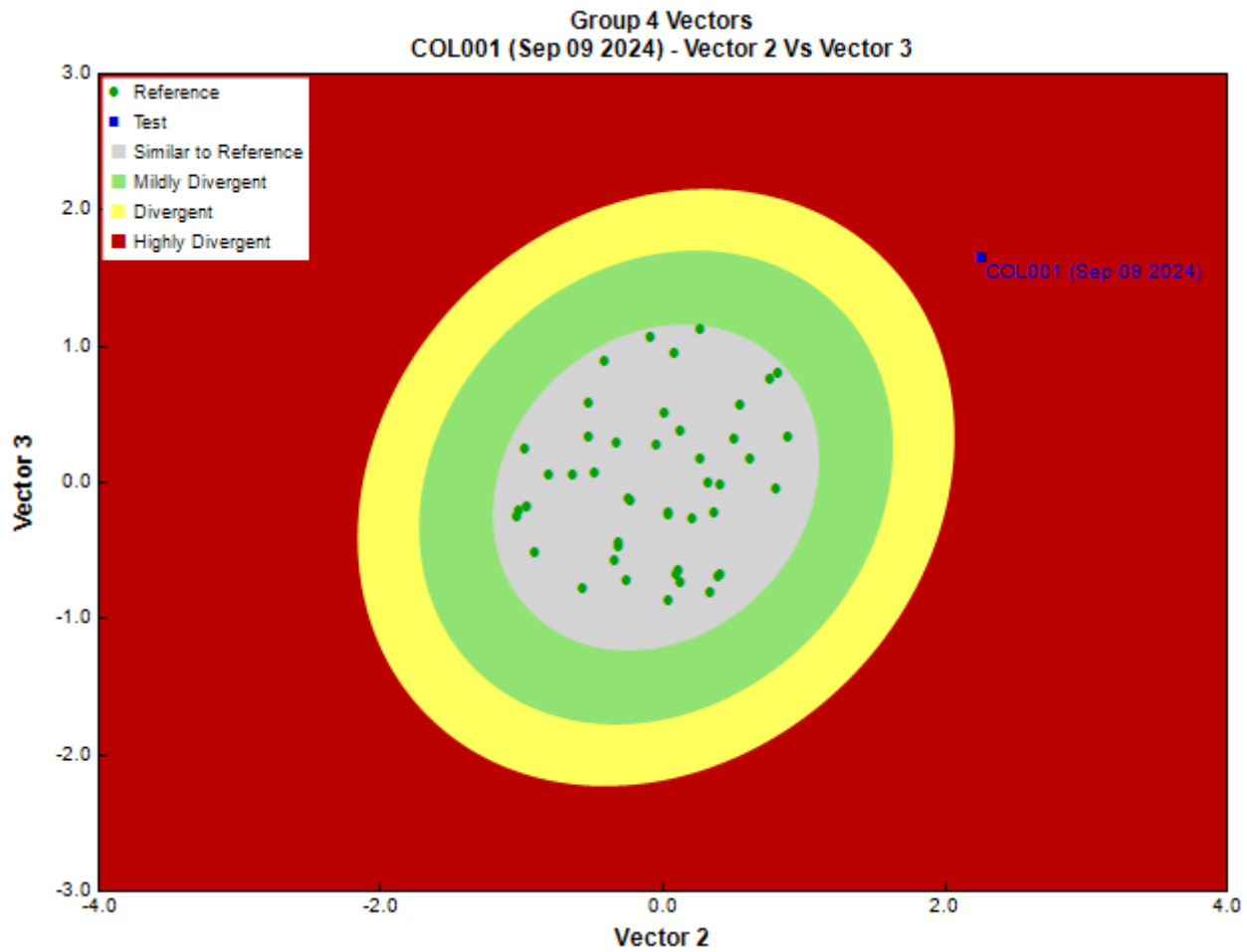


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	7/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	90	1,285.8
Arthropoda	Arachnida	Trombidiformes	Lebertiidae	1	14.3
			Sperchontidae	2	28.6
			Torrenticolidae	14	200.0
	Insecta	Diptera	Chironomidae	132	1,885.9
			Empididae	3	42.9
			Tipulidae	7	100.0
		Ephemeroptera	Baetidae	1	14.3
			Ephemerellidae	32	457.1
			Heptageniidae	2	28.6
			Leptophlebiidae	2	28.6
		Plecoptera	Capniidae	1	14.3
			Perlidae	1	14.3
			Perlodidae	1	14.3
		Trichoptera	Hydropsychidae	4	57.2
			Lepidostomatidae	43	614.3

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Total	336	4,800.5

Metrics

Name	COL001	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.94	0.3 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	8.0	3.2 \pm 0.4
Hilsenhoff Family index (North-West)	8.0	2.9 \pm 0.3
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	1.0	1.9 \pm 1.0
Tolerant individuals (%)	--	0.5 \pm 0.4
Functional Measures		
% Filterers	--	0.3
% Gatherers	106.3	47.1 \pm 15.4
% Predatores	47.0	12.9 \pm 7.3
% Scrapers	2.1	68.3 \pm 16.1
% Shredder	15.2	36.7 \pm 14.6
No. Clinger Taxa	12.0	20.2 \pm 4.4
Number Of Individuals		
% Chironomidae	39.3	5.2 \pm 5.7
% Coleoptera	0.0	0.6 \pm 2.2
% Diptera + Non-insects	74.1	7.4 \pm 7.0
% Ephemeroptera	11.0	45.8 \pm 15.1
% Ephemeroptera that are Baetidae	2.7	28.9 \pm 20.8
% EPT Individuals	25.9	91.9 \pm 7.3
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	66.1	59.5 \pm 11.3
% of 5 dominant taxa	92.6	85.1 \pm 6.5
% of dominant taxa	39.3	37.7 \pm 10.4
% Plecoptera	0.9	40.5 \pm 13.3
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	8.5	23.9 \pm 23.6
% Tricoptera	14.0	5.6 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.4	0.9 \pm 0.1
Total Abundance	4800.0	1449.4 \pm 859.7
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.2
Coleoptera taxa	0.0	0.2 \pm 0.5
Diptera taxa	3.0	2.6 \pm 1.1
Ephemeroptera taxa	4.0	3.7 \pm 0.6
EPT Individuals (Sum)	1242.9	1352.9 \pm 804.6
EPT taxa (no)	9.0	12.2 \pm 2.1
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.6	0.7 \pm 0.1
Plecoptera taxa	3.0	5.4 \pm 1.2
Shannon-Wiener Diversity	1.7	1.9 \pm 0.3
Simpson's Diversity	0.7	0.8 \pm 0.1
Simpson's Evenness	0.2	0.3 \pm 0.1
Total No. of Taxa	16.0	16.4 \pm 3.5
Trichoptera taxa	2.0	3.2 \pm 1.3

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at COL001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.59
Apataniidae	8%	14%	5%	7%	13%	6%	0.09
Athericidae	0%	7%	0%	4%	0%	0%	0.03
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at COL001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Blephariceridae	0%	3%	0%	4%	0%	6%	0.03
Brachycentridae	31%	17%	27%	13%	4%	12%	0.14
Capniidae	77%	79%	63%	74%	63%	76%	0.71
Carabidae	0%	0%	0%	2%	0%	0%	0.01
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.11
Chironomidae	100%	100%	100%	93%	100%	88%	0.97
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.93
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.01
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.01
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.22
Empididae	54%	62%	71%	50%	62%	65%	0.57
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.11
Ephemerelellidae	85%	97%	98%	98%	98%	82%	0.97
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.00
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.39
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.01
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.81
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.03
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.07
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.09
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.12
Lebertiidae	38%	52%	46%	9%	35%	29%	0.26
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.09
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.11
Leuctridae	8%	38%	24%	33%	62%	41%	0.38
Limnephilidae	46%	38%	29%	30%	31%	29%	0.32
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.15
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.08
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecorynchidae	0%	0%	0%	0%	2%	6%	0.01
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.18
Perlidae	31%	38%	59%	17%	19%	18%	0.26
Perlodidae	77%	97%	85%	83%	90%	82%	0.86
Philopotamidae	8%	3%	12%	2%	0%	6%	0.03
Pisidiidae	8%	7%	10%	0%	0%	0%	0.02
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.24
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.01
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.92
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.25
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.48
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.02
Tabanidae	8%	0%	0%	0%	2%	0%	0.01
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.97
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.01
Tipulidae	69%	48%	49%	65%	40%	53%	0.55
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.10
Uenoidae	0%	14%	15%	41%	44%	12%	0.33
Valvatidae	0%	0%	0%	0%	2%	0%	0.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	11.83
RIVPACS : Observed taxa P>0.50	9.00
RIVPACS : O:E (p > 0.5)	0.76
RIVPACS : Expected taxa P>0.70	10.12
RIVPACS : Observed taxa P>0.70	7.00
RIVPACS : O:E (p > 0.7)	0.69

Habitat Description

Variable	COL001	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	90.78003 \pm 16.48787
Channel		
Depth-Avg (cm)	10.6	27.7 \pm 12.1
Depth-BankfullMinusWetted (cm)	1.05	48.41 \pm 32.00
Depth-Max (cm)	28.6	41.6 \pm 18.0
Discharge (m ³ /s)	0.071	4.100
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.20 \pm 0.86
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	3	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 1
Reach-Rapids (Binary)	0	1 \pm 1
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0090000	0.0302442 \pm 0.0225320
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.11	0.65 \pm 0.30
Velocity-Max (m/s)	0.20	1.02 \pm 0.40
Width-Bankfull (m)	18.9	22.0 \pm 20.4
Width-Wetted (m)	14.7	14.4 \pm 14.2
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	52.84964	101.93711 \pm 37.08464
Temp12_DECmin (Degrees Celsius)	-13.25000	-12.60285 \pm 1.55807
Hydrology		
Drainage-Area (km ²)	117.65190	153.19859 \pm 249.47160
Landcover		
Natl-Grassland (%)	0.08905	4.14423 \pm 3.51761
Natl-ShrubLow (%)	2.06878	4.00461 \pm 2.77104
Natl-Water (%)	0.00000	0.26551 \pm 0.58793
Reg-Ice (%)	0.00000	2.39543 \pm 4.09623
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	1	8 \pm 8
%Cobble (%)	58	53 \pm 15
%Gravel (%)	0	4 \pm 6
%Pebble (%)	41	33 \pm 14
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 0
D50 (cm)	7.20	14.48 \pm 20.33
Dg (cm)	7.2	13.1 \pm 19.3
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	4	2 \pm 1
SurroundingMaterial (Category(0-9))	2	3 \pm 2
Topography		
Reg-SlopeLT30% (%)	44.43454	17.11832 \pm 8.21512
SlopeMax (%)	161.32619	386.22536 \pm 140.72382

Habitat Description

Variable	COL001	Predicted Group Reference Mean \pm SD
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000028 \pm 0.0000036
Al (mg/L)	0.0109000	0.0136410 \pm 0.0145846
As (mg/L)	0.0002500	0.0001754 \pm 0.0001818
B (mg/L)	0.0250000	0.0305833 \pm 0.0370084
Ba (mg/L)	0.2970000	0.0435560 \pm 0.0571949
Be (mg/L)	0.0000500	0.0000056 \pm 0.0000072
Bi (mg/L)	0.0000500	0.0000028 \pm 0.0000036
Br (mg/L)	0.0500000	0.0268750 \pm 0.0585132
Ca (mg/L)	39.2000000	20.8384848 \pm 13.6841012
Cd (mg/L)	0.0000380	0.0000115 \pm 0.0000149
Chloride-Total (mg/L)	0.5800000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000298 \pm 0.0000226
Cr (mg/L)	0.0002500	0.0000900 \pm 0.0000889
Cu (mg/L)	0.0004500	0.0003212 \pm 0.0001572
F (mg/L)	0.0500000	0.0484615 \pm 0.0355181
Fe (mg/L)	0.0110000	0.0442667 \pm 0.0348579
General-Alkalinity (mg/L)	126.0000000	59.4800000 \pm 43.9851975
General-CarbonDOC (mg/L)	1.2300000	0.6500000 \pm 0.3535534
General-CarbonTOC (mg/L)	1.2600000	0.3944444 \pm 0.3157179
General-Conductivity (μ S/cm)	220.2000000	117.1461538 \pm 96.2732948
General-DO (mg/L)	10.6400000	12.6802381 \pm 11.2165934
General-Hardness (mg/L)	134.0000000	76.7342857 \pm 54.3511564
General-pH (pH)	8.4	7.9 \pm 0.4
General-SolidsTSS (mg/L)	9.8000000	1.9034611 \pm 3.0161707
General-SpCond (μ S/cm)	220.2000000	153.2777778 \pm 120.2707781
General-TempAir (Degrees Celsius)	27.6	10.6 \pm 5.4
General-TempWater (Degrees Celsius)	17.6000000	6.4219048 \pm 2.3475813
General-Turbidity (NTU)	1.5500000	2.7965000 \pm 4.1415171
K (mg/L)	0.9000000	0.4511613 \pm 0.2901093
Li (mg/L)	0.0104000	0.0016910 \pm 0.0023918
Mg (mg/L)	8.6700000	5.1886364 \pm 5.0072212
Mn (mg/L)	0.0033300	0.0028572 \pm 0.0019872
Mo (mg/L)	0.0007500	0.0006660 \pm 0.0004339
Na (mg/L)	3.0700000	0.9945806 \pm 0.9373003
Ni (mg/L)	0.0002000	0.0002298 \pm 0.0001811
Nitrogen-NO2 (mg/L)	0.0050000	0.0042917 \pm 0.0108893
Nitrogen-NO2+NO3 (mg/L)	0.0147000	0.0732400 \pm 0.0567225
Nitrogen-NO3 (mg/L)	0.0150000	0.0865111 \pm 0.0538993
Nitrogen-TKN (mg/L)	0.1920000	97.0987778 \pm 290.9629753
Nitrogen-TN (mg/L)	0.2070000	24.3739167 \pm 145.4787822
Pb (mg/L)	0.0001000	0.0000559 \pm 0.0000496
Phosphorus-OrthoP (mg/L)	0.0025000	0.0008667 \pm 0.0013292
Phosphorus-TP (mg/L)	0.0188000	0.0031194 \pm 0.0039854
S (mg/L)	1.5000000	362.2600000 \pm 803.7224104
Sb (mg/L)	0.0001000	0.0000288 \pm 0.0000136
Se (mg/L)	0.0002500	0.0002422 \pm 0.0003912
Si (mg/L)	2.4000000	1.9070000 \pm 0.6500353
Sn (mg/L)	0.0001000	0.0000988 \pm 0.0001602
SO4 (mg/L)	4.9000000	18.1942857 \pm 18.0693910
Sr (mg/L)	0.1410000	0.1493500 \pm 0.1276611
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0008433 \pm 0.0009290
Tl (mg/L)	0.0000100	0.0000031 \pm 0.0000048
U (mg/L)	0.0004560	0.0005805 \pm 0.0003382
V (mg/L)	0.0025000	0.0001220 \pm 0.0001369
Zn (mg/L)	0.0071000	0.0009430 \pm 0.0009518
Zr (mg/L)	0.0000500	0.0000900 \pm 0.0000894

Site Description

Study Name	CBWQ-Elk
Site	COL003
Sampling Date	Sep 09 2024
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

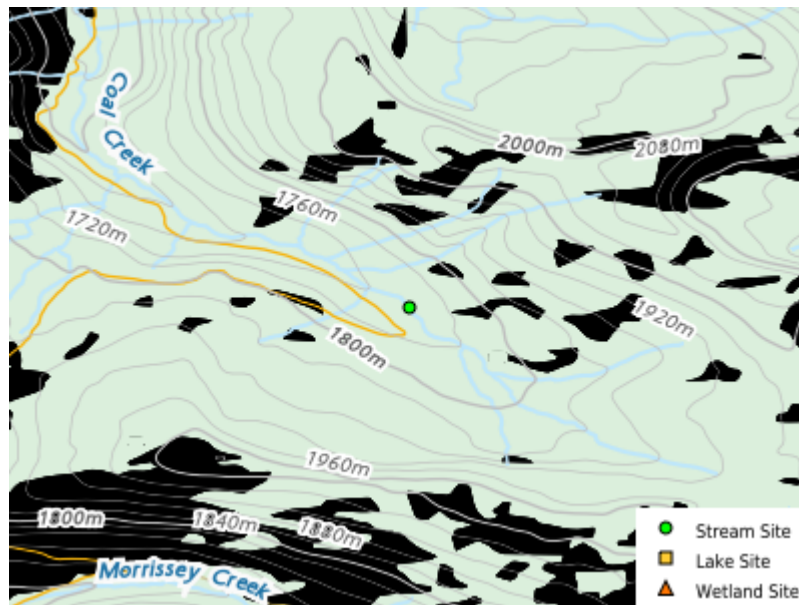


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	
Number of Reference Sites	1 13 2 24 3 28 4 35 5 32 6 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	0.2% 0.0% 2.5% 0.8% 96.4% 0.0%
CABIN Assessment of COL003 on Sep 09, 2024	Divergent

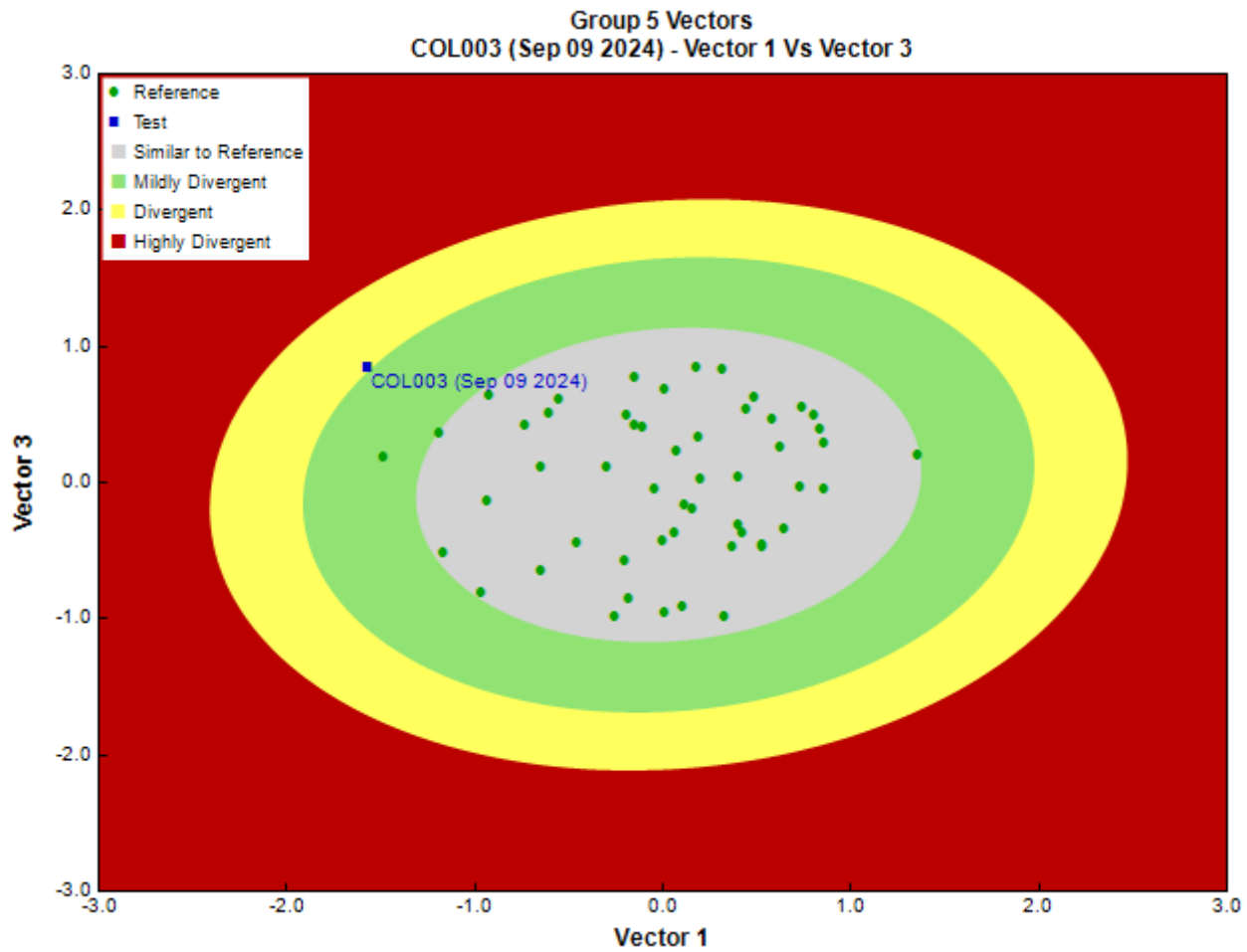


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	9/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
Annelida	Clitellata	Tubificida	Naididae	2	22.2
Arthropoda	Arachnida	Trombidiformes	Aturidae	2	22.2
			Lebertiidae	2	22.2
			Sperchontidae	3	33.3
	Collembola	Collembola		2	22.2
	Insecta	Coleoptera	Elmidae	2	22.2
		Diptera	Ceratopogonidae	1	11.1
			Chironomidae	211	2,344.3
			Empididae	2	22.2
		Ephemeroptera	Ameletidae	6	66.7
			Baetidae	16	177.8
			Ephemerellidae	8	88.8
			Heptageniidae	8	88.9
		Plecoptera		1	11.1
			Capniidae	8	88.9
			Chloroperlidae	2	22.2

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Nemouridae	18	199.9
			Perlidae	4	44.4
			Perlodidae	3	33.3
		Trichoptera	Brachycentridae	35	388.9
			Limnephilidae	1	11.1
			Rhyacophilidae	1	11.1
			Uenoidae	3	33.3
			Total	341	3,788.3

Metrics

Name	COL003	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.73	0.4 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	3.0	3.4 \pm 0.4
Hilsenhoff Family index (North-West)	3.0	3.1 \pm 0.5
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	4.0	1.7 \pm 1.2
Tolerant individuals (%)	--	0.3 \pm 0.0
Functional Measures		
% Filterers	--	
% Gatherers	84.2	45.8 \pm 14.9
% Predatores	77.1	14.8 \pm 9.8
% Scrapers	8.8	59.4 \pm 19.6
% Shredder	18.8	30.7 \pm 17.4
No. Clinger Taxa	24.0	19.8 \pm 4.0
Number Of Individuals		
% Chironomidae	62.4	7.5 \pm 8.6
% Coleoptera	0.6	0.1 \pm 0.3
% Diptera + Non-insects	66.0	10.7 \pm 9.9
% Ephemeroptera	11.2	47.2 \pm 15.8
% Ephemeroptera that are Baetidae	42.1	25.4 \pm 20.8
% EPT Individuals	33.4	89.2 \pm 10.0
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	72.8	58.3 \pm 10.6
% of 5 dominant taxa	85.2	83.6 \pm 6.3
% of dominant taxa	62.4	37.8 \pm 11.1
% Plecoptera	10.4	36.3 \pm 16.7
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	0.0	25.4 \pm 24.6
% Tricoptera	11.8	5.7 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.3	0.9 \pm 0.1
Total Abundance	3788.9	4661.0 \pm 3119.0
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.1 \pm 0.3
Diptera taxa	3.0	2.8 \pm 1.0
Ephemeroptera taxa	4.0	3.7 \pm 0.5
EPT Individuals (Sum)	1255.6	4035.4 \pm 2618.4
EPT taxa (no)	13.0	12.3 \pm 1.9
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.5	0.7 \pm 0.1
Plecoptera taxa	5.0	5.5 \pm 1.1
Shannon-Wiener Diversity	1.6	1.9 \pm 0.3
Simpson's Diversity	0.6	0.8 \pm 0.1
Simpson's Evenness	0.1	0.3 \pm 0.1
Total No. of Taxa	21.0	17.0 \pm 3.1
Trichoptera taxa	4.0	3.1 \pm 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at COL003
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.58
Apataniidae	8%	14%	5%	7%	13%	6%	0.13
Athericidae	0%	7%	0%	4%	0%	0%	0.00
Aturidae	8%	0%	5%	0%	0%	0%	0.00
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.00
Brachycentridae	31%	17%	27%	13%	4%	12%	0.05
Capniidae	77%	79%	63%	74%	63%	76%	0.64
Carabidae	0%	0%	0%	2%	0%	0%	0.00
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.15
Chironomidae	100%	100%	100%	93%	100%	88%	1.00
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.96
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.00
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.00
Elmidae	38%	17%	54%	15%	19%	12%	0.20
Empididae	54%	62%	71%	50%	62%	65%	0.62
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemerellidae	85%	97%	98%	98%	98%	82%	0.98
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.02
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.42
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.00
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.79
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.00
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.08
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.15
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.14
Lebertiidae	38%	52%	46%	9%	35%	29%	0.35
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.06
Leuctridae	8%	38%	24%	33%	62%	41%	0.60
Limnephilidae	46%	38%	29%	30%	31%	29%	0.31
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.27
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.11
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.02
Pelecorthynchidae	0%	0%	0%	0%	2%	6%	0.02
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.28
Perlidae	31%	38%	59%	17%	19%	18%	0.20
Perlodidae	77%	97%	85%	83%	90%	82%	0.90
Philopotamidae	8%	3%	12%	2%	0%	6%	0.00
Pisidiidae	8%	7%	10%	0%	0%	0%	0.00
Planorbidae	0%	0%	2%	2%	0%	0%	0.00
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.57
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.00
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.98
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.37
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.44
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.00
Tabanidae	8%	0%	0%	0%	2%	0%	0.02
Taeniopterygidae	69%	97%	88%	100%	100%	88%	1.00
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.00

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at COL003
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.41
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.14
Uenoidae	0%	14%	15%	41%	44%	12%	0.43
Valvatidae	0%	0%	0%	0%	2%	0%	0.02

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.58
RIVPACS : Observed taxa P>0.50	11.00
RIVPACS : O:E (p > 0.5)	0.87
RIVPACS : Expected taxa P>0.70	9.58
RIVPACS : Observed taxa P>0.70	8.00
RIVPACS : O:E (p > 0.7)	0.84

Habitat Description

Variable	COL003	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 \pm 8.10999
Channel		
Depth-Avg (cm)	6.4	20.0 \pm 8.6
Depth-BankfullMinusWetted (cm)	0.47	46.71 \pm 35.00
Depth-Max (cm)	13.6	28.8 \pm 13.7
Discharge (m ³ /s)	0.009	0.682
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	3.00	1.04 \pm 0.95
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 0
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0400000	0.0270638 \pm 0.0257534
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.12	0.58 \pm 0.20
Velocity-Max (m/s)	0.24	0.85 \pm 0.27
Width-Bankfull (m)	3.9	16.1 \pm 13.1
Width-Wetted (m)	2.2	9.8 \pm 7.7
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	52.73000	64.42223 \pm 33.96544
Temp12_DECmin (Degrees Celsius)	-13.00000	-12.74810 \pm 1.73767
Hydrology		
Drainage-Area (km ²)	5.65737	100.09787 \pm 132.80561
Landcover		
Natl-Grassland (%)	0.00000	7.47766 \pm 6.29880
Natl-ShrubLow (%)	0.14265	1.80492 \pm 1.50412
Natl-Water (%)	0.00000	0.32077 \pm 0.59001
Reg-Ice (%)	0.00000	1.28005 \pm 3.54484
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	5	6 \pm 6
%Cobble (%)	48	57 \pm 15
%Gravel (%)	1	2 \pm 3
%Pebble (%)	46	34 \pm 16
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 1

Habitat Description

Variable	COL003	Predicted Group Reference Mean \pm SD
D50 (cm)	6.40	24.05 \pm 35.66
Dg (cm)	6.7	23.0 \pm 33.8
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	5	4 \pm 1
PeriphytonCoverage (Category(1-5))	1	2 \pm 1
SurroundingMaterial (Category(0-9))	3	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	73.39946	20.01334 \pm 7.41149
SlopeMax (%)	101.76495	488.94077 \pm 542.32910
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000018 \pm 0.0000013
Al (mg/L)	0.0242000	0.0078031 \pm 0.0090962
As (mg/L)	0.0002500	0.0002735 \pm 0.0001787
B (mg/L)	0.0250000	0.0127286 \pm 0.0135802
Ba (mg/L)	0.0882000	0.0677069 \pm 0.0514113
Be (mg/L)	0.0000500	0.0000043 \pm 0.0000039
Bi (mg/L)	0.0000500	0.0000018 \pm 0.0000013
Br (mg/L)	0.0500000	0.0303333 \pm 0.0788597
Ca (mg/L)	14.6000000	28.2142857 \pm 13.7707094
Cd (mg/L)	0.0000590	0.0000100 \pm 0.0000293
Chloride-Total (mg/L)	0.0500000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000075 \pm 0.0000060
Cr (mg/L)	0.0002500	0.0001514 \pm 0.0001361
Cu (mg/L)	0.0002000	0.0001604 \pm 0.0001447
F (mg/L)	0.0500000	0.0876667 \pm 0.0847823
Fe (mg/L)	0.0050000	0.0101789 \pm 0.0111495
General-Alkalinity (mg/L)	44.5000000	98.9704545 \pm 43.8308301
General-CarbonDOC (mg/L)	1.6800000	0.8383333 \pm 0.4040008
General-CarbonTOC (mg/L)	1.6900000	0.5586957 \pm 0.6229060
General-Conductivity (μ S/cm)	58.9000000	173.5150000 \pm 86.2502071
General-DO (mg/L)	10.1300000	10.7243478 \pm 0.8596502
General-Hardness (mg/L)	48.7000000	109.1853659 \pm 48.3470504
General-pH (pH)	7.8	8.0 \pm 0.6
General-SolidsTSS (mg/L)	2.2000000	5.2717002 \pm 27.1908288
General-SpCond (μ S/cm)	58.9000000	196.0710526 \pm 116.3908975
General-TempAir (Degrees Celsius)	16.8	7.2 \pm 5.7
General-TempWater (Degrees Celsius)	8.4000000	6.2042553 \pm 2.0993816
General-Turbidity (NTU)	1.1400000	0.4347619 \pm 0.5563328
K (mg/L)	0.2900000	0.3312424 \pm 0.1572675
Li (mg/L)	0.0001700	0.0009183 \pm 0.0003795
Mg (mg/L)	2.9800000	7.8748571 \pm 3.9958945
Mn (mg/L)	0.0004000	0.0007721 \pm 0.0008518
Mo (mg/L)	0.0004300	0.0012835 \pm 0.0042333
Na (mg/L)	0.2000000	0.7930303 \pm 0.4756164
Ni (mg/L)	0.0000050	0.0001266 \pm 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 \pm 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0287300 \pm 0.0357249
Nitrogen-NO3 (mg/L)	0.0050000	0.0336397 \pm 0.0328125
Nitrogen-TKN (mg/L)	0.0860000	0.0352941 \pm 0.0299453
Nitrogen-TN (mg/L)	0.0860000	0.0675581 \pm 0.0509763
Pb (mg/L)	0.0001000	0.0000179 \pm 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 \pm 0.5208890
Phosphorus-TP (mg/L)	0.0136000	0.0031912 \pm 0.0087929
S (mg/L)	1.5000000	3.6625000 \pm 1.5619928
Sb (mg/L)	0.0001000	0.0000337 \pm 0.0000157
Se (mg/L)	0.0002500	0.0002782 \pm 0.0002859
Si (mg/L)	1.2000000	2.0400303 \pm 0.8510321
Sn (mg/L)	0.0001000	0.0000300 \pm 0.0000407
SO4 (mg/L)	5.4000000	13.3070732 \pm 13.0883468
Sr (mg/L)	0.0216000	0.0893414 \pm 0.0805860
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000

Habitat Description

Variable	COL003	Predicted Group Reference Mean \pmSD
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0003150 \pm 0.0001205
Tl (mg/L)	0.0000100	0.0000040 \pm 0.0000067
U (mg/L)	0.0000770	0.0003872 \pm 0.0002299
V (mg/L)	0.0025000	0.0001617 \pm 0.0001537
Zn (mg/L)	0.0075000	0.0003724 \pm 0.0003377
Zr (mg/L)	0.0000500	0.0000500 \pm 0.0000000

Site Description

Study Name	CBWQ-Elk
Site	LIZ001
Sampling Date	Sep 24 2024
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

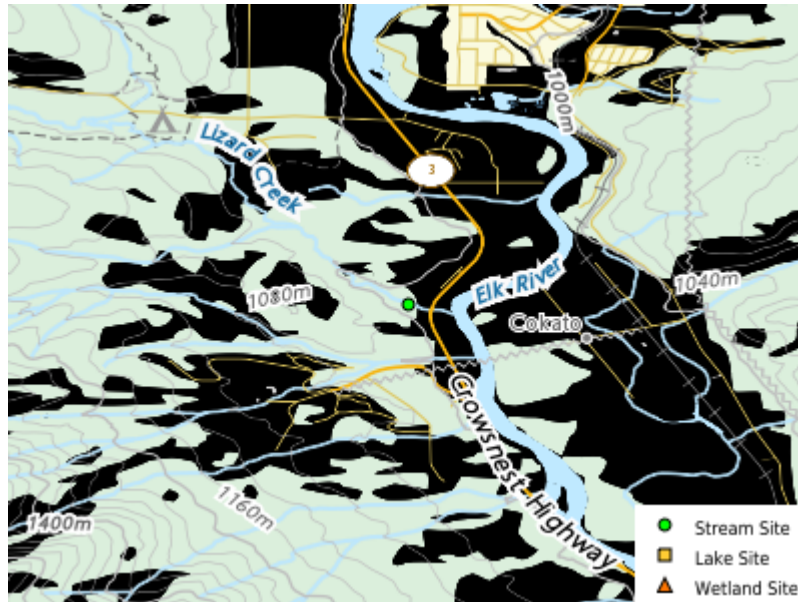


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary							
Model	Columbia Basin 2020						
Analysis Date	May 29, 2025						
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		4.1%	32.0%	18.2%	31.6%	8.3%	5.9%
CABIN Assessment of LIZ001 on Sep 24, 2024		Highly Divergent					

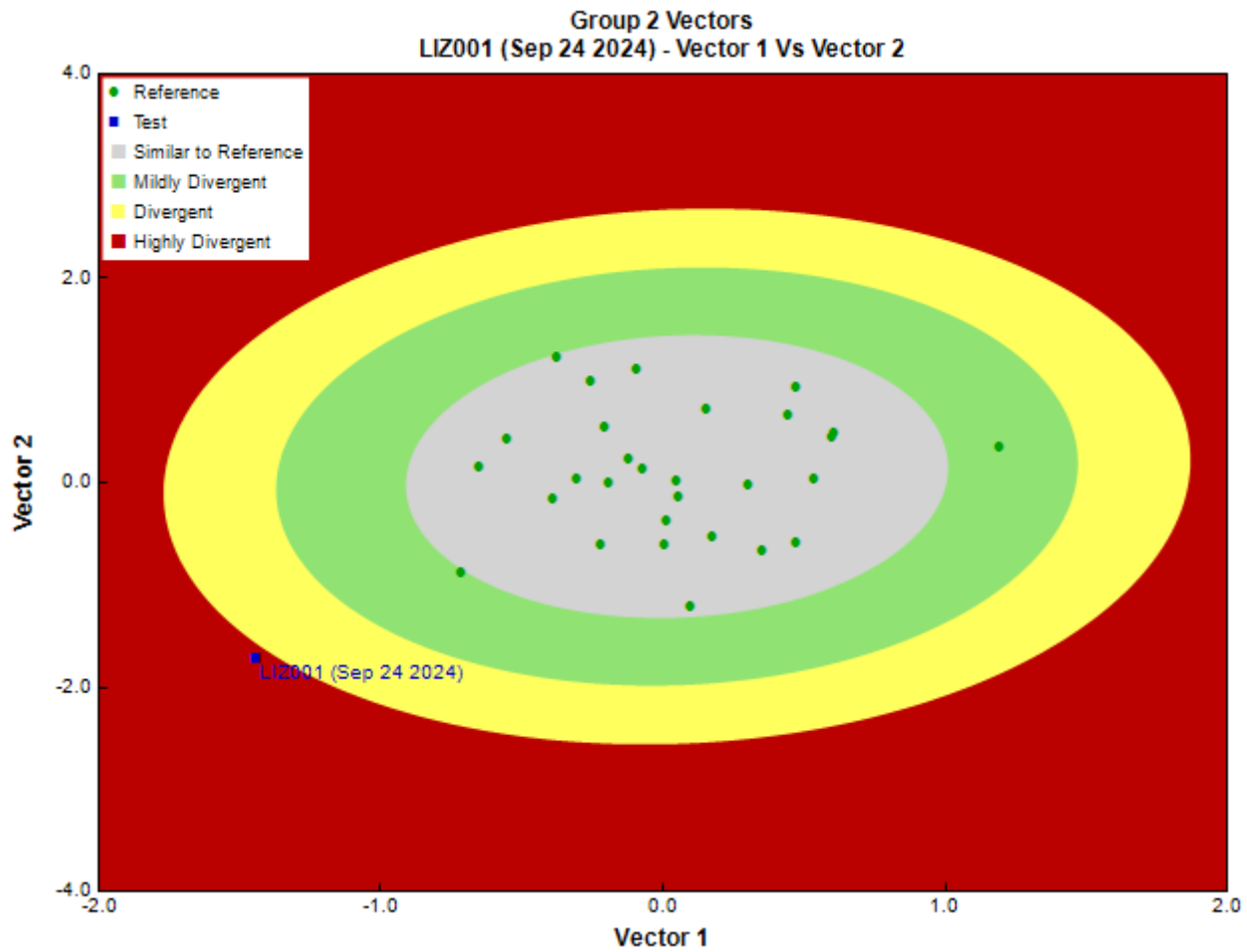


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

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	Insecta	Diptera	Lebertiidae	2	40.0	
			Sperchontidae	2	40.0	
			Torrenticolidae	3	60.0	
			Elmidae	8	160.0	
			Chironomidae	37	740.0	
			Empididae	17	340.0	
			Psychodidae	11	220.0	
			Tipulidae	2	40.0	
			Ephemeroptera	Baetidae	24	480.0
			Ephemerellidae	7	140.0	
			Heptageniidae	10	200.0	
			Plecoptera		1	20.0
				Capniidae	13	260.0
				Nemouridae	48	960.0
	Perlidae	3	60.0			

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Perlodidae	1	20.0
			Taeniopterygidae	1	20.0
		Trichoptera		1	20.0
			Brachycentridae	7	140.0
			Hydropsychidae	177	3,540.0
			Lepidostomatidae	1	20.0
			Rhyacophilidae	2	40.0
			Total	380	7,600.0

Metrics

Name	LIZ001	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.91	0.3 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	4.0	3.6 \pm 0.4
Hilsenhoff Family index (North-West)	4.0	3.2 \pm 0.3
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	4.0	2.7 \pm 1.5
Tolerant individuals (%)	--	0.9 \pm 0.2
Functional Measures		
% Filterers	--	0.6 \pm 0.3
% Gatherers	79.5	38.1 \pm 14.1
% Predatores	66.1	15.8 \pm 9.1
% Scrapers	57.9	60.8 \pm 14.6
% Shredder	21.1	23.9 \pm 11.1
No. Clinger Taxa	22.0	22.0 \pm 5.6
Number Of Individuals		
% Chironomidae	9.8	6.0 \pm 5.6
% Coleoptera	2.1	1.7 \pm 4.1
% Diptera + Non-insects	20.1	10.1 \pm 7.7
% Ephemeroptera	10.8	53.4 \pm 13.8
% Ephemeroptera that are Baetidae	58.5	29.5 \pm 17.8
% EPT Individuals	77.8	88.1 \pm 9.3
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	59.5	54.4 \pm 11.4
% of 5 dominant taxa	80.2	81.6 \pm 8.1
% of dominant taxa	46.8	35.2 \pm 11.4
% Plecoptera	17.5	28.8 \pm 11.6
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	94.7	28.7 \pm 28.3
% Tricoptera	49.5	6.0 \pm 5.0
No. EPT individuals/Chironomids+EPT Individuals	0.9	0.9 \pm 0.1
Total Abundance	7600.0	1083.1 \pm 932.3
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.3 \pm 0.5
Diptera taxa	4.0	3.1 \pm 1.3
Ephemeroptera taxa	3.0	3.8 \pm 0.6
EPT Individuals (Sum)	5880.0	941.8 \pm 766.3
EPT taxa (no)	12.0	12.4 \pm 2.4
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.6	0.7 \pm 0.1
Plecoptera taxa	5.0	5.3 \pm 1.3
Shannon-Wiener Diversity	2.0	2.0 \pm 0.3
Simpson's Diversity	0.7	0.8 \pm 0.1
Simpson's Evenness	0.2	0.3 \pm 0.1
Total No. of Taxa	21.0	18.2 \pm 4.7
Trichoptera taxa	4.0	3.3 \pm 1.5

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at LIZ2001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.60
Apataniidae	8%	14%	5%	7%	13%	6%	0.09
Athericidae	0%	7%	0%	4%	0%	0%	0.04
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.03
Brachycentridae	31%	17%	27%	13%	4%	12%	0.17
Capniidae	77%	79%	63%	74%	63%	76%	0.73
Carabidae	0%	0%	0%	2%	0%	0%	0.01
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.13
Chironomidae	100%	100%	100%	93%	100%	88%	0.97
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.91
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.01
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.01
Dixidae	8%	0%	0%	0%	0%	6%	0.01
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.24
Empididae	54%	62%	71%	50%	62%	65%	0.60
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemerellidae	85%	97%	98%	98%	98%	82%	0.96
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.00
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.36
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.01
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.76
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.03
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.06
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.11
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.14
Lebertiidae	38%	52%	46%	9%	35%	29%	0.34
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.12
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.13
Leuctridae	8%	38%	24%	33%	62%	41%	0.35
Limnephilidae	46%	38%	29%	30%	31%	29%	0.33
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.14
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.08
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecorthynchidae	0%	0%	0%	0%	2%	6%	0.01
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.15
Perlidae	31%	38%	59%	17%	19%	18%	0.32
Perlodidae	77%	97%	85%	83%	90%	82%	0.88
Philopotamidae	8%	3%	12%	2%	0%	6%	0.05
Pisidiidae	8%	7%	10%	0%	0%	0%	0.04
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.01
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.23
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.01
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.92
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.30
Sminthuridae	0%	3%	0%	0%	0%	0%	0.01
Sperchontidae	23%	76%	46%	43%	44%	59%	0.54
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.03
Tabanidae	8%	0%	0%	0%	2%	0%	0.00
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.95
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.01

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at LIZ001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.54
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.11
Uenoidae	0%	14%	15%	41%	44%	12%	0.24
Valvatidae	0%	0%	0%	0%	2%	0%	0.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.35
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS : O:E (p > 0.5)	1.05
RIVPACS : Expected taxa P>0.70	10.06
RIVPACS : Observed taxa P>0.70	10.00
RIVPACS : O:E (p > 0.7)	0.99

Habitat Description

Variable	LIZ001	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	91.25558 \pm 24.81348
Channel		
Depth-Avg (cm)	19.1	31.4 \pm 15.4
Depth-BankfullMinusWetted (cm)	78.00	54.15 \pm 36.59
Depth-Max (cm)	31.8	46.8 \pm 23.7
Discharge (m ³ /s)	0.226	0.000 \pm 0.000
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.00 \pm 0.96
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	3	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 1
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 1
Slope (m/m)	0.0100000	0.0435622 \pm 0.0544263
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.21	0.63 \pm 0.23
Velocity-Max (m/s)	0.37	0.95 \pm 0.33
Width-Bankfull (m)	10.0	23.6 \pm 18.9
Width-Wetted (m)	6.8	14.0 \pm 9.6
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	48.29762	93.78954 \pm 37.73803
Temp12_DECmin (Degrees Celsius)	-13.15000	-12.77499 \pm 1.90440
Hydrology		
Drainage-Area (km ²)	45.25148	267.49128 \pm 347.95771
Landcover		
Natl-Grassland (%)	3.20456	4.84000 \pm 3.39798
Natl-ShrubLow (%)	6.94321	4.94988 \pm 4.53147
Natl-Water (%)	0.16023	0.22026 \pm 0.32058
Reg-Ice (%)	0.00000	4.18114 \pm 6.57069
Substrate Data		
%Bedrock (%)	0	0 \pm 1
%Boulder (%)	0	6 \pm 7
%Cobble (%)	46	51 \pm 23
%Gravel (%)	3	4 \pm 6
%Pebble (%)	51	39 \pm 23
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 0

Habitat Description

Variable	LIZ001	Predicted Group Reference Mean \pm SD
D50 (cm)	5.90	8.79 \pm 6.32
Dg (cm)	5.6	7.7 \pm 3.1
Dominant-1st (Category(0-9))	5	6 \pm 1
Dominant-2nd (Category(0-9))	6	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	3	2 \pm 1
Topography		
Reg-SlopeLT30% (%)	35.05430	22.23150 \pm 8.61518
SlopeMax (%)	223.55025	475.68167 \pm 413.51912
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000038 \pm 0.0000018
Al (mg/L)	0.0261000	0.0064450 \pm 0.0021850
As (mg/L)	0.0002500	0.0002615 \pm 0.0000120
B (mg/L)	0.0250000	0.0262500 \pm 0.0335876
Ba (mg/L)	0.0933000	0.0683500 \pm 0.0002121
Be (mg/L)	0.0000500	0.0000075 \pm 0.0000035
Bi (mg/L)	0.0000500	0.0000038 \pm 0.0000018
Br (mg/L)	0.0500000	0.0140909 \pm 0.0253375
Ca (mg/L)	99.2000000	24.6363636 \pm 20.0629852
Cd (mg/L)	0.0000180	0.0000038 \pm 0.0000018
Chloride-Total (mg/L)	0.3000000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000114 \pm 0.0000019
Cr (mg/L)	0.0002500	0.0000750 \pm 0.0000354
Cu (mg/L)	0.0002000	0.0001155 \pm 0.0000219
F (mg/L)	0.2200000	0.0633810 \pm 0.0630004
Fe (mg/L)	0.0280000	0.0105500 \pm 0.0036062
General-Alkalinity (mg/L)	136.0000000	74.2125000 \pm 53.9915558
General-CarbonDOC (mg/L)	0.8500000	0.0000000 \pm 0.0000000
General-CarbonTOC (mg/L)	1.6900000	0.9750000 \pm 0.4596194
General-Conductivity (μ S/cm)	645.0000000	121.7600000 \pm 104.0053005
General-DO (mg/L)	10.3300000	11.0129630 \pm 0.8955266
General-Hardness (mg/L)	345.0000000	95.8956522 \pm 77.3576081
General-pH (pH)	8.2	7.7 \pm 0.8
General-SolidsTSS (mg/L)	2.6000000	5.9463636 \pm 8.6422279
General-SpCond (μ S/cm)	645.0000000	165.1777778 \pm 128.4575336
General-TempAir (Degrees Celsius)	21.0	11.5 \pm 5.9
General-TempWater (Degrees Celsius)	11.1000000	6.4451852 \pm 2.2997548
General-Turbidity (NTU)	2.1700000	5.7154545 \pm 6.9690564
K (mg/L)	0.4100000	0.4604091 \pm 0.2737828
Li (mg/L)	0.0033500	0.0011000 \pm 0.0000000
Mg (mg/L)	23.7000000	8.6045455 \pm 7.5439965
Mn (mg/L)	0.0023200	0.0007470 \pm 0.0001937
Mo (mg/L)	0.0017900	0.0006780 \pm 0.0000170
Na (mg/L)	1.6800000	1.0881818 \pm 0.7163042
Ni (mg/L)	0.0002000	0.0001625 \pm 0.0001945
Nitrogen-NO2 (mg/L)	0.0050000	0.0034091 \pm 0.0048394
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0789333 \pm 0.0140433
Nitrogen-NO3 (mg/L)	0.0050000	0.0719000 \pm 0.0408583
Nitrogen-TKN (mg/L)	0.1030000	0.0200000
Nitrogen-TN (mg/L)	0.1030000	0.0929091 \pm 0.0373336
Pb (mg/L)	0.0001000	0.0000337 \pm 0.0000259
Phosphorus-OrthoP (mg/L)	0.0090000	0.0005167 \pm 0.0006974
Phosphorus-TP (mg/L)	0.0260000	0.0049864 \pm 0.0043795
S (mg/L)	69.0000000	5.0000000
Sb (mg/L)	0.0001000	0.0000635 \pm 0.0000092
Se (mg/L)	0.0002500	0.0001105 \pm 0.0000134
Si (mg/L)	2.6000000	2.5681818 \pm 1.4562562
Sn (mg/L)	0.0001000	0.0000075 \pm 0.0000035
SO4 (mg/L)	255.0000000	23.3522727 \pm 29.9414845
Sr (mg/L)	1.8200000	0.0445000 \pm 0.0002828
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000

Habitat Description

Variable	LIZ001	Predicted Group Reference Mean \pmSD
Ti (mg/L)	0.0025000	0.0005000
Tl (mg/L)	0.0000100	0.0000015 \pm 0.0000007
U (mg/L)	0.0004290	0.0012050 \pm 0.0000495
V (mg/L)	0.0025000	0.0001500 \pm 0.0000707
Zn (mg/L)	0.0068000	0.0006400 \pm 0.0005091
Zr (mg/L)	0.0000500	0.0000000 \pm 0.0000000

Site Description

Study Name	CBWQ-Elk
Site	LIZ003
Sampling Date	Sep 24 2024
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

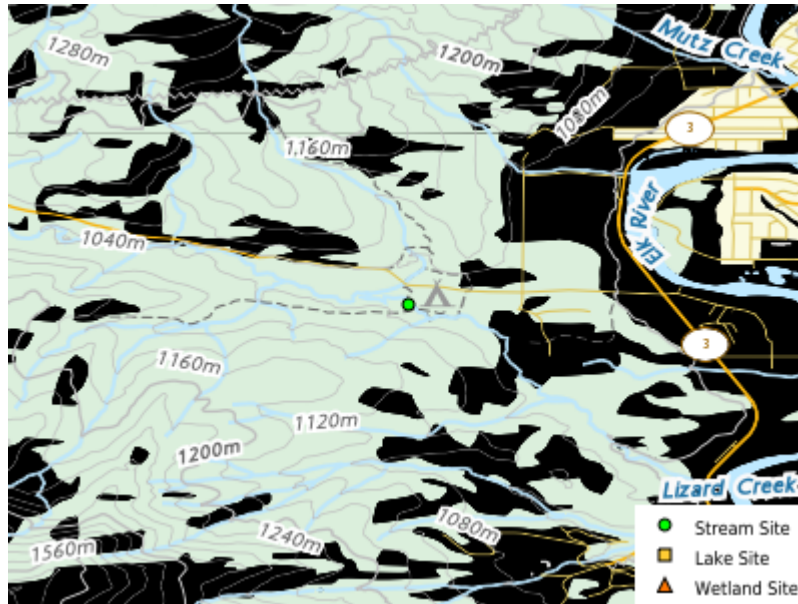


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	
Number of Reference Sites	1 13 2 24 3 28 4 35 5 32 6 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	4.4% 29.0% 17.7% 31.8% 11.5% 5.6%
CABIN Assessment of LIZ003 on Sep 24, 2024	Highly Divergent

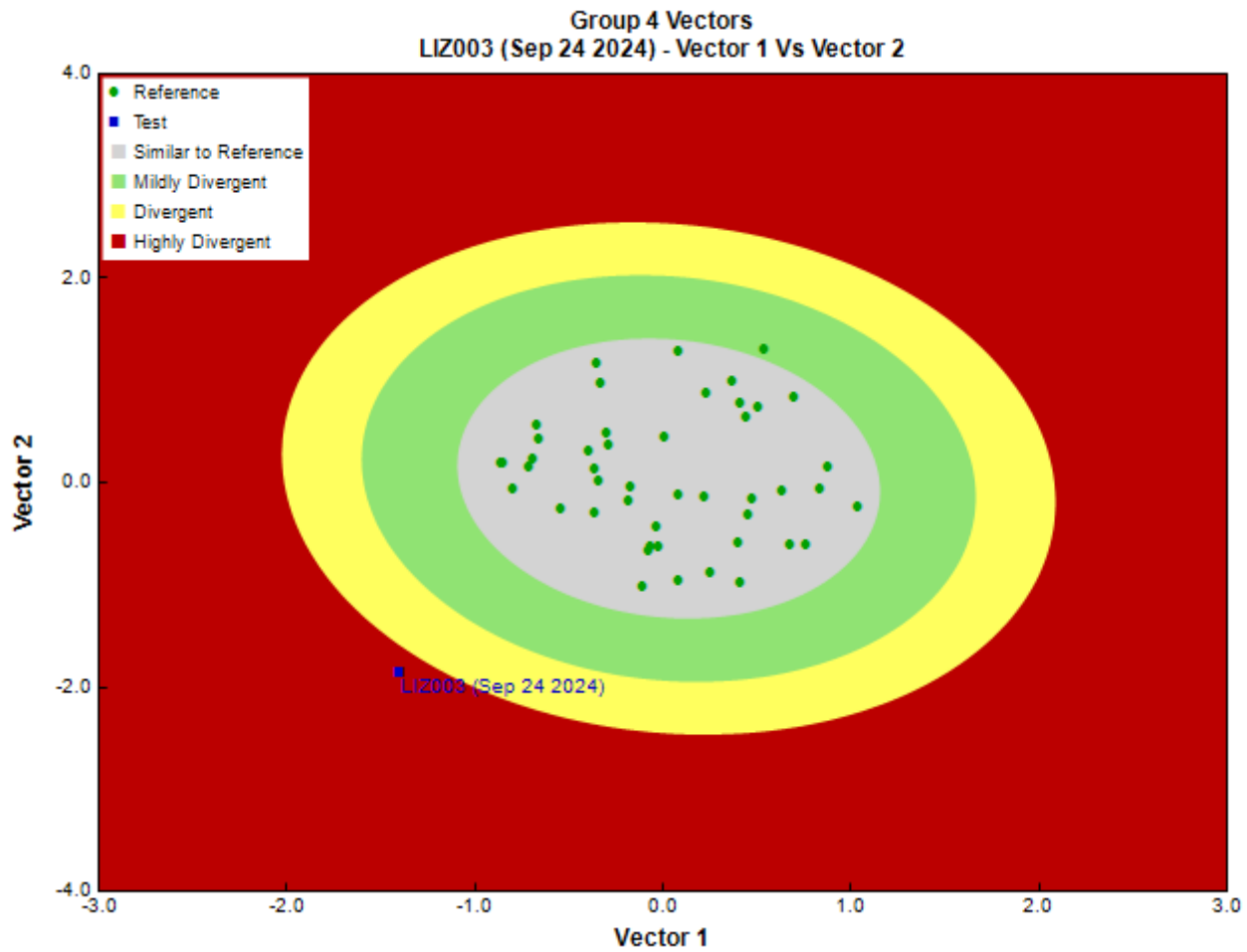


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

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	7	140.0	
			Torrenticolidae	8	160.0	
Insecta		Coleoptera	Elmidae	185	3,700.0	
			Diptera	Chironomidae	5	100.0
			Empididae	4	80.0	
			Pelecorhynchidae	3	60.0	
			Psychodidae	31	620.0	
			Simuliidae	1	20.0	
			Tipulidae	6	120.0	
			Ephemeroptera	Baetidae	101	2,020.0
				Ephemerellidae	37	740.0
				Heptageniidae	31	620.0
			Plecoptera		6	120.0
				Capniidae	8	160.0
				Chloroperlidae	8	160.0
				Leuctridae	7	140.0

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Nemouridae	69	1,380.0
			Peltoperlidae	2	40.0
			Perlidae	11	220.0
			Perlodidae	5	100.0
			Taeniopterygidae	11	220.0
		Trichoptera		2	40.0
			Brachycentridae	14	280.0
			Glossosomatidae	5	100.0
			Hydropsychidae	111	2,220.0
			Rhyacophilidae	8	160.0
			Uenoidae	17	340.0
			Total	703	14,060.0

Metrics

Name	LIZ003	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.87	0.3 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	3.6	3.2 \pm 0.4
Hilsenhoff Family index (North-West)	3.6	2.9 \pm 0.3
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	4.0	1.9 \pm 1.0
Tolerant individuals (%)	--	0.5 \pm 0.4
Functional Measures		
% Filterers	--	0.3
% Gatherers	69.3	47.1 \pm 15.4
% Predatores	25.2	12.9 \pm 7.3
% Scrapers	65.7	68.3 \pm 16.1
% Shredder	43.0	36.7 \pm 14.6
No. Clinger Taxa	32.0	20.2 \pm 4.4
Number Of Individuals		
% Chironomidae	0.7	5.2 \pm 5.7
% Coleoptera	26.6	0.6 \pm 2.2
% Diptera + Non-insects	9.4	7.4 \pm 7.0
% Ephemeroptera	24.3	45.8 \pm 15.1
% Ephemeroptera that are Baetidae	59.8	28.9 \pm 20.8
% EPT Individuals	64.0	91.9 \pm 7.3
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	42.6	59.5 \pm 11.3
% of 5 dominant taxa	72.4	85.1 \pm 6.5
% of dominant taxa	26.6	37.7 \pm 10.4
% Plecoptera	17.4	40.5 \pm 13.3
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	71.6	23.9 \pm 23.6
% Tricoptera	22.3	5.6 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	1.0	0.9 \pm 0.1
Total Abundance	14060.0	1449.4 \pm 859.7
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.2
Coleoptera taxa	1.0	0.2 \pm 0.5
Diptera taxa	6.0	2.6 \pm 1.1
Ephemeroptera taxa	3.0	3.7 \pm 0.6
EPT Individuals (Sum)	8900.0	1352.9 \pm 804.6
EPT taxa (no)	16.0	12.2 \pm 2.1
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.8	0.7 \pm 0.1
Plecoptera taxa	8.0	5.4 \pm 1.2
Shannon-Wiener Diversity	2.4	1.9 \pm 0.3
Simpson's Diversity	0.9	0.8 \pm 0.1
Simpson's Evenness	0.3	0.3 \pm 0.1
Total No. of Taxa	25.0	16.4 \pm 3.5
Trichoptera taxa	5.0	3.2 \pm 1.3

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at LIZ2003
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.60
Apataniidae	8%	14%	5%	7%	13%	6%	0.09
Athericidae	0%	7%	0%	4%	0%	0%	0.03
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.03
Brachycentridae	31%	17%	27%	13%	4%	12%	0.16
Capniidae	77%	79%	63%	74%	63%	76%	0.73
Carabidae	0%	0%	0%	2%	0%	0%	0.01
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.13
Chironomidae	100%	100%	100%	93%	100%	88%	0.97
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.91
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.01
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.01
Dixidae	8%	0%	0%	0%	0%	6%	0.01
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.24
Empididae	54%	62%	71%	50%	62%	65%	0.59
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemereidae	85%	97%	98%	98%	98%	82%	0.96
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.00
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.37
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.01
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.77
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.03
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.06
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.11
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.14
Lebertiidae	38%	52%	46%	9%	35%	29%	0.33
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.12
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.13
Leuctridae	8%	38%	24%	33%	62%	41%	0.35
Limnephilidae	46%	38%	29%	30%	31%	29%	0.33
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.15
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.08
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecophlebiidae	0%	0%	0%	0%	2%	6%	0.01
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.16
Perlidae	31%	38%	59%	17%	19%	18%	0.31
Perlodidae	77%	97%	85%	83%	90%	82%	0.88
Philopotamidae	8%	3%	12%	2%	0%	6%	0.05
Pisidiidae	8%	7%	10%	0%	0%	0%	0.04
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.01
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.24
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.01
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.92
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.30
Sminthuridae	0%	3%	0%	0%	0%	0%	0.01
Sperchontidae	23%	76%	46%	43%	44%	59%	0.53
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.03
Tabanidae	8%	0%	0%	0%	2%	0%	0.01
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.95
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.01

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at LIZ2003
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.54
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.11
Uenoidae	0%	14%	15%	41%	44%	12%	0.25
Valvatidae	0%	0%	0%	0%	2%	0%	0.00

RIVPACS Ratios

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

Habitat Description

Variable	LIZ2003	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	90.78003 \pm 16.48787
Channel		
Depth-Avg (cm)	13.5	27.7 \pm 12.1
Depth-BankfullMinusWetted (cm)	44.50	48.41 \pm 32.00
Depth-Max (cm)	21.0	41.6 \pm 18.0
Discharge (m ³ /s)	0.128	4.100
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.20 \pm 0.86
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 1
Reach-Rapids (Binary)	0	1 \pm 1
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0120000	0.0302442 \pm 0.0225320
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.39	0.65 \pm 0.30
Velocity-Max (m/s)	0.61	1.02 \pm 0.40
Width-Bankfull (m)	10.2	22.0 \pm 20.4
Width-Wetted (m)	6.2	14.4 \pm 14.2
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	50.00611	101.93711 \pm 37.08464
Temp12_DECmin (Degrees Celsius)	-13.15000	-12.60285 \pm 1.55807
Hydrology		
Drainage-Area (km ²)	41.13000	153.19859 \pm 249.47160
Landcover		
Natl-Grassland (%)	3.33072	4.14423 \pm 3.51761
Natl-ShrubLow (%)	6.54389	4.00461 \pm 2.77104
Natl-Water (%)	0.17633	0.26551 \pm 0.58793
Reg-Ice (%)	0.00000	2.39543 \pm 4.09623
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	1	8 \pm 8
%Cobble (%)	54	53 \pm 15
%Gravel (%)	0	4 \pm 6
%Pebble (%)	45	33 \pm 14
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 0

Habitat Description

Variable	LIZ003	Predicted Group Reference Mean \pm SD
D50 (cm)	6.70	14.48 \pm 20.33
Dg (cm)	7.1	13.1 \pm 19.3
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	5	4 \pm 1
PeriphytonCoverage (Category(1-5))	1	2 \pm 1
SurroundingMaterial (Category(0-9))	7	3 \pm 2
Topography		
Reg-SlopeLT30% (%)	30.96964	17.11832 \pm 8.21512
SlopeMax (%)	223.55025	386.22536 \pm 140.72382
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000028 \pm 0.0000036
Al (mg/L)	0.0180000	0.0136410 \pm 0.0145846
As (mg/L)	0.0002500	0.0001754 \pm 0.0001818
B (mg/L)	0.0250000	0.0305833 \pm 0.0370084
Ba (mg/L)	0.0802000	0.0435560 \pm 0.0571949
Be (mg/L)	0.0000500	0.0000056 \pm 0.0000072
Bi (mg/L)	0.0000500	0.0000028 \pm 0.0000036
Br (mg/L)	0.0500000	0.0268750 \pm 0.0585132
Ca (mg/L)	99.9000000	20.8384848 \pm 13.6841012
Cd (mg/L)	0.0000210	0.0000115 \pm 0.0000149
Chloride-Total (mg/L)	0.3300000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000298 \pm 0.0000226
Cr (mg/L)	0.0002500	0.0000900 \pm 0.0000889
Cu (mg/L)	0.0002000	0.0003212 \pm 0.0001572
F (mg/L)	0.2200000	0.0484615 \pm 0.0355181
Fe (mg/L)	0.0490000	0.0442667 \pm 0.0348579
General-Alkalinity (mg/L)	139.0000000	59.4800000 \pm 43.9851975
General-CarbonDOC (mg/L)	0.5200000	0.6500000 \pm 0.3535534
General-CarbonTOC (mg/L)	0.6600000	0.3944444 \pm 0.3157179
General-Conductivity (μ S/cm)	659.0000000	117.1461538 \pm 96.2732948
General-DO (mg/L)	10.4100000	12.6802381 \pm 11.2165934
General-Hardness (mg/L)	348.0000000	76.7342857 \pm 54.3511564
General-pH (pH)	7.8	7.9 \pm 0.4
General-SolidsTSS (mg/L)	1.0000000	1.9034611 \pm 3.0161707
General-SpCond (μ S/cm)	659.0000000	153.2777778 \pm 120.2707781
General-TempAir (Degrees Celsius)	8.8	10.6 \pm 5.4
General-TempWater (Degrees Celsius)	7.8000000	6.4219048 \pm 2.3475813
General-Turbidity (NTU)	1.8600000	2.7965000 \pm 4.1415171
K (mg/L)	0.4400000	0.4511613 \pm 0.2901093
Li (mg/L)	0.0035200	0.0016910 \pm 0.0023918
Mg (mg/L)	23.9000000	5.1886364 \pm 5.0072212
Mn (mg/L)	0.0032800	0.0028572 \pm 0.0019872
Mo (mg/L)	0.0018300	0.0006660 \pm 0.0004339
Na (mg/L)	1.6200000	0.9945806 \pm 0.9373003
Ni (mg/L)	0.0002000	0.0002298 \pm 0.0001811
Nitrogen-NO2 (mg/L)	0.0050000	0.0042917 \pm 0.0108893
Nitrogen-NO2+NO3 (mg/L)	0.0525000	0.0732400 \pm 0.0567225
Nitrogen-NO3 (mg/L)	0.0520000	0.0865111 \pm 0.0538993
Nitrogen-TKN (mg/L)	0.0860000	97.0987778 \pm 290.9629753
Nitrogen-TN (mg/L)	0.1380000	24.3739167 \pm 145.4787822
Pb (mg/L)	0.0001000	0.0000559 \pm 0.0000496
Phosphorus-OrthoP (mg/L)	0.0120000	0.0008667 \pm 0.0013292
Phosphorus-TP (mg/L)	0.0373000	0.0031194 \pm 0.0039854
S (mg/L)	70.3000000	362.2600000 \pm 803.7224104
Sb (mg/L)	0.0001000	0.0000288 \pm 0.0000136
Se (mg/L)	0.0005000	0.0002422 \pm 0.0003912
Si (mg/L)	2.8000000	1.9070000 \pm 0.6500353
Sn (mg/L)	0.0001000	0.0000988 \pm 0.0001602
SO4 (mg/L)	259.0000000	18.1942857 \pm 18.0693910
Sr (mg/L)	1.8200000	0.1493500 \pm 0.1276611
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000

