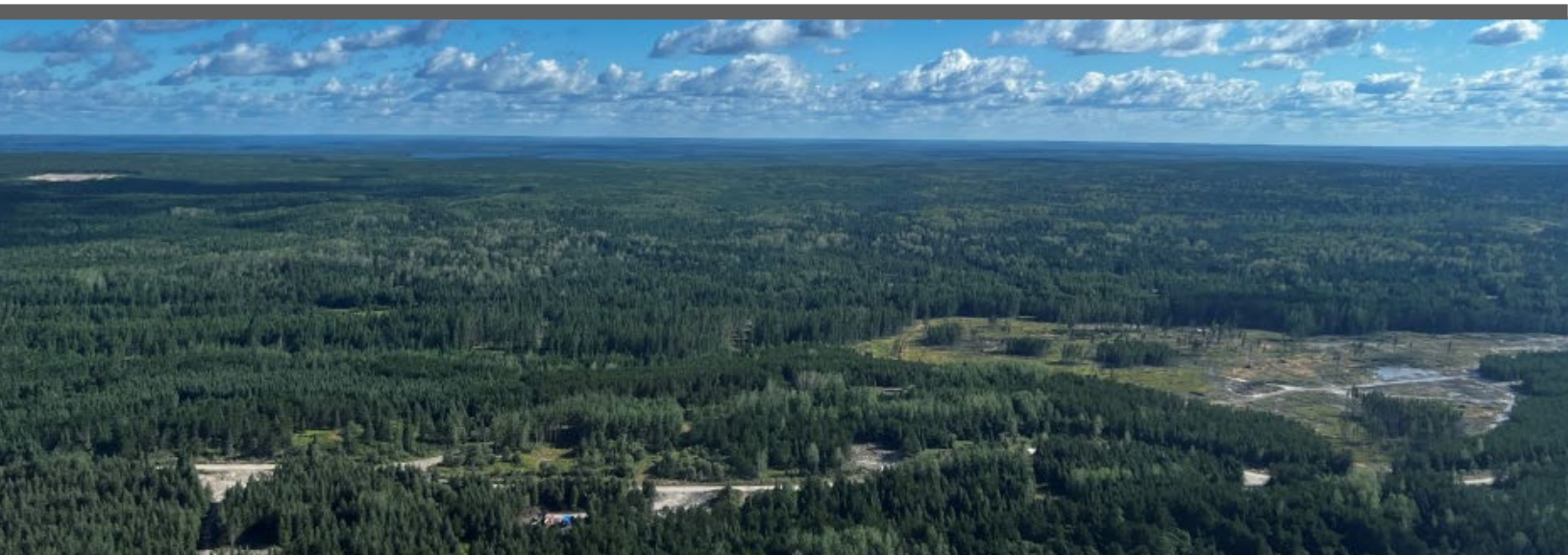
KINROSS Great Bear

Great Bear Gold Project
Impact Statement

Appendix T:

Mercury Bioaccumulation Study for Downstream English River to Wabigoon System Waterbodies



GREAT BEAR RESOURCES

GREAT BEAR PROJECT
MERCURY BIOACCUMULATION STUDY

MARCH 2026



GREAT BEAR PROJECT

MERCURY BIOACCUMULATION STUDY FOR DOWNSTREAM ENGLISH RIVER TO WABIGOON SYSTEM WATERBODIES

GREAT BEAR RESOURCES

PROJECT NO.: OMEMA2303
MARCH 2026

WSP CANADA INC.
6925 CENTURY AVENUE, SUITE 600
MISSISSAUGA, ONTARIO, CANADA, L5N 7K2

T: +1 905-567-4444
WSP.COM

SIGNATURES

PREPARED BY:

Original Signed

Karl Bresee, B.Sc., P.Biol, RP Biol., QP_{SASK}
Senior Risk Assessor

Original Signed

Amy Elliott, Ph.D.
Senior Technical Manager, Water Quality

Original Signed

David Leeder, P.Geo.
Senior Environmental Scientist
Hutchinson Environmental Sciences Ltd.

REVIEWED BY:

Original Signed

Christine Plourde, FEC, B.Sc. Eng.
Principal Risk Assessor

ABBREVIATIONS

°C	Degrees Celsius
$	Dollar
µg/g	Microgram per gram
µg/L	Microgram per litre
%	Percent
%Methylmercury	Percent of methylmercury relative to total mercury
95UCLM	95% upper confidence limit on the mean
AEX	Advanced Exploration Program
ANA	Asubpeeschoseewagong Netum Anishinabek
ATSDR	Agency for Toxic Substances and Disease Registry
BAF	Bioaccumulation factor
BC WQG	British Columbia Long-Term Exposure Guidelines
BMD	Benchmark dose
CCME	Canadian Council of Ministers of the Environment
cm	Centimetre
CHMS	Canadian Health Measures Survey
CSQG	Canadian Sediment Quality Guidelines
CVAAS	Cold Vapor Atomic Absorption Spectroscopy
CVAFS	Cold Vapor Atomic Florescence Spectroscopy
DL	Detection Limit
DW	Dry weight
DWEL	Drinking Water Equivalent Level
ECCC	Environment Canada and Climate Change
EDI	Estimated Daily Intake
EFSA	European Food and Safety Authority
EPC	Exposure point concentrations
FAO	Food and Agriculture Organization
FCMP	Fish Chemical Monitoring Program
FNFNES	First Nations Food, Nutrition and Environment Study
GNLPT	Grassy Narrows Land Protection Team
Great Bear Resources	Great Bear Resources Ltd.
HESL	Hutchinson Environmental Science Inc
Hg	Mercury
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
IAAC	Impact Assessment Agency of Canada
IgHg	Inorganic mercury
ISQG	Interim Sediment Quality Guidelines
kg	Kilograms
km	Kilometres
LEL	Lowest effect level
L/kg-WW	Litres per kilogram by wet weight
LSA	Local Study Area
LSFN	Lac Seul First Nation

m^3/hr	Cubic metres per hour
MDL	Method detection limit
MECP	Ministry of the Environment, Conservation and Parks
MeHg	Methylmercury
mg/L	Milligram per litre
mg/kg	Milligram per kilogram
ng/L	Nanogram per litre
ML	Minimum level
NML	Non-metal leaching
NPAG	Non-potentially acid generating
NRCan	Natural Resources Canada
MWOMC	Northwestern Ontario Métis Community
PA	Project Area
PAG	Potentially acid generating
PEL	Probable effect level
POPC	Parameters of potential concern
Project	Great Bear Project
Property	Great Bear Property
PSQG	Provincial Sedimental Quality Guidelines
PWQO	Provincial Water Quality Objectives
RDL	Reporting Detection Limit
RfD	Reference Dose
RLEF	Red Lake and Ear Falls
RSA	Regional Study Area
SEL	Severe effect level
SRB	Sulphate reducing bacteria
TDI	Tolerable Daily Intake
THg	Total mercury
TISG	Tailed Impact Assessment Guidelines
TRV	Toxicity reference values
US EPA	United States Environmental Protection Agency
WFN	Wabauskang First Nation
WHO	World Health Organization
WQG PAL	Water Quality Guidelines for the Protection of Aquatic Life
WSP	WSP Cananda Inc.
WW	Wet weight

ABBREVIATIONS II

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ATTACHMENTS

A Baseline Water Quality Data
B Sediment, Porewater and Invertebrates Data
C Baseline Fish Data
D Site Specific Data and BAFs
E Human Health Exposure Model
F Fish Tissue Power Analysis

1 INTRODUCTION

1.1 PROJECT BACKGROUND

Great Bear Resources Ltd. (Great Bear Resources), a wholly owned subsidiary of Kinross Gold Corporation, proposes to develop a gold mine, hereafter referred to as the Great Bear Gold Project (Project), at the Great Bear Property (the Property). The Property is in the Red Lake mining district of northwestern Ontario, about 25 kilometres (km) southeast of the Municipality of Red Lake (Figure 1-1).

The Project involves extracting and processing ore from two open pits and an underground mine. The main components of the Project are shown in Figure 1-2 and include:

- Underground mine
- LP Central pit
- West Viggo pit / West Viggo management facility (VMF)
- East Viggo pit / East VMF
- Tailings management facility (TMF)
- TMF pond
- Mine water pond (MWP)
- Advanced Exploration Program (AEX) mine water pond
- AEX effluent treatment plant (ETP)
- AEX treated water pond (TWP)
- Holding pond
- Collection water pond (CWP)
- Main collection channel
- Dixie Creek flood protection berm
- Mine rock stockpile (MRS)
- Overburden stockpiles
- Ore stockpiles
- Process plant
- Other buildings and supporting infrastructure
- Water management and treatment facilities
- Sand and gravel (borrow) and quarry operations
- Explosives storage facility.

The Project phases are planned as follows:

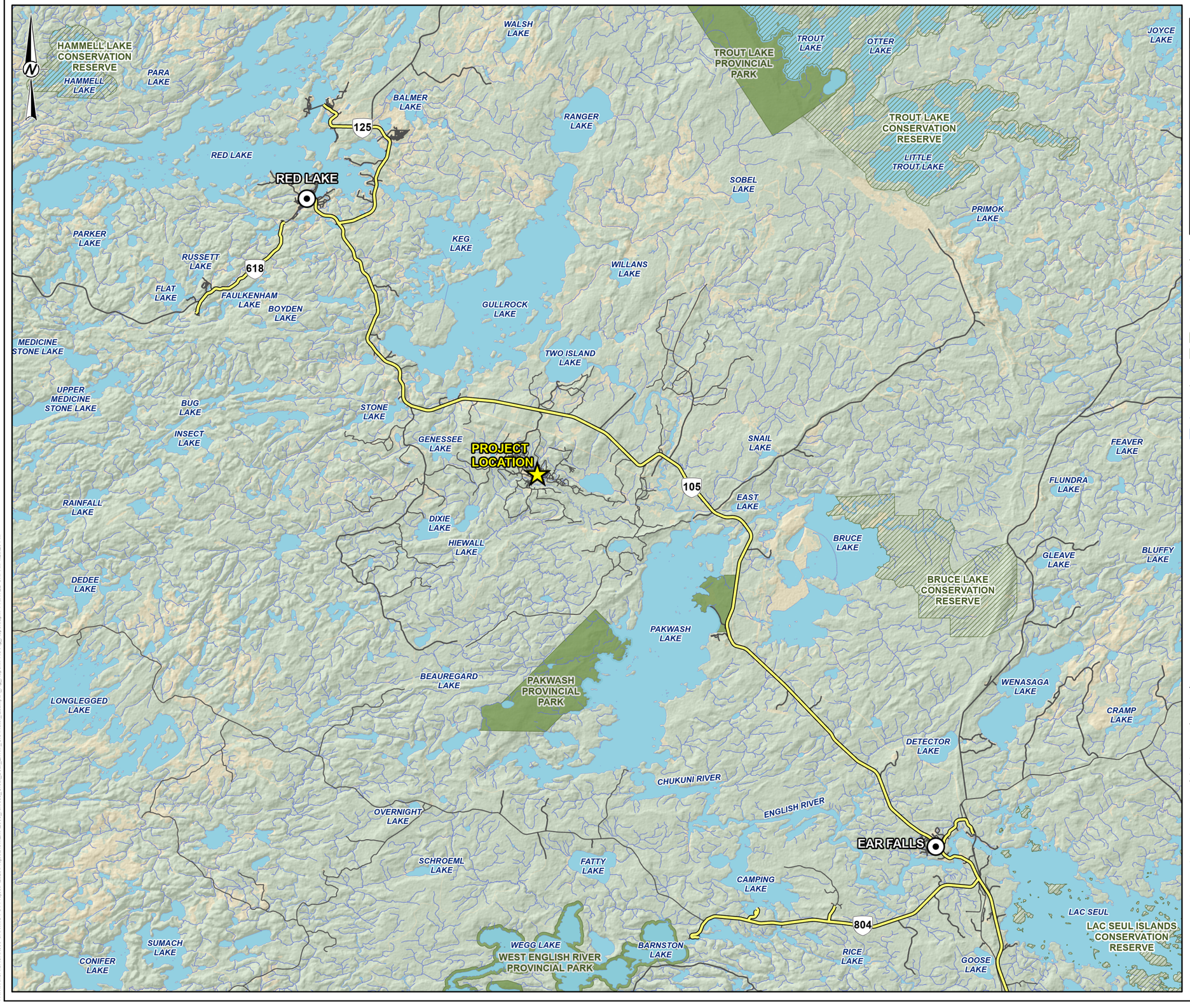
- Construction phase: Year -3 to Year -1
- Operations phase: Year 1 to Year 26
- Closure phase (including active closure and passive closure periods; Year 27 to Year 33)
- After the completion of the closure phase, a final closure period will occur starting in Year 34

The Project includes a comprehensive, integrated water management system designed to protect water quality during construction, operations and closure (WSP 2025a). Following an alternatives assessment,

the Chukuni River was selected as the preferred receiving environment for discharge of treated effluent (Figure 1-2). The Chukuni River is a large system with a high assimilative capacity, even during low-flow conditions, with a watershed area of approximately 4,415 square kilometres (km^2) at the proposed discharge location. The maximum predicted effluent discharge rate of 1,330 cubic metres per hour (m^3/hr) equates to approximately 1.2% of the river's mean annual flow and 3.6% of flow during a 1-in-100-year dry event (WSP 2025b). The river's high flow volumes also promote turbulent mixing, which facilitates rapid dispersion and assimilation of treated effluent into natural riverine flows, minimizing the size and extent of the mixing zone. The maximum extent of the mixing zone is predicted to be less than 300 metres (WSP 2025b). Additional discussion of mitigation measures for water quality, including water treatment, is presented in Section 4.2.

Discharge of treated effluent to the environment is subject to strict regulatory requirements in Ontario and final effluent limits must be set such that Water Quality Guidelines for the Protection of Aquatic Life (WQG PAL) are achieved by the end of the mixing zone. WQG PAL are based on rigorous peer-reviewed scientific study to specifically safeguard the most sensitive life stages of aquatic species for periods of indefinite exposure. Through adherence to these standards the Chukuni River will be protected, supporting the long-term health and resilience of its aquatic ecosystem. Further information regarding identified WQG PAL for the Project, as well as the quality of treated effluent discharge, is provided in the Receiver Water Quality Modelling Report (WSP 2025b). WQG PAL for mercury and methylmercury referenced in this study are discussed in Section 3.1.2.

Since mercury is considered a highly bioaccumulative substance and has been identified of concern to communities in the area of the Project, potential secondary effects from methylmercury stimulation and bioaccumulation in the downstream aquatic environment (i.e., sulphate) were considered in the mercury study. As such, detailed water quality modelling and bioaccumulation assessments were completed as described in Sections 4 and 5, respectively. Based on the results of the water quality modelling and bioaccumulation assessments, an assessment of human health risks related to existing conditions in comparison with risks related to predicted conditions from the Project is provided in Section 6.



KEY MAP



SCALE: 1:30,000,000

LEGEND

- PROJECT LOCATION
- TOWN
- CONSERVATION RESERVE
- PROVINCIAL PARK
- HIGHWAY
- LOCAL ROAD
- RESOURCE / RECREATION ROAD
- WATERCOURSE
- WATERBODY

0 2.5 5 10

1:250,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES AND WATERBODY ACQUIRED FROM LAND INFORMATION ONTARIO (MNRF) AND MODIFIED TO MATCH AERIAL IMAGERY AND LIDAR.
3. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
PROJECT LOCATION

CONSULTANT

wsp

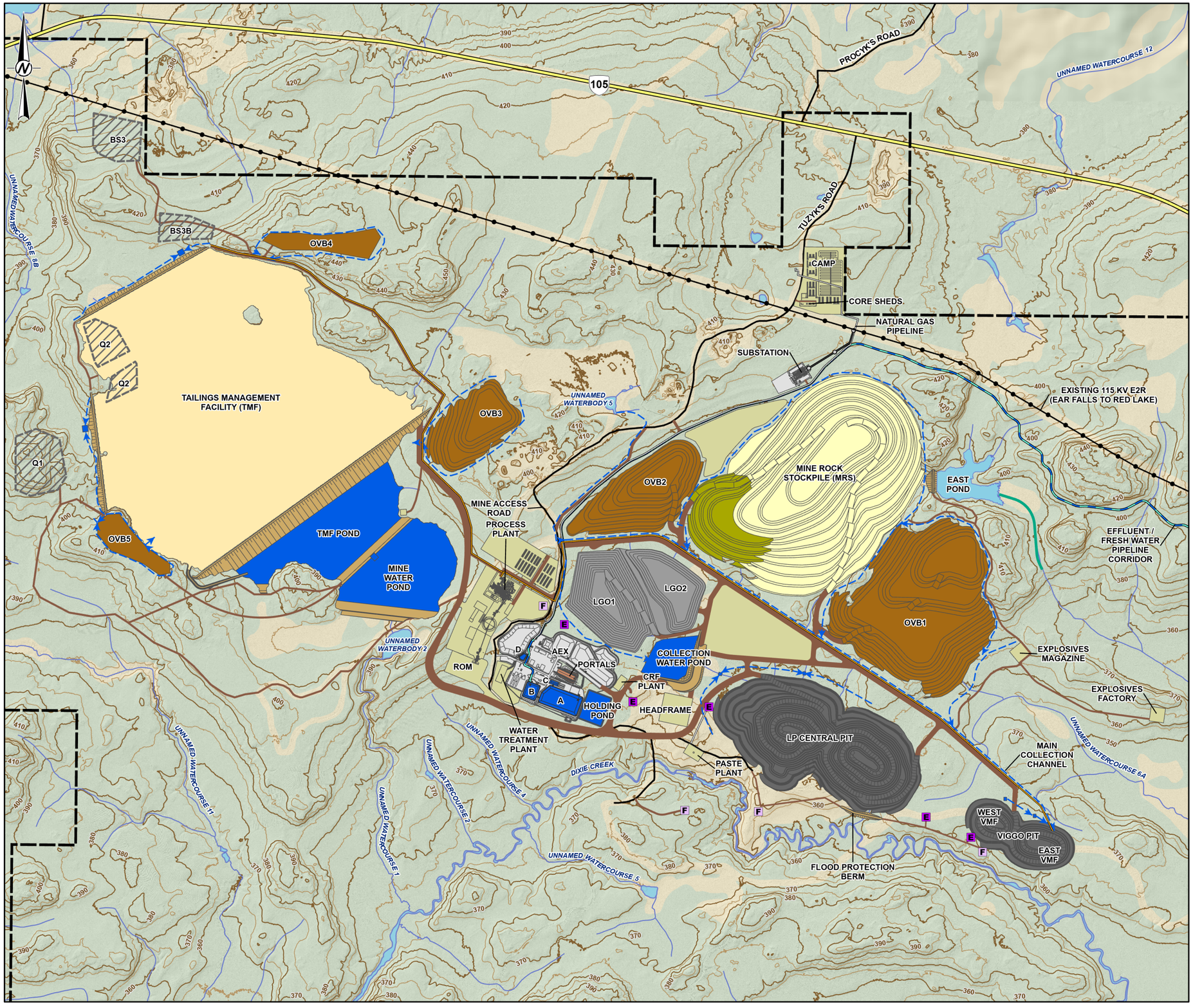
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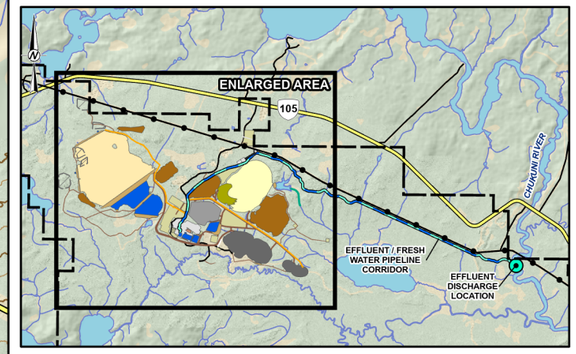
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KEY MAP



SCALE: 1:175,000

LEGEND

- PROPERTY BOUNDARY
- HIGHWAY (INCLUDING ENBRIDGE PIPELINE)
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- WATERCOURSE
- WATERBODY
- MAJOR CONTOURS (10 M INTERVAL)
- MINOR CONTOURS (5 M INTERVAL)

PROPOSED MINE FEATURE

- OPEN PIT
- MINE ROCK STOCKPILE (NPAG)
- MINE ROCK STOCKPILE (PAG)
- LOW GRADE ORE STOCKPILE (LGO)
- OVERBURDEN STOCKPILE (OVB)
- TAILINGS MANAGEMENT FACILITY (TMF)
- DAM
- POND
- COLLECTION DITCH
- MINE FACILITIES / INFRASTRUCTURE
- ROAD
- PORTAL
- ADVANCED EXPLORATION SITE (AEX)
- ROCK QUARRY (Q) / SAND AND GRAVEL PIT (B)
- DIVERSION CHANNEL
- EXHAUST VENT RAISE
- FRESH AIR VENT RAISE
- TRANSMISSION LINE
- TAILINGS PIPELINE
- PASTE PLANT PIPELINE
- EFFLUENT / FRESH WATER PIPELINE CORRIDOR
- EFFLUENT DISCHARGE LOCATION

0 0.25 0.5 1

1:26,500 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE
2. VMF: VIGGO MANAGEMENT FACILITY
3. ROM: RUN OF MINE ORE
4. AEX PONDS: A-AEX MINE WATER POND, B-AEX TREATED WATER POND, C-AEX SETTLING POND, D-AEX SEDIMENT POND

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. CONTOURS ACQUIRED FROM 2022 LIDAR SURVEY.
3. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
4. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
5. SITE PLAN BASED ON INFORMATION PROVIDED BY GREAT BEAR RESOURCES, DECEMBER 2024 / JUNE 2025.
6. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
SITE PLAN (TOPOGRAPHY)

CONSULTANT
wsp

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PREPARED	MD
REVIEWED	----
APPROVED	----

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1.2 OBJECTIVES

This Mercury Study Report has been prepared by WSP Canada Inc. (WSP) to present the baseline investigations and predictive modelling conducted for mercury and methylmercury in support of the Impact Statement.

The objective of this report is to present the results of the studies outlined in the Mercury Study Plan (WSP 2024), in fulfilment of the following requirements specified in Section 7.2 of the Tailored Impact Statement Guidelines (TISG) for the Project:

> *Of particular note, the potential for project contributions to methylmercury production in downstream watersheds requires a detailed and robust analysis. The proponent must submit a study plan to the Agency with sufficient time to facilitate a review by experts and interested parties and to inform the studies undertaken. This includes establishing baseline methodology and effects assessment methodology related to methylmercury as outlined in section 8.6 Groundwater and Surface Water and 8.8 Fish and Fish Habitat*

Understanding and effectively managing methylmercury production is important for predicting and mitigating potential effects of the proposed Project. This study has been designed to identify and evaluate potential contributions of the Project to methylmercury production in downstream watersheds, with a focus on the linkages between sulphate reducing bacteria (SRB) and methylmercury production. This scope of work included:

- Baseline characterization: assessing mercury and methylmercury concentrations in surface water, sediment, benthic invertebrates, and fish within the Chukuni River and downstream watercourses
- Predictive mass balance modelling: forecasting changes in mercury and methylmercury concentrations in the Chukuni River and downstream watercourses resulting from the discharge of treated effluent
- Predictive bioaccumulation modelling: forecasting changes in mercury and methylmercury concentrations in fish tissue in the Chukuni River and downstream watercourses due to treated effluent discharge
- Evaluating potential risks to human health associated with fish and surface water consumption, based on predicted changes in fish tissue mercury and methylmercury concentrations resulting from treated effluent discharge
- Engagement was completed with federal and provincial authorities (Impact Assessment Agency of Canada (IAAC 2025; feedback received during July 17 2025 and October 23 2025 meetings with IAAC); Ministry of the Environment, Conservation and Parks (MECP 2025, 2026); Environment and Climate Change Canada (ECCC 2025), Natural Resources Canada (NRCan 2025), and potentially affected communities (Lac Seul First Nation and Wabauskang First Nation (LSFN WFN 2025; feedback received during September 3 2025, October 20 2025 and November 6 2025 meetings with LSFN and WFN), Northwestern Ontario Metis Community and Metis Nation of Ontario (NWOMC MNO 2025) and Asubpeeschoseewagong Netum Anishinabek (ANA) (ANA 2025; Branfireun, B 2025; MDAG 2025; GNLPT 2025; Mergler 2015) were consulted to aid with the scope of work. Feedback was also considered from the Expert Technical Review panel (ETR, 2025) and evidence from subject matter experts (Philbert et al. 2020 and Philbert et al. 2022) also aided in developing the scope of work for the study.

The focus of this report is on the potential for Project influence to methylmercury production in downstream waterbodies. Baseline data and predictive modelling results for other parameters of potential concern (POPC) and valued components within the local study area (LSA) and regional study area (RSA) are described in baseline and modelling reports within the Impact Statement.

1.3 INFLUENCE OF CONSULTATION

In submissions during 2024 and 2025, primarily related to the AEX Program but also regarding the Project, Asubpeeschoseewagong Netum Anishinabek (ANA) expressed a concern regarding the potential risk of mercury methylation from sulphate released by the Project, directly or indirectly into the Chukuni River, which is part of the English River system. Great Bear Resources understands the source of this concern to the community. Through consultation with federal, provincial and municipal (e.g., Red Lake Ear Falls [RLEF]) government review teams (e.g., Environment and Climate Change Canada [ECCC], NRCan and MECP) and local communities (e.g., ANA, Lac Seul First Nation [LSFN], Wabauskang First Nation [WFN] and Northwestern Ontario Métis Community [NWOMC]) have expressed concerns regarding potential for increased mercury methylation in the downstream aquatic system and increasing human health risks from subsistence consumption of fish. These consultation exchanges have been captured in Section 3 (Participation and Engagement) and detailed in the Impact Statement Appendix C (Record of Consultation.)

The potential for increased mercury and methylmercury related to the Project has been modelled further downstream in response to comments, outside the spatial boundaries used to bound the assessment of the potential effects of the Project in the Impact Statement (IS). A draft Mercury Study Plan was provided to Indigenous communities for review in December 2024. Feedback on the draft study plan received from ANA, LSFN, WFN, NWOMC and government agencies was responded to and fully considered and incorporated into the design of this report as appropriate.

1.3.1 ASUBPEESCHOSEEWAGONG NETUM ANISHINABEK

In response to ANA feedback on the Mercury Study Plan, an upper-case scenario was identified based on the modelling results (Section 4.3.2 and Section 4.4.4). This approach, applying the identification and discussion of an upper-case scenario, was used consistently across model components, including methylmercury production, so that both expected and upper-bound outcomes are explicitly considered in the assessment. Additionally, data inputs, assumptions, and calculations are explicitly documented in the model reporting for the GoldSim water quality model (WSP 2024b,d).

ANA requested that the Mercury Study Plan include monthly estimates of mercury, methylmercury and substances affecting methylation, such as sulphate. The Mercury Study Report (Section 4) includes loading estimates for sulphate, mercury and methylmercury and other relevant parameters, as appropriate, for local watercourses and waterbodies, including the Chukuni River where applicable.

ANA noted that the methodology for the Mercury Study Plan did not include quality assurance / quality control procedures and laboratory certificates of analysis. Geochemical baseline information, including laboratory certificates of analysis for all samples, along with information related to analytical methodology and other quality assurance / control measures is provided in the Impact Statement.

1.3.2 LAC SEUL FIRST NATION AND WABAUSKANG FIRST NATION

LSFN and WFN requested that wetland sediment and porewater sampling be added to the baseline program, targeting potential areas of anoxic conditions that may be contributing to methylmercury production. Additional sampling was completed in the fall of 2025 by WSP and Hutchinson Environmental Sciences Ltd. (HESL). Sampling includes wetland soils, porewater and sediment samples with over 80 samples collected to date.

LSFN and WFN recommended that water quality sampling included sampling at surface and depth to monitor stratification and the effects of anoxia and lake turnover on results. Water quality samples were collected at surface and at depth for Dixie Lake, Genessee Lake, Unnamed Waterbody 6, Gullrock Lake and Pakwash Lake and water quality profiles with depth were also completed as part of the monitoring program. These data are included in the Mercury Study Report. Additionally, in response to a request by LSFN and WFN, data from Nation-led regional water quality monitoring programs was included in the water quality reports (WSP 2025d) where available.

LSFN and WFN requested that the Mercury Study Report consider Project-related water level changes and climate scenarios. In addition to longer term regional stations, 12 flow monitoring stations and 19 water level monitoring stations were established between June 2022 and June 2024. Flow monitoring data was used to corroborate long term regional data and inform the modelling of the mine site and receiver water hydrology. Also, receiver water balance modelling includes post closure conditions with climate change. These predictions inform the Mercury Study Report with respect to potential Project related water level fluctuations to the outlet of Pakwash Lake.

LSFN and WFN requested information on how elevated existing baseline mercury concentrations in some waterbodies will inform the assessment. These elevated existing baseline mercury concentrations were incorporated into water quality and food web modelling as part of the Mercury Study Report to assess potential changes relative to existing conditions during Project development, as well as the risk of methylmercury production and biomagnification.

LSFN and WFN requested that the Mercury Study Plan include a food web analysis of all trophic levels to understand potential biomagnification. Mercury and methylmercury have been sampled in water, sediment and fish samples collected for the Project since 2022. Recognizing the importance of food web analysis, additional sampling was completed in 2024 and 2025. Sampling includes all major trophic levels (primary, secondary and tertiary) with over 400 samples collected to date (Section 3.2.1)

1.3.3 NORTHWESTERN ONTARIO MÉTIS COMMUNITY

NWOMC requested that the Mercury Study Plan include background and context on the effects of mercury consumption to human health as a result of industrial activities in the region. A summary of the historical mercury exposure and adverse health effects in the region is included in Section 1.4, below.

1.3.4 GOVERNMENT AGENCIES

Meetings and responses have been provided to the government review team with respect to the Mercury Study Plan, including with:

- Environment and Climate Change Canada
- Fisheries and Oceans Canada
- Health Canada
- IAAC
- Indigenous Services Canada
- Ministry of Energy and Mines
- MECP
- NRCan
- Natural Resources Canada.

The comments received have been considered in the assessment of water quality and incorporated into the study plan as applicable, which guided this Mercury Study Report.

1.4 SUMMARY OF HISTORICAL MERCURY EXPOSURE IN REGION

1.4.1 CONTRIBUTIONS TO MERCURY LEVELS IN THE REGION

Mercury is a naturally occurring element that is present in the environment as a result of both natural geological processes and anthropogenic activities. Natural sources include the weathering of mercury-bearing rocks and soils, volcanic activity, forest fires, and natural biogeochemical cycling within aquatic and terrestrial ecosystems. In addition to these background sources, mercury can be released to the environment through human activities. Global emissions (e.g., coal power plants) and mercury deposition are sources of anthropogenic mercury (Agency for Toxic Substances and Disease Registry; ATSDR 2024); however, other industrial processes and developments can influence mercury levels in the environment. For instance, hydroelectric dam sites or any flooded reservoirs have the potential to increase mercury levels within aquatic ecosystems via leaching from flooded soils (Heron 2013).

1.4.2 CONTRIBUTIONS SPECIFIC TO THE WABIGOON-ENGLISH RIVER SYSTEM

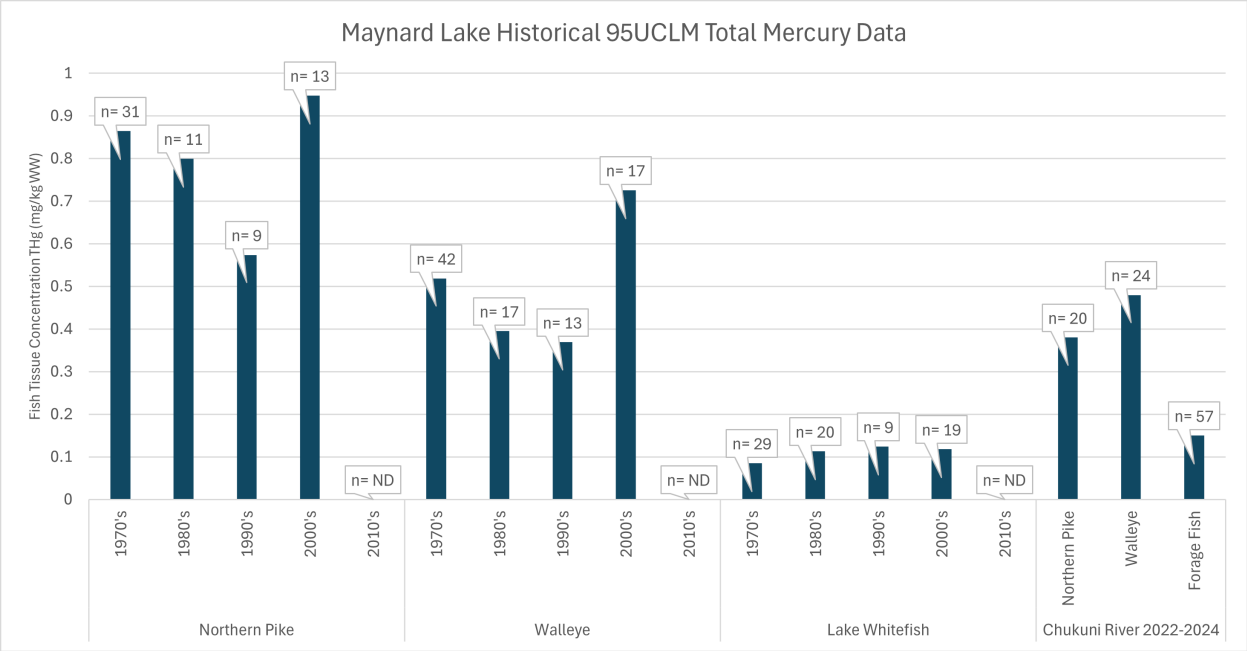
1.4.2.1 HISTORICAL SUMMARY

During the 1960s and 1970s, a chlor-alkali plant in Dryden, Ontario released approximately 10,000 kilograms (kg) of mercury into the Wabigoon-English River System. This water system is located within the identified traditional land use area and territory of ANA (Philibert et al. 2020; Mergler et al. 2025). The discharged mercury waste entered the waterways and bioaccumulated in fish, resulting in elevated mercury levels in the fish tissues. Relative to the concentration present in the 1970s, mercury levels in fish in parts of the English River and Wabigoon River have declined (MECP 2024). In 1970, a government monitoring program found that mercury concentrations in the fish (i.e., Walleye) captured in ANA traditional fishing grounds were between 1.2 micrograms per gram (µg/g) to 24 µg/g (Mergler et al. 2025). Results of the monitoring program conducted between 1970 and 1974 also found that all of the Walleye captured had mercury concentrations above the commercial limit of 0.5 µg/g (Mergler et al. 2025). The concentration of mercury in fish from the waters surrounding the ANA community decreased until the mid-1980s to early 1990s. Based on the most recent publicly available temporal analysis of local fish mercury concentrations (Rudd et al. 2021; Philibert et al. 2020; Neff et al. 2012), the average fish tissue concentrations in the English-Wabigoon system stabilized at around 2 µg/g, wet weight.

A study by Rudd et al. (2021) that investigated mercury concentrations in the water, sediments and fish in the English-Wabigoon River System, found that ongoing erosion of high mercury particles by the river is responsible for present-day transport of mercury from Clay Lake to Ball Lake. The study noted that the north basin of Ball Lake is quite clean because it receives large volumes of clean water from the English River (Rudd et al. 2021).

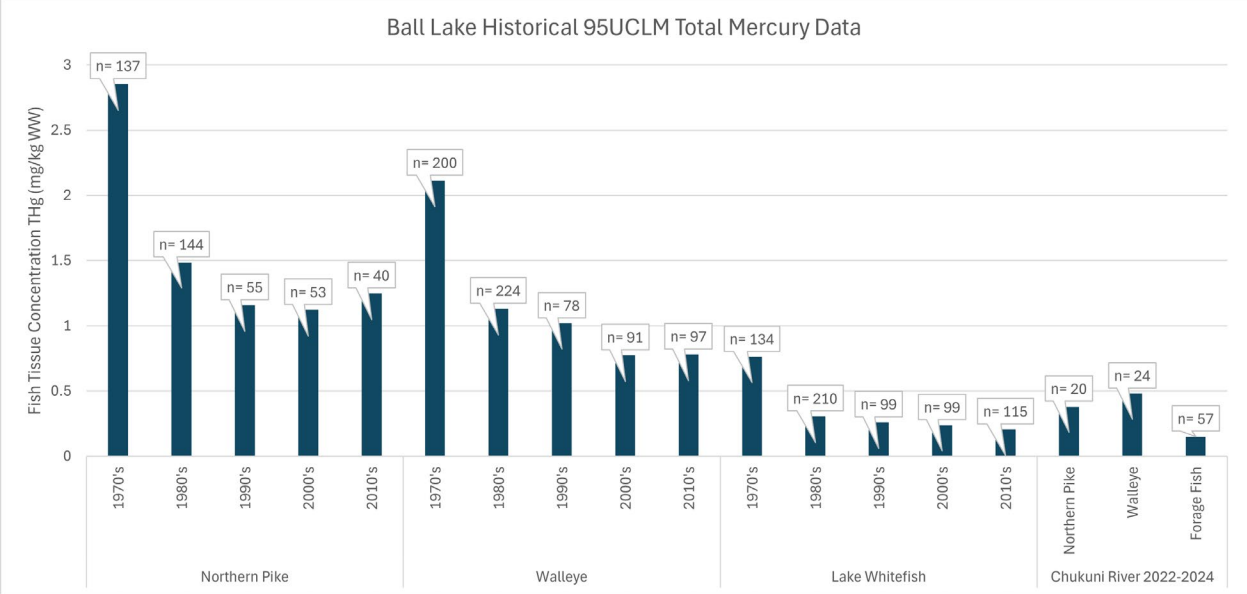
Figure 1-3 to Figure 1-5 show historical fish tissue sampling results (i.e., 95th percent upper confidence limit on the mean-95UCLM) from the MECP since the 1970s in the English-Wabigoon River System. Historical data for waterbodies in the study area were only available for Maynard, Ball, and Indian Lakes. The data present a decreasing trend in total mercury concentrations of predatory fish (i.e., Northern Pike and Walleye) since the 1970s and the fish sample concentrations for the LSA (i.e., Chukuni River) are lower than current and historical levels measured near the community of ANA.

Figure 1-3: Historical Sampling Results of Fish Tissue Mercury Since the 1970s in Maynard Lake



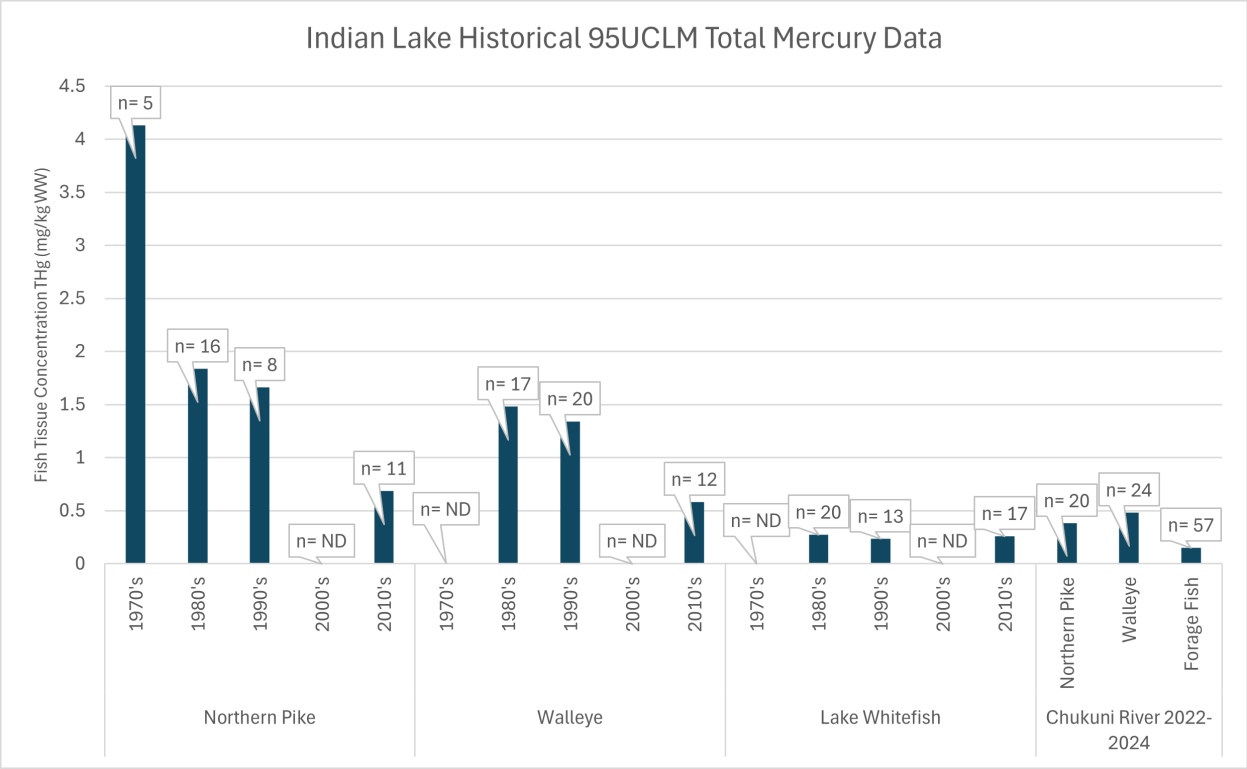
Note:
Data is represented by 95UCLMs. Data from all years within each decade was pooled. Data callouts represent the sample size. Only fish within the previously stated size ranges were considered. Briefly, Northern Pike: 40-70 cm, Walleye: 28-52 cm, lake Whitefish: >25 cm. A sample size of ND represents no relevant data available.

