Upper Beaver Gold Project

2021-2023 Fish and Fish Habitat Baseline

Submitted to:

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List of Acronyms

°C	Degrees Celsius
AEM	Agnico Eagle Mines Limited
BIC	Benthic Invertebrate Community
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
cm	Centimetre
CSQG	Canadian Sediment Quality Guidelines
CWQG	Canadian Water Quality Guidelines
DO	Dissolved Oxygen
DQO	Data Quality Objectives
EEM	Environmental Effects Monitoring
EPT	Ephemeroptera, Plecoptera, Trichoptera
FLEN	Fork Length
g	Gram
GPS	Global Positioning System
HDPE	High Density Polyethylene
ISQG	Canadian Interim Sediment Quality Guidelines
km	Kilometre
km^2	Square Kilometre
LEL	Lowest Effect Level
m	Metre
m^2	Square Metre
MDMER	Metal and Diamond Mining Effluent Regulations
MECP	Ministry of the Environment, Conservation and Parks
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mL	Millilitre
MNRF	Ministry of Natural Resources and Forestry
m/s	Metres per Second
PEL	Probable Effect Level
PSQG	Provincial Sediment Quality Guidelines
PWQO	Provincial Water Quality Objectives
QA/QC	Quality Assurance and Quality Control

RPD	Relative Percent Difference
SEI	Story Environmental Inc.
SEL	Severe Effect Level
TID	Total Invertebrate Density
TLEN	Total Length
TSS	Total Suspended Solids
UTM	Universal Transverse Mercator
wwt	Wet Weight

List of Scientific Names

Common Name(s)	Scientific Name
Blacknose Shiner	*Notropis heterolepis*
Bluntnose Minnow	*Pimephales notatus*
Brassy Minnow	*Hybognathus hankinsoni*
Brook Stickleback	*Culaea inconstans*
Burbot	*Lota lota*
Cisco	*Coregonus artedi*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Emerald Shiner	*Notropis atherinoides*
Fathead Minnow	*Pimephales promelas*
Finescale Dace	*Chrosomus neogaeus*
Finescale x Northern Redbelly dace hybrid	*Chrosomus* hybrid
Johnny Darter	*Etheostoma nigrum*
Lake Chub	*Couesius plumbeus*
Lake Whitefish	*Coregonus clupeaformis*
Logperch	*Percina caprodes*
Longnose Dace	*Rhinichthys cataractae*
Mottled Sculpin	*Cottus bairdii*
Northern Pearl Dace	*Margariscus nachtriebi*
Northern Pike / Jackfish / Northern	*Esox lucius*
Northern Redbelly Dace	*Chrosomus eos*
Sauger	*Sander canadensis*
Slimy Sculpin	*Cottus cognatus*
Smallmouth Bass	*Micropterus dolomieu*
Spottail Shiner	*Notropis hudsonius*
Trout Perch	*Percopsis omiscomaycus*
Walleye	*Sander vitreus*
White Sucker	*Catostomus commersonii*
Yellow Perch	*Perca flavescens*

1.0 INTRODUCTION

1.1 Purpose and Objective of the Report

Agnico Eagle Mines Limited (AEM) is proposing to develop the Upper Beaver Gold Project (the Project), located in northeastern Ontario approximately 25 kilometres (km) east of Kirkland Lake, Ontario (Figure 1-1). This report is one of a series of technical support documents prepared by WSP E&I Canada Limited (WSP; formerly Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited), on behalf of AEM to describe the current environmental conditions in the local area.

The scope of work to assess baseline fish and fish habitat included multi-season sampling for the below aspects:

- In-field surface water quality measurements within Ava, York, and Beaverhouse lakes, Misema and Blanche rivers, Victoria and Wawagoshe creeks and nearby unnamed tributaries and ponds;
- In-field surface water quality profile measurements from deep locations within the above noted lakes;
- Primary productivity (chlorophyll *a*, phytoplankton and zooplankton) assessment within Ava, York, and Beaverhouse lakes, Misema and Blanche rivers, and Wawagoshe Creek (as applicable);
- Fish community and habitat assessment using various gear types to target all species and life stages;
- Fall small-bodied and large-bodied fish species lethal sampling to assess contaminants in fish tissue and age assessment; and
- Sediment quality sampling and co-located benthic invertebrate surveys.

A photographic record using consistent vantage points among seasons also provided visual documentation of the seasonal and between-year variability of conditions within the study area. Incidental wildlife observations were communicated to the broader project team and incorporated into other study reports. Common names for species are used within the report however a list of scientific names is provided in the report preface.

1.2 Overview of Baseline Studies

This report has been prepared to summarize the findings of the fish and fish habitat assessments conducted during the 2021 to 2023 periods as follows:

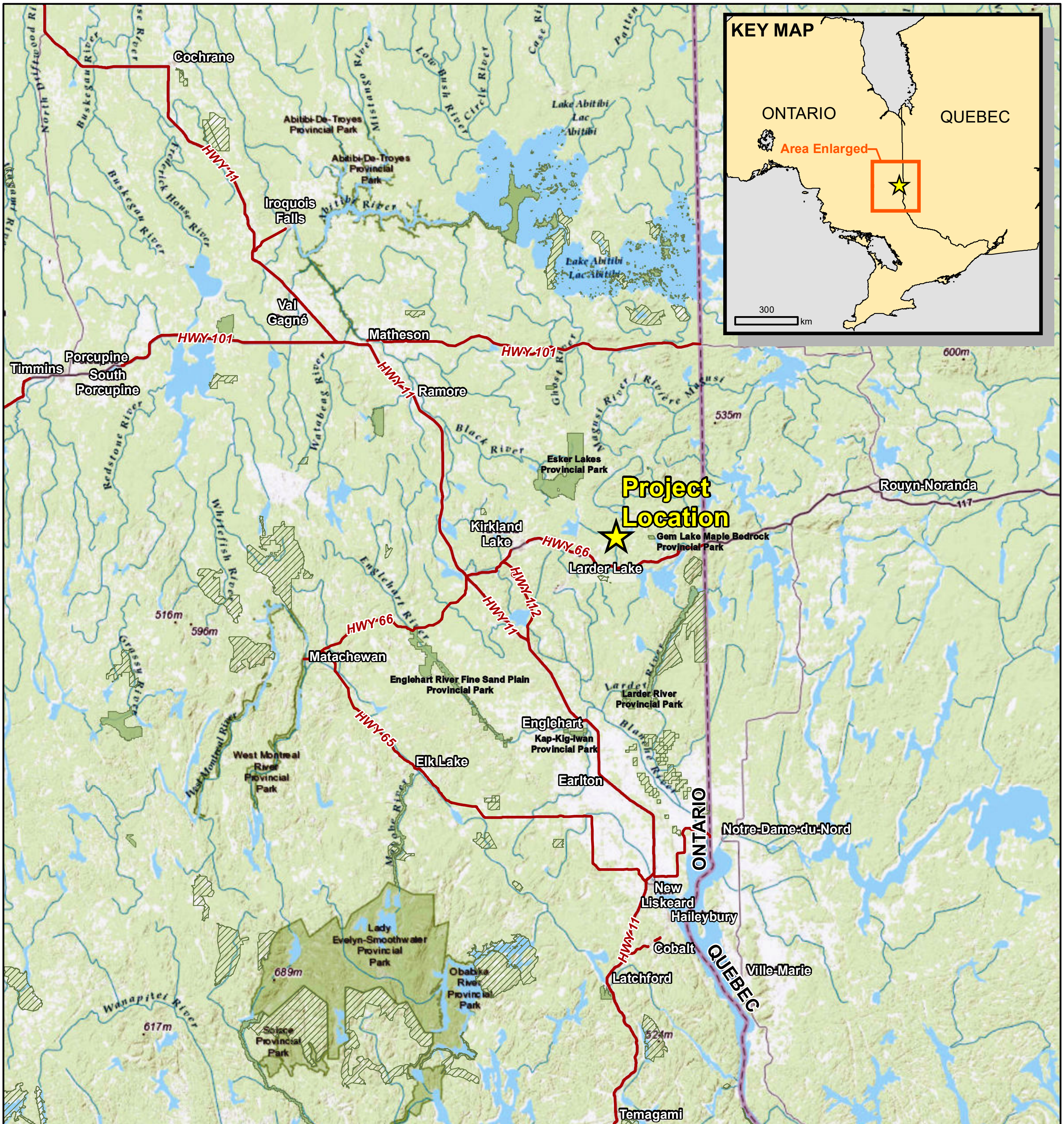
- 2021: spring (16 to 18 June), summer (10 to 24 August) and fall (22 September to 03 October and 08 to 10 November);
- 2022: spring (16 to 26 May), summer (15 to 22 August) and fall (11 to 22 October); and,
- 2023: spring (02 to 03 and 16 to 24 May) and summer sampling program (29 July to 01 August).

Aquatic baseline studies were completed in 2011, 2018, 2021, 2022 and 2023 for the Project within the following waterbodies and watercourses:

- Victoria Creek;
- Ava Lake;
- York Lake;

- Beaverhouse Lake;
- Misema River;
- Wawagoshe Creek;
- Blanche River; and
- Unnamed inland waterbodies and watercourses.

Previous studies included fish habitat and community assessment, detailed bathymetric surveys, fish tissue analyses, surface water quality and sediment quality analyses, as well as benthic invertebrate community surveys and lower trophic level assessment. Fish communities within the region are generally diverse with coolwater game fish species representing the upper trophic species in larger lakes and river systems, and a variety of commonly occurring small-bodied species found within small creeks and beaver ponds.



X:\CA\CAOAK300-OAK\MIS-FS1-ProjectF\2020\Projects\OMEMA2008Z_Agnico_Upper_Beaver IA\11_GIS\Aquatics\Baseline_2023\MXD\Project_Location_2.mxd

LEGEND

- Project Location
- Regional Highways
- Conservation Reserve
- Provincial Park

0 5 10 20 30 40 50 Kilometres

NOTES:
- Background topographic map information extracted from ESRI Base Map Services
- Additional park information, conservation reserve and highway information extracted from Land Information Ontario (MNRF), Queen's Printer for Ontario, 2020/2021

Datum: NAD83
Projection: UTM Zone 17N

AGNICO EAGLE
UPPER BEAVER PROJECT

wsp

UPPER BEAVER GOLD PROJECT

Project Location

PROJECT N°: OMEMA2008	**FIGURE: 1-1**
SCALE: 1:1,100,000	DATE: March 2024

2.0 METHODOLOGY

2.1 Assessment Overview

The 2021 to 2023 aquatic resources assessment field studies contributed to the fisheries resources data previously collected within the sample locations presented on Figure 2-1. A summary of the 2021 to 2023 aquatic resources assessment sampling effort by season is provided in Table 2-1, with a summary of the fish community sampling gear-specific efforts by location and season in Table 2-2. Fish habitat types were characterized during the 2021 baseline studies, with any observed differences noted during the 2022 and 2023 field studies and descriptions of the habitat types are summarized in each section.

2.2 Fish Habitat

Fish habitat assessments were conducted at representative riverine (lotic) and ponded or lake (lentic) stations during the field studies. These assessments characterized the fish habitat types and were collected to support delineation of homogeneous habitats.

In-field surface water quality measurements were recorded at each sample location using handheld portable water quality meters. Physicochemical parameter profiles at 1-metre (m) intervals were also collected within the basins of Ava Lake, York Lake and Beaverhouse Lake as well as the Blanche River, Misema River and Wawagoshe Creek. The water quality instruments were calibrated as needed per the manufacturer's directions and measured the following parameters:

- Temperature;
- pH;
- Conductivity;
- Dissolved oxygen (DO); and
- Depth of parameter measurement (using manual graduation on signal cable or electronic pressure sensor values as available).

2.3 Fish Community

2.4 Culturally Significant Fish Species

Indigenous communities have culturally significant fish species, many related to traditional harvest activities and are important sources of subsistence and country food. These species can vary by community and harvesting activities may vary based on time of year, as such the following list of common names provides a preliminary summary of the species likely to be considered culturally significant and further engagement with the communities will be needed to refine the list:

- Baitfish (includes various minnows and small-bodied species);
- Sportfish: Bass (Largemouth and Smallmouth), Brook Trout, Lake Trout, Lake Whitefish, Northern / Northern Pike/Jackfish, Pickerel / Walleye, Yellow Perch; and
- Coarse fish: Burbot, Catfish (Channel and Brown Bullhead), Sheepshead, Sucker, Goldeye and Mooneye.

Section 3.0 includes fish community descriptions by sample location and confirms presence (or the likelihood of presence based on habitat connectivity) for the above species.

2.5 Fish Community Surveys

Fish community surveys were conducted during summer and fall as per the approved conditions of the Licenses to Collect Fish for Scientific Purposes issued by the Ministry of Natural Resources and Forestry (MNRF). The following gear types were utilized as able, per site-specific habitat conditions:

- Baited gee-style minnow traps;
- Dip nets;
- Seine net;
- Backpack electrofishing; and,
- Gillnets (various stretched mesh sizes).

A summary of the fish sampling gear utilized at each sampling location and by field program is presented in Table 2-2. All fish captured were identified to species by qualified fisheries staff, measured for length (total and fork, as able) and fresh weight, scrutinized for visible malformation, parasites, or evidence of disease, and sex was determined when possible. Additionally, aging structures and whole body individuals (for small-bodied species) were submitted for age assessment, and abundant fish species were collected and submitted for contaminants in fish tissue analysis during the fall assessments.

2.6 Fish Tissue

Sportfish tissue samples for analysis (e.g., metals concentrations) were comprised of skinless, boneless left dorsal epaxial muscle tissue for large-bodied species. The species retained for analysis were determined based on presence and abundance of the species within each sample location, and to support future ecological assessment and monitoring programs.

Small-bodied fish species retained for tissue analysis during the field studies included Common Shiner and Fathead Minnow. Whole body composite samples each consisted of enough small-bodied fish for a minimum total mass greater than 20 grams (g) wet weight. There were eight fish per composite sample and the 75% rule was applied for all composite samples (Stahl et al 2009). Meaning the smallest fish in each sample was generally greater than or equal to 85% of the total length of the largest fish chosen for the sample. If the smallest fish was not within 85% of the largest fish, the size difference (largest to smallest) was not greater than 75%, which was intended to include only one age cohort per composite sample. Individuals from the sampled populations representing the full range of total lengths were submitted for age assessment using species appropriate ageing structures. Most of the Unnamed Streams only contained small-bodied fish species and sampling conducted in 2021 and 2022 characterized these systems, as such, recently surveyed Unnamed Streams in 2023 were not sampled for small-bodied fish tissue.

Large-bodied fish species retained for tissue analysis during the field studies included Northern Pike, Walleye, Lake Whitefish, Smallmouth Bass, White Sucker, Brown Bullhead and Yellow Perch. Individual fish were measured for fork (FLEN) and total lengths (TLEN) and total weight (g). Species specific appropriate ageing structures (e.g., cleithra and scales) were submitted for age assessment. Fillet tissue samples were collected from the left side of the body, with each sample having a total mass greater than 10 grams (g) wet weight.

Fish tissue samples collected by WSP during the 2021 and 2022 field studies were submitted to ALS Environmental, Waterloo, Ontario, for total metals including mercury, methylmercury, as well as percent moisture. Metals of interest analyzed for this study included deleterious substances measured in treated mining effluent under the Metal and Diamond Mining Effluent Regulations (MDMER), and metals known to have an impact on the health of aquatic life and consumers of aquatic biota: arsenic, copper, lead, mercury, selenium, and zinc. Fish tissue metal concentrations were compared among sample areas. Mercury and selenium are often of particular interest when assessing baseline conditions as these metals are known to have negative effects on the health of aquatic life and consumers of aquatic biota, discussed in more detail as follows.

Total mercury concentrations measured in fish tissue were compared to the provincial consumption guidelines (MOECC 2015) and federal food and nutrition standards (Health Canada 2011). Methylmercury concentrations were also compared to the Canadian Council of Ministers of the Environment (CCME) Canadian Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota – methylmercury (CCME 2000).

Selenium is often considered a metal of concern because it can have negative effects on aquatic life. It can be released into aquatic environments naturally through weathering or anthropogenic sources (United States Environmental Protection Agency [US EPA] 2016). Concentrations of selenium were measured in fish tissue during the studies to determine baseline concentrations and for future reference if needed. The Federal Environmental Quality Guideline (FEQG) established for selenium in whole body fish tissue were compared to the study results.

2.7 In-field Surface Water Quality

2.7.1 Lake Profiles

Lake profiles were assessed using temperature (°C) and DO (mg/L) measurements at depth within the three sampling seasons (spring, summer, and fall) in 2021 and 2022. Profiles were measured at 1 m intervals within the deepest location of the fish sampling areas and targeting the deepest part of the lake.

2.7.2 Field Sampling

In-field water quality data were collected by Story Environmental Inc. (SEI), Haileybury, ON and WSP staff during the 2021 to 2023 field surveys and compared to federal and provincial guidelines to assist with interpretation of the water quality data and in assessing habitat quality. In-field water quality measurements were collected at each benthic invertebrate sampling location and at each fish sampling location using a hand-held YSI™ DSS multi-parameter water quality meter. Temperature, DO, pH, conductivity were recorded at the surface, within the thermocline (if present) and near bottom. Surface water quality samples for laboratory analysis were collected during each sampling event (Figure 2-1). The location of all sampling locations was recorded in Universal Transverse Mercator (UTM) using a handheld Global Positioning System (GPS) unit.

2.7.3 Water Quality Data Analysis

The surface water quality assessment documented existing, baseline conditions within the sampled locations and as such, water quality standards for the protection of aquatic life were used for comparison to the laboratory results thereby documenting existing concentrations including naturally elevated parameters that may be present. The water quality results were compared to applicable Canadian Council of Ministers of Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic life (CCME 2016) and Provincial Water Quality Objectives (PWQO, MOEE 1999). Water quality parameter concentrations that were not within these criteria ranges in baseline condition were noted to support interpretation of these values within the context of documenting existing conditions.

2.8 Lower Trophic & Primary Productivity

The lower trophic and primary productivity assessment evaluated eutrophication indicators, including chlorophyll *a*, phytoplankton and zooplankton (first order consumers; animal component of the planktonic community) biomass. These groups are within the lowest trophic levels of an aquatic ecosystem which support the upper-level fish community. These components were sampled during the open-water season from Ava, York and Beaverhouse lakes, Unnamed Stream 7, and Victoria Creek in 2021 and Misema River, Wawagoshe Creek, Blanche River, Ava, York and Beaverhouse lakes in 2022.

2.8.1 Chlorophyll *a*

Chlorophyll *a* samples were collected concurrently with the composite water sample collected for the phytoplankton community analysis in 2021. In-field depth integrated composite samples were collected and stored in black high-density polyethylene (HDPE) bottles, kept cool (on ice or with ice packs) and away from direct light for shipment to ALS Environmental, Thunder Bay, Ontario

2.8.2 Phytoplankton

An interval water sampler (e.g., Kemmerer) was used to collect phytoplankton samples from within the euphotic zone (uppermost layer of a body of water that receives sunlight). At sampling stations with euphotic zones greater than 2 m in depth, water was collected at 2 m intervals and combined into a composite sample in a clean container (e.g., bucket). A sub-sample of the water was poured into a pre-labelled 500 millilitre (mL) opaque plastic bottle and preserved with 2 mL of Lugol’s solution. Phytoplankton samples were kept cool and in the dark for shipment to ALS for analyses of taxonomic composition, abundance, and biomass assessment.

2.8.3 Zooplankton

Zooplankton sampling methods followed a standardized protocol utilizing a 0.13 m diameter, 63 micron (μm) mesh Wisconsin plankton net with a detachable collection bucket (codend) to collect zooplankton samples from the water column. The plankton net was lowered until the bottom of the collection bucket was approximately 30 centimeters (cm) above the bottom sediment and then towed vertically to the surface at a rate of approximately 0.5 metres per second (m/s). Approximately half an Alka-Seltzer tablet was added as a narcotizing agent to prevent contortion of organisms prior to the sample being transferred from the codend to a prelabelled container and preserved with 10% buffered formalin. Zooplankton samples were kept cool (although not frozen) for shipment to Salki Consultants, Winnipeg, Manitoba for taxonomic analysis (i.e., species composition, density, and biomass).

2.8.4 Data Analysis

The lower trophic and primary productivity results analyses focused on total biomass and community composition. Biomass data can be used to interpret ecological significance and has food web linkages. Community composition was based on genus-level identifications for phytoplankton. Calculations were completed using Microsoft Excel and plots were created using RStudio 3.6.2.

2.9 Sediment and Benthic Invertebrate Surveys

2.9.1 Data Analysis

Surficial sediment samples were collected concurrently with benthic invertebrate community (BIC) samples using a Petite Ponar grab sampler during the fall sampling programs (2021 and 2022). Each ponar grab sampled a surface area of 0.023 square metres (m^2). A total of three grab sub-samples were taken at each sample location within similar depths and pooled (homogenized) into one composite sample to account for localized habitat heterogeneity and represent the substrates within the sampling location. Collecting three replicate grabs and homogenizing the benthic samples also increases the likelihood of sampling all available taxa from the BIC by reducing the effects of intra-sample variation inherent to benthic communities.

The substrate physicochemical properties at each benthic sampling location (i.e., metal and nutrient concentrations) were characterized to further support interpretation of the benthic community between and among sample locations. All surficial sediment sampling followed the protocols as set out by Canadian Association for Laboratory Accreditation (CALA) Guide to Current Sampling Practices (Fowlie 2014) and Environment Canada's technical guidance for environmental effects monitoring (EEM; 2012).

The following quality assurance and control (QA/QC) measures were implemented during sediment quality and benthic invertebrate sample collection:

- Sampling gear utilized was appropriate for substrate present;
- Laboratory gloves (e.g., nitrile) were worn throughout the sampling process and replaced at each sampling location;
- Equipment was thoroughly rinsed and cleaned using appropriate cleansers and decontaminant agents prior to use between sampling locations;
- BIC samples were stored in appropriate containers using appropriate preservatives as directed by the laboratory;
- Sediment samples were placed in clean, pre-labeled, laboratory prepared glass jars;
- Blind field duplicate sediment quality samples were collected for 10% of total samples;
- Sample identification, location, date and other pertinent information was recorded in a field logbook / log sheet, on the sample container and on laboratory Chain of Custody (COC) forms;
- An experienced taxonomist was used for identification of freshwater macroinvertebrates; and
- Electronic data received from the taxonomist were checked to ensure correctness by qualified staff.

All benthic samples were labeled with unique identification numeration. The BIC samples were field sieved and preserved with 10% buffered formalin solution within six hours of sample collection, or as soon as practical, to maintain sample integrity and minimize the likelihood of within sample predation or decomposition.

2.9.2 Laboratory Sampling Processing

Substrate composition was characterized through qualitative visual field assessments and quantitative laboratory grain size analysis. Laboratory chemical analysis was conducted by ALS Environmental, Waterloo, which is accredited by the CALA in accordance with ISO/IEC 17025:2005 – General Requirements for the Competence of

Testing and Calibration Laboratories for the tested parameters. The occurrence of large particle sizes (cobble and boulder) within representative reaches and sections of the rivers and creeks was recorded by field staff during habitat assessment.

Taxonomist laboratory BIC sample processing procedures included subsampling as required for samples containing large amounts of organic material and/or large sample volumes, to identify a minimum of 100 individuals. Sorting included washing samples through 250 and 500 µm sieves, and organism sorting and identification using a stereomicroscope (10 times multiplication). All invertebrates were identified to the lowest practical level and generally to the genus level, with the exception of leeches; oligochaetes, stoneflies, mayflies, dragonflies, amphipods, and adult beetles and bugs, which were identified to the species level.

2.9.3 Sediment Quality Data Analysis

The sediment quality assessment documented existing, baseline conditions within the sampled locations and as such, sediment quality standards for the protection of aquatic life were used for comparison to the laboratory results thereby documenting existing concentrations including naturally elevated parameters that may be present. The analytical sediment results were compared to the Ontario Provincial Sediment Quality Guidelines (PSQG; MOE 2008) and Canadian Sediment Quality Guidelines (CSQG) for the Protection of Aquatic Life (CCME 2001). The CSQG criteria are established based on the formal federal protocol to evaluate potential adverse biological effects in aquatic environments. They prescribe a level of contamination at which there are probable effects (Probable Effect Level, PEL). The PSQG are guidelines which promote the protection of aquatic life and are based on sound scientific information. The PSQG establish three levels of effects that reflect potential chronic and long-term effects of contaminants on benthic invertebrates as follows:

- No Effect Level: fish and sediment-dwelling organisms are not affected by chemicals in the sediment.
- Lowest Effect Level (LEL): level of sediment contamination that can be tolerated by the majority of sediment-dwelling benthic invertebrates.
- Severe Effect Level (SEL): level of sediment contamination at which pronounced disturbance of the sediment-dwelling community can be expected.

Sediment quality parameter concentrations that exceeded guidelines in baseline condition were noted to support interpretation of these values within the context of documenting existing conditions unrelated to the proposed Project. Sediment grain size and chemical analyses were conducted at a lab accredited by the CALA in accordance with ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories.

2.9.4 Sediment Quality Assurance and Control

A data quality assessment was completed on all sediment quality data. The assessment included a comparison of the field duplicates to data quality objectives (DQOs).

The precision of the sediment quality data was assessed using blind, split field duplicate samples collected from the composited and homogenized ponar grabs. The relative percent difference (RPD) between measured data and the duplicate from the same location was analyzed using the following methods. The sediment sample results did not meet the DQO when the RPD was greater than 30%.

Blind, split field duplicate samples were collected to verify analytical results and laboratory precision by assessing the relative percent difference (RPD) between measured data and the duplicate from the same site. The RPD was calculated by dividing the difference of the two measurements by the average of the measurements and multiplying by 100. The equation for RPD is shown below:

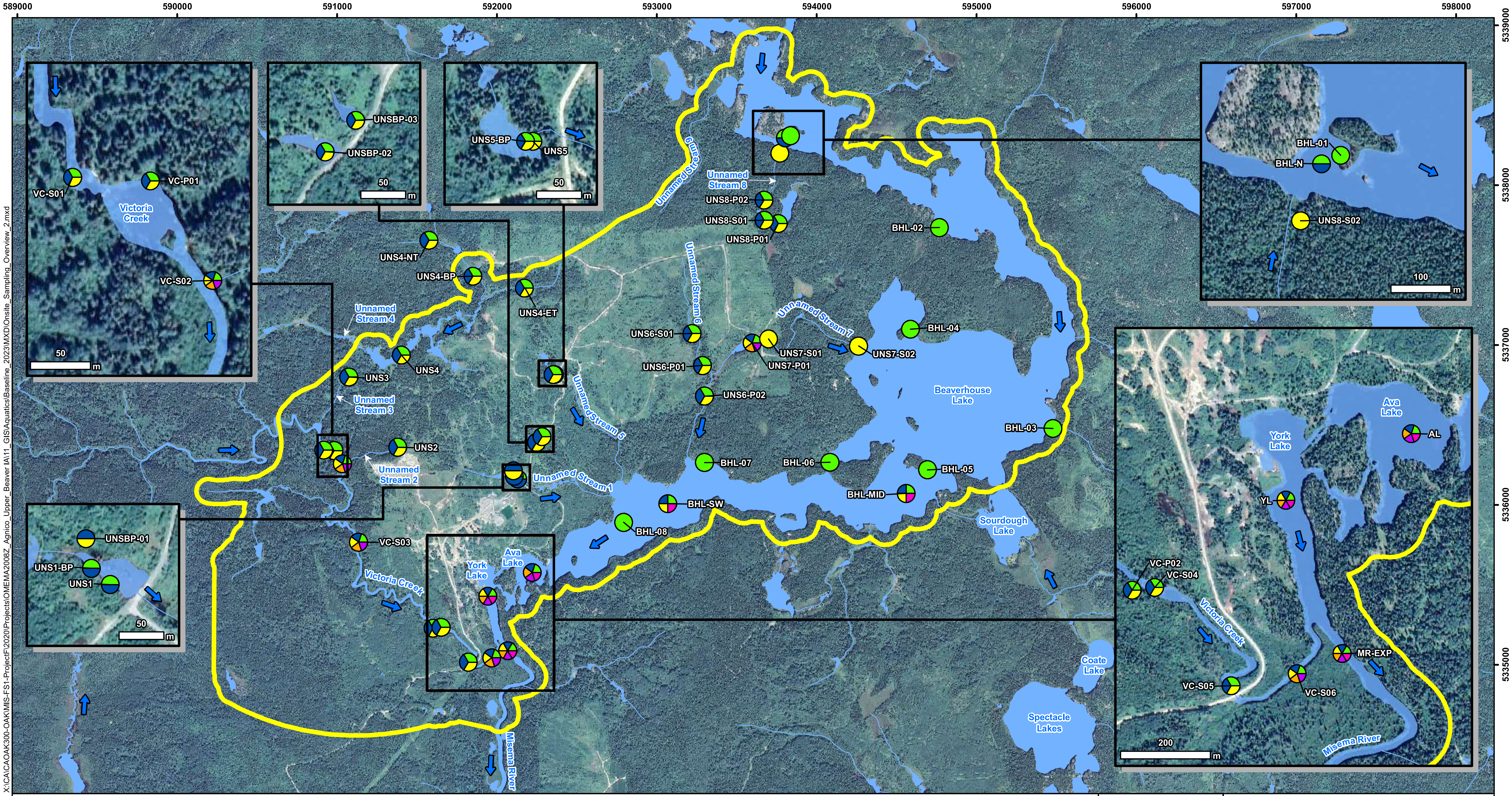
$$RPD = \frac{(X1 - X2)}{\left(\frac{X1 + X2}{2}\right)} \; x \; 100$$

Further data evaluation was considered when the RPD between native and duplicate sample results was greater than 30%.

2.9.5 Benthic Invertebrate Data Analysis

The BIC at each sample location were characterized using descriptive indices, including total invertebrate density, Simpson's index of diversity, evenness and taxon richness. These indices were calculated and summarized using the guidelines for Environmental Effects Monitoring as stipulated by Environment Canada (2002). In addition, the relative percent community contribution of the Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies; EPT) taxa groups and the Chironomid (non-biting midge) taxa were calculated to further characterize the sample station benthic invertebrate communities. The BIC indices calculations were completed using Microsoft Excel and plots were created using RStudio 3.6.2.

- Total invertebrate density (TID) was calculated for each replicate station as the total number of individuals per square metre.
- Simpson's Index of Diversity (I-D) is a descriptor of both the abundance patterns and taxonomic richness of the community. Simpson's Index of Diversity can range from 0 to 1 and reaches its greatest indication of diversity at a value of 1.
- Simpson's Evenness (E) is similar to Simpson's Index of Diversity but is a measure of how the abundance of individuals is distributed within the taxonomic groups inhabiting the sample location. Evenness ranges from 0 to 1 and reaches complete evenness at 1.
- Taxon richness (Family Richness) is a count of the number of taxa found within an area. For this study richness was reported at the family level.
- The percent EPT is the percentage of individual benthic invertebrates within a sample. High relative percent EPT composition can indicate un-impacted water quality, since EPT taxa are generally intolerant of environmental stresses and are typically more abundant in areas unaffected by anthropogenic factors.
- The percentage of the community represented by Chironomids (family: Chironomidae) were also calculated. Some genera of this taxa group are more tolerant of environmental stresses (pollution), consequently Chironomids tend to dominate the benthic invertebrate community in areas with degraded conditions.



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Sampling Location (2021-2023)

- Aquatic Resource
- Surface Water
- Habitat Assessment
- Water Profile
- Sediment Quality
- Benthic Invertebrate Community

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

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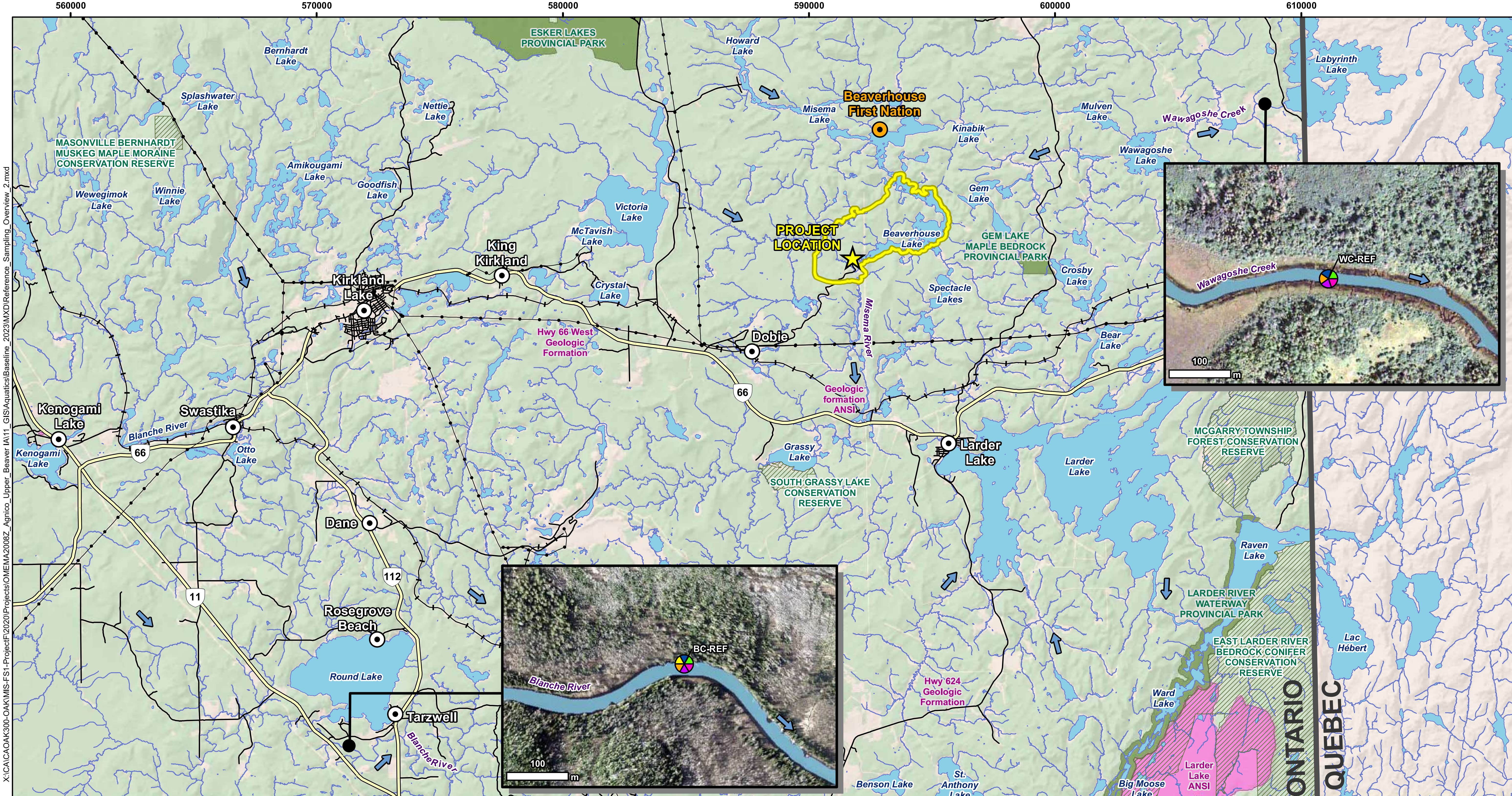
Sample Locations (2021-2023)

PROJECT Nº: OMEMA2008	FIGURE: 2-1a
SCALE: 1:22,500	DATE: March 2024



LEGEND

- Project Location
- Aquatic Study Area
- Town / Community
- First Nation Community
- Conservation Reserve
- Provincial Park
- Candidate ANSI
- Provincial Border
- Transmission Line
- Railway
- Highway
- Local Road
- Resource / Recreation Road
- Watercourse
- Waterbody
- Flow Direction

Sampling Location (2021-2023)

- Aquatic Resource
- Surface Water
- Habitat Assessment
- Water Profile
- Sediment Quality
- Benthic Invertebrate Community

0 2.5 5 10 15 20 Kilometres

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from AgMaps, MAFRA.

Datum: NAD83
Projection: UTM Zone 17N

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Sample Locations (2021-2023)

PROJECT N°: OMEMA2008	FIGURE: 2-1b
SCALE: 1:150,000	DATE: March 2024

Table 2-1: Fish and Fish Habitat Field Study Locations

Sample Location	Sample ID	UTM Easting (m)	UTM Northing (m)	Fish Community	Fish Tissue	Surface Water, Lower Trophic	Habitat Observations	Sediment and Benthos Sampling
Unnamed Beaver Pond 1	UNSBP-01	592,103	5,336,213	—	—	Fa[2]	Fa[2]	—
Unnamed Beaver Pond 2	UNSBP-02	592,194	5,336,333	Sp[3]	—	Fa[2]	Fa[2]	—
Unnamed Beaver Pond 3	UNSBP-03	592,281	5,336,412	Sp[3]	—	Fa[2]	Fa[2]	—
Unnamed Stream 1	UNS1	592,188	5,336,130	Sp[3], Su[3]	—	Sp[3], Su[3]	Sp[3], Su[3]	—
	UNS1-BP	592,109	5,336,180	Su[3]	—	Sp[3]	—	—
Unnamed Stream 2	UNS2	591,380	5,336,366	Sp[3], Su[3]	—	Sp[3], Su[3]	Sp[3], Su[3]	—
Unnamed Stream 3	UNS3	591,072	5,336,803	Sp[3]	—	Sp[3], Su[3]	—	—
Unnamed Stream 4	UNS4	591,342	5,336,901	Sp[3], Su[3]	—	Sp[3], Su[3]	Sp[3], Su[3]	—
	UNS4-BP	591,864	5,337,459	Sp[3], Su[3]	—	Sp[3], Su[3]	—	—
	UNS4-ET	592,172	5,337,357	Su[3]	—	Su[3]	Sp[3]	—
	UNS4-NT	591,575	5,337,656	Sp[3]	—	Sp[3]	Sp[3]	—
Unnamed Stream 5	UNS5	592,406	5,336,818	Sp[3]	—	Sp[3]	Sp[3]	—
	UNS5-BP	592,353	5,336,804	Sp[3], Su[3]	—	Sp[3]	—	—
Unnamed Stream 6	UNS6-P01	593,287	5,336,872	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	UNS6-P02	593,327	5,336,710	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	UNS6-S01	593,221	5,337,072	Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	UNS6-S02	593,210	5,336,304	—	—	—	Su[1]	—
Unnamed Stream 7	UNS7-P01	593,598	5,337,014	Su[1], Fa[1], Sp[2], Fa[2]	Fa[1]	Sp[2], Fa[2]	Su[1], Fa[1], Sp[2], Fa[2]	Fa[1]
	UNS7-S01	593,700	5,337,039	—	—	—	Su[1]	—
	UNS7-S02	594,263	5,336,994	—	—	—	Su[1]	—
Unnamed Stream 8	UNS8-P01	593,816	5,337,807	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	UNS8-P02	593,671	5,337,907	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	UNS8-S01	593,672	5,337,781	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	UNS8-S02	593,770	5,338,201	—	—	—	Su[1]	—
Ava Lake	AL	592,220	5,335,582	Sp[3]	—	Sp[1], Su[1], Fa[1], Sp[2], Fa[2], Sp[3]	Su[1], Fa[1]	Fa[1]
Beaverhouse Lake	BL-MID	594,547	5,336,079	Fa[2]	Fa[1], Fa[2]	Sp[1], Su[1], Fa[1], Sp[2], Fa[2]	Su[1], Fa[1]	—
	BHL-N	593,805	5,338,296	Fa[2]	Fa[1], Fa[2]	Fa[2]	—	—
	BL-SW	593,069	5,336,008	—	—	Sp[1], Su[1], Fa[1], Sp[2], Fa[2]	Su[1], Fa[1]	—
	BHL-01	593,837	5,338,310	Su[1], Fa[1]	—	—	Su[1], Fa[1]	—
	BHL-02	594,769	5,337,735	Su[1], Fa[1]	—	—	Su[1], Fa[1]	—
	BHL-03	595,479	5,336,479	Su[1]	—	—	Su[1]	—
	BHL-04	594,588	5,337,100	Su[1], Fa[1]	—	—	Su[1], Fa[1]	—
	BHL-05	594,694	5,336,220	Su[1], Fa[1]	—	—	Su[1], Fa[1]	—

Sample Location	Sample ID	UTM Easting (m)	UTM Northing (m)	Fish Community	Fish Tissue	Surface Water, Lower Trophic	Habitat Observations	Sediment and Benthos Sampling
	BHL-06	594,084	5,336,267	Su[1]	—	—	Su[1]	—
	BHL-07	593,299	5,336,266	Su[1]	—	—	Su[1]	—
	BHL-08	592,793	5,335,891	Su[1]	—	—	Su[1]	—
Blanche River	BR-REF	571,307	5,315,741	Fa[2]	—	Su[2], Fa[2]	Fa[2]	Fa[2]
Misema River	MR-EXP	592,068	5,335,088	Sp[2], Fa[2]	Fa[2]	Fa[2]	Fa[1], Fa[2]	Fa[1], Fa[2]
Victoria Creek	VC-P01	590,981	5,336,308	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	VC-P02	591,700	5,335,216	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	VC-S01	590,932	5,336,343	Su[1], Sp[2]	—	Sp[2]	Su[1], Sp[2]	—
	VC-S02	591,016	5,336,273	Su[1], Fa[1], Sp[2]	Fa[1]	Sp[2]	Su[1], Fa[1], Sp[2]	Fa[1]
	VC-S03	591,135	5,335,767	Su[1], Sp[2]	—	Sp[2]	Su[1], Fa[1], Sp[2]	Fa[1]
	VC-S04	591,646	5,335,237	Su[1]	—	Sp[2]	Su[1], Sp[2]	—
	VC-S05	591,821	5,335,016	Su[1], Fa[1], Sp[2]	—	Sp[2]	Su[1], Fa[1], Sp[2]	—
	VC-S06	591,968	5,335,043	Su[1], Fa[1], Sp[2]	—	Sp[2]	Su[1], Fa[1], Sp[2]	Fa[1]
Wawagoshe Creek	WC-REF	608,521	5,341,827	Fa[2]	—	Su[2], Fa[2]	Fa[2]	Fa[2]
York Lake	YL	591,924	5,335,424	Su[1], Fa[1], Fa[2], Sp[3]	Fa[1], Fa[2]	Sp[1], Su[1], Fa[1], Sp[2], Fa[2], Sp[3]	Su[1], Fa[1]	Fa[1]

Sp[1] spring sampling program (16 to 18 June 2021)
Su[1] summer sampling program (10 to 24 August 2021)
Fa[1] fall sampling program (22 September to 03 October and 08 to 10 November 2021)
Sp[2] spring sampling program (16 to 26 May 2022)
Su[2] summer sampling program (15 to 22 August 2022)
Fa[2] fall sampling program (11 to 22 October 2022)
Sp[3] spring sampling program (02 to 03 and 16 to 24 May 2023)
Su[3] summer sampling program (29 July to 01 August 2023)

Table 2-2: Fish Community Gear-Specific Sampling Summary by Location and Season

Sample Location	Sample ID	Gill Net	Dip Net	Minnow Trap	Electrofishing	Spawning Survey
Unnamed Beaver Pond 2	UNSBP-02	—	—	Sp[3]	—	—
Unnamed Beaver Pond 3	UNSBP-03	—	—	Sp[3]	—	—
Unnamed Stream 1	UNS1	—	Sp[3], Su[3]	Sp[3], Su[3]	Sp[3]	—
	UNS1-BP	—	—	Su[3]	—	—
Unnamed Stream 2	UNS2	—	Sp[3], Su[3]	Sp[3], Su[3]	—	—
Unnamed Stream 3	UNS3	—	—	Sp[3], Su[3]	—	—
Unnamed Stream 4	UNS4	—	Sp[3]	Sp[3], Su[3]	Sp[3], Su[3]	—
	UNS4-BP	—	—	Sp[3], Su[3]	—	—
	UNS4-ET	—	—	Su[3]	—	—
	UNS4-NT	—	Sp[3]	—	—	—
Unnamed Stream 5	UNS5	—	Sp[3]	Sp[3]	—	—
	UNS5-BP	—	—	Sp[3], Su[3]	—	—
Unnamed Stream 6	UNS6-S01	—	—	Sp[2]	—	—
	UNS6-P01	—	—	Su[1], Sp[2]	—	—
	UNS6-P02	—	—	Sp[2]	—	—
Unnamed Stream 7	UNS7-P01	—	—	Su[1], Fa[1], Sp[2]	—	—
Unnamed Stream 8	UNS8-P01	—	—	Su[1], Sp[2]	—	—
	UNS8-P02	—	—	Su[1], Sp[2]	—	—
	UNS8-S01	—	—	Su[1], Sp[2]	—	—
Ava Lake	AL	—	—	—	—	Sp[3]
Beaverhouse Lake	BL-MID	Fa[1], Fa[2]	—	Fa[1]	—	—
	BHL-N	Fa[1], Fa[2]	—	Fa[1]	—	—
	BHL-01	Su[1]	—	Su[1]	—	—
	BHL-02	Su[1]	—	Su[1]	—	—
	BHL-03	Su[1]	—	Su[1]	—	—
	BHL-04	Su[1]	—	Su[1]	—	—
	BHL-05	Su[1]	—	Su[1]	—	—
	BHL-06	Su[1]	—	—	—	—

Sample Location	Sample ID	Gill Net	Dip Net	Minnow Trap	Electrofishing	Spawning Survey
	BHL-07	Su[1]	—	Su[1]	—	—
	BHL-08	Su[1]	—	Su[1]	—	—
Blanche River	BR-REF	—	—	Fa[2]	—	—
Misema River	MR-EXP	Sp[2], Fa[2]	—	Sp[2], Fa[2]	—	—
Victoria Creek	VC-P01	—	—	Su[1], Sp[2]	—	—
	VC-S01	—	—	Su[1], Sp[2]	—	—
	VC-S02	—	—	Su[1], Fa[1], Sp[2]	Fa[1]	—
	VC-S03	—	—	Su[1], Sp[2]	—	—
	VC-S04	—	—	Su[1], Sp[2]	—	—
	VC-P02	—	—	Su[1], Sp[2]	—	—
	VC-S05	—	—	Su[1], Fa[1], Sp[2]	—	—
	VC-S06	—	—	Su[1], Fa[1], Sp[2]	—	—
Wawagoshe Creek	WC-REF	—	—	Fa[2]	—	—
York Lake	YL	Fa[1], Fa[2]	—	Fa[1]	—	Sp[3]

Electrofishing refers to the use of a backpack electrofishing unit to sample an isolated segment of habitat.

Sp[1] spring sampling program (16 to 18 June 2021)

Su[1] summer sampling program (10 to 24 August 2021)

Fa[1] fall sampling program (22 September to 03 October and 08 to 10 November 2021)

Sp[2] spring sampling program (16 to 26 May 2022)

Su[2] summer sampling program (15 to 22 August 2022)

Fa[2] fall sampling program (11 to 22 October 2022)

Sp[3] spring sampling program (02 to 03 and 16 to 24 May 2023)

Su[3] summer sampling program (29 July to 01 August 2023)

3.0 RESULTS

The following sections provide location-specific assessment results for the 2021 to 2023 fish and fish habitat studies, including as completed and appropriate:

- In-field surface water quality sampling locations and measured parameters in Appendix A (Tables A1-1 to A3-1 and Plates A1-1 to A1-11);
- Fish habitat and community sample locations, survey results including gear-specific capture results listing fish species occurrence in each waterbody in Appendix B (Tables B1-1 to B3-3);
- Concentrations of select contaminants of concern in fish tissue, including total mercury and methylmercury, as well as fish ageing results in Appendix C (Tables C1-1 to C2-1 and Figures C1-1 to C2-5);
- Lower trophic and primary productivity results in Appendix D (Figures D1-1 to D1-10);
- Sediment quality sample locations and laboratory results in Appendix E (Tables E1-1 to E2-1);
- The BIC sample locations and taxonomic results including descriptive community-based metrics are provided in Appendix F (Tables F1-1 to F2-2 and Figures F1-1 to F2-8);
- Data quality assurance and control assessments are in Appendix G (Tables G1-1 to G2-1); and
- A photographic record of site conditions is provided in Appendix H.

The following sections are organized by general study areas and present the location-specific findings for the above noted study components, as applicable with reference to the season and year specific data contained in the appendices. These report sections summarize the 2021 to 2023 findings with some reference to earlier baseline assessments. The 2021 to 2023 field data and laboratory results summaries by year and location are provided within the appendices as noted above.

3.1 Unnamed Streams

3.1.1 Unnamed Stream 1

3.1.1.1 Surface Water Quality

In-field water quality measurements were taken at two sites in Unnamed Stream 1 (UNS1 and UNS1-BP) during the spring and summer of 2023. There were two exceedances of the PWQO or CWQG for DO for the general protection of coldwater biota (6.5 mg/L). All in-field pH measurements were within the PWQO and CWQG range of 6.5 to 9.0 in 2023. Detailed in-field measurements are presented in Appendix A (Table A3-1).

3.1.1.2 Fish Habitat

Unnamed Stream 1 is a shallow narrow stream located east of an Unnamed Road. The wetted channel width ranged from 0.3 to 0.9 m and the maximum total water depth ranged from 0.03 to 0.4 m. Abundant emergent macrophytes (e.g., cattail and horsetail) dominated the riparian zone with herbaceous vegetation and woody shrubs transitioning to mixed forest. The stream bottom was soft and mucky and abundant woody debris provided in-stream cover.

3.1.1.3 Fish Community

Fish community surveys were completed in UNS1 in 2023 by WSP and in 2020 by SEI. A total of seven fish species were detected throughout the study period (Table 3-1), with Finescale Dace being the most frequently caught species. Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coolwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A total of 1,773 individuals were captured using dip nets, minnow traps and backpack electrofishing with minnow traps being the most effective method of capture (Appendix B; Tables B3-1 to B3-3).

3.1.2 Unnamed Stream 2

3.1.2.1 Surface Water Quality

In-field water quality measurements were taken at one location on Unnamed Stream 2 (UNS2) during the spring and summer of 2023. One DO measurement exceeded of the PWQO or CWQG for DO for the general protection of coldwater biota (6.5 mg/L). All in-field pH measurements fell within the PWQO and CWQG range of 6.5 to 9.0 in 2023. Detailed in-field measurements are presented in Appendix A (Table A3-1).

3.1.2.2 Fish Habitat

Unnamed Stream 2 had a wetted channel width ranging from 0.2 to 0.5 m and a maximum total water depth ranging from 0.05 to 0.15 m in spring but was dry in summer. Steep banks (~1.5 m) were highly eroded and substrate consisted of silt. The stream flows through a culvert under an site trail. The downstream reach is located in a deciduous forest with trees and shrubs lining the banks. These banks were substantially eroded and undercut with abundant woody debris.

This is a headwater stream ultimately flowing into Vicotria Creek to the west. The upstream reaches of are characterized by a hummocky wetland within a dense tamarack stand. This section of stream had very little flow and abundant algal growth with a mucky bottom. The upstream reach is located in a wetland with grasses and alder lining the banks and some woody debris providing in-stream cover.

3.1.2.3 Fish Community

Fish community surveys were completed in Unnamed Stream 2 in 2023. A single fish species (Brook Stickleback) was detected throughout the study period (Table 3-1). Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of cool to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A total of 5 individuals were captured using dip nets and minnow traps with minnow traps being the only effective method of capture (Appendix B; Tables B3-1 and B3-3).

3.1.3 Unnamed Stream 3

3.1.3.1 Surface Water Quality

In-field water quality measurements were taken at one location on Unnamed Stream 3 (UNS3) during the spring and summer of 2023. One DO measurement exceeded of the PWQO or CWQG for DO for the general protection of coldwater biota (6.5 mg/L). All in-field pH measurements fell within the PWQO and CWQG range of 6.5 to 9.0 in 2023. Detailed in-field measurements are presented in Appendix A (Table A3-1).

3.1.3.2 Fish Habitat

Unnamed Stream 3 is located in a mature mixed coniferous and deciduous forest. A stagnant beaver pond at the upper reach of this stream is approximately 0.5 m deep, 30 m long and 6 m wide and does not receive continuous surface flow. The riparian zone was densely vegetated and dominated by grasses, sedges, herbaceous vegetation and shrubs transitioning to mixed forest. Abundant submergent macrophytes (i.e. algae and milfoil spp.), fallen logs and woody debris were present within the waterbody. Water was brown in colour, turbid and tea-stained.

3.1.3.3 Fish Community

Fish community surveys were completed in spring 2023; however, no fish species were detected (Table 3-1). The shallow, stagnant conditions and low dissolved oxygen observed in summer did not provide suitable fish habitat . Studies conducted by SEI in 2020 also deemed Unnamed Stream 3 unsuitable fish habitat (SEI 2021). Minnow traps were the only method of capture deployed in this waterbody (Appendix B; Table B3-1).

3.1.4 Unnamed Stream 4

3.1.4.1 Surface Water Quality

In-field water quality measurements were taken at three locations in Unnamed Stream 4 (UNS4, UNS4-BP and UNS4-ET) during the spring and summer of 2023. Three DO measurements exceeded of the PWQO or CWQG for DO for the general protection of coldwater and warmwater biota (6.5 mg/L and 5 mg/L). All in-field pH measurements were less than the PWQO and CWQG range of 6.5 to 9.0 in 2023. Detailed in-field measurements are presented in Appendix A (Table A3-1).

3.1.4.2 Fish Habitat

Unnamed Stream 4 (UNS4) is a meandering stream within a floodplain that flows into a beaver pond (UNS4-BP). The riparian zone was dominated by grasses and sedges, transitioning to small shrubs and coniferous forest. Woody debris provides in-stream cover and substrate consisted mainly of silt. Depths ranged from 0.1 to 0.5 m. The large beaver pond is located within a hummocky wetland surrounded by coniferous forest and a historic (inactive) beaver lodge is located to the west. The water was brown, tea-stained in colour and the substate consisted of soft, fine-grained sediment.

The Unnamed Stream 4 north tributary (UNS4-NT) is located within a floodplain, banked by dense alders. No visible stream or defined flow path is observed and is a collection of small (>5 cm in depth), isolated pockets of water with dense algae growth. Substrate is soft and is comprised of muck. Shallow, isolated pools do not provide suitable habitat for a sustainable fish community.

Unnamed Stream 4 east tributary (UNS4-ET) is a shallow stagnant pond with little to no flow located within a floodplain to the east, ponded by a beaver dam to the west. Large wood dead-heads, floating and emergent vegetation provide in-stream cover. The riparian zone was dominated by grasses and sedges with vascular plants and shrubs (sweet-joe-pyeweed and alders), transitioning to a mostly black spruce forest. The water was brown in colour and the substate consisted of soft, fine-grained sediment. Unnamed Stream 4 East Tributary dries up in the summer months further upstream as it meanders through a floodplain into a coniferous forest.

3.1.4.3 Fish Community

Fish community surveys were completed in Unnamed Stream 4 in 2023 by WSP E&I and in 2020 by SEI. A total of 11 fish species were detected throughout the study period (Table 3-1), with Finescale Dace being the most frequently caught species. Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A total of 4,210 individuals were captured using dip nets, minnow traps and backpack electrofishing, with minnow traps being the most effective method of capture (Appendix B; Tables B3-1 to B3-3).

Fish community within Unnamed Stream 4 north tributary was not sampled due to shallow water that did not allow use of collection/capture gear and represented unsuitable fish habitat.

3.1.5 Unnamed Stream 5

3.1.5.1 Surface Water Quality

In-field water quality measurements were taken at two locations in Unnamed Stream 5 (UNS5 and UNS5-BP) during the spring of 2023. Measurements were within the acceptable range of the PWQO or CWQG for DO for the general protection of coldwater and warmwater biota (6.5 mg/L and 5 mg/L). All in-field pH measurements were within the PWQO and CWQG range of 6.5 to 9.0 in 2023. Detailed in-field measurements are presented in Appendix A (Table A3-1).

3.1.5.2 Fish Habitat

In the spring Unnamed Stream 5 (UNS5) was approximately 0.05 m deep, 0.10 m wide with some larger pools approximately 0.30 m width and was dry during the summer site visit. This watercourse receives flow from UNS5-BP where the watercourse is directed through a culvert under a site trail. Downstream of the culvert, flow continues underground and re-emerges within a wetland. Downstream of the wetland, flow is received by another beaver pond. The riparian zone of UNS5 consists of grasses, sedges, cattail and overhanging alder with some shrubs transitioning to coniferous forest upland. The substrate consisted mainly of soft, fine-grained sediments. UNS5-BP is a small beaver pond located within a hummocky wetland. Floating and emergent macrophytes were present within the waterbody (i.e., cattail, horsetail and algae). Water was brown in colour containing high TSS and woody debris and submergent vegetation provides in-stream cover.

3.1.5.3 Fish Community

Fish community surveys were completed in Unnamed Stream 5 by WSP E&I in 2023 and SEI in 2020. A total of seven fish species were detected throughout the study period (Table 3-1), with Finescale Dace being the most frequently caught species. Fish species records show the thermal guild classification for these locations represents a range of warm to coolwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A total of 729 individuals were captured using dip nets and minnow traps, with minnow traps being the only effective method of capture (Appendix B; Tables B3-1 to B3-3).

3.1.6 Unnamed Stream 6

3.1.6.1 Surface Water Quality

In-field water quality measurements were taken at two locations in Unnamed Stream 6 (UNS6-P01) in the summer of 2021 and at three locations in the spring of 2022. In 2021 and 2022, most DO measurements were less than the PWQO range required for coldwater and warmwater biota and most measurements did not meet the CWQG criteria for the general protection of coldwater biota (6.5 mg/L). Most in-field pH measurements exceeded the PWQO and CWQG range of 6.5 to 9.0. Detailed in-field measurements are presented in Appendix A (Table A1-1 and A2-1).

3.1.6.2 Fish Habitat

Unnamed Stream 6 is characterized by a series of ponded habitat with connecting streams within an open wetland that ultimately drains into Beaverhouse Lake to the south. The water had a brown, tea-stained colour. The surrounding areas consisted of an open grass area and a mixed deciduous and coniferous forest with shrub understory. Emergent tall grass vegetation provided almost complete cover to the channel. The extreme low flow and poorly defined channel at Beaverhouse Lake likely limits fish passage upstream into this stream.

3.1.6.3 Fish Community

Fish community surveys were completed in Unnamed Stream 6 in 2021 and 2022. A total of five fish species were detected throughout the study period (Table 3-1), with Brook Stickleback being the most frequently caught species. Fish species records show the thermal guild classification for these locations represents a range of warm to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A total of 48 individuals were captured using minnow traps in 2022, while no fish were captured in 2021 (Appendix B; Tables B1-1 and B2-1).

3.1.7 Unnamed Stream 7

3.1.7.1 Surface Water Quality

In-field water quality measurements were taken at one location in Unnamed Stream 7 (UNS7-P01) during the summer and fall field studies in 2021 and spring and fall field studies of 2022. In 2021 and 2022, most DO measurement satisfied the PWQO range required for coldwater and warmwater biota and the CWQG criteria for the general protection of coldwater biota (6.5 mg/L). In 2021, all pH measurements met the PWQO and CWQG criteria of 6.5 to 9.0; however, in 2022, all pH measurements exceeded this range. This variability is likely due to measurements taken at different depths or locations. Detailed in-field measurements are presented in Appendix A (Table A1-1 and A2-1).

3.1.7.2 Fish Habitat

Unnamed Stream 7 is a small watercourse located west of Beaverhouse Lake. The shoreline was dominated by speckled alder, black spruce, tamarack, shrubs and emergent grasses. The shallow margins of the tea-stained pond support low to moderate abundance of floating, emergent and submergent macrophytes. The substrate was comprised of silt and muck with woody debris. Dead, standing trees and floating logs were present within the pond. There was evidence of beaver activity, including observations of the beaver and an actively maintained dam. The watercourse had low flow and a maximum total depth of approximately one metre within the ponded habitat.

3.1.7.3 Fish Community

Fish community surveys were completed in 2021 and 2022. A total of four fish species were detected throughout the study period (Table 3-1). Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coolwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A summary of the fish community survey results by year is provided below:

- During the 2021 field program four fish species were captured (Appendix B; Table B1-1), with Fathead Minnow being the most frequently caught fish. Baited minnow traps were used in August and September and captured a total of 571 individuals.
- During the 2022 field program three fish species were captured (Appendix B; Table B2-1), with Fathead Minnow being the most frequently caught fish. Baited minnow traps were used in May and captured a total of 441 individuals.

3.1.7.4 Fish Tissue

Five Fathead Minnow composite samples were submitted for fish tissue analysis from Unnamed Stream 7 in 2021. Each composite sample included eight individuals, based on the minimum sample mass target. No obvious abnormalities or external parasites were noted for these fish. Whole body Fathead Minnow composite tissue results are displayed in Appendix C, Table C1-1. Analytical results displaying total metals in mg/kg of wet weight (wwt) are presented in Appendix C, Figures C1-9 to C1-16.

- Three of five composite samples had total methylmercury concentrations greater than the CCME 2000 guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.
- All selenium concentrations were less than the FEQG for whole body samples (6.7 mg/kg dry weight; dwt).

Individual Fathead Minnow age results are displayed in Appendix C, Table C1-3 and age at length in Figure C2-5.

3.1.7.5 Sediment Quality

Sediment samples were collected during fall 2021 with parameters of interest and respective quality criteria shown in Figures 3-1 and 3-2, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Total Kjeldahl nitrogen measured in 2021 with concentrations greater than the PSQG LEL and SEL.
- Total organic carbon content was greater than the PSQG LEL with some concentrations greater than the PSQG SEL.

Nutrient and organic carbon content enrichment was expected and commonly measured greater than the quality criterion in depositional lentic environs that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the ponded habitat and identify preexisting sediment quality concentrations that are naturally greater than their respective quality criteria.

3.1.7.6 Benthic Invertebrate Community

Benthic invertebrate samples were collected in 2021 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F1-1 to F1-2). A summary of these findings is provided below:

- Mean total invertebrate density was the highest of all locations sampled in 2021.;
- Mean taxa richness, evenness, and Simpson's diversity were similar to most other sites sampled in 2021;
- Mean percent of EPT taxa was the lowest of all sites sampled in 2021, with values similar to Victoria Creek;
- Mean percent of chironomids was among the highest of all sites samples in 2021; and,
- Taxa composition was generally similar among most sites sampled in 2021, showing a high abundance of Chironomidae. Sphaeriidae showed the second highest abundance at Unnamed Stream 7.

3.1.8 Unnamed Stream 8

3.1.8.1 Surface Water Quality

In-field water quality measurements were taken at three locations in Unnamed Stream 8 (UNS8-P01, UNS8-P02 and UNS8-S01) during the 2021 summer and 2022 spring field studies. Most measurements satisfied the PWQO range required for DO for coldwater and warmwater biota and the CWQG criteria for the general protection of coldwater biota (6.5 mg/L) in 2021. However, dissolved oxygen was less than the criteria at two of three locations in 2022. Most in-field pH measurements exceeded the PWQO and CWQG range of 6.5 to 9.0 in 2021 and 2022. Detailed in-field measurements are presented in Appendix A (Table A1-1 and A2-1).

3.1.8.2 Fish Habitat

Unnamed Stream 8 is a small stream system located west of Beaverhouse Lake. The narrow channel (approximately 0.80 m wide) flows through an open grassy wetland that leads to a ponded habitat. A gradual slope leads into a stagnant pond measuring approximately 55 by 230 m. Emergent and submergent vegetation are noted throughout the pond with some down woody debris.

3.1.8.3 Fish Community

Fish community surveys were completed in 2021 and 2022. A total of five fish species were detected throughout the study period (Table 3-1), with Fathead Minnow being the most frequently caught fish. Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm coolwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A summary of the fish community survey results by year is provided below:

- During the 2021 field program a total of five fish species were captured (Appendix B; Table B1-1). Baited minnow traps were used in August and captured a total of 1,354 individuals.
- During the 2022 field program three fish species were captured (Appendix B; Table B2-1). Baited minnow traps were used in May and captured a total of 1,588 individuals.

3.2 Victoria Creek

3.2.1 Surface Water Quality

In-field water quality measurements were taken at eight locations in Victoria Creek (VC-S01, VC-P01, VC-S02, VC-S03, VC-S04, VC-P02, VC-S05, and VC-S06) during the summer and fall field studies 2021 and spring field studies of 2022. In 2021, there were no exceedances of the PWQO or CWQG for DO (6.5 mg/L) or pH (6.5 to 9.0). The pH values ranged from 6.2 to 6.8, with four within the PWQO and CWQG range of 6.5 to 9.0 in 2022. Detailed in-field measurements are presented in Appendix A (Tables A1-1 and A2-1).

3.2.2 Fish Habitat

Victoria Creek is located west of York Lake and discharges into Misema River. This watercourse is surrounded by a mixed deciduous and coniferous forest with a shrub understory overhanging the stream. The banks of Victoria Creek are unstable with eroding and undercut banks, in some cases greater than 1 m in height. The stream bottom consists of silt, sand and clay and depth greater than 1 m in the middle of the channel.

3.2.3 Fish Community

Fish community surveys were completed at VC-P01, VC-P02, VC-S01, VC-S02, VC-S03, VC-S04, VC-S05 and VC-S06 in 2021 and 2022. A total of seven fish species were detected throughout the study period (Table 3-1). Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A summary of the fish community survey results by year is provided below:

- In 2021 a total of seven fish species were captured, with Common Shiner representing the greatest proportion of fish caught. Baited minnow traps and backpack electrofishing captured a total of 279 individuals, with minnow traps being the most effective method of capture (Appendix B; Tables B1-1 and B1-2).

- In 2022 a total of seven fish species were captured, with Northern Pearl Dace representing the greatest proportion of fish caught. Baited minnow traps were used in May and captured a total of 188 individuals (Appendix B; Table B2-1).

3.2.4 Fish Tissue

Five Common Shiner composite samples were submitted for fish tissue analysis from Victoria Creek in 2021. Each composite sample included eight individuals, based on the minimum sample mass target. No obvious abnormalities or external parasites were noted for these fish. Whole body Common Shiner composite tissue results are displayed in Appendix C, Table C1-1 for the following parameters: aluminum, arsenic, cadmium, copper, iron, selenium, mercury and methylmercury. Analytical results displaying total metals in mg/kg of wet weight (wwt) are presented in Appendix C, Figures C1-9 to C1-16.

- All composite samples had methylmercury concentrations greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota in all samples.
- All selenium concentrations were less than the FEQG for whole body samples (6.7 mg/kg dwt).

Individual Common Shiner age results are displayed in Appendix C, Table C1-3 and age at length in Figure C2-5 (Appendix C).

3.2.5 Sediment Quality

Sediment samples were collected from three sites in Victoria Creek (VC-S03, VC-S02 and VC-S06) during the fall of 2021 with parameters of interest and respective quality criteria shown on Figures 3-1 to 3-3, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Mean chromium concentrations exceeded the PSQG LEL and the CSQG ISQG at VC-S02.
- Mean copper concentrations exceeded the PSQG LEL at one location for one replicate grab.
- Mean nickel concentrations were greater than the PSQG LEL at VC-S02.
- Total Kjeldahl nitrogen was measured in 2021 with concentrations greater than the PSQG LEL.
- Total organic carbon content was generally at or greater than the PSQG LEL at all locations.

Nutrient and organic carbon content enrichment was expected and commonly measured greater than the quality criterion in depositional lentic and low gradient lotic environs that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the depositional reaches of the creek and identify preexisting sediment quality concentrations that are naturally greater than their respective quality criteria.

3.2.6 Benthic Invertebrate Community

Benthic invertebrate samples were collected from three locations within Victoria Creek (VC-S02, VC-S03 and VC-S06) in 2021 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F1-1 to F1-2). A summary of these findings is provided below:

- Mean TID was similar at VC-S02 and VC-S03, while values were higher at VC-S06. These values represented the midrange for all locations sampled in 2021;

- Mean taxa richness at VC-S02 and VC-S03 was similar to most other locations sampled, while VC-S06 showed the second highest value obtained in 2021;
- Mean evenness was highest at VC-S02 and VC-S03, while VC-S06 was similar to the remaining locations sampled in 2021;
- Mean Simpson's Diversity was similar among all locations sampled in 2021, with VC-S02, VC-S03 and VC-S06 showing slightly higher values;
- Mean percent of EPT taxa was among the lowest of all locations sampled in 2021. Within Victoria Creek, VC-S03 showed the lowest value obtained and VC-S06 showed the highest value obtained;
- Mean percent of chironomids was lowest at VC-S02 and VC-S03, while VC-S06 represented the midrange of all locations sampled in 2021;
- Taxa composition was generally similar among VC-S02, VC-S03 and VC-S06 showing a high abundance of Chironomidae. Ceratopogonidae showed a high abundance at VC-S02 followed by VC-S03 and VC-S06. Ephemeridae was only present within Victoria Creek at VC-S02.

3.3 Ava Lake

3.3.1 Surface Water Quality

Lake Profiles

Ava Lake (AL) water quality profiles were measured at one location during the 2021 and 2022 field programs (Appendix A, Plates A1-1 to A1-2). The maximum measured water depth was between 10 and 11 m in 2021 and 2022. A thermocline was not present during the May, September, October and November sampling events, which suggests Ava Lake was well mixed during these periods. Temperature and DO generally show a declining trend with depth, as expected.