Habitat Description

Variable	LIZ003	Predicted Group Reference Mean \pmSD
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0008433 \pm 0.0009290
Tl (mg/L)	0.0000100	0.0000031 \pm 0.0000048
U (mg/L)	0.0004200	0.0005805 \pm 0.0003382
V (mg/L)	0.0025000	0.0001220 \pm 0.0001369
Zn (mg/L)	0.0060000	0.0009430 \pm 0.0009518
Zr (mg/L)	0.0000500	0.0000900 \pm 0.0000894

Site Description

Study Name	CBWQ-Elk
Site	LIZ009
Sampling Date	Sep 24 2024
Know Your Watershed Basin	Central Kootenay
Province / Territory	British Columbia
Terrestrial Ecological Classification	Montane Cordillera EcoZone Northern Continental Divide EcoRegion
Coordinates (decimal degrees)	49.47386 N, 115.08119 W
Altitude	1002
Local Basin Name	Lizard Creek
	Central Kootenay
Stream Order	3

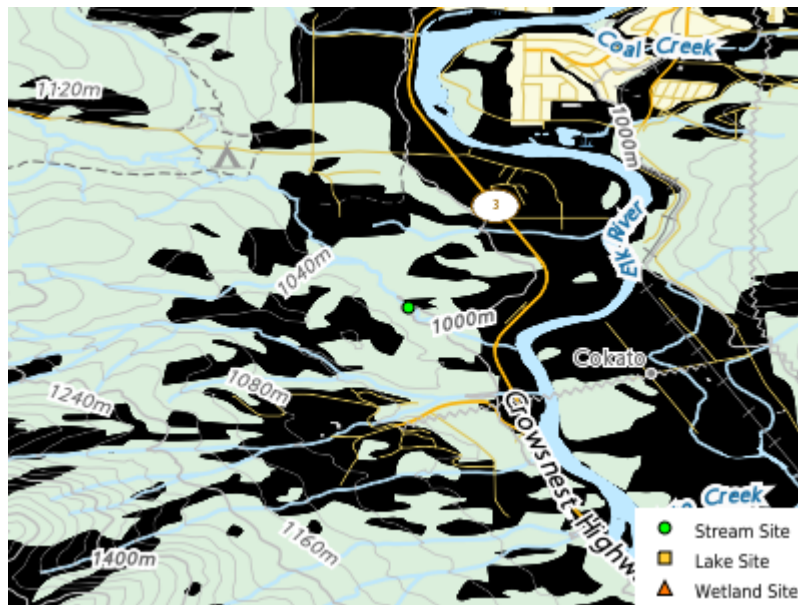


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	
Number of Reference Sites	1 13 2 24 3 28 4 35 5 32 6 15
Group Error Rate	1 53.8% 2 55.2% 3 34.1% 4 52.2% 5 23.1% 6 29.4%
Overall Model Error Rate	39.4%
Probability of Group Membership	1 5.1% 2 33.1% 3 17.8% 4 29.1% 5 9.8% 6 5.1%
CABIN Assessment of LIZ009 on Sep 24, 2024	Highly Divergent

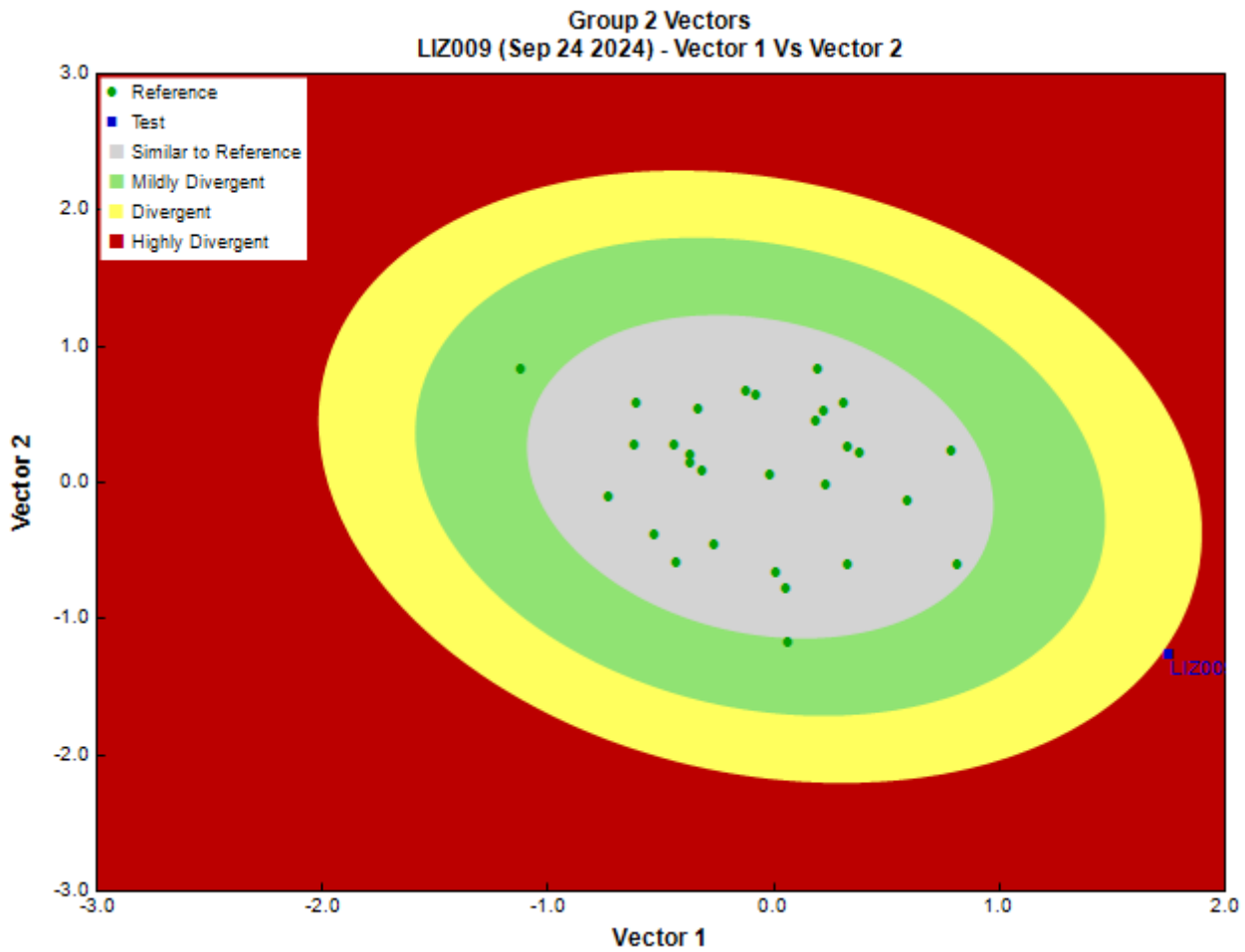


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

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		
Annelida	Clitellata	Tubificida	Naididae	1	12.5		
Arthropoda	Arachnida	Trombidiformes	Lebertiidae	5	62.5		
			Torrenticolidae	4	50.0		
	Insecta	Coleoptera	Elmidae	33	412.5		
			Diptera	Chironomidae	8	100.0	
				Empididae	1	12.5	
		Ephemeroptera		Psychodidae	16	200.0	
				Tipulidae	2	25.0	
				Baetidae	57	712.5	
			Plecoptera		Ephemerellidae	3	37.5
					Heptageniidae	8	100.0
						1	12.5
					Capniidae	6	75.0
					Chloroperlidae	1	12.5
					Leuctridae	1	12.5
Nemouridae	45				562.5		

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Perlidae	4	50.0
			Perlodidae	2	25.0
			Taeniopterygidae	2	25.0
		Trichoptera	Brachycentridae	15	187.5
			Hydropsychidae	130	1,625.0
			Lepidostomatidae	3	37.5
			Leptoceridae	1	12.5
			Rhyacophilidae	12	150.0
			Uenoidae	6	75.0
			Total	367	4,587.5

Metrics

Name	LIZ2009	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.88	0.3 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	3.7	3.6 \pm 0.4
Hilsenhoff Family index (North-West)	3.7	3.2 \pm 0.3
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	3.0	2.7 \pm 1.5
Tolerant individuals (%)	--	0.9 \pm 0.2
Functional Measures		
% Filterers	--	0.6 \pm 0.3
% Gatherers	71.7	38.1 \pm 14.1
% Predatores	49.3	15.8 \pm 9.1
% Scrapers	64.3	60.8 \pm 14.6
% Shredder	29.4	23.9 \pm 11.1
No. Clinger Taxa	25.0	22.0 \pm 5.6
Number Of Individuals		
% Chironomidae	2.2	6.0 \pm 5.6
% Coleoptera	9.0	1.7 \pm 4.1
% Diptera + Non-insects	10.1	10.1 \pm 7.7
% Ephemeroptera	18.6	53.4 \pm 13.8
% Ephemeroptera that are Baetidae	83.8	29.5 \pm 17.8
% EPT Individuals	80.9	88.1 \pm 9.3
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	51.1	54.4 \pm 11.4
% of 5 dominant taxa	76.8	81.6 \pm 8.1
% of dominant taxa	35.5	35.2 \pm 11.4
% Plecoptera	16.7	28.8 \pm 11.6
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	77.8	28.7 \pm 28.3
% Tricoptera	45.6	6.0 \pm 5.0
No. EPT individuals/Chironomids+EPT Individuals	1.0	0.9 \pm 0.1
Total Abundance	4587.5	1083.1 \pm 932.3
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.3 \pm 0.5
Diptera taxa	4.0	3.1 \pm 1.3
Ephemeroptera taxa	3.0	3.8 \pm 0.6
EPT Individuals (Sum)	3700.0	941.8 \pm 766.3
EPT taxa (no)	16.0	12.4 \pm 2.4
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.7	0.7 \pm 0.1
Plecoptera taxa	7.0	5.3 \pm 1.3
Shannon-Wiener Diversity	2.2	2.0 \pm 0.3
Simpson's Diversity	0.8	0.8 \pm 0.1
Simpson's Evenness	0.2	0.3 \pm 0.1
Total No. of Taxa	24.0	18.2 \pm 4.7
Trichoptera taxa	6.0	3.3 \pm 1.5

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at LIZ2009
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.60
Apataniidae	8%	14%	5%	7%	13%	6%	0.09
Athericidae	0%	7%	0%	4%	0%	0%	0.04
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.03
Brachycentridae	31%	17%	27%	13%	4%	12%	0.17
Capniidae	77%	79%	63%	74%	63%	76%	0.73
Carabidae	0%	0%	0%	2%	0%	0%	0.01
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.13
Chironomidae	100%	100%	100%	93%	100%	88%	0.98
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.91
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.01
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.01
Dixidae	8%	0%	0%	0%	0%	6%	0.01
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.24
Empididae	54%	62%	71%	50%	62%	65%	0.60
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemereidae	85%	97%	98%	98%	98%	82%	0.96
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.00
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.37
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.01
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.76
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.03
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.06
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.11
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.15
Lebertiidae	38%	52%	46%	9%	35%	29%	0.35
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.12
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.14
Leuctridae	8%	38%	24%	33%	62%	41%	0.35
Limnephilidae	46%	38%	29%	30%	31%	29%	0.33
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.14
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.08
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecophlebiidae	0%	0%	0%	0%	2%	6%	0.00
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.15
Perlidae	31%	38%	59%	17%	19%	18%	0.32
Perlodidae	77%	97%	85%	83%	90%	82%	0.88
Philopotamidae	8%	3%	12%	2%	0%	6%	0.05
Pisidiidae	8%	7%	10%	0%	0%	0%	0.04
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.01
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.24
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.01
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.92
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.30
Sminthuridae	0%	3%	0%	0%	0%	0%	0.01
Sperchontidae	23%	76%	46%	43%	44%	59%	0.55
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.03
Tabanidae	8%	0%	0%	0%	2%	0%	0.01
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.95
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.01

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at LIZ2009
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.54
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.12
Uenoidae	0%	14%	15%	41%	44%	12%	0.24
Valvatidae	0%	0%	0%	0%	2%	0%	0.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.34
RIVPACS : Observed taxa P>0.50	13.00
RIVPACS : O:E (p > 0.5)	1.05
RIVPACS : Expected taxa P>0.70	10.06
RIVPACS : Observed taxa P>0.70	11.00
RIVPACS : O:E (p > 0.7)	1.09

Habitat Description

Variable	LIZ2009	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	91.25558 \pm 24.81348
Channel		
Depth-Avg (cm)	13.6	31.4 \pm 15.4
Depth-BankfullMinusWetted (cm)	32.00	54.15 \pm 36.59
Depth-Max (cm)	15.5	46.8 \pm 23.7
Discharge (m ³ /s)	0.459	0.000 \pm 0.000
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.00 \pm 0.96
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	3	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 1
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 1
Slope (m/m)	0.0200000	0.0435622 \pm 0.0544263
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.43	0.63 \pm 0.23
Velocity-Max (m/s)	0.69	0.95 \pm 0.33
Width-Bankfull (m)	12.5	23.6 \pm 18.9
Width-Wetted (m)	9.1	14.0 \pm 9.6
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	49.09590	93.78954 \pm 37.73803
Temp12_DECmin (Degrees Celsius)	-12.96000	-12.77499 \pm 1.90440
Hydrology		
Drainage-Area (km ²)	44.77000	267.49128 \pm 347.95771
Landcover		
Natl-Grassland (%)	3.14103	4.84000 \pm 3.39798
Natl-ShrubLow (%)	6.96618	4.94988 \pm 4.53147
Natl-Water (%)	0.15442	0.22026 \pm 0.32058
Substrate Data		
%Bedrock (%)	0	0 \pm 1
%Boulder (%)	1	6 \pm 7
%Cobble (%)	68	51 \pm 23
%Gravel (%)	0	4 \pm 6
%Pebble (%)	31	39 \pm 23
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 0
D50 (cm)	7.65	8.79 \pm 6.32

Habitat Description

Variable	LIZ009	Predicted Group Reference Mean \pm SD
Dg (cm)	7.8	7.7 \pm 3.1
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	3	2 \pm 1
SurroundingMaterial (Category(0-9))	3	3 \pm 1
Topography		
SlopeMax (%)	240.45216	475.68167 \pm 413.51912
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000038 \pm 0.0000018
Al (mg/L)	0.0191000	0.0064450 \pm 0.0021850
As (mg/L)	0.0002500	0.0002615 \pm 0.0000120
B (mg/L)	0.0250000	0.0262500 \pm 0.0335876
Ba (mg/L)	0.0837000	0.0683500 \pm 0.0002121
Be (mg/L)	0.0000500	0.0000075 \pm 0.0000035
Bi (mg/L)	0.0000500	0.0000038 \pm 0.0000018
Br (mg/L)	0.0500000	0.0140909 \pm 0.0253375
Ca (mg/L)	102.0000000	24.6363636 \pm 20.0629852
Cd (mg/L)	0.0000220	0.0000038 \pm 0.0000018
Chloride-Total (mg/L)	0.3900000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000114 \pm 0.0000019
Cr (mg/L)	0.0002500	0.0000750 \pm 0.0000354
Cu (mg/L)	0.0002000	0.0001155 \pm 0.0000219
F (mg/L)	0.2800000	0.0633810 \pm 0.0630004
Fe (mg/L)	0.0220000	0.0105500 \pm 0.0036062
General-Alkalinity (mg/L)	137.0000000	74.2125000 \pm 53.9915558
General-CarbonDOC (mg/L)	0.7500000	0.0000000 \pm 0.0000000
General-CarbonTOC (mg/L)	1.1000000	0.9750000 \pm 0.4596194
General-Conductivity (μ S/cm)	652.0000000	121.7600000 \pm 104.0053005
General-DO (mg/L)	10.5200000	11.0129630 \pm 6.8955266
General-Hardness (mg/L)	351.0000000	95.8956522 \pm 77.3576081
General-pH (pH)	8.0	7.7 \pm 0.8
General-SolidsTSS (mg/L)	2.0000000	5.9463636 \pm 8.6422279
General-SpCond (μ S/cm)	652.0000000	165.1777778 \pm 128.4575336
General-TempAir (Degrees Celsius)	14.1	11.5 \pm 5.9
General-TempWater (Degrees Celsius)	9.2000000	6.4451852 \pm 2.2997548
General-Turbidity (NTU)	1.4100000	5.7154545 \pm 6.9690564
K (mg/L)	0.4600000	0.4604091 \pm 0.2737828
Li (mg/L)	0.0034200	0.0011000 \pm 0.0000000
Mg (mg/L)	23.7000000	8.6045455 \pm 7.5439965
Mn (mg/L)	0.0024700	0.0007470 \pm 0.0001937
Mo (mg/L)	0.0018700	0.0006780 \pm 0.0000170
Na (mg/L)	1.6200000	1.0881818 \pm 0.7163042
Ni (mg/L)	0.0002000	0.0001625 \pm 0.0001945
Nitrogen-NO2 (mg/L)	0.0050000	0.0034091 \pm 0.0048394
Nitrogen-NO2+NO3 (mg/L)	0.0226000	0.0789333 \pm 0.0140433
Nitrogen-NO3 (mg/L)	0.0230000	0.0719000 \pm 0.0408583
Nitrogen-TKN (mg/L)	0.0670000	0.0200000
Nitrogen-TN (mg/L)	0.0896000	0.0929091 \pm 0.0373336
Pb (mg/L)	0.0001000	0.0000337 \pm 0.0000259
Phosphorus-OrthoP (mg/L)	0.0190000	0.0005167 \pm 0.0006974
Phosphorus-TP (mg/L)	0.0221000	0.0049864 \pm 0.0043795
S (mg/L)	70.1000000	5.0000000
Sb (mg/L)	0.0001000	0.0000635 \pm 0.0000092
Se (mg/L)	0.0005000	0.0001105 \pm 0.0000134
Si (mg/L)	2.6000000	2.5681818 \pm 1.4562562
Sn (mg/L)	0.0001000	0.0000075 \pm 0.0000035
SO4 (mg/L)	260.0000000	23.3522727 \pm 29.9414845
Sr (mg/L)	1.7300000	0.0445000 \pm 0.0002828
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0005000

Habitat Description

Variable	LIZ009	Predicted Group Reference Mean \pmSD
Tl (mg/L)	0.0000100	0.0000015 \pm 0.0000007
U (mg/L)	0.0004280	0.0012050 \pm 0.0000495
V (mg/L)	0.0025000	0.0001500 \pm 0.0000707
Zn (mg/L)	0.0057000	0.0006400 \pm 0.0005091
Zr (mg/L)	0.0000500	0.0000000 \pm 0.0000000

Site Description

Study Name	CBWQ-Elk
Site	MOR001
Sampling Date	Sep 23 2024
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

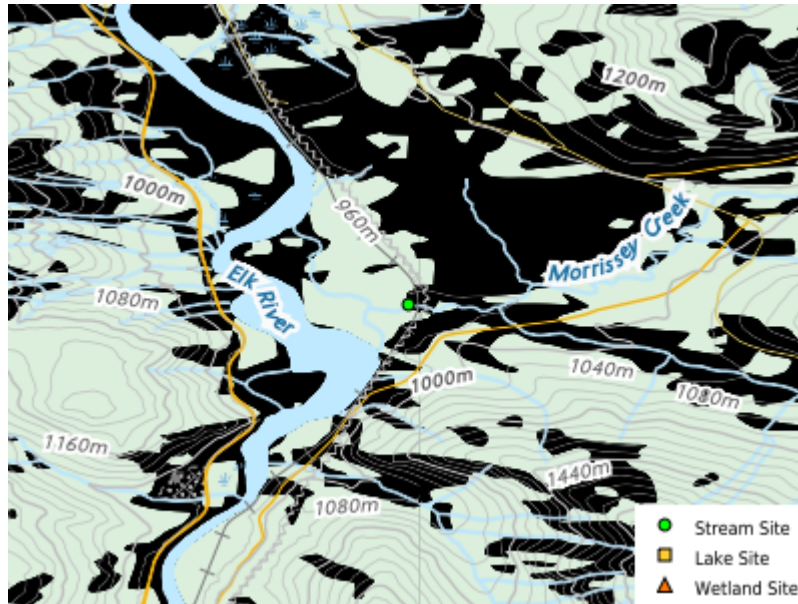


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary							
Model	Columbia Basin 2020						
Analysis Date	May 29, 2025						
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		3.0%	22.7%	14.6%	47.6%	9.6%	2.5%
CABIN Assessment of MOR001 on Sep 23, 2024		Highly Divergent					

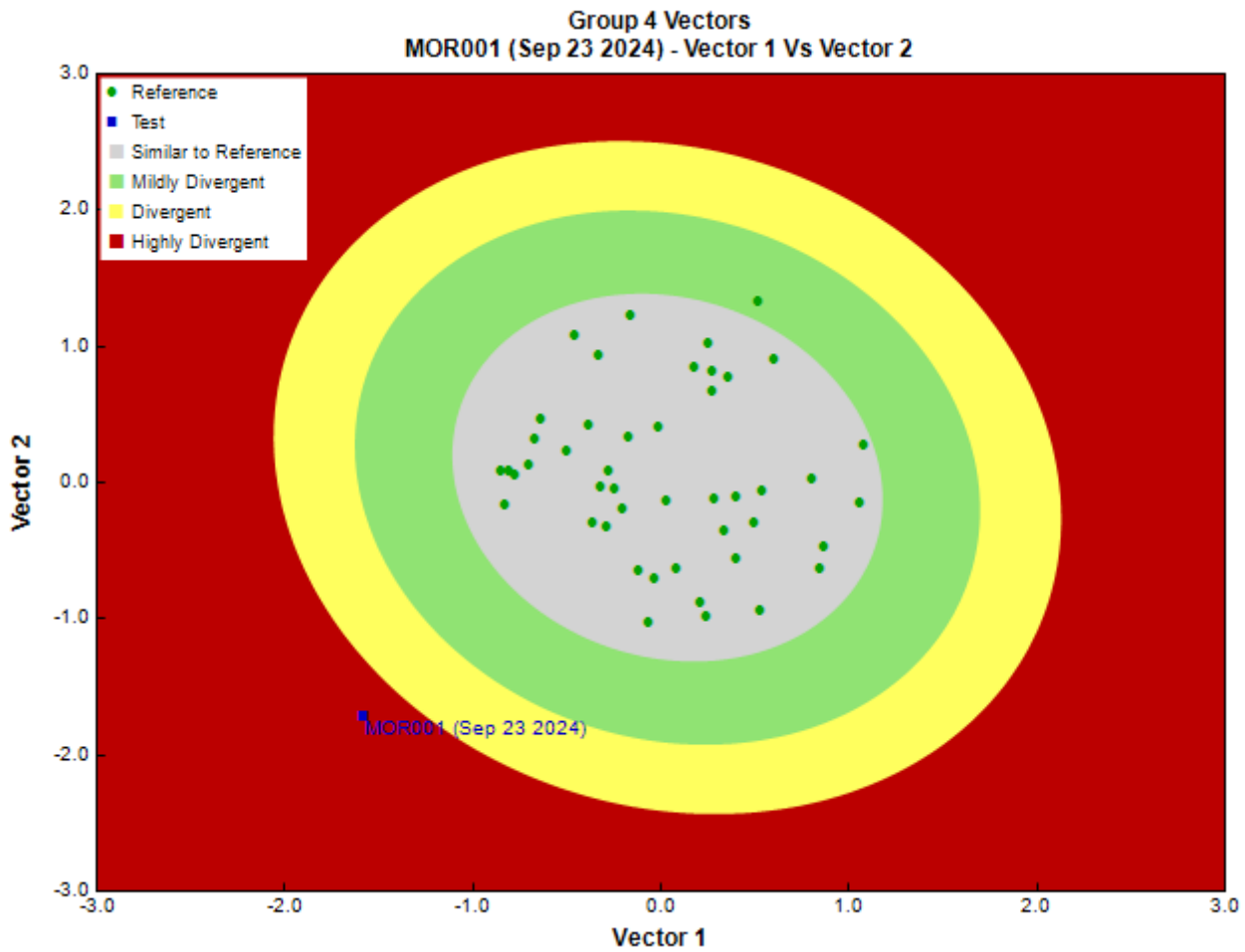


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

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	3	60.0	
			Torrenticolidae	2	40.0	
Insecta	Coleoptera	Diptera	Elmidae	16	320.0	
			Ceratopogonidae	1	20.0	
			Chironomidae	3	60.0	
			Psychodidae	1	20.0	
			Tipulidae	3	60.0	
			Ameletidae	1	20.0	
	Ephemeroptera	Baetidae	Baetidae	5	100.0	
			Ephemerellidae	3	60.0	
			Heptageniidae	54	1,080.0	
			Leptophlebiidae	3	60.0	
			Plecoptera	Nemouridae	3	60.0
			Perlodidae	2	40.0	
			Trichoptera		2	40.0
	Brachycentridae	16	320.0			

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
			Hydropsychidae	20	400.0
			Lepidostomatidae	311	6,220.0
			Total	449	8,980.0

Metrics

Name	MOR001	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.86	0.3 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	1.6	3.2 \pm 0.4
Hilsenhoff Family index (North-West)	1.6	2.9 \pm 0.3
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	3.0	1.9 \pm 1.0
Tolerant individuals (%)	--	0.5 \pm 0.4
Functional Measures		
% Filterers	--	0.3
% Gatherers	15.4	47.1 \pm 15.4
% Predatores	10.2	12.9 \pm 7.3
% Scrapers	21.2	68.3 \pm 16.1
% Shredder	77.7	36.7 \pm 14.6
No. Clinger Taxa	19.0	20.2 \pm 4.4
Number Of Individuals		
% Chironomidae	0.7	5.2 \pm 5.7
% Coleoptera	3.6	0.6 \pm 2.2
% Diptera + Non-insects	2.9	7.4 \pm 7.0
% Ephemeroptera	14.8	45.8 \pm 15.1
% Ephemeroptera that are Baetidae	7.6	28.9 \pm 20.8
% EPT Individuals	93.5	91.9 \pm 7.3
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	81.7	59.5 \pm 11.3
% of 5 dominant taxa	93.3	85.1 \pm 6.5
% of dominant taxa	69.6	37.7 \pm 10.4
% Plecoptera	1.1	40.5 \pm 13.3
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	5.8	23.9 \pm 23.6
% Tricoptera	77.6	5.6 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	1.0	0.9 \pm 0.1
Total Abundance	8980.0	1449.4 \pm 859.7
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.2
Coleoptera taxa	1.0	0.2 \pm 0.5
Diptera taxa	4.0	2.6 \pm 1.1
Ephemeroptera taxa	5.0	3.7 \pm 0.6
EPT Individuals (Sum)	8360.0	1352.9 \pm 804.6
EPT taxa (no)	10.0	12.2 \pm 2.1
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.4	0.7 \pm 0.1
Plecoptera taxa	2.0	5.4 \pm 1.2
Shannon-Wiener Diversity	1.2	1.9 \pm 0.3
Simpson's Diversity	0.5	0.8 \pm 0.1
Simpson's Evenness	0.1	0.3 \pm 0.1
Total No. of Taxa	17.0	16.4 \pm 3.5
Trichoptera taxa	3.0	3.2 \pm 1.3

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at MOR001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.59
Apataniidae	8%	14%	5%	7%	13%	6%	0.09
Athericidae	0%	7%	0%	4%	0%	0%	0.04

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at MOR001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Aturidae	8%	0%	5%	0%	0%	0%	0.01
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.03
Brachycentridae	31%	17%	27%	13%	4%	12%	0.16
Capniidae	77%	79%	63%	74%	63%	76%	0.73
Carabidae	0%	0%	0%	2%	0%	0%	0.01
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.11
Chironomidae	100%	100%	100%	93%	100%	88%	0.97
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.92
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.01
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.01
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.01
Elmidae	38%	17%	54%	15%	19%	12%	0.22
Empididae	54%	62%	71%	50%	62%	65%	0.57
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.11
Ephemerellidae	85%	97%	98%	98%	98%	82%	0.97
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.00
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.38
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.01
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.81
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.03
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.06
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.09
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.12
Lebertiidae	38%	52%	46%	9%	35%	29%	0.28
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.12
Leuctridae	8%	38%	24%	33%	62%	41%	0.35
Limnephilidae	46%	38%	29%	30%	31%	29%	0.32
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.13
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.07
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.01
Pelecorynchidae	0%	0%	0%	0%	2%	6%	0.00
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.16
Perlidae	31%	38%	59%	17%	19%	18%	0.29
Perlodidae	77%	97%	85%	83%	90%	82%	0.87
Philopotamidae	8%	3%	12%	2%	0%	6%	0.04
Pisidiidae	8%	7%	10%	0%	0%	0%	0.03
Planorbidae	0%	0%	2%	2%	0%	0%	0.01
Poduridae	0%	3%	0%	0%	0%	0%	0.01
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.20
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.01
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.92
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.26
Sminthuridae	0%	3%	0%	0%	0%	0%	0.01
Sperchontidae	23%	76%	46%	43%	44%	59%	0.51
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.03
Tabanidae	8%	0%	0%	0%	2%	0%	0.00
Taeniopterygidae	69%	97%	88%	100%	100%	88%	0.96
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.01
Tipulidae	69%	48%	49%	65%	40%	53%	0.56
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.10
Uenoidae	0%	14%	15%	41%	44%	12%	0.29

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at MOR001
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Valvatidae	0%	0%	0%	0%	2%	0%	0.00

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.35
RIVPACS : Observed taxa P>0.50	10.00
RIVPACS : O:E (p > 0.5)	0.81
RIVPACS : Expected taxa P>0.70	10.11
RIVPACS : Observed taxa P>0.70	7.00
RIVPACS : O:E (p > 0.7)	0.69

Habitat Description

Variable	MOR001	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	90.78003 \pm 16.48787
Channel		
Depth-Avg (cm)	13.8	27.7 \pm 12.1
Depth-BankfullMinusWetted (cm)	81.00	48.41 \pm 32.00
Depth-Max (cm)	23.5	41.6 \pm 18.0
Discharge (m ³ /s)	0.083	4.100
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.20 \pm 0.86
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	3	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 1
Reach-Rapids (Binary)	0	1 \pm 1
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0085000	0.0302442 \pm 0.0225320
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.17	0.65 \pm 0.30
Velocity-Max (m/s)	0.20	1.02 \pm 0.40
Width-Bankfull (m)	239.0	22.0 \pm 20.4
Width-Wetted (m)	4.6	14.4 \pm 14.2
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	51.55424	101.93711 \pm 37.08464
Temp12_DECmin (Degrees Celsius)	-13.00000	-12.60285 \pm 1.55807
Hydrology		
Drainage-Area (km ²)	81.94000	153.19859 \pm 249.47160
Landcover		
Natl-Grassland (%)	0.00000	4.14423 \pm 3.51761
Natl-ShrubLow (%)	4.53336	4.00461 \pm 2.77104
Natl-Water (%)	0.00000	0.26551 \pm 0.58793
Reg-Ice (%)	0.00000	2.39543 \pm 4.09623
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	0	8 \pm 8
%Cobble (%)	49	53 \pm 15
%Gravel (%)	5	4 \pm 6
%Pebble (%)	45	33 \pm 14
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	1	0 \pm 0
D50 (cm)	6.20	14.48 \pm 20.33
Dg (cm)	5.1	13.1 \pm 19.3
Dominant-1st (Category(0-9))	6	6 \pm 1

Habitat Description

Variable	MOR001	Predicted Group Reference Mean \pm SD
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	5	4 \pm 1
PeriphytonCoverage (Category(1-5))	2	2 \pm 1
SurroundingMaterial (Category(0-9))	3	3 \pm 2
Topography		
Reg-SlopeLT30% (%)	50.32512	17.11832 \pm 8.21512
SlopeMax (%)	209.87454	386.22536 \pm 140.72382
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000028 \pm 0.0000036
Al (mg/L)	0.0102000	0.0136410 \pm 0.0145846
As (mg/L)	0.0002500	0.0001754 \pm 0.0001818
B (mg/L)	0.0250000	0.0305833 \pm 0.0370084
Ba (mg/L)	0.1600000	0.0435560 \pm 0.0571949
Be (mg/L)	0.0000500	0.0000056 \pm 0.0000072
Bi (mg/L)	0.0000500	0.0000028 \pm 0.0000036
Br (mg/L)	0.0500000	0.0268750 \pm 0.0585132
Ca (mg/L)	41.4000000	20.8384848 \pm 13.6841012
Cd (mg/L)	0.0000210	0.0000115 \pm 0.0000149
Chloride-Total (mg/L)	3.8200000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000298 \pm 0.0000226
Cr (mg/L)	0.0002500	0.0000900 \pm 0.0000889
Cu (mg/L)	0.0002000	0.0003212 \pm 0.0001572
F (mg/L)	0.0500000	0.0484615 \pm 0.0355181
Fe (mg/L)	0.0220000	0.0442667 \pm 0.0348579
General-Alkalinity (mg/L)	122.0000000	59.4800000 \pm 43.9851975
General-CarbonDOC (mg/L)	1.4400000	0.6500000 \pm 0.3535534
General-CarbonTOC (mg/L)	1.5800000	0.3944444 \pm 0.3157179
General-Conductivity (μ S/cm)	261.7000000	117.1461538 \pm 96.2732948
General-DO (mg/L)	10.2400000	12.6802381 \pm 11.2165934
General-Hardness (mg/L)	140.0000000	76.7342857 \pm 54.3511564
General-pH (pH)	8.1	7.9 \pm 0.4
General-SolidsTSS (mg/L)	1.2000000	1.9034611 \pm 3.0161707
General-SpCond (μ S/cm)	261.7000000	153.2777778 \pm 120.2707781
General-TempAir (Degrees Celsius)	18.4	10.6 \pm 5.4
General-TempWater (Degrees Celsius)	14.2000000	6.4219048 \pm 2.3475813
General-Turbidity (NTU)	1.1900000	2.7965000 \pm 4.1415171
K (mg/L)	0.5900000	0.4511613 \pm 0.2901093
Li (mg/L)	0.0036200	0.0016910 \pm 0.0023918
Mg (mg/L)	8.8400000	5.1886364 \pm 5.0072212
Mn (mg/L)	0.0101000	0.0028572 \pm 0.0019872
Mo (mg/L)	0.0007100	0.0006660 \pm 0.0004339
Na (mg/L)	2.3700000	0.9945806 \pm 0.9373003
Ni (mg/L)	0.0002000	0.0002298 \pm 0.0001811
Nitrogen-NO2 (mg/L)	0.0050000	0.0042917 \pm 0.0108893
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0732400 \pm 0.0567225
Nitrogen-NO3 (mg/L)	0.0050000	0.0865111 \pm 0.0538993
Nitrogen-TKN (mg/L)	0.0250000	97.0987778 \pm 290.9629753
Nitrogen-TN (mg/L)	0.0250000	24.3739167 \pm 145.4787822
Pb (mg/L)	0.0001000	0.0000559 \pm 0.0000496
Phosphorus-OrthoP (mg/L)	0.0025000	0.0008667 \pm 0.0013292
Phosphorus-TP (mg/L)	0.0025000	0.0031194 \pm 0.0039854
S (mg/L)	1.5000000	362.2600000 \pm 803.7224104
Sb (mg/L)	0.0001000	0.0000288 \pm 0.0000136
Se (mg/L)	0.0002500	0.0002422 \pm 0.0003912
Si (mg/L)	2.2000000	1.9070000 \pm 0.6500353
Sn (mg/L)	0.0001000	0.0000988 \pm 0.0001602
SO4 (mg/L)	8.6000000	18.1942857 \pm 18.0693910
Sr (mg/L)	0.1470000	0.1493500 \pm 0.1276611
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0008433 \pm 0.0009290
Tl (mg/L)	0.0000100	0.0000031 \pm 0.0000048

Habitat Description

Variable	MOR001	Predicted Group Reference Mean \pmSD
U (mg/L)	0.0002950	0.0005805 \pm 0.0003382
V (mg/L)	0.0025000	0.0001220 \pm 0.0001369
Zn (mg/L)	0.0020000	0.0009430 \pm 0.0009518
Zr (mg/L)	0.0000500	0.0000900 \pm 0.0000894

Site Description

Study Name	CBWQ-Elk
Site	MOR002
Sampling Date	Sep 23 2024
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	15440
Local Basin Name	Morrissey Creek
	Central Kootenay
Stream Order	3

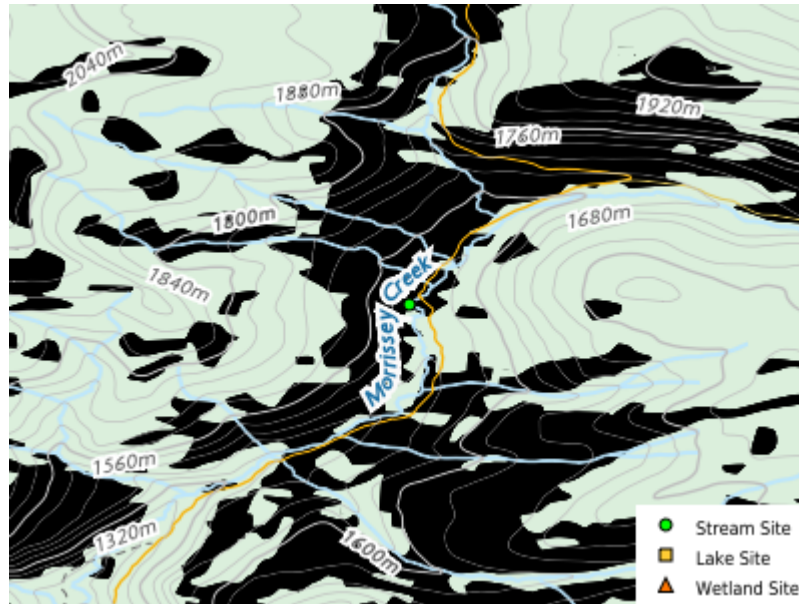


Figure 1. Location Map

Cabin Assessment Results

Reference Model Summary	
Model	Columbia Basin 2020
Analysis Date	May 29, 2025
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	
Number of Reference Sites	1 2 3 4 5 6
	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	0.0% 0.0% 0.0% 0.0% 100.0% 0.0%
CABIN Assessment of MOR002 on Sep 23, 2024	Divergent

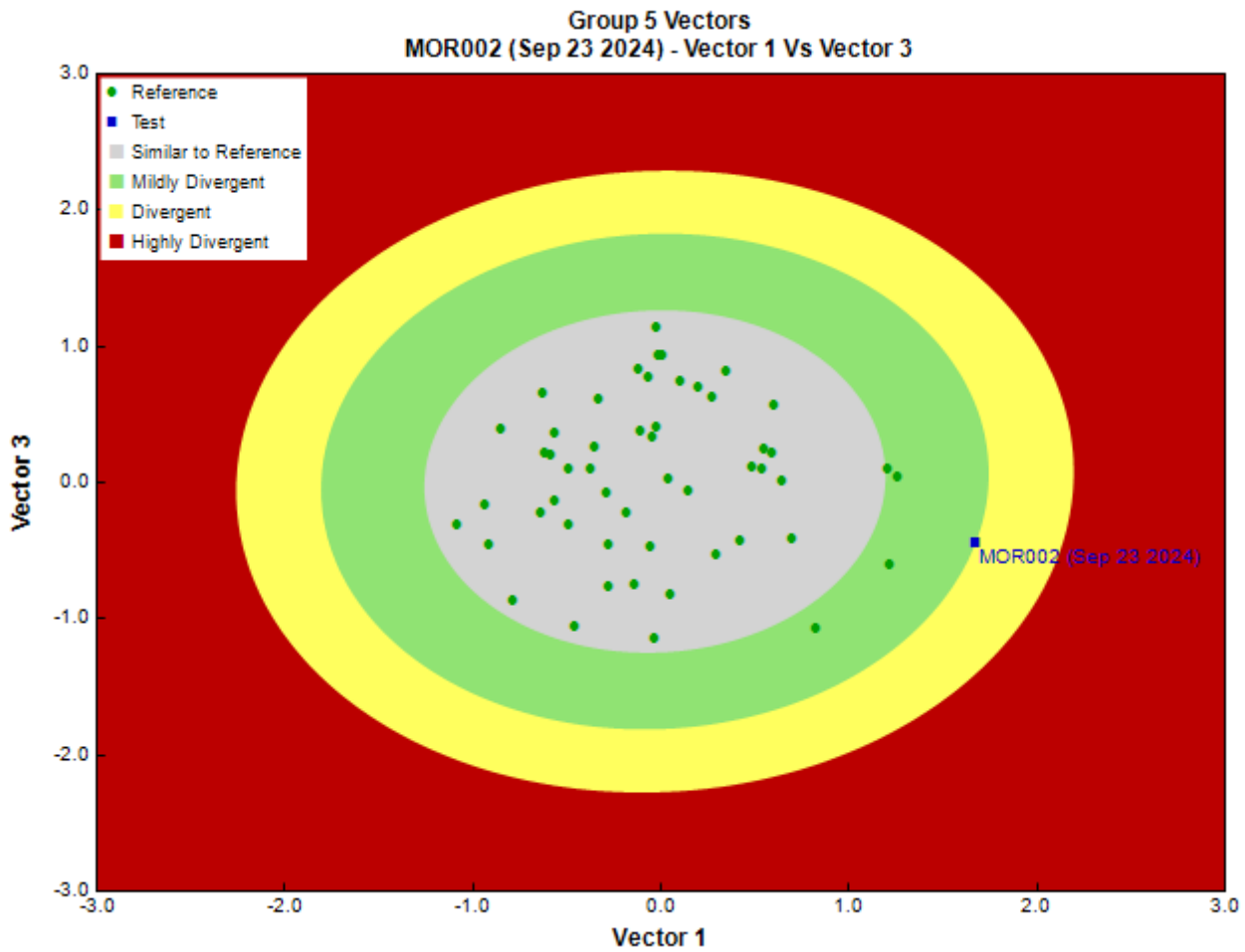


Figure 3. CABIN ordination assessment of the test site with the predicted group of reference sites. Each axis represents the relative abundance of the entire benthic invertebrate community with different organisms weighted differently on each axis.

Sample Information

Sampling Device	Kick Net
Mesh Size	400
Sampling Time	3
Taxonomist	-
	-
Sub-Sample Proportion	24/100

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count	
Annelida	Clitellata	Tubificida	Naididae	1	4.2	
Arthropoda	Arachnida	Trombidiformes	Hydryphantidae	1	4.2	
	Collembola	Collembola		12	50.0	
Insecta	Coleoptera		Elmidae	2	8.4	
			Chironomidae	104	433.4	
	Diptera		Tipulidae	2	8.3	
		Ephemeroptera		Ameletidae	3	12.5
				Baetidae	78	325.0
			Ephemerellidae	5	20.9	
			Heptageniidae	30	125.0	
			Leptophlebiidae	4	16.7	
		Plecoptera		Capniidae	17	70.8
				Chloroperlidae	8	33.3
				Nemouridae	8	33.3
				Perlidae	2	8.3
			Perlodidae	2	8.4	

Community Structure

Phylum	Class	Order	Family	Raw Count	Total Count
		Thysanoptera		1	4.2
		Trichoptera	Brachycentridae	35	145.8
			Glossosomatidae	3	12.5
			Hydropsychidae	4	16.7
			Lepidostomatidae	3	12.5
			Rhyacophilidae	6	25.0
			Total	331	1,379.4

Metrics

Name	MOR002	Predicted Group Reference Mean \pm SD
Bray-Curtis Distance	0.62	0.4 \pm 0.1
Biotic Indices		
Hilsenhoff Family index (Mid-Atlantic)	3.2	3.4 \pm 0.4
Hilsenhoff Family index (North-West)	3.2	3.1 \pm 0.5
Intolerant taxa	--	1.0 \pm 0.0
Long-lived taxa	3.0	1.7 \pm 1.2
Tolerant individuals (%)	--	0.3 \pm 0.0
Functional Measures		
% Filterers	--	
% Gatherers	51.1	45.8 \pm 14.9
% Predators	46.5	14.8 \pm 9.8
% Scrapers	35.3	59.4 \pm 19.6
% Shredder	20.2	30.7 \pm 17.4
No. Clinger Taxa	28.0	19.8 \pm 4.0
Number Of Individuals		
% Chironomidae	32.7	7.5 \pm 8.6
% Coleoptera	0.6	0.1 \pm 0.3
% Diptera + Non-insects	34.0	10.7 \pm 9.9
% Ephemeroptera	37.7	47.2 \pm 15.8
% Ephemeroptera that are Baetidae	65.0	25.4 \pm 20.8
% EPT Individuals	65.4	89.2 \pm 10.0
% Odonata	--	0.0 \pm 0.0
% of 2 dominant taxa	57.2	58.3 \pm 10.6
% of 5 dominant taxa	83.0	83.6 \pm 6.3
% of dominant taxa	32.7	37.8 \pm 11.1
% Plecoptera	11.6	36.3 \pm 16.7
% Tribe Tanyatarisini	--	
% Trichoptera that are Hydropsychida	7.8	25.4 \pm 24.6
% Tricoptera	16.0	5.7 \pm 3.9
No. EPT individuals/Chironomids+EPT Individuals	0.7	0.9 \pm 0.1
Total Abundance	1379.2	4661.0 \pm 3119.0
Richness		
Chironomidae taxa (genus level only)	1.0	1.0 \pm 0.1
Coleoptera taxa	1.0	0.1 \pm 0.3
Diptera taxa	2.0	2.8 \pm 1.0
Ephemeroptera taxa	5.0	3.7 \pm 0.5
EPT Individuals (Sum)	866.7	4035.4 \pm 2618.4
EPT taxa (no)	15.0	12.3 \pm 1.9
Odonata taxa	--	0.0 \pm 0.0
Pielou's Evenness	0.7	0.7 \pm 0.1
Plecoptera taxa	5.0	5.5 \pm 1.1
Shannon-Wiener Diversity	2.1	1.9 \pm 0.3
Simpson's Diversity	0.8	0.8 \pm 0.1
Simpson's Evenness	0.3	0.3 \pm 0.1
Total No. of Taxa	20.0	17.0 \pm 3.1
Trichoptera taxa	5.0	3.1 \pm 1.2

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at MOR002
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Ameletidae	69%	59%	68%	57%	58%	65%	0.58
Apataniidae	8%	14%	5%	7%	13%	6%	0.13
Athericidae	0%	7%	0%	4%	0%	0%	0.00
Aturidae	8%	0%	5%	0%	0%	0%	0.00
Baetidae	100%	100%	100%	100%	100%	100%	1.00
Blephariceridae	0%	3%	0%	4%	0%	6%	0.00
Brachycentridae	31%	17%	27%	13%	4%	12%	0.04
Capniidae	77%	79%	63%	74%	63%	76%	0.63
Carabidae	0%	0%	0%	2%	0%	0%	0.00
Ceratopogonidae	23%	21%	12%	4%	15%	6%	0.15
Chironomidae	100%	100%	100%	93%	100%	88%	1.00
Chloroperlidae	77%	93%	88%	93%	96%	82%	0.96
Corixidae	0%	0%	0%	0%	0%	6%	0.00
Curculionidae	0%	0%	0%	2%	0%	0%	0.00
Deuterophlebiidae	0%	0%	0%	2%	0%	0%	0.00
Dixidae	8%	0%	0%	0%	0%	6%	0.00
Dytiscidae	8%	0%	5%	0%	0%	0%	0.00
Elmidae	38%	17%	54%	15%	19%	12%	0.19
Empididae	54%	62%	71%	50%	62%	65%	0.62
Enchytraeidae	8%	14%	15%	9%	12%	24%	0.12
Ephemereidae	85%	97%	98%	98%	98%	82%	0.98
Ephydriidae	0%	0%	2%	0%	0%	0%	0.00
Feltriidae	0%	0%	0%	0%	2%	0%	0.02
Glossosomatidae	38%	34%	37%	39%	42%	24%	0.42
Heptageniidae	92%	100%	100%	100%	100%	100%	1.00
Hydraenidae	0%	0%	0%	2%	0%	0%	0.00
Hydropsychidae	46%	72%	71%	91%	79%	53%	0.79
Hydroptilidae	15%	0%	10%	2%	0%	0%	0.00
Hydrozetidae	0%	3%	7%	7%	8%	18%	0.08
Hydryphantidae	0%	21%	7%	2%	15%	18%	0.15
Hygrobatidae	15%	17%	22%	7%	13%	18%	0.13
Lebertiidae	38%	52%	46%	9%	35%	29%	0.35
Lepidostomatidae	23%	17%	17%	4%	10%	6%	0.10
Leptophlebiidae	54%	10%	17%	9%	6%	24%	0.06
Leuctridae	8%	38%	24%	33%	62%	41%	0.62
Limnephilidae	46%	38%	29%	30%	31%	29%	0.31
Lumbriculidae	8%	10%	24%	9%	27%	18%	0.27
Mideopsidae	0%	0%	0%	0%	0%	6%	0.00
Naididae	15%	10%	0%	7%	12%	12%	0.12
Nemouridae	85%	100%	98%	98%	98%	100%	0.98
Oreoleptidae	0%	3%	0%	0%	2%	0%	0.02
Pelecophlebiidae	0%	0%	0%	0%	2%	6%	0.02
Peltoperlidae	15%	10%	17%	15%	29%	18%	0.29
Perlidae	31%	38%	59%	17%	19%	18%	0.19
Perlodidae	77%	97%	85%	83%	90%	82%	0.90
Philopotamidae	8%	3%	12%	2%	0%	6%	0.00
Pisidiidae	8%	7%	10%	0%	0%	0%	0.00
Planorbidae	0%	0%	2%	2%	0%	0%	0.00
Poduridae	0%	3%	0%	0%	0%	0%	0.00
Psephenidae	0%	0%	2%	0%	0%	0%	0.00
Psychodidae	31%	21%	44%	4%	58%	18%	0.58
Pteronarcyidae	0%	0%	5%	0%	0%	0%	0.00
Rhyacophilidae	69%	100%	83%	91%	98%	82%	0.98
Sciomyzidae	8%	0%	0%	0%	0%	0%	0.00
Simuliidae	15%	38%	49%	11%	37%	29%	0.37
Sminthuridae	0%	3%	0%	0%	0%	0%	0.00
Sperchontidae	23%	76%	46%	43%	44%	59%	0.44
Stygothrombiidae	0%	3%	5%	2%	0%	6%	0.00
Tabanidae	8%	0%	0%	0%	2%	0%	0.02
Taeniopterygidae	69%	97%	88%	100%	100%	88%	1.00
Thaumaleidae	0%	3%	0%	0%	0%	6%	0.00

Frequency and Probability of Taxa Occurrence

Reference Model Taxa	Frequency of Occurrence in Reference Sites						Probability Of Occurrence at MOR002
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Tipulidae	69%	48%	49%	65%	40%	53%	0.40
Torrenticolidae	15%	10%	22%	4%	13%	18%	0.13
Uenoidae	0%	14%	15%	41%	44%	12%	0.44
Valvatidae	0%	0%	0%	0%	2%	0%	0.02

RIVPACS Ratios

RIVPACS : Expected taxa P>0.50	12.62
RIVPACS : Observed taxa P>0.50	11.00
RIVPACS : O:E (p > 0.5)	0.87
RIVPACS : Expected taxa P>0.70	9.60
RIVPACS : Observed taxa P>0.70	9.00
RIVPACS : O:E (p > 0.7)	0.94

Habitat Description

Variable	MOR002	Predicted Group Reference Mean \pm SD
Bedrock Geology		
Sedimentary (%)	100.00000	98.46051 \pm 8.10999
Channel		
Depth-Avg (cm)	6.8	20.0 \pm 8.6
Depth-BankfullMinusWetted (cm)	62.00	46.71 \pm 35.00
Depth-Max (cm)	9.9	28.8 \pm 13.7
Discharge (m ³ /s)	0.025	0.682
Macrophyte (PercentRange)	0	0 \pm 0
Reach-%CanopyCoverage (PercentRange)	1.00	1.04 \pm 0.95
Reach-%Logging (PercentRange)	0	0 \pm 0
Reach-DomStreamsideVeg (Category(1-4))	2	3 \pm 1
Reach-Pools (Binary)	1	1 \pm 0
Reach-Rapids (Binary)	0	0 \pm 0
Reach-Riffles (Binary)	1	1 \pm 0
Reach-StraightRun (Binary)	1	1 \pm 0
Slope (m/m)	0.0195000	0.0270638 \pm 0.0257534
Veg-Coniferous (Binary)	1	1 \pm 0
Veg-Deciduous (Binary)	1	1 \pm 0
Veg-GrassesFerns (Binary)	1	1 \pm 0
Veg-Shrubs (Binary)	1	1 \pm 0
Velocity-Avg (m/s)	0.10	0.58 \pm 0.20
Velocity-Max (m/s)	0.37	0.85 \pm 0.27
Width-Bankfull (m)	8.7	16.1 \pm 13.1
Width-Wetted (m)	5.2	9.8 \pm 7.7
XSEC-VelMethod (Category(1-3))	1	2 \pm 1
Climate		
Precip10_OCT (mm)	54.52875	64.42223 \pm 33.96544
Temp12_DECmin (Degrees Celsius)	-13.00000	-12.74810 \pm 1.73767
Hydrology		
Drainage-Area (km ²)	17.89000	100.09787 \pm 132.80561
Landcover		
Natl-Grassland (%)	0.00000	7.47766 \pm 6.29880
Natl-ShrubLow (%)	2.38954	1.80492 \pm 1.50412
Natl-Water (%)	0.00000	0.32077 \pm 0.59001
Reg-Ice (%)	0.00000	1.28005 \pm 3.54484
Substrate Data		
%Bedrock (%)	0	0 \pm 0
%Boulder (%)	2	6 \pm 6
%Cobble (%)	60	57 \pm 15
%Gravel (%)	3	2 \pm 3
%Pebble (%)	35	34 \pm 16
%Sand (%)	0	0 \pm 0
%Silt+Clay (%)	0	0 \pm 1

Habitat Description

Variable	MOR002	Predicted Group Reference Mean \pm SD
D50 (cm)	7.85	24.05 \pm 35.66
Dg (cm)	7.2	23.0 \pm 33.8
Dominant-1st (Category(0-9))	6	6 \pm 1
Dominant-2nd (Category(0-9))	5	6 \pm 1
Embeddedness (Category(1-5))	4	4 \pm 1
PeriphytonCoverage (Category(1-5))	2	2 \pm 1
SurroundingMaterial (Category(0-9))	3	3 \pm 1
Topography		
Reg-SlopeLT30% (%)	73.39946	20.01334 \pm 7.41149
SlopeMax (%)	97.94038	488.94077 \pm 542.32910
Water Chemistry		
Ag (mg/L)	0.0000250	0.0000018 \pm 0.0000013
Al (mg/L)	0.0499000	0.0078031 \pm 0.0090962
As (mg/L)	0.0002500	0.0002735 \pm 0.0001787
B (mg/L)	0.0250000	0.0127286 \pm 0.0135802
Ba (mg/L)	0.1810000	0.0677069 \pm 0.0514113
Be (mg/L)	0.0000500	0.0000043 \pm 0.0000039
Bi (mg/L)	0.0000500	0.0000018 \pm 0.0000013
Br (mg/L)	0.0500000	0.0303333 \pm 0.0788597
Ca (mg/L)	20.0000000	28.2142857 \pm 13.7707094
Cd (mg/L)	0.0000300	0.0000100 \pm 0.0000293
Chloride-Total (mg/L)	3.3600000	0.0000000 \pm 0.0000000
Co (mg/L)	0.0000500	0.0000075 \pm 0.0000060
Cr (mg/L)	0.0002500	0.0001514 \pm 0.0001361
Cu (mg/L)	0.0002000	0.0001604 \pm 0.0001447
F (mg/L)	0.0500000	0.0876667 \pm 0.0847823
Fe (mg/L)	0.0350000	0.0101789 \pm 0.0111495
General-Alkalinity (mg/L)	58.5000000	98.9704545 \pm 43.8308301
General-CarbonDOC (mg/L)	1.8300000	0.8383333 \pm 0.4040008
General-CarbonTOC (mg/L)	1.9600000	0.5586957 \pm 0.6229060
General-Conductivity (μ S/cm)	114.6000000	173.5150000 \pm 86.2502071
General-DO (mg/L)	10.4800000	10.7243478 \pm 0.8596502
General-Hardness (mg/L)	67.2000000	109.1853659 \pm 48.3470504
General-pH (pH)	7.8	8.0 \pm 0.6
General-SolidsTSS (mg/L)	1.2000000	5.2717002 \pm 27.1908288
General-SpCond (μ S/cm)	114.6000000	196.0710526 \pm 116.3908975
General-TempAir (Degrees Celsius)	12.5	7.2 \pm 5.7
General-TempWater (Degrees Celsius)	7.2000000	6.2042553 \pm 2.0993816
General-Turbidity (NTU)	2.3000000	0.4347619 \pm 0.5563328
K (mg/L)	0.5000000	0.3312424 \pm 0.1572675
Li (mg/L)	0.0015600	0.0009183 \pm 0.0003795
Mg (mg/L)	4.2000000	7.8748571 \pm 3.9958945
Mn (mg/L)	0.0023900	0.0007721 \pm 0.0008518
Mo (mg/L)	0.0006200	0.0012835 \pm 0.0042333
Na (mg/L)	1.8800000	0.7930303 \pm 0.4756164
Ni (mg/L)	0.0002000	0.0001266 \pm 0.0001131
Nitrogen-NO2 (mg/L)	0.0050000	0.0049953 \pm 0.0199967
Nitrogen-NO2+NO3 (mg/L)	0.0050000	0.0287300 \pm 0.0357249
Nitrogen-NO3 (mg/L)	0.0050000	0.0336397 \pm 0.0328125
Nitrogen-TKN (mg/L)	0.0640000	0.0352941 \pm 0.0299453
Nitrogen-TN (mg/L)	0.0640000	0.0675581 \pm 0.0509763
Pb (mg/L)	0.0001000	0.0000179 \pm 0.0000156
Phosphorus-OrthoP (mg/L)	0.0025000	0.1105304 \pm 0.5208890
Phosphorus-TP (mg/L)	0.0150000	0.0031912 \pm 0.0087929
S (mg/L)	1.5000000	3.6625000 \pm 1.5619928
Sb (mg/L)	0.0001000	0.0000337 \pm 0.0000157
Se (mg/L)	0.0002500	0.0002782 \pm 0.0002859
Si (mg/L)	1.0000000	2.0400303 \pm 0.8510321
Sn (mg/L)	0.0001000	0.0000300 \pm 0.0000407
SO4 (mg/L)	4.5000000	13.3070732 \pm 13.0883468
Sr (mg/L)	0.1240000	0.0893414 \pm 0.0805860
Te (mg/L)	0.0002500	0.0000000 \pm 0.0000000

Habitat Description

Variable	MOR002	Predicted Group Reference Mean \pmSD
Th (mg/L)	0.0000500	0.0000000 \pm 0.0000000
Ti (mg/L)	0.0025000	0.0003150 \pm 0.0001205
Tl (mg/L)	0.0000100	0.0000040 \pm 0.0000067
U (mg/L)	0.0001760	0.0003872 \pm 0.0002299
V (mg/L)	0.0025000	0.0001617 \pm 0.0001537
Zn (mg/L)	0.0137000	0.0003724 \pm 0.0003377
Zr (mg/L)	0.0000500	0.0000500 \pm 0.0000000



Appendix B: Raw CABIN Datasheets

Field Crew: FKwist, S Ramirez, F Thomson, B Woodward Site Code: ALX001
 Sampling Date (DD/MM/YYYY): 10/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWA -Elk Local Basin Name: Elk River

River/Stream Name: Alexander Creek Stream Order: (map scale 1:50,000) 4

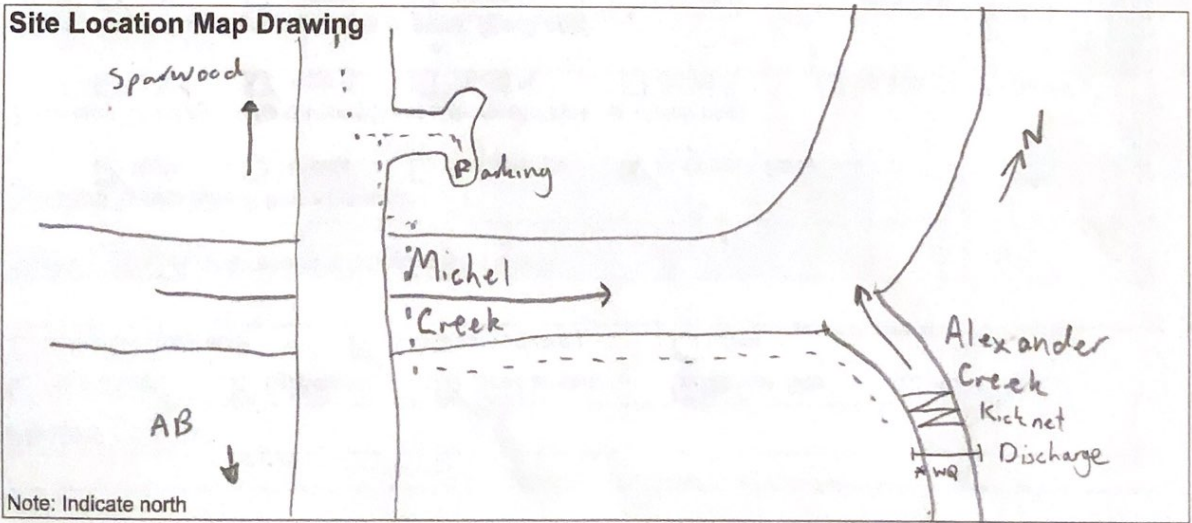
Select one: Test Site Potential Reference Site

Geographical Description/Notes:
 Parked on stream side of Hwy 3 in construction zone, will permissich from site super. Walked up Hwy, Crossed Anabelle creek & walked down stream to Alexander creek confluence. Size \approx 70m upstream of confluence. 10m DS of temp logger.