Figure 1-4: Historical Sampling Results of Fish Tissue Mercury Since the 1970's in Ball Lake



Note:
Data includes the north and south basins where available. Data is represented by 95 UCLMs. Data from all years within each decade was pooled. Data callouts represent the sample size. Only fish within the previously stated size ranges were considered. Briefly, Northern Pike: 40-70 cm, Walleye: 28-52 cm, lake Whitefish: >25 cm.

Figure 1-5: Historical Sampling Results of Fish Tissue Mercury Since the 1970's in Indian Lake



Note:
Data is represented by 95 UCLMs. Data from all years within each decade was pooled. Data callouts represent the sample size. Only fish within the previously stated size ranges were considered. Briefly, Northern Pike: 40-70 cm, Walleye: 28-52 cm, lake Whitefish: >25 cm. A sample size of ND represents no relevant data available.

1.4.2.2 BIOMONITORING

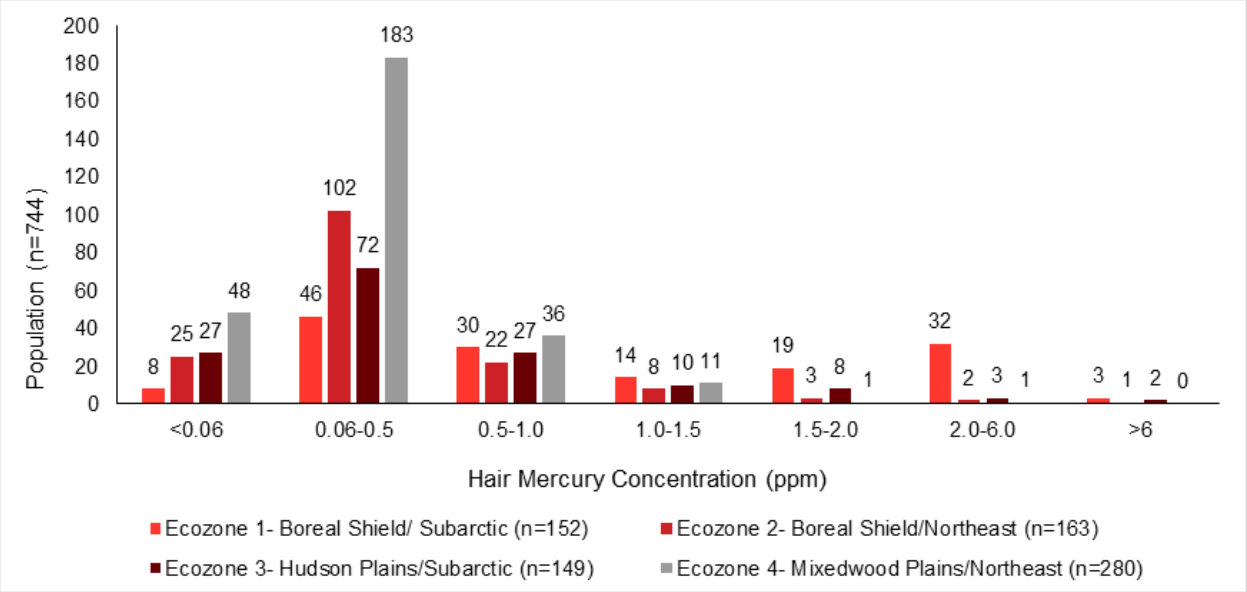
In the early 1970s, the Medical Service Branch of Health Canada initiated mercury biomarker testing (blood and hair) in two communities living downstream of the plant, ANA and Wabaseemoong Independent Nation (Philibert et al. 2020, 2022). The results of that biomarker testing prompted the Medical Research Branch of Health Canada to initiate a nationwide surveillance program for mercury in Indigenous communities across Canada (Philibert et al. 2020). Between 1970 and 1992, 71,842 samples from 38,571 people from 514 different Indigenous communities across Canada were analyzed by Wheatley and Paradis (1995). The highest detected concentration of mercury in blood from this program was 660 µg/L from a person in ANA in 1971 (Philibert et al. 2020).

Another program carried out between 1970 and 1992 assessed mercury concentrations in umbilical cord blood collected from the local hospital for ANA (Philibert et al. 2022). This study found that biomarker mercury concentrations from ANA followed a similar pattern to mercury levels in local fish from the local river system, with very high concentrations in the early 1970s and a sharp decline until 1977, then a less pronounced decline until 1987, after which mean concentrations remained relatively stable (Philibert et al. 2022).

Total and inorganic mercury levels in hair within Indigenous communities have been monitored by the First Nations Food, Nutrition and Environment Study (FNFNES) from 2008 to 2016, to help validate dietary assessments and to develop an estimate of mercury exposure in Indigenous populations across Canada (Chan et al. 2014). In Ontario, data were collected from 18 Indigenous communities in 2011 and 2012. Mercury analysis and results were based on data from 744 of the 1,429 FNFNES participants in Ontario included in their 2011/2012 report. The arithmetic mean (average of mercury concentrations in hair among the Indigenous population living on-reserve in Ontario) was 0.64 µg/g (ppm) for adults and 0.40 µg/g for women of child-bearing age, while the geometric mean was 0.27 µg/g for adults and 0.21 µg/g for women of child-bearing age (sample data unweighted). Based on the distribution of mercury

concentrations in hair (90th and 95th percentile) of Indigenous people living on reserves, the hair concentration from mercury exposure is below the Health Canada mercury guideline of 2 µg/g for hair and 8 µg/L for blood and sensitive individuals and level of 6 µg/g for hair and 20 µg/L for blood and general population (Health Canada 2025a). The FNFNES split Ontario study results into four different ecozones. The Project and the ANA Reserve are located within Ecozone 1 - Boreal Shield/Subarctic. When comparing results by ecozone, results of the study demonstrated that Indigenous study participants from Ecozone 1 – Boreal Shield/Subarctic (n=152), including women of childbearing age, have higher mercury exposure (higher population in the higher concentration bands) on average compared to participants living in the three other ecozones (Figure 1-6).

Figure 1-6: Mercury Concentrations in Hair (parts per million [ppm]) for all Ontario Participants Separated by Ecozone



Note:
Adapted from Figures 41a – 41d presented in Chan et al. (2014).

Total mercury in the general Canadian population is measured on an ongoing basis as part of the nationwide Canadian Health Measures Survey (CHMS), conducted by Health Canada. This survey began in 2007 and includes assessment of a wide variety of environmental chemicals in blood, urine and hair collected from survey participants. The type of media analyzed is dependent on the chemical. To date, there have been six cycles of the CHMS where mercury was primarily analyzed in the whole blood of CHMS participants, however mercury was not analyzed in hair samples. Health Canada indicates that inorganic forms of mercury are not excreted in any significant amount in scalp hair, making it an inappropriate biomarker of inorganic mercury exposure (Health Canada 2021). Therefore, there are no mercury data in hair among the Canadian population from the CMHS for comparison of data in the Chan et al (2014) report.

In response to the mercury contamination, the Government of Ontario is working with ANA and Wabaseemoong Independent Nations to investigate the current contamination levels in sediment and fish in the Wabigoon-English River system (MECP 2024). Several scientific assessments led by Indigenous communities are currently underway to determine the extent and location of mercury contamination and identify how mercury moves throughout the food chain (MECP 2024).

1.4.2.3 MERCURY AND COMMUNITY HEALTH STATUS

Most scientific knowledge about health effects from high levels of mercury in the environment comes from studies on Minamata Disease (a severe neurological condition caused by methylmercury poisoning) conducted among communities living around Minamata Bay, Japan in the 1950s, where methylmercury was discharged into the water (Harada 1995; Philibert, et al. 2020).

The mercury discharge from the chlor-alkali plant in northwestern Ontario in the 1960s affected the fish resources and health of ANA and Wabaseemoong Independent Nation. In 1975, Dr. Masazumi Harada and colleagues examined 89 members of these communities and reported that a high prevalence of these individuals showed signs and symptoms consistent with those observed in Minamata Disease patients (Philibert et al. 2022). On return in the early 2000s and examination of 175 individuals, 60 individuals received a diagnosis of Minamata disease, 54 received a diagnosis of Minamata Disease with complications due to other diseases, and 25 were categorized under suspicion of Minamata Disease (Philibert et al. 2020 and 2022).

A community-based health assessment was conducted with ANA between 2015 and 2018 using a community-driven survey with a questionnaire adapted from the First Nations Regional Health Survey, including new questions (Mergler et al. 2019; FNIGC 2012). The participation rate of the survey was 78% with 424 adults and 353 children (Mergler et al. 2019). Based on the results of the community-based health assessment, ANA had poorer physical and mental health, and more socio-economic difficulties compared to other Indigenous communities in Ontario and in Canada (Mergler et al. 2019). In addition, results of multiple regression models indicated that fish consumption, particularly during childhood, significantly contributes to poor health and well-being of individuals and the community of ANA (Mergler et al. 2019). Finally, recent studies have shown that prolonged historical mercury exposure in the ANA community was associated with a higher prevalence of symptoms of nervous system dysfunction (Philibert et al. 2022), and premature mortality (Philibert et al. 2020; Mergler et al. 2025).

1.4.2.4 ECONOMIC AND SOCIAL IMPLICATIONS

Prior to the mercury incident in the 1970s, ANA primarily consisted of a cash economy predominantly based on commercial fishing, sports fishing and trapping (Mergler et al. 2025). In the 1970s, the traditional fishing practices of the ANA were disrupted, as the levels of mercury contamination in the local rivers and lakes forced the community to stop commercial and tourist fishing (Ilyniak 2014). The people of ANA began experiencing health, economic and social effects resulting from the loss of income, culture, traditions, and a highly nutritious food source (Mergler et al. 2025).

Results of a 2018 community-based assessment conducted by Mergler et al. (2019) in ANA revealed that childhood fish consumption was associated with symptoms such as motor difficulties, loss of memory, anxiety, depression. For persons aged 18 to 49 years, childhood fish consumption was also associated with income less than $20,000 per year, struggling to pay for food, and having done fairly or poorly in school (Mergler et al. 2019). It is noted that this assessment considered different contextual variables such as age, sex, chronic health conditions, smoking and nutrition (Mergler et al. 2019). In addition, results of the assessment revealed that 54% of respondents among ANA reported that they struggle to pay for food at least a few times a year, compared to 37% of Indigenous people in Ontario and 40% of Indigenous people in Canada (Mergler et al. 2019).

1.5 CURRENT UNDERSTANDING OF METHYLMERCURY PRODUCTION BY SULPHATE REDUCING BACTERIA

This section briefly summarizes the current understanding of methylmercury production in freshwater systems to provide context and to support a clear interpretation of the modelling methodology, data inputs and results presented herein.

Natural aquatic environments in northern Ontario contain mercury from long-range atmospheric transport and deposition of gaseous elemental mercury from sources like volcanic activity and industrial emissions, particularly from coal-fired power plants (e.g., Government of Canada 2023; Thomas 1972). As per the Ontario Ministry of the Environment, Conservation and Parks (MECP) website, approximately 40% of mercury deposited in Ontario originates from air emissions from human activities, including coal-fired power plants. As industrial activity is a relatively recent phenomenon, sediment profiles in many environments typically show higher mercury concentrations in the upper layers.

In natural aquatic environments, most of the total mercury present exists as inorganic mercury, largely in the form of $Hg(OH)_2$ and $HgCl_2$ and less than five percent of total mercury typically occurs as methylmercury (CH_3Hg) (Environment Canada ; EC 2003). Characterizing the site-specific distribution of different forms of mercury, especially the proportion of methylmercury to inorganic mercury, is important because methylmercury is the form most readily taken up by aquatic organisms and biomagnified through the food chain. This process generally results in the highest body-burden mercury concentrations occurring in top fish predators (e.g., Northern Pike and Walleye) and in fish-eating birds and mammals. Based on community feedback, Great Bear Resources understands that mercury body-burden levels in fish such as Northern Pike, Walleye and Whitefish, are of particular concern to Indigenous harvesters, as wild-caught fish are an important part of Indigenous community diets (Section 1.3). Risks to fish-eating birds and mammals (i.e., piscivores) are assessed in the Impact Statement (WSP 2026b).

The distribution of mercury forms in aquatic environments is affected by the redox potential, pH and the anions present. For example, under anoxic conditions, inorganic mercury can be transformed by SRB into organic mercury compounds, the most common of which is methylmercury; this process has been documented in the peer-reviewed literature (e.g., Gilmour et al. 1992; Eckley et al. 2005; Paranjape and Hall 2017; Zeng et al. 2016). Typical anoxic environments in northern Ontario include wetlands, bogs, and hypolimnetic waters of deep lake basins. In anoxic environments, SRB in sediment can utilize sulphate as an electron acceptor as part of their metabolic process and can generate methylmercury as a byproduct from inorganic mercury already present in the environment. Thus, when sulphate is low or limiting in an anoxic environment, addition of sulphate tends to promote increased rates of methylmercury production via SRB metabolic activities (e.g., Ullrich et al. 2001; Jeremiason et al. 2006). In contrast, methylmercury can also be broken down through microbial demethylation, which occurs via two main pathways: reductive demethylation, producing methane and elemental mercury, and oxidative demethylation, yielding carbon dioxide and divalent mercury (e.g., Barkay and Gu 2021). The water management system for the Project has been designed to prevent the release of site contact waters, which may contain elevated sulphate concentrations (e.g., from the leaching of locally mined rock), from being discharged directly into oxygen-poor environments or wetland areas; these areas, including sediments in rivers or lakes and riparian wetlands, are recognized as high-risk zones for enhanced methylmercury production when sulphate levels increase over baseline levels. Additional discussion of mitigation measures are provided in Section 4.2.

Sulphate is universally present in surface water and groundwater and can be elevated in waters contacting typical mine site features, like rock stockpiles and within tailings storage facilities. Understanding and managing sulphate on site, as well as the interactions between sulphate and methylmercury production in the receiving environment, is important for predicting and mitigating the potential for increased methylmercury production in the context of proposed Project activities and mining operations.

1.6 DATA SOURCES

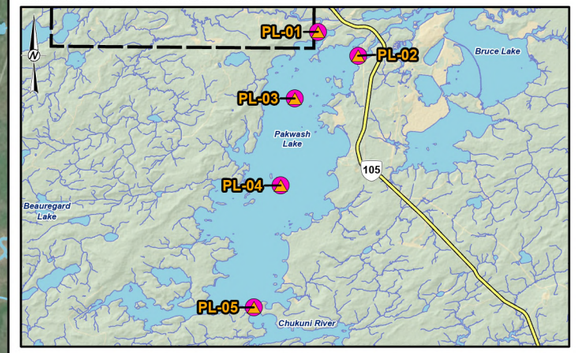
Baseline data and predictive modelling results presented in this report are informed by a series of supporting documents prepared by WSP, MECP as follows. Additional supporting documents by others are listed in the references in Section 8.

Mine Site Water Balance (WSP 2025a)	–	Describes water management activities for the Project
	–	Predicts maximum required discharge rate (1330 m^3/hr) and average discharge rate (544 m^3/hr) used in mercury and methylmercury modelling studies (Section 4)
Receiver Water Quality Modelling Report (WSP 2025b)	–	Provides predictions of treated effluent quality discharged to the Chukuni River, including the maximum predicted sulphate concentration (400 mg/L) used in in mercury and methylmercury modelling studies (Section 4)

Hydrology Baseline Report (WSP 2025c)	– Presents baseline hydrologic (water levels and flows) conditions of watercourses and waterbodies in the Project Area (PA) used in mercury and methylmercury modelling studies (Section 4)
Water Quality Baseline Report (WSP 2025d)	– Presents baseline water quality of watercourses and waterbodies and groundwater quality in the PA, including sulphate, mercury and methylmercury concentrations. Surface water quality monitoring stations are presented in Figure 1-7. Groundwater monitoring stations are presented in Figure 1-8 and Figure 1-9.
Aquatic Resources Baseline Report (WSP 2025e)	– Presents baseline benthos, fisheries and sediment quality monitoring data, summarized in Section 3 of this report. Supplemental porewater sampling was initiated in 2024 to monitor ultra-low mercury and methylmercury. The lower trophic, sediment quality and benthic invertebrate monitoring network is shown in Figure 1-10. Fish total mercury and methylmercury monitoring locations are presented in Figure 1-11.
Ontario Data Catalogue (MECP 2018)	– Regional historical fish sample data (also skinless and boneless left dorsal epaxial muscle tissue samples from similar species) obtained from the province to help characterize baseline case total mercury concentrations in fish, discussed in Section 3 and used in modelling studies (Section 4).

GRL-03
GULLROCK LAKE
TWO ISLAND LAKE
GRL-02
GRL-01
UNNAMED WATERCOURSE 10
MOOSE CREEK
SW-GL01
SW-18
UNNAMED WATERCOURSE 12
SW-GL02
STONE LAKE
SW-17
UNNAMED WATERCOURSE 8
105
CR-REF
UNNAMED WATERBODY 3
TUCK'S ROAD
SW-16
SW-TR
UNNAMED WATERBODY 4
UNNAMED WATERCOURSE 6B
UNNAMED WATERBODY 7
SW-12
SW-13
SW-GL
SW-05
GENESSEE LAKE
CARIBOU CREEK
UNNAMED WATERBODY 1
UNNAMED WATERCOURSE 3
UNNAMED WATERCOURSE 11
SW-01
SW-07
SW-06
UNNAMED WATERBODY 2
SW-11
SW-12b
SW-04
UNNAMED WATERCOURSE 6C
SW-08a
UNNAMED WATERCOURSE 1
CR-FDP
SW-03
SW-14
SW-02
UNNAMED WATERCOURSE 6D
SW-08
UNNAMED WATERBODY 6
UNNAMED WATERCOURSE 5
CHUKUNI RIVER
SW-09
DIXIE CREEK
UNNAMED WATERCOURSE 6
GL-Trib
SW-15
DC-US
CR-DS
SW-10
DIXIE LAKE ROAD
PL-01
DIXIE LAKE
UNNAMED WATERCOURSE 7
DL-Ref
HIEWALL LAKE
TOTE ROAD LAKE
PAKWASH LAKE

PAKWASH LAKE MONITORING STATIONS



SCALE: 1:350,000

LEGEND

- SURFACE WATER QUALITY MONITORING STATION
- METHLYMERCURY AND SUPPLEMENTAL ULTRALOW MERCURY MONITORING STATION
- PROPERTY BOUNDARY
- HIGHWAY
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- WATERCOURSE
- WATERBODY
- FLOW DIRECTION

0 1 2 4

1:70,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. AERIAL IMAGERY PROVIDED BY GREAT BEAR RESOURCES (SCENE DATE: SEPTEMBER 2022).
3. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
4. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
5. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
SURFACE WATER QUALITY MONITORING STATIONS (BASELINE)

CONSULTANT
wsp

YYYY-MM-DD	2026-03-04
DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

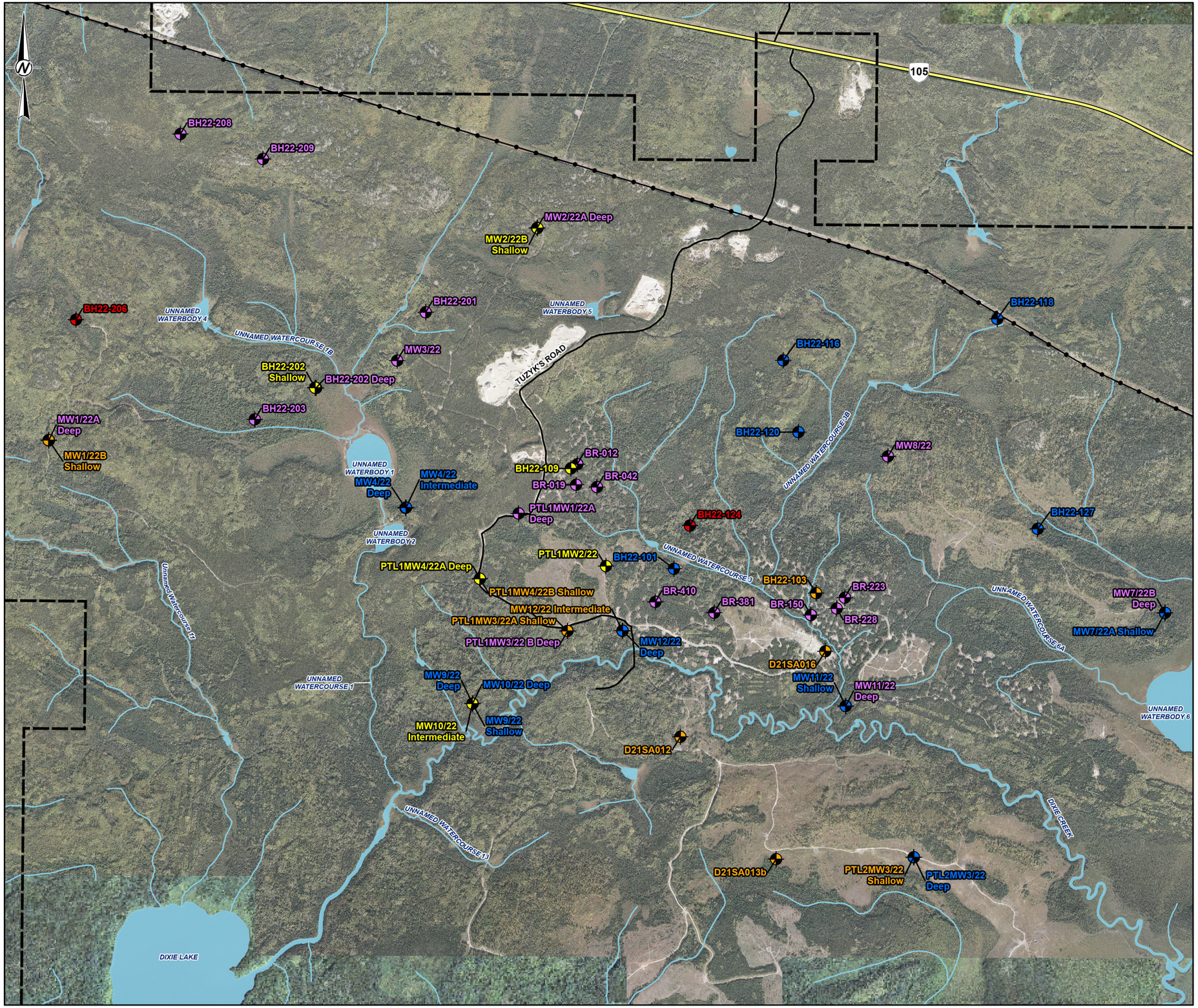
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LEGEND

- PROPERTY BOUNDARY
- HIGHWAY
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- WATERCOURSE
- WATERBODY

GROUNDWATER QUALITY MONIITORING STATION

STRATIGRAPHIC UNIT

- BEDROCK
- CLAY
- GLACIAL
- SAND
- SILT

0 0.25 0.5 1

1:28,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. AERIAL IMAGERY PROVIDED BY GREAT BEAR RESOURCES (SCENE DATE: SEPTEMBER 2022).
3. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
4. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
5. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
GROUNDWATER QUALITY MONITORING STATIONS, 2022-2023

CONSULTANT

wsp

YYYY-MM-DD	2026-03-04
DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

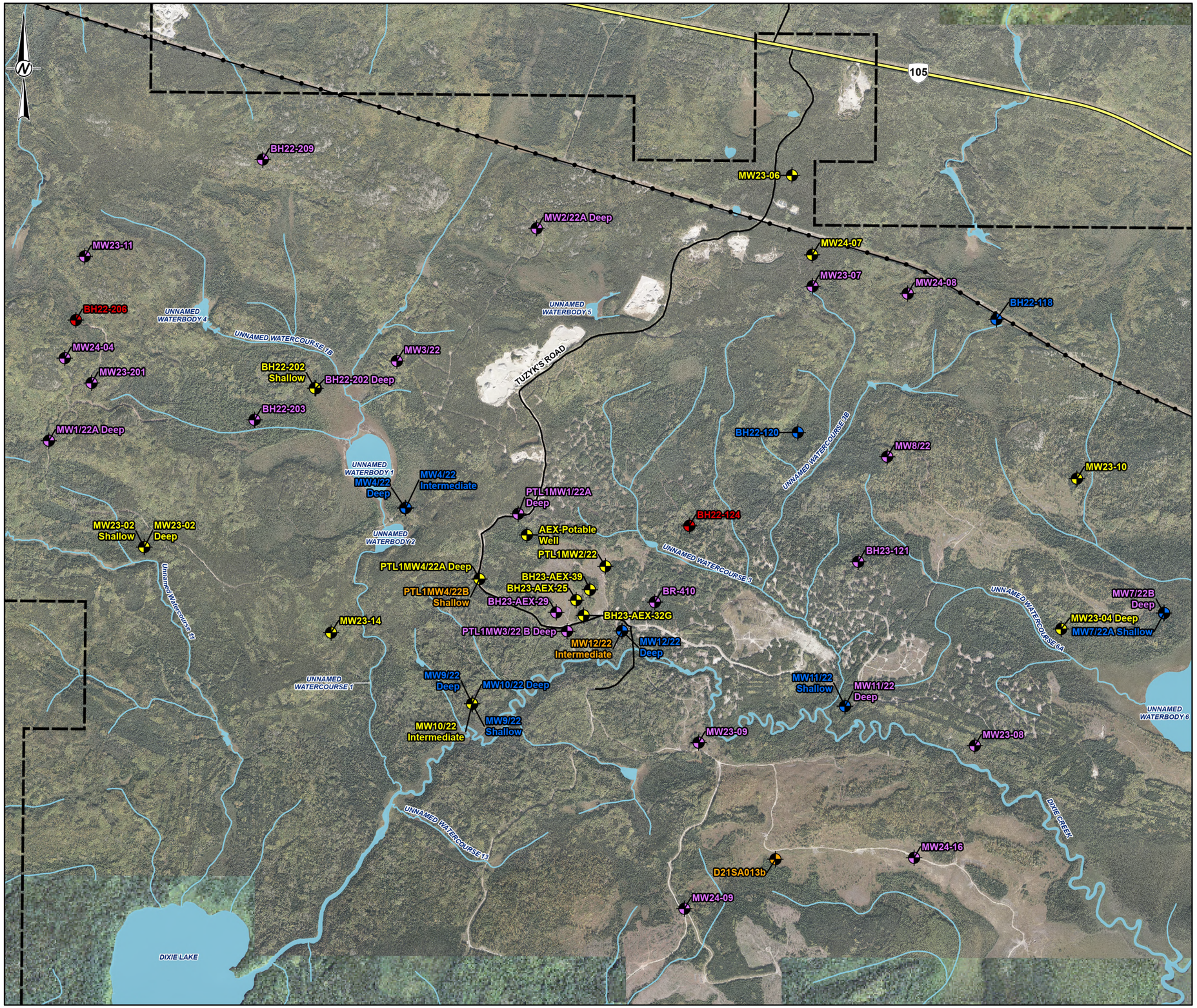
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CA0031271	0001	A	1-8

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LEGEND

- PROPERTY BOUNDARY
- HIGHWAY
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- WATERCOURSE
- WATERBODY

GROUNDWATER QUALITY MONIITORING STATION

STRATIGRAPHIC UNIT

- BEDROCK
- CLAY
- GLACIAL
- SAND
- SILT

0 0.25 0.5 1

1:28,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. AERIAL IMAGERY PROVIDED BY GREAT BEAR RESOURCES (SCENE DATE: SEPTEMBER 2022).
3. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
4. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
5. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
GROUNDWATER QUALITY MONITORING STATIONS, 2024

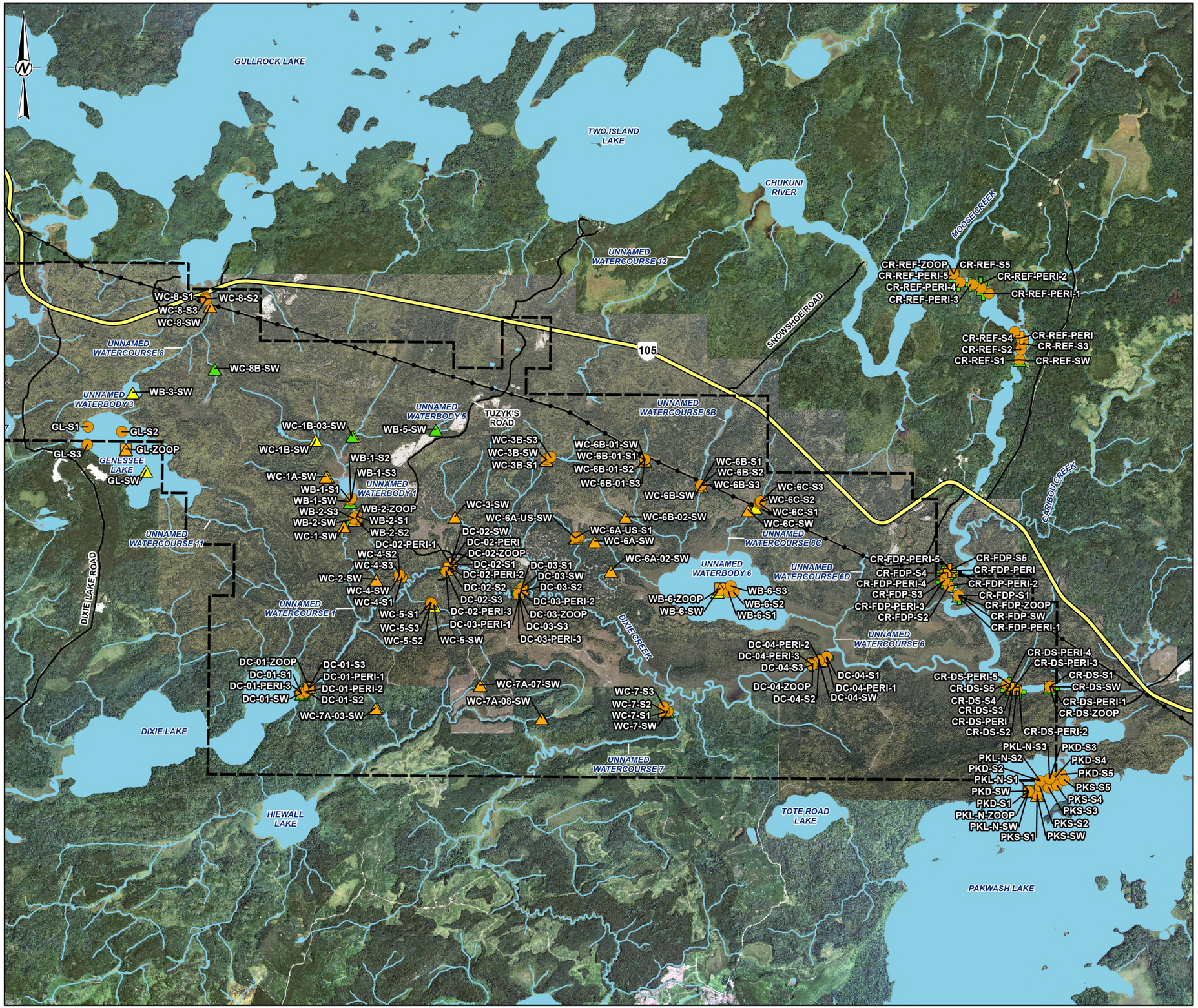
CONSULTANT

wsp

YYYY-MM-DD	2026-03-04
DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
CA0031271	0001	A	1-9

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PAKWASH LAKE OVERVIEW

SCALE: 1:315,000

LEGEND

- PROPERTY BOUNDARY
- HIGHWAY
- LOCAL ROAD
- POWER LINE
- WATERCOURSE
- WATERBODY

SAMPLING TYPE

- PERIPHYTON
- SEDIMENT / BENTHIC
- SURFACE WATER
- ZOOPLANKTON

SEASON

- SPRING
- SUMMER
- FALL

0 1,000 2,000 4,000

1:70,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE
2. CR-REF UPSTREAM SAMPLE LOCATIONS WERE COMPLETED IN 2024. CR-REF DOWNSTREAM SAMPLE LOCATIONS WERE COMPLETED IN 2022-2023.

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES AND WATERBODY ACQUIRED FROM LAND INFORMATION ONTARIO (MNRF) AND MODIFIED TO MATCH AERIAL IMAGERY AND LIDAR.
3. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
4. AERIAL IMAGERY PROVIDED BY GREAT BEAR RESOURCES (SCENE DATE: SEPTEMBER 2022).
5. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
LOWER TROPHIC, IN-SITU WATER QUALITY, SEDIMENT QUALITY AND BENTHIC INVERTEBRATE SAMPLE LOCATIONS

CONSULTANT

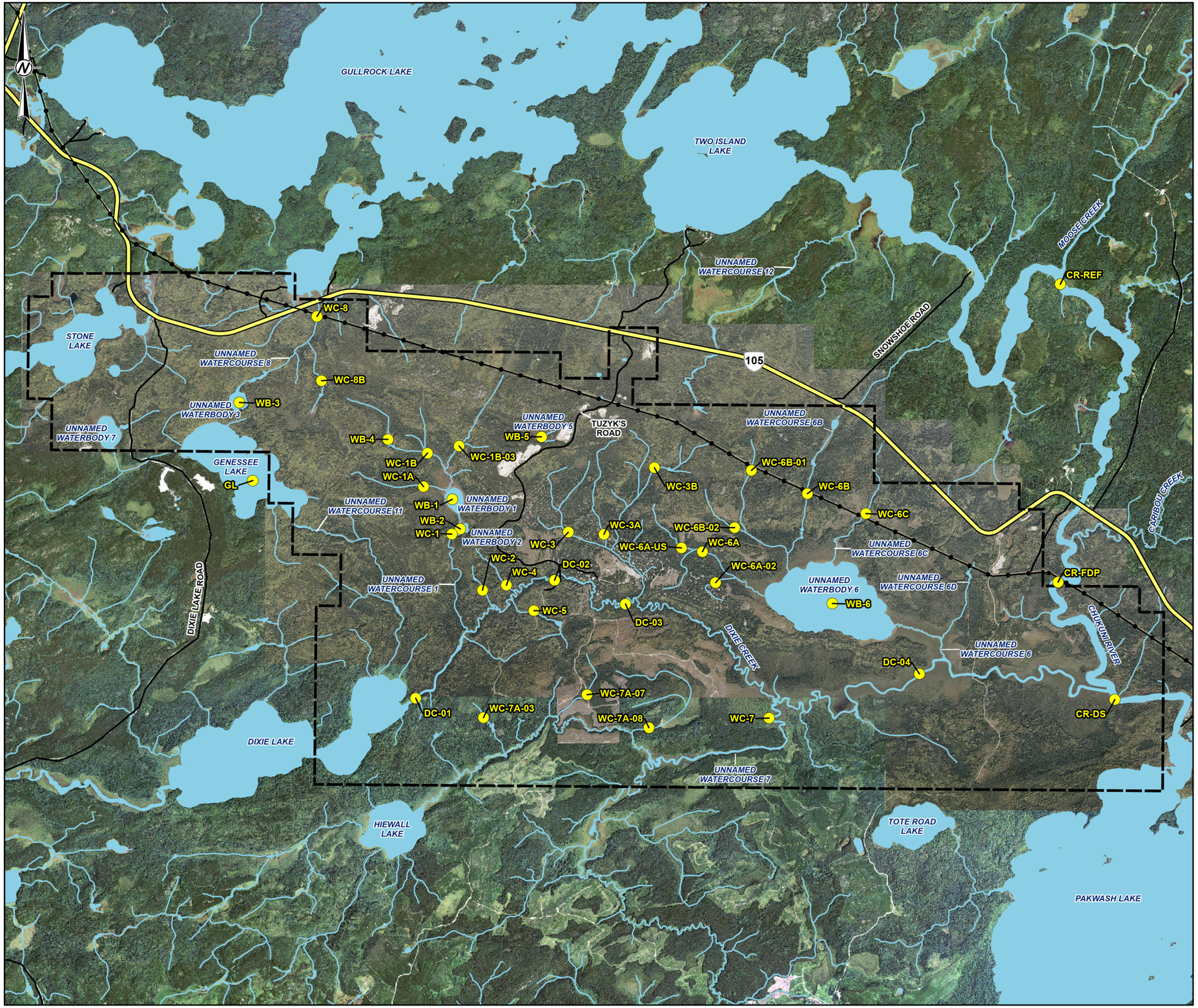
YYYY-MM-DD	2026-03-04
DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
CA0031271	0001	A	1-10

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

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LEGEND

- SITE LOCATION
- PROPERTY BOUNDARY
- HIGHWAY
- LOCAL ROAD
- POWER LINE
- WATERCOURSE
- WATERBODY

0 1,000 2,000 4,000

1:70,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
3. AERIAL IMAGERY PROVIDED BY GREAT BEAR RESOURCES (SCENE DATE: SEPTEMBER 2022).
4. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
AQUATIC BASELINE SITE LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2026-03-26
DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
CA0031271	0001	A	1-11

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

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2 ENVIRONMENTAL SETTING AND STUDY AREA

Regional and local watershed areas and boundaries are presented in Figure 2-1 and Figure 2-2, respectively. At a regional scale, the Property is within the Red Lake mining district in northwestern Ontario, which has a long history of gold exploration and mining production. There are historical and currently operating mines in the region and within the Chukuni River watershed, including the Red Lake Mine. Locally, the Project is situated within the Dixie Creek watershed (Figure 2-1), which feeds into the Chukuni River and eventually drains into Pakwash Lake. The proposed PA which is approximately 18 km^2 in area, comprises roughly 0.4% of the Chukuni River watershed area upstream of Pakwash Lake.

The Chukuni River is the proposed receiving environment for the Project. The Chukuni River is a large, regulated watercourse with flow controlled by the Snowshoe Rapids Dam, constructed in 1927 to raise upstream water levels for transporting equipment and goods to support gold mining operations in the Red Lake area before the construction of Highway 105. Today, the Snowshoe Rapids Dam is operated by the Ministry of Natural Resources with multiple objectives in mind, including flood protection, navigation, water supply and environmental considerations. Water levels and flows in the Chukuni River are managed according to a rule curve designed to balance these goals; the associated monthly average flows range from 51,900 m^3/hr to 197,120 m^3/hr at the discharge location, with March being the lowest flow month.

The confluence of the Chukuni River into Pakwash Lake is about 6 km downstream (by watercourse) of the discharge location. Pakwash Lake is a large lake, greater than 98 km^2, with a maximum depth of approximately 17.4 m and average depth of 6.8 m. Pakwash Lake has a watershed area of approximately 8,020 km^2 and receives flow from the Chukuni River, Troutlake River, Lac Seul and Cedar River (Figure 2-1). Pakwash Lake discharges into the English River system through the Manitou Falls generating station. The distance by watercourse from the discharge location to the outlet of Pakwash Lake is approximately 26 km. The distance by watercourse from the discharge location to the downstream Manitou Falls dam is approximately 54 km. The community of ANA is approximately 145 km downstream of the proposed Project treated effluent discharge location.