In-Field Measurements

In-field water quality measurements were taken at one site in Ava Lake five times during the 2021 field studies and twice during the 2022 field studies. In 2021, there were no exceedances of the PWQO or CWQG for DO (6.5 mg/L) or pH (6.5 to 9.0). One in-field pH measurement exceeded the PWQO and CWQG range of 6.5 to 9.0 in 2022. Detailed in-field measurements are presented in Appendix A (Table A1-1 and A2-1).

3.3.2 Fish Habitat

Ava Lake is a shallow lake that receives inflow from Beaverhouse Lake and drains into York Lake. The waterbody is surrounded by a mixed coniferous and deciduous forest with a shrub dominated riparian zone. The lake bottom is mainly consisted of large boulders and bedrock with gravel and cobble closer to the outlet of Beaverhouse Lake. The fast-flowing connection from Beaverhouse Lake and rocky substrate provides suitable habitat for riverine spawning species such as Walleye and White Sucker.

3.3.3 Fish Community

Fish community sampling at Ava Lake was conducted in 2020. Fish species captured included Brown Bullhead, Johnny Darter, Slimy Sculpin, Trout Perch, Walleye, Lake Chub, Northern Pike, Smallmouth Bass and Yellow Perch (SEI 2021). Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010).

In 2023, spawning surveys were completed using artificial substrate egg collection mats. Surveys were conducted during the anticipated spawning period of Walleye and White Sucker. Eggs for both species were present on egg collection mats, confirming spawning habitat for these species in Ava Lake. Visual inspections for Northern Pike eggs were conducted, however none were observed due to very high water levels and strong current resulting from heavy seasonal rainfall.

3.3.4 Lower Trophic & Primary Productivity

Chlorophyll a

The 2021 chlorophyll a results showed seasonal variability, with an increase in chlorophyll a concentration observed from June to September, and declining in November (Appendix D, Figures D1-1 and D1-2). All values were within the oligotrophic range (i.e., 0.3 to 4.5 µg/L; Wetzel 2001). Chlorophyll a was lowest in water samples collected at the surface in August by SEI staff and highest at the bottom of the lake in September. Chlorophyll a was sampled in August by both WSP E&I and SEI staff. These results showed different concentrations with SEI data being lowest at all lakes, demonstrating the natural variability of Chlorophyll a concentration. Spatial variation observed between lakes is also likely reflective of natural variability associated with phytoplankton communities.

Phytoplankton

Phytoplankton samples were collected from one Ava Lake location in June, August, September and November 2021. Graphical analysis suggests that total phytoplankton biovolume (µm3) trends are variable between sampling months (Appendix D, Figure D1-3). September data had the lowest total biovolume recorded in Ava Lake, but values were similar to that of York Lake. One sample was collected in September for Ava Lake, but due to an issue during analysis, the other lakes did not have data available for comparison. Phytoplankton was sampled in August by both WSP E&I and SEI staff and results showed similar biovolumes and relative community compositions. Relative phytoplankton community composition (as density) within Ava Lake showed seasonal variability (Appendix D, Figure D1-4). The relative community composition was dominated by Chlorophyceae (green algae) and Cyanophyceae (blue-green algae) in June, Chrysophyceae (golden algae) and Cyanophyceae in August and September, and Bacillariophyceae (diatoms) and Chrysophyceae in November.

Zooplankton

Zooplankton samples were collected from the Ava Lake biota location five times during the 2021 and 2022 field studies. Total biomass (mg/m^3), total density (#/m^3) and percent relative zooplankton density were analyzed graphically to determine trends (Appendix D, Figures D1-5 to D1-10). Data shows seasonal variability for biomass and density, particularly during the August sample event when phytoplankton growth is high and changes in zooplankton communities respond to the availability of food (phytoplankton) within a short timeframe. Ava Lake was the only location sampled to show any Harpacticoida present. During both sampling events, Daphniidae comprised a very little proportion of the relative zooplankton density (<5%) which differs from 2021 results which indicate greater than 20% of the zooplankton community consisted of Daphniidae. Total zooplankton biomass of Ava Lake was consistently greater (>100 µg/L wwt) during the 2022 sampling season than the 2021 sampling season (<40 µg/L wwt), demonstrating interannual natural variability.

3.3.5 Sediment Quality

Sediment samples were collected from Ava Lake during the fall of 2021 with parameters of interest and respective quality criteria shown on Figures 3-1 to 3-3, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Mean chromium, manganese and nickel concentrations exceeded the PSQG LEL.
- Mean copper concentrations exceeded the PSQG LEL and the CSQG ISQG.
- Mean lead concentrations exceeded the PSQG LEL and the CSQG ISQG, with the upper variability of concentrations exceeding the CSQG PEL.
- Total Kjeldahl nitrogen was measured in 2021, with all concentrations greater than the PSQG LEL and more than half of the concentrations greater than the PSQG SEL.
- Total organic carbon content was greater than the PSQG LEL at all locations, with two samples greater than the PSQG SEL.

Nutrient and organic carbon content enrichment was expected since these are commonly measured greater than the respective quality criteria in depositional lentic environs that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the lake and identify preexisting sediment quality concentrations that are naturally greater than their respective quality criteria.

3.3.6 Benthic Invertebrate Community

Benthic invertebrate samples were collected from Ava Lake in 2021 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F1-1 to F1-2). A summary of these findings is provided below:

- Mean TID was the second highest of all locations sampled in 2021;
- Mean taxa richness was the highest of all locations sampled in 2021;
- Mean evenness and mean Simpson's Diversity were similar to most other locations sampled in 2021;
- Mean percent EPT taxa represented the midrange of all locations sampled in 2021;
- Mean percent of chironomids was among the highest of all locations sampled in 2021;
- Taxa composition was generally similar among Ava and York lakes, showing a high abundance of Chironomidae. Ava Lake showed a presence of Leptophlebiidae, not observed in other adjacent habitat.

3.4 York Lake

3.4.1 Surface Water Quality

Lake Profiles

York Lake (YL) profiles were measured one location during the 2021 and 2022 field programs (Appendix A, Plates A1-3 to A1-4). The maximum measured water depth was 8 m. A thermocline was not present during the May, September, October and November sampling events, which suggests York Lake was well mixed during these periods. Temperature and DO generally show a declining trend with depth, as expected.

In-Field Measurements

In-field water quality measurements were taken at one location in York Lake six times during the 2021 field studies and twice during the 2022 field studies. In 2021, there were no exceedances of the PWQO or CWQG for DO (6.5 mg/L) or pH (6.5 to 9.0). One in-field pH measurement exceeded the PWQO and CWQG range of 6.5 to 9.0 in 2022. Detailed in-field measurements are presented in Appendix A (Tables A1-1 and A2-1).

3.4.2 Fish Habitat

York Lake is a small lake that receives inflow from Ava Lake and drains into the Misema River. York Lake contains residual tailings from historic mining operations. This waterbody is surrounded by mixed deciduous and coniferous forests with an understory comprised of shrub species. Woody debris, submergent and emergent macrophytes were present and included watermilfoil, pondweed, and horsetail. Substrate consisted of bedrock, boulder and both fine- and coarse-grained sediments, with cobble and gravel near the outflow form Ava Lake. The high flow and rocky substrate at the outflow from Ava Lake provide suitable habitat for riverine spawning species such as Walleye and White Sucker.

3.4.3 Fish Community

Fish community surveys were completed in York Lake in 2020, 2021 and 2022 and spawning surveys were completed in 2023. A total of 17 fish species were detected throughout the study period (Table 3-1). Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A summary of the fish community and spawning survey results by year is provided below:

- In 2020 a total of 13 fish species were captured (SEI, 2021).
- In 2021 a total of nine fish species were captured, with Northern Pike and White Sucker representing the greatest proportions of fish caught. Baited minnow traps and gillnets captured a total of 96 individuals, with gillnets being the most effective method of capture (Appendix B; Tables B1-1 and B1-3).
- In 2022 a total of nine fish species were captured, with Northern Pike representing the greatest proportion of fish caught. Gillnets were used in October and captured a total of 66 individuals (Appendix B; Table B2-2).
- In 2023 artificial substrate egg collection mats were deployed during the anticipated spawning timing of Walleye and White Sucker. Eggs for both species were present on egg collection mats, confirming spawning habitat for these species in York Lake. Northern Pike were not observed during the spring spawning survey in York Lake.

3.4.4 Fish Tissue

A total of 69 dorsal skinless, boneless epaxial muscle tissue samples from seven different species were submitted for analysis from York Lake in 2021 and 2022. No obvious abnormalities or external parasites were noted for these fish. Dorsal muscle tissue results are displayed in Appendix C, Tables C1-2 and C2-1 for the following parameters: aluminum, arsenic, cadmium, copper, iron, selenium, mercury and methylmercury. The analytical results display total metals including total mercury by length and weight (Appendix C, Figures C1-1 to C1-8 and C1-17 to C1-25).

- The average total mercury concentration for all species was less than the Ontario consumption guidelines developed for the general population (1.8 mg/kg). A total of 14 Northern Pike, one Smallmouth Bass and three Walleye exceeded the Ontario consumption guidelines for women of child-bearing age and children (0.5 mg/kg) in 2021 and 2022. Total mercury concentrations tended to be higher in York Lake than any other lake sampled.
- All 2021 biota samples had methylmercury concentrations greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota. Total methylmercury

concentrations tended to be lower in York Lake than any other lake sampled. Methylmercury was not analyzed in fish tissue samples in 2022.

- Total selenium concentrations were less than the FEQG (6.7 mg/kg dwt) for all tissue samples.

Individual age results are displayed in Appendix C, Tables C1-3 and C2-1 and age at length in Figures C2-1 and C2-2.

3.4.5 Lower Trophic & Primary Productivity

Chlorophyll a

The Chlorophyll a 2021 results showed seasonal variability, with an increase in chlorophyll a concentration observed from June to August, and declining in September and November (Appendix D, Figures D1-1 and D1-2). All values were within the oligotrophic range (i.e., 0.3 to 4.5 µg/L; Wetzel 2001). Chlorophyll a was lowest in water samples collected at the surface in August and highest at the surface in August. These results demonstrate the natural variability of Chlorophyll a concentration within various depths at the same locations and variability between samples collected in the same month.

Phytoplankton

Phytoplankton volume samples were collected from one York Lake location in June, August and November 2021. Graphical analysis suggests that total phytoplankton biovolume (µm^3) trends are variable between sampling months (Appendix D, Figure D1-3). Phytoplankton was sampled in August by both WSP E&I and SEI staff, results showed differing biovolumes, but relative community compositions were similar. August data collected by SEI and November data were very similar and had the lowest total biovolume recorded across all lakes and sampling months. Biovolume was highest in August samples collected by WSP E&I staff. Relative phytoplankton community composition (as density) within York Lake showed seasonal variability (Appendix D, Figure D1-4). The relative community composition was dominated by Chlorophyceae (green algae) and Cyanophyceae (blue-green algae) in June, Chrysophyceae (golden algae) and Cyanophyceae in August, and Bacillariophyceae (diatoms) and Chrysophyceae in November. These results are similar to Ava Lake and Beaverhouse Lake.

Zooplankton

Zooplankton samples were collected from the York Lake biota location during the 2021 and 2022 field studies. Total biomass (mg/m^3), total density (#/m^3) and percent relative zooplankton density were analyzed graphically to determine trends (Appendix D, Figures D1-5 to D1-10). Data shows seasonal variability for biomass and density, particularly during the August sample event when phytoplankton growth is high and changes in zooplankton communities respond to the availability of food (phytoplankton) within a short timeframe. Eight orders of zooplankton were found within York Lake, where Cyclopoida represented most of the community by relative percent density in 2021, compared to 2022 where Ploima was found to comprise most of the sample. Similarly, relative zooplankton density was co-dominated by Cyclopoida and Daphniidae.

3.4.6 Sediment Quality

Sediment samples were collected from York Lake during the fall of 2021 with parameters of interest and respective quality criteria shown on Figures 3-1 to 3-3, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Mean arsenic concentrations exceeded the CSQG ISQG and PSQG LEL.

- Mean chromium concentrations exceeded the PSQG LEL and CSQG ISQG.
- Copper concentrations exceeded the CSQG PEL in all samples.
- Mean iron concentrations exceeded the PSQG LEL, with the upper variability of concentrations exceeding the CSQG ISQG.
- Mean mercury concentrations exceeded the CSQG PEL, with the upper variability of concentrations exceeding the PSQG SEL.
- Nickel concentrations were greater than the PSQG LEL in all sample replicate grabs.
- Total Kjeldahl nitrogen was measured in 2021, with all concentrations greater than the PSQG LEL with one exception.
- Total organic carbon content was greater than the PSQG LEL at all locations, with one exception.

Nutrient and organic carbon content enrichment was expected since these are commonly measured greater than the respective quality criteria in depositional lentic environs that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the lake and identify preexisting sediment quality concentrations that are greater than their respective quality criteria.

3.4.7 Benthic Invertebrate Community

Benthic invertebrate samples were collected from York Lake in 2021 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F1-1 to F1-2). A summary of these findings is provided below:

- Mean TID at YL was the lowest of all sites sampled in 2021.
- Mean taxa richness, mean evenness, and mean Simpson's Diversity were similar to most locations sampled in 2021.
- Mean percent EPT taxa was the second highest of all locations sampled in 2021.
- Mean percent of chironomids was the highest of all locations sampled in 2021.
- Taxa composition was generally similar among Ava and York lakes, showing a high abundance of Chironomidae.

3.5 Beaverhouse Lake

3.5.1 Surface Water Quality

Lake Profiles

Beaverhouse Lake profiles were measured at two sampling locations during the 2021 and 2022 sampling periods, BHL-MID and BHL-SW (Appendix A; Plates A1-5 to A1-8). Maximum measured water depth was 16 m in the south basin (BL-SW) and 10 m in the mid basin (BL-MID). Seasonal measurements, at all sites, show a declining trend with depth for temperature and DO. A thermocline was not present in November for either of the sampling sites, which suggests well mixing in Beaverhouse Lake.

In-Field Measurements

In-field water quality measurements were taken at eleven sites in Beaverhouse Lake during the 2021 field studies and at three locations during the 2022 field studies. In 2021, there were no exceedances of the PWQO or CWQG for DO (6.5 mg/L) or pH (6.5 to 9.0). Two in-field pH measurements exceeded the PWQO and CWQG range of 6.5 to 9.0 in 2022. Detailed in-field measurements are presented in Appendix A (Tables A1-1 and A2-1).

3.5.2 Fish Habitat

Beaverhouse Lake is a large lake with several basins. The north basin is a deep basin (greater than 20 m) that receives drainage from Misema Lake and consists of exposed bedrock, steep rock cliffs and boulders. Shorelines consist of mixed coniferous and deciduous forest with several seasonal cabins. The southwest basin drains into Ava Lake and is comprised of low-sloping shorelines with emergent grasses and shrubs transitioning into a mixed deciduous and coniferous forest. Lake bottom consists of boulders and bedrock in the northern, deep embayments. Shallow embayments in the southwest basin consist of soft fine-grained sediments with emergent macrophytes including water horsetail and cattail.

3.5.3 Fish Community

Fish community surveys were completed within Beaverhouse Lake in 2020, 2021 and 2022. A total of 14 fish species were detected throughout the study period (Table 3-1). Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of coolwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A summary of the fish community survey results by year is provided below:

- In 2020 a total of 11 fish species were captured (SEI, 2021).
- In 2021 a total of eight fish species were captured. Baited minnow traps captured a total of 149 individuals, with Yellow Perch representing the greatest proportion of small bodied fish caught (Appendix B; Table B1-1). Gillnets captured a total of 123 individuals, with Walleye representing the greatest proportion of large-bodied fish caught (Appendix B; Table B1-3).
- In 2022 a total of eight fish species were captured, with Walleye representing the greatest proportion of fish caught since gillnets were primary sample gear used in October and captured a total of 104 individuals (Appendix B; Table B2-2).

3.5.4 Fish Tissue

A total of 117 dorsal skinless, boneless epaxial muscle tissue samples from six fish species were submitted for analysis from two basins within Beaverhouse Lake (north and middle) in 2021 and 2022. No obvious abnormalities or external parasites were noted for these fish. Dorsal muscle tissue results are displayed in Appendix C, Tables C1-2 and C2-1 for the following parameters: aluminum, arsenic, cadmium, copper, iron, selenium, mercury and methylmercury. The analytical results display total metals including total mercury by length and weight (Appendix C, Figures C1-1 to C1-8 and C1-17 to C1-28).

- The average total mercury concentration for all species was less than the Ontario consumption guidelines developed for the general population (1.8 mg/kg). A total of 24 Northern Pike, two Smallmouth Bass and 32 Walleye exceeded the Ontario consumption guidelines for women of child-bearing age and children (0.5 mg/kg) in 2021 and 2022. Total mercury concentrations in Northern Pike, Walleye and White Sucker were greater in Beaverhouse Lake than any other sampling location.

- All 2021 biota samples had methylmercury concentrations greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota. Total methylmercury concentrations were greater in Beaverhouse Lake than any other lake sampled.
- Total selenium concentrations were less than the FEQG (6.7 mg/kg dwt) for all tissue samples. Selenium concentrations were lower in all species than York Lake.

Individual age results are displayed in Appendix C, Tables C1-3 and C2-1 and age at length in Figures C2-1 to C2-4.

3.5.5 Lower Trophic & Primary Productivity

Chlorophyll a

The chlorophyll a 2021 results showed seasonal variability, with an increase in chlorophyll a concentration observed from June to August and declining in September and further in November (Appendix D, Figures D1-1 and D1-2). All values were within the oligotrophic range (i.e., 0.3 to 4.5 µg/L; Wetzel 2001). Similar to York Lake, BL-MID chlorophyll a results were lowest in water samples collected at the surface in August by SEI staff and highest at the surface in August collected by WSP E&I staff. These results demonstrate the natural variability of Chlorophyll a concentration. For BL-SW, chlorophyll a 2021 results were lowest in water samples collected at the thermocline in September and highest at the surface in August collected by WSP E&I staff. Spatial variation observed between the two lake stations is likely reflective of natural variability associated with phytoplankton communities.

Phytoplankton

Phytoplankton volume samples were collected from two Beaverhouse Lake stations in June, August, and November 2021. Graphical analysis suggests that total phytoplankton biovolume (µm3) trends are variable between sampling months (Appendix D, Figure D1-3). Phytoplankton was sampled in August by both WSP E&I and SEI staff, results showed differing biovolumes in BL-MID, but similar biovolumes in BL-SW. August data collected by WSP E&I at BL-SW had the lowest total biovolume recorded across both stations and was highest at the same station in the August sample collected by SEI staff. Temperature fluctuations and sampling variability could lead to the differences noted in these two samples.

Relative phytoplankton community composition (as density) within Beaverhouse Lake showed seasonal variability but was similar between the two stations in one sampling month (Appendix D, Figure D1-4). The relative community composition was dominated by Chlorophyceae (green algae) and Cyanophyceae (blue-green algae) in June, Chrysophyceae (golden algae) and Cyanophyceae in August, and Bacillariophyceae (diatoms) and Chrysophyceae in November. These results are similar to Ava Lake and York Lake.

Zooplankton

Zooplankton samples were collected from two Beaverhouse Lake biota stations during the 2021 and 2022 field studies. Total biomass (mg/m^3), total density (#/m^3) and percent relative zooplankton density were analyzed graphically to determine trends (Appendix D, Figures D1-5 to D1-10). Data show variability between both stations for biomass and density, as well as seasonal variability by station which is expected due to zooplankton community responses to food availability (phytoplankton). Eight orders of zooplankton were found within Beaverhouse Lake south basin (BL-SW) and nine orders in the mid basin (BL-MID), where Daphniidae and Calanoida constituted nearly all zooplankton biomass in 2021. Cyclopoida dominated the zooplankton community of Beaverhouse Lake by relative percent density in 2021 (<70%), compared to 2022 where Ploima (<50%) and Cyclopoida (<30%) represented most of the sample.

3.5.6 Sediment Quality

The Beaverhouse Lake sediment within a deep profundal basin was sampled in spring and fall 2011 concurrent with benthic invertebrate sampling (SEI 2018). Most measured parameter concentrations were less than their respective quality criteria except for arsenic, cadmium, chromium, lead, iron, manganese, nickel and zinc. The elevated concentrations of these parameters, located upgradient of historic mining activities, demonstrates naturally enriched geology in baseline condition.

3.5.7 Benthic Invertebrate Community

The Beaverhouse Lake benthic invertebrate community was sampled in spring and fall of 2011, and spring 2012 at one profundal (deep) location and one littoral (shallow nearshore) location per year (SEI 2018). The littoral samples were collected using a kicknet, whereas the profundal samples were collected using an Ekman grab sampler. The taxonomic results varied between seasons, as expected due to inherent differences in life cycle (growth periods and emergence timing) of taxa groups.

The nearshore kicknet samples are a qualitative measure of species presence; however, this does not provide a precise measurement of the sample area to calculate invertebrate density but is useful to survey the taxa groups at sample locations. The Ekman sample area was 15x15 cm (0.023 m^2) which is the same sample area as the Petite Ponar grab samplers used during the recent studies. For comparison to the recent studies, the fall 2011 Ekman grab sample results from the profundal sample location have been summarized below and compared to the adjacent Ava and York Lake results:

- The relative percent EPT was 4%, which is less than the mean percent EPT observed in Ava and York lakes in 2021.
- The percent Chironomids was 20%, which is less than half the mean percent Chironomids observed in Ava and York lakes in 2021.
- Taxa richness ranged from 7 to 10, which is similar to the richness observed in Ava and York lakes in 2021.
- Simpson's Diversity was 0.82, which is greater than the mean diversity in Ava and York lakes in 2021 showing a more diverse community in the 2011 Beaverhouse Lake sample; and,
- Total invertebrate density was 324 individuals/m^2, this value is substantially lower by an order of magnitude compared to the fall 2021 mean density values at Ava and York lakes. This is due to the low invertebrate count within the 2011 samples.

3.6 Misema River

3.6.1 Surface Water Quality

Lake Profiles

Misema River profiles were measured once during the 2022 sampling period (Appendix A; Plate A1-11). Maximum measured water depth was 5 m, and a thermocline was not present during the fall sampling event. Temperature and DO generally show a declining trend with depth, as expected.

In-Field Measurements

In-field water quality measurements were taken at one location in the Misema River (MR-EXP) during the 2021 and 2022 field studies. There were no exceedances of the PWQO or CWQG for DO (6.5 mg/L) or pH (6.5 to 9.0). Detailed in-field measurements are presented in Appendix A (Tables A1-1 and A2-1).

3.6.2 Fish Habitat

The Misema River is characterized as a large riverine system that flows southward eventually into the Blanche River, with an approximate drainage area of 254 km^2 that receives inflow from York Lake and Victoria Creek near the Project. The total river depth with the sampled locations is approximately 5.2 m and is surrounded by mixed coniferous and deciduous forest with shrub species dominating the shoreline. The nearshore river bottom was densely covered by submerged macrophytes, including watermilfoil and pondweed species. The emergent macrophyte community along the shorelines was sparse and mostly consisted of water horsetail and overhanging and fallen woody debris. Substrate consisted of fine sand and silt with some clay and detritus.

3.6.3 Fish Community

Fish community surveys were completed in the Misema River in 2022. A total of eight fish species were detected throughout the study period (Table 3-1), with White Sucker being the most frequently caught species. Summer water temperature measurements and the fish species records show the thermal guild classification for these locations represents a range of warm to coldwater fish habitat (Coker et al. 2001; Hasnain et al. 2010). A total of 57 individuals were captured using minnow traps and gillnets, with gillnets being the only effective method of capture (Appendix B; Tables B2-1 and B2-2). Small bodied species were not observed during the field studies, and the lack of minnow trap catch suggest forage fish may reside in adjacent tributaries and are less abundant within the Misema River mainstem.

3.6.4 Fish Tissue

A total of 22 dorsal skinless, boneless epaxial muscle tissue samples were submitted for fish tissue analysis from the Misema River which consisted of 16 Walleye, 2 Northern Pike and 4 White Sucker in 2022. No obvious abnormalities or external parasites were noted for these fish. Dorsal muscle tissue results are displayed in Appendix C, Table C2-1 for the following parameters: aluminum, arsenic, cadmium, copper, iron, selenium, mercury and methylmercury. The analytical results display total metals including total mercury by length and weight (Appendix C, Figures C1-1 to C1-8 and C1-23 to C1-25).

- The total mercury concentration for all species was less than the Ontario consumption guidelines developed for the general population (1.8 mg/kg) and those developed for women of child-bearing age and children (0.5 mg/kg) with the exception of one walleye sample. Total mercury concentrations in Northern Pike, Walleye and White Sucker were generally lower in the Misema River than other sampling locations.
- Total selenium concentrations were less than the FEQG (6.7 mg/kg dwt) for all tissue samples. Selenium concentrations tended to be lower in Misema River in all species than any other sampling location.

Individual aging results from Northern Pike, Walleye and White Sucker are shown in Appendix C (Table C2-1) and age at length figures are displayed in Appendix C (Figure C1-1).

3.6.5 Sediment Quality

Sediment samples were collected from the Misema River during the fall of 2021 and 2022 with parameters of interest and respective quality criteria shown in Figures 3-1 to 3-3, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Mean chromium concentrations exceeded the PSQG LEL in 2021, with one exceedance in 2022.
- Mean copper concentrations exceeded the PSQG LEL in both years, with the upper variability of concentrations exceeding the CSQG ISQG in 2022.
- Mean nickel concentrations were greater than the PSQG LEL in 2021; one exceedance was observed in 2022.
- Mean total Kjeldahl nitrogen concentrations and total organic carbon were greater than the PSQG LEL in both years.

Nutrient and organic carbon content enrichment was expected since these are commonly measured greater than the respective quality criteria in depositional lentic environs and low gradient lotic systems that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the river and identify preexisting sediment quality concentrations that are naturally greater than their respective quality criteria. Some influence from historic mining activities within York Lake may also contribute to these concentrations.

3.6.6 Benthic Invertebrate Community

Benthic invertebrate samples were collected from the Misema River in 2021 and 2022 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F2-1 to F2-8). A summary of these findings is provided below:

- Mean TID was significantly higher in 2022 compared to values obtained in 2021. In 2021, MR-EXP showed similar values to Victoria Creek (VC-S02 and VC-S03).
- Mean taxa richness showed very similar values in 2021 and 2022.
- Mean evenness and mean Simpson’s Diversity were similar in both 2021 and 2022.
- Mean percent EPT taxa was significantly higher in 2021 compared to 2022.
- Mean percent chironomids was considerably higher in 2022 than values obtained in 2021. In 2021, MR-EXP showed similar to Victoria Creek (VC-S06).
- In 2021, taxa composition was generally similar among most locations, showing a high abundance of Chironomidae, whereas, the greatest abundance of Ephemeridae was observed at MR-EXP. In 2022, Chironomidae contributed the greatest community proportion and was similar to the Wawagoshe Creek (WC-REF) candidate reference study area.

3.7 Wawagoshe Creek

3.7.1 Surface Water Quality

Lake Profiles

Surface water quality profiles were taken of Wawagoshe Creek (WC-REF) twice during the 2022 field program, once in the summer and once in the fall (Appendix A; Plate A1-9). The maximum measured water depth was

2.5 m, and a thermocline was present at a depth of 1.5 m in the summer, and there was no thermocline present in October. Temperature and DO have a declining trend with depth, as expected.

In-Field Measurements

In-field measurements were collected during the 2022 summer and fall surveys. One DO measurement met the PWQO and CWQG, and both pH measurements met the quality criteria. Detailed in-field measurements are presented in Appendix A (Table A2-1).

3.7.2 Fish Habitat

Wawagoshe Creek is a watercourse located north of Cheminis, Ontario, in the Timiskaming District that receives drainage from Wawagoshe Lake and reports to Labyrinth Lake. This waterbody is surrounded by open wetlands, and mixed deciduous and coniferous forests with an understory comprised of shrub species. Both shorelines consisted of flat bathymetry with dense emergent grasses, reeds, and cattail. The substrate was predominantly soft fine-grained sediments, and was mostly covered by dense submerged macrophytes, including watermilfoil and pondweed. Wawagoshe Creek was selected as a candidate reference location due to the habitat and sediment similarities to the Misema River.

3.7.3 Fish Community

Fish community surveys were completed in Wawagoshe Creek during the 2022 field studies. No fish were observed or captured at this location (Appendix B; Table B2-1); however, short duration trap sets were utilized during the field program to provide preliminary fish species as per the MNRF licence conditions. Secondary source data show Cisco, Lake Whitefish, Northern Pike, Rock Bass, Walleye, White Sucker and Yellow Perch occur within Wawagoshe and Waterhen lakes positioned upstream of the sample location, which are also found in Labyrinth Lake where Wawagoshe Creek ultimately flows (MNRF 2022).

3.7.4 Lower Trophic & Primary Productivity

Zooplankton

Zooplankton samples were collected from Wawagoshe Creek during the fall of 2022. Total biomass expressed as micrograms per litre (µg/L), total density as the number of individuals per litre (#/L) and percent relative zooplankton density were analyzed graphically to determine trends (Appendix D; Figures D1-5 to D1-10). Six orders of zooplankton were found within Wawagoshe Creek, where Bosminidae, Calanoida and Cyclopoida represented nearly all zooplankton biomass. Contrary to this, relative zooplankton density was dominated by Ploima. Wawagoshe Creek showed the second lowest total biomass of sites sampled during the fall 2022 field program.

3.7.5 Sediment Quality

Sediment samples were collected from Wawagoshe Creek during the fall of 2022 with parameters of interest and respective quality criteria shown in Figures 3-1 to 3-3, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Mean cadmium, copper, iron, manganese, and nickel concentrations exceeded the PSQG LEL.
- Chromium concentrations exceeded the CSQG ISQG in all samples.

- Mean total Kjeldahl nitrogen concentrations and total organic carbon content measured greater than the PSQG LEL and SEL.

Nutrient and organic carbon content enrichment was expected since these are commonly measured greater than the respective quality criteria in depositional lentic environs and low gradient lotic habitat that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the creek and identify preexisting sediment quality concentrations that are naturally greater than their respective quality criteria in baseline condition.

3.7.6 Benthic Invertebrate Community

Benthic invertebrate samples were collected from Wawagoshe Creek in 2022 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F2-1 to F2-8). A summary of these findings is provided below:

- Mean TID and mean taxa richness were greater than the Misema River, and slightly less than Blanche River reference area (BR-REF).
- Mean evenness, percent EPT taxa and Simpson's Diversity were similar between Wawagoshe Creek and the other two 2022 sample locations.
- Mean percent chironomids was nearly equal to the Misema River value and was greater than the Blanche River reference mean.
- Taxa composition was similar to the Misema River, but dissimilar to the Blanche River, with Chironomidae representing the highest proportion.

3.8 Blanche River

3.8.1 Surface Water Quality

Lake Profiles

The Blanche River (BC-REF) surface water quality profiles were measured twice during the 2022 field investigations (Appendix A; Plate A1-10). The maximum measured water depth was 3 m. A thermocline was not present in either sampling event, suggesting the river was well mixed at the time of sampling. Temperature and DO generally show a declining trend with depth, as expected.

In-Field Measurements

In-field measurements were collected in fall and summer during the 2022 field investigation. The DO did not meet the PWQO and CWQG for the general protection of coldwater biota in one measurement (6.5 mg/L), pH measurements met the quality criteria across all measurement events (6.5 to 9.0). Detailed in-field measurements are presented in Appendix A (Table A2-1).

3.8.2 Fish Habitat

Blanche River is a large river located south-west of Kirkland Lake, Ontario, in the Timiskaming District that receives drainage from Sesekinika Lake and ultimately reports to Lake Timiskaming. The sample location for this study was positioned directly downstream of Round Lake, north of Highway 11. This waterbody is relatively shallow (less than 4 m in depth) and is surrounded by mixed deciduous and coniferous forests with an understory comprised of shrub species. Both the northern and southern shorelines have gradual slopes along the banks, and few macrophytes. The lake bottom was a mix of coarse-grained and soft fine-grained sediments, with an abundance of mussel shells, leaf litter, grasses and detritus. No floating or emergent macrophytes were noted and in-stream cover consisted of downed or low-hanging trees. The Blanche River was selected as a potential reference area due to the habitat and sediment similarities with the Misema River.

3.8.3 Fish Community

Fish community surveys were completed in BC-REF in 2022. No fish were observed or captured at this location (Appendix B; Table B2-1); however, short trap sets were utilized during the field program to provide preliminary fish species. Secondary source data show Channel Catfish, Rainbow Smelt, Sauger, Smallmouth Bass and Walleye occur in the river (MNRF 2022).

3.8.4 Lower Trophic & Primary Productivity

Zooplankton

Zooplankton samples were collected from the Blanche River during the fall 2022 studies. Total biomass (µg/L wwt), total density (#/L) and percent relative zooplankton density were analyzed graphically to determine trends (Appendix D; Figures D1-5 to D1-10). Nine orders of zooplankton were found within the Blanche River, where Cyclopoida represented most of the zooplankton biomass with some Calanoida and Ploima. Similarly, relative zooplankton density was co-dominated by Cyclopoida and Ploima. Blanche River showed the highest Sididae population by density. The Blanche River also showed the highest total biomass and density compared to all other sampling events.

3.8.5 Sediment Quality

Sediment samples were collected from the Blanche River during the fall 2022 field studies with parameters of interest and respective quality criteria shown in Figures 3-1 to 3-3, as well as detailed laboratory results presented in Appendix E. A summary of baseline sediment quality results that were greater than their respective quality criteria is provided below to identify naturally elevated concentrations of these parameters:

- Mean chromium concentrations exceeded the PSQG LEL and CSQG ISQG.
- Mean nickel, total Kjeldahl nitrogen and total organic carbon content concentrations were greater than the PSQG LEL in all samples.

Nutrient and organic carbon content enrichment was expected since these are commonly measured greater than the respective quality criteria in depositional lentic environs and low gradient lotic habitat that receive organic inputs and typically contain high organics content. These data help to establish baseline condition within the river and identify preexisting sediment quality concentrations that are naturally greater than their respective quality criteria.

3.8.6 Benthic Invertebrate Community

Benthic invertebrate samples were collected from the Blanche River in 2022 concurrently with the sediment quality sampling. A summary of the benthic invertebrate community descriptors are presented in Table 3-2, with detailed results provided in Appendix F (Tables F2-1 to F2-8). A summary of these findings is provided below:

- Mean TID and mean taxa richness were greater than the Wawagoshe Creek and Misema River, with TID nearly double that measured in the Misema River.
- Mean evenness, percent EPT taxa and Simpson’s Diversity were similar between the Blanche River and the other two 2022 sample locations.

- Mean percent chironomids was similar to the Wawagoshe Creek and Misema River, and was the lowest of these sample locations.
- Taxa composition was dissimilar to the Wawagoshe Creek and Misema River, showing a high abundance of Hydrobiidae and Ceratopogonidae and a low abundance of Chironomidae.

Table 3-1: Fish Species Presence by Location

Waterbody / Watercourse	Location ID	Species Richness	Blacknose Shiner	Bluntnose Minnow	Brassy Minnow	Brook Stickleback	Brown Bullhead	Burbot	Cisco	Chrosomus hybrid	Common Shiner	Creek Chub	Cyprinid species	Emerald Shiner	Fathead Minnow	Finescale Dace	Johnny Darter	Lake Chub	Lake Whitefish	Logperch	Longnose Dace	Mottled Sculpin	Northern Pearl Dace	Northern Pike	Northern Redbelly Dace	Sauger	Sculpin species	Slimy Sculpin	Smallmouth Bass	Spottail Shiner	Trout Perch	Walleye	White Sucker	Yellow Perch
Unnamed Stream 1	UNS1	7		X	X	X				X						X							X		X									
	UNS1-BP	5(7)		Xi	X	X				Xi						X							X		X									
Unnamed Stream 2	UNS2	1				X																												
Unnamed Stream 3	UNS3	0																																
Unnamed Stream 4	UNS4	11		X	X	X				X	X	X		X	X	X							X		X									
Unnamed Stream 4 East Tributary	UNS4-ET	3(11)		Xi	Xi	X				Xi	Xi	Xi		Xi	Xi	X							X		Xi									
Unnamed Stream 4 Beaver Pond	UNS4-BP	8(11)		X	X	X				Xi	X	Xi		Xi	X	X							X		X									
Unnamed Stream 5	UNS5	5(7)		Xi		X				X				X		Xi							X		X									
Unnamed Stream 5 Beaver Pond	UNS5-BP	5		X						X						X							X		X									
Unnamed Stream 6	UNS6-S01	2(4)				X									Xi	X									Xi									
	UNS6-P01	4(5)				X				X					X	Xi									X									
	UNS6-P02	1(4)				X									Xi	Xi									Xi									
Unnamed Stream 7	UNS7-P01	4								X					X	X									X									
Unnamed Stream 8	UNS8-S01	5				X				X					X	X									X									
	UNS8-P01	5				X				X					X	X									X									
	UNS8-P02	3(5)				X				X					X	Xi									Xi									
Beaverhouse Lake	BL	14	X				X	X	X										X	X				X		X	X		X		X	X	X	X
Ava Lake	AL	9					X*										X*	X*						X*				X*	X*		X*	X*		X*
York Lake	YL	17			X		X	X	X				X				X		X	X	X		X	X				X	X	X		X	X	X
Misema River	MR-EXP	8(11)					X	X	Xi				Xi						X					X				Xi	X			X	X	X
Victoria Creek	VCS01	2(11)				X	Xi				Xi	Xi				Xi				Xi	Xi	Xi	X						Xi					Xi
	VCS02	6(12)				X	Xi				X	X	X			X				Xi	Xi	Xi	X						Xi					Xi
	VCS03	2(11)				Xi	Xi				X	Xi				Xi				Xi	Xi	X	Xi						Xi					Xi
	VCS04	2(11)				Xi	Xi				Xi	Xi				Xi				X	X	Xi	Xi						Xi					Xi
	VCS05	5(11)				X	X				X	Xi				Xi				Xi	Xi	Xi	Xi						X					X
	VCS06	2(11)					X	Xi	Xi				Xi						Xi					Xi				X	Xi			Xi	Xi	Xi
	VCP01	5(11)				X	Xi				X	X				Xi				Xi	Xi	Xi	X						X					Xi
	VCP02	2(11)				X	X				Xi	Xi				Xi				Xi	Xi	Xi	Xi						Xi					Xi

Species caught during conventional fish community surveys within the sample locations are denoted with an X., representing WSP E&I and SEI fish community surveys 2020-2023.
Species inferred to be present within a sample location due to connectivity and proximity to sampled locations are denoted with an Xi with inferred richness presented within brackets.

Table 3-2: Benthic Invertebrate Community Descriptors by Location and Year

Habitat Type	Location	Year	Statistic	Count	TID (#/m²)	Richness	Diversity	Evenness	% EPT	% Chironomid
Lake	Ava Lake	2021	Average	342	4,951	12	0.74	0.23	13.27	42.63
			Standard Error	100	1,451	2	0.05	0.05	4.14	5.92
	York Lake	2021	Average	129	1,867	7	0.63	0.26	18.85	51.85
			Standard Error	14	202	2	0.05	0.04	4.19	6.49
Pond	Unnamed Stream 7	2021	Average	390	5,655	8	0.68	0.21	7.72	48.32
			Standard Error	104	1,504	1	0.03	0.03	3.50	4.84
Watercourse	Victoria Creek S02	2021	Average	181	2,620	9	0.79	0.42	11.74	24.32
			Standard Error	56	809	2	0.04	0.07	5.28	1.89
	Victoria Creek S03	2021	Average	181	2,620	8	0.78	0.50	8.41	20.71
			Standard Error	63	911	1	0.01	0.12	3.32	6.34
	Victoria Creek S06	2021	Average	249	3,614	11	0.73	0.24	13.47	33.38
			Standard Error	102	1,474	2	0.03	0.06	9.92	7.12
	Misema River	2021	Average	182	2,643	9	0.69	0.23	29.27	30.49
			Standard Error	44	643	1	0.04	0.07	8.43	9.91
		2022	Average	575	8,330	12	0.68	0.30	9	49
			Standard Error	88	1,284	2	0.04	0.05	1.75	5.23
	Wawagoshe Creek	2022	Average	919	13,322	16	0.75	0.26	8	44
			Standard Error	79	1,150	1	0.02	0.03	3.54	3.52
	Blanche River	2022	Average	1,002	14,525	18	0.77	0.29	9	30
			Standard Error	211	3,059	4	0.04	0.04	4.73	8.17

TID represents total invertebrate density expressed as the number of individuals per square metre.

%EPT represents the percent proportion of individuals from the families Ephemeroptera, Plecoptera and Trichoptera.

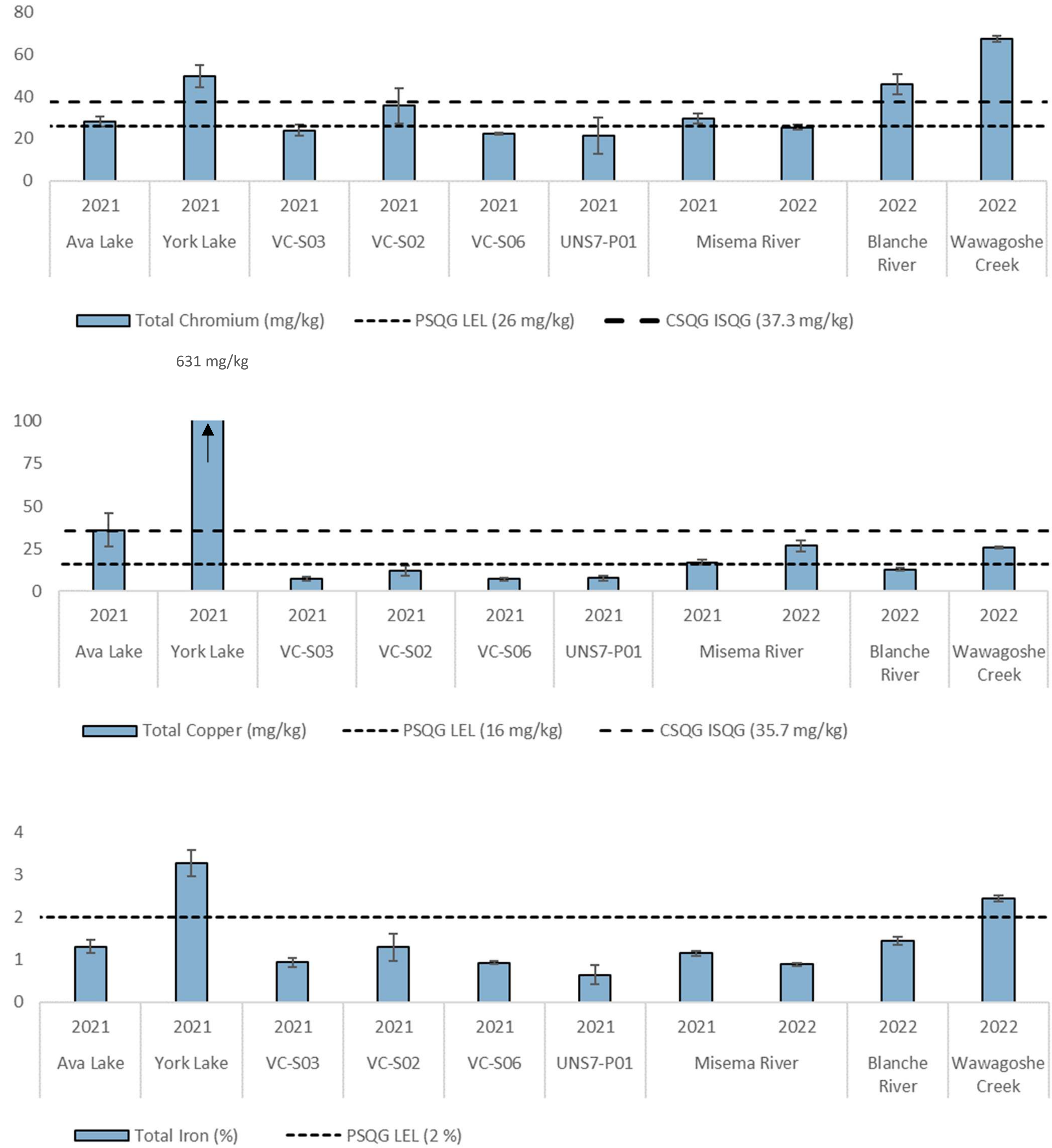

Figure 3-1: Sediment Quality Parameters (total chromium, copper and iron)

Concentrations reported less than laboratory detection limit were divided in half for calculation of mean and plotting purposes. Individual concentration values are presented in Appendix E by location and year, the above plots represent mean values where available.

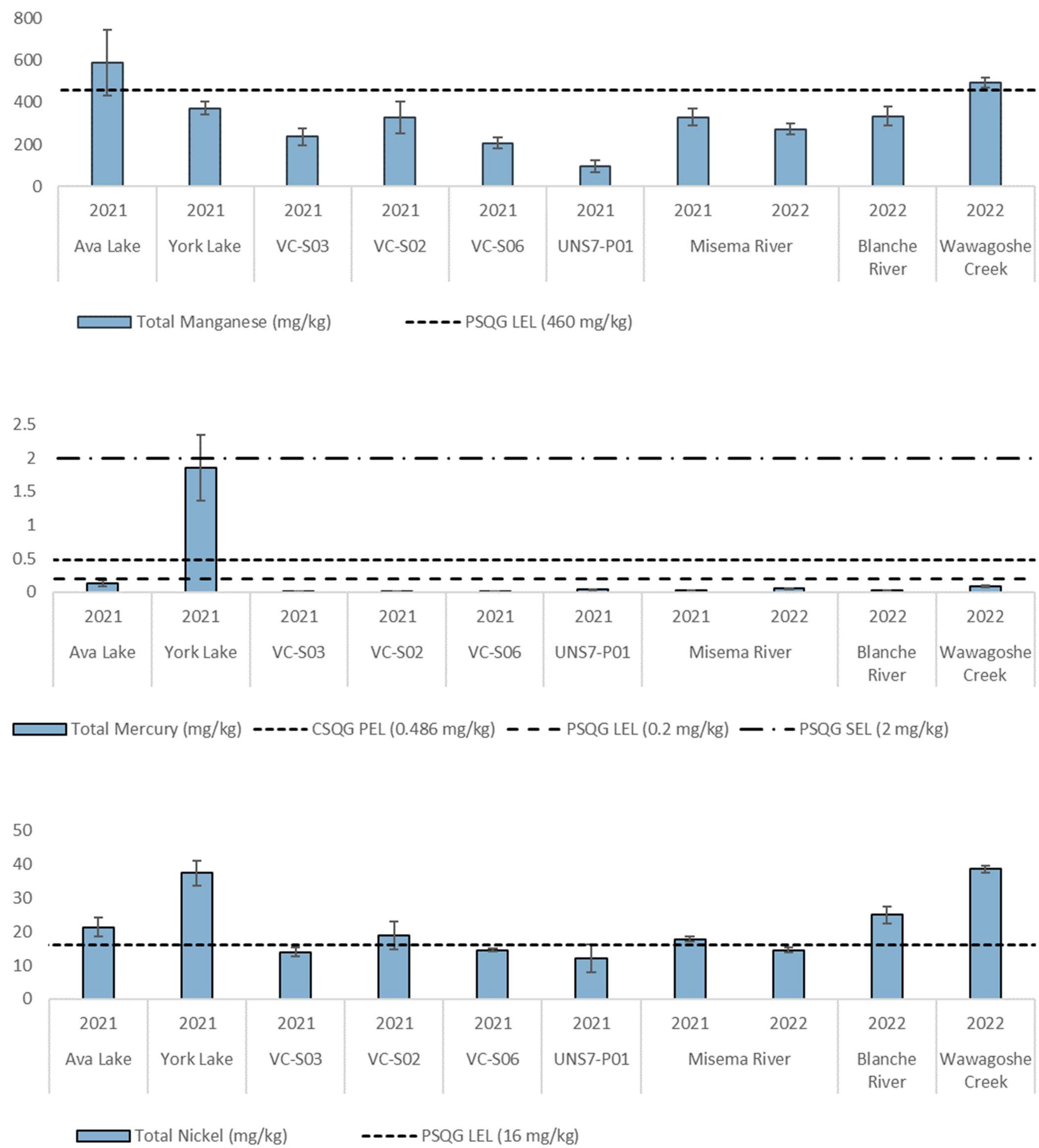

Figure 3-2: Sediment Quality Parameters (total manganese, mercury and nickel)

Concentrations reported less than laboratory detection limit were divided in half for calculation of mean and plotting purposes. Individual concentration values are presented in Appendix E by location and year, the above plots represent mean values where available.

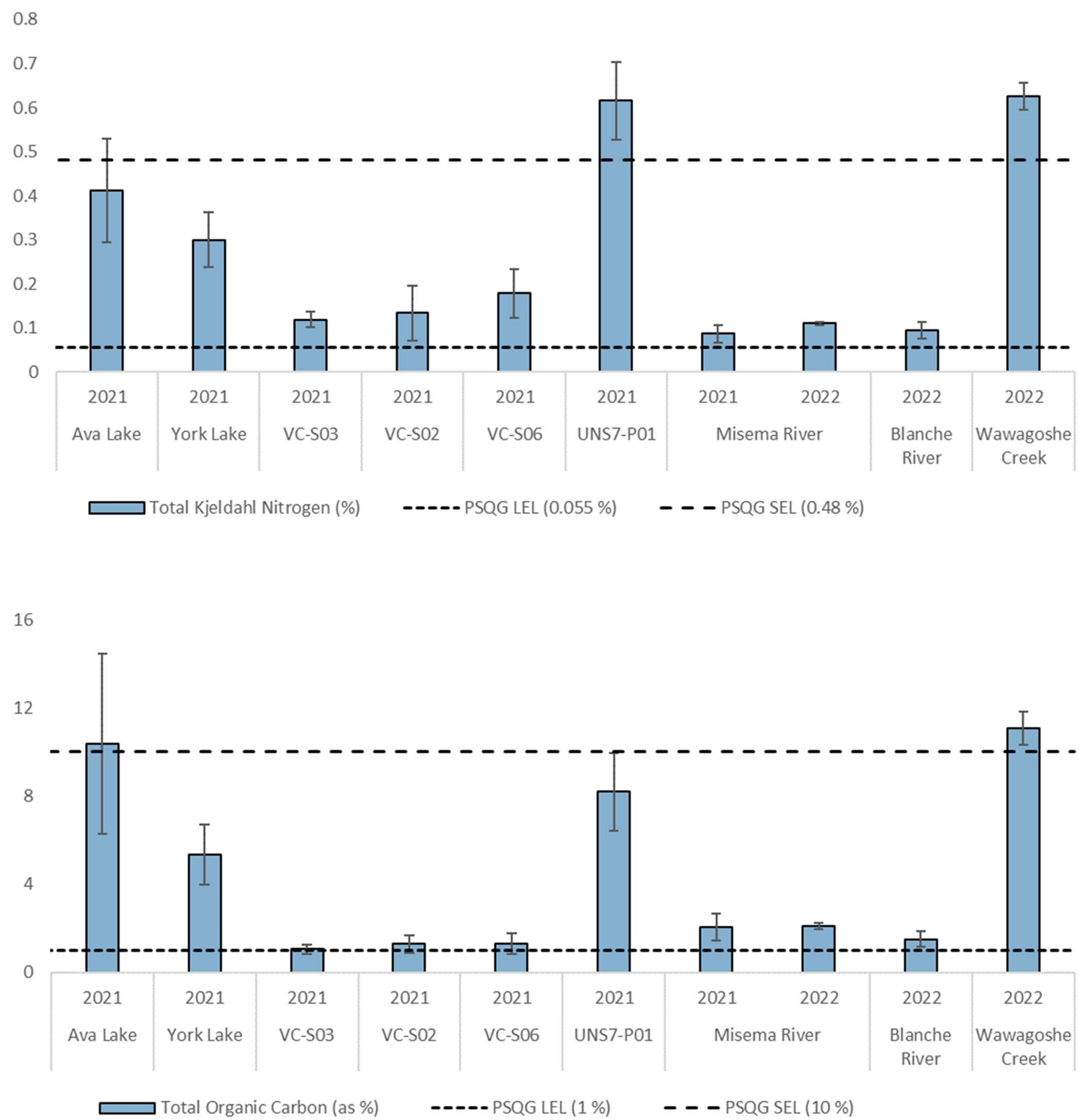

Figure 3-3: Sediment Quality Parameters (total Kjeldahl nitrogen and total organic carbon)

Concentrations reported less than laboratory detection limit were divided in half for calculation of mean and plotting purposes. Individual concentration values are presented in Appendix E by location and year, the above plots represent mean values where available.

4.0 SUMMARY OF FINDINGS

The 2021 to 2023 fish and fish habitat studies characterized the existing conditions, fish community, surface water and sediment quality, as well as lower trophic level metrics (e.g., benthic invertebrate and zooplankton communities) for a number of locations within, and adjacent to the Project. These results show the surrounding terrestrial habitat contain black spruce and coniferous forest and localized areas of grass and shrub dominated floodplains, with drier upland communities comprised of black spruce. These riparian areas contribute coarse organic material, and the acidic, conifer inputs result in tea-stained surface water. Mineral and organic wetlands connected by streams, ponds, rivers are common in the region.

Surface water quality measured in field generally met the respective quality criteria for the protection of aquatic life in baseline condition. Lower trophic level parameters measured concurrently with the surface water samples included chlorophyll a, phytoplankton and zooplankton. These results showed seasonal and interannual variability in taxa assemblage and biomass, typical of northeastern Ontario environs, and provide baseline data for future comparison.

The small streams and drainage channels connecting the inland waterbodies (i.e., beaver ponds) to mainstem river drainages are generally low gradient, low energy depositional environments with fine grained organic substrates. The larger mainstem streams and rivers such as the Misema River, are generally slow moving, with a fine substrate and a riparian zone densely populated with tree and shrub vegetation.

Fish community survey results show the fish species are typical of those inhabiting northeastern Ontario. Fish communities predominantly included forage (baitfish) species, as well as coarse fish (sucker) and upper trophic predatory species (e.g., Northern Pike and Walleye). No aquatic Species at Risk were anticipated within the inland watercourse and waterbodies, and none were encountered during the 2021 to 2023 studies.

Fish tissue analysis shows naturally elevated concentrations of total mercury and methylmercury in Northern Pike, Smallmouth Bass and Walleye which is commonly observed within northeastern Ontario and has been historically detected during the Ministry of the Environment, Conservation and Parks sportfish tissue monitoring program. These analytes were also measured in baitfish (forage) species to better understand mercury concentrations in lower trophic levels, with results showing some mercury content but not concerning levels, as expected.

Sediment quality results showed typical nutrient and organic content exceeded their respective quality criteria for the protection of aquatic life in baseline condition. For example, total Kjeldahl nitrogen and total organic carbon were generally greater than their quality criteria, which is commonly observed in northeastern Ontario depositional lentic environs and low gradient watercourses that receive organic inputs and typically contain high organics content. These data help to establish baseline sediment quality concentrations that are naturally greater than their respective quality criteria.

The benthic invertebrate community survey results show a typical range of taxa richness, diversity and density observed in northeastern Ontario. These data help characterize another metric of the lower trophic status within lake (lentic) and riverine (lotic) environs for the Project and provide baseline data for future comparison.

5.0 REFERENCES

Canadian Council of Ministers of the Environment (CCME). 2000. Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota: Methylmercury. In: Canadian Environmental Quality Guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Canadian Council of Ministers of the Environment (CCME). 2001. Sediment Quality Guidelines for the Protection of Aquatic Life. Summary table accessed at: Canadian Council of Ministers of the Environment | Le Conseil canadien des ministres de l'environment (ccme.ca) [accessed February 28, 2023]

Canadian Council of Ministers of the Environment (CCME). 2016. Water Quality Guidelines for the Protection of Aquatic Life. Summary table accessed at: Canadian Council of Ministers of the Environment | Le Conseil canadien des ministres de l'environment (ccme.ca) [accessed February 28, 2023]

Coker, G.A., Portt, C.B., Minns, C.K. 2001. Morphological and Ecological Characteristics of Canadian Freshwater Fishes. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2554.

Environment and Climate Change Canada (ECCC). 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring.

Environment and Climate Change Canada (ECCC). 2022. Federal Environmental Quality Guidelines (FEQGs). Accessed at: Federal Environmental Quality Guidelines (FEQGs) - Canada.ca [accessed 28 February 2023]

Fowlie, P. 2014. CALA Guide to Current Sampling Practices. April 2014.

Hasnain, S.S., Minns, C.K., Shuter, B.J. 2010. Key Ecological Temperature Metrics for Canadian Freshwater Fishes. Climate Change Research Project.

Health Canada. 2011. Food and Nutrition, Canadian Standards (Maximum Levels for Various Chemical Contaminants in Foods. Summary table accessed at https://www.ontario.ca/page/eating-ontario-fish-2017-18 (Last Updated: February 2, 2023).

Ministry of Environment and Energy (MOEE). 1999. Provincial Water Quality Objectives.

Ministry of the Environment and Climate Change (MOECC). 2008. Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario.

Ministry of the Environment and Climate Change (MOECC). 2015. Guide of Eating Ontario Sport Fish 2015-2016. Available: https://dr6j45jk9xcmk.cloudfront.net/documents/4460/fishguide2015-final-aoda-en-final.pdf [accessed 28 February 2023]

Ministry of Natural Resources and Forestry (MNRF). 2022a. Ontario Watershed Information Tool. Accessed at https://www.lioapplications.lrc.gov.on.ca/OWIT/Index.html?viewer=OWIT.OWIT&locale=en-ca. [accessed 03 March 2023].

Ministry of Natural Resources and Forestry (MNRF). 2022b. Fish ON-Line. Accessed at https://www.lioapplications.lrc.gov.on.ca/fishonline/Index.html?viewer=FishONLine.FishONLine&locale=en-CA. [accessed 03 October 2023].

Ministry of Transportation (MTO). 2020. Environmental Guide for Fisheries.

Stahl, L., Snyder, B., Olsen, A., Pitt, J., 2009. Contaminants in fish tissue from US lakes and reservoirs: a national probabilistic study. Environ. Monit. Assess. 150, 3–19.

Story Environmental Inc. (SEI). 2013. Upper Beaver Project, Aquatic Baseline Study, Gauthier Township, Ontario. Prepared for Osisko Mining Ltd.

Story Environmental Inc. (SEI). 2021. 2020 Fish and Fish Habitat Baseline Report for the Upper Beaver Zone Project. April 2021.

United States Environmental Protection Agency (US EPA). 2016. Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater 2016 – Fact Sheet. Available: https://www.epa.gov/sites/default/files/2016-06/documents/se_2016_fact_sheet_final.pdf [accessed February 28 2023]

WSP E&I. 2023. 2021 Aquatic Resources Baseline Report. April 2023.

WSP E&I. 2023. 2022 Fisheries Resources Baseline Report. April 2023.

Wetzel, R.G. and G.E. Likens. 2001. Seasonality in Abundance, Biomass and Production of the Phytoplankton of Welala and Shesher Wetlands, Lake Tana Sub-Basin (Ethiopia). Journal of Water Resource and Protection, Vol.4 No.10, October 30, 2012.