Surrounding Land Use: (check those present) Information Source: Visual, Maps
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other CP Rail

Dominant Surrounding Land Use: (check one) Information Source: Visual, Maps
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data
 Latitude: 49.674237 N Longitude: -114.780191 W (DMS or DD)
 Elevation: 1219.0 (asl or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____



Field Crew: F. Kujt, S. Ramirez, F. Thomson, B. Woodworth Site Code: ALX 001
 Sampling Date (DD/MM/YYYY): 10/09/2024

Photos

Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other _____

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 0 % 1-25 % 26-50 % 51-75 % 76-100 %
- Macrophyte Coverage: (not algae or moss, check one)
 0 % 1-25 % 26-50 % 51-75 % 76-100 %
- Streamside Vegetation: (check those present)
 ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	1
Sampling time (i.e. 3 min.)	3 min
No. of sample jars	1
Typical depth in kick area (cm)	40

Preservative used: Isopropyl

Sampled sieved on site using the "Bucket Swirling Method":

YES NO

If YES, debris collected for QA/QC

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

Field Crew: F. Kuyt, S. Ramirez, F. Thomson, B. Woodward Site Code: ALX 001
 Sampling Date (DD/MM/YYYY): 10/09/2024

WATER CHEMISTRY DATA Time: 12:18 (24 hr clock) Time zone: MST

Air Temp: 21.4 (°C) Water Temp: ~~13.5~~ 9.9 (°C) pH: 8.19
 Specific Conductance: ~~176~~ ^{230.3} (µs/cm) DO: ~~9.25~~ ^{89.4} (mg/L) Turbidity: 1.62 (NTU)

Check if water samples were collected for the following analyses:

- TSS (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) Other An Ions

Note: 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 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 = _____

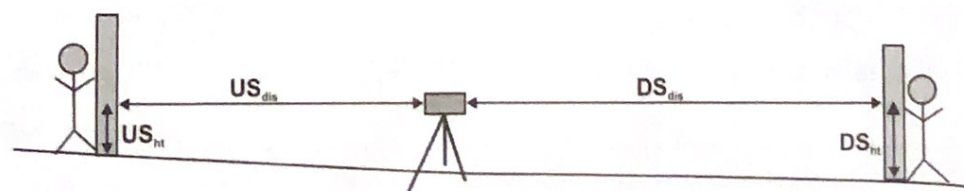
OR

Measured in field

Circle 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	<u>0.899</u>	<u>1.096</u>	
^b Height of rod			
^a Bottom Hairline (B)			
^b Distance (dis) OR	<u>11.70m</u>	<u>11.71</u>	US _{dis} +DS _{dis} =
^a T-B x 100	^a US _{dis} =T-B	^a DS _{dis} =T-B	<u>23.41</u>
Change in height (Δht)			DS _{ht} -US _{ht} = <u>0.197</u>
Slope (Δht/total dis)			<u>0.04</u>



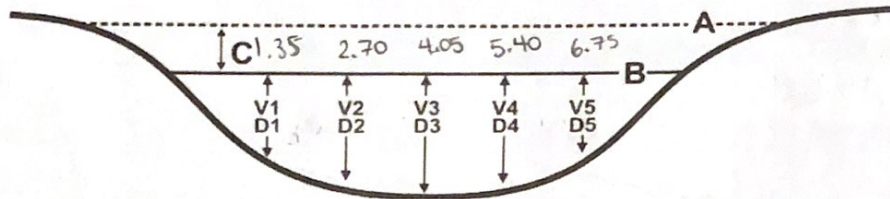
Field Crew: F. Kvijs, S. Ramirez, F. Thomson, B. Woodworth Site Code: ALX 001
 Sampling Date (DD/MM/YYYY): 10/09/2024

Widths and Depth

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

A - Bankfull Width: 12.77 (m) B - Wetted Stream Width: 8.12 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 11.40 (cm)



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:

*Charts
Propeller*

- 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 Global Water Flow Probe

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.35	2.70	4.05	5.40	6.75		
Depth (D) (cm)	41	47	36	16	8		29.6 Avg
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)							
Depth of Stagnation (D ₂) (cm)							
Change in depth (ΔD=D ₂ -D ₁) (cm)							
Rotary meter							
Revolutions							
Time (minimum 40 seconds)							
Direct Measurement or calculation							
Velocity (V) (m/s)	0.50	0.60	0.50	0.30	0.1		0.4

0.40
 42.7 47.7 First
 42.9 42.9 2nd
 Page 4 of 6

APR
 $\frac{0.4}{m/s}$

Field Crew: F Kojit, S Ramirez, F Thomson, B Woodworth Site Code: ALX 001
 Sampling Date (DD/MM/YYYY): 10/09/2024

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.
- Embeddedness categories (E):
 Completely embedded = 1
 75% embedded = 3/4
 50% embedded = 1/2
 25% embedded = 1/4
 Unembedded = 0

Handwritten note: $\frac{16.7}{100} =$

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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52	0	77	
3		28	0	53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	0
7	1/2	32		57		82	
8		33		58		83	
9		34		59	0	84	
10		35		60		85	
11		36	1/4	61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68	1/4	93	
19		44		69		94	
20		45		70		95	
21	0	46		71		96	
22		47		72		97	1/2
23		48	1/2	73		98	
24		49		74		99	
25		50		75		100	

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: F. Kujit, S. Ramirez, F. Thomson, B. Woodworth Site Code: ALX001
Sampling Date (DD/MM/YYYY): 10/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kujit

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Akshia Conely Time checked-in: 9 AM

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

Phone number: (647) 876 6245

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 N/A shallow
 Appropriate footwear, waders, wading belt

Belay used N/A shallow

Notes: Deeper flow along right bank.

Field Crew: F. Kuyt, S. Ramirez, F. Thomson, B. Wood Site Code: AXL003
 Sampling Date (DD/MM/YYYY): 10/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: ~~AXL~~ CBWQ-EIK Local Basin Name: EIK River

River/Stream Name: Alexander Creek Stream Order: (map scale 1:50,000) 4

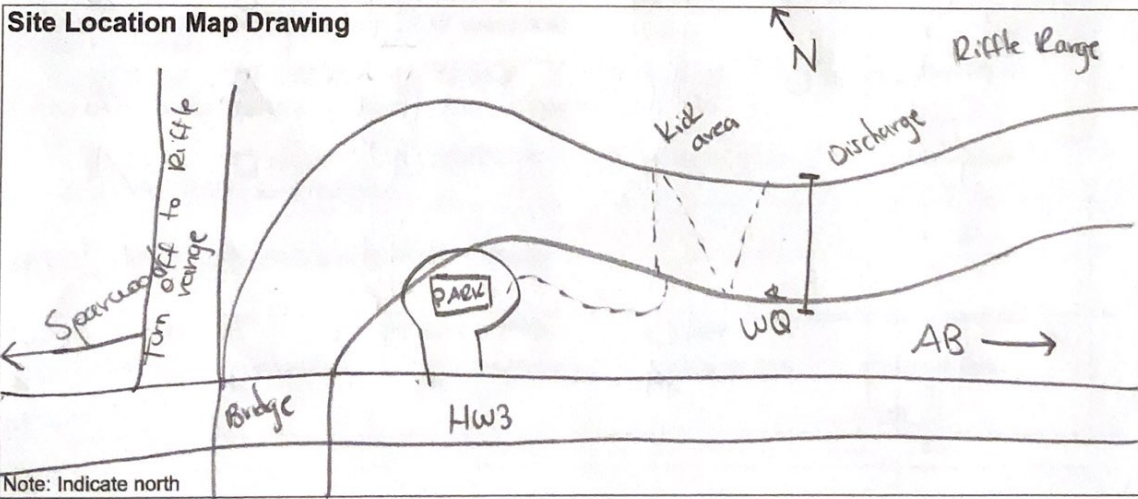
Select one: Test Site Potential Reference Site

Geographical Description/Notes: From Hwy 3 (Spanwood → Alberta), take left turn off onto dirt road (turn off before weigh station). Keep left + park. Walk into forest (past campground) to the creek. Site is about 30 m w/s across.

Surrounding Land Use: (check those present) Information Source: Visual/Map
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other Riffle range/Campground

Dominant Surrounding Land Use: (check one) Information Source: Visual/Map
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data
 Latitude: 49.655630 N Longitude: -114.73078 W (DMS or DD)
 Elevation: 1311 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____



Field Crew: F. Kuyt, S. Ramirez, F. Thomson, B. Woodworth Site Code: ALY 003
 Sampling Date (DD/MM/YYYY): 10/09/2024

Photos

Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other _____

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	<u>F. Kuyt</u>
Sampling time (i.e. 3 min.)	<u>3 mins</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>40</u>

Preservative used: Isopropryl 99%

Sampled sieved on site using the "Bucket Swirling Method":

YES NO

If YES, debris collected for QA/QC

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



Field Crew: F. Kuyt, S. Ramirez, F. Thompson, B. Woodworth Site Code: ALX003
 Sampling Date (DD/MM/YYYY): 10/09/2024

WATER CHEMISTRY DATA Time: 0845 (24 hr clock) Time zone: MST
 Air Temp: 21.3 (°C) Water Temp: 7.6 (°C) pH: 8.01
 Specific Conductance: 280.6 (µs/cm) DO: 10.42 (mg/L) Turbidity: 1.18 (NTU)

Check if water samples were collected for the following analyses:
 TSS (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) Other ANIONS

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

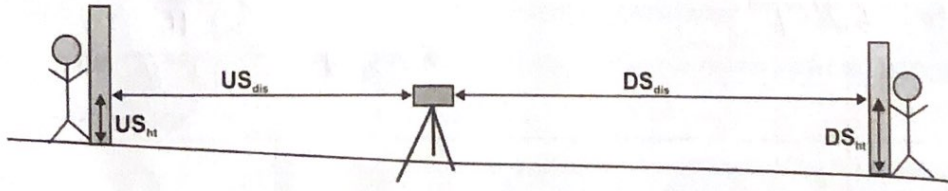
CHANNEL DATA

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

- Calculated from 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 = _____

- OR**
 Measured in field
 Circle 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
*Top Hairline (T)	—	—	
*Mid Hairline (ht) OR	10.536	0.9915	
^b Height of rod			
*Bottom Hairline (B)	—	—	
^b Distance (dis) OR	12.71	10.10	US _{dis} +DS _{dis} =
*T-B x 100	^a US _{dis} =T-B	^a DS _{dis} =T-B	22.81
Change in height (Δht)			DS _{ht} -US _{ht} = 0.455
Slope (Δht/total dis)			0.02



Field Crew: F. Kujit, S. Ramirez, F. Thompson Site Code: ALX003
 Sampling Date (DD/MM/YYYY): 10/09/2024

Widths and Depth

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

A - Bankfull Width: 11.63 (m) B - Wetted Stream Width: 10.09 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 34.5 (cm)

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 Global Water Flow Probe

Chad's 2001

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.68	3.36	5.04	6.72	8.40		
Depth (D) (cm)	26.5	26.0	28.0	22.5	16.5		23.9
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	/	/	/	/	/		
Depth of Stagnation (D ₂) (cm)	26.5	26.0	28.0	22.5	16.5		
Change in depth ($\Delta D = D_2 - D_1$) (cm)	/	/	/	/	/		
Rotary meter							
Revolutions	/	/	/	/	/		
Time (minimum 40 seconds)	/	/	/	/	/		
Direct Measurement or calculation							
Velocity (V) (m/s)	0.6	0.3	0.8	0.9	0.9		0.7

Field Crew: F. Knight, S. Ramirez, F. Thompson, R. Wood Site Code: ALX 003
 Sampling Date (DD/MM/YYYY): 10/09/24

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.
- Embeddedness categories (E):
 Completely embedded = 1
 75% embedded = ¾
 50% embedded = ½
 25% embedded = ¼
 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

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: F. Kuyt, S. Ramirez, F. Thomson, B. Woodworth Site Code: ALX003
Sampling Date (DD/MM/YYYY): 10/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kuyt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Aleshia ~~Conley~~ Conley Time checked-in: 9:00

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

Phone number: (647) 876-6245

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:

Deep pool along right bank.
Riffle range close by.

CABIN Field Sheet April 2023

Field Crew: F. Kujt, S. Ramirez, C. Hughes, C. McArthur Site Code: B01001
 Sampling Date (DD/MM/YYYY): 08/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWM-EIK Local Basin Name: EIK River

River/Stream Name: Boivin Creek Stream Order: (map scale 1:50,000) 4

Select one: Test Site Potential Reference Site

Geographical Description/Notes:

Boivin Creek above confluence with EIK River,
 DS of HWY 3 bridge, by Esso gas station.

Surrounding Land Use: (check those present)

- | | | | |
|----------------------------------|----------------------------------------|-----------------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> Forest | <input type="checkbox"/> Field/Pasture | <input type="checkbox"/> Agriculture | <input checked="" type="checkbox"/> Residential/Urban |
| <input type="checkbox"/> Logging | <input type="checkbox"/> Mining | <input checked="" type="checkbox"/> Commercial/Industrial | <input type="checkbox"/> Other _____ |

Information Source: Past visits, local, online resources

Dominant Surrounding Land Use: (check one)

- | | | | |
|----------------------------------|----------------------------------------|------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> Forest | <input type="checkbox"/> Field/Pasture | <input type="checkbox"/> Agriculture | <input checked="" type="checkbox"/> Residential/Urban |
| <input type="checkbox"/> Logging | <input type="checkbox"/> Mining | <input type="checkbox"/> Commercial/Industrial | <input type="checkbox"/> Other _____ |

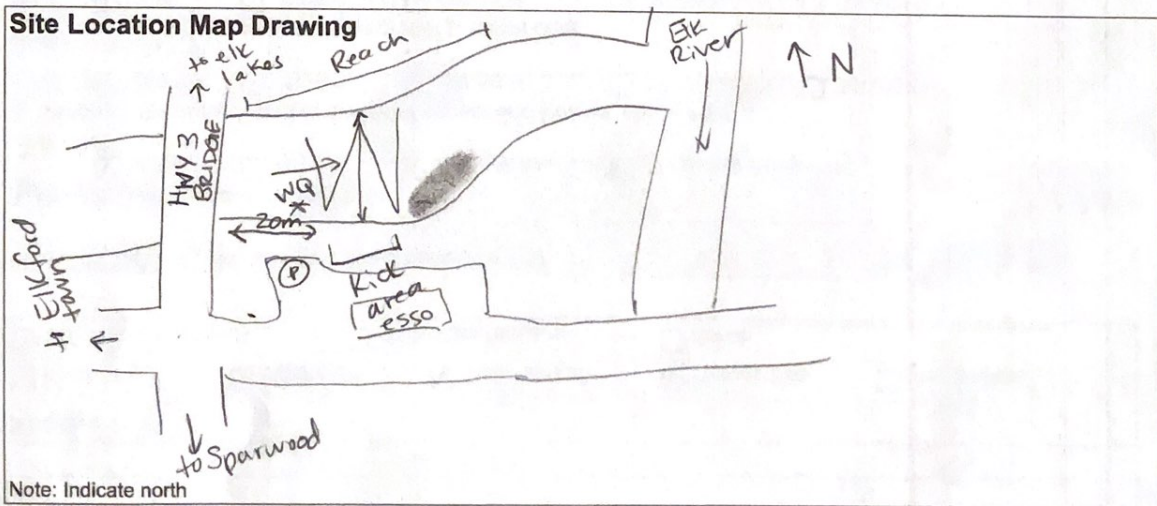
Information Source: As above

Location Data

Latitude: 50.023144 N Longitude: -114.916138 W (DMS or DD)

Elevation: 1260 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____

Site Location Map Drawing



Field Crew: F. Kijt, C. Hughes, S. Ramirez, C. McArthur Site Code: B01001
 Sampling Date (DD/MM/YYYY): 08/09/2024

Photos

- Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other _____

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 0 % 1-25 % 26-50 % 51-75 % 76-100 %
- Macrophyte Coverage: (not algae or moss, check one)
 0 % 1-25 % 26-50 % 51-75 % 76-100 %
- Streamside Vegetation: (check those present)
 ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	<u>F. Kijt</u>
Sampling time (i.e. 3 min.)	<u>3 minutes</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>35 cm</u>

Preservative used: Isopropyl 99%

Sampled sieved on site using the "Bucket Swirling Method":
 YES NO

If YES, debris collected for QA/QC

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



Field Crew: F. Kwijt, S. Ramirez, C. Hughes, C. McArthur Site Code: B01001
 Sampling Date (DD/MM/YYYY): 08/09/2024

WATER CHEMISTRY DATA Time: 12:15 (24 hr clock) Time zone: MST

Air Temp: 24 (°C) Water Temp: 6.5 (°C) pH: 7.91

Specific Conductance: 291.2 (µs/cm) DO: ~~88.2~~ 10.82 (mg/L) Turbidity: 0.53 (NTU)

Check if water samples were collected for the following analyses:

TSS (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) Other Anions

Note: 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 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 = _____

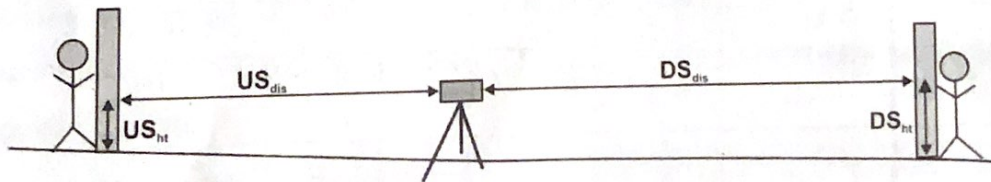
OR

Measured in field

Circle 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	<u>10.7911</u>	<u>1.201</u>	
^b Height of rod	—		
^a Bottom Hairline (B)	—		
^b Distance (dis) OR	<u>13.59</u>	<u>12.9</u>	US _{dis} +DS _{dis} =
^a T-B x 100	_a US _{dis} =T-B	_a DS _{dis} =T-B	<u>26.49</u>
Change in height (Δht)			DS _{ht} -US _{ht} = <u>0.41</u>
Slope (Δht/total dis)			<u>0.0155</u>



Field Crew: Ryan F. Kujit, S. Ramirez, C. Hughes, C. McArthur Site Code: B01001
 Sampling Date (DD/MM/YYYY): 08/09/2024

Widths and Depth

Location at site: @ top end of kick area (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 11.38 (m) B - Wetted Stream Width: 9.8 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 4 cm (cm)

Note:
 Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations.
 Wetted widths < 5 m, measure 3-4 equidistant locations.

BF = 0.37
 BF2 = 11.75
 WS = 10.77
 BWD = 0.97
 38.5
 BFH: 40.5
 WH: 42.5

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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.63	3.26	4.9	6.5	8.1	—	
Depth (D) (cm)	0.18	0.23	0.36	0.14	0.10	—	0.202
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)						—	
Depth of Stagnation (D ₂) (cm)						—	
Change in depth ($\Delta D = D_2 - D_1$) (cm)						—	
Rotary meter							
Revolutions						—	
Time (minimum 40 seconds)						—	
Direct Measurement or calculation							
Velocity (V) (m/s)	0.576	0.6804	0.5559	0.7012	0.3344	—	0.5696

F. K. Vijt

Field Crew: F. K. Vijt, S. Ramirez, C. Hughes, C. McArthur Site Code: BS01001
 Sampling Date (DD/MM/YYYY): 08/09/2024

Slope

DS: 12.9
1.201

US: 13.59
0.791

SUBSTRATE DATA

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

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.
- Embeddedness categories (E):
 Completely embedded = 1
 75% embedded = 3/4
 50% embedded = 1/2
 25% embedded = 1/4
 Unembedded = 0

Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

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: F. Kvijt, S. Ramirez, C. Hughes, C. McArthur Site Code: B01001
Sampling Date (DD/MM/YYYY): 2024/09/08

SITE INSPECTION

Site Inspected by: Fynley Kvijt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Aleshia Conely Time checked-in: 08:30 AM

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

Phone number: (647) 876 6245

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: In Esso Parking lot

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) Urban - people

PFD worn N/A Shallow

Appropriate footwear, waders, wading belt

Belay used N/A Shallow

Notes:

CABIN Field Sheet April 2023



Field Crew: F. Kuyt, C. Hughes, S. Ramirez, C. McArthur Site Code: B01002
 Sampling Date (DD/MM/YYYY): 08/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWQ - Elk Local Basin Name: EK River

River/Stream Name: Bovine Creek Stream Order: (map scale 1:50,000) 4

Select one: Test Site Potential Reference Site

Geographical Description/Notes:

Park @ Xcountry trail (on Natal Rd), follow path to bridge, stay on LWB. Keep walking until you find "Nightmare before xmas tree"

Surrounding Land Use: (check those present)

- Forest
- Field/Pasture
- Agriculture
- Residential/Urban
- Logging
- Mining
- Commercial/Industrial
- Other Xcountry trail, ATV

Information Source: Past visits, local, Online maps

Dominant Surrounding Land Use: (check one)

- Forest
- Field/Pasture
- Agriculture
- Residential/Urban
- Logging
- Mining
- Commercial/Industrial
- Other _____

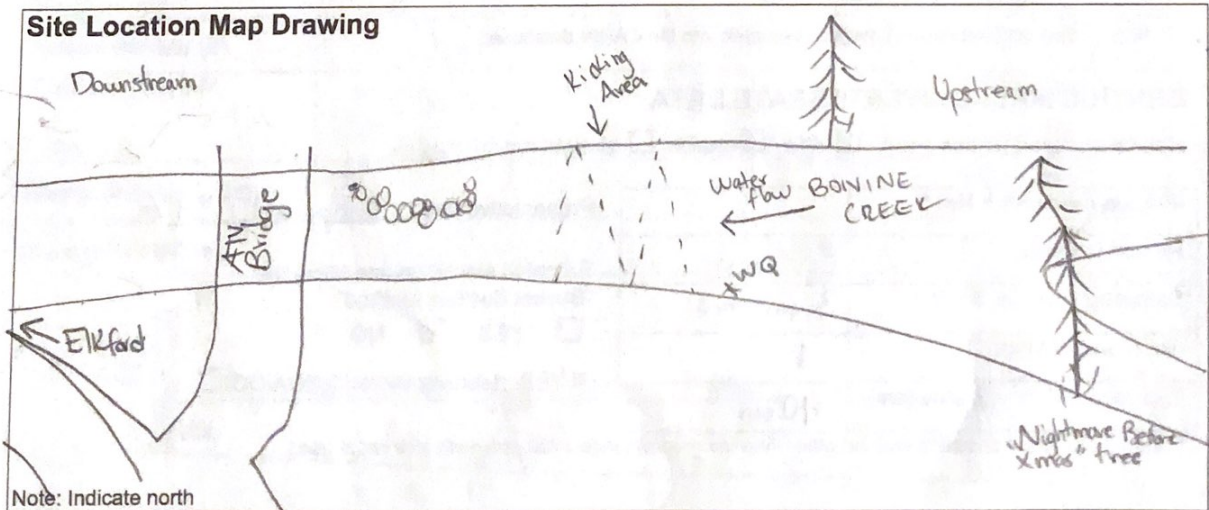
Information Source: As above

Location Data

Latitude: 50.016927 N Longitude: -114.936979 W (DMS or DD)

Elevation: 1316 (asl or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____

Site Location Map Drawing



Field Crew: F. Kuijt, C. Hughes, S. Ramirez, C. McArthur Site Code: BO1002
 Sampling Date (DD/MM/YYYY): 08/09/2024

Photos

Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other _____

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	<u>F. Kuijt</u>
Sampling time (i.e. 3 min.)	<u>3 minutes</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>40 cm</u>

Preservative used: Isopropyl 99%
 Sampled sieved on site using the "Bucket Swirling Method":
 YES NO
 If YES, debris collected for QA/QC

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

Field Crew: F. Kujit, C. Hughes, S. Ramirez, C. McArthur Site Code: B01002
 Sampling Date (DD/MM/YYYY): 08/09/2024

WATER CHEMISTRY DATA Time: 09:23 (24 hr clock) Time zone: MST

Air Temp: ~~4.5~~ ^{AFL} 9.0 (°C) Water Temp: 4.5 (°C) pH: 7.83

Specific Conductance: 293 (µs/cm) DO: 10.95 (mg/L) Turbidity: 0.63 (NTU)

Check if water samples were collected for the following analyses:

TSS (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) Other anions

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

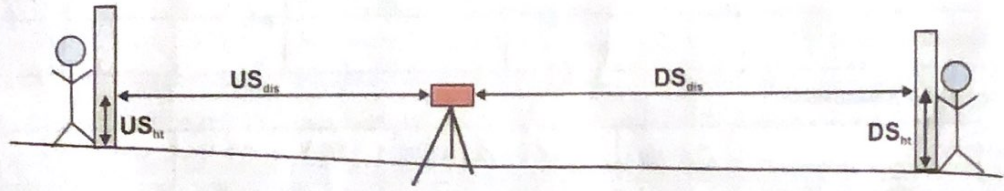
CHANNEL DATA

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

Calculated from 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 = _____

OR
 Measured in field
 Circle 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	<u>2.13^{cm} 0.955</u>	<u>2.135</u>	
^b Height of rod			
^a Bottom Hairline (B)	/	/	
^b Distance (dis) OR	<u>20.0</u>	<u>20.0</u>	US _{dis} +DS _{dis} = <u>40.0</u>
^a T-B x 100	<u>aUS_{dis}=T-B</u>	<u>aDS_{dis}=T-B</u>	DS _{ht} -US _{ht} = <u>1.18</u>
Change in height (Δht)			
Slope (Δht/total dis)			<u>0.03</u>



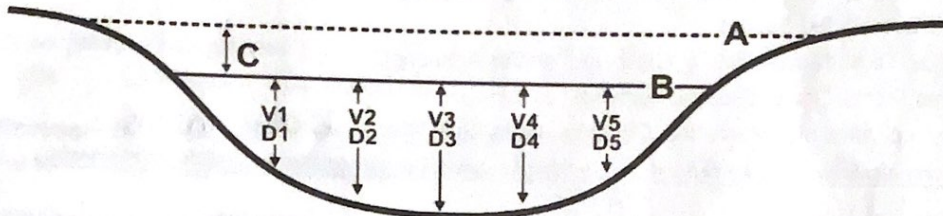
Field Crew: F. Rujt, C. Hughes, S. Ramirez, C. McArthur Site Code: B01002
 Sampling Date (DD/MM/YYYY): 08/09/2024

Widths and Depth

Location at site: At DS bottom of kick area (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 8.65 (m) B - Wetted Stream Width: 6.56 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 12.0 (cm)



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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.09	2.18	3.27	4.36	5.45	—	
Depth (D) (cm)	0.28	0.46	0.35	0.22	0.24	—	1.55
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)							
Depth of Stagnation (D ₂) (cm)							
Change in depth (ΔD=D ₂ -D ₁) (cm)							
Rotary meter							
Revolutions							
Time (minimum 40 seconds)							
Direct Measurement or calculation							
Velocity (V) (m/s)	0.4260	0.6627	1.1210	1.2507	0.6714	—	0.82656

Field Crew: F. Kwijt, C. Hughes, S. Ramirez, C. McArthur Site Code: B01002
 Sampling Date (DD/MM/YYYY): 08/09/2024

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.
- Embeddedness categories (E):
 - Completely embedded = 1
 - 75% embedded = ¾
 - 50% embedded = ½
 - 25% embedded = ¼
 - 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

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: Fynley Kwijt, Sarai, Chad, Cameron M. Site Code: B01002
Sampling Date (DD/MM/YYYY): 08/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kwijt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Aleshia Conely Time checked-in: 8:30 AM

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

Phone number: (647) 876 6245

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 N/A shallow

Appropriate footwear, waders, wading belt

Belay used N/A shallow

Notes:

Slightly Slippery

CABIN Field Sheet April 2023



Field Crew: F. Kujot, S. Ramirez, B. Woodworth Site Code: CO1001
 Sampling Date (DD/MM/YYYY): 09/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWQ - Elk Local Basin Name: Elk River
 River/Stream Name: Coal Creek Stream Order: (map scale 1:50,000) 3

Select one: Test Site Potential Reference Site

Geographical Description/Notes:

Site btw Park Ave bridge and train bridge (across from Sombrowskis giant mansion.

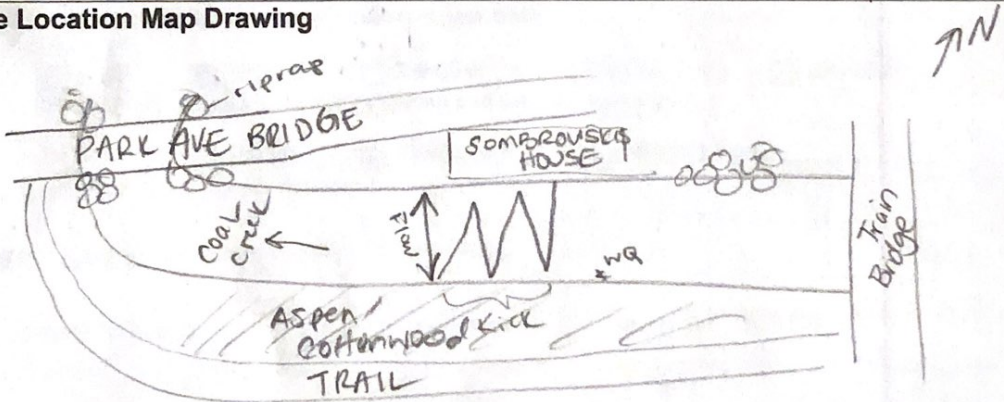
Surrounding Land Use: (check those present) Information Source: local, observation
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other Recreation trail / train

Dominant Surrounding Land Use: (check one) Information Source: As above
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data

Latitude: 49.49574N Longitude: -115.06643W (DMS or DD)
 Elevation: 999 (fast or mas) GPS Datum: GRS80 (NAD83/WGS84) Other: _____

Site Location Map Drawing



Note: Indicate north

Field Crew: F. Kujit, S. Ramirez, B Woodworth Site Code: COL001
 Sampling Date (DD/MM/YYYY): 09/09/2024

Photos

Field Sheet
 Upstream
 Downstream
 Across Site
 Aerial View
 Substrate (exposed)
 Substrate (aquatic)
 Other Algae

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 - Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 - ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 - ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	Sarah Ramirez
Sampling time (i.e. 3 min.)	3 min
No. of sample jars	1
Typical depth in kick area (cm)	12 cm

Preservative used: Isopropyl 99%

Sampled sieved on site using the "Bucket Swirling Method":
 YES NO

If YES, debris collected for QA/QC

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

Field Crew: F. Kuyt, S. Ramirez Site Code: COL 001
 Sampling Date (DD/MM/YYYY): 09/09/2024

WATER CHEMISTRY DATA Time: 14:32 (24 hr clock) Time zone: NST
 Air Temp: 27.6 (°C) Water Temp: 17.6 (°C) pH: 8.37
 Specific Conductance: 220.7 (µs/cm) DO: 10.64 (mg/L) Turbidity: 1.55 (NTU)

Check if water samples were collected for the following analyses:
 TSS (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) Other Anions

Note: 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 map

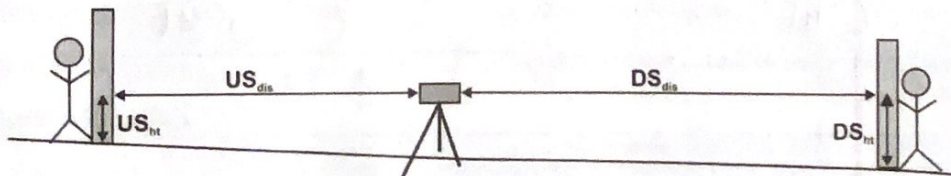
Scale: _____ (Note: small scale map recommended if field measurement is not possible - i.e. 1:20,000).
 contour interval (vertical distance) _____ (m),
 distance between contour intervals (horizontal distance) _____ (m)
 slope = vertical distance/horizontal distance = _____

OR

Measured in field

Circle 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	<u>1.066</u>	<u>1.250</u>	
^b Height of rod			
^a Bottom Hairline (B)	—	—	
^b Distance (dis) OR	<u>10.25</u>	<u>10.46</u>	US _{dis} +DS _{dis} =
^a T-B x 100	^a US _{dis} =T-B	^a DS _{dis} =T-B	<u>20.71</u>
Change in height (Δht)			DS _{ht} -US _{ht} =
Slope (Δht/total dis)			<u>0.184</u>
			<u>0.009</u>



2.45
3.91

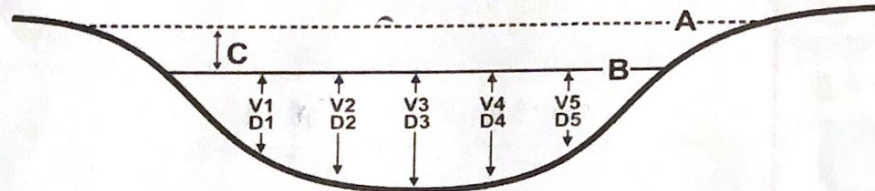
Field Crew: F. Kujit, S. Ramirez, B. Woodworth Site Code: C01001
 Sampling Date (DD/MM/YYYY): 09/09/2024

Widths and Depth

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

A - Bankfull Width: 18.87 (m) B - Wetted Stream Width: 14.70 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 1.05 (cm)



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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	2.45	4.90	7.35	9.80	12.25	—	
Depth (D) (cm)	28.6	4.0	5.4	9.0	8.2	—	10.64
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	28.6	3.90	5.2	9.0	8.0	—	
Depth of Stagnation (D ₂) (cm)	28.6	4.0	5.4	9.0	8.2	—	
Change in depth (ΔD=D ₂ -D ₁) (cm)	0	0.10	0.2	0	0.2	—	
Rotary meter							
Revolutions	/	/	/	/	/	—	
Time (minimum 40 seconds)	/	/	/	/	/	—	
Direct Measurement or calculation							
Velocity (V) (m/s)	0	0.14	0.20	0	0.20	—	0.108

Field Crew: J. Knight, J. Pomeroy, B. Vachon Site Code: COL001
 Sampling Date (DD/MM/YYYY): 09/09/2024

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.
- Embeddedness categories (E):
 Completely embedded = 1
 75% embedded = ¾
 50% embedded = ½
 25% embedded = ¼
 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2	10.5	27	7.0	52	4.2	77	5.5
3	12.8	28	3.4	53	7.9	78	5.3
4	5.2	29	2.7	54	8.3	79	4.6
5	6.9	30	10.7	55	6.8	80	22.2
6	4.9	31	5.4	56	4.4	81	2.9
7	11.5	32	3.8	57	7.8	82	6.1
8	10.5	33	16.2	58	6.7	83	3.8
9	14.9	34	4.1	59	9.7	84	14.1
10	8.2	35	11.9	60	3.2	85	3.4
11	16	36	4.3	61	6.4	86	5.9
12	11.6	37	7.9	62	12.4	87	6.7
13	6.8	38	9.1	63	4.7	88	6.2
14	6.2	39	21.4	64	3.8	89	4.1
15	5.9	40	28.5	65	4.3	90	3.6
16	2.9	41	3.7	66	7.4	91	13.0
17	2.5	42	10.3	67	2.9	92	8.9
18	10.8	43	12.8	68	7.7	93	4.1
19	4.8	44	12.9	69	10.6	94	10.4
20	20.1	45	9.2	70	8.2	95	7.0
21	9.7	46	12.3	71	7.4	96	3.9
22	6.6	47	15.2	72	5.0	97	9.7
23	2.4	48	9.4	73	7.6	98	4.8
24	16.1	49	13.8	74	9.3	99	3.3
25	11.7	50	8.5	75	5.6	100	9.2
	14.5		9.4		3.8		6.2

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.

Field Crew: F. Kuijt, S. Ramirez, B. Woodworth Site Code: COL 001
Sampling Date (DD/MM/YYYY): 09/09/2024

SITE INSPECTION

Site Inspected by: F. Kuijt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Black Hughes Time checked-in: 12:00

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

Phone number: (250) 423-0344

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 NA

Appropriate footwear, waders, wading belt

Belay used NA

Notes: Lots of algae in stream

Field Crew: F. Kujit, S. Ramirez, B. Woodworth Site Code: COL003
 Sampling Date (DD/MM/YYYY): 09/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWQ-EK2 Local Basin Name: Elk River
 River/Stream Name: Coal Creek Stream Order: (map scale 1:50,000) 1

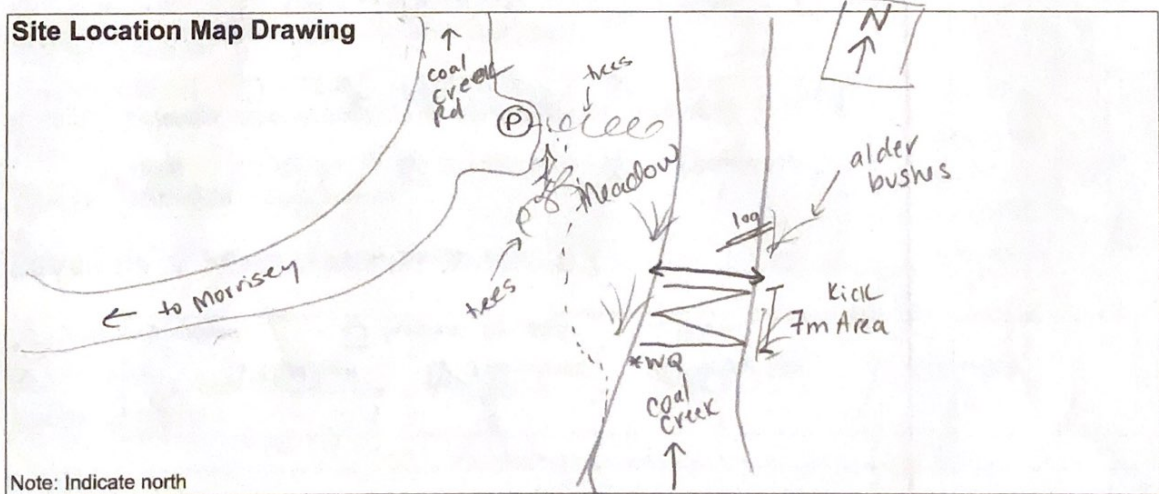
Select one: Test Site Potential Reference Site

Geographical Description/Notes:
 Coming from Morrissey: Head up Morrissey FSR past FWA, past MOR002, continue until fork with sign for coal creek. Follow to left. Continue to pullout on right w metal pipe, (past right-side turn off to Morrissey). Follow flagging tape from site above old man pool.

Surrounding Land Use: (check those present) Information Source: visual, local
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other hunting/Snowmobile

Dominant Surrounding Land Use: (check one) Information Source: As above
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data
 Latitude: 49.452853N Longitude: -114.87999 W (DMS or DD)
 Elevation: 1737 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____



Field Crew: F. Kujit, S. Ramirez, B. Woodworth Site Code: COL003
 Sampling Date (DD/MM/YYYY): 09/09/2024

Photos

Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other _____

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	<u>S. Ramirez</u>
Sampling time (i.e. 3 min.)	<u>3 min</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>8cm</u>

Preservative used: Isopropyl 99+
 Sampled sieved on site using the "Bucket Swirling Method":
 YES NO
 If YES, debris collected for QA/QC

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



Field Crew: E. Kuyt, S. Ramirez, B. Woodworth Site Code: COL003
 Sampling Date (DD/MM/YYYY): 09/09/2024

WATER CHEMISTRY DATA Time: 9:28 (24 hr clock) Time zone: MST
 Air Temp: 16.8 (°C) Water Temp: 8.4 (°C) pH: 7.76
 Specific Conductance: 58.9 (µs/cm) DO: 10.13 (mg/L) Turbidity: 1.14 (NTU)
 Check if water samples were collected for the following analyses:
 TSS (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) Other Anions
 Note: 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 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 = _____

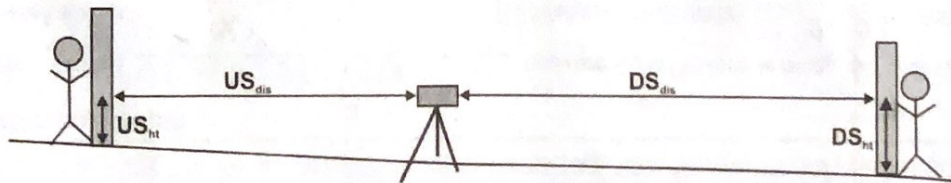
OR

Measured in field

Circle 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	0.812 0.773	0.697	
^b Height of rod	0.775	1.493	
^a Bottom Hairline (B)			
^b Distance (dis) OR	10.24	11.19 10.44	US _{dis} +DS _{dis} = 20.68
^a T-B x 100	aUS _{dis} =T-B	aDS _{dis} =T-B	20.72
Change in height (Δht)			DS _{ht} -US _{ht} = 0.72
Slope (Δht/total dis)			0.038 0.04



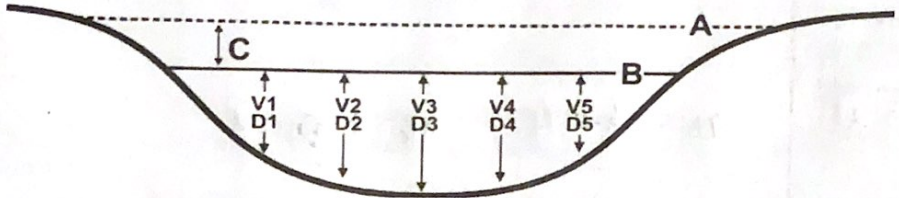
Field Crew: F. Kujit, S. Ramirez, B. Woodworth Site Code: COL003
 Sampling Date (DD/MM/YYYY): 09/09/2024

Widths and Depth

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

A - Bankfull Width: 3.88 (m) B - Wetted Stream Width: 2.21 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 0.47 (cm)



Note:
 Wetted widths > 5 m, measure a minimum of 5-6 equidistant locations.
 Wetted widths < 5 m, measure 3-4 equidistant locations.

.36

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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	0.36	0.72	1.08	1.44	1.80		
Depth (D) (cm)	7.25	4.80	4.20	13.6	2.30		6.43
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	7.2	4.75	4.20	13.3	2.20		
Depth of Stagnation (D ₂) (cm)	7.25	4.80	4.20	13.6	2.30		
Change in depth ($\Delta D = D_2 - D_1$) (cm)	0.05	0.05	0	0.30	0.10		
Rotary meter							
Revolutions	/	/	/	/	/		
Time (minimum 40 seconds)	/	/	/	/	/		
Direct Measurement or calculation							
Velocity (V) (m/s)	0.10	0.10	0	0.08	0.14		0.084

Field Crew: F. Kujit, S. Ramirez, B. Woodworth Site Code: COL003
 Sampling Date (DD/MM/YYYY): 09/09/2024

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.
- Embeddedness categories (E):
 - Completely embedded = 1
 - 75% embedded = $\frac{3}{4}$
 - 50% embedded = $\frac{1}{2}$
 - 25% embedded = $\frac{1}{4}$
 - 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1	2.1	26	1.8	51	4.9	76	4.8
2	8.2	27	5.9	52	4.4	77	31.6
3	2.8	28	11.3	53	6.5	78	7.5
4	22.4	29	24.0	54	10.4	79	6.7
5	3.3	30	3.9	55	4.5	80	4.3
6	2.0	31	6.4	56	6.4	81	7.1
7	2.6	32	6.2	57	6.4	82	5.7
8	6.8	33	4.5	58	5.6	83	3.9
9	3.9	34	12.1	59	8.2	84	2.5
10	6.8	35	32.5	60	5.9	85	4.9
11	10.3	36	5.7	61	18.1	86	5.8
12	35.4	37	18.4	62	3.1	87	6.4
13	14.1	38	4.9	63	5.0	88	6.2
14	4.0	39	15.2	64	8.2	89	7.8
15	2.6	40	11.7	65	5.3	90	8.2
16	20.9	41	11.4	66	3.2	91	9.9
17	7.5	42	7.2	67	11.9	92	1.9
18	7.1	43	10.2	68	1.4	93	2.1
19	5.5	44	5.2	69	5.9	94	6.6
20	2.4	45	18.7	70	3.0	95	4.4
21	28.4	46	7.6	71	6.5	96	6.8
22	5.4	47	29.1	72	2.8	97	5.4
23	25.2	48	8.7	73	6.7	98	9.7
24	3.8	49	5.5	74	7.9	99	6.5
25	11.4	50	9.3	75	4.3	100	12.3

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: F. Kuyt, S. Ramirez, B. Woodworth Site Code: COL003
Sampling Date (DD/MM/YYYY): 09/09/2024

SITE INSPECTION

Site Inspected by: Fynky Kuyt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: chad Hughes Time checked-in: 9 AM

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

Phone number: (250) 423 0344

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) Slippery

PFD worn N/A shallow

Appropriate footwear, waders, wading belt

Belay used N/A shallow

Notes: Very shallow flows

CABIN Field Sheet April 2023



Field Crew: E. Kujit, S. Ramirez, F. Thompson, B. Woodworth Site Code: L17001
 Sampling Date (DD/MM/YYYY): 24/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CRWQ - EIK Local Basin Name: EIK River
 River/Stream Name: Lizard Creek Stream Order: (map scale 1:50,000) 3

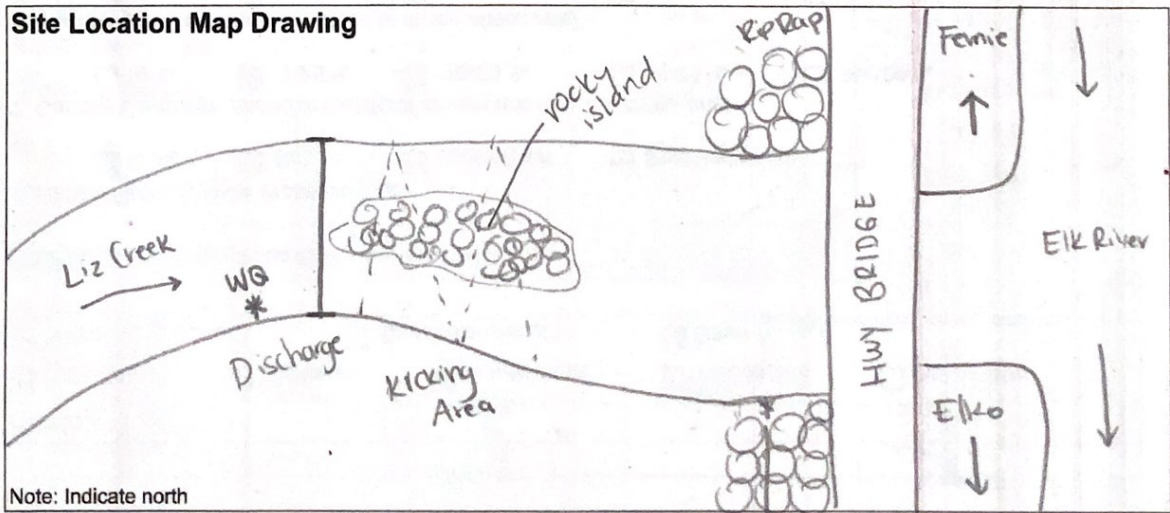
Select one: Test Site Potential Reference Site

Geographical Description/Notes: Approx. 100m U/S from hwy. 3 Liz Creek Bridge, U/S the temperature logger.

Surrounding Land Use: (check those present) Information Source: visual, local
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other Recreational/Provincial Park

Dominant Surrounding Land Use: (check one) Information Source: Visual, local
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data
 Latitude: 49.471164 N Longitude: -115.07759 W (DMS or DD)
 Elevation: 994.0 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____



Field Crew: F. Kuyt, S. Ramirez, F. Thomen, B. Woodworth Site Code: L12 001
 Sampling Date (DD/MM/YYYY): 24/09/2024

Photos

Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other Algae

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 - Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 - ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 - ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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.
 * clumps of green stringy algae present sporadically

BENTHIC MACROINVERTEBRATE DATA

Habitat sampled (check one): riffle rapids straight run

400 µm mesh Kick Net *	
Person sampling	<u>Fynley Kuyt</u>
Sampling time (i.e. 3 min.)	<u>3 min.</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>15 cm</u>

Preservative used: Isopropyl 99%

Sampled sieved on site using the "Bucket Swirling Method":
 YES NO
 If YES, debris collected for QA/QC

* Note: Indicate if a sampling method other than the recommended 400 µm mesh kick net is used.
 * Kick split between 2 channels around rocky island

Field Crew: F. Kijt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12 001
 Sampling Date (DD/MM/YYYY): 24/09/2024

WATER CHEMISTRY DATA Time: 12:30 (24 hr clock) Time zone: MST

Air Temp: 21.0 (°C) Water Temp: 11.1 (°C) pH: 8.22

Specific Conductance: 645 (µs/cm) DO: 10.33 (mg/L) Turbidity: 2.17 (NTU)

Check if water samples were collected for the following analyses:

TSS (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) Other Anions

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

CHANNEL DATA

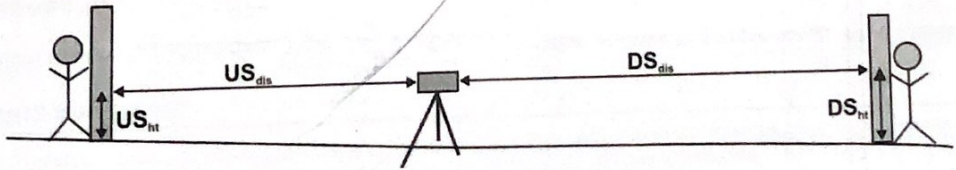
Slope - Indicate how slope was measured: (check one)

Calculated from 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 = _____

OR

Measured in field
 Circle device used and fill out table according to device:
 a. Survey Equipment b. Hand Level & Measuring Tape

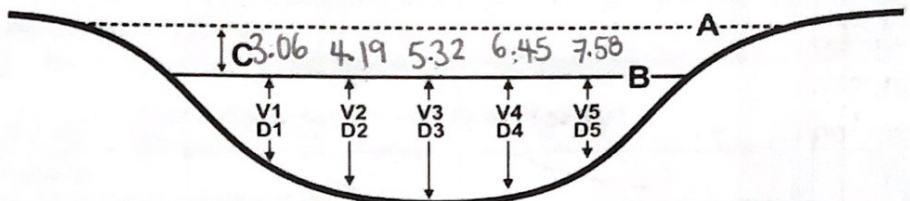
Measurements	Upstream (U/S)	Downstream(D/S)	Calculation
*Top Hairline (T)	<u> </u>	<u> </u>	
*Mid Hairline (ht) OR	<u>0.869</u>	<u>1.279</u>	
^b Height of rod			
*Bottom Hairline (B)	<u> </u>	<u> </u>	
^b Distance (dis) OR	<u>12.35</u>	<u>18.57</u>	US _{dis} +DS _{dis} = <u>30.92</u>
*T-B x 100	<u>aUS_{dis}=T-B</u>	<u>aDS_{dis}=T-B</u>	DS _{ht} -US _{ht} = <u>0.41</u>
Change in height (Δht)			
Slope (Δht/total dis)			<u>0.01</u>



Field Crew: F. Kwijt, S. Ramirez, F. Thomson, B. Woodcock Site Code: L1200
 Sampling Date (DD/MM/YYYY): 24/09/2024

Widths and Depth

Location at site: Upstream Kicking Area (Indicate where in sample reach, ex. d/s of kick area)
 A - Bankfull Width: 10.04 (m) B - Wetted Stream Width: 6.83 (m)
 C - Bankfull-Wetted Depth (height from water surface to Bankfull): 78 cm (cm)



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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.13	2.26	3.39	4.52	5.65	/	
Depth (D) (cm)	31.8	27.5	16.2	11.6	8.2	/	16.74
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	31.8	27.5	16.2	11.6	8.2	/	
Depth of Stagnation (D ₂) (cm)	32.5	27.8	16.3	11.7	8.3	/	
Change in depth (ΔD=D ₂ -D ₁) (cm)	0.7	0.3	0.1	0.1	0.1	/	
Rotary meter							
Revolutions	/	/	/	/	/	/	
Time (minimum 40 seconds)	/	/	/	/	/	/	
Direct Measurement or calculation							
Velocity (V) (m/s)	0.370	0.243	0.140	0.140	0.140	/	0.206

Field Crew: F. Kijft, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12 001
 Sampling Date (DD/MM/YYYY): 24 / 09 / 2024

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.
- Embeddedness categories (E):
 - Completely embedded = 1
 - 75% embedded = ¾
 - 50% embedded = ½
 - 25% embedded = ¼
 - 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53	1/4	78	
4		29		54		79	
5	0	30		55		80	0
6		31		56		81	
7		32		57		82	
8		33	1/2	58		83	
9		34		59		84	
10		35		60		85	
11		36		61	0	86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40	1/4	65		90	
16		41		66		91	
17		42		67		92	0
18		43		68		93	
19		44		69		94	
20	1/2	45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75	0	100	1/2

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.



Field Crew: F. Kuyt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L17001
Sampling Date (DD/MM/YYYY): 24/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kuyt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Chad Hughes Time checked-in: 12:00 MDT

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

Phone number: (250) 423 0344

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: Park at HWY3 pullout road near creek RB

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 N/A

Appropriate footwear, waders, wading belt

Belay used N/A

Notes: Slippery clay deposits

CABIN Field Sheet April 2023



Field Crew: F. Kujit, S. Ramirez, F. Thomson, B. Woodworth Site Code: LIZ 003
 Sampling Date (DD/MM/YYYY): 24/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWQ-ELK Local Basin Name: ELK River

River/Stream Name: Lizard Creek Stream Order: (map scale 1:50,000) 3

Select one: Test Site Potential Reference Site

Geographical Description/Notes: Park at the Mount Fernie Provincial Park at the Visitor Parking. Take trail u/s. Head down to river + walk u/s to site.

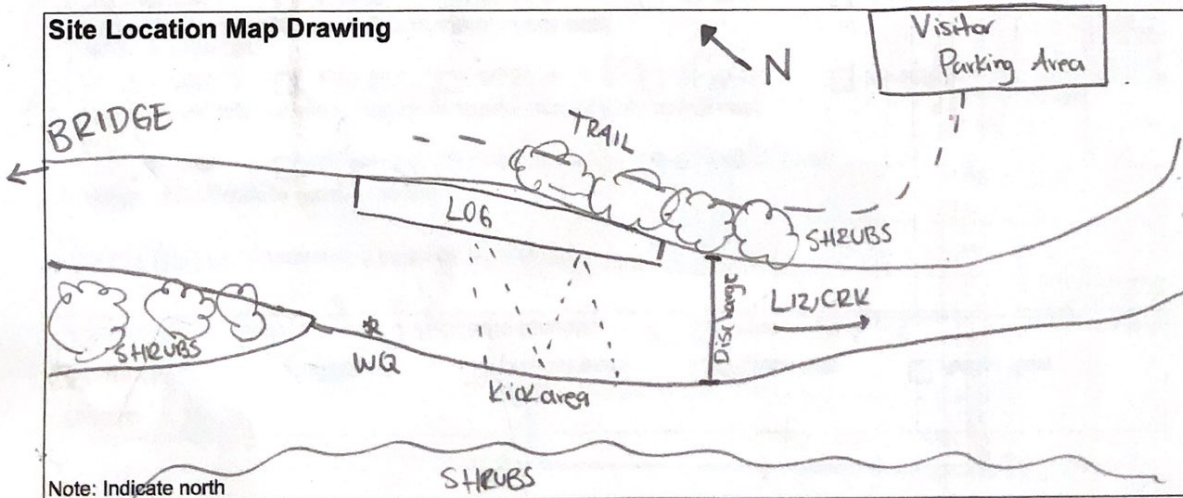
Surrounding Land Use: (check those present) Information Source: local, visual
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other Recreation: Island lake lodge, Prov. park trails.

Dominant Surrounding Land Use: (check one) Information Source: local, visual
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data

Latitude: 49.485696 N Longitude: -115.094321 W (DMS or DD)
 Elevation: 1022.0 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____

Site Location Map Drawing



Field Crew: F. Kuijt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12003
 Sampling Date (DD/MM/YYYY): 24/09/2024

Photos
 Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other Algae

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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: Long string algae green sporadically present

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 *	
Person sampling	<u>Fynley Kuijt</u>
Sampling time (i.e. 3 min.)	<u>3 minutes</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>35 cm</u>

Preservative used: Isopropyl 99%

Sampled sieved on site using the "Bucket Swirling Method":

YES NO

If YES, debris collected for QA/QC

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

Field Crew: F. Kujit, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12 003
 Sampling Date (DD/MM/YYYY): 24/09/2024

WATER CHEMISTRY DATA Time: 08:07 (24 hr clock) Time zone: MST

Air Temp: 8.8 (°C) Water Temp: 7.8 (°C) pH: 7.83
 Specific Conductance: 659 (µs/cm) DO: 10.41 (mg/L) Turbidity: 1.86 (NTU)

- Check if water samples were collected for the following analyses:
- TSS (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) Other Anions
- Note: Determining alkalinity is recommended, as are other analyses, but not required for CABIN assessments.

CHANNEL DATA

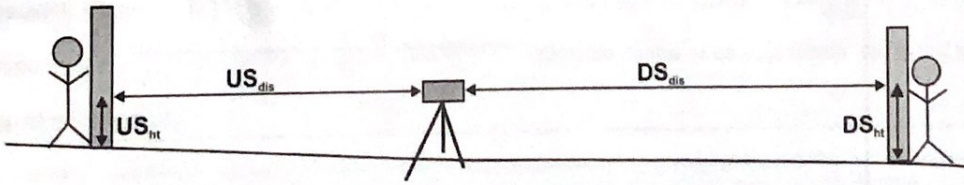
Slope - Indicate how slope was measured: (check one)

- Calculated from 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 = _____

- OR**
- Measured in field**
 Circle 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	0.794	1.087	
^b Height of rod	0.794		
^a Bottom Hairline (B)			
^b Distance (dis) OR	11.81	11.82	US _{dis} +DS _{dis} = 23.63
^a T-B x 100	^a US _{dis} =T-B	^a DS _{dis} =T-B	DS _{ht} -US _{ht} = 0.293
Change in height (Δht)			0.012
Slope (Δht/total dis)			

Rise = 0.012



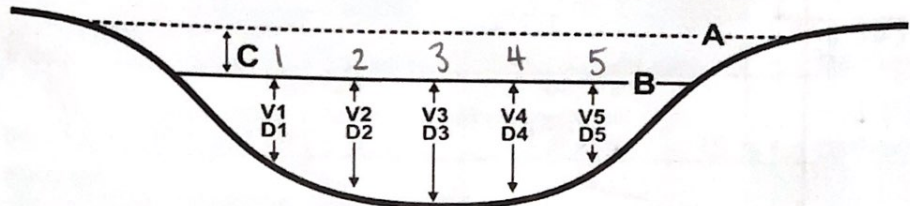
Field Crew: F. Kijt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12 003
 Sampling Date (DD/MM/YYYY): 24/09/2024

Widths and Depth

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

A - Bankfull Width: 10.22 (m) B - Wetted Stream Width: 6.20 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 44.5 (cm)



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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.0	2.0	3.0	4.0	5.0	/	
Depth (D) (cm)	10.5	21.0	18.4	15.4	2.2	/	13.5
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	10.5	21.0	18.4	15.4	2.2	/	
Depth of Stagnation (D ₂) (cm)	11.4	22.9	19.0	16.2	2.4	/	
Change in depth ($\Delta D = D_2 - D_1$) (cm)	0.9	1.9	0.6	0.8	0.2	/	
Rotary meter							
Revolutions	/	/	/	/	/	/	
Time (minimum 40 seconds)	/	/	/	/	/	/	
Direct Measurement or calculation							
Velocity (V) (m/s)	0.42	0.61	0.12	0.16	0.04	/	0.27

Field Crew: F. Kujt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12 003
 Sampling Date (DD/MM/YYYY): 24/09/2024

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.
- Embeddedness categories (E):
 Completely embedded = 1
 75% embedded = ¾
 50% embedded = ½
 25% embedded = ¼
 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6	0	31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35	¼	60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20	0	45		70	0	95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50	½	75		100	

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: F. Kuyt, S. Ramirez, F. Thomson, B. Woodcock Site Code: 112 003
Sampling Date (DD/MM/YYYY): 24/09/2024

SITE INSPECTION

Site Inspected by: Fynky Kuyt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Chad Hughes Time checked-in: 8:00 am

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

Phone number: (250) 423 0344

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: Parked at Fernie Provincial Park Day Use area.

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:

Field Crew: F. Kujt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12009
 Sampling Date (DD/MM/YYYY): 24/09/2024

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: Lizard Creek Stream Order: (map scale 1:50,000) 3

Select one: Test Site Potential Reference Site

Geographical Description/Notes: Car parked at same location as L12001 site, off the highway. Start walking from US highway 3 Bridge. Walk approx. 800 m ~~US~~ passed small waterfall. Site is slightly to the left of "big metal poles" across the stream.