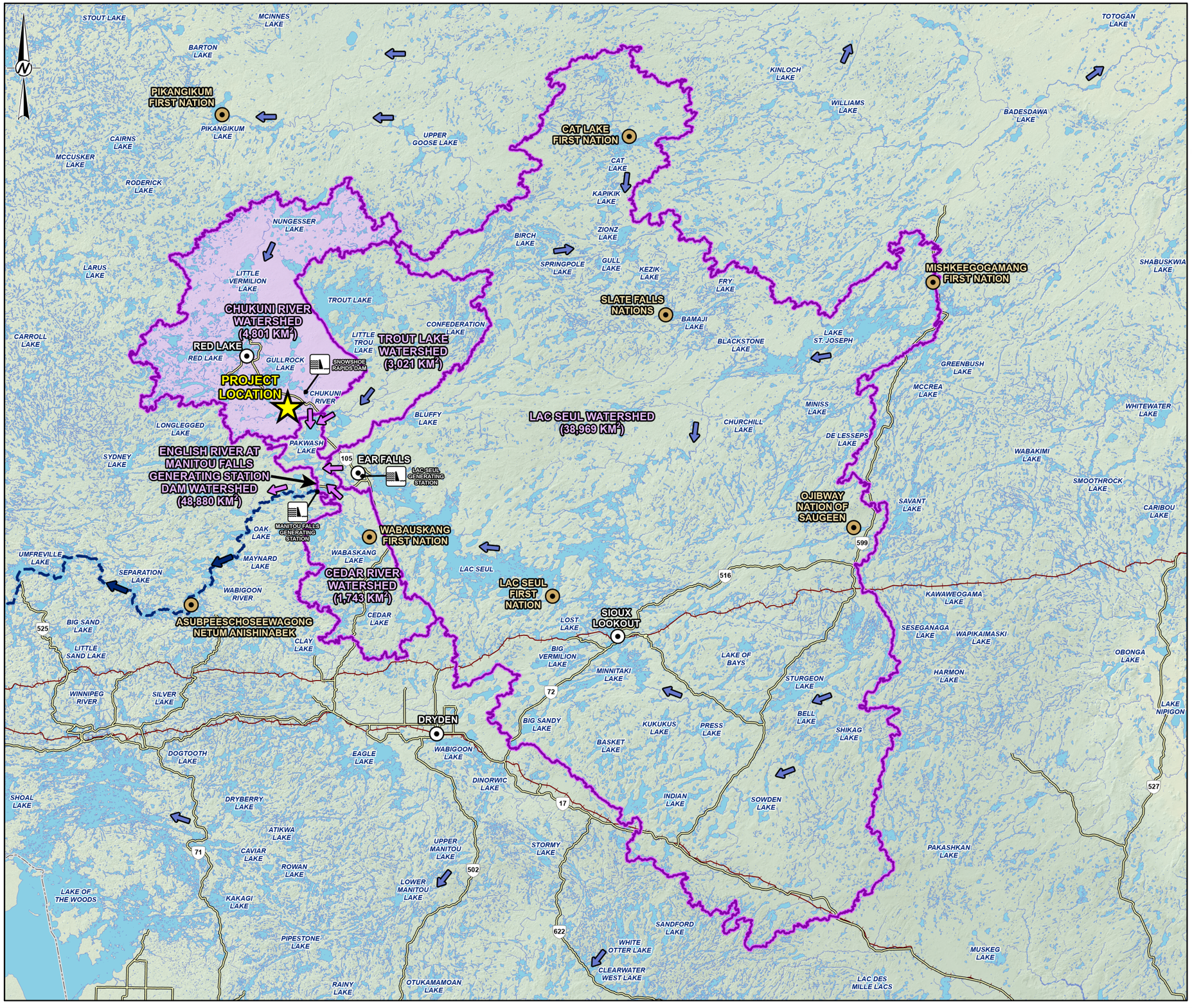
The water quality local study area (LSA) for the Impact Statement (Figure 2-3) corresponds to the area around the PA where most of the water quality effects of the Project are expected to occur, taking into account the water management plans, drainage patterns and potential changes to surface water flows and groundwater systems. The LSA extends downstream to the Chukuni River confluence with Pakwash Lake, where the predicted Project effluent discharge constitutes less than 2% of flows. The water quality regional study area (RSA_ for the Impact Statement (Figure 2-4) extends further downstream through Pakwash Lake and along the Chukuni River to its confluence with the English River. At the outlet of Pakwash Lake, quantitative predictive modelling indicates negligible (i.e., not measurable / observable) changes to water quality and water quantity, relative to existing conditions. Figure 2-6 presents the surface water quality modelling nodes for the assessment.

In direct response to feedback received from ANA, the study area for the Mercury Study was expanded beyond the downstream extent of the water quality RSA to include additional watercourses downstream of Pakwash Lake. For the assessment of Project contributions to methylmercury production in this Mercury Study, the modelling efforts have been focused on 20 waterbody segments downgradient of the proposed effluent discharge location in the Chukuni River. The first three segments:

- Segment 1: Chukuni River from the proposed effluent location to the confluence of Pakwash Lake
- Segment 2: Pakwash Lake (segment 2)
- Segment 3: Chukuni River from Pakwash Lake to the confluence of Chukuni River with the English River,

are located within the water quality RSA for the Impact Statement.

An additional 17 downstream watercourses and waterbodies were added for the purposes of the Mercury Study. These segments are located downgradient of the RSA through to where the English River upstream joins Little Fox Lake, north of Grassy Narrows Lake (Figure 2-5). This expanded study area boundary does not reflect the area where Project-related effects are anticipated. Rather, this study area has been delineated solely in recognition of the concerns raised by ANA. The intent is to demonstrate responsiveness to community input and Great Bear Resources' commitment to incorporation of areas identified by Indigenous communities as culturally and environmentally important.



LEGEND

- PROJECT LOCATION
- FIRST NATION RESERVE
- TOWN
- DAM / GENERATING STATION
- CHUKUNI RIVER WATERSHED
- OTHER WATERSHED
- APPROXIMATE FLOW DIRECTION OF THE ENGLISH RIVER SYSTEM
- HIGHWAY
- RAILWAY
- NATIONAL BOUNDARY
- WATERSHED OUTLET
- FLOW DIRECTION

0 12.5 25 50

1:1,400,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERSHEDS DELINEATED USING ONTARIO WATERSHED INFORMATION TOOL (MNRF).
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
REGIONAL WATERSHED AREAS

CONSULTANT

wsp

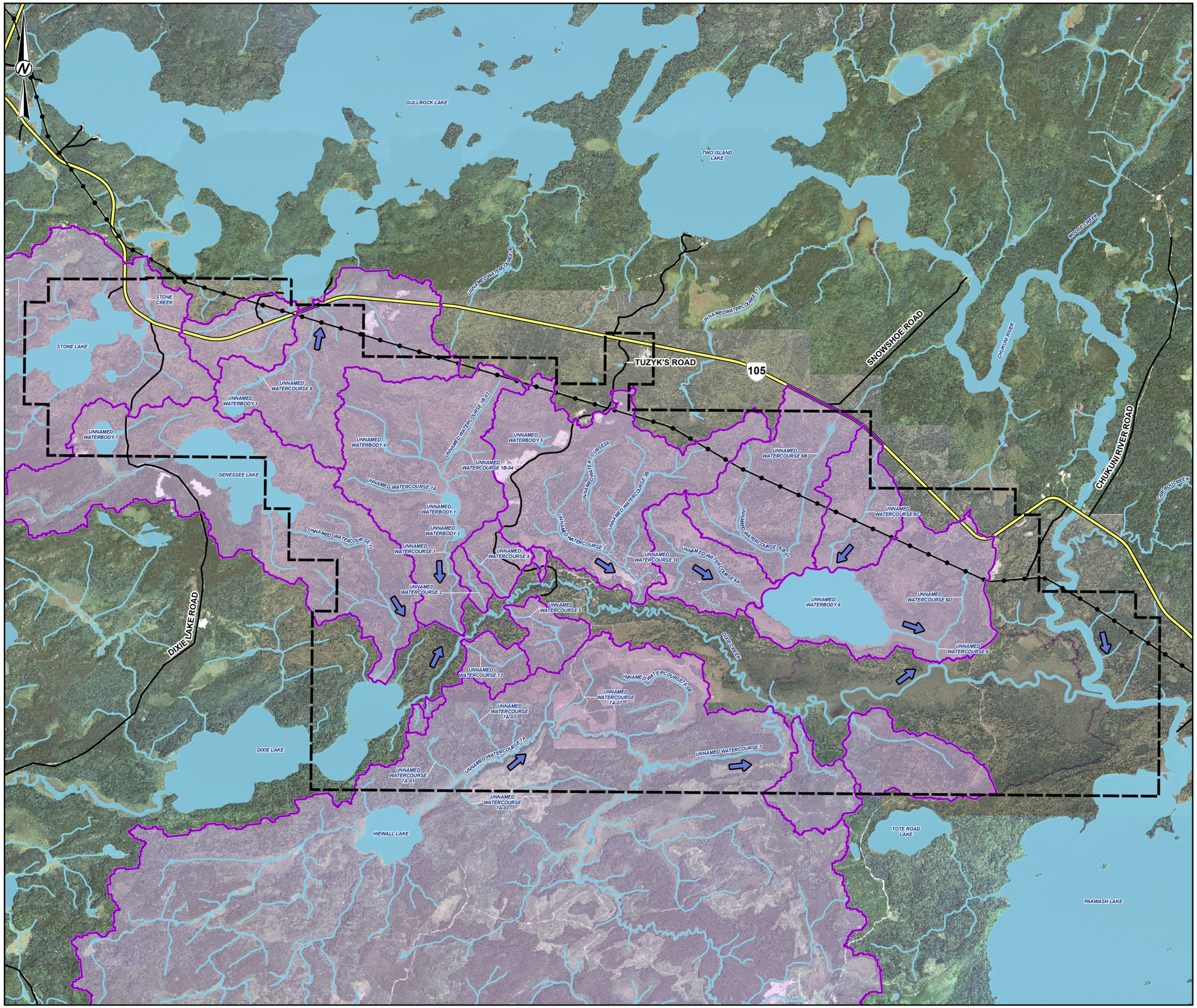
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PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
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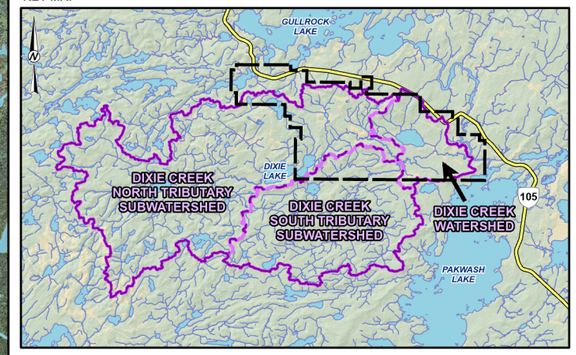
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KEY MAP



SCALE: 1:485,000

LEGEND

- PROPERTY BOUNDARY
- PROPERTY SUBCATCHMENT
- DIXIE CREEK SUBWATERSHED (SHOWN IN KEY MAP)
- DIXIE CREEK WATERSHED (SHOWN IN KEY MAP)
- HIGHWAY
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- WATERCOURSE
- WATERBODY
- FLOW DIRECTION

0 1 2 4

1:70,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. AERIAL IMAGERY PROVIDED BY GREAT BEAR RESOURCES (SCENE DATE: SEPTEMBER 2022).
3. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
4. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
5. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
LOCAL WATERSHED AREAS

CONSULTANT

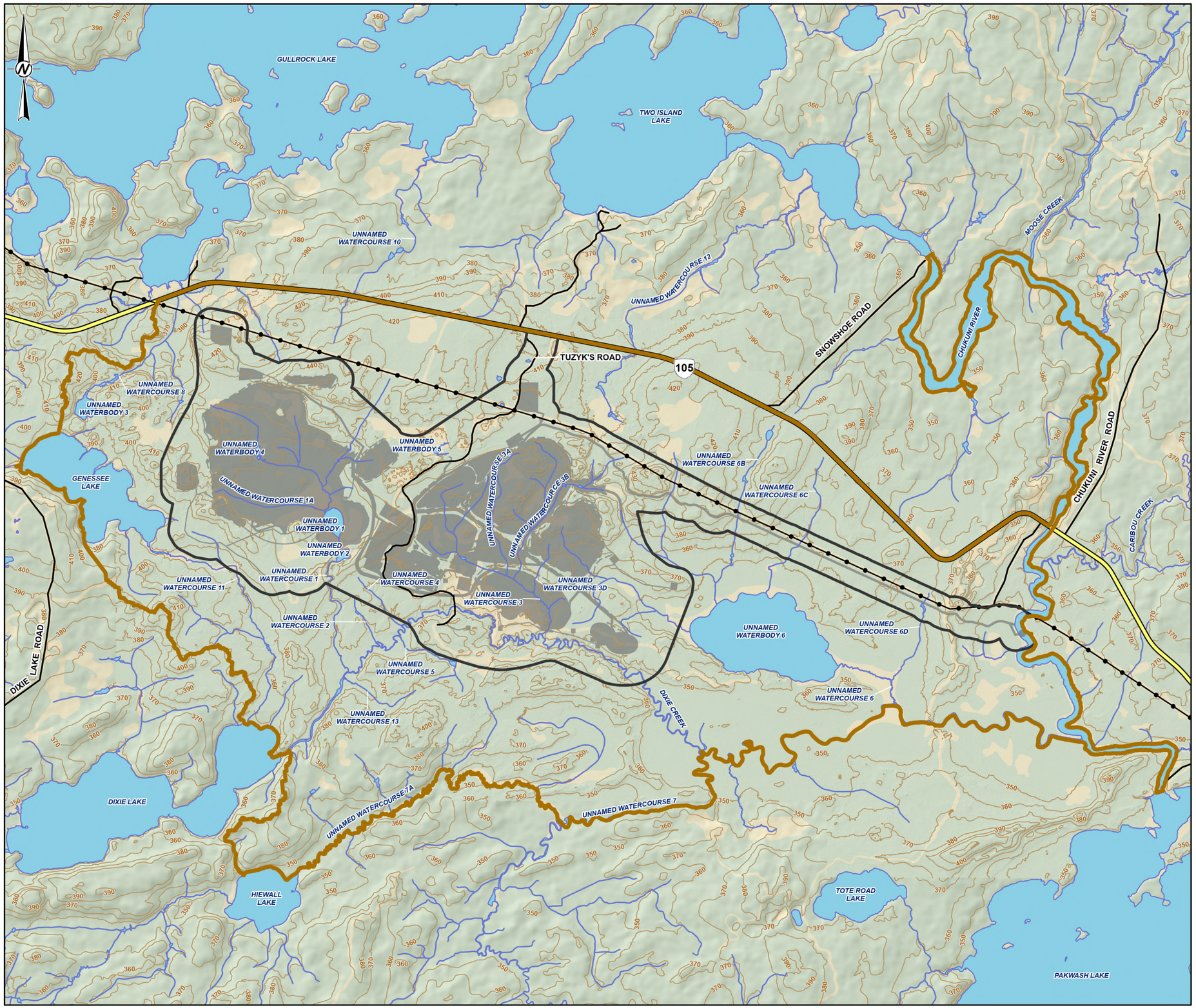
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YYYY-MM-DD	2025-08-22
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PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
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LEGEND

- GREAT BEAR PROJECT FOOTPRINT
- PROJECT AREA
- LOCAL STUDY AREA FOR WATER QUALITY
- HIGHWAY
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- CONTOURS (10 M INTERVAL)
- WATERCOURSE
- WATERBODY

0 0.75 1.5 3

1:61,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. CONTOURS ACQUIRED FROM LAND INFORMATION ONTARIO (MNRF), 2022 AND DERIVED FROM 2022 LIDAR PROVIDED BY GREAT BEAR RESOURCES
3. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
4. SITE PLAN BASED ON INFORMATION PROVIDED BY GREAT BEAR RESOURCES, DECEMBER 2024 / JUNE 2025.
5. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
LOCAL STUDY AREA FOR WATER QUALITY

CONSULTANT
wsp

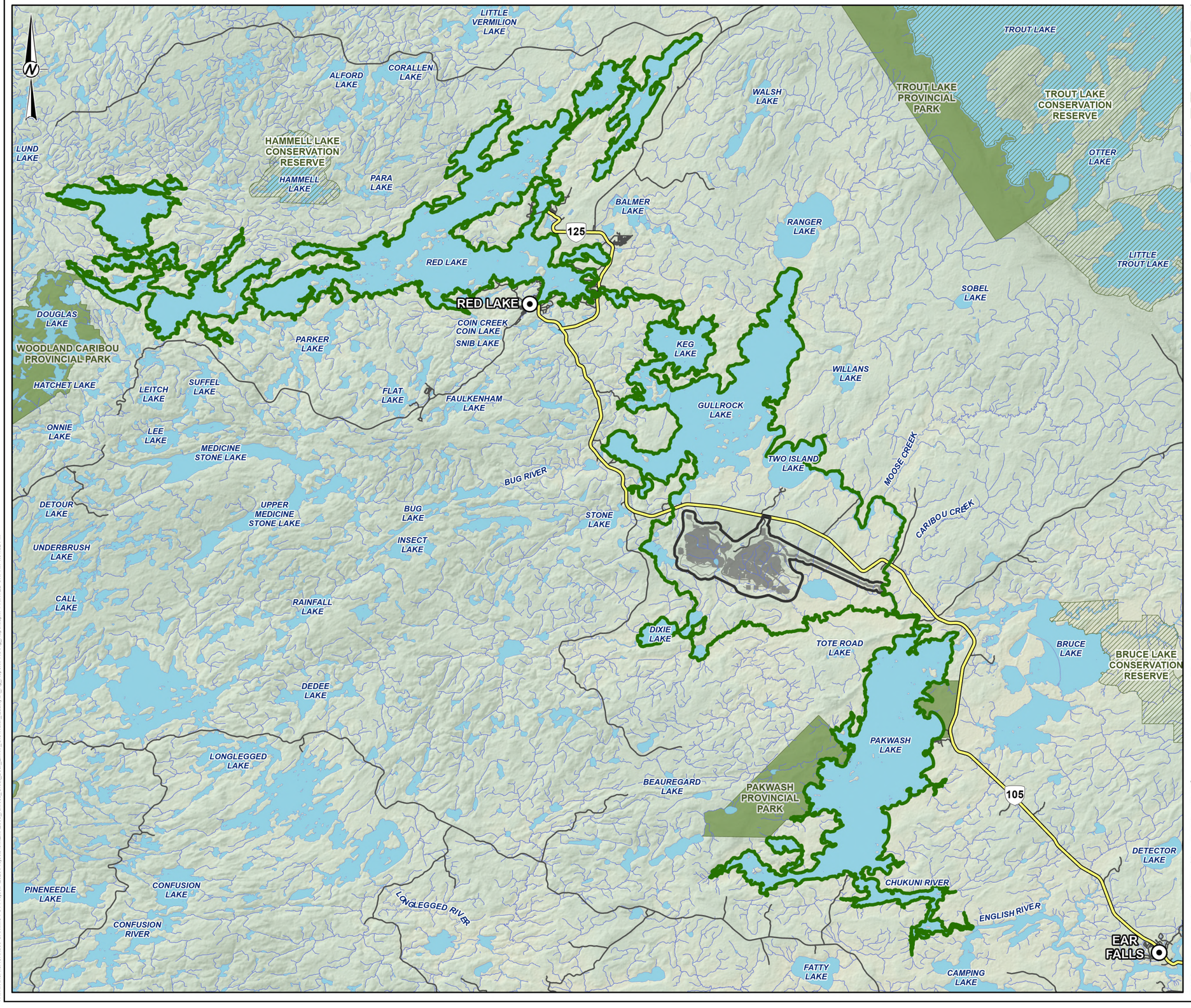
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DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
CA0031271	0001	A	2-3

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LEGEND

- GREAT BEAR PROJECT FOOTPRINT
- PROJECT AREA
- REGIONAL STUDY AREA FOR WATER QUALITY
- TOWN
- CONSERVATION RESERVE
- PROVINCIAL PARK
- HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- WATERBODY

0 2.5 5 10

1:250,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. SITE PLAN BASED ON INFORMATION PROVIDED BY GREAT BEAR RESOURCES, DECEMBER 2024 / JUNE 2025.
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
REGIONAL STUDY AREA FOR WATER QUALITY

CONSULTANT

wsp

YYYY-MM-DD	2026-01-17
DESIGNED	----
PREPARED	MD
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
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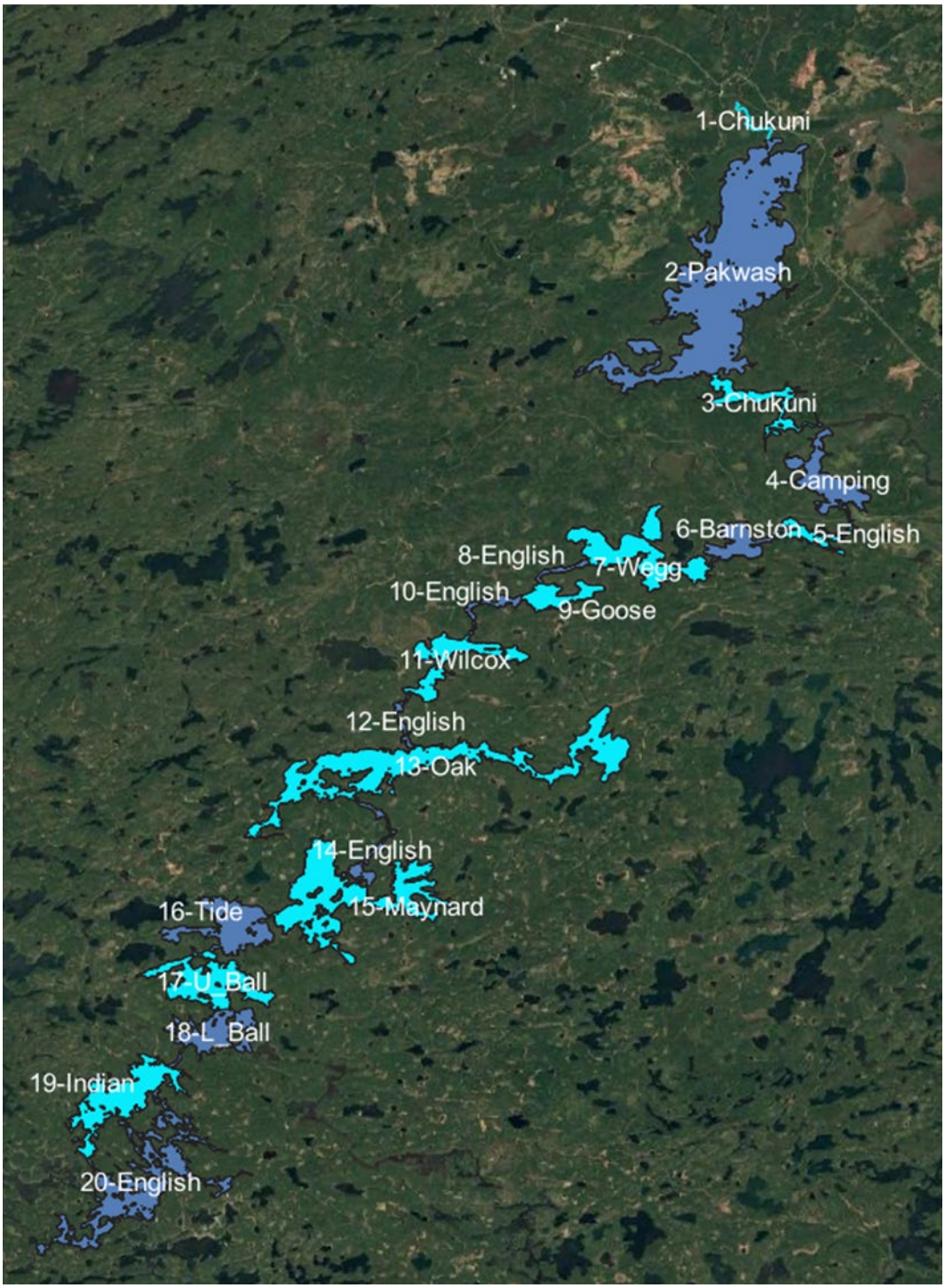
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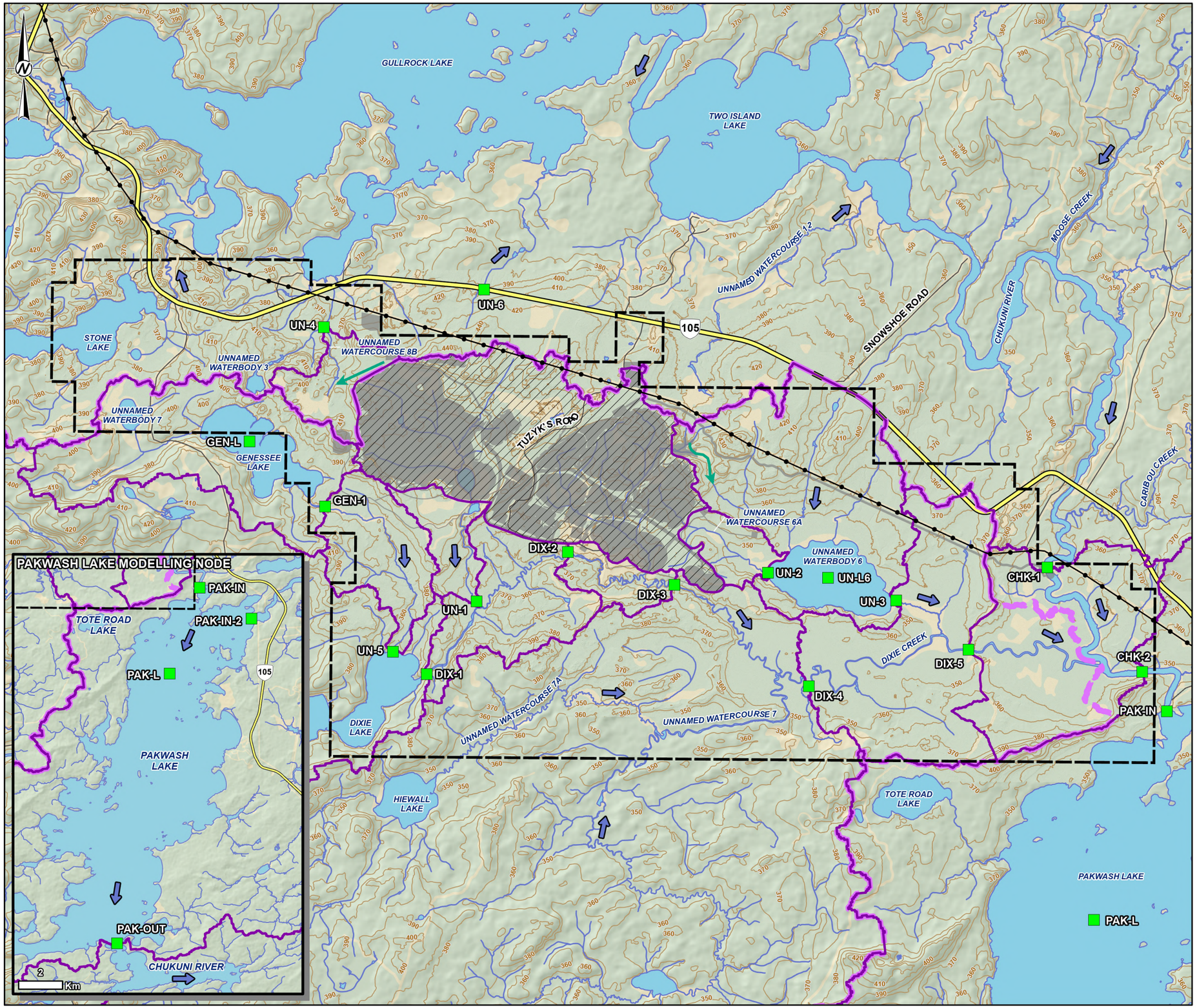
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Figure 2-5: Waterbody Segments used in the Predictive Methylmercury Water Quality Model





LEGEND

- PROPERTY BOUNDARY
- GREAT BEAR PROJECT FOOTPRINT
- CLEAN WATER DIVERSION
- SURFACE WATER QUALITY MODELLING NODE
- DIXIE CREEK WATERSHED (NOT USED FOR NODE AREAS)
- MODELLING NODE WATERSHED
- PROJECT WATERSHED
- HIGHWAY
- LOCAL ROAD
- EXISTING TRANSMISSION LINE
- CONTOURS (10 M INTERVAL)
- WATERCOURSE
- WATERBODY
- FLOW DIRECTION

0 1 2 4

1:72,000 KILOMETRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. WATERCOURSES AND WATERBODY ACQUIRED FROM LAND INFORMATION ONTARIO (MNRF) AND MODIFIED TO MATCH AERIAL IMAGERY AND LIDAR.
3. ROADS INFORMATION PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2022.
4. PROPERTY BOUNDARY PROVIDED BY GREAT BEAR RESOURCES, AUGUST 2024.
5. CONTOURS ACQUIRED FROM LAND INFORMATION ONTARIO (MNRF), 2022AND DERIVED FROM 2022 LIDAR PROVIDED BY GREAT BEAR RESOURCES.
6. SITE PLAN BASED ON INFORMATION PROVIDED BY GREAT BEAR RESOURCES, DECEMBER 2024 / JUNE 2025.
7. COORDINATE SYSTEM: NAD 1983 UTM ZONE 15N

CLIENT
GREAT BEAR RESOURCES

PROJECT
GREAT BEAR PROJECT

TITLE
OPERATIONS / CLOSURE SURFACE WATER QUALITY MODELLING NODES

CONSULTANT

wsp

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DESIGNED	----
PREPARED	MD
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APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
CA0031271	0001	A	2-6

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

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3 ENVIRONMENTAL BASELINE STUDIES

Extensive baseline data has been collected to support the Project. Comprehensive reports detailing the pre-development Project conditions for hydrology, water quality and aquatic resources are provided in WSP 2025c, WSP 2025d, WSP 2025e, respectively.

The following sections focus discussion on mercury and methylmercury baseline investigations in the aquatic environment to support the objectives outlined in Section 1.2. Baseline data results for other parameters and value components are described in the Impact Statement (WSP 2026b). The baseline data described in this section include sample data collected between 2022 to 2024, which is in alignment with the sample data used to support the Impact Statement. This sample data included measurement of chemical and physical parameters in surface water and sediment, and tissue concentrations in biota (i.e., aquatic invertebrates and fish).

Additional sample data (i.e., physical and chemical parameters in surface water, porewater and sediment) collected by HESL in waterbody segments in the fall of 2025 to support the predictive methylmercury water quality model are described in Section 4.4 of this report.

Additional sampling was completed in the fall of 2025 to augment the existing dataset (fish tissue samples from Chukuni River and other waterbody segments south of Pakwash Lake). The analysis of these samples are in progress, and results were not available for in this report. The programs included samples of large-bodied fish tissue and small-bodied fish tissue, benthic invertebrates and periphyton collected from Dixie Creek, Chukuni River, Pakwash Lake, Camping Lake, Wegg Lake, Ball Lake and / or Indian Lake.

3.1 WATER QUALITY

3.1.1 SAMPLING LOCATIONS AND COLLECTION

The surface and groundwater quality environmental baseline programs for the Project have been developed in alignment with the applicable regulatory framework for proposed mining projects in Ontario. The programs include long-term seasonal sampling to capture natural variability and to characterize pre-development conditions. Sampling locations were selected to characterize pre-development conditions for areas that may be directly or indirectly affected by the Project and include representative upstream, downstream and reference locations. Sampling locations have also been chosen to capture spatial variability, account for variability in natural influences (e.g., geology, anoxic environments, riverine vs. lake systems), and to support the Mercury Study.

Figure 1-7 presents the baseline surface water quality monitoring network. Monitored watercourses and waterbodies include:

- Dixie Creek and its tributaries
- Chukuni River
- Genessee Lake
- Dixie Lake
- Small unnamed waterbodies within the Dixie Creek watershed, including Unnamed Waterbody 1 and Unnamed Waterbody 6
- Regional monitoring locations, including Pakwash Lake and Gullrock Lake.

A list of monitoring stations and rationale for inclusion are presented in WSP 2025d.

The baseline sampling program has collected approximately 600 surface water quality samples since 2020. The majority of surface water quality sampling completed has been conducted monthly, when flow was present and the sampling station could be safely accessed. Note that some unnamed watercourses

and small tributaries could only be sampled seasonally and / or on a quarterly basis due to site accessibly constraints and because flow was seasonally absent or frozen to bottom.

Surface water quality sampling included the measurement of (Table 3-1):

- Total and dissolved ultra-low mercury using Cold Vapor Atomic Fluorescence Spectroscopy (CVAFS) with detection limits of approximately 0.04 ng/L (or 0.00000004 mg/L)
- Total and dissolved ultra-low methylmercury using CVAFS with detection limits of approximately 0.0035 ng/L (or 0.0000000035 mg/L)
- Standard total and dissolved mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS) with detection limits of approximately 5 ng/L (or 0.000005 mg/L)
- Supplemental parameters known to influence mercury speciation and SRB activity, including iron, dissolved organic carbon and nitrate
- In situ physicochemical profiling (temperature, pH, oxygen).

Analysis of sulphate, total mercury and dissolved mercury concentrations occurred at all surface water sampling stations. Additional supplemental ultra low-level mercury and methylmercury sampling occurred at targeted reference and receiving environment locations as presented in Figure 1-7. Water quality samples were collected both at surface and at depth for Genessee Lake, Unnamed Waterbody 6, Gullrock Lake and Pakwash Lake.

Groundwater sampling locations are presented in Figure 1-8 and Figure 1-9. The geographic extent of the groundwater quality baseline program has varied slightly from year to year, reflecting updates in Project design and availability of groundwater monitoring wells. Mercury monitoring occurred at all groundwater wells across years, and additional targeted supplemental low-level mercury and methylmercury monitoring began in 2024.

Water quality sampling adhered to industry standard practices for sampling procedures, quality assurance and quality control protocols, as well as equipment recommendations as outlined in CCME (2011) and British Columbia (BC) (2003). These industry standard protocols allow for collection of samples that are uncontaminated, properly preserved, unbiased and representative. Key sampling protocols included:

- Samples were analyzed at laboratories that have Canadian Association for Laboratory Accreditation, an internationally recognized not for profit accreditation body.
- Sample bottles and caps are provided by the issuing accredited laboratory and certified as chemical-free.
- Reagents and preservatives used in the process are of analytical grade and certified chemical-free by the laboratory.
- Samples are placed in a chilled, hard-bodied container immediately after collection and maintained at approximately 4°C to 10°C until received by the laboratory.
- Samples are shipped under a Chain of Custody Protocol without delay, targeting arrival at the laboratory aligned with recommended holding times.
- Trip blanks, field blanks and laboratory blanks are analyzed during each sampling event to verify the purity of chemical preservatives, check for contamination from containers or equipment and detect potential systematic or random errors from sampling to analysis.
- Replicate samples (at least 10%) are collected to estimate the precision of the sampling and measurement processes.

3.1.2 BASELINE DATA ANALYSIS

Baseline water quality data analyses included basic descriptive summary statistics and regression analyses; duplicate samples were averaged before inclusion in statistics. For regression analyses, the R^2 criterion is used as an additional descriptive metric to evaluate the strength of association between

variables, and is not intended as a definitive test of causality. In environmental baseline datasets, where natural variability and unmeasured influences are common, relatively modest R^2 values may still be informative and is thus used as a screening tool in this report. For this report, as a general interpretive guideline, R^2 values greater than approximately 0.3 are considered weak but potentially meaningful, while values between approximately 0.3 and 0.5 are interpreted as indicating a moderate relationship. For analytical results that were less than the analytical method detection limit (MDL), half the MDL was used in the statistical summaries. This approach is consistent with industry standard practice for substitution of non-detects and is consistent with available guidance documents regarding environmental data handling (EPA 1990; EPA 1991; Environment Canda 2012). Adhering to standard environmental data handling practices herein supports comparisons to regulatory standards and facilitates consistency in data interpretation and reporting across different technical studies, different points in the Project life cycle and between the provincial and federal regulatory approvals processes relevant to the Project. Following a standardized approach to handling non-detect values enhances the transparency and reproducibility of analyses presented. A summary of analytical MDLs is provided in Table 3-1 and Table 3-2.

Baseline data analyses included comparison of observed mercury and methylmercury concentrations in surface water and groundwater to available WQG PAL. Comparison of observed concentrations to available water quality guidelines is a required practice under the Ontario regulatory regime and is stipulated by the TISGs issued for the Project. WQG PAL are routinely used as screening-level benchmarks and are an accepted component of effects assessment. Importantly, the use of water quality guidelines does not preclude supplemental analyses, e.g., consideration of bioaccumulation process (see Section 5), should they be warranted, and should be understood as one tool within a broader effects assessment toolbox.

WQG PAL are numerical criteria that have been developed by the provincial and federal government to establish a measurable level of water quality that is protective of all aquatic life, for all life cycle stages, for periods of indefinite exposure. Both surface water and groundwater quality results are compared to WQG PAL in this report. Groundwater exists in the subsurface, however, where environmental conditions differ notably from those of surface water, resulting in distinct water quality profiles. Natural, undisturbed groundwater often exhibits concentrations greater than surface waters and WQG PAL. WQG PAL are not applicable to groundwater and are used here to support conservative comparisons relative to surface water quality results. For example, health-based drinking water quality guidelines that may be seen as applicable to groundwater quality wells are generally less stringent than WQG PAL.

Available WQG PAL for mercury and methylmercury are:

- CCME guidelines for total mercury (26 ng/L) and methylmercury (4 ng/L) for the protection of aquatic life
- Provincial Water Quality Objective (PWQO) for dissolved mercury (200 ng/L)
- BC Environment guideline (BC Environmental 2001) for total mercury for the protection of aquatic life. The guideline value is calculated on a site-specific basis, using an assumed linear relationship between an acceptable methylmercury concentration in water for the protection of wildlife that consume fish (WQG_{wl} = 0.1 ng/L) and the percent of methylmercury relative to total mercury (%Methylmercury). Where:

$$\text{Site-specific guideline value} = WQG_{wl} \div \%\text{Methylmercury}$$

WQG PAL are not directly applicable to groundwater quality and are here used for information purposes only.

Note, that when mercury and methylmercury concentrations in the existing environment (pre-project) are greater than the generalized guidelines described above, site-specific guidance is necessary, and baseline equivalents may be used instead.

3.2 FISH AND FISH HABITAT

The baseline study for total mercury and methylmercury levels in fish and their habitats (WSP 2025e) included:

- Multi-season habitat assessments within Genessee Lake, Chukuni River, Dixie Creek, Pakwash Lake and nearby unnamed watercourses and waterbodies
- Baseline monitoring of sediment and pore water quality, lower trophic community (benthos, periphyton and zooplankton), fish community and tissue metals
- A desktop review of publicly available information to supplement field investigations for characterizing the aquatic environment and mercury tissue concentrations, including data from MECP fish tissue database, which contains approximately over 2,000 mercury-related records within the baseline study area.

This section summarizes sampling protocols and sample collection by media-type; additional detailed discussion in this regard is provided in WSP 2025e. Additional sample data (i.e., physical and chemical parameters in surface water and sediment) collected by HESL in waterbody segments in the fall of 2025 to support the predictive methylmercury water quality model are described in Section 4.4.

3.2.1 SAMPLING LOCATIONS AND COLLECTION

3.2.1.1 SEDIMENT AND BENTHIC INVERTEBRATES

Figure 1-10 presents the sediment and benthic invertebrate monitoring network for total mercury and methylmercury as presented in WSP (2025e). A list of monitoring stations and rationale for inclusion are also presented in WSP (2025e).

Surficial sediment quality sampling collection included composite sampling of three petite-Ponar grabs (or other methods suitable to environmental conditions as needed) from five sample locations per study area (total of five samples per study area). The biologically active upper layer sediment is retained for analysis (typically intervals between 0 cm to 20 cm), as this is the most recently deposited material and most biologically relevant. Collecting a composite of three replicate samples at each sample location is needed as part of quality assurance and control and to account for habitat heterogeneity.

All surficial sediment sampling followed the protocols as set out by the Guide to Current Sampling Practices (Fowlie 2014) and Environment and Climate Change Canada's technical guidance for environmental effects monitoring (Environment Canda 2012). Similarly, the Project has characterized the baseline sediment conditions using methods consistent with the Metal Mining Technical Guidance for Environmental Effects Monitoring (Environment Canada 2012). The methods are repeatable and include multiple samples and subsamples at each monitoring site to effectively characterize and account for variability in the active sediment layers used by fish and invertebrates.

For porewater collection, stand piezometers were used, consisting of a one-foot drive point with perforated screens to allow water ingress, couplers and varying length (usually 2 inches or 3 inches) sections. Each sampling location identified (three sites in the Chukuni River, four sites in Dixie Creek, three sites in Pakwash Lake) the following piezometers were installed:

- One in the waterbody 1 m from the bank
- One at 1 m out of waterbody from the bank
- One at 2 m out of waterbody from the bank
- One at 5 m out of waterbody from the bank
- One at 10 m out of waterbody from the bank
- One at 20 m out of waterbody from the bank.

The piezometers were installed at the water-soil interface with the top of the drive point section below the line. The piezometer installed within the waterbody was buried in sediment above the drive point head. If substrate was too firm to push in the piezometer by hand, a post pounder and thread on cap can was used to drive the unit into the ground.