Signature Page

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APPENDIX A

Surface Water Quality Data

Table A1-1: In-Field Surface Water Measurements (2021)

Waterbody	ID	Date (dd/mm/yyyy)	Season	UTM Coordinates (Easting, Northing)		Time (Military)	YSI Depth (m)	Water Temperature (°C)	pH	Conductivity (mS/cm)	Conductivity (uS/cm)	DO (%)	DO (mg/L)
Ava Lake	AL	17/06/2021	Spring	592,157	5,335,660	18:15	1.0	21.4	n/a	n/a	58.7	n/a	8.7
	AL	18/08/2021	Summer	592,220	5,335,582	14:40	0.0	23.3	8.0	0.060	n/a	100.2	8.5
	AL	24/08/2021	Summer	592,157	5,335,660	11:45	0.0	24.8	7.7	n/a	61.8	n/a	7.9
	AL	2021-03-10	Fall	592,157	5,335,660	13:00	0.0	13.8	7.5	0.064	n/a	90.9	9.4
	AL	2021-09-11	Fall	592,157	5,335,660	10:23	0.0	6.6	7.3	n/a	66.2	n/a	9.9
Beaverhouse Lake	BL-SW	17/06/2021	Spring	593,078	5,335,988	10:30	1.0	19.5	n/a	n/a	58.2	n/a	8.9
	BL-MID	17/06/2021	Spring	594,561	5,336,072	15:30	1.0	19.8	n/a	n/a	57.9	n/a	9.0
	BL-SW	15/08/2021	Summer	593,069	5,336,008	14:43	0.0	21.4	7.6	0.059	n/a	94.7	8.4
	BL-07-GN1	16/08/2021	Summer	593,313	5,336,265	16:10	0.5	23.9	7.4	0.059	n/a	106.1	8.9
	BL-08-GN1	16/08/2021	Summer	592,793	5,335,891	15:53	0.5	22.0	7.7	0.059	n/a	98.5	8.6
	BL-01-GN1	17/08/2021	Summer	593,805	5,338,296	15:20	0.1	23.1	7.7	0.057	n/a	105.5	9.0
	BL-02-GN1	17/08/2021	Summer	594,760	5,337,750	15:56	0.2	23.7	7.8	0.059	n/a	102.1	8.7
	BL-03-GN1	17/08/2021	Summer	595,462	5,336,556	15:45	0.3	23.6	8.0	0.059	n/a	105.4	9.0
	BL-05-GN1	17/08/2021	Summer	594,708	5,336,278	18:00	0.2	23.1	7.8	0.059	n/a	100.4	8.6
	BL-MID	18/08/2021	Summer	594,547	5,336,079	9:40	0.0	22.5	7.8	0.059	n/a	99.2	8.6
	BL-04-GN1	18/08/2021	Summer	594,588	5,337,100	11:02	0.1	23.1	7.7	0.059	n/a	97.9	8.4
	BL-06-GN1	18/08/2021	Summer	594,149	5,336,333	11:19	0.5	22.7	7.7	0.059	n/a	98.8	8.5
	BL-MID	22/08/2021	Summer	594,561	5,336,072	11:50	0.0	25.3	7.7	n/a	60.7	n/a	8.3
	BL-SW	23/08/2021	Summer	593,078	5,335,988	15:45	0.0	26.7	7.9	n/a	61.8	n/a	8.4
	BL-SW	2021-08-11	Fall	593,078	5,335,988	11:20	0.0	6.7	7.5	n/a	66.1	n/a	10.3
	BL-MID	2021-08-11	Fall	594,561	5,336,072	15:35	0.0	6.4	7.5	n/a	62.4	n/a	10.9
	BL-MID	29/09/2021	Fall	594,561	5,336,072	14:15	0.0	13.8	7.5	0.062	n/a	90.6	9.4
	BL-SW	29/09/21	Fall	593,078	5,335,988	12:45	0.0	13.9	7.5	0.062	n/a	86.6	8.9

Waterbody	ID	Date (dd/mm/yyyy)	Season	UTM Coordinates (Easting, Northing)		Time (Military)	YSI Depth (m)	Water Temperature (°C)	pH	Conductivity (mS/cm)	Conductivity (uS/cm)	DO (%)	DO (mg/L)
Misema River	MR-EXP	2021-02-10	Fall	592,141	5,335,015	8:10	0.7	12.7	7.6	0.078	n/a	93.8	10.0
Unnamed Stream 6	UNS6-P01	19/08/2021	Summer	n/a	n/a	9:21	0.1	21.2	5.7	0.036	33.0	30.9	2.7
	UNS6-P02	19/08/2021	Summer	593,313	5,336,689	11:22	0.5	21.5	6.9	0.051	n/a	74.4	6.6
Unnamed Stream 7	UNS7-P01	16/08/2021	Summer	593,600	5,337,046	14:13	0.5	23.3	7.8	0.059	n/a	102.9	8.8
	UNS7-P01	24/09/2021	Fall	593,610	5,337,028	14:00	n/a	12.0	7.0	0.033	n/a	55.6	6.0
Unnamed Stream 8	UNS8-P01	19/08/2021	Summer	593,761	5,337,760	14:52	0.5	28.8	7.5	0.026	n/a	118.4	9.1
	UNS8-S01	19/08/2021	Summer	593,671	5,337,782	15:13	0.5	23.7	5.9	0.025	n/a	60.6	5.1
	UNS8-P02	19/08/2021	Summer	593,659	5,337,902	15:38	0.5	22.6	6.1	0.020	n/a	92.5	8.0
Victoria Creek	VCS01	13/08/2021	Summer	590,917	5,336,362	11:15	0.5	21.3	7.7	0.108	n/a	96.3	8.5
	VCP01	13/08/2021	Summer	590,994	5,336,320	10:17	0.5	21.0	7.9	0.108	n/a	98.6	8.8
	VCS02	13/08/2021	Summer	591,028	5,336,252	9:20	0.5	20.9	7.9	0.106	n/a	97.8	8.7
	VCS03	13/08/2021	Summer	591,135	5,335,767	13:02	0.5	21.3	7.9	0.109	n/a	97.8	8.7
	VCS04	13/08/2021	Summer	591,633	5,335,240	14:13	0.5	21.5	7.9	0.110	n/a	96.4	8.5
	VCP02	13/08/2021	Summer	591,679	5,335,234	14:00	0.5	21.6	7.7	0.110	n/a	95.7	8.4
	VCS05	13/08/2021	Summer	591,821	5,335,016	15:23	0.5	21.6	7.9	0.110	n/a	97.5	8.6
	VCS06	13/08/2021	Summer	591,947	5,335,044	15:12	0.5	21.7	7.9	0.110	n/a	96.9	8.5
	VCS06	22/09/2021	Fall	591,957	533,506	17:00	0.5	15.4	8.1	0.115	n/a	97.6	9.8
	VCS02	23/09/2021	Fall	591,028	5,336,263	15:35	0.7	12.6	7.9	0.113	n/a	99.3	10.6
	VCS03	25/09/2021	Fall	591,127	5,335,713	12:30	0.6	11.7	8.2	0.111	n/a	98.4	10.7
York Lake	YL	16/06/2021	Spring	591,926	5,335,406	13:30	1.0	19.7	7.5	n/a	72.4		8.5
	YL	15/08/2021	Summer	591,924	5,335,424	10:30	0.0	20.3	7.6	0.063	n/a	93.8	8.4
	YL	24/08/2021	Summer	591,926	5,335,406	14:30	0.0	24.9	7.7	n/a	66.9		7.8
	YL	2021-09-11	Fall	591,926	5,335,406	13:16	0.0	6.8	7.4	n/a	67.4		10.9
	YL	22/09/2021	Fall	591,926	5,335,406	10:00	0.0	13.9	8.0	0.066	n/a	93.5	9.6

Waterbody	ID	Date (dd/mm/yyyy)	Season	UTM Coordinates (Easting, Northing)		Time (Military)	YSI Depth (m)	Water Temperature (°C)	pH	Conductivity (mS/cm)	Conductivity (uS/cm)	DO (%)	DO (mg/L)
	YL	26/09/2021	Fall	591,942	5,335,561	16:00	1.5	14.3	8.0	0.065	n/a	93.9	9.6

All values expressed as mg/L unless otherwise noted.
PWQO; Provincial Water Quality Objectives
CWQG; Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for the protection of aquatic life
Dark blue shaded values indicate concentrations that exceed the PWQO PQL
Gray shaded values indicate concentrations that exceed the CCME CWQG

Table A2-1: In-Field Surface Water Measurements (2022)

Waterbody	Location ID	Date (yyyy/mm/dd)	Season	UTM Coordinates (Easting, Northing)		Time (24-hr)	Water Temperature (°C)	pH	Conductivity (uS/cm)	DO (%)	DO (mg/L)
Ava Lake	AL	2022-05-23	Spring	592,222	5,335,577	9:10	12.9	6.0	45.2	89.9	9.65
	AL	2022-10-16	Fall	592,222	5,335,577	9:45	9.8	7.2	55	85.7	9.73
Beaverhouse Lake	BHL-MID	2022-10-14	Fall	594,561	5,336,072	10:30	10.3	7.3	53	93.0	10.04
	BHL-N	2022-10-16	Fall	593,805	5,338,296	11:45	9.4	7.1	54	88.5	9.47
	BHL-MID	2022-05-21	Spring	594,547	5,336,079	14:00	13.2	6.1	44.1	96.5	10.01
	BHL-MID	2022-10-12	Fall	594,547	5,336,079	13:23	10.4	7.1	54	84.5	9.44
	BHL-SW	2022-05-21	Spring	593,069	5,336,008	14:45	13.5	6.1	45.4	94.5	9.76
	BHL-SW	2022-10-12	Fall	593,069	5,336,008	14:00	10.6	7.1	55	83.0	9.24
Blance River	BR-REF	2022-10-22	Fall	571,353	5,315,720	12:00	7.5	7.5	118	89.2	10.70
	BR-REF	2022-08-19	Summer	571,130	5,315,678	10:10	22.3	7.5	142	104.5	8.96
Misema River	MR-EXP	2022-10-18	Fall	592,024	5,334,823	9:40	8.7	7.4	69	94.0	10.92
Unnamed Beaver Pond 1	UNSBP-01	2022-10-12	Fall	592,103	5,336,213	9:55	6.5	6.8	79	49.6	6.08
Unnamed Beaver Pond 2	UNSBP-02	2022-10-12	Fall	592,194	5,336,333	10:00	7.4	6.5	53	51.1	6.11
Unnamed Beaver Pond 3	UNSBP-03	2022-10-12	Fall	592,281	5,336,412	10:05	7.1	6.6	85	34.7	4.18
Unnamed Stream 6	UNS6-P01	2022-05-21	Spring	593,287	5,336,872	10:30	13.0	5.7	50.1	56.3	5.89
	UNS6-P02	2022-05-21	Spring	593,313	5,336,689	9:40	12.7	5.9	48.1	58.9	6.19
	UNS6-S01	2022-05-18	Spring	593,221	5,337,072	12:09	10.7	5.4	58.1	85.1	9.34
Unnamed Stream 7	UNS7-P01	2022-05-17	Spring	593,610	5,337,028	11:00	16.4	5.3	25	63.2	6.10
	UNS7-P01	2022-10-12	Fall	593,598	5,337,014	10:15	8.6	6.5	34	69.3	8.00
Unnamed Stream 8	UNS8-P01	2022-05-22	Spring	593,761	5,337,760	10:17	13.6	5.1	23.7	58.4	5.91
	UNS8-P02	2022-05-22	Spring	593,659	5,337,902	10:42	11.7	5.0	20	58.4	6.30
	UNS8-S01	2022-05-22	Spring	593,671	5,337,782	9:40	11.5	5.2	25.4	30.6	3.32
Victoria Creek	VC-P01	2022-05-21	Spring	590,994	5,336,320	12:23	12.6	6.8	85.1	96.3	10.15
	VC-P02	2022-05-19	Spring	591,679	5,335,234	12:15	12.1	6.7	87.1	97.7	10.34
	VC-S01	2022-05-21	Spring	590,917	5,336,362	11:50	12.3	6.2	84.9	98.1	10.36

Waterbody	Location ID	Date (yyyy/mm/dd)	Season	UTM Coordinates (Easting, Northing)		Time (24-hr)	Water Temperature (°C)	pH	Conductivity (uS/cm)	DO (%)	DO (mg/L)
	VC-S02	2022-05-21	Spring	591,028	5,336,252	12:48	12.6	6.7	85	98.5	10.37
	VC-S03	2022-05-19	Spring	591,135	5,335,767	11:17	12.1	6.5	86.9	98.1	10.41
	VC-S04	2022-05-19	Spring	591,633	5,335,240	13:00	12.2	6.7	87.1	100.0	10.55
	VC-S05	2022-05-17	Spring	591,821	5,335,016	17:00	13.3	6.2	89.3	86.5	8.99
	VC-S06	2022-05-18	Spring	591,947	5,335,044	14:00	12.2	6.4	85.2	93.2	9.89
Wawagoshe Creek	WC-REF	2022-10-21	Fall	608,533	5,341,817	10:30	5.3	6.8	47	77.5	9.82
	WC-REF	2022-08-21	Summer	608,527	5,341,820	12:10	21.6	7.4	54	68.0	5.93
York Lake	YL	2022-05-24	Spring	531,918	5,335,434	12:27	13.3	5.9	45.3	98.4	10.39
	YL	2022-10-18	Fall	531,918	5,335,434	10:30	9.4	7.3	56	91.1	10.43

All values expressed as mg/L unless otherwise noted.
PWQO; Provincial Water Quality Objectives
CWQG; Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for the protection of aquatic life
Dark blue shaded values indicate concentrations that exceed the PWQO PQL
Gray shaded values indicate concentrations that exceed the CCME CWQG

Table A3-1: In-Field Surface Water Measurements (2023)

Waterbody	Location ID	Date (yyyy/mm/dd)	Season	UTM Coordinates (Easting, Northing)		Time (24-hr)	Water Temperature (°C)	pH	Conductivity (us/cm)	DO (%)	DO (mg/L)
York Lake	YL	2023-05-02	Spring	531,918	5,335,434	14:30	4.2	n/a	n/a	115.3	14.3
Ava Lake	AL	2023-05-24	Spring	592,222	5,335,577	10:40	10.6	6.20	n/a	89.8	9.7
Unnamed Stream 1	UNS1	2023-05-21	Spring	592,188	5,336,130	14:00	14.3	6.96	n/a	71.3	7.1
		2023-07-31	Summer	592,188	5,336,130	14:30	21.9	6.53	129	44.0	3.9
	UNS1-BP	2023-05-24	Spring	592,109	5,336,180	9:40	10.6	6.95	n/a	56.1	6.1
Unnamed Stream 2	UNS2	2023-05-19	Spring	591,380	5,336,366	14:45	9.0	7.00	n/a	72.3	8.0
		2023-07-29	Summer	591,380	5,336,366	15:50	10.8	6.80	147	37.9	4.2
Unnamed Stream 3	UNS3	2023-05-19	Spring	591,074	5,336,801	13:00	7.7	6.99	n/a	96.2	11.0
		2023-07-29	Summer	591,074	5,336,801	14:00	15.6	6.66	233	18.5	1.8
Unnamed Stream 4	UNS4-BP	2023-05-20	Spring	591,864	5,337,459	13:00	9.4	5.50	n/a	65.2	7.2
		2023-07-31	Summer	591,864	5,337,459	11:00	15.6	5.81	44	46.1	4.6
	UNS4	2023-05-19	Spring	591,342	5,336,901	10:00	8.7	5.51	n/a	91.6	10.2
		2023-07-29	Summer	591,342	5,336,901	13:15	18.7	6.03	70	11.4	1.1
Unnamed Stream 4 East Tributary	UNS4-ET	2023-07-30	Summer	592,172	5,337,357	13:30	13.7	5.46	68	14.9	1.5
Unnamed Stream 5	UNS5-BP	2023-05-20	Spring	592,353	5,336,804	13:00	11.6	7.69	n/a	69.4	7.3
	UNS5	2023-05-20	Spring	592,406	5,336,818	14:10	8.8	6.58	n/a	74.9	8.4

All values expressed as mg/L unless otherwise noted.
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CWQG; Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for the protection of aquatic life
Dark blue shaded values indicate concentrations that exceed the PWQO PQL
Gray shaded values indicate concentrations that exceed the CWQG

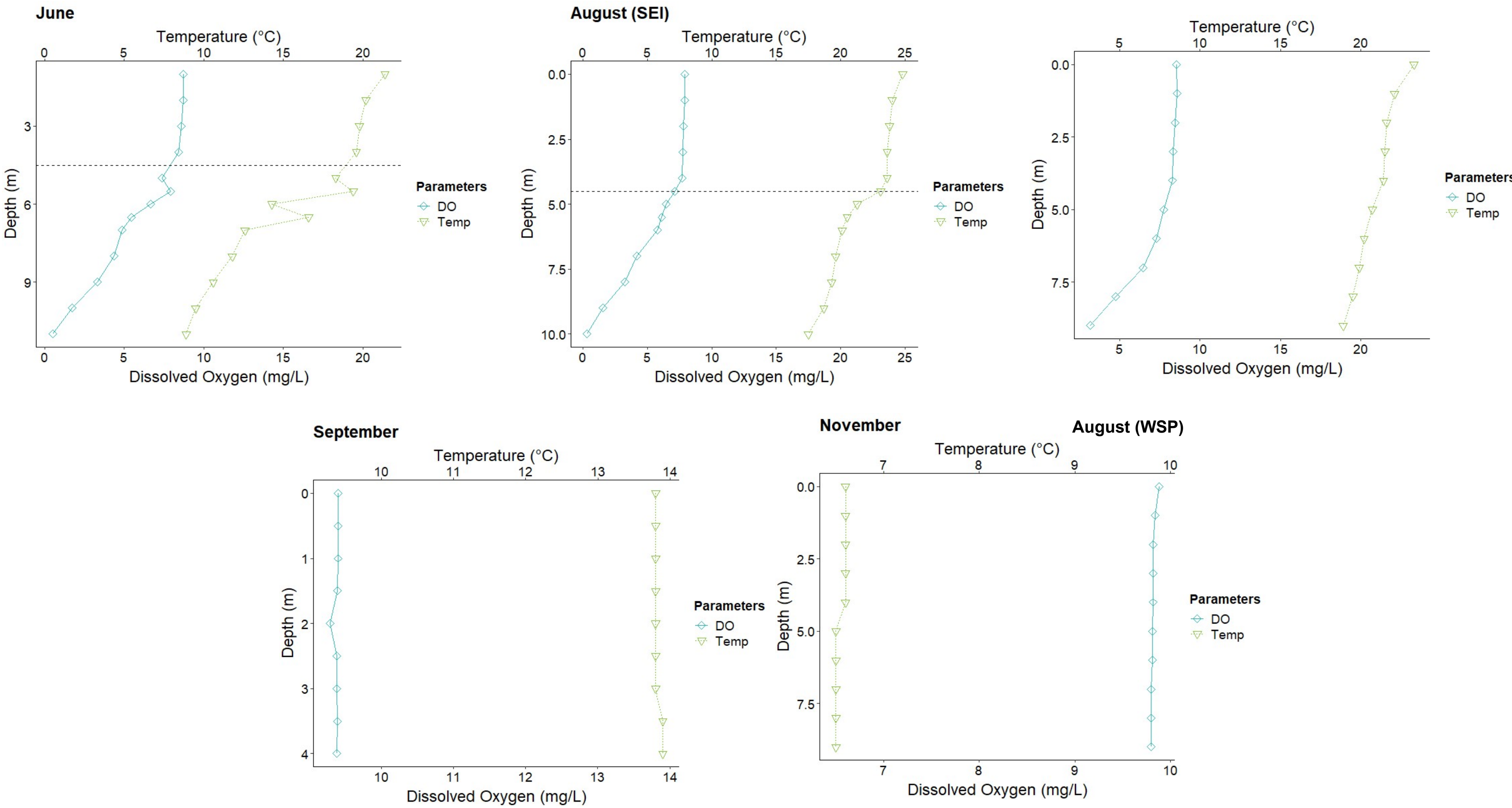


Plate A1-1: Ava Lake Temperature-DO Profiles (2021)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

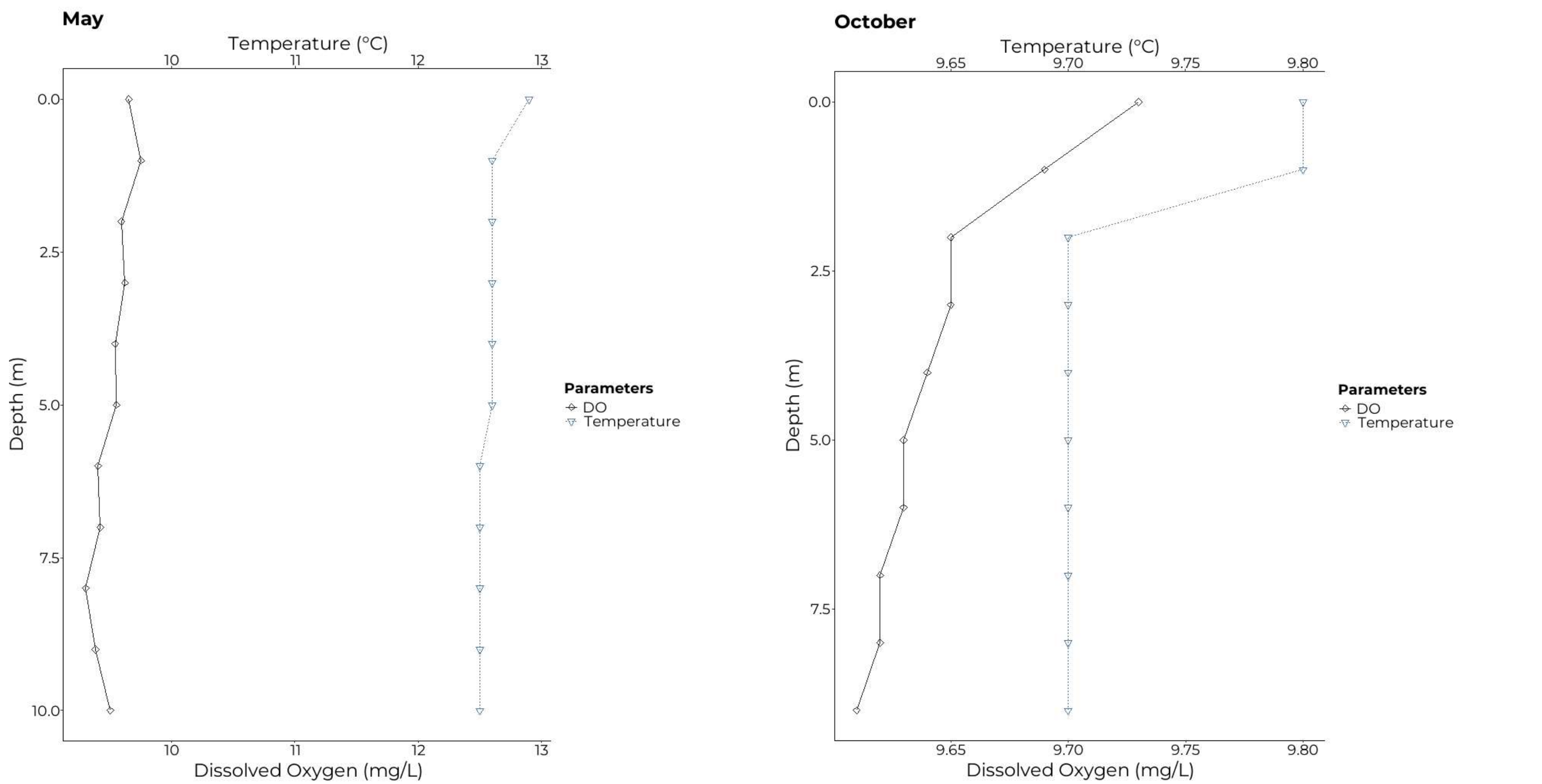


Plate A1-2: Ava Lake Temperature-DO Profiles (2022)

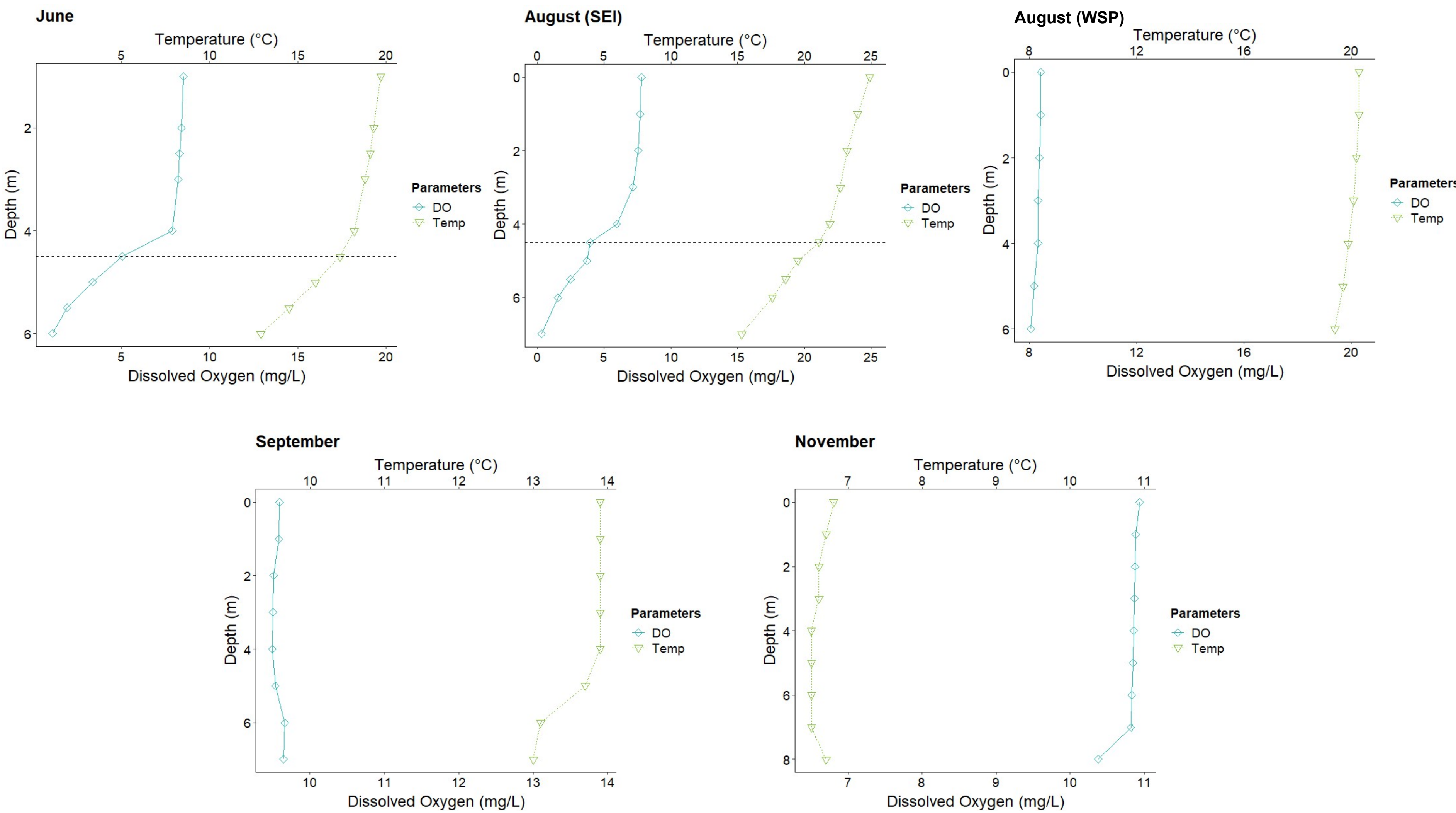


Plate A1-3: York Lake Temperature-DO Profiles (2021)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

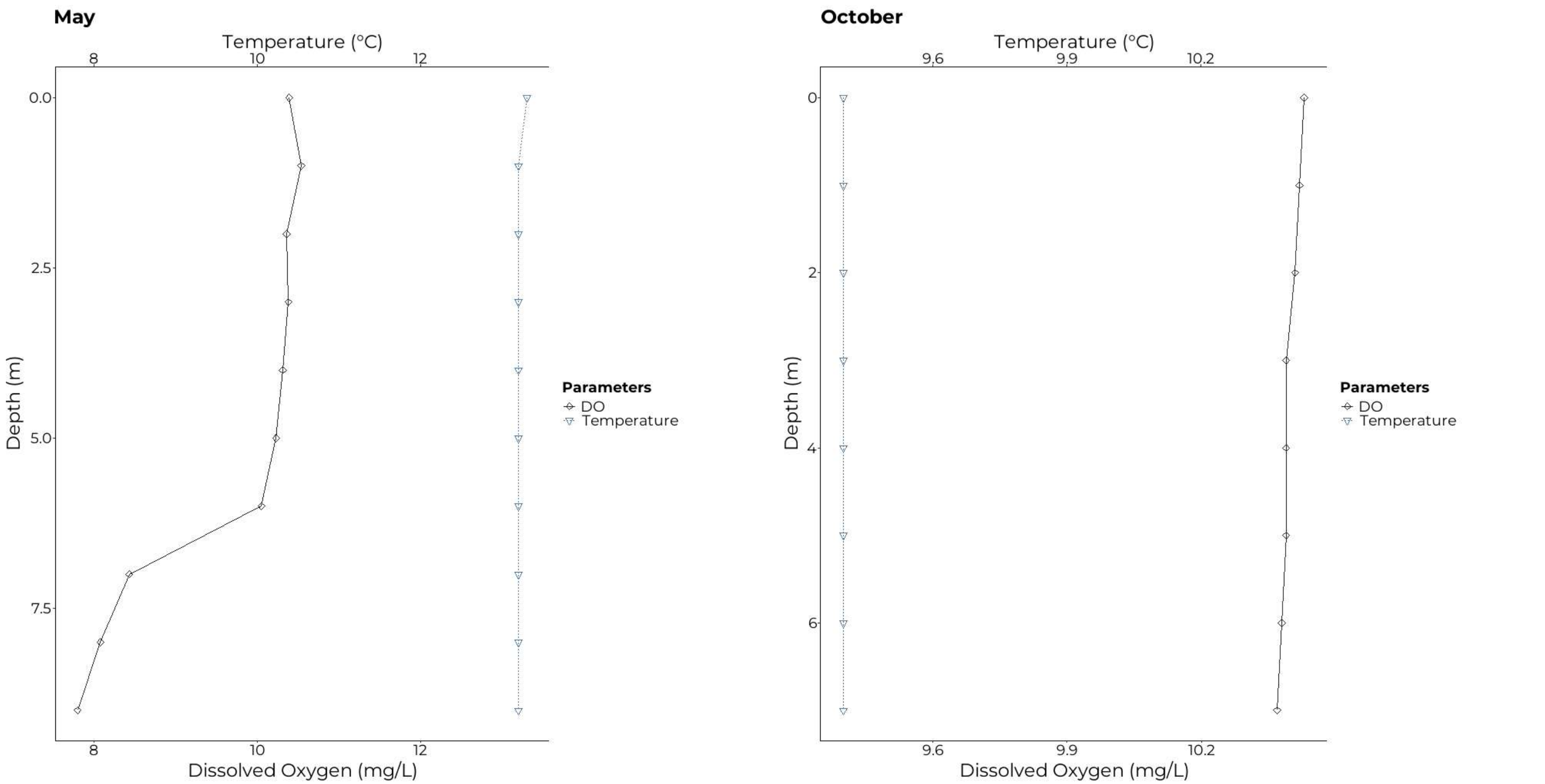


Plate A1-4: York Lake Temperature-DO Profiles (2022)

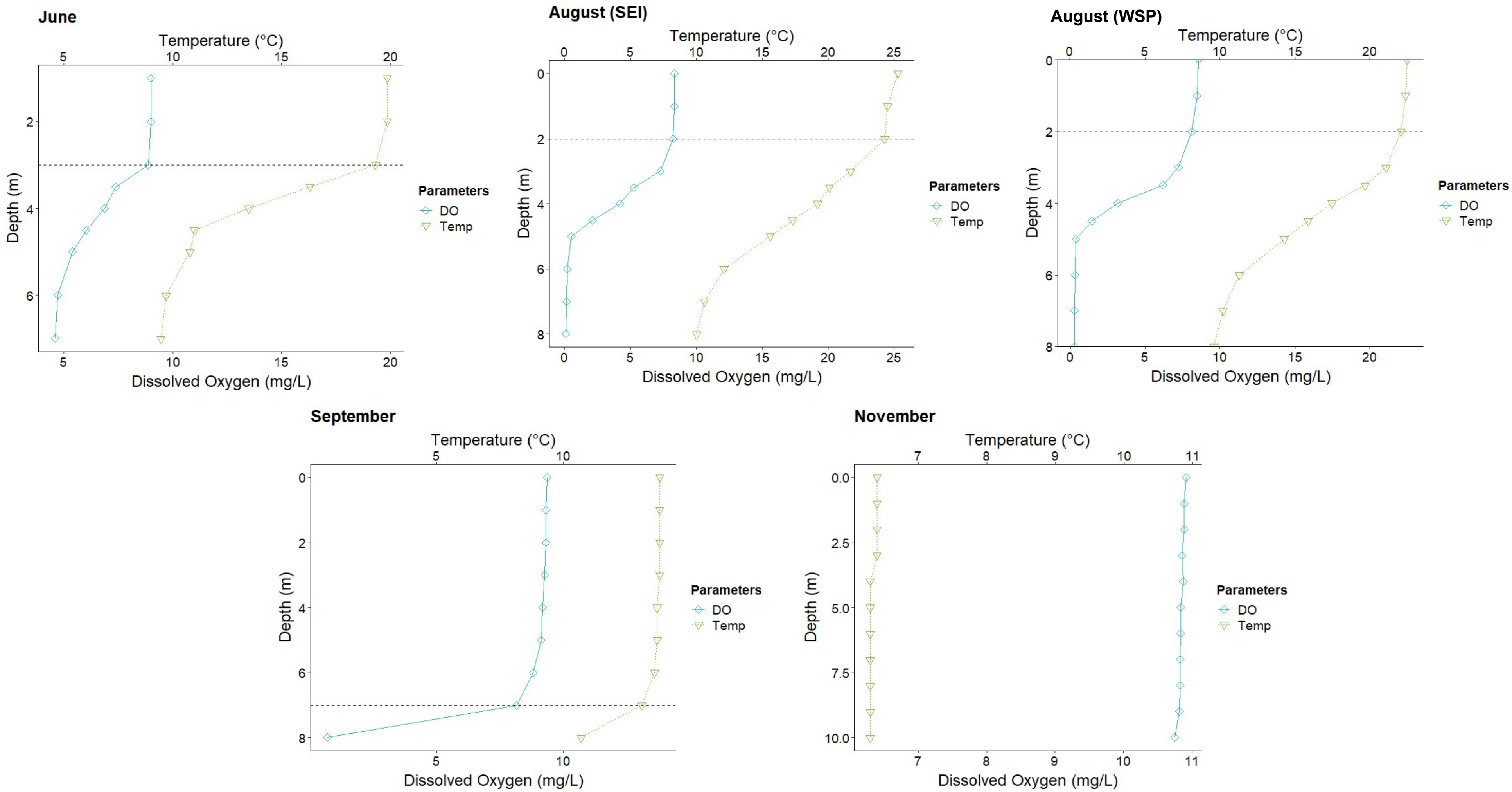


Plate A1-5: Beaverhouse Lake MID Temperature-DO Profiles (2021)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

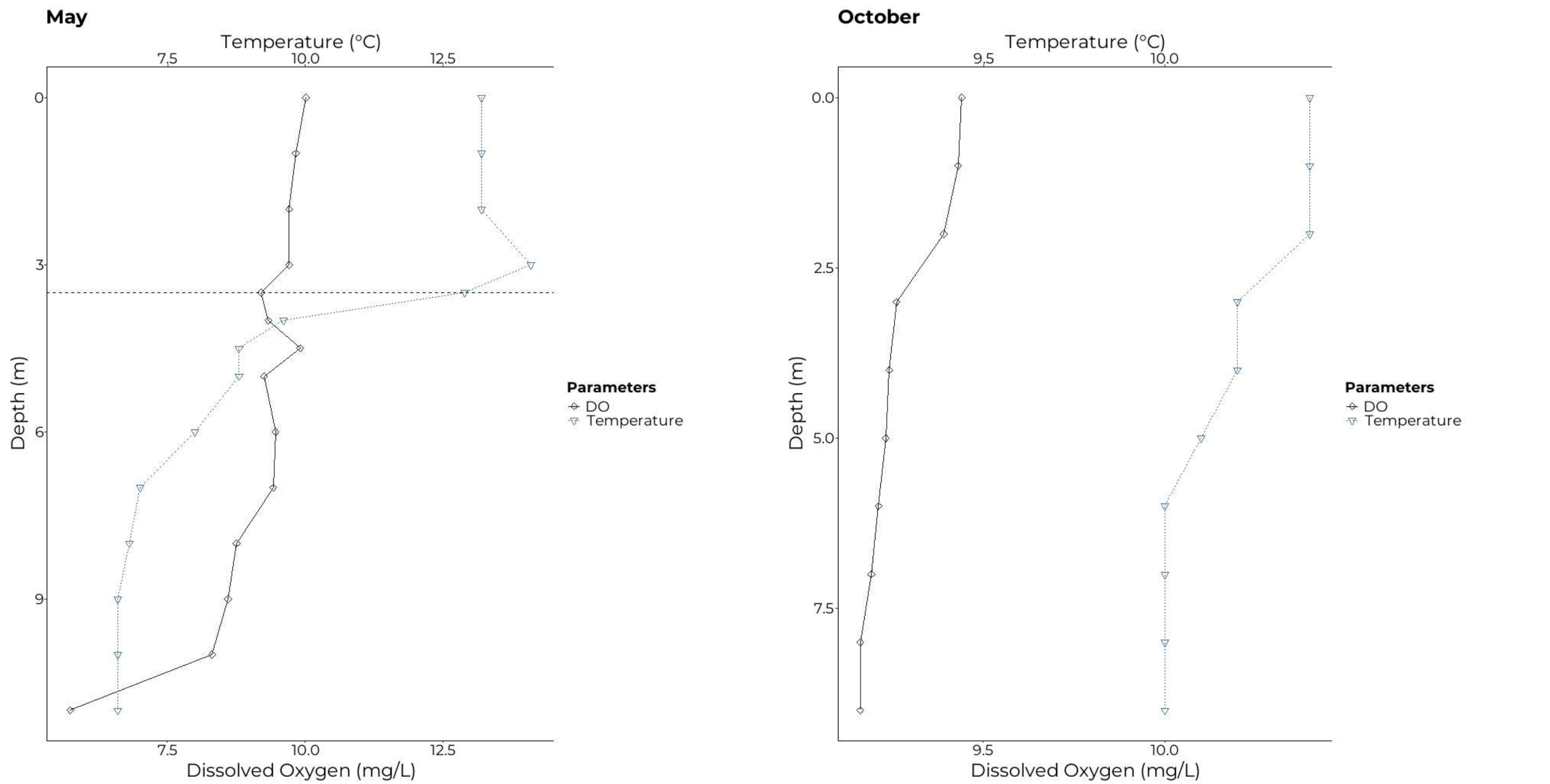


Plate A1-6: Beaverhouse Lake MID Temperature-DO Profiles (2022)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

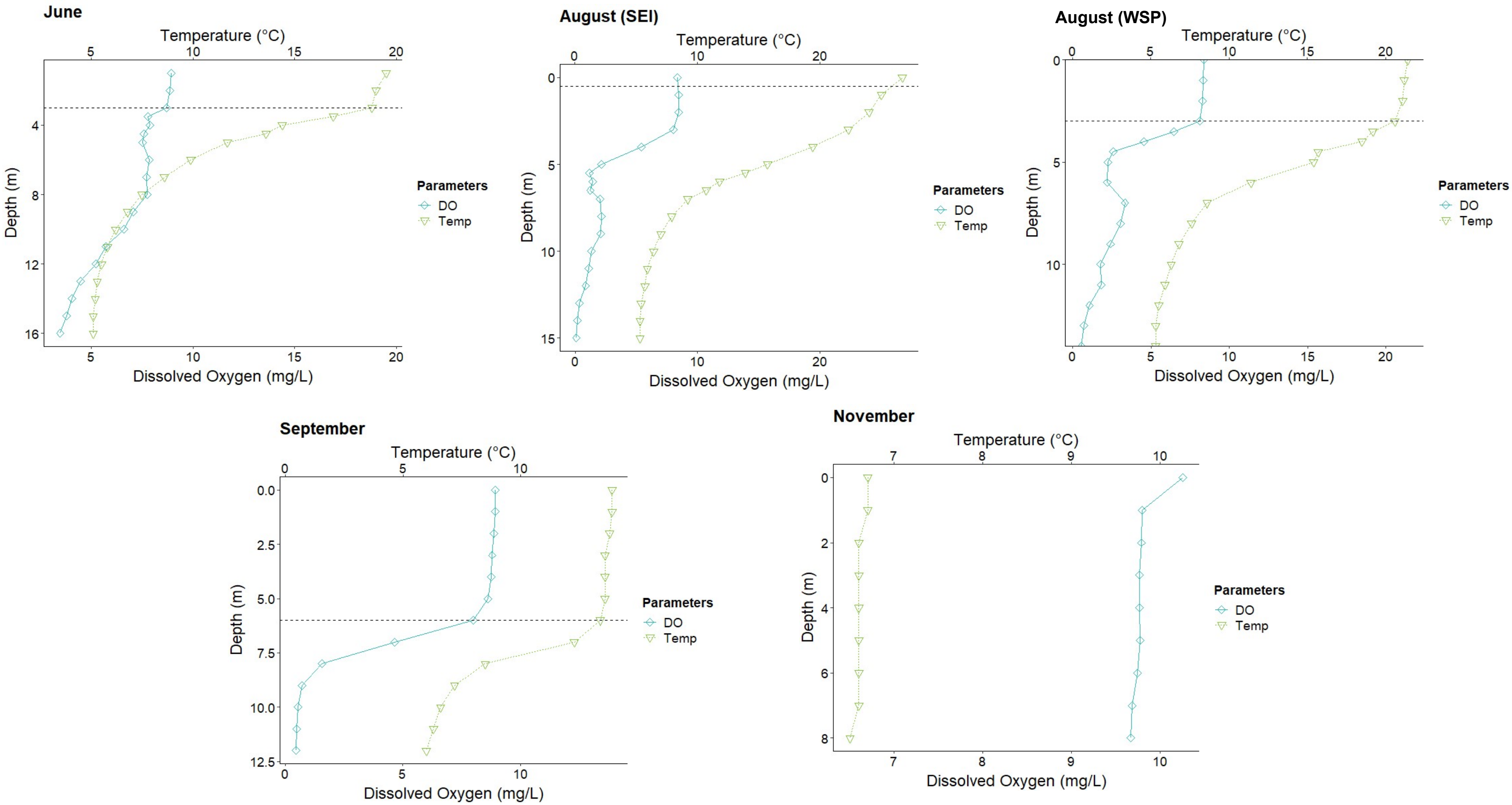


Plate A1-7: Beaverhouse Lake SW Temperature-DO Profiles (2021)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

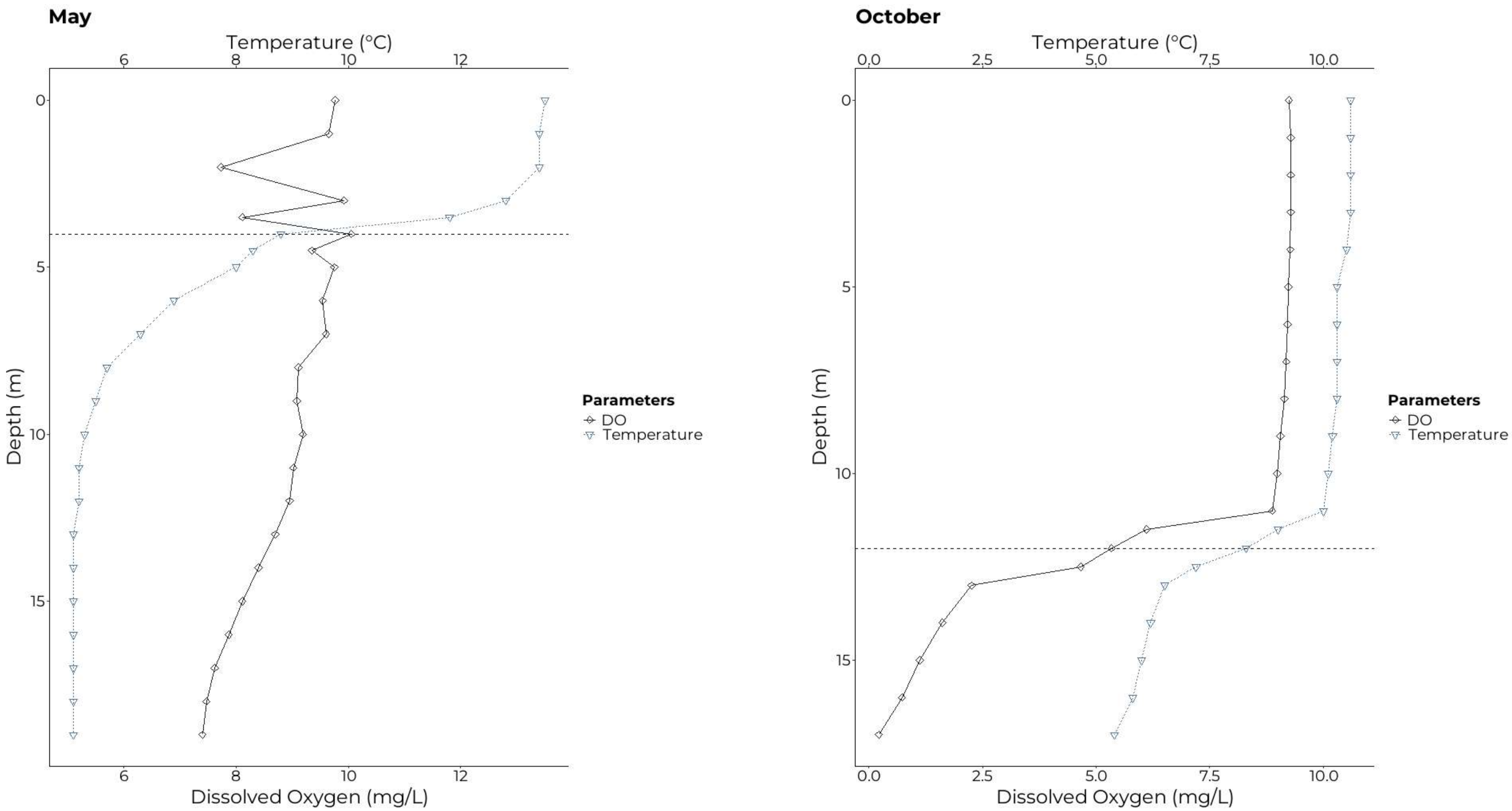


Plate A1-8: Beaverhouse Lake SW Temperature-DO Profiles (2022)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

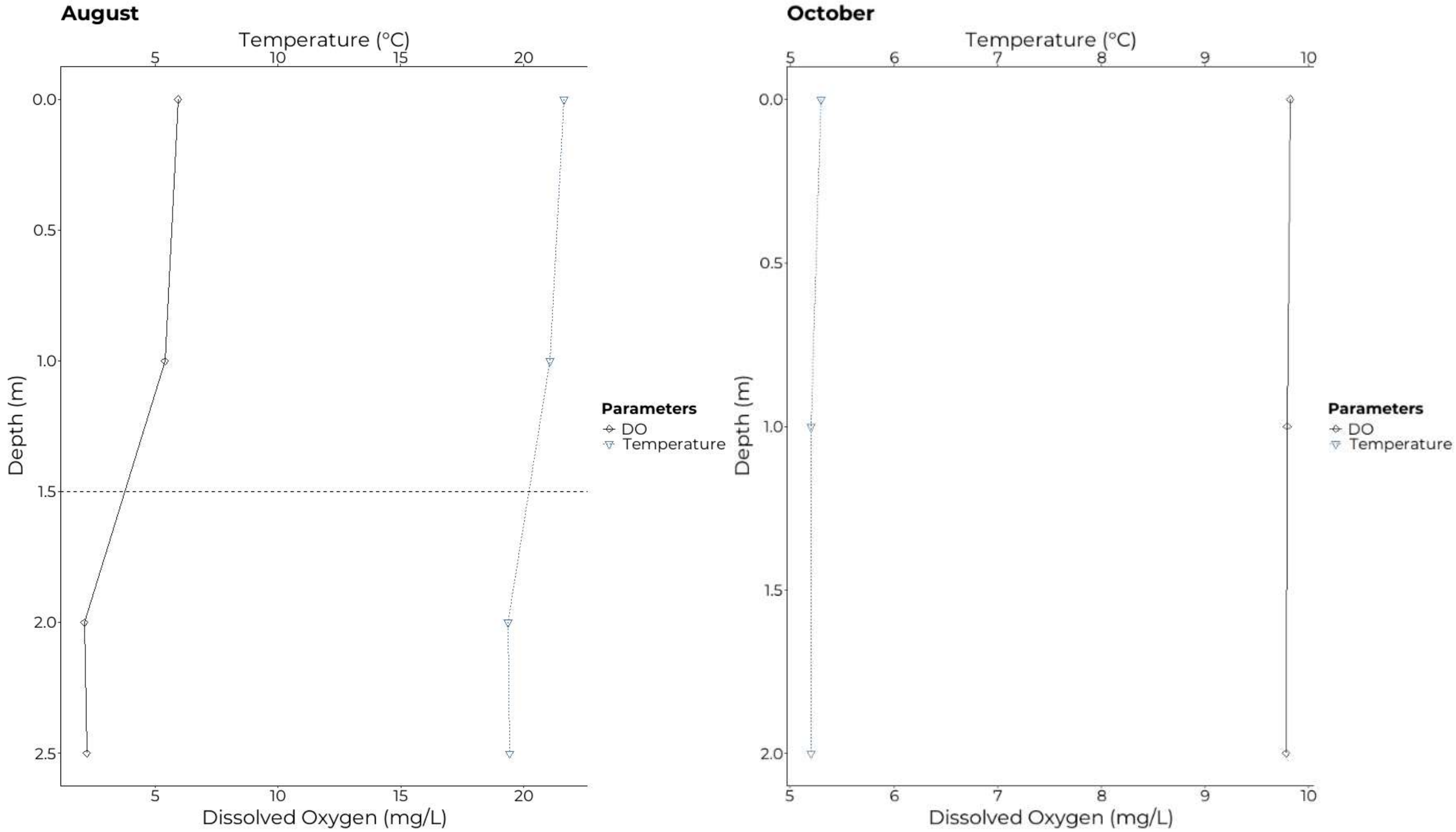


Plate A1-9: Wawagoshe Creek Temperature-DO Profiles (2022)

Dashed line represents the thermocline, defined as a change of ≥1°C within 1 m of water depth.

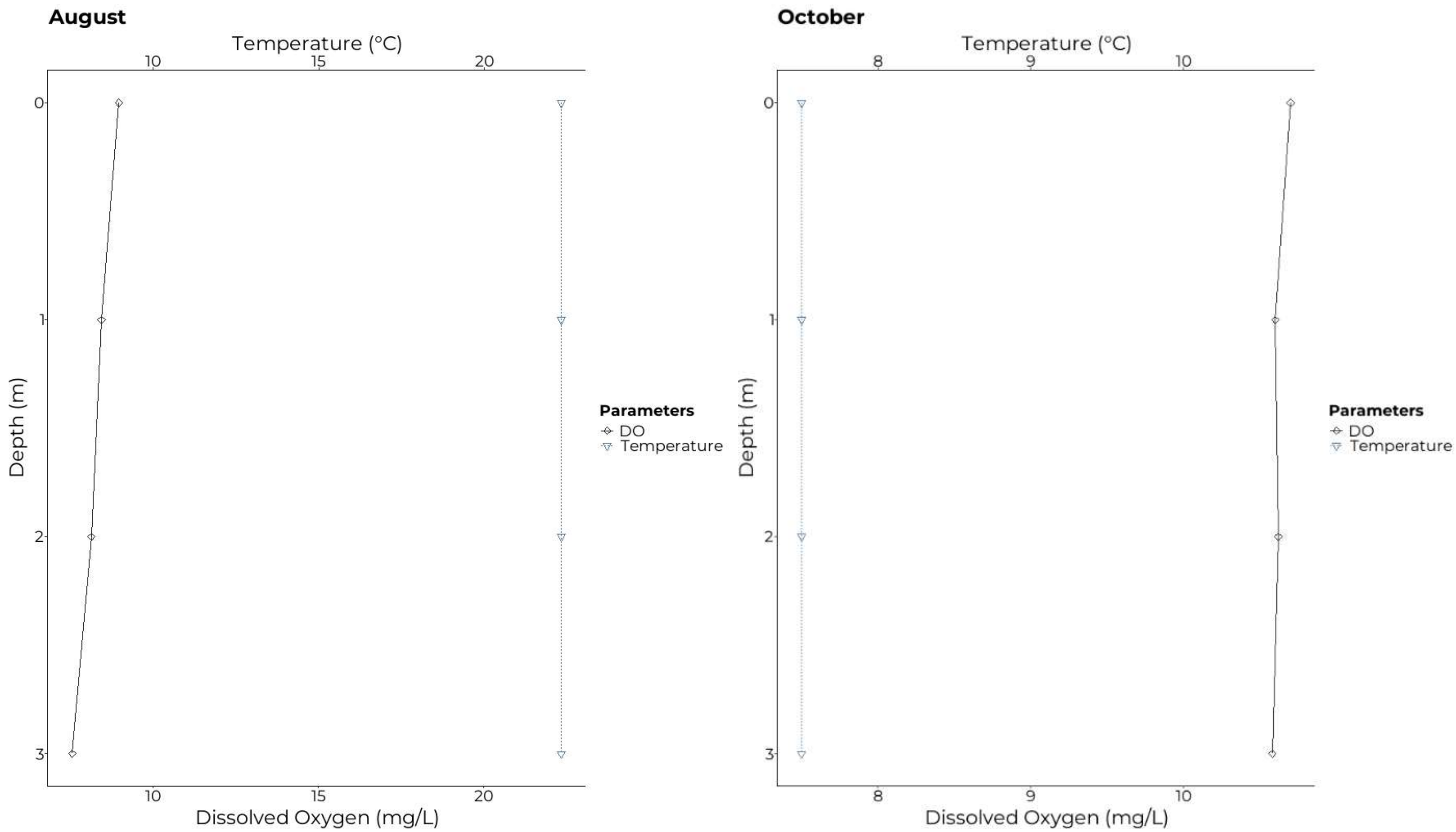


Plate A1-10: Blanche River Temperature-DO Profiles (2022)

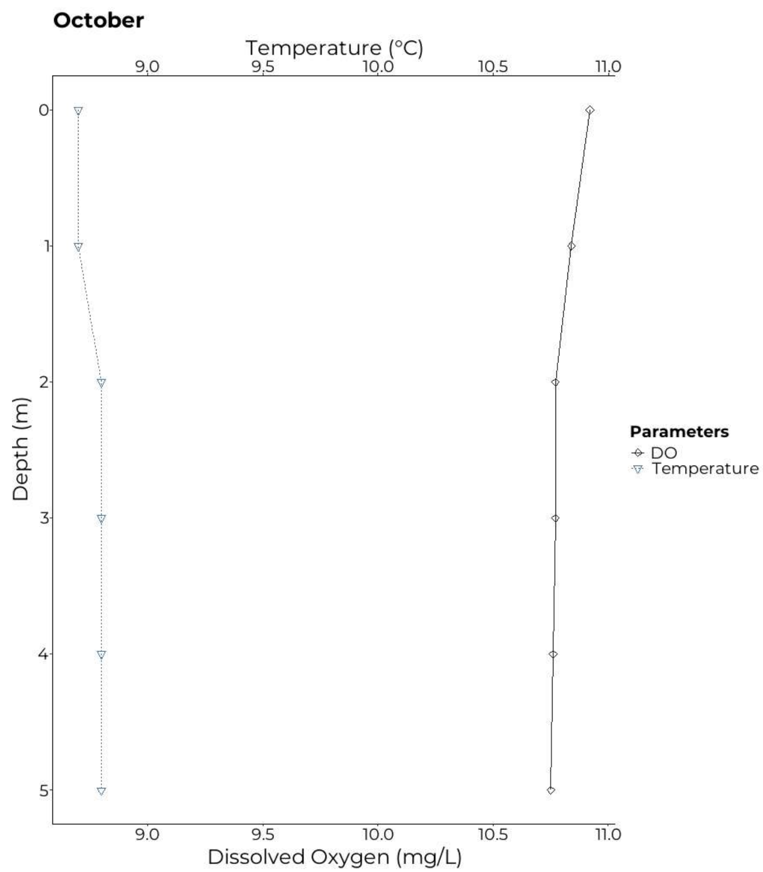
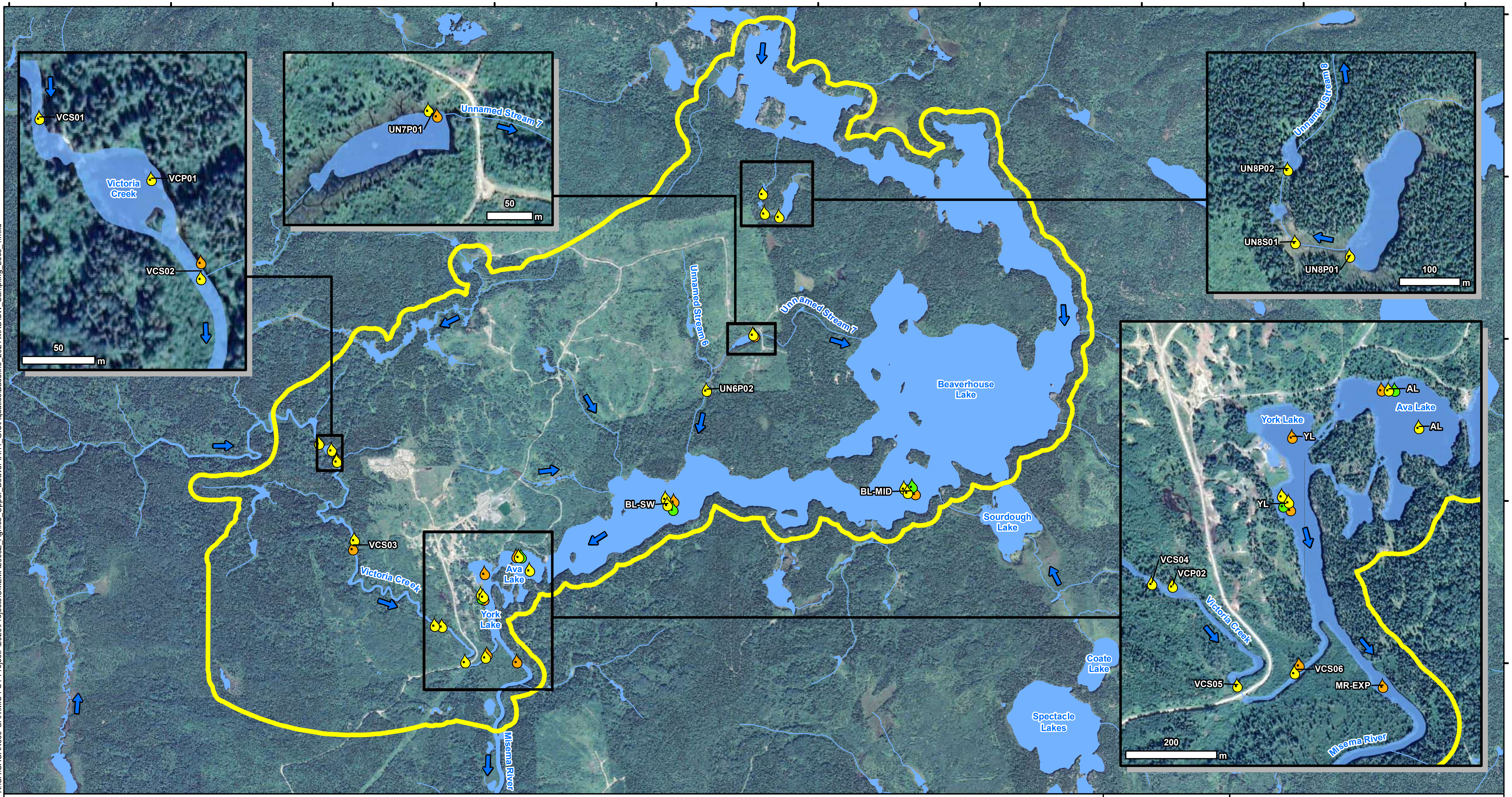


Plate A1-11: Misema River Temperature-DO Profiles (2022)



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Surface Water Sampling Location

- Spring
- Summer
- Fall

NOTES:
- Waterbodies and watercourse extracted from LIO, NDMNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

AGNICO EAGLE
UPPER BEAVER PROJECT

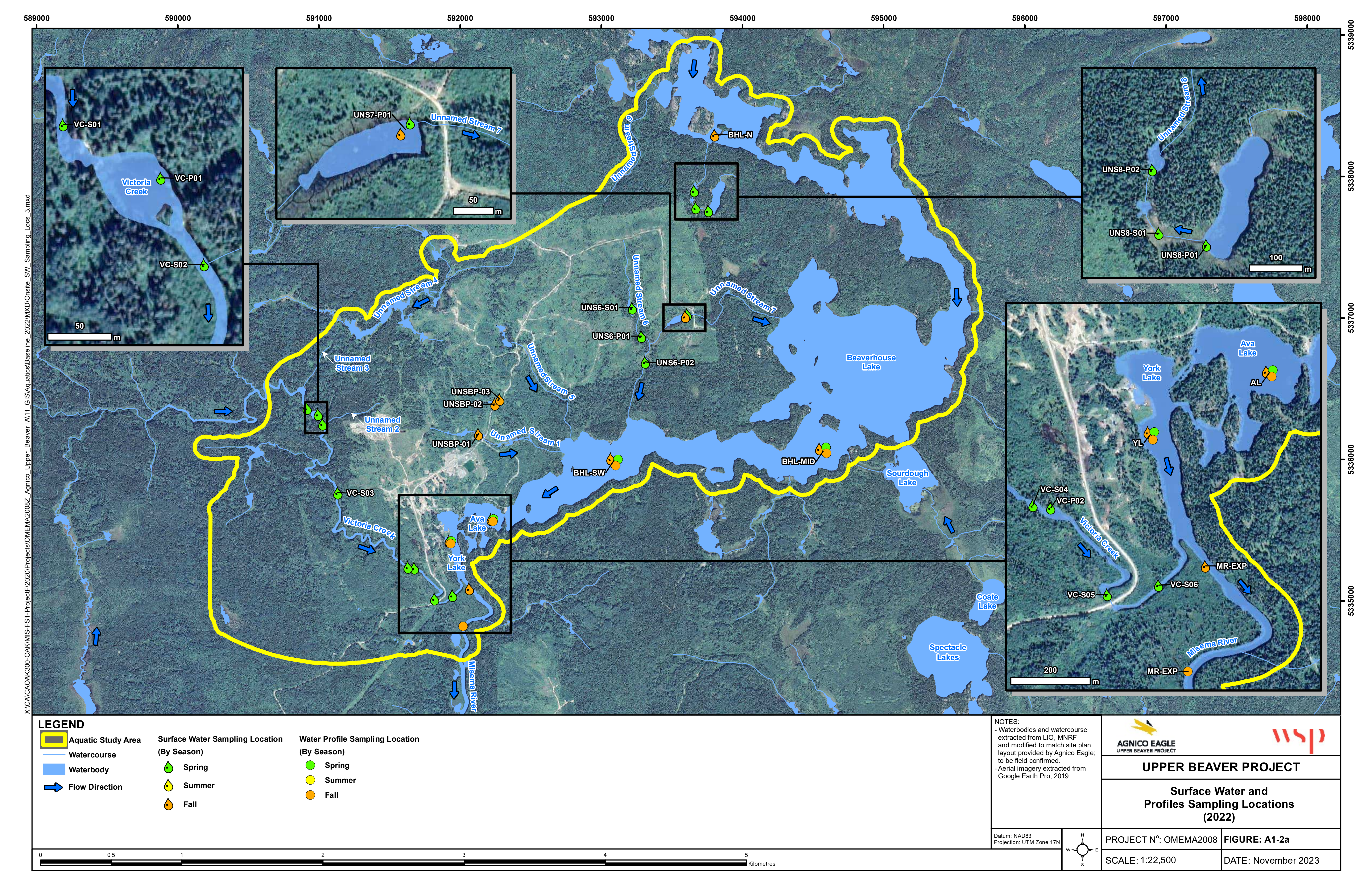
wsp

UPPER BEAVER GOLD PROJECT

Surface Water Sampling Locations (2021)

PROJECT N°: OMEMA2008 | FIGURE: A1-1

SCALE: 1:22,500 | DATE: November 2023



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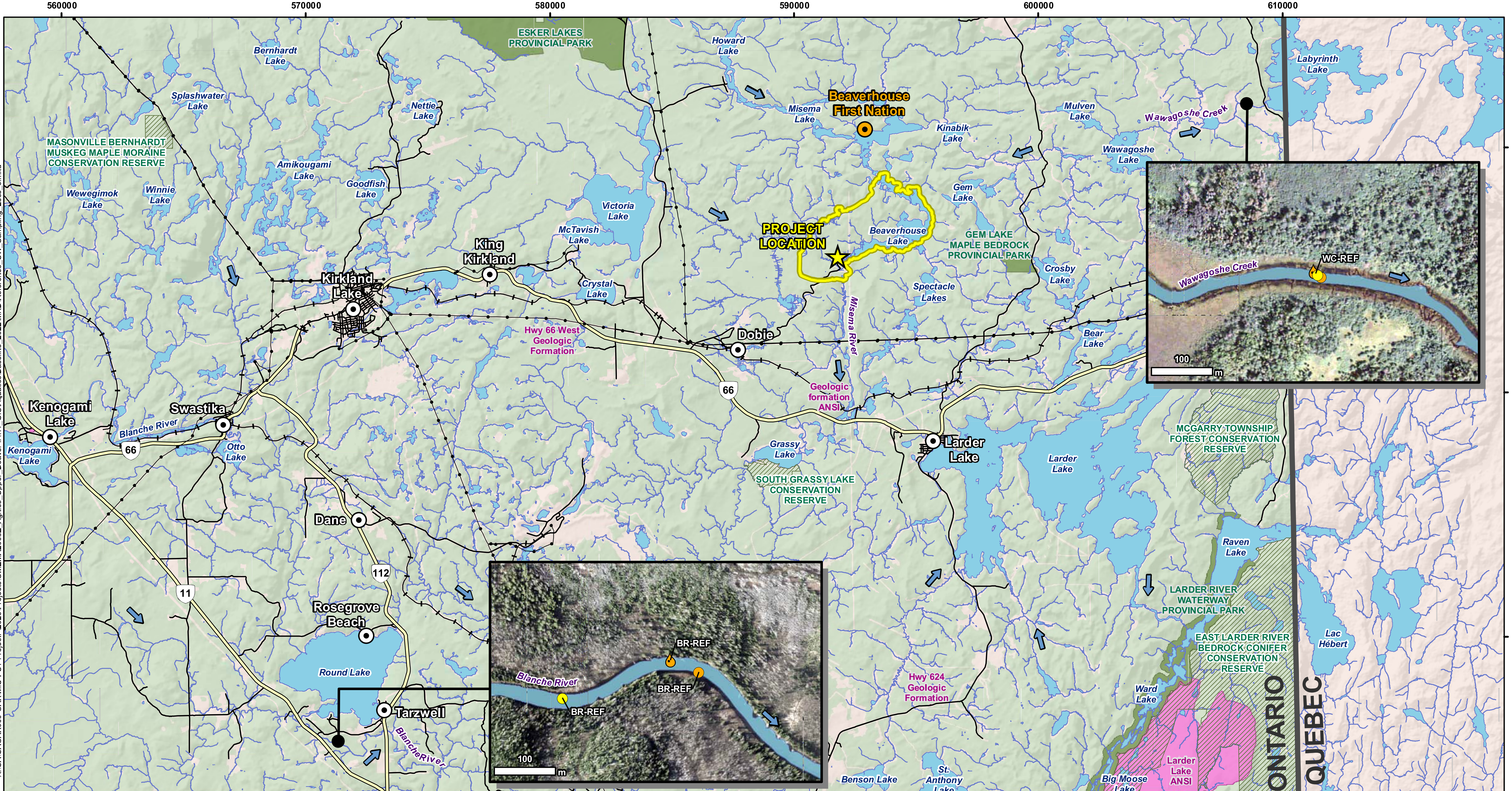
VC-S01
VC-P01
Victoria Creek
VC-S02
50
m
UNS7-P01
Unnamed Stream 7
50
m
Unnamed Stream 9
BHL-N
UNS8-P02
Unnamed Stream 8
UNS8-S01
UNS8-P01
100
m
Unnamed Stream 4
Unnamed Stream 3
Unnamed Stream 2
UNS6-S01
UNS6-P01
UNS6-P02
Unnamed Stream 6
Unnamed Stream 7
Unnamed Stream 5
UNSBP-03
UNSBP-02
UNSBP-01
Unnamed Stream 1
Beaverhouse Lake
BHL-SW
BHL-MID
Sourdough Lake
VC-S03
Victoria Creek
Ava Lake
York Lake
Misema River
Coate Lake
Spectacle Lakes
Ava Lake
AL
York Lake
YL
VC-S04
VC-P02
Victoria Creek
MR-EXP
VC-S06
VC-S05
Misema River
MR-EXP
200
m
LEGEND
Aquatic Study Area
Watercourse
Waterbody
Flow Direction
Surface Water Sampling Location (By Season)
Spring
Summer
Fall
Water Profile Sampling Location (By Season)
Spring
Summer
Fall
NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.
Datum: NAD83
Projection: UTM Zone 17N
0
0.5
1
2
3
4
5
Kilometres
AGNICO EAGLE
UPPER BEAVER PROJECT
wsp
UPPER BEAVER PROJECT
Surface Water and Profiles Sampling Locations (2022)
PROJECT Nº: OMEMA2008
FIGURE: A1-2a
SCALE: 1:22,500
DATE: November 2023



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LEGEND

- ★ Project Location
- Aquatic Study Area
- Town / Community
- First Nation Community
- Conservation Reserve
- Provincial Park
- Candidate ANSI
- Provincial Border
- Transmission Line
- Railway
- Highway
- Local Road
- Resource / Recreation Road
- Watercourse
- Waterbody
- Flow Direction

Surface Water Sampling Location (By Season)
- Spring
- Summer
- Fall

Water Profile Sampling Location (By Season)
- Spring
- Summer
- Fall

0 2.5 5 10 15 20 Kilometres

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from AgMaps, MAFRA.