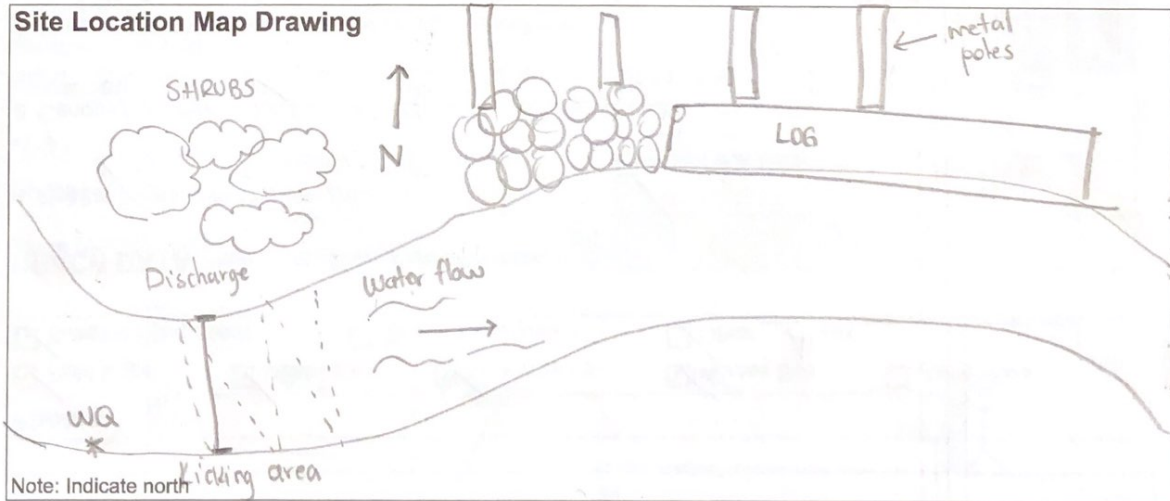
Surrounding Land Use: (check those present) Information Source: Visual
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other Future Galway development/ Nordic Trail

Dominant Surrounding Land Use: (check one) Information Source: Visual
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data

Latitude: 49.47386 N Longitude: -116.08119 W (DMS or DD)
 Elevation: 1002.0 (asl or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____

Site Location Map Drawing



Field Crew: F. Kujit, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12009
 Sampling Date (DD/MM/YYYY): 24/09/2024

Photos

Field Sheet
 Upstream
 Downstream
 Across Site
 Aerial View
 Substrate (exposed)
 Substrate (aquatic)
 Other Algae

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 - Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 - ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 - ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	<u>Fynley Kujit</u>
Sampling time (i.e. 3 min.)	<u>3 minutes</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>20 cm</u>

Preservative used: Isopropyl 99%

Sampled sieved on site using the "Bucket Swirling Method":

YES NO

If YES, debris collected for QA/QC

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

Field Crew: E. Kaijt, S. Ramirez, F. Thomson, B. Woodworth Site Code: 412 009
 Sampling Date (DD/MM/YYYY): 24/09/2024

WATER CHEMISTRY DATA Time: 10:38 (24 hr clock) Time zone: U.S.T
 Air Temp: 14.1 (°C) Water Temp: 9.2 (°C) pH: 8.03
 Specific Conductance: 652 (µs/cm) DO: 10.52 (mg/L) Turbidity: 1.41 (NTU)

Check if water samples were collected for the following analyses:
 TSS (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) Other Anions

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

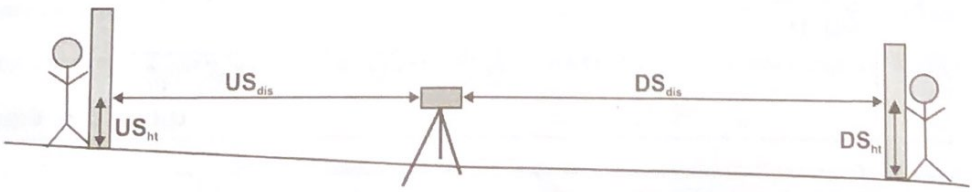
CHANNEL DATA

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

Calculated from 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 = _____

OR
 Measured in field
 Circle 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	<u>0.732</u>	<u>1.148</u>	
^b Height of rod			
^a Bottom Hairline (B)			
^b Distance (dis) OR	<u>11.08</u>	<u>10.13</u>	US _{dis} +DS _{dis} =
^a T-B x 100	^a US _{dis} =T-B	^a DS _{dis} =T-B	<u>21-21</u>
Change in height (Δht)			DS _{ht} -US _{ht} = <u>0.416</u>
Slope (Δht/total dis)			<u>0.02</u>



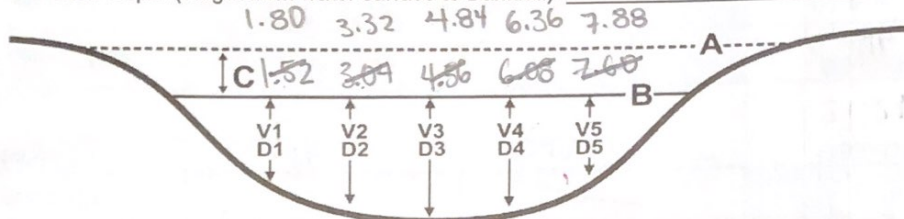
Field Crew: F. Kuyt, S. Ramirez, F. Thomson, B. Woodworth Site Code: L12 009
 Sampling Date (DD/MM/YYYY): 24/09/2024

Widths and Depth

Location at site: W/Stream Upper end of Kicking area (Indicate where in sample reach, ex. d/s of kick area)

A - Bankfull Width: 12.52 (m) B - Wetted Stream Width: 9.12 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 32.0 (cm)



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 _____

0-45126

	1	2	3	4	5	6	AVG
Distance from Shore (m)	1.52	3.04	4.56	6.08	7.60	/	
Depth (D) (cm)	15.5	13.8	14.1	12.0	12.4	/	13.56
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	15.5	13.8	14.1	12.0	12.4	/	
Depth of Stagnation (D ₂) (cm)	17.8	14.2	15.0	14.4	12.5	/	
Change in depth ($\Delta D = D_2 - D_1$) (cm)	2.3	0.4	0.9	2.4	0.1	/	
Rotary meter							
Revolutions	/	/	/	/	/	/	
Time (minimum 40 seconds)	/	/	/	/	/	/	
Direct Measurement or calculation							
Velocity (V) (m/s)	0.67	0.28	0.42	0.69	0.14	/	0.356

Field Crew: F. Kujit, S. Ramirez, F. Plenson, B. Woodworth Site Code: L12009
 Sampling Date (DD/MM/YYYY): 24/09/2024

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.
- Embeddedness categories (**E**):
 Completely embedded = 1
 75% embedded = ¾
 50% embedded = ½
 25% embedded = ¼
 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

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: F. Kuyt, S. Ramirez, F. Thomson, B. Woodworth Site Code: Liz 009
Sampling Date (DD/MM/YYYY): 24/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kuyt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Chad Hughes Time checked-in: 10:00am

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

Phone number: (250) 423 0344

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: Parked at same location as Liz 001, off highway.

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 N/A shallow

Appropriate footwear, waders, wading belt

Belay used N/A shallow

Notes: Watch footing in stream - slippery
Caution when ascending/descending waterfall during
Site access.

CABIN Field Sheet April 2023



Field Crew: F. Krijt, S. Ramirez, B. Woodworth, K. Hiber Site Code: MOR001
 Sampling Date (DD/MM/YYYY): 23/09/2024

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: Morrissey Stream Order: (map scale 1:50,000) 4

Select one: Test Site Potential Reference Site

Geographical Description/Notes:

Morrissey FSR to Lodgepole. Turn right near snowmobile Association sign on left. Drive to eroded bank and park. follow road to railway and walk ~50m d/s to site.

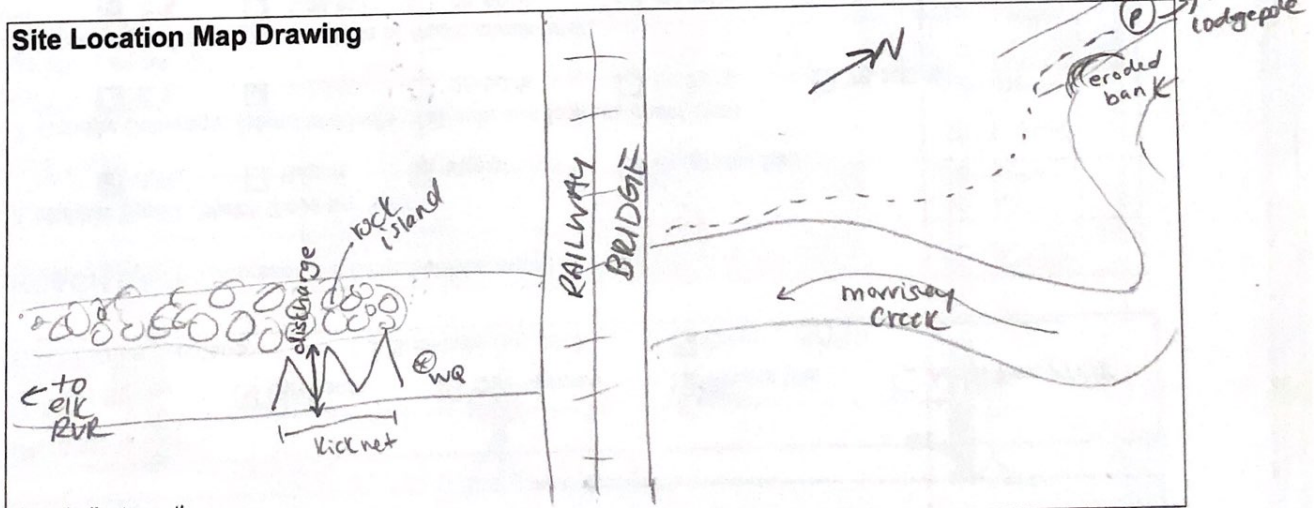
Surrounding Land Use: (check those present) Information Source: visual, maps
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other pipeline, hunting, railway v/s

Dominant Surrounding Land Use: (check one) Information Source: As above
 Forest Field/Pasture Agriculture Residential/Urban
 Logging Mining Commercial/Industrial Other _____

Location Data

Latitude: 49.358322 N Longitude: -115.000669 W (DMS or DD)
 Elevation: 948 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____

Site Location Map Drawing



Note: Indicate north

Field Crew: F. Kujit, S. Ramirez, B. Woodworth, K. Hribek Site Code: MOR001
 Sampling Date (DD/MM/YYYY): 23/09/2024

Photos

- Field Sheet Upstream Downstream Across Site Aerial View *N/A*
 Substrate (exposed) Substrate (aquatic) Other eggs

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% 1-25% 26-50% 51-75% 76-100%

3. Macrophyte Coverage: (not algae or moss, check one)

- 0% 1-25% 26-50% 51-75% 76-100%

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 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 mm 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 *	
Person sampling	<u>Sarai Ramirez</u>
Sampling time (i.e. 3 min.)	<u>3min</u>
No. of sample jars	<u>1</u>
Typical depth in kick area (cm)	<u>40</u>

Preservative used: 99-1 Isopropanol

Sampled sieved on site using the "Bucket Swirling Method":

- YES NO

If YES, debris collected for QA/QC

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

Field Crew: F. Kvijs, S. Ramirez, B. Woodworth, K. Hibbard Site Code: M02001
 Sampling Date (DD/MM/YYYY): 23/09/2024

WATER CHEMISTRY DATA Time: 11:50 (24 hr clock) Time zone: MST
 Air Temp: 18.4 (°C) Water Temp: 14.2 (°C) pH: 8.05
 Specific Conductance: 261.7 (µs/cm) DO: 10.24 (mg/L) Turbidity: 1.19 (NTU)

Check if water samples were collected for the following analyses:
 TSS (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) Other Anions

Note: 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 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 = _____

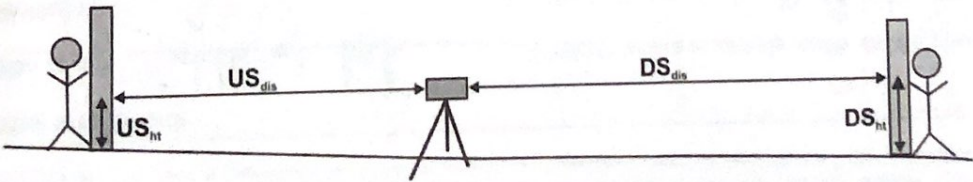
OR

Measured in field

Circle 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
*Top Hairline (T)			
*Mid Hairline (ht) OR	<u>0.838</u>	<u>1.029</u>	
^b Height of rod			
*Bottom Hairline (B)			
^b Distance (dis) OR	<u>11.26</u>	<u>11.22</u>	US _{dis} +DS _{dis} = <u>22.48</u>
*T-B x 100	_a US _{dis} =T-B	_a DS _{dis} =T-B	DS _{ht} -US _{ht} = <u>0.191</u>
Change in height (Δht)			
Slope (Δht/total dis)			<u>0.0085</u>



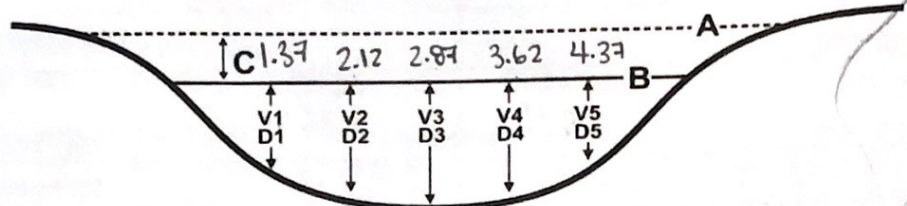
Field Crew: F. Kijjt, S. Romicz, B. Woodworth, K. Hribar Site Code: M02001
 Sampling Date (DD/MM/YYYY): 23/09/2024

Widths and Depth

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

A - Bankfull Width: 239 (m) B - Wetted Stream Width: 4.55 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 81 (cm)



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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	0.75	1.50	2.25	3.00	3.75	/	
Depth (D) (cm)	12.2	18.8	23.5	6.70	7.6	/	13.76
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	12.2	18.8	23.5	6.70	7.6	/	
Depth of Stagnation (D ₂) (cm)	12.3	19.0	23.7	6.90	7.7	/	
Change in depth (ΔD=D ₂ -D ₁) (cm)	0.1	0.2	0.2	0.2	0.1	/	
Rotary meter							
Revolutions	/	/	/	/	/	/	
Time (minimum 40 seconds)	/	/	/	/	/	/	
Direct Measurement or calculation							
Velocity (V) (m/s)	0.14	0.20	0.20	0.20	0.14	/	0.176

23.9

Field Crew: F. Kuyt, S. Ramirez, B. Woodworth, K. Hribar Site Code: MOR001
Sampling Date (DD/MM/YYYY): 23/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kuyt

Communication Information

Itinerary left with contact person (include contact numbers)

Contact Person: Chad Hughes
Fynley Kuyt Time checked-in: 12AM

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

Phone number: (250) 423 0344

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: Parked just before eroded bank on FSR

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 N/A shallow

Appropriate footwear, waders, wading belt

Belay used N/A shallow

Notes: near CP Rail - stay off tracks
Have permission for site access

CABIN Field Sheet April 2023

Field Crew: F. Kvijit, S. Ramirez, B. Woodworth, K. Hribar Site Code: MOR002
 Sampling Date (DD/MM/YYYY): 23/09/2024

Occupational Health & Safety: Site Inspection Sheet completed (see page 6)

PRIMARY SITE DATA

CABIN Study Name: CBWM-EIK Local Basin Name: EIK River

River/Stream Name: Morrissey Stream Order: (map scale 1:50,000) 3

Select one: Test Site Potential Reference Site

Geographical Description/Notes:
Drive morrisey FSR until 3rd bridge, walk ~50m d/s to site.

Surrounding Land Use: (check those present) Information Source: visual / maps

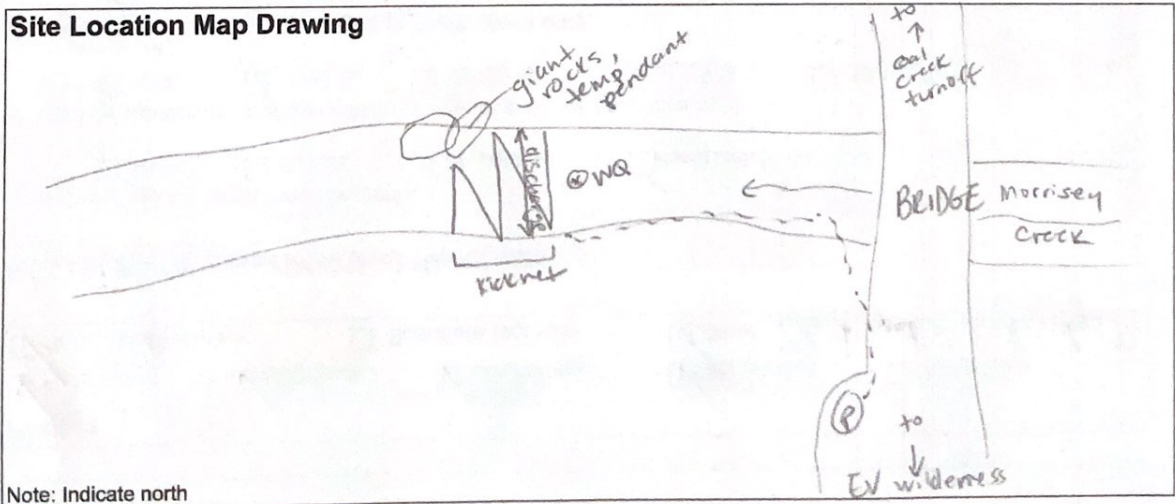
<input checked="" type="checkbox"/> Forest	<input type="checkbox"/> Field/Pasture	<input type="checkbox"/> Agriculture	<input type="checkbox"/> Residential/Urban
<input checked="" type="checkbox"/> Logging	<input type="checkbox"/> Mining	<input type="checkbox"/> Commercial/Industrial	<input checked="" type="checkbox"/> Other <u>pipeline</u>

Dominant Surrounding Land Use: (check one) Information Source: As above

<input checked="" type="checkbox"/> Forest	<input type="checkbox"/> Field/Pasture	<input type="checkbox"/> Agriculture	<input type="checkbox"/> Residential/Urban
<input type="checkbox"/> Logging	<input type="checkbox"/> Mining	<input type="checkbox"/> Commercial/Industrial	<input type="checkbox"/> Other _____

Location Data

Latitude: 49.420558 N Longitude: -114.910687 W (DMS or DD)
 Elevation: 15440 (fast or masl) GPS Datum: GRS80 (NAD83/WGS84) Other: _____



Field Crew: E. Kujit, S. Ramirez, B. Woodworth, K. Hribar Site Code: MOR002
 Sampling Date (DD/MM/YYYY): 23/09/2024

Photos

Field Sheet Upstream Downstream Across Site Aerial View
 Substrate (exposed) Substrate (aquatic) Other Black spots on rocks (algae?)

REACH DATA (represents 6 times bankfull width)

- Habitat Types: (check those present)
 - Riffle Rapids Straight run Pool/Back Eddy
- Canopy Coverage: (stand in middle of stream and look up, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Macrophyte Coverage: (not algae or moss, check one)
 - 0% 1-25% 26-50% 51-75% 76-100%
- Streamside Vegetation: (check those present)
 - ferns/grasses shrubs deciduous trees coniferous trees
- Dominant Streamside Vegetation: (check one)
 - ferns/grasses shrubs deciduous trees coniferous trees
- 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 mm 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 *	
Person sampling	Sarai Ramirez
Sampling time (i.e. 3 min.)	3min
No. of sample jars	1
Typical depth in kick area (cm)	15cm

Preservative used: 99-1. Isopropyl
 Sampled sieved on site using the "Bucket Swirling Method":
 YES NO
 If YES, debris collected for QA/QC

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

Field Crew: F. Kujit, S. Ramirez, B. Woodworth, K. Hibar Site Code: MDR002
 Sampling Date (DD/MM/YYYY): 23/09/2024

WATER CHEMISTRY DATA Time: 09:27 (24 hr clock) Time zone: MST
 Air Temp: 12.5 (°C) Water Temp: 7.2 (°C) pH: 7.81
 Specific Conductance: 114.6 (µs/cm) DO: 10.47 (mg/L) Turbidity: 2.30 (NTU)

Check if water samples were collected for the following analyses:
 TSS (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) Other Anions

Note: 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 map

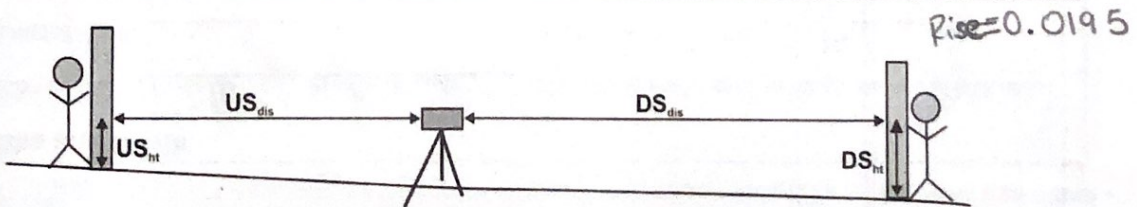
Scale: _____ (Note: small scale map recommended if field measurement is not possible - i.e. 1:20,000).
 contour interval (vertical distance) _____ (m),
 distance between contour intervals (horizontal distance) _____ (m)
 slope = vertical distance/horizontal distance = _____

OR

Measured in field

Circle 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	0.755	1.185	
^b Height of rod			
^a Bottom Hairline (B)			
^b Distance (dis) OR	10.66	11.34	US _{dis} +DS _{dis} = 22
^a T-B x 100	^a US _{dis} =T-B	^a DS _{dis} =T-B	
Change in height (Δht)			DS _{ht} -US _{ht} = 0.43
Slope (Δht/total dis)			0.0195



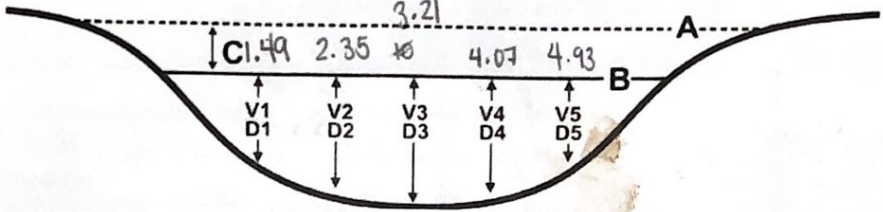
Field Crew: F. Kujt, S. Ramirez, B. Woodworth, K. Hibber Site Code: MOR002
 Sampling Date (DD/MM/YYYY): 23/09/2024

Widths and Depth

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

A - Bankfull Width: 8.68 (m) B - Wetted Stream Width: 5.17 (m)

C - Bankfull-Wetted Depth (height from water surface to Bankfull): 62 (cm)



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 _____

	1	2	3	4	5	6	AVG
Distance from Shore (m)	0.86	1.72	2.58	3.44	4.04	/	
Depth (D) (cm)	4.7	9.9	8.0	5.8	5.5	/	6.78
Velocity Head Rod (ruler)							
Flowing water Depth (D ₁) (cm)	4.7	9.9	8.0	5.8	5.5	/	
Depth of Stagnation (D ₂) (cm)	5.4	9.9	8.1	5.8	5.5	/	
Change in depth (ΔD=D ₂ -D ₁) (cm)	0.7	0	0.1	0	0	/	0.2
Rotary meter							
Revolutions	/	/	/	/	/	/	
Time (minimum 40 seconds)	/	/	/	/	/	/	
Direct Measurement or calculation							
Velocity (V) (m/s)	0.37	0	0.14	0	0	/	0.396 0.108

0.396

Field Crew: F. Kviat, S. Ramirez, B. Woodworth, K. Hribar Site Code: Mo2002
 Sampling Date (DD/MM/YYYY): 23/09/2024

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.
- Embeddedness categories (**E**):
 Completely embedded = 1
 75% embedded = ¾
 50% embedded = ½
 25% embedded = ¼
 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	Diameter (cm)	E	Diameter (cm)	E	Diameter (cm)	E
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

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: F. Kuyil, S. Ramirez, B. Worth, K. Friday Site Code: MOR002
Sampling Date (DD/MM/YYYY): 23/09/2024

SITE INSPECTION

Site Inspected by: Fynley Kuyil

Communication Information

Itinerary left with contact person (include contact numbers)
Contact Person: Chad Hughes Time checked-in: 8AM
Form of communication: radio cell satellite hotel/pay phone SPOT
Phone number: (250) 423 0344

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: Parked to side of bridge on pullout

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) algae on rocks
 PFD worn N/A shallow
 Appropriate footwear, waders, wading belt
 Belay used N/A shallow

Notes:



Appendix C: CARO Reports

CERTIFICATE OF ANALYSIS

REPORTED TO Elk River Alliance
PO Box 2095, 1111 2nd Ave
Fernie, BC V0B1M0

ATTENTION Fynley Kujit

PO NUMBER

PROJECT CBWM-2024

PROJECT INFO

WORK ORDER 2411640

RECEIVED / TEMP 2024-09-13 08:48 / 3.4°C
REPORTED 2024-10-02 10:28

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



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.

We've Got Chemistry



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.

Ahead of the Curve



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>

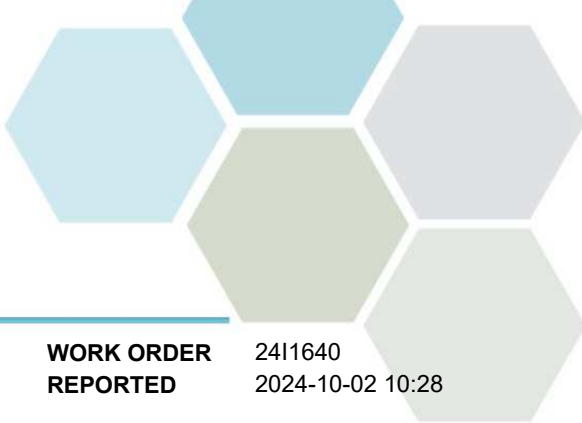
If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

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

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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ALX001_20240910_1218 (2411640-01) | Matrix: Water | Sampled: 2024-09-10 12:18

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-14	
Chloride	1.18	AO ≤ 250	0.10	mg/L	2024-09-14	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-14	
Nitrate (as N)	0.015	MAC = 10	0.010	mg/L	2024-09-14	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-14	HT1
Sulfate	24.0	AO ≤ 500	1.0	mg/L	2024-09-14	

BCMOE Aggregate Hydrocarbons

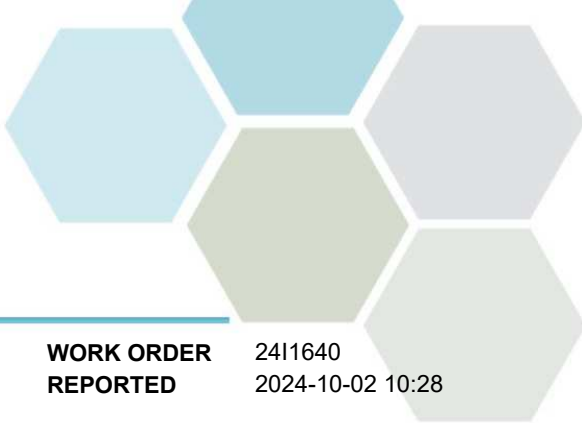
EPHw10-19	< 250	N/A	250	µg/L	2024-09-17	
EPHw19-32	< 250	N/A	250	µg/L	2024-09-17	
Surrogate: 2-Methylnonane (EPH/F2-4)	100		60-140	%	2024-09-17	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	180	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0153	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.0953	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Barium, dissolved	0.0729	N/A	0.0050	mg/L	2024-09-16	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-16	
Cadmium, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-16	
Calcium, dissolved	49.4	N/A	0.20	mg/L	2024-09-16	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-16	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Lithium, dissolved	0.00445	N/A	0.00010	mg/L	2024-09-16	
Magnesium, dissolved	13.6	N/A	0.010	mg/L	2024-09-16	
Manganese, dissolved	0.00045	N/A	0.00020	mg/L	2024-09-16	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-16	
Molybdenum, dissolved	0.00065	N/A	0.00010	mg/L	2024-09-16	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, dissolved	0.40	N/A	0.10	mg/L	2024-09-16	
Selenium, dissolved	0.00070	N/A	0.00050	mg/L	2024-09-16	
Silicon, dissolved	2.5	N/A	1.0	mg/L	2024-09-16	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-16	
Sodium, dissolved	1.84	N/A	0.10	mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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ALX001_20240910_1218 (2411640-01) | Matrix: Water | Sampled: 2024-09-10 12:18, Continued

Dissolved Metals, Continued

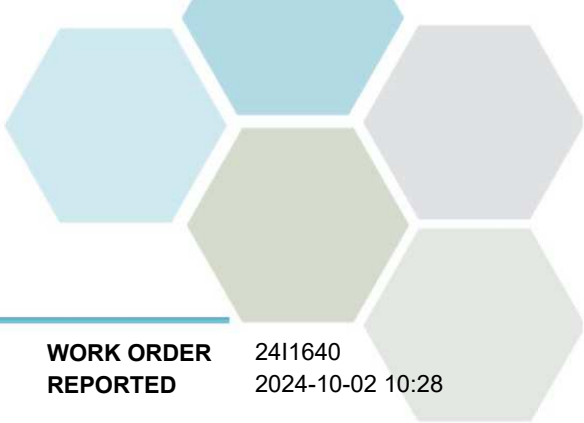
Strontium, dissolved	0.123	N/A	0.0010 mg/L	2024-09-16	
Sulfur, dissolved	7.1	N/A	3.0 mg/L	2024-09-16	
Tellurium, dissolved	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Thallium, dissolved	< 0.000020	N/A	0.000020 mg/L	2024-09-16	
Thorium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Tin, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Titanium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Tungsten, dissolved	< 0.0010	N/A	0.0010 mg/L	2024-09-16	
Uranium, dissolved	0.000512	N/A	0.000020 mg/L	2024-09-16	
Vanadium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Zinc, dissolved	< 0.0040	N/A	0.0040 mg/L	2024-09-16	
Zirconium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	

General Parameters

Alkalinity, Total (as CaCO3)	146	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Bicarbonate (as CaCO3)	146	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-09-17	
BOD, 5-day	< 5.8	N/A	2.0 mg/L	2024-09-18	
Carbon, Total Organic	0.72	N/A	0.50 mg/L	2024-09-16	
Carbon, Dissolved Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-09-17	
Nitrogen, Total Kjeldahl	0.080	N/A	0.050 mg/L	2024-09-19	
Phosphorus, Total (as P)	0.0087	N/A	0.0050 mg/L	2024-09-17	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050 mg/L	2024-09-14	HT1
Solids, Total Suspended	< 2.0	N/A	2.0 mg/L	2024-09-19	HT1

Total Metals

Aluminum, total	0.0061	OG < 0.1	0.0050 mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-09-16	
Barium, total	0.0722	MAC = 2	0.0050 mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-09-16	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010 mg/L	2024-09-16	
Calcium, total	49.0	None Required	0.20 mg/L	2024-09-16	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-09-16	
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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ALX001_20240910_1218 (2411640-01) | Matrix: Water | Sampled: 2024-09-10 12:18, Continued

Total Metals, Continued

Lithium, total	0.00420	N/A	0.00010	mg/L	2024-09-16	
Magnesium, total	13.4	None Required	0.010	mg/L	2024-09-16	
Manganese, total	0.00080	MAC = 0.12	0.00020	mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-09-16	
Molybdenum, total	0.00072	N/A	0.00010	mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, total	0.41	N/A	0.10	mg/L	2024-09-16	
Selenium, total	0.00062	MAC = 0.05	0.00050	mg/L	2024-09-16	
Silicon, total	2.5	N/A	1.0	mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-09-16	
Sodium, total	1.75	AO ≤ 200	0.10	mg/L	2024-09-16	
Strontium, total	0.121	MAC = 7	0.0010	mg/L	2024-09-16	
Sulfur, total	7.0	N/A	3.0	mg/L	2024-09-16	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, total	0.000587	MAC = 0.02	0.000020	mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, total	0.0082	AO ≤ 5	0.0040	mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

ALX003_20240910_0845 (2411640-02) | Matrix: Water | Sampled: 2024-09-10 08:45

Anions

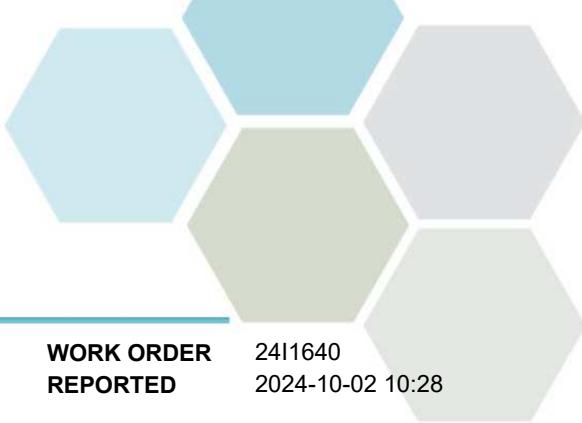
Bromide	< 0.10	N/A	0.10	mg/L	2024-09-14	
Chloride	0.89	AO ≤ 250	0.10	mg/L	2024-09-14	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-14	
Nitrate (as N)	0.017	MAC = 10	0.010	mg/L	2024-09-14	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-14	HT1
Sulfate	20.5	AO ≤ 500	1.0	mg/L	2024-09-14	

BCMOE Aggregate Hydrocarbons

EPHw10-19	< 250	N/A	250	µg/L	2024-09-17	
EPHw19-32	< 250	N/A	250	µg/L	2024-09-17	
Surrogate: 2-Methylnonane (EPH/F2-4)	102		60-140	%	2024-09-17	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	175	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0172	N/A	0.0100	mg/L	N/A	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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ALX003_20240910_0845 (2411640-02) | Matrix: Water | Sampled: 2024-09-10 08:45, Continued

Calculated Parameters, Continued

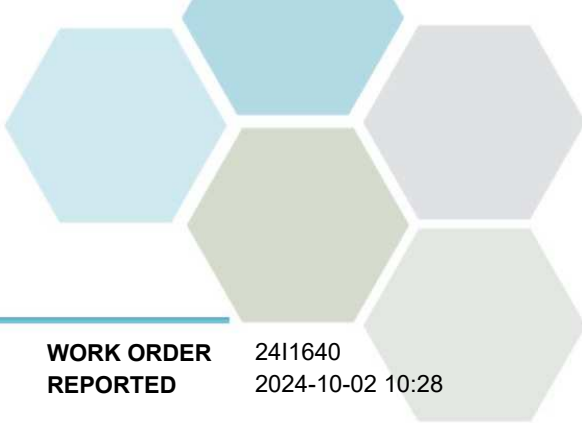
Nitrogen, Total	0.202	N/A	0.0500	mg/L	N/A	
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Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Barium, dissolved	0.0757	N/A	0.0050	mg/L	2024-09-16	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-16	
Cadmium, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-16	
Calcium, dissolved	45.9	N/A	0.20	mg/L	2024-09-16	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-16	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Lithium, dissolved	0.00402	N/A	0.00010	mg/L	2024-09-16	
Magnesium, dissolved	14.5	N/A	0.010	mg/L	2024-09-16	
Manganese, dissolved	0.00096	N/A	0.00020	mg/L	2024-09-16	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-16	
Molybdenum, dissolved	0.00052	N/A	0.00010	mg/L	2024-09-16	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, dissolved	0.40	N/A	0.10	mg/L	2024-09-16	
Selenium, dissolved	0.00057	N/A	0.00050	mg/L	2024-09-16	
Silicon, dissolved	2.3	N/A	1.0	mg/L	2024-09-16	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-16	
Sodium, dissolved	1.58	N/A	0.10	mg/L	2024-09-16	
Strontium, dissolved	0.122	N/A	0.0010	mg/L	2024-09-16	
Sulfur, dissolved	5.3	N/A	3.0	mg/L	2024-09-16	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, dissolved	0.000500	N/A	0.000020	mg/L	2024-09-16	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-16	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

General Parameters

Alkalinity, Total (as CaCO3)	149	N/A	1.0	mg/L	2024-09-16	
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TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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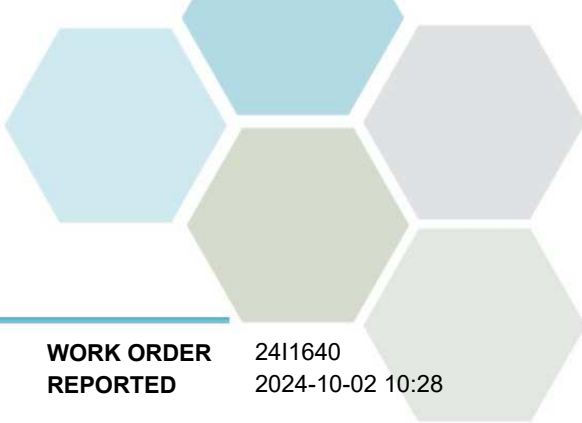
ALX003_20240910_0845 (2411640-02) | Matrix: Water | Sampled: 2024-09-10 08:45, Continued

General Parameters, Continued

Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Bicarbonate (as CaCO3)	149	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-09-17	
BOD, 5-day	< 5.8	N/A	2.0 mg/L	2024-09-18	
Carbon, Total Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Carbon, Dissolved Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-09-17	
Nitrogen, Total Kjeldahl	0.185	N/A	0.050 mg/L	2024-09-19	
Phosphorus, Total (as P)	0.0055	N/A	0.0050 mg/L	2024-09-17	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050 mg/L	2024-09-14	HT1
Solids, Total Suspended	< 2.0	N/A	2.0 mg/L	2024-09-18	

Total Metals

Aluminum, total	0.0077	OG < 0.1	0.0050 mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-09-16	
Barium, total	0.0726	MAC = 2	0.0050 mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-09-16	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010 mg/L	2024-09-16	
Calcium, total	50.3	None Required	0.20 mg/L	2024-09-16	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-09-16	
Iron, total	0.013	AO ≤ 0.3	0.010 mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-09-16	
Lithium, total	0.00400	N/A	0.00010 mg/L	2024-09-16	
Magnesium, total	13.4	None Required	0.010 mg/L	2024-09-16	
Manganese, total	0.00138	MAC = 0.12	0.00020 mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2024-09-16	
Molybdenum, total	0.00066	N/A	0.00010 mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2024-09-16	
Potassium, total	0.39	N/A	0.10 mg/L	2024-09-16	
Selenium, total	0.00056	MAC = 0.05	0.00050 mg/L	2024-09-16	
Silicon, total	2.4	N/A	1.0 mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2024-09-16	
Sodium, total	1.59	AO ≤ 200	0.10 mg/L	2024-09-16	
Strontium, total	0.118	MAC = 7	0.0010 mg/L	2024-09-16	
Sulfur, total	6.4	N/A	3.0 mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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ALX003_20240910_0845 (2411640-02) | Matrix: Water | Sampled: 2024-09-10 08:45, Continued

Total Metals, Continued

Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, total	0.000545	MAC = 0.02	0.000020	mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

DUP001_20240910_1240 (2411640-03) | Matrix: Water | Sampled: 2024-09-10 12:40

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-14	
Chloride	1.03	AO ≤ 250	0.10	mg/L	2024-09-14	
Fluoride	0.11	MAC = 1.5	0.10	mg/L	2024-09-14	
Nitrate (as N)	0.014	MAC = 10	0.010	mg/L	2024-09-14	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-14	HT1
Sulfate	20.8	AO ≤ 500	1.0	mg/L	2024-09-14	

BCMOE Aggregate Hydrocarbons

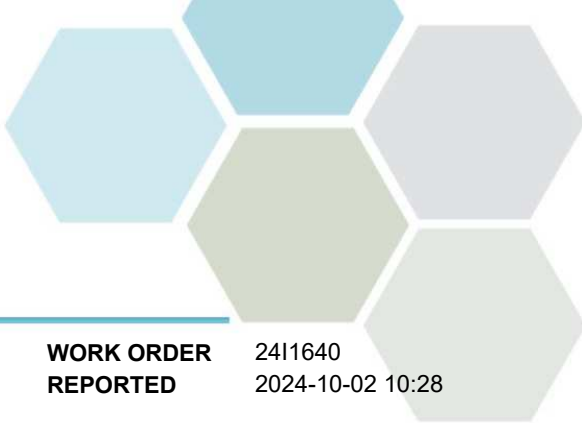
EPHw10-19	< 250	N/A	250	µg/L	2024-09-17	
EPHw19-32	< 250	N/A	250	µg/L	2024-09-17	
Surrogate: 2-Methylnonane (EPH/F2-4)	104		60-140	%	2024-09-17	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	179	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0144	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.110	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Barium, dissolved	0.0728	N/A	0.0050	mg/L	2024-09-16	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-16	
Cadmium, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-16	
Calcium, dissolved	49.1	N/A	0.20	mg/L	2024-09-16	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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DUP001_20240910_1240 (2411640-03) | Matrix: Water | Sampled: 2024-09-10 12:40, Continued

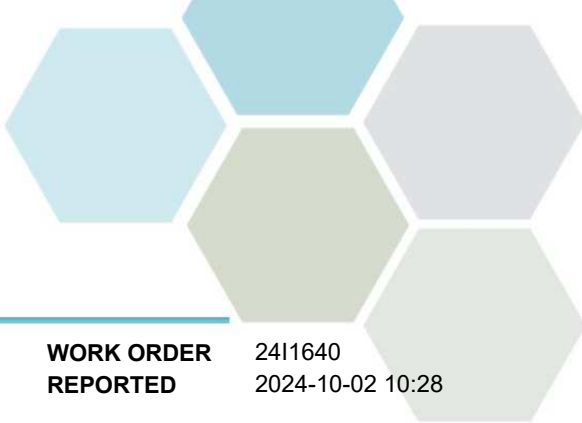
Dissolved Metals, Continued

Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-16	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Lithium, dissolved	0.00451	N/A	0.00010	mg/L	2024-09-16	
Magnesium, dissolved	13.6	N/A	0.010	mg/L	2024-09-16	
Manganese, dissolved	0.00042	N/A	0.00020	mg/L	2024-09-16	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-16	
Molybdenum, dissolved	0.00067	N/A	0.00010	mg/L	2024-09-16	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, dissolved	0.40	N/A	0.10	mg/L	2024-09-16	
Selenium, dissolved	0.00065	N/A	0.00050	mg/L	2024-09-16	
Silicon, dissolved	2.5	N/A	1.0	mg/L	2024-09-16	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-16	
Sodium, dissolved	1.86	N/A	0.10	mg/L	2024-09-16	
Strontium, dissolved	0.123	N/A	0.0010	mg/L	2024-09-16	
Sulfur, dissolved	7.0	N/A	3.0	mg/L	2024-09-16	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, dissolved	0.000513	N/A	0.000020	mg/L	2024-09-16	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-16	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

General Parameters

Alkalinity, Total (as CaCO3)	146	N/A	1.0	mg/L	2024-09-16	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-16	
Alkalinity, Bicarbonate (as CaCO3)	146	N/A	1.0	mg/L	2024-09-16	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-16	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-16	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-09-17	
BOD, 5-day	< 5.8	N/A	2.0	mg/L	2024-09-18	
Carbon, Total Organic	0.77	N/A	0.50	mg/L	2024-09-16	
Carbon, Dissolved Organic	3.25	N/A	0.50	mg/L	2024-09-16	RE2
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2024-09-17	
Nitrogen, Total Kjeldahl	0.096	N/A	0.050	mg/L	2024-09-19	
Phosphorus, Total (as P)	0.0057	N/A	0.0050	mg/L	2024-09-17	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050	mg/L	2024-09-14	HT1
Solids, Total Suspended	< 2.0	N/A	2.0	mg/L	2024-09-18	

Total Metals



TEST RESULTS

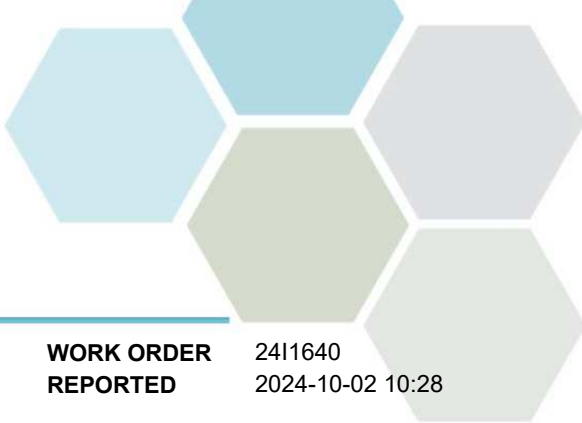
REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
DUP001_20240910_1240 (2411640-03) Matrix: Water Sampled: 2024-09-10 12:40, Continued					
<i>Total Metals, Continued</i>					
Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-09-16	
Barium, total	0.0724	MAC = 2	0.0050 mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-09-17	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010 mg/L	2024-09-16	
Calcium, total	46.7	None Required	0.20 mg/L	2024-09-16	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-09-16	
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-09-16	
Lithium, total	0.00377	N/A	0.00010 mg/L	2024-09-17	
Magnesium, total	14.4	None Required	0.010 mg/L	2024-09-16	
Manganese, total	0.00077	MAC = 0.12	0.00020 mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2024-09-16	
Molybdenum, total	0.00083	N/A	0.00010 mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2024-09-16	
Potassium, total	0.43	N/A	0.10 mg/L	2024-09-16	
Selenium, total	0.00070	MAC = 0.05	0.00050 mg/L	2024-09-16	
Silicon, total	2.4	N/A	1.0 mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2024-09-16	
Sodium, total	1.77	AO ≤ 200	0.10 mg/L	2024-09-16	
Strontium, total	0.124	MAC = 7	0.0010 mg/L	2024-09-16	
Sulfur, total	6.3	N/A	3.0 mg/L	2024-09-16	
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2024-09-16	
Uranium, total	0.000650	MAC = 0.02	0.000020 mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	

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 PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

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, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	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

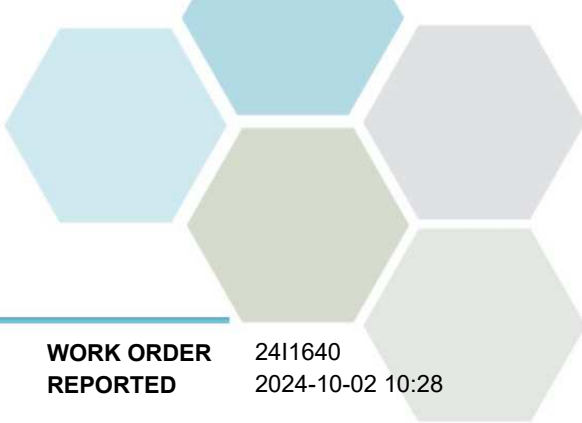
Glossary of Terms:

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-2024

WORK ORDER 2411640
REPORTED 2024-10-02 10:28

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 not 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.



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

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 B412764									
Blank (B412764-BLK1)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.005	0.005 mg/L							
Nitrite (as N)	< 0.005	0.005 mg/L							
Sulfate	< 1.0	1.0 mg/L							
Blank (B412764-BLK2)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.005	0.005 mg/L							
Nitrite (as N)	< 0.005	0.005 mg/L							
Sulfate	< 1.0	1.0 mg/L							
LCS (B412764-BS1)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	4.04	0.10 mg/L	4.00		101	85-115			
Chloride	16.2	0.10 mg/L	16.0		101	90-110			
Fluoride	3.97	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)	3.96	0.005 mg/L	4.00		99	90-110			
Nitrite (as N)	2.11	0.005 mg/L	2.00		105	85-115			
Sulfate	16.2	1.0 mg/L	16.0		102	90-110			
LCS (B412764-BS2)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	3.85	0.10 mg/L	4.00		96	85-115			
Chloride	16.1	0.10 mg/L	16.0		101	90-110			
Fluoride	3.90	0.10 mg/L	4.00		98	88-108			
Nitrate (as N)	4.00	0.005 mg/L	4.00		100	90-110			
Nitrite (as N)	2.17	0.005 mg/L	2.00		109	85-115			
Sulfate	16.0	1.0 mg/L	16.0		100	90-110			
Duplicate (B412764-DUP2)			Source: 2411640-01		Prepared: 2024-09-14, Analyzed: 2024-09-14				
Bromide	< 0.10	0.10 mg/L		< 0.10					10
Chloride	1.21	0.10 mg/L		1.18			2		10
Fluoride	0.10	0.10 mg/L		0.10					10
Nitrate (as N)	0.015	0.010 mg/L		0.015					10
Nitrite (as N)	< 0.005	0.010 mg/L		< 0.010					15



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Anions, Batch B4I2764, Continued

Duplicate (B4I2764-DUP2), Continued		Source: 2411640-01		Prepared: 2024-09-14, Analyzed: 2024-09-14					
Sulfate	24.3	1.0 mg/L		24.0			1	10	
Matrix Spike (B4I2764-MS2)		Source: 2411640-01		Prepared: 2024-09-14, Analyzed: 2024-09-14					
Bromide	4.04	0.10 mg/L	4.00	< 0.10	101	80-120			
Chloride	17.2	0.10 mg/L	16.0	1.18	100	75-125			
Fluoride	4.09	0.10 mg/L	4.00	0.10	100	75-125			
Nitrate (as N)	3.96	0.005 mg/L	4.00	0.015	99	75-125			
Nitrite (as N)	2.14	0.005 mg/L	2.00	< 0.010	107	75-115			
Sulfate	41.5	1.0 mg/L	16.0	24.0	109	75-125			

BCMOE Aggregate Hydrocarbons, Batch B4I2916

Blank (B4I2916-BLK1)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
EPHw10-19	< 250	250 µg/L							
EPHw19-32	< 250	250 µg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	280	µg/L	2490		11	60-140			S09
LCS (B4I2916-BS2)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
EPHw10-19	21600	250 µg/L	17400		124	70-130			
EPHw19-32	31000	250 µg/L	24800		125	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1780	µg/L	2490		71	60-140			
LCS (B4I2916-BS4)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
EPHw10-19	20200	250 µg/L	17400		117	70-130			
EPHw19-32	28800	250 µg/L	24800		116	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1680	µg/L	2490		67	60-140			
LCS Dup (B4I2916-BSD2)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
EPHw10-19	22300	250 µg/L	17400		128	70-130	3	20	
EPHw19-32	31500	250 µg/L	24800		127	70-130	2	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1230	µg/L	2490		49	60-140			S09

Dissolved Metals, Batch B4I2868

Blank (B4I2868-BLK1)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 mg/L							
Potassium, dissolved	< 0.10	0.10 mg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4I2868, Continued									
Blank (B4I2868-BLK1), Continued					Prepared: 2024-09-16, Analyzed: 2024-09-16				
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 (B4I2868-BS1)									
					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Aluminum, dissolved	4.22	0.0050 mg/L	4.00		105	80-120			
Antimony, dissolved	0.0409	0.00020 mg/L	0.0400		102	80-120			
Arsenic, dissolved	0.404	0.00050 mg/L	0.400		101	80-120			
Barium, dissolved	0.0404	0.0050 mg/L	0.0400		101	80-120			
Beryllium, dissolved	0.0402	0.00010 mg/L	0.0400		100	80-120			
Bismuth, dissolved	0.0411	0.00010 mg/L	0.0400		103	80-120			
Boron, dissolved	0.401	0.0500 mg/L	0.400		100	80-120			
Cadmium, dissolved	0.0410	0.000010 mg/L	0.0400		102	80-120			
Calcium, dissolved	3.97	0.20 mg/L	4.00		99	80-120			
Chromium, dissolved	0.0412	0.00050 mg/L	0.0400		103	80-120			
Cobalt, dissolved	0.0408	0.00010 mg/L	0.0400		102	80-120			
Copper, dissolved	0.0403	0.00040 mg/L	0.0400		101	80-120			
Iron, dissolved	4.00	0.010 mg/L	4.00		100	80-120			
Lead, dissolved	0.0408	0.00020 mg/L	0.0400		102	80-120			
Lithium, dissolved	0.0412	0.00010 mg/L	0.0400		103	80-120			
Magnesium, dissolved	4.13	0.010 mg/L	4.00		103	80-120			
Manganese, dissolved	0.0414	0.00020 mg/L	0.0400		104	80-120			
Molybdenum, dissolved	0.0408	0.00010 mg/L	0.0400		102	80-120			
Nickel, dissolved	0.0406	0.00040 mg/L	0.0400		102	80-120			
Phosphorus, dissolved	4.17	0.050 mg/L	4.00		104	80-120			
Potassium, dissolved	4.16	0.10 mg/L	4.00		104	80-120			
Selenium, dissolved	0.392	0.00050 mg/L	0.400		98	80-120			
Silicon, dissolved	4.1	1.0 mg/L	4.00		103	80-120			
Silver, dissolved	0.0405	0.000050 mg/L	0.0400		101	80-120			
Sodium, dissolved	4.13	0.10 mg/L	4.00		103	80-120			
Strontium, dissolved	0.0408	0.0010 mg/L	0.0400		102	80-120			
Sulfur, dissolved	40.8	3.0 mg/L	40.0		102	80-120			
Tellurium, dissolved	0.0390	0.00050 mg/L	0.0400		98	80-120			
Thallium, dissolved	0.0412	0.000020 mg/L	0.0400		103	80-120			
Thorium, dissolved	0.0406	0.00010 mg/L	0.0400		102	80-120			
Tin, dissolved	0.0407	0.00020 mg/L	0.0400		102	80-120			
Titanium, dissolved	0.0407	0.0050 mg/L	0.0400		102	80-120			
Tungsten, dissolved	0.0404	0.0010 mg/L	0.0400		101	80-120			
Uranium, dissolved	0.0409	0.000020 mg/L	0.0400		102	80-120			
Vanadium, dissolved	0.0398	0.0050 mg/L	0.0400		100	80-120			
Zinc, dissolved	0.408	0.0040 mg/L	0.400		102	80-120			
Zirconium, dissolved	0.0400	0.00010 mg/L	0.0400		100	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B4I2896

Blank (B4I2896-BLK1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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 (B4I2896-BS1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

Aluminum, dissolved	4.12	0.0050 mg/L	4.00	103	80-120
Antimony, dissolved	0.0409	0.00020 mg/L	0.0400	102	80-120
Arsenic, dissolved	0.404	0.00050 mg/L	0.400	101	80-120
Barium, dissolved	0.0399	0.0050 mg/L	0.0400	100	80-120
Beryllium, dissolved	0.0401	0.00010 mg/L	0.0400	100	80-120
Bismuth, dissolved	0.0397	0.00010 mg/L	0.0400	99	80-120
Boron, dissolved	0.415	0.0500 mg/L	0.400	104	80-120
Cadmium, dissolved	0.0410	0.000010 mg/L	0.0400	103	80-120
Calcium, dissolved	4.16	0.20 mg/L	4.00	104	80-120
Chromium, dissolved	0.0410	0.00050 mg/L	0.0400	103	80-120
Cobalt, dissolved	0.0406	0.00010 mg/L	0.0400	102	80-120
Copper, dissolved	0.0405	0.00040 mg/L	0.0400	101	80-120
Iron, dissolved	4.04	0.010 mg/L	4.00	101	80-120
Lead, dissolved	0.0407	0.00020 mg/L	0.0400	102	80-120
Lithium, dissolved	0.0408	0.00010 mg/L	0.0400	102	80-120
Magnesium, dissolved	4.18	0.010 mg/L	4.00	105	80-120
Manganese, dissolved	0.0407	0.00020 mg/L	0.0400	102	80-120



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
 CBWM-2024

WORK ORDER REPORTED 2411640
 2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4I2896, Continued									
LCS (B4I2896-BS1), Continued					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Molybdenum, dissolved	0.0408	0.00010 mg/L	0.0400		102	80-120			
Nickel, dissolved	0.0412	0.00040 mg/L	0.0400		103	80-120			
Phosphorus, dissolved	4.13	0.050 mg/L	4.00		103	80-120			
Potassium, dissolved	3.92	0.10 mg/L	4.00		98	80-120			
Selenium, dissolved	0.404	0.00050 mg/L	0.400		101	80-120			
Silicon, dissolved	4.1	1.0 mg/L	4.00		103	80-120			
Silver, dissolved	0.0408	0.000050 mg/L	0.0400		102	80-120			
Sodium, dissolved	4.10	0.10 mg/L	4.00		102	80-120			
Strontium, dissolved	0.0410	0.0010 mg/L	0.0400		102	80-120			
Sulfur, dissolved	42.2	3.0 mg/L	40.0		106	80-120			
Tellurium, dissolved	0.0375	0.00050 mg/L	0.0400		94	80-120			
Thallium, dissolved	0.0412	0.000020 mg/L	0.0400		103	80-120			
Thorium, dissolved	0.0393	0.00010 mg/L	0.0400		98	80-120			
Tin, dissolved	0.0407	0.00020 mg/L	0.0400		102	80-120			
Titanium, dissolved	0.0399	0.0050 mg/L	0.0400		100	80-120			
Tungsten, dissolved	0.0405	0.0010 mg/L	0.0400		101	80-120			
Uranium, dissolved	0.0404	0.000020 mg/L	0.0400		101	80-120			
Vanadium, dissolved	0.0393	0.0050 mg/L	0.0400		98	80-120			
Zinc, dissolved	0.412	0.0040 mg/L	0.400		103	80-120			
Zirconium, dissolved	0.0385	0.00010 mg/L	0.0400		96	80-120			

Dissolved Metals, Batch B4I2948

Blank (B4I2948-BLK1)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4I2948-BLK2)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4I2948-BLK3)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4I2948-BLK4)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
LCS (B4I2948-BS1)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	0.00237	0.000010 mg/L	0.00250		95	80-120			
LCS (B4I2948-BS2)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	0.00250	0.000010 mg/L	0.00250		100	80-120			
LCS (B4I2948-BS3)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	0.00241	0.000010 mg/L	0.00250		96	80-120			
LCS (B4I2948-BS4)					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	0.00247	0.000010 mg/L	0.00250		99	80-120			
Matrix Spike (B4I2948-MS1)					Source: 2411640-03 Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	0.00197	0.000010 mg/L	0.00250	< 0.000010	79	70-130			
Matrix Spike (B4I2948-MS4)					Source: 2411640-01 Prepared: 2024-09-16, Analyzed: 2024-09-16				
Mercury, dissolved	0.00241	0.000010 mg/L	0.00250	< 0.000010	96	70-130			

General Parameters, Batch B4I2685



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2411640 2024-10-02 10:28
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4I2685, Continued

Blank (B4I2685-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK2)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK3)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK4)			Prepared: 2024-09-14, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B4I2685-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.58	0.50 mg/L	10.0		96	78-116			
Carbon, Dissolved Organic	9.71	0.50 mg/L	10.0		97	78-116			
LCS (B4I2685-BS2)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.81	0.50 mg/L	10.0		98	78-116			
Carbon, Dissolved Organic	10.0	0.50 mg/L	10.0		100	78-116			
LCS (B4I2685-BS3)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.89	0.50 mg/L	10.0		99	78-116			
Carbon, Dissolved Organic	9.59	0.50 mg/L	10.0		96	78-116			
LCS (B4I2685-BS4)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
Carbon, Total Organic	9.25	0.50 mg/L	10.0		93	78-116			
Carbon, Dissolved Organic	9.39	0.50 mg/L	10.0		94	78-116			
Duplicate (B4I2685-DUP4)			Source: 2411640-01		Prepared: 2024-09-14, Analyzed: 2024-09-16				
Carbon, Total Organic	0.64	0.50 mg/L		0.72					16
Carbon, Dissolved Organic	< 0.50	0.50 mg/L		< 0.50					15
Matrix Spike (B4I2685-MS4)			Source: 2411640-01		Prepared: 2024-09-14, Analyzed: 2024-09-16				
Carbon, Total Organic	9.99	0.50 mg/L	10.0	0.72	93	70-130			
Carbon, Dissolved Organic	9.79	0.50 mg/L	10.0	< 0.50	93	70-130			

General Parameters, Batch B4I2743

Blank (B4I2743-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-18						
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B4I2743-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-18						
BOD, 5-day	186	48.4 mg/L	198		94	85-115			

General Parameters, Batch B4I2761

Blank (B4I2761-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
Blank (B4I2761-BLK2)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
LCS (B4I2761-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	0.100	0.0050 mg/L	0.100		100	84-115			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2411640 2024-10-02 10:28
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4I2761, Continued

LCS (B4I2761-BS2)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	0.100	0.0050 mg/L	0.100		100	84-115			
Duplicate (B4I2761-DUP2)			Source: 2411640-03 Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L	< 0.0050					14	
Matrix Spike (B4I2761-MS2)			Source: 2411640-03 Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	0.0960	0.0050 mg/L	0.100	< 0.0050	94	70-130			

General Parameters, Batch B4I2913

Blank (B4I2913-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Blank (B4I2913-BLK2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
LCS (B4I2913-BS1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Alkalinity, Total (as CaCO3)	92.8	1.0 mg/L	100		93	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	46.9	1.0 mg/L	50.0		94	0-200			
LCS (B4I2913-BS3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Alkalinity, Total (as CaCO3)	93.2	1.0 mg/L	100		93	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.8	1.0 mg/L	50.0		88	0-200			

General Parameters, Batch B4I2915

Blank (B4I2915-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	< 20	20 mg/L							
Blank (B4I2915-BLK2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B4I2915-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	507	20 mg/L	500		101	89-115			
LCS (B4I2915-BS2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	507	20 mg/L	500		101	89-115			

General Parameters, Batch B4I3007

Blank (B4I3007-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4I3007-BLK2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4I3007-BLK3)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2411640 2024-10-02 10:28
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I3007, Continued									
LCS (B4I3007-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Phosphorus, Total (as P)	0.101	0.0050 mg/L	0.100		101	85-115			
LCS (B4I3007-BS2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Phosphorus, Total (as P)	0.0999	0.0050 mg/L	0.100		100	85-115			
LCS (B4I3007-BS3)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Phosphorus, Total (as P)	0.0996	0.0050 mg/L	0.100		100	85-115			
General Parameters, Batch B4I3013									
Blank (B4I3013-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I3013-BLK2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I3013-BLK3)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B4I3013-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Ammonia, Total (as N)	1.14	0.050 mg/L	1.00		114	85-115			
LCS (B4I3013-BS2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Ammonia, Total (as N)	1.12	0.050 mg/L	1.00		112	85-115			
LCS (B4I3013-BS3)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Ammonia, Total (as N)	1.08	0.050 mg/L	1.00		108	85-115			
General Parameters, Batch B4I3101									
Blank (B4I3101-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-18						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B4I3101-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-18						
Solids, Total Suspended	91.5	5.0 mg/L	100		92	85-115			
General Parameters, Batch B4I3188									
Blank (B4I3188-BLK1)			Prepared: 2024-09-18, Analyzed: 2024-09-19						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B4I3188-BS1)			Prepared: 2024-09-18, Analyzed: 2024-09-19						
Solids, Total Suspended	93.5	5.0 mg/L	100		94	85-115			
General Parameters, Batch B4I3211									
Blank (B4I3211-BLK1)			Prepared: 2024-09-18, Analyzed: 2024-09-19						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4I3211-BLK2)			Prepared: 2024-09-18, Analyzed: 2024-09-19						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B4I3211-BS1)			Prepared: 2024-09-18, Analyzed: 2024-09-19						
Nitrogen, Total Kjeldahl	0.993	0.050 mg/L	1.00		99	85-115			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B413211, Continued

LCS (B413211-BS2)

Prepared: 2024-09-18, Analyzed: 2024-09-19

Nitrogen, Total Kjeldahl	0.992	0.050 mg/L	1.00		99	85-115			
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Total Metals, Batch B412885

Blank (B412885-BLK1)

Prepared: 2024-09-15, Analyzed: 2024-09-16

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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							

LCS (B412885-BS1)

Prepared: 2024-09-15, Analyzed: 2024-09-16

Aluminum, total	3.97	0.0050 mg/L	4.00		99	80-120			
Antimony, total	0.0391	0.00020 mg/L	0.0400		98	80-120			
Arsenic, total	0.387	0.00050 mg/L	0.400		97	80-120			
Barium, total	0.0394	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0390	0.00010 mg/L	0.0400		97	80-120			
Bismuth, total	0.0384	0.00010 mg/L	0.0400		96	80-120			
Boron, total	0.396	0.0500 mg/L	0.400		99	80-120			
Cadmium, total	0.0389	0.000010 mg/L	0.0400		97	80-120			
Calcium, total	3.87	0.20 mg/L	4.00		97	80-120			
Chromium, total	0.0399	0.00050 mg/L	0.0400		100	80-120			
Cobalt, total	0.0390	0.00010 mg/L	0.0400		98	80-120			
Copper, total	0.0390	0.00040 mg/L	0.0400		97	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4I2885, Continued									
LCS (B4I2885-BS1), Continued					Prepared: 2024-09-15, Analyzed: 2024-09-16				
Iron, total	3.91	0.010 mg/L	4.00		98	80-120			
Lead, total	0.0390	0.00020 mg/L	0.0400		98	80-120			
Lithium, total	0.0398	0.00010 mg/L	0.0400		100	80-120			
Magnesium, total	3.97	0.010 mg/L	4.00		99	80-120			
Manganese, total	0.0399	0.00020 mg/L	0.0400		100	80-120			
Molybdenum, total	0.0396	0.00010 mg/L	0.0400		99	80-120			
Nickel, total	0.0396	0.00040 mg/L	0.0400		99	80-120			
Phosphorus, total	3.94	0.050 mg/L	4.00		98	80-120			
Potassium, total	3.84	0.10 mg/L	4.00		96	80-120			
Selenium, total	0.380	0.00050 mg/L	0.400		95	80-120			
Silicon, total	4.0	1.0 mg/L	4.00		99	80-120			
Silver, total	0.0389	0.000050 mg/L	0.0400		97	80-120			
Sodium, total	4.01	0.10 mg/L	4.00		100	80-120			
Strontium, total	0.0398	0.0010 mg/L	0.0400		99	80-120			
Sulfur, total	39.6	3.0 mg/L	40.0		99	80-120			
Tellurium, total	0.0356	0.00050 mg/L	0.0400		89	80-120			
Thallium, total	0.0391	0.000020 mg/L	0.0400		98	80-120			
Thorium, total	0.0404	0.00010 mg/L	0.0400		101	80-120			
Tin, total	0.0395	0.00020 mg/L	0.0400		99	80-120			
Titanium, total	0.0383	0.0050 mg/L	0.0400		96	80-120			
Tungsten, total	0.0398	0.0010 mg/L	0.0400		99	80-120			
Uranium, total	0.0401	0.000020 mg/L	0.0400		100	80-120			
Vanadium, total	0.0391	0.0050 mg/L	0.0400		98	80-120			
Zinc, total	0.387	0.0040 mg/L	0.400		97	80-120			
Zirconium, total	0.0375	0.00010 mg/L	0.0400		94	80-120			
Matrix Spike (B4I2885-MS1)			Source: 2411640-02		Prepared: 2024-09-15, Analyzed: 2024-09-16				
Aluminum, total	4.43	0.0050 mg/L	4.00	0.0077	110	70-130			
Antimony, total	0.0443	0.00020 mg/L	0.0400	< 0.00020	111	70-130			
Arsenic, total	0.441	0.00050 mg/L	0.400	< 0.00050	110	70-130			
Barium, total	0.115	0.0050 mg/L	0.0400	0.0726	107	70-130			
Beryllium, total	0.0432	0.00010 mg/L	0.0400	< 0.00010	108	70-130			
Bismuth, total	0.0417	0.00010 mg/L	0.0400	< 0.00010	104	70-130			
Boron, total	0.451	0.0500 mg/L	0.400	< 0.0500	111	70-130			
Cadmium, total	0.0443	0.000010 mg/L	0.0400	< 0.000010	111	70-130			
Calcium, total	51.8	0.20 mg/L	4.00	50.3	38	70-130			MS2
Chromium, total	0.0446	0.00050 mg/L	0.0400	< 0.00050	110	70-130			
Cobalt, total	0.0425	0.00010 mg/L	0.0400	< 0.00010	106	70-130			
Copper, total	0.0418	0.00040 mg/L	0.0400	< 0.00040	104	70-130			
Iron, total	4.34	0.010 mg/L	4.00	0.013	108	70-130			
Lead, total	0.0435	0.00020 mg/L	0.0400	< 0.00020	109	70-130			
Lithium, total	0.0485	0.00010 mg/L	0.0400	0.00400	111	70-130			
Magnesium, total	17.1	0.010 mg/L	4.00	13.4	91	70-130			
Manganese, total	0.0449	0.00020 mg/L	0.0400	0.00138	109	70-130			
Molybdenum, total	0.0464	0.00010 mg/L	0.0400	0.00066	114	70-130			
Nickel, total	0.0430	0.00040 mg/L	0.0400	< 0.00040	107	70-130			
Phosphorus, total	4.52	0.050 mg/L	4.00	< 0.050	113	70-130			
Potassium, total	4.59	0.10 mg/L	4.00	0.39	105	70-130			
Selenium, total	0.432	0.00050 mg/L	0.400	0.00056	108	70-130			
Silicon, total	7.2	1.0 mg/L	4.00	2.4	118	70-130			
Silver, total	0.0416	0.000050 mg/L	0.0400	< 0.000050	104	70-130			
Sodium, total	5.86	0.10 mg/L	4.00	1.59	107	70-130			
Strontium, total	0.156	0.0010 mg/L	0.0400	0.118	95	70-130			
Sulfur, total	50.7	3.0 mg/L	40.0	6.4	111	70-130			
Tellurium, total	0.0406	0.00050 mg/L	0.0400	< 0.00050	102	70-130			
Thallium, total	0.0435	0.000020 mg/L	0.0400	< 0.000020	109	70-130			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4I2885, Continued									
Matrix Spike (B4I2885-MS1), Continued		Source: 2411640-02		Prepared: 2024-09-15, Analyzed: 2024-09-16					
Thorium, total	0.0439	0.00010 mg/L	0.0400	< 0.00010	110	70-130			
Tin, total	0.0448	0.00020 mg/L	0.0400	< 0.00020	112	70-130			
Titanium, total	0.0432	0.0050 mg/L	0.0400	< 0.0050	108	70-130			
Tungsten, total	0.0446	0.0010 mg/L	0.0400	< 0.0010	112	70-130			
Uranium, total	0.0448	0.000020 mg/L	0.0400	0.000545	111	70-130			
Vanadium, total	0.0441	0.0050 mg/L	0.0400	< 0.0050	110	70-130			
Zinc, total	0.428	0.0040 mg/L	0.400	< 0.0040	107	70-130			
Zirconium, total	0.0430	0.00010 mg/L	0.0400	< 0.00010	107	70-130			

Total Metals, Batch B4I2898

Blank (B4I2898-BLK1)		Prepared: 2024-09-15, Analyzed: 2024-09-16							
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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							

LCS (B4I2898-BS1)		Prepared: 2024-09-15, Analyzed: 2024-09-16							
Aluminum, total	4.19	0.0050 mg/L	4.00		105	80-120			
Antimony, total	0.0391	0.00020 mg/L	0.0400		98	80-120			
Arsenic, total	0.390	0.00050 mg/L	0.400		98	80-120			
Barium, total	0.0399	0.0050 mg/L	0.0400		100	80-120			
Beryllium, total	0.0399	0.00010 mg/L	0.0400		100	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411640
2024-10-02 10:28

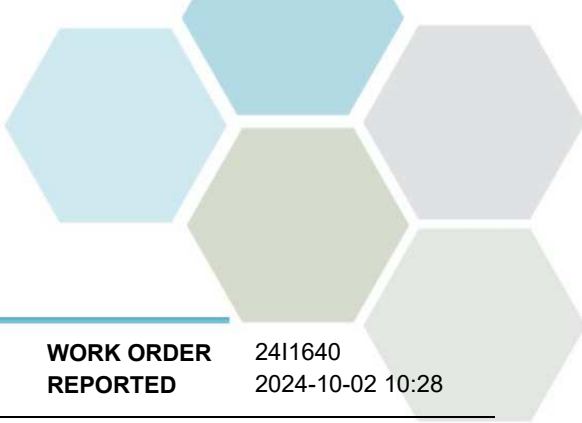
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4I2898, Continued

LCS (B4I2898-BS1), Continued				Prepared: 2024-09-15, Analyzed: 2024-09-16					
Bismuth, total	0.0400	0.00010 mg/L	0.0400		100	80-120			
Boron, total	0.401	0.0500 mg/L	0.400		100	80-120			
Cadmium, total	0.0396	0.000010 mg/L	0.0400		99	80-120			
Calcium, total	3.87	0.20 mg/L	4.00		97	80-120			
Chromium, total	0.0402	0.00050 mg/L	0.0400		100	80-120			
Cobalt, total	0.0398	0.00010 mg/L	0.0400		100	80-120			
Copper, total	0.0396	0.00040 mg/L	0.0400		99	80-120			
Iron, total	3.98	0.010 mg/L	4.00		100	80-120			
Lead, total	0.0404	0.00020 mg/L	0.0400		101	80-120			
Lithium, total	0.0400	0.00010 mg/L	0.0400		100	80-120			
Magnesium, total	4.11	0.010 mg/L	4.00		103	80-120			
Manganese, total	0.0406	0.00020 mg/L	0.0400		101	80-120			
Molybdenum, total	0.0407	0.00010 mg/L	0.0400		102	80-120			
Nickel, total	0.0402	0.00040 mg/L	0.0400		100	80-120			
Phosphorus, total	4.01	0.050 mg/L	4.00		100	80-120			
Potassium, total	4.06	0.10 mg/L	4.00		101	80-120			
Selenium, total	0.382	0.00050 mg/L	0.400		95	80-120			
Silicon, total	4.0	1.0 mg/L	4.00		101	80-120			
Silver, total	0.0397	0.000050 mg/L	0.0400		99	80-120			
Sodium, total	4.10	0.10 mg/L	4.00		103	80-120			
Strontium, total	0.0396	0.0010 mg/L	0.0400		99	80-120			
Sulfur, total	40.0	3.0 mg/L	40.0		100	80-120			
Tellurium, total	0.0377	0.00050 mg/L	0.0400		94	80-120			
Thallium, total	0.0409	0.000020 mg/L	0.0400		102	80-120			
Thorium, total	0.0410	0.00010 mg/L	0.0400		102	80-120			
Tin, total	0.0402	0.00020 mg/L	0.0400		100	80-120			
Titanium, total	0.0403	0.0050 mg/L	0.0400		101	80-120			
Tungsten, total	0.0407	0.0010 mg/L	0.0400		102	80-120			
Uranium, total	0.0408	0.000020 mg/L	0.0400		102	80-120			
Vanadium, total	0.0395	0.0050 mg/L	0.0400		99	80-120			
Zinc, total	0.391	0.0040 mg/L	0.400		98	80-120			
Zirconium, total	0.0394	0.00010 mg/L	0.0400		99	80-120			

Total Metals, Batch B4I2948

Blank (B4I2948-BLK1)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2948-BLK2)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2948-BLK3)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2948-BLK4)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	< 0.000010	0.000010 mg/L							
LCS (B4I2948-BS1)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	0.00237	0.000010 mg/L	0.00250		95	80-120			
LCS (B4I2948-BS2)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	0.00250	0.000010 mg/L	0.00250		100	80-120			
LCS (B4I2948-BS3)				Prepared: 2024-09-16, Analyzed: 2024-09-16					
Mercury, total	0.00241	0.000010 mg/L	0.00250		96	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2411640 2024-10-02 10:28						
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier

Total Metals, Batch B4I2948, Continued

LCS (B4I2948-BS4)	Prepared: 2024-09-16, Analyzed: 2024-09-16								
Mercury, total	0.00247	0.000010 mg/L	0.00250		99	80-120			

QC Qualifiers:									
MS2	The native sample concentration is greater than the spike concentration hence the matrix spike limits do not apply.								
S09	The surrogate recovery for this sample is outside of established control limits Suspect syringe error, data not affected.								