Once the piezometers were installed, the quarter inch low flow Waterra tubing was placed inside ensuring the tube extended all the way to the bottom. The piezometer was purged of water prior to sampling; the piezometer was sampled once porewater recharged into the unit.

3.2.1.2 LOWER TROPHIC COMMUNITY (PERIPHYTON AND ZOOPLANKTON)

Figure 1-10 presents the baseline lower trophic community monitoring network. A list of monitoring stations and rationale for inclusion are presented in WSP 2025e.

Periphyton and zooplankton are two of the lowest trophic levels of an aquatic ecosystem, supporting the upper-level fish community. Zooplankton and periphyton were both sampled during the fall field programs in 2024.

Zooplankton and periphyton sampling methods followed a standardized protocol, and full details on sampling methodology are presented in WSP 2025e. Periphyton and zooplankton were analyzed for both mercury and methylmercury, with analysis conducted by Flett Research in Winnipeg, Manitoba.

3.2.1.3 FISH TISSUE

Figure 1-11 presents the baseline fish tissue sampling location for total mercury and methylmercury. A list of monitoring stations and rationale for inclusion are presented in WSP 2025e.

Fish tissue samples for total mercury and methylmercury analysis included skinless, boneless left dorsal epaxial muscle tissue from fish. Fish community assessments were conducted during spring, summer and fall as per conditions of the 2022, 2023 and 2024 Licences to Collect Fish for Scientific Purposes issued by the Red Lake District Ministry of Natural Resources. Further details can be found in the Aquatics Baseline Report (WSP 2025e). Figure 1-11 presents the baseline fish sampling locations.

Fish tissue samples were submitted to ALS Environmental in Thunder Bay, Ontario for total mercury and methylmercury analysis.

Regional fish concentration data from waterbodies downstream of the proposed Project were also characterized for the Baseline program.

3.2.2 DATA ANALYSIS METHODS

3.2.2.1 BASELINE SEDIMENT QUALITY

Baseline data analyses for sediment and porewater included basic descriptive and summary statistics; duplicate samples were averaged before inclusion in descriptive statistics. For analytical results that were less than the analytical MDL, half the MDL was used in the statistical summaries. As discussed in Section 3.1.2, this represents industry standard data handling practices and is consistent with available guidance documents regarding environmental data handling. A summary of analytical MDLs is provided in Table 3-1.

Baseline data analyses included comparison of observed sediment mercury concentrations to available sediment quality guidelines. Comparison of observed concentrations to available sediment quality guidelines is a required practice under the Ontario regulatory regime, and specified in the TISGs issued for the Project. Sediment quality guidelines are routinely used as screening level benchmarks and are an accepted component of effects assessment. Importantly, the use available guidelines does not preclude supplemental analyses, e.g., consideration of bioaccumulation process (see Section 5), should they be warranted, and should be understood as one tool within a broader effects assessment toolbox.

Baseline mercury concentrations in sediments were compared to the Ontario Provincial Sediment Quality Guidelines (PSQG; MOE 2008) and the Canadian Sediment Quality Guidelines (CSQG) for the Protection of Aquatic Life (CCME 2001).

The PSQG establishes three levels of effects that reflect potential chronic and long-term effects on benthic invertebrates as follows:

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

The CSQG is established based on the formal federal protocol to evaluate potential adverse biological effects in aquatic environments and includes an Interim Sediment Quality Guideline (ISQG) and a Probable Effect Level (PEL), the latter indicating contamination levels at which there are probable effects.

All baseline sediment samples were assessed against the PSQG lowest effect level (LEL) and severe effect level (SEL) effect levels as well as the CSQG ISQG and PEL.

Baseline mercury and methylmercury concentrations in porewater were compared to identified WQG PAL used for surface water and groundwater quality, noting that WQG PAL are not directly applicable to porewater quality and are here used for information purposes only.

3.2.2.2 BENTHOS AND LOWER TROPHIC COMMUNITY

Data analyses for benthic invertebrates and the lower trophic communities (periphyton and zooplankton) included basic descriptive and summary statistics; duplicate samples were averaged before inclusion in descriptive statistics. Values below the minimum level (ML) were flagged by the laboratory and were not included in the summary statistics. The ML is defined as the amount of mercury that can be reported with almost 100% confidence that the measured concentration is greater than zero. A summary of analytical MDLs throughout the baseline programs in relation to the current mercury baseline study are provided in Table 3-1.

There were no mercury or methylmercury guidelines available for benthic invertebrates, periphyton and zooplankton. The benthic and lower trophic community data were used to characterize baseline conditions and the measured concentrations were used to validate uptake models and exposure point concentrations for aquatic wildlife (e.g., beaver and mallard) dietary exposures in the ecological risk assessment in the Human Health and Ecological Risk Assessment Report (HHERA) (WSP 2026b).

3.2.2.3 FISH AND FISH TISSUE

Data analyses for fish included basic descriptive and summary statistics. A summary of analytical MDLs throughout the baseline programs in relation to the current mercury baseline study are provided in Table 3-1. Total mercury and methylmercury concentrations in fish increase with age and size (i.e., length and weight) due to biomagnification (Environment Canada 2003). As such, fish concentration data were grouped into size ranges that are applicable to consumption for human health such as the following:

- Northern Pike restricted to 40 to 70 cm length (i.e., 55 + / - 15 cm)
- Walleye restricted to 28 to 52 cm length (i.e., 40 + / - 12 cm)
- Forage fish segregated into fish length less than 25 cm (i.e., length for consumption by ecological receptors) and greater than 25 cm (i.e., length for consumption by human receptors).

The total mercury concentrations measured in fish tissue were compared to Health Canada's Maximum Levels for Chemical Contaminants in Foods, Table 1, Mercury in edible portion of retail fish (0.5 mg/kg). (Health Canada 2011). Concentrations of methylmercury in fish were also compared to the CCME Canadian Tissue Residue Guideline for the Protection of Wildlife Consumers of Aquatic Biota – methylmercury (CCME 2000).

It is important to note that the CCME methylmercury guideline for the protection of wildlife consumers of aquatic biota (0.033 mg/kg) is based on the Wilson's storm petrel (which is not found in the PA), a seabird particularly sensitive to methylmercury bioaccumulation due to its diet as it typically consumes nearly its

entire body weight in aquatic biota each day (Environment Canada 2002). It is also recommended by the CCME that alternative benchmarks may be more appropriate in regions with other species, as this reference species was selected because of its high exposure potential (Environment Canada 2002).

Additionally, the CCME guideline was developed for wildlife that typically consume small fish (< 35 cm in length), and all fish included in this report were large fish (> 25 cm) which accumulate significantly higher methylmercury concentrations (i.e., biomagnification) due to their age and trophic level. As such, while the CCME guideline is used here as a screening benchmark, it is not directly applicable to human health and results should be interpreted with caution.

Table 3-8 presents a variety of reference concentrations for Canadian fish tissue residue guidelines for protection of fish eating wildlife species (birds and mammals) that are more suitable to the PA (Environment Canada 2002).

3.3 BASELINE RESULTS

3.3.1 SURFACE WATER QUALITY

3.3.1.1 OVERVIEW

The baseline water quality program has collected approximately 600 samples since 2020. Concentrations of total and dissolved mercury are monitored at all sampling locations (Figure 1-7). This data is supplemented by an ultra-low detection mercury monitoring program, conducted at key locations in the baseline study area (Figure 1-7, Table 3-1). Ultra-low detection mercury quantifies mercury at the sub-nanogram level, allowing for better assessment of seasonal variation of ultra-low concentrations and an overall improved understanding of very low mercury levels.

Results from standard mercury analyses by CVAAS indicate that, overall, mercury concentrations in sampled watercourses and waterbodies are generally very low, at or below the standard detection limit of 5 ng/L, and well below the WQG PAL of 26 ng/L (Table 3-3). Measured total mercury concentrations across the study area ranged from < 5.0 ng/L to 150 ng/L. The highest mercury concentrations were observed within the north-flowing unnamed tributaries in the Dixie Creek watershed (7.8 ng/L average; Table 3-3), with the greatest single value collected at SW-TR (150 ng/L).

Over the 2020 to 2024 monitoring period, there were nine instances within the baseline study area in which observed values were above WQG PAL (26 ng/L):

- 70 ng/L at SW-04 on July 25, 2022
- 30 ng/L at SW-04 on August 9, 2022
- 50 ng/L at SW-09 on August 23, 2022
- 50 ng/L at CR-DS on August 23, 2022
- 30 ng/L at SW-12 on August 29, 2022
- 56 ng/L at DC-US on October 18, 2022
- 30 ng/L at SW-01 on February 8, 2023
- 150 ng/L at SW-TR on February 13, 2023
- 41.7 ng/L at SW-11 on April 4, 2024.

At most monitoring stations (35 out of 37), dissolved mercury comprised the dominant portion of total mercury concentrations, accounting for more than 85%.

Supplemental ultra low-level mercury analyses by CVAFS results showed total mercury concentrations ranging from 0.40 ng/L to 18.5 ng/L, with an average concentration of 2.7 ng/L and a median concentration of 1.7 ng/L. In line with results from the standard CVAAS discussed above, the

north- flowing unnamed tributaries were observed to have the highest mercury concentrations (5.9 ng/L average, Table 3-3).

Methylmercury concentrations across all sampled watercourses and waterbodies ranged from 0.014 ng/L to 2.7 ng/L, with an average concentration of 0.19 ng/L and a median concentration of 0.059 ng/L (Table 3-3). The highest average methylmercury concentrations were observed in tributaries to Unnamed Waterbody 6 (0.8 ng/L average; Table 3-3), and the highest single concentration collected was at the north-flowing unnamed tributary, SW-TR (2.7 ng/L; Attachment A). The lowest average methylmercury concentrations were observed within Gullrock Lake (0.026 ng/L average; Table 3-3). Methylmercury concentrations for all samples collected remained well below the WQG PAL of 4 ng/L.

Methylmercury constitutes between 1.0% to 54.3% of the total mercury in sampled watercourses and waterbodies, with an average value of 6.2% and a median value of 4.2% across all samples collected. The highest relative proportion of methylmercury was observed at SW-TR, and the lowest proportion of methylmercury was observed at SW-14.

Baseline results across the study area indicate that higher proportions of methylmercury relative to total mercury in surface water, as well as higher methylmercury concentrations overall, were generally observed under environmental conditions that are known to support sulphate-reducing bacteria activity, such as anoxic or very low dissolved oxygen, wetland-type environments, and higher dissolved organic carbon. This pattern is consistent with current scientific understanding of mercury methylation processes (Section 1.4). These findings are presented as background context to help describe baseline conditions and are not intended to identify specific sources or causes. Natural variability across the system and limitations in assessing detailed methylation processes mean there is uncertainty in how and where methylmercury is produced and transformed. As such, the results support interpretation of baseline conditions while acknowledging this uncertainty.

The following sections provide additional discussion of baseline monitoring results for sampled watercourses and waterbodies, grouped into the following general categories, based on their location and size for ease of discussion:

- Chukuni River
- Dixie Creek
- Unnamed Watercourses
- Unnamed Waterbodies
- Regional Waterbodies (Pakwash Lake, Gullrock Lake).

3.3.1.2 CHUKUNI RIVER

The Chukuni River is the proposed receiving environment for the Project; baseline water quality monitoring has occurred at the following locations along the waterway (Figure 1-7):

- Chukuni River-REF (CR-REF): upstream reference site for the Project, downstream of the Snowshoe Dam, upstream of proposed discharge location, upstream of Highway 105
- Chukuni River-FDP (CR-FDP): approximate discharge location
- Chukuni River-DS (CR-DS): downstream of all Project influences, approximately 3.6 km downstream of the proposed discharge location, downstream of confluence with Dixie Creek, upstream of Pakwash Lake.

Overall results indicate surface water quality in the Chukuni River is typical of northern Ontario. This includes circumneutral pH, low concentration of nutrients (nitrate, nitrite and ammonia) and low concentrations of major anions (chloride). Sulphate concentrations were consistently low, ranging from approximately 1.0 mg/L to 10 mg/L in the Chukuni River (5.4 mg/L average, 5.8 mg/L median). British Columbia long-term exposure guidelines (BC WQG) for sulphate in freshwater were accessed here in the absence of Ontario or federal guidelines, and all samples remained well below identified BC WQG (218 mg/L). Detailed results and summary statistics for overall baseline water quality in the Chukuni River are presented in WSP 2025d.

Results from standard mercury analyses by CVAAS indicate total mercury concentrations range from < 5 ng/L to 50 ng/L in the Chukuni River, with an average value of 4.0 ng/L (Table 3-3). No apparent seasonal trends were identified. Spatially, mercury concentrations were observed to increase moving down the Chukuni River, with the greatest average concentration observed at CR-DS, downstream of the confluence with Dixie Creek. Overall results indicate total mercury concentrations in the Chukuni River are generally low, consistently below identified WQG PAL (26 ng/L), with only one instance in which values were above WQG PAL:

- 50 ng/L at CR-DS on August 23, 2022.

Supplemental ultra low-level mercury analyses by CVAFS results showed mercury concentrations range from 0.52 ng/L to 11.3 ng/L, with an average concentration of 1.3 ng/L and a median concentration of 0.98 ng/L. (Table 3-3). All low-level mercury samples collected in the Chukuni River remain below identified WQG PAL (26 ng/L).

Methylmercury concentrations range from 0.019 ng/L to 0.63 ng/L in the Chukuni River, with an average concentration of 0.057 ng/L and a median concentration of 0.047 ng/L. All samples collected were well below the WQG PAL of 4 ng/L (Table 3-3). No apparent seasonal trends were observed. The highest average methylmercury concentration was measured at station CR-FDP (0.072 ng/L). Methylmercury constitutes an average of 4.8% of the total mercury in the Chukuni River, with the highest %Methylmercury observed at CR-FDP (10.6%) and the lowest %Methylmercury at CR-REF (1.7%). The median %Methylmercury value for the Chukuni River was 4.4%. An assessment of the dataset indicates that there is no clear or consistent correlation between methylmercury and sulphate concentrations in the water column or sediments. BC WQG based on %Methylmercury, as described in Section 3.1.1, states that average concentrations of total mercury should not be greater than 2.1 ng/L when %Methylmercury is 4.8%. On a sample-by-sample basis, approximately 96.8% of samples collected in the Chukuni River are below the calculated BC water quality guideline, with only two instances in which values were above BC guidelines:

- 2.5 ng/L at CR-REF when %Methylmercury was 5.6% on October 6, 2024
- 11.3 ng/L at CR-FDP when %Methylmercury was 5.6% on January 16, 2024.

Regression analysis was completed with respect to key parameters associated with SRB activity and methylmercury concentrations: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature (Attachment A). The R^2 criterion is used as an additional descriptive metric to evaluate the strength of association between variables and is not intended a definitive test of causality. In environmental baseline datasets, where natural variability and unmeasured influences are common, relatively modest R^2 values may still be informative and is thus used as a screening tool in this report. For this report, as a general interpretive guideline, R^2 values greater than approximately 0.3 are considered weak but potentially meaningful, while values between approximately 0.3 and 0.5 are interpreted as indicating a moderate relationship. The following trends were observed with methylmercury concentrations in the Chukuni River:

- Iron, positive linear correlation ($R^2 = 0.44$)
- Phosphorus, positive linear correlation ($R^2 = 0.34$).

No other parameters showed trends with mercury or methylmercury concentrations in the Chukuni River (Attachment A).

3.3.1.3 DIXIE CREEK

The Project will be located primarily within the drainage area of Dixie Creek and its tributaries. Dixie Creek itself crosses the southern portion of the Property and flows into the Chukuni River to the east. Water quality monitoring on Dixie Creek has occurred at the following locations (Figure 1-7):

- Near-Field: at the southern portion of the proposed Project footprint (stations SW-03, SW-04, SW-08, SW-09)
- Far-field: stations downstream of direct Project influences on Dixie Creek, downstream of Unnamed Waterbody 6, upstream of the confluence with the Chukuni River (station SW-15)

Overall results indicate surface water quality of Dixie Creek are typical of northern Ontario. This includes circumneutral pH, low concentration of nutrients (nitrate, nitrite and ammonia) and low concentrations of major anions (chloride). Sulphate concentrations were generally low in Dixie Creek, ranging from approximately 0.35 mg/L to 10 mg/L (1.6 mg/L average, 1.0 mg/L median). The BC WQG for sulphate in freshwater were accessed here in the absence of Ontario or federal guidelines, and all samples remained well below identified BC WQG (218 mg/L). Detailed results and summary statistics for overall baseline water quality in Dixie Creek are presented in WSP 2025d.

Results from standard mercury analyses by CVAAS indicate total mercury concentrations range from < 5 ng/L to 70 ng/L in Dixie Creek, with an average value of 5.2 ng/L (Table 3-3). Mercury concentrations were observed to fluctuate along the creek, with the greatest average baseline concentration at SW-04 (6.3 ng/L) and the lowest average baseline concentration at SW-08 (3.7 ng/L; Attachment A). Overall results indicate total mercury concentrations in Dixie Creek are generally low, consistently below identified WQG PAL (26 ng/L), with only three instances in which values were above WQG PAL:

- 70 ng/L at SW-04 on July 25, 2022
- 30 ng/L at SW-04 on August 9, 2022
- 50 ng/L at SW-09 on August 23, 2022

Elevated concentrations were not observed in subsequent years of sampling (2023 and 2024).

Supplemental ultra low-level mercury analyses by CVAFS results ranged from 0.41 ng/L to 18.2 ng/L with an average concentration of 3.3 ng/L and a median concentration of 2.1 ng/L (Table 3-3). All low-level mercury samples collected in Dixie Creek were below WQG PAL (26 ng/L).

Regression analysis was completed with respect to key parameters associated with SRB activity and methylmercury concentrations: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature (Attachment A). The following trends were observed with low-level mercury:

- Dissolved organic carbon, positive linear correlation ($R^2 = 0.57$)
- Phosphorus, positive linear correlation ($R^2 = 0.61$).

These observations may suggest that in this system, dissolved carbon and phosphorus exert a stronger limiting influence than sulphate. The predictive modelling conservatively assumes that all water chemistry co-factors influencing methylmercury stimulation are non-limiting, with the exception of sulphate; the full influence of organic carbon and phosphorus are therefore considered in the model.

Methylmercury concentrations range between 0.032 ng/L and 0.70 ng/L, with an average concentration of 0.16 ng/L and a median concentration of 0.10 ng/L. Overall results indicate that methylmercury concentrations in Dixie Creek are generally low and well below WQG PAL (4 ng/L; Table 3-3). Seasonal trends were observed in Dixie Creek, particularly at SW-03 and SW-08, whereby methylmercury concentrations were highest in the summer season (May to August), although remained well below the WQG PAL. Average methylmercury concentrations are also observed to increase from upstream to downstream, with the highest average concentration at SW-15 (0.35 ng/L; Attachment A).

Methylmercury constitutes an average of 6.5% of the total mercury, with the highest %Methylmercury observed at SW-15 (11.5% average) and the lowest %Methylmercury at SW-04 (3.9% average). The median %Methylmercury value for Dixie Creek is 4.7%.

BC WQG based on %Methylmercury states that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 1.5 ng/L when %Methylmercury is 6.5%. On a sample-by-sample basis, approximately 49% of samples collected in Dixie Creek are above BC guidelines based on %Methylmercury, but remain below the identified federal WQG PAL.

Regression analysis was completed with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature. No material trends were observed (Attachment A).

3.3.1.4 UNNAMED WATERCOURSES

Three groups of unnamed watercourses in the Project area were monitored as part of the baseline program:

- Unnamed watercourses draining to Dixie Creek, corresponding to monitoring stations SW-02, SW-08a, SW-07, SW-06, SW-05, SW-10
- Unnamed watercourses flowing north and proximate to Highway 105, corresponding to monitoring stations SW-GL-02, SW-GL-01, SW-17, SW-18
- Unnamed watercourses flowing to Unnamed Waterbody 6 (corresponding to monitoring stations SW-16, SW-12, SW-12, SW-11) and from Genessee Lake to Dixie Lake (GL-Trib)

These unnamed watercourses are characterized by very low flow, largely ephemeral conditions with disconnected pools and these watercourses have been observed to typically freeze to the bottom during late fall and winter sampling events. Water quality samples are collected only when flow is present, and the stations can be safely accessed. As a result, less water quality data is available for these stations compared to other waterbodies and watercourses included in the water quality baseline program.

Results are discussed by watercourse grouping underlying. Regression analysis was completed for all unnamed watercourses for mercury with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature. No material trends were observed (Attachment A).

Regression analysis was also completed for all unnamed watercourses for methylmercury with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature (Attachment A). The following trends were observed with methylmercury:

Dissolved organic carbon, strong positive correlation (R^2 = 0.53).The predictive modelling conservatively assumes that all water chemistry co-factors influencing methylmercury stimulation are non-limiting, with the exception of sulphate; the full influence of organic carbon is therefore considered in the model. No other parameters showed trends with mercury or methylmercury concentrations (Attachment A).

3.3.1.5 UNNAMED WATERCOURSES TO DIXIE CREEK

Overall results indicate that surface water quality of the unnamed watercourses is highly seasonally variable as would be expected for shallow, ephemeral, wetland-influenced waters typical to this area of northern Ontario. Unnamed watercourses draining to Dixie Creek were of circumneutral pH with high hardness and dissolved organic carbon concentrations. Concentrations of nutrients and anions were elevated in these small unnamed watercourses relative to the main stem Dixie Creek, including observations for chloride, sulphate and total phosphorus. Sulphate concentrations ranged from 0.15 mg/L to 25.0 mg/L (4.5 mg/L average, 1.0 mg/L median), with the highest concentrations observed at monitoring station SW-08a. The BC WQG for sulphate in freshwater was used here in the absence of Ontario or federal guidelines, and all samples remained well below identified BC WQG (218 mg/L).

Results from standard mercury analyses by CVAAS indicate total mercury concentrations in unnamed watercourses flowing into Dixie Creek range between < 5 ng/L to 18.4 ng/L, with an average concentration of 5.4 ng/L (Table 3-3). The highest concentration was observed at SW-08a, located near the confluence to Dixie Creek at monitoring station SW-08. Overall, total mercury concentrations are slightly higher than main-stem Dixie Creek but were low and below WQG PAL (26 ng/L). Dissolved mercury accounted for an average of 92.1% of the total mercury in watercourses flowing into Dixie Creek (Table 3-3).

Supplemental ultra low-level mercury analyses by CVAFS results for station SW-08a ranged from 1.1 ng/L to 18.5 ng/L with an average concentration of 5.7 ng/L and a median concentration of 4.1 ng/L. All samples collected in the watercourses flowing into Dixie Creek remain below identified WQG PAL (26 ng/L).

Methylmercury concentrations range between 0.04 ng/L and 0.75 ng/L, with an average concentration of 0.33 ng/L and a median concentration of 0.30 ng/L. Seasonal trends were observed at SW-08a whereby methylmercury concentrations were higher in warmer months (May to August; Attachment A). Overall results indicate that methylmercury concentrations in the unnamed watercourses flowing into Dixie Creek are higher than that of main-stem Dixie Creek, but all samples collected are well below WQG PAL (4 ng/L). Methylmercury constitutes an average of 7.9% of the total mercury with most data points collected from SW-08a (Table 3-3). The median %Methylmercury value for the unnamed watercourses is 6.2%.

BC WQG based on %Methylmercury states that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 1.3 ng/L when %Methylmercury is 7.9%. On a sample-by-sample basis, approximately 89% of samples collected in the unnamed watercourses flowing into Dixie Creek are above BC guidelines based on %Methylmercury, but remain below the identified federal WQG PAL.

3.3.1.6 UNNAMED NORTH-FLOWING WATERCOURSES TO HIGHWAY 105

Unnamed watercourse draining towards Highway 105 as well as to Gullrock Lake are ephemeral and were very frequently observed to have no flowing water during field campaigns. Based on available data collected when flow was present, these unnamed watercourses were of circumneutral to slightly acidic pH with high hardness and moderate dissolved organic carbon concentrations. Sulphate concentrations ranged from approximately 0.15 mg/L to 22.2 mg/L (1.8 mg/L average, 1.0 mg/L median), with the highest concentration observed at SW-17. The BC WQG for sulphate in freshwater was used here in the absence of Ontario or federal guidelines, and all samples remained well below identified BC WQG (218 mg/L).

Results from standard mercury analyses by CVAAS indicate total mercury concentrations in north-flowing unnamed watercourses range between < 5 ng/L to 150 ng/L, with an average concentration of 7.8 ng/L (Table 3-3). Overall, the highest mercury concentrations in the baseline study area were associated with the north-flowing watercourses, but total mercury concentrations were below WQG PAL (26 ng/L), with only one instance in which a value was above WQG PAL:

- 150 ng/L at SW-TR on February 13, 2023.

Supplemental ultra low-level mercury analyses by CVAFS results ranged from 1.9 ng/L to 11.6 ng/L with an average concentration of 5.9 ng/L and a median concentration of 5.1 ng/L. All samples collected in the north-flowing unnamed watercourses remain below identified WQG PAL (26 ng/L).

Methylmercury concentrations range between 0.14 ng/L and 2.7 ng/L (Table 3-3). The highest concentration observed in the North-flowing watercourses and across the baseline study area occurred at SW-TR. Overall results indicate that methylmercury concentrations in the North-flowing watercourses to Highway 105 are higher than most of the baseline study area, but all samples collected are well below WQG PAL (4 ng/L). Methylmercury constitutes an average of 12.1% of the total mercury, with the highest and lowest %Methylmercury observed at SW-TR (54.4% and 2.2%, respectively). The median %Methylmercury value for north-flowing watercourses is 7.2%.

BC WQG based on %Methylmercury states that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 0.83 ng/L when %Methylmercury is 12.1%. On a sample-by-sample basis, all samples collected in the unnamed north flowing watercourses are above BC guidelines based on %Methylmercury, but remain below the identified federal WQG PAL.

3.3.1.7 UNNAMED WATERCOURSES TO WATERBODY 6 AND FROM GENESSEE LAKE

Unnamed watercourse flowing mostly eastward toward Unnamed Waterbody 6 are within mineralized zone. The general chemistry of these watercourses is similar to the Dixie Creek tributaries; waters were of circumneutral to slightly acidic pH with high hardness and high dissolved organic carbon concentrations. Concentrations of nitrate, sulphate and chloride were elevated in these unnamed watercourses relative to Waterbody 6 and Genessee Lake. Sulphate concentrations ranged between 0.15 mg/L to 70.0 mg/L (4.2 mg/L average, 1.0 mg/L median), with both the lowest and highest concentrations observed at station SW-11. The BC WQG for sulphate in freshwater were accessed here in the absence of Ontario or federal guidelines, and all samples remained well below identified BC WQG (218 mg/L).

Results from standard mercury analyses by CVAAS indicate total mercury concentrations in the Waterbody 6 and Genessee Lake tributaries range between < 5 ng/L to 41.7 ng/L, with an average of 6.6 ng/L (Table 3-3). The highest concentration was observed at SW-11, a tributary to Waterbody 6. Total mercury concentrations were below WQG PAL (26 ng/L), with only two instances in which values were above WQG PAL:

- 30 ng/L at SW-12 on August 29, 2022
- 41.7 ng/L at SW-11 on April 4, 2024.

Supplementary low-level mercury by CVAFS results ranged from 1.4 ng/L to 11.1 ng/L with an average and median concentration of 5.6 ng/L. All samples collected in the Unnamed Waterbody 6 and Dixie Creek tributaries remain below identified WQG PAL (26 ng/L).

Methylmercury concentrations range between 0.11 ng/L and 1.6 ng/L (Table 3-3). The highest concentration was observed at SW-11 and the lowest concentration was observed at GL-Trib. Overall results indicate that methylmercury concentrations in the watercourses to Waterbody 6 and from Genessee lake are higher than most of the baseline study area, but all samples collected are well below WQG PAL (4 ng/L). Methylmercury constitutes an average of 13.9% of the total mercury, with the highest and lowest %Methylmercury observed at SW-11 (24.4% and 6.6%, respectively).

BC WQG based on %Methylmercury state that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 0.72 ng/L when %Methylmercury is 13.9%. On a sample-by-sample basis, all samples collected in the unnamed North flowing watercourses are above BC guidelines based on %Methylmercury, but remain below the identified federal WQG PAL.

3.3.1.8 LOCAL AREA WATERBODIES

There are four waterbodies monitored within the Property boundary (Figure 1-7):

- Unnamed Waterbody 6
- Genessee Lake
- Unnamed Waterbody 1
- Dixie Lake.

Unnamed Waterbody 6 is monitored at station SW-14. It is a shallow waterbody that has wide riparian habitat comprised of grasses, sedges and shrubs along the northwest margin. Unnamed Waterbody 6 ultimately outlets to Dixie Creek, upstream of surface water quality monitoring location SW-15. Lake profiles were completed as part of the fisheries resources baseline program (Attachment A).

Genessee Lake is a large lake with multiple basins and embankments and is monitored at station SW-GL. The east basin is a deep basin (> 10 m) that consists of mostly bedrock and bouldered shorelines with mixed coniferous and deciduous forest. The west basin is comprised of gradual sloping shorelines with emergent grasses and shrubs merging into a mixed deciduous and coniferous forest. Lake profiles were completed as part of the fisheries resources baseline program (Attachment A).

Unnamed Waterbody 1 is very shallow and has wide riparian habitat dominated by shrubs, grasses and sedges along the margins and is monitored at SW-01. Its outlet drainage reports to Unnamed Watercourse 1.

Dixie Lake is a large shallow lake west of the Project site within the Dixie River system and is monitored at its inlet (DL-Ref) and outlet (DC-US). It is comprised of two distinct basins, separated by a narrow channel, and measures around 4.5 km long. Maximum depth is approximately 3.5 m, with substrate ranging from coarse sand to finer silt and clay. Submergent vegetation is present throughout the lake, as well as emergent vegetation in nearshore areas.

Results from standard mercury analyses by CVAAS indicate total mercury across all unnamed waterbodies ranges from < 5 ng/L to 20 ng/L, with an average of 3.6 ng/L (Table 3-3). The highest concentration was observed in Unnamed Waterbody 6 while the lowest concentration was observed at the bottom of Genessee Lake. Supplementary low-level mercury analyses by CVAFS revealed a range

between 0.40 ng/L to 7.6 ng/L, with an average of 1.9 ng/L and a median of 1.5 ng/L. All samples collected in the unnamed waterbodies remain below identified WQG PAL (26 ng/L).

Regression analysis for these local area waterbodies was completed with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature (Attachment A). The following trends were observed with low-level mercury:

- Dissolved organic carbon, positive linear correlation ($R^2 = 0.77$)
- pH, negative linear correlation ($R^2 = 0.22$).

The predictive modelling conservatively assumes that all water chemistry co-factors influencing methylmercury stimulation are non-limiting, with the exception of sulphate; the full influence of organic carbon is therefore considered in the model.

Methylmercury concentrations range between 0.014 ng/L to 0.66 ng/L with an average of 0.077 ng/L and a median of 0.031 ng/L (Table 3-3). The highest concentration was observed in the bottom waters of Genessee Lake, and the lowest concentration was observed in the top waters of Genessee Lake. Methylmercury concentrations for all samples collected were well below the WQG PAL (4 ng/L). Methylmercury constitutes an average of 4.5% of the total mercury, with the highest %Methylmercury recorded in the bottom waters of Genessee Lake (37.6%) and lowest %Methylmercury recorded at Unnamed Waterbody 6 (1.0%). The median %Methylmercury value for the Project area waterbodies is 3.2%.

BC WQG based on %Methylmercury state that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 2.22 ng/L when %Methylmercury is 4.5%. On a sample-by-sample basis, approximately 89.1% of samples collected in the local area waterbodies are below the calculated BC water quality guideline, with the following instances in which values were above BC guidelines:

- 4.4 ng/L at DL-Ref when %Methylmercury was 2.8% on May 27, 2024
- 4.1 ng/L at SW-01 when %Methylmercury was 6.7% on September 2, 2024
- 6.2 ng/L at SW-01 when %Methylmercury was 4.8% on October 2, 2024
- 5.6 ng/L at SW-01 when %Methylmercury was 4.8% on November 2, 2024
- 7.6 ng/L at SW-01 when %Methylmercury was 3.6% on December 1, 2024.

Regression analysis was completed with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature (Attachment A). The following trends were observed with methylmercury:

- Iron, strong positive correlation ($R^2 = 0.83$)
- Dissolved organic carbon, positive correlation ($R^2 = 0.3$).

The predictive modelling conservatively assumes that all water chemistry co-factors influencing methylmercury stimulation are non-limiting, with the exception of sulphate; the full influence of organic carbon and iron are therefore considered in the model. No other parameters showed trends with mercury or methylmercury concentrations (Attachment A).

3.3.1.9 PAKWASH LAKE

Pakwash Lake is a large, deep lake (> 10 m) outside of the Property boundary, about 6 km downstream of the of CR-FDP monitoring station (proposed discharge location on the Chukuni River). The lake has multiple basins and embayments, extending about 17 km southwest from Highway 105 to its outflow into the English River system.

Water quality monitoring for total, dissolved and low-level mercury on Pakwash Lake commenced in 2023. Samples were collected in May, August and October at the following locations (Figure 1-7):

- PL-01: at the inlet of Chukuni River in Pakwash Lake
- PL-02: near the inlet of Troutlake River in Pakwash Lake
- PL-03: downstream of PL-01 and PL-02
- PL-04: approximate mid-basin
- PL-05: near the outlet of Pakwash Lake.

These baseline sampling stations on Pakwash Lake were selected to characterize spatial variability in lake water quality and to capture the influence of the major inflows and baseline loadings to the lake, including from the Chukuni River and Trout Lake, which are the major inflows. Station PL-04, positioned within the approximate mid-basin of Pakwash Lake, provides information on open-water conditions representative of the central lake environment and supports assessment of internal lake processes. Station PL-05 is located near the lake outlet to characterize water quality conditions exported from Pakwash Lake to the downstream English River system. Together, the monitoring network supports evaluation of spatial patterns and seasonal variability.

Physicochemical profiling at all monitoring stations on Pakwash Lake through depth commenced in October 2023 and has proceeded in conjunction with scheduled quarterly sampling for water quality parameters. Monitoring for lake stratification can allow the Project to identify potential seasonal effects on water quality parameters due to the potential establishment of anoxic zones in the water column and lake turnover, aligning with recommendations proposed by LSFN and WFN in January 2025 to harmonize with sampling methods in their Nation-led regional monitoring program (see Section 1.3). Temperature and oxygen profiles for all monitoring stations in Pakwash Lake are presented in Attachment A.

Physicochemical profiling indicates the water column in Pakwash Lake remains oxygenated throughout the year, with dissolved oxygen concentrations averaging 6.4 mg/L during the summer season and 14 mg/L during the winter season. Summer stratification appears to occur in August 2024 profiles, whereby dissolved oxygen concentrations begin to decrease below 6 m, reaching 0.24 mg/L at the bottom.

Pakwash Lake is of circumneutral pH with low concentrations of most nutrients (nitrate, nitrite, ammonia) and low concentrations of total dissolved solids. Sulphate concentrations range from approximately 1.5 mg/L to 5.9 mg/L, with an average and median concentration of 3.6 mg/L. The BC WQG for sulphate in freshwater were accessed here in the absence of Ontario or federal guidelines, and all samples remained well below identified BC WQG (218 mg/L).

Results for standard mercury analyses by CVAAS for total and dissolved mercury were at or below detection limit (< 5 ng/L) at all monitoring stations in Pakwash Lake. Supplemental ultra low-level mercury analysis by CVAFS showed total mercury concentrations ranging from 0.58 ng/L to 5.0 ng/L with an average concentration of 1.3 ng/L and a median concentration of 1.1 ng/L. The highest concentration was recorded in a bottom sample of PL-02 and the lowest concentration recorded in the top waters of the outlet station, PL-05. All samples collected remained well below identified WQG PAL (26 ng/L).

Regression analysis was completed with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature. The following trends were observed with low-level mercury:

- Iron, positive linear correlation ($R^2 = 0.76$).

The predictive modelling conservatively assumes that all water chemistry co-factors influencing methylmercury stimulation are non-limiting, with the exception of sulphate; the full influence of iron is therefore considered in the model.

Overall results indicate that methylmercury concentrations in Pakwash Lake are generally low and below WQG PAL (4 ng/L), ranging 0.016 ng/L to 0.15 ng/L with an average concentration of 0.040 ng/L and a median concentration of 0.035 ng/L (Table 3-3). The highest methylmercury concentration was recorded in a bottom sample at the inlet of Chukuni River (PL-01). Methylmercury concentrations slightly increase with water column depth, where surface waters of Pakwash Lake had an average concentration of 0.036 ng/L while the bottom waters had an average concentration of 0.051 ng/L. No seasonal trends were

identified. Methylmercury constitutes an average of 3.4% of the total mercury in Pakwash Lake, with the highest %Methylmercury observed in a bottom sample at PL-01 (8.6%) and the lowest %Methylmercury in a bottom sample at PL-02 (1.3%).

BC WQG based on %Methylmercury states that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 2.9 ng/L when %Methylmercury is 3.5%. On a sample-by-sample basis, all samples collected in Pakwash Lake are below the calculated BC guideline.

Regression analysis for methylmercury concentrations was completed with respect to key parameters associated with SRB activity and methylmercury production: dissolved oxygen, nitrate, iron, sulphate, dissolved organic carbon, phosphorus, chloride, pH and temperature. The following trends were observed:

- Dissolved organic carbon, positive linear correlation (R^2 = 0.33)
- Iron, positive linear correlation (R^2 = 0.31).

The predictive modelling conservatively assumes that all water chemistry co-factors influencing methylmercury stimulation are non-limiting, with the exception of sulphate; the full influence of organic carbon and iron are therefore considered in the model. No other parameters showed trends with mercury or methylmercury concentrations (Attachment A).

3.3.1.10 GULLROCK LAKE

Gullrock Lake is upstream of the Project. Water quality monitoring in Gullrock Lake commenced in October 2024 at stations GRL-01, GRL-02 and GRL-03 (Figure 1-7). These stations were established in response to feedback received during consultation regarding potential effects of historical mining activities at Red Lake (see Section 1.3).

Gullrock Lake is of circumneutral pH with low concentrations of most nutrients and anions (nitrate, nitrite, ammonia, chloride). Sulphate concentrations were low and ranged from 5.6 mg/L to 7.0 mg/L. Temperature and oxygen profiles for Gullrock Lake are presented in Attachment A Dissolved oxygen concentrations are observed to decrease moving down the water column ranging between 11.4 mg/L at surface to 2.7 mg/L at bottom.

Results for standard mercury analyses by CVAAS for total and dissolved mercury were below standard detection limits (< 5 ng/L). Supplemental ultra low-level mercury analysis by CVAFS showed total mercury concentrations ranging from 0.56 ng/L to 0.60 ng/L with an average concentration of 0.58 ng/L and a median concentration of 0.57 ng/L. Preliminary results showed the highest concentration recorded in GRL-03 and the lowest concentration recorded in the bottom waters of GRL-02.

Methylmercury concentrations in Gullrock Lake range from 0.016 ng/L to 0.031 ng/L (Table 3-3). Methylmercury constitutes 4.4% of the total low-level mercury with the highest %Methylmercury observed in a bottom sample at GRL-03 (5.3%) and the lowest %Methylmercury in a bottom sample at GRL-01 (2.7%).

BC WQG based on %Methylmercury states that average concentrations of total mercury in water as measured over a 30-day period should not be greater than 2.3 ng/L when %Methylmercury is 4.4%. On a sample-by-sample basis, all samples collected in Gullrock Lake are below the calculated BC guideline.

3.3.2 GROUNDWATER QUALITY

Overall, groundwater quality of monitored wells is circumneutral to slightly alkaline, with high hardness, low chloride concentrations, and moderate to high conductivity. Concentrations of nitrogen species (ammonia, nitrate, nitrite) are very low, often at analytical detection limits and always below WQG PAL. Concentrations of dissolved metals and metalloids are also generally low, with most parameters at or below analytical detection limits and / or below WQG PAL. Key exceptions were noted for phosphorus, cobalt, copper, iron, tungsten and uranium. Descriptive results and summary statistics for overall groundwater water quality are presented in the final Water Quality Baseline Report (WSP 2025d). Here, the existing groundwater quality with respect to mercury and methylmercury is discussed.

Dissolved mercury across the baseline study area for groundwater ranged between 2.5 ng/L and 20 ng/L, with an average concentration of 2.9 ng/L (Table 3-3). Supplementary low-level mercury analyses revealed mercury concentrations ranging between 0.06 ng/L to 61.6 ng/L, with an average concentration of 5.2 ng/L and a median concentration of 1.7 ng/L (Table 3-3). Methylmercury concentrations ranged between 0.0018 ng/L to 0.80 ng/L, with an average concentration of 0.066 ng/L and a median concentration of 0.012 ng/L. All methylmercury samples collected were well below identified WQG PAL (4 ng/L).