Datum: NAD83
Projection: UTM Zone 17N

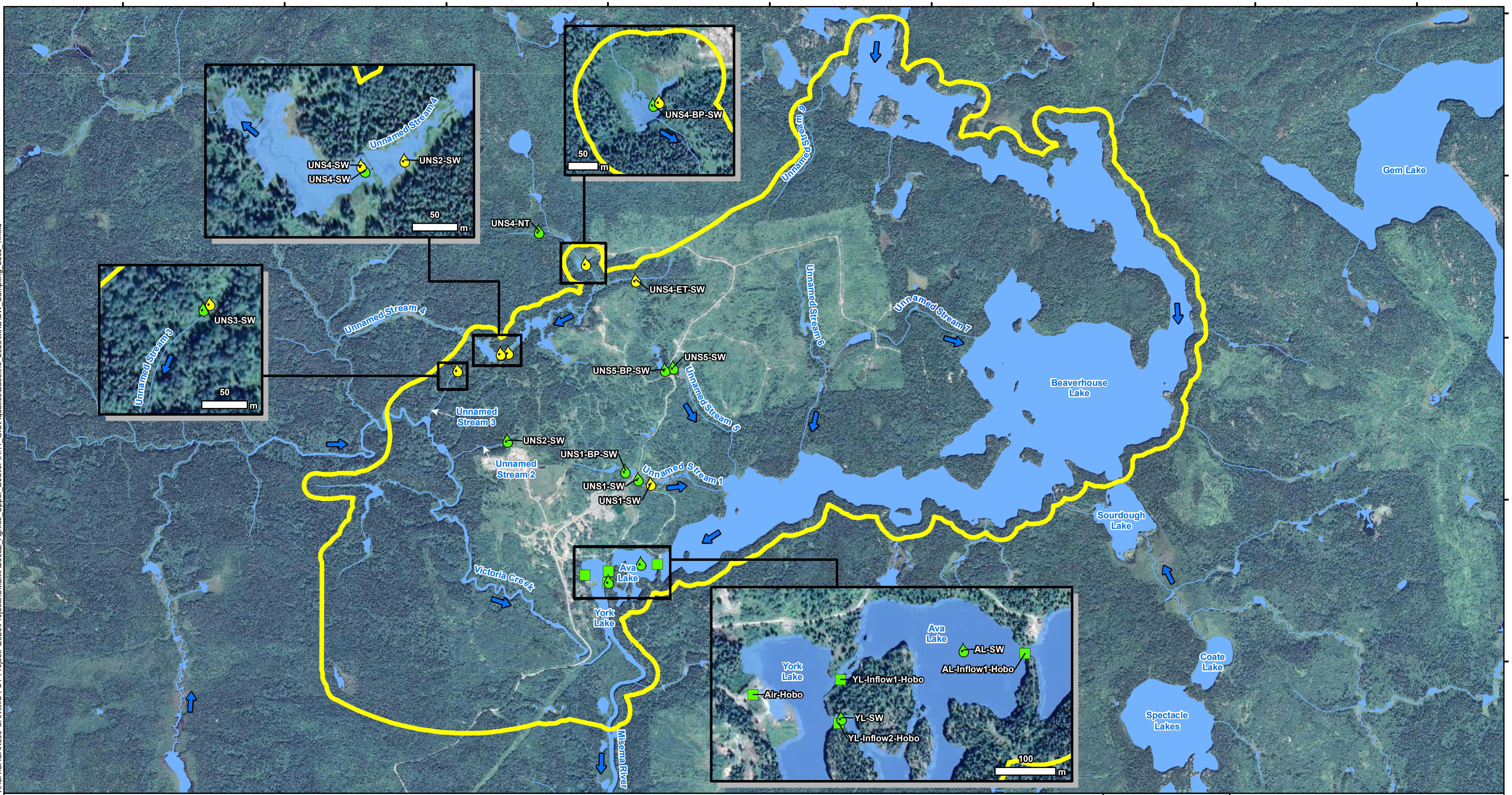
AGNICO EAGLE UPPER BEAVER PROJECT

wsp

UPPER BEAVER GOLD PROJECT

Surface Water and Profiles Sampling Locations (2022)

PROJECT Nº: OMEMA2008	FIGURE: A1-2b
SCALE: 1:150,000	DATE: November 2023



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LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Surface Water Sampling Location (By Season)

- Spring
- Summer
- Fall

Temperature Logger Location (By Season)

- Spring

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

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UPPER BEAVER PROJECT

Surface Water Sampling Locations (2023)

PROJECT N°: OMEMA2008	FIGURE: A1-3
SCALE: 1:22,500	DATE: November 2023

APPENDIX B

Fish Habitat and Fish Community Data

Table B1-1: Minnow Trap Catch Summary (2021)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yyyy)	Traps set	Duration (hr)	Total Effort (hr)	Fish Species												Total Catch	Total CPUE
							Brook Stickleback	Brown Bullhead	Chrosomus Hybrid	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Logperch	Mottled Sculpin	Northern Redbelly Dace	Smallmouth Bass	Yellow Perch		
Unnamed Stream 6	Summer	UNS6-P01	20/08/2023	5	24.00	120.0	No Catch												0	0
Unnamed Stream 7	Summer	UNS7-P01-MT1	15/08/2021	6	24.00	144.0			1.326			131	38			22			191	1.33
	Fall	UNS7-P01-MT1	24/09/2021	5	23.00	115.0			3.304			280							380	3.30
Unnamed Stream 8	Summer	UNS8-S01-MT1	20/08/2021	5	17.75	88.8	23		6.344			266	33			28			563	6.34
		UNS8-P01-MT1	20/08/2021	5	17.93	89.7	3		5.643			280	25			198			506	5.64
		UNS8-P02-MT1	20/08/2021	5	18.50	92.5	9		3.081			68							285	3.08
Beaverhouse Lake	Summer	BL-01-MT1	18/08/2021	5	26.75	133.8			0.015								2		2	0.01
		BL-02-MT1	18/08/2021	5	22.00	110.0			0.036									4	4	0.04
		BL-03-MT1	18/08/2021	5	27.25	136.3		6	0.088								4	2	12	0.09
		BL-04-MT1	19/08/2021	5	20.25	101.3			0.227									23	23	0.23
		BL-05-MT1	17/08/2021	5	25.50	127.5			0.275								1	34	35	0.27
		BL-07-MT1	17/08/2021	10	28.00	280.0		45	0.171									3	48	0.17
		BL-08-MT1	17/08/2021	5	26.00	130.0			0.015								2		2	0.02
	Fall	BL-MID-05-MT1	29/09/2021	10	23.25	232.5			0.017								4		4	0.02
		BL-MID-05-MT2	30/09/2021	10	20.50	205.0			0.029								6		6	0.03
		BL-MID-04-MT1	29/09/2021	13	23.00	299.0		1	0.013									3	4	0.01
		BL-MID-04-MT2	30/09/2021	13	20.50	266.5		1	0.008									1	2	0.01
		BL-N-02-MT1	2021-01-10	10	22.50	225.0		3	0.013										3	0.01
		BL-N-02-MT2	2021-02-10	10	24.00	240.0			0.013									3	3	0.013
		BL-N-01-MT1	2021-01-10	13	22.25	289.3	No Catch												0	0
		BL-N-01-MT2	2021-02-10	13	25.50	331.5			0.003									1	1	0.008

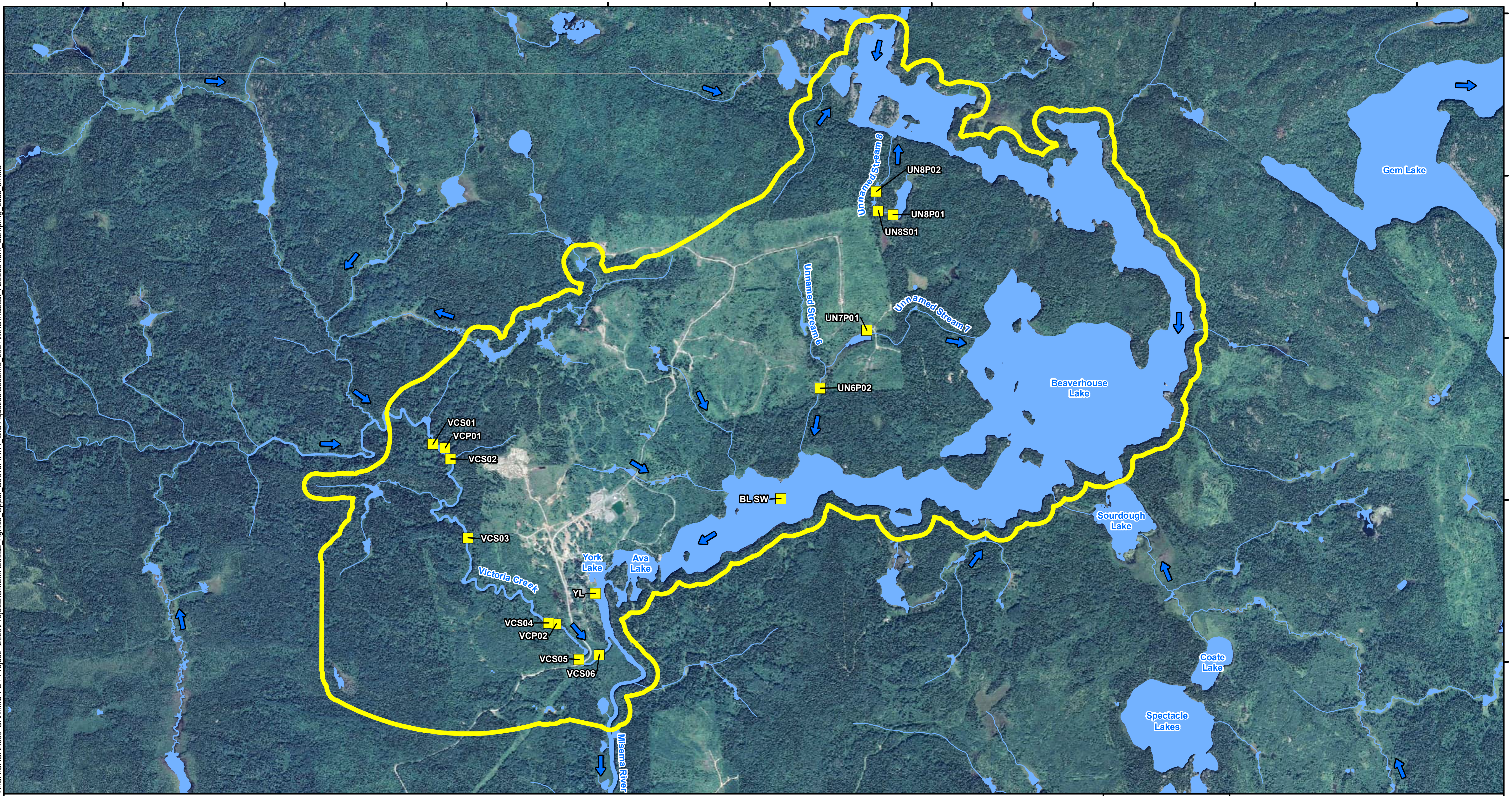
Waterbody	Season	Sample ID	Lift Date (dd/mm/yyyy)	Traps set	Duration (hr)	Total Effort (hr)	Fish Species												Total Catch	Total CPUE
							Brook Stickleback	Brown Bullhead	Chrosomus Hybrid	Common Shiner	Creek Chub	Fathead Minnow	Finescale Dace	Logperch	Mottled Sculpin	Northern Redbelly Dace	Smallmouth Bass	Yellow Perch		
Victoria Creek	Summer	VCS01-MT1	14/08/2021	6	31.00	186.0	No Catch												0	0
		VCS02-MT1	14/08/2021	9	31.75	285.8			0.294	82	2								84	0.29
		VCS03-MT1	13/08/2021	10	19.75	197.5			0.015	2					1				3	0.02
		VCS04-MT1	13/08/2021	10	24.00	240.0			0.004					1					1	0.013
		VCS05-MT1	12/08/2021	10	27.50	275.0			0.025								5	2	7	0.03
		VCS06-MT1	12/08/2021	12	26.00	312.0		1	0.003										1	0.00
		VCP01-MT1	12/08/2021	8	30.25	242.0			0.360	79	7						1		87	0.36
		VCP02-MT1	13/08/2021	10	24.50	245.0	No Catch												0	0
	Fall	VCS06-MT1	23/09/2021	21	16.50	346.5		1	0.003										1	0.013
		VCS06-MT2	24/09/2021	21	31.00	651.0	No Catch												0	0
		VCS02-MT1	26/09/2021	6	23.00	138.0			0.601	68	15								83	0.601
		VCS05-MT1	25/09/2021	25	15.25	381.3	No Catch												0	0
		VCS05-MT2	26/09/2021	20	24.00	480.0	No Catch												0	0
York Lake	Fall	YL-MT1	27/09/2021	24	27.50	660.0			0.009								4	2	6	0.01
		YL-MT2	28/09/2021	24	22.00	528.0			0.011								6		6	0.01
Total Catch							**35**	**58**	**521**	**231**	**24**	**1,025**	**96**	**1**	—	**248**	**31**	**78**	**2,353**	**—**

Table B1-2: Electrofishing Catch Summary (2021)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	# Seconds	Fish Species	Total Catch	Total CPUE
					YOY Cyprinid sp.		
Victoria Creek	Fall	VCS02-EF1	23/09/2021	260	12	12	0.05
				Total Catch	**12**	**12**	**-**

Table B1-3: Gillnet Catch Summary (2021)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	Duration (hr)	Fish Species										Total Catch	Total CPUE
					Northern Pike	Yellow Perch	Walleye	Smallmouth Bass	Lake Whitefish	White Sucker	Brown Bullhead	Cisco	Burbot	Shiner spp.		
Beaverhouse Lake	Summer	BL-01-GN1	17/08/2021	3	2										2	0.7
		BL-02-GN1	17/08/2021	1.5		1	1								2	1.3
		BL-03-GN1	17/08/2021	3.5		1		1							2	0.6
		BL-04-GN1	18/08/2021	1.75			1								1	0.6
		BL-05-GN1	18/08/2021	1.25					1						1	0.8
		BL-06-GN1	18/08/2021	2			2			1	1				4	2.0
		BL-07-GN1	16/08/2021	2.5		13									13	5.2
		BL-08-GN1	16/08/2021	2	1				5			1			7	3.5
	Fall	BL-MID-GN1	30/09/2021	22.25	2		10	3	8	2	3				28	1.3
		BL-MID-GN2	30/09/2021	4.75				2							2	0.4
		BL-MID-GN3	2021-01-10	19	3		7		4	3					17	0.9
		BL-N-GN1	2021-02-10	24.15	5		5	1	7	5		1			24	1.0
		BL-N-GN2	2021-02-10	2.25	1	1									2	0.9
		BL-N-GN3	2021-03-10	21.25	1		1	1	8	6	1				18	0.8
York Lake	Fall	YL-GN1	27/09/2021	22.5	13	15	6		2	16	1	6	2	4	65	2.9
		YL-GN2	28/09/2021	19	5		3	5		2		4			19	1.0
				Total Catch	**33**	**31**	**36**	**13**	**35**	**35**	**6**	**12**	**2**	**4**	**207**	**-**



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction
- Habitat Assessment Sampling Location

NOTES:
- Waterbodies and watercourse extracted from LIO, NDMNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

AGNICO EAGLE
UPPER BEAVER PROJECT

wsp

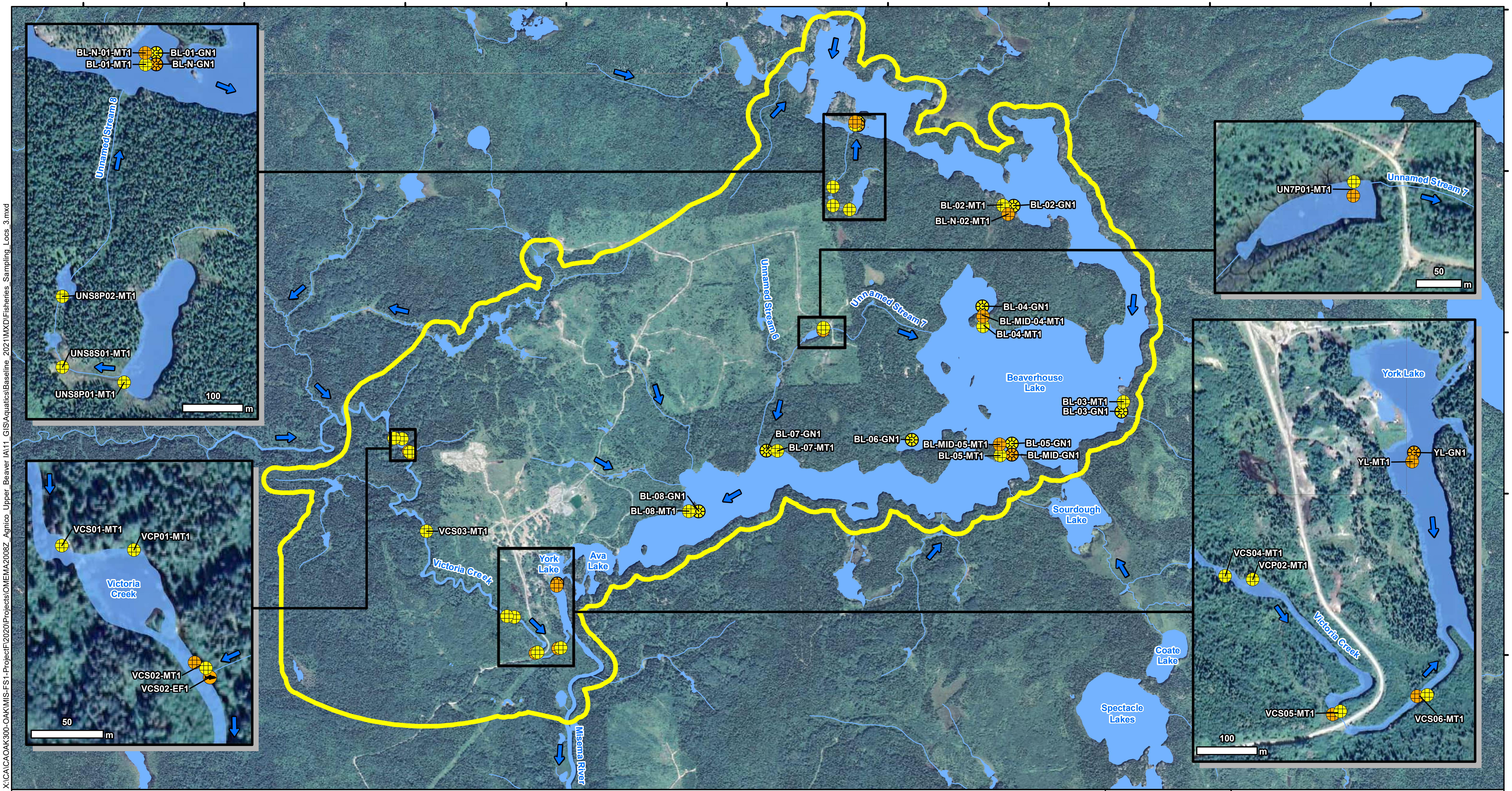
UPPER BEAVER GOLD PROJECT

Habitat Assessment Sampling Locations (2021)

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

PROJECT N°:OMEMA2008	**FIGURE: B1-1**
SCALE: 1:22,500	DATE: November 2023



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Aquatic Resource Sampling Location

Gear Type: Electrofishing; Gillnet; Minnow Trap

Season: Summer; Fall

NOTES:
- Waterbodies and watercourse extracted from LIO, NDMNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

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UPPER BEAVER PROJECT

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UPPER BEAVER GOLD PROJECT

Aquatic Resource Sampling Locations (2021)

PROJECT Nº: OMEMA2008 | FIGURE: B1-2

SCALE: 1:22,500 | DATE: November 2023

0 0.5 1 2 3 4 5 Kilometres

Table B2-1: Minnow Trap Catch Summary (2022)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	Traps set	Duration (hr)	Total Effort (hr)	Fish Species										Total Catch	Total CPUE
							Brook Stickleback	Brown Bullhead	Common Shiner	Fathead Minnow	Finescale Dace	Longnose Dace	Northern Pearl Dace	Northern Redbelly Dace	Chrosomus Hybrid	Slimy Sculpin		
Unnamed Stream 7	Spring	UNS7-P01-MT1	18/05/2022	10	26	260				333	58			50			441	1.696
Victoria Creek	Spring	VCS05-MT1	18/05/2022	10	21.72	217.17	1										1	0.005
		VCS05-MT2	19/05/2022	5	24.17	120.83		1	1								2	0.017
		VCS03-MT1	19/05/2022	5	26.25	131.25			1								1	0.008
		VCS06-MT1	19/05/2022	10	25	250		2								1	3	0.012
		VCS06-MT2	20/05/2022	5	18.05	90.25	No Catch										0	0.000
		VCP02-MT1	20/05/2022	6	24.67	148	1	1									2	0.014
		VCS04-MT1	20/05/2022	5	24	120						1					1	0.008
		VCS01-MT1	21/05/2022	7	19.25	134.75	2						3				5	0.037
		VCP01-MT1	21/05/2022	7	19.33	135.33	4		37				42				83	0.613
		VCS02-MT1	21/05/2022	6	19.4	116.4	5		29		1		55				90	0.773
Unnamed Stream 6	Spring	UNS6-S01-MT1	19/05/2022	5	25.28	126.42	1				2						3	0.024
		UNS6-P01-MT1	22/05/2022	7	26.5	185.5	11		13					1	3		28	0.151
		UNS6-P02-MT1	22/05/2022	8	26.4	211.2	17										17	0.080
Unnamed Stream 8	Spring	UNS8-P02-MT1	23/05/2022	5	24.75	123.75	169			140					460		769	6.214
		UNS8-S01-MT1	23/05/2022	5	25.5	127.5	23			19					257		299	2.345

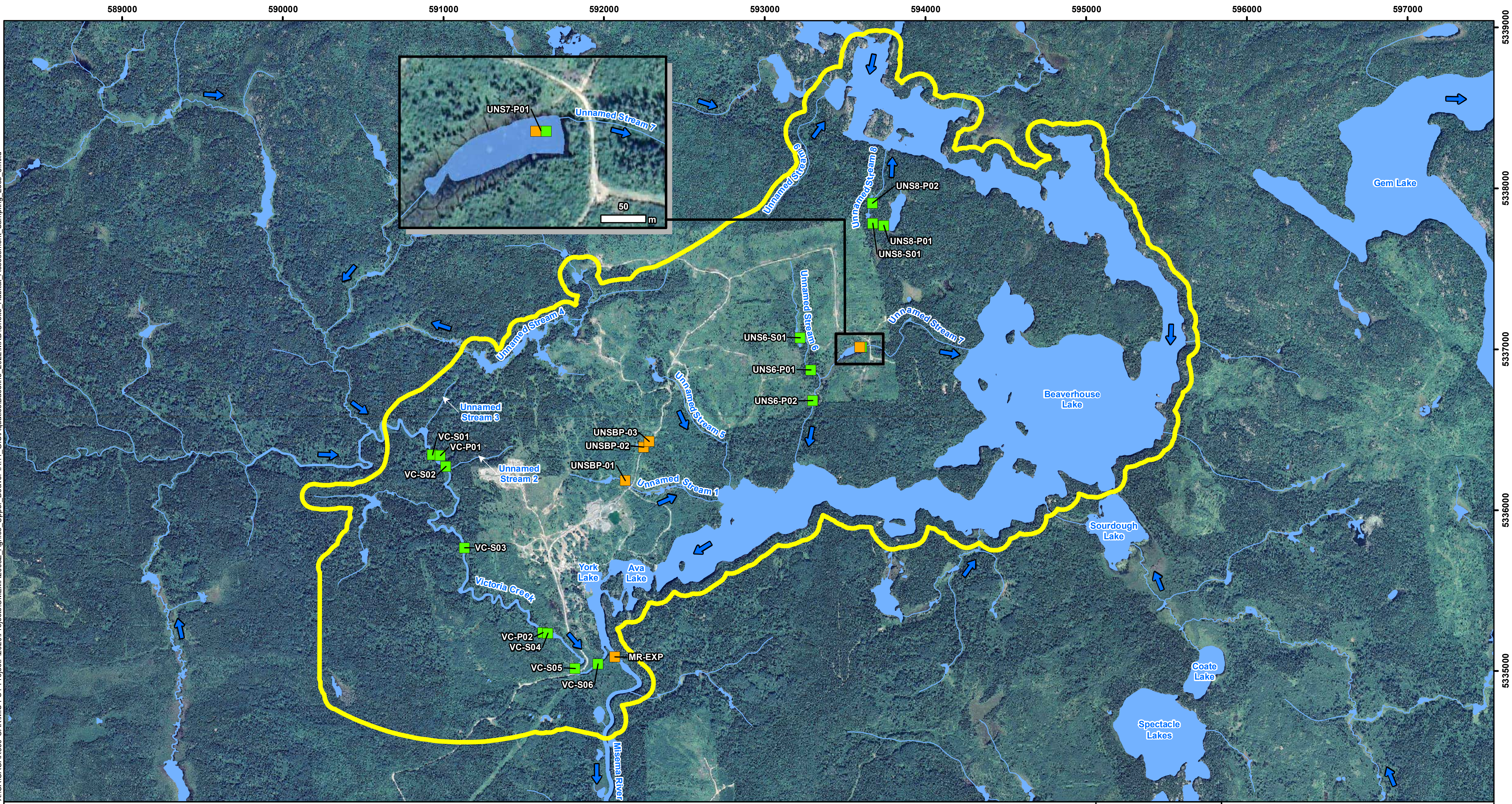
Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	Traps set	Duration (hr)	Total Effort (hr)	Fish Species										Total Catch	Total CPUE
							Brook Stickleback	Brown Bullhead	Common Shiner	Fathead Minnow	Finescale Dace	Longnose Dace	Northern Pearl Dace	Northern Redbelly Dace	Chrosomus Hybrid	Slimy Sculpin		
		UNS8-P01-MT1	23/05/2022	5	24.73	123.67	21			37					462		520	4.205
Misema River	Spring	MR-EXP-MT1	25/05/2022	15	21.53	323	No Catch										0	0
	Fall	MR-EXP-MT2	19/10/2022	30	2.33	70	No Catch										0	0
Blanche River	Fall	BC-REF-MT1	20/10/2022	27	4.17	112.5	No Catch										0	0
Wawagoshe Creek	Fall	WC-REF-MT1	21/10/2022	27	4.08	110.25	No Catch										0	0
						Total Catch	**255**	**4**	**81**	**529**	**61**	**1**	**100**	**51**	**1182**	**1**	**2,265**	**-**

Table B2-2: Gillnet Catch Summary (2022)

Waterbody Name	Season	Sample ID	Lift Date (dd/mm/yy)	Duration (hr)	Fish Species									Total Catch	Total CPUE
					Brown Bullhead	Burbot	Cisco	Lake Whitefish	Northern Pike	Smallmouth Bass	Walleye	White Sucker	Yellow Perch		
Misema River	Spring	MR-EXP-GN1	24/05/2022	21.02		1			1			1		3	0.14
		MR-EXP-GN2	24/05/2022	21.02				1				1		2	0.10
		MR-EXP-GN6	24/05/2022	1.92									1	1	0.52
		MR-EXP-GN13	25/05/2022	23							1			1	0.04
		MR-EXP-GN15	25/05/2022	23	2	3			1	1	3	4		14	0.61
Beaverhouse Lake	Fall	BHL-N-GN1	15/10/2022	21.75				1				1		2	0.09
		BHL-N-GN4	15/10/2022	21.75							2	3		5	0.23
		BHL-N-GN5	15/10/2022	21.75							1			1	0.05
		BHL-N-GN7	15/10/2022	21.75					2		1			3	0.14
		BHL-N-GN8	15/10/2022	21.75					2		1	1		4	0.18
		BHL-N-GN9	16/10/2022	25.25				3						3	0.12
		BHL-N-GN10	16/10/2022	25.25								1		1	0.04
		BHL-N-GN11	16/10/2022	25.25				2			2	1		5	0.20
		BHL-N-GN12	16/10/2022	25.25				2			1	3		6	0.24
		BHL-N-GN13	16/10/2022	25.25			1		1					2	0.08
		BHL-N-GN14	16/10/2022	25.25				1				1		2	0.08
		BHL-N-GN15	16/10/2022	25.25							1			1	0.04
		BHL-N-GN16	16/10/2022	25.25	1			1			1	3		6	0.24
		BHL-MID-GN1	13/10/2022	21.83				1	2		1			4	0.18
		BHL-MID-GN2	13/10/2022	21.83							1		1	2	0.09
		BHL-MID-GN3	13/10/2022	21.83				2	1					3	0.14

Waterbody Name	Season	Sample ID	Lift Date (dd/mm/yy)	Duration (hr)	Fish Species									Total Catch	Total CPUE
					Brown Bullhead	Burbot	Cisco	Lake Whitefish	Northern Pike	Smallmouth Bass	Walleye	White Sucker	Yellow Perch		
		BHL-MID-GN4	13/10/2022	21.83					1		2			3	0.14
		BHL-MID-GN5	13/10/2022	21.83				1			1	1		3	0.14
		BHL-MID-GN6	13/10/2022	21.83				3	1		2			6	0.27
		BHL-MID-GN7	13/10/2022	21.83					1		4			5	0.23
		BHL-MID-GN8	13/10/2022	21.83				2		2		2		6	0.27
		BHL-MID-GN9	14/10/2022	23.67	1			2	2		1			6	0.25
		BHL-MID-GN11	14/10/2022	23.67								2		2	0.08
		BHL-MID-GN12	14/10/2022	23.67								2		2	0.08
		BHL-MID-GN14	14/10/2022	23.67				2	2		3	1		8	0.34
		BHL-MID-GN15	14/10/2022	23.67					1		12			13	0.55
Misema River	Fall	MR-EXP-GN1	18/10/2022	25.33							8	5		13	0.51
		MR-EXP-GN2	18/10/2022	25.33					1			1		2	0.08
		MR-EXP-GN5	18/10/2022	25.33				1						1	0.04
		MR-EXP-GN6	19/10/2022	24.5					1		9	7		17	0.69
		MR-EXP-GN7	19/10/2022	24.5								2		2	0.08
		MR-EXP-GN9	19/10/2022	24.5								1		1	0.04
York Lake	Fall	YL-GN1	18/10/2022	24.5	1				13		1	1		16	0.65
		YL-GN2	18/10/2022	24.5							2	2		4	0.16
		YL-GN3	18/10/2022	24.5	1	2			2		2		1	8	0.33
		YL-GN4	18/10/2022	24.5				2				2		4	0.16
		YL-GN5	19/10/2022	25.5				4	2		1		1	8	0.31
		YL-GN6	19/10/2022	25.5				2			2	1		5	0.20

Waterbody Name	Season	Sample ID	Lift Date (dd/mm/yy)	Duration (hr)	Fish Species									Total Catch	Total CPUE
					Brown Bullhead	Burbot	Cisco	Lake Whitefish	Northern Pike	Smallmouth Bass	Walleye	White Sucker	Yellow Perch		
		YL-GN7	19/10/2022	25.5	2		1	1	2		6		4	16	0.63
		YL-GN8	19/10/2022	25.5				2		1		2		5	0.20
				Total Catch	**8**	**6**	**2**	**36**	**39**	**4**	**72**	**52**	**8**	**227**	**-**



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LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Habitat Assessment Sampling Location (By Season)

- Spring
- Fall

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

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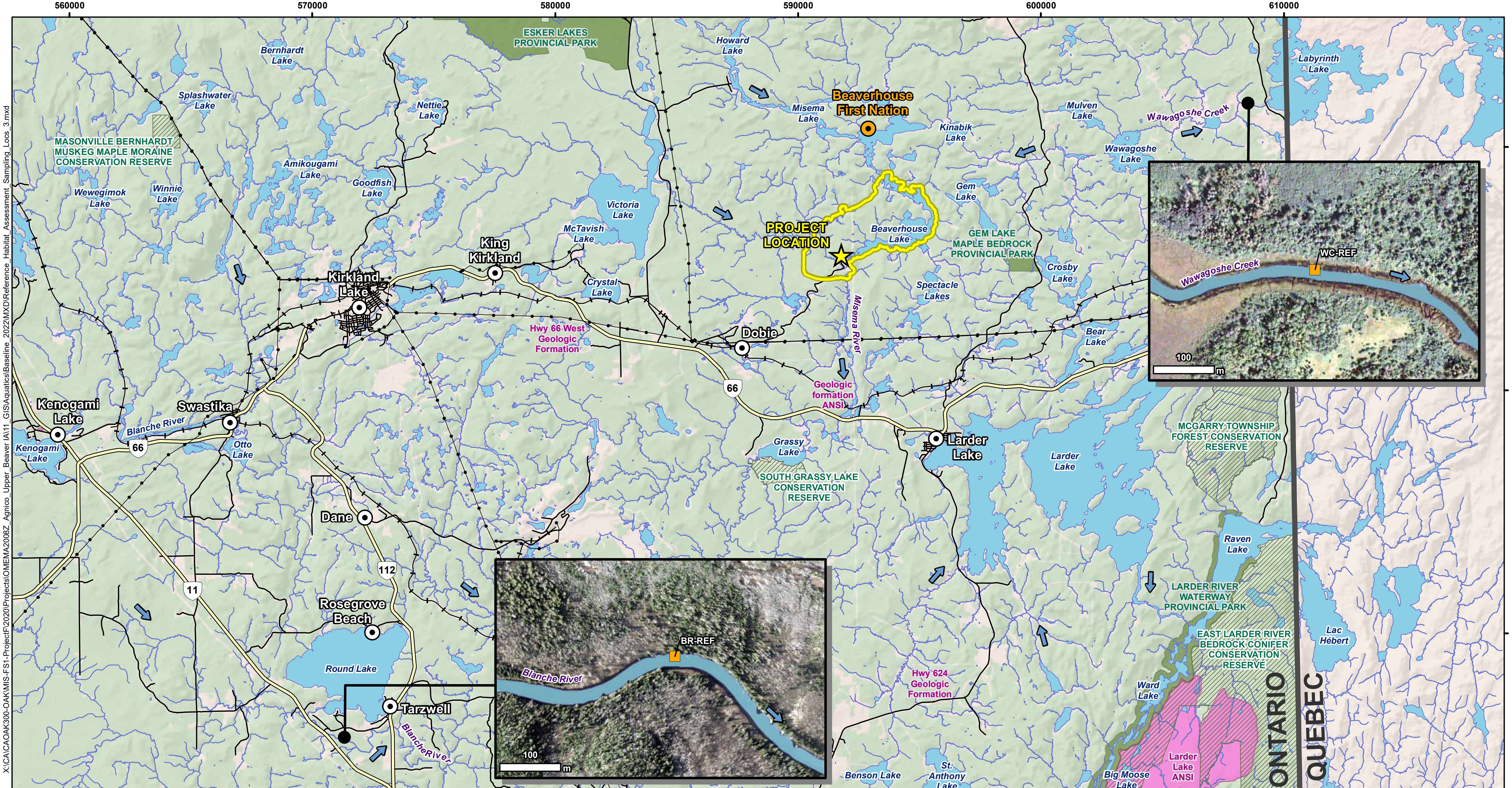
Habitat Assessment Sampling Locations (2022)

PROJECT N°:OMEMA2008	**FIGURE: B2-1a**
SCALE: 1:22,500	DATE: November 2023



LEGEND

- ★ Project Location
- Aquatic Study Area
- Town / Community
- First Nation Community
- Conservation Reserve
- Provincial Park
- Candidate ANSI
- Provincial Border
- Transmission Line
- Railway
- Highway
- Local Road
- Resource / Recreation Road
- Watercourse
- Waterbody
- Flow Direction

Habitat Assessment Sampling Location (By Season)

- Fall

0 2.5 5 10 15 20 Kilometres

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from AgMaps, MAFRA.

Datum: NAD83
Projection: UTM Zone 17N

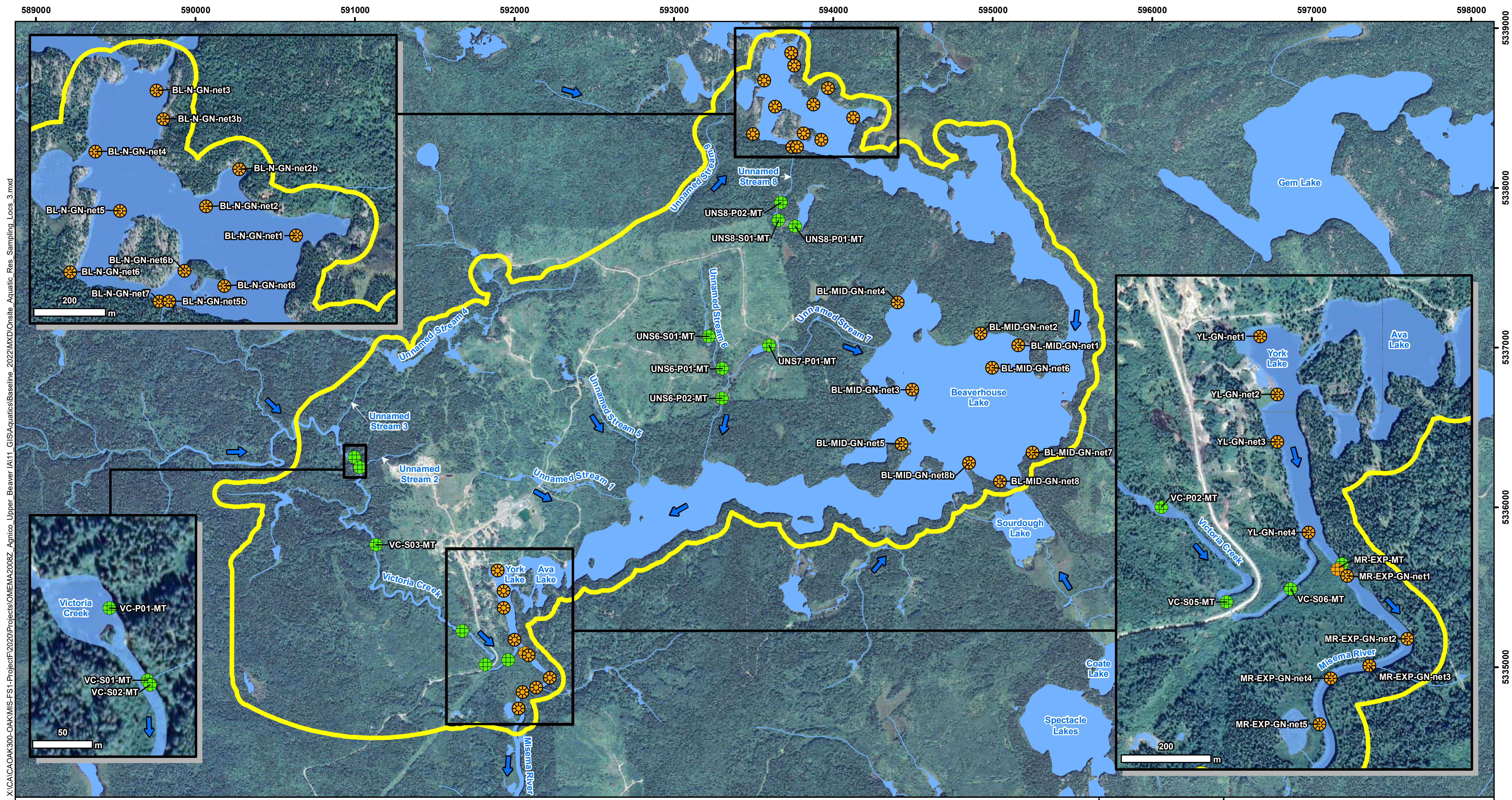
AGNICO EAGLE UPPER BEAVER PROJECT

wsp

UPPER BEAVER GOLD PROJECT

Habitat Assessment Sampling Locations (2022)

PROJECT N°: OMEMA2008	FIGURE: B2-1b
SCALE: 1:150,000	DATE: November 2023



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Aquatic Resource Sampling Location

Gear Type	Season
Gillnet	Spring
Minnow Trap	Fall

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

AGNICO EAGLE UPPER BEAVER PROJECT

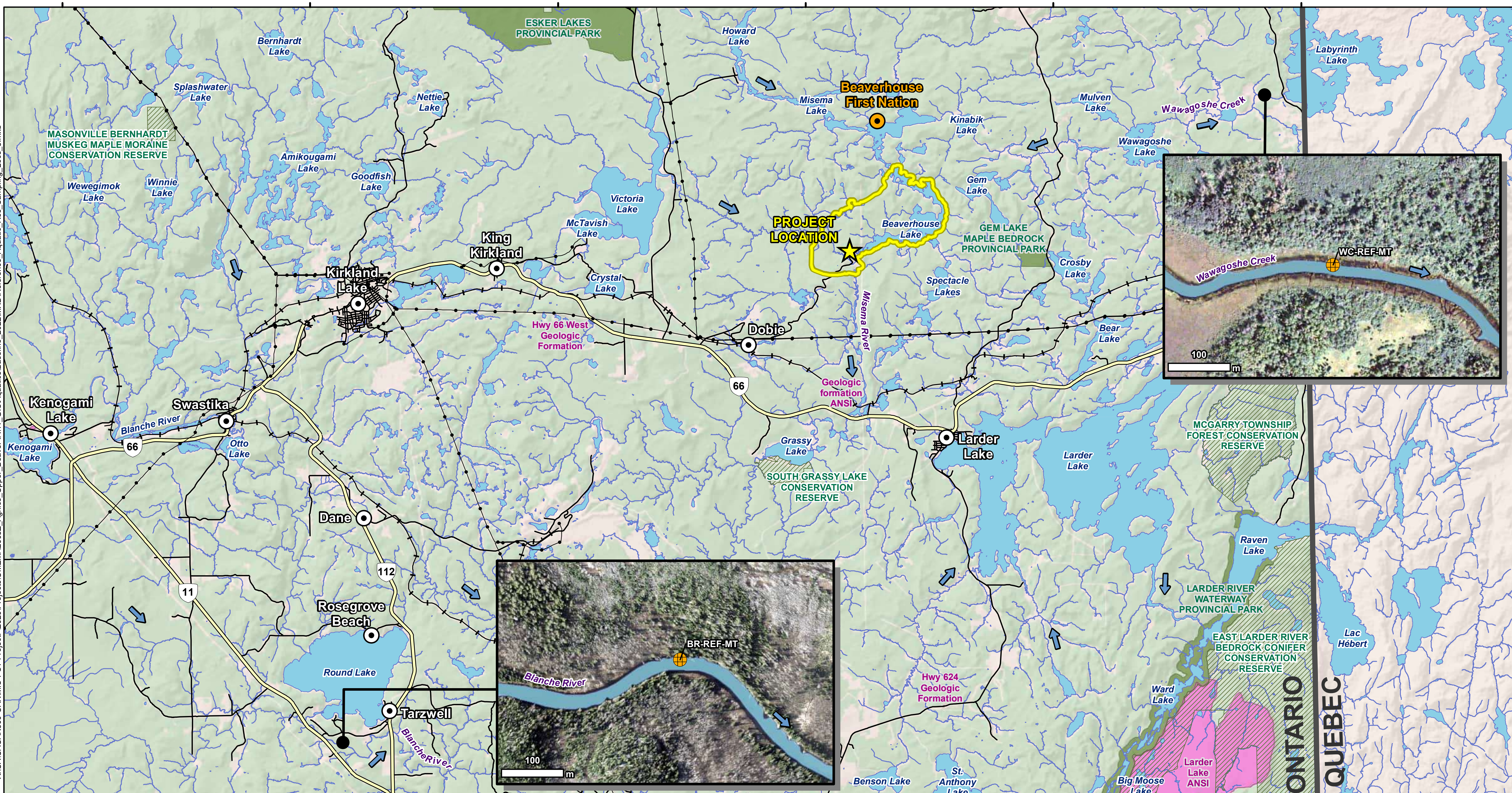
wsp

UPPER BEAVER PROJECT

Aquatic Resource Sampling Locations (2022)

PROJECT N°: OMEMA2008 | FIGURE: B2-2a

SCALE: 1:22,500 | DATE: November 2023



LEGEND

- Project Location
- Aquatic Study Area
- Town / Community
- First Nation Community
- Conservation Reserve
- Provincial Park
- Candidate ANSI
- Provincial Border
- Transmission Line
- Railway
- Highway
- Local Road
- Resource / Recreation Road
- Watercourse
- Waterbody
- Flow Direction

Aquatic Resource Sampling Location

Gear Type
- Gillnet
- Minnow Trap

Season
- Spring
- Fall

0 2.5 5 10 15 20 Kilometres

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from AgMaps, MAFRA.

Datum: NAD83
Projection: UTM Zone 17N

AGNICO EAGLE UPPER BEAVER PROJECT

WSP

UPPER BEAVER GOLD PROJECT

Aquatic Resource Sampling Locations (2022)

PROJECT Nº: OMEMA2008	FIGURE: B2-2b
SCALE: 1:150,000	DATE: November 2023

Table B3-1: Minnow Trap Catch Summary (2023)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	Traps set	Duration (hr)	Fish Species									Total Catch	Total CPUE
						Bluntnose Minnow	Brassy Minnow	Brook Stickleback	Creek Chub	Chrosomus hybrid	Fathead Minnow	Finescale Dace	Northern Pearl Dace	Northern Redbelly Dace		
Unnamed Beaver Pond 2	Spring	BP02-MT1	18/05/2023	3	24	No Catch									0	0
Unnamed Beaver Pond 3	Spring	BP03-MT1	18/05/2023	3	23.67	No Catch									0	0
Unnamed Stream 1	Spring	UNS1-MT1	23/05/2023	20	27.25	66		140				435	20	139	800	1.47
		UNS1-MT2	24/05/2023	20	15.5	2		78				122	47	116	365	1.18
	Summer	UNS1-BP-MT1	1/08/2023	20	26		11	16				360	115		502	0.97
		UNS1-BP-MT2	2/08/2023	20	16			5				32	8	8	53	0.17
Unnamed Stream 2	Spring	UNS2-MT1	20/05/2023	5	23.33			3							3	0.03
	Summer	UNS2-MT1	29/07/2023	4	21			2							2	0.02
Unnamed Stream 3	Spring	UNS3-MT1	19/05/2023	20	20.5	No Catch									0	0
	Summer	UNS3-MT1	30/7/2023	10	20	No Catch									0	0
Unnamed Stream 4	Spring	UNS4-MT1	18/05/2023	20	19.5			57	34			15	6	3	115	0.29
		UNS4-MT2	19/05/2023	20	22.82	13		268	76			46	29	82	514	1.13
		UNS4-BP-MT1	21/05/2023	20	23.33	34		182	2			194	1	121	534	1.14
		UNS4-BP-MT2	22/05/2023	18	24.83	248		266	4			222	5	160	905	2.02
	Summer	UNS4-MT1	29/07/2023	20	15			48	15			109	79	21	272	0.91
		UNS4-MT2	30/07/2023	20	22			47	7			60	39	2	155	0.35
		UNS4-ET-MT1	31/07/2023	6	20			72				124	17		213	1.78
		UNS4-BP-MT1	31/07/2023	20	19.5		23	8			17	475		61	584	1.50
		UNS4-BP-MT2	1/08/2023	20	21.5		160	9			17	520		156	862	2.00

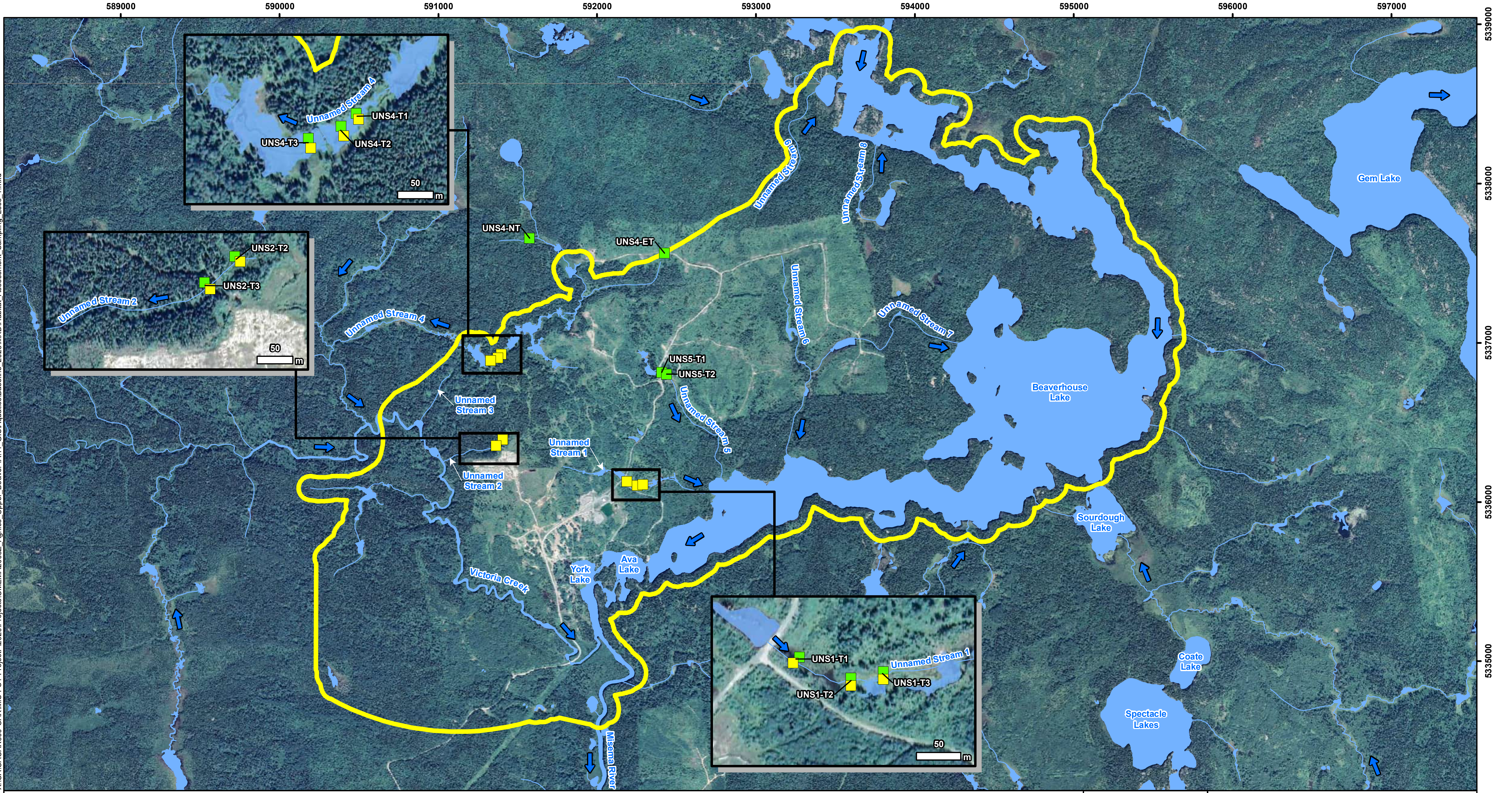
Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	Traps set	Duration (hr)	Fish Species									Total Catch	Total CPUE
						Bluntnose Minnow	Brassy Minnow	Brook Stickleback	Creek Chub	Chrosomus hybrid	Fathead Minnow	Finescale Dace	Northern Pearl Dace	Northern Redbelly Dace		
Unnamed Stream 5	Spring	UNS5-MT1	20/05/2023	2	22								1		1	0.02
		UNS5-BP-MT1	20/05/2023	20	22.5	3				16		102	2	59	182	0.40
	Summer	UNS5-BP-MT1	2/08/2023	21	17.5							472	5	69	546	1.49
Total Catch						**366**	**194**	**1,201**	**138**	**16**	**34**	**3,288**	**374**	**997**	**6,608**	**-**

Table B3-2: Electrofishing Catch Summary (2023)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	# Seconds	Fish Species						Total Catch	Total CPUE
					Brook Stickleback	Bluntnose Minnow	Fathead Minnow	Finescale Dace	Northern Pearl Dace	Northern Redbelly Dace		
Unnamed Stream 1	Spring	UNS1-EF1	21/05/2023	243						2	2	0.49
		UNS1-EF2	21/05/2023	186	3	2			1		6	1.94
		UNS1-EF3	21/05/2023	254	3			3	1	6	13	3.07
Unnamed Stream 4	Spring	UNS4-EF1	18/05/2023	407	6						6	0.88
		UNS4-EF2	18/05/2023	357	1						1	0.17
		UNS4-EF3	18/05/2023	340	1						1	0.18
	Summer	UNS4-EF1	29/07/2023	420	7			9	2		18	2.57
		UNS4-EF2	29/07/2023	422	14			2			16	2.27
		UNS4-EF3	29/07/2023	422	6			2			8	1.14
				Total Catch	**41**	**2**	**0**	**16**	**4**	**8**	**71**	**-**

Table B3-3: Dipnet Catch Summary (2023)

Waterbody	Season	Sample ID	Lift Date (dd/mm/yy)	# Dips	Fish Species				Total Catch	Total CPUE
					Brook Stickleback	Finescale Dace	Northern Pearl Dace	Northern Redbelly Dace		
Unnamed Stream 1	Spring	UNS1-DN1	21/05/2023	1	6			11	17	17.00
	Summer	UNS1-DN1	31/07/2023	4	8	5	1	1	15	3.75
Unnamed Stream 2	Spring	UNS2-DN1	19/05/2023	5	No Catch				0	0.00
		UNS2-DN2	19/05/2023	5	No Catch				0	0.00
	Summer	UNS2-DN1	29/07/2023	5	No Catch				0	0.00
Unnamed Stream 4	Spring	UNS4-DN1	22/05/2023	6	4				4	0.67
Unnamed Stream 5	Spring	UNS5-DN1	20/05/2023	2	No Catch				0	0.00
Total Catch					**18**	**5**	**1**	**12**	**36**	**-**



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Habitat Assessment Sampling Location (By Season)

- Spring
- Summer

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

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wsp

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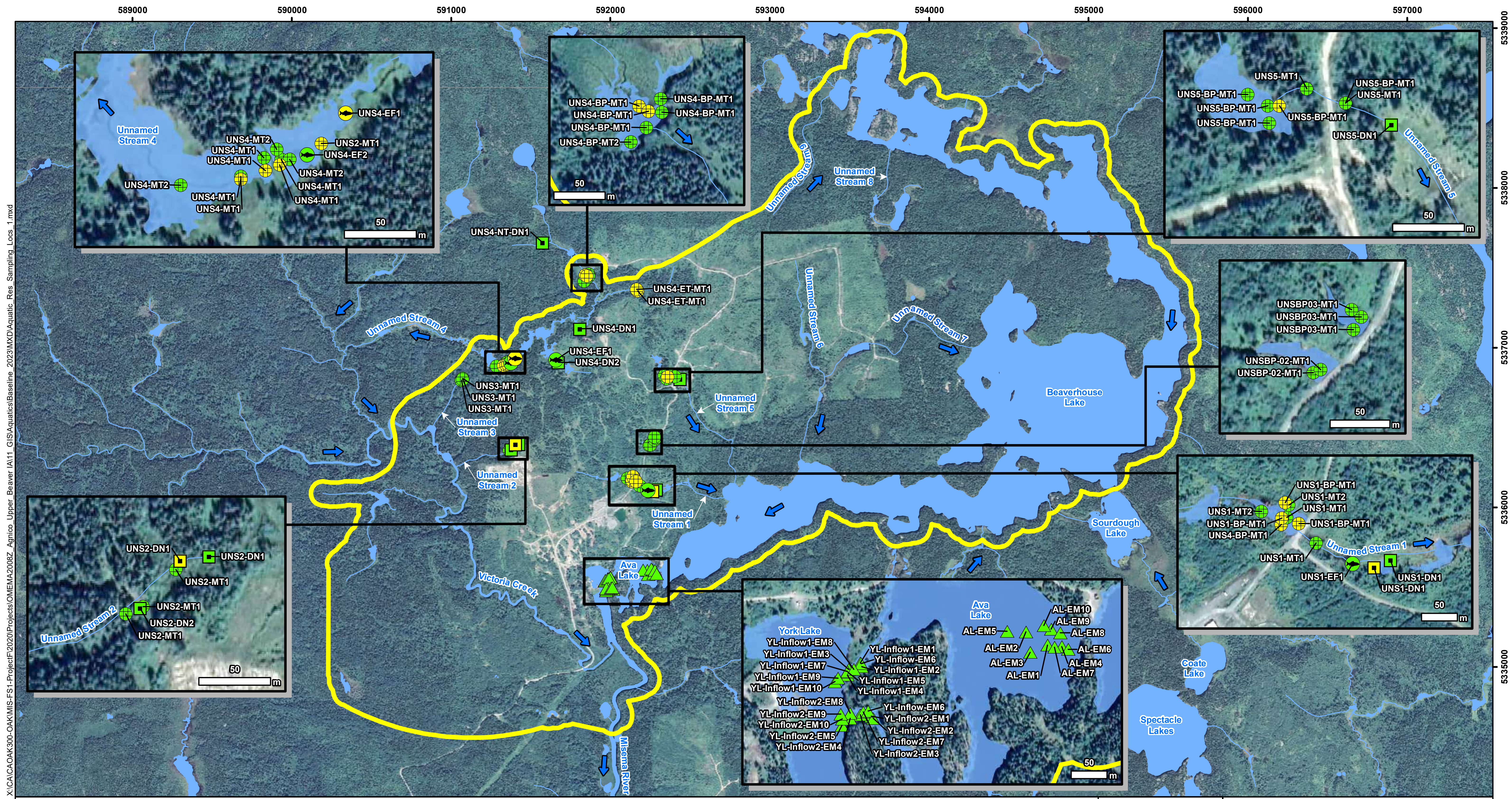
Habitat Assessment Sampling Locations (2023)

Datum: NAD83
Projection: UTM Zone 17N

N W E S

PROJECT N°:OMEMA2008	FIGURE: B3-1
SCALE: 1:22,500	DATE: November 2023

0 0.5 1 2 3 4 5 Kilometres



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction

Aquatic Resource Sampling Location

Gear Type
- Backpack Electrofishing
- Dip Net
- Minnow Trap
- Spawning Survey

Season
- Spring
- Summer

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

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wsp

UPPER BEAVER PROJECT

Aquatic Resource Sampling Locations (2023)

PROJECT N°: OMEMA2008	FIGURE: B3-2
SCALE: 1:22,500	DATE: November 2023

APPENDIX C

Fish Tissue and Age Data

Table C1-1: Small-bodied Fish Composite Tissue Sample Results (2021)

Waterbody	Species	Sample ID	Total Length Min. (cm)	Total Length Max. (cm)	Mean Total Length (cm)	Total Weight Min. (cm)	Total Weight Max. (cm)	Mean Individual Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Methyl-mercury (mg/kg wwt)	Selenium (mg/kg wwt)
Victoria Creek	Common Shiner	VCS02-MT1-COMP1-CMSH	7.9	10.0	9.0	3.48	7.62	5.55	77.1	2.47	0.0597	0.015	0.609	17.7	0.067	0.077	0.299
		VCS02-MT1-COMP2-CMSH	8	10.0	9.0	4.16	10.94	6.20	76.8	1.74	0.0579	0.015	0.630	20.0	0.063	0.078	0.333
		VCS02-MT1-COMP3-CMSH	8	10.4	9.2	3.01	8.19	5.45	75.7	4.68	0.0688	0.019	0.639	25.4	0.078	0.095	0.340
		VCS02-MT1-COMP4-CMSH	8.2	10.0	9.1	4.16	7.39	5.31	76.4	2.85	0.5590	0.015	0.569	16.4	0.058	0.069	0.313
		VCS02-MT1-COMP5-CMSH	8.1	10.6	9.4	3.64	9.80	5.55	76.8	2.02	0.0635	0.013	0.599	22.1	0.056	0.059	0.298
Unnamed Stream 7	Fathead Minnow	UNS7-P01-MT1-COMP1-FTMN	6.3	7.6	7.0	1.93	4.14	2.97	76.7	9.56	0.0416	0.017	0.765	37.1	0.027	0.033	0.201
		UNS7-P01-MT1-COMP2-FTMN	6.3	7.6	7.0	2.45	4.32	3.22	76.9	3.96	0.0371	0.015	0.733	29.9	0.026	0.031	0.196
		UNS7-P01-MT1-COMP3-FTMN	6.4	7.7	7.1	2.36	4.55	3.61	76.0	6.77	0.0299	0.014	0.724	34.5	0.026	0.033	0.199
		UNS7-P01-MT1-COMP4-FTMN	6.5	7.2	6.9	2.24	3.79	3.03	76.3	5.94	0.0335	0.016	0.829	30.6	0.028	0.035	0.200
		UNS7-P01-MT1-COMP5-FTMN	6.6	7.5	7.1	2.74	4.03	3.59	77.4	6.78	0.0306	0.017	0.849	34.7	0.027	0.034	0.199

All composite samples were comprised of eight (8) individuals.
All metal concentrations are expressed as mg/kg wet weight.

Table C1-2: Sportfish Tissue Sample Results (2021)

Waterbody	Species	Sample ID	Total Length (cm)	Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Methyl-mercury (mg/kg wwt)	Selenium (mg/kg wwt)
Beaverhouse Lake	Northern Pike	BL-MID-GN1-F1-NRPK	634	1910	78.1	0.4	0.024	0.001	0.121	1.47	0.597	0.340	0.331
	Northern Pike	BL-MID-GN1-F2-NRPK	732	1990	77.8	0.4	0.012	0.001	0.137	1.64	1.550	1.800	0.182
	Northern Pike	BL-MID-GN3-F1-NRPK	643	1880	78.6	0.4	0.053	0.001	0.101	0.98	0.868	0.959	0.258
	Northern Pike	BL-MID-GN3-F2-NRPK	547	830	78.0	0.4	0.035	0.001	0.129	1.55	0.534	0.573	0.273
	Northern Pike	BL-MID-GN3-F3-NRPK	939	5000	77.6	0.4	0.102	0.001	0.111	1.30	1.410	1.360	0.219
	Northern Pike	BL-NORTH-GN1-F1-NPRK	576	1050	78.7	0.4	0.035	0.001	0.122	1.32	0.559	0.512	0.238
	Northern Pike	BL-NORTH-GN1-F2-NPRK	641	1510	78.1	0.4	0.038	0.001	0.109	1.06	0.919	0.954	0.230
	Northern Pike	BL-NORTH-GN1-F3-NPRK	750	2830	78.3	0.4	0.053	0.001	0.134	1.19	0.870	0.626	0.211
	Northern Pike	BL-NORTH-GN1-F4-NPRK	696	2280	79.0	0.4	0.066	0.001	0.091	1.02	1.030	1.010	0.222
	Northern Pike	BL-NORTH-GN1-F5-NPRK	718	2600	78.6	0.4	0.057	0.001	0.109	1.03	1.530	1.600	0.227
	Northern Pike	BL-NORTH-GN3-F1-NRPK	500	640	78.4	0.4	0.052	0.001	0.177	1.63	0.283	0.318	0.242
	Walleye	BL-MID-GN1-F1-WALL	525	1120	77.9	0.4	0.034	0.001	0.138	1.22	0.576	0.330	0.314
	Walleye	BL-MID-GN1-F2-WALL	481	1010	77.5	0.4	0.042	0.001	0.138	1.17	0.436	0.201	0.331
	Walleye	BL-MID-GN1-F3-WALL	573	1900	77.4	0.4	0.062	0.001	0.143	1.45	1.400	0.478	0.380
	Walleye	BL-MID-GN1-F4-WALL	462	1050	76.7	0.4	0.047	0.001	0.213	1.96	0.701	0.367	0.274
	Walleye	BL-MID-GN1-F5-WALL	447	780	77.1	0.4	0.062	0.001	0.208	2.02	0.500	0.258	0.250
	Walleye	BL-MID-GN1-F6-WALL	392	480	77.7	0.4	0.033	0.001	0.124	1.45	0.399	0.225	0.312
	Walleye	BL-MID-GN1-F7-WALL	510	1040	79.8	0.4	0.036	0.001	0.154	1.76	0.645	0.330	0.399
	Walleye	BL-MID-GN1-F8-WALL	386	470	80.1	0.4	0.023	0.001	0.133	1.35	0.385	0.228	0.234
	Walleye	BL-MID-GN1-F9-WALL	344	310	80.3	0.4	0.034	0.001	0.159	1.37	0.291	0.199	0.272
	Walleye	BL-MID-GN1-F10-WALL	368	440	78.4	0.4	0.066	0.001	0.182	1.54	0.534	0.305	0.264
	Walleye	BL-MID-GN3-F1-WALL	505	1130	77.5	0.4	0.049	0.001	0.131	1.20	0.557	0.333	0.340
	Walleye	BL-MID-GN3-F2-WALL	628	2480	78.6	0.4	0.035	0.001	0.139	1.49	1.280	1.600	0.309
	Walleye	BL-MID-GN3-F3-WALL	600	2120	79.3	0.4	0.027	0.001	0.103	1.76	1.180	1.400	0.232
	Walleye	BL-MID-GN3-F4-WALL	525	1480	77.4	0.4	0.046	0.001	0.156	1.50	0.975	1.300	0.317
	Walleye	BL-MID-GN3-F5-WALL	346	360	78.6	0.4	0.027	0.001	0.122	1.04	0.392	0.256	0.237
	Walleye	BL-MID-GN3-F6-WALL	388	530	77.9	0.4	0.054	0.001	0.173	1.67	0.416	0.399	0.251
	Walleye	BL-MID-GN3-F7-WALL	361	380	77.9	0.4	0.024	0.001	0.142	1.63	0.438	0.474	0.308
	Walleye	BL-MID-GN3-F8-WALL	376	420	78.7	0.44	0.027	0.001	0.146	1.13	0.360	0.422	0.248
	Walleye	BL-MID-GN3-F9-WALL	364	510	77.4	0.4	0.079	0.001	0.158	1.64	0.504	0.561	0.249
	Walleye	BL-NORTH-GN1-F1-WALL	415	770	78.2	0.4	0.044	0.001	0.155	1.43	0.431	0.509	0.248
	Walleye	BL-NORTH-GN1-F2-WALL	346	213	79.3	0.44	0.024	0.001	0.120	1.36	0.698	0.733	0.263
	Walleye	BL-NORTH-GN1-F3-WALL	480	1220	77.1	0.4	0.048	0.001	0.162	1.77	1.160	1.050	0.265
	Walleye	BL-NORTH-GN1-F4-WALL	525	1570	76.8	0.4	0.062	0.001	0.125	1.31	0.984	1.080	0.290
	Walleye	BL-NORTH-GN1-F5-WALL	555	1600	78.8	0.4	0.062	0.001	0.143	1.56	1.010	1.050	0.267
	Walleye	BL-NORTH-GN3-F1-WALL	372	480	77.6	0.49	0.033	0.001	0.149	1.80	0.333	0.298	0.262
York Lake	Northern Pike	YL-GN1-F1-NRPK	609	1190	80.6	0.42	0.038	0.001	0.138	2.47	0.651	0.702	0.247
	Northern Pike	YL-GN1-F2-NRPK	533	880	79.3	0.4	0.124	0.002	0.180	2.79	0.557	0.551	0.244
	Northern Pike	YL-GN1-F3-NRPK	565	900	80.0	0.4	0.032	0.001	0.127	1.83	1.030	0.828	0.247
	Northern Pike	YL-GN1-F4-NRPK	483	530	78.8	0.4	0.094	0.002	0.204	2.37	0.261	0.290	0.273
	Northern Pike	YL-GN1-F5-NRPK	521	780	80.1	0.4	0.056	0.001	0.211	2.49	0.312	0.292	0.204

Waterbody	Species	Sample ID	Total Length (cm)	Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Methyl-mercury (mg/kg wwt)	Selenium (mg/kg wwt)
York Lake	Northern Pike	YL-GN1-F6-NRPK	486	550	79.3	0.49	0.053	0.001	0.164	2.64	0.318	0.314	0.259
	Northern Pike	YL-GN1-F7-NRPK	613	1220	80.1	0.4	0.057	0.001	0.170	2.09	1.140	1.040	0.231
	Northern Pike	YL-GN1-F8-NRPK	775	3080	80.0	0.4	0.248	0.001	0.163	1.67	0.720	0.700	0.233
	Northern Pike	YL-GN1-F9-NRPK	653	1580	78.2	0.4	0.046	0.001	0.137	1.55	0.858	0.759	0.257
	Northern Pike	YL-GN1-F10-NRPK	522	870	79.0	0.4	0.146	0.001	0.150	1.69	0.402	0.360	0.235
	Northern Pike	YL-GN1-F11-NRPK	426	450	80.8	0.4	0.063	0.001	0.140	1.71	0.435	0.403	0.192
	Northern Pike	YL-GN1-F12-NRPK	528	910	79.5	0.4	0.055	0.001	0.145	1.87	0.635	0.680	0.198
	Northern Pike	YL-GN1-F13-NRPK	540	860	80.0	0.4	0.052	0.001	0.141	2.29	0.535	0.468	0.224
	Northern Pike	YL-GN2-F1-NRPK	574	1140	78.8	0.4	0.332	0.002	0.187	2.75	0.321	0.294	0.344
	Northern Pike	YL-GN2-F2-NRPK	562	850	79.9	0.4	0.113	0.002	0.174	3.08	0.748	0.803	0.264
	Northern Pike	YL-GN2-F3-NRPK	480	570	79.2	0.4	0.067	0.001	0.115	1.91	0.434	0.460	0.201
	Northern Pike	YL-GN2-F4-NRPK	514	810	79.5	0.4	0.028	0.001	0.177	2.12	0.435	0.496	0.183
	Northern Pike	YL-GN2-F5-NRPK	599	1160	80.4	0.4	0.097	0.001	0.111	1.63	0.717	0.794	0.197
	Walleye	YL-GN1-F1-WALL	399	560	78.8	0.4	0.143	0.002	0.197	1.63	0.428	0.363	0.289
	Walleye	YL-GN1-F2-WALL	393	560	78.7	0.4	0.071	0.001	0.173	1.76	0.351	0.393	0.307
	Walleye	YL-GN1-F3-WALL	334	350	78.3	0.4	0.050	0.001	0.128	1.14	0.241	0.277	0.289
	Walleye	YL-GN1-F4-WALL	362	430	80.4	0.4	0.028	0.001	0.183	2.05	0.262	0.260	0.253
	Walleye	YL-GN1-F5-WALL	335	330	79.3	0.4	0.068	0.001	0.168	1.48	0.318	0.326	0.271
	Walleye	YL-GN2-F1-WALL	352	380	79.8	0.65	0.034	0.001	0.138	1.58	0.377	0.220	0.223
	Walleye	YL-GN2-F2-WALL	444	840	78.6	0.4	0.034	0.001	0.157	1.48	0.545	0.298	0.194
	Walleye	YL-GN2-F3-WALL	407	540	79.0	0.4	0.107	0.001	0.125	1.42	0.323	0.221	0.254

Table C1-3: Small-bodied and Sportfish Age Assessment Results (2021)

Waterbody	Species	ID	Total Length (cm)	Total Weight (g)	Ageing Structure	Age
Victoria Creek	Common Shiner	VCS02-MT1-F1-CMSH	12.2	21.901	Otolith	5
		VCS02-MT1-F2-CMSH	12.3	24.463	Otolith	4
		VCS02-MT1-F3-CMSH	13.1	18.234	Otolith	2
		VCS02-MT1-F4-CMSH	12.1	13.420	Otolith	4
		VCS02-MT1-F5-CMSH	7.2	3.354	Otolith	3
		VCS02-MT1-F6-CMSH	12.1	9.839	Otolith	3
		VCS02-MT1-F7-CMSH	10.9	8.540	Otolith	5
		VCS02-MT1-F8-CMSH	12.2	13.600	Otolith	4
		VCS02-MT1-F9-CMSH	13.0	18.675	Otolith	4
		VCS02-MT1-F10-CMSH	11.9	13.370	Otolith	4
		VCS02-MT1-F11-CMSH	12.3	16.066	Otolith	3
		VCS02-MT1-F12-CMSH	11.1	9.945	Otolith	3
		VCS02-MT1-F13-CMSH	11.0	9.849	Otolith	6
		VCS02-MT1-F14-CMSH	10.9	10.019	Otolith	2
		VCS02-MT1-F15-CMSH	12.0	14.466	Otolith	3
		VCS02-MT1-F16-CMSH	11.9	13.677	Otolith	3
		VCS02-MT1-F17-CMSH	7.0	2.995	Otolith	2
		VCS02-MT1-F18-CMSH	10.2	8.389	Otolith	3
		VCS02-MT1-F19-CMSH	10.1	9.896	Otolith	4
		VCS02-MT1-F20-CMSH	10.0	10.313	Otolith	3
Unnamed Stream 7	Fathead Minnow	UNS7-P01-MT1-F1-FTMN	6.1	2.277	Otolith	2
		UNS7-P01-MT1-F2-FTMN	5.7	2.226	Otolith	2
		UNS7-P01-MT1-F3-FTMN	5.2	1.330	Otolith	2
		UNS7-P01-MT1-F4-FTMN	7.5	4.115	Otolith	3
		UNS7-P01-MT1-F5-FTMN	4.6	1.157	Otolith	1
		UNS7-P01-MT1-F6-FTMN	7.8	5.042	Otolith	3
		UNS7-P01-MT1-F7-FTMN	6.2	2.224	Otolith	2
		UNS7-P01-MT1-F8-FTMN	5.3	1.096	Otolith	2
		UNS7-P01-MT1-F9-FTMN	7.4	3.565	Otolith	3
		UNS7-P01-MT1-F10-FTMN	5.2	1.501	Otolith	2
		UNS7-P01-MT1-F11-FTMN	7.0	3.423	Otolith	3
		UNS7-P01-MT1-F12-FTMN	6.2	2.067	Otolith	3
		UNS7-P01-MT1-F13-FTMN	7.8	4.549	Otolith	3
		UNS7-P01-MT1-F14-FTMN	7.6	2.869	Otolith	3
		UNS7-P01-MT1-F15-FTMN	5.7	2.770	Otolith	3
		UNS7-P01-MT1-F16-FTMN	7.7	4.137	Otolith	3
		UNS7-P01-MT1-F17-FTMN	7.5	3.844	Otolith	3

Waterbody	Species	ID	Total Length (cm)	Total Weight (g)	Ageing Structure	Age
		UNS7-P01-MT1-F18-FTMN	6.6	2.674	Otolith	3
		UNS7-P01-MT1-F19-FTMN	5.2	1.513	Otolith	2
		UNS7-P01-MT1-F20-FTMN	8.0	5.450	Otolith	3
Beaverhouse Lake	Northern Pike	BL-MID-GN1-F1-NRPK	634	1910	Cleithra	4
		BL-MID-GN1-F2-NRPK	732	1990	Cleithra	6
		BL-MID-GN3-F1-NRPK	643	1880	Cleithra	5
		BL-MID-GN3-F2-NRPK	547	830	Cleithra	3
		BL-MID-GN3-F3-NRPK	939	5000	Cleithra	7
		BL-NORTH-GN1-F1-NPRK	576	1050	Cleithra	4
		BL-NORTH-GN1-F2-NPRK	641	1510	Cleithra	3
		BL-NORTH-GN1-F3-NPRK	750	2830	Cleithra	5
		BL-NORTH-GN1-F4-NPRK	696	2280	Cleithra	6
		BL-NORTH-GN1-F5-NPRK	718	2600	Cleithra	6
		BL-NORTH-GN3-F1-NRPK	500	640	Cleithra	2
	Walleye	BL-MID-GN1-F1-WALL	525	1120	Dorsal Spine	6
		BL-MID-GN1-F2-WALL	481	1010	Dorsal Spine	6
		BL-MID-GN1-F3-WALL	573	1900	Dorsal Spine	9
		BL-MID-GN1-F4-WALL	462	1050	Dorsal Spine	6
		BL-MID-GN1-F5-WALL	447	780	Dorsal Spine	4
		BL-MID-GN1-F6-WALL	392	480	Dorsal Spine	4
		BL-MID-GN1-F7-WALL	510	1040	Dorsal Spine	6
		BL-MID-GN1-F8-WALL	386	470	Dorsal Spine	5
		BL-MID-GN1-F9-WALL	344	310	Dorsal Spine	4
		BL-MID-GN1-F10-WALL	368	440	Dorsal Spine	4
		BL-MID-GN3-F1-WALL	505	1130	Dorsal Spine	6
		BL-MID-GN3-F2-WALL	628	2480	Dorsal Spine	9
		BL-MID-GN3-F3-WALL	600	2120	Dorsal Spine	8
		BL-MID-GN3-F4-WALL	525	1480	Dorsal Spine	8
		BL-MID-GN3-F5-WALL	346	360	Dorsal Spine	4
		BL-MID-GN3-F6-WALL	388	530	Dorsal Spine	4
		BL-MID-GN3-F7-WALL	361	380	Dorsal Spine	4
		BL-MID-GN3-F8-WALL	376	420	Dorsal Spine	4

Waterbody	Species	ID	Total Length (cm)	Total Weight (g)	Ageing Structure	Age
		BL-MID-GN3-F9-WALL	364	510	Dorsal Spine	4
		BL-NORTH-GN1-F1-WALL	415	770	Dorsal Spine	5
		BL-NORTH-GN1-F2-WALL	346	213	Dorsal Spine	4
		BL-NORTH-GN1-F3-WALL	480	1220	Dorsal Spine	8
		BL-NORTH-GN1-F4-WALL	525	1570	Dorsal Spine	6
		BL-NORTH-GN1-F5-WALL	555	1600	Dorsal Spine	6
		BL-NORTH-GN3-F1-WALL	372	480	Dorsal Spine	4
York Lake	Northern Pike	YL-GN1-F1-NRPK	609	1190	Cleithra	4
		YL-GN1-F2-NRPK	533	880	Cleithra	3
		YL-GN1-F3-NRPK	565	900	Cleithra	4
		YL-GN1-F4-NRPK	483	530	Cleithra	2
		YL-GN1-F5-NRPK	521	780	Cleithra	4
		YL-GN1-F6-NRPK	486	550	Cleithra	2
		YL-GN1-F7-NRPK	613	1220	Cleithra	4
		YL-GN1-F8-NRPK	775	3080	Cleithra	5
		YL-GN1-F9-NRPK	653	1580	Cleithra	5
		YL-GN1-F10-NRPK	522	870	Cleithra	4
		YL-GN1-F11-NRPK	426	450	Cleithra	2
		YL-GN1-F12-NRPK	528	910	Cleithra	2
		YL-GN1-F13-NRPK	540	860	Cleithra	3
		YL-GN2-F1-NRPK	574	1140	Cleithra	5
		YL-GN2-F2-NRPK	562	850	Cleithra	3
		YL-GN2-F3-NRPK	480	570	Cleithra	3
		YL-GN2-F4-NRPK	514	810	Cleithra	3
		YL-GN2-F5-NRPK	599	1160	Cleithra	4
	Walleye	YL-GN1-F1-WALL	399	560	Dorsal Spine	4
		YL-GN1-F2-WALL	393	560	Dorsal Spine	4
		YL-GN1-F3-WALL	334	350	Dorsal Spine	3
		YL-GN1-F4-WALL	362	430	Dorsal Spine	3
		YL-GN1-F5-WALL	335	330	Dorsal Spine	3
		YL-GN2-F1-WALL	352	380	Dorsal Spine	3/4
		YL-GN2-F2-WALL	444	840	Dorsal Spine	4
		YL-GN2-F3-WALL	407	540	Dorsal Spine	4

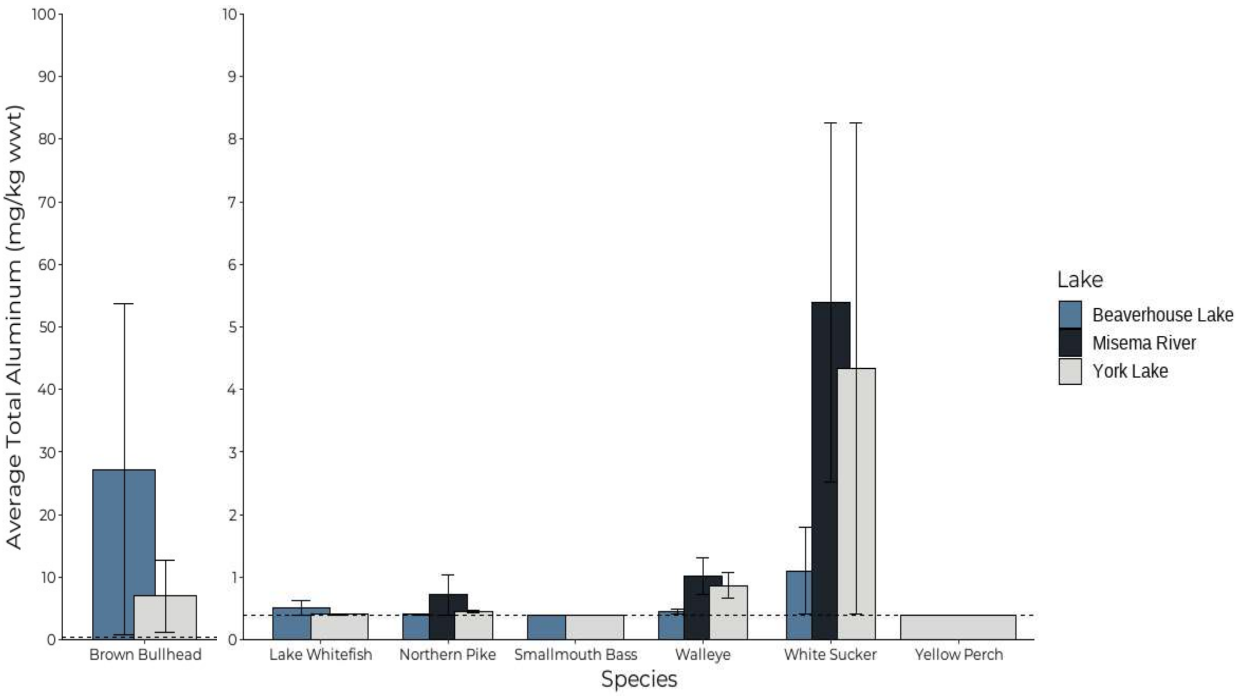


Figure C1-1: Average total (± standard error) aluminum concentration (mg/kg wwt) in large body fish tissue

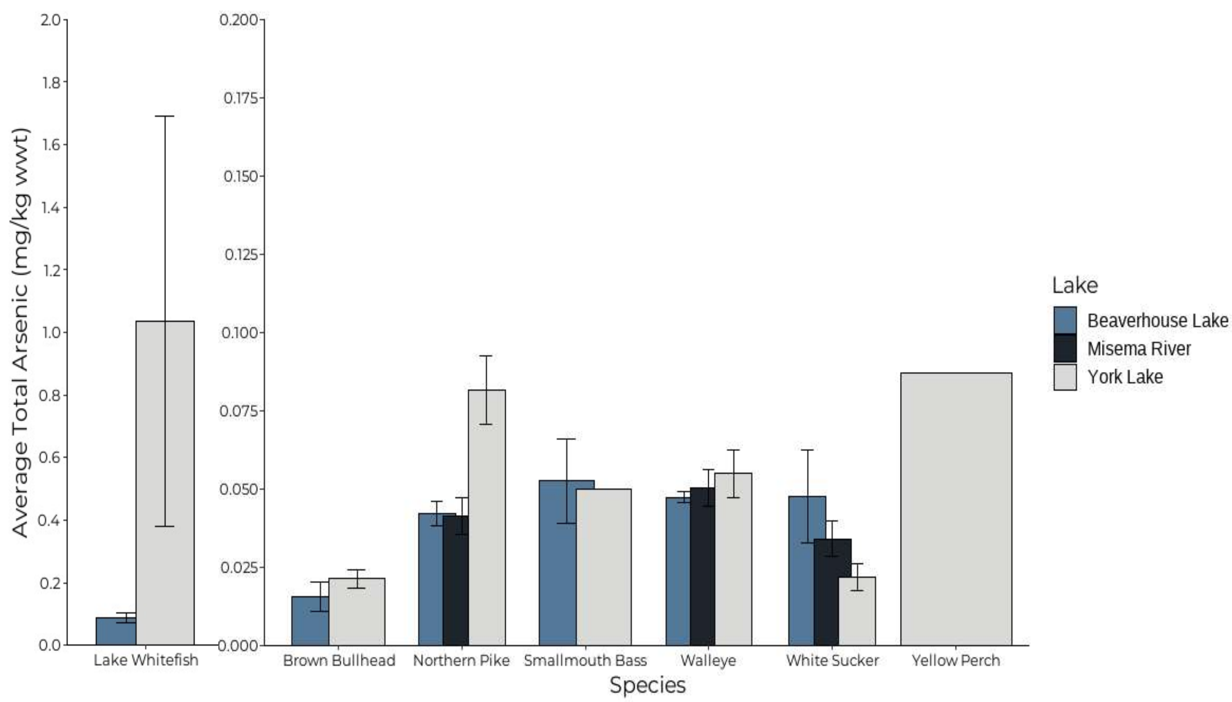


Figure C1-2: Average total (± standard error) arsenic concentration (mg/kg wwt) in large body fish tissue

Notes: Data included in the above figures is inclusive of samples collected in 2021 and 2022. Black dashed lines represent the lowest detection limit for each metal (0.40 mg/kg wwt for aluminum). Lowest detection limit for total arsenic is not visible on figure C1-2 (0.0040 mg/kg wwt).