CERTIFICATE OF ANALYSIS

REPORTED TO Elk River Alliance
PO Box 2095, 1111 2nd Ave
Fernie, BC V0B1M0

ATTENTION Fynley Kujit

PO NUMBER

PROJECT CBWM-2024

PROJECT INFO

WORK ORDER 2411648

RECEIVED / TEMP 2024-09-11 09:03 / 3.2°C

REPORTED 2024-09-18 16:18

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



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.

We've Got Chemistry



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.

Ahead of the Curve



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>

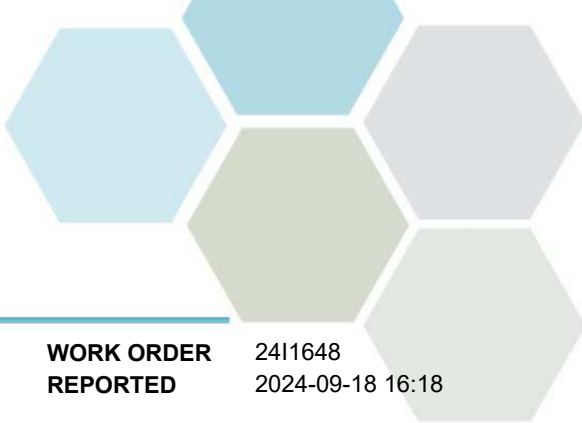
If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

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

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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B01002_20240908_0940 (2411648-01) | Matrix: Water | Sampled: 2024-09-08 09:40

Anions

Bromide	< 0.10	N/A	0.10 mg/L	2024-09-14	
Chloride	0.17	AO ≤ 250	0.10 mg/L	2024-09-14	
Fluoride	0.18	MAC = 1.5	0.10 mg/L	2024-09-14	
Nitrate (as N)	0.040	MAC = 10	0.010 mg/L	2024-09-14	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010 mg/L	2024-09-14	HT1
Sulfate	57.2	AO ≤ 500	1.0 mg/L	2024-09-14	

BCMOE Aggregate Hydrocarbons

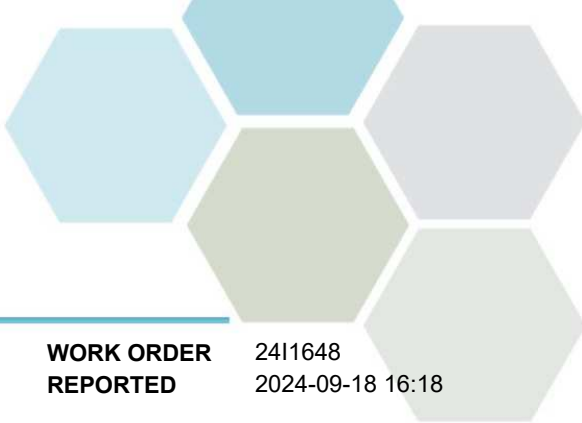
EPHw10-19	< 250	N/A	250 µg/L	2024-09-17	
EPHw19-32	< 250	N/A	250 µg/L	2024-09-17	
Surrogate: 2-Methylnonane (EPH/F2-4)	102		60-140 %	2024-09-17	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	184	N/A	0.500 mg/L	N/A	
Nitrate+Nitrite (as N)	0.0403	N/A	0.0100 mg/L	N/A	
Nitrogen, Total	0.125	N/A	0.0500 mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Antimony, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Arsenic, dissolved	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Barium, dissolved	0.0287	N/A	0.0050 mg/L	2024-09-16	
Beryllium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, dissolved	< 0.0500	N/A	0.0500 mg/L	2024-09-16	
Cadmium, dissolved	0.000027	N/A	0.000010 mg/L	2024-09-16	
Calcium, dissolved	51.0	N/A	0.20 mg/L	2024-09-16	
Chromium, dissolved	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Cobalt, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, dissolved	< 0.00040	N/A	0.00040 mg/L	2024-09-16	
Iron, dissolved	< 0.010	N/A	0.010 mg/L	2024-09-16	
Lead, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Lithium, dissolved	0.00151	N/A	0.00010 mg/L	2024-09-16	
Magnesium, dissolved	13.7	N/A	0.010 mg/L	2024-09-16	
Manganese, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Mercury, dissolved	< 0.000010	N/A	0.000010 mg/L	2024-09-15	
Molybdenum, dissolved	0.00121	N/A	0.00010 mg/L	2024-09-16	
Nickel, dissolved	< 0.00040	N/A	0.00040 mg/L	2024-09-16	
Phosphorus, dissolved	< 0.050	N/A	0.050 mg/L	2024-09-16	
Potassium, dissolved	0.27	N/A	0.10 mg/L	2024-09-16	
Selenium, dissolved	0.00099	N/A	0.00050 mg/L	2024-09-16	
Silicon, dissolved	2.3	N/A	1.0 mg/L	2024-09-16	
Silver, dissolved	< 0.000050	N/A	0.000050 mg/L	2024-09-16	
Sodium, dissolved	0.55	N/A	0.10 mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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B01002_20240908_0940 (2411648-01) | Matrix: Water | Sampled: 2024-09-08 09:40, Continued

Dissolved Metals, Continued

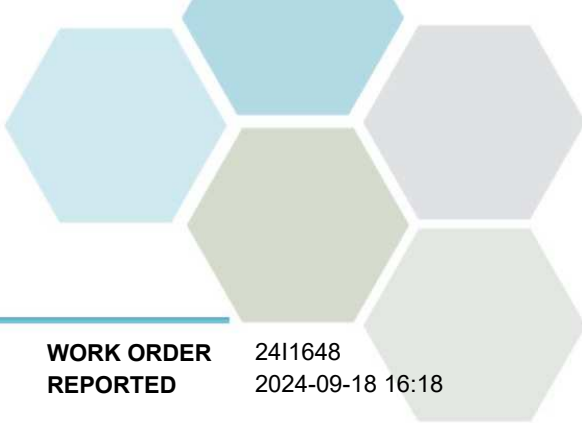
Strontium, dissolved	0.572	N/A	0.0010 mg/L	2024-09-16	
Sulfur, dissolved	19.4	N/A	3.0 mg/L	2024-09-16	
Tellurium, dissolved	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Thallium, dissolved	< 0.000020	N/A	0.000020 mg/L	2024-09-16	
Thorium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Tin, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Titanium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Tungsten, dissolved	< 0.0010	N/A	0.0010 mg/L	2024-09-16	
Uranium, dissolved	0.000769	N/A	0.000020 mg/L	2024-09-16	
Vanadium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Zinc, dissolved	< 0.0040	N/A	0.0040 mg/L	2024-09-16	
Zirconium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-09-16	

General Parameters

Alkalinity, Total (as CaCO3)	119	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Bicarbonate (as CaCO3)	119	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-09-16	
BOD, 5-day	< 5.8	N/A	2.0 mg/L	2024-09-18	HT1
Carbon, Total Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Carbon, Dissolved Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-09-17	
Nitrogen, Total Kjeldahl	0.085	N/A	0.050 mg/L	2024-09-18	
Phosphorus, Total (as P)	0.0078	N/A	0.0050 mg/L	2024-09-16	
Phosphorus, Dissolved Reactive	0.0080	N/A	0.0050 mg/L	2024-09-14	HT1
Solids, Total Suspended	< 2.0	N/A	2.0 mg/L	2024-09-17	HT1

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-09-16	
Barium, total	0.0262	MAC = 2	0.0050 mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-09-16	
Cadmium, total	0.000026	MAC = 0.007	0.000010 mg/L	2024-09-16	
Calcium, total	50.4	None Required	0.20 mg/L	2024-09-16	
Chromium, total	0.00051	MAC = 0.05	0.00050 mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-09-16	
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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B01002_20240908_0940 (2411648-01) | Matrix: Water | Sampled: 2024-09-08 09:40, Continued

Total Metals, Continued

Lithium, total	0.00137	N/A	0.00010	mg/L	2024-09-16	
Magnesium, total	12.3	None Required	0.010	mg/L	2024-09-16	
Manganese, total	< 0.00020	MAC = 0.12	0.00020	mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-09-15	
Molybdenum, total	0.00131	N/A	0.00010	mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, total	0.27	N/A	0.10	mg/L	2024-09-16	
Selenium, total	0.00102	MAC = 0.05	0.00050	mg/L	2024-09-16	
Silicon, total	2.2	N/A	1.0	mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-09-16	
Sodium, total	0.51	AO ≤ 200	0.10	mg/L	2024-09-16	
Strontium, total	0.501	MAC = 7	0.0010	mg/L	2024-09-16	
Sulfur, total	18.0	N/A	3.0	mg/L	2024-09-16	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, total	0.000863	MAC = 0.02	0.000020	mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

B01001_20240908_1215 (2411648-02) | Matrix: Water | Sampled: 2024-09-08 12:15

Anions

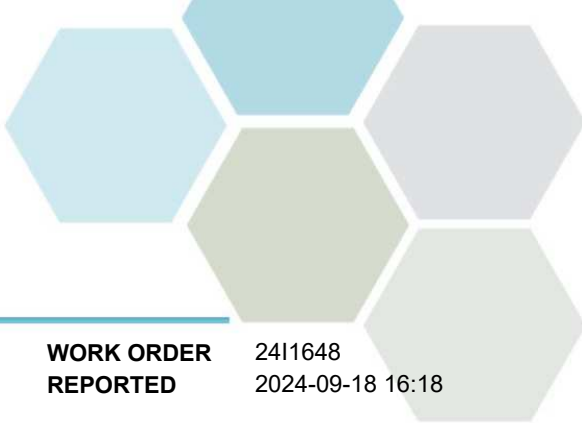
Bromide	< 0.10	N/A	0.10	mg/L	2024-09-14	
Chloride	0.15	AO ≤ 250	0.10	mg/L	2024-09-14	
Fluoride	0.17	MAC = 1.5	0.10	mg/L	2024-09-14	
Nitrate (as N)	0.045	MAC = 10	0.010	mg/L	2024-09-14	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-14	HT1
Sulfate	56.8	AO ≤ 500	1.0	mg/L	2024-09-14	

BCMOE Aggregate Hydrocarbons

EPHw10-19	< 250	N/A	250	µg/L	2024-09-17	
EPHw19-32	< 250	N/A	250	µg/L	2024-09-17	
Surrogate: 2-Methylnonane (EPH/F2-4)	106		60-140	%	2024-09-17	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	186	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0454	N/A	0.0100	mg/L	N/A	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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B01001_20240908_1215 (2411648-02) | Matrix: Water | Sampled: 2024-09-08 12:15, Continued

Calculated Parameters, Continued

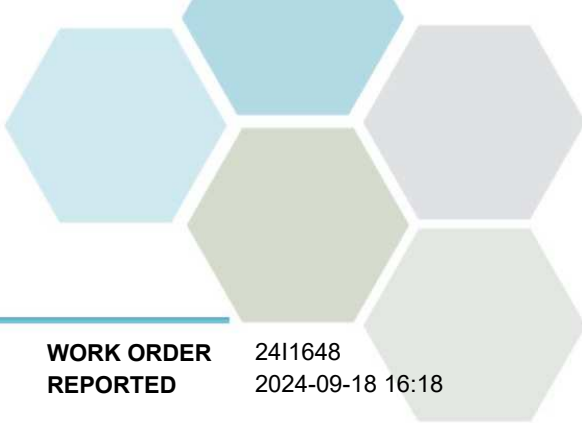
Nitrogen, Total	< 0.0500	N/A	0.0500	mg/L	N/A	
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Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Barium, dissolved	0.0293	N/A	0.0050	mg/L	2024-09-16	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-16	
Cadmium, dissolved	0.000026	N/A	0.000010	mg/L	2024-09-16	
Calcium, dissolved	51.8	N/A	0.20	mg/L	2024-09-16	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-16	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Lithium, dissolved	0.00154	N/A	0.00010	mg/L	2024-09-16	
Magnesium, dissolved	13.6	N/A	0.010	mg/L	2024-09-16	
Manganese, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-15	
Molybdenum, dissolved	0.00122	N/A	0.00010	mg/L	2024-09-16	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, dissolved	0.28	N/A	0.10	mg/L	2024-09-16	
Selenium, dissolved	0.00097	N/A	0.00050	mg/L	2024-09-16	
Silicon, dissolved	2.4	N/A	1.0	mg/L	2024-09-16	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-16	
Sodium, dissolved	0.57	N/A	0.10	mg/L	2024-09-16	
Strontium, dissolved	0.576	N/A	0.0010	mg/L	2024-09-16	
Sulfur, dissolved	19.7	N/A	3.0	mg/L	2024-09-16	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, dissolved	0.000765	N/A	0.000020	mg/L	2024-09-16	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-16	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

General Parameters

Alkalinity, Total (as CaCO3)	119	N/A	1.0	mg/L	2024-09-16	
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TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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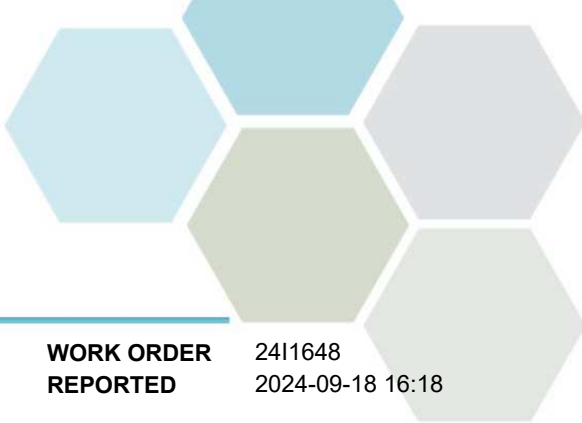
B01001_20240908_1215 (2411648-02) | Matrix: Water | Sampled: 2024-09-08 12:15, Continued

General Parameters, Continued

Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Bicarbonate (as CaCO3)	119	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-16	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-09-16	
BOD, 5-day	< 5.8	N/A	2.0 mg/L	2024-09-18	HT1
Carbon, Total Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Carbon, Dissolved Organic	< 0.50	N/A	0.50 mg/L	2024-09-16	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-09-17	
Nitrogen, Total Kjeldahl	< 0.050	N/A	0.050 mg/L	2024-09-18	
Phosphorus, Total (as P)	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050 mg/L	2024-09-14	HT1
Solids, Total Suspended	< 2.0	N/A	2.0 mg/L	2024-09-17	HT1

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050 mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-09-16	
Barium, total	0.0282	MAC = 2	0.0050 mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-09-16	
Cadmium, total	0.000028	MAC = 0.007	0.000010 mg/L	2024-09-16	
Calcium, total	48.5	None Required	0.20 mg/L	2024-09-16	
Chromium, total	0.00052	MAC = 0.05	0.00050 mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-09-16	
Iron, total	< 0.010	AO ≤ 0.3	0.010 mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-09-16	
Lithium, total	0.00145	N/A	0.00010 mg/L	2024-09-16	
Magnesium, total	14.5	None Required	0.010 mg/L	2024-09-16	
Manganese, total	< 0.00020	MAC = 0.12	0.00020 mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2024-09-15	
Molybdenum, total	0.00138	N/A	0.00010 mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2024-09-16	
Potassium, total	0.30	N/A	0.10 mg/L	2024-09-16	
Selenium, total	0.00100	MAC = 0.05	0.00050 mg/L	2024-09-16	
Silicon, total	2.2	N/A	1.0 mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2024-09-16	
Sodium, total	0.58	AO ≤ 200	0.10 mg/L	2024-09-16	
Strontium, total	0.531	MAC = 7	0.0010 mg/L	2024-09-16	
Sulfur, total	18.0	N/A	3.0 mg/L	2024-09-16	



TEST RESULTS

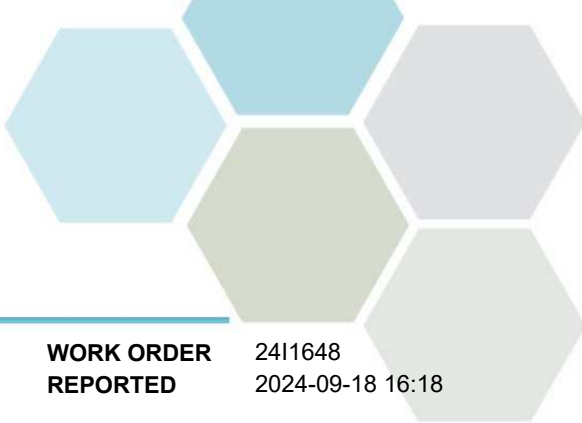
REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
B01001_20240908_1215 (2411648-02) Matrix: Water Sampled: 2024-09-08 12:15, Continued					
<i>Total Metals, Continued</i>					
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2024-09-16	
Uranium, total	0.000926	MAC = 0.02	0.000020 mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Zinc, total	< 0.0040	AO ≤ 5	0.0040 mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	

Sample Qualifiers:

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



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

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, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	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

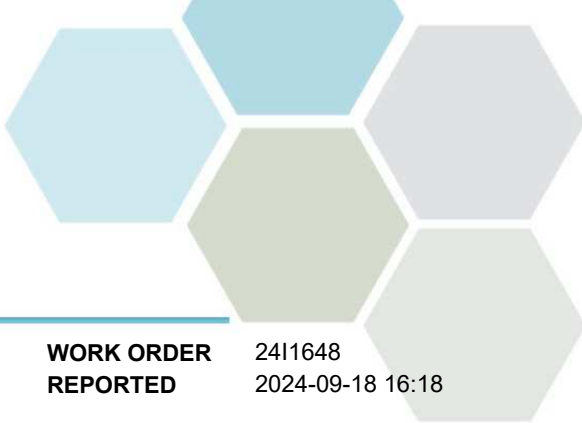
Glossary of Terms:

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

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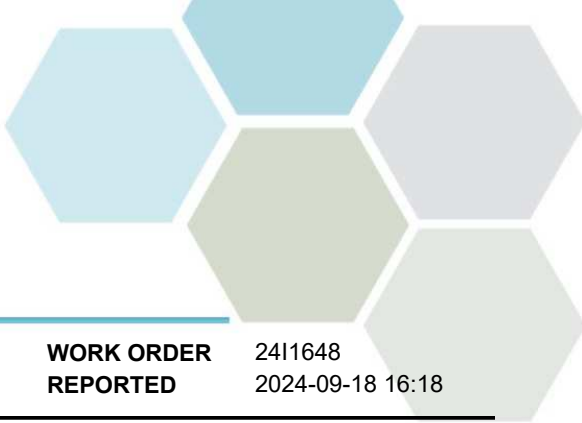
WORK ORDER 2411648
REPORTED 2024-09-18 16:18

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 not 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.



APPENDIX 2: QUALITY CONTROL RESULTS

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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 B4I2764									
Blank (B4I2764-BLK1)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.005	0.005 mg/L							
Nitrite (as N)	< 0.005	0.005 mg/L							
Sulfate	< 1.0	1.0 mg/L							
Blank (B4I2764-BLK2)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	< 0.10	0.10 mg/L							
Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrate (as N)	< 0.005	0.005 mg/L							
Nitrite (as N)	< 0.005	0.005 mg/L							
Sulfate	< 1.0	1.0 mg/L							
LCS (B4I2764-BS1)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	4.04	0.10 mg/L	4.00		101	85-115			
Chloride	16.2	0.10 mg/L	16.0		101	90-110			
Fluoride	3.97	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)	3.96	0.005 mg/L	4.00		99	90-110			
Nitrite (as N)	2.11	0.005 mg/L	2.00		105	85-115			
Sulfate	16.2	1.0 mg/L	16.0		102	90-110			
LCS (B4I2764-BS2)			Prepared: 2024-09-14, Analyzed: 2024-09-14						
Bromide	3.85	0.10 mg/L	4.00		96	85-115			
Chloride	16.1	0.10 mg/L	16.0		101	90-110			
Fluoride	3.90	0.10 mg/L	4.00		98	88-108			
Nitrate (as N)	4.00	0.005 mg/L	4.00		100	90-110			
Nitrite (as N)	2.17	0.005 mg/L	2.00		109	85-115			
Sulfate	16.0	1.0 mg/L	16.0		100	90-110			

BCMOE Aggregate Hydrocarbons, Batch B4I2916

Blank (B4I2916-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
EPHw10-19	< 250	250 µg/L							
EPHw19-32	< 250	250 µg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
BCMOE Aggregate Hydrocarbons, Batch B4I2916, Continued									
Blank (B4I2916-BLK1), Continued			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Surrogate: 2-Methylnonane (EPH/F2-4)	280	µg/L	2490		11	60-140			S09
LCS (B4I2916-BS2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
EPHw10-19	21600	250 µg/L	17400		124	70-130			
EPHw19-32	31000	250 µg/L	24800		125	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1780	µg/L	2490		71	60-140			
LCS (B4I2916-BS4)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
EPHw10-19	20200	250 µg/L	17400		117	70-130			
EPHw19-32	28800	250 µg/L	24800		116	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1680	µg/L	2490		67	60-140			
LCS Dup (B4I2916-BSD2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
EPHw10-19	22300	250 µg/L	17400		128	70-130	3	20	
EPHw19-32	31500	250 µg/L	24800		127	70-130	2	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1230	µg/L	2490		49	60-140			S09

Dissolved Metals, Batch B4I2896

Blank (B4I2896-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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							



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B4I2896, Continued

Blank (B4I2896-BLK1), Continued

Prepared: 2024-09-16, Analyzed: 2024-09-16

Zirconium, dissolved	< 0.00010	0.00010 mg/L
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LCS (B4I2896-BS1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

Aluminum, dissolved	4.12	0.0050 mg/L	4.00	103	80-120
Antimony, dissolved	0.0409	0.00020 mg/L	0.0400	102	80-120
Arsenic, dissolved	0.404	0.00050 mg/L	0.400	101	80-120
Barium, dissolved	0.0399	0.0050 mg/L	0.0400	100	80-120
Beryllium, dissolved	0.0401	0.00010 mg/L	0.0400	100	80-120
Bismuth, dissolved	0.0397	0.00010 mg/L	0.0400	99	80-120
Boron, dissolved	0.415	0.0500 mg/L	0.400	104	80-120
Cadmium, dissolved	0.0410	0.000010 mg/L	0.0400	103	80-120
Calcium, dissolved	4.16	0.20 mg/L	4.00	104	80-120
Chromium, dissolved	0.0410	0.00050 mg/L	0.0400	103	80-120
Cobalt, dissolved	0.0406	0.00010 mg/L	0.0400	102	80-120
Copper, dissolved	0.0405	0.00040 mg/L	0.0400	101	80-120
Iron, dissolved	4.04	0.010 mg/L	4.00	101	80-120
Lead, dissolved	0.0407	0.00020 mg/L	0.0400	102	80-120
Lithium, dissolved	0.0408	0.00010 mg/L	0.0400	102	80-120
Magnesium, dissolved	4.18	0.010 mg/L	4.00	105	80-120
Manganese, dissolved	0.0407	0.00020 mg/L	0.0400	102	80-120
Molybdenum, dissolved	0.0408	0.00010 mg/L	0.0400	102	80-120
Nickel, dissolved	0.0412	0.00040 mg/L	0.0400	103	80-120
Phosphorus, dissolved	4.13	0.050 mg/L	4.00	103	80-120
Potassium, dissolved	3.92	0.10 mg/L	4.00	98	80-120
Selenium, dissolved	0.404	0.00050 mg/L	0.400	101	80-120
Silicon, dissolved	4.1	1.0 mg/L	4.00	103	80-120
Silver, dissolved	0.0408	0.000050 mg/L	0.0400	102	80-120
Sodium, dissolved	4.10	0.10 mg/L	4.00	102	80-120
Strontium, dissolved	0.0410	0.0010 mg/L	0.0400	102	80-120
Sulfur, dissolved	42.2	3.0 mg/L	40.0	106	80-120
Tellurium, dissolved	0.0375	0.00050 mg/L	0.0400	94	80-120
Thallium, dissolved	0.0412	0.000020 mg/L	0.0400	103	80-120
Thorium, dissolved	0.0393	0.00010 mg/L	0.0400	98	80-120
Tin, dissolved	0.0407	0.00020 mg/L	0.0400	102	80-120
Titanium, dissolved	0.0399	0.0050 mg/L	0.0400	100	80-120
Tungsten, dissolved	0.0405	0.0010 mg/L	0.0400	101	80-120
Uranium, dissolved	0.0404	0.000020 mg/L	0.0400	101	80-120
Vanadium, dissolved	0.0393	0.0050 mg/L	0.0400	98	80-120
Zinc, dissolved	0.412	0.0040 mg/L	0.400	103	80-120
Zirconium, dissolved	0.0385	0.00010 mg/L	0.0400	96	80-120

Dissolved Metals, Batch B4I2899

Blank (B4I2899-BLK1)

Prepared: 2024-09-15, Analyzed: 2024-09-15

Mercury, dissolved	< 0.000010	0.000010 mg/L
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Blank (B4I2899-BLK2)

Prepared: 2024-09-15, Analyzed: 2024-09-15

Mercury, dissolved	< 0.000010	0.000010 mg/L
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Blank (B4I2899-BLK3)

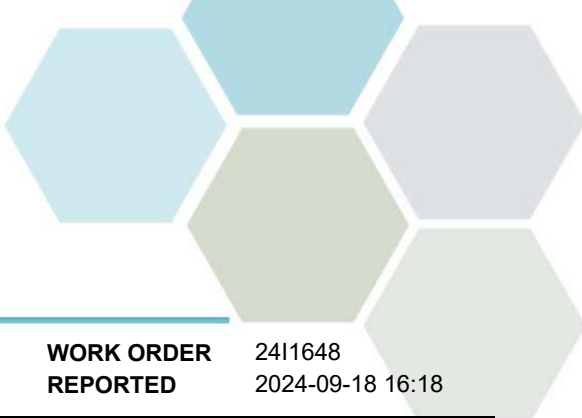
Prepared: 2024-09-15, Analyzed: 2024-09-15

Mercury, dissolved	< 0.000010	0.000010 mg/L
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Blank (B4I2899-BLK4)

Prepared: 2024-09-15, Analyzed: 2024-09-15

Mercury, dissolved	< 0.000010	0.000010 mg/L
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APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B4I2899, Continued

LCS (B4I2899-BS1)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00243	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS2)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00244	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS3)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00244	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS4)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00253	0.000010 mg/L	0.00250		101	80-120			
Duplicate (B4I2899-DUP1)		Source: 2411648-02		Prepared: 2024-09-15, Analyzed: 2024-09-15					
Mercury, dissolved	< 0.000010	0.000010 mg/L	< 0.000010					20	

General Parameters, Batch B4I2685

Blank (B4I2685-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK2)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK3)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK4)			Prepared: 2024-09-14, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B4I2685-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.58	0.50 mg/L	10.0		96	78-116			
Carbon, Dissolved Organic	9.71	0.50 mg/L	10.0		97	78-116			
LCS (B4I2685-BS2)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.81	0.50 mg/L	10.0		98	78-116			
Carbon, Dissolved Organic	10.0	0.50 mg/L	10.0		100	78-116			
LCS (B4I2685-BS3)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.89	0.50 mg/L	10.0		99	78-116			
Carbon, Dissolved Organic	9.59	0.50 mg/L	10.0		96	78-116			
LCS (B4I2685-BS4)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
Carbon, Total Organic	9.25	0.50 mg/L	10.0		93	78-116			
Carbon, Dissolved Organic	9.39	0.50 mg/L	10.0		94	78-116			

General Parameters, Batch B4I2743

Blank (B4I2743-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-18						
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B4I2743-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-18						
BOD, 5-day	186	48.4 mg/L	198		94	85-115			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4I2743, Continued

Duplicate (B4I2743-DUP2)		Source: 2411648-01		Prepared: 2024-09-13, Analyzed: 2024-09-18					
BOD, 5-day	< 5.8	2.0 mg/L		< 5.8				22	

General Parameters, Batch B4I2771

Blank (B4I2771-BLK1)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

Blank (B4I2771-BLK2)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

LCS (B4I2771-BS1)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Alkalinity, Total (as CaCO3)	94.1	1.0 mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.7	1.0 mg/L	50.0		89	0-200			

LCS (B4I2771-BS3)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Alkalinity, Total (as CaCO3)	94.1	1.0 mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.1	1.0 mg/L	50.0		88	0-200			

General Parameters, Batch B4I2812

Blank (B4I2812-BLK1)		Prepared: 2024-09-14, Analyzed: 2024-09-14							
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							

Blank (B4I2812-BLK2)		Prepared: 2024-09-14, Analyzed: 2024-09-14							
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							

LCS (B4I2812-BS1)		Prepared: 2024-09-14, Analyzed: 2024-09-14							
Phosphorus, Dissolved Reactive	0.100	0.0050 mg/L	0.100		100	84-115			

LCS (B4I2812-BS2)		Prepared: 2024-09-14, Analyzed: 2024-09-14							
Phosphorus, Dissolved Reactive	0.106	0.0050 mg/L	0.100		106	84-115			

Duplicate (B4I2812-DUP1)		Source: 2411648-01		Prepared: 2024-09-14, Analyzed: 2024-09-14					
Phosphorus, Dissolved Reactive	0.0080	0.0050 mg/L		0.0080					14

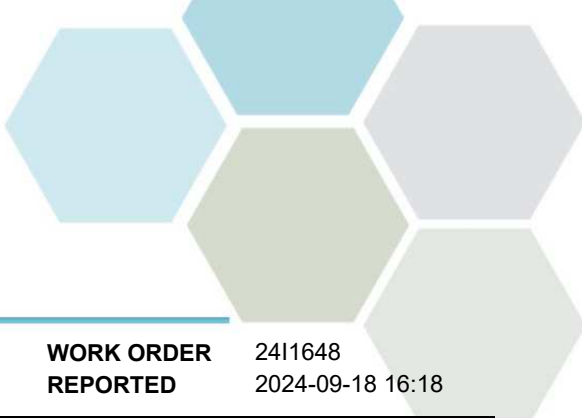
Matrix Spike (B4I2812-MS1)		Source: 2411648-01		Prepared: 2024-09-14, Analyzed: 2024-09-14					
Phosphorus, Dissolved Reactive	0.108	0.0050 mg/L	0.100	0.0080	100	70-130			

General Parameters, Batch B4I2906

Blank (B4I2906-BLK1)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							

Blank (B4I2906-BLK2)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							

Blank (B4I2906-BLK3)		Prepared: 2024-09-16, Analyzed: 2024-09-16							
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2906, Continued									
LCS (B4I2906-BS1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B4I2906-BS2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B4I2906-BS3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	0.103	0.0050 mg/L	0.100		103	85-115			
General Parameters, Batch B4I2915									
Blank (B4I2915-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	< 20	20 mg/L							
Blank (B4I2915-BLK2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B4I2915-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	507	20 mg/L	500		101	89-115			
LCS (B4I2915-BS2)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Chemical Oxygen Demand	507	20 mg/L	500		101	89-115			
General Parameters, Batch B4I2920									
Blank (B4I2920-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I2920-BLK2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I2920-BLK3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I2920-BLK4)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B4I2920-BS1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00		107	85-115			
LCS (B4I2920-BS2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.05	0.050 mg/L	1.00		105	85-115			
LCS (B4I2920-BS3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00		107	85-115			
LCS (B4I2920-BS4)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.06	0.050 mg/L	1.00		106	85-115			
General Parameters, Batch B4I2982									
Blank (B4I2982-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B4I2982-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-17						
Solids, Total Suspended	91.5	5.0 mg/L	100		92	85-115			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I3079									
Blank (B4I3079-BLK1)			Prepared: 2024-09-17, Analyzed: 2024-09-18						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4I3079-BLK2)			Prepared: 2024-09-17, Analyzed: 2024-09-18						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B4I3079-BS1)			Prepared: 2024-09-17, Analyzed: 2024-09-18						
Nitrogen, Total Kjeldahl	1.05	0.050 mg/L	1.00		105	85-115			
LCS (B4I3079-BS2)			Prepared: 2024-09-17, Analyzed: 2024-09-18						
Nitrogen, Total Kjeldahl	1.05	0.050 mg/L	1.00		105	85-115			
Total Metals, Batch B4I2884									
Blank (B4I2884-BLK1)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							
LCS (B4I2884-BS1)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
Aluminum, total	4.25	0.0050 mg/L	4.00		106	80-120			
Antimony, total	0.0392	0.00020 mg/L	0.0400		98	80-120			
Arsenic, total	0.396	0.00050 mg/L	0.400		99	80-120			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4I2884, Continued									
LCS (B4I2884-BS1), Continued					Prepared: 2024-09-15, Analyzed: 2024-09-16				
Barium, total	0.0396	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0399	0.00010 mg/L	0.0400		100	80-120			
Bismuth, total	0.0405	0.00010 mg/L	0.0400		101	80-120			
Boron, total	0.410	0.0500 mg/L	0.400		103	80-120			
Cadmium, total	0.0394	0.000010 mg/L	0.0400		99	80-120			
Calcium, total	3.97	0.20 mg/L	4.00		99	80-120			
Chromium, total	0.0404	0.00050 mg/L	0.0400		101	80-120			
Cobalt, total	0.0402	0.00010 mg/L	0.0400		100	80-120			
Copper, total	0.0395	0.00040 mg/L	0.0400		99	80-120			
Iron, total	4.02	0.10 mg/L	4.00		100	80-120			
Lead, total	0.0403	0.00020 mg/L	0.0400		101	80-120			
Lithium, total	0.0407	0.00010 mg/L	0.0400		102	80-120			
Magnesium, total	4.15	0.010 mg/L	4.00		104	80-120			
Manganese, total	0.0406	0.00020 mg/L	0.0400		102	80-120			
Molybdenum, total	0.0403	0.00010 mg/L	0.0400		101	80-120			
Nickel, total	0.0400	0.00040 mg/L	0.0400		100	80-120			
Phosphorus, total	4.18	0.050 mg/L	4.00		105	80-120			
Potassium, total	4.13	0.10 mg/L	4.00		103	80-120			
Selenium, total	0.380	0.00050 mg/L	0.400		95	80-120			
Silicon, total	4.1	1.0 mg/L	4.00		102	80-120			
Silver, total	0.0390	0.000050 mg/L	0.0400		98	80-120			
Sodium, total	4.11	0.10 mg/L	4.00		103	80-120			
Strontium, total	0.0403	0.0010 mg/L	0.0400		101	80-120			
Sulfur, total	39.6	3.0 mg/L	40.0		99	80-120			
Tellurium, total	0.0376	0.00050 mg/L	0.0400		94	80-120			
Thallium, total	0.0406	0.000020 mg/L	0.0400		102	80-120			
Thorium, total	0.0412	0.00010 mg/L	0.0400		103	80-120			
Tin, total	0.0400	0.00020 mg/L	0.0400		100	80-120			
Titanium, total	0.0409	0.0050 mg/L	0.0400		102	80-120			
Tungsten, total	0.0406	0.0010 mg/L	0.0400		101	80-120			
Uranium, total	0.0408	0.000020 mg/L	0.0400		102	80-120			
Vanadium, total	0.0396	0.0050 mg/L	0.0400		99	80-120			
Zinc, total	0.394	0.0040 mg/L	0.400		99	80-120			
Zirconium, total	0.0393	0.00010 mg/L	0.0400		98	80-120			

Total Metals, Batch B4I2899

Blank (B4I2899-BLK1)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK2)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK3)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK4)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	< 0.000010	0.000010 mg/L							
LCS (B4I2899-BS1)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	0.00243	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS2)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	0.00244	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS3)					Prepared: 2024-09-15, Analyzed: 2024-09-15				
Mercury, total	0.00244	0.000010 mg/L	0.00250		97	80-120			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4I2899, Continued

LCS (B4I2899-BS4)

Prepared: 2024-09-15, Analyzed: 2024-09-15

Mercury, total	0.00253	0.000010 mg/L	0.00250		101	80-120			
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Total Metals, Batch B4I2928

Blank (B4I2928-BLK1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							

LCS (B4I2928-BS1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

Aluminum, total	3.87	0.0050 mg/L	4.00		97	80-120			
Antimony, total	0.0389	0.00020 mg/L	0.0400		97	80-120			
Arsenic, total	0.385	0.00050 mg/L	0.400		96	80-120			
Barium, total	0.0388	0.0050 mg/L	0.0400		97	80-120			
Beryllium, total	0.0422	0.00010 mg/L	0.0400		105	80-120			
Bismuth, total	0.0384	0.00010 mg/L	0.0400		96	80-120			
Boron, total	0.431	0.0500 mg/L	0.400		108	80-120			
Cadmium, total	0.0388	0.000010 mg/L	0.0400		97	80-120			
Calcium, total	4.12	0.20 mg/L	4.00		103	80-120			
Chromium, total	0.0395	0.00050 mg/L	0.0400		99	80-120			
Cobalt, total	0.0383	0.00010 mg/L	0.0400		96	80-120			
Copper, total	0.0388	0.00040 mg/L	0.0400		97	80-120			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4I2928, Continued

LCS (B4I2928-BS1), Continued

Prepared: 2024-09-16, Analyzed: 2024-09-16

Iron, total	3.83	0.010 mg/L	4.00		96	80-120			
Lead, total	0.0384	0.00020 mg/L	0.0400		96	80-120			
Lithium, total	0.0418	0.00010 mg/L	0.0400		105	80-120			
Magnesium, total	3.91	0.010 mg/L	4.00		98	80-120			
Manganese, total	0.0387	0.00020 mg/L	0.0400		97	80-120			
Molybdenum, total	0.0394	0.00010 mg/L	0.0400		98	80-120			
Nickel, total	0.0390	0.00040 mg/L	0.0400		98	80-120			
Phosphorus, total	3.90	0.050 mg/L	4.00		97	80-120			
Potassium, total	3.85	0.10 mg/L	4.00		96	80-120			
Selenium, total	0.405	0.00050 mg/L	0.400		101	80-120			
Silicon, total	4.1	1.0 mg/L	4.00		103	80-120			
Silver, total	0.0388	0.000050 mg/L	0.0400		97	80-120			
Sodium, total	3.78	0.10 mg/L	4.00		95	80-120			
Strontium, total	0.0394	0.0010 mg/L	0.0400		99	80-120			
Sulfur, total	42.2	3.0 mg/L	40.0		105	80-120			
Tellurium, total	0.0370	0.00050 mg/L	0.0400		92	80-120			
Thallium, total	0.0391	0.000020 mg/L	0.0400		98	80-120			
Thorium, total	0.0384	0.00010 mg/L	0.0400		96	80-120			
Tin, total	0.0389	0.00020 mg/L	0.0400		97	80-120			
Titanium, total	0.0389	0.0050 mg/L	0.0400		97	80-120			
Tungsten, total	0.0384	0.0010 mg/L	0.0400		96	80-120			
Uranium, total	0.0385	0.000020 mg/L	0.0400		96	80-120			
Vanadium, total	0.0380	0.0050 mg/L	0.0400		95	80-120			
Zinc, total	0.381	0.0040 mg/L	0.400		95	80-120			
Zirconium, total	0.0389	0.00010 mg/L	0.0400		97	80-120			

Matrix Spike (B4I2928-MS1)

Source: 2411648-01

Prepared: 2024-09-16, Analyzed: 2024-09-16

Aluminum, total	4.00	0.0050 mg/L	4.00	< 0.0050	100	70-130			
Antimony, total	0.0412	0.00020 mg/L	0.0400	< 0.00020	103	70-130			
Arsenic, total	0.410	0.00050 mg/L	0.400	< 0.00050	102	70-130			
Barium, total	0.0687	0.0050 mg/L	0.0400	0.0262	106	70-130			
Beryllium, total	0.0450	0.00010 mg/L	0.0400	< 0.00010	112	70-130			
Bismuth, total	0.0398	0.00010 mg/L	0.0400	< 0.00010	100	70-130			
Boron, total	0.461	0.0500 mg/L	0.400	< 0.0500	114	70-130			
Cadmium, total	0.0419	0.000010 mg/L	0.0400	0.000026	105	70-130			
Calcium, total	52.5	0.20 mg/L	4.00	50.4	53	70-130			MS2
Chromium, total	0.0410	0.00050 mg/L	0.0400	0.00051	101	70-130			
Cobalt, total	0.0392	0.00010 mg/L	0.0400	< 0.00010	98	70-130			
Copper, total	0.0388	0.00040 mg/L	0.0400	< 0.00040	97	70-130			
Iron, total	4.01	0.010 mg/L	4.00	< 0.010	100	70-130			
Lead, total	0.0407	0.00020 mg/L	0.0400	< 0.00020	102	70-130			
Lithium, total	0.0464	0.00010 mg/L	0.0400	0.00137	112	70-130			
Magnesium, total	15.7	0.010 mg/L	4.00	12.3	86	70-130			
Manganese, total	0.0404	0.00020 mg/L	0.0400	< 0.00020	101	70-130			
Molybdenum, total	0.0441	0.00010 mg/L	0.0400	0.00131	107	70-130			
Nickel, total	0.0396	0.00040 mg/L	0.0400	< 0.00040	98	70-130			
Phosphorus, total	4.21	0.050 mg/L	4.00	< 0.050	105	70-130			
Potassium, total	4.28	0.10 mg/L	4.00	0.27	100	70-130			
Selenium, total	0.429	0.00050 mg/L	0.400	0.00102	107	70-130			
Silicon, total	6.4	1.0 mg/L	4.00	2.2	107	70-130			
Silver, total	0.0392	0.000050 mg/L	0.0400	< 0.000050	98	70-130			
Sodium, total	4.46	0.10 mg/L	4.00	0.51	99	70-130			
Strontium, total	0.522	0.0010 mg/L	0.0400	0.501	52	70-130			MS2
Sulfur, total	61.7	3.0 mg/L	40.0	18.0	109	70-130			
Tellurium, total	0.0410	0.00050 mg/L	0.0400	< 0.00050	103	70-130			
Thallium, total	0.0424	0.000020 mg/L	0.0400	< 0.000020	106	70-130			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411648
2024-09-18 16:18

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4I2928, Continued									
Matrix Spike (B4I2928-MS1), Continued			Source: 2411648-01		Prepared: 2024-09-16, Analyzed: 2024-09-16				
Thorium, total	0.0403	0.00010 mg/L	0.0400	< 0.00010	101	70-130			
Tin, total	0.0421	0.00020 mg/L	0.0400	< 0.00020	105	70-130			
Titanium, total	0.0407	0.0050 mg/L	0.0400	< 0.0050	102	70-130			
Tungsten, total	0.0414	0.0010 mg/L	0.0400	< 0.0010	103	70-130			
Uranium, total	0.0425	0.000020 mg/L	0.0400	0.000863	104	70-130			
Vanadium, total	0.0412	0.0050 mg/L	0.0400	< 0.0050	102	70-130			
Zinc, total	0.401	0.0040 mg/L	0.400	< 0.0040	99	70-130			
Zirconium, total	0.0420	0.00010 mg/L	0.0400	< 0.00010	105	70-130			

QC Qualifiers:

- MS2 The native sample concentration is greater than the spike concentration hence the matrix spike limits do not apply.
- S09 The surrogate recovery for this sample is outside of established control limits Suspect syringe error, data not affected.

CERTIFICATE OF ANALYSIS

REPORTED TO Elk River Alliance
PO Box 2095, 1111 2nd Ave
Fernie, BC V0B1M0

ATTENTION Fynley Kujit

PO NUMBER

PROJECT CBWM-2024

PROJECT INFO

WORK ORDER 2411535

RECEIVED / TEMP 2024-09-11 09:07 / 5.6°C

REPORTED 2024-09-18 14:58

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



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.

We've Got Chemistry



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.

Ahead of the Curve



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>

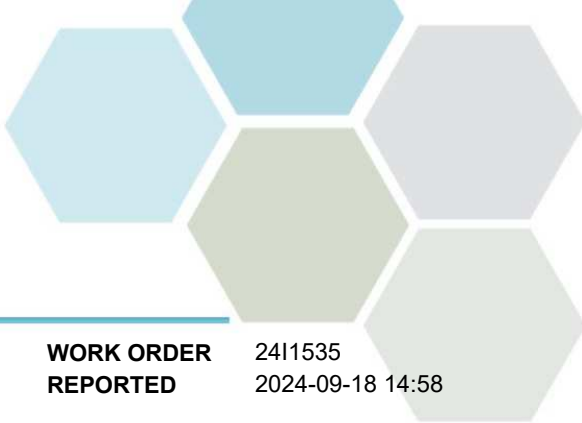
If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

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

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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COL003_20240909 (2411535-01) | Matrix: Water | Sampled: 2024-09-09 09:28

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-13	
Chloride	< 0.10	AO ≤ 250	0.10	mg/L	2024-09-13	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-13	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-09-13	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-13	HT1
Sulfate	5.4	AO ≤ 500	1.0	mg/L	2024-09-13	

BCMOE Aggregate Hydrocarbons

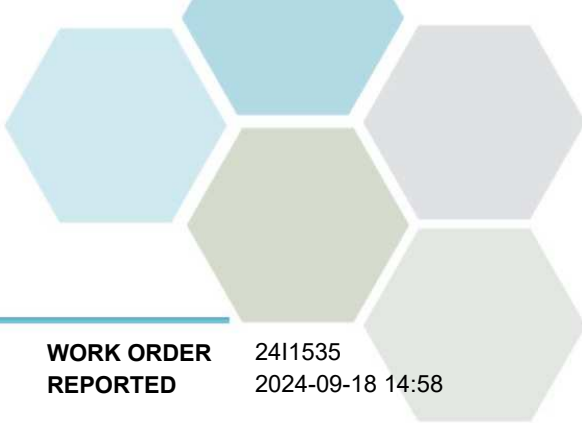
EPHw10-19	< 250	N/A	250	µg/L	2024-09-16	
EPHw19-32	< 250	N/A	250	µg/L	2024-09-16	
Surrogate: 2-Methylnonane (EPH/F2-4)	97		60-140	%	2024-09-16	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	52.6	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.0860	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	0.0227	N/A	0.0050	mg/L	2024-09-16	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Barium, dissolved	0.0896	N/A	0.0050	mg/L	2024-09-16	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-16	
Cadmium, dissolved	0.000062	N/A	0.000010	mg/L	2024-09-16	
Calcium, dissolved	15.8	N/A	0.20	mg/L	2024-09-16	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Copper, dissolved	0.00041	N/A	0.00040	mg/L	2024-09-16	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-16	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Lithium, dissolved	0.00017	N/A	0.00010	mg/L	2024-09-16	
Magnesium, dissolved	3.20	N/A	0.010	mg/L	2024-09-16	
Manganese, dissolved	0.00027	N/A	0.00020	mg/L	2024-09-16	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-15	
Molybdenum, dissolved	0.00037	N/A	0.00010	mg/L	2024-09-16	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, dissolved	0.28	N/A	0.10	mg/L	2024-09-16	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Silicon, dissolved	1.2	N/A	1.0	mg/L	2024-09-16	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-16	
Sodium, dissolved	0.19	N/A	0.10	mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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COL003_20240909 (2411535-01) | Matrix: Water | Sampled: 2024-09-09 09:28, Continued

Dissolved Metals, Continued

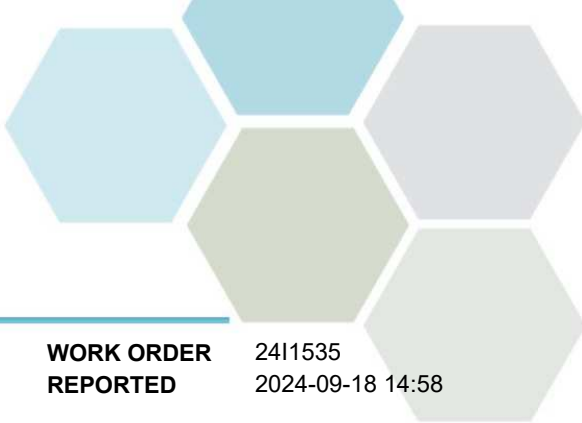
Strontium, dissolved	0.0216	N/A	0.0010	mg/L	2024-09-16	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2024-09-16	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, dissolved	0.000064	N/A	0.000020	mg/L	2024-09-16	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-16	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

General Parameters

Alkalinity, Total (as CaCO3)	44.5	N/A	1.0	mg/L	2024-09-13	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-13	
Alkalinity, Bicarbonate (as CaCO3)	44.5	N/A	1.0	mg/L	2024-09-13	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-13	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-09-13	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-09-16	
BOD, 5-day	< 6.4	N/A	2.0	mg/L	2024-09-17	
Carbon, Total Organic	1.69	N/A	0.50	mg/L	2024-09-16	
Carbon, Dissolved Organic	1.68	N/A	0.50	mg/L	2024-09-16	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2024-09-14	
Nitrogen, Total Kjeldahl	0.086	N/A	0.050	mg/L	2024-09-17	
Phosphorus, Total (as P)	0.0136	N/A	0.0050	mg/L	2024-09-16	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050	mg/L	2024-09-14	HT1
Solids, Total Suspended	2.2	N/A	2.0	mg/L	2024-09-13	

Total Metals

Aluminum, total	0.0242	OG < 0.1	0.0050	mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-09-16	
Barium, total	0.0882	MAC = 2	0.0050	mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2024-09-16	
Cadmium, total	0.000059	MAC = 0.007	0.000010	mg/L	2024-09-16	
Calcium, total	14.6	None Required	0.20	mg/L	2024-09-16	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2024-09-16	
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-09-16	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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COL003_20240909 (2411535-01) | Matrix: Water | Sampled: 2024-09-09 09:28, Continued

Total Metals, Continued

Lithium, total	0.00017	N/A	0.00010	mg/L	2024-09-16	
Magnesium, total	2.98	None Required	0.010	mg/L	2024-09-16	
Manganese, total	0.00040	MAC = 0.12	0.00020	mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-09-15	
Molybdenum, total	0.00043	N/A	0.00010	mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-09-16	
Potassium, total	0.29	N/A	0.10	mg/L	2024-09-16	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-09-16	
Silicon, total	1.2	N/A	1.0	mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-09-16	
Sodium, total	0.20	AO ≤ 200	0.10	mg/L	2024-09-16	
Strontium, total	0.0216	MAC = 7	0.0010	mg/L	2024-09-16	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2024-09-16	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-09-16	
Uranium, total	0.000077	MAC = 0.02	0.000020	mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-09-16	
Zinc, total	0.0075	AO ≤ 5	0.0040	mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-09-16	

COL001_20240909_1432 (2411535-02) | Matrix: Water | Sampled: 2024-09-09 14:32

Anions

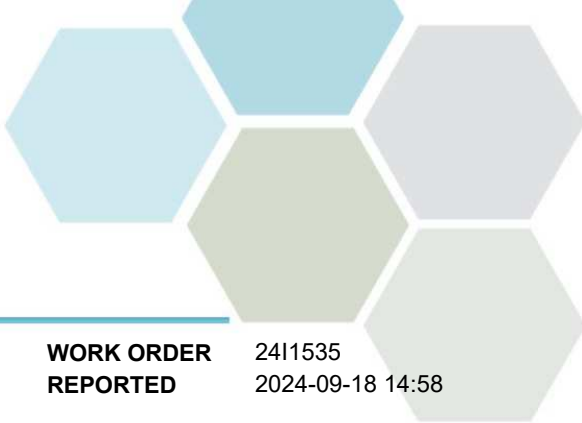
Bromide	< 0.10	N/A	0.10	mg/L	2024-09-13	
Chloride	0.58	AO ≤ 250	0.10	mg/L	2024-09-13	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-13	
Nitrate (as N)	0.015	MAC = 10	0.010	mg/L	2024-09-13	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-13	HT1
Sulfate	4.9	AO ≤ 500	1.0	mg/L	2024-09-13	

BCMOE Aggregate Hydrocarbons

EPHw10-19	< 250	N/A	250	µg/L	2024-09-16	
EPHw19-32	< 250	N/A	250	µg/L	2024-09-16	
Surrogate: 2-Methylnonane (EPH/F2-4)	103		60-140	%	2024-09-16	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	135	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0147	N/A	0.0100	mg/L	N/A	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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COL001_20240909_1432 (2411535-02) | Matrix: Water | Sampled: 2024-09-09 14:32, Continued

Calculated Parameters, Continued

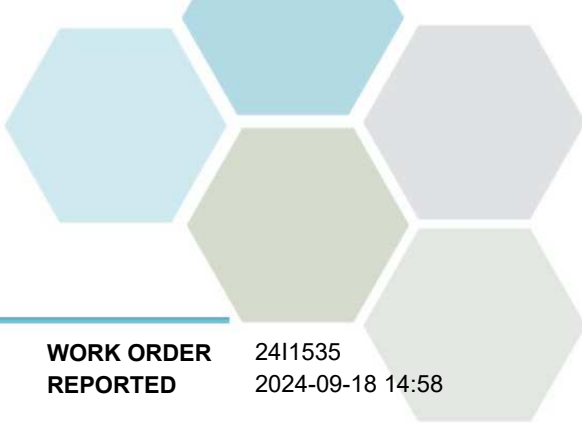
Nitrogen, Total	0.207	N/A	0.0500	mg/L	N/A	
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Dissolved Metals

Aluminum, dissolved	0.0072	N/A	0.0050	mg/L	2024-09-18	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-18	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-18	
Barium, dissolved	0.311	N/A	0.0050	mg/L	2024-09-18	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-18	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-18	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-18	
Cadmium, dissolved	0.000038	N/A	0.000010	mg/L	2024-09-18	
Calcium, dissolved	40.1	N/A	0.20	mg/L	2024-09-18	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-18	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-18	
Copper, dissolved	0.00050	N/A	0.00040	mg/L	2024-09-18	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-18	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-18	
Lithium, dissolved	0.0107	N/A	0.00010	mg/L	2024-09-18	
Magnesium, dissolved	8.54	N/A	0.010	mg/L	2024-09-18	
Manganese, dissolved	0.00231	N/A	0.00020	mg/L	2024-09-18	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-15	
Molybdenum, dissolved	0.00070	N/A	0.00010	mg/L	2024-09-18	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-18	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-18	
Potassium, dissolved	0.87	N/A	0.10	mg/L	2024-09-18	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-18	
Silicon, dissolved	2.4	N/A	1.0	mg/L	2024-09-18	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-18	
Sodium, dissolved	3.34	N/A	0.10	mg/L	2024-09-18	
Strontium, dissolved	0.143	N/A	0.0010	mg/L	2024-09-18	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2024-09-18	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-18	
Thallium, dissolved	0.000022	N/A	0.000020	mg/L	2024-09-18	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-18	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-18	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-18	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-18	
Uranium, dissolved	0.000364	N/A	0.000020	mg/L	2024-09-18	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-18	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-18	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-18	

General Parameters

Alkalinity, Total (as CaCO3)	126	N/A	1.0	mg/L	2024-09-13	
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TEST RESULTS

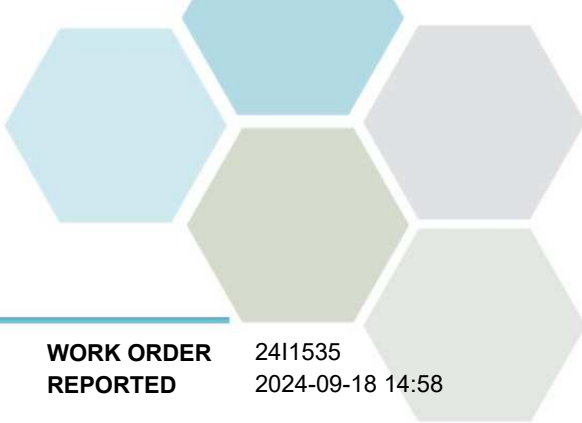
REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
COL001_20240909_1432 (2411535-02) Matrix: Water Sampled: 2024-09-09 14:32, Continued					
<i>General Parameters, Continued</i>					
Alkalinity, Phenolphthalein (as CaCO3)	5.3	N/A	1.0 mg/L	2024-09-13	
Alkalinity, Bicarbonate (as CaCO3)	115	N/A	1.0 mg/L	2024-09-13	
Alkalinity, Carbonate (as CaCO3)	10.5	N/A	1.0 mg/L	2024-09-13	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-09-13	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-09-16	
BOD, 5-day	< 6.4	N/A	2.0 mg/L	2024-09-17	
Carbon, Total Organic	1.26	N/A	0.50 mg/L	2024-09-16	
Carbon, Dissolved Organic	1.23	N/A	0.50 mg/L	2024-09-16	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-09-14	
Nitrogen, Total Kjeldahl	0.192	N/A	0.050 mg/L	2024-09-17	
Phosphorus, Total (as P)	0.0188	N/A	0.0050 mg/L	2024-09-16	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050 mg/L	2024-09-14	HT1
Solids, Total Suspended	9.8	N/A	2.0 mg/L	2024-09-13	

Total Metals

Aluminum, total	0.0109	OG < 0.1	0.0050 mg/L	2024-09-16	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-09-16	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-09-16	
Barium, total	0.297	MAC = 2	0.0050 mg/L	2024-09-16	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-09-16	
Cadmium, total	0.000038	MAC = 0.007	0.000010 mg/L	2024-09-17	
Calcium, total	39.2	None Required	0.20 mg/L	2024-09-16	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-09-16	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Copper, total	0.00045	MAC = 2	0.00040 mg/L	2024-09-16	
Iron, total	0.011	AO ≤ 0.3	0.010 mg/L	2024-09-16	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-09-16	
Lithium, total	0.0104	N/A	0.00010 mg/L	2024-09-16	
Magnesium, total	8.67	None Required	0.010 mg/L	2024-09-16	
Manganese, total	0.00333	MAC = 0.12	0.00020 mg/L	2024-09-16	
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2024-09-15	
Molybdenum, total	0.00075	N/A	0.00010 mg/L	2024-09-16	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2024-09-16	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2024-09-17	
Potassium, total	0.90	N/A	0.10 mg/L	2024-09-16	
Selenium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-09-16	
Silicon, total	2.4	N/A	1.0 mg/L	2024-09-16	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2024-09-16	
Sodium, total	3.07	AO ≤ 200	0.10 mg/L	2024-09-16	
Strontium, total	0.141	MAC = 7	0.0010 mg/L	2024-09-16	
Sulfur, total	< 3.0	N/A	3.0 mg/L	2024-09-16	



TEST RESULTS

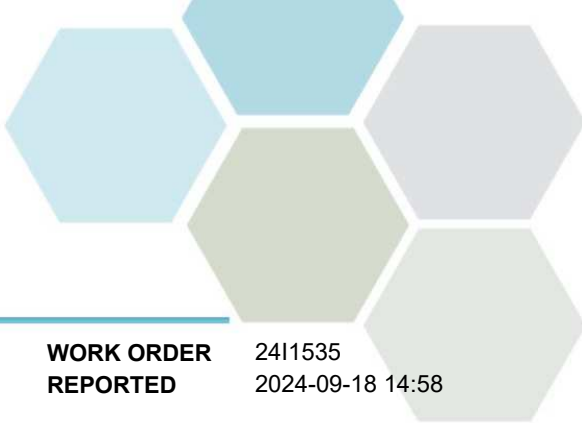
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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
COL001_20240909_1432 (2411535-02) Matrix: Water Sampled: 2024-09-09 14:32, Continued					
<i>Total Metals, Continued</i>					
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2024-09-16	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2024-09-16	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	
Tin, total	< 0.00020	N/A	0.00020 mg/L	2024-09-16	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2024-09-16	
Uranium, total	0.000456	MAC = 0.02	0.000020 mg/L	2024-09-16	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2024-09-16	
Zinc, total	0.0071	AO ≤ 5	0.0040 mg/L	2024-09-16	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2024-09-16	

Sample Qualifiers:

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



APPENDIX 1: SUPPORTING INFORMATION

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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, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	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

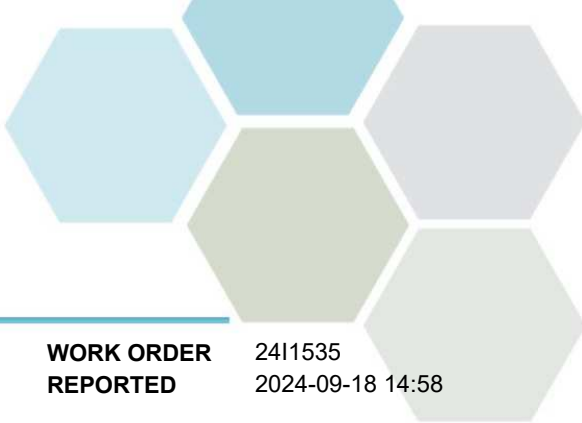
Glossary of Terms:

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

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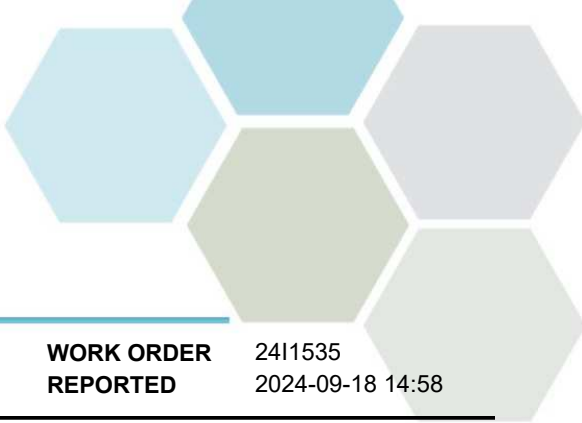
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General Comments:

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.