3.3.3 SEDIMENT QUALITY

Sediment and porewater quality results are summarized in the following sections. Summary statistics by waterbody are presented in Table 3-4 (sediment) and Table 3-5 (porewater) as well as in Attachment B. Additional details are presented in WSP 2025e.

3.3.3.1 CHUKUNI RIVER

Baseline sediment quality monitoring has occurred at key locations along Chukuni River (Figure 1-10), aligned to surface water quality sampling locations. Total mercury concentrations in sediment range from 0.0071 mg/kg to 0.06 mg/kg (Table 3-4). The highest concentration was recorded at CR-REF, while the lowest was observed at CR-FDP. All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg) and PSQG SEL (2 mg/kg).

Baseline porewater monitoring has occurred in tandem with sediment sampling beginning in 2024. Dissolved mercury concentrations ranging from 0.80 ng/L to 1.7 ng/L (Table 3-5). Both the highest and lowest dissolved mercury concentrations were observed in CR-FDP. Dissolved methylmercury porewater concentrations ranged from 0.039 ng/L to 0.21 ng/L (Table 3-4). The highest methylmercury concentration was observed at CR-FDP and lowest methylmercury concentration was observed at CR-DS. All porewater samples were well below the identified WQG PAL for dissolved mercury and methylmercury.

3.3.3.2 PAKWASH LAKE

Baseline sediment quality monitoring has occurred at key locations across Pakwash Lake (Figure 1-10). Total mercury concentrations in sediments ranged from 0.012 mg/kg to 0.061 mg/kg (Table 3-4). The highest concentration was recorded near the western edge of Pakwash Lake (PKL-C), while the lowest concentration was observed near the outlet of Pakwash Lake (PKL-S). All measured values were below identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Baseline porewater monitoring has occurred in tandem with sediment sampling beginning in 2024. Dissolved mercury porewater concentrations ranging from 0.22 ng/L to 2.9 ng/L (Table 3-5). Dissolved methylmercury concentrations ranged from 0.025 ng/L to 0.32 ng/L. For both dissolved mercury and methylmercury, the highest concentration was observed near the outlet of Pakwash Lake (PKL-S), while the lowest concentration was observed at the inlet into Pakwash Lake (PKL-N). All porewater samples were well below identified WQG PAL for dissolved mercury and methylmercury.

3.3.3.3 GENESSEE LAKE

Baseline sediment quality monitoring has occurred at key locations across Genessee Lake (Figure 1-10). Total mercury concentrations in sediments ranged from 0.0051 mg/kg to 0.12 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Baseline porewater monitoring has occurred in tandem with sediment sampling beginning in 2024. Dissolved mercury porewater concentrations ranged from 1.6 ng/L to 22 ng/L (Table 3-5). Methylmercury concentrations ranging from 0.24 ng/L to 1.4 ng/L (Table 3-5). All porewater samples collected in Genessee Lake were well below the identified WQG PAL for dissolved mercury and methylmercury.

3.3.3.4 DIXIE CREEK

Baseline sediment quality monitoring has occurred at key locations along Dixie Creek (Figure 1-10). Total mercury concentrations in sediments ranged from 0.013 mg/kg to 0.11 mg/kg (Table 3-4). The highest concentration was recorded near Tuzyk's Road (DC-02), while the lowest was observed near the outlet of Dixie Lake (DC-01). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Baseline porewater monitoring has occurred in tandem with sediment sampling beginning in 2024. Dissolved methylmercury concentrations ranged from 0.010 ng/L to 0.60 ng/L (Table 3-5). The highest concentration was recorded at a downstream Dixie Lake station, just before the confluence with Chukuni River (DC-04), while the lowest concentration was observed near the outlet of Dixie Lake (DC-01). All porewater samples collected in Dixie Creek were well below the identified WQG PAL for dissolved mercury and methylmercury.

3.3.3.5 UNNAMED WATERBODIES

Unnamed Waterbody 1

Baseline sediment monitoring occurred near the outlet of Unnamed Waterbody 1 (Figure 1-10). Total mercury concentrations in sediments ranged from 0.088 mg/kg to 0.18 mg/kg (Table 3-4). There were two instances in which samples were above the CSQG ISQG of 0.17 mg/kg:

- 0.18 mg/kg collected at WB-1-S01 on October 27, 2022
- 0.18 mg/kg collected at WB-1-S02 on October 27, 2022.

However, all samples were below the PSQG LEL (0.2 mg/kg), the CSQG PEL (0.486 mg/kg) and the PSQG SEL (2 mg/kg).

Unnamed Waterbody 2

Baseline sediment monitoring occurred in Unnamed Waterbody 2 (Figure 1-10). Total mercury concentrations in sediments ranged from 0.15 mg/kg to 0.22 mg/kg (Table 3-4). Approximately 67% of samples were above identified CSQG ISQG (0.17 mg/kg), and there were two instances in which samples were above the identified PSQG LEL of 0.2 mg/kg.

- 0.21 mg/kg collected at WB-2-S03 on October 27, 2022
- 0.22 mg/kg collected at WB-2-S02 on October 27, 2022.

All samples were below the CSQG PEL (0.486 mg/kg) and the PSQG SEL (2 mg/kg).

Unnamed Waterbody 3

Baseline sediment monitoring occurred in Unnamed Waterbody 3 (Figure 1-10). Total mercury concentrations in sediments ranged from 0.084 to 0.13 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Waterbody 5

Baseline sediment monitoring occurred in Unnamed Waterbody 5 (Figure 1-10). Total mercury concentrations in all sediment samples were below the detection limit of 0.05 mg/kg for 2022. Thus, all measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Waterbody 6

Baseline sediment monitoring occurred at the centre of Unnamed Waterbody 6 (Figure 1-10). Total mercury concentrations in sediments ranged from 0.077 mg/kg to 0.18 mg/kg (Table 3-4). While all values remained below the PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg) and the PSQG SEL (2 mg/kg), there was one instance in which a sample was above the identified CSQG ISQG of 0.17 mg/kg:

- 0.18 mg/kg collected at WB-6-S01 on October 26, 2022.

Baseline porewater monitoring has occurred in tandem with sediment sampling beginning in 2024. Dissolved mercury concentrations ranged from 0.46 ng/L to 2.2 ng/L, with an average of 0.84 ng/L (Table 3-5). Dissolved methylmercury concentrations ranged from 0.05 ng/L to 0.4 ng/L, with an average of 0.20 ng/L and a median of 0.11 ng/L. All porewater samples collected in Unnamed Waterbody 6 remained well below the identified WQG PAL for dissolved mercury and methylmercury.

3.3.3.6 UNNAMED WATERCOURSES

Unnamed Watercourse 3

Baseline sediment monitoring occurred on Unnamed Watercourse during the fall 2022 and 2023 field investigations (Figure 1-10). Total mercury concentration ranged from 0.025 mg/kg to 0.028 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Watercourse 4

Baseline sediment monitoring occurred in Unnamed Watercourse 4 (Figure 1-10). Total mercury concentrations ranged from 0.013 mg/kg to 0.025 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Watercourse 5

Baseline sediment monitoring occurred in Unnamed Watercourse 5 (Figure 1-10). Total mercury concentrations in sediments ranged from 0.022 to 0.033 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Watercourse 6

Baseline sediment monitoring occurred in Unnamed Waterbody 6 (Figure 1-10). Total mercury concentrations in sediment samples ranged from 0.0098 to 0.052 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Watercourse 7

Baseline sediment monitoring occurred in Unnamed Watercourse 7 (Figure 1-10). Total mercury concentrations in sediments ranged from 0.025 mg/kg to 0.11 mg/kg (Table 3-4). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

Unnamed Watercourse 8

Baseline sediment monitoring occurred in Unnamed Watercourse 8 (Figure 1-10). Total mercury concentrations ranged from 0.0025 mg/kg to 0.025 mg/kg (Table 3-5). All measured values were below the identified sediment quality guidelines, including the CSQG ISQG (0.17 mg/kg), PSQG LEL (0.2 mg/kg), CSQG PEL (0.486 mg/kg), and PSQG SEL (2 mg/kg).

3.3.4 BENTHOS AND LOWER TROPHIC COMMUNITY

Benthos and lower trophic community results are summarized in the following sections. Summary statistics by waterbody are presented for benthic invertebrates and lower trophic communities including periphyton and zooplankton in Table 3-6 and Table 3-7, respectively. Laboratory results presented here for total mercury and methylmercury are displayed in mg/kg dry weight (dw).

The assessment of mercury and methylmercury concentrations in benthic invertebrates, plankton, periphyton and fish within the Chukuni River and downstream watercourses is presented below for the characterization of baseline conditions and to address the objectives stated in Section 1.2 (i.e., baseline characterization). Benthos and lower trophic community data are presented in Attachment B and were used in the ecological risk assessment presented within the Human Health and Ecological Risk Assessment report in the Impact Statement (WSP 2026b). The measured co-located surface water and fish tissue concentration data were used to calculate site-specific bio-accumulation factors (BAFs), with further details provided in Section 5.2. Complete and detailed results for benthos and lower trophic communities can be found in the Aquatic Resources Baseline Report (WSP 2025e).

3.3.4.1 CHUKUNI RIVER

Benthic invertebrate samples were collected from the Chukuni River during the fall 2024 field programs from total water depths between 3.85 m and 7.05 m (Figure 1-10). Total mercury concentrations for benthic invertebrates ranged between 0.060 mg/kg and 1.4 mg/kg, with an average concentration of 0.21 mg/kg and a median concentration of 0.13 mg/kg. The highest concentration was recorded at CR-DS, while the lowest concentration was observed at CR-REF. Methylmercury concentrations ranged between 0.056 mg/kg to 1.3 mg/kg, with an average concentration of 0.20 mg/kg and a median concentration of 0.14 mg/kg. Across all samples collected from the Chukuni River, methylmercury accounted for an average of 99% of the total mercury concentrations.

Lower trophic community (periphyton and zooplankton) samples were collected from natural substrate in the Chukuni River (Figure 1-10). Total mercury concentrations for periphyton samples ranged between 0.021 mg/kg and 0.044 mg/kg, while methylmercury concentrations ranged between 0.00062 mg/kg to 0.0038 mg/kg. Six total mercury samples were below the MDL, and thus not included. There was only one total mercury sample collected for zooplankton, which had a concentration of 0.037 mg/kg. Two zooplankton samples were analyzed for methylmercury, which had concentrations of 0.0024 mg/kg and 0.0002 mg/kg, respectively. One total mercury and one methylmercury sample were below the MDL and thus not included. Across samples collected from the Chukuni River, methylmercury accounted for an average of 7% of the total mercury concentrations for periphyton.

3.3.4.2 PAKWASH LAKE

In fall 2024, a total of 15 benthic invertebrate samples were collected concurrently with the sediment quality samples from Pakwash Lake (Figure 1-10). Total mercury concentrations for benthic invertebrates ranged between 0.092 mg/kg and 0.36 mg/kg, with an average concentration of 0.19 mg/kg and a median concentration of 0.17 mg/kg. The highest and lowest concentration were recorded near the outlet of Pakwash Lake (PKL-S). Methylmercury concentrations ranged between 0.093 mg/kg to 0.34 mg/kg, with an average of 0.19 mg/kg and a median of 0.18 mg/kg. Across samples collected from the Pakwash Lake, methylmercury accounted for an average of 100% of the total mercury concentrations.

A total of four samples were collected for zooplankton in Pakwash Lake, and no sample was collected for periphyton (Figure 1-10). Total mercury concentrations for zooplankton ranged between 0.013 mg/kg and 0.022 mg/kg, with an average concentration of 0.017 mg/kg and a median concentration of 0.017 mg/kg. Methylmercury concentrations ranged between 0.0030 to 0.0071 mg/kg, with an average concentration of 0.0054 mg/kg and a median concentration of 0.0057 mg/kg. Across samples collected from Pakwash lake, methylmercury accounted for an average of 30% of the total mercury concentrations for zooplankton.

3.3.4.3 GENESSEE LAKE

A total of five benthic invertebrate samples were collected from Genessee Lake during the fall of 2024 field programs from total water depths between 4.0 and 7.0 m (Figure 1-10). Total mercury concentrations for benthic invertebrates ranged between 0.069 mg/kg and 0.16 mg/kg, with an average of 0.10 mg/kg and a median of 0.088 mg/kg. The highest concentration was recorded at GL-LET, while the lowest was observed at GL-AES. Methylmercury concentrations ranged between 0.064 mg/kg to 0.15 mg/kg, with an average of 0.095 mg/kg and a median of 0.080 mg/kg. Across samples collected from Pakwash Lake, methylmercury accounted for an average of 94% of the total mercury concentrations.

One zooplankton sample was collected from Genessee Lake in 2024; samples were not collected for periphyton. The total mercury concentration for the single zooplankton sample was 0.023 mg/kg and the methylmercury concentration for the single zooplankton sample was 0.0050 mg/kg. Methylmercury accounted for 30% of the total mercury concentrations for zooplankton.

3.3.4.4 DIXIE CREEK

A total of 24 benthic invertebrate samples were collected from Dixie Creek during the 2024 field programs from total water depths between 1.0 and 1.5 m (Figure 1-10). Total mercury concentrations for benthic invertebrates ranged between 0.066 mg/kg and 0.20 mg/kg, with an average of 0.12 mg/kg and a median of 0.12 mg/kg. The highest concentration was recorded at DC-03, while the lowest was observed at DC-01. Methylmercury concentrations ranged between 0.064 mg/kg to 0.20 mg/kg, with an average of 0.12 mg/kg and a median of 0.11 mg/kg. Across samples collected from Dixie Creek, methylmercury accounted for an average of 98% of the total mercury concentrations.

A total of seven periphyton and four zooplankton samples were collected from Dixie Creek during the 2024 field programs. Total mercury concentrations for periphyton ranged between 0.015 mg/kg and 0.044 mg/kg, while methylmercury concentrations ranged between 0.00049 mg/kg to 0.0036 mg/kg. Five total mercury samples were below the minimum level (ML) and thus not included. Total mercury concentrations for zooplankton ranged between 0.0175 mg/kg and 0.042 mg/kg, while methylmercury concentrations ranged between 0.0002 mg/kg to 0.0040 mg/kg.

3.3.4.5 UNNAMED WATERBODY 6

A total of three benthic invertebrate samples were collected from Unnamed Waterbody 6 during the 2024 field programs from total water depths between 1.0 and 2.0 m (Figure 1-10). Total mercury concentrations for benthic invertebrates ranged between 0.055 mg/kg to 0.056 mg/kg, with an average of 0.55 mg/kg and a median of 0.056 mg/kg. Methylmercury concentrations ranged between 0.052 mg/kg to 0.057 mg/kg with an average of 0.054 mg/kg and a median of 0.054 mg/kg. Across samples collected from Unnamed Waterbody 6, methylmercury accounted for an average of 98% of the total mercury concentrations.

There was only one sample collected for zooplankton. The total mercury concentration was 0.043 mg/kg, and the methylmercury concentration was 0.0040 mg/kg.(9% methylmercury).

3.3.5 METALS CONCENTRATION IN FISH TISSUE

3.3.5.1 OVERVIEW

Concentrations of total mercury and methylmercury in fish were measured across waterbodies where surface water samples were collected, except for regional waterbodies such as Pakwash Lake. In these regional waterbodies, the following species historical fish tissue data for Northern Pike, Lake Whitefish, Walleye, Yellow Perch, White sucker and Silver Redhorse were obtained from the MECP (2018). Laboratory results described in text and presented in tables for total mercury and methylmercury are in mg/kg wet weight (wwt). A summary of measured mercury (i.e., total and methylmercury) concentrations in fish for human consumption, characterized by fish size, species and waterbody, is presented in Section 5.

Across all fish species within all waterbodies measured for total mercury concentrations, methylmercury accounted for an average of 75% of the total mercury concentrations, which is consistent with reported values in fish tissues across various species, where methylmercury comprises 61 to 95% of total mercury (Health Canada 2007). The following was observed with measured total mercury and methylmercury concentrations in fish:

- Northern Pike total mercury concentrations ranged from 0.12 to 0.67 mg/kg, with two samples greater than the Health Canada (2011) maximum mercury concentration in the edible portion of retail fish guideline (0.5 mg/kg). Methylmercury concentrations ranged from 0.13 to 0.51 mg/kg.

- Walleye total mercury concentrations ranged from 0.14 to 0.86 mg/kg, with six samples greater than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.078 mg/kg to 0.53 mg/kg.
- White Sucker total mercury concentrations ranged from 0.05 to 0.32 mg/kg, and were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg).
- Yellow Perch total mercury concentrations ranged from 0.03 mg/kg to 0.30 mg/kg , and were less than the Health Canada guideline for retail fish (0.5 mg/kg).
- The highest proportion of methylmercury was observed at CR-DS and the lowest at CR-FDP.

Overall, total mercury concentrations in the local baseline study area generally remain low, with 93% of samples collected between 2022 and 2024 less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg).

Regardless of how the measured fish concentrations compare to the Health Canada guideline for retail fish, the consumption rates used by the federal government to develop these guidelines may not be representative of Indigenous consumers in the study area who may consume fish at higher rates than the general population. As such, the Mercury Study includes a detailed and site-specific human health risk assessment (HHRA) for consumption of fish by Indigenous consumers in the region (Section 6).

3.3.5.2 CHUKUNI RIVER

The Chukuni River has been identified as a spawning habitat for Lake Whitefish, Northern Pike, Walleye, and others. A total of 23 Northern Pike, 26 Walleye, 2 Lake Whitefish, 25 White Sucker, 1 Silver Redhorse, and 30 Yellow Perch tissue samples were submitted for analysis from the Chukuni River (CR-REF, CR-DS, and CR-FDP) between 2022 to 2024.

There were eight instances in which values were above the Health Canada (2011) guideline for retail fish (0.5 mg/kg) in the Chukuni River, which were also the only instances above the guideline across the study area:

- Northern Pike (0.61 mg/kg at CR-FDP in 2023)
- Northern Pike (0.67 mg/kg at CR-DS in 2024)
- Walleye (0.504 mg/kg at CR-DS in 2022)
- Walleye (0.86 mg/kg at CR-FDP in 2023)
- Walleye (0.76 mg/kg at CR-FDP in 2023)
- Walleye (0.62 mg/kg at CR-FDP in 2023)
- Walleye (0.504 mg/kg at CR-DS in 2023)
- Walleye (0.80 mg/kg at CR-DS in 2023).

Total mercury concentrations in Northern Pike ranged from 0.12 mg/kg to 0.67 mg/kg, with two samples greater than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.13 mg/kg to 0.51 mg/kg. All values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Walleye total mercury concentrations ranged from 0.14 mg/kg to 0.86 mg/kg, with six samples greater than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.078 mg/kg to 0.53 mg/kg. All values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

White Sucker total mercury concentrations ranged from 0.05 to 0.32 mg/kg, and were less than the Health Canada (2011) guideline for retail fish. The methylmercury concentrations ranged from 0.025 mg/kg to 0.33 mg/kg, which is greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Yellow Perch total mercury concentrations ranged from 0.03 mg/kg to 0.30 mg/kg and were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.019 mg/kg to 0.23 mg/kg. Most values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Lake Whitefish total mercury concentrations were 0.06 mg/kg and 0.10 mg/kg for 2022 and 2023, respectively. Both samples were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations were 0.080 mg/kg and 0.054 mg/kg for Lake Whitefish in 2022 and 2023, respectively. Both samples were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Silver Redhorse total mercury concentration was 0.18 mg/kg for 2023 and was less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentration was 0.077 mg/kg and was greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

3.3.5.3 DIXIE CREEK

A total of 18 Northern Pike, 2 White Sucker, and 5 Yellow Perch tissue samples were submitted for analysis from Dixie Creek (DC-02 and DC-04) from 2022 to 2023.

Total mercury concentrations for Yellow Perch ranged between 0.03 mg/kg and 0.20 mg/kg and were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged between 0.023 mg/kg to 0.11 mg/kg, with three samples greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Total mercury concentrations ranged from 0.02 mg/kg to 0.81 mg/kg for Northern Pike with only one sample higher than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged between 0.025 mg/kg to 0.52 mg/kg, with most samples greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Total mercury concentration was 0.103 mg/kg in 2022 and 0.037 mg/kg in 2023 for White Sucker. Collected samples were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentration was 0.131 mg/kg in 2022 and 0.033 mg/kg in 2023 for White Sucker and was generally below the CCME (2000) guideline of 0.033 mg/kg for the protection of wildlife consumers of aquatic biota, apart from one sample collected for White Sucker.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics, and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

3.3.5.4 GENESSEE LAKE

A total of 14 Northern Pike, 6 Walleye, 1 White Sucker and 18 Yellow Perch tissue samples were submitted for analysis from Genessee Lake from 2022 to 2023.

Total mercury concentrations in fish tissue ranged from 0.07 mg/kg to 1.18 mg/kg, 0.24 mg/kg to 0.51 mg/kg and 0.034 mg/kg to 0.15 mg/kg for Northern Pike, Walleye and Yellow Perch, respectively. Total mercury concentration for White Sucker was 0.016 mg/kg, with all but four Northern Pike samples and one Walleye sample less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg).

Methylmercury concentrations ranged from 0.064 mg/kg to 1.40 mg/kg, 0.152 mg/kg to 0.379 mg/kg and 0.029 mg/kg to 0.156 mg/kg for Northern Pike, Walleye and Yellow Perch, respectively. Methylmercury concentration for White Sucker was 0.014 mg/kg. All values except for one Yellow Perch and White Sucker were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

In total, across all species in Genessee Lake, methylmercury accounted for an average of 77% of the total mercury concentrations, which is consistent with reported values in fish tissues across various species where methylmercury comprises 61 to 95% of total mercury (Health Canada 2007).

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

3.3.5.5 UNNAMED WATERBODIES

Unnamed Waterbody 2

A total of five Northern Pike tissue samples were submitted for analysis from Unnamed Waterbody 2 in 2022 and 2023.

Northern Pike total mercury concentrations ranged from 0.062 mg/kg to 0.64 mg/kg, with two samples greater than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.041 mg/kg to 0.32 mg/kg. All values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics, and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

Unnamed Waterbody 6

A total of 11 Northern Pike and 12 Yellow Perch tissue samples were submitted for analysis from Unnamed Waterbody 6 in 2022 and 2023.

Northern Pike total mercury concentrations ranged from 0.19 mg/kg to 0.37 mg/kg and were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.095 to 0.25 mg/kg. All values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Yellow Perch total mercury concentrations ranged from 0.036 mg/kg to 0.085 mg/kg and were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.018 to 0.055 mg/kg. Five values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics, and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

3.3.5.6 UNNAMED WATERCOURSES

Unnamed Watercourse 1

A total of three Northern Pike tissue samples were submitted for analysis from Unnamed Watercourse 1 in 2023.

Northern Pike total mercury concentrations ranged from 0.056 mg/kg to 0.10 mg/kg and were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.044 mg/kg to 0.080 mg/kg. All values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics, and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

Unnamed Watercourse 3

A total of two White sucker tissue samples were submitted for analysis from Unnamed Watercourse 3 in 2023.

White sucker total mercury concentrations were 0.078 mg/kg and 0.041 mg/kg. Both samples were less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations were 0.030 mg/kg and 0.080mg/kg with one being greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics, and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

Unnamed Watercourse 7

A total of three Northern Pike and one Yellow Perch tissue samples were submitted for analysis from Unnamed Watercourse 7 in 2023.

Northern Pike total mercury concentrations ranged from 0.25 mg/kg to 0.54 mg/kg, with one sample greater than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations ranged from 0.13 mg/kg to 0.36 mg/kg. All values were greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Yellow Perch total mercury concentrations were 0.064 mg/kg and less than the Health Canada (2011) guideline for retail fish (0.5 mg/kg). Methylmercury concentrations were 0.054 mg/kg, which is greater than the CCME (2000) guideline of 0.033 mg/kg methylmercury for the protection of wildlife consumers of aquatic biota.

Full results are provided in Attachment C. Detailed information on fish community, habitat characteristics, and related information is provided in the Aquatic Resources Baseline Report (WSP 2025e).

Table 3-1: Analytical Method Detection Limits

Matrix	Parameter	Unit	Analytical Method	MDL[(1)]
Surface Water / Groundwater	Total Mercury	ng/L	CVAAS	5
	Dissolved Mercury	ng/L	CVAAS	5
	Low-Level Detection Mercury	ng/L	Oxidation, Purge and Trap, and CVAFS	0.04
	Methylmercury	ng/L	Distillation, Aqueous Ethylation, Purge and Trap, and CVAFS	0.0035
Porewater	Dissolved Mercury	ng/L	Oxidation, Purge and Trap, and CVAFS	0.1
	Dissolved Methylmercury	ng/L	Distillation, Aqueous Ethylation, Purge and Trap, Desorption, GC separation, and CVAFS	0.02
Sediment	Total Mercury	mg/kg	Sieved, Digested with HNO_3 and HCl, and CVAAS	0.005
Benthic	Total Mercury	mg/kg	Thermal Desorption, Gold Amalgamation, and AAS	0.004
	Methylmercury	mg/kg	Digestion, Aqueous Ethylation Purge and Trap, and CVAFS	0.0004
Periphyton	Total Mercury	mg/kg	Thermal Desorption, Gold Amalgamation, and AAS	0.004
	Methylmercury	mg/kg	Digestion, Aqueous Ethylation Purge and Trap, and CVAFS	0.00004
Zooplankton	Total Mercury	mg/kg	Digestion, Purge and Trap, and CVAFS	0.0011
	Methylmercury	mg/kg	Digestion, Aqueous Ethylation Purge and Trap, and CVAFS	0.0004
Fish	Total Mercury	mg/kg	CVAAS	0.001
	Methylmercury	mg/kg	Ethylation, Purge and Trap, and GC CVAFS	0.001

Notes:
1 MDL: Method Detection Limit.
AAS: Atomic Absorption Spectrophotometry; CVAAS: Cold vapor atomic absorption spectroscopy;
CVAFS: Cold vapor atomic fluorescence spectroscopy; GC: Gas chromatography
MeHg: Methylmercury- no benchmark values available.

Table 3-2: Water Quality Co-factor Method Detection Limits and Guideline Values

Lab Parameters [2]	Units	MDL [1]	Guideline Value	Source [3,4,5]
General Parameters				
Temperature	°C	0.1	-	-
Field pH	s.u.	0.01	6.5 to 8.5	PWQO
Dissolved Oxygen	mg/L	0.1	-	-
Nutrients and Anions				
Chloride	mg/L	0.10	120	CCME
Nitrate (as N)	mg/L	0.020	3	CCME
Phosphorus, Total	mg/L	0.0020 to 0.0050	0.02 (lakes), 0.03 (rivers)	iPWQO
Sulphate (SO_4)	mg/L	0.30 to 1.0	128 if hardness is between 0 to 30 mg/L 218 if hardness is between 31 to 75 mg/L 309 if hardness is between 76 to 180 mg/L 429 if hardness is between 181 to 250 mg/L	BC WQG
Dissolved Organic Carbon	mg/L	0.5	-	-
Total and Dissolved Metals				
Iron	mg/L	0.010	*Calculated*	FEQG

Notes:
1 MDL: average method detection limit during the baseline program.
2 Groundwater quality analyses was performed for dissolved concentrations, as is standard practice. Field parameters for groundwater include pH and conductivity.
3 PWQO / iPWQO: Provincial Water Quality Objectives / interim Provincial Water Quality Objectives.
4 CCME: Canadian Council of Ministers of the Environment
5 BC WQG: British Columbia Guidelines for the Protection of Aquatic Life (long-term exposure).
- no benchmark values available.

Table 3-3: Baseline Surface Water and Groundwater Results

Waterbody		Total Mercury (ng/L) (WQG PAL: 26 ng/L) [1]	Dissolved Mercury (ng/L) (WQG PAL: 200 ng/L)	Methylmercury ng/L) (WQG PAL: 4 ng/L)	Total Low-Level Detection Mercury (ng/L) (WQG PAL: 26 ng/L for	Percent Dissolved Mercury [2] (%)	Percent Methylmercury [3] (%)
Chukuni River	Count	86	80	60	63	70	59
	25th Percentile	2.5	2.5	0.034	0.75	100	3.5
	Median	2.5	2.5	0.047	0.98	100	4.4
	Average	4.0	3.5	0.057	1.3	100	4.8
	75th Percentile	5.0	5.0	0.058	1.6	100	5.6
	95th Percentile	5.0	5.0	0.081	2.1	100	8.3
Dixie Creek	Count	139	125	56	59	116	56
	25th Percentile	2.5	2.5	0.065	1.7	100	3.4
	Median	2.5	2.5	0.10	2.1	100	4.7
	Average	5.2	3.8	0.16	3.3	99.5	6.5
	75th Percentile	5.0	5.0	0.20	3.5	100	8.0
	95th Percentile	10.4	5.0	0.47	11.0	100	15.4
Unnamed Watercourses flowing into Dixie Creek	Count	54	46	17	18	42	17
	25th Percentile	2.5	2.5	0.18	2.9	100	4.7
	Median	5.0	5.0	0.30	4.1	100	6.2
	Average	5.4	5.0	0.33	5.7	93.1	7.9
	75th Percentile	5.0	5.0	0.53	6.8	100	9.1
	95th Percentile	10.2	11.3	0.68	15.9	100	19.0
North-Flowing Unnamed Watercourses	Count	62	51	28	29	50	28
	25th Percentile	2.5	2.5	0.18	4.3	81.4	3.2
	Median	5.0	2.5	0.32	5.1	100	7.2
	Average	7.8	7.6	0.70	5.9	94.6	12.1
	75th Percentile	6.6	5.8	0.73	6.9	100	11.5
	95th Percentile	10.4	15.0	2.7	10.1	170	47.8
Unnamed Waterbody 6 and Genessee Lake Tributaries	Count	50	43	11	11	40	11
	25th Percentile	2.5	2.5	0.40	3.8	92	8.0
	Median	5.0	5.0	0.78	5.6	100	11.2
	Average	6.6	4.7	0.80	5.6	92.8	13.9
	75th Percentile	6.3	5.2	1.2	7.0	100	18.7
	95th Percentile	15.9	9.4	1.4	9.4	111	24.1

Waterbody		Total Mercury (ng/L) (WQG PAL: 26 ng/L) [1]	Dissolved Mercury (ng/L) (WQG PAL: 200 ng/L)	Methylmercury ng/L) (WQG PAL: 4 ng/L)	Total Low-Level Detection Mercury (ng/L) (WQG PAL: 26 ng/L for	Percent Dissolved Mercury [2] (%)	Percent Methylmercury [3] (%)
Project Area Waterbodies	Count	122	122	46	47	107	44
	25th Percentile	2.5	2.5	0.021	0.6	100	2.5
	Median	2.5	2.5	0.031	1.5	100	3.3
	Average	3.6	3.5	0.077	1.9	100	4.4
	75th Percentile	5.0	5.0	0.075	2.3	100	4.8
	95th Percentile	5.4	5.9	0.28	5.6	100	7.2
Gullrock Lake	Count	6	6	6	6	6	6
	25th Percentile	2.5	2.5	0.022	0.57	100	3.6
	Median	2.5	2.5	0.028	0.59	100	4.8
	Average	2.5	2.5	0.026	0.58	100	4.4
	75th Percentile	2.5	2.5	0.030	0.59	100	5.3
	95th Percentile	2.5	2.5	0.031	0.60	100	5.4
Pakwash Lake	Count	51	51	51	51	51	51
	25th Percentile	2.5	2.5	0.027	0.88	100	2.5
	Median	2.5	2.5	0.035	1.1	100	3.1
	Average	2.5	2.5	0.040	1.3	100	3.4
	75th Percentile	2.5	2.5	0.049	1.6	100	3.5
	95th Percentile	2.5	2.5	0.066	2.5	100	6.5
Groundwater	Count	-	240	48	48	-	48
	25th Percentile	-	2.5	0.0034	0.30	-	0.53
	Median	-	2.5	0.012	1.7	-	1.1
	Average	-	2.9	0.066	5.2	-	1.9
	75th Percentile	-	2.5	0.039	3.8	-	2.6
	95th Percentile	-	5.0	0.27	16.5	-	6.4

Notes:
All units are ng/L (unless otherwise noted).
WQG PAL: Water Quality Guideline for the Protection of Aquatic Life.
Grey highlighted values are greater than identified WQG PAL (none).

1 Total mercury guidelines were also calculated using the British Columbia WQG PAL for each individual waterbody using the following equation as described in Section 3.1.2: 0.1 ÷ %MeHg.
2 Percent dissolved mercury was calculated for each individual sample and averaged afterwards. Percent dissolved mercury was calculated using total mercury (Dissolved Mercury / Total Mercury x 100).
3 Percent methylmercury was calculated for each individual sample and averaged afterwards. Percent methylmercury was calculated using low-level detection mercury (Methylmercury / Total Low-Level Hg x 100).

Table 3-4: Baseline Sediment Mercury Results

Waterbody		Total Mercury (mg/kg)
Chukuni River	Count	45
	25th Percentile	0.012
	Median	0.022
	Average	0.021
	75th Percentile	0.025
	95th Percentile	0.044
Dixie Creek	Count	24
	25th Percentile	0.020
	Median	0.025
	Average	0.026
	75th Percentile	0.025
	95th Percentile	0.027
Genessee Lake	Count	9
	25th Percentile	0.027
	Median	0.082
	Average	0.065
	75th Percentile	0.087
	95th Percentile	0.11
Pakwash Lake	Count	9
	25th Percentile	0.017
	Median	0.030
	Average	0.031
	75th Percentile	0.045
	95th Percentile	0.055
Unnamed Waterbody 1	Count	6
	25th Percentile	0.10
	Median	0.12
	Average	0.13
	75th Percentile	0.17
	95th Percentile	0.18
Unnamed Waterbody 2	Count	6
	25th Percentile	0.17
	Median	0.19
	Average	0.19
	75th Percentile	0.21
	95th Percentile	0.22
Unnamed Waterbody 3	Count	3
	25th Percentile	-
	Median	-
	Average	0.11
	75th Percentile	-
	95th Percentile	-
Unnamed Waterbody 5	Count	3
	25th Percentile	-
	Median	-
	Average	0.025
	75th Percentile	-
	95th Percentile	-
Unnamed Waterbody 6	Count	9
	25th Percentile	0.11
	Median	0.12
	Average	0.12
	75th Percentile	0.12
	95th Percentile	0.16
Unnamed Watercourse 3	Count	10
	25th Percentile	0.025
	Median	0.025

Waterbody		Total Mercury (mg/kg)
	Average	0.025
	75th Percentile	0.025
	95th Percentile	0.027
Unnamed Watercourse 4	Count	6
	25th Percentile	0.016
	Median	0.021
	Average	0.020
	75th Percentile	0.025
	95th Percentile	0.025
Unnamed Watercourse 5	Count	6
	25th Percentile	0.025
	Median	0.025
	Average	0.026
	75th Percentile	0.027
	95th Percentile	0.032
Unnamed Watercourse 6	Count	20
	25th Percentile	0.025
	Median	0.025
	Average	0.028
	75th Percentile	0.037
	95th Percentile	0.047
Unnamed Watercourse 7	Count	15
	25th Percentile	0.032
	Median	0.050
	Average	0.054
	75th Percentile	0.063
	95th Percentile	0.096
Unnamed Watercourse 8	Count	6
	25th Percentile	0.004
	Median	0.017
	Average	0.015
	75th Percentile	0.025
	95th Percentile	0.025

Notes:
All units are mg/kg (unless otherwise noted).
For values below the MDL, half the MDL was used.

Table 3-5: Porewater Mercury and Methylmercury Results

Waterbody		Dissolved Mercury (ng/L) (WQG PAL: 200 ng/L)	Dissolved Methylmercury (ng/L) (WQG PAL: 4 ng/L)
Chukuni River	Count	6	18
	25th Percentile	0.93	0.078
	Median	1.3	0.090
	Average	1.2	0.10
	75th Percentile	1.5	0.12
	95th Percentile	1.6	0.19
Dixie Creek	Count	-	14
	25th Percentile	-	0.048
	Median	-	0.10
	Average	-	0.15
	75th Percentile	-	0.20
	95th Percentile	-	0.37
Genessee Lake	Count	6	6
	25th Percentile	2.5	0.32
	Median	7.1	0.55
	Average	8.9	0.62
	75th Percentile	13	0.69
	95th Percentile	20	1.2
Pakwash Lake	Count	8	18
	25th Percentile	0.61	0.043
	Median	0.82	0.060
	Average	1.0	0.094
	75th Percentile	1.2	0.11
	95th Percentile	2.3	0.25
Unnamed Waterbody 6	Count	6	6
	25th Percentile	0.56	0.11
	Median	0.57	0.11
	Average	0.84	0.20
	75th Percentile	0.65	0.33
	95th Percentile	1.8	0.40

Notes:
All units are ng/L (unless otherwise noted).
WQG PAL: Water Quality Guideline for the Protection of Aquatic Life
For values below the MDL, half the MDL was used.

Table 3-6: Benthic Invertebrates Summary Statistics, Baseline Mercury by Waterbody

Waterbody		Total Mercury (mg/kg)	Methylmercury (mg/kg)	Percent Methylmercury (%)
Chukuni River	Count	13	13	13
	25th Percentile	0.082	0.087	98
	Median	0.13	0.14	99
	Average	0.21	0.20	99
	75th Percentile	0..14	0.14	101
	95th Percentile	0.66	0.60	107
Dixie Creek	Count	24	24	24
	25th Percentile	0.089	0.087	96
	Median	0.12	0.11	98
	Average	0.12	0.12	98
	75th Percentile	0.14	0.15	102
	95th Percentile	0.19	0.18	105
Pakwash Lake	Count	15	15	15
	25th Percentile	0.16	0.16	98
	Median	0.17	0.18	100
	Average	0.19	0.19	100
	75th Percentile	0.20	0.20	102
	95th Percentile	0.28	0.29	106
Genessee Lake	Count	5	5	5
	25th Percentile	0.072	0.067	91
	Median	0.088	0.080	95
	Average	0.10	0.095	94
	75th Percentile	0.12	0.11	96
	95th Percentile	0.15	0.14	97
Unnamed Waterbody 6	Count	3	3	3
	25th Percentile	-	-	-
	Median	-	-	-
	Average	0.055	0.054	98
	75th Percentile	-	-	-
	95th Percentile	-	-	-

Notes:
All units are mg/kg dry weight (unless otherwise noted).
For values below the MDL, half the MDL was used.

Table 3-7: Lower Trophic Community (Periphyton and Zooplankton) Baseline Mercury Results

Trophic Community	Waterbody		Total Mercury (mg/kg)	Methylmercury (mg/kg)	Percent Methylmercury (%)
Periphyton	Chukuni River	Count	6	15	6
		25th Percentile	0.032	0.0012	6
		Median	0.034	0.0015	6
		Average	0.034	0.0018	7
		75th Percentile	0.037	0.0021	7
		95th Percentile	0.043	0.0034	11
	Dixie Creek	Count	7	12	7
		25th Percentile	0.031	0.00061	4
		Median	0.039	0.0011	5
		Average	0.035	0.0015	5
		75th Percentile	0.041	0.0022	6
		95th Percentile	0.043	0.0031	8
Zooplankton	Chukuni River	Count	1	2	1
		25th Percentile	-	-	-
		Median	-	-	-
		Average	0.037	0.0013	7
		75th Percentile	-	-	-
		95th Percentile	-	-	-
	Dixie Creek	Count	4	3	3
		25th Percentile	0.018	-	-
		Median	0.027	-	-
		Average	0.028	0.002	10
		75th Percentile	0.037	-	-
		95th Percentile	0.041	-	-
	Pakwash Lake	Count	4	4	4
		25th Percentile	0.014	0.0043	30
		Median	0.017	0.0057	32
		Average	0.017	0.0054	30
		75th Percentile	0.020	0.0067	33
		95th Percentile	0.022	0.0070	34
	Genessee Lake	Count	1	1	1
		25th Percentile	-	-	-
		Median	-	-	-
		Average	0.023	0.0050	22
		75th Percentile	-	-	-
		95th Percentile	-	-	-

Trophic Community	Waterbody		Total Mercury (mg/kg)	Methylmercury (mg/kg)	Percent Methylmercury (%)
Zooplankton	Unnamed Waterbody 6	Count	1	1	1
		25th Percentile	-	-	-
		Median	-	-	-
		Average	0.043	0.0040	9
		75th Percentile	-	-	-
		95th Percentile	-	-	-

Notes:
All units are mg/kg dry weight (unless otherwise noted).
Values below the ML as flagged by the lab are not included in summary statistics.
For values below the MDL, half the MDL was used.
Summary statistics not applicable for sample size of n=1.