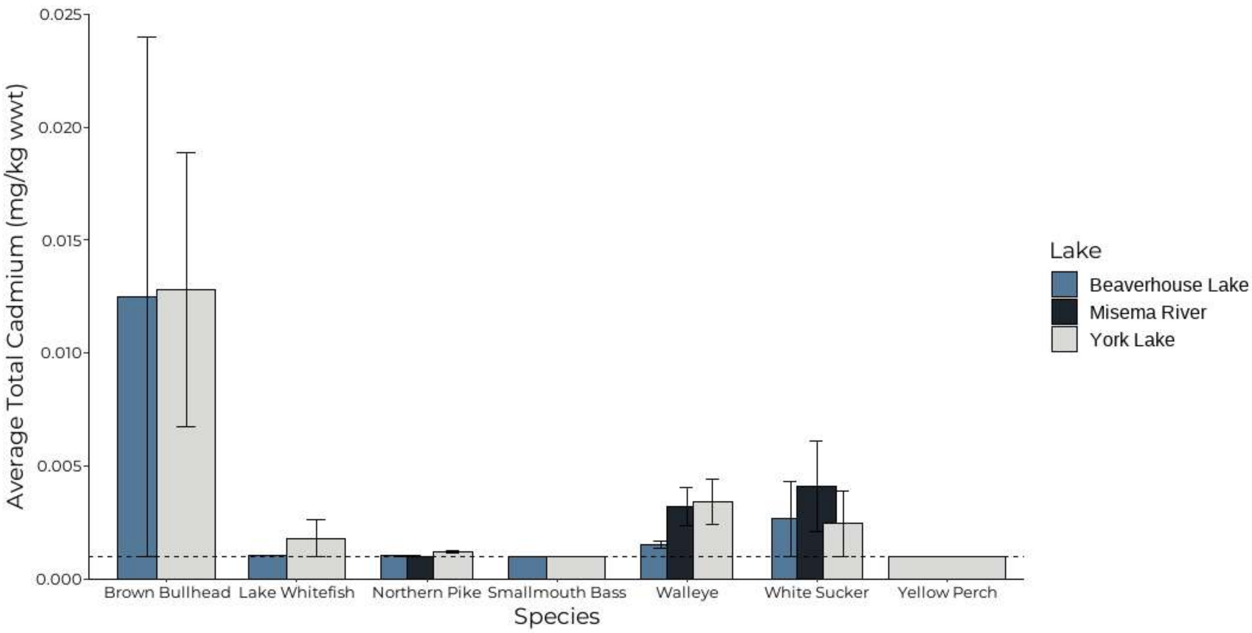


Figure C1-3: Average total (± standard error) cadmium concentration (mg/kg wwt) in large body fish tissue

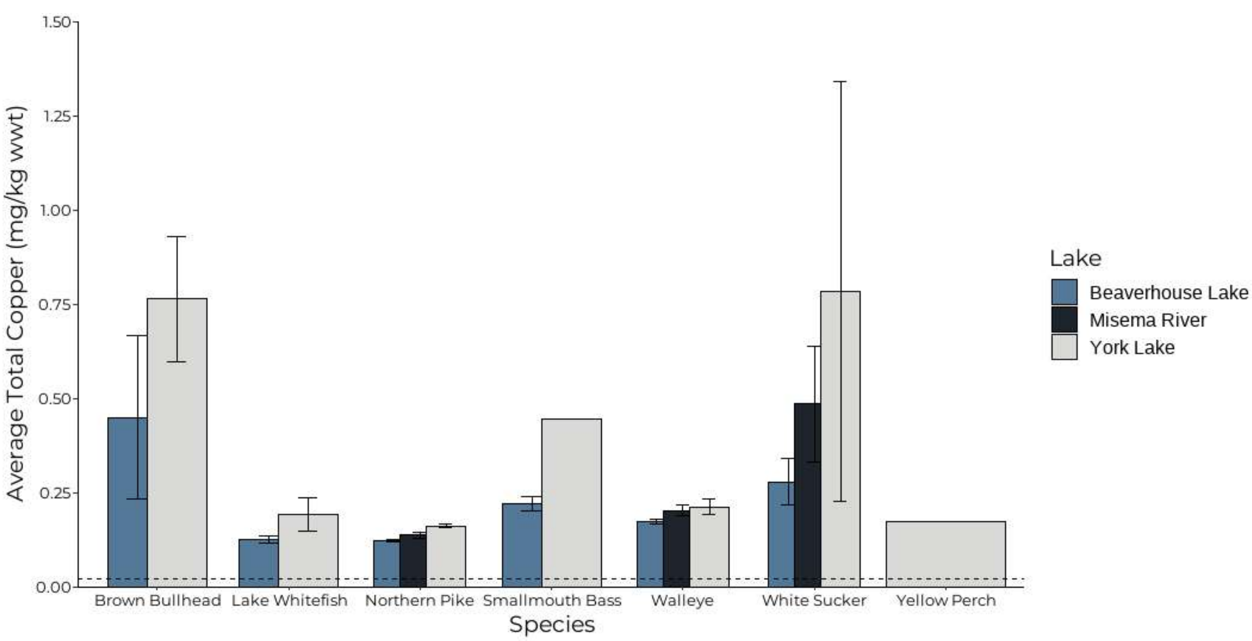


Figure C1-4: Average total (± standard error) copper concentration (mg/kg wwt) in large body fish tissue

Notes: Data included in the above figures is inclusive of samples collected in 2021 and 2022. Black dashed lines represent the lowest detection limit for each metal (0.0010 mg/kg wwt for cadmium and 0.020 mg/kg wwt for copper).

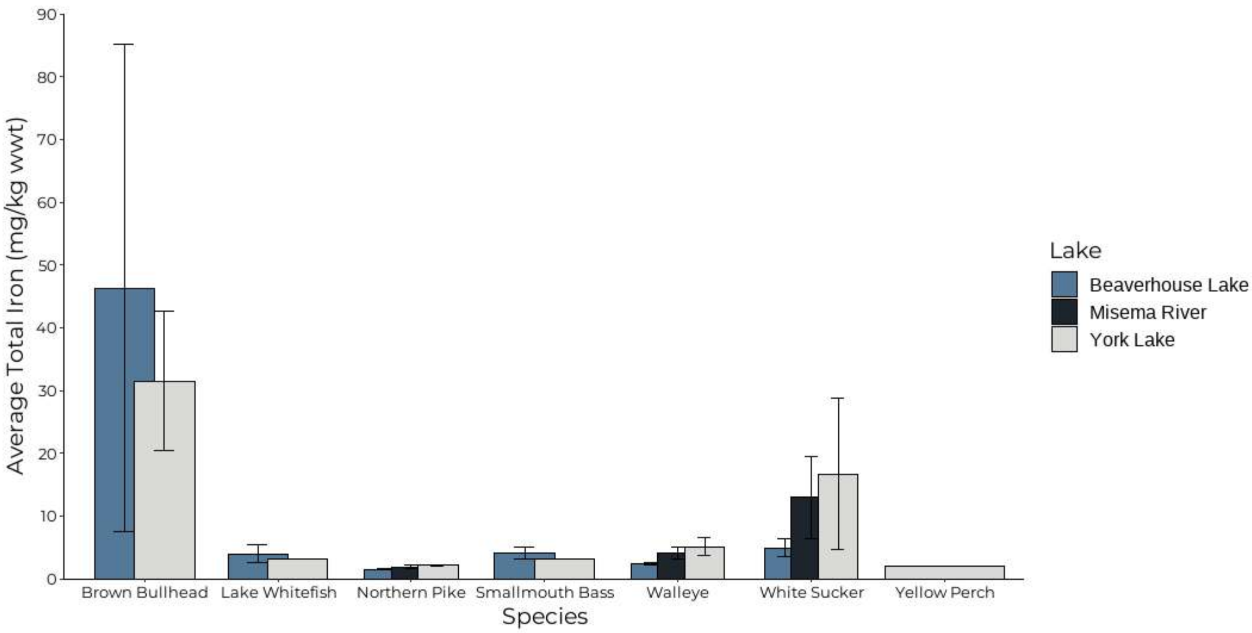


Figure C1-5: Average total (± standard error) iron concentration (mg/kg wwt) in Northern Pike fish tissue

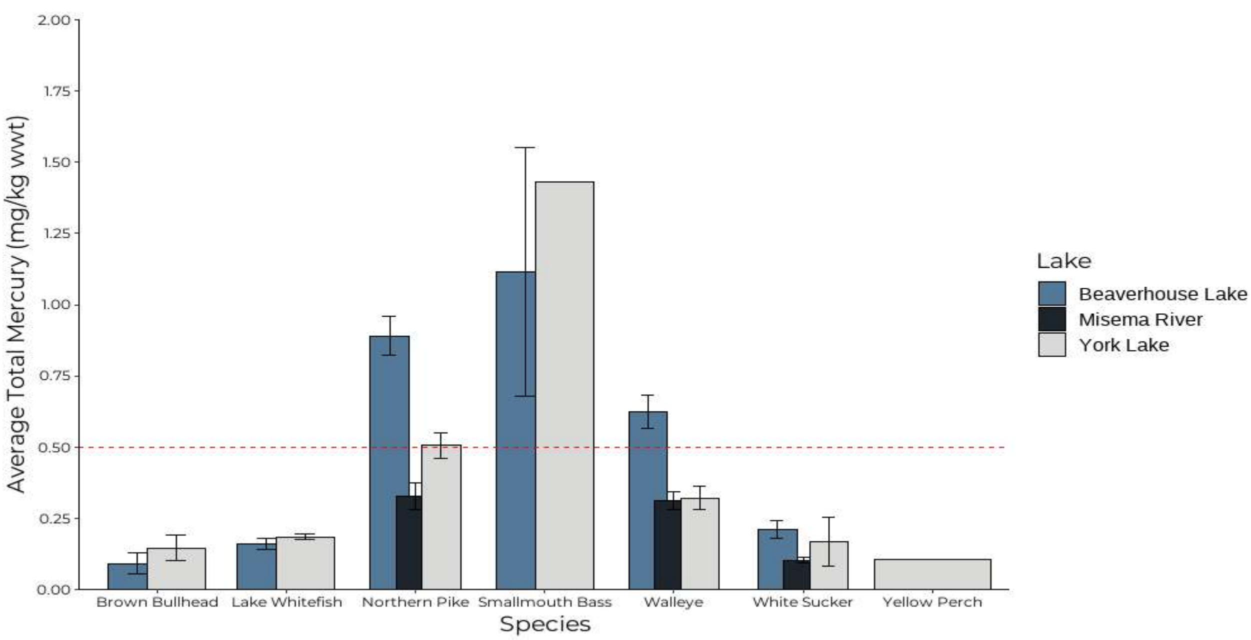


Figure C1-6: Average total (± standard error) mercury concentration (mg/kg wwt) in Northern Pike fish tissue

Notes: Data included in the above figures is inclusive of samples collected in 2021 and 2022. Lowest detection limit for total iron and mercury is not visible on figures C1-5 and C1-6 (0.6 mg/kg wwt and 0.0010 mg/kg wwt). Red dashed line denotes the Ontario consumption guideline for the protection of children and women of child-bearing age (0.5 mg/kg wwt).

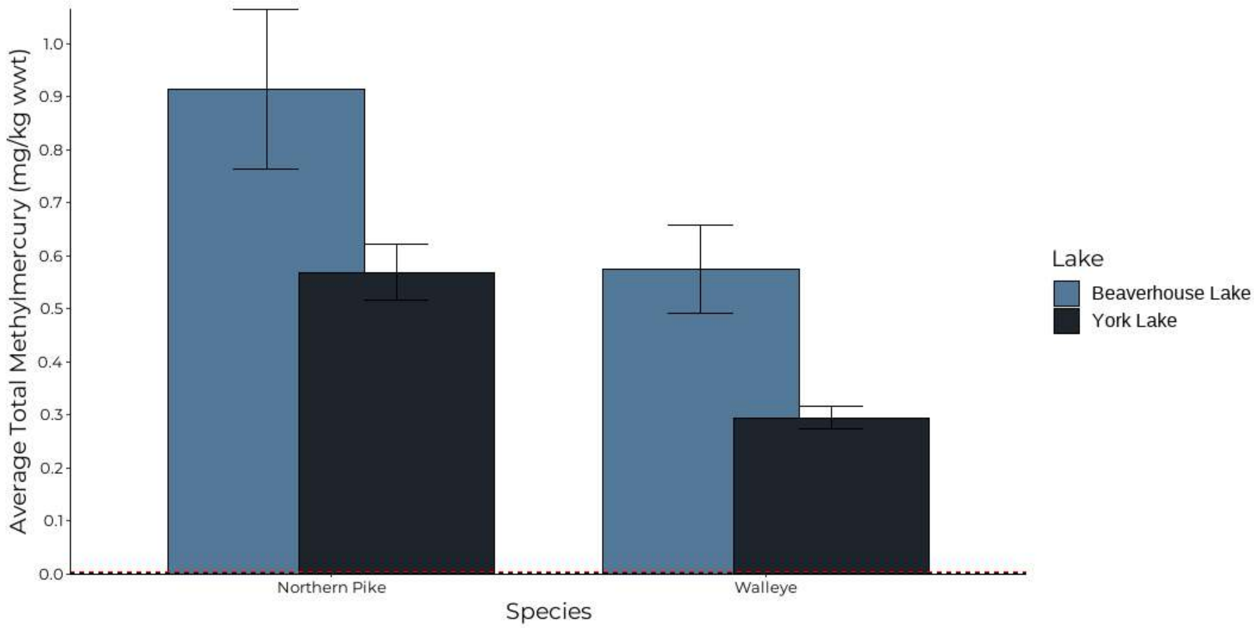


Figure C1-7: Average total (± standard error) methylmercury concentration (mg/kg wwt) in large body fish tissue

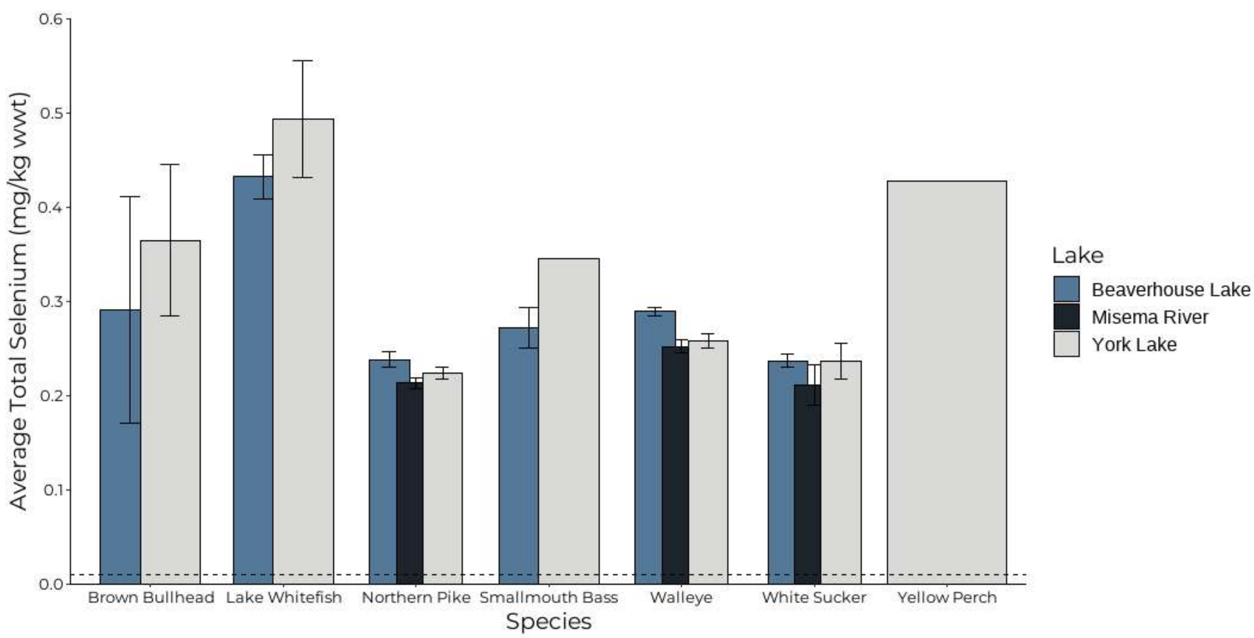


Figure C1-8: Average total (± standard error) selenium concentration (mg/kg wwt) in large body fish tissue

Notes: Data included in Figure C1-7 is inclusive of samples collected in 2021. Data included in Figure C1-8 is inclusive of samples collected in 2021 and 2022. Black dashed line on above figures represents lowest detection limit for each metal (0.0010 mg/kg wwt for methylmercury and 0.010 mg/kg wwt for selenium). Red dashed line in Figure C1-7 denotes the CCME guideline (0.033 mg/kg wwt).

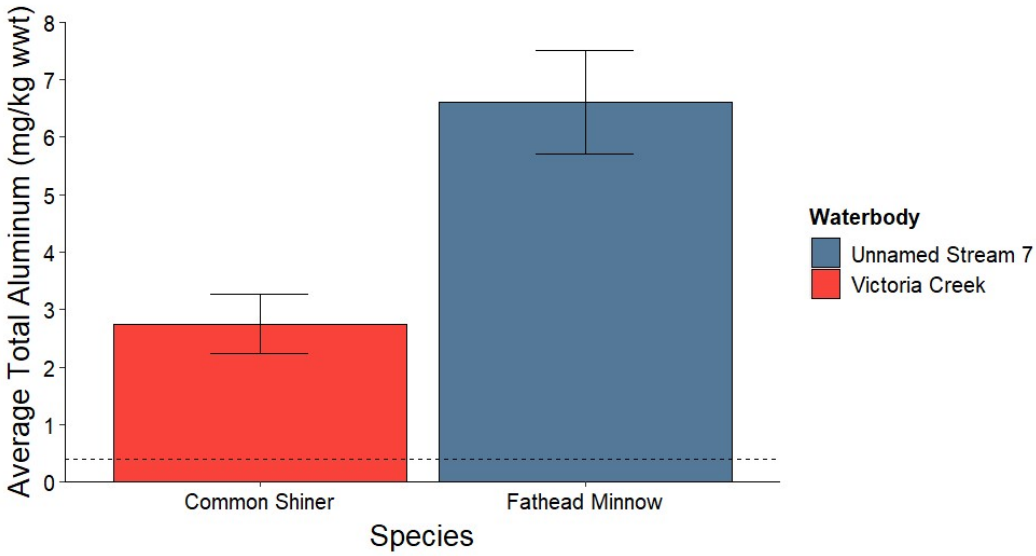


Figure C1-9: Average total (± standard error) aluminum concentration (mg/kg wwt) in small body fish composite sample tissue

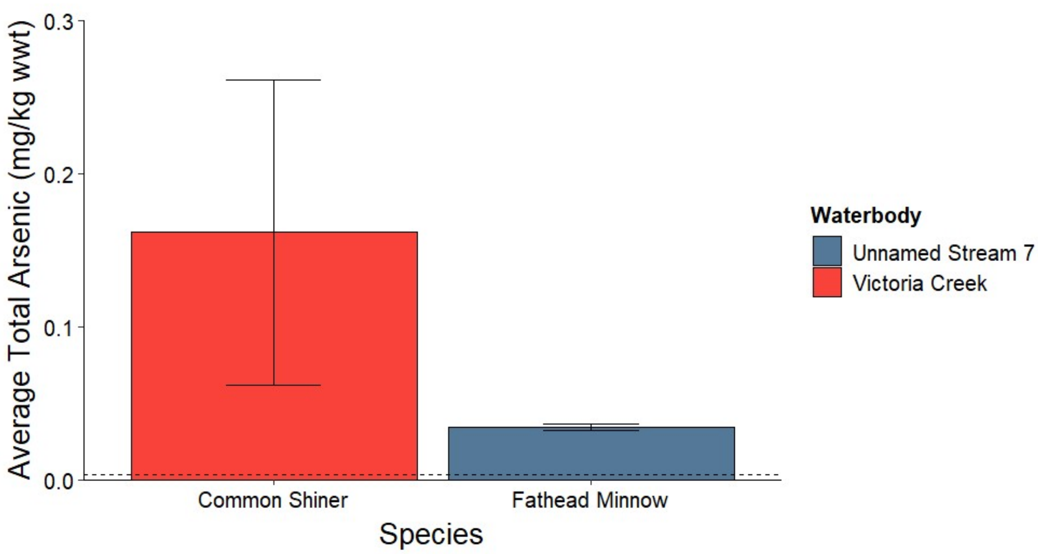


Figure C1-10: Average total (± standard error) arsenic concentration (mg/kg wwt) in small body fish composite sample tissue

Notes: Data included in the above figures is inclusive of composite samples collected in 2021. Black dashed lines represent the lowest detection limit for each metal (0.40 mg/kg wwt for aluminum and 0.0040 mg/kg wwt for arsenic). Composite samples were comprised of 8 individuals of each species from Victoria Creek (n=5) and Unnamed Stream 7 (n=5).

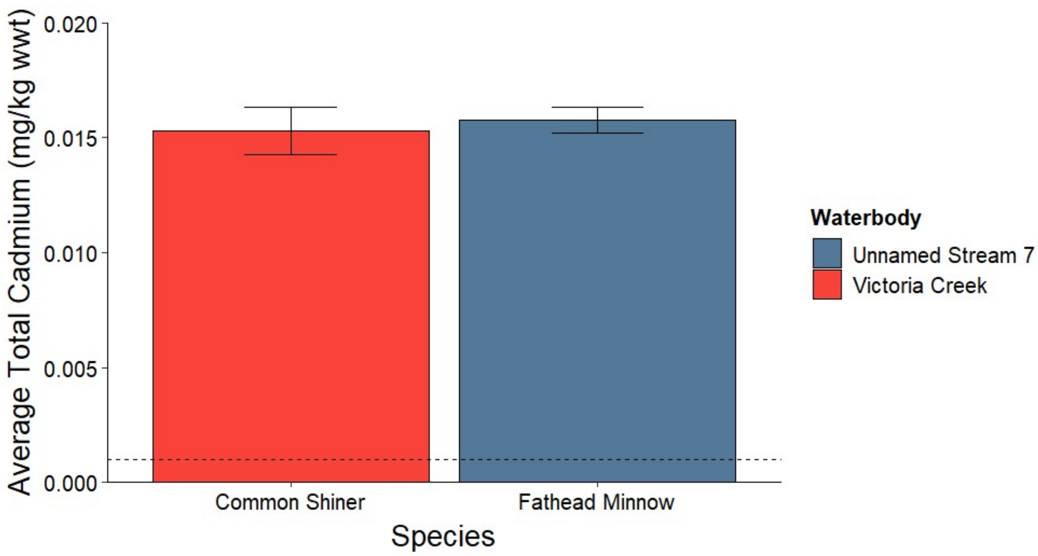


Figure C1-11: Average total (± standard error) cadmium concentration (mg/kg wwt) in small body fish composite sample tissue

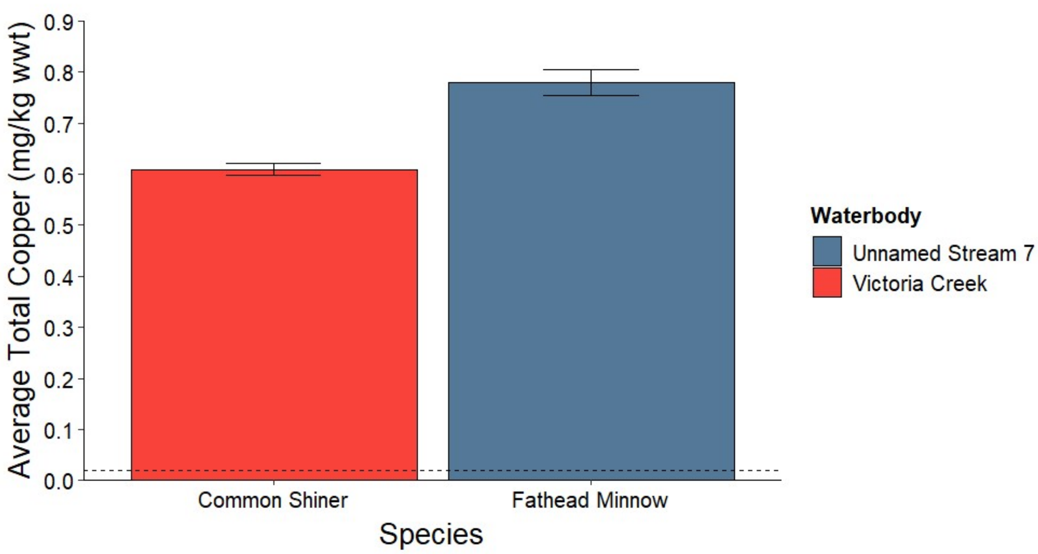


Figure C1-12: Average total (± standard error) copper concentration (mg/kg wwt) in small body fish composite sample tissue

Notes: Data included in the above figures is inclusive of composite samples collected in 2021. Black dashed lines represent the lowest detection limit for each metal (0.0010 mg/kg wwt for cadmium and 0.020 mg/kg wwt for copper). Composite samples were comprised of 8 individuals of each species from Victoria Creek (n=5) and Unnamed Stream 7 (n=5).

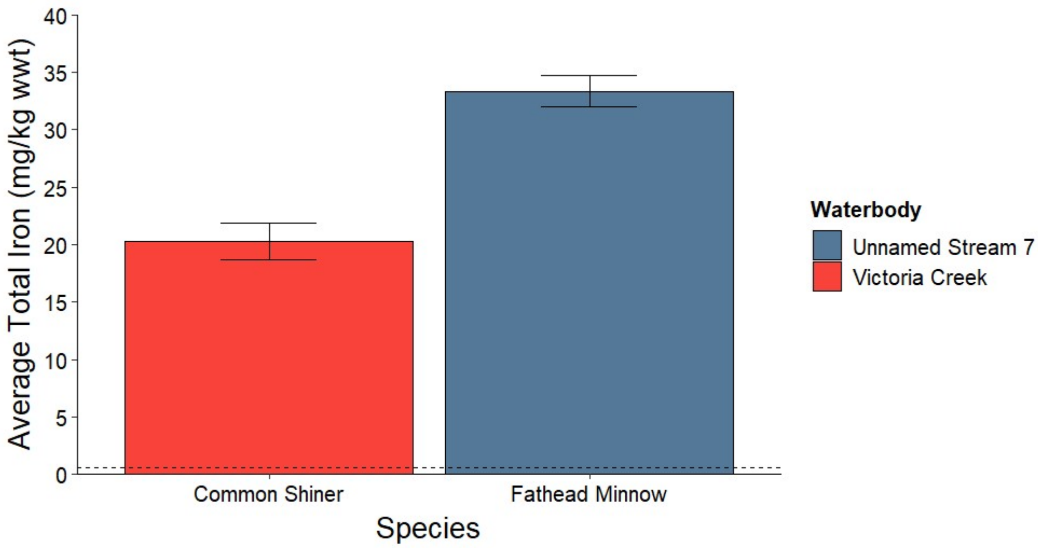


Figure C1-13: Average total (± standard error) iron concentration (mg/kg wwt) in small body fish composite sample tissue

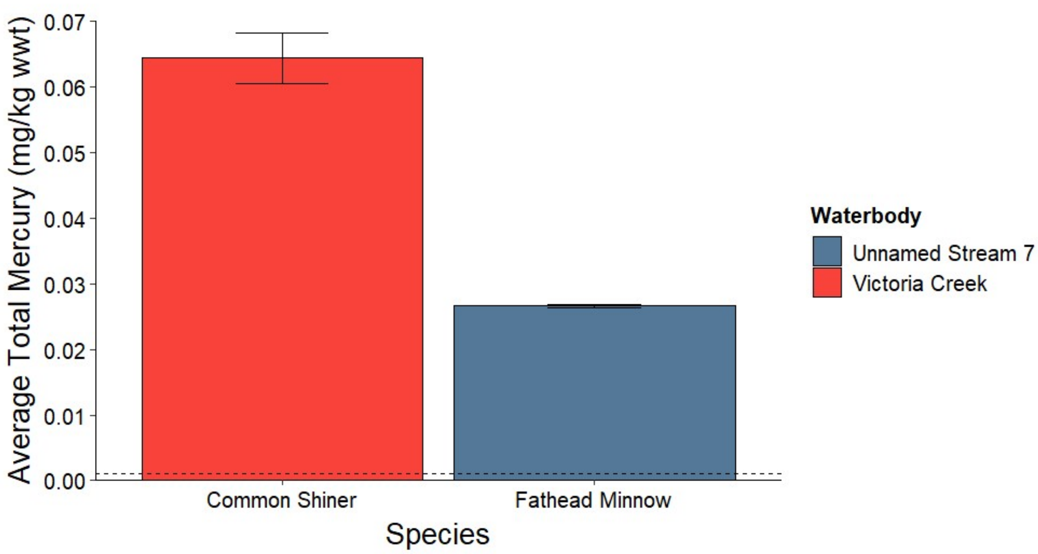


Figure C1-14: Average total (± standard error) mercury concentration (mg/kg wwt) in small body fish composite sample tissue

Notes: Data included in the above figures is inclusive of composite samples collected in 2022. Black dashed lines represent the lowest detection limit for each metal (0.60 mg/kg wwt for iron and 0.0010 mg/kg wwt for mercury). Composite samples were comprised of 8 individuals of each species from Victoria Creek (n=5) and Unnamed Stream 7 (n=5).

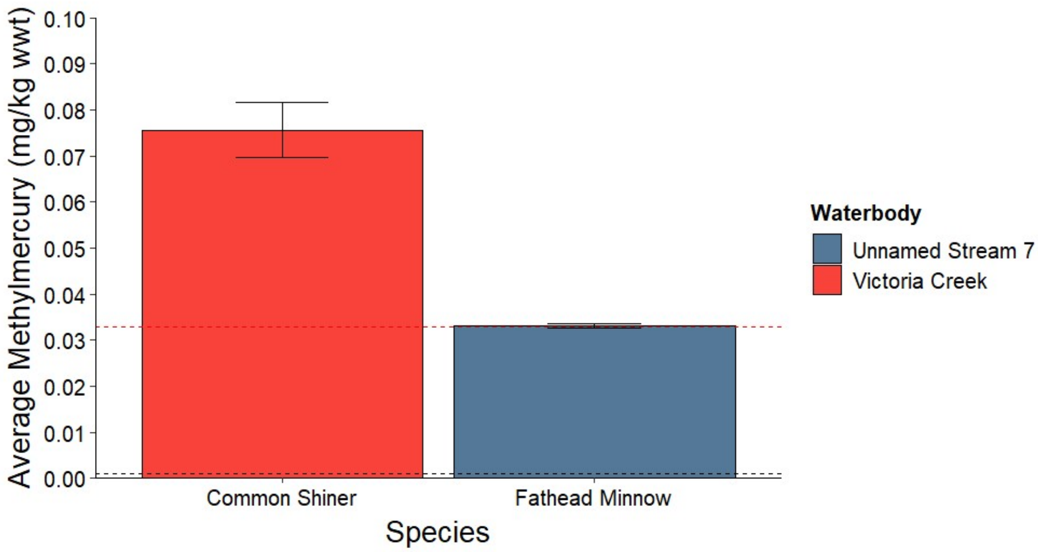


Figure C1-15: Average total (± standard error) methylmercury concentration (mg/kg wwt) in small body fish composite sample tissue

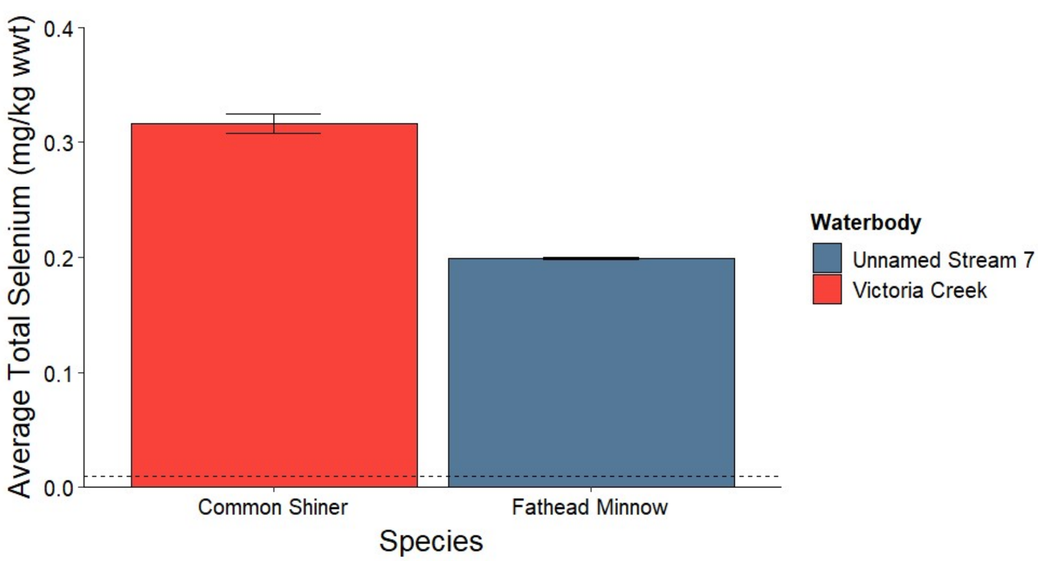


Figure C1-16: Average total (± standard error) selenium concentration (mg/kg wwt) in small body fish composite sample tissue

Notes: Data included in the above figures is inclusive of composite samples collected in 2021. Black dashed lines represent the lowest detection limit for each metal (0.0010 mg/kg wwt for methylmercury and 0.010 mg/kg wwt for selenium). Red dashed line in Figure C1-15 denotes the CCME guideline (0.033 mg/kg wwt). Composite samples were comprised of 8 individuals of each species from Victoria Creek (n=5) and Unnamed Stream 7 (n=5).

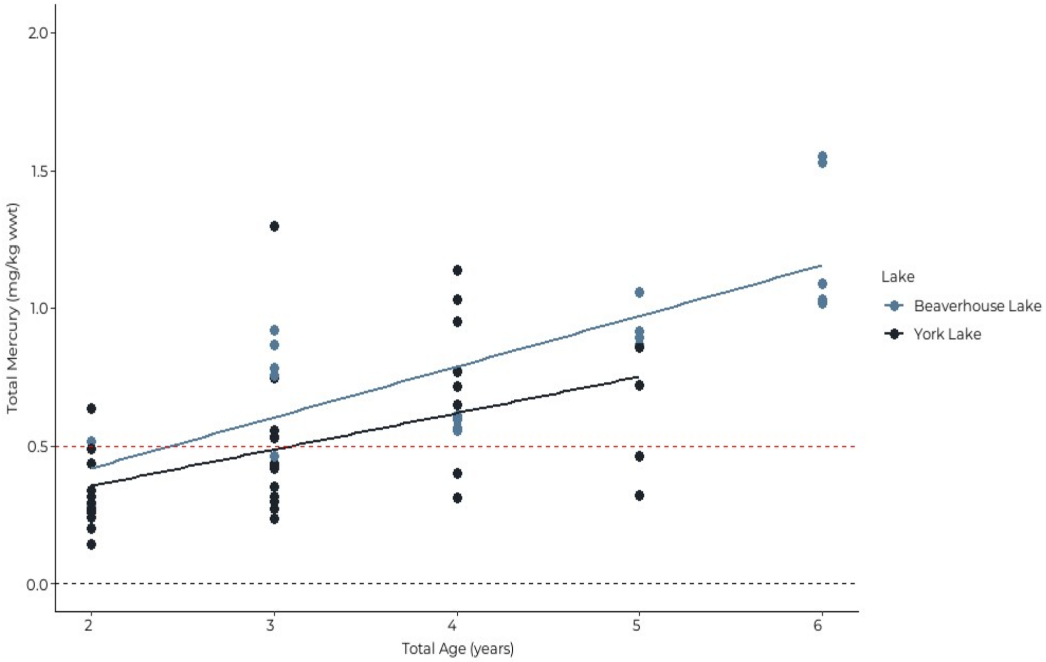


Figure C1-17: Linear regression of total mercury at age for Northern Pike (2021-2022)

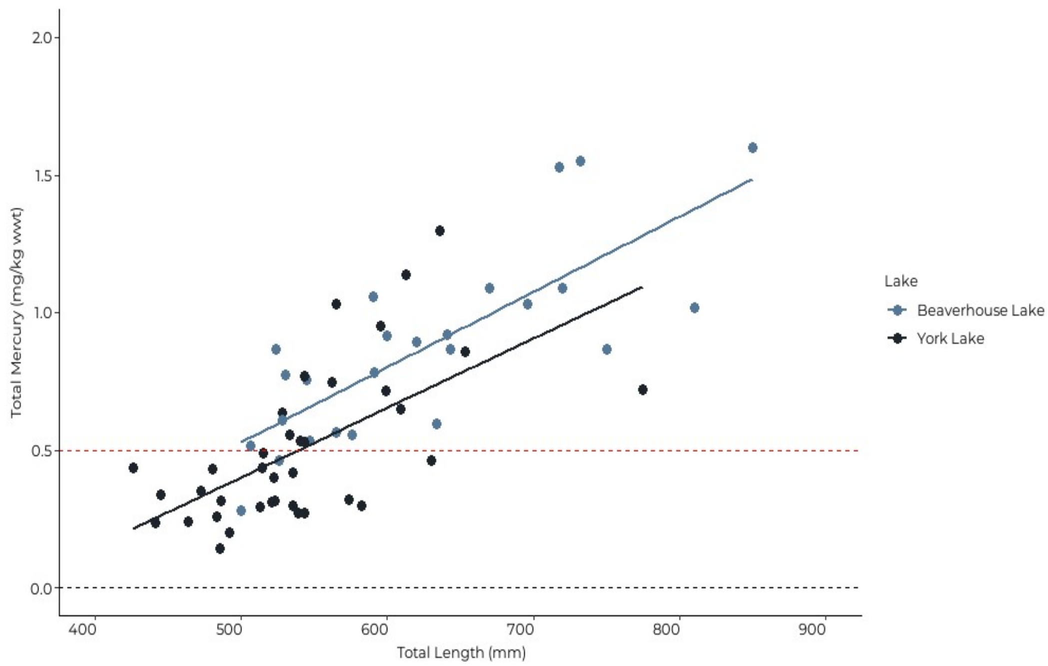


Figure C1-18: Linear regression of total mercury at total length for Northern Pike (2021-2022)

Notes: The black dashed line represents the lowest detection limit during analysis (0.0010 mg/kg wwt). The red dashed line represents the consumption guideline developed for women of child-bearing age and children (complete restriction; 0.5 mg/kg wwt). Data included in the above figures is inclusive of samples collected in 2021 and 2022. Northern Pike tissue samples from Misema River (n=2; 2022) were not included in figures due to insufficient sample size.

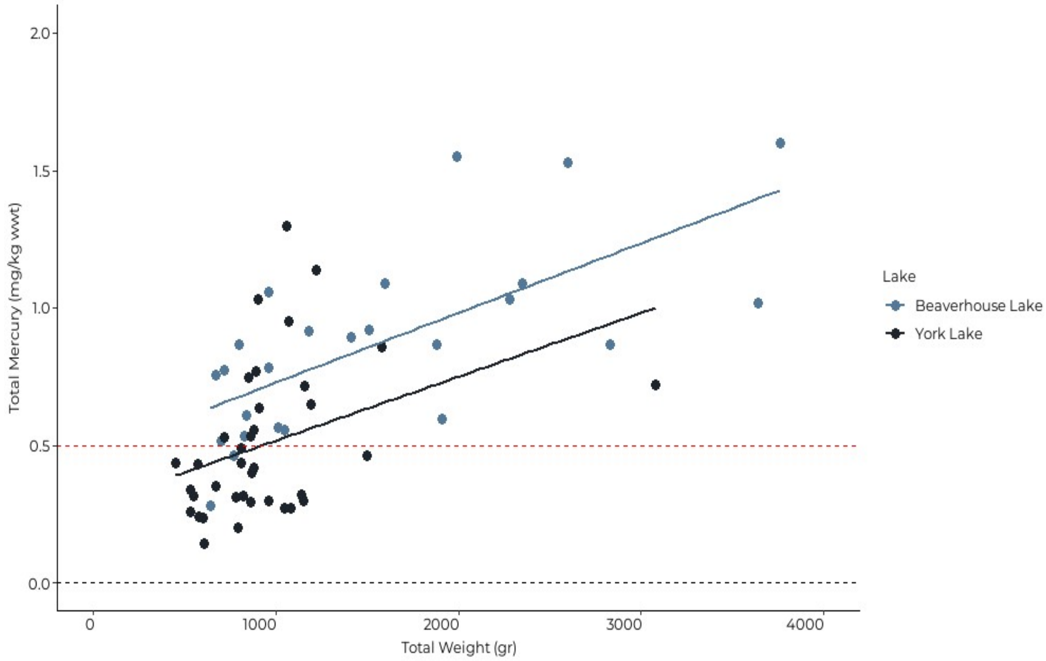


Figure C1-19: Linear regression of total mercury at total weight for Northern Pike (2021-2022)

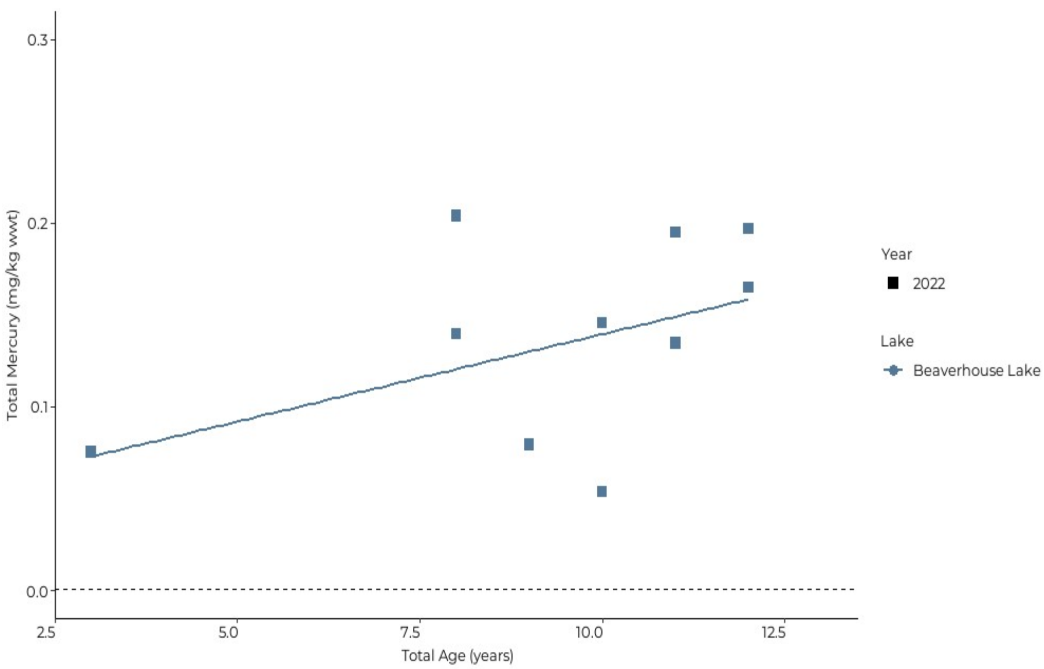


Figure C1-20: Linear regression of total mercury at age for Lake Whitefish

Notes: The black dashed line represents the lowest detection limit during analysis (0.0010 mg/kg wwt). The red dashed line represents the consumption guideline developed for women of child-bearing age and children (complete restriction; 0.5 mg/kg wwt). Data included in the above figures is inclusive of samples collected in 2022. Northern Pike tissue samples from Misema River (n=2; 2022) and Lake Whitefish tissue samples from Misema River (n=0; 2022) and York Lake (n=2, 2022) were not included in figures due to insufficient sample size.

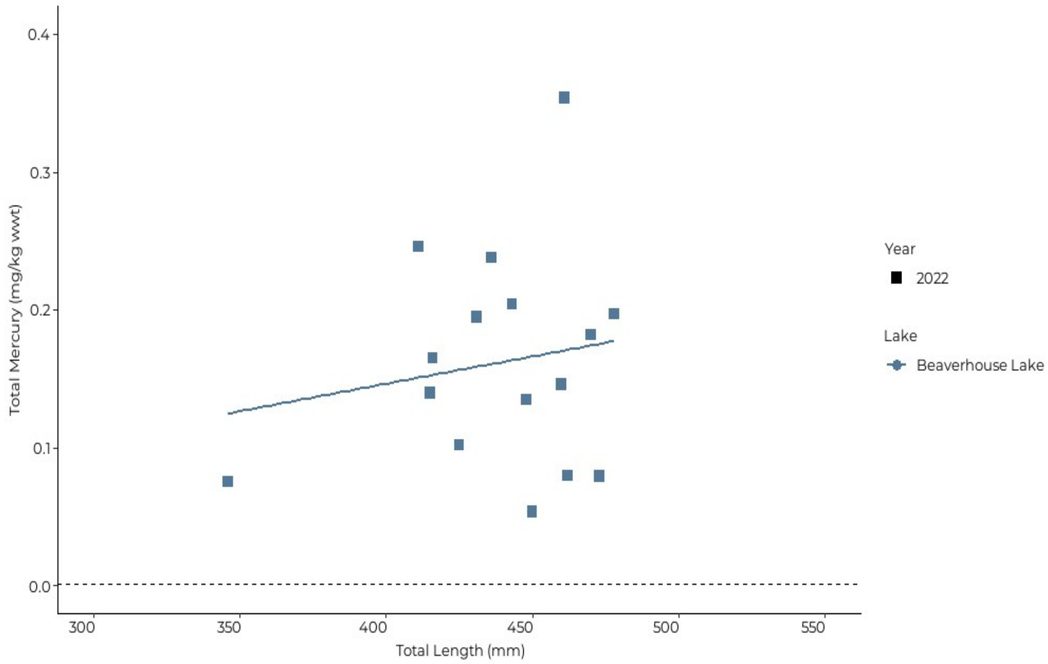


Figure C1-21: Linear regression of total mercury at total length for Lake Whitefish

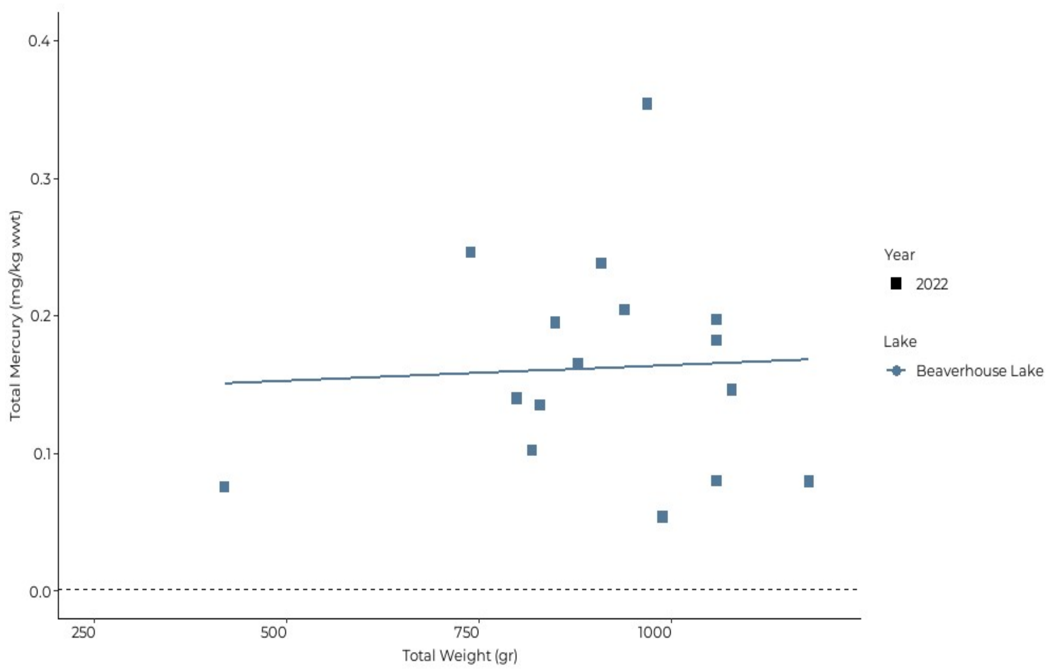


Figure C1-22: Linear regression of total mercury at total weight for Lake Whitefish

Notes: The black dashed line represents the lowest detection limit during analysis (0.0010 mg/kg wwt). The red dashed line represents the consumption guideline developed for women of child-bearing age and children (complete restriction; 0.5 mg/kg wwt). Data included in the above figures is inclusive of samples collected in 2022. Lake Whitefish tissue samples from Misema River (n=0; 2022) and York Lake (n=2, 2022) were not included in figures due to insufficient sample size.

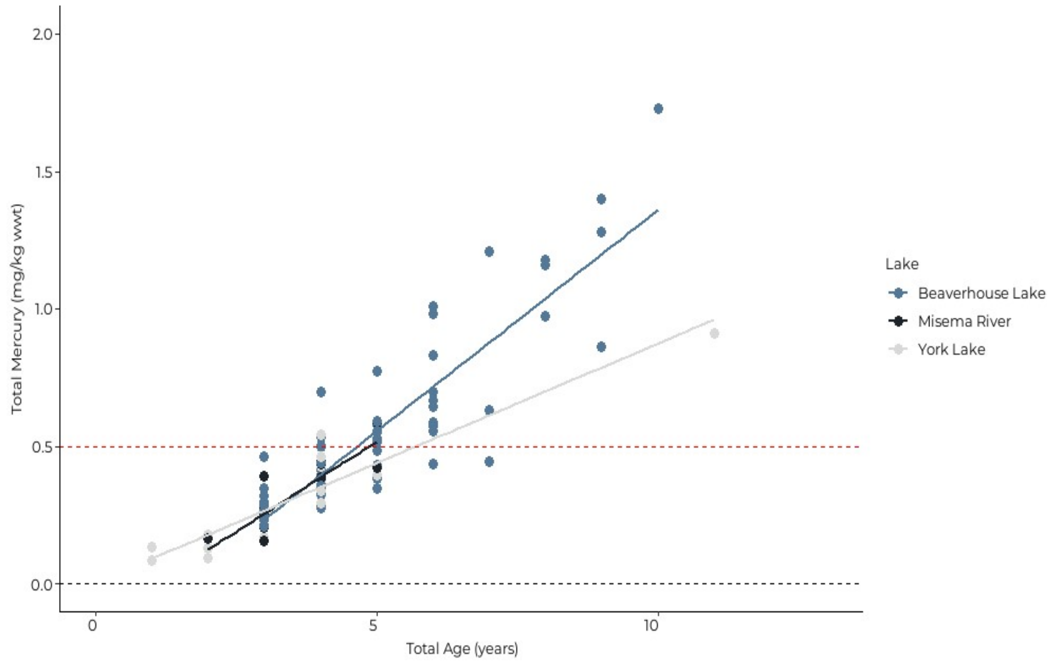


Figure C1-23: Linear regression of total mercury at age for Walleye (2021-2022)

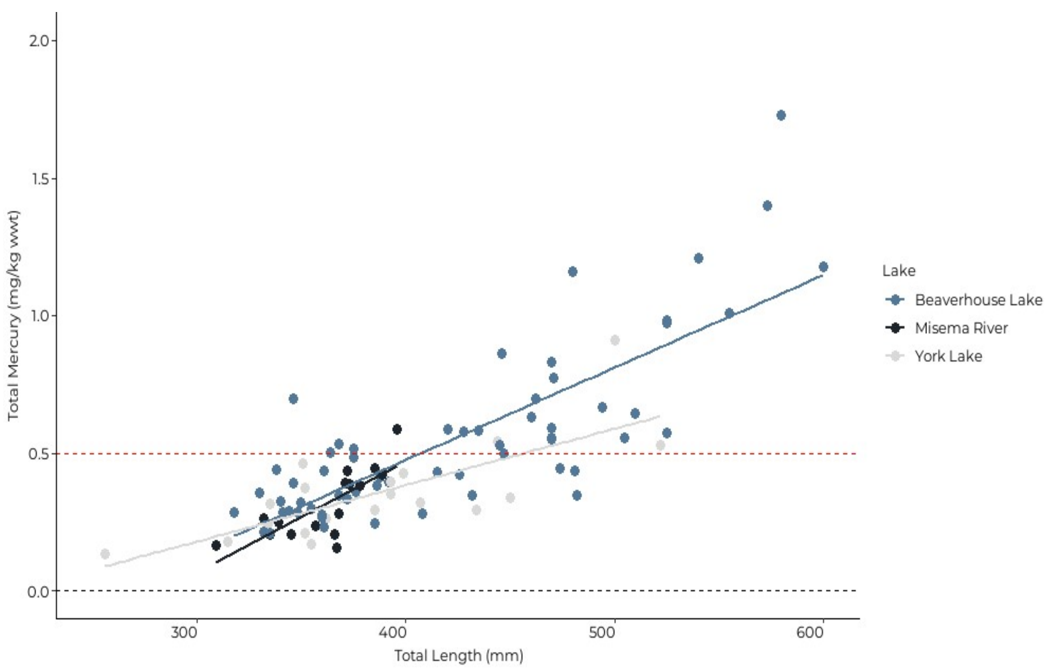


Figure C1-24: Linear regression of total mercury at total length for Walleye (2021-2022)

Notes: The black dashed line represents the lowest detection limit during analysis (0.0010 mg/kg wwt). The red dashed line represents the consumption guideline developed for women of child-bearing age and children (complete restriction; 0.5 mg/kg wwt). Data included in the above figures is inclusive of samples collected in 2021 and 2022.

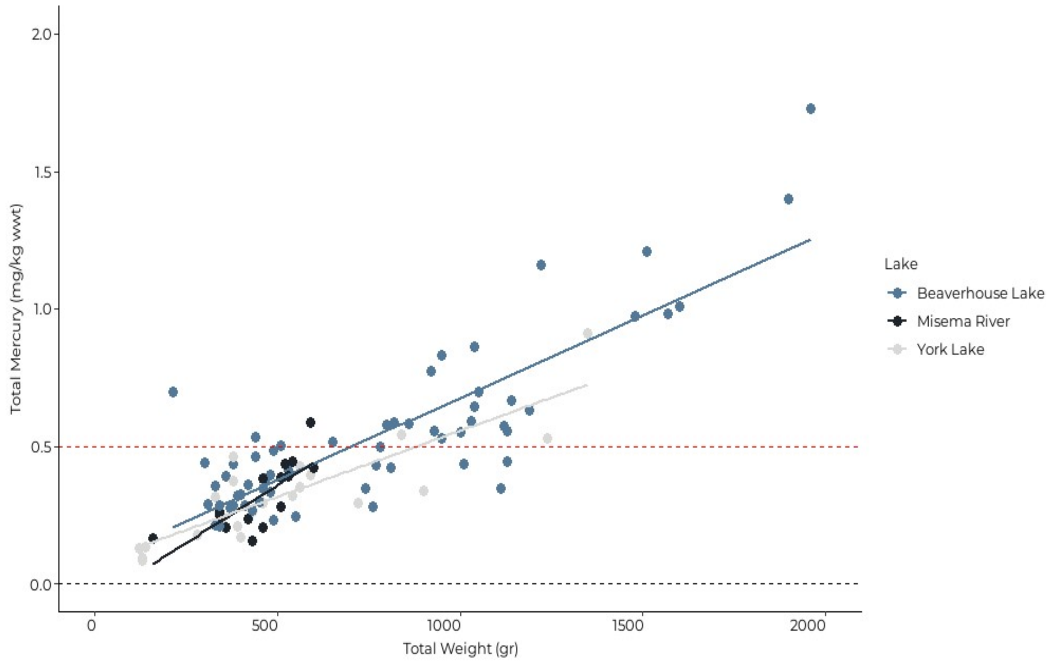


Figure C1-25: Linear regression of total mercury at total weight for Walleye (2021-2022)

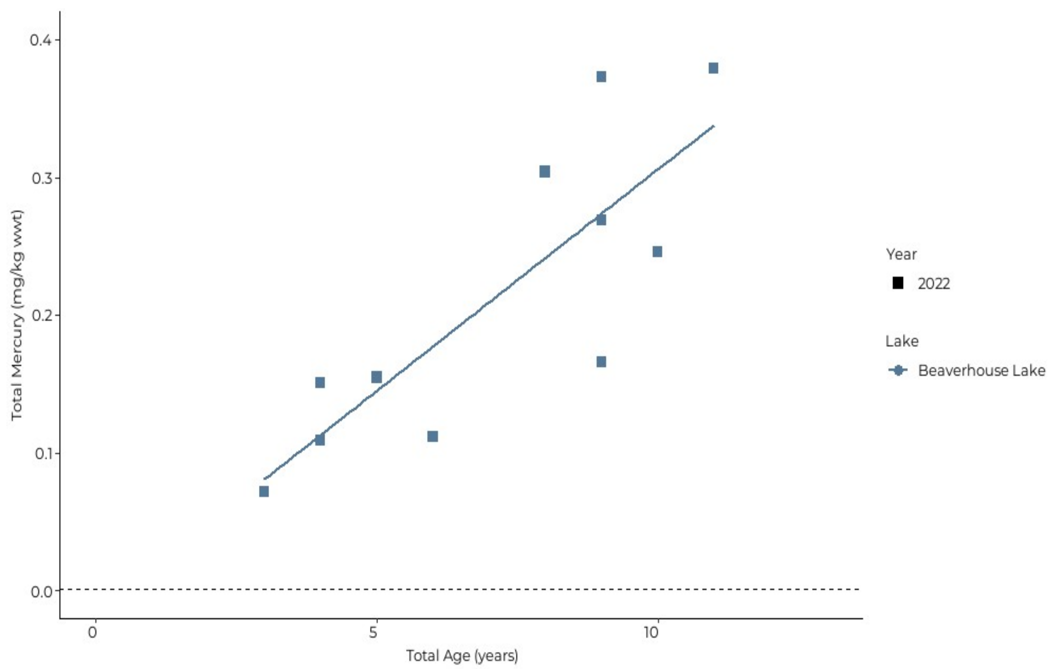


Figure C1-26: Linear regression of total mercury at age for White Sucker

Notes: The black dashed line represents the lowest detection limit during analysis (0.0010 mg/kg wwt). The red dashed line represents the consumption guideline developed for women of child-bearing age and children (complete restriction; 0.5 mg/kg wwt). Data included in the above figures is inclusive of samples collected in 2021 (Walleye) and 2022. White Sucker tissue samples from Misema River (n=4; 2022) and York Lake (n=2, 2022) were not included in figures due to insufficient sample size.