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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.



APPENDIX 2: QUALITY CONTROL RESULTS

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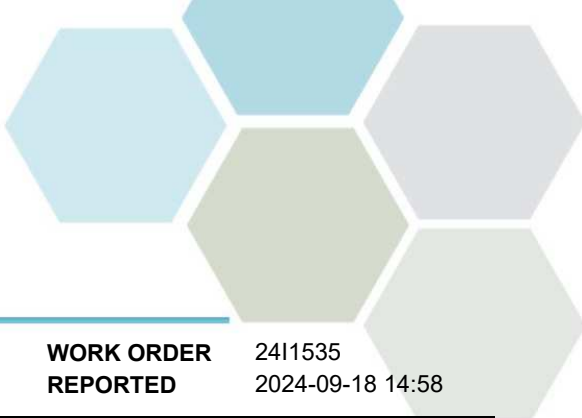
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The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC 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 B412675									
Blank (B412675-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
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							
Sulfate	< 1.0	1.0 mg/L							
Blank (B412675-BLK2)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
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							
Sulfate	< 1.0	1.0 mg/L							
Blank (B412675-BLK3)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
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							
Sulfate	< 1.0	1.0 mg/L							
LCS (B412675-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
Bromide	4.18	0.10 mg/L	4.00		104	85-115			
Chloride	15.8	0.10 mg/L	16.0		99	90-110			
Fluoride	3.70	0.10 mg/L	4.00		93	88-108			
Nitrate (as N)	3.94	0.010 mg/L	4.00		98	90-110			
Nitrite (as N)	2.17	0.010 mg/L	2.00		108	85-115			
Sulfate	16.1	1.0 mg/L	16.0		100	90-110			
LCS (B412675-BS2)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
Bromide	3.97	0.10 mg/L	4.00		99	85-115			
Chloride	15.8	0.10 mg/L	16.0		98	90-110			
Fluoride	4.08	0.10 mg/L	4.00		102	88-108			
Nitrate (as N)	3.85	0.010 mg/L	4.00		96	90-110			
Nitrite (as N)	2.06	0.010 mg/L	2.00		103	85-115			



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Anions, Batch B4I2675, Continued

LCS (B4I2675-BS2), Continued

Prepared: 2024-09-13, Analyzed: 2024-09-13

Sulfate	16.2	1.0 mg/L	16.0		101	90-110			
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LCS (B4I2675-BS3)

Prepared: 2024-09-13, Analyzed: 2024-09-13

Bromide	4.12	0.10 mg/L	4.00		103	85-115			
Chloride	15.8	0.10 mg/L	16.0		98	90-110			
Fluoride	3.96	0.10 mg/L	4.00		99	88-108			
Nitrate (as N)	4.02	0.010 mg/L	4.00		100	90-110			
Nitrite (as N)	2.06	0.010 mg/L	2.00		103	85-115			
Sulfate	16.1	1.0 mg/L	16.0		101	90-110			

Duplicate (B4I2675-DUP3)

Source: 2411535-02

Prepared: 2024-09-13, Analyzed: 2024-09-13

Bromide	< 0.10	0.10 mg/L		< 0.10					10
Chloride	0.57	0.10 mg/L		0.58			1		10
Fluoride	< 0.10	0.10 mg/L		< 0.10					10
Nitrate (as N)	0.014	0.010 mg/L		0.015					10
Nitrite (as N)	< 0.010	0.010 mg/L		< 0.010					15
Sulfate	4.8	1.0 mg/L		4.9					10

Matrix Spike (B4I2675-MS3)

Source: 2411535-02

Prepared: 2024-09-13, Analyzed: 2024-09-13

Bromide	4.32	0.10 mg/L	4.00	< 0.10	108	80-120			
Chloride	16.4	0.10 mg/L	16.0	0.58	99	75-125			
Fluoride	4.03	0.10 mg/L	4.00	< 0.10	100	75-125			
Nitrate (as N)	4.23	0.010 mg/L	4.00	0.015	105	75-125			
Nitrite (as N)	2.02	0.010 mg/L	2.00	< 0.010	101	75-115			
Sulfate	20.5	1.0 mg/L	16.0	4.9	98	75-125			

BCMOE Aggregate Hydrocarbons, Batch B4I2916

Blank (B4I2916-BLK1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

EPHw10-19	< 250	250 µg/L							
EPHw19-32	< 250	250 µg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	280	µg/L	2490		11	60-140			S09

LCS (B4I2916-BS2)

Prepared: 2024-09-16, Analyzed: 2024-09-16

EPHw10-19	21600	250 µg/L	17400		124	70-130			
EPHw19-32	31000	250 µg/L	24800		125	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1780	µg/L	2490		71	60-140			

LCS (B4I2916-BS4)

Prepared: 2024-09-16, Analyzed: 2024-09-16

EPHw10-19	20200	250 µg/L	17400		117	70-130			
EPHw19-32	28800	250 µg/L	24800		116	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1680	µg/L	2490		67	60-140			

LCS Dup (B4I2916-BSD2)

Prepared: 2024-09-16, Analyzed: 2024-09-16

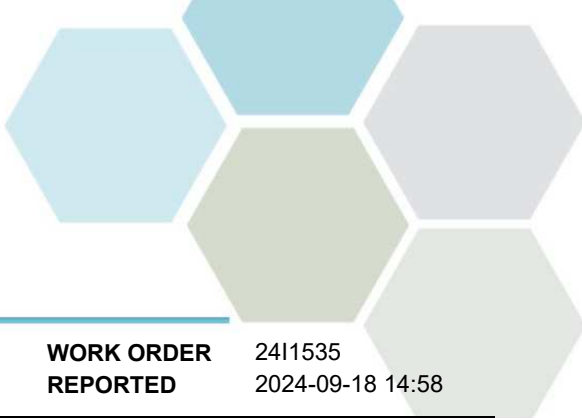
EPHw10-19	22300	250 µg/L	17400		128	70-130	3	20	
EPHw19-32	31500	250 µg/L	24800		127	70-130	2	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1230	µg/L	2490		49	60-140			S09

Dissolved Metals, Batch B4I2894

Blank (B4I2894-BLK1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

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	< 0.00010	0.00010 mg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B412894, Continued

Blank (B412894-BLK1), Continued

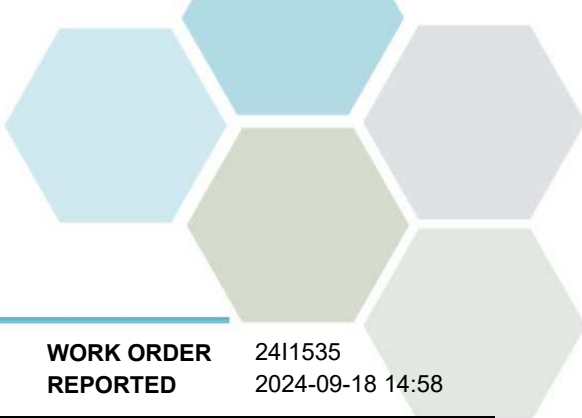
Prepared: 2024-09-16, Analyzed: 2024-09-16

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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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 (B412894-BS1)

Prepared: 2024-09-16, Analyzed: 2024-09-16

Aluminum, dissolved	4.10	0.0050 mg/L	4.00		102	80-120			
Antimony, dissolved	0.0400	0.00020 mg/L	0.0400		100	80-120			
Arsenic, dissolved	0.403	0.00050 mg/L	0.400		101	80-120			
Barium, dissolved	0.0404	0.0050 mg/L	0.0400		101	80-120			
Beryllium, dissolved	0.0399	0.00010 mg/L	0.0400		100	80-120			
Bismuth, dissolved	0.0389	0.00010 mg/L	0.0400		97	80-120			
Boron, dissolved	0.408	0.0500 mg/L	0.400		102	80-120			
Cadmium, dissolved	0.0402	0.000010 mg/L	0.0400		100	80-120			
Calcium, dissolved	3.93	0.20 mg/L	4.00		98	80-120			
Chromium, dissolved	0.0407	0.00050 mg/L	0.0400		102	80-120			
Cobalt, dissolved	0.0401	0.00010 mg/L	0.0400		100	80-120			
Copper, dissolved	0.0402	0.00040 mg/L	0.0400		100	80-120			
Iron, dissolved	4.02	0.010 mg/L	4.00		101	80-120			
Lead, dissolved	0.0397	0.00020 mg/L	0.0400		99	80-120			
Lithium, dissolved	0.0405	0.00010 mg/L	0.0400		101	80-120			
Magnesium, dissolved	4.17	0.010 mg/L	4.00		104	80-120			
Manganese, dissolved	0.0406	0.00020 mg/L	0.0400		102	80-120			
Molybdenum, dissolved	0.0398	0.00010 mg/L	0.0400		100	80-120			
Nickel, dissolved	0.0402	0.00040 mg/L	0.0400		101	80-120			
Phosphorus, dissolved	4.08	0.050 mg/L	4.00		102	80-120			
Potassium, dissolved	3.90	0.10 mg/L	4.00		98	80-120			
Selenium, dissolved	0.393	0.00050 mg/L	0.400		98	80-120			



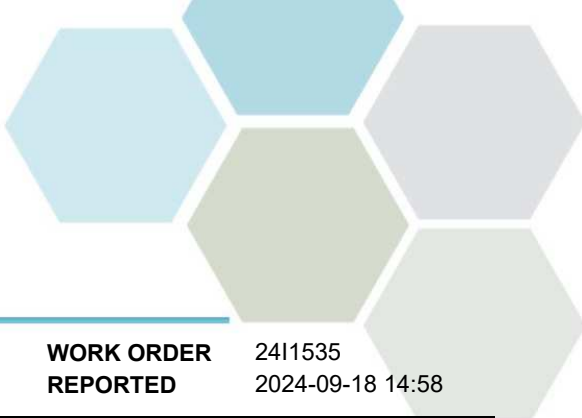
APPENDIX 2: QUALITY CONTROL RESULTS

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2024-09-18 14:58

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4I2894, Continued									
LCS (B4I2894-BS1), Continued					Prepared: 2024-09-16, Analyzed: 2024-09-16				
Silicon, dissolved	4.0	1.0 mg/L	4.00		99	80-120			
Silver, dissolved	0.0399	0.000050 mg/L	0.0400		100	80-120			
Sodium, dissolved	4.00	0.10 mg/L	4.00		100	80-120			
Strontium, dissolved	0.0403	0.0010 mg/L	0.0400		101	80-120			
Sulfur, dissolved	40.7	3.0 mg/L	40.0		102	80-120			
Tellurium, dissolved	0.0366	0.00050 mg/L	0.0400		91	80-120			
Thallium, dissolved	0.0400	0.000020 mg/L	0.0400		100	80-120			
Thorium, dissolved	0.0399	0.00010 mg/L	0.0400		100	80-120			
Tin, dissolved	0.0396	0.00020 mg/L	0.0400		99	80-120			
Titanium, dissolved	0.0394	0.0050 mg/L	0.0400		99	80-120			
Tungsten, dissolved	0.0398	0.0010 mg/L	0.0400		100	80-120			
Uranium, dissolved	0.0399	0.000020 mg/L	0.0400		100	80-120			
Vanadium, dissolved	0.0393	0.0050 mg/L	0.0400		98	80-120			
Zinc, dissolved	0.409	0.0040 mg/L	0.400		102	80-120			
Zirconium, dissolved	0.0385	0.00010 mg/L	0.0400		96	80-120			
Matrix Spike (B4I2894-MS1)			Source: 2411535-01		Prepared: 2024-09-16, Analyzed: 2024-09-16				
Aluminum, dissolved	4.44	0.0050 mg/L	4.00	0.0227	111	70-130			
Antimony, dissolved	0.0429	0.00020 mg/L	0.0400	< 0.00020	107	70-130			
Arsenic, dissolved	0.429	0.00050 mg/L	0.400	< 0.00050	107	70-130			
Barium, dissolved	0.133	0.0050 mg/L	0.0400	0.0896	109	70-130			
Beryllium, dissolved	0.0447	0.00010 mg/L	0.0400	< 0.00010	112	70-130			
Bismuth, dissolved	0.0332	0.00010 mg/L	0.0400	< 0.00010	83	70-130			
Boron, dissolved	0.438	0.0500 mg/L	0.400	< 0.0500	109	70-130			
Cadmium, dissolved	0.0443	0.000010 mg/L	0.0400	0.000062	111	70-130			
Calcium, dissolved	19.1	0.20 mg/L	4.00	15.8	84	70-130			
Chromium, dissolved	0.0437	0.00050 mg/L	0.0400	< 0.00050	109	70-130			
Cobalt, dissolved	0.0422	0.00010 mg/L	0.0400	< 0.00010	105	70-130			
Copper, dissolved	0.0426	0.00040 mg/L	0.0400	0.00041	105	70-130			
Iron, dissolved	4.20	0.010 mg/L	4.00	< 0.010	105	70-130			
Lead, dissolved	0.0430	0.00020 mg/L	0.0400	< 0.00020	108	70-130			
Lithium, dissolved	0.0454	0.00010 mg/L	0.0400	0.00017	113	70-130			
Magnesium, dissolved	7.25	0.010 mg/L	4.00	3.20	101	70-130			
Manganese, dissolved	0.0436	0.00020 mg/L	0.0400	0.00027	108	70-130			
Molybdenum, dissolved	0.0406	0.00010 mg/L	0.0400	0.00037	101	70-130			
Nickel, dissolved	0.0430	0.00040 mg/L	0.0400	< 0.00040	106	70-130			
Phosphorus, dissolved	4.52	0.050 mg/L	4.00	< 0.050	113	70-130			
Potassium, dissolved	4.54	0.10 mg/L	4.00	0.28	106	70-130			
Selenium, dissolved	0.427	0.00050 mg/L	0.400	< 0.00050	107	70-130			
Silicon, dissolved	5.6	1.0 mg/L	4.00	1.2	110	70-130			
Silver, dissolved	0.0264	0.000050 mg/L	0.0400	< 0.000050	66	70-130			MES
Sodium, dissolved	4.39	0.10 mg/L	4.00	0.19	105	70-130			
Strontium, dissolved	0.0635	0.0010 mg/L	0.0400	0.0216	105	70-130			
Sulfur, dissolved	45.8	3.0 mg/L	40.0	< 3.0	110	70-130			
Tellurium, dissolved	0.0376	0.00050 mg/L	0.0400	< 0.00050	94	70-130			
Thallium, dissolved	0.0416	0.000020 mg/L	0.0400	< 0.000020	104	70-130			
Thorium, dissolved	0.0398	0.00010 mg/L	0.0400	< 0.00010	100	70-130			
Tin, dissolved	0.0414	0.00020 mg/L	0.0400	< 0.00020	104	70-130			
Titanium, dissolved	0.0403	0.0050 mg/L	0.0400	< 0.0050	101	70-130			
Tungsten, dissolved	0.0396	0.0010 mg/L	0.0400	< 0.0010	99	70-130			
Uranium, dissolved	0.0409	0.000020 mg/L	0.0400	0.000064	102	70-130			
Vanadium, dissolved	0.0424	0.0050 mg/L	0.0400	< 0.0050	106	70-130			
Zinc, dissolved	0.443	0.0040 mg/L	0.400	< 0.0040	111	70-130			
Zirconium, dissolved	0.0397	0.00010 mg/L	0.0400	< 0.00010	99	70-130			

Dissolved Metals, Batch B4I2899



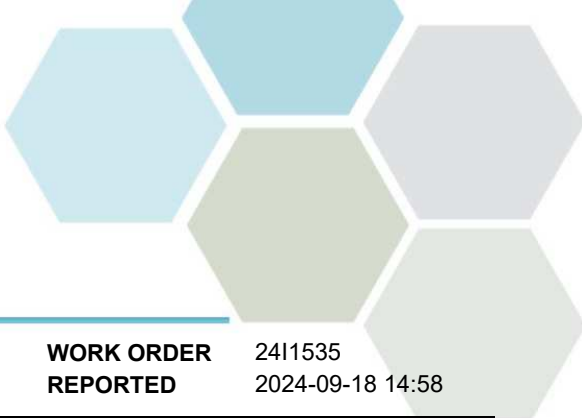
APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2411535 2024-09-18 14:58
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4I2899, Continued									
Blank (B4I2899-BLK1)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK2)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK3)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK4)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
LCS (B4I2899-BS1)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00243	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS2)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00244	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS3)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00244	0.000010 mg/L	0.00250		97	80-120			
LCS (B4I2899-BS4)			Prepared: 2024-09-15, Analyzed: 2024-09-15						
Mercury, dissolved	0.00253	0.000010 mg/L	0.00250		101	80-120			
Matrix Spike (B4I2899-MS4)			Source: 2411535-02			Prepared: 2024-09-15, Analyzed: 2024-09-15			
Mercury, dissolved	0.00248	0.000010 mg/L	0.00250	< 0.000010	99	70-130			

Dissolved Metals, Batch B4I3213

Blank (B4I3213-BLK1)			Prepared: 2024-09-18, Analyzed: 2024-09-18						
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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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							



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B413213, Continued

Blank (B413213-BLK1), Continued

Prepared: 2024-09-18, Analyzed: 2024-09-18

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 (B413213-BS1)

Prepared: 2024-09-18, Analyzed: 2024-09-18

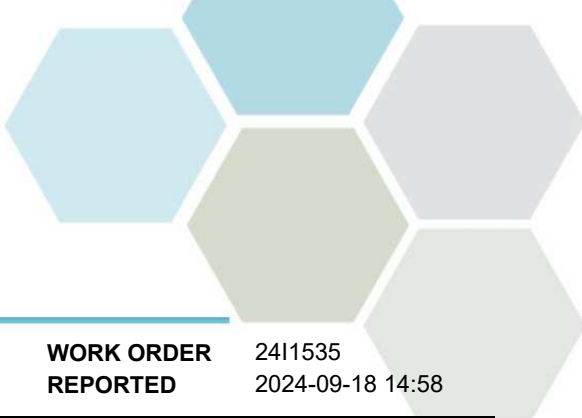
Aluminum, dissolved	4.11	0.0050 mg/L	4.00		103	80-120			
Antimony, dissolved	0.0408	0.00020 mg/L	0.0400		102	80-120			
Arsenic, dissolved	0.407	0.00050 mg/L	0.400		102	80-120			
Barium, dissolved	0.0408	0.0050 mg/L	0.0400		102	80-120			
Beryllium, dissolved	0.0399	0.00010 mg/L	0.0400		100	80-120			
Bismuth, dissolved	0.0408	0.00010 mg/L	0.0400		102	80-120			
Boron, dissolved	0.403	0.0500 mg/L	0.400		101	80-120			
Cadmium, dissolved	0.0406	0.000010 mg/L	0.0400		101	80-120			
Calcium, dissolved	4.00	0.20 mg/L	4.00		100	80-120			
Chromium, dissolved	0.0410	0.00050 mg/L	0.0400		102	80-120			
Cobalt, dissolved	0.0410	0.00010 mg/L	0.0400		103	80-120			
Copper, dissolved	0.0413	0.00040 mg/L	0.0400		103	80-120			
Iron, dissolved	4.08	0.10 mg/L	4.00		102	80-120			
Lead, dissolved	0.0402	0.00020 mg/L	0.0400		101	80-120			
Lithium, dissolved	0.0403	0.00010 mg/L	0.0400		101	80-120			
Magnesium, dissolved	4.32	0.10 mg/L	4.00		108	80-120			
Manganese, dissolved	0.0412	0.00020 mg/L	0.0400		103	80-120			
Molybdenum, dissolved	0.0412	0.00010 mg/L	0.0400		103	80-120			
Nickel, dissolved	0.0417	0.00040 mg/L	0.0400		104	80-120			
Phosphorus, dissolved	4.10	0.050 mg/L	4.00		103	80-120			
Potassium, dissolved	4.04	0.10 mg/L	4.00		101	80-120			
Selenium, dissolved	0.394	0.00050 mg/L	0.400		99	80-120			
Silicon, dissolved	4.1	1.0 mg/L	4.00		101	80-120			
Silver, dissolved	0.0408	0.000050 mg/L	0.0400		102	80-120			
Sodium, dissolved	4.12	0.10 mg/L	4.00		103	80-120			
Strontium, dissolved	0.0408	0.0010 mg/L	0.0400		102	80-120			
Sulfur, dissolved	41.1	3.0 mg/L	40.0		103	80-120			
Tellurium, dissolved	0.0399	0.00050 mg/L	0.0400		100	80-120			
Thallium, dissolved	0.0402	0.000020 mg/L	0.0400		100	80-120			
Thorium, dissolved	0.0405	0.00010 mg/L	0.0400		101	80-120			
Tin, dissolved	0.0410	0.00020 mg/L	0.0400		102	80-120			
Titanium, dissolved	0.0421	0.0050 mg/L	0.0400		105	80-120			
Tungsten, dissolved	0.0401	0.0010 mg/L	0.0400		100	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	0.410	0.0040 mg/L	0.400		103	80-120			
Zirconium, dissolved	0.0417	0.00010 mg/L	0.0400		104	80-120			

Duplicate (B413213-DUP1)

Source: 2411535-02

Prepared: 2024-09-18, Analyzed: 2024-09-18

Aluminum, dissolved	0.0071	0.0050 mg/L	0.0072					20	
Antimony, dissolved	< 0.00020	0.00020 mg/L	< 0.00020					20	
Arsenic, dissolved	< 0.00050	0.00050 mg/L	< 0.00050					20	
Barium, dissolved	0.308	0.0050 mg/L	0.311				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	



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4I3213, Continued									
Duplicate (B4I3213-DUP1), Continued		Source: 2411535-02		Prepared: 2024-09-18, Analyzed: 2024-09-18					
Cadmium, dissolved	0.000039	0.000010 mg/L		0.000038				20	
Calcium, dissolved	40.3	0.20 mg/L		40.1			< 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	0.00052	0.00040 mg/L		0.00050				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	0.0105	0.00010 mg/L		0.0107			2	20	
Magnesium, dissolved	8.33	0.010 mg/L		8.54			3	20	
Manganese, dissolved	0.00235	0.00020 mg/L		0.00231			2	20	
Molybdenum, dissolved	0.00068	0.00010 mg/L		0.00070			4	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	0.85	0.10 mg/L		0.87			2	20	
Selenium, dissolved	< 0.00050	0.00050 mg/L		< 0.00050				20	
Silicon, dissolved	2.4	1.0 mg/L		2.4				20	
Silver, dissolved	< 0.000050	0.000050 mg/L		< 0.000050				20	
Sodium, dissolved	3.33	0.10 mg/L		3.34			< 1	20	
Strontium, dissolved	0.143	0.0010 mg/L		0.143			< 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	0.000021	0.000020 mg/L		0.000022				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	0.000367	0.000020 mg/L		0.000364			< 1	20	
Vanadium, dissolved	< 0.0050	0.0050 mg/L		< 0.0050				20	
Zinc, dissolved	< 0.0040	0.0040 mg/L		< 0.0040				20	
Zirconium, dissolved	< 0.00010	0.00010 mg/L		< 0.00010				20	

General Parameters, Batch B4I2606

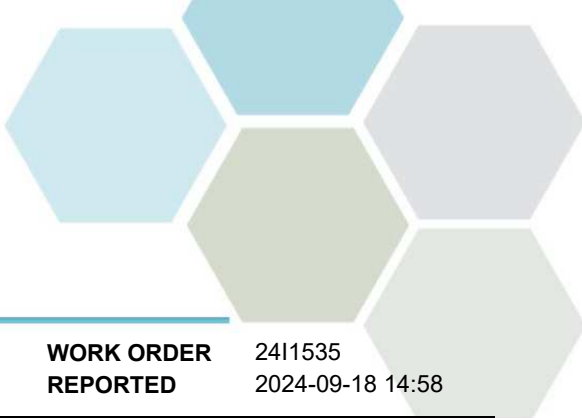
Blank (B4I2606-BLK1)		Prepared: 2024-09-12, Analyzed: 2024-09-17							
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B4I2606-BS1)		Prepared: 2024-09-12, Analyzed: 2024-09-17							
BOD, 5-day	228	53.5 mg/L	198	115	85-115				

General Parameters, Batch B4I2683

Blank (B4I2683-BLK1)		Prepared: 2024-09-14, Analyzed: 2024-09-14							
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B4I2683-BS1)		Prepared: 2024-09-14, Analyzed: 2024-09-14							
Chemical Oxygen Demand	502	20 mg/L	500	100	89-115				

General Parameters, Batch B4I2684

Blank (B4I2684-BLK1)		Prepared: 2024-09-13, Analyzed: 2024-09-13							
Alkalinity, Total (as CaCO ₃)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO ₃)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO ₃)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO ₃)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO ₃)	< 1.0	1.0 mg/L							

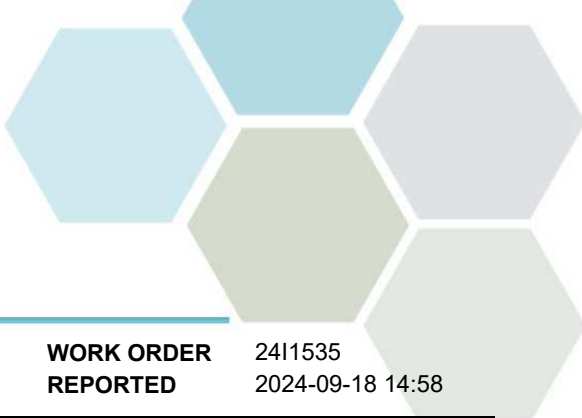


APPENDIX 2: QUALITY CONTROL RESULTS

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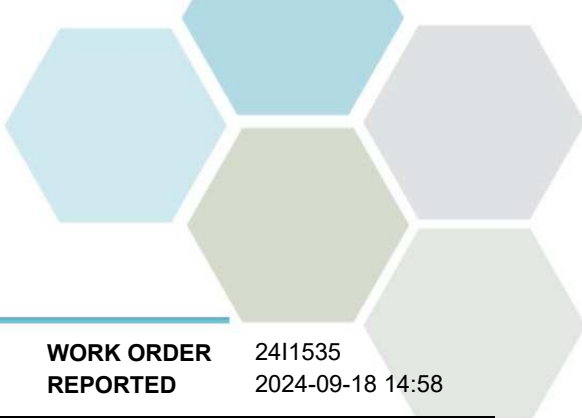
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2684, Continued									
LCS (B4I2684-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
Alkalinity, Total (as CaCO3)	94.2	1.0 mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	42.5	1.0 mg/L	50.0		85	0-200			
General Parameters, Batch B4I2685									
Blank (B4I2685-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK2)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK3)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I2685-BLK4)			Prepared: 2024-09-14, Analyzed: 2024-09-16						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B4I2685-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.58	0.50 mg/L	10.0		96	78-116			
Carbon, Dissolved Organic	9.71	0.50 mg/L	10.0		97	78-116			
LCS (B4I2685-BS2)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.81	0.50 mg/L	10.0		98	78-116			
Carbon, Dissolved Organic	10.0	0.50 mg/L	10.0		100	78-116			
LCS (B4I2685-BS3)			Prepared: 2024-09-13, Analyzed: 2024-09-16						
Carbon, Total Organic	9.89	0.50 mg/L	10.0		99	78-116			
Carbon, Dissolved Organic	9.59	0.50 mg/L	10.0		96	78-116			
LCS (B4I2685-BS4)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
Carbon, Total Organic	9.25	0.50 mg/L	10.0		93	78-116			
Carbon, Dissolved Organic	9.39	0.50 mg/L	10.0		94	78-116			
Duplicate (B4I2685-DUP1)			Source: 2411535-01		Prepared: 2024-09-13, Analyzed: 2024-09-16				
Carbon, Total Organic	1.72	0.50 mg/L		1.69					16
Carbon, Dissolved Organic	1.64	0.50 mg/L		1.68					15
Matrix Spike (B4I2685-MS1)			Source: 2411535-01		Prepared: 2024-09-13, Analyzed: 2024-09-16				
Carbon, Total Organic	10.8	0.50 mg/L	10.0	1.69	91	70-130			
Carbon, Dissolved Organic	11.0	0.50 mg/L	10.0	1.68	94	70-130			
General Parameters, Batch B4I2721									
Blank (B4I2721-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B4I2721-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-13						
Solids, Total Suspended	97.5	5.0 mg/L	100		98	85-115			
General Parameters, Batch B4I2761									



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2411535 2024-09-18 14:58
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2761, Continued									
Blank (B4I2761-BLK1)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
Blank (B4I2761-BLK2)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
LCS (B4I2761-BS1)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	0.100	0.0050 mg/L	0.100		100	84-115			
LCS (B4I2761-BS2)			Prepared: 2024-09-13, Analyzed: 2024-09-14						
Phosphorus, Dissolved Reactive	0.100	0.0050 mg/L	0.100		100	84-115			
General Parameters, Batch B4I2906									
Blank (B4I2906-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4I2906-BLK2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4I2906-BLK3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B4I2906-BS1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B4I2906-BS2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B4I2906-BS3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Phosphorus, Total (as P)	0.103	0.0050 mg/L	0.100		103	85-115			
General Parameters, Batch B4I2920									
Blank (B4I2920-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I2920-BLK2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I2920-BLK3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4I2920-BLK4)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B4I2920-BS1)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00		107	85-115			
LCS (B4I2920-BS2)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.05	0.050 mg/L	1.00		105	85-115			
LCS (B4I2920-BS3)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00		107	85-115			
LCS (B4I2920-BS4)			Prepared: 2024-09-16, Analyzed: 2024-09-16						
Ammonia, Total (as N)	1.06	0.050 mg/L	1.00		106	85-115			

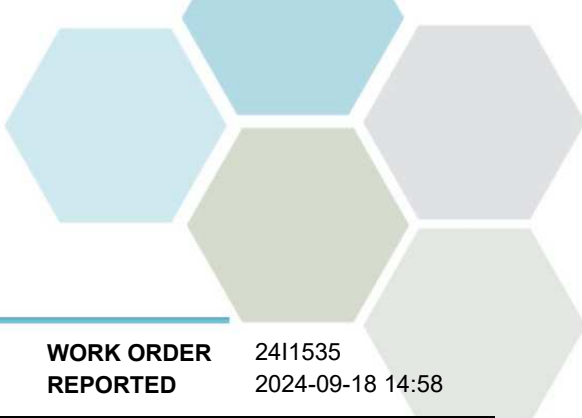


APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I2953									
Blank (B4I2953-BLK1)			Prepared: 2024-09-16, Analyzed: 2024-09-17						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4I2953-BLK2)			Prepared: 2024-09-16, Analyzed: 2024-09-17						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B4I2953-BS1)			Prepared: 2024-09-16, Analyzed: 2024-09-17						
Nitrogen, Total Kjeldahl	1.08	0.050 mg/L	1.00		108	85-115			
LCS (B4I2953-BS2)			Prepared: 2024-09-16, Analyzed: 2024-09-17						
Nitrogen, Total Kjeldahl	1.13	0.050 mg/L	1.00		113	85-115			
Total Metals, Batch B4I2886									
Blank (B4I2886-BLK1)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							
LCS (B4I2886-BS1)			Prepared: 2024-09-15, Analyzed: 2024-09-16						
Aluminum, total	4.17	0.0050 mg/L	4.00		104	80-120			
Antimony, total	0.0389	0.00020 mg/L	0.0400		97	80-120			
Arsenic, total	0.396	0.00050 mg/L	0.400		99	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4I2886, Continued

LCS (B4I2886-BS1), Continued

Prepared: 2024-09-15, Analyzed: 2024-09-16

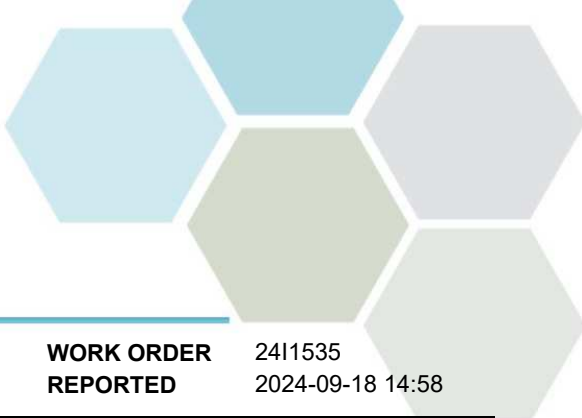
Barium, total	0.0398	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0395	0.00010 mg/L	0.0400		99	80-120			
Bismuth, total	0.0401	0.00010 mg/L	0.0400		100	80-120			
Boron, total	0.405	0.0500 mg/L	0.400		101	80-120			
Cadmium, total	0.0396	0.000010 mg/L	0.0400		99	80-120			
Calcium, total	3.92	0.20 mg/L	4.00		98	80-120			
Chromium, total	0.0404	0.00050 mg/L	0.0400		101	80-120			
Cobalt, total	0.0403	0.00010 mg/L	0.0400		101	80-120			
Copper, total	0.0399	0.00040 mg/L	0.0400		100	80-120			
Iron, total	4.00	0.010 mg/L	4.00		100	80-120			
Lead, total	0.0397	0.00020 mg/L	0.0400		99	80-120			
Lithium, total	0.0395	0.00010 mg/L	0.0400		99	80-120			
Magnesium, total	4.10	0.010 mg/L	4.00		102	80-120			
Manganese, total	0.0405	0.00020 mg/L	0.0400		101	80-120			
Molybdenum, total	0.0404	0.00010 mg/L	0.0400		101	80-120			
Nickel, total	0.0402	0.00040 mg/L	0.0400		101	80-120			
Phosphorus, total	4.14	0.050 mg/L	4.00		104	80-120			
Potassium, total	4.12	0.10 mg/L	4.00		103	80-120			
Selenium, total	0.385	0.00050 mg/L	0.400		96	80-120			
Silicon, total	4.0	1.0 mg/L	4.00		101	80-120			
Silver, total	0.0393	0.000050 mg/L	0.0400		98	80-120			
Sodium, total	4.00	0.10 mg/L	4.00		100	80-120			
Strontium, total	0.0405	0.0010 mg/L	0.0400		101	80-120			
Sulfur, total	40.4	3.0 mg/L	40.0		101	80-120			
Tellurium, total	0.0378	0.00050 mg/L	0.0400		94	80-120			
Thallium, total	0.0408	0.000020 mg/L	0.0400		102	80-120			
Thorium, total	0.0417	0.00010 mg/L	0.0400		104	80-120			
Tin, total	0.0402	0.00020 mg/L	0.0400		100	80-120			
Titanium, total	0.0403	0.0050 mg/L	0.0400		101	80-120			
Tungsten, total	0.0403	0.0010 mg/L	0.0400		101	80-120			
Uranium, total	0.0404	0.000020 mg/L	0.0400		101	80-120			
Vanadium, total	0.0389	0.0050 mg/L	0.0400		97	80-120			
Zinc, total	0.399	0.0040 mg/L	0.400		100	80-120			
Zirconium, total	0.0400	0.00010 mg/L	0.0400		100	80-120			

Duplicate (B4I2886-DUP1)

Source: 2411535-02

Prepared: 2024-09-15, Analyzed: 2024-09-16

Aluminum, total	0.0112	0.0050 mg/L	0.0109						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	0.297	0.0050 mg/L	0.297				< 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	0.000039	0.000010 mg/L	0.000038						20
Calcium, total	38.4	0.20 mg/L	39.2				2		20
Chromium, total	< 0.00050	0.00050 mg/L	< 0.00050						20
Cobalt, total	< 0.00010	0.00010 mg/L	< 0.00010						20
Copper, total	0.00045	0.00040 mg/L	0.00045						20
Iron, total	0.012	0.010 mg/L	0.011						20
Lead, total	< 0.00020	0.00020 mg/L	< 0.00020						20
Lithium, total	0.0102	0.00010 mg/L	0.0104				1		20
Magnesium, total	8.50	0.010 mg/L	8.67				2		20
Manganese, total	0.00338	0.00020 mg/L	0.00333				1		20
Molybdenum, total	0.00073	0.00010 mg/L	0.00075				3		20
Nickel, total	< 0.00040	0.00040 mg/L	< 0.00040						20
Phosphorus, total	< 0.050	0.050 mg/L	< 0.050						20



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2411535
2024-09-18 14:58

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4I2886, Continued									
Duplicate (B4I2886-DUP1), Continued		Source: 2411535-02		Prepared: 2024-09-15, Analyzed: 2024-09-16					
Potassium, total	0.90	0.10 mg/L		0.90			< 1	20	
Selenium, total	< 0.00050	0.00050 mg/L		< 0.00050				20	
Silicon, total	2.3	1.0 mg/L		2.4				20	
Silver, total	< 0.000050	0.000050 mg/L		< 0.000050				20	
Sodium, total	3.02	0.10 mg/L		3.07			2	20	
Strontium, total	0.140	0.0010 mg/L		0.141			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	< 0.0010	0.0010 mg/L		< 0.0010				20	
Uranium, total	0.000448	0.000020 mg/L		0.000456			2	20	
Vanadium, total	< 0.0050	0.0050 mg/L		< 0.0050				20	
Zinc, total	0.0069	0.0040 mg/L		0.0071				20	
Zirconium, total	< 0.00010	0.00010 mg/L		< 0.00010				20	

Total Metals, Batch B4I2899

Blank (B4I2899-BLK1)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK2)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK3)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4I2899-BLK4)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	< 0.000010	0.000010 mg/L							
LCS (B4I2899-BS1)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	0.00243	0.000010 mg/L		0.00250	97	80-120			
LCS (B4I2899-BS2)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	0.00244	0.000010 mg/L		0.00250	97	80-120			
LCS (B4I2899-BS3)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	0.00244	0.000010 mg/L		0.00250	97	80-120			
LCS (B4I2899-BS4)		Prepared: 2024-09-15, Analyzed: 2024-09-15							
Mercury, total	0.00253	0.000010 mg/L		0.00250	101	80-120			

QC Qualifiers:

- MES A number up to 10% (rounded down) of the analytes in a Multi-Element Scan may exceed control limits by up to 10% (absolute).
- S09 The surrogate recovery for this sample is outside of established control limits Suspect syringe error, data not affected.

CERTIFICATE OF ANALYSIS

REPORTED TO Elk River Alliance
PO Box 2095, 1111 2nd Ave
Fernie, BC V0B1M0

ATTENTION Fynley Kujit

PO NUMBER

PROJECT CBWM-2024

PROJECT INFO

WORK ORDER 2413615

RECEIVED / TEMP 2024-09-26 09:00 / 12.0°C

REPORTED 2024-10-09 09:24

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



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.

We've Got Chemistry



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.

Ahead of the Curve



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>

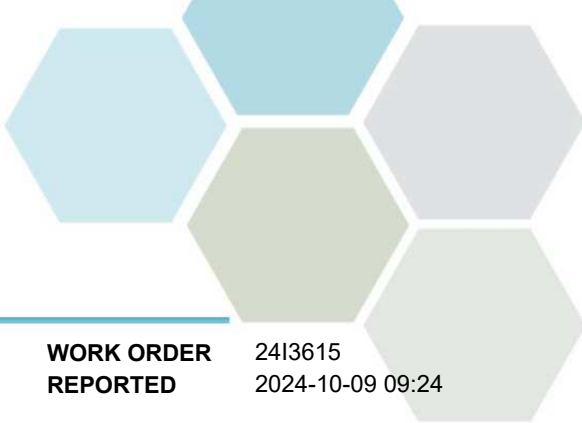
If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

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

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413615
2024-10-09 09:24

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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L1Z 001-20240924-1230 (2413615-01) | Matrix: Water | Sampled: 2024-09-24 12:30

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-28	
Chloride	0.30	AO ≤ 250	0.10	mg/L	2024-09-28	
Fluoride	0.22	MAC = 1.5	0.10	mg/L	2024-09-28	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-09-28	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-28	HT1
Sulfate	255	AO ≤ 500	1.0	mg/L	2024-09-28	

BCMOE Aggregate Hydrocarbons

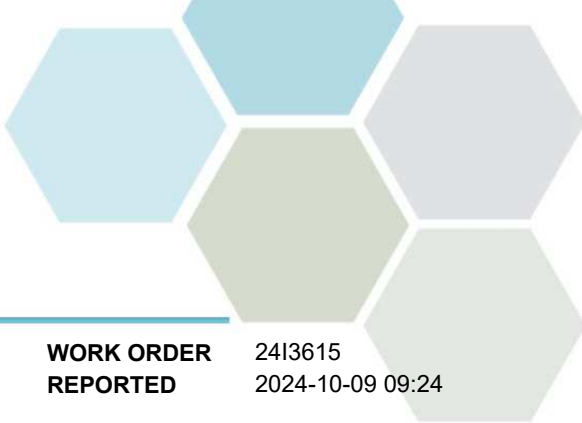
EPHw10-19	< 250	N/A	250	µg/L	2024-10-03	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-03	
Surrogate: 2-Methylnonane (EPH/F2-4)	91		60-140	%	2024-10-03	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	363	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.103	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Barium, dissolved	0.0818	N/A	0.0050	mg/L	2024-10-03	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-10-03	
Cadmium, dissolved	0.000017	N/A	0.000010	mg/L	2024-10-03	
Calcium, dissolved	104	N/A	0.20	mg/L	2024-10-03	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-10-03	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Lithium, dissolved	0.00400	N/A	0.00010	mg/L	2024-10-03	
Magnesium, dissolved	24.9	N/A	0.010	mg/L	2024-10-03	
Manganese, dissolved	0.00133	N/A	0.00020	mg/L	2024-10-03	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-03	
Molybdenum, dissolved	0.00172	N/A	0.00010	mg/L	2024-10-03	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-10-03	
Potassium, dissolved	0.46	N/A	0.10	mg/L	2024-10-03	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Silicon, dissolved	2.8	N/A	1.0	mg/L	2024-10-03	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-03	
Sodium, dissolved	1.84	N/A	0.10	mg/L	2024-10-03	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413615
2024-10-09 09:24

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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L1Z 001-20240924-1230 (2413615-01) | Matrix: Water | Sampled: 2024-09-24 12:30, Continued

Dissolved Metals, Continued

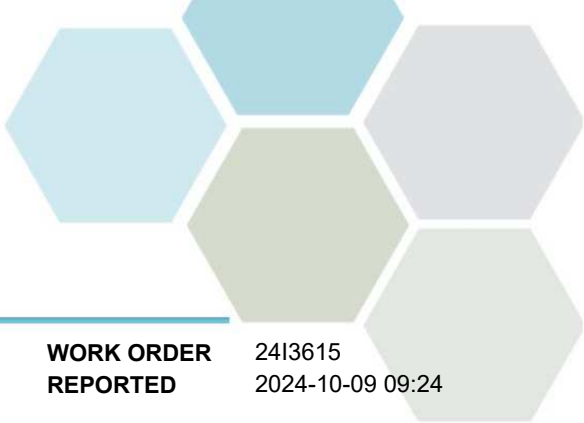
Strontium, dissolved	1.71	N/A	0.0010 mg/L	2024-10-03	
Sulfur, dissolved	75.5	N/A	3.0 mg/L	2024-10-03	
Tellurium, dissolved	< 0.00050	N/A	0.00050 mg/L	2024-10-03	
Thallium, dissolved	< 0.000020	N/A	0.000020 mg/L	2024-10-03	
Thorium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Tin, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-10-03	
Titanium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-10-03	
Tungsten, dissolved	< 0.0010	N/A	0.0010 mg/L	2024-10-03	
Uranium, dissolved	0.000355	N/A	0.000020 mg/L	2024-10-03	
Vanadium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-10-03	
Zinc, dissolved	0.0043	N/A	0.0040 mg/L	2024-10-03	
Zirconium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-10-03	

General Parameters

Alkalinity, Total (as CaCO3)	136	N/A	1.0 mg/L	2024-10-02	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-10-02	
Alkalinity, Bicarbonate (as CaCO3)	136	N/A	1.0 mg/L	2024-10-02	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-10-02	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-10-02	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-10-02	
BOD, 5-day	< 5.6	N/A	2.0 mg/L	2024-10-02	
Carbon, Total Organic	1.69	N/A	0.50 mg/L	2024-10-01	
Carbon, Dissolved Organic	0.85	N/A	0.50 mg/L	2024-10-01	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-10-03	
Nitrogen, Total Kjeldahl	0.103	N/A	0.050 mg/L	2024-10-04	
pH	8.21	7.0-10.5	0.10 pH units	2024-10-02	HT2
Phosphorus, Total (as P)	0.0260	N/A	0.0050 mg/L	2024-10-03	
Phosphorus, Dissolved Reactive	0.0090	N/A	0.0050 mg/L	2024-10-02	HT1
Solids, Total Suspended	2.6	N/A	2.0 mg/L	2024-10-04	HT1

Total Metals

Aluminum, total	0.0261	OG < 0.1	0.0050 mg/L	2024-10-03	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-10-03	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-10-03	
Barium, total	0.0933	MAC = 2	0.0050 mg/L	2024-10-03	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-10-03	
Cadmium, total	0.000018	MAC = 0.007	0.000010 mg/L	2024-10-03	
Calcium, total	99.2	None Required	0.20 mg/L	2024-10-03	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-10-03	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-10-03	
Iron, total	0.028	AO ≤ 0.3	0.010 mg/L	2024-10-03	



TEST RESULTS

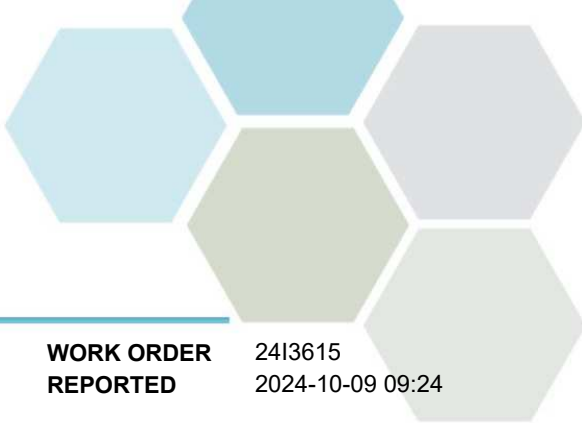
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Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
L1Z 001-20240924-1230 (2413615-01) Matrix: Water Sampled: 2024-09-24 12:30, Continued					
<i>Total Metals, Continued</i>					
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-10-03	
Lithium, total	0.00335	N/A	0.00010 mg/L	2024-10-03	
Magnesium, total	23.7	None Required	0.010 mg/L	2024-10-03	
Manganese, total	0.00232	MAC = 0.12	0.00020 mg/L	2024-10-03	
Mercury, total	< 0.000010	MAC = 0.001	0.000010 mg/L	2024-10-03	
Molybdenum, total	0.00179	N/A	0.00010 mg/L	2024-10-03	
Nickel, total	< 0.00040	N/A	0.00040 mg/L	2024-10-03	
Phosphorus, total	< 0.050	N/A	0.050 mg/L	2024-10-03	
Potassium, total	0.41	N/A	0.10 mg/L	2024-10-03	
Selenium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-10-03	
Silicon, total	2.6	N/A	1.0 mg/L	2024-10-03	
Silver, total	< 0.000050	None Required	0.000050 mg/L	2024-10-03	
Sodium, total	1.68	AO ≤ 200	0.10 mg/L	2024-10-03	
Strontium, total	1.82	MAC = 7	0.0010 mg/L	2024-10-03	
Sulfur, total	69.0	N/A	3.0 mg/L	2024-10-03	
Tellurium, total	< 0.00050	N/A	0.00050 mg/L	2024-10-03	
Thallium, total	< 0.000020	N/A	0.000020 mg/L	2024-10-03	
Thorium, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Tin, total	< 0.00020	N/A	0.00020 mg/L	2024-10-03	
Titanium, total	< 0.0050	N/A	0.0050 mg/L	2024-10-03	
Tungsten, total	< 0.0010	N/A	0.0010 mg/L	2024-10-03	
Uranium, total	0.000429	MAC = 0.02	0.000020 mg/L	2024-10-03	
Vanadium, total	< 0.0050	N/A	0.0050 mg/L	2024-10-03	
Zinc, total	0.0068	AO ≤ 5	0.0040 mg/L	2024-10-03	
Zirconium, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	

Sample Qualifiers:

- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.



APPENDIX 1: SUPPORTING INFORMATION

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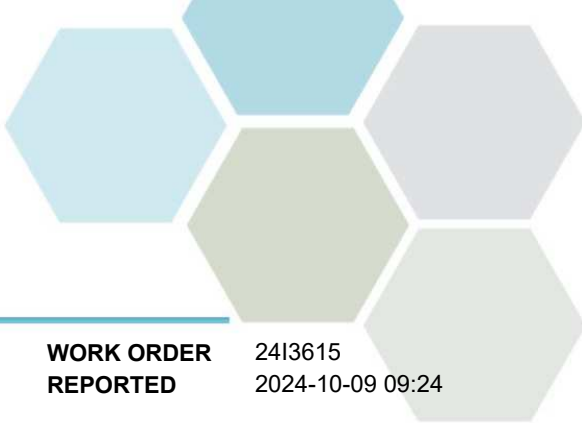
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Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	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
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	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
pH in Water	SM 4500-H+ B (2021)	Electrometry	✓	Kelowna
Phosphorus, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	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)
pH units	pH < 7 = acidic, pH > 7 = basic
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



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance
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Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, September 2022\)](#)

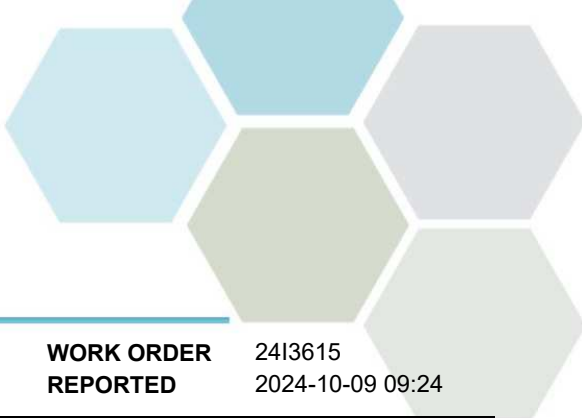
Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

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 not 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.