Table 3-8: Summary of Methylmercury Fish Tissue Residue Reference Concentrations

Wildlife	Species	Reference Concentration for Protection of Relevant Canadian Wildlife (mg/kg-ww)
Bird	Wood duck (Aix sponsa)	0.089
	Great blue heron (Ardea Herodias)	0.141
	Mallard (Anas platyrhynchos)	0.135
Mammal	River otter (Luta canadensis)	0.220

Notes:
Canadian Council of Ministers of the Environment (CCME 2000).
Environment Canada. 2002.

4 WATER QUALITY MODELLING

4.1 PATHWAYS OF PROJECT INTERACTION WITH METHYLMERCURY PRODUCTION

In general, Project contributions to methylmercury production in the Chukuni River and downstream waterbodies have the potential to occur through:

- **Direct effects:** including effluent discharge containing mercury and methylmercury.
- **Indirect effects:** the Project may indirectly influence methylmercury concentrations in the environment by altering sulphate concentrations in downstream waters, which could result in the conversion of mercury already present in the environment to methylmercury. For example, in downstream watersheds, areas with low oxygen levels, such as lake bottom sediments, or riparian wetlands, may become active sites for SRB and methylating bacteria.

Water management planning and mitigation measures for the Project have been developed to minimize or eliminate these direct and indirect effects. Discussion of mitigations measures is provided in Section 4.2

4.2 MITIGATION MEASURES

Great Bear Resources is aware of the cited linkages between sulphate reducing bacteria and methylmercury production, which have been documented in the literature elsewhere. In consideration, water management and mitigation measures for the Project are being developed to minimize potential effects to water quality, including mercury, methylmercury and sulphate concentrations. Development of mitigation measures for Project influences on for water quality as well as methylmercury production have considered industry-standard practices, outcomes of baseline studies, outcomes of predictive modelling efforts as well as inputs received during consultation and engagement.

An integrated water management system has been developed for the Project site to manage contact water from the underground mine, open pits and surface facilities. The underground mine will intercept groundwater, while the open pit will collect groundwater, runoff and direct precipitation. Mine water from the required dewatering of the underground mine and open pit will be collected in sumps and pumped to the surface for additional management, including water treatment. The water management system is also designed with the goal of limiting the release of site contact waters, which may contain elevated sulphate concentrations (e.g., from the leaching of locally mined rock), from being discharged directly into oxygen-poor environments or wetland areas. These areas, including sediments in rivers or lakes and riparian wetlands, are recognized as high-risk zones for enhanced methylmercury production when sulphate levels increase over baseline levels (Section 1.3).

Additionally, a portion of the contact water treatment stream (currently proposed as excess water from the Tailings Management Facility) will be subject to enhanced water treatment (membrane filtration) to reduce sulphate concentrations in treated effluent. Membrane filtration is a separation process that uses a semi-permeable membrane to separate components of a liquid based on their size and properties. It involves passing the contact water to be treated through the membrane by differential pressure, to produce clear water and a reject solution. The membrane-treated water will be combined with other treated water, and excess treated water will be discharged to the environment. The reject solution will primarily be used in the paste backfill mixture that will be sent underground to fill underground voids and solidify. Excess reject solution will be pumped to the west Viggo Management Facility for temporary storage during operations, and at closure it will be pumped underground for permanent storage. This treatment chain, with the membrane filtration step, has been designed to remove 95 to 98% of incoming sulphate concentrations (WSP 2025c). Excess treated water will be discharged to the Chukuni River in accordance with applicable regulatory requirements.

Other measures to limit the rate of sulphate-related methylmercury production and drainage include:

- Desulphurization of tailings at the process plant to create two tailings streams for more effective management (a non-potentially acid generating desulphurized tailings and a smaller quantity of concentrate tailings that would be managed in a manner to mitigate their acid generating potential).
- Maintaining concentrate tailings in a saturated condition during operation and post closure in a fully contained facility (mined out open pit on site).
- Interception of sulphate-bearing mine site drainage using methods such as perimeter runoff and seepage collection systems, installation of sheet pile barriers or employing negative drainage gradients to direct seepage to collection points, preventing sulphate from contacting anoxic soils, wetlands, and sediments where inorganic mercury is naturally present.
- Discharging treated effluent to a large receiver (Chukuni River) that has a high oxygenation level and high assimilative capacity.
- Stripping and stockpiling upper organic soil layers at stockpile location within the mine site for later use in reclamation, rather than leaving in place and allowing anoxic conditions to arise that could encourage SRB activity.
- Lined facilities (i.e., collection water pond, collection channels, etc.) to support optimal containment of contact water prior to water treatment.

4.3 MASS BALANCE MODELLING

4.3.1 APPROACH

The mass balance water quality model was developed in GoldSim to stimulate the volume and flow of water and the concentrations and transport of chemical species over the life of the Project. GoldSim was selected as the modelling platform to develop source terms for the subsequent methylmercury production models (Section 4.4) as it represents a well-established mass-balance modelling tool that is specifically suited to integrating water quantity, water quality, and geochemical loading information over complex project life cycles. Its use provides a transparent, internally consistent framework for estimating mercury loads that could be reliably transferred to subsequent mercury fate, methylation, and bioaccumulation models described in Section 4.4 and 5. Complete details of modelling for the mine site and surface water receiving environment are provided in WSP (2024b) and WSP (2024d). This section presents key details of these mass balance models to provide context and to support a clear interpretation of the data used as inputs for methylmercury production modelling (Section 4.4) and bioaccumulation modelling (Section 5), which is the overall focus of this report.

Water quality predictions for the mine site were built upon the average annual monthly water balance for the Project, along with currently available mine planning information and geochemical data. The mass balance model assumed persistence of all modelled parameters, including mercury, without accounting for assimilation or natural attenuation processes that would occur in the receiving environment. For all modelled parameters, including mercury, geochemical loading terms (including influent and effluent qualities) applies the full detection limit when analytical results are below the reporting detection limit (RDL). While this approach is inherently very conservative, particularly for constituents such as mercury where the full RDLs will inflate calculated geochemical loadings, this conservatism is intentional and appropriate at this stage of assessment. It further serves to consider internal consistency across datasets generated by different laboratories and detection limits, and allows direct comparison with other regulatory documents and precedent projects. It should therefore be clearly understood that these values represent upper-bound estimates, not best-estimate conditions. The mine site water quality model is a mass balance model structured as a monthly water balance with associated water quality inputs and geochemical source terms. The models account for flows and chemical loadings entering and leaving Project components as well as and the surface water receiving environment; the associated generalized mass balance equations applied in the models are:

$$C_{A+B\,i} = \frac{(C_{A\,i} \times Q_A + C_{B\,i} \times Q_B)}{(Q_A + Q_B)} \qquad \text{[Equation 1]}$$

Where:

C_{Ai} and C_{Bi} are the concentrations of chemical species *i* in waters A and B, respectively.

Q_A and Q_B are the flow rates or volumes of water in waters A and B, respectively.

$C_{A+B\,i}$ is the concentration of chemical species i in the mixed body of waters A and B.

$$\sum (\text{Mass Loading In})_i - \sum(\text{Mass Loading out})_i = \Delta C_i \times V \qquad \text{[Equation 2]}$$

Where:

ΔC_i is the change in concentration of chemical species *i* in a body of water; V is the volume of the body of water.

$\sum(\text{Mass Loading In})_i$ and $\sum(\text{Mass Loading out})_i$ are the sum of masses of chemical species *i* added to, and removed from, the body of water, respectively.

Various types of mine waste will be managed at the Project, including non-metal leaching (NML) non-potentially acid generating (NPAG) mine rock, non-acidic potentially acid generating (PAG) mine rock, acidic PAG mine rock, NPAG / ML mine rock, NPAG desulphurized tailings, and PAG concentrate tailings. The specific geochemical characteristics of these mine materials were considered in detail for source term development (i.e., Project loadings) for the mass balance model.

Source terms and supporting geochemical conditions utilized in the model were developed using a reasonable conservative case approach. Under this approach, where strong geochemical trends were observed in the Project data parameters (e.g., as observed for sulphate, arsenic, cadmium, lead, selenium and zinc), the rates of parameter release from mine materials (mine rock, tailings, etc.) were represented by the overall dataset including low, average and worst case materials. However, where there was uncertainty on parameter release rates, source terms utilized higher values, namely the 75th percentile or in some cases maximum values, depending upon the observed data distributions. For those parameters, estimated release rates would be much greater than the expected median condition for those materials. Other model assumptions were derived to reasonably represent field scale conditions, as possible with available data.

4.3.2 RESULTS

Operations were modelled using the highest Project loadings to develop a conservative assessment of potential environmental effects, preventing underestimation of contaminant release rates under realistic and worst-case conditions. Mass balance model results for the operations phase are presented in detail the WSP (2025b).

Results indicate that all water quality parameters, including mercury, methylmercury and sulphate are less than WQG PAL in the Chukuni River by the end of the mixing zone during all periods of discharge. Results indicate that the highest contact water quality concentrations occur during the late operations phase of the Project, when it is operating at full capacity and generating the largest volumes of contact water requiring management and discharge.

Results for nodes CHK-1 (Chukuni River, Project effluent discharge location), PAK-L (Pakwash Lake) and PAK-OUT (outlet of Pakwash Lake), which inform this Mercury Study, are summarized in Table 4 1. These results were used to inform the methylmercury production modelling (Section 4.4), bioaccumulation modelling (Section 5) and HHRA modelling (Section 6).

4.4 METHYLMERCURY PRODUCTION MODELLING

4.4.1 INTRODUCTION

The methylmercury production modelling described in this section was completed by HESL This section summarizes the methodology and results of the additional baseline sampling and modelling completed by HESL. The predictive model was developed specifically for the aquatic system downstream of the Project, using site-specific data to the extent possible, industry-accepted approaches for quantifying common processes (e.g., mass balance and concentration gradients), and relevant literature-derived input values and co-factor relationships to calculate methylmercury stimulation by sulphate within the aquatic conditions downstream of the Project. The model allows for sensitivity case testing on a broad range of factors and is Microsoft Excel-based for transparency and ease of use.

Sulphate-reducing bacteria (SRB) are the principal methylators of inorganic mercury in freshwater environments (Gilmour et al. 1992). The production of methylmercury can be limited by sulphate availability (Orem et al. 2020) and therefore the addition of sulphate to an aquatic system can stimulate methylmercury production under certain conditions (e.g., in anoxic sediment where sufficient concentrations of organic carbon and inorganic mercury are present, such as presented in Watras et al. 1995). There is concern regarding sulphate loading into freshwater ecosystems, especially where consumption of fish is significant, because methylmercury bioaccumulates in fish tissue and may pose a risk to human health (Driscoll et al. 2013).

This section presents the model methods and predicted estimates of the potential effect of sulphate loading from the Project effluent to the Chukuni River, on downstream methylmercury concentrations in surface water. The results of the modelling provide input data for bioaccumulation predictions (via water- to-fish BAF) and health-risk modelling completed by WSP. The surface water methylmercury predictions should be considered in the relevant context of the bioaccumulation health risk predicted by WSP. The model was supported by data collected by WSP (discussed in previous sections of the report) and data collected from lakes within the area modelled by HESL in fall, 2025 (summarized in Section 4.4.3, below).

4.4.2 OVERVIEW OF APPROACH

Changes in surface-water methylmercury concentrations downstream of the project were predicted based on changes in methylmercury in both sediment porewater (Figure 4-1) and deep-water (hypolimnetic) anoxic zones due to increased sulphate loading from treated Project effluent.

The quantification of sulphate loading was based on conventional mass-balance modelling. The influx of sulphate into the sediment porewater and efflux of methylmercury out of the porewater were estimated based on Fick's First Law (i.e., concentration gradients).

There is no standard approach for estimating changes in methylmercury concentrations due to changes in sulphate loading in freshwater environments. The conditions in each aquatic system vary, as does the information available to define the sulphate - methylmercury relationship in each system. An empirical sulphate loading - methylmercury relationship for the Project was derived from several research studies completed in similar environments (i.e., northern / temperate softwater aquatic systems with high concentrations of dissolved organic carbon); site-specific data collected from the area downstream of the project informed factors that effect methylmercury stimulation by sulphate and transmission of methylmercury from source environments to overlying water. Stimulation of methylmercury production in deep (hypolimnetic) anoxic waters was estimated based on sulphate-methylmercury stoichiometry and empirically determined changes in methylmercury concentration in the hypolimnion of one of the lakes within the modelled area.

The fundamental assumption upon which the modelling is predicated, is that sulphate availability limits methylmercury production in the Chukuni–English River system, as opposed to limitation by organic

carbon supply, inorganic mercury availability or other limiting factors. Such factors are conservatively assumed to be non-limiting by the predictive model, such that methylmercury stimulation by sulphate is unconstrained. The model estimates increases in methylmercury due to sulphate enrichment under the (theoretical) condition of sulphate limitation; at present, the actual extent to which sulphate availability limits methylmercury production in the Chukuni-English River system is unknown. The model components are identified in Table 4-2; each component is discussed in its respective subsection below.

4.4.3 MODELLED AREA DATA COLLECTION – SEPTEMBER, 2025

4.4.3.1 INTRODUCTION

The modelled area downstream program (the downstream program) was completed by HESL to collect key information on surface water, sediment and porewater in seven lakes downstream of the Project, that represent limnological conditions between the Project effluent discharge point and Indian Lake. Sampling locations are illustrated on Figure 4-2. The data provide site-specific inputs to numerical models that will predict the possible effects of sulphate in Project effluent on methylmercury stimulation in sediment porewater and egress of the methylmercury to surface water. The data supplement existing information collected by WSP.

4.4.3.2 SCOPE OF WORK

The downstream program collected data from a subset of seven (7) lakes of the model nodes. The selected lakes were set at regular intervals from the Project to provide representative spatial coverage of the downstream aquatic features, and included large and small lakes. Lakes upstream and downstream of the confluences of the English and Wabigoon Rivers were sampled to measure water quality differences from the rivers' inflows. The following lakes were sampled:

- Pakwash Lake
- Camping Lake
- Wegg Lake
- Oak Lake
- Maynard Lake
- Ball Lake
- Indian Lake.

Surface water, sediment and sediment porewater were sampled from each lake. Where lakes were stratified or had a strong vertical dissolved oxygen gradient, surface water was sampled from each of the epilimnetic and hypolimnetic waters.

Sediment and porewater samples were collected from sediment that would typically occur in the epilminetic and hypolimnetic zones to measure physical conditions and chemistry that effect the methylating bacteria community, including sulphate influx to sediment and methylmercury efflux to surface water. While the HESL predictive model conservatively assumes that all factors needed to facilitate mercury methylation in sediment are present (e.g., anoxia, non-limiting organic carbon, non-limiting inorganic mercury), these elements and environmental co-factors were measured to describe sediment and porewater conditions for comparison with literature studies, establish baseline pre-development data points and inform model inputs.

4.4.3.3 METHODS

Access and Logistics

The sampling was completed from September 21 to 26, 2025, and occurred when the lakes had recently undergone fall overturn, or immediately before fall overturn occurred (in the case of Maynard Lake). The lakes were accessed via float plane. Once on the lake, sampling was completed from a 12 ft (3.7 m) long

aluminum boat. The boat was anchored at the sampling site, and all in-water or in-water sediment work was conducted from the up-wind side of the boat to avoid sample contamination by the boat or field staff.

Sample Naming Convention

For transparency and ease of interpreting results, the sample naming convention was:

- E.g., 02-25-01-SW-HYP:
  - 02 – lake number
  - 25 – sampling year
  - 01 – deep (Hypolimnetic) location; or 02 – shallow (Epilimnetic) location
  - SW – what matrix was sampled (SW = surface water, SED = sediment, PW = porewater)
  - HYP – what portion of water column or sediment core the sample was from:
    - For SW either HYP = hypolimnion or EPI = epilimnion
    - For SED and PW either UPP = biologically active layer or LOW = legacy layer

Surface Water Sampling

In each lake, the following measurements and sampling were completed:

Temperature and dissolved oxygen profile:

- 1 m depth intervals.
- Measure: water temperature, dissolved oxygen (%, mg/L), conductivity (SPC, C), pH, oxidation-reduction potential (ORP).
  - All measurements were made using a [Draft note: YSI model], calibrated daily per the manufacturer's specifications.
- Secchi depth measurement.

Water was sampled from the epilimnion (if present) at 2 x Secchi depth, using weighted bottle. If present, a discrete water sample was also collected from the hypolimnion using Kemmerer sampler at 1 m off of the bottom.

The surface water, sediment and porewater samples were allocated to laboratory-supplied bottles for analysis of the following parameters, by the methods and laboratories shown in Table 4-3. Table 4-4 and Table 4-5, respectively.

Sediment Sampling

Epilimnetic sediment samples were collected from relatively shallow waters that were 2 to 3 m deep. Samples were collected from locations where the softest and most fine-grained sediment occurred (including the highest organic content). These represented the deepest biologically active layers, and sites were mercury methylation was likely to be most pronounced. Sediment was sampled using a direct push, stainless steel sediment corer, with clear, LDPE liners and core-catcher inserts. The corer was handled and samples were recovered to extract sediment in its *ex-situ* but intact form.

A geotechnical characterization and log of the recovered sediment was completed to record structure information that informed surface water – porewater flux modelling. The upper biologically active sediment layer was identified and measured, based on sediment structure and organisms (if present).

The core sample was extruded to displace all recovered surface water, debris and periphyton such that only sediment and porewater remained. The biologically active layer of the core was removed section-wise to retain structure and porewater. The next layer down was extracted the same way, to provide a reference of deeper sediment conditions. Each layer was kept separately. Several cores were extracted in a 5 to 10 m radius around each sample centroid to collect enough sediment from each layer to provide a sufficient porewater volume for laboratory analyses.

Porewater Sampling

Porewater was sampled from hypolimnetic and epilimnion sediment, at each location, by gently agitating the collected sampled vigorously until pore water rose to the surface of the sediment for collection by syringe. The method liberated readily available porewater from the sediment interstitial spaces, and the recovered porewater was a proxy for the porewater that can freely exchange with overlying surface water (in the case of biologically active sediment) or between sediment layers (in the case of legacy and biologically active.

4.4.3.4 RESULTS

Surface Water Quality

The threshold used for determining if lakes were stratified was if there was a temperature change of 1^{o}C or more over 1 m. Only Maynard Lake met these criteria with deep water anoxia at around 14 m deep. Dissolved oxygen and temperature profiles are presented in Figure 4-3.

The surface water data are presented in Table 4-6 which were collected at the end of the summer 2025, thermally stratified period. The profiles indicated that all lakes except Maynard had undergone vertical mixing (fall overturn), and that thermal stratification occured below 14 m during the summer months. The summary statistics for the key water quality parameters related to methyl mercury prediction, are provided below. The data indicate that mercury in the downstream lakes (total and methylmercury), dissolved organic carbon and sulphate, were low and within the ranges measured by WSP in the Pakwash Lake area. Hypolimnetic waters were slightly enriched with all methylmercury-related parameters, expect sulphate which was lower, as would be expected for anoxic bottom waters in close contact with sediment and where suspended solids had settled and accumulated during summer stratification.

Sediment Physical Characteristics

The biologically active layer of sediment in all lakes was thin, 0.01 to 0.05 m deep, except in Oak Lake where it was 0.13 m deep in one location and Indian Lake where it was 0.24 m deep in one location. Biologically active sediment was consistently silt or clay based, with minor amounts of organic matter (i.e., < 20% to < 5% by volume, visually).

Commonly, at water depths less than 5 m, the sediment was sand-sized or coarser, or bare bedrock was present. In these conditions, mercury methylation potential is limited due to the low presence of organic matter, exchange of oxygenated surface water in large void spaces between sediment grains, and substrate that has poor suitability for methylating bacteria community development.

Sediment Quality

The summary statistics for the key sediment quality parameters related to methylmercury prediction, are provided below (Table 4-7). The data indicate that the upper, biologically active layer of sediment (which varied in depth by location and lake) was slightly enriched with total and methylmercury, as well as sulphate, compared to the underlying sediment. Organic carbon was slightly enriched in lower, legacy sediment, indicating that the sediment in the lakes acts as a sink for organic carbon over time.

Porewater Quality

The summary statistics for the key porewater quality parameters related to methyl mercury prediction, are provided below (Table 4-8). The data indicate that in the fall of 2025, porewater was more enriched with methylmercury than epilimnetic surface water and a net gradient of methylmercury from porewater into the lake was occurring; the opposite was true in hypolimnetic water, where methylmercury was higher in surface water and net gradient into sediment was occurring. Sulphate was higher in porewater than epilimnetic and hypolimnetic waters, indicating no net gradient of sulphate into porewater. This is an important dynamic to identify, because it indicates that during some of the year no additional sulphate from surface water migrates to porewater and sulphate-related methylmercury stimulation occurs based on the sulphate sink in sediment, rather than from surface water inputs.

4.4.4 MODEL METHODS

4.4.4.1 SPATIAL COMPONENT

The modelling was completed for a linear sequence of 20 waterbodies and watercourses (hereafter referred to collectively as waterbodies), beginning with the Chukuni River immediately downstream of the proposed project outfall location (upstream of Pakwash Lake) and ending with the reach of the English River upstream of Little Fox Lake and downstream of Grassy Narrows Lake(Figure 4-4; Table 4-9). Grassy Narrows Lake was not included as one of the modelled waterbodies because it flows into (i.e., is upstream of) the terminal section of the English River within the modelled area (MNR 2025; Figure 4-5).

The model waterbodies generally correspond to distinct waterbodies / watercourses defined by the Ontario Hydrographic Network (Ontario GeoHub; MNRF 2025), with these exceptions:

- Very small (<50 ha) reaches of the English River were combined with adjacent waterbodies
- Ball Lake was divided into Upper Ball Lake and Lower Ball Lake due to the inflow of the Wabigoon River into the lower portion of Ball Lake and resulting distinct water quality up and downstream of the confluence with the Wabigoon River.

Within each waterbody, porewater methylmercury efflux was estimated for the entire lake / sediment surface for the period from October to July and for areas shallower than 15 m during August and September. Hypolimnetic methylmercury production was additionally estimated for the deep (≥15 m) areas of each waterbody during August and September, to reflect lake overturn conditions indicated by the downstream program. Bathymetric data were obtained from Ontario GeoHub (LIO 2025).

4.4.4.2 HYDROLOGY

The drainage area upstream of the outlet of each waterbody (Table 4-10) was calculated using the Ontario Watershed Information Tool (OWIT; MNR 2025). Annual average ambient flow rates (Q-Bkg(i)) were estimated for each waterbody based on areal prorating. The annual average flows for the Chukuni River and English River at Manitou Falls were calculated based on long-term data from the Water Survey of Canada (1994–2023) and Lake of the Woods Control Board (1991–2020), respectively (Table 4-10).

The flow-area ratio (runoff) at the Chukuni River gauge (0.23 m/y) was used to estimate flows upstream of the confluence with the English River; the English River at Manitou Falls flow-area ratio (0.26 m/y) was used to estimate flows downstream of the confluence. While seasonal variation in flow has differed markedly between the two locations (Figure 4-5 and Figure 4-6), presumably due largely to the dams on the English River, the annual-average flows of the two watercourses (i.e., the flow statistics used for the modelling) have been strongly correlated among years (Figure 4-7), and the flow-vs-drainage-area ratios are comparable to those at other regional gauges (Table 4-10; Figure 4-8). Annual-average flow rates were used for the model because appreciable bioaccumulative change in fish-tissue methylmercury occurs over a timescale of years (i.e., is not a short-term process).

4.4.4.3 SEPTEMBER 2025 FIELD PROGRAM

Overview of Sept 2025 Sampling

As of mid-2025, water quality and sediment data availability for the English River between Manitou Falls and ANA (i.e., waterbodies 4 to 20 in Figure 4-4) was limited (e.g., a small amount of data collected by the Ministry of Environment, Conservation and Parks in Ball Lake). The fall 2025 field program improved characterization of the model waterbodies and augmented the input dataset for the sulphate-methylmercury model.

During September 21–26, 2025, HESL assessed 7 waterbodies as a representative sub-set of the 20 model water features: Pakwash Lake, Camping Lake, Wegg Lake, Oak Lake, Maynard Lake, Ball Lake, and Indian Lake (Figure 4-2). Samples were collected from the surface mixed layer of water (from 2 x Secchi depth) and, where applicable, from 1 m above the lakebed to characterize the hypolimnion. A

sonde was used to profile vertical variation in water temperature, pH, dissolved oxygen, and conductivity at 1 m intervals throughout the water column.

Relevant to this model, samples of sectioned sediment cores and porewater extruded from the cores, were collected from the upper (biologically active) layer of sediment. Surface water, porewater, and sediment samples were shipped to ALS Environmental in Winnipeg for analysis of standard water-quality and sediment-composition parameters. Low-level mercury (including methylmercury) analysis was completed by Flett Research Ltd. in Winnipeg.

Model Inputs from Sep 2025 Dataset

The model inputs derived from the September 2025 dataset included sediment porosity and water-column and porewater concentrations of sulphate and methylmercury. Water-column concentrations of sulphate and methylmercury in the unassessed waterbodies were estimated by linear interpolation between measured data. Porewater concentrations in most waterbodies did not exhibit the expected relationship with water-column concentrations: porewater sulphate was often higher than it was in the water column and porewater methylmercury was often lower than it was in the water column. These gradients may reflect the seasonal timing of the sampling (i.e., around the typical time of water-column destratification known as fall turnover); cool water and strong winds are correlated with turbulence at the sediment-water interface due to wind-driven mixing of the water column. The gradients indicated that no methylmercury may egress from sediment to surface water during some parts of the year. The data do not yet have the resolution to quantify which p portions of the year that no methylmercury egress to surface water occurs, and it was conservatively assumed that methylmercury gradients into surface water occurred year-round.

To provide representative baseline water-porewater concentration gradients for model inputs year-round (Table 4-11), the porewater concentrations were estimated based on surface-water concentrations from all waterbodies and the porewater:water concentration ratios observed in Pakwash Lake for sulphate (93%) and methylmercury (348%).

Water-column Sulphate Concentrations

The final water-column sulphate concentration of each waterbody (baseline + effluent) was calculated as the quotient of the total sulphate load to that waterbody and the total flow through that waterbody as

$$[SO_4]_{(i)} = L\text{-}SO_{4(i)} \div Q_{(i)} \quad (1)$$

where

(i) is the waterbody (i.e., one of the 20 model compartments)

$[SO_4]_{(i)}$ is the water-column concentration of SO_4 in the i^{th} waterbody (mg/L = g/m^3)

$L\text{-}SO_{4(i)}$ is the total (project + baseline) loading of SO_4 to the i^{th} waterbody (g/d)

$Q_{(i)}$ is the total flow (discharge) through the i^{th} waterbody (m^3/d)

4.4.4.4 SULPHATE LOADING IN SURFACE WATER

The total sulphate load to each waterbody (g/d) is the sum of the baseline loading ($L\text{-}SO_4\text{-}BSL_{(i)}$) and net (residual) effluent load exported from the upstream waterbody ($L\text{-}SO_4\text{-}Eff_{(i)}$).

$$L\text{-}SO_{4(i)} = L\text{-}SO_4\text{-}BSL_{(i)} + L\text{-}SO_4\text{-}Eff_{(i)} \quad (2)$$

where the baseline loading is the product of the baseline concentration ($[SO_4\text{-}BSL]$) and flow (Q-BSL).

$$L\text{-}SO_4\text{-}BSL_{(i)} = [SO_4\text{-}BSL]_{(i)} \times Q\text{-}BSL_{(i)}$$

Values of $[SO_4\text{-}BSL_{(i)}]$, which ranged from 1.34–3.61 mg/L, were derived from data collected in Sep 2025 by the HESL field program.

The net effluent loading is the upstream net effluent load minus that lost to the sediments within the upstream waterbody.

$$L\text{-}SO_4\text{-}Eff_{(i)} = L\text{-}SO_4\text{-}Eff_{(i-1)} - F\text{-}SO_4\text{-}Eff_{(i-1)} \quad (3)$$

The initial (i = 1; Chukuni River upstream of Pakwash Lake) effluent sulphate load is the product of the end-of-pipe effluent concentration ([SO_4-Eff]) and the effluent discharge rate (Q-Eff).

$$L\text{-}SO_4\text{-}Eff_{(1)} = [SO_4\text{-}Eff] \times Q\text{-}Eff \quad (4)$$

Four effluent-discharge scenarios for the operations and active closure phases of the Project were modelled based on information provided to HESL by WSP (Table 4-12).

4.4.4.5 SULPHATE FLUX TO SEDIMENTS

Fluxes were modelled based on Fick's 1st Law using equations found in Delongchamp et al. (2009). The areal flux ($g/m^2/d$) of sulphate from the water column to sediment porewater in each waterbody was calculated as

$$F = (\Phi \times D_W \div \theta^2) \times (\Delta SO_4 \div \Delta x) \quad (6)$$

where

Φ is sediment porosity (dimensionless)

D_W is the diffusion coefficient of SO_4 in water (m^2/s)

θ is the sediment tortuosity (dimensionless)

ΔSO_4 is the change in SO_4 concentration over Δx ($mg/L = g/m^3$)

Δx is the change in depth within the surficial sediments

Following Delongchamp et al. (2009), tortuosity was estimated from porosity as

$$\theta = 1 - \ln(\Phi^2) \quad (7)$$

A diffusion coefficient of 3.13×10^{-9} m^2/s (= 3.13×10^{-5} cm^2/s) was used. This value is the average of those reported for five lakes with comparable sediment porosity to the model waterbodies, after correction for porosity and tortuosity (see Table 4-13 of Rudd et al. 1986).

The change in sulphate concentration between the sediment-water interface and depth of Δx in the sediment under baseline conditions was calculated as

$$\Delta SO_4\text{-}BSL = [SO_4\text{-}BSL]_{(i)} - [SO_4\text{-}BSL\text{-}porewater]_{(i)} \quad (8)$$

where $[SO_4\text{-}BSL]_{(i)}$ represents the baseline water-column sulphate concentrations (1.34–3.61 mg/L; Section 4.4.3.3.2) and the baseline porewater sulphate concentrations ($[SO_4\text{-}BSL\text{-}porewater]_{(i)}$) ranged from 1.24–3.35 mg/L.

The change in depth within the surficial sediments (Δx) was set to half the length of sediment cores extracted during the September 2025 field program; core depth was intended to correspond to the biologically active layer of the sediment and ranged from 10–16 cm among waterbodies (Table 4-11), yielding Δx values of 5–8 cm.

The total sulphate influx to sediment in each waterbody ($F\text{-}SO_{4(i)}$) was calculated based on the total sulphate concentration of each waterbody ($[SO_4]_{(i)}$); i.e., in the presence of effluent discharge, based on the concentration gradient in the presence of the additional sulphate loading.

$$\Delta SO_4 = [SO_4]_{(i)} - [SO_4\text{-}BSL\text{-}porewater]_{(i)} \quad (9)$$

The baseline porewater-sulphate concentration was used to calculate the flux in the presence of the total sulphate concentration (BSL + Effluent) based on the assumption that the increases in porewater-sulphate due to increased influx are transient (i.e., elevated porewater sulphate concentrations return to initial concentrations when the sulphate is reduced by SRB).

4.4.4.6 STIMULATION OF MERCURY METHYLATION BY SRB

The change in porewater methylmercury concentrations in each waterbody were estimated based on reported empirical relationships between changes in sulphate loading and porewater methylmercury concentrations (4-13). Many available studies on this topic were not included, because sulphate loads

relative to natural (baseline) loading were not considered (e.g., Harmon et al. 2004) and others reported sulphate concentrations but not loading (e.g., Gilmour et al. 1992). When only considering the field (mesocosm) studies that did quantify increases in porewater methylmercury as a function of augmented sulphate loading (relative to natural loading), the data available to establish an empirical relationship are from varying temporal scales (days to years), various geographic locations, various depths in sediment, and were collected using variable methods. These studies are, however, to our knowledge, the most recent and specific studies in softwater systems for establishing an empirical relationship between increased sulphate loading and mercury methylation.

The data considered most representative of the potential effect of sulphate on methylmercury were extracted from the text or figures of the paper for the study. In extracting data from figures, data from multiple sediment depths and replicates were first averaged, and the highest methylmercury concentrations in reported timeseries were then extracted, per a conservative approach. The median ratio of 0.65 (increase in sulphate load relative to increase in methylmercury concentration) of the available (relevant) data was used to estimate the change in sediment porewater methylmercury concentration (Table 4-13).

With the exception of the laboratory study of Branfireun (2024), based on samples from the Wabigoon River watershed, the available studies were conducted in peatlands not lakes. We are not aware of any studies conducted in Canadian lakes, in lakes of the northern United States or other comparable areas, that have quantified the relationship between change in sulphate loading and porewater methylmercury concentration. The model does not assume that sulphate or methylmercury concentrations or Hg-methylation rates in the study area are equal to those in peatlands; rather, the model assumes that the stoichiometry — i.e., the proportional change in methylmercury in response to increased sulphate — is comparable to or less than that reported for peatlands, when changes are expressed relative to baseline levels.

4.4.4.7 CHANGE IN POREWATER-METHYLMERCURY CONCENTRATIONS

The changes in porewater-methylmercury were predicted from changes in sulphate influx to porewater (i.e., sulphate loading to sediment) as

$$\text{increase-[MeHg-pw]}_{(i)} = \text{increase-F-SO}_{4(i)} \times 0.65 \times \text{TCF} \quad (10)$$

where 0.65 is the median ratio between reported changes in sulphate loading and porewater-methylmercury (Table 4-14), TCF is a temperature-correction factor (see), and

$$\text{increase-F-SO}_{4(i)} = (\text{F-SO}_{4(i)} - \text{F-SO}_4\text{-BSL}) \div \text{F-SO}_4\text{-BSL} \quad (11)$$

4.4.4.7.1 TEMPERATURE CORRECTION FACTOR

The effect of temperature on the relationship between sulphate loading and methylmercury generation was accounted for by assuming a direct relationship between the sulphate-reduction rate and methylmercury generation (i.e., change in porewater methylmercury concentration or hypolimnetic methylmercury production rate). The effect of temperature on the sulphate-reduction rate was modelled based on data presented by Robador et al. (2016) for a hypothetical mixture of sulphate-reducing microorganisms with activation energy (Ea) of 70 kJ/mol (data for up to 100% of maximum reduction rate, from their Figure 1b; reproduced below as Figure 4-9).

The temperature of porewater was reported in two of the five sulphate-methylmercury studies used to establish the sulphate-load–[methylmercury] relationship. Jeremiason et al. (2006) reported a porewater temperature of 4.5°C associated with their May results. Mitchell et al. (2008) reported average porewater temperatures of 19.8°C and 15.2°C at depths of 5 cm and 15 cm, respectively, and an average air temperature of 15°C. The average air temperature was comparable (14°C) during the September 1997 experiment of Branfireun et al. (1999), based on historical Environment Canada data for Rawson Lake (Climate ID 6036904). Branfireun et al. (2001) did not report temperatures or the dates of their experiments but noted that treatments were applied during the snow-free period and that methylmercury samples were taken 5 weeks after the last sulphate addition. Branfireun (2024) data were obtained from laboratory incubations suggesting that the temperature was likely room temperature, approximately 21°C.

Based on the available data, it was conservatively estimated that the average porewater temperature for the sulphate-methylmercury studies was 15°C.

In order to adjust the sulphate-methylmercury stoichiometry observed at ~15°C (Table 4-14 for the different sulphate-reduction rates (SRRs) expected in Hg-methylation zones within the receiving environment, the relative SRR (i.e., as percent of maximum) was calculated for specific temperatures (T) based on the relationship presented by Robador et al. (2016)

$$SRR_T = 0.065 \times temp^2 + 2.6313 \times T + 12.702 \quad (12)$$

The temperature correction factor (TCF) was then calculated as the ratio of the SRR at temperature T to the SRR at 15°C

$$TCF = SRR_T \div SRR_{15°C} \quad (13)$$

Porewater temperature data from the modelled area are not available. Therefore, porewater temperatures of 5°C and 25°C were assumed for the October to July and August to September periods, respectively, based on expected spatial and temporal variation in water temperature at the sediment-water interface in northern lakes. A temperature of 15°C was assumed for the hypolimnetic environments based on a thermal profile collected by HESL in September 2025 from Maynard Lake (Figure 4-10); this lake was stratified at the time of sampling, had elevated hypolimnetic methylmercury, and was used to estimate the baseline hypolimnetic methylmercury production rate.

For porewater in October to July, the cool water implies a TCF < 1 (41%) whereas for the late-summer period the warm water implies a TCF > 1 (119%; Table 4-14).

4.4.4.8 METHYLMERCURY EFFLUX TO WATER COLUMN

The areal methylmercury efflux from sediment porewater ($g/m^2/d$) was estimated in the same fashion as sulphate influx into porewater, using a diffusion coefficient for methylmercury in water of 1.3×10^{-9} m^2/s ($= 1.3 \times 10^{-5}$ cm^2/s) after Delongchamp et al. (2009).

The baseline methylmercury efflux was calculated using dissolved methylmercury concentrations based on data collected by HESL in Sep 2025. The baseline water-column methylmercury concentrations (excluding hypolimnetic data) ranged from 0.017–0.055 mg-Hg/L and the baseline porewater d- methylmercury concentrations used for modelling ranged from 0.059–0.191 mg-Hg/L ().

Lake-wide methylmercury effluxes were calculated based on lake areas and both baseline porewater- methylmercury concentrations (F-MeHg-BSL(i)) and total porewater-methylmercury concentrations ($F\text{-}MeHg_{(i)}$; i.e., in the presence of effluent sulphate).

4.4.4.9 HYPOLIMNETIC METHYLMERCURY PRODUCTION

In addition to Hg methylation in sediment porewater, the model accounts for Hg methylation in anoxic hypolimnetic waters under certain conditions (i.e., in deep areas in late summer). The baseline areal hypolimnetic methylmercury production rate was estimated based on data collected from Maynard Lake in Sep 2025. Maynard Lake was the only lake sampled that was stratified (Figure 4-10) with an anoxic hypolimnion; methylmercury was elevated in water collected from immediately above the lakebed and most of the Hg was present as methylmercury (Table 4-15).

The baseline areal hypolimnetic methylmercury production rate ($\mu g/m^2/d$) was estimated based on the anoxic hypolimnetic volume (below 15 m; Figure 4-11) and the estimated change in hypolimnetic methylmercury concentration in Maynard Lake in 2025 as

$$Hypo\text{-}MeHg\text{-}L\text{-}BSL = \Delta MeHg \div A_{Hypo} \div t \quad (14)$$

where

$\Delta MeHg$ is the change in mass of MeHg (µg) in the anoxic hypolimnion

A_{Hypo} is the area of the lake where water-column depth is 15 m or deeper (assumed to correspond to the anoxic portion of the hypolimnion based on Figure 4-11)

t is time = 54 days; based on the expectation of hypolimnetic anoxia beginning on August 1

and

$$\Delta MeHg = ([MeHg]_{T2} - [MeHg]_{T1}) \times Vol\text{-}Hypo \quad (15)$$

where

$[MeHg]_{T1}$ is the estimated hypolimnetic methylmercury concentration prior to anoxia (0.038 µg-Hg/m^3; this was the epilimnetic concentration on 24 Sep 2025)

$[MeHg]_{T2}$ is the hypolimnetic methylmercury concentration on 24 Sep 2025 (1.3 µg-Hg/m^3)

Vol-Hypo is the volume of the anoxic hypolimnion below 15 m depth (9,784,334 m^3); calculated in QGIS based on bathymetric data obtained from Ontario GeoHub (LIO 2025)

The areal hypolimnetic methylmercury production rate of 0.0521 µg/m^2/d estimated from Maynard Lake data was then used to estimate hypolimnetic methylmercury production in all lakes with areas deeper than 15 m for the August to September period based on lake-specific bathymetry (Table 4-16). For lakes without bathymetric data the median of 5.4% of area below 15 m was assumed. Hypolimnetic methylmercury production was not modelled for small, riverine waterbodies (i.e., the Chukuni River and short reaches of the English River; 1,3,8,10,12,14).