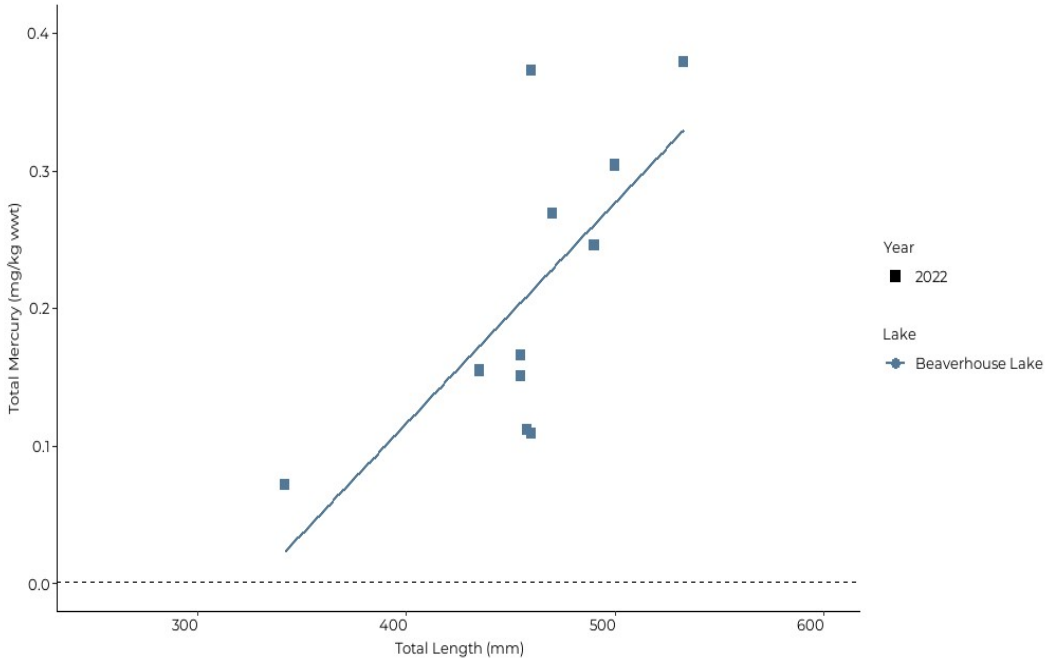


Figure C1-27: Linear regression of total mercury at total length for White Sucker

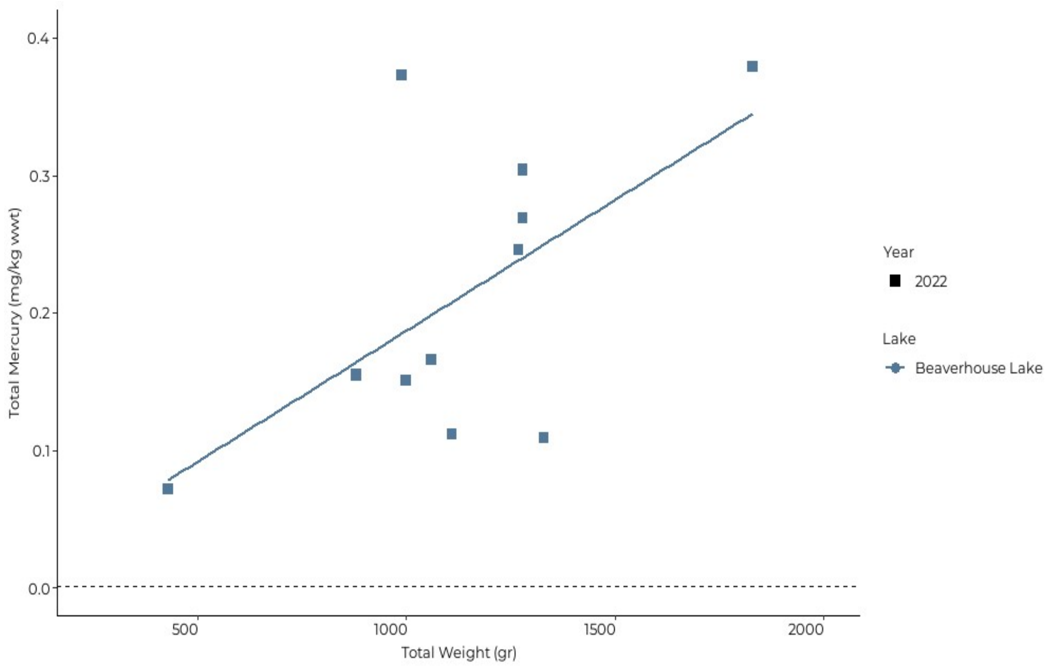


Figure C1-28: Linear regression of total mercury at total length for White Sucker

Notes: The black dashed line represents the lowest detection limit during analysis (0.0010 mg/kg wwt). The red dashed line represents the consumption guideline developed for women of child-bearing age and children (complete restriction; 0.5 mg/kg wwt). Data included in the above figures is inclusive of samples collected in 2022. White Sucker tissue samples from Misema River (n=4; 2022) and York Lake (n=2, 2022) were not included in figures due to insufficient sample size.

Table C2-1: Sportfish Species Tissue Metal and Aging Results (2022)

Waterbody	Species	Sample ID	Fork Length (cm)	Total Length (cm)	Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Selenium (mg/kg wwt)	Aging Structure	Age
Beaverhouse Lake	Northern Pike	BHL-MID-GN1-NRPK-F1	70	72	2350	79.6	<0.40	0.0853	<0.0010	0.108	1.75	1.09	0.242	Cleithra	6
Beaverhouse Lake	Northern Pike	BHL-MID-GN1-NRPK-F2	50	52.4	800	81.6	<0.40	0.0437	<0.0010	0.142	2.24	0.87	0.248	Cleithra	3
Beaverhouse Lake	Northern Pike	BHL-MID-GN1-NRPK-F3	78	81	3640	78.8	<0.40	0.0202	<0.0010	0.105	0.99	1.02	0.124	Cleithra	6
Beaverhouse Lake	Northern Pike	BHL-MID-GN1-NRPK-F4	58	60	1180	79.4	0.48	0.0397	<0.0010	0.133	2.79	0.917	0.273	Cleithra	5
Beaverhouse Lake	Northern Pike	BHL-MID-GN1-NRPK-F5	56.5	59	960	80.4	0.5	0.0412	<0.0010	0.106	2.73	1.06	0.219	Cleithra	5
Beaverhouse Lake	Northern Pike	BHL-MID-GN1-NRPK-F6	56	59.1	960	79	<0.40	0.0374	<0.0010	0.116	1.65	0.782	0.256	Cleithra	3
Beaverhouse Lake	Lake Whitefish	BHL-MID-GN1-LKWH-F1	40.5	44.8	830	75.9	<0.40	0.091	<0.0010	0.103	3.49	0.135	0.51	Otolith	11
Beaverhouse Lake	Lake Whitefish	BHL-MID-GN1-LKWH-F2	38	41.5	800	79.5	2.18	0.0733	0.0013	0.187	24.7	0.14	0.478	Otolith	8
Beaverhouse Lake	Lake Whitefish	BHL-MID-GN1-LKWH-F3	41.5	46	1080	78.1	<0.40	0.0455	<0.0010	0.098	2.44	0.146	0.52	Otolith	10
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F1	33	34	400	71.3	<0.40	0.0426	0.0051	0.273	5.06	0.325	0.33	Otolith	4
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F2	32	33	330	79.9	<0.40	0.05	<0.0010	0.131	1.22	0.357	0.296	Otolith	4
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F3	43.5	46	1190	77.1	<0.40	0.0497	<0.0010	0.175	1.7	0.633	0.308	Otolith	7
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F4	32.6	34.8	410	75.8	<0.40	0.0303	0.0055	0.279	6.72	0.288	0.341	Otolith	4
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F5	33.5	35	390	79.8	<0.40	0.0447	<0.0010	0.148	1.59	0.322	0.263	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F6	59	61.5	2410	78.5	<0.40	0.056	<0.0010	0.114	2.2	2.9	0.393	Dorsal Spine	10
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F7	51	54	1510	77.3	<0.40	0.0616	<0.0010	0.158	1.95	1.21	0.295	Otolith	7
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F8	34.5	36.8	460	78	<0.40	0.0563	<0.0010	0.162	1.77	0.347	0.291	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F9	36.8	38.5	550	76.6	<0.40	0.0436	0.003	0.281	5.68	0.246	0.313	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F10	41.5	43.5	860	79.4	0.41	0.0533	<0.0010	0.181	1.97	0.583	0.28	Otolith	6
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F11	44.5	47	930	77.9	<0.40	0.0582	<0.0010	0.141	1.56	0.559	0.282	Otolith	5
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F12	45.5	47.1	920	77.5	<0.40	0.0694	<0.0010	0.13	1.44	0.776	0.262	Otolith	5
Beaverhouse Lake	Walleye	BHL-MID-GN1-WALL-F13	45	47	1030	78.9	<0.40	0.0718	<0.0010	0.17	1.64	0.591	0.288	Otolith	5
Beaverhouse Lake	Smallmouth Bass	BHL-MID-GN1-SMBS-F1	39.5	42	940	78.2	<0.40	0.0661	<0.0010	0.239	3.25	0.68	0.25	Pectoral Fin	4
Beaverhouse Lake	Smallmouth Bass	BHL-MID-GN1-SMBS-F2	41.5	44.5	1070	82.6	<0.40	0.0393	<0.0010	0.203	5.06	1.55	0.293	Pectoral Fin	6
Beaverhouse Lake	White Sucker	BHL-MID-GN1-WHSC-F1	46	49	1270	81.8	<0.40	0.0526	<0.0010	0.171	2.68	0.246	0.231	Pectoral Fin	10
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F1	54.8	58	1960	80.2	<0.40	0.0482	<0.0010	0.214	2.96	1.73	0.324	Dorsal Spine	10
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F2	37	42	820	76.8	<0.40	0.0507	<0.0010	0.199	2.51	0.59	0.308	Otolith	6
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F3	34.4	36	370	78.1	<0.40	0.0394	0.0056	0.238	5.34	0.277	0.318	Otolith	4
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F4	32	33.5	340	77.1	<0.40	0.0392	0.0026	0.23	4.25	0.209	0.249	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F5	36	37.5	490	78.1	<0.40	0.0444	<0.0010	0.132	1.1	0.484	0.296	Otolith	5
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F6	44.1	47	1000	77.3	<0.40	0.062	<0.0010	0.124	1.13	0.554	0.306	Otolith	5
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F7	30.5	31.8	340	79.8	0.53	0.0441	<0.0010	0.123	1.42	0.288	0.283	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F8	33.4	35.1	440	80.2	<0.40	0.0902	<0.0010	0.156	1.09	0.464	0.279	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F9	34	35.5	450	77.8	<0.40	0.046	<0.0010	0.132	1.12	0.3	0.259	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F10	35.5	37.5	650	77.8	<0.40	0.0478	<0.0010	0.174	1.59	0.519	0.275	Otolith	5
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F11	41.2	43.2	740	72.5	<0.40	0.0532	0.0031	0.264	8.05	0.348	0.31	Otolith	4
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F12	34.4	36	430	77	<0.40	0.042	0.0027	0.284	5.59	0.268	0.267	Otolith	3

Waterbody	Species	Sample ID	Fork Length (cm)	Total Length (cm)	Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Selenium (mg/kg wwt)	Aging Structure	Age
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F13	64.8	67.3	3210	77.9	<0.40	0.065	<0.0010	0.123	1.3	2.11	0.351	Otolith	15
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F14	42.7	44.5	950	78.5	<0.40	0.052	<0.0010	0.203	2.32	0.531	0.283	Otolith	5
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F15	45	47	950	77.6	<0.40	0.0632	<0.0010	0.294	2.49	0.831	0.265	Otolith	6
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F16	34.5	36.1	490	75.6	<0.40	0.0403	0.0039	0.294	5.82	0.234	0.309	Otolith	3
Beaverhouse Lake	Walleye	BHL-MID-GN2-WALL-F17	32	33.8	300	79.5	0.93	0.0319	<0.0010	0.144	1.71	0.441	0.294	Otolith	4
Beaverhouse Lake	Northern Pike	BHL-MID-GN2-NRPK-F1	64	67	1600	79.9	<0.40	0.0444	<0.0010	0.114	1.46	1.09	0.241	Cleithra	7
Beaverhouse Lake	Northern Pike	BHL-MID-GN2-NRPK-F2	49	52.6	770	77.6	0.44	0.0315	<0.0010	0.135	1.77	0.462	0.258	Cleithra	3
Beaverhouse Lake	Northern Pike	BHL-MID-GN2-NRPK-F3	81	85	3760	75.5	0.41	0.0206	<0.0010	0.13	1.28	1.6	0.17	Cleithra	7
Beaverhouse Lake	Northern Pike	BHL-MID-GN2-NRPK-F4	48.5	52.8	840	77.1	<0.40	0.0303	<0.0010	0.144	1.31	0.61	0.278	Cleithra	4
Beaverhouse Lake	Northern Pike	BHL-MID-GN2-NRPK-F5	58.8	62	1410	77.8	<0.40	0.0446	<0.0010	0.102	1.58	0.896	0.264	Cleithra	5
Beaverhouse Lake	Lake Whitefish	BHL-MID-GN2-LKWH-F1	29.9	34.6	420	78.7	<0.40	0.0453	<0.0010	0.12	2.01	0.0756	0.541	Pectoral Fin	3
Beaverhouse Lake	Brown Bullhead	BHL-MID-GN2-BRBL-F1		23.5	150	80.1	53.7	0.0203	0.024	0.666	85.2	0.0567	0.411	Pectoral Fin	1
Beaverhouse Lake	Northern Pike	BHL-N-GN1-NRPK-F1	53.3	56.5	1010	79	<0.40	0.029	<0.0010	0.108	1.33	0.564	0.22	Cleithra	4
Beaverhouse Lake	Northern Pike	BHL-N-GN1-NRPK-F2	48.9	50.6	700	76.5	<0.40	0.0287	<0.0010	0.123	1.48	0.519	0.266	Cleithra	2
Beaverhouse Lake	Northern Pike	BHL-N-GN1-NRPK-F3	48.6	54.5	670	79.6	<0.40	0.0441	<0.0010	0.107	1.55	0.757	0.237	Cleithra	3
Beaverhouse Lake	Northern Pike	BHL-N-GN1-NRPK-F4	49.8	53	720	78.2	<0.40	0.03	0.001	0.179	1.87	0.773	0.266	Cleithra	4
Beaverhouse Lake	Walleye	BHL-N-GN1-WALL-F1	47.4	49.4	1140	77.2	<0.40	0.0487	<0.0010	0.121	1.14	0.667	0.284	Otolith	6
Beaverhouse Lake	Walleye	BHL-N-GN1-WALL-F2	45	47.4	1130	79.5	<0.40	0.0404	<0.0010	0.128	2.06	0.446	0.312	Otolith	7
Beaverhouse Lake	Walleye	BHL-N-GN1-WALL-F3	32	34.1	380	76.7	<0.40	0.075	0.0035	0.272	6.94	0.286	0.295	Otolith	3
Beaverhouse Lake	Walleye	BHL-N-GN1-WALL-F4	43.3	44.6	1040	79.1	<0.40	0.0425	<0.0010	0.17	1.46	0.864	0.277	Otolith	9
Beaverhouse Lake	Lake Whitefish	BHL-N-GN1-LKWH-F1	39.5	43.6	910	79.6	<0.40	0.0552	<0.0010	0.116	2.95	0.238	0.382	Otolith	16
Beaverhouse Lake	Lake Whitefish	BHL-N-GN1-LKWH-F2	37	41.1	740	80.4	<0.40	0.254	<0.0010	0.131	2.87	0.246	0.456	Otolith	15
Beaverhouse Lake	White Sucker	BHL-N-GN1-WHSC-F1	41.7	45.5	1060	80.6	<0.40	0.0272	<0.0010	0.21	2.53	0.166	0.211	Pectoral Fin	9
Beaverhouse Lake	White Sucker	BHL-N-GN1-WHSC-F2	49.5	53.3	1830	76.8	0.47	0.0192	<0.0010	0.32	8.48	0.379	0.223	Pectoral Fin	11
Beaverhouse Lake	White Sucker	BHL-N-GN1-WHSC-F3	43.4	47	1280	78.8	<0.40	0.012	<0.0010	0.362	4.46	0.269	0.282	Pectoral Fin	9
Beaverhouse Lake	White Sucker	BHL-N-GN1-WHSC-F4	42	46	990	81.2	<0.40	0.0153	<0.0010	0.242	5.3	0.373	0.215	Pectoral Fin	9
Beaverhouse Lake	White Sucker	BHL-N-GN2-WHSC-F1	32	34.2	430	80.3	8.05	0.0672	0.0192	0.858	18.4	0.072	0.24	Pectoral Fin	3
Beaverhouse Lake	White Sucker	BHL-N-GN2-WHSC-F2	43	46	1330	79.1	<0.40	0.0633	<0.0010	0.148	1.94	0.109	0.217	Pectoral Fin	4
Beaverhouse Lake	White Sucker	BHL-N-GN2-WHSC-F3	42.5	45.5	1000	81.7	<0.40	0.0145	<0.0010	0.187	2.58	0.151	0.237	Pectoral Fin	4
Beaverhouse Lake	White Sucker	BHL-N-GN2-WHSC-F4	43	45.8	1110	81.6	<0.40	0.184	<0.0010	0.129	1.77	0.112	0.245	Pectoral Fin	6
Beaverhouse Lake	White Sucker	BHL-N-GN2-WHSC-F5	47	50	1280	77.8	<0.40	0.028	<0.0010	0.183	2.96	0.304	0.232	Pectoral Fin	8
Beaverhouse Lake	White Sucker	BHL-N-GN2-WHSC-F6	40.5	43.5	880	79.6	<0.40	0.0431	<0.0010	0.252	3.31	0.155	0.273	Pectoral Fin	5
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F1	39	41.6	880	79.7	<0.40	0.0839	<0.0010	0.106	1.55	0.165	0.451	Otolith	12
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F2	39.8	44.3	940	77.2	<0.40	0.03	<0.0010	0.17	2.7	0.204	0.316	Otolith	8
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F3	40.8	45	990	77.6	0.42	0.0743	<0.0010	0.102	2.6	0.0539	0.29	Otolith	10
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F4	39	43.1	850	79.2	<0.40	0.102	<0.0010	0.114	2.2	0.195	0.333	Otolith	11
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F5	41.4	46.1	970	81	<0.40	0.0542	0.0011	0.098	2.52	0.354	0.316	Otolith	15
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F6	42.5	47	1060	78	<0.40	0.108	<0.0010	0.115	2.08	0.182	0.558	Otolith	16

Waterbody	Species	Sample ID	Fork Length (cm)	Total Length (cm)	Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Selenium (mg/kg wwt)	Aging Structure	Age
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F7	43	47.8	1060	79	<0.40	0.0924	0.0012	0.13	2.78	0.197	0.531	Otolith	12
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F8	38.5	42.5	820	77.9	<0.40	0.18	<0.0010	0.239	4.42	0.102	0.343	Otolith	15
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F9	41.5	46.2	1060	78	<0.40	0.058	<0.0010	0.098	2.2	0.0799	0.385	Otolith	9
Beaverhouse Lake	Lake Whitefish	BHL-N-GN2-LKWH-F10	42.7	47.3	1180	79.6	<0.40	0.0571	<0.0010	0.103	2.02	0.0794	0.506	Otolith	9
Beaverhouse Lake	Walleye	BHL-N-GN2-WALL-F1	40.5	42.8	800	78.6	<0.40	0.0444	<0.0010	0.147	1.95	0.58	0.26	Otolith	5
Beaverhouse Lake	Walleye	BHL-N-GN2-WALL-F2	39	40.8	760	74.5	2.92	0.0368	0.0029	0.241	10.2	0.282	0.26	Otolith	4
Beaverhouse Lake	Walleye	BHL-N-GN2-WALL-F3	31.5	33.2	330	75.3	<0.40	0.0344	0.0045	0.246	5.64	0.216	0.263	Otolith	3
Beaverhouse Lake	Walleye	BHL-N-GN2-WALL-F4	40	42.6	810	73.9	<0.40	0.0368	0.0025	0.226	4.7	0.425	0.279	Otolith	5
Beaverhouse Lake	Walleye	BHL-N-GN2-WALL-F5	46	48.2	1110	78	<0.40	0.0477	<0.0010	0.139	1.29	0.347	0.261	Otolith	5
Beaverhouse Lake	Brown Bullhead	BHL-N-GN2-BRBL-F1		30.5	390	77.6	0.76	0.0112	<0.0010	0.232	7.46	0.129	0.171	Pectoral Fin	3
York Lake	Northern Pike	YL-GN1-NRPK-F1	50	53.5	960	77.7	<0.40	0.0402	<0.0010	0.19	2	0.301	0.178	Cleithra	3
York Lake	Northern Pike	YL-GN1-NRPK-F2	59.5	63	1500	77.2	<0.40	0.125	<0.0010	0.146	1.48	0.466	0.216	Cleithra	5
York Lake	Northern Pike	YL-GN1-NRPK-F3	50.5	54.3	1080	78.5	<0.40	0.0411	<0.0010	0.153	1.8	0.272	0.195	Cleithra	3
York Lake	Northern Pike	YL-GN1-NRPK-F4	56.7	59.5	1070	81.1	<0.40	0.0293	<0.0010	0.143	1.6	0.951	0.142	Cleithra	4
York Lake	Northern Pike	YL-GN1-NRPK-F5	45.2	48.5	610	78.5	0.99	0.0479	<0.0010	0.172	4.84	0.143	0.18	Cleithra	2
York Lake	Northern Pike	YL-GN1-NRPK-F6	41.5	44.1	600	78.2	<0.40	0.105	0.0013	0.256	2.78	0.236	0.252	Cleithra	3
York Lake	Northern Pike	YL-GN1-NRPK-F7	54.3	58.2	1150	78.5	<0.40	0.0292	<0.0010	0.113	1.33	0.301	0.205	Cleithra	3
York Lake	Northern Pike	YL-GN1-NRPK-F8	46.4	49.2	790	78.2	0.4	0.0455	<0.0010	0.13	1.58	0.204	0.2	Cleithra	2
York Lake	Northern Pike	YL-GN1-NRPK-F9	41.3	44.5	530	78	<0.40	0.15	<0.0010	0.145	1.69	0.339	0.23	Cleithra	2
York Lake	Northern Pike	YL-GN1-NRPK-F10	50.8	53.9	1050	77.6	<0.40	0.0287	<0.0010	0.189	1.44	0.274	0.219	Cleithra	2
York Lake	Northern Pike	YL-GN1-NRPK-F11	59.9	63.6	1060	81.2	<0.40	0.0541	0.001	0.138	2.63	1.3	0.223	Cleithra	3
York Lake	Northern Pike	YL-GN1-NRPK-F12	43.5	46.4	580	76.9	0.51	0.0458	<0.0010	0.169	1.94	0.244	0.224	Cleithra	2
York Lake	Northern Pike	YL-GN1-NRPK-F13	48	51.5	810	78.5	<0.40	0.0367	<0.0010	0.136	1.25	0.49	0.195	Cleithra	2
York Lake	Northern Pike	YL-GN1-NRPK-F14	50.9	53.5	880	81	<0.40	0.0732	0.0012	0.188	1.83	0.421	0.232	Cleithra	3
York Lake	Northern Pike	YL-GN1-NRPK-F15	47.2	51.3	860	79.2	<0.40	0.0512	<0.0010	0.166	1.56	0.296	0.181	Cleithra	2
York Lake	Yellow Perch	YL-GN1-YLPR-F1	18.8	19.3	80	76.4	<0.40	0.0873	<0.0010	0.174	1.95	0.105	0.427	Otolith	2
York Lake	Walleye	YL-GN1-WALL-F1	43	45	900	80.2	1.57	0.0259	<0.0010	0.178	5.57	0.341	0.25	Otolith	4
York Lake	Walleye	YL-GN1-WALL-F2	41	43.4	720	78.8	<0.40	0.104	<0.0010	0.132	1.44	0.297	0.232	Otolith	4
York Lake	Walleye	YL-GN1-WALL-F3	33.5	35.1	380	77.3	0.4	0.0618	<0.0010	0.201	2.17	0.466	0.24	Otolith	4
York Lake	Walleye	YL-GN1-WALL-F4	36.5	38.5	460	77	<0.40	0.0221	0.0065	0.272	7.31	0.293	0.217	Otolith	4
York Lake	Walleye	YL-GN1-WALL-F5	22.6	23.5	120	77.5	3.29	0.0253	0.0054	0.524	34.1	0.131	0.263	Scales	2
York Lake	White Sucker	YL-GN1-WHSC-F1	33.2	35.4	470	75.2	8.26	0.0175	0.0039	1.34	28.8	0.085	0.255	Pectoral Fin	3
York Lake	Brown Bullhead	YL-GN1-BRBL-F1		28	280	78.2	0.51	0.0296	<0.0010	0.387	6.58	0.28	0.136	Pectoral Fin	3
York Lake	Brown Bullhead	YL-GN1-BRBL-F2		20.4	100	77.3	24.2	0.017	0.0298	0.989	58.9	0.112	0.392	Pectoral Fin	2
York Lake	Northern Pike	YL-GN2-NRPK-F1	49	52.3	820	79	0.51	0.118	0.0016	0.159	2.62	0.316	0.223	Cleithra	3
York Lake	Northern Pike	YL-GN2-NRPK-F2	44	47.2	670	76.7	0.82	0.217	0.0018	0.219	3.42	0.353	0.312	Cleithra	3
York Lake	Northern Pike	YL-GN2-NRPK-F3	51	54.3	890	78.8	<0.40	0.0331	<0.0010	0.148	2.06	0.769	0.213	Cleithra	4
York Lake	Northern Pike	YL-GN2-NRPK-F4	51	54.3	720	79.9	0.75	0.0483	<0.0010	0.195	2.38	0.532	0.228	Cleithra	3

Waterbody	Species	Sample ID	Fork Length (cm)	Total Length (cm)	Total Weight (g)	Moisture (%)	Aluminum (mg/kg wwt)	Arsenic (mg/kg wwt)	Cadmium (mg/kg wwt)	Copper (mg/kg wwt)	Iron (mg/kg wwt)	Mercury (mg/kg wwt)	Selenium (mg/kg wwt)	Aging Structure	Age
York Lake	Walleye	YL-GN2-WALL-F1	22.9	24	130	72.1	0.99	0.0199	0.0033	0.283	8.02	0.0864	0.228	Otolith	1
York Lake	Walleye	YL-GN2-WALL-F2	22.4	25.6	140	74.7	1.08	0.0181	0.0037	0.265	6.36	0.136	0.3	Otolith	1
York Lake	Walleye	YL-GN2-WALL-F3	22.7	24	130	76.2	0.7	0.0448	0.0202	0.338	7.59	0.094	0.318	Otolith	2
York Lake	Walleye	YL-GN2-WALL-F4	49.5	52.2	1240	77.6	<0.40	0.113	<0.0010	0.13	1.26	0.53	0.259	Otolith	5
York Lake	Walleye	YL-GN2-WALL-F5	47.5	50	1350	78.5	<0.40	0.0516	<0.0010	0.128	1.24	0.912	0.216	Otolith	11
York Lake	Walleye	YL-GN2-WALL-F6	37.1	39.3	590	80.6	<0.40	0.0877	<0.0010	0.12	1.88	0.398	0.232	Otolith	5
York Lake	Walleye	YL-GN2-WALL-F7	33.6	35.5	400	76.3	0.46	0.027	0.0048	0.268	6.82	0.17	0.272	Otolith	3
York Lake	Walleye	YL-GN2-WALL-F8	33.5	35.2	390	77.4	0.79	0.0287	0.0047	0.304	8.26	0.209	0.25	Otolith	3
York Lake	Walleye	YL-GN2-WALL-F9	29.5	31.5	280	76.3	0.75	0.0453	0.0125	0.267	9	0.18	0.313	Otolith	2
York Lake	Lake Whitefish	YL-GN2-LKWH-F1	47.3	52.5	1520	79.2	<0.40	1.69	0.0026	0.148	3.16	0.197	0.555	Scales	10
York Lake	Lake Whitefish	YL-GN2-LKWH-F2	33.3	37.2	560	77.6	0.41	0.381	<0.0010	0.235	3.27	0.175	0.432	Otolith	9
York Lake	Smallmouth Bass	YL-GN2-SMBS-F1	40	42.3	1030	75.2	<0.40	0.0499	<0.0010	0.446	3.26	1.43	0.345	Pectoral Fin	4
York Lake	White Sucker	YL-GN2-WHSC-F1	44	47.2	1230	78.9	0.42	0.0262	<0.0010	0.226	4.7	0.256	0.218	Pectoral Fin	6
York Lake	Brown Bullhead	YL-GN2-BRBL-F1		19.5	110	77.3	2.53	0.0189	0.0097	0.59	23.1	0.0761	0.418	Pectoral Fin	2
York Lake	Brown Bullhead	YL-GN2-BRBL-F2		20	100	77.9	0.85	0.0201	0.0108	1.09	37.6	0.12	0.512	Pectoral Fin	1
Misema River	Walleye	MR-EXP-GN1-WALL-F1	31.5	33.2	340	79.2	<0.40	0.104	<0.0010	0.168	1.53	0.266	0.242	Otolith	3
Misema River	Walleye	MR-EXP-GN1-WALL-F2	35.5	37.2	520	80.1	0.4	0.0296	<0.0010	0.122	1.5	0.438	0.229	Otolith	4
Misema River	Walleye	MR-EXP-GN1-WALL-F3	37	38.9	600	79	<0.40	0.0634	<0.0010	0.273	2.56	0.422	0.239	Otolith	5
Misema River	Walleye	MR-EXP-GN1-WALL-F4	35.5	37.8	460	79.6	0.62	0.0217	<0.0010	0.194	2.08	0.382	0.232	Otolith	4
Misema River	Walleye	MR-EXP-GN1-WALL-F5	32.8	34.5	360	78.9	0.46	0.0478	0.0071	0.265	8.24	0.205	0.264	Otolith	3
Misema River	Walleye	MR-EXP-GN1-WALL-F6	35.5	37.1	530	79.1	<0.40	0.0258	<0.0010	0.145	1.35	0.392	0.284	Otolith	3
Misema River	Walleye	MR-EXP-GN1-WALL-F7	35	36.7	430	77.5	0.57	0.0806	0.0082	0.236	6.6	0.158	0.311	Otolith	3
Misema River	Northern Pike	MR-EXP-GN1-NRPK-F1	54.5	58.5	1090	80.1	1.04	0.0474	<0.0010	0.13	2.22	0.375	0.219	Cleithra	3
Misema River	White Sucker	MR-EXP-GN1-WHSC-F1	30	32.3	270	80.8	<0.40	0.0465	<0.0010	0.208	1.76	0.116	0.156	Pectoral Fin	3
Misema River	Walleye	MR-EXP-GN2-WALL-F1	38	39.6	590	78.5	1.13	0.0849	<0.0010	0.179	3.24	0.586	0.24	Otolith	5
Misema River	Walleye	MR-EXP-GN2-WALL-F2	35	36.6	460	79.8	3.78	0.042	0.0089	0.245	11.8	0.206	0.266	Otolith	3
Misema River	Walleye	MR-EXP-GN2-WALL-F3	35.3	37.3	510	77.5	0.48	0.0406	<0.0010	0.168	1.98	0.388	0.271	Otolith	4
Misema River	Walleye	MR-EXP-GN2-WALL-F4	33.6	35.7	420	78.9	<0.40	0.0318	<0.0010	0.16	1.73	0.236	0.218	Otolith	3
Misema River	Walleye	MR-EXP-GN2-WALL-F5	35	36.8	510	79	<0.40	0.068	<0.0010	0.194	1.52	0.281	0.274	Otolith	3
Misema River	Walleye	MR-EXP-GN2-WALL-F6	32.5	33.5	360	77.1	2.44	0.0328	0.0074	0.244	6.79	0.207	0.239	Scales	3
Misema River	Walleye	MR-EXP-GN2-WALL-F7	32	33.9	340	79.2	<0.40	0.0475	<0.0010	0.188	1.81	0.25	0.232	Otolith	3
Misema River	Walleye	MR-EXP-GN2-WALL-F8	36.6	38.5	540	77.8	<0.40	0.0412	<0.0010	0.147	1.98	0.445	0.213	Otolith	4
Misema River	Walleye	MR-EXP-GN2-WALL-F9	29	30.9	160	76.3	3.65	0.0427	0.0087	0.313	12	0.166	0.281	Otolith	2
Misema River	White Sucker	MR-EXP-GN2-WHSC-F1	31.5	33.5	410	79.4	10.7	0.0385	0.0094	0.899	29.1	0.0961	0.26	Pectoral Fin	3
Misema River	White Sucker	MR-EXP-GN2-WHSC-F2	32.8	35.5	480	77.8	10	0.0198	0.005	0.533	17.9	0.0785	0.224	Pectoral Fin	3
Misema River	White Sucker	MR-EXP-GN2-WHSC-F3	34.9	37.1	600	80.6	0.44	0.0315	<0.0010	0.301	3.18	0.123	0.203	Pectoral Fin	3
Misema River	Northern Pike	MR-EXP-GN2-NRPK-F1	52.5	56.3	770	78.9	<0.40	0.0356	<0.0010	0.145	1.63	0.282	0.207	Cleithra	2

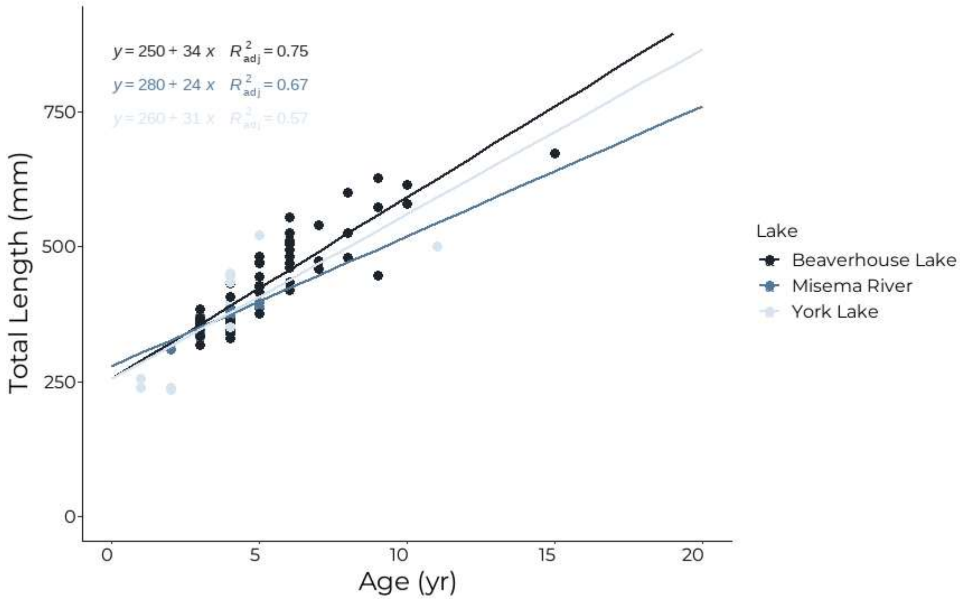


Figure C2-1: Linear regression of total length at age for Walleye by lake

Note: Data included in the above figure is inclusive of samples collected in 2021 and 2022.

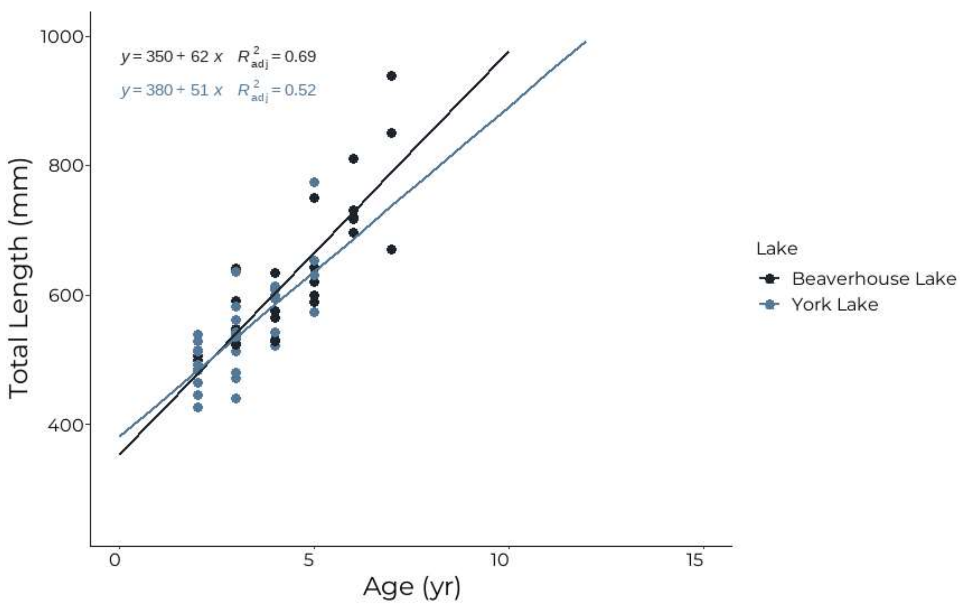


Figure C2-2: Linear regression of total length at age for Northern Pike by lake

Notes: Data included in the above figure is inclusive of samples collected in 2021 and 2022. Samples collected from Misema River were not included due to insufficient sample size (n=2, 2022).

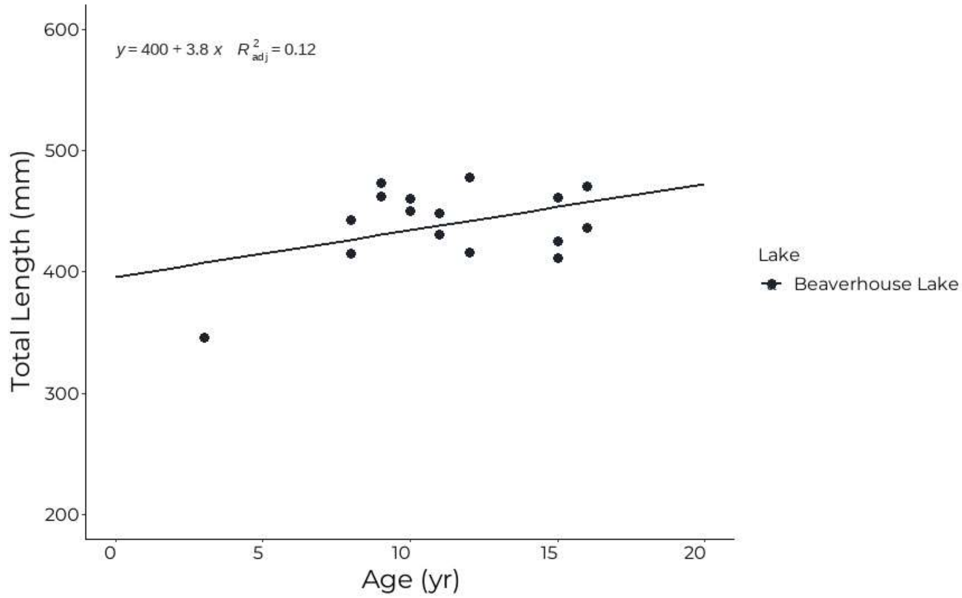


Figure C2-3: Linear regression of total length at age for Lake Whitefish by lake

Notes: Data included in the above figure is inclusive of samples collected in 2022. Samples collected from Misema River and York Lake were not included due to insufficient sample size (n=0, 2022; and n=2, 2022).

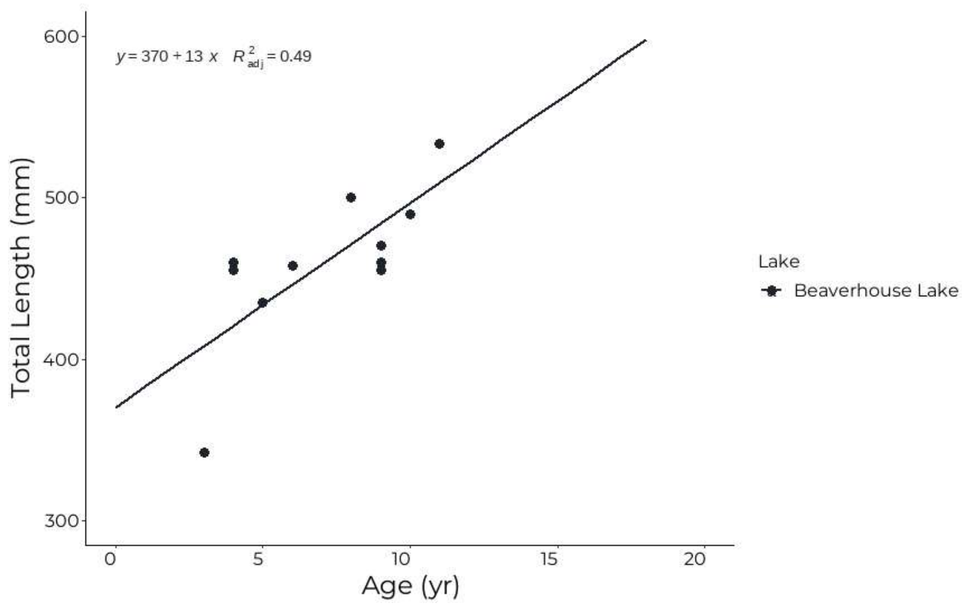


Figure C2-4: Linear regression of total length at age for Lake Whitefish by lake

Notes: Data included in the above figure is inclusive of samples collected in 2022. Samples collected from Misema River and York Lake were not included due to insufficient sample size (n=4, 2022; and n=2, 2022).

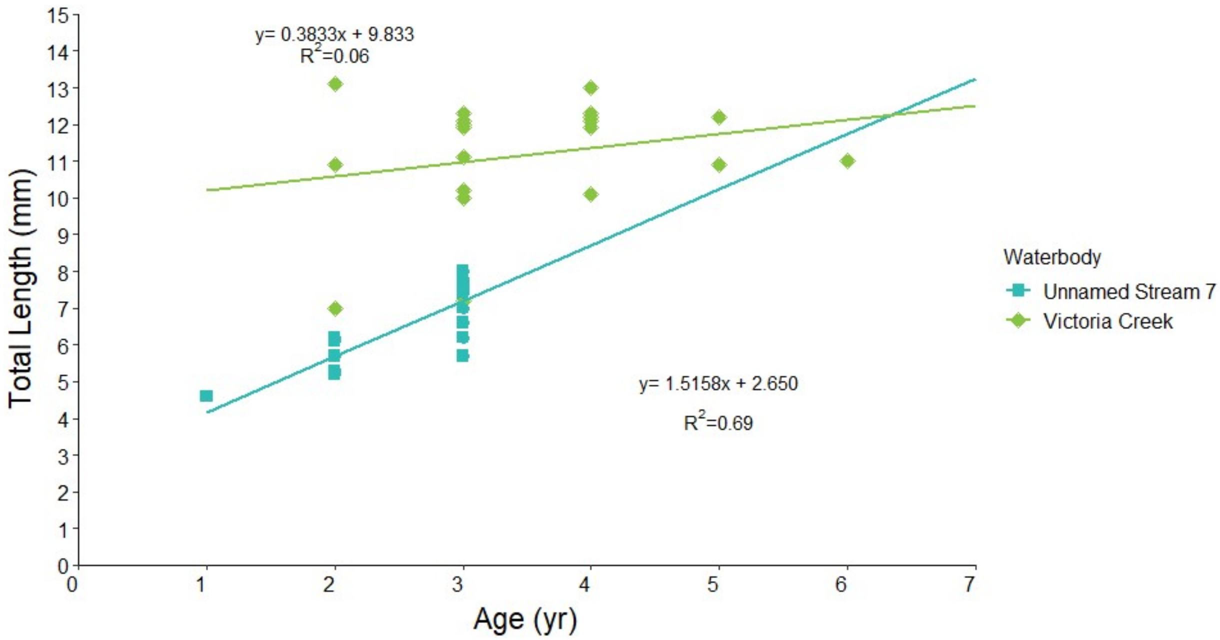


Figure C2-5: Linear regression of total length at age for small-bodied fish species by waterbody

Notes: Data included in the above figure is inclusive of samples collected in 2021; forage fish species were not retained in 2022. Blue data points denote Fathead Minnow and green denotes Common Shiner.

APPENDIX D

Lower Trophic and Primary Productivity Data

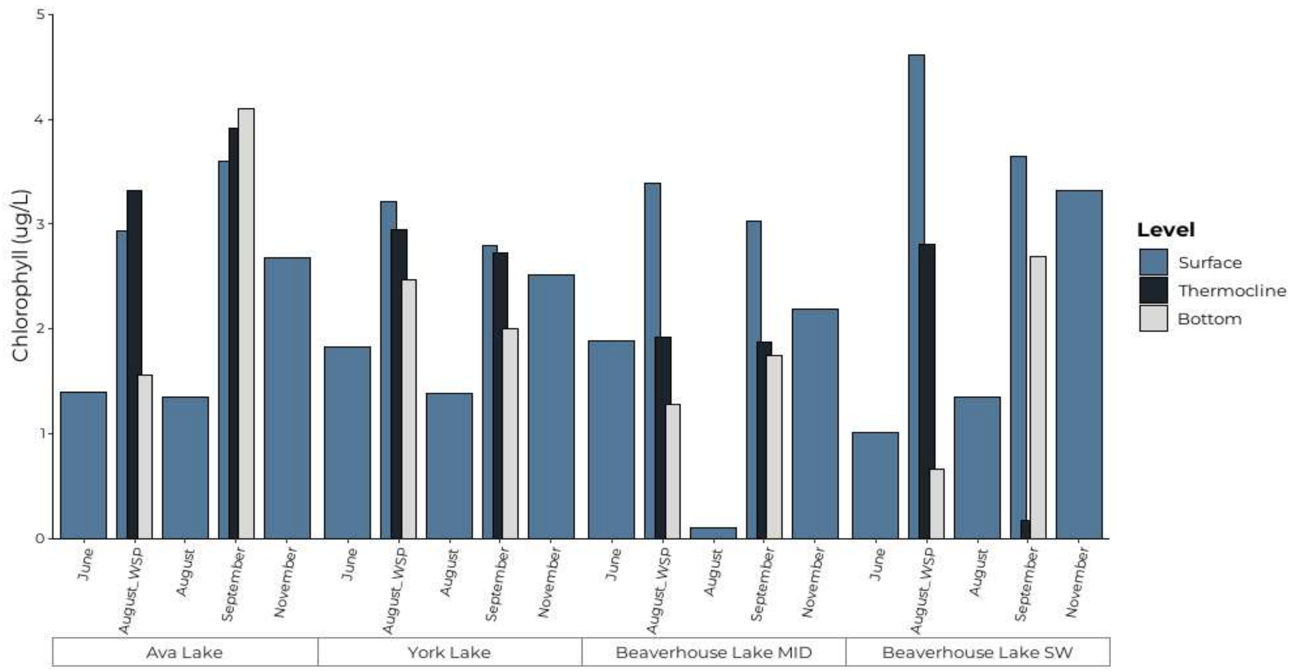


Figure D1-1: Chlorophyll a Concentration (ug/L) at Surface, Thermocline and Bottom by Lake 2021

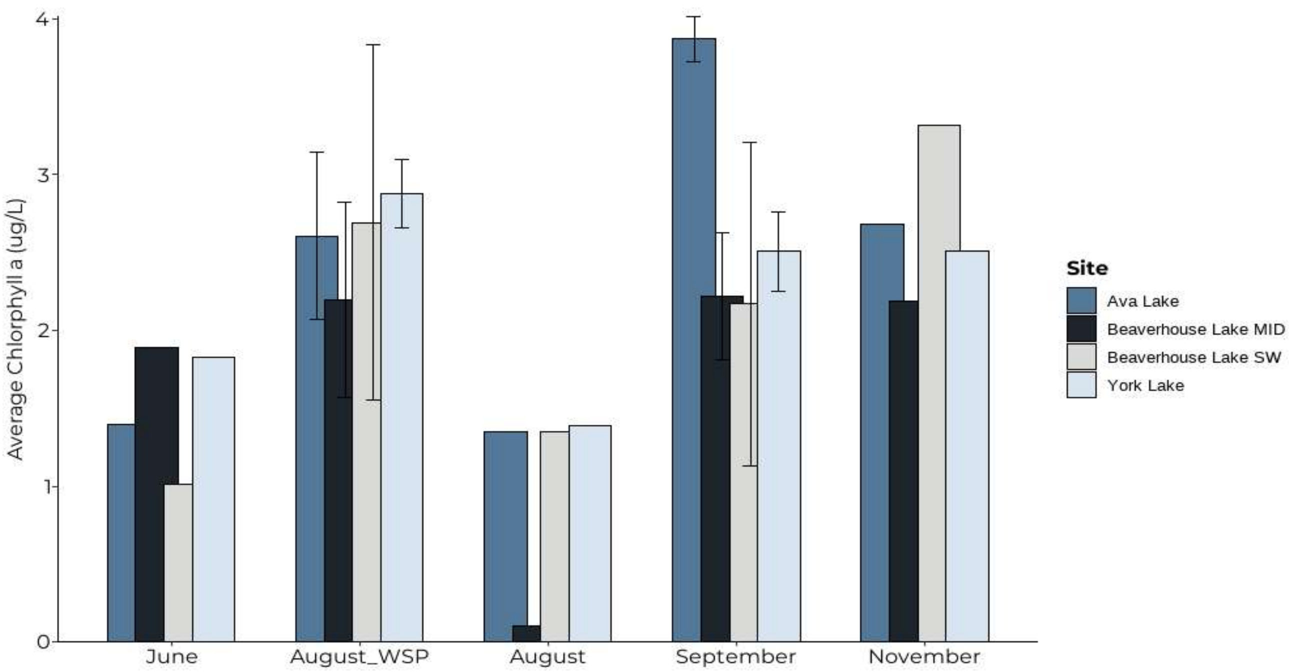


Figure D1-2: Average (± Standard Error) Chlorophyll a Concentration (ug/L) by Lake 2021

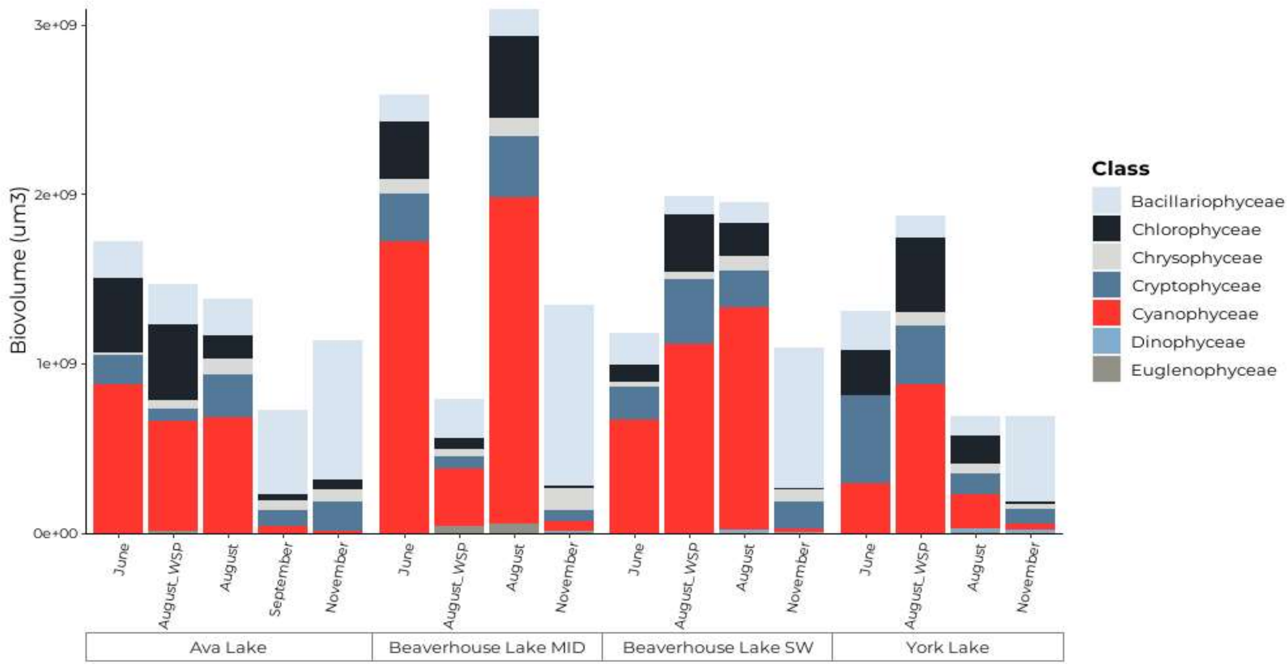


Figure D1-3: Total Phytoplankton Biovolume (um^3) by Taxonomic Group and Lake 2021

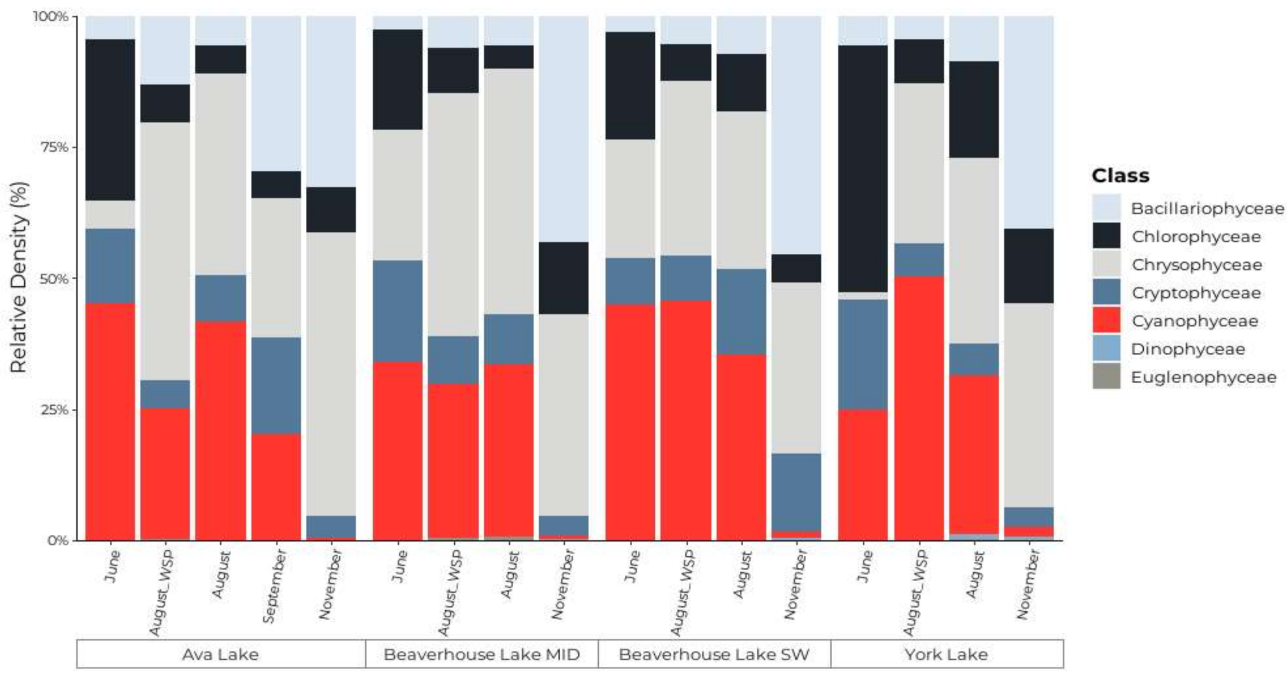


Figure D1-4: Relative Phytoplankton Density (%) by Taxonomic Group and Lake 2021

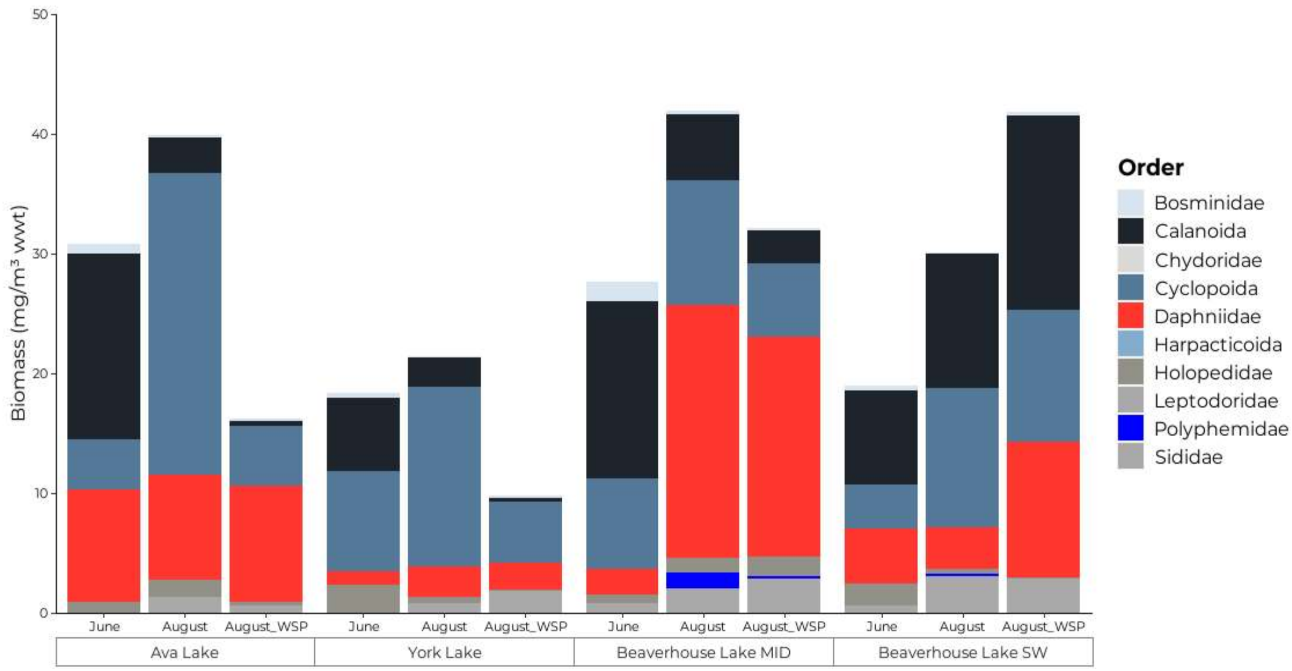


Figure D1-5: Zooplankton Biomass (mg/m^3) by Station and Season 2021

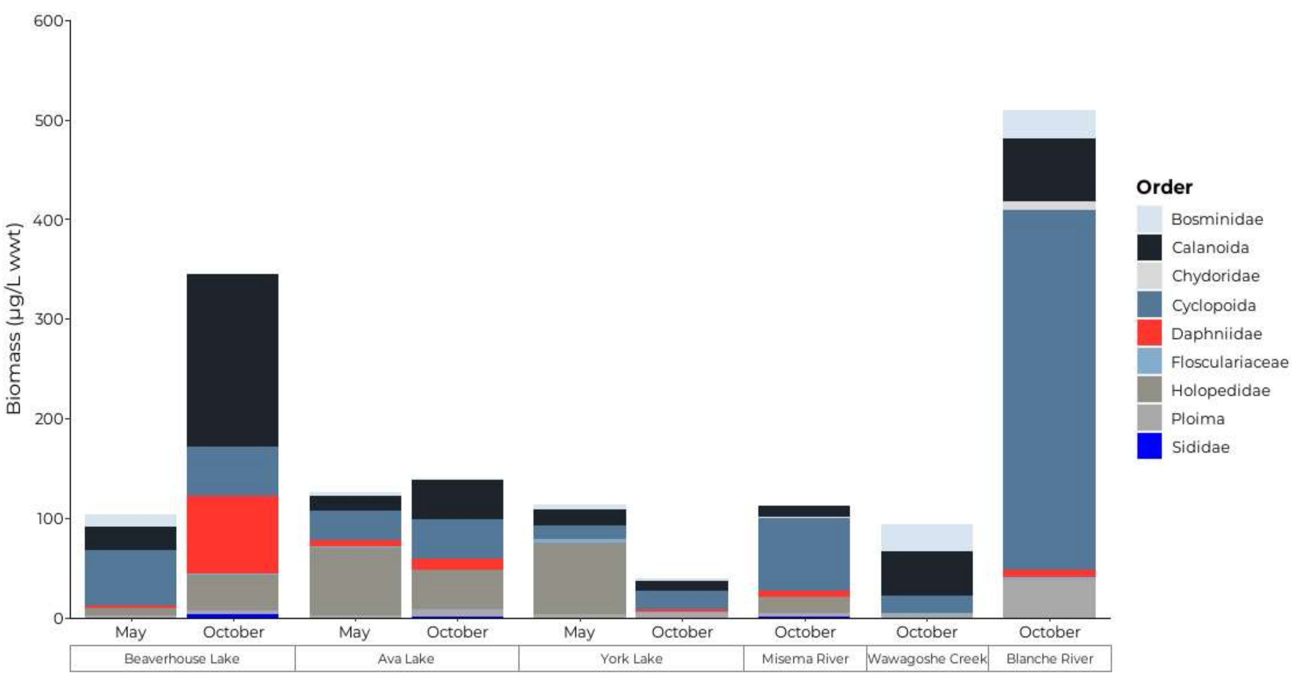


Figure D1-6: Zooplankton Biomass (ug/L wwt) by Station and Season 2022

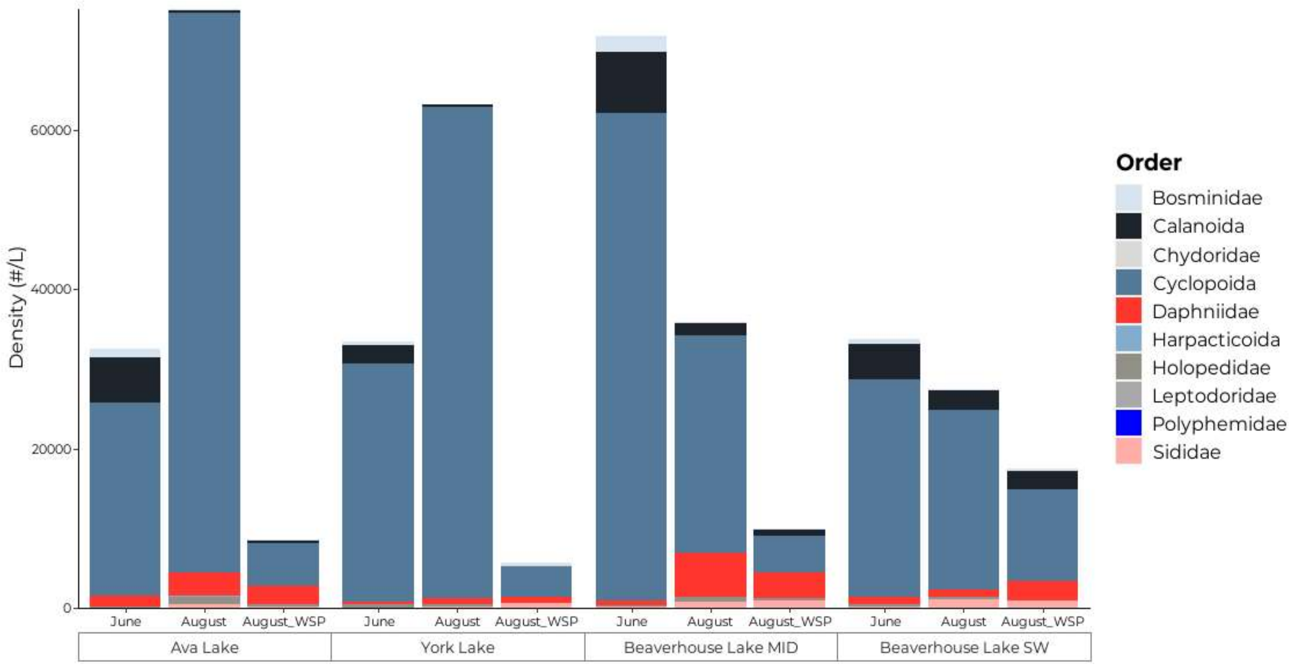


Figure D1-7: Zooplankton Density (#/m^3) by Station and Season 2021

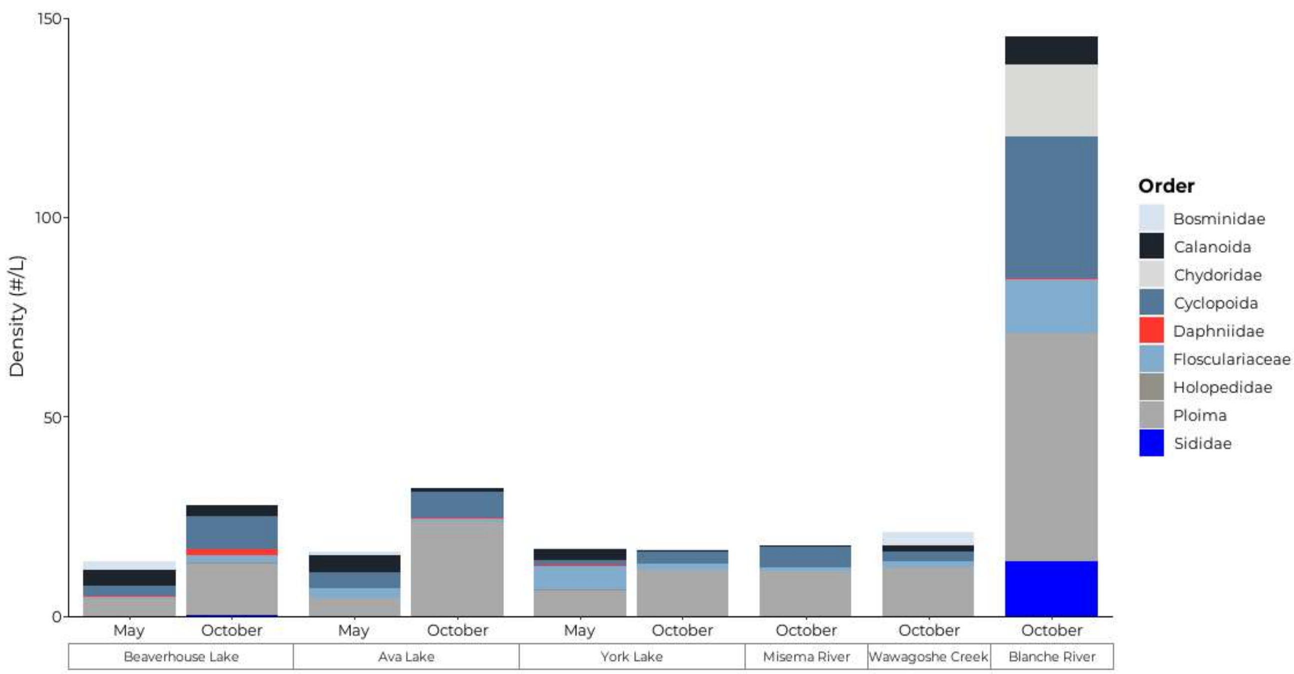


Figure D1-8: Zooplankton Density (#/L) by Station and Season 2022

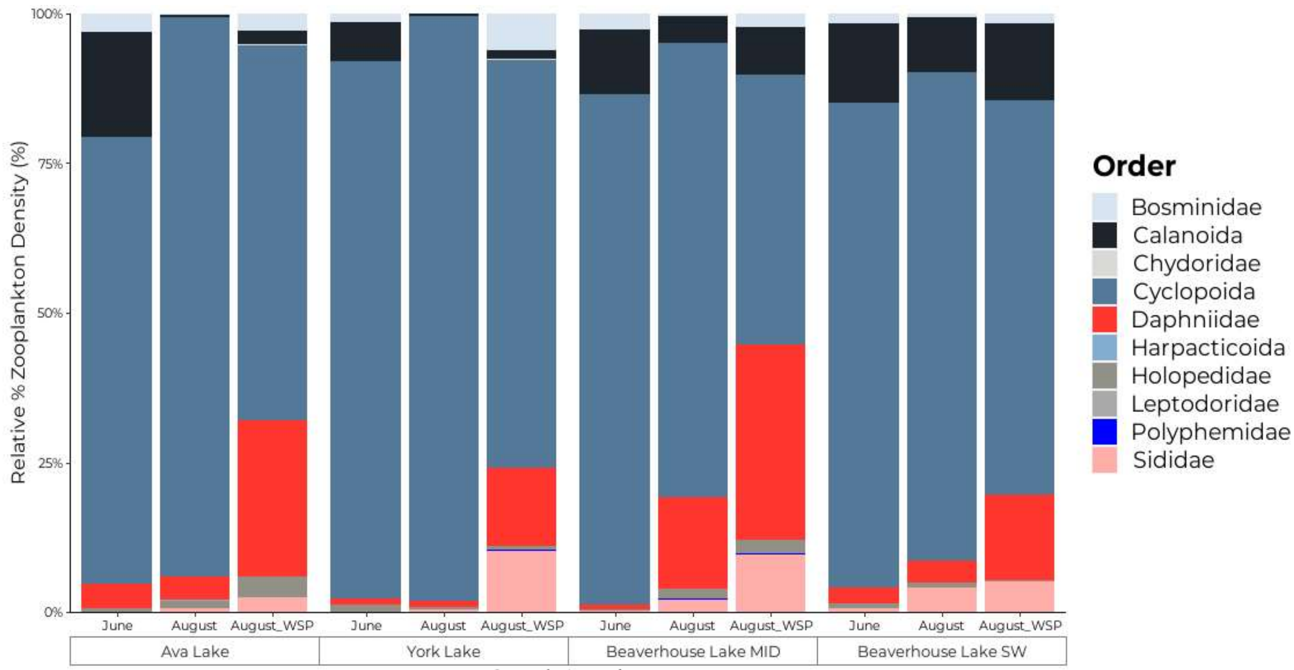


Figure D1-9: Relative Percent Zooplankton Density by Station and Season 2021

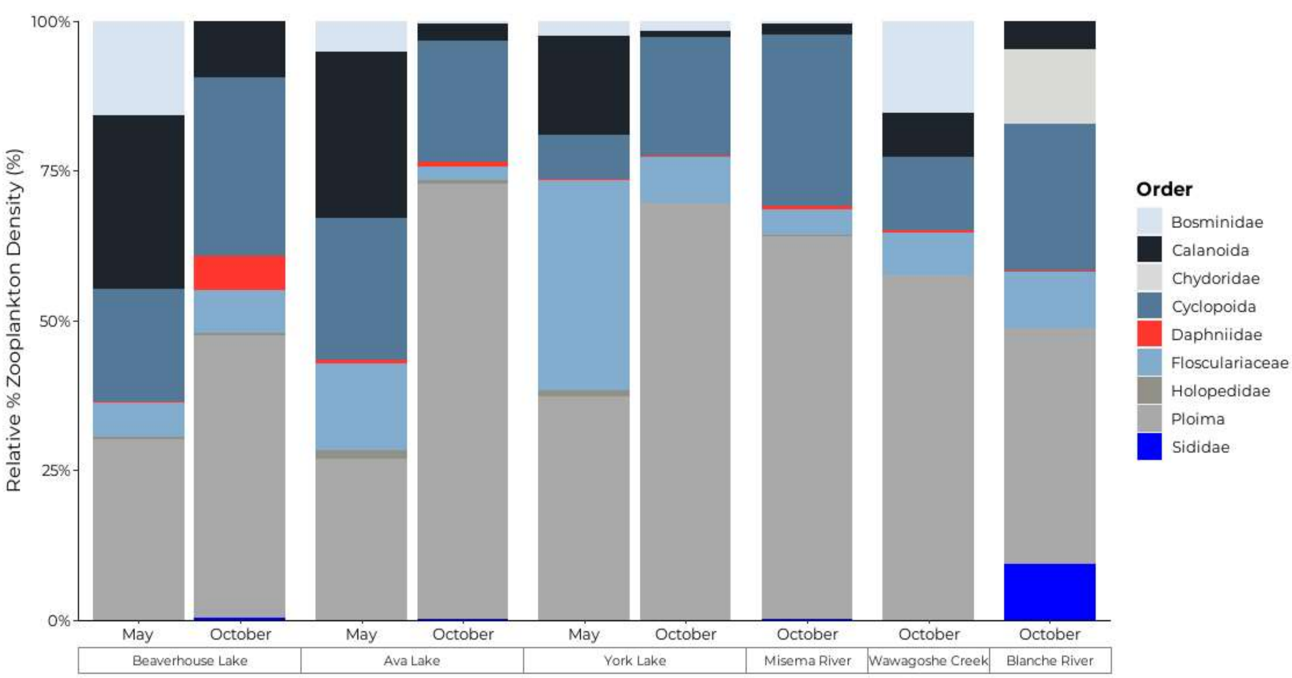


Figure D1-10: Relative Percent Zooplankton Density by Station and Season 2022

APPENDIX E

Sediment Quality Data

Table E1-1: Sediment Quality Laboratory Results (2021)