APPENDIX 2: QUALITY CONTROL RESULTS

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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:

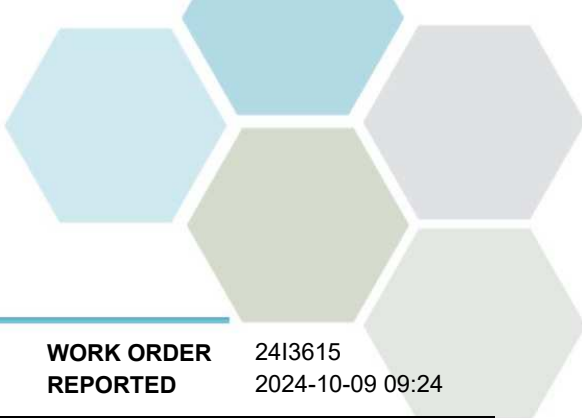
- **Method Blank (Blk):** A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup):** An additional or second portion of a randomly selected 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 B414392									
Blank (B414392-BLK2)			Prepared: 2024-09-28, Analyzed: 2024-09-28						
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							
Sulfate	< 1.0	1.0 mg/L							
LCS (B414392-BS1)			Prepared: 2024-09-28, Analyzed: 2024-09-28						
Bromide	4.16	0.10 mg/L	4.00		104	85-115			
Chloride	16.1	0.10 mg/L	16.0		100	90-110			
Fluoride	3.79	0.10 mg/L	4.00		95	88-108			
Nitrate (as N)	3.95	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)	2.10	0.010 mg/L	2.00		105	85-115			
Sulfate	16.2	1.0 mg/L	16.0		101	90-110			
LCS (B414392-BS2)			Prepared: 2024-09-28, Analyzed: 2024-09-28						
Bromide	4.09	0.10 mg/L	4.00		102	85-115			
Chloride	16.0	0.10 mg/L	16.0		100	90-110			
Fluoride	3.99	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)	3.97	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)	2.04	0.010 mg/L	2.00		102	85-115			
Sulfate	16.2	1.0 mg/L	16.0		101	90-110			
Duplicate (B414392-DUP2)			Source: 2413615-01		Prepared: 2024-09-28, Analyzed: 2024-09-28				
Bromide	< 0.10	0.10 mg/L		< 0.10					10
Chloride	0.30	0.10 mg/L		0.30					10
Fluoride	0.22	0.10 mg/L		0.22					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
Sulfate	242	1.0 mg/L		255			5		10

BCMOE Aggregate Hydrocarbons, Batch B4J1757

Blank (B4J1757-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
EPHw10-19	< 250	250 µg/L							
EPHw19-32	< 250	250 µg/L							

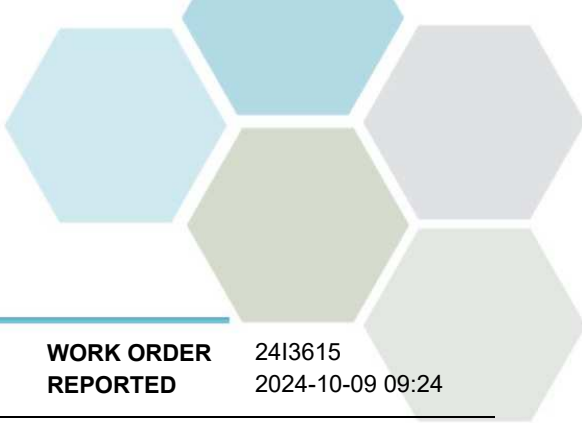


APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

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2024-10-09 09:24

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
BCMOE Aggregate Hydrocarbons, Batch B4J1757, Continued									
Blank (B4J1757-BLK1), Continued			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Surrogate: 2-Methylnonane (EPH/F2-4)	2230	µg/L	2490		90	60-140			
LCS (B4J1757-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
EPHw10-19	17100	250 µg/L	17400		99	70-130			
EPHw19-32	20100	250 µg/L	24800		81	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1650	µg/L	2490		66	60-140			
LCS Dup (B4J1757-BSD2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
EPHw10-19	18600	250 µg/L	17400		107	70-130	8	20	
EPHw19-32	21700	250 µg/L	24800		87	70-130	8	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1550	µg/L	2490		62	60-140			
Dissolved Metals, Batch B4J1778									
Blank (B4J1778-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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 (B4J1778-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Aluminum, dissolved	4.03	0.0050 mg/L	4.00		101	80-120			
Antimony, dissolved	0.0405	0.00020 mg/L	0.0400		101	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4J1778, Continued									
LCS (B4J1778-BS1), Continued					Prepared: 2024-10-03, Analyzed: 2024-10-03				
Arsenic, dissolved	0.400	0.00050 mg/L	0.400		100	80-120			
Barium, dissolved	0.0412	0.0050 mg/L	0.0400		103	80-120			
Beryllium, dissolved	0.0391	0.00010 mg/L	0.0400		98	80-120			
Bismuth, dissolved	0.0398	0.00010 mg/L	0.0400		100	80-120			
Boron, dissolved	0.394	0.0500 mg/L	0.400		98	80-120			
Cadmium, dissolved	0.0409	0.000010 mg/L	0.0400		102	80-120			
Calcium, dissolved	4.07	0.20 mg/L	4.00		102	80-120			
Chromium, dissolved	0.0399	0.00050 mg/L	0.0400		100	80-120			
Cobalt, dissolved	0.0405	0.00010 mg/L	0.0400		101	80-120			
Copper, dissolved	0.0405	0.00040 mg/L	0.0400		101	80-120			
Iron, dissolved	4.03	0.010 mg/L	4.00		101	80-120			
Lead, dissolved	0.0413	0.00020 mg/L	0.0400		103	80-120			
Lithium, dissolved	0.0394	0.00010 mg/L	0.0400		98	80-120			
Magnesium, dissolved	4.03	0.010 mg/L	4.00		101	80-120			
Manganese, dissolved	0.0406	0.00020 mg/L	0.0400		101	80-120			
Molybdenum, dissolved	0.0409	0.00010 mg/L	0.0400		102	80-120			
Nickel, dissolved	0.0405	0.00040 mg/L	0.0400		101	80-120			
Phosphorus, dissolved	4.04	0.050 mg/L	4.00		101	80-120			
Potassium, dissolved	3.99	0.10 mg/L	4.00		100	80-120			
Selenium, dissolved	0.397	0.00050 mg/L	0.400		99	80-120			
Silicon, dissolved	4.0	1.0 mg/L	4.00		99	80-120			
Silver, dissolved	0.0406	0.000050 mg/L	0.0400		101	80-120			
Sodium, dissolved	4.05	0.10 mg/L	4.00		101	80-120			
Strontium, dissolved	0.0409	0.0010 mg/L	0.0400		102	80-120			
Sulfur, dissolved	40.5	3.0 mg/L	40.0		101	80-120			
Tellurium, dissolved	0.0409	0.00050 mg/L	0.0400		102	80-120			
Thallium, dissolved	0.0405	0.000020 mg/L	0.0400		101	80-120			
Thorium, dissolved	0.0411	0.00010 mg/L	0.0400		103	80-120			
Tin, dissolved	0.0418	0.00020 mg/L	0.0400		104	80-120			
Titanium, dissolved	0.0398	0.0050 mg/L	0.0400		99	80-120			
Tungsten, dissolved	0.0406	0.0010 mg/L	0.0400		102	80-120			
Uranium, dissolved	0.0414	0.000020 mg/L	0.0400		104	80-120			
Vanadium, dissolved	0.0403	0.0050 mg/L	0.0400		101	80-120			
Zinc, dissolved	0.405	0.0040 mg/L	0.400		101	80-120			
Zirconium, dissolved	0.0410	0.00010 mg/L	0.0400		102	80-120			

Matrix Spike (B4J1778-MS1)		Source: 2413615-01		Prepared: 2024-10-03, Analyzed: 2024-10-03					
Aluminum, dissolved	4.50	0.0050 mg/L	4.00	< 0.0050	112	70-130			
Antimony, dissolved	0.0463	0.00020 mg/L	0.0400	< 0.00020	116	70-130			
Arsenic, dissolved	0.449	0.00050 mg/L	0.400	< 0.00050	112	70-130			
Barium, dissolved	0.127	0.0050 mg/L	0.0400	0.0818	112	70-130			
Beryllium, dissolved	0.0432	0.00010 mg/L	0.0400	< 0.00010	108	70-130			
Bismuth, dissolved	0.0325	0.00010 mg/L	0.0400	< 0.00010	81	70-130			
Boron, dissolved	0.427	0.0500 mg/L	0.400	< 0.0500	104	70-130			
Cadmium, dissolved	0.0454	0.000010 mg/L	0.0400	0.000017	113	70-130			
Calcium, dissolved	107	0.20 mg/L	4.00	104	58	70-130			MS2
Chromium, dissolved	0.0462	0.00050 mg/L	0.0400	< 0.00050	115	70-130			
Cobalt, dissolved	0.0430	0.00010 mg/L	0.0400	< 0.00010	107	70-130			
Copper, dissolved	0.0422	0.00040 mg/L	0.0400	< 0.00040	105	70-130			
Iron, dissolved	4.29	0.010 mg/L	4.00	< 0.010	107	70-130			
Lead, dissolved	0.0439	0.00020 mg/L	0.0400	< 0.00020	110	70-130			
Lithium, dissolved	0.0463	0.00010 mg/L	0.0400	0.00400	106	70-130			
Magnesium, dissolved	28.5	0.010 mg/L	4.00	24.9	89	70-130			
Manganese, dissolved	0.0452	0.00020 mg/L	0.0400	0.00133	110	70-130			
Molybdenum, dissolved	0.0467	0.00010 mg/L	0.0400	0.00172	113	70-130			
Nickel, dissolved	0.0438	0.00040 mg/L	0.0400	< 0.00040	109	70-130			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413615
2024-10-09 09:24

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B4J1778, Continued

Matrix Spike (B4J1778-MS1), Continued

Source: 2413615-01

Prepared: 2024-10-03, Analyzed: 2024-10-03

Phosphorus, dissolved	4.72	0.050 mg/L	4.00	< 0.050	118	70-130			
Potassium, dissolved	5.03	0.10 mg/L	4.00	0.46	114	70-130			
Selenium, dissolved	0.447	0.00050 mg/L	0.400	< 0.00050	112	70-130			
Silicon, dissolved	7.4	1.0 mg/L	4.00	2.8	116	70-130			
Silver, dissolved	0.0332	0.000050 mg/L	0.0400	< 0.000050	83	70-130			
Sodium, dissolved	6.06	0.10 mg/L	4.00	1.84	105	70-130			
Strontium, dissolved	1.71	0.0010 mg/L	0.0400	1.71	10	70-130			MS2
Sulfur, dissolved	122	3.0 mg/L	40.0	75.5	115	70-130			
Tellurium, dissolved	0.0389	0.00050 mg/L	0.0400	< 0.00050	97	70-130			
Thallium, dissolved	0.0440	0.000020 mg/L	0.0400	< 0.000020	110	70-130			
Thorium, dissolved	0.0439	0.00010 mg/L	0.0400	< 0.00010	110	70-130			
Tin, dissolved	0.0447	0.00020 mg/L	0.0400	< 0.00020	112	70-130			
Titanium, dissolved	0.0446	0.0050 mg/L	0.0400	< 0.0050	111	70-130			
Tungsten, dissolved	0.0433	0.0010 mg/L	0.0400	< 0.0010	108	70-130			
Uranium, dissolved	0.0461	0.000020 mg/L	0.0400	0.000355	114	70-130			
Vanadium, dissolved	0.0453	0.0050 mg/L	0.0400	< 0.0050	113	70-130			
Zinc, dissolved	0.445	0.0040 mg/L	0.400	0.0043	110	70-130			
Zirconium, dissolved	0.0448	0.00010 mg/L	0.0400	< 0.00010	112	70-130			

Dissolved Metals, Batch B4J1839

Blank (B4J1839-BLK1)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	< 0.000010	0.000010 mg/L							
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Blank (B4J1839-BLK2)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	< 0.000010	0.000010 mg/L							
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Blank (B4J1839-BLK3)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	< 0.000010	0.000010 mg/L							
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Blank (B4J1839-BLK4)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	< 0.000010	0.000010 mg/L							
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Blank (B4J1839-BLK5)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	< 0.000010	0.000010 mg/L							
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LCS (B4J1839-BS1)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	0.00231	0.000010 mg/L	0.00250		93	80-120			
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LCS (B4J1839-BS2)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	0.00242	0.000010 mg/L	0.00250		97	80-120			
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LCS (B4J1839-BS3)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	0.00231	0.000010 mg/L	0.00250		92	80-120			
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LCS (B4J1839-BS4)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Mercury, dissolved	0.00216	0.000010 mg/L	0.00250		86	80-120			
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LCS (B4J1839-BS5)

Prepared: 2024-10-03, Analyzed: 2024-10-03

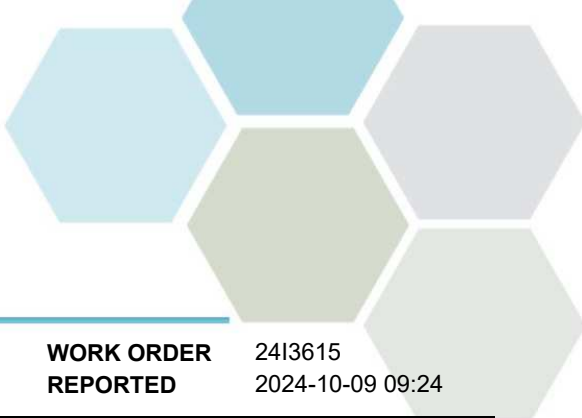
Mercury, dissolved	0.00238	0.000010 mg/L	0.00250		95	80-120			
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General Parameters, Batch B4I4312

Blank (B4I4312-BLK1)

Prepared: 2024-09-27, Analyzed: 2024-10-02

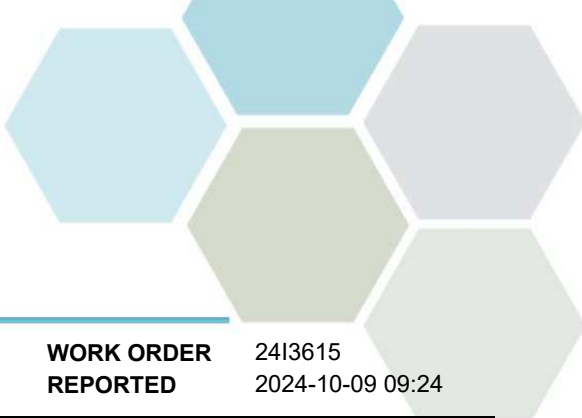
BOD, 5-day	< 2.0	2.0 mg/L							
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APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413615 2024-10-09 09:24
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I4312, Continued									
LCS (B4I4312-BS1)			Prepared: 2024-09-27, Analyzed: 2024-10-02						
BOD, 5-day	197	46.7 mg/L	198		99	85-115			
General Parameters, Batch B4I4369									
Blank (B4I4369-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I4369-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B4I4369-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	9.21	0.50 mg/L	10.0		92	78-116			
Carbon, Dissolved Organic	9.01	0.50 mg/L	10.0		90	78-116			
LCS (B4I4369-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	9.04	0.50 mg/L	10.0		90	78-116			
Carbon, Dissolved Organic	9.12	0.50 mg/L	10.0		91	78-116			
Duplicate (B4I4369-DUP2)			Source: 2413615-01		Prepared: 2024-10-01, Analyzed: 2024-10-01				
Carbon, Total Organic	1.75	0.50 mg/L		1.69				16	
Carbon, Dissolved Organic	0.83	0.50 mg/L		0.85				15	
Matrix Spike (B4I4369-MS2)			Source: 2413615-01		Prepared: 2024-10-01, Analyzed: 2024-10-01				
Carbon, Total Organic	10.1	0.50 mg/L	10.0	1.69	84	70-130			
Carbon, Dissolved Organic	9.23	0.50 mg/L	10.0	0.85	84	70-130			
General Parameters, Batch B4J1596									
Blank (B4J1596-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
Blank (B4J1596-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
LCS (B4J1596-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	0.0960	0.0050 mg/L	0.100		96	84-115			
LCS (B4J1596-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	0.0950	0.0050 mg/L	0.100		95	84-115			
General Parameters, Batch B4J1632									
Blank (B4J1632-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK2)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK4)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413615 2024-10-09 09:24
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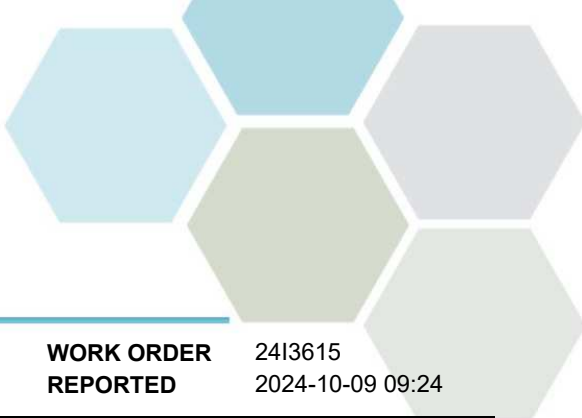
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4J1632, Continued

Blank (B4J1632-BLK5)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK6)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B4J1632-BS1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00		107	85-115			
LCS (B4J1632-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	1.06	0.050 mg/L	1.00		106	85-115			
LCS (B4J1632-BS3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.971	0.050 mg/L	1.00		97	85-115			
LCS (B4J1632-BS4)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.986	0.050 mg/L	1.00		99	85-115			
LCS (B4J1632-BS5)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.974	0.050 mg/L	1.00		97	85-115			
LCS (B4J1632-BS6)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.947	0.050 mg/L	1.00		95	85-115			

General Parameters, Batch B4J1649

Blank (B4J1649-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Blank (B4J1649-BLK2)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
Blank (B4J1649-BLK3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							
LCS (B4J1649-BS1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Alkalinity, Total (as CaCO3)	95.2	1.0 mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.7	1.0 mg/L	50.0		87	0-200			
LCS (B4J1649-BS3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Alkalinity, Total (as CaCO3)	95.6	1.0 mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	49.7	1.0 mg/L	50.0		99	0-200			
LCS (B4J1649-BS5)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Alkalinity, Total (as CaCO3)	93.7	1.0 mg/L	100		94	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.2	1.0 mg/L	50.0		86	0-200			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413615 2024-10-09 09:24
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4J1649, Continued

Reference (B4J1649-SRM1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
pH	7.00	0.10 pH units	7.01		100	98-102			
Reference (B4J1649-SRM2)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
pH	7.01	0.10 pH units	7.01		100	98-102			
Reference (B4J1649-SRM3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
pH	7.01	0.10 pH units	7.01		100	98-102			

General Parameters, Batch B4J1654

Blank (B4J1654-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	< 20	20 mg/L							
Blank (B4J1654-BLK2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B4J1654-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	504	20 mg/L	500		101	89-115			
LCS (B4J1654-BS2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	503	20 mg/L	500		101	89-115			

General Parameters, Batch B4J1813

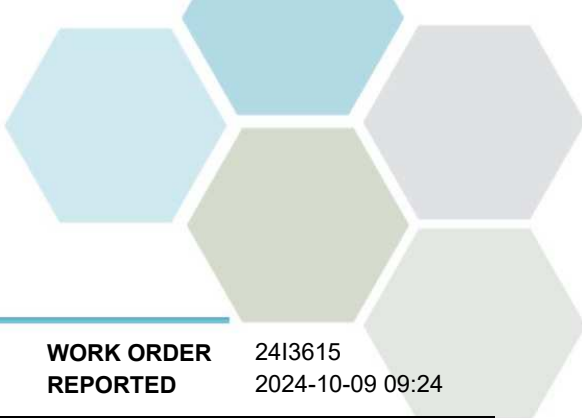
Blank (B4J1813-BLK2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4J1813-BLK3)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B4J1813-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	0.102	0.0050 mg/L	0.100		102	85-115			
LCS (B4J1813-BS3)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	0.0908	0.0050 mg/L	0.100		91	85-115			

General Parameters, Batch B4J1851

Blank (B4J1851-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Solids, Total Suspended	< 2.0	2.0 mg/L							
LCS (B4J1851-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Solids, Total Suspended	114	5.3 mg/L	100		114	85-115			

General Parameters, Batch B4J1913

Blank (B4J1913-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4J1913-BLK2)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4J1913-BLK3)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413615
2024-10-09 09:24

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J1913, Continued									
LCS (B4J1913-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Nitrogen, Total Kjeldahl	0.974	0.050 mg/L	1.00		97	85-115			
LCS (B4J1913-BS2)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Nitrogen, Total Kjeldahl	0.993	0.050 mg/L	1.00		99	85-115			
LCS (B4J1913-BS3)			Prepared: 2024-10-03, Analyzed: 2024-10-04						
Nitrogen, Total Kjeldahl	0.999	0.050 mg/L	1.00		100	85-115			
Total Metals, Batch B4J1763									
Blank (B4J1763-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							
LCS (B4J1763-BS1)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Aluminum, total	4.03	0.0050 mg/L	4.00		101	80-120			
Antimony, total	0.0386	0.00020 mg/L	0.0400		96	80-120			
Arsenic, total	0.391	0.00050 mg/L	0.400		98	80-120			
Barium, total	0.0396	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0345	0.00010 mg/L	0.0400		86	80-120			
Bismuth, total	0.0392	0.00010 mg/L	0.0400		98	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

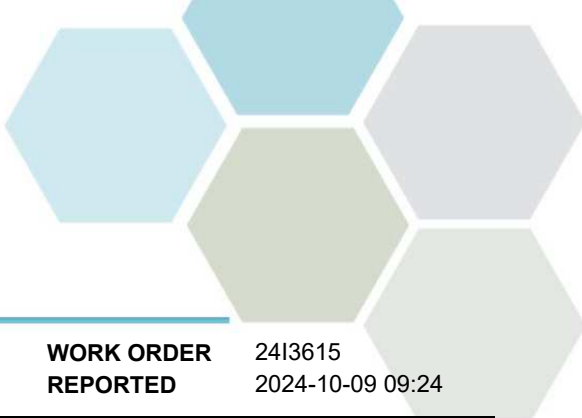
WORK ORDER REPORTED 2413615
2024-10-09 09:24

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4J1763, Continued

LCS (B4J1763-BS1), Continued			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Boron, total	0.412	0.0500 mg/L	0.400		103	80-120			
Cadmium, total	0.0390	0.000010 mg/L	0.0400		98	80-120			
Calcium, total	4.03	0.20 mg/L	4.00		101	80-120			
Chromium, total	0.0402	0.00050 mg/L	0.0400		100	80-120			
Cobalt, total	0.0396	0.00010 mg/L	0.0400		99	80-120			
Copper, total	0.0391	0.00040 mg/L	0.0400		98	80-120			
Iron, total	3.95	0.010 mg/L	4.00		99	80-120			
Lead, total	0.0396	0.00020 mg/L	0.0400		99	80-120			
Lithium, total	0.0378	0.00010 mg/L	0.0400		95	80-120			
Magnesium, total	4.03	0.010 mg/L	4.00		101	80-120			
Manganese, total	0.0403	0.00020 mg/L	0.0400		101	80-120			
Molybdenum, total	0.0398	0.00010 mg/L	0.0400		99	80-120			
Nickel, total	0.0399	0.00040 mg/L	0.0400		100	80-120			
Phosphorus, total	4.00	0.050 mg/L	4.00		100	80-120			
Potassium, total	3.95	0.10 mg/L	4.00		99	80-120			
Selenium, total	0.380	0.00050 mg/L	0.400		95	80-120			
Silicon, total	3.8	1.0 mg/L	4.00		95	80-120			
Silver, total	0.0387	0.000050 mg/L	0.0400		97	80-120			
Sodium, total	3.89	0.10 mg/L	4.00		97	80-120			
Strontium, total	0.0403	0.0010 mg/L	0.0400		101	80-120			
Sulfur, total	38.2	3.0 mg/L	40.0		96	80-120			
Tellurium, total	0.0371	0.00050 mg/L	0.0400		93	80-120			
Thallium, total	0.0397	0.000020 mg/L	0.0400		99	80-120			
Thorium, total	0.0402	0.00010 mg/L	0.0400		100	80-120			
Tin, total	0.0391	0.00020 mg/L	0.0400		98	80-120			
Titanium, total	0.0398	0.0050 mg/L	0.0400		100	80-120			
Tungsten, total	0.0397	0.0010 mg/L	0.0400		99	80-120			
Uranium, total	0.0393	0.000020 mg/L	0.0400		98	80-120			
Vanadium, total	0.0397	0.0050 mg/L	0.0400		99	80-120			
Zinc, total	0.392	0.0040 mg/L	0.400		98	80-120			
Zirconium, total	0.0396	0.00010 mg/L	0.0400		99	80-120			

Matrix Spike (B4J1763-MS1)			Source: 2413615-01		Prepared: 2024-10-02, Analyzed: 2024-10-03				
Aluminum, total	4.49	0.0050 mg/L	4.00	0.0261	112	70-130			
Antimony, total	0.0451	0.00020 mg/L	0.0400	< 0.00020	113	70-130			
Arsenic, total	0.453	0.00050 mg/L	0.400	< 0.00050	113	70-130			
Barium, total	0.128	0.0050 mg/L	0.0400	0.0933	88	70-130			
Beryllium, total	0.0455	0.00010 mg/L	0.0400	< 0.00010	114	70-130			
Bismuth, total	0.0451	0.00010 mg/L	0.0400	< 0.00010	113	70-130			
Boron, total	0.499	0.0500 mg/L	0.400	< 0.0500	121	70-130			
Cadmium, total	0.0455	0.000010 mg/L	0.0400	0.000018	114	70-130			
Calcium, total	103	0.20 mg/L	4.00	99.2	105	70-130			
Chromium, total	0.0472	0.00050 mg/L	0.0400	< 0.00050	117	70-130			
Cobalt, total	0.0446	0.00010 mg/L	0.0400	< 0.00010	112	70-130			
Copper, total	0.0430	0.00040 mg/L	0.0400	< 0.00040	107	70-130			
Iron, total	4.45	0.010 mg/L	4.00	0.028	110	70-130			
Lead, total	0.0460	0.00020 mg/L	0.0400	< 0.00020	115	70-130			
Lithium, total	0.0502	0.00010 mg/L	0.0400	0.00335	117	70-130			
Magnesium, total	27.6	0.010 mg/L	4.00	23.7	98	70-130			
Manganese, total	0.0479	0.00020 mg/L	0.0400	0.00232	114	70-130			
Molybdenum, total	0.0486	0.00010 mg/L	0.0400	0.00179	117	70-130			
Nickel, total	0.0451	0.00040 mg/L	0.0400	< 0.00040	112	70-130			
Phosphorus, total	4.80	0.050 mg/L	4.00	< 0.050	119	70-130			
Potassium, total	5.18	0.10 mg/L	4.00	0.41	119	70-130			
Selenium, total	0.466	0.00050 mg/L	0.400	< 0.00050	116	70-130			
Silicon, total	7.7	1.0 mg/L	4.00	2.6	127	70-130			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413615
2024-10-09 09:24

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B4J1763, Continued									
Matrix Spike (B4J1763-MS1), Continued		Source: 2413615-01		Prepared: 2024-10-02, Analyzed: 2024-10-03					
Silver, total	0.0309	0.000050 mg/L	0.0400	< 0.000050	77	70-130			
Sodium, total	5.77	0.10 mg/L	4.00	1.68	102	70-130			
Strontium, total	1.68	0.0010 mg/L	0.0400	1.82	NR	70-130			MS2
Sulfur, total	122	3.0 mg/L	40.0	69.0	133	70-130			MS2
Tellurium, total	0.0432	0.00050 mg/L	0.0400	< 0.00050	108	70-130			
Thallium, total	0.0465	0.000020 mg/L	0.0400	< 0.000020	116	70-130			
Thorium, total	0.0451	0.00010 mg/L	0.0400	< 0.00010	113	70-130			
Tin, total	0.0456	0.00020 mg/L	0.0400	< 0.00020	114	70-130			
Titanium, total	0.0462	0.0050 mg/L	0.0400	< 0.0050	115	70-130			
Tungsten, total	0.0459	0.0010 mg/L	0.0400	< 0.0010	115	70-130			
Uranium, total	0.0462	0.000020 mg/L	0.0400	0.000429	114	70-130			
Vanadium, total	0.0461	0.0050 mg/L	0.0400	< 0.0050	115	70-130			
Zinc, total	0.444	0.0040 mg/L	0.400	0.0068	109	70-130			
Zirconium, total	0.0441	0.00010 mg/L	0.0400	< 0.00010	110	70-130			

Total Metals, Batch B4J1839

Blank (B4J1839-BLK1)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK2)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK3)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK4)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK5)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	< 0.000010	0.000010 mg/L							
LCS (B4J1839-BS1)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	0.00231	0.000010 mg/L	0.00250		93	80-120			
LCS (B4J1839-BS2)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	0.00242	0.000010 mg/L	0.00250		97	80-120			
LCS (B4J1839-BS3)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	0.00231	0.000010 mg/L	0.00250		92	80-120			
LCS (B4J1839-BS4)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	0.00216	0.000010 mg/L	0.00250		86	80-120			
LCS (B4J1839-BS5)		Prepared: 2024-10-03, Analyzed: 2024-10-03							
Mercury, total	0.00238	0.000010 mg/L	0.00250		95	80-120			
Matrix Spike (B4J1839-MS4)		Source: 2413615-01		Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	0.00198	0.000010 mg/L	0.00250	< 0.000010	79	70-130			

QC Qualifiers:

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

CERTIFICATE OF ANALYSIS

REPORTED TO Elk River Alliance
PO Box 2095, 1111 2nd Ave
Fernie, BC V0B1M0

ATTENTION Fynley Kujit

PO NUMBER

PROJECT CBWM-2024

PROJECT INFO

WORK ORDER 2413599

RECEIVED / TEMP 2024-09-26 09:00 / 8.5°C

REPORTED 2024-10-15 14:43

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



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.

We've Got Chemistry



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.

Ahead of the Curve



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>

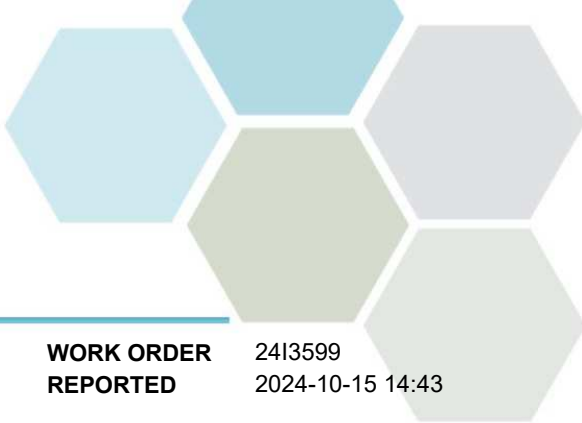
If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

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

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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L1Z003-20240924-0807 (2413599-01) | Matrix: Water | Sampled: 2024-09-24 08:07

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-28	
Chloride	0.33	AO ≤ 250	0.10	mg/L	2024-09-28	
Fluoride	0.22	MAC = 1.5	0.10	mg/L	2024-09-28	
Nitrate (as N)	0.052	MAC = 10	0.010	mg/L	2024-09-28	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-28	HT1
Sulfate	259	AO ≤ 500	1.0	mg/L	2024-09-28	

BCMOE Aggregate Hydrocarbons

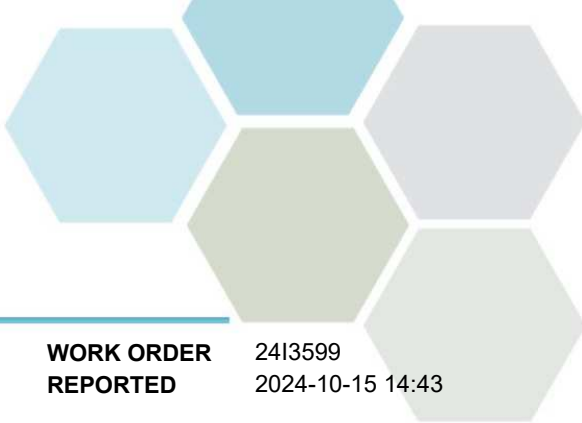
EPHw10-19	< 250	N/A	250	µg/L	2024-10-03	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-03	
Surrogate: 2-Methylnonane (EPH/F2-4)	86		60-140	%	2024-10-03	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	369	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0525	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.138	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Barium, dissolved	0.0760	N/A	0.0050	mg/L	2024-10-03	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-10-03	
Cadmium, dissolved	0.000016	N/A	0.000010	mg/L	2024-10-03	
Calcium, dissolved	107	N/A	0.20	mg/L	2024-10-03	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-10-03	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Lithium, dissolved	0.00398	N/A	0.00010	mg/L	2024-10-03	
Magnesium, dissolved	24.7	N/A	0.010	mg/L	2024-10-03	
Manganese, dissolved	0.00244	N/A	0.00020	mg/L	2024-10-03	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-03	
Molybdenum, dissolved	0.00166	N/A	0.00010	mg/L	2024-10-03	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-10-03	
Potassium, dissolved	0.45	N/A	0.10	mg/L	2024-10-03	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Silicon, dissolved	2.9	N/A	1.0	mg/L	2024-10-03	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-03	
Sodium, dissolved	1.83	N/A	0.10	mg/L	2024-10-03	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	Guideline	RL Units	Analyzed	Qualifier
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L1Z003-20240924-0807 (2413599-01) | Matrix: Water | Sampled: 2024-09-24 08:07, Continued

Dissolved Metals, Continued

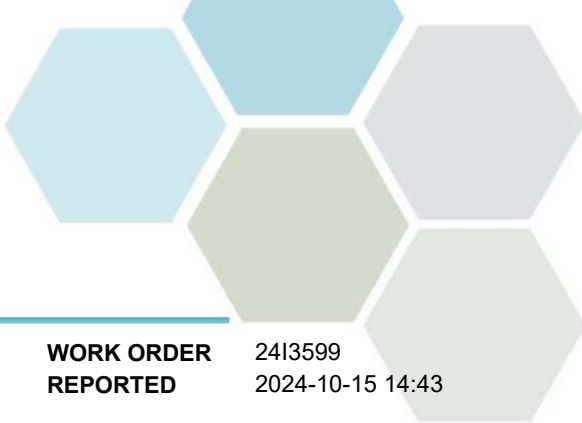
Strontium, dissolved	1.77	N/A	0.0010 mg/L	2024-10-03	
Sulfur, dissolved	75.1	N/A	3.0 mg/L	2024-10-03	
Tellurium, dissolved	< 0.00050	N/A	0.00050 mg/L	2024-10-03	
Thallium, dissolved	< 0.000020	N/A	0.000020 mg/L	2024-10-03	
Thorium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Tin, dissolved	< 0.00020	N/A	0.00020 mg/L	2024-10-03	
Titanium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-10-03	
Tungsten, dissolved	< 0.0010	N/A	0.0010 mg/L	2024-10-03	
Uranium, dissolved	0.000345	N/A	0.000020 mg/L	2024-10-03	
Vanadium, dissolved	< 0.0050	N/A	0.0050 mg/L	2024-10-03	
Zinc, dissolved	0.0048	N/A	0.0040 mg/L	2024-10-03	
Zirconium, dissolved	< 0.00010	N/A	0.00010 mg/L	2024-10-03	

General Parameters

Alkalinity, Total (as CaCO3)	139	N/A	1.0 mg/L	2024-10-01	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-10-01	
Alkalinity, Bicarbonate (as CaCO3)	139	N/A	1.0 mg/L	2024-10-01	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-10-01	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0 mg/L	2024-10-01	
Ammonia, Total (as N)	< 0.050	None Required	0.050 mg/L	2024-10-02	
BOD, 5-day	< 5.6	N/A	2.0 mg/L	2024-10-02	
Carbon, Total Organic	0.66	N/A	0.50 mg/L	2024-10-01	
Carbon, Dissolved Organic	0.52	N/A	0.50 mg/L	2024-10-01	
Chemical Oxygen Demand	< 20	N/A	20 mg/L	2024-10-03	
Nitrogen, Total Kjeldahl	0.086	N/A	0.050 mg/L	2024-10-04	
Phosphorus, Total (as P)	0.0373	N/A	0.0050 mg/L	2024-10-03	
Phosphorus, Dissolved Reactive	0.0120	N/A	0.0050 mg/L	2024-10-02	HT1
Solids, Total Suspended	< 2.0	N/A	2.0 mg/L	2024-10-04	HT1

Total Metals

Aluminum, total	0.0180	OG < 0.1	0.0050 mg/L	2024-10-03	
Antimony, total	< 0.00020	MAC = 0.006	0.00020 mg/L	2024-10-03	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050 mg/L	2024-10-03	
Barium, total	0.0802	MAC = 2	0.0050 mg/L	2024-10-03	
Beryllium, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Bismuth, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Boron, total	< 0.0500	MAC = 5	0.0500 mg/L	2024-10-03	
Cadmium, total	0.000021	MAC = 0.007	0.000010 mg/L	2024-10-03	
Calcium, total	99.9	None Required	0.20 mg/L	2024-10-03	
Chromium, total	< 0.00050	MAC = 0.05	0.00050 mg/L	2024-10-03	
Cobalt, total	< 0.00010	N/A	0.00010 mg/L	2024-10-03	
Copper, total	< 0.00040	MAC = 2	0.00040 mg/L	2024-10-03	
Iron, total	0.049	AO ≤ 0.3	0.010 mg/L	2024-10-03	
Lead, total	< 0.00020	MAC = 0.005	0.00020 mg/L	2024-10-03	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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L1Z003-20240924-0807 (2413599-01) | Matrix: Water | Sampled: 2024-09-24 08:07, Continued

Total Metals, Continued

Lithium, total	0.00352	N/A	0.00010	mg/L	2024-10-03	
Magnesium, total	23.9	None Required	0.010	mg/L	2024-10-03	
Manganese, total	0.00328	MAC = 0.12	0.00020	mg/L	2024-10-03	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-03	
Molybdenum, total	0.00183	N/A	0.00010	mg/L	2024-10-03	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-03	
Potassium, total	0.44	N/A	0.10	mg/L	2024-10-03	
Selenium, total	0.00050	MAC = 0.05	0.00050	mg/L	2024-10-03	
Silicon, total	2.8	N/A	1.0	mg/L	2024-10-03	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-03	
Sodium, total	1.62	AO ≤ 200	0.10	mg/L	2024-10-03	
Strontium, total	1.82	MAC = 7	0.0010	mg/L	2024-10-03	
Sulfur, total	70.3	N/A	3.0	mg/L	2024-10-03	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-03	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-03	
Uranium, total	0.000420	MAC = 0.02	0.000020	mg/L	2024-10-03	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Zinc, total	0.0060	AO ≤ 5	0.0040	mg/L	2024-10-03	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	

L1Z2009_20240924_1033 (2413599-02) | Matrix: Water | Sampled: 2024-09-24 10:33

Anions

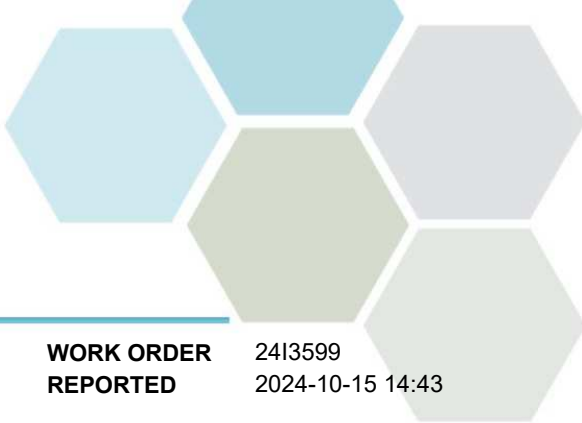
Bromide	< 0.10	N/A	0.10	mg/L	2024-09-28	
Chloride	0.39	AO ≤ 250	0.10	mg/L	2024-09-28	
Fluoride	0.28	MAC = 1.5	0.10	mg/L	2024-09-28	
Nitrate (as N)	0.023	MAC = 10	0.010	mg/L	2024-09-28	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-28	HT1
Sulfate	260	AO ≤ 500	1.0	mg/L	2024-09-28	

BCMOE Aggregate Hydrocarbons

EPHw10-19	< 250	N/A	250	µg/L	2024-10-03	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-03	
Surrogate: 2-Methylnonane (EPH/F2-4)	90		60-140	%	2024-10-03	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	369	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0226	N/A	0.0100	mg/L	N/A	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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L1Z2009_20240924_1033 (2413599-02) | Matrix: Water | Sampled: 2024-09-24 10:33, Continued

Calculated Parameters, Continued

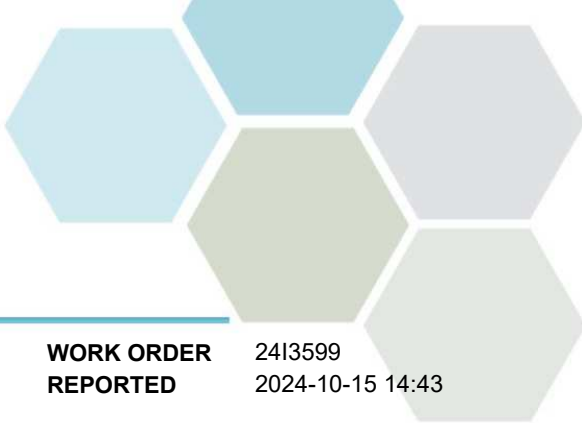
Nitrogen, Total	0.0896	N/A	0.0500	mg/L	N/A	
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Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Barium, dissolved	0.0835	N/A	0.0050	mg/L	2024-10-03	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-10-03	
Cadmium, dissolved	0.000015	N/A	0.000010	mg/L	2024-10-03	
Calcium, dissolved	106	N/A	0.20	mg/L	2024-10-03	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-10-03	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Lithium, dissolved	0.00391	N/A	0.00010	mg/L	2024-10-03	
Magnesium, dissolved	25.2	N/A	0.010	mg/L	2024-10-03	
Manganese, dissolved	0.00159	N/A	0.00020	mg/L	2024-10-03	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-03	
Molybdenum, dissolved	0.00166	N/A	0.00010	mg/L	2024-10-03	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-10-03	
Potassium, dissolved	0.45	N/A	0.10	mg/L	2024-10-03	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Silicon, dissolved	2.9	N/A	1.0	mg/L	2024-10-03	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-10-03	
Sodium, dissolved	1.80	N/A	0.10	mg/L	2024-10-03	
Strontium, dissolved	1.71	N/A	0.0010	mg/L	2024-10-03	
Sulfur, dissolved	76.6	N/A	3.0	mg/L	2024-10-03	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-10-03	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-10-03	
Uranium, dissolved	0.000351	N/A	0.000020	mg/L	2024-10-03	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-10-03	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-03	

General Parameters

Alkalinity, Total (as CaCO3)	137	N/A	1.0	mg/L	2024-10-01	
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TEST RESULTS

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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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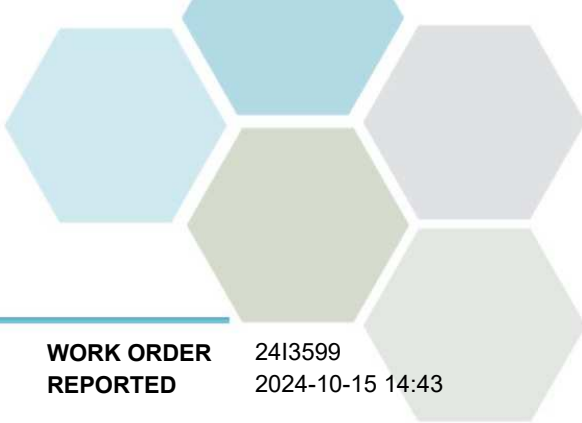
L1Z2009_20240924_1033 (2413599-02) | Matrix: Water | Sampled: 2024-09-24 10:33, Continued

General Parameters, Continued

Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Bicarbonate (as CaCO3)	137	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-02	
BOD, 5-day	< 5.6	N/A	2.0	mg/L	2024-10-02	
Carbon, Total Organic	1.10	N/A	0.50	mg/L	2024-10-01	
Carbon, Dissolved Organic	0.75	N/A	0.50	mg/L	2024-10-01	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2024-10-03	
Nitrogen, Total Kjeldahl	0.067	N/A	0.050	mg/L	2024-10-04	
Phosphorus, Total (as P)	0.0221	N/A	0.0050	mg/L	2024-10-03	
Phosphorus, Dissolved Reactive	0.0190	N/A	0.0050	mg/L	2024-10-02	HT1
Solids, Total Suspended	2.0	N/A	2.0	mg/L	2024-10-04	HT1

Total Metals

Aluminum, total	0.0191	OG < 0.1	0.0050	mg/L	2024-10-03	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-10-03	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-10-03	
Barium, total	0.0837	MAC = 2	0.0050	mg/L	2024-10-03	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2024-10-03	
Cadmium, total	0.000022	MAC = 0.007	0.000010	mg/L	2024-10-03	
Calcium, total	102	None Required	0.20	mg/L	2024-10-03	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-03	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2024-10-03	
Iron, total	0.022	AO ≤ 0.3	0.010	mg/L	2024-10-03	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-10-03	
Lithium, total	0.00342	N/A	0.00010	mg/L	2024-10-03	
Magnesium, total	23.7	None Required	0.010	mg/L	2024-10-03	
Manganese, total	0.00247	MAC = 0.12	0.00020	mg/L	2024-10-03	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-03	
Molybdenum, total	0.00187	N/A	0.00010	mg/L	2024-10-03	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-03	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-03	
Potassium, total	0.46	N/A	0.10	mg/L	2024-10-03	
Selenium, total	0.00050	MAC = 0.05	0.00050	mg/L	2024-10-03	
Silicon, total	2.6	N/A	1.0	mg/L	2024-10-03	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-03	
Sodium, total	1.62	AO ≤ 200	0.10	mg/L	2024-10-03	
Strontium, total	1.73	MAC = 7	0.0010	mg/L	2024-10-03	
Sulfur, total	70.1	N/A	3.0	mg/L	2024-10-03	



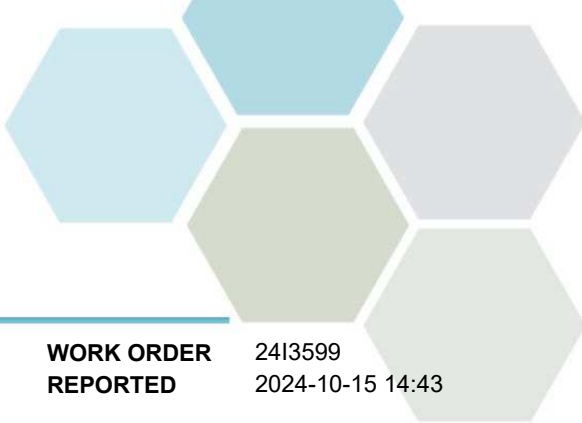
TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
L1Z2009_20240924_1033 (2413599-02) Matrix: Water Sampled: 2024-09-24 10:33, Continued						
<i>Total Metals, Continued</i>						
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-03	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-03	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-03	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-03	
Uranium, total	0.000428	MAC = 0.02	0.000020	mg/L	2024-10-03	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-03	
Zinc, total	0.0057	AO ≤ 5	0.0040	mg/L	2024-10-03	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-03	

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



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Elk River Alliance
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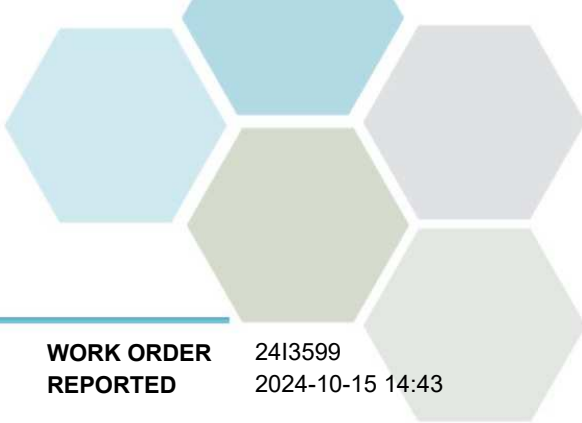
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Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2021)	Titration with H2SO4	✓	Kelowna
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	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
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	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, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	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



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO Elk River Alliance
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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

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 not 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.



APPENDIX 2: QUALITY CONTROL RESULTS

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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
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Anions, Batch B4I4392

Blank (B4I4392-BLK2)			Prepared: 2024-09-28, Analyzed: 2024-09-28						
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							
Sulfate	< 1.0	1.0 mg/L							

LCS (B4I4392-BS1)			Prepared: 2024-09-28, Analyzed: 2024-09-28						
Bromide	4.16	0.10 mg/L	4.00		104	85-115			
Chloride	16.1	0.10 mg/L	16.0		100	90-110			
Fluoride	3.79	0.10 mg/L	4.00		95	88-108			
Nitrate (as N)	3.95	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)	2.10	0.010 mg/L	2.00		105	85-115			
Sulfate	16.2	1.0 mg/L	16.0		101	90-110			

LCS (B4I4392-BS2)			Prepared: 2024-09-28, Analyzed: 2024-09-28						
Bromide	4.09	0.10 mg/L	4.00		102	85-115			
Chloride	16.0	0.10 mg/L	16.0		100	90-110			
Fluoride	3.99	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)	3.97	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)	2.04	0.010 mg/L	2.00		102	85-115			
Sulfate	16.2	1.0 mg/L	16.0		101	90-110			

BCMOE Aggregate Hydrocarbons, Batch B4J1757

Blank (B4J1757-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
EPHw10-19	< 250	250 µg/L							
EPHw19-32	< 250	250 µg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	2230	µg/L	2490		90	60-140			

LCS (B4J1757-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
EPHw10-19	17100	250 µg/L	17400		99	70-130			
EPHw19-32	20100	250 µg/L	24800		81	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1650	µg/L	2490		66	60-140			



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
BCMOE Aggregate Hydrocarbons, Batch B4J1757, Continued									
LCS Dup (B4J1757-BSD2)					Prepared: 2024-10-02, Analyzed: 2024-10-03				
EPHw10-19	18600	250 µg/L	17400		107	70-130	8	20	
EPHw19-32	21700	250 µg/L	24800		87	70-130	8	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1550	µg/L	2490		62	60-140			

Dissolved Metals, Batch B4J1778

Blank (B4J1778-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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 (B4J1778-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Aluminum, dissolved	4.03	0.0050 mg/L	4.00		101	80-120			
Antimony, dissolved	0.0405	0.00020 mg/L	0.0400		101	80-120			
Arsenic, dissolved	0.400	0.00050 mg/L	0.400		100	80-120			
Barium, dissolved	0.0412	0.0050 mg/L	0.0400		103	80-120			
Beryllium, dissolved	0.0391	0.00010 mg/L	0.0400		98	80-120			
Bismuth, dissolved	0.0398	0.00010 mg/L	0.0400		100	80-120			
Boron, dissolved	0.394	0.0500 mg/L	0.400		98	80-120			
Cadmium, dissolved	0.0409	0.000010 mg/L	0.0400		102	80-120			
Calcium, dissolved	4.07	0.20 mg/L	4.00		102	80-120			
Chromium, dissolved	0.0399	0.00050 mg/L	0.0400		100	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B4J1778, Continued

LCS (B4J1778-BS1), Continued

Prepared: 2024-10-03, Analyzed: 2024-10-03

Cobalt, dissolved	0.0405	0.00010 mg/L	0.0400		101	80-120			
Copper, dissolved	0.0405	0.00040 mg/L	0.0400		101	80-120			
Iron, dissolved	4.03	0.010 mg/L	4.00		101	80-120			
Lead, dissolved	0.0413	0.00020 mg/L	0.0400		103	80-120			
Lithium, dissolved	0.0394	0.00010 mg/L	0.0400		98	80-120			
Magnesium, dissolved	4.03	0.010 mg/L	4.00		101	80-120			
Manganese, dissolved	0.0406	0.00020 mg/L	0.0400		101	80-120			
Molybdenum, dissolved	0.0409	0.00010 mg/L	0.0400		102	80-120			
Nickel, dissolved	0.0405	0.00040 mg/L	0.0400		101	80-120			
Phosphorus, dissolved	4.04	0.050 mg/L	4.00		101	80-120			
Potassium, dissolved	3.99	0.10 mg/L	4.00		100	80-120			
Selenium, dissolved	0.397	0.00050 mg/L	0.400		99	80-120			
Silicon, dissolved	4.0	1.0 mg/L	4.00		99	80-120			
Silver, dissolved	0.0406	0.000050 mg/L	0.0400		101	80-120			
Sodium, dissolved	4.05	0.10 mg/L	4.00		101	80-120			
Strontium, dissolved	0.0409	0.0010 mg/L	0.0400		102	80-120			
Sulfur, dissolved	40.5	3.0 mg/L	40.0		101	80-120			
Tellurium, dissolved	0.0409	0.00050 mg/L	0.0400		102	80-120			
Thallium, dissolved	0.0405	0.000020 mg/L	0.0400		101	80-120			
Thorium, dissolved	0.0411	0.00010 mg/L	0.0400		103	80-120			
Tin, dissolved	0.0418	0.00020 mg/L	0.0400		104	80-120			
Titanium, dissolved	0.0398	0.0050 mg/L	0.0400		99	80-120			
Tungsten, dissolved	0.0406	0.0010 mg/L	0.0400		102	80-120			
Uranium, dissolved	0.0414	0.000020 mg/L	0.0400		104	80-120			
Vanadium, dissolved	0.0403	0.0050 mg/L	0.0400		101	80-120			
Zinc, dissolved	0.405	0.0040 mg/L	0.400		101	80-120			
Zirconium, dissolved	0.0410	0.00010 mg/L	0.0400		102	80-120			

Dissolved Metals, Batch B4J1786

Blank (B4J1786-BLK1)

Prepared: 2024-10-03, Analyzed: 2024-10-03

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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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							



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B4J1786, Continued

Blank (B4J1786-BLK1), Continued

Prepared: 2024-10-03, Analyzed: 2024-10-03

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 (B4J1786-BS1)

Prepared: 2024-10-03, Analyzed: 2024-10-03

Aluminum, dissolved	4.04	0.0050 mg/L	4.00		101	80-120			
Antimony, dissolved	0.0398	0.00020 mg/L	0.0400		99	80-120			
Arsenic, dissolved	0.404	0.00050 mg/L	0.400		101	80-120			
Barium, dissolved	0.0404	0.0050 mg/L	0.0400		101	80-120			
Beryllium, dissolved	0.0391	0.00010 mg/L	0.0400		98	80-120			
Bismuth, dissolved	0.0397	0.00010 mg/L	0.0400		99	80-120			
Boron, dissolved	0.405	0.0500 mg/L	0.400		101	80-120			
Cadmium, dissolved	0.0403	0.000010 mg/L	0.0400		101	80-120			
Calcium, dissolved	3.99	0.20 mg/L	4.00		100	80-120			
Chromium, dissolved	0.0403	0.00050 mg/L	0.0400		101	80-120			
Cobalt, dissolved	0.0404	0.00010 mg/L	0.0400		101	80-120			
Copper, dissolved	0.0401	0.00040 mg/L	0.0400		100	80-120			
Iron, dissolved	4.07	0.010 mg/L	4.00		102	80-120			
Lead, dissolved	0.0405	0.00020 mg/L	0.0400		101	80-120			
Lithium, dissolved	0.0397	0.00010 mg/L	0.0400		99	80-120			
Magnesium, dissolved	4.20	0.010 mg/L	4.00		105	80-120			
Manganese, dissolved	0.0406	0.00020 mg/L	0.0400		102	80-120			
Molybdenum, dissolved	0.0414	0.00010 mg/L	0.0400		103	80-120			
Nickel, dissolved	0.0403	0.00040 mg/L	0.0400		101	80-120			
Phosphorus, dissolved	4.05	0.050 mg/L	4.00		101	80-120			
Potassium, dissolved	4.08	0.10 mg/L	4.00		102	80-120			
Selenium, dissolved	0.403	0.00050 mg/L	0.400		101	80-120			
Silicon, dissolved	4.0	1.0 mg/L	4.00		99	80-120			
Silver, dissolved	0.0399	0.000050 mg/L	0.0400		100	80-120			
Sodium, dissolved	4.02	0.10 mg/L	4.00		100	80-120			
Strontium, dissolved	0.0409	0.0010 mg/L	0.0400		102	80-120			
Sulfur, dissolved	40.9	3.0 mg/L	40.0		102	80-120			
Tellurium, dissolved	0.0401	0.00050 mg/L	0.0400		100	80-120			
Thallium, dissolved	0.0407	0.000020 mg/L	0.0400		102	80-120			
Thorium, dissolved	0.0424	0.00010 mg/L	0.0400		106	80-120			
Tin, dissolved	0.0407	0.00020 mg/L	0.0400		102	80-120			
Titanium, dissolved	0.0400	0.0050 mg/L	0.0400		100	80-120			
Tungsten, dissolved	0.0417	0.0010 mg/L	0.0400		104	80-120			
Uranium, dissolved	0.0412	0.000020 mg/L	0.0400		103	80-120			
Vanadium, dissolved	0.0403	0.0050 mg/L	0.0400		101	80-120			
Zinc, dissolved	0.408	0.0040 mg/L	0.400		102	80-120			
Zirconium, dissolved	0.0403	0.00010 mg/L	0.0400		101	80-120			

Dissolved Metals, Batch B4J1839

Blank (B4J1839-BLK1)

Prepared: 2024-10-03, Analyzed: 2024-10-03

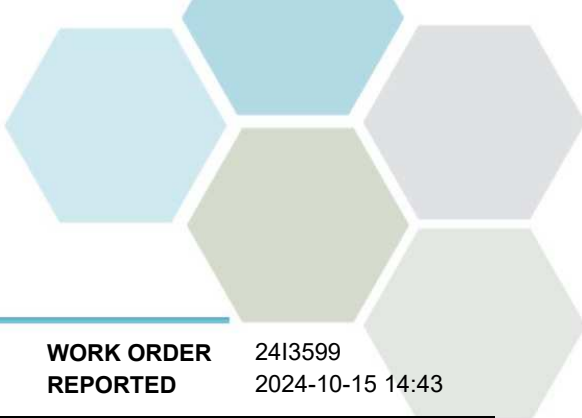
Mercury, dissolved	< 0.000010	0.000010 mg/L							
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APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413599 2024-10-15 14:43
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B4J1839, Continued									
Blank (B4J1839-BLK2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK3)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK4)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK5)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	< 0.000010	0.000010 mg/L							
LCS (B4J1839-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	0.00231	0.000010 mg/L	0.00250		93	80-120			
LCS (B4J1839-BS2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	0.00242	0.000010 mg/L	0.00250		97	80-120			
LCS (B4J1839-BS3)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	0.00231	0.000010 mg/L	0.00250		92	80-120			
LCS (B4J1839-BS4)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	0.00216	0.000010 mg/L	0.00250		86	80-120			
LCS (B4J1839-BS5)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Mercury, dissolved	0.00238	0.000010 mg/L	0.00250		95	80-120			
Duplicate (B4J1839-DUP5)			Source: 2413599-02		Prepared: 2024-10-03, Analyzed: 2024-10-03				
Mercury, dissolved	< 0.000010	0.000010 mg/L	< 0.000010					20	
Matrix Spike (B4J1839-MS2)			Source: 2413599-01		Prepared: 2024-10-03, Analyzed: 2024-10-03				
Mercury, dissolved	0.00187	0.000010 mg/L	0.00250	< 0.000010	75	70-130			
General Parameters, Batch B4I4312									
Blank (B4I4312-BLK1)			Prepared: 2024-09-27, Analyzed: 2024-10-02						
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B4I4312-BS1)			Prepared: 2024-09-27, Analyzed: 2024-10-02						
BOD, 5-day	197	46.7 mg/L	198		99	85-115			
Duplicate (B4I4312-DUP2)			Source: 2413599-01		Prepared: 2024-09-27, Analyzed: 2024-10-02				
BOD, 5-day	< 5.6	2.0 mg/L	< 5.6					22	
General Parameters, Batch B4I4369									
Blank (B4I4369-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I4369-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B4I4369-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	9.21	0.50 mg/L	10.0		92	78-116			
Carbon, Dissolved Organic	9.01	0.50 mg/L	10.0		90	78-116			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4I4369, Continued

LCS (B4I4369-BS2)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Carbon, Total Organic	9.04	0.50 mg/L	10.0		90	78-116			
Carbon, Dissolved Organic	9.12	0.50 mg/L	10.0		91	78-116			

General Parameters, Batch B4J1588

Blank (B4J1588-BLK1)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

Blank (B4J1588-BLK2)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

Blank (B4J1588-BLK3)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

LCS (B4J1588-BS1)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Alkalinity, Total (as CaCO3)	95.8	1.0 mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.9	1.0 mg/L	50.0		90	0-200			

LCS (B4J1588-BS3)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Alkalinity, Total (as CaCO3)	95.0	1.0 mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	45.7	1.0 mg/L	50.0		91	0-200			

LCS (B4J1588-BS5)

Prepared: 2024-10-01, Analyzed: 2024-10-01

Alkalinity, Total (as CaCO3)	95.7	1.0 mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.4	1.0 mg/L	50.0		87	0-200			

General Parameters, Batch B4J1596

Blank (B4J1596-BLK1)

Prepared: 2024-10-01, Analyzed: 2024-10-02

Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
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Blank (B4J1596-BLK2)

Prepared: 2024-10-01, Analyzed: 2024-10-02

Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							
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LCS (B4J1596-BS1)

Prepared: 2024-10-01, Analyzed: 2024-10-02

Phosphorus, Dissolved Reactive	0.0960	0.0050 mg/L	0.100		96	84-115			
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LCS (B4J1596-BS2)

Prepared: 2024-10-01, Analyzed: 2024-10-02

Phosphorus, Dissolved Reactive	0.0950	0.0050 mg/L	0.100		95	84-115			
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General Parameters, Batch B4J1632

Blank (B4J1632-BLK1)

Prepared: 2024-10-02, Analyzed: 2024-10-02

Ammonia, Total (as N)	< 0.050	0.050 mg/L							
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APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413599 2024-10-15 14:43
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4J1632, Continued

Blank (B4J1632-BLK2)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK4)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK5)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1632-BLK6)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B4J1632-BS1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	1.07	0.050 mg/L	1.00	107	85-115				
LCS (B4J1632-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	1.06	0.050 mg/L	1.00	106	85-115				
LCS (B4J1632-BS3)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.971	0.050 mg/L	1.00	97	85-115				
LCS (B4J1632-BS4)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.986	0.050 mg/L	1.00	99	85-115				
LCS (B4J1632-BS5)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.974	0.050 mg/L	1.00	97	85-115				
LCS (B4J1632-BS6)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Ammonia, Total (as N)	0.947	0.050 mg/L	1.00	95	85-115				

General Parameters, Batch B4J1654

Blank (B4J1654-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	< 20	20 mg/L							
Blank (B4J1654-BLK2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B4J1654-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	504	20 mg/L	500	101	89-115				
LCS (B4J1654-BS2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	503	20 mg/L	500	101	89-115				

General Parameters, Batch B4J1813

Blank (B4J1813-BLK2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4J1813-BLK3)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B4J1813-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Phosphorus, Total (as P)	0.102	0.0050 mg/L	0.100	102	85-115				



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413599 2024-10-15 14:43
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4J1813, Continued

LCS (B4J1813-BS3) Prepared: 2024-10-02, Analyzed: 2024-10-03

Phosphorus, Total (as P)	0.0908	0.0050 mg/L	0.100		91	85-115			
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General Parameters, Batch B4J1851

Blank (B4J1851-BLK1) Prepared: 2024-10-03, Analyzed: 2024-10-04

Solids, Total Suspended	< 2.0	2.0 mg/L							
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LCS (B4J1851-BS1) Prepared: 2024-10-03, Analyzed: 2024-10-04

Solids, Total Suspended	114	5.3 mg/L	100		114	85-115			
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General Parameters, Batch B4J1913

Blank (B4J1913-BLK1) Prepared: 2024-10-03, Analyzed: 2024-10-04

Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
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Blank (B4J1913-BLK2) Prepared: 2024-10-03, Analyzed: 2024-10-04

Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
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Blank (B4J1913-BLK3) Prepared: 2024-10-03, Analyzed: 2024-10-04

Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
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LCS (B4J1913-BS1) Prepared: 2024-10-03, Analyzed: 2024-10-04

Nitrogen, Total Kjeldahl	0.974	0.050 mg/L	1.00		97	85-115			
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LCS (B4J1913-BS2) Prepared: 2024-10-03, Analyzed: 2024-10-04

Nitrogen, Total Kjeldahl	0.993	0.050 mg/L	1.00		99	85-115			
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LCS (B4J1913-BS3) Prepared: 2024-10-03, Analyzed: 2024-10-04

Nitrogen, Total Kjeldahl	0.999	0.050 mg/L	1.00		100	85-115			
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General Parameters, Batch B4J1944

Blank (B4J1944-BLK1) Prepared: 2024-10-03, Analyzed: 2024-10-04

Solids, Total Suspended	< 2.0	2.0 mg/L							
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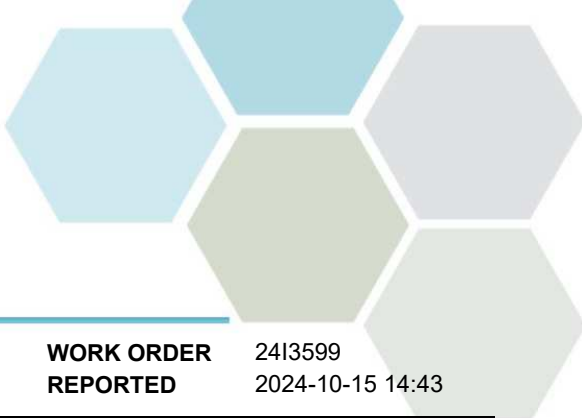
LCS (B4J1944-BS1) Prepared: 2024-10-03, Analyzed: 2024-10-04

Solids, Total Suspended	93.0	5.0 mg/L	100		93	85-115			
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Total Metals, Batch B4J1763

Blank (B4J1763-BLK1) Prepared: 2024-10-02, Analyzed: 2024-10-03

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							



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413599
2024-10-15 14:43

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4J1763, Continued

Blank (B4J1763-BLK1), Continued

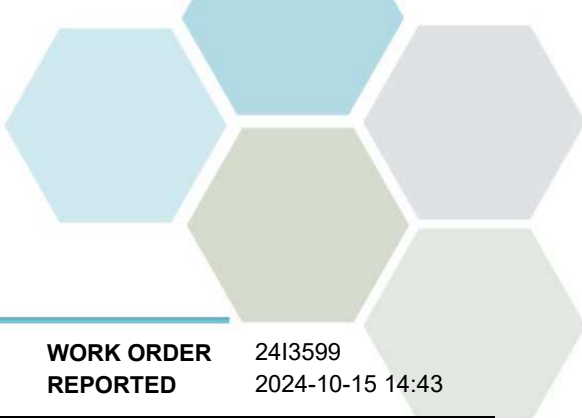
Prepared: 2024-10-02, Analyzed: 2024-10-03

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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							

LCS (B4J1763-BS1)

Prepared: 2024-10-02, Analyzed: 2024-10-03

Aluminum, total	4.03	0.0050 mg/L	4.00		101	80-120			
Antimony, total	0.0386	0.00020 mg/L	0.0400		96	80-120			
Arsenic, total	0.391	0.00050 mg/L	0.400		98	80-120			
Barium, total	0.0396	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0345	0.00010 mg/L	0.0400		86	80-120			
Bismuth, total	0.0392	0.00010 mg/L	0.0400		98	80-120			
Boron, total	0.412	0.0500 mg/L	0.400		103	80-120			
Cadmium, total	0.0390	0.000010 mg/L	0.0400		98	80-120			
Calcium, total	4.03	0.20 mg/L	4.00		101	80-120			
Chromium, total	0.0402	0.00050 mg/L	0.0400		100	80-120			
Cobalt, total	0.0396	0.00010 mg/L	0.0400		99	80-120			
Copper, total	0.0391	0.00040 mg/L	0.0400		98	80-120			
Iron, total	3.95	0.010 mg/L	4.00		99	80-120			
Lead, total	0.0396	0.00020 mg/L	0.0400		99	80-120			
Lithium, total	0.0378	0.00010 mg/L	0.0400		95	80-120			
Magnesium, total	4.03	0.010 mg/L	4.00		101	80-120			
Manganese, total	0.0403	0.00020 mg/L	0.0400		101	80-120			
Molybdenum, total	0.0398	0.00010 mg/L	0.0400		99	80-120			
Nickel, total	0.0399	0.00040 mg/L	0.0400		100	80-120			
Phosphorus, total	4.00	0.050 mg/L	4.00		100	80-120			
Potassium, total	3.95	0.10 mg/L	4.00		99	80-120			
Selenium, total	0.380	0.00050 mg/L	0.400		95	80-120			
Silicon, total	3.8	1.0 mg/L	4.00		95	80-120			
Silver, total	0.0387	0.000050 mg/L	0.0400		97	80-120			
Sodium, total	3.89	0.10 mg/L	4.00		97	80-120			
Strontium, total	0.0403	0.0010 mg/L	0.0400		101	80-120			
Sulfur, total	38.2	3.0 mg/L	40.0		96	80-120			
Tellurium, total	0.0371	0.00050 mg/L	0.0400		93	80-120			
Thallium, total	0.0397	0.000020 mg/L	0.0400		99	80-120			
Thorium, total	0.0402	0.00010 mg/L	0.0400		100	80-120			
Tin, total	0.0391	0.00020 mg/L	0.0400		98	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Elk River Alliance CBWM-2024	WORK ORDER REPORTED	2413599 2024-10-15 14:43
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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B4J1763, Continued

LCS (B4J1763-BS1), Continued				Prepared: 2024-10-02, Analyzed: 2024-10-03					
Titanium, total	0.0398	0.0050 mg/L	0.0400		100	80-120			
Tungsten, total	0.0397	0.0010 mg/L	0.0400		99	80-120			
Uranium, total	0.0393	0.000020 mg/L	0.0400		98	80-120			
Vanadium, total	0.0397	0.0050 mg/L	0.0400		99	80-120			
Zinc, total	0.392	0.0040 mg/L	0.400		98	80-120			
Zirconium, total	0.0396	0.00010 mg/L	0.0400		99	80-120			

Total Metals, Batch B4J1839

Blank (B4J1839-BLK1)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK2)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK3)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK4)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B4J1839-BLK5)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	< 0.000010	0.000010 mg/L							
LCS (B4J1839-BS1)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	0.00231	0.000010 mg/L	0.00250		93	80-120			
LCS (B4J1839-BS2)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	0.00242	0.000010 mg/L	0.00250		97	80-120			
LCS (B4J1839-BS3)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	0.00231	0.000010 mg/L	0.00250		92	80-120			
LCS (B4J1839-BS4)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	0.00216	0.000010 mg/L	0.00250		86	80-120			
LCS (B4J1839-BS5)				Prepared: 2024-10-03, Analyzed: 2024-10-03					
Mercury, total	0.00238	0.000010 mg/L	0.00250		95	80-120			

CERTIFICATE OF ANALYSIS

REPORTED TO Elk River Alliance
PO Box 2095, 1111 2nd Ave
Fernie, BC V0B1M0

ATTENTION Fynley Kujit

PO NUMBER

PROJECT CBWM-2024

PROJECT INFO

WORK ORDER 2413542

RECEIVED / TEMP 2024-09-25 14:30 / 15.9°C
REPORTED 2024-10-04 08:56

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



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.