4.4.4.10 TOTAL METHYLMERCURY LOADING

The increase in methylmercury loading (g/d) for each waterbody was calculated as the sum of the increase in porewater efflux of methylmercury and the increase in hypolimnetic methylmercury production.

$$Inc\text{-}L\text{-}MeHg_{(i)} = (F\text{-}MeHg_{(i)} - F\text{-}MeHg\text{-}BSL_{(i)}) + (Hypo\text{-}MeHg\text{-}L_{(i)} - Hypo\text{-}MeHg\text{-}L\text{-}BSL_{(i)}) \quad (16)$$

4.4.4.11 WATER-COLUMN METHYLMERCURY CONCENTRATIONS

The predicted increase in water-column methylmercury concentration (i.e., additional to the baseline methylmercury concentration) of each waterbody ($[MeHg\text{-}Inc]_{(i)}$) due to Project sulphate loading was calculated based on the increase in the total methylmercury loading within the waterbody and the upstream contribution as

$$[MeHg\text{-}Inc]_{(i)} = (Inc\text{-}L\text{-}MeHg_{(i)} + Inc\text{-}L\text{-}MeHg_{(i-1)}) \div Q_{(i)} \quad (17)$$

4.4.5 RESULTS

The predicted increases in water-column methylmercury concentration were from 1.4×10^{-7} ng-Hg/L to 2.1×10^{-3} ng-Hg/L, depending on the waterbody and model scenario (Table 4-17; Figure 4-4).

The predicted methylmercury concentrations in surface water are intended to and will be used as input information for bioaccumulation predictions (by bioaccumulation factor – BAF – scaling) presented in Section 5. The results from this sulphate-methylmercury Water-quality model are to be considered in conjunction with the BAF modelling (Section 5) and subsequent human-health risk predictions (Section 6).

Table 4-1: Predicted Surface Water Mercury Concentrations Based on Effluent Emissions to Chukuni River and Pakwash Lake Used in the Mercury Study to Predict Exposures

Assessment Case	Predicted SW Concentrations [ng/L]		
	Chukuni R. (outfall to Pakwash Lake) - CHK_1	Pakwash Lake - PAK_L	Chukuni R. (Pakwash to English R.) - PAK_O
Model Baseline Methylmercury (1)	0.054	0.053	0.050
Project-only Methylmercury	0.000018	0.0021	0.00010
Baseline + Project-only Methylmercury	0.054	0.056	0.050
Calculated Increase [%] Methylmercury	0.034%	3.9%	0.19%
Model Baseline Inorganic Mercury (2)	1.3	1.3	1.2
Project-only Inorganic Mercury	0.16	0.076	0.10
Baseline + Project-only Inorganic Mercury	1.5	1.4	1.3
Calculated Increase [%] Inorganic Mercury	12%	5.8%	8.5%

Notes:

1 Baseline methylmercury concentrations used for the HHRA were derived by taking 4.1% (average percent methylmercury of total mercury for the Chukuni River) of the 95th percentile model baseline mercury concentrations from the receiver water quality model (WSP 2025b).

2 95th percentile model baseline mercury concentration (WSP 2025b).

Table 4-2: Overview of Model Structure

Sub-model	Relevance
Hydrology	Estimated flows (discharge rates) of each waterbody were used to calculate sulphate and methylmercury loading / fluxes and concentrations.
Sulphate Loading	Increases in porewater methylmercury concentration and hypolimnetic methylmercury production were based on the predicted increase in sulphate loading (due to project activities under four scenarios) relative to the pre-Project (baseline) loading.
Sulphate Influx to Sediment	The flux of sulphate to sediment was estimated based on the sulphate concentration gradient between the overlying water column and sediment porewater.
Sulphate Loading versus Methylmercury	Changes in methylmercury due to project activities are based on sulphate loading above the baseline. The sulphate-methylmercury relationship is based on empirical data from several published studies that are judged to be relevant to the project setting (Branfireun et al. 1999; Branfireun et al. 2001; Jeremiason et al. 2006; Mitchell et al. 2008; Branfireun 2024; hereafter, the sulphate-methylmercury studies).
Temperature - dependence of Sulphate Reduction	The sulphate–methylmercury relationship (above) was adjusted based on the difference between the estimated water temperature downstream of the project area and the porewater temperatures of the sulphate-methylmercury studies; this adjustment was based on a published relationship between temperature and sulphate-reduction rate.
Methylmercury Efflux from Sediment	The fluxes of methylmercury from sediments were estimated based on the concentration gradients between the sediment porewater and overlying water column. The predicted increases in water-column methylmercury concentrations due to increased sulphate loading were based on the increases in methylmercury efflux within each waterbody.
Hypolimnetic Methylmercury Production	Data collected from Maynard Lake in September 2025 were consistent with methylmercury production within the water column (i.e., in addition to that in porewater). This is known to occur within the bottom layer (hypolimnion) of lakes when devoid of oxygen (anoxic) during late summer lake stratification. Hypolimnetic methylmercury production was included in the model during Aug–Sep in deep areas (>15 m) and predicted to increase with sulphate loading per the sulphate-methylmercury relationship used for porewater.

Table 4-3: Downstream Program Surface Water Quality Analyses and Laboratories

FLETT RESEARCH

Analyte	Bottle	Method	Min. Sample
Total mercury (low level)	125 mL glass	Bulk	100 mL
Total mercury (low level, dissolved)	125 mL glass	Field filter 0.45 um - triple rinse syringe	100 mL
Methyl mercury (low level)	250 mL PETG	Bulk Bottle 2/3 full	220 mL
Methyl mercury (low level, dissolved)	250 mL PETG	Field filter 0.45 um - triple rinse syringe Bottle 2/3 full	220 mL

Note: Flett clean-hands dirty-hands protocol was used for all sampling.

ALS ENVIRONMENTAL

Analyte	Method
Dissolved sulphide	Field filter 0.45 um
Dissolved organic carbon (DOC)	Field filter 0.45 um
Dissolved metals	Field filter 0.45 um
Total organic carbon (TOC)	Bulk
Total metals	Bulk
Major ions, general chemistry	Bulk

Table 4-4: Sediment Quality Analyses and Laboratories

FLETT RESEARCH

Analyte	Jar	Method	Min. Sample
Total mercury (low level)	Zip lock bag (double)	¼ cup of sediment	60 g
Methylmercury (low level)	Zip lock bag (double)	¼ cup of sediment	60 g

Note: Flett clean-hands dirty-hands protocol was used for all sampling.

ALS ENVIRONMENTAL

Analyte	Method
Sulphide	Bulk
Metals	Bulk
Total organic carbon (TOC)	Bulk
Major ions, general chemistry	Bulk
Bulk density, % moisture, calc. porosity	Bulk

Table 4-5: Porewater Quality Analyses and Analytical Laboratories

FLETT RESEARCH

Analyte	Bottle	Method	Min. Sample
Methyl mercury (low level, dissolved)	250 mL PETG	Field filter 0.45 um - triple rinse syringe	30 mL
Total mercury (low level, dissolved)	125 mL glass	Field filter 0.45 um - triple rinse syringe Bottle 2/3 full	30 mL

ALS ENVIRONMENTAL

Analyte	Jar	Method	Min. Sample
Dissolved sulphate	250 mL gen chem (combined)	Field filter 0.45 um	5 mL
DOC	100mL nutrient (H_2SO_4)		30 mL
Alkalinity (bicarbonate from major ions), pH	250 mL gen chem (combined)		20 mL
Diss metals	120mL metals (HNO_3)		50 mL
Dissolved sulphide	60mL sulphide (ZNOAc)		15 mL

Table 4-6: Results of Downstream Surface Water Analysis in Fall 2025

Lakes	Medium	Layer	Depth	Parameter	Units	Avg.	Min.	Max.	*n*
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Surface water	Epilimnion	0-4.15 m	Carbon, total organic [TOC]	mg/L	11.3	10.6	12.7	7
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Surface water	Epilimnion	0-4.15 m	Mercury, total	ng/L	0.74	0.56	0.85	7
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Surface water	Epilimnion	0-4.15 m	Methylmercury, total	ng-Hg/L	0.043	0.028	0.068	7
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Surface water	Epilimnion	0-4.15 m	Sulfate (as SO4)	mg/L	2.04	1.33	3.61	7
Oak, Maynard, Indian	Surface water	Hypolimnion	12.6-15.5 m	Carbon, total organic [TOC]	mg/L	11.6	10.8	12.5	3
Oak, Maynard, Indian	Surface water	Hypolimnion	12.6-15.5 m	Mercury, total	ng/L	1.25	0.80	1.68	3
Oak, Maynard, Indian	Surface water	Hypolimnion	12.6-15.5 m	Methylmercury, total	ng-Hg/L	0.464	0.027	1.300	3
Oak, Maynard, Indian	Surface water	Hypolimnion	12.6-15.5 m	Sulfate (as SO4)	mg/L	1.69	1.34	2.35	3

Table 4-7: Results of Downstream Sediment Analysis in Fall 2025

Lakes	Medium	Layer	Depth	Parameter	Units	Avg.	Min.	Max.	*n*
Pakwash, Wegg, Oak, Maynard, Ball, Indian	Sediment	Upper	0-15 cm	Carbon, total organic [TOC]	%	1.6	0.3	2.8	8
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Sediment	Upper	0-15 cm	Mercury, total	ng/g	65.3	3.7	208.0	9
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Sediment	Upper	0-15 cm	Methylmercury, total	ng-Hg/g	0.241	<0.15	0.570	9
Pakwash, Wegg, Oak, Maynard, Ball, Indian	Sediment	Upper	0-15 cm	Sulfate, soluble ion content	µg/g	17.0	<20	36.0	8
Pakwash, Wegg, Oak, Maynard, Ball, Indian	Sediment	Lower	2-37 cm	Carbon, total organic [TOC]	%	1.8	1.0	2.7	7
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Sediment	Lower	2-37 cm	Mercury, total	ng/g	38.3	21.6	69.0	8
Pakwash, Camping, Wegg, Oak, Maynard, Ball, Indian	Sediment	Lower	2-37 cm	Methylmercury, total	ng-Hg/g	0.099	<0.15	0.270	8
Pakwash, Wegg, Oak, Maynard, Ball, Indian	Sediment	Lower	2-37 cm	Sulfate, soluble ion content	µg/g	15.6	<20	38.0	7

Table 4-8:Results of Downstream Porewater Analysis in Fall 2025

Lakes	Medium	Layer	Depth	Parameter	Units	Avg.	Min.	Max.	*n*
Pakwash, Wegg, Maynard, Ball, Indian	Porewater	Upper	0-15 cm	Carbon, dissolved organic [DOC]	mg/L	12.5	9.8	16.1	5
Pakwash, Camping, Wegg, Maynard, Ball, Indian	Porewater	Upper	0-15 cm	Mercury, dissolved	ng/L	1.02	0.49	1.67	6
Pakwash, Camping, Wegg, Maynard, Ball, Indian	Porewater	Upper	0-15 cm	Methylmercury, dissolved	ng-Hg/L	0.089	0.017	0.300	6
Pakwash, Wegg, Maynard, Ball, Indian	Porewater	Upper	0-15 cm	Sulfate (as SO4)	mg/L	2.34	1.26	3.35	5

Table 4-9: Model Waterbodies Description

#	Description	Waterbody Area (ha)	Drainage Area (km^2)	Flow (m^3/s)	Ontario Geospatial Feature ID	OGF Official Names
1	Chukuni River (between proposed outfall location and Pakwash Lake)	57.9	4,782	34.1	107130612	Chukuni River
2	Pakwash Lake	8,782.6	8,014	57.1	107130586	Pakwash Lake
3	Chukuni River (downstream of Pakwash)	795.6	8,064	57.5	127694485	Chukuni River
4	Camping Lake	1,141.9	46,887	383.1	127694470	Camping Lake
5	English River reach	424.1	48,649	397.5	127694484	English River
6	Barnston Lake (including reach of English River)	648.3	48,734	398.2	127694547 + 127694486	English River + Barnston Lake
7	Wegg Lake	1,877.4	48,876	399.3	127694548	Wegg Lake
8	English River	131.9	48,879	399.3	127694515	English River
9	Goose Lake	592.7	48,912	399.6	127694502	Goose Lake
10	English River reach	230.8	48,951	399.9	127694511	English River
11	Wilcox Lake	1,120.2	50,139	409.6	127694499	Wilcox Lake
12	English River reach	146.3	50,169	409.9	127694513	English River
13	Oak Lake	4,286.7	50,601	413.4	127694477	Oak Lake
14	English River reach	338.6	50,626	413.6	127694504	English River
15	Maynard Lake (including reach of English River)	3,306.1	50,728	414.4	127694500 + 127694505	Maynard Lake + English River
16	Tide Lake (including reach of English River)	1,452.6	50,774	414.8	127694496 + 127694497	Tide Lake + English River
17	Upper Ball Lake	1,620.2	51,169	418.1	127694482	Ball Lake
18	Lower Ball Lake (including reach of English River)	1,066.2	59,626	487.1	127694482 + 127694480	Ball Lake + English River
19	Indian Lake	1,900.8	59,718	487.9	127151733	Indian Lake
20	English River downstream of Grassy Narrows	2,894.3	60,062	490.7	127151725	English River

Notes:
1 Waterbody areas are from Ontario GeoHub. Drainage areas were estimated using the Ontario Watershed Information Tool (MNR 2025). Flow was estimated by areal prorating (see Section 4).

Table 4-10: Drainage Areas (from OWIT) and Flows for Regional Gauges

ID	Name	Watershed Area (km^2)	Avg. Flow (m^3/s)	Runoff (m/y)	Flow Data Included		
					From	To	Years
05QC006	GOLDEN CREEK NEAR RED LAKE	56	0.5	0.28	2009	2023	15
05QE012	LONG-LEGGED RIVER BELOW LONG-LEGGED LAKE	544	3.6	0.21	1994	2023	30
05QE009	STURGEON RIVER AT OUTLET OF SALVESEN LAKE	1,746	12.2	0.22	1994	2023	30
05QE008	CEDAR RIVER BELOW WABASKANG LAKE	1,623	12.7	0.25	1995	2024	30
04GA003	PASHKOKOGAN RIVER AT OUTLET OF PASHKOKOGAN LAKE	2,246	21.6	0.30	1968	2023	25
05QC007	TROUTLAKE RIVER BELOW WOMAN RIVER	2,290	15.8	0.22	2016	2023	8
05QA004	STURGEON RIVER AT MCDOUGALL MILLS	4,416	41.7	0.30	1994	2023	30
05QC001	**CHUKUNI RIVER NEAR EAR FALLS**	**4,333**	**32.1**	**0.23**	**1995**	**2024**	**30**
04GA002	CAT RIVER BELOW WESLEYAN LAKE	5,390	50.5	0.30	1995	2024	29
05RC001	BERENS RIVER ABOVE BERENS LAKE	5,709	49.0	0.27	1987	2024	30
05QA002	ENGLISH RIVER AT UMFREVILLE	6,127	60.7	0.31	1994	2023	30
05QE007	**ENGLISH RIVER AT MANITOU FALLS**	**48,649**	**397.2 (1)**	**0.26(1)**	**1991**	**2020**	**30**
05QE005	ENGLISH RIVER AT CARIBOU FALLS	64,206	431.7	0.21	1965	1994	30

Notes:
1 English River at Manitou Falls flow data from the Lake of the Woods Control Board; all other flow data from Water Survey of Canada.

Bold text shows gauges used for prorating

Table 4-11: Observed SO_4 and Dissolved MeHg Concentrations Determined in September 2025

#	Waterbody	SO_4 (mg/L)			d-MeHg (ng-Hg/L)			Core depth (cm)	Sediment Porosity (%)
		Water*	Porewater		Water[(1)]	Porewater			
		Obs.	Obs.	Adj.	Obs.	Obs.	Adj.		
1	Chukuni River	3.61	3.35	3.35	0.027	0.094	0.094	12	51.36
2	Pakwash Lake	**3.61**	**3.35**	3.35	**0.027**	**0.094**	0.094	**12**	**51.36**
3	Chukuni River	3.61	3.35	3.35	0.027	0.094	0.094	12	51.36
4	Camping Lake	**1.46**	1.52	1.35	**0.019**	**0.021**	0.066	**10**	**45.71**
5	English River	1.36	1.52	1.26	0.017	0.017	0.059	10	42.31
6	Barnston Lake	1.36	1.52	1.26	0.017	0.017	0.059	10	42.31
7	Wegg Lake	**1.36**	**1.52**	1.26	**0.017**	**0.017**	0.059	**10**	**42.31**
8	English River	1.35	1.39	1.25	0.022	0.017	0.077	10	40.35
9	Goose Lake	1.35	1.39	1.25	0.022	0.017	0.077	10	40.35
10	English River	1.35	1.39	1.25	0.022	0.017	0.077	10	40.35
11	Wilcox Lake	1.35	1.39	1.25	0.022	0.017	0.077	10	40.35
12	English River	1.35	1.39	1.25	0.022	0.017	0.077	10	40.35
13	Oak Lake	**1.34**	1.39	1.24	**0.027**	0.017	0.094	10	**38.39**
14	English River	1.36	1.39	1.26	0.029	0.017	0.099	10	45.65
15	Maynard Lake	**1.45**	**1.26**	1.35	**0.030**	0.017	0.104	**10**	**52.91**
16	Tide Lake	1.45	1.26	1.35	0.030	0.017	0.104	10	52.91
17	Upper Ball L.	1.45	1.26	1.35	0.030	0.017	0.104	10	52.91
18	Lower Ball L.	**2.68**	**3.07**	2.49	**0.044**	**0.032**	0.153	**15**	**52.48**
19	Indian Lake	**2.35**	**2.49**	2.18	**0.055**	**0.071**	0.191	**11**	**51.51**
20	English River	2.35	2.49	2.18	0.055	0.071	0.191	11	51.51
	Model Inputs:	X	-	X	X	-	X	X	X

Notes:
The term water refers to the surface mixed layer (epilimnion) in this table.
Obs.; boldface as well as interpolated values
Obs.; non-boldface and the adjusted porewater values used as input to the model (Adj.) that were estimated based on the porewater:water concentration ratios in Pakwash Lake.

Table 4-12: Effluent-Discharge Scenarios upon which Total Project SO_4 Loading (L-SO_4-$Eff_{(1)}$) was Based

#	Scenario Description	Effluent SO_4 (mg/L)	Effluent Flow (m^3/d)		
			Annual	Aug–Sep	Oct–Jul
1	Operations – WSP Upper Case Scenario	400	31,920	31,920	31,920
2	Operations (GoldSim Avg.) – 2030–2055	250	16,456	23,424	15,062
3	Active Closure (GoldSim Avg.) – 2056–2062	202	5,861	8,593	5,315
4	Active Closure (GoldSim Avg.) – 2060–2062	360	12,445	16,426	11,649

Table 4-13: Studies of Porewater-MeHg Increases Above Baseline (BSL) in Response to Augmented SO_4 Loading

Reference	Location	Date of Experiments	Duration [1]	SO_4 Loading (variable units)		MeHg Concentration (ng-Hg/L)		SO_4 load (/ BSL)	[MeHg] (/ BSL)	Ratio	Avg. Ratio
				BSL	Experiment	BSL	Experiment				
Branfireun et al. 1999	Small headwater peatland in Experimental Lakes Area, ON	Sep 1996	2 days	1.4 kg/ha	28 kg/ha	1.5	3.8	20.0	2.5	0.13	0.96
		Sep 1997	1 day		2.8 kg/ha	0.7	2.5	2.0	3.6	1.79	
Branfireun et al. 2001	Low sedge peatland in northern Sweden	*during the snow-free period*	3 years	9 kg-S/ha/y	30 kg-S/ha/y	0.33	0.61	3.3	1.8	0.55	0.65
					60 kg-S/ha/y		1.62	6.7	4.9	0.74	
Jeremiason et al. 2006	Marcell Experimental Forest, MN	May 2002	2 weeks	8 kg/ha/y	32 kg/ha	0.52	1.63	4.0	3.1	0.78	0.78
Mitchell et al. 2008	Marcell Experimental Forest, MN	Jun 2005	2 days	6.2 kg/ha/y	24.8 kg/ha/y	0.26	1.18	4.0	4.5	1.13	0.71
					62 kg/ha/y	0.26	0.72	10.0	2.8	0.28	
Branfireun 2024 [2]	Wabigoon River at Dryden Mill	Nov–Dec (year unspecified)	9–24 days	0.28 mg	1.4 mg	151	200	5	1.32	0.26	0.19
					4.2 mg		265	15	1.75	0.12	
					1.4 mg	187	236	5	1.26	0.25	
					4.2 mg		347	15	1.86	0.12	
Median:											0.65

Notes:
1 Refers to time elapsed prior to the presented data, not necessarily the duration of the entire experiment.
2 Branfireun (2024) used bottle incubations and reported MeHg in supernatant water (deionized and mill effluent) from experimental samples; here it is assumed that the 2-mg/L sulphate treatment from this study represents baseline conditions (allowing relative changes to be quantified for the 10 mg/L and 30 mg/L treatments).

Table 4-14: Calculation of Temperature-Correction Factors from Sulphate-Reduction Rates

Environment	Avg. Temp. (°C)	SRR (% max.)	TCF (ratio)
Porewater (Oct–Jul)	5	27.48	0.41
SO_4-MeHg studies	15	66.80	1.00
Hypolimnia (Aug–Sep)	15	66.80	1.00
Porewater (Aug–Sep)	25	119.11	1.78

Table 4-15: Epilimnetic versus Hypolimnetic Oxygen and MeHg in Maynard Lake on September 24, 2025

Parameter	Epilimnion	Hypolimnion
Sample Depth (m)	0.0–3.4	15.5
Dissolved Oxygen (mg/L)	9.6 (avg.)	0.1
MeHg (ng-Hg/L)	0.038	1.300
MeHg as fraction total Hg	6.8%	77.4%

Table 4-16: Lake Areas of Depth in Excess of 15 m Based on Available Bathymetry Data

#	Lake	Lake Area (m^2)	Lake Area With Depth ≥ 15 m	
			(m^2)	(Percent)
2	Pakwash Lake	87,826,000	1,455,045	1.7%
4	Camping Lake	11,419,000	369,308	3.2%
6	Barnston Lake	6,483,000	130,563	2.0%
11	Wilcox Lake	11,202,000	839,559	7.5%
13	Oak Lake	42,867,000	4,316,379	10.1%
15	Maynard Lake	3,3061,000	4,388,819	13.3%
			Median:	5.4%

Table 4-17: Predicted Increases in MeHg (Ng/L) above Baseline (Water-Column Averages) for Four Effluent Discharge Scenarios

#	Waterbody	Operations		Active Closure (Goldsim Avg.)	
		Upper Case (Scenario 1)	Goldsim Avg. (Scenario 2)	2025–2062 (Scenario 3)	2060–2062 (Scenario 4)
1	Chukuni River	1.82E-05	8.37E-06	2.49E-06	8.51E-06
2	Pakwash Lake	2.09E-03	9.21E-04	2.74E-04	9.33E-04
3	Chukuni River	9.51E-05	4.02E-05	1.19E-05	4.08E-05
4	Camping Lake	2.57E-05	1.15E-05	3.42E-06	1.16E-05
5	English River	1.35E-05	6.10E-06	1.81E-06	6.16E-06
6	Barnston Lake	1.03E-05	4.58E-06	1.36E-06	4.63E-06
7	Wegg Lake	5.92E-05	2.67E-05	7.93E-06	2.70E-05
8	English River	1.09E-06	4.63E-07	1.37E-07	4.68E-07
9	Goose Lake	1.99E-05	8.95E-06	2.65E-06	9.04E-06
10	English River	1.91E-06	8.08E-07	2.39E-07	8.17E-07
11	Wilcox Lake	4.64E-05	2.10E-05	6.23E-06	2.12E-05
12	English River	1.15E-06	4.87E-07	1.44E-07	4.93E-07
13	Oak Lake	2.32E-04	1.05E-04	3.11E-05	1.06E-04
14	English River	2.82E-06	1.20E-06	3.55E-07	1.21E-06
15	Maynard Lake	2.11E-04	9.55E-05	2.83E-05	9.64E-05
16	Tide Lake	4.57E-05	2.05E-05	6.07E-06	2.07E-05
17	Upper Ball Lake	5.02E-05	2.25E-05	6.67E-06	2.27E-05
18	Lower Ball Lake	1.31E-05	5.85E-06	1.73E-06	5.91E-06
19	Indian Lake	3.20E-05	1.42E-05	4.21E-06	1.44E-05
20	English River	4.82E-05	2.14E-05	6.33E-06	2.16E-05
Minimum		1.09E-06	4.63E-07	1.37E-07	4.68E-07
Maximum		2.09E-03	9.21E-04	2.74E-04	9.33E-04

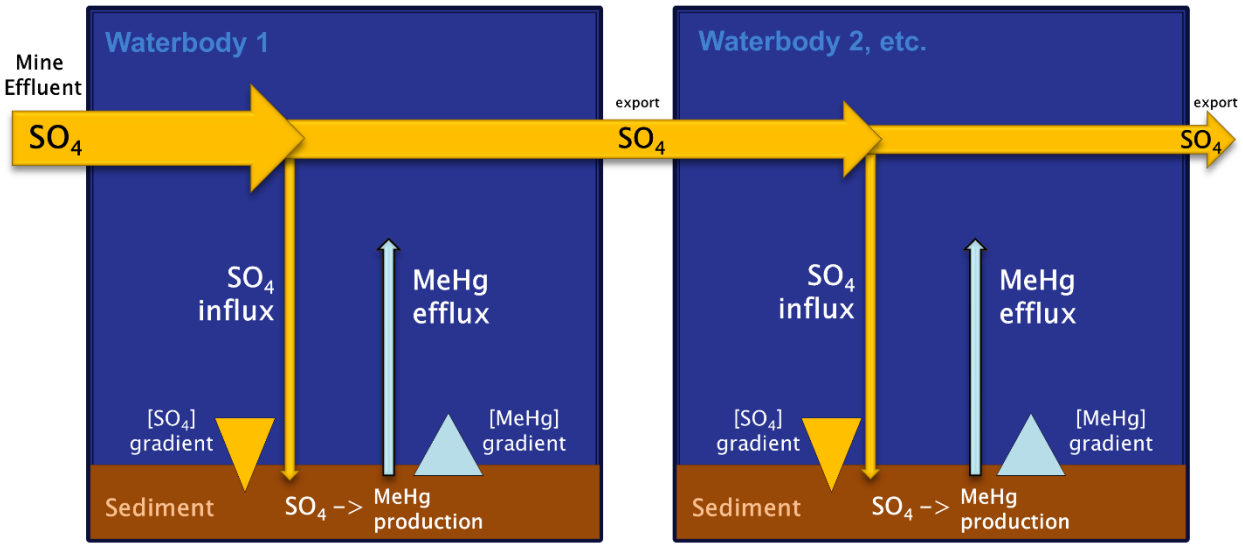
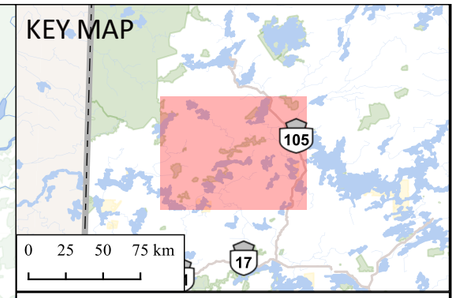


Figure 4-1: Schematization of the Major Components of the Model



KEY MAP



Legend

Fall Sampling Points
02 - Lake Number
25 - Sampling Year
01 - Deep Location; or
02 - Shallow Location

Hutchinson Environmental Sciences Ltd.

1:300,000

0 3,000 6,000 9,000 m

Location: Fall 2025 Water & Sediment Sampling Kinross Great Bear

Project No.: 240147

Date: 2026-03-13

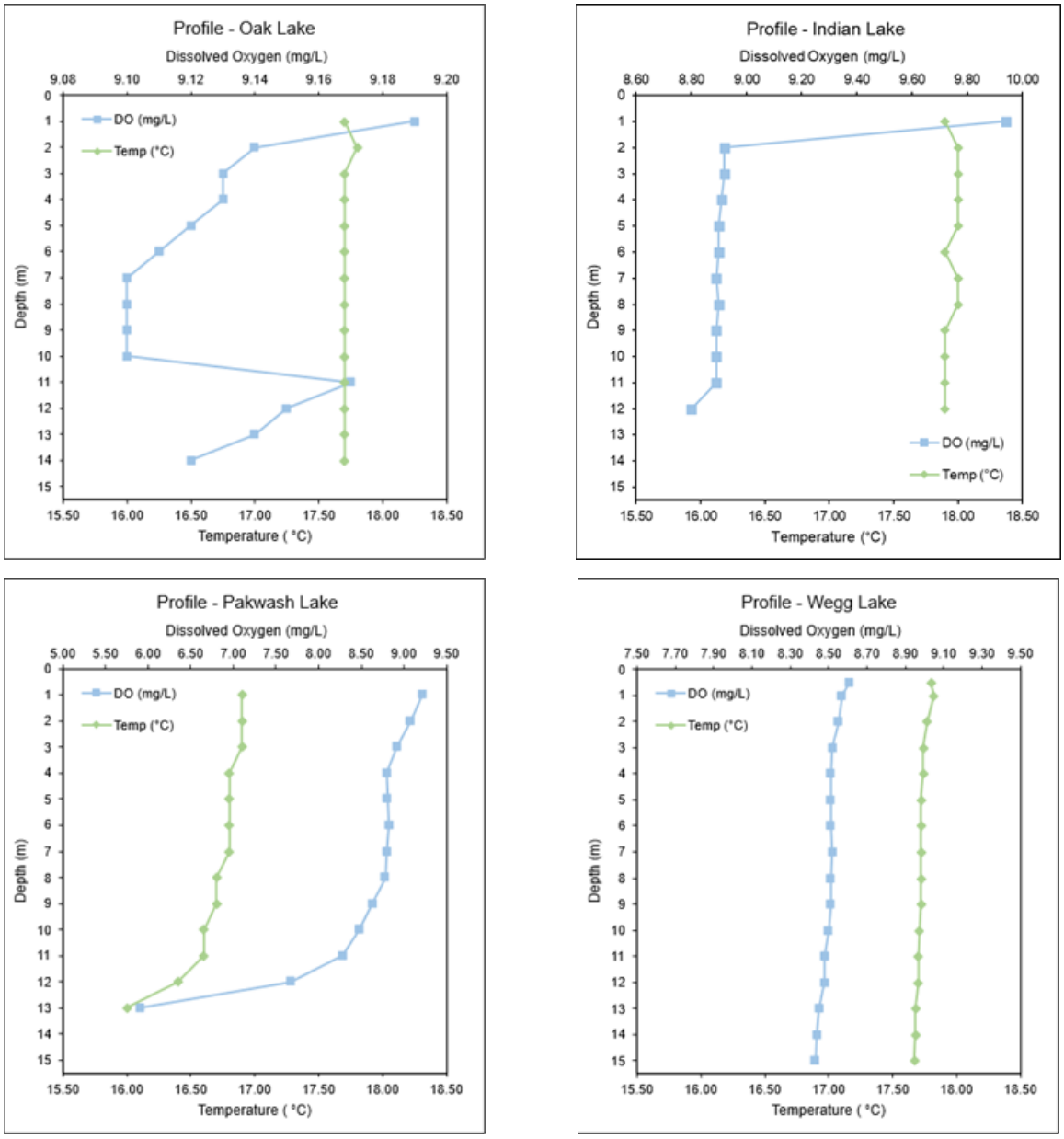
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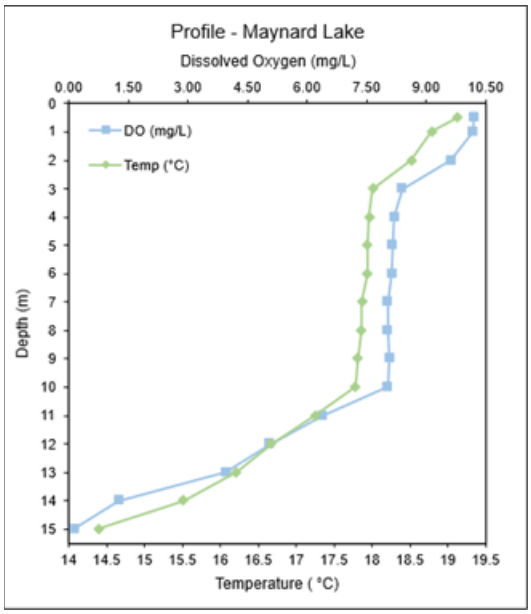
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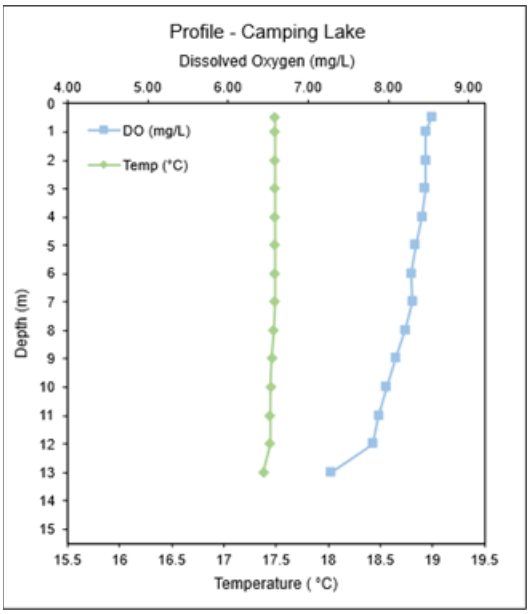
Fall 2025 Sampling Locations

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Figure 4-3: Oxygen and Temperature Profiles for the Seven Downstream Lakes




Profile - Maynard Lake
Dissolved Oxygen (mg/L)
0.00 1.50 3.00 4.50 6.00 7.50 9.00 10.50
DO (mg/L)
Temp (°C)
Depth (m)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
14 14.5 15 15.5 16 16.5 17 17.5 18 18.5 19 19.5
Temperature (°C)


Profile - Camping Lake
Dissolved Oxygen (mg/L)
4.00 5.00 6.00 7.00 8.00 9.00
DO (mg/L)
Temp (°C)
Depth (m)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
15.5 16 16.5 17 17.5 18 18.5 19 19.5
Temperature (°C)

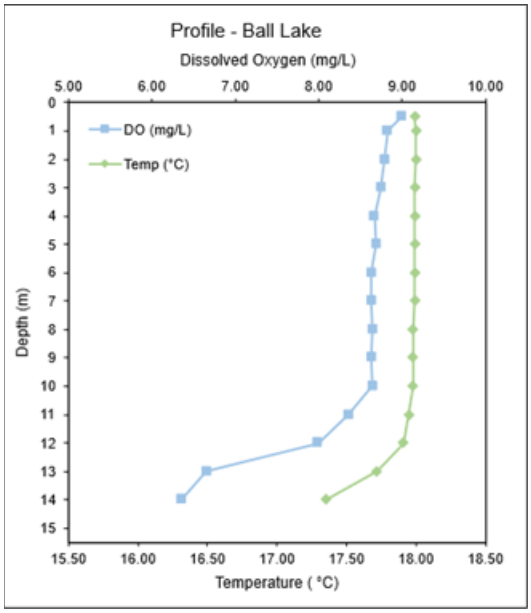
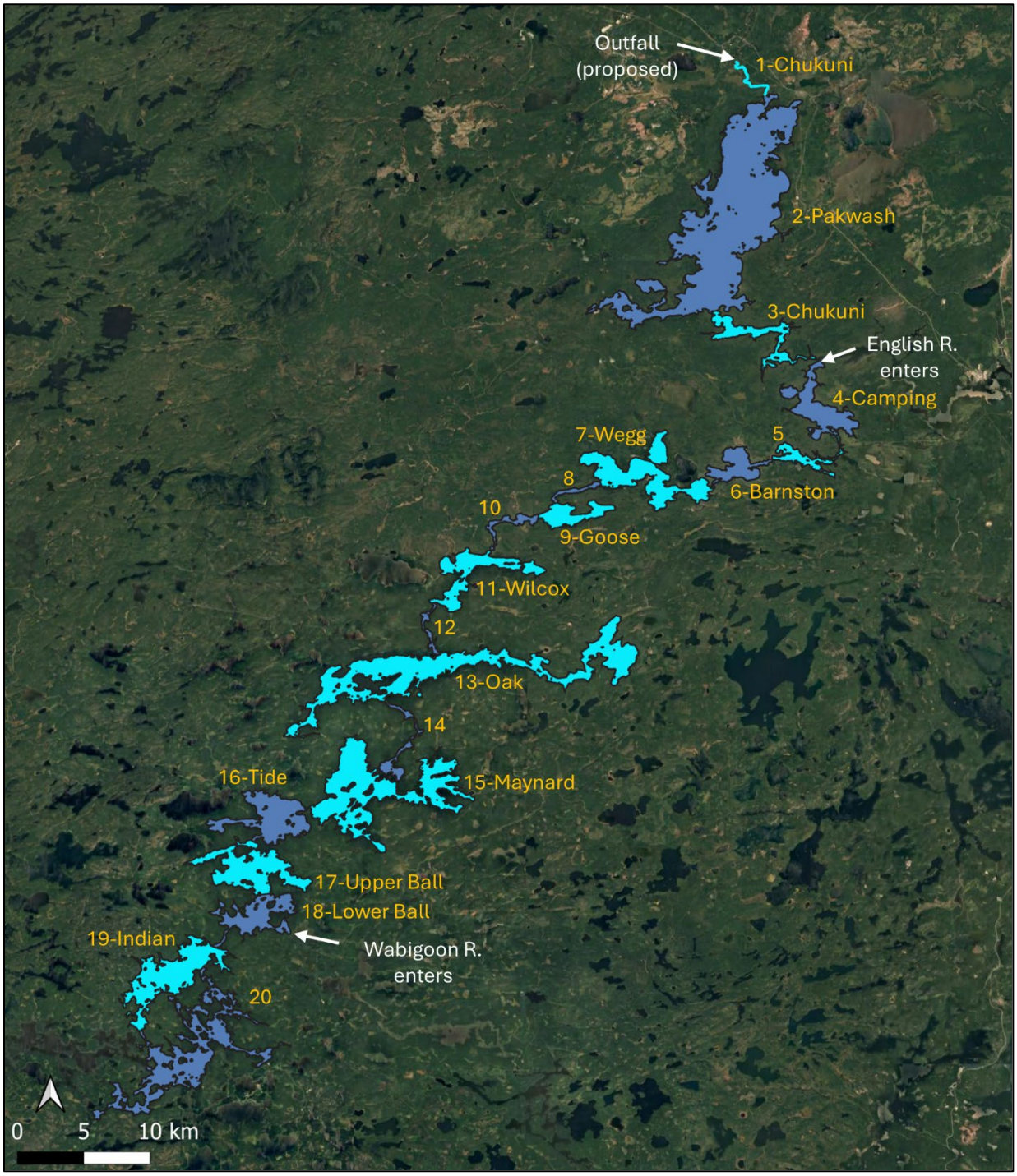
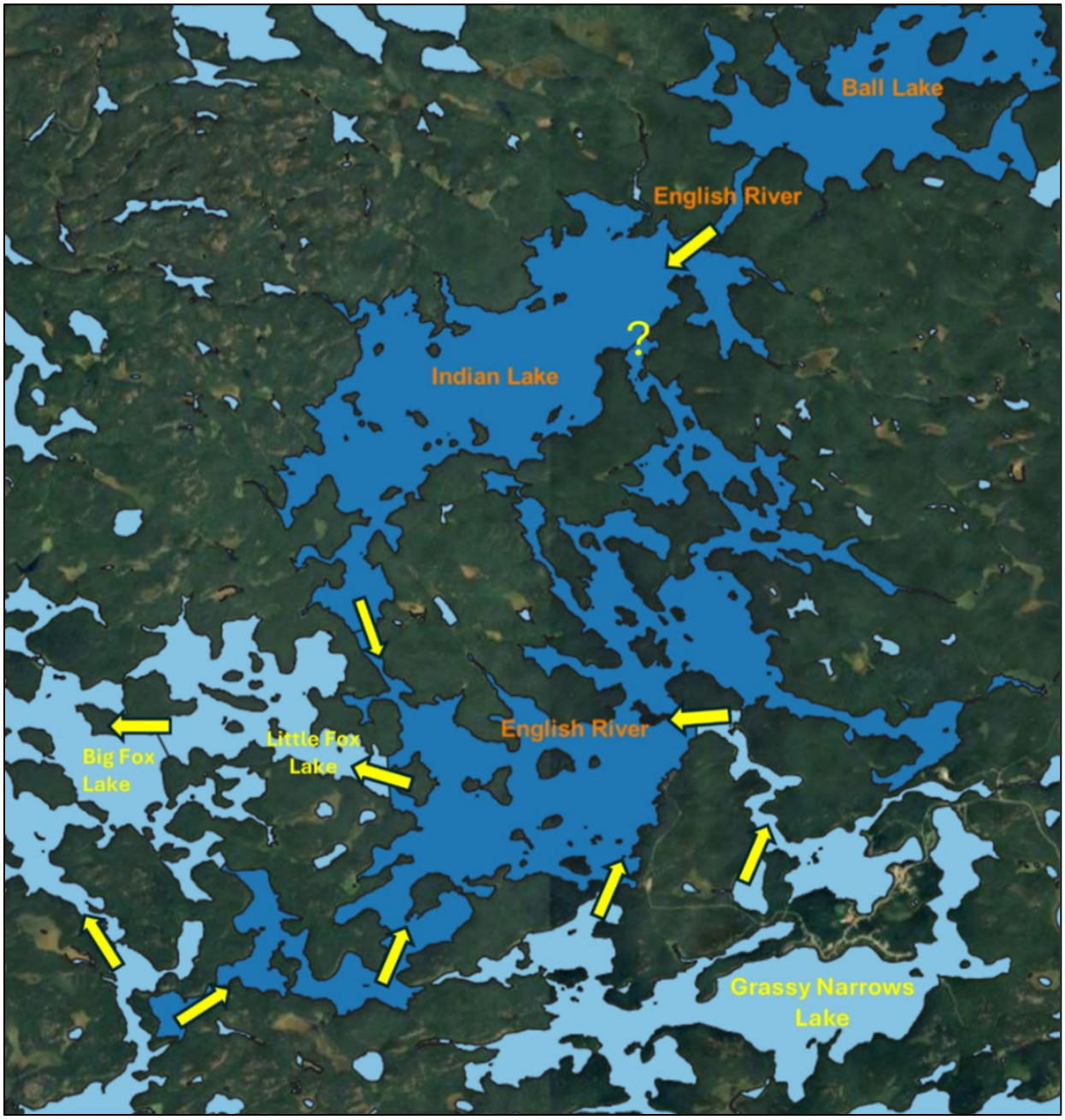

Profile - Ball Lake
Dissolved Oxygen (mg/L)
5.00 6.00 7.00 8.00 9.00 10.00
DO (mg/L)
Temp (°C)
Depth (m)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
15.50 16.00 16.50 17.00 17.50 18.00 18.50
Temperature (°C)

Figure 4-4: Modelled Waterbodies



Notes:
Adjacent waterbodies are distinguished by coloration. Numbers without names represent reaches of the English River.

Figure 4-5: Flow Directions in the most downstream area of the model region according to the Ontario Watershed Information Tool



Notes:
(MNR 2025)
The model waterbodies are depicted in dark blue.

Figure 4-6: Seasonal Variation in Average Flows as Reported by the Lake of the Woods Control Board for the Period 1991–2020

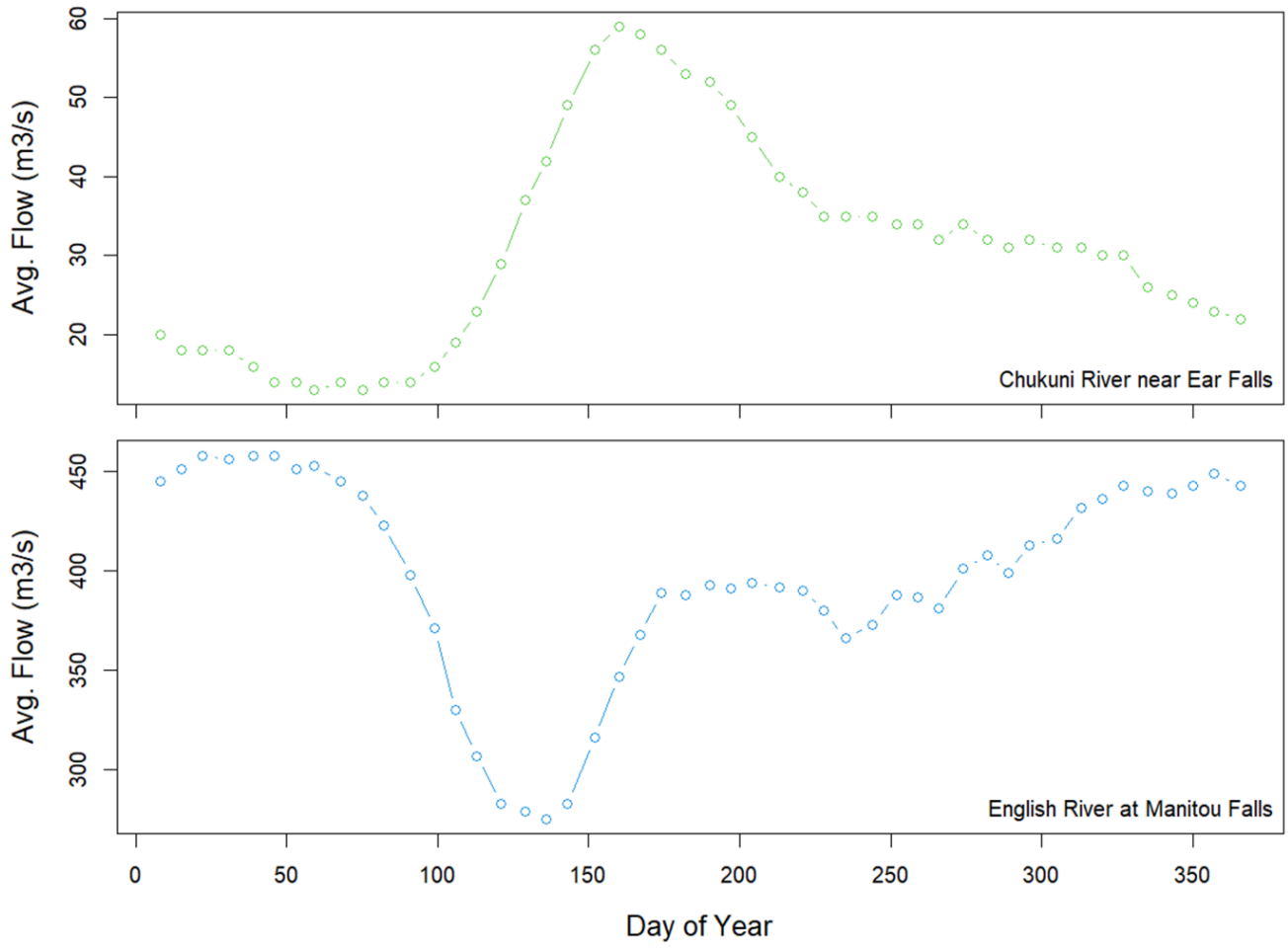
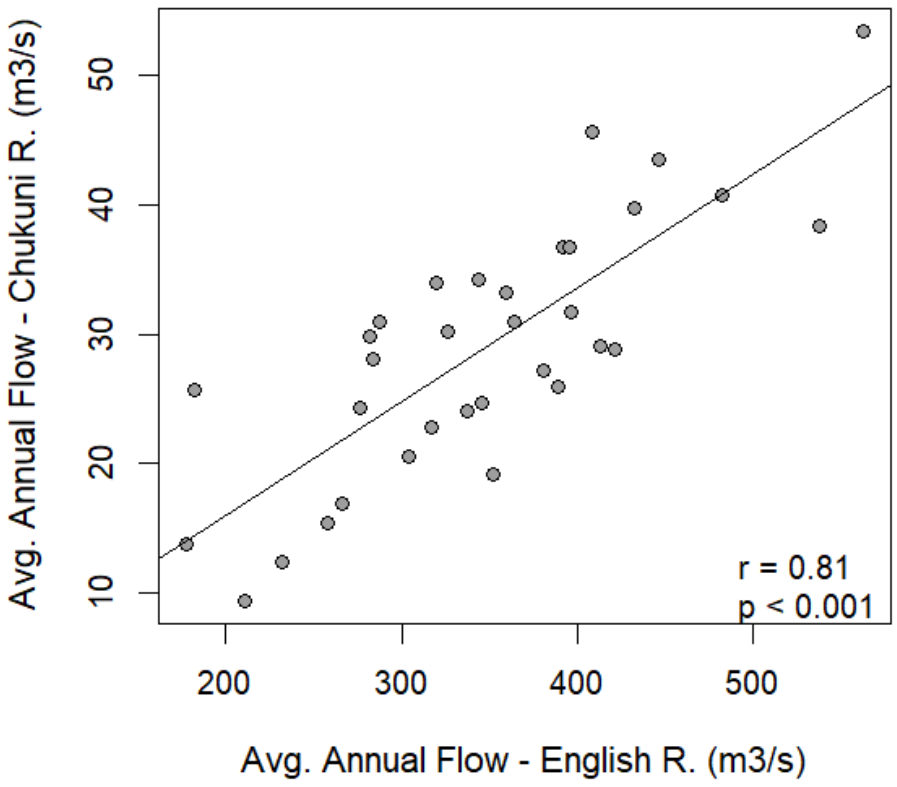
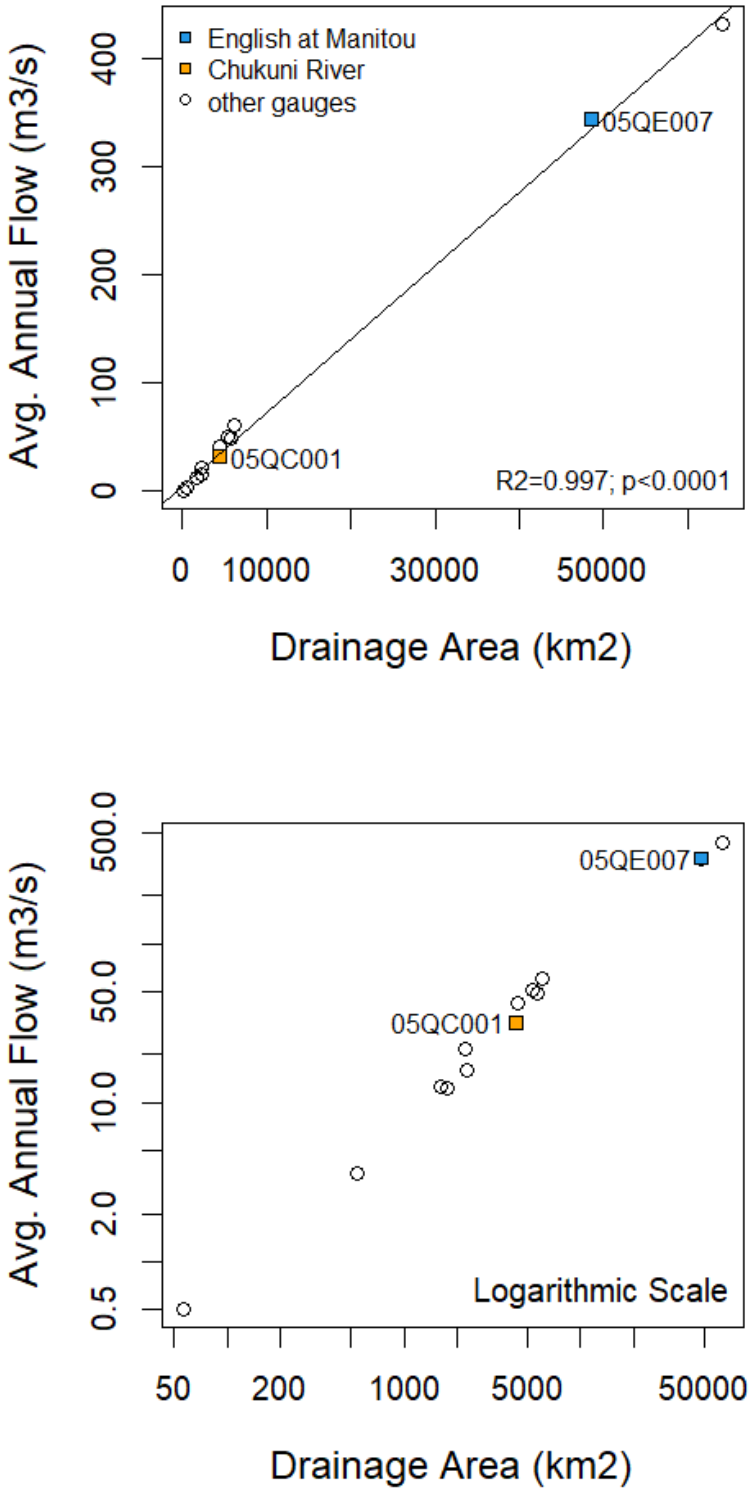


Figure 4-7: Strength of Correlation (as Pearson's product-moment coefficient)



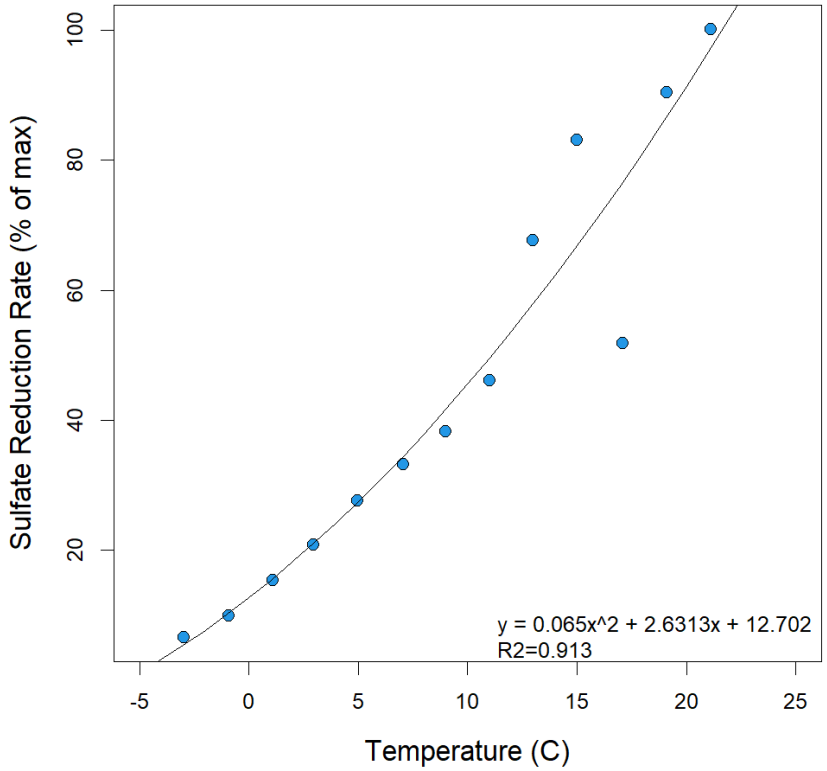
Notes:
Between annual-average flows of the Chukuni River near Ears Falls (05QC001) and the English River at Manitou Falls (05QE007) based on the shared period of record during Water Survey of Canada operation of both gauges; noting more recent (post-1994) annual average flows for the English River at Manitou Falls are not available from LWCB (2025).

Figure 4-8: Relationship between Average Annual Flow and Drainage Area



Notes:
For gauges in and around the study area (see Table 4-4) in linear space (top) and logarithmic space (bottom).

Figure 4-9: Temperature Dependence of Sulphate-reduction Rate for a Hypothetical Mixture of SRB



(data from Robador et al. 2016).

Figure 4-10: Temperature and Dissolved Oxygen Profile of Maynard Lake on Sep 24, 2025

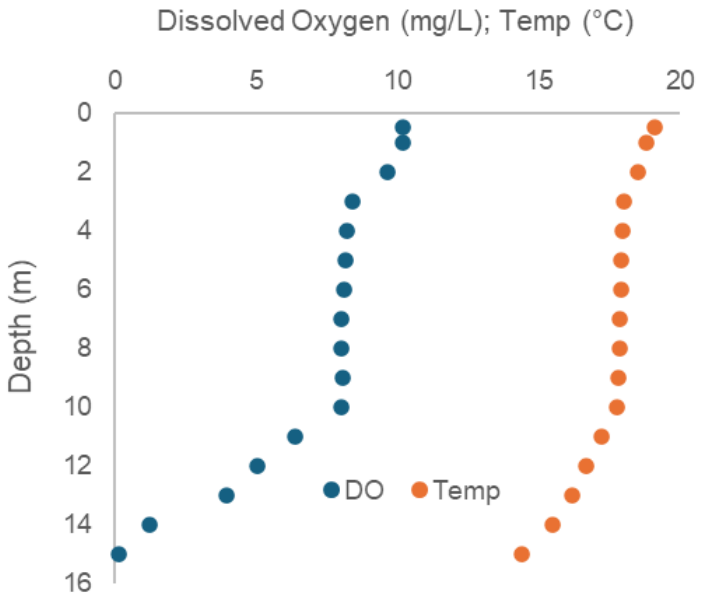
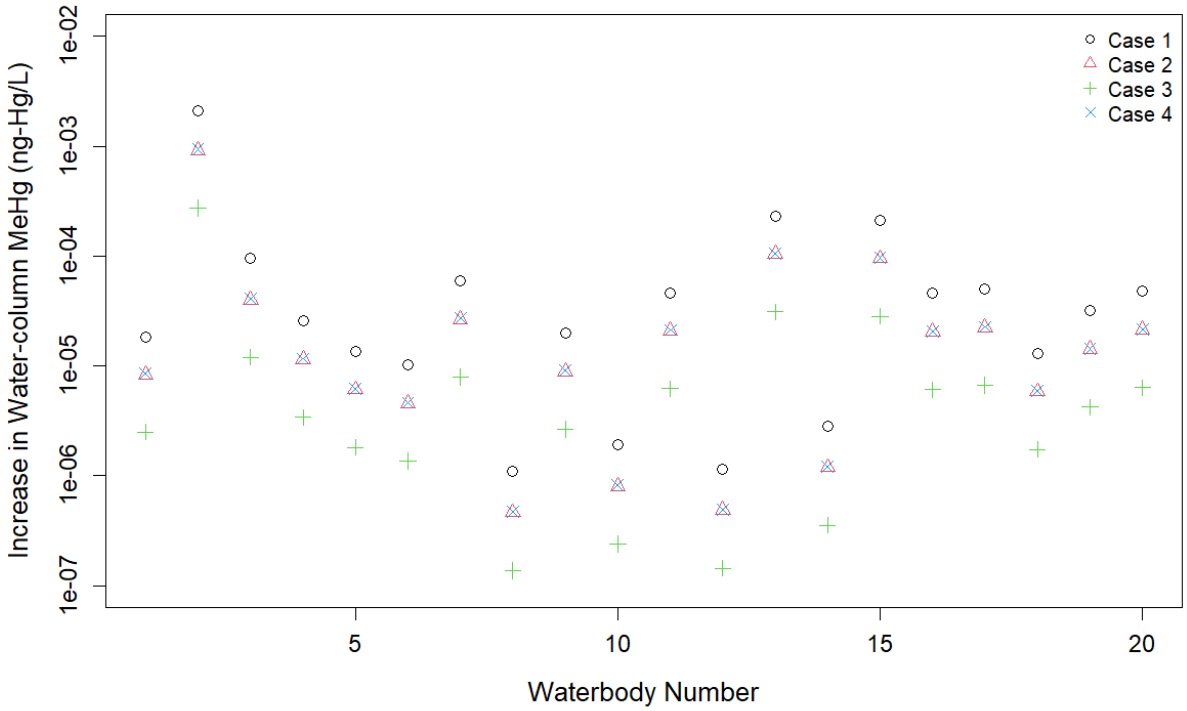


Figure 4-11: Spatial Variation in Predicted MeHg Increases for the Modelled Effluent – Discharge Scenarios



Notes:
(1) Upper Case, (2) Operations Average, (3) Active Closure (2025–2062), and (4) late Active Closure (2060–2062).

5 BIOACCUMULATION MODELLING AND APPROACH

5.1 DATA INPUTS AND ASSUMPTIONS

This section presents the baseline fish and surface water mercury and methylmercury concentration data that were used as inputs into the human health risk assessment (Section 6). The measured surface water and fish methylmercury and total mercury concentration data (Section 3.3) were used to calculate site-specific methylmercury and total mercury bioaccumulation factors (BAFs = $Concentration_{fish}$ / $Concentration_{water}$), which were used to calculate the predicted increase in fish concentrations associated with the Project (Project Case). Attachment D presents the sample data that were used to calculate the site-specific BAFs.

Site-specific total mercury and methylmercury data in surface water collected from the Chukuni River, the primary receiving waterbody for effluent from the proposed Project, during the 2021 to 2024 period were used to characterize the Baseline Case. A summary of the surface water data used in the bioaccumulation and HHRA modelling is presented in Table 5-1 and Attachment D.

Site-specific total mercury and methylmercury data in fish (i.e., Northern Pike, Walleye, and forage fish, including Yellow Perch and White Sucker) collected from the Chukuni River during the 2022 to 2024 period were used to define baseline conditions in the HHRA exposure model (Baseline Case). Table 5-2 presents the estimated 95% upper confidence limit on the mean (95UCLM) and the mean fish concentrations for sampling locations in the Chukuni River. Due to the inability to obtain a permit to sample Lake Whitefish (only two samples were analyzed) in the local study area (Chukuni River), Yellow Perch and White Sucker, classified as forage fish, were used as a substitute species. The feeding habits of Lake Whitefish are more like Perch and White Sucker (i.e., herbivore / insectivore), as opposed to Walleye and Northern Pike (i.e., predators); therefore, the use of forage fish as a proxy was considered a reasonable assumption.

In some instances, surface water data were not available for a specific waterbody and year when fish data were collected. In these circumstances, the assessment used data from other years as it was assumed that annual average water concentrations within a waterbody did not materially fluctuate from year to year.

Fish length data were also collected, and fish data utilised were restricted to the following size ranges:

- Northern Pike restricted to 40 to 70 cm length (i.e., 55 + / - 15 cm)
- Walleye restricted to 28 to 52 cm length (i.e., 40 + / - 12 cm)
- Forage fish segregated into fish length less than 25 cm (i.e., length for consumption by ecological receptors) and greater than 25 cm (i.e., assumed length for consumption by human receptors).

Total mercury and methylmercury concentrations in fish increase with age and size (i.e., length and weight) due to biomagnification (Environment Canada 2003). Fish length was used to normalize mercury concentrations for comparison among years and waterbodies and to focus on fish sizes that people consume, which aligns with fish size ranges used to develop provincial fish consumption advisories (MECP 2021a,b,c). The measured baseline fish concentration data were used to estimate the 95UCLM using ProUCL Version 5.2 (US EPA 2022). The 95UCLM is a reasonable maximum exposure estimate, representative of the upper estimate of the annual average exposure point concentration that is expected for the evaluation of chronic exposure and risks from consumption of fish (US EPA 2001 and Health Canada 2024).

Regional fish concentration data available from MECP for waterbodies downstream of the proposed Project (i.e., from Pakwash Lake to the English River system adjacent to the community of ANA) were also characterised for the Baseline Case in the Human Health Risk Assessment (HHRA). Aligned to the water quality modelling (Section 4.4), the downstream waterbodies were divided into 20 segments for the purposes of predictive methylmercury water quality and fish methylmercury bioaccumulation modelling, which are described in Table 5-3 and illustrated in Figure 2-5. The analysis of the regional data aimed to

acquire relevant fish sample data from the latest sampling periods (2010 to present), where available. For Oak Lake and Maynard Lake, the most recent sampling data from 2006 were used to characterize Baseline Case fish concentrations. The HHRA assumed that these measured fish concentrations from the seven regional sample locations where data were available are adequate to characterize measured fish concentrations for the Baseline Case, as fish will migrate throughout the system except where barriers are present. The estimated 95UCLM and mean concentrations for these historical regional sampling locations are presented in Table 5-4. The detailed sample data and ProUCL outputs for regional data are presented in Attachment D.

5.2 CALCULATION OF FISH BIOACCUMULATION FACTORS (BAFS)

The measured site-specific total mercury and methylmercury concentration data for fish and surface water in the Chukuni River were used to calculate site-specific BAFs between surface water and fish, with resulting units in litres per kilogram by wet weight (L/kg-WW). The BAF is the sum of the aqueous and dietary uptakes in an organism minus depuration (Gobas et al. 2009). These calculated BAFs were then used to predict potential changes in fish tissue concentrations associated with changes in water quality predicted from water quality modelling (HESL 2026; WSP 2025b). The calculated BAFs were based on the measured annual mean fish and surface water concentrations at three locations along the Chukuni River (sampling locations CR-REF, CR-FDP and CR-DS; Figure 1-7), which is the receiver of treated effluent from the proposed mine. The calculated site-specific BAFs are presented in Table 5-5. A summary of the sample data used to calculate the site-specific BAFs is presented in Attachment D.

A mathematical model was explored to determine relationships between plankton (benthic invertebrates and zooplankton), fish and surface water (i.e., food web model); however, scatter plots and regression analysis indicated a weak relationship between plankton and surface water concentrations. As such, site-specific fish BAFs were based on measured surface water and fish concentrations (i.e., Northern Pike, Walleye and forage fish).

A literature search was also completed to determine if the calculated site-specific BAFs were of comparable magnitude to those reported in other literature sources (Table 5-6). The range in fish BAFs reported in the literature (Environment Canada 2003; Calder et al. 2016; Wu et al. 2019; US EPA 1997) are in alignment with the calculated site-specific BAFs, supporting their use in the HHRA. The United States Environmental Protection Agency (US EPA) (1997) noted that the mean BAFs derived from field studies are believed to be better estimates of mercury bioaccumulation in natural systems than values derived from laboratory studies.

5.3 MODEL FOR PREDICTED MERCURY CONCENTRATIONS IN FISH

Total mercury in surface water and fish will be in the form of organic mercury (i.e., methylmercury) and inorganic mercury. In addition, certain parameters in the effluent may have secondary effects on methylmercury stimulation and bioaccumulation in the downstream aquatic environment (such as sulphate), which was included in the water quality modelling. The HHRA calculated exposures and risks for both forms of mercury, including the potential increase in methylmercury concentrations from sulphate. In many instances measurements (i.e., measured concentrations in fish or surface water) report total mercury which can be apportioned into organic and inorganic forms. Discharge of mercury and sulphate in effluent from the project to the Chukuni River was assumed to affect mercury in receiving waters and biota in two manners, which are described as follows:

1 WSP receiver water quality model (WSP 2025b): Total mercury is discharged to the Chukuni River via effluent which was assumed to be dissolved inorganic mercury and available for uptake by fish. The dissolved inorganic mercury (IgHg) was assumed to remain in that form within the water column as abiotic methylmercury production is limited and methylmercury production is greatest in sediments

or lake bottoms via biotic mechanisms (Bento and Hintelmann 2024). Mercury water quality in receiving waters was modelled by the mass balance water quality model (Section 4.3). The changes in mercury water quality predicted in the WSP (2025b) model are confined to within the RSA:

a. Segment 1: Chukuni River segment upgradient of Pakwash Lake
b. Segment 2 (Pakwash Lake segment) and
c. Segment 3 (Chukuni River segment downgradient of Pakwash Lake), represented by the modelling node (PAK_OUT) at the Pakwash Lake outlet which is hydraulically down gradient of the proposed Project effluent outlet (Figure 2-6).

2 HESL (2026) water quality model: Dissolved sulphate is discharged to the Chukuni River via effluent which was assumed to stimulate methylmercury production in sediment via anaerobic microorganisms or SRB which are described in Section 4.4. The assessment assumed that sulphate related changes could affect water quality from the Chukuni River further downstream and below Pakwash Lake outlet.

Inorganic mercury (IgHg) added to freshwater environments would be methylated primarily by anaerobic bacteria in anoxic bottom water and sediments to produce methylmercury (MeHg) (Compeau and Bartha 1985; Eckley et al 2005; Yu et al., 2012). Within the water column methylation activity is limited to anoxic hypolimnia of lakes where studies have observed that the zone of greatest methylation was just below the oxic / anoxic transition zone in sediments underlying oxygenated water where sulphate reduction is the greatest (Eckley and Hintelmann 2006).The assessment assumed that the inorganic mercury released from the effluent would not be converted to organic mercury in the water column, but could be in the sediment which was accounted for in the HESL (2026) water quality model, which assumed that there was unlimited mercury in the sediment / system available for methylmercury production (i.e., sulphur was the rate limiting factor for methylmercury production).

The Scenario 1 (Upper Case) results of the methylmercury modelling (Section 4.4) were used to predict changes in fish concentrations using the site-specific BAFs presented in Table 5-5.

The following equations were used to predict methylmercury and inorganic mercury concentrations in fish from predicted concentration changes in surface water due to the Project:

$$C_{fish-MeHg-base+proj} = C_{fish-MeHg-base} + \left(\Delta C_{sw-MeHg} \times BAF_{fish-MeHg}\right) \quad \textit{Equation 2}$$

Where

$C_{fish\text{-}MeHg\text{-}base+proj}$ = Predicted fish methylmercury concentration from Project [mg/kg-WW]
$C_{fish\text{-}MeHg\text{-}base}$ = Measured methylmercury concentration in fish at baseline [mg/kg-WW]
$\Delta C_{sw\text{-}MeHg}$ = Predicted change in methylmercury in surface water concentration based on HESL (2026) [mg/L]
$BAF_{fish\text{-}MeHg}$ = Site-specific fish BAF from surface water for methylmercury [L/kg-WW]

$$C_{fish-THg-base+proj} = C_{fish-THg-base} + \left(\Delta C_{sw-THg} \times BAF_{fish-THg}\right) \quad \textit{Equation 3}$$

$$C_{fish-IgHg-base+proj} = C_{fish-THg-base+proj} \times P_{IgHg} \quad \textit{Equation 4}$$

Where

$C_{fishTHg\text{-}base+proj}$ = Predicted fish total mercury concentration from Project [mg/kg-WW]
$C_{fishTHg\text{--}base}$ = Measured total mercury concentration in fish at baseline [mg/kg-WW]
$\Delta C_{sw\text{-}THg}$ = Predicted change in total mercury in surface water concentration based on predicted total mercury concentrations from WSP 2025b [mg/L]
$BAF_{fish\text{-}THg}$ = Site-specific fish BAF for total mercury [L/kg-WW]
$C_{fish\text{-}IgHg\text{-}base+prof}$ = Predicted fish inorganic mercury concentration from Project [mg/kg-WW]

P_{IgHg} = Portion of inorganic mercury in fish [unitless fraction]

5.4 BASELINE AND MODELLED PROJECT-RELATED FISH TISSUE RESULTS

This section summarizes predicted methylmercury and inorganic mercury in fish tissue concentrations relative to baseline conditions.

Baseline methylmercury concentrations varied slightly among fish species. Overall, forage fish (Yellow Perch and White Sucker) exhibited the lowest concentrations, followed by Walleye and Northern Pike with the highest concentrations. The accumulation of metals in aquatic organisms primarily depends on ambient water concentrations and species-specific factors such as foraging behavior, growth rate, age and trophic position (Barone et al. 2015). The differences in fish concentrations based on feeding guilds align with their trophic positions: Northern Pike and Walleye occupy the highest level as top predators compared to Lake Whitefish, which feed lower in the food web, and thus reflecting differences in total mercury and methylmercury concentrations among the three species due to biomagnification (Health Canada 2007).

A summary of the baseline, modelled Project-only and modelled baseline plus Project methylmercury and inorganic mercury concentrations in fish are presented below. Attachment E presents the detailed summary of the fish concentrations for each assessment case, fish and waterbody segment, which includes the measured and predicted total mercury concentrations.

Estimated 95UCLM baseline methylmercury concentrations in fish tissue ranging from:

- Whitefish: 0.079 to 0.18 mg/kg-WW
- Walleye: 0.27 to 0.56 mg/kg-WW
- Northern Pike: 0.26 to 1.4 mg/kg-WW.

Modelled Project-only contributions for methylmercury were substantially lower across all species and river segments (Chukuni River to Indian Lake) ranging from:

- Whitefish: 2.79E-05 to 4.47E-03 mg/kg-WW
- Walleye: 7.52E-05 to 1.20E-02 mg/kg-WW
- Northern Pike: 7.46E-05 to 1.19E-02 mg/kg-WW.

Modelled Baseline + Project-only methylmercury concentrations in fish tissue ranging across all species and river segments (Chukuni River to Indian Lake) ranging from:

- Whitefish: 0.080 to 0.18 mg/kg-WW
- Walleye: 0.27 to 0.56 mg/kg-WW
- Northern Pike: 0.26 to 1.4 mg/kg-WW.

Estimated 95UCLM baseline inorganic mercury concentrations in fish tissue ranging from:

- Whitefish: 0.038 to 0.079 mg/kg-WW
- Walleye: 0.17 to 0.38 mg/kg-WW
- Northern Pike: 0.044 to 0.28 mg/kg-WW.

Modelled Project-only contributions for inorganic mercury were lower across all species and river segments within the RSA (Chukuni River and Pakwash Lake) ranging from:

- Whitefish: 0.0032 to 0.0066 mg/kg-WW
- Walleye: 0.011 to 0.022 mg/kg-WW

- Northern Pike: 0.0034 to 0.0069 mg/kg-WW.

Estimated 95UCLM baseline plus Project-only inorganic mercury concentrations in fish tissue ranging from:

- Whitefish: 0.038 to 0.079 mg/kg-WW
- Walleye: 0.17 to 0.38 mg/kg-WW
- Northern Pike: 0.047 to 0.28 mg/kg-WW.

In summary:

- Modelled Project-only inorganic mercury concentrations in Chukuni River and Pakwash Lake were predicted above the fish tissue reporting detection limit (RDL = 0.001 mg/kg-WW)
- All modelled Project-only methylmercury concentrations in Chukuni River and Pakwash Lake were below the RDL.

The modelled Project-only contributions to methylmercury fish tissue concentrations are so small (equal to or less than the RDL) that they would be analytically indistinguishable from baseline concentration variability.

- Modelled Project fish concentrations (baseline plus Project) in Chukuni River and Pakwash Lake remain within the range of baseline variability conditions for each species.

Attachment F provides a power analysis of measured fish tissue concentrations in the Chukuni River, which are presented in Table 5-7.

The power analysis provides an estimate of natural variability in fish total mercury and methylmercury concentrations based on existing conditions and presents an interval (i.e., upper and lower prediction interval) that can be used to provide evidence when annual average concentrations in fish are rising or falling outside the expected range of natural variability. Based on the power analysis the following can be identified:

- Estimated annual 95UCLM concentrations above the upper prediction interval indicate concentrations are outside the range of expected natural variability and indicate concentrations levels may be rising.
- Estimated annual 95LCLM concentrations below the lower prediction interval indicate concentrations are outside the range of expected natural variability and indicate concentrations levels may be falling.

Methylmercury baseline and modelled Project-only and baseline plus Project concentration data for Northern Pike, Walleye and Whitefish are presented in Figures 5-1 through Figure 5-3 Figure 5-4 to Figure 5-6 presents the inorganic mercury baseline and project related concentrations for Pike, Walleye and Whitefish, respectively. Complete results for total mercury, methylmercury and inorganic mercury are presented in Attachment E.

The modelled Project-only fish concentrations are not visible on these figures as the incremental changes are too small (i.e., <0.01 mg/kg-WW). Attachment E presents figures of the fish concentrations on a logarithmic scale below the level of 0.01 mg/kg-WW to make them more discernible despite the very low levels.

Table 5-1: Measured Average Mercury Concentrations in Surface Water for Chukuni River Used in HHRA Exposure Modelling and to Develop BAFs

Location and year	Methylmercury (ng/L)	Total mercury (ng/L)	Percent Methylmercury (%)
Chukuni River-DS (All Years)	0.055	1.22	5%
2022	0.044	1.19	4%
2023	0.058	1.18	5%
2024	0.057	1.28	4%
Chukuni River-FDP (All Years)	0.070	1.46	5%
2022	0.037	1.15	3%
2023	0.046	0.94	5%
2024	0.104	1.99	5%
Chukuni River-REF (All Years)	0.045	1.19	4%
2021	0.029	0.74	4%
2022	0.042	1.54	3%
2023	0.042	1.16	4%
2024	0.051	1.21	4%
Average (All Stations and Years)	0.051 ± 0.021	1.24 ± 0.34	4.1% ± 0.74

Table 5-2: Estimated 95UCLM and Measured Mean Total Mercury and Methylmercury Concentrations in Fish for the Chukuni River

Fish species	Mercury species	Estimated 95UCLM and (average) Concentration [mg/kg-WW]	Distribution Model Assumed for the 95UCLM
Northern Pike (40 to 70 cm)	Total Mercury	0.38 (0.34)	Normal
	Methylmercury	0.33 (0.29)	Normal
Walleye (28 to 53 cm)	Total Mercury	0.48 (0.41)	Log-Normal
	Methylmercury	0.30 (0.26)	Normal
Forage Fish (9.7 to 56 cm)	Total Mercury	0.15 (0.14)	Gamma
	Methylmercury	0.11 (0.098)	Gamma
Forage Fish (<25 cm)	Total Mercury	0.12 and 0.13[(1)]	Not Calculated
	Methylmercury	0.081 and 0.092[(1)]	Not Calculated
Forage Fish (>25 cm)	Total Mercury	0.18 (0.15)	Normal
	Methylmercury	0.14 (0.10)	Normal

Notes:
Forage Fish (Yellow Perch and White Sucker) from the baseline study area were assumed to represent Whitefish concentrations in samples from 2022 to 2024.
Values within brackets represent means, while values outside of brackets represent 95UCLMs.
1 Sample size low (i.e., n=3), 95UCLM not calculated and presents average concentration and maximum concentration.

Table 5-3: Availability of Regional Fish Tissue Hg Concentrations from within the Modelling Segments used in the Predictive Methylmercury Water Quality Model

Segment	Waterbody	Description of Available Regional Fish Sample Data
1	Chukuni River	Used site-specific sample data from 2022 to 2024
2	Pakwash Lake	Historical sample data from 2014 available for Northern Pike and Walleye
3	Chukuni River	Not directly available
4	Camping Lake	Not directly available
5	English River	Not directly available
6	Barnston Lake	Not directly available
7	Wegg Lake	Historical sample data from 2013 available for Northern Pike and Walleye
8	English River	Not directly available
9	Goose Lake	Not directly available
10	English River	Not directly available
11	Wilcox Lake	Not directly available
12	English River	Not directly available
13	Oak Lake	Historical sample data from 2006 available for Northern Pike, Walleye and Lake Whitefish
14	English River	Not directly available
15	Maynard Lake	Historical sample data from 2006 available for Northern Pike, Walleye and Lake Whitefish
16	Tide Lake	Historical sample data from 2014 available for Northern Pike and Walleye
17	Upper Ball Lake	Historical sample data from 2010 to 2016 available for Northern Pike, Walleye and Lake Whitefish
18	Lower Ball Lake	Historical sample data from 2010 to 2016 available for Northern Pike, Walleye and Lake Whitefish
19	Indian Lake	Historical sample data from 2014 available for Northern Pike, Walleye and Lake Whitefish
20	English River	Not directly available

Table 5-4: Estimated 95UCLM and Measured (Mean) Total Mercury and Methylmercury Fish Concentrations for the Downstream Segments of the Project Area from the Ontario Regional Database

Fish Species	Mercury Species	Pakwash Lake (2014)	Wegg Lake (2013)	Oak Lake (2006)	Maynard Lake (2006)	Tide Lake (2014)	Ball Lake North Basin (2010-2016)	Ball Lake South Basin (2010-2016)	Indian Lake (2014)
Northern Pike (40 to 70 cm)	Total Mercury	0.304 (0.274)	0.559 (0.453)	0.844 (0.676)	1.216 |(0.945)	0.602 (0.500)	0.854 (0.693)	1.696 (1.462)	0.684 (0.522)
	Methylmercury(3)	0.26	0.48	0.72	1.04	0.51	0.73	1.45	0.58
Walleye (28 to 53 cm)	Total Mercury	0.882 (0.640)	0.443 (0.400)	0.608 (0.538)	0.726 (0.582)(1)	0.772 (0.573)	0.644 (0.583)	0.935 (0.855)	0.581 (0.503)
	Methylmercury(3)	0.75	0.38	0.52	0.62	0.66	0.55	0.80	0.50
Forage(4) Fish (All Lengths)	Total Mercury	NA	NA	0.203 (0.178)	0.116 (0.104)	NA	0.191 (0.174)	0.232 (0.211) (1)	0.259 (0.223)
	Methylmercury(3)	NA	NA	0.16	0.092	NA	0.15	0.18	0.20
Forage(4) Fish (<25 cm)	Total Mercury	NA	NA	NA	0.08(2)	NA	NA	NA	NA
	Methylmercury(3)	NA	NA	NA	0.062	NA	NA	NA	NA
Forage(4) Fish (>25 cm)	Total Mercury	NA	NA	0.203 (0.178)	0.118 (0.105)	NA	0.191 (0.174)	0.232 (0.211)	0.259 (0.223)
	Methylmercury(3)	NA	NA	0.158	0.092	NA	0.148	0.18	0.20

Notes:
NA indicates not available.
Values within brackets represent means, while values outside of brackets represent 95UCLMs.
1 The 95UCLM estimates for Walleye from Maynord Lake and Forage Fish from Ball Lake South Basin were based on a Gamma distribution of the datasets. The 95UCLM estimates for all other fish from all other lakes were based on a Normal distribution of the datasets.
2 Value for small forage fish at Maynard Lake has only 1 sample, so represents a maximum.
3 Estimated assuming Methylmercury was 85.3%, 85.3% and 77.6% of measured Total mercury in site-specific Northern Pike, Walleye and