						Waterbody	Misema River					Ava Lake				
						Client Sample ID	MR-EXP-S1	MR-EXP-S2	MR-EXP-S3	MR-EXP-S4	MR-EXP-S5	AL-S1	AL-S2	AL-S3	AL-S4	AL-S5
						Date Sampled	2-Oct-2021	2-Oct-2021	2-Oct-2021	1-Oct-2021	28-Sep-2021	2-Oct-2021	3-Oct-2021	3-Oct-2021	3-Oct-2021	3-Oct-2021
						Time Sampled	9:20	8:49	8:10	11:10	11:30	15:20	10:50	11:50	12:50	13:50
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL										
Physical Tests																
Loss on Ignition @ 550 C (as %)	1	%					6	4	2	2	6	77	44	6	29	6
pH (1:2 soil:water) as pH units	0.10	pH units					6.54	6.59	6.64	6.67	6.77	5.79	5.88	6.18	5.77	6.10
Particle Size (as %)																
Gravel (4.75mm - 3in.)	1.0	%					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Medium Sand (0.425mm - 2.0mm)	1.0	%					1.3	2.0	33.5	13.5	<1.0	1.1	<1.0	1.0	2.1	<1.0
Coarse Sand (2.0mm - 4.75mm)	1.0	%					<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fine Sand (0.075mm - 0.425mm)	1.0	%					20.0	21.9	48.6	67.0	6.0	19.8	32.6	50.2	68.6	42.5
Silt (0.002mm - 0.075mm)	1.0	%					72.6	67.2	12.7	15.3	85.0	68.2	56.0	37.2	25.6	51.7
Clay (<0.002mm)	1.0	%					5.9	9.0	4.0	4.2	9.0	11.0	10.6	11.7	3.7	4.9
Nutrients & Organics																
Total Kjeldahl Nitrogen	0.020	%			0.055	0.48	0.065	0.121	0.038	0.066	0.143	0.58	0.68	0.093	0.54	0.167
Total Organic Carbon (as %)	0.050	%			1	10	3.43	2.21	0.554	0.783	3.34	24.4	14.7	3.14	6.5	3.14
Metals																
Aluminum (Al)	50	mg/kg					9270	8370	8870	6500	9500	6480	11800	8770	9700	7850
Antimony (Sb)	0.10	mg/kg					0.11	<0.10	<0.10	<0.10	<0.10	0.46	0.52	<0.10	0.27	<0.10
Arsenic (As)	0.10	mg/kg	5.9	17	6	33	1.70	1.52	0.97	0.86	1.69	5.37	6.98	1.65	4.44	1.52
Barium (Ba)	0.50	mg/kg					56.6	47.1	32.0	29.2	54.7	46.2	71.1	47.1	33.0	41.9
Beryllium (Be)	0.10	mg/kg					0.22	0.20	0.14	0.11	0.23	0.23	0.34	0.23	0.25	0.20
Bismuth (Bi)	0.20	mg/kg					<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.33	<0.20	<0.20	<0.20
Boron (B)	5.0	mg/kg					<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	0.020	mg/kg	0.6	3.5	0.6	10	0.121	0.103	0.066	0.059	0.119	2.08	2.36	0.210	0.956	0.182
Calcium (Ca)	50	mg/kg					4790	4410	3110	2690	5030	9920	8140	4420	5300	4790
Chromium (Cr)	0.50	mg/kg	37.3	90	26	110	32.3	31.3	26.8	21.5	35.1	19.7	34.9	28.5	30.1	27.1
Cobalt (Co)	0.10	mg/kg					5.93	5.84	6.91	5.12	6.33	6.49	11.0	7.49	8.66	5.90
Copper (Cu)	0.50	mg/kg	35.7	197	16	110	19.1	21.5	14.3	13.0	16.4	47.8	66.6	14.6	34.9	16.1
Iron (Fe)	50	mg/kg			20000	40000	11200	11000	13400	9520	12200	11000	17400	10700	16100	9880
Lead (Pb)	0.50	mg/kg	35	91.3	31	250	4.02	3.71	3.25	2.71	3.90	32.2	44.8	6.60	105	5.85
Lithium (Li)	2.0	mg/kg					10.4	9.3	8.8	7.0	10.9	4.3	9.9	8.8	8.4	8.1
Magnesium (Mg)	20	mg/kg					4300	4060	5020	3770	4540	3210	5130	3830	5610	3600
Manganese (Mn)	1.0	mg/kg			460	1100	400	368	253	213	410	1020	880	264	529	250
Mercury (Hg)	0.0050	mg/kg	0.17	0.486	0.2	2	0.0351	0.0399	0.0232	0.0238	0.0296	0.150	0.265	0.0427	0.165	0.0433

						Waterbody	Misema River					Ava Lake				
						Client Sample ID	MR-EXP-S1	MR-EXP-S2	MR-EXP-S3	MR-EXP-S4	MR-EXP-S5	AL-S1	AL-S2	AL-S3	AL-S4	AL-S5
						Date Sampled	2-Oct-2021	2-Oct-2021	2-Oct-2021	1-Oct-2021	28-Sep-2021	2-Oct-2021	3-Oct-2021	3-Oct-2021	3-Oct-2021	3-Oct-2021
						Time Sampled	9:20	8:49	8:10	11:10	11:30	15:20	10:50	11:50	12:50	13:50
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL										
Molybdenum (Mo)	0.10	mg/kg					0.54	0.57	0.29	0.42	0.37	1.12	2.69	0.47	2.12	0.47
Nickel (Ni)	0.50	mg/kg			16	75	17.9	17.8	19.4	15.0	19.0	18.5	29.4	17.4	26.2	15.3
							17.8									
Phosphorus (P)	50	mg/kg					348	365	255	199	416	316	479	280	471	306
Potassium (K)	100	mg/kg					750	770	480	410	930	340	710	670	420	560
Selenium (Se)	0.20	mg/kg					<0.20	<0.20	<0.20	<0.20	<0.20	1.09	1.18	<0.20	0.42	<0.20
Silver (Ag)	0.10	mg/kg					<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.18	<0.10	0.48	<0.10
Sodium (Na)	50	mg/kg					199	221	129	109	230	113	161	158	110	179
Strontium (Sr)	0.50	mg/kg					25.5	23.3	14.2	13.8	26.3	28.3	27.3	19.3	18.3	20.3
Sulfur (S)	1000	mg/kg					<1000	<1000	<1000	<1000	<1000	5900	5300	<1000	2600	<1000
Thallium (Tl)	0.050	mg/kg					0.075	0.065	<0.050	<0.050	0.073	0.189	0.257	0.079	0.121	0.064
Tin (Sn)	1.0	mg/kg					<1.0	<1.0	<1.0	<1.0	<1.0	1.3	1.9	<1.0	<1.0	<1.0
Titanium (Ti)	1.0	mg/kg					735	698	674	524	726	363	567	683	628	703
Tungsten (W)	0.50	mg/kg					<0.50	<0.50	<0.50	<0.50	<0.50	1.34	1.43	<0.50	1.71	<0.50
Uranium (U)	0.050	mg/kg					0.477	0.444	0.195	0.194	0.468	0.415	0.592	0.541	0.301	0.553
Vanadium (V)	0.20	mg/kg					25.2	23.3	27.2	18.5	24.8	24.2	34.8	25.1	33.8	23.9
Zinc (Zn)	2.0	mg/kg	123	315	120	820	30.2	28.3	30.2	23.0	30.5	67.3	87.6	27.9	57.3	23.7
Zirconium (Zr)	1.0	mg/kg					3.3	3.7	2.6	1.8	4.8	2.1	1.9	2.7	1.6	2.7

							Waterbody	York Lake					Victoria Creek (S03)				
							Client Sample ID	YORK-S1	YORK-S2	YORK-S3	YORK-S4	YORK-S5	VC-S03-S1	VC-S03-S2	VC-S03-S3	VC-S03-S4	VC-S03-S5
							Date Sampled	26-Sep-2021	26-Sep-2021	26-Sep-2021	26-Sep-2021	26-Sep-2021	25-Sep-2021	25-Sep-2021	25-Sep-2021	25-Sep-2021	25-Sep-2021
							Time Sampled	14:30	15:22	16:00	17:00	17:50	11:08	11:40	12:30	13:00	13:28
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL											
Physical Tests																	
Loss on Ignition @ 550 C (as %)	1	%						17	13	2	28	36	3	2	3	5	3
pH (1:2 soil:water) as pH units	0.10	pH units						5.95	5.88	6.41	6.01	5.82	6.87	6.67	6.70	6.47	6.89
Particle Size (as %)																	
Gravel (4.75mm - 3in.)	1.0	%						<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Medium Sand (0.425mm - 2.0mm)	1.0	%						<1.0	<1.0	28.1	3.8	<1.0	<1.0	<1.0	8.0	<1.0	2.7
Coarse Sand (2.0mm - 4.75mm)	1.0	%						<1.0	<1.0	3.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fine Sand (0.075mm - 0.425mm)	1.0	%						29.0	28.3	54.7	65.7	29.2	38.0	68.6	74.0	56.8	78.0
Silt (0.002mm - 0.075mm)	1.0	%						64.1	64.6	5.7	26.5	61.1	48.2	22.9	9.4	36.5	11.1
Clay (<0.002mm)	1.0	%						6.8	6.9	6.4	4.0	9.5	12.6	8.0	8.6	6.8	8.2
Nutrients & Organics																	
Total Kjeldahl Nitrogen	0.020	%			0.055	0.48		0.367	0.328	0.054	0.346	0.402	0.062	0.092	0.146	0.145	0.147
Total Organic Carbon (as %)	0.050	%			1	10		5.54	4.43	0.646	8.14	7.86	1.13	0.799	0.718	1.83	0.73
Metals																	
Aluminum (Al)	50	mg/kg						15600	14700	10300	11800	14200	9350	6050	6610	5590	6750
Antimony (Sb)	0.10	mg/kg						3.72	4.39	0.68	1.04	2.17	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	0.10	mg/kg	5.9	17	6	33		8.49	7.83	4.29	3.79	7.29	1.54	0.77	1.04	0.87	0.96
Barium (Ba)	0.50	mg/kg						92.3	47.4	26.8	46.4	70.3	44.1	28.5	34.6	31.5	35.3
Beryllium (Be)	0.10	mg/kg						0.43	0.40	0.21	0.30	0.39	0.24	0.17	0.15	0.13	0.16
Bismuth (Bi)	0.20	mg/kg						1.86	1.38	0.65	0.74	1.81	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	5.0	mg/kg						<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	0.020	mg/kg	0.6	3.5	0.6	10		0.642	0.581	0.144	0.436	0.814	0.073	0.051	0.060	0.081	0.065
Calcium (Ca)	50	mg/kg						5750	4920	3620	4870	5970	4320	2560	3090	3220	3000
Chromium (Cr)	0.50	mg/kg	37.3	90	26	110		59.5	60.5	34.1	41.3	51.9	33.8	20.4	22.2	20.0	23.6
Cobalt (Co)	0.10	mg/kg						19.1	18.9	10.6	12.2	16.9	7.90	3.97	5.10	3.85	5.13
Copper (Cu)	0.50	mg/kg	35.7	197	16	110		931	811	335	358	720	10.7	4.44	5.88	8.05	6.51
Iron (Fe)	50	mg/kg			20000	40000		38100	41300	26400	27000	30500	13200	7500	9360	7420	9220
Lead (Pb)	0.50	mg/kg	35	91.3	31	250		18.7	20.1	4.08	11.9	20.3	4.23	2.38	2.28	2.59	2.41
Lithium (Li)	2.0	mg/kg						16.1	14.3	9.5	11.2	13.9	11.0	7.1	7.1	6.3	8.2
Magnesium (Mg)	20	mg/kg						9710	9620	7180	7650	8350	4100	2580	3290	2540	3430
Manganese (Mn)	1.0	mg/kg			460	1100		386	346	277	381	472	395	157	216	184	227
Mercury (Hg)	0.0050	mg/kg	0.17	0.486	0.2	2		2.97	2.81	0.596	0.859	2.05	0.0133	0.0090	0.0091	0.0118	0.0091
Molybdenum (Mo)	0.10	mg/kg						74.0	82.4	20.3	28.5	44.1	0.14	<0.10	<0.10	<0.10	<0.10
Nickel (Ni)	0.50	mg/kg			16	75		45.1	45.4	26.8	31.1	38.8	18.5	11.4	13.8	11.1	15.0

Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL	York Lake					Victoria Creek (S03)				
Client Sample ID							YORK-S1	YORK-S2	YORK-S3	YORK-S4	YORK-S5	VC-S03-S1	VC-S03-S2	VC-S03-S3	VC-S03-S4	VC-S03-S5
Date Sampled							26-Sep-2021	26-Sep-2021	26-Sep-2021	26-Sep-2021	26-Sep-2021	25-Sep-2021	25-Sep-2021	25-Sep-2021	25-Sep-2021	25-Sep-2021
Time Sampled							14:30	15:22	16:00	17:00	17:50	11:08	11:40	12:30	13:00	13:28
Phosphorus (P)	50	mg/kg					686	681	365	540	708	287	182	218	238	206
Potassium (K)	100	mg/kg					900	800	300	550	830	840	390	500	440	580
Selenium (Se)	0.20	mg/kg					0.91	0.74	0.26	0.43	0.75	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	0.10	mg/kg					0.63	0.51	0.15	0.31	0.32	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	50	mg/kg					153	119	73	100	156	192	87	111	104	116
Strontium (Sr)	0.50	mg/kg					25.5	20.6	11.3	20.2	25.7	23.1	15.0	15.7	17.3	17.1
Sulfur (S)	1000	mg/kg					4100	3700	1000	1200	3300	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	0.050	mg/kg					0.149	0.111	<0.050	0.092	0.152	0.075	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	1.0	mg/kg					2.1	4.3	<1.0	3.0	2.2	<1.0	<1.0	<1.0	<1.0	<1.0
Titanium (Ti)	1.0	mg/kg					847	788	915	884	728	768	523	578	544	563
Tungsten (W)	0.50	mg/kg					12.3	11.4	4.59	4.83	8.37	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg					0.550	0.494	0.218	0.380	0.626	0.345	0.259	0.206	0.261	0.233
Vanadium (V)	0.20	mg/kg					76.6	77.0	58.5	61.7	63.6	30.0	17.3	19.8	16.4	19.4
Zinc (Zn)	2.0	mg/kg	123	315	120	820	74.4	69.1	34.1	50.4	75.8	23.1	15.0	22.0	20.2	22.9
Zirconium (Zr)	1.0	mg/kg					2.9	2.5	2.9	2.1	2.9	2.8	1.3	2.4	1.6	2.4

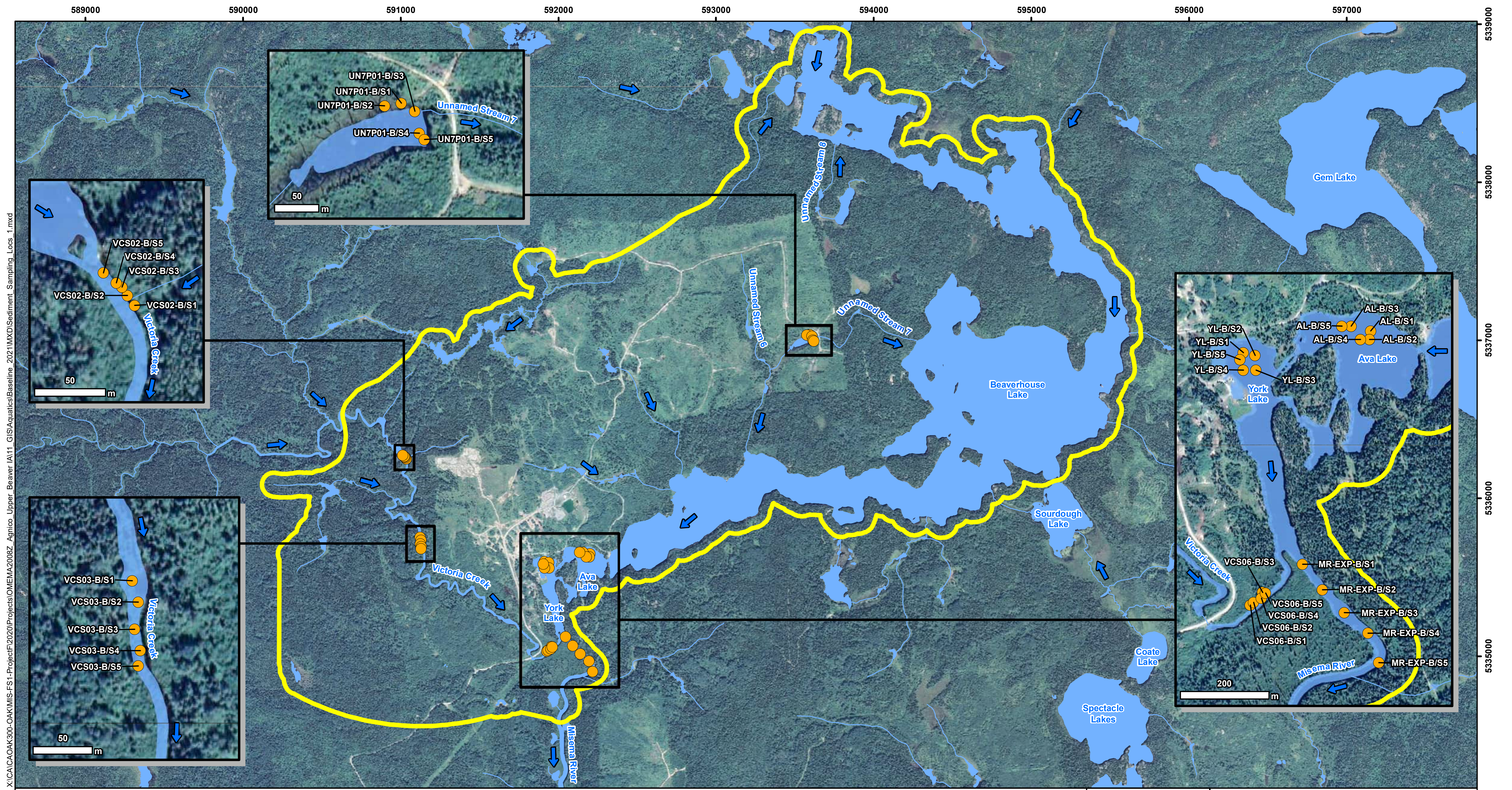
							Waterbody	Victoria Creek (S02)					Victoria Creek (S06)				
							Client Sample ID	VC-S02-S1	VC-S02-S2	VC-S02-S3	VC-S02-S4	VC-S02-S5	VC-S06-S1	VC-S06-S2	VC-S06-S3	VC-S06-S4	VC-S06-S5
							Date Sampled	23-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021
							Time Sampled	14:15	15:17	15:35	17:00	15:17	12:00	12:00	12:00	12:00	12:00
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL											
Physical Tests																	
Loss on Ignition @ 550 C (as %)	1	%						8	3	4	3	12	9	2	2	7	2
pH (1:2 soil:water) as pH units	0.10	pH units						7.08	7.22	7.92	8.19	7.37	6.43	6.68	6.68	6.55	6.72
Particle Size (as %)																	
Gravel (4.75mm - 3in.)	1.0	%						<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Medium Sand (0.425mm - 2.0mm)	1.0	%						<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.6	25.2	11.4	<1.0
Coarse Sand (2.0mm - 4.75mm)	1.0	%						<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fine Sand (0.075mm - 0.425mm)	1.0	%						63.8	63.9	19.4	2.7	60.0	60.7	80.2	62.4	72.5	77.5
Silt (0.002mm - 0.075mm)	1.0	%						31.6	27.7	49.6	52.7	27.4	29.2	7.4	5.7	10.9	14.9
Clay (<0.002mm)	1.0	%						4.7	8.0	31.0	44.6	12.4	10.0	6.8	6.7	5.3	6.7
Nutrients & Organics																	
Total Kjeldahl Nitrogen	0.020	%			0.055	0.48		0.139	0.068	0.068	0.022	0.37	0.272	0.055	0.211	0.311	0.042
Total Organic Carbon (as %)	0.050	%			1	10		1.22	0.885	1.15	0.41	2.71	3.02	0.513	0.966	1.47	0.454
Metals																	
Aluminum (Al)	50	mg/kg						4640	5490	12900	17200	7690	6990	6350	6960	7140	6690
Antimony (Sb)	0.10	mg/kg						<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Arsenic (As)	0.10	mg/kg	5.9	17	6	33		0.87	0.84	1.86	2.44	1.40	1.23	0.78	0.83	1.10	0.83
Barium (Ba)	0.50	mg/kg						24.4	29.3	73.4	100	57.6	47.0	33.5	27.1	39.6	36.2
Beryllium (Be)	0.10	mg/kg						0.12	0.14	0.37	0.55	0.19	0.17	0.14	0.11	0.16	0.14
Bismuth (Bi)	0.20	mg/kg						<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	5.0	mg/kg						<5.0	<5.0	6.2	11.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	0.020	mg/kg	0.6	3.5	0.6	10		0.076	0.060	0.097	0.073	0.117	0.107	0.042	0.040	0.065	0.039
Calcium (Ca)	50	mg/kg						3450	3440	20800	41300	5400	3810	2700	3170	3340	2900
Chromium (Cr)	0.50	mg/kg	37.3	90	26	110		19.5	21.0	47.8	62.4	27.1	24.0	21.0	22.7	22.9	21.8
Cobalt (Co)	0.10	mg/kg						3.07	3.67	8.13	11.0	5.50	4.87	4.74	5.34	5.41	4.83
Copper (Cu)	0.50	mg/kg	35.7	197	16	110		4.59	5.60	18.0	19.9	11.5	10.5	6.12	5.61	7.49	5.31
Iron (Fe)	50	mg/kg			20000	40000		6520	7550	16900	23400	10400	8840	8510	10100	10300	8610
Lead (Pb)	0.50	mg/kg	35	91.3	31	250		2.15	2.28	5.64	6.55	3.64	3.33	2.28	2.34	2.53	2.33
Lithium (Li)	2.0	mg/kg						5.4	6.7	19.5	28.0	10.1	8.2	7.7	7.9	8.5	8.7
Magnesium (Mg)	20	mg/kg						2210	2860	10200	17600	4080	3470	3250	4120	4090	3430
Manganese (Mn)	1.0	mg/kg			460	1100		122	175	362	492	489	277	145	186	251	170
Mercury (Hg)	0.0050	mg/kg	0.17	0.486	0.2	2		0.0106	0.0096	0.0163	0.0128	0.0158	0.0125	0.0073	0.0060	0.0096	0.0075
Molybdenum (Mo)	0.10	mg/kg						<0.10	<0.10	0.30	0.29	0.10	0.10	<0.10	0.17	<0.10	0.14
Nickel (Ni)	0.50	mg/kg			16	75		10.3	11.8	24.2	32.2	15.3	14.3	13.6	15.0	15.6	14.3

Waterbody							Victoria Creek (S02)					Victoria Creek (S06)				
Client Sample ID							VC-S02-S1	VC-S02-S2	VC-S02-S3	VC-S02-S4	VC-S02-S5	VC-S06-S1	VC-S06-S2	VC-S06-S3	VC-S06-S4	VC-S06-S5
Date Sampled							23-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	23-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021
Time Sampled							14:15	15:17	15:35	17:00	15:17	12:00	12:00	12:00	12:00	12:00
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL										
Phosphorus (P)	50	mg/kg					238	244	410	501	260	281	182	268	230	210
Potassium (K)	100	mg/kg					320	450	2180	3300	860	620	510	400	540	580
Selenium (Se)	0.20	mg/kg					<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Silver (Ag)	0.10	mg/kg					<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sodium (Na)	50	mg/kg					65	94	400	604	175	152	118	107	131	136
Strontium (Sr)	0.50	mg/kg					12.9	13.0	36.2	58.2	24.1	23.2	15.3	15.7	18.9	15.6
Sulfur (S)	1000	mg/kg					<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	0.050	mg/kg					<0.050	<0.050	0.121	0.164	0.056	0.052	<0.050	<0.050	<0.050	<0.050
Tin (Sn)	1.0	mg/kg					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.5	<1.0	<1.0
Titanium (Ti)	1.0	mg/kg					443	480	986	1300	627	604	553	647	608	606
Tungsten (W)	0.50	mg/kg					<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg					0.347	0.263	0.665	0.711	0.328	0.304	0.183	0.175	0.212	0.203
Vanadium (V)	0.20	mg/kg					15.8	16.6	35.9	48.2	21.7	18.8	17.8	21.8	19.9	18.2
Zinc (Zn)	2.0	mg/kg	123	315	120	820	15.5	18.4	38.6	46.5	30.0	27.5	22.4	23.3	27.0	23.5
Zirconium (Zr)	1.0	mg/kg					1.4	1.6	7.9	20.2	3.1	2.3	2.6	2.7	3.0	2.6

							Waterbody	Unnamed Stream 7 (P01)				
							Client Sample ID	UNS7-P01-S1	UNS7-P01-S2	UNS7-P01-S3	UNS7-P01-S4	UNS7-P01-S5
							Date Sampled	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021
							Time Sampled	12:00	12:00	12:00	12:00	12:00
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL						
Physical Tests												
Loss on Ignition @ 550 C (as %)	1	%						28	17	17	35	27
pH (1:2 soil:water) as pH units	0.10	pH units						5.77	5.80	5.83	5.67	5.67
Particle Size (as %)												
Gravel (4.75mm - 3in.)	1.0	%						<1.0	<1.0	<1.0	<1.0	<1.0
Medium Sand (0.425mm - 2.0mm)	1.0	%						1.2	<1.0	1.8	1.4	3.0
Coarse Sand (2.0mm - 4.75mm)	1.0	%						<1.0	<1.0	<1.0	<1.0	1.6
Fine Sand (0.075mm - 0.425mm)	1.0	%						56.5	43.0	61.1	44.8	8.1
Silt (0.002mm - 0.075mm)	1.0	%						36.9	51.6	30.8	45.4	67.1
Clay (<0.002mm)	1.0	%						5.5	4.7	6.3	8.4	19.3
Nutrients & Organics												
Total Kjeldahl Nitrogen	0.020	%			0.055	0.48		0.593	0.390	0.516	0.92	0.66
Total Organic Carbon (as %)	0.050	%			1	10		4.48	6.34	5.24	12.4	12.5
Metals												
Aluminum (Al)	50	mg/kg						4280	8500	6970	6170	18500
Antimony (Sb)	0.10	mg/kg						0.10	<0.10	<0.10	<0.10	0.13
Arsenic (As)	0.10	mg/kg	5.9	17	6	33		0.60	0.90	0.66	0.82	1.82
Barium (Ba)	0.50	mg/kg						24.2	20.9	22.3	29.6	72.0
Beryllium (Be)	0.10	mg/kg						0.11	0.14	0.12	0.16	0.34
Bismuth (Bi)	0.20	mg/kg						<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	5.0	mg/kg						<5.0	<5.0	<5.0	<5.0	<5.0
Cadmium (Cd)	0.020	mg/kg	0.6	3.5	0.6	10		0.261	0.199	0.178	0.316	0.384
Calcium (Ca)	50	mg/kg						2080	2270	2300	3160	6090
Chromium (Cr)	0.50	mg/kg	37.3	90	26	110		8.68	15.3	15.1	12.7	55.2
Cobalt (Co)	0.10	mg/kg						1.20	2.32	2.63	1.82	6.60
Copper (Cu)	0.50	mg/kg	35.7	197	16	110		5.71	5.46	5.43	7.83	13.4
Iron (Fe)	50	mg/kg			20000	40000		2770	4910	5460	3890	15100
Lead (Pb)	0.50	mg/kg	35	91.3	31	250		6.37	5.58	5.15	7.23	11.2
Lithium (Li)	2.0	mg/kg						2.3	4.4	5.5	3.5	14.5
Magnesium (Mg)	20	mg/kg						995	1800	2060	1410	5530
Manganese (Mn)	1.0	mg/kg			460	1100		51.3	71.3	80.7	71.7	205
Mercury (Hg)	0.0050	mg/kg	0.17	0.486	0.2	2		0.0311	0.0330	0.0260	0.0473	0.0712
Molybdenum (Mo)	0.10	mg/kg						<0.10	0.13	0.11	0.13	0.32
Nickel (Ni)	0.50	mg/kg			16	75		4.94	9.14	10.0	7.49	28.8

							Waterbody	Unnamed Stream 7 (P01)				
							Client Sample ID	UNS7-P01-S1	UNS7-P01-S2	UNS7-P01-S3	UNS7-P01-S4	UNS7-P01-S5
							Date Sampled	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021	24-Sep-2021
							Time Sampled	12:00	12:00	12:00	12:00	12:00
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL						
Phosphorus (P)	50	mg/kg						232	287	291	363	501
Potassium (K)	100	mg/kg						210	180	240	290	1130
Selenium (Se)	0.20	mg/kg						<0.20	0.25	<0.20	0.27	0.34
Silver (Ag)	0.10	mg/kg						<0.10	<0.10	<0.10	0.24	0.16
Sodium (Na)	50	mg/kg						60	52	61	70	215
Strontium (Sr)	0.50	mg/kg						11.3	11.8	11.9	16.1	34.4
Sulfur (S)	1000	mg/kg						<1000	<1000	<1000	<1000	<1000
Thallium (Tl)	0.050	mg/kg						<0.050	<0.050	<0.050	<0.050	0.106
Tin (Sn)	1.0	mg/kg						<1.0	<1.0	<1.0	<1.0	<1.0
Titanium (Ti)	1.0	mg/kg						273	472	469	270	991
Tungsten (W)	0.50	mg/kg						<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg						0.145	0.173	0.151	0.201	0.412
Vanadium (V)	0.20	mg/kg						8.01	14.2	14.0	10.3	35.5
Zinc (Zn)	2.0	mg/kg	123	315	120	820		20.0	19.3	24.4	27.0	55.8
Zirconium (Zr)	1.0	mg/kg						<1.0	<1.0	<1.0	<1.0	2.3

PSQG; Provincial Sediment Quality Guidelines for the protection and management of aquatic sediment quality in Ontario
CSQG; Canadian Council of Ministers of the Environment Canadian Sediment Quality Guidelines for the protection of aquatic life
All values expressed as mg/kg unless otherwise indicated
Dark blue shaded values indicate concentrations that exceed the PSQG LEL
Gray shaded values indicate concentrations that exceed the PSQG SEL and LEL
Blue shaded values indicate concentrations that exceed the CCME ISQG
Light blue shaded values indicate concentrations that exceed the CCME ISQG and PEL



LEGEND

- Aquatic Study Area
- Sediment Quality Sampling Location
- Watercourse
- Waterbody
- Flow Direction

NOTES:
- Waterbodies and watercourse extracted from LIO, NDMNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

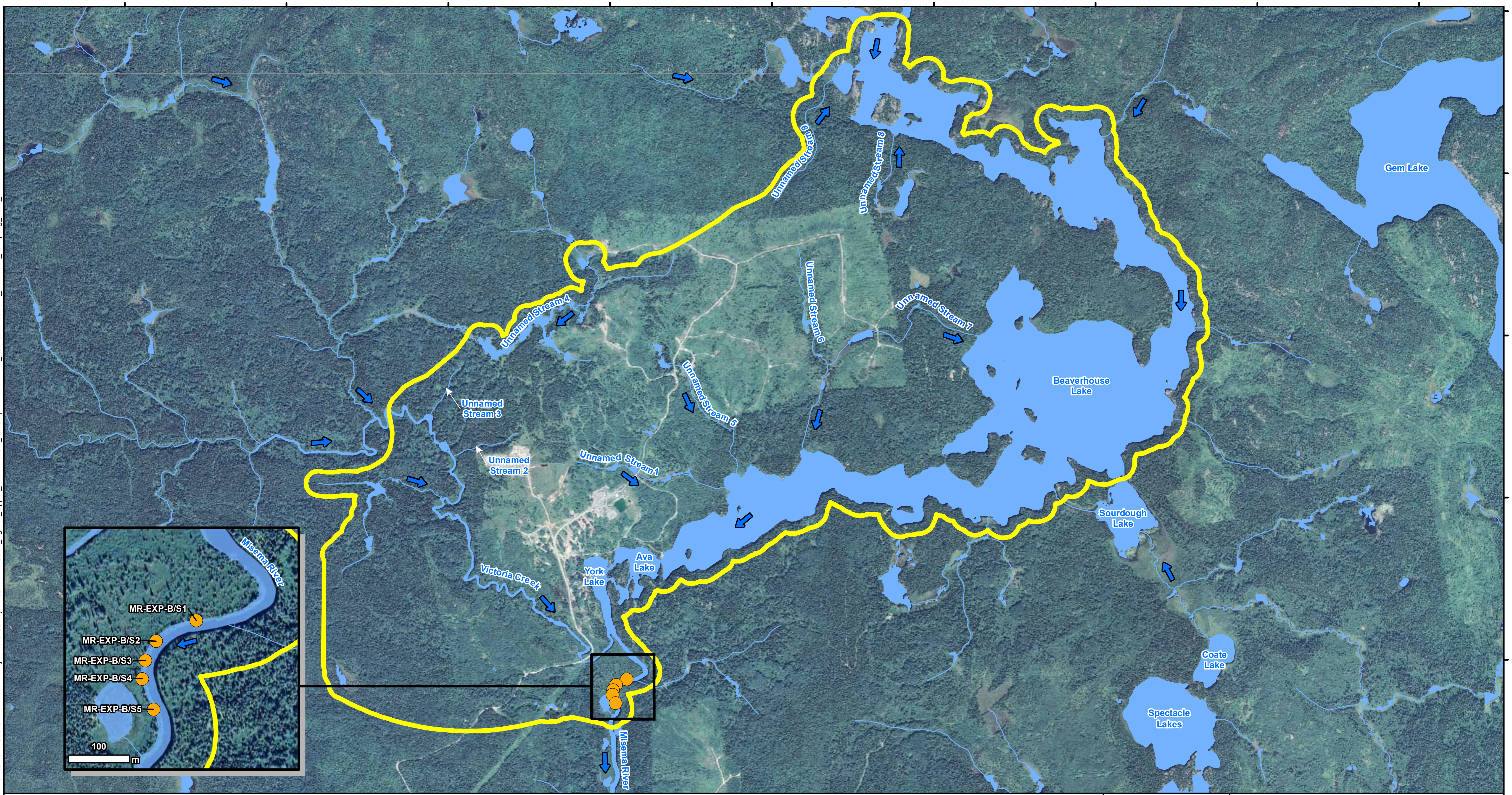
AGNICO EAGLE
UPPER BEAVER PROJECT

wsp

UPPER BEAVER GOLD PROJECT

Sediment Quality Sampling Locations (2021)

PROJECT N°: OMEMA2008	**FIGURE: E1-1**
SCALE: 1:22,500	DATE: November 2023



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LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction
- Sediment Quality Sampling Location

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

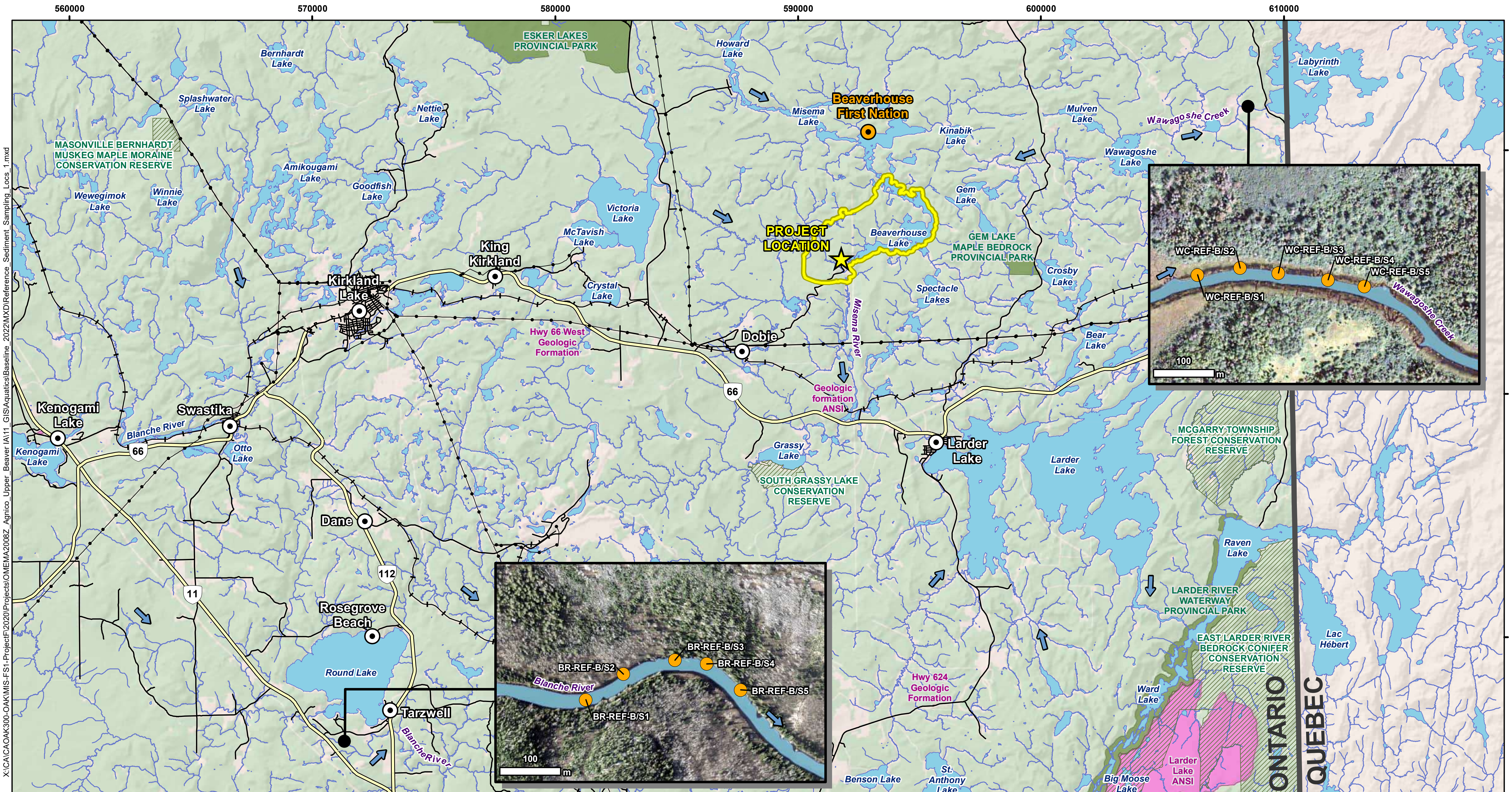
AGNICO EAGLE UPPER BEAVER PROJECT

wsp

UPPER BEAVER PROJECT

Sediment Quality Sampling Locations (2022)

PROJECT N°: OMEMA2008	**FIGURE: E1-2a**
SCALE: 1:22,500	DATE: November 2023



LEGEND

- ★ Project Location
- Aquatic Study Area
- Town / Community
- First Nation Community
- Conservation Reserve
- Provincial Park
- Candidate ANSI
- Provincial Border
- Transmission Line
- Railway
- Highway
- Local Road
- Resource / Recreation Road
- Watercourse
- Waterbody
- Flow Direction
- Sediment Quality Sampling Location

0 2.5 5 10 15 20 Kilometres

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from AgMaps, MAFRA.

Datum: NAD83
Projection: UTM Zone 17N

AGNICO EAGLE UPPER BEAVER PROJECT

WSP

UPPER BEAVER GOLD PROJECT

Sediment Quality Sampling Locations (2022)

PROJECT Nº: OMEMA2008	FIGURE: E1-2b
SCALE: 1:150,000	DATE: November 2023

Table E2-1: Sediment Quality Laboratory Results (2022)

							Misema River					Blanche River					Wawagoshe Creek				
						Waterbody	Misema River					Blanche River					Wawagoshe Creek				
						Client Sample ID	MR-EXP-S1	MR-EXP-S2	MR-EXP-S3	MR-EXP-S4	MR-EXP-S5	BR-REF-S1	BR-REF-S2	BR-REF-S3	BR-REF-S4	BR-REF-S5	WC-REF-S1	WC-REF-S2	WC-REF-S3	WC-REF-S4	WC-REF-S5
						Date Sampled	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022
						Time Sampled	11:52	12:35	13:11	13:53	14:30	12:20	13:00	13:40	14:15	14:40	10:50	11:30	11:30	11:30	11:30
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL															
Physical Tests																					
Loss on Ignition @550C	1	%					6.8	5.1	6.9	4.4	6.3	6	1.9	4.3	5.2	3.1	24.8	22.8	22.2	25.4	18.1
Moisture	0.25	%					42.1	35.1	44.4	30.7	37.1	43.4	56.3	41.1	40.6	28.5	82.2	82.8	78.2	76.1	76
pH	0.10	pH units					5.93	5.8	5.55	5.28	5.4	6.35	7.33	6.54	6.92	7.08	5.43	5.53	5.33	5.34	5.3
Ash content @ 550°C	1.0	%					93.2	94.8	93	95.6	93.6	94	98.1	95.6	94.8	96.9	75.2	77.1	77.7	74.6	81.9
Particle Size																					
Clay (<0.004mm)	1.0	%					13.5	10	10.7	11.2	11	19.5	25.2	19.3	39.3	16.1	43.6	52.5	39.1	35.4	42.7
Silt (0.063mm - 0.004mm)	1.0	%					39.5	42.8	34	30.4	40.9	36	55.8	38	21	20.2	45.8	39.4	46.7	50.4	47.4
Fine Sand (0.50mm - 0.063 mm)	1	%					46.40	47.10	55.20	58.20	47.80	37.90	17.70	41.20	33.90	42.90	10.10	7.90	14.10	13.80	9.60
Medium Sand (1.0mm - 0.50mm)	1.0	%					<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	1.2	18.7	<1.0	<1.0	<1.0	<1.0	<1.0
Coarse Sand (2.0mm - 1.0mm)	1.0	%					<1.0	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	2	2	<1.0	<1.0	<1.0	<1.0	<1.0
Gravel (>2mm)	1.0	%					<1.0	<1.0	<1.0	<1.0	<1.0	4.2	<1.0	<1.0	2.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nutrients & Organics																					
Total Kjeldahl Nitrogen	0.020	%			0.055	0.48	0.111	0.104	0.112	0.097	0.124	0.151	0.039	0.116	0.099	0.066	0.702	0.621	0.666	0.626	0.515
Total Organic Carbon	0.050	%			1	10	2.33	1.68	2.3	2.34	1.88	2.63	0.423	1.69	1.48	1.23	12.6	10.9	10.8	12.6	8.46
Metals																					
Aluminum (Al)	50	mg/kg					8350	6880	7020	6400	7140	9730	12500	9900	12500	9210	22200	24400	24800	22500	23200
Antimony (Sb)	0.10	mg/kg					<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.16	0.19	0.16	0.14	0.14
Arsenic (As)	0.10	mg/kg	5.9	17	6	33	1.38	1.1	1.21	1.07	1.35	1.57	1.46	1.55	2.81	1.26	4.59	4.76	3.32	3.29	3.4
Barium (Ba)	0.50	mg/kg					49.6	39.3	39.7	35.2	40.4	66.7	67.7	63.3	83.9	49.3	110	120	130	116	124
Beryllium (Be)	0.10	mg/kg					0.2	0.15	0.15	0.14	0.16	0.27	0.35	0.29	0.4	0.23	0.54	0.56	0.58	0.69	0.62
Bismuth (Bi)	0.20	mg/kg					<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.26	0.34	0.25	0.2	0.24
Boron (B)	5.0	mg/kg					<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	6.1	<5.0	5.9	6.2	5.4	6.2	5.5
Cadmium (Cd)	0.020	mg/kg	0.6	3.5	0.6	10	0.126	0.097	0.115	0.103	0.14	0.142	0.105	0.122	0.112	0.092	0.939	1.11	0.619	0.603	0.62
Calcium (Ca)	50	mg/kg					4010	3410	3440	2740	3470	9340	7520	8620	32300	9080	8450	8840	8610	8490	7760
Chromium (Cr)	0.50	mg/kg	37.3	90	26	110	29.9	24.9	25.1	22	25.1	61.9	48.8	37.2	44.5	36.6	67.4	71.9	67.2	62	67.1
Cobalt (Co)	0.10	mg/kg					5.88	4.73	4.92	4.47	5.1	7.12	7.57	7.08	9.56	7.56	12.4	13.2	12.5	11.7	13.1
Copper (Cu)	0.50	mg/kg	35.7	197	16	110	24.3	17.2	24.8	29.7	37.4	12.8	12.9	12	15.5	10.6	26	27.6	24.7	24.8	24.3
Iron (Fe)	50	mg/kg			20000	40000	10300	8410	8830	7800	9040	12500	15100	12900	18000	13300	21900	24600	24800	24200	26400
Lead (Pb)	0.50	mg/kg	35	91.3	31	250	4.17	3.28	3.9	3.83	4.62	5.61	5.42	5.4	5.93	4.01	15.2	20	13.9	13.2	14.4

						Waterbody	Misema River					Blanche River					Wawagoshe Creek				
						Client Sample ID	MR-EXP-S1	MR-EXP-S2	MR-EXP-S3	MR-EXP-S4	MR-EXP-S5	BR-REF-S1	BR-REF-S2	BR-REF-S3	BR-REF-S4	BR-REF-S5	WC-REF-S1	WC-REF-S2	WC-REF-S3	WC-REF-S4	WC-REF-S5
						Date Sampled	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022	24-Oct-2022
						Time Sampled	11:52	12:35	13:11	13:53	14:30	12:20	13:00	13:40	14:15	14:40	10:50	11:30	11:30	11:30	11:30
Parameter	Lowest Detection Limit	Units	CSQG ISQG	CSQG PEL	PSQG LEL	PSQG SEL															
Lithium (Li)	2.0	mg/kg					9.1	7.3	7.5	6.8	7.6	11.8	14.6	12.7	17	11.3	25.8	28.8	26.4	32.3	31
Magnesium (Mg)	20	mg/kg					3690	3170	3220	2980	3300	5480	5500	5850	10600	6430	7760	9130	9010	8140	9040
Manganese (Mn)	1.0	mg/kg			460	1100	350	245	282	201	288	345	281	286	499	264	570	456	534	437	483
Mercury (Hg)	0.0050	mg/kg	0.17	0.486	0.2	2	0.047	0.0319	0.0444	0.0763	0.0662	0.0444	0.0213	0.0239	0.0221	0.0188	0.107	0.106	0.076	0.0762	0.0712
Molybdenum (Mo)	0.10	mg/kg					0.66	0.46	0.61	0.83	0.89	5.6	0.75	2.08	0.96	0.64	1.42	0.98	0.45	0.65	0.64
Nickel (Ni)	0.50	mg/kg			16	75	16.8	14.1	14.4	12.9	14.6	33.9	24.4	19.7	25.8	21.3	39.4	42	37.7	35.8	38.2
Phosphorus (P)	50	mg/kg					331	304	308	246	334	388	463	374	479	380	657	642	580	536	521
Potassium (K)	100	mg/kg					670	540	540	450	530	1040	980	1120	2040	960	2160	2320	2470	2550	2660
Selenium (Se)	0.20	mg/kg					<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.62	0.66	0.5	0.48	0.46
Silver (Ag)	0.10	mg/kg					<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	0.13	0.12	0.12	0.1
Sodium (Na)	50	mg/kg					162	138	144	122	150	218	246	208	370	203	388	391	392	307	345
Strontium (Sr)	0.50	mg/kg					17.7	14.8	15.4	13	15.5	40.6	30.9	36.8	69.8	31.8	34	36	36.4	36.1	30.8
Sulfur (S)	1000	mg/kg					<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	1900	1800	1300	1500	<1000
Thallium (Tl)	0.050	mg/kg					0.056	<0.050	<0.050	<0.050	0.052	0.088	0.07	0.095	0.116	0.069	0.172	0.196	0.188	0.173	0.202
Tin (Sn)	1.0	mg/kg					<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg					586	518	543	485	525	630	729	608	748	622	778	916	958	947	1030
Tungsten (W)	0.50	mg/kg					<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg					0.387	0.369	0.363	0.303	0.378	0.599	0.565	0.544	0.534	0.392	0.892	0.931	1.18	1.18	0.919
Vanadium (V)	0.20	mg/kg					21.1	17.6	17.9	16.4	18.2	23.8	30.4	24	32.6	26.8	40.9	45.1	44.4	44	46.2
Zinc (Zn)	2.0	mg/kg	123	315	120	820	29	24	25.7	25.2	28.9	37.7	36.2	34.9	44.7	33.6	96.1	106	82.4	80.5	85.9
Zirconium (Zr)	1.0	mg/kg					2.7	2.3	1.9	1.5	1.8	3.1	6.2	3.9	8.8	4.2	4.8	5.4	6.5	9.9	7.4

PSQG; Provincial Sediment Quality Guidelines for the protection and management of aquatic sediment quality in Ontario
CSQG; Canadian Council of Ministers of the Environment Canadian Sediment Quality Guidelines for the protection of aquatic life
All values expressed as mg/kg unless otherwise indicated
Dark blue shaded values indicate concentrations that exceed the PSQG LEL
Gray shaded values indicate concentrations that exceed the PSQG SEL and LEL
Blue shaded values indicate concentrations that exceed the CCME ISQG
Light blue shaded values indicate concentrations that exceed the CCME ISQG and PEL

APPENDIX F

Benthic Invertebrate Community Data

Table F1-1: Benthic Invertebrate Community Descriptors (2021)

Station	Replicate	Descriptor						
		Count	TID (#/m²)	Richness	Diversity	Evenness	% EPT	% Chiron.
Ava Lake (AL)	1	281	4,072	17	0.81	0.17	14.59	34.16
	2	137	1,986	9	0.84	0.43	29.20	29.20
	3	262	3,797	7	0.51	0.16	1.15	67.18
	4	250	3,623	9	0.79	0.25	13.20	38.40
	5	778	11,275	19	0.77	0.13	8.23	44.22
Mean		342	4,951	12	0.74	0.23	13.27	42.63
Median		262	3,797	9	0.79	0.17	13.20	38.40
Minimum		137	1,986	7	0.51	0.13	1.15	29.20
Maximum		778	11,275	19	0.84	0.43	29.20	67.18
Standard Deviation		224	3,245	5	0.12	0.11	9.25	13.23
Standard Error		100	1,451	2	0.05	0.05	4.14	5.92
York Lake (YL)	1	100	1,449	3	0.52	0.35	12.00	64.00
	2	169	2,449	5	0.47	0.19	10.06	71.01
	3	90	1,304	13	0.69	0.14	14.44	52.22
	4	159	2,304	8	0.74	0.24	22.01	40.25
	5	126	1,826	7	0.74	0.39	35.71	31.75
Mean		129	1,867	7	0.63	0.26	18.85	51.85
Median		126	1,826	7	0.69	0.24	14.44	52.22
Minimum		90	1,304	3	0.47	0.14	10.06	31.75
Maximum		169	2,449	13	0.74	0.39	35.71	71.01
Standard Deviation		31	452	3	0.12	0.09	9.36	14.51
Standard Error		14	202	2	0.05	0.04	4.19	6.49
Misema River (MR-EXP)	1	231	3,348	7	0.59	0.16	54.98	31.17
	2	56	812	6	0.73	0.47	7.14	0.00
	3	203	2,942	8	0.59	0.09	9.85	61.58
	4	331	4,797	12	0.69	0.10	29.31	46.53
	5	91	1,319	13	0.82	0.32	45.05	13.19
Mean		182	2,643	9	0.69	0.23	29.27	30.49
Median		203	2,942	8	0.69	0.16	29.31	31.17
Minimum		56	812	6	0.59	0.09	7.14	0.00
Maximum		331	4,797	13	0.82	0.47	54.98	61.58
Standard Deviation		99	1,438	3	0.09	0.15	18.85	22.15
Standard Error		44	643	1	0.04	0.07	8.43	9.91

Station	Replicate	Descriptor						
		Count	TID (#/m²)	Richness	Diversity	Evenness	% EPT	% Chiron.
Unnamed Stream 7 (UNS7-PO1)	1	344	4,986	7	0.60	0.15	2.33	58.14
	2	817	11,841	9	0.63	0.13	1.96	56.79
	3	201	2,913	7	0.75	0.26	0.00	35.82
	4	419	6,072	10	0.77	0.27	15.51	34.37
	5	170	2,464	7	0.64	0.21	18.82	56.47
	Mean	390	5,655	8	0.68	0.21	7.72	48.32
	Median	344	4,986	7	0.64	0.21	2.33	56.47
	Minimum	170	2,464	7	0.60	0.13	0.00	34.37
	Maximum	817	11,841	10	0.77	0.27	18.82	58.14
	Standard Deviation	232	3,364	1	0.07	0.06	7.82	10.82
	Standard Error	104	1,504	1	0.03	0.03	3.50	4.84
Victoria Creek (VC-S02)	1	176	2,551	5	0.62	0.26	0.00	27.27
	2	116	1,681	10	0.85	0.38	3.45	17.24
	3	56	812	5	0.78	0.74	14.29	28.57
	4	138	2,000	14	0.87	0.38	33.33	21.74
	5	418	6,058	9	0.82	0.34	7.66	26.79
	Mean	181	2,620	9	0.79	0.42	11.74	24.32
	Median	138	2,000	9	0.82	0.38	7.66	26.79
	Minimum	56	812	5	0.62	0.26	0.00	17.24
	Maximum	418	6,058	14	0.87	0.74	33.33	28.57
	Standard Deviation	125	1,809	3	0.09	0.17	11.80	4.24
	Standard Error	56	809	2	0.04	0.07	5.28	1.89
Victoria Creek (VC-S03)	1	26	377	7	0.80	0.73	15.38	7.69
	2	157	2,275	9	0.74	0.24	8.28	43.31
	3	48	696	5	0.78	0.90	0.00	16.67
	4	400	5,797	8	0.79	0.25	18.00	30.00
	5	273	3,957	9	0.76	0.35	0.37	5.86
	Mean	181	2,620	8	0.78	0.50	8.41	20.71
	Median	157	2,275	8	0.78	0.35	8.28	16.67
	Minimum	26	377	5	0.74	0.24	0.00	5.86
	Maximum	400	5,797	9	0.80	0.90	18.00	43.31
	Standard Deviation	141	2,036	1	0.02	0.27	7.43	14.17
	Standard Error	63	911	1	0.01	0.12	3.32	6.34

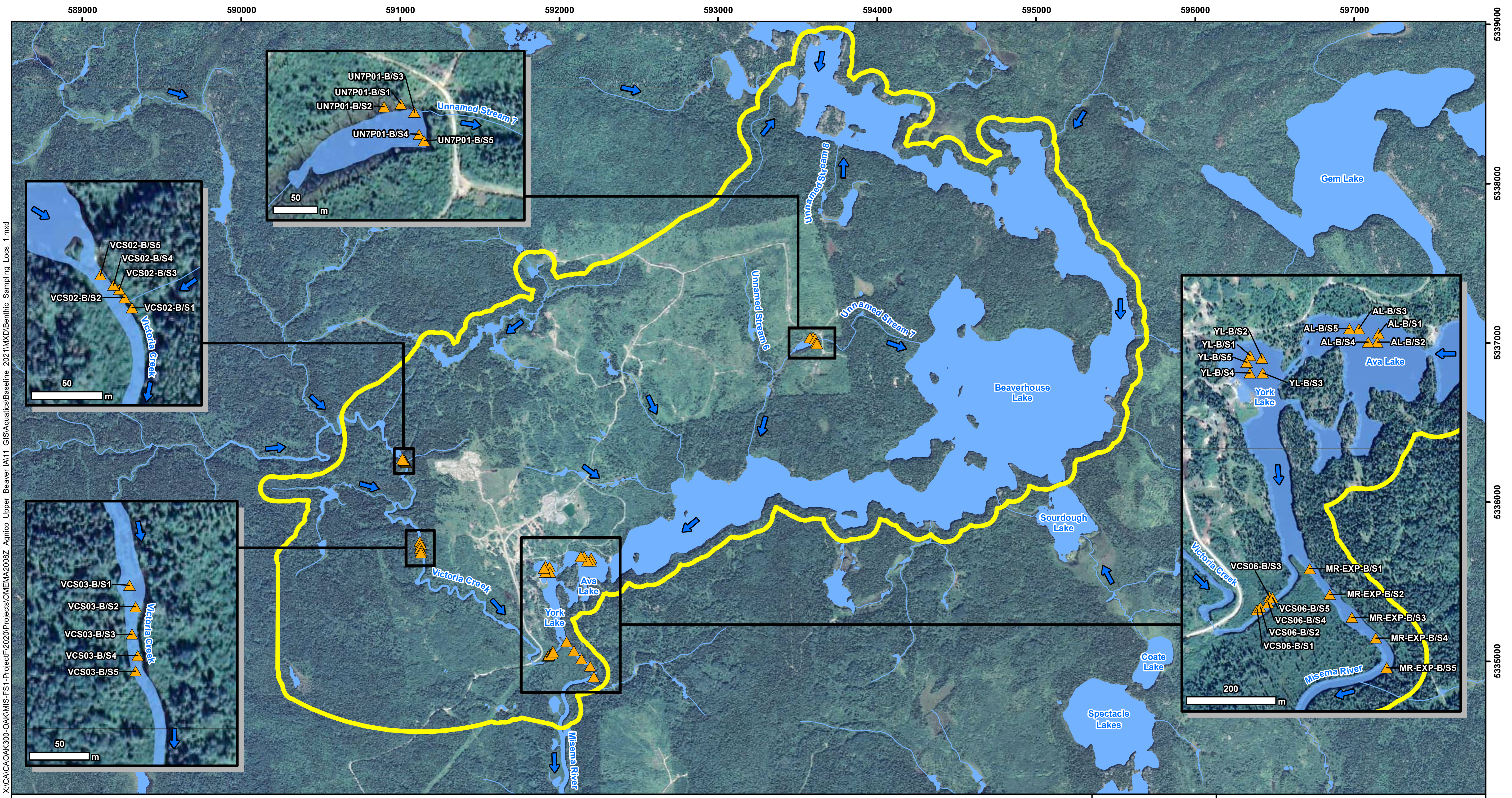
Station	Replicate	Descriptor						
		Count	TID (#/m^2)	Richness	Diversity	Evenness	% EPT	% Chiron.
Victoria Creek (VC-S06)	1	39	565	7	0.80	0.49	0.00	20.51
	2	121	1,754	6	0.59	0.22	0.83	59.50
	3	645	9,348	20	0.75	0.13	57.67	17.98
	4	362	5,246	15	0.73	0.11	3.87	43.92
	5	80	1,159	9	0.79	0.26	5.00	25.00
Mean		249	3,614	11	0.73	0.24	13.47	33.38
Median		121	1,754	9	0.75	0.22	3.87	25.00
Minimum		39	565	6	0.59	0.11	0.00	17.98
Maximum		645	9,348	20	0.80	0.49	57.67	59.50
Standard Deviation		227	3,296	5	0.07	0.14	22.18	15.91
Standard Error		102	1,474	2	0.03	0.06	9.92	7.12

SD Standard Deviation
SE Standard Error
EPT Ephemeroptera, Plecoptera, Trichoptera
Chiron Chironomids

Table F1-2: Benthic Invertebrate Community Descriptors (2021)

Family	PROPORTIONS BY AREA (%)													
	AL	SE	YL	SE	MR-EXP	SE	UNS7-PO1	SE	VC-S02	SE	VC-S03	SE	VC-S06	SE
Nemata	2.33	1.08	1.84	1.01	1.47	0.83	3.06	0.82	0.29	0.26	6.15	5.50	0.11	0.10
Dugesiidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.33
Enchytraeidae	1.66	0.97	0.00	0.00	0.44	0.39	0.80	0.71	0.00	0.00	11.17	6.02	0.00	0.00
Naididae	8.44	3.40	7.23	3.55	13.86	6.71	7.27	3.94	14.95	5.12	9.85	2.72	16.63	4.61
Lumbricidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.81	0.59	0.52	0.50	0.45
Lumbriculidae	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.72	0.00	0.00	0.00	0.00	0.22	0.20
Glossiphoniidae	0.28	0.25	0.00	0.00	0.00	0.00	0.76	0.68	0.00	0.00	0.00	0.00	0.00	0.00
Hygrobatidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.26	0.00	0.00	0.00	0.00
Lebertiidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.43
Mideopsidae	0.00	0.00	0.50	0.45	0.24	0.22	0.76	0.68	5.44	3.53	0.00	0.00	1.32	1.18
Pionidae	0.21	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.62	0.00	0.00	0.00	0.00
Unionicolidae	0.21	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ostracoda	0.21	0.18	0.00	0.00	0.44	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.45
Hyalellidae	4.02	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.36	0.00	0.00
Collembola	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.52	0.00	0.00
Dytiscidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.46	0.00	0.00
Elmidae	0.21	0.18	0.00	0.00	2.02	1.19	0.00	0.00	6.84	3.79	0.80	0.72	3.90	1.71
Ephemeroptera	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Baetidae	0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.84	0.00	0.00	1.54	1.38	0.00	0.00
Caenidae	2.18	1.07	0.00	0.00	0.00	0.00	3.70	1.90	0.00	0.00	0.00	0.00	0.00	0.00
Ephemeridae	4.59	1.20	16.95	4.31	25.35	8.67	0.00	0.00	2.32	2.07	0.00	0.00	0.00	0.00
Ephemerellidae	0.00	0.00	0.22	0.20	0.00	0.00	0.00	0.00	0.29	0.26	0.00	0.00	0.62	0.55
Heptageniidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.52	0.00	0.00	0.12	0.11
Leptophlebiidae	3.11	1.97	0.00	0.00	1.43	1.28	0.00	0.00	2.43	1.52	1.31	0.75	10.51	7.95
Metretopodidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.68	0.00	0.00	0.00	0.00
Sialidae	1.45	1.21	0.16	0.14	4.42	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Family	PROPORTIONS BY AREA (%)													
	AL	SE	YL	SE	MR-EXP	SE	UNS7-PO1	SE	VC-S02	SE	VC-S03	SE	VC-S06	SE
Aeshnidae	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Cordulegastridae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.00	0.00	0.00	0.00
Gomphidae	0.13	0.07	0.00	0.00	0.22	0.20	0.00	0.00	2.08	0.78	0.00	0.00	0.85	0.45
Libellulidae	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.08	0.00	0.00	0.00	0.00	0.00	0.00
Macromiidae	0.43	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Corixidae	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.35	0.00	0.00	0.00	0.00	0.00	0.00
Dipseudopsidae	0.00	0.00	0.51	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.25
Hydropsychidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.46	0.00	0.00
Hydroptilidae	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.35	0.00	0.00	0.00	0.00	0.50	0.44
Leptoceridae	0.49	0.27	0.73	0.44	2.00	1.53	2.65	1.65	2.86	2.56	0.00	0.00	0.30	0.21
Limnephilidae	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	1.16	1.04	5.05	2.35	0.00	0.00
Molannidae	0.57	0.25	0.44	0.40	0.12	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.16
Polycentropodidae	2.34	2.09	0.00	0.00	0.24	0.22	0.00	0.00	0.58	0.52	0.00	0.00	0.25	0.22
Psychomyiidae	0.00	0.00	0.00	0.00	0.12	0.11	0.00	0.00	0.77	0.68	0.00	0.00	0.62	0.55
Ceratopogonidae	6.03	2.95	4.17	1.87	4.47	2.31	9.65	2.19	21.83	7.38	18.10	4.73	12.08	3.01
Chaoboridae	6.96	2.83	1.49	1.10	2.35	1.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chironomidae	42.63	5.92	51.85	6.49	30.49	9.91	48.32	4.84	24.32	1.89	20.71	6.34	33.38	7.12
Tabanidae	0.00	0.00	0.00	0.00	1.87	1.24	0.00	0.00	2.29	1.30	0.00	0.00	9.43	4.94
Tipulidae	0.00	0.00	0.22	0.20	0.00	0.00	0.00	0.00	4.68	2.66	6.55	2.55	0.23	0.13
Ancylidae	0.00	0.00	0.44	0.40	0.10	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.11
Hydrobiidae	2.26	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Physidae	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.13
Planorbidae	0.41	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sphaeriidae	8.88	2.17	13.25	2.76	8.34	3.09	19.79	2.81	3.60	2.01	16.17	5.04	5.77	1.91
TOTAL	**100**		**100**		**100**		**100**		**100**		**100**		**100**	



LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction
- Benthic Invertebrate Community Sampling Location

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

AGNICO EAGLE
UPPER BEAVER PROJECT

wsp

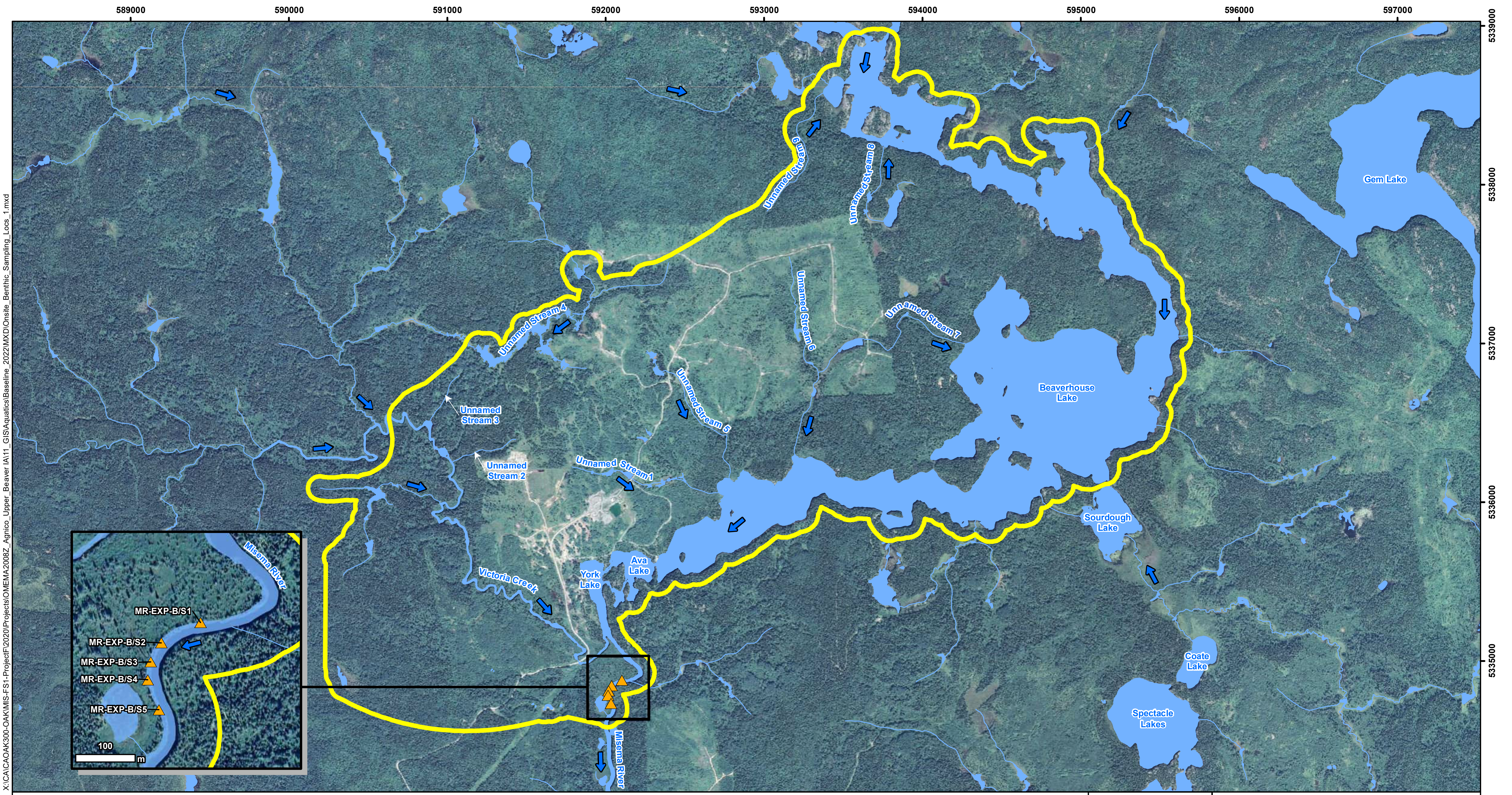
UPPER BEAVER GOLD PROJECT

Benthic Invertebrate Community Sampling Locations (2021)

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

PROJECT N°: OMEMA2008	**FIGURE: F1-1**
SCALE: 1:22,500	DATE: November 2023



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LEGEND

- Aquatic Study Area
- Watercourse
- Waterbody
- Flow Direction
- Benthic Invertebrate Community Sampling Location

NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from Google Earth Pro, 2019.