We've Got Chemistry



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.

Ahead of the Curve



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.

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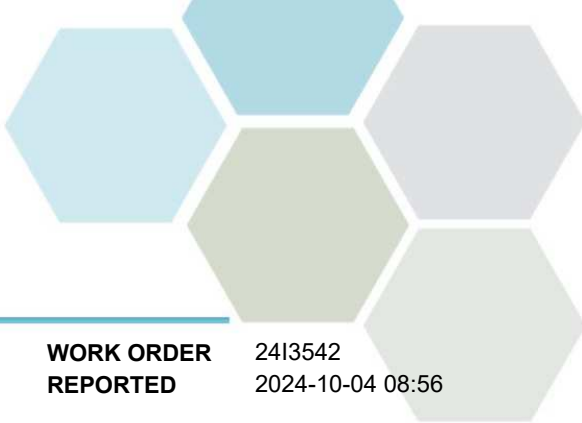
If you have any questions or concerns, please contact me at TeamCaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

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#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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MOR001_20240923_1150 (2413542-01) | Matrix: Water | Sampled: 2024-09-23 11:50

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-27	
Chloride	3.82	AO ≤ 250	0.10	mg/L	2024-09-27	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-27	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-09-27	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-27	HT1
Sulfate	8.6	AO ≤ 500	1.0	mg/L	2024-09-27	

BCMOE Aggregate Hydrocarbons

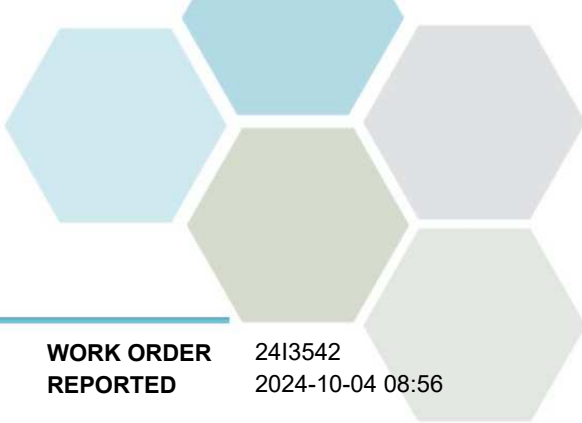
EPHw10-19	< 250	N/A	250	µg/L	2024-10-02	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-02	
Surrogate: 2-Methylnonane (EPH/F2-4)	101		60-140	%	2024-10-02	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	139	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	< 0.0500	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Barium, dissolved	0.174	N/A	0.0050	mg/L	2024-09-30	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-30	
Cadmium, dissolved	0.000023	N/A	0.000010	mg/L	2024-09-30	
Calcium, dissolved	40.1	N/A	0.20	mg/L	2024-09-30	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-30	
Iron, dissolved	0.012	N/A	0.010	mg/L	2024-09-30	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Lithium, dissolved	0.00386	N/A	0.00010	mg/L	2024-09-30	
Magnesium, dissolved	9.41	N/A	0.010	mg/L	2024-09-30	
Manganese, dissolved	0.00875	N/A	0.00020	mg/L	2024-09-30	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-01	
Molybdenum, dissolved	0.00070	N/A	0.00010	mg/L	2024-09-30	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-30	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-30	
Potassium, dissolved	0.65	N/A	0.10	mg/L	2024-09-30	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Silicon, dissolved	2.2	N/A	1.0	mg/L	2024-09-30	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-30	
Sodium, dissolved	2.37	N/A	0.10	mg/L	2024-09-30	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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MOR001_20240923_1150 (2413542-01) | Matrix: Water | Sampled: 2024-09-23 11:50, Continued

Dissolved Metals, Continued

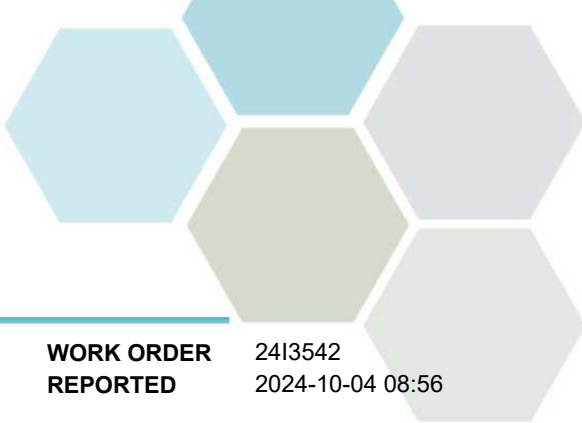
Strontium, dissolved	0.156	N/A	0.0010	mg/L	2024-09-30	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2024-09-30	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-30	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-30	
Uranium, dissolved	0.000324	N/A	0.000020	mg/L	2024-09-30	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-30	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	

General Parameters

Alkalinity, Total (as CaCO3)	122	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Bicarbonate (as CaCO3)	122	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Ammonia, Total (as N)	0.056	None Required	0.050	mg/L	2024-10-01	
BOD, 5-day	< 5.6	N/A	2.0	mg/L	2024-10-03	HT1
Carbon, Total Organic	1.58	N/A	0.50	mg/L	2024-10-01	
Carbon, Dissolved Organic	1.44	N/A	0.50	mg/L	2024-10-01	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2024-10-03	
Nitrogen, Total Kjeldahl	< 0.050	N/A	0.050	mg/L	2024-10-02	
Phosphorus, Total (as P)	< 0.0050	N/A	0.0050	mg/L	2024-10-02	
Solids, Total Suspended	< 2.4	N/A	2.0	mg/L	2024-10-02	HT1, RS2

Total Metals

Aluminum, total	0.0102	OG < 0.1	0.0050	mg/L	2024-10-01	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-10-01	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-10-01	
Barium, total	0.160	MAC = 2	0.0050	mg/L	2024-10-01	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2024-10-01	
Cadmium, total	0.000021	MAC = 0.007	0.000010	mg/L	2024-10-01	
Calcium, total	41.4	None Required	0.20	mg/L	2024-10-01	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-01	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2024-10-01	
Iron, total	0.022	AO ≤ 0.3	0.010	mg/L	2024-10-01	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-10-01	
Lithium, total	0.00362	N/A	0.00010	mg/L	2024-10-01	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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MOR001_20240923_1150 (2413542-01) | Matrix: Water | Sampled: 2024-09-23 11:50, Continued

Total Metals, Continued

Magnesium, total	8.84	None Required	0.010	mg/L	2024-10-01	
Manganese, total	0.0101	MAC = 0.12	0.00020	mg/L	2024-10-01	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-01	
Molybdenum, total	0.00071	N/A	0.00010	mg/L	2024-10-01	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-01	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-01	
Potassium, total	0.59	N/A	0.10	mg/L	2024-10-01	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-01	
Silicon, total	2.2	N/A	1.0	mg/L	2024-10-01	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-01	
Sodium, total	2.37	AO ≤ 200	0.10	mg/L	2024-10-01	
Strontium, total	0.147	MAC = 7	0.0010	mg/L	2024-10-01	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2024-10-01	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-01	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-01	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-01	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-01	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-01	
Uranium, total	0.000295	MAC = 0.02	0.000020	mg/L	2024-10-01	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-01	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2024-10-01	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	

FLD001_20240923_1159 (2413542-02) | Matrix: Water | Sampled: 2024-09-23 11:59

Anions

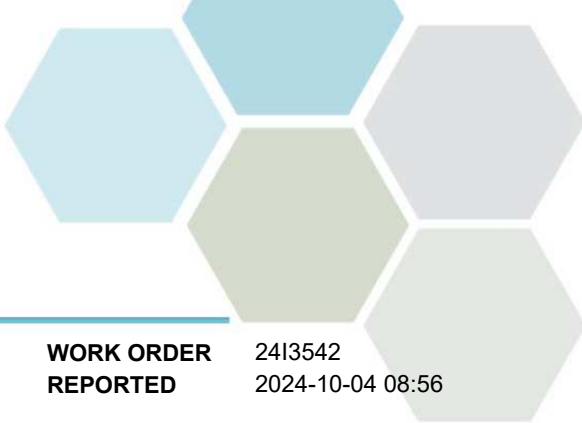
Bromide	< 0.10	N/A	0.10	mg/L	2024-09-27	
Chloride	< 0.10	AO ≤ 250	0.10	mg/L	2024-09-27	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-27	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-09-27	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-27	HT1
Sulfate	< 1.0	AO ≤ 500	1.0	mg/L	2024-09-27	

BCMOE Aggregate Hydrocarbons

EPHw10-19	< 250	N/A	250	µg/L	2024-10-02	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-02	
Surrogate: 2-Methylnonane (EPH/F2-4)	106		60-140	%	2024-10-02	

Calculated Parameters

Hardness, Dissolved (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	< 0.0500	N/A	0.0500	mg/L	N/A	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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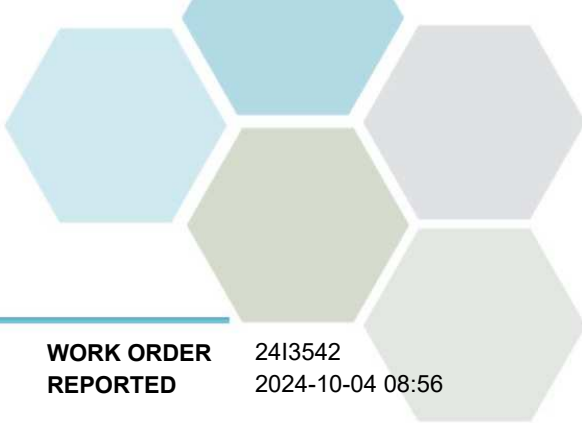
FLD001_20240923_1159 (2413542-02) | Matrix: Water | Sampled: 2024-09-23 11:59, Continued

Dissolved Metals

Aluminum, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Barium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-10-01	
Cadmium, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-09-30	
Calcium, dissolved	< 0.20	N/A	0.20	mg/L	2024-09-30	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-30	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-30	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Lithium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Magnesium, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-30	
Manganese, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Mercury, dissolved	< 0.000040	N/A	0.000040	mg/L	2024-09-30	HG1
Molybdenum, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-30	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-30	
Potassium, dissolved	< 0.10	N/A	0.10	mg/L	2024-09-30	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Silicon, dissolved	< 1.0	N/A	1.0	mg/L	2024-09-30	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-30	
Sodium, dissolved	< 0.10	N/A	0.10	mg/L	2024-09-30	
Strontium, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-30	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2024-09-30	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-30	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-30	
Uranium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-30	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Zinc, dissolved	< 0.0040	N/A	0.0040	mg/L	2024-09-30	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	

General Parameters

Alkalinity, Total (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
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WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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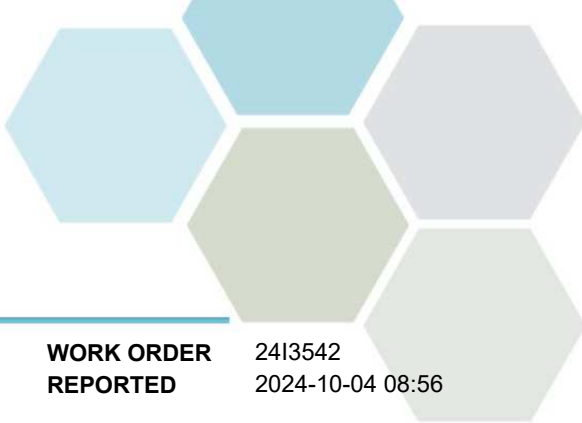
FLD001_20240923_1159 (2413542-02) | Matrix: Water | Sampled: 2024-09-23 11:59, Continued

General Parameters, Continued

Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-01	
BOD, 5-day	< 5.6	N/A	2.0	mg/L	2024-10-03	HT1
Carbon, Total Organic	< 0.50	N/A	0.50	mg/L	2024-10-01	
Carbon, Dissolved Organic	< 0.50	N/A	0.50	mg/L	2024-10-01	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2024-10-03	
Nitrogen, Total Kjeldahl	< 0.050	N/A	0.050	mg/L	2024-10-03	
Phosphorus, Total (as P)	0.0082	N/A	0.0050	mg/L	2024-10-02	
Phosphorus, Dissolved Reactive	0.0060	N/A	0.0050	mg/L	2024-10-02	HT1
Solids, Total Suspended	< 2.4	N/A	2.0	mg/L	2024-10-02	HT1, RS2

Total Metals

Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2024-10-01	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-10-01	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-10-01	
Barium, total	< 0.0050	MAC = 2	0.0050	mg/L	2024-10-01	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2024-10-01	
Cadmium, total	< 0.000010	MAC = 0.007	0.000010	mg/L	2024-10-01	
Calcium, total	< 0.20	None Required	0.20	mg/L	2024-10-01	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-01	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Copper, total	0.00080	MAC = 2	0.00040	mg/L	2024-10-03	RE2
Iron, total	< 0.010	AO ≤ 0.3	0.010	mg/L	2024-10-01	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-10-01	
Lithium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Magnesium, total	< 0.010	None Required	0.010	mg/L	2024-10-01	
Manganese, total	< 0.00020	MAC = 0.12	0.00020	mg/L	2024-10-01	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-01	
Molybdenum, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-01	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-01	
Potassium, total	< 0.10	N/A	0.10	mg/L	2024-10-01	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-01	
Silicon, total	< 1.0	N/A	1.0	mg/L	2024-10-01	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-01	
Sodium, total	< 0.10	AO ≤ 200	0.10	mg/L	2024-10-01	
Strontium, total	< 0.0010	MAC = 7	0.0010	mg/L	2024-10-01	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2024-10-01	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-01	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-01	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
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WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
FLD001_20240923_1159 (2413542-02) Matrix: Water Sampled: 2024-09-23 11:59, Continued						
<i>Total Metals, Continued</i>						
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-01	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-01	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-01	
Uranium, total	< 0.000020	MAC = 0.02	0.000020	mg/L	2024-10-01	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-01	
Zinc, total	< 0.0040	AO ≤ 5	0.0040	mg/L	2024-10-01	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	

MOR002_20240923_0927 (2413542-03) | Matrix: Water | Sampled: 2024-09-23 09:27

Anions

Bromide	< 0.10	N/A	0.10	mg/L	2024-09-27	
Chloride	3.36	AO ≤ 250	0.10	mg/L	2024-09-27	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	2024-09-27	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2024-09-27	HT1
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2024-09-27	HT1
Sulfate	4.5	AO ≤ 500	1.0	mg/L	2024-09-27	

BCMOE Aggregate Hydrocarbons

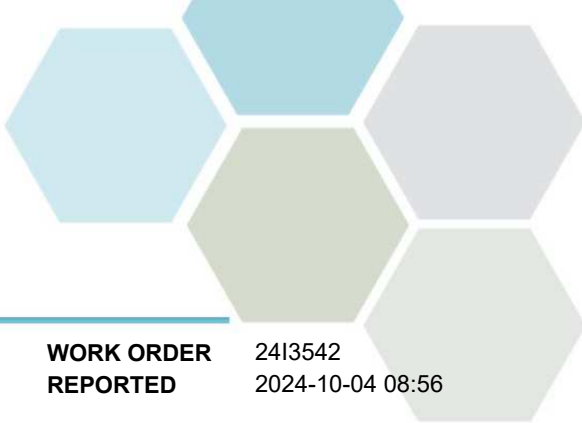
EPHw10-19	< 250	N/A	250	µg/L	2024-10-02	
EPHw19-32	< 250	N/A	250	µg/L	2024-10-02	
Surrogate: 2-Methylnonane (EPH/F2-4)	99		60-140	%	2024-10-02	

Calculated Parameters

Hardness, Dissolved (as CaCO3)	66.4	N/A	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
Nitrogen, Total	0.0640	N/A	0.0500	mg/L	N/A	

Dissolved Metals

Aluminum, dissolved	0.0102	N/A	0.0050	mg/L	2024-09-30	
Antimony, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Arsenic, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Barium, dissolved	0.192	N/A	0.0050	mg/L	2024-09-30	
Beryllium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Bismuth, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Boron, dissolved	< 0.0500	N/A	0.0500	mg/L	2024-09-30	
Cadmium, dissolved	0.000031	N/A	0.000010	mg/L	2024-09-30	
Calcium, dissolved	19.5	N/A	0.20	mg/L	2024-09-30	
Chromium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Cobalt, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Copper, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-30	
Iron, dissolved	< 0.010	N/A	0.010	mg/L	2024-09-30	
Lead, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	



TEST RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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MOR002_20240923_0927 (2413542-03) | Matrix: Water | Sampled: 2024-09-23 09:27, Continued

Dissolved Metals, Continued

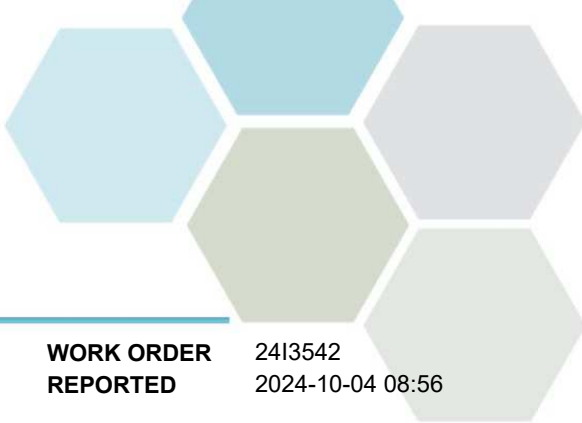
Lithium, dissolved	0.00169	N/A	0.00010	mg/L	2024-09-30	
Magnesium, dissolved	4.25	N/A	0.010	mg/L	2024-09-30	
Manganese, dissolved	0.00174	N/A	0.00020	mg/L	2024-09-30	
Mercury, dissolved	< 0.000010	N/A	0.000010	mg/L	2024-10-01	
Molybdenum, dissolved	0.00062	N/A	0.00010	mg/L	2024-09-30	
Nickel, dissolved	< 0.00040	N/A	0.00040	mg/L	2024-09-30	
Phosphorus, dissolved	< 0.050	N/A	0.050	mg/L	2024-09-30	
Potassium, dissolved	0.50	N/A	0.10	mg/L	2024-09-30	
Selenium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Silicon, dissolved	1.1	N/A	1.0	mg/L	2024-09-30	
Silver, dissolved	< 0.000050	N/A	0.000050	mg/L	2024-09-30	
Sodium, dissolved	1.80	N/A	0.10	mg/L	2024-09-30	
Strontium, dissolved	0.128	N/A	0.0010	mg/L	2024-09-30	
Sulfur, dissolved	< 3.0	N/A	3.0	mg/L	2024-09-30	
Tellurium, dissolved	< 0.00050	N/A	0.00050	mg/L	2024-09-30	
Thallium, dissolved	< 0.000020	N/A	0.000020	mg/L	2024-09-30	
Thorium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	
Tin, dissolved	< 0.00020	N/A	0.00020	mg/L	2024-09-30	
Titanium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Tungsten, dissolved	< 0.0010	N/A	0.0010	mg/L	2024-09-30	
Uranium, dissolved	0.000176	N/A	0.000020	mg/L	2024-09-30	
Vanadium, dissolved	< 0.0050	N/A	0.0050	mg/L	2024-09-30	
Zinc, dissolved	0.0064	N/A	0.0040	mg/L	2024-09-30	
Zirconium, dissolved	< 0.00010	N/A	0.00010	mg/L	2024-09-30	

General Parameters

Alkalinity, Total (as CaCO3)	58.5	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Bicarbonate (as CaCO3)	58.5	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2024-10-01	
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2024-10-01	
BOD, 5-day	< 5.6	N/A	2.0	mg/L	2024-10-03	HT1
Carbon, Total Organic	1.96	N/A	0.50	mg/L	2024-10-01	
Carbon, Dissolved Organic	1.83	N/A	0.50	mg/L	2024-10-01	
Chemical Oxygen Demand	< 20	N/A	20	mg/L	2024-10-03	
Nitrogen, Total Kjeldahl	0.064	N/A	0.050	mg/L	2024-10-03	
Phosphorus, Total (as P)	0.0150	N/A	0.0050	mg/L	2024-10-02	
Phosphorus, Dissolved Reactive	< 0.0050	N/A	0.0050	mg/L	2024-10-02	HT1
Solids, Total Suspended	< 2.4	N/A	2.0	mg/L	2024-10-02	HT1, RS2

Total Metals

Aluminum, total	0.0499	OG < 0.1	0.0050	mg/L	2024-10-01	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2024-10-01	



TEST RESULTS

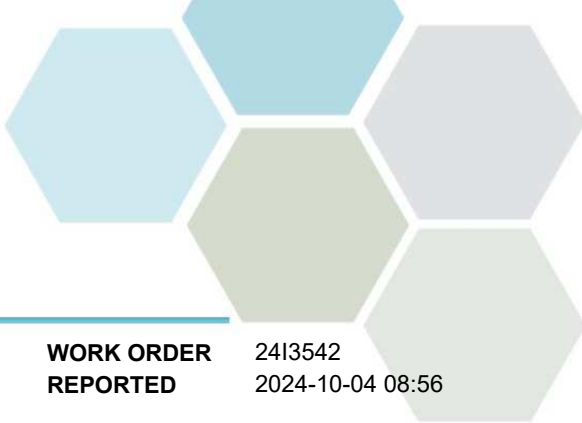
REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MOR002_20240923_0927 (2413542-03) Matrix: Water Sampled: 2024-09-23 09:27, Continued						
<i>Total Metals, Continued</i>						
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2024-10-01	
Barium, total	0.181	MAC = 2	0.0050	mg/L	2024-10-01	
Beryllium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Bismuth, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2024-10-01	
Cadmium, total	0.000030	MAC = 0.007	0.000010	mg/L	2024-10-01	
Calcium, total	20.0	None Required	0.20	mg/L	2024-10-01	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-01	
Cobalt, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2024-10-01	
Iron, total	0.035	AO ≤ 0.3	0.010	mg/L	2024-10-01	
Lead, total	< 0.00020	MAC = 0.005	0.00020	mg/L	2024-10-01	
Lithium, total	0.00156	N/A	0.00010	mg/L	2024-10-01	
Magnesium, total	4.20	None Required	0.010	mg/L	2024-10-01	
Manganese, total	0.00239	MAC = 0.12	0.00020	mg/L	2024-10-01	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2024-10-01	
Molybdenum, total	0.00062	N/A	0.00010	mg/L	2024-10-01	
Nickel, total	< 0.00040	N/A	0.00040	mg/L	2024-10-01	
Phosphorus, total	< 0.050	N/A	0.050	mg/L	2024-10-01	
Potassium, total	0.50	N/A	0.10	mg/L	2024-10-01	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2024-10-01	
Silicon, total	1.0	N/A	1.0	mg/L	2024-10-01	
Silver, total	< 0.000050	None Required	0.000050	mg/L	2024-10-01	
Sodium, total	1.88	AO ≤ 200	0.10	mg/L	2024-10-01	
Strontium, total	0.124	MAC = 7	0.0010	mg/L	2024-10-01	
Sulfur, total	< 3.0	N/A	3.0	mg/L	2024-10-01	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2024-10-01	
Thallium, total	< 0.000020	N/A	0.000020	mg/L	2024-10-01	
Thorium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	
Tin, total	< 0.00020	N/A	0.00020	mg/L	2024-10-01	
Titanium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-01	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2024-10-01	
Uranium, total	0.000176	MAC = 0.02	0.000020	mg/L	2024-10-01	
Vanadium, total	< 0.0050	N/A	0.0050	mg/L	2024-10-01	
Zinc, total	0.0137	AO ≤ 5	0.0040	mg/L	2024-10-01	
Zirconium, total	< 0.00010	N/A	0.00010	mg/L	2024-10-01	

Sample Qualifiers:

- HG1 Sample bottle and preservation submitted is not suitable for Mercury analysis and analyte stability may be affected.
- HT1 The sample was prepared and/or analyzed past the recommended holding time.
- RE2 Result was confirmed by re-analysis prior to reporting.
- RS2 The Reporting Limits for this sample have been raised due to limited sample volume.



APPENDIX 1: SUPPORTING INFORMATION

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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, Dissolved Reactive in Water	SM 4500-P F (2021)	Automated Colorimetry (Ascorbic Acid)	✓	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

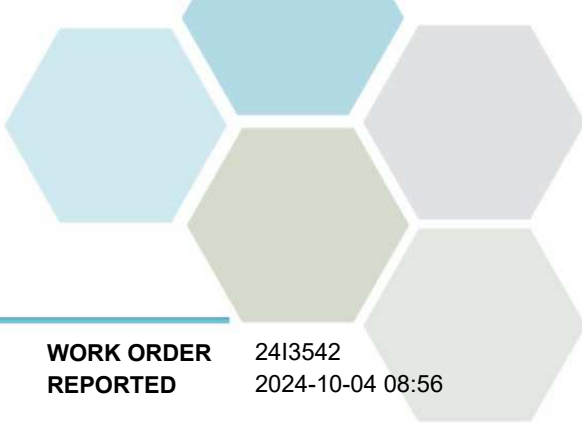
Glossary of Terms:

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
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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 not 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.



APPENDIX 2: QUALITY CONTROL RESULTS

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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 B414350									
Blank (B414350-BLK1)			Prepared: 2024-09-27, Analyzed: 2024-09-27						
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							
Sulfate	< 0.5	0.5 mg/L							
Blank (B414350-BLK2)			Prepared: 2024-09-27, Analyzed: 2024-09-27						
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							
Sulfate	< 1.0	1.0 mg/L							
LCS (B414350-BS1)			Prepared: 2024-09-27, Analyzed: 2024-09-27						
Bromide	4.10	0.10 mg/L	4.00		103	85-115			
Chloride	16.0	0.10 mg/L	16.0		100	90-110			
Fluoride	4.00	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)	3.98	0.010 mg/L	4.00		99	90-110			
Nitrite (as N)	2.04	0.010 mg/L	2.00		102	85-115			
Sulfate	16.3	0.5 mg/L	16.0		102	90-110			
LCS (B414350-BS2)			Prepared: 2024-09-27, Analyzed: 2024-09-27						
Bromide	4.09	0.10 mg/L	4.00		102	85-115			
Chloride	15.7	0.10 mg/L	16.0		98	90-110			
Fluoride	4.01	0.10 mg/L	4.00		100	88-108			
Nitrate (as N)	4.16	0.010 mg/L	4.00		104	90-110			
Nitrite (as N)	2.05	0.010 mg/L	2.00		102	85-115			
Sulfate	15.9	0.5 mg/L	16.0		99	90-110			
Duplicate (B414350-DUP2)			Source: 2413542-01		Prepared: 2024-09-27, Analyzed: 2024-09-27				
Bromide	< 0.10	0.10 mg/L		< 0.10					10
Chloride	3.81	0.10 mg/L		3.82			< 1		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



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B4I4350, Continued									
Duplicate (B4I4350-DUP2), Continued		Source: 2413542-01		Prepared: 2024-09-27, Analyzed: 2024-09-27					
Sulfate	8.8	1.0 mg/L		8.6			2	10	
Matrix Spike (B4I4350-MS2)		Source: 2413542-01		Prepared: 2024-09-27, Analyzed: 2024-09-27					
Bromide	4.02	0.10 mg/L	4.00	< 0.10	100	80-120			
Chloride	20.1	0.10 mg/L	16.0	3.82	102	75-125			
Fluoride	4.11	0.10 mg/L	4.00	< 0.10	102	75-125			
Nitrate (as N)	4.04	0.010 mg/L	4.00	< 0.010	101	75-125			
Nitrite (as N)	2.12	0.010 mg/L	2.00	< 0.010	106	75-115			
Sulfate	25.4	0.5 mg/L	16.0	8.6	105	75-125			

BCMOE Aggregate Hydrocarbons, Batch B4J1605

Blank (B4J1605-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
EPHw10-19	< 250	250 µg/L							
EPHw19-32	< 250	250 µg/L							
Surrogate: 2-Methylnonane (EPH/F2-4)	2140	µg/L	2490		86	60-140			
LCS (B4J1605-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
EPHw10-19	17500	250 µg/L	17400		101	70-130			
EPHw19-32	23000	250 µg/L	24800		93	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1590	µg/L	2490		64	60-140			
LCS (B4J1605-BS4)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
EPHw10-19	17300	250 µg/L	17400		100	70-130			
EPHw19-32	23100	250 µg/L	24800		93	70-130			
Surrogate: 2-Methylnonane (EPH/F2-4)	1570	µg/L	2490		63	60-140			
LCS Dup (B4J1605-BSD2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
EPHw10-19	17600	250 µg/L	17400		102	70-130	1	20	
EPHw19-32	23400	250 µg/L	24800		94	70-130	2	20	
Surrogate: 2-Methylnonane (EPH/F2-4)	1720	µg/L	2490		69	60-140			

Dissolved Metals, Batch B4I4460

Blank (B4I4460-BLK1)			Prepared: 2024-09-30, Analyzed: 2024-09-30						
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	< 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	< 0.00010	0.00010 mg/L							
Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 mg/L							
Potassium, dissolved	< 0.10	0.10 mg/L							



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B414460, Continued

Blank (B414460-BLK1), Continued

Prepared: 2024-09-30, Analyzed: 2024-09-30

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 (B414460-BS1)

Prepared: 2024-09-30, Analyzed: 2024-09-30

Aluminum, dissolved	4.18	0.0050 mg/L	4.00		105	80-120			
Antimony, dissolved	0.0411	0.00020 mg/L	0.0400		103	80-120			
Arsenic, dissolved	0.417	0.00050 mg/L	0.400		104	80-120			
Barium, dissolved	0.0416	0.0050 mg/L	0.0400		104	80-120			
Beryllium, dissolved	0.0390	0.00010 mg/L	0.0400		97	80-120			
Bismuth, dissolved	0.0412	0.00010 mg/L	0.0400		103	80-120			
Boron, dissolved	0.405	0.0500 mg/L	0.400		101	80-120			
Cadmium, dissolved	0.0411	0.000010 mg/L	0.0400		103	80-120			
Calcium, dissolved	4.16	0.20 mg/L	4.00		104	80-120			
Chromium, dissolved	0.0419	0.00050 mg/L	0.0400		105	80-120			
Cobalt, dissolved	0.0419	0.00010 mg/L	0.0400		105	80-120			
Copper, dissolved	0.0412	0.00040 mg/L	0.0400		103	80-120			
Iron, dissolved	4.19	0.010 mg/L	4.00		105	80-120			
Lead, dissolved	0.0411	0.00020 mg/L	0.0400		103	80-120			
Lithium, dissolved	0.0392	0.00010 mg/L	0.0400		98	80-120			
Magnesium, dissolved	4.26	0.010 mg/L	4.00		107	80-120			
Manganese, dissolved	0.0422	0.00020 mg/L	0.0400		105	80-120			
Molybdenum, dissolved	0.0409	0.00010 mg/L	0.0400		102	80-120			
Nickel, dissolved	0.0420	0.00040 mg/L	0.0400		105	80-120			
Phosphorus, dissolved	4.13	0.050 mg/L	4.00		103	80-120			
Potassium, dissolved	4.21	0.10 mg/L	4.00		105	80-120			
Selenium, dissolved	0.406	0.00050 mg/L	0.400		101	80-120			
Silicon, dissolved	4.1	1.0 mg/L	4.00		103	80-120			
Silver, dissolved	0.0405	0.000050 mg/L	0.0400		101	80-120			
Sodium, dissolved	4.32	0.10 mg/L	4.00		108	80-120			
Strontium, dissolved	0.0424	0.0010 mg/L	0.0400		106	80-120			
Sulfur, dissolved	40.8	3.0 mg/L	40.0		102	80-120			
Tellurium, dissolved	0.0398	0.00050 mg/L	0.0400		100	80-120			
Thallium, dissolved	0.0415	0.000020 mg/L	0.0400		104	80-120			
Thorium, dissolved	0.0409	0.00010 mg/L	0.0400		102	80-120			
Tin, dissolved	0.0399	0.00020 mg/L	0.0400		100	80-120			
Titanium, dissolved	0.0417	0.0050 mg/L	0.0400		104	80-120			
Tungsten, dissolved	0.0410	0.0010 mg/L	0.0400		102	80-120			
Uranium, dissolved	0.0408	0.000020 mg/L	0.0400		102	80-120			
Vanadium, dissolved	0.0409	0.0050 mg/L	0.0400		102	80-120			
Zinc, dissolved	0.414	0.0040 mg/L	0.400		104	80-120			
Zirconium, dissolved	0.0410	0.00010 mg/L	0.0400		102	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B414460, Continued									
Matrix Spike (B414460-MS1)	Source: 2413542-03		Prepared: 2024-09-30, Analyzed: 2024-09-30						
Aluminum, dissolved	4.66	0.0050 mg/L	4.00	0.0102	116	70-130			
Antimony, dissolved	0.0474	0.00020 mg/L	0.0400	< 0.00020	118	70-130			
Arsenic, dissolved	0.450	0.00050 mg/L	0.400	< 0.00050	113	70-130			
Barium, dissolved	0.241	0.0050 mg/L	0.0400	0.192	123	70-130			
Beryllium, dissolved	0.0483	0.00010 mg/L	0.0400	< 0.00010	121	70-130			
Bismuth, dissolved	0.0449	0.00010 mg/L	0.0400	< 0.00010	112	70-130			
Boron, dissolved	0.473	0.0500 mg/L	0.400	< 0.0500	117	70-130			
Cadmium, dissolved	0.0469	0.000010 mg/L	0.0400	0.000031	117	70-130			
Calcium, dissolved	23.1	0.20 mg/L	4.00	19.5	90	70-130			
Chromium, dissolved	0.0465	0.00050 mg/L	0.0400	< 0.00050	116	70-130			
Cobalt, dissolved	0.0435	0.00010 mg/L	0.0400	< 0.00010	109	70-130			
Copper, dissolved	0.0425	0.00040 mg/L	0.0400	< 0.00040	106	70-130			
Iron, dissolved	4.45	0.010 mg/L	4.00	< 0.010	111	70-130			
Lead, dissolved	0.0469	0.00020 mg/L	0.0400	< 0.00020	117	70-130			
Lithium, dissolved	0.0500	0.00010 mg/L	0.0400	0.00169	121	70-130			
Magnesium, dissolved	8.59	0.010 mg/L	4.00	4.25	108	70-130			
Manganese, dissolved	0.0471	0.00020 mg/L	0.0400	0.00174	113	70-130			
Molybdenum, dissolved	0.0467	0.00010 mg/L	0.0400	0.00062	115	70-130			
Nickel, dissolved	0.0445	0.00040 mg/L	0.0400	< 0.00040	111	70-130			
Phosphorus, dissolved	4.80	0.050 mg/L	4.00	< 0.050	120	70-130			
Potassium, dissolved	5.10	0.10 mg/L	4.00	0.50	115	70-130			
Selenium, dissolved	0.444	0.00050 mg/L	0.400	< 0.00050	111	70-130			
Silicon, dissolved	5.6	1.0 mg/L	4.00	1.1	114	70-130			
Silver, dissolved	0.0291	0.000050 mg/L	0.0400	< 0.000050	73	70-130			
Sodium, dissolved	6.22	0.10 mg/L	4.00	1.80	110	70-130			
Strontium, dissolved	0.171	0.0010 mg/L	0.0400	0.128	107	70-130			
Sulfur, dissolved	47.3	3.0 mg/L	40.0	< 3.0	115	70-130			
Tellurium, dissolved	0.0474	0.00050 mg/L	0.0400	< 0.00050	119	70-130			
Thallium, dissolved	0.0473	0.000020 mg/L	0.0400	< 0.000020	118	70-130			
Thorium, dissolved	0.0478	0.00010 mg/L	0.0400	< 0.00010	120	70-130			
Tin, dissolved	0.0460	0.00020 mg/L	0.0400	< 0.00020	115	70-130			
Titanium, dissolved	0.0453	0.0050 mg/L	0.0400	< 0.0050	113	70-130			
Tungsten, dissolved	0.0459	0.0010 mg/L	0.0400	< 0.0010	115	70-130			
Uranium, dissolved	0.0470	0.000020 mg/L	0.0400	0.000176	117	70-130			
Vanadium, dissolved	0.0442	0.0050 mg/L	0.0400	< 0.0050	110	70-130			
Zinc, dissolved	0.454	0.0040 mg/L	0.400	0.0064	112	70-130			
Zirconium, dissolved	0.0470	0.00010 mg/L	0.0400	< 0.00010	117	70-130			

Dissolved Metals, Batch B414469

Blank (B414469-BLK1)	Prepared: 2024-09-30, Analyzed: 2024-09-30								
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	< 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	< 0.00010	0.00010 mg/L							



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Dissolved Metals, Batch B414469, Continued

Blank (B414469-BLK1), Continued

Prepared: 2024-09-30, Analyzed: 2024-09-30

Magnesium, dissolved	< 0.010	0.010 mg/L							
Manganese, dissolved	< 0.00020	0.00020 mg/L							
Mercury, dissolved	< 0.000040	0.000040 mg/L							
Molybdenum, dissolved	< 0.00010	0.00010 mg/L							
Nickel, dissolved	< 0.00040	0.00040 mg/L							
Phosphorus, dissolved	< 0.050	0.050 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 (B414469-BS1)

Prepared: 2024-09-30, Analyzed: 2024-09-30

Aluminum, dissolved	4.11	0.0050 mg/L	4.00		103	80-120			
Antimony, dissolved	0.0402	0.00020 mg/L	0.0400		100	80-120			
Arsenic, dissolved	0.403	0.00050 mg/L	0.400		101	80-120			
Barium, dissolved	0.0403	0.0050 mg/L	0.0400		101	80-120			
Beryllium, dissolved	0.0340	0.00010 mg/L	0.0400		85	80-120			
Bismuth, dissolved	0.0411	0.00010 mg/L	0.0400		103	80-120			
Boron, dissolved	0.351	0.0500 mg/L	0.400		88	80-120			
Cadmium, dissolved	0.0395	0.000010 mg/L	0.0400		99	80-120			
Calcium, dissolved	3.89	0.20 mg/L	4.00		97	80-120			
Chromium, dissolved	0.0407	0.00050 mg/L	0.0400		102	80-120			
Cobalt, dissolved	0.0406	0.00010 mg/L	0.0400		101	80-120			
Copper, dissolved	0.0396	0.00040 mg/L	0.0400		99	80-120			
Iron, dissolved	4.10	0.010 mg/L	4.00		103	80-120			
Lead, dissolved	0.0408	0.00020 mg/L	0.0400		102	80-120			
Lithium, dissolved	0.0336	0.00010 mg/L	0.0400		84	80-120			
Magnesium, dissolved	4.09	0.010 mg/L	4.00		102	80-120			
Manganese, dissolved	0.0414	0.00020 mg/L	0.0400		103	80-120			
Mercury, dissolved	0.00405	0.000040 mg/L	0.00400		101	80-120			
Molybdenum, dissolved	0.0398	0.00010 mg/L	0.0400		100	80-120			
Nickel, dissolved	0.0409	0.00040 mg/L	0.0400		102	80-120			
Phosphorus, dissolved	4.07	0.050 mg/L	4.00		102	80-120			
Potassium, dissolved	4.12	0.10 mg/L	4.00		103	80-120			
Selenium, dissolved	0.379	0.00050 mg/L	0.400		95	80-120			
Silicon, dissolved	4.0	1.0 mg/L	4.00		100	80-120			
Silver, dissolved	0.0393	0.000050 mg/L	0.0400		98	80-120			
Sodium, dissolved	4.10	0.10 mg/L	4.00		103	80-120			
Strontium, dissolved	0.0412	0.0010 mg/L	0.0400		103	80-120			
Sulfur, dissolved	39.2	3.0 mg/L	40.0		98	80-120			
Tellurium, dissolved	0.0398	0.00050 mg/L	0.0400		100	80-120			
Thallium, dissolved	0.0407	0.000020 mg/L	0.0400		102	80-120			
Thorium, dissolved	0.0408	0.00010 mg/L	0.0400		102	80-120			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Dissolved Metals, Batch B414469, Continued									
LCS (B414469-BS1), Continued					Prepared: 2024-09-30, Analyzed: 2024-09-30				
Tin, dissolved	0.0396	0.00020 mg/L	0.0400		99	80-120			
Titanium, dissolved	0.0405	0.0050 mg/L	0.0400		101	80-120			
Tungsten, dissolved	0.0404	0.0010 mg/L	0.0400		101	80-120			
Uranium, dissolved	0.0405	0.000020 mg/L	0.0400		101	80-120			
Vanadium, dissolved	0.0393	0.0050 mg/L	0.0400		98	80-120			
Zinc, dissolved	0.398	0.0040 mg/L	0.400		99	80-120			
Zirconium, dissolved	0.0399	0.00010 mg/L	0.0400		100	80-120			
Dissolved Metals, Batch B414475									
Blank (B414475-BLK1)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK2)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK3)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK4)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK5)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK6)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK7)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK8)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	< 0.000010	0.000010 mg/L							
LCS (B414475-BS1)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00245	0.000010 mg/L	0.00250		98	80-120			
LCS (B414475-BS2)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00247	0.000010 mg/L	0.00250		99	80-120			
LCS (B414475-BS3)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00252	0.000010 mg/L	0.00250		101	80-120			
LCS (B414475-BS4)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00264	0.000010 mg/L	0.00250		106	80-120			
LCS (B414475-BS5)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00228	0.000010 mg/L	0.00250		91	80-120			
LCS (B414475-BS6)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00248	0.000010 mg/L	0.00250		99	80-120			
LCS (B414475-BS7)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00250	0.000010 mg/L	0.00250		100	80-120			
LCS (B414475-BS8)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, dissolved	0.00234	0.000010 mg/L	0.00250		93	80-120			



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4I4369									
Blank (B4I4369-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
Blank (B4I4369-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	< 0.50	0.50 mg/L							
Carbon, Dissolved Organic	< 0.50	0.50 mg/L							
LCS (B4I4369-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	9.21	0.50 mg/L	10.0		92	78-116			
Carbon, Dissolved Organic	9.01	0.50 mg/L	10.0		90	78-116			
LCS (B4I4369-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Carbon, Total Organic	9.04	0.50 mg/L	10.0		90	78-116			
Carbon, Dissolved Organic	9.12	0.50 mg/L	10.0		91	78-116			
General Parameters, Batch B4I4412									
Blank (B4I4412-BLK1)			Prepared: 2024-09-28, Analyzed: 2024-10-03						
BOD, 5-day	< 2.0	2.0 mg/L							
LCS (B4I4412-BS1)			Prepared: 2024-09-28, Analyzed: 2024-10-03						
BOD, 5-day	183	47.0 mg/L	198		93	85-115			
General Parameters, Batch B4J1532									
Blank (B4J1532-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
Blank (B4J1532-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Total (as P)	< 0.0050	0.0050 mg/L							
LCS (B4J1532-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Total (as P)	0.112	0.0050 mg/L	0.100		112	85-115			
LCS (B4J1532-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Total (as P)	0.112	0.0050 mg/L	0.100		112	85-115			
General Parameters, Batch B4J1535									
Blank (B4J1535-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
Blank (B4J1535-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Ammonia, Total (as N)	< 0.050	0.050 mg/L							
LCS (B4J1535-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Ammonia, Total (as N)	1.02	0.050 mg/L	1.00		102	85-115			
LCS (B4J1535-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Ammonia, Total (as N)	1.01	0.050 mg/L	1.00		101	85-115			
General Parameters, Batch B4J1574									
Blank (B4J1574-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Solids, Total Suspended	< 2.0	2.0 mg/L							



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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General Parameters, Batch B4J1574, Continued

LCS (B4J1574-BS1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Solids, Total Suspended	85.5	5.0 mg/L	100		86	85-115			
Reference (B4J1574-SRM1)			Prepared: 2024-10-02, Analyzed: 2024-10-02						
Solids, Total Suspended	418	20.0 mg/L	459		91	80-120			

General Parameters, Batch B4J1588

Blank (B4J1588-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

Blank (B4J1588-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

Blank (B4J1588-BLK3)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0 mg/L							

LCS (B4J1588-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Alkalinity, Total (as CaCO3)	95.8	1.0 mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	44.9	1.0 mg/L	50.0		90	0-200			

LCS (B4J1588-BS3)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Alkalinity, Total (as CaCO3)	95.0	1.0 mg/L	100		95	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	45.7	1.0 mg/L	50.0		91	0-200			

LCS (B4J1588-BS5)			Prepared: 2024-10-01, Analyzed: 2024-10-01						
Alkalinity, Total (as CaCO3)	95.7	1.0 mg/L	100		96	80-120			
Alkalinity, Phenolphthalein (as CaCO3)	43.4	1.0 mg/L	50.0		87	0-200			

General Parameters, Batch B4J1596

Blank (B4J1596-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							

Blank (B4J1596-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	< 0.0050	0.0050 mg/L							

LCS (B4J1596-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	0.0960	0.0050 mg/L	0.100		96	84-115			

LCS (B4J1596-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Phosphorus, Dissolved Reactive	0.0950	0.0050 mg/L	0.100		95	84-115			

General Parameters, Batch B4J1612



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B4J1612, Continued									
Blank (B4J1612-BLK1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4J1612-BLK2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B4J1612-BS1)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Nitrogen, Total Kjeldahl	0.996	0.050 mg/L	1.00		100	85-115			
LCS (B4J1612-BS2)			Prepared: 2024-10-01, Analyzed: 2024-10-02						
Nitrogen, Total Kjeldahl	1.02	0.050 mg/L	1.00		102	85-115			
General Parameters, Batch B4J1654									
Blank (B4J1654-BLK1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	< 20	20 mg/L							
Blank (B4J1654-BLK2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	< 20	20 mg/L							
LCS (B4J1654-BS1)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	504	20 mg/L	500		101	89-115			
LCS (B4J1654-BS2)			Prepared: 2024-10-03, Analyzed: 2024-10-03						
Chemical Oxygen Demand	503	20 mg/L	500		101	89-115			
General Parameters, Batch B4J1737									
Blank (B4J1737-BLK1)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
Blank (B4J1737-BLK2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Nitrogen, Total Kjeldahl	< 0.050	0.050 mg/L							
LCS (B4J1737-BS1)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Nitrogen, Total Kjeldahl	0.990	0.050 mg/L	1.00		99	85-115			
LCS (B4J1737-BS2)			Prepared: 2024-10-02, Analyzed: 2024-10-03						
Nitrogen, Total Kjeldahl	0.980	0.050 mg/L	1.00		98	85-115			
Total Metals, Batch B4I4462									
Blank (B4I4462-BLK1)			Prepared: 2024-09-30, Analyzed: 2024-10-01						
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							



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Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
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Total Metals, Batch B414462, Continued

Blank (B414462-BLK1), Continued

Prepared: 2024-09-30, Analyzed: 2024-10-01

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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							

LCS (B414462-BS1)

Prepared: 2024-09-30, Analyzed: 2024-10-01

Aluminum, total	3.89	0.0050 mg/L	4.00		97	80-120			
Antimony, total	0.0392	0.00020 mg/L	0.0400		98	80-120			
Arsenic, total	0.391	0.00050 mg/L	0.400		98	80-120			
Barium, total	0.0398	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0392	0.00010 mg/L	0.0400		98	80-120			
Bismuth, total	0.0387	0.00010 mg/L	0.0400		97	80-120			
Boron, total	0.399	0.0500 mg/L	0.400		100	80-120			
Cadmium, total	0.0390	0.000010 mg/L	0.0400		97	80-120			
Calcium, total	3.98	0.20 mg/L	4.00		99	80-120			
Chromium, total	0.0398	0.00050 mg/L	0.0400		99	80-120			
Cobalt, total	0.0400	0.00010 mg/L	0.0400		100	80-120			
Copper, total	0.0391	0.00040 mg/L	0.0400		98	80-120			
Iron, total	3.99	0.010 mg/L	4.00		100	80-120			
Lead, total	0.0399	0.00020 mg/L	0.0400		100	80-120			
Lithium, total	0.0390	0.00010 mg/L	0.0400		98	80-120			
Magnesium, total	3.93	0.010 mg/L	4.00		98	80-120			
Manganese, total	0.0396	0.00020 mg/L	0.0400		99	80-120			
Molybdenum, total	0.0403	0.00010 mg/L	0.0400		101	80-120			
Nickel, total	0.0399	0.00040 mg/L	0.0400		100	80-120			
Phosphorus, total	3.86	0.050 mg/L	4.00		96	80-120			
Potassium, total	3.85	0.10 mg/L	4.00		96	80-120			
Selenium, total	0.394	0.00050 mg/L	0.400		98	80-120			
Silicon, total	3.8	1.0 mg/L	4.00		94	80-120			
Silver, total	0.0397	0.000050 mg/L	0.0400		99	80-120			
Sodium, total	4.09	0.10 mg/L	4.00		102	80-120			
Strontium, total	0.0392	0.0010 mg/L	0.0400		98	80-120			
Sulfur, total	39.4	3.0 mg/L	40.0		98	80-120			
Tellurium, total	0.0380	0.00050 mg/L	0.0400		95	80-120			
Thallium, total	0.0394	0.000020 mg/L	0.0400		99	80-120			
Thorium, total	0.0409	0.00010 mg/L	0.0400		102	80-120			
Tin, total	0.0391	0.00020 mg/L	0.0400		98	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B414462, Continued									
LCS (B414462-BS1), Continued					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Titanium, total	0.0394	0.0050 mg/L	0.0400		99	80-120			
Tungsten, total	0.0406	0.0010 mg/L	0.0400		102	80-120			
Uranium, total	0.0396	0.000020 mg/L	0.0400		99	80-120			
Vanadium, total	0.0400	0.0050 mg/L	0.0400		100	80-120			
Zinc, total	0.390	0.0040 mg/L	0.400		98	80-120			
Zirconium, total	0.0394	0.00010 mg/L	0.0400		99	80-120			
Total Metals, Batch B414475									
Blank (B414475-BLK1)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK2)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK3)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK4)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK5)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK6)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK7)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
Blank (B414475-BLK8)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	< 0.000010	0.000010 mg/L							
LCS (B414475-BS1)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00245	0.000010 mg/L	0.00250		98	80-120			
LCS (B414475-BS2)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00247	0.000010 mg/L	0.00250		99	80-120			
LCS (B414475-BS3)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00252	0.000010 mg/L	0.00250		101	80-120			
LCS (B414475-BS4)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00264	0.000010 mg/L	0.00250		106	80-120			
LCS (B414475-BS5)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00228	0.000010 mg/L	0.00250		91	80-120			
LCS (B414475-BS6)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00248	0.000010 mg/L	0.00250		99	80-120			
LCS (B414475-BS7)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00250	0.000010 mg/L	0.00250		100	80-120			
LCS (B414475-BS8)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Mercury, total	0.00234	0.000010 mg/L	0.00250		93	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B414476									
Blank (B414476-BLK1)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
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							
Zinc, total	< 0.0040	0.0040 mg/L							
Zirconium, total	< 0.00010	0.00010 mg/L							

LCS (B414476-BS1)					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Aluminum, total	3.95	0.0050 mg/L	4.00		99	80-120			
Antimony, total	0.0396	0.00020 mg/L	0.0400		99	80-120			
Arsenic, total	0.395	0.00050 mg/L	0.400		99	80-120			
Barium, total	0.0394	0.0050 mg/L	0.0400		99	80-120			
Beryllium, total	0.0395	0.00010 mg/L	0.0400		99	80-120			
Bismuth, total	0.0409	0.00010 mg/L	0.0400		102	80-120			
Boron, total	0.403	0.0500 mg/L	0.400		101	80-120			
Cadmium, total	0.0394	0.000010 mg/L	0.0400		98	80-120			
Calcium, total	4.13	0.20 mg/L	4.00		103	80-120			
Chromium, total	0.0398	0.00050 mg/L	0.0400		100	80-120			
Cobalt, total	0.0401	0.00010 mg/L	0.0400		100	80-120			
Copper, total	0.0399	0.00040 mg/L	0.0400		100	80-120			
Iron, total	4.03	0.010 mg/L	4.00		101	80-120			
Lead, total	0.0403	0.00020 mg/L	0.0400		101	80-120			
Lithium, total	0.0387	0.00010 mg/L	0.0400		97	80-120			
Magnesium, total	3.94	0.010 mg/L	4.00		98	80-120			
Manganese, total	0.0401	0.00020 mg/L	0.0400		100	80-120			



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT Elk River Alliance
CBWM-2024

WORK ORDER REPORTED 2413542
2024-10-04 08:56

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B414476, Continued									
LCS (B414476-BS1), Continued					Prepared: 2024-09-30, Analyzed: 2024-10-01				
Molybdenum, total	0.0408	0.00010 mg/L	0.0400		102	80-120			
Nickel, total	0.0398	0.00040 mg/L	0.0400		100	80-120			
Phosphorus, total	4.01	0.050 mg/L	4.00		100	80-120			
Potassium, total	3.91	0.10 mg/L	4.00		98	80-120			
Selenium, total	0.395	0.00050 mg/L	0.400		99	80-120			
Silicon, total	4.0	1.0 mg/L	4.00		100	80-120			
Silver, total	0.0400	0.000050 mg/L	0.0400		100	80-120			
Sodium, total	4.10	0.10 mg/L	4.00		103	80-120			
Strontium, total	0.0401	0.0010 mg/L	0.0400		100	80-120			
Sulfur, total	39.9	3.0 mg/L	40.0		100	80-120			
Tellurium, total	0.0385	0.00050 mg/L	0.0400		96	80-120			
Thallium, total	0.0394	0.000020 mg/L	0.0400		98	80-120			
Thorium, total	0.0422	0.00010 mg/L	0.0400		106	80-120			
Tin, total	0.0398	0.00020 mg/L	0.0400		99	80-120			
Titanium, total	0.0400	0.0050 mg/L	0.0400		100	80-120			
Tungsten, total	0.0412	0.0010 mg/L	0.0400		103	80-120			
Uranium, total	0.0407	0.000020 mg/L	0.0400		102	80-120			
Vanadium, total	0.0396	0.0050 mg/L	0.0400		99	80-120			
Zinc, total	0.392	0.0040 mg/L	0.400		98	80-120			
Zirconium, total	0.0399	0.00010 mg/L	0.0400		100	80-120			



Appendix D: Benthic Macroinvertebrate Taxonomy Report



CORDILLERA CONSULTING
FRESHWATER INVERTEBRATE TAXONOMY

Project: Community-based Water Monitoring - 2024

Elk River Alliance

Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca

250-494-7553

Site:	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024	2024
Sample:	BOI001	BOI002	COL001	COL003	ALX001	ALX003	MOR001	MOR002	LIZ001	LIZ003	LIZ009
Sample Collection Date:	8-Sep-24	8-Sep-24	9-Sep-24	9-Sep-24	10-Sep-24	10-Sep-24	23-Sep-24	23-Sep-24	24-Sep-24	24-Sep-24	24-Sep-24
CC#:	CC251682	CC251683	CC251684	CC251685	CC251686	CC251687	CC251688	CC251689	CC251690	CC251691	CC251692
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0
Class: Insecta	0	0	0	0	0	0	0	0	0	0	0
Order: Coleoptera	0	0	0	0	0	0	0	0	0	0	0
Family: Elmidae	0	0	0	11	38	60	200	4	60	2220	125
<i>Heterlimnius</i>	0	10	0	11	50	60	60	4	100	1480	288
<i>Zaitzevia</i>	0	0	0	0	0	0	60	0	0	0	0
Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0
Family: Ameletidae	0	0	0	0	0	0	0	0	0	0	0
<i>Ameletus</i>	14	0	0	67	0	0	20	13	0	0	0
Family: Baetidae	0	120	0	100	213	680	60	154	200	960	138
<i>Anafroptilum</i>	0	0	14	0	0	0	0	0	0	0	0
<i>Baetis</i>	43	500	0	0	225	180	20	88	80	160	138
<i>Baetis fuscatus gr.</i>	0	0	0	0	13	0	0	0	0	0	0
<i>Baetis rhodani group</i>	57	560	0	11	675	460	0	21	200	900	438
<i>Dipheter hageni</i>	0	0	0	67	0	0	20	63	0	0	0
Family: Ephemerellidae	57	20	357	44	313	1060	20	8	60	320	13
<i>Caudatella</i>	0	0	0	0	13	40	0	0	0	0	0
<i>Drunella</i>	171	370	0	0	38	60	0	4	0	40	0
<i>Drunella coloradensis</i>	129	10	0	0	50	180	0	0	0	0	0
<i>Drunella doddsii</i>	186	760	0	0	50	140	0	4	0	340	13
<i>Drunella grandis group</i>	0	0	0	11	0	0	0	0	20	40	0
<i>Drunella spinifera</i>	0	0	0	0	13	0	0	0	0	0	0
<i>Ephemerella</i>	0	0	100	33	213	20	40	4	60	0	13
Family: Heptageniidae	643	290	29	56	238	320	980	100	200	600	100
<i>Cinygmula</i>	57	0	0	33	25	60	80	13	0	0	0
<i>Epeorus</i>	686	90	0	0	13	220	0	0	0	0	0
<i>Rhithrogena</i>	57	160	0	0	13	160	20	13	0	20	0
Family: Leptophlebiidae	0	0	14	0	0	0	60	13	0	0	0
<i>Neoleptophlebia</i>	0	0	0	0	0	0	0	4	0	0	0
<i>Paraleptophlebia</i>	0	0	14	0	0	0	0	0	0	0	0
Order: Plecoptera	14	0	0	11	25	0	0	0	20	120	13
Family: Capniidae	29	0	14	89	0	0	0	71	260	160	75

Family: Ceratopogonidae	0	0	0	11	0	20	20	0	0	0	0
<i>Mallochohelea</i>	0	0	0	0	13	0	0	0	0	0	0
Family: Chironomidae	471	40	114	111	88	380	0	8	100	0	0
Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0
Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0
<i>Phaenopsectra</i>	0	0	0	0	13	0	0	0	0	0	0
<i>Polypedilum</i>	0	0	71	0	0	0	0	58	20	0	38
Tribelos	0	0	29	0	0	0	0	0	0	0	0
Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0	0
<i>Micropsectra</i>	0	0	600	311	200	300	0	0	60	20	13
<i>Paratanytarsus</i>	0	0	243	0	0	0	0	0	0	0	0
<i>Rheotanytarsus</i>	0	0	0	0	0	0	0	25	0	0	0
<i>Stempellinella</i>	0	0	0	11	0	0	0	0	0	0	0
Subfamily: Diamesinae	0	0	0	0	0	0	0	0	0	0	0
Tribe: Diamesini	0	0	0	0	0	0	0	0	0	0	0
<i>Diamesa</i>	171	10	29	0	0	0	0	0	440	0	0
<i>Pagastia</i>	0	10	14	22	13	0	0	4	0	0	0
<i>Pseudodiamesa</i>	0	0	0	0	13	0	0	0	0	0	0
Subfamily: Orthoclaadiinae	0	0	0	0	0	0	0	0	0	0	0
<i>Brillia</i>	0	0	0	33	0	0	0	0	0	0	0
<i>Corynoneura</i>	0	0	0	11	0	0	0	0	0	0	0
<i>Cricotopus (Nostococladus)</i>	0	0	0	11	0	0	0	192	0	0	0
<i>Eukiefferiella</i>	500	100	29	189	13	200	0	4	0	20	0
<i>Hydrobaenus</i>	14	0	14	22	13	0	0	0	0	0	0
<i>Orthocladus complex</i>	186	0	471	1056	38	180	20	71	120	40	38
<i>Parakiefferiella</i>	0	0	0	11	0	0	0	0	0	0	0
<i>Parorthocladus</i>	43	10	0	11	0	0	0	50	0	0	0
<i>Rheocricotopus</i>	57	0	0	211	0	0	0	0	0	20	0
<i>Thienemanniella</i>	0	0	0	22	0	0	0	0	0	0	0
<i>Tvetenia</i>	371	20	14	289	25	280	0	0	0	0	13
Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0
Tribe: Pentaneurini	0	0	0	0	0	0	0	0	0	0	0
<i>Thienemannimyia group</i>	0	0	257	22	0	20	40	21	0	0	0
Family: Empididae	14	0	43	0	0	80	0	0	100	40	0
<i>Neoplasta</i>	0	0	0	0	0	40	0	0	0	0	0
<i>Oreogeton</i>	0	0	0	22	0	0	0	0	0	0	0
<i>Roederiodes</i>	0	0	0	0	0	0	0	0	80	40	13
<i>Wiedemannia</i>	0	0	0	0	0	0	0	0	160	0	0
Family: Pelecorhynchidae	0	0	0	0	0	0	0	0	0	0	0
<i>Glutops</i>	0	0	0	0	0	0	0	0	0	60	0
Family: Psychodidae	0	0	0	0	0	0	0	0	0	0	0
<i>Pericoma/Telmatoscopus</i>	43	0	0	0	263	260	20	0	220	620	200
Family: Simuliidae	0	10	0	0	0	0	0	0	0	20	0
<i>Simulium</i>	29	0	0	0	13	40	0	0	0	0	0
Family: Tipulidae	0	0	14	0	0	0	20	0	0	0	0
<i>Antocha</i>	0	0	14	0	0	0	0	8	40	100	25
<i>Cryptolabis</i>	0	0	14	0	0	0	20	0	0	0	0
<i>Dicranota</i>	14	0	0	0	0	0	0	0	0	20	0
<i>Hexatoma</i>	0	0	57	0	0	0	20	0	0	0	0
Order: Thysanoptera	0	0	0	0	0	0	0	4	0	0	0

Order: Collembola	0	0	0	22	0	0	0	50	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0
Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0
Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0
Family: Aturidae	0	0	0	0	0	0	0	0	0	0	0
<i>Aturus</i>	0	0	0	22	0	0	0	0	0	0	0
Family: Feltriidae	0	0	0	0	0	0	0	0	0	0	0
<i>Feltria</i>	14	0	0	0	0	0	0	0	0	0	0
Family: Hydryphantidae	0	0	0	0	0	0	0	0	0	0	0
<i>Albertathyas</i>	0	20	0	0	0	0	0	0	0	0	0
<i>Protzia</i>	0	0	0	0	0	0	0	4	0	0	0
Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0
<i>Atractides</i>	0	0	0	0	13	0	0	0	0	0	0
Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0
<i>Lebertia</i>	0	0	14	22	38	20	0	40	140	63	0
Family: Sperchontidae	0	0	0	0	0	0	0	0	0	0	0
<i>Sperchon</i>	0	0	29	33	25	20	60	0	40	0	0
Family: Torrenticolidae	0	0	0	0	0	0	0	0	0	0	0
<i>Testudacarus</i>	0	0	57	0	0	0	0	0	60	140	50
<i>Torrenticola</i>	0	0	143	0	13	0	40	0	0	20	0
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0
Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0
Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0
Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0
<i>Rhynchelmis</i>	14	0	0	0	0	0	0	0	0	0	0
Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0
Family: Naididae	0	0	0	0	0	0	0	0	0	0	0
<i>Limnodrilus</i>	0	0	0	0	13	0	0	0	0	0	0
<i>Nais</i>	0	0	1243	22	0	40	0	4	40	0	13
<i>Rhyacodrilus</i>	0	0	43	0	0	0	0	0	0	0	0
Totals:	4597	3520	4797	3783	3982	6760	8980	1381	7600	14060	4599

Taxa present but not included:

Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0
Class: Copepoda	0	0	14	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0
Class: Ostracoda	14	0	0	0	13	0	0	0	0	0	0
Phylum: Nemata	14	0	0	0	0	0	0	0	0	20	13
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0
Class: Turbellaria	14	0	0	0	13	20	0	4	0	0	0
Totals:	42	0	14	0	26	20	0	4	0	20	13