Datum: NAD83
Projection: UTM Zone 17N

0 0.5 1 2 3 4 5 Kilometres

AGNICO EAGLE UPPER BEAVER PROJECT

wsp

UPPER BEAVER PROJECT

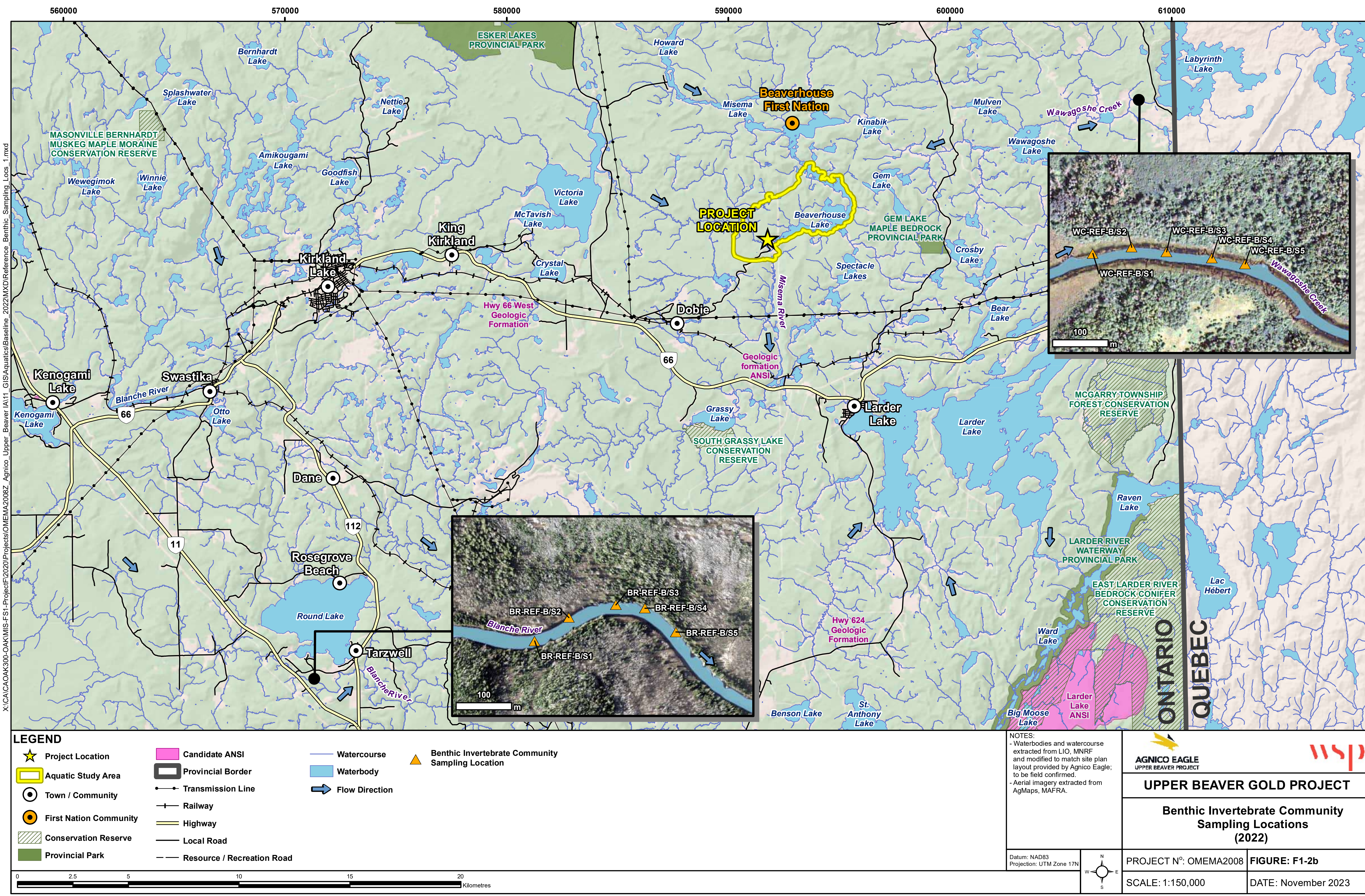
Benthic Invertebrate Community Sampling Locations (2022)

PROJECT N°: OMEMA2008

FIGURE: F1-2a

SCALE: 1:22,500

DATE: November 2023



560000
570000
580000
590000
600000
610000
5340000
5330000
5320000
ESKER LAKES PROVINCIAL PARK
Bernhardt Lake
Howard Lake
Labyrinth Lake
Splashwater Lake
Nettie Lake
Misema Lake
Beaverhouse First Nation
Kinabik Lake
Mulven Lake
Wawagoshe Creek
Wawagoshe Lake
MASONVILLE BERNHARDT MUSKEG MAPLE MORAINE CONSERVATION RESERVE
Amikougami Lake
Goodfish Lake
Wewegimok Lake
Winnie Lake
Victoria Lake
Gem Lake
McTavish Lake
PROJECT LOCATION
Beaverhouse Lake
GEM LAKE MAPLE BEDROCK PROVINCIAL PARK
King Kirkland
Crystal Lake
Crosby Lake
Kirkland Lake
Spectacle Lakes
Hwy 66 West Geologic Formation
Dobie
Misema River
Bear Lake
Geologic formation ANSI
66
Kenogami Lake
Swastika
Blanche River
Otto Lake
Grassy Lake
Larder Lake
MCGARRY TOWNSHIP FOREST CONSERVATION RESERVE
SOUTH GRASSY LAKE CONSERVATION RESERVE
Dane
Raven Lake
112
11
LARDER RIVER WATERWAY PROVINCIAL PARK
Rosegrove Beach
EAST LARDER RIVER BEDROCK CONIFER CONSERVATION RESERVE
Lac Hébert
Round Lake
Hwy 624 Geologic Formation
Ward Lake
Tarzwell
Blanche River
Larder Lake ANSI
ONTARIO
QUEBEC
Benson Lake
St. Anthony Lake
Big Moose Lake
WC-REF-B/S1
WC-REF-B/S2
WC-REF-B/S3
WC-REF-B/S4
WC-REF-B/S5
Wawagoshe Creek
100 m
BR-REF-B/S1
BR-REF-B/S2
BR-REF-B/S3
BR-REF-B/S4
BR-REF-B/S5
Blanche River
100 m
X:\CA\CAOAK300-OAK\MIS-FS1-Project\2020\Projects\OMEMA2008Z_Agnico_Upper_Beaver IA\11_GIS\Aquatics\Baseline_2022\MXD\Reference_Benthic_Sampling_Locs_1.mxd
LEGEND
Project Location
Aquatic Study Area
Town / Community
First Nation Community
Conservation Reserve
Provincial Park
Candidate ANSI
Provincial Border
Transmission Line
Railway
Highway
Local Road
Resource / Recreation Road
Watercourse
Waterbody
Flow Direction
Benthic Invertebrate Community Sampling Location
0 2.5 5 10 15 20 Kilometres
NOTES:
- Waterbodies and watercourse extracted from LIO, MNRF and modified to match site plan layout provided by Agnico Eagle; to be field confirmed.
- Aerial imagery extracted from AgMaps, MAFRA.
Datum: NAD83
Projection: UTM Zone 17N
N S E W
AGNICO EAGLE UPPER BEAVER PROJECT
wsp
UPPER BEAVER GOLD PROJECT
Benthic Invertebrate Community Sampling Locations (2022)
PROJECT N°: OMEMA2008
FIGURE: F1-2b
SCALE: 1:150,000
DATE: November 2023

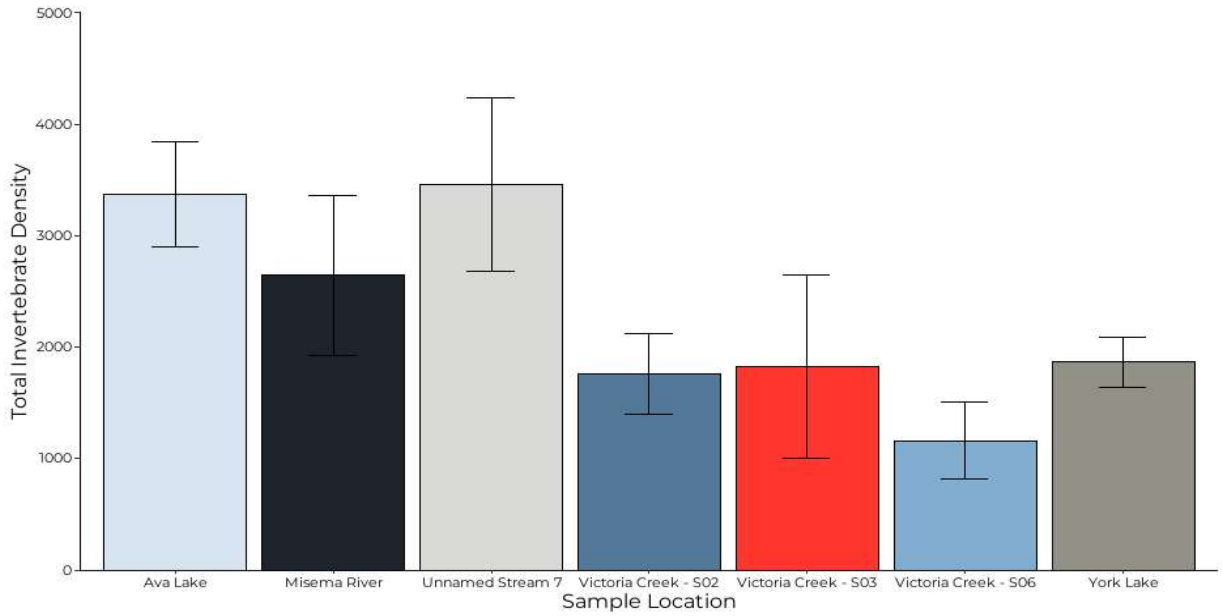


Figure F1-3: Mean Benthic Invertebrate Community Total Invertebrate Density (m^2) (± Standard Error) by Sample Location 2021

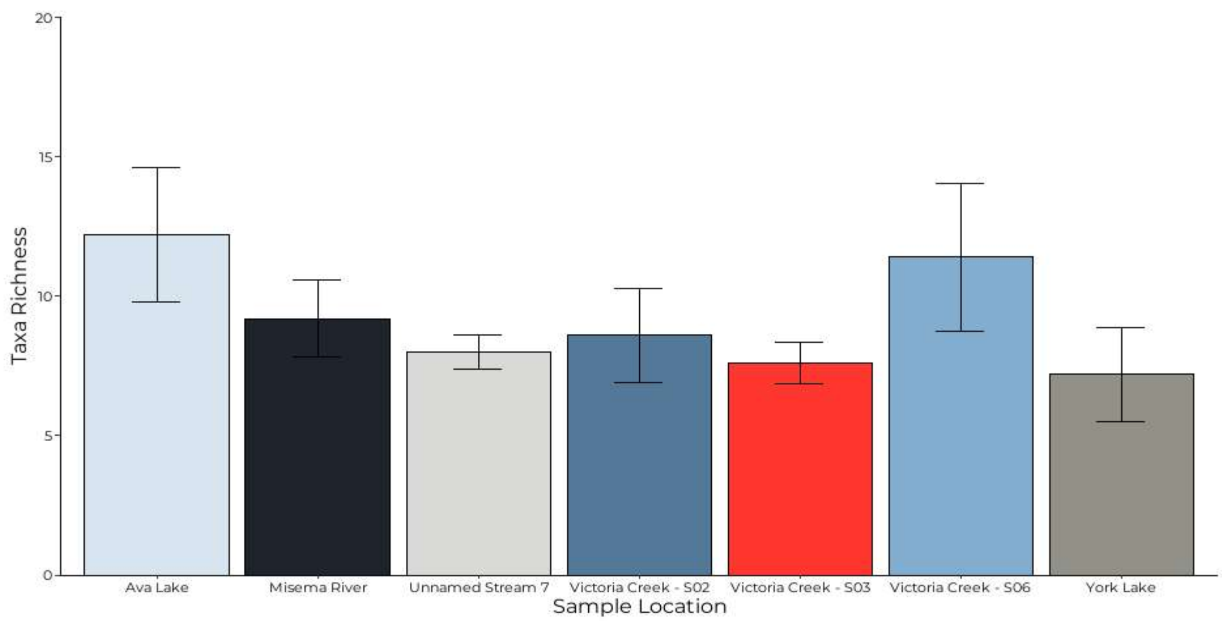


Figure F1-4: Mean Benthic Invertebrate Community Richness (± Standard Error) by Sample Location 2021

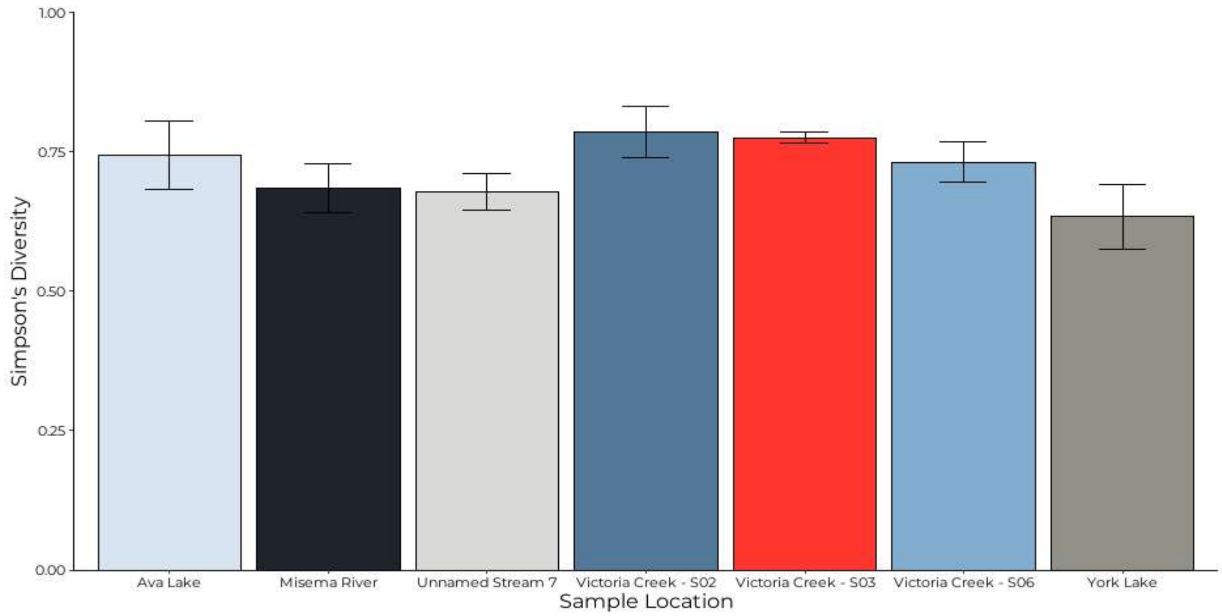


Figure F1-5: Mean Benthic Invertebrate Community Simpson's Diversity (D) (± Standard Error) by Sample Location 2021

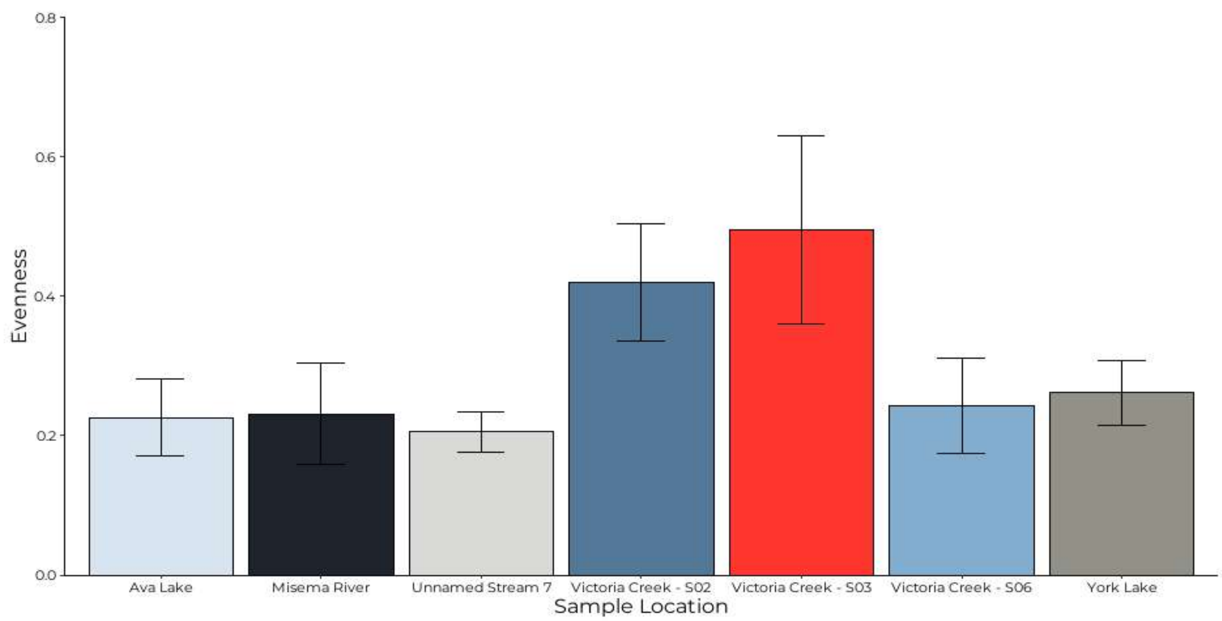


Figure F1-6: Mean Benthic Invertebrate Community Evenness (E) (± Standard Error) by Sample Location 2021

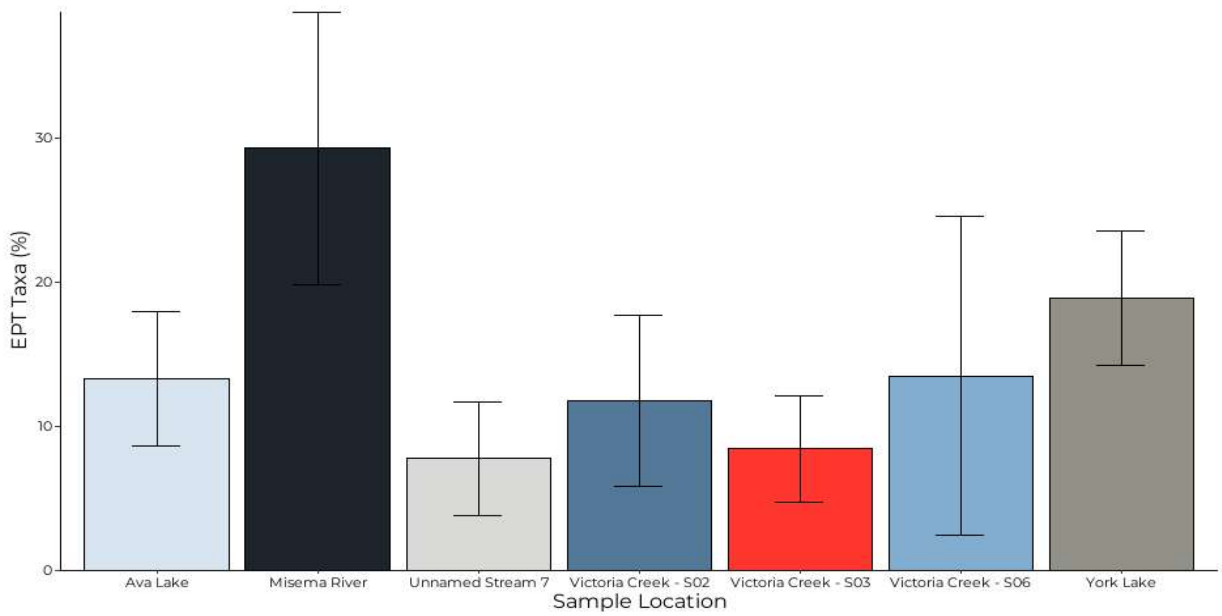


Figure F1-7: Mean Benthic Invertebrate Community EPT Taxa (%) (± Standard Error) by Sample Location 2021

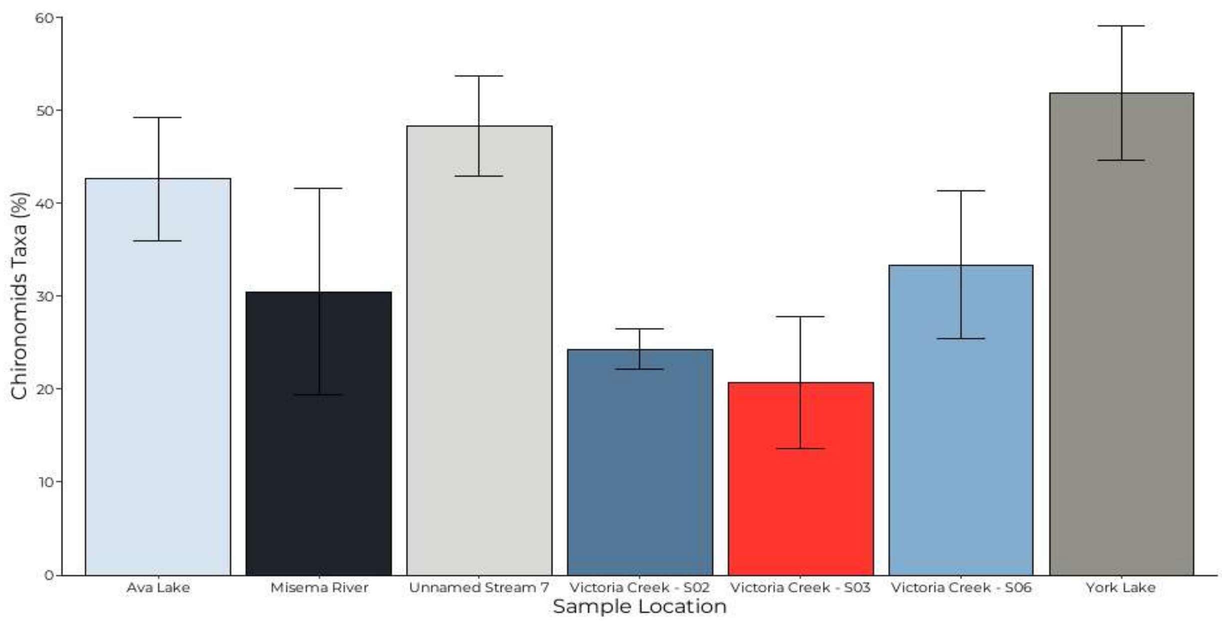


Figure F1-8: Mean Benthic Invertebrate Community Chironomids Taxa (%) (± Standard Error) by Sample Location 2021

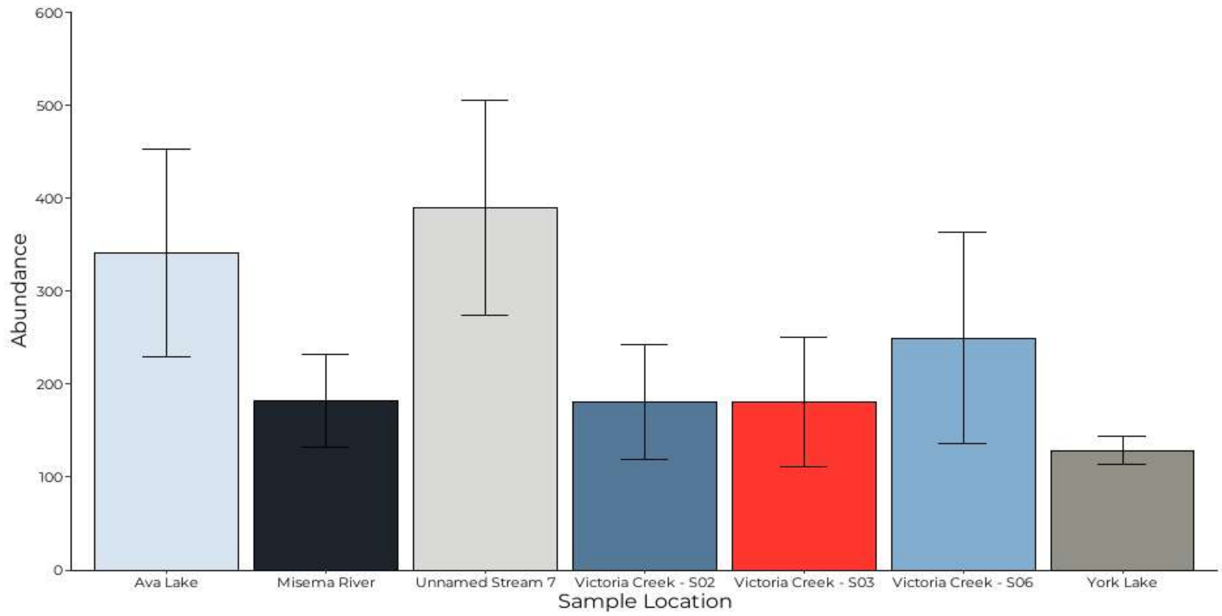


Figure F1-9: Mean Benthic Invertebrate Community Abundance (± Standard Error) by Sample Location 2021

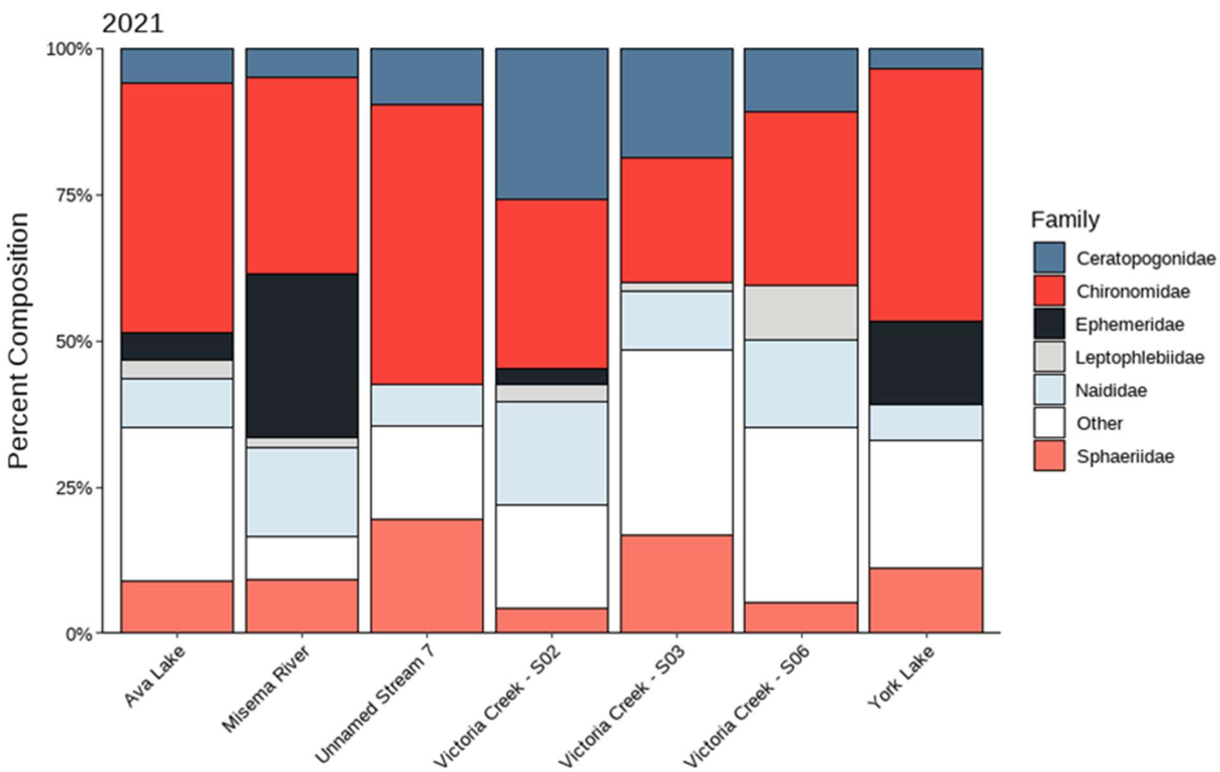


Figure F1-10: Mean Proportions of Major Benthic Invertebrate Families by Sample Location 2021

Table F2-1: Benthic Invertebrate Community Descriptors (2022)

Station	Replicate	Descriptor						
		Count	TID (#/m^2)	Richness	Diversity	Evenness	% EPT	% Chiron.
Wawagoshe Creek (WC-REF)	1	1,061	15,377	16	0.72	0.22	21.87	49.76
	2	916	13,275	13	0.72	0.27	3.71	48.91
	3	842	12,203	20	0.78	0.23	7.60	42.76
	4	667	9,667	14	0.81	0.37	2.70	31.18
	5	1,110	16,087	18	0.70	0.19	4.59	49.01
	Mean	919	13,322	16	0.75	0.26	8.09	44.32
	Median	916	13,275	16	0.72	0.23	4.59	48.91
	Minimum	667	9,667	13	0.70	0.19	2.70	31.18
	Maximum	1,110	16,087	20	0.81	0.37	21.87	49.76
	Standard Deviation	178	2,573	3	0.05	0.07	7.91	7.87
	Standard Error	79	1,151	1	0.02	0.03	3.54	3.52
Blanche River (BR-REF)	1	457	6,623	12	0.76	0.35	1.09	32.39
	2	895	12,971	28	0.84	0.22	10.95	16.98
	3	1,228	17,797	10	0.60	0.25	0.24	54.72
	4	746	10,812	13	0.83	0.44	26.01	7.51
	5	1,685	24,420	25	0.81	0.21	4.93	36.56
	Mean	1,002	14,525	18	0.77	0.29	8.64	29.63
	Median	895	12,971	13	0.81	0.25	4.93	32.39
	Minimum	457	6,623	10	0.60	0.21	0.24	7.51
	Maximum	1,685	24,420	28	0.84	0.44	26.01	54.72
	Standard Deviation	472	6,842	8	0.10	0.10	10.58	18.27
	Standard Error	211	3,060	4	0.04	0.04	4.73	8.17
Misema River (MR-EXP)	1	643	9,319	17	0.76	0.25	13.69	42.30
	2	396	5,739	13	0.71	0.26	11.11	49.49
	3	464	6,725	8	0.74	0.49	8.62	36.21
	4	481	6,971	12	0.69	0.27	6.65	50.10
	5	890	12,899	9	0.51	0.23	3.60	67.42
	Mean	575	8,330	12	0.68	0.30	8.73	49.10
	Median	481	6,971	12	0.71	0.26	8.62	49.49
	Minimum	396	5,739	8	0.51	0.23	3.60	36.21
	Maximum	890	12,899	17	0.76	0.49	13.69	67.42
	Standard Deviation	198	2,872	4	0.10	0.11	3.90	11.72
	Standard Error	89	1,284	2	0.04	0.05	1.75	5.24

SD Standard Deviation
SE Standard Error
EPT Ephemeroptera, Plecoptera, Trichoptera
Chiron Chironomids

Table F2-2: Benthic Invertebrate Community Descriptors (2022)

Family	PROPORTIONS BY AREA (%)					
	MR-EXP	SE	WC-REF	SE	BR-REF	SE
Acroloxidae	0.00	0.00	0.19	0.17	0.00	0.00
Belostomatidae	0.00	0.00	0.00	0.00	0.02	0.02
Caenidae	0.33	0.30	3.49	2.60	0.37	0.25
Calopterygidae	0.00	0.00	0.00	0.00	0.18	0.16
Ceratopogonidae	7.69	1.08	2.98	0.93	0.00	0.00
Chironomidae	48.16	4.84	44.32	3.15	29.63	7.31
Chrysomelidae	0.00	0.00	0.29	0.26	0.00	0.00
Coenagrionidae	0.00	0.00	0.67	0.37	0.18	0.16
Cordulegastridae	0.05	0.03	0.00	0.00	0.00	0.00
Corduliidae	0.00	0.00	0.37	0.31	0.00	0.00
Corixidae	0.00	0.00	0.00	0.00	0.09	0.08
Crambidae	0.00	0.00	0.00	0.00	0.09	0.08
Crangonyctidae	0.00	0.00	0.42	0.33	0.09	0.08
Dipseudopsidae	0.00	0.00	1.57	0.76	0.08	0.04
Dugesiidae	0.00	0.00	0.00	0.00	1.36	0.42
Dytiscidae	0.00	0.00	0.02	0.02	0.00	0.00
Elmidae	1.71	1.12	0.00	0.00	3.18	0.45
Enchytraeidae	0.00	0.00	0.00	0.00	0.19	0.17
Empididae	0.45	0.25	0.00	0.00	0.00	0.00
Ephemeridae	4.27	0.69	0.28	0.15	0.08	0.04
Glossiphoniidae	0.00	0.00	0.00	0.00	0.03	0.02
Gomphidae	0.23	0.18	0.03	0.03	0.27	0.19
Harpacticoida	0.00	0.00	0.00	0.00	1.04	0.59
Hyalellidae	0.00	0.00	2.69	0.90	0.64	0.39
Hydrobiidae	0.00	0.00	12.86	2.54	2.41	1.08
Hydrophilidae	0.00	0.00	0.00	0.00	0.09	0.09
Hydropsychidae	0.00	0.00	0.00	0.00	0.76	0.17
Hydroptilidae	0.45	0.25	0.00	0.00	0.18	0.10
Leptoceridae	1.23	0.47	0.19	0.17	0.38	0.15
Leptophlebiidae	0.65	0.37	1.88	0.69	0.00	0.00
Libellulidae	0.00	0.00	0.00	0.00	0.42	0.30
Limnephilidae	0.00	0.00	0.48	0.43	0.00	0.00
Lumbriculidae	0.00	0.00	0.00	0.00	0.09	0.09
Macromiidae	0.39	0.29	0.00	0.00	0.00	0.00
Mideopsidae	0.50	0.45	2.02	0.66	0.26	0.16
Naididae	23.21	2.28	5.13	1.08	25.10	3.72
Nemata	1.09	0.55	1.75	0.47	1.98	1.30
Nemertea	0.00	0.00	0.00	0.00	1.67	0.57
Ostracoda	0.34	0.31	1.37	0.58	8.13	2.94
Phryganeidae	0.00	0.00	0.21	0.17	0.02	0.02
Planorbidae	0.00	0.00	2.15	0.85	0.00	0.00
Physidae	0.00	0.00	0.00	0.00	0.37	0.25
Polycentropodidae	1.79	1.03	0.00	0.00	6.77	4.14
Sialidae	0.58	0.32	0.08	0.07	1.40	0.60
Simuliidae	0.00	0.00	0.00	0.00	0.18	0.16

Family	PROPORTIONS BY AREA (%)					
	MR-EXP	SE	WC-REF	SE	BR-REF	SE
Sphaeriidae	6.02	0.96	11.83	3.05	12.05	2.89
Tabanidae	0.49	0.24	0.02	0.02	0.03	0.02
Tipulidae	0.00	0.00	1.05	0.66	0.00	0.00
Unionicolidae	0.34	0.31	0.48	0.43	0.00	0.00
Unionidae	0.00	0.00	0.02	0.02	0.00	0.00
Valvatidae	0.00	0.00	1.16	0.48	0.36	0.23
TOTAL	**100**		**100**		**100**	

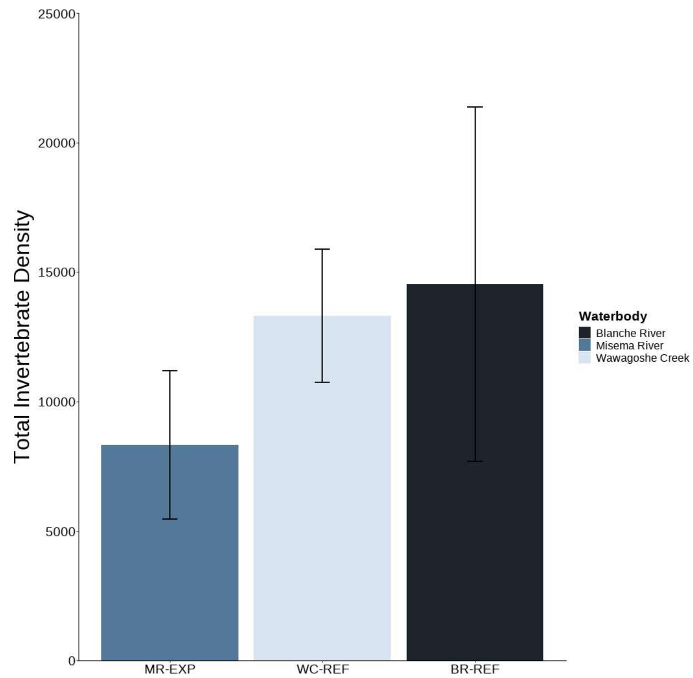


Figure F2-1: Mean Benthic Invertebrate Community Total Invertebrate Density (m^2) (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

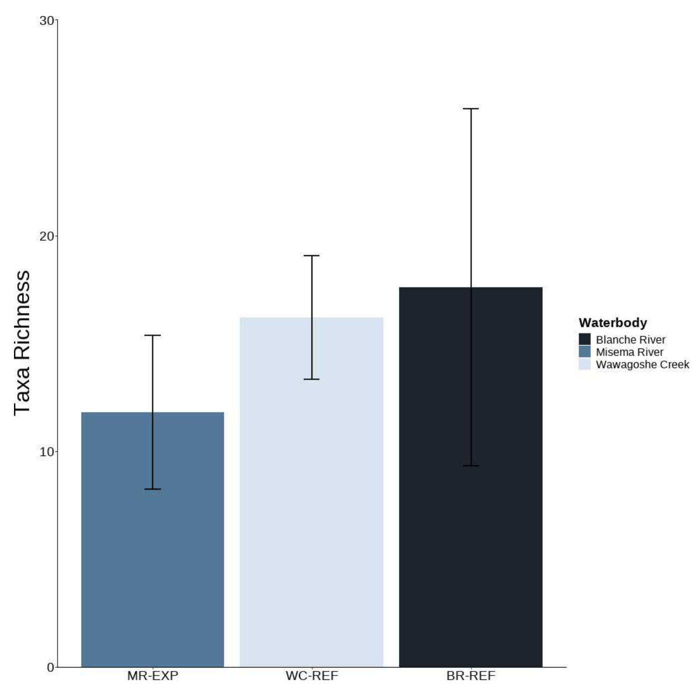


Figure F2-2: Mean Benthic Invertebrate Community Richness (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

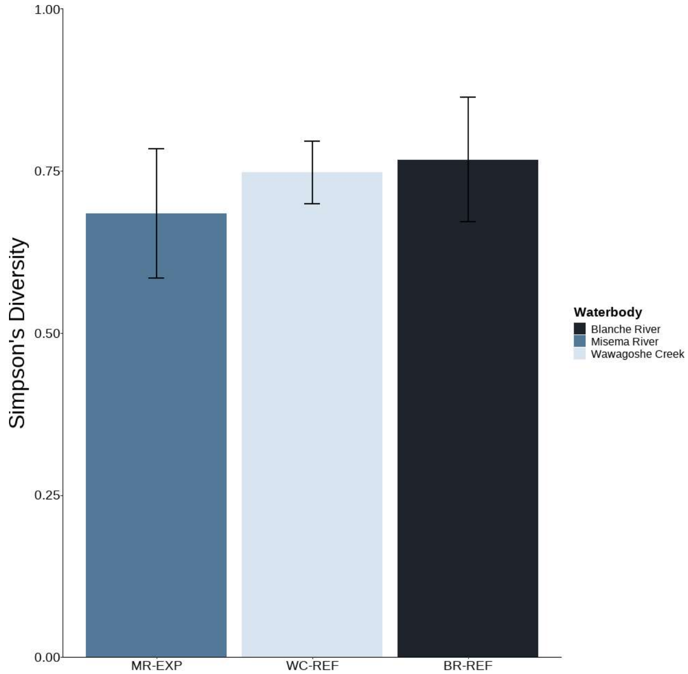


Figure F2-3: Mean Benthic Invertebrate Community Simpson's Diversity (D) (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

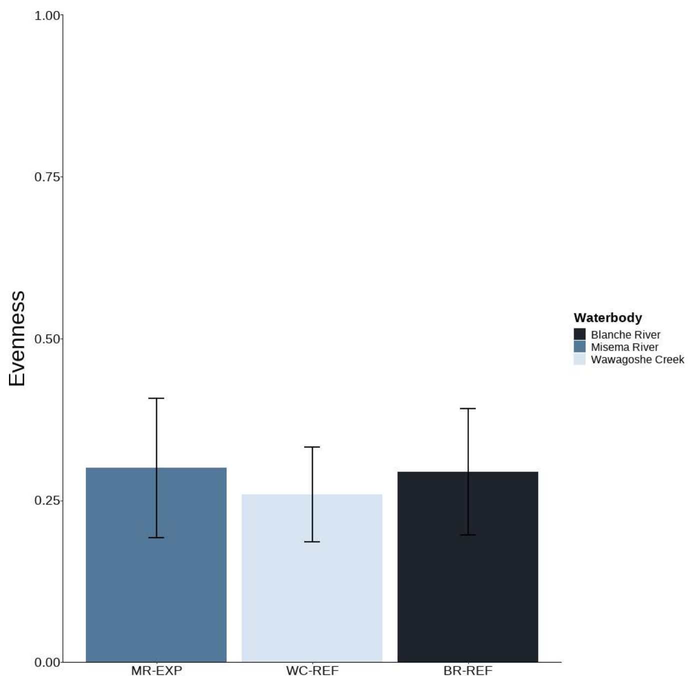


Figure F2-4: Mean Benthic Invertebrate Community Evenness (E) (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

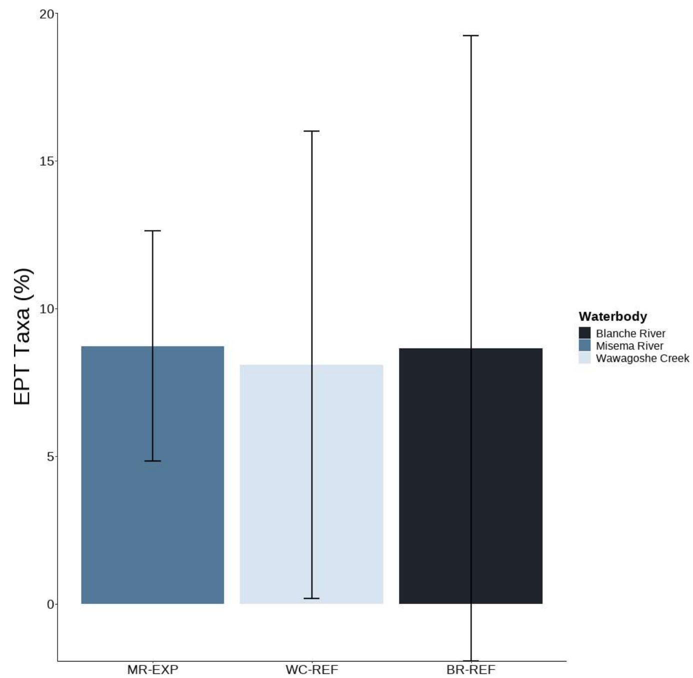


Figure F2-5: Mean Benthic Invertebrate Community EPT Taxa (%) (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

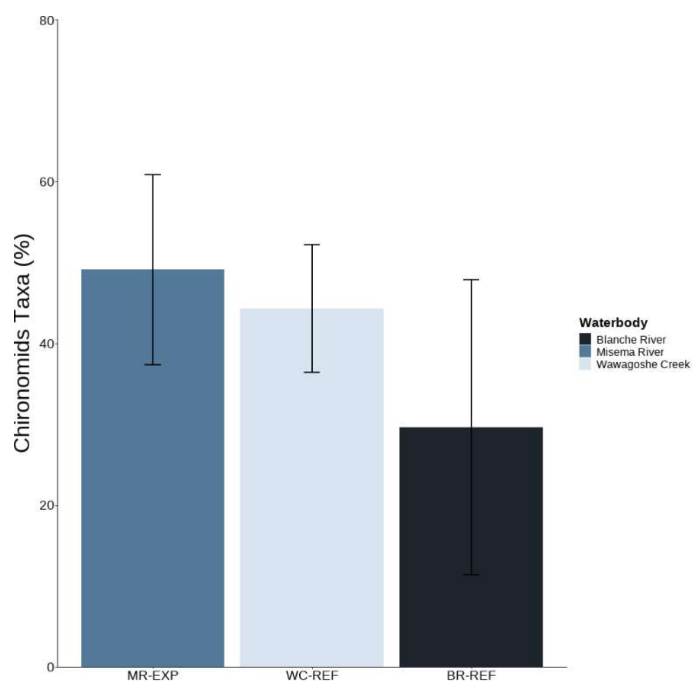


Figure F2-6: Mean Benthic Invertebrate Community Chironomids Taxa (%) (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

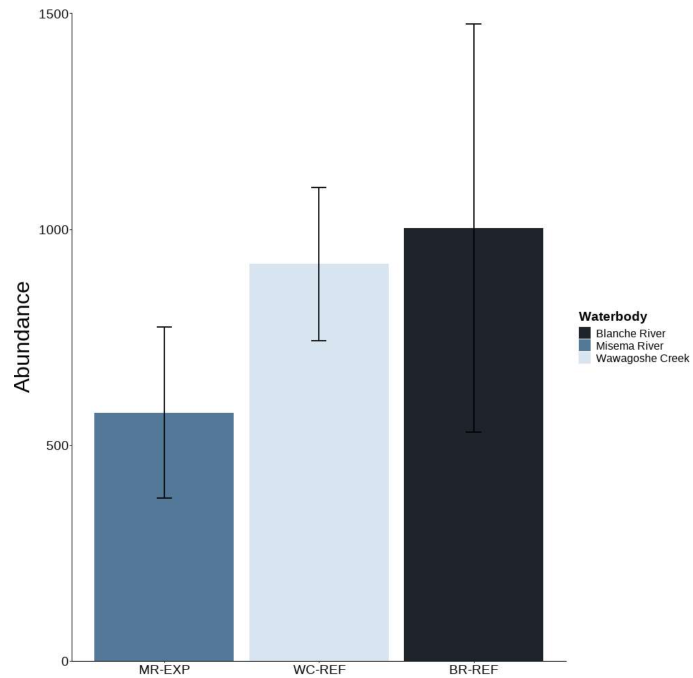


Figure F2-7: Mean Benthic Invertebrate Community Abundance (± Standard Error) of Wawagoshe Creek, Blanche River and Misema River October 2022

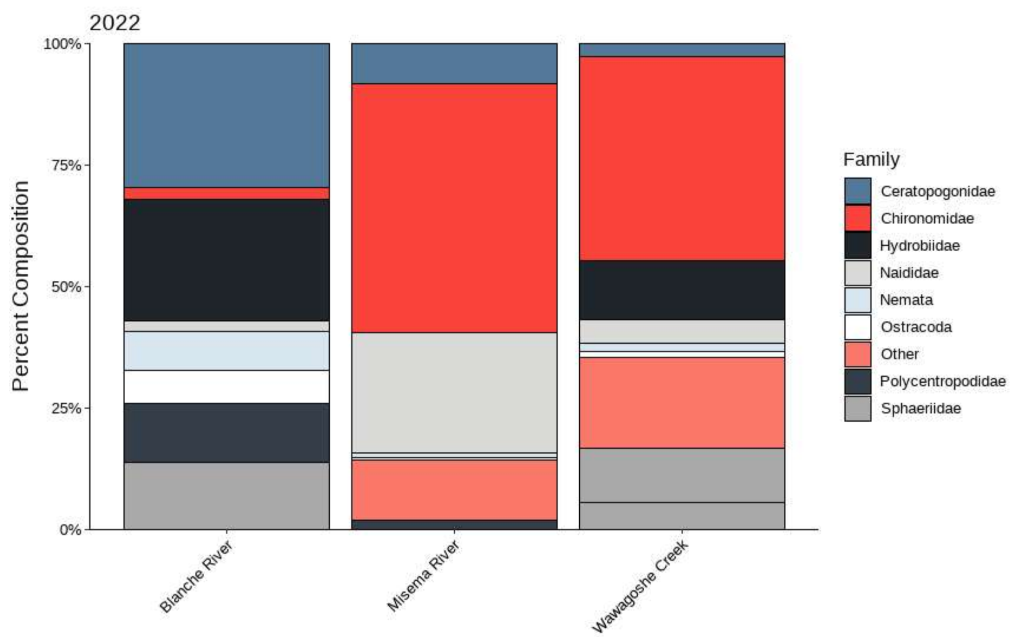


Figure F2-8: Mean Proportions of Major Benthic Invertebrate Families for Each Sampling Area 2022

APPENDIX G

Data Quality Assurance and Control Assessments

Table G1-1: Sediment Quality Results – Quality Assurance and Control (2021)

Client Sample ID		YORK-S4	DUP-01	Meets RPD Detection Limit Trigger?	RPD	MR-EXP-S5	DUP-2	Meets RPD Detection Limit Trigger?	RPD	MR-EXP-S1	DUP-3	Meets RPD Detection Limit Trigger?	RPD	AL-S1	DUP-4	Meets RPD Detection Limit Trigger?	RPD
Date Sampled		26-Sep-2021	26-Sep-2021			28-Sep-2021	28-Sep-2021			2-Oct-2021	2-Oct-2021			2-Oct-2021	2-Oct-2021		
Time Sampled		17:00	0:00			11:30	0:00			9:20	0:00			15:20	0:00		
Parameter	Lowest Detection Limit	Wood	Wood			Wood	Wood			Wood	Wood			Wood	Wood		
Physical Tests																	
Loss on Ignition @ 550 C (as %)	1	28	15	YES	**60.47**	6	6	YES	0.00	6	6	YES	0.00	77	57	YES	29.85
pH (1:2 soil:water) as pH units	0.10	6.01	6.04	YES	0.50	6.77	6.75	YES	0.30	6.54	6.47	YES	1.08	5.79	5.97	YES	3.06
Particle Size (as % composition)																	
Gravel (4.75mm - 3in.)	1.0	<1.0	<1.0				<1.0				<1.0				<1.0		
Medium Sand (0.425mm - 2.0mm)	1.0	3.8	3.6	YES	5.41	<1.0	<1.0			1.3	<1.0			1.1	1.2	NO	
Coarse Sand (2.0mm - 4.75mm)	1.0	<1.0	<1.0			<1.0	<1.0			<1.0	<1.0			<1.0	<1.0		
Fine Sand (0.075mm - 0.425mm)	1.0	65.7	66.5	YES	1.21	6.0	6.6	YES	9.52	20.0	21.5	YES	7.23	19.8	23.5	YES	17.09
Silt (0.002mm - 0.075mm)	1.0	26.5	25.2	YES	5.03	85.0	83.1	YES	2.26	72.6	66.4	YES	8.92	68.2	55.4	YES	20.71
Silt (0.005mm - 0.075mm)	1.0	25.3	22.3	YES	12.61	76.9	75.2	YES	2.24	66.7	62.2	YES	6.98	66.5	54.1	YES	20.56
Clay (<0.002mm)	1.0	4.0	4.8	YES	18.18	9.0	10.3	YES	13.47	5.9	10.3	YES	**54.32**	11.0	19.9	YES	**57.61**
Clay (<0.005mm)	1.0	5.2	7.6	YES	**37.50**	17.1	18.1	YES	5.68	11.8	14.5	YES	20.53	12.7	21.1	YES	**49.70**
Nutrients and Organics																	
Total Kjeldahl Nitrogen (as %)	0.020	0.346	0.341	YES	1.46	0.143	0.144	YES	0.70	0.065	0.158	YES	**83.41**	0.58	0.60	YES	3.39
Total Organic Carbon (as %)	0.050	8.14	3.07	YES	**90.45**	3.34	2.88	YES	14.79	3.43	2.9	YES	16.75	24.4	28.2	YES	14.45
Metals																	
Aluminum (Al)	50	11800	11600	YES	1.71	9500	11500	YES	19.05	9270	10300	YES	10.53	6480	7410	YES	13.39
Antimony (Sb)	0.10	1.04	1.11	YES	6.51	<0.10	<0.10			0.11	<0.10			0.46	0.45	YES	2.20
Arsenic (As)	0.10	3.79	3.37	YES	11.73	1.69	1.96	YES	14.79	1.70	1.76	YES	3.47	5.37	4.67	YES	13.94
Barium (Ba)	0.50	46.4	41.7	YES	10.67	54.7	62.8	YES	13.79	56.6	59.4	YES	4.83	46.2	43.1	YES	6.94
Beryllium (Be)	0.10	0.30	0.26	NO		0.23	0.30	NO		0.22	0.25	NO		0.23	0.24	NO	
Bismuth (Bi)	0.20	0.74	0.65	YES	12.95	<0.20	<0.20			<0.20	<0.20			<0.20	<0.20		
Boron (B)	5.0	<5.0	<5.0			<5.0	<5.0			<5.0	<5.0			<5.0	<5.0		
Cadmium (Cd)	0.020	0.436	0.308	YES	**34.41**	0.119	0.138	YES	14.79	0.121	0.123	YES	1.64	2.08	1.70	YES	20.11
Calcium (Ca)	50	4870	4250	YES	13.60	5030	6080	YES	18.90	4790	4890	YES	2.07	9920	8850	YES	11.40
Chromium (Cr)	0.50	41.3	40.9	YES	0.97	35.1	41.1	YES	15.75	32.3	35.0	YES	8.02	19.7	21.6	YES	9.20
Cobalt (Co)	0.10	12.2	11.3	YES	7.66	6.33	7.19	YES	12.72	5.93	6.30	YES	6.05	6.49	6.86	YES	5.54
Copper (Cu)	0.50	358	311	YES	14.05	16.4	18.6	YES	12.57	19.1	19.6	YES	2.58	47.8	49.1	YES	2.68
Iron (Fe)	50	27000	26600	YES	1.49	12200	14400	YES	16.54	11200	12100	YES	7.73	11000	11400	YES	3.57
Lead (Pb)	0.50	11.9	9.71	YES	20.27	3.90	4.53	YES	14.95	4.02	4.09	YES	1.73	32.2	53.8	YES	**50.23**
Lithium (Li)	2.0	11.2	10.9	YES	2.71	10.9	12.9	YES	16.81	10.4	11.0	YES	5.61	4.3	5.1	NO	
Magnesium (Mg)	20	7650	7620	YES	0.39	4540	5320	YES	15.82	4300	4640	YES	7.61	3210	3520	YES	9.21
Manganese (Mn)	1.0	381	333	YES	13.45	410	473	YES	14.27	400	389	YES	2.79	1020	1020	YES	0.00

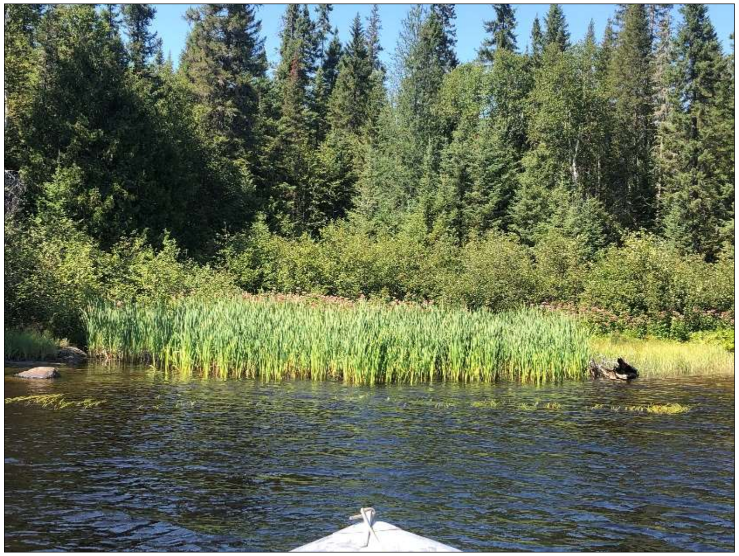
Client Sample ID		YORK-S4	DUP-01	Meets RPD Detection Limit Trigger?	RPD	MR-EXP-S5	DUP-2	Meets RPD Detection Limit Trigger?	RPD	MR-EXP-S1	DUP-3	Meets RPD Detection Limit Trigger?	RPD	AL-S1	DUP-4	Meets RPD Detection Limit Trigger?	RPD
Date Sampled		26-Sep-2021	26-Sep-2021			28-Sep-2021	28-Sep-2021			2-Oct-2021	2-Oct-2021			2-Oct-2021	2-Oct-2021		
Time Sampled		17:00	0:00			11:30	0:00			9:20	0:00			15:20	0:00		
Parameter	Lowest Detection Limit	Wood	Wood			Wood	Wood			Wood	Wood			Wood	Wood		
Mercury (Hg)	0.0050	0.859	1.37	YES	**45.85**	0.0296	0.0308	YES	3.97	0.0351	0.0310	YES	12.41	0.150	0.185	YES	20.90
Molybdenum (Mo)	0.10	28.5	31.2	YES	9.05	0.37	0.42	YES	12.66	0.54	0.58	YES	7.14	1.12	1.10	YES	1.80
Nickel (Ni)	0.50	31.1	30.2	YES	2.94	19.0	21.8	YES	13.73	17.9	18.6	YES	3.84	18.5	19.8	YES	6.79
Phosphorus (P)	50	540	474	YES	13.02	416	462	YES	10.48	348	372	YES	6.67	316	383	YES	19.17
Potassium (K)	100	550	520	YES	5.61	930	1090	YES	15.84	750	800	YES	6.45	340	370	YES	8.45
Selenium (Se)	0.20	0.43	0.36	NO		<0.20	<0.20			<0.20	<0.20			1.09	0.98	YES	10.63
Silver (Ag)	0.10	0.31	0.18	NO		<0.10	<0.10			<0.10	<0.10			<0.10	<0.10		
Sodium (Na)	50	100	97	NO		230	298	YES	25.76	199	198	YES	0.50	113	110	NO	
Strontium (Sr)	0.50	20.2	17.9	YES	12.07	26.3	30.8	YES	15.76	25.5	26.1	YES	2.33	28.3	25.5	YES	10.41
Sulfur (S)	1000	1200	<1000			<1000	<1000			<1000	<1000			5900	5100	YES	14.55
Thallium (Tl)	0.050	0.092	0.076	NO		0.073	0.088	NO		0.075	0.071	NO		0.189	0.172	YES	9.42
Tin (Sn)	1.0	3.0	2.1	NO		<1.0	<1.0			<1.0	<1.0			1.3	3.4	NO	
Titanium (Ti)	1.0	884	828	YES	6.54	726	920	YES	23.57	735	713	YES	3.04	363	376	YES	3.52
Tungsten (W)	0.50	4.83	5.84	YES	18.93	<0.50	<0.50			<0.50	<0.50			1.34	0.67	NO	
Uranium (U)	0.050	0.380	0.330	YES	14.08	0.468	0.546	YES	15.38	0.477	0.496	YES	3.91	0.415	0.418	YES	0.72
Vanadium (V)	0.20	61.7	60.4	YES	2.13	24.8	29.5	YES	17.31	25.2	27.5	YES	8.73	24.2	25.0	YES	3.25
Zinc (Zn)	2.0	50.4	46.3	YES	8.48	30.5	35.3	YES	14.59	30.2	30.9	YES	2.29	67.3	63.6	YES	5.65
Zirconium (Zr)	1.0	2.1	2.1	NO		4.8	5.3	YES	9.90	3.3	3.4	NO		2.1	1.7	NO	

YES denotes that the average of the two sample concentrations was greater than 5x the requested detection limit (RDL)
< denotes values that were less than the RDL
Bold values indicate RPD values that were greater than 30%

APPENDIX H

Photographic Site Record

Site overview of UNS6-P02 (20 Aug 2021)



Emergent vegetation and shrub dominated shoreline (16 Aug 2021)

Clear tannin-coloured water (16 Aug 2021)

Example of native freshwater mussel (*Lampsilis sp.*) (16 Aug 2021)

Plate H1-1: Sample Area UNS6-S02

Site overview facing upstream (22 Sep 2021)

Site overview facing bank (22 Sep 2021)

Collection of three ponar grab samples (23 Sep 2021)

Clear tannin-coloured water (22 Sep 2021)

Plate H1-2: Sample Area VC-S06

Shrub-dominated banks line the creek of VC-S02 (23 Sep 2021)

Collection of three ponar grab samples of VC-S02 (23 Sep 2021)

Site overview facing downstream of VC-S01 (26 Sep 2021)

Site overview facing left bank of VC-S01 (26 Sep 2021)

Plate H1-3: Sample Area VC-S02 and VC-S01

Spruce-dominated forest surrounding BL-05 (16 Aug 2021)

Island adjacent to sample area BL-05 (16 Aug 2021)

Site overview facing bank of BL-04 (01 Oct 2021)

Site overview of BL-04 (01 Oct 2021)

Plate H1-4: Sample Area BL-05 and BHL-04

Site overview of BL-North (01 Oct 2021)

Large rocks and sedges line the banks of BL-North (30 Sep 2021)

Site overview facing bank of UNS8-S02 (30 Sep 2021)

Site overview facing bank of UNS8-S02 (30 Sep 2021)

Plate H1-5: Sample Area BL-North and UNS8-S02

Site overview of UNS7-P01 (25 Sep 2021)

Route leading to UNS7-P01 (25 Sep 2021)

Emergent vegetation transitioning to stream UNS7-S02 (16 Aug 2021)

Site overview facing bank of UNS7-S01 (14 Aug 2021)

Plate H1-6: Sample Area UNS7


Site overview facing upstream VC-P01 (26 Sep 2021)


Rapids pouring into VC-P01 (26 Sep 2021)

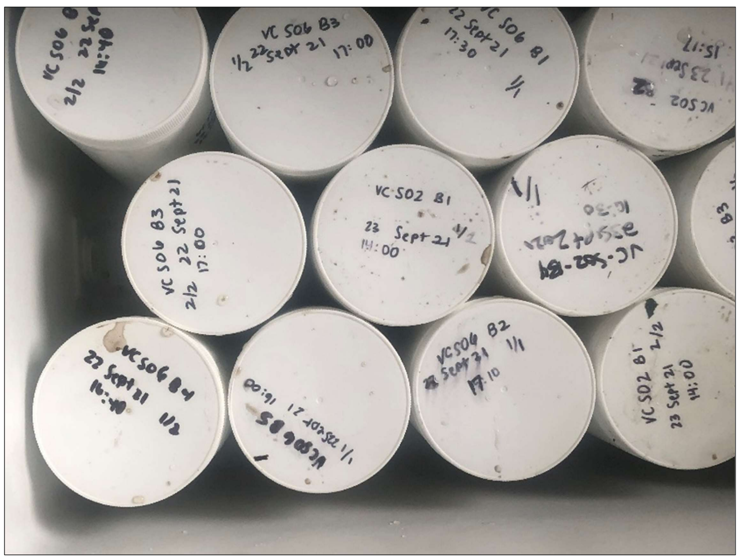

Overhanging shrubs line the banks of VC-S03 (25 Sep 2021)


Collection of three ponar grab samples from VC-S03 (25 Sep 2021)

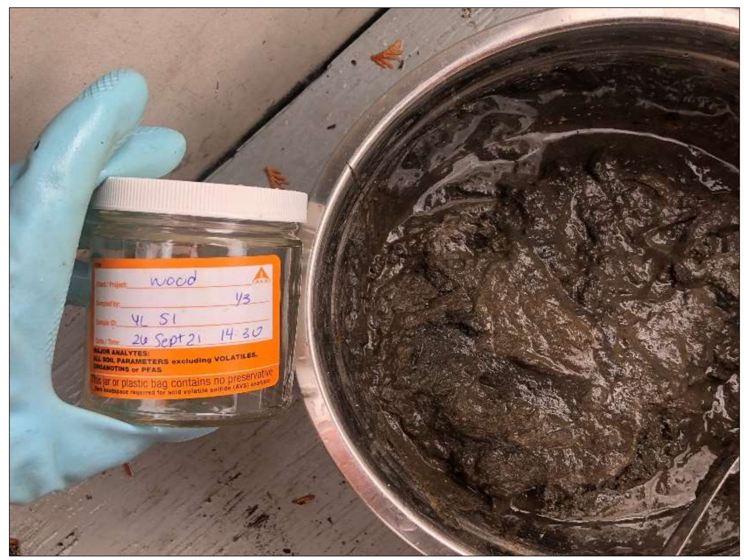
Plate H1-7: Sample Area VC-P01 and VC-S03

Northern Pike captured from gillnet (17 Aug 2021)

Juvenile Yellow Perch captured in a minnow trap (18 Aug 2021)



Transportation and storage of samples (26 Sep 2021)



Collection of three ponar grab samples York Lake (26 Sep 2021)

Plate H1-8: Sample Collection Photos

Site overview facing east (Spring 2022)

Site overview facing north (Spring 2022)

Site overview facing north (Fall 2022)

Sediment sample collected Fall 2022

Plate H2-1: Misema River (MR-EXP)

Site overview facing southwest (Fall 2022)

Site overview facing southeast (Fall 2022)

Site overview facing west (Fall 2022)

Site overview facing northeast (Fall 2022)

Plate H2-2: Blanche River (BR-REF)

Site overview facing northeast (Fall 2022)

Site overview facing northwest (Fall 2022)

Emergent grasses transitioning to marsh (Fall 2022)

Mixed deciduous and coniferous forest line creek edge (Fall 2022)

Plate H2-3: Wawagoshe Creek (WC-REF)

Site overview of Ava Lake facing northeast (Spring 2022)

Site overview of York Lake facing boat launch (southeast) (Spring 2022)

Steep rock cliffs lining shore of Beaverhouse Lake (Spring 2022)

Tumour observed on one walleye (*Sander vitreus*) (Fall 2022)

Plate H2-4: Ava Lake, York Lake and Beaverhouse Lake

Site overview of UNS6 facing southwest (Spring 2022)

Site overview of VC-P01 facing west (Spring 2022)

Emergent woody debris and vegetation at UNS7-P01 (Fall 2022)

Site overview of BP-S03 facing west (Fall 2022)

Plate H2-5: Unnamed Streams, Beaver Ponds and Victoria Creek

Site overview facing east (Spring 2023)

Site overview facing east (Spring 2023)

Site overview facing east (Spring 2023)

Site overview facing east (Spring 2023)

Plate H3-1: Unnamed Stream 1 (UNS1)

Shallow stream with mucky bottom (Spring 2023)

Pool downstream of culvert on west side of Unnamed Road (Spring 2023)

Sections of stream dry up in Summer (2023)

Shallow stream with dense overhanging canopy (Summer 2023)

Plate H3-2: Unnamed Stream 2 (UNS2)

Site overview facing northeast (Spring 2023)

Site overview facing northwest (Spring 2023)

Site overview facing northeast (Summer 2023)

Heavy instream vegetation and deciduous forest line pond edge (Summer 2023)

Plate H3-3: Unnamed Stream 3 (UNS3)

Site overview facing west (Spring 2023)

Site overview facing north (Spring 2023)

Site overview facing west (Summer 2023)

Site overview facing west (Summer 2023)

Plate H3-4: Unnamed Stream 4 (UNS4)


Site overview of UNS4-BP facing west (Spring 2023)


Site overview of UNS4-BP facing east (Spring 2023)


Site overview of UNS4-ET facing west (Summer 2023)


Site overview of UNS4-ET facing southwest (Summer 2023)

Plate H3-5: Unnamed Stream 4 Beaver Pond and Unnamed Stream 4 East Tributary (UNS4-BP and UNS4-ET)


Stream goes underground through dense coniferous forest (Spring 2023)


Shallow stream flows into wetland (Spring 2023)


Stream dries up in Summer (2023)


Small, shallow pools do not provide sufficient fish habitat (Summer 2023)

Plate H3-6: Unnamed Stream 5 (UNS5)


Ava Lake rapids flowing into York Lake (May 2 2023)


Shallow stream flows into wetland (May 16 2023)


Beaverhouse Lake rapids flowing into Ava Lake (May 3 2023)


Beaverhouse Lake rapids flowing into Ava Lake (May 17 2023)

Plate H3-7: York Lake and Ava Lake (YL and AL)

Example of Walleye eggs captured on Egg Mats (Spring 2023)

Example of habitat assessments conducted at Stream 4 (Spring 2023)

Egg mats ready for deployment (Spring 2023)

Example of Creek Chub (*Semotilus atromaculatus*) captured in minnow traps

Plate H3-8: Aquatic Resources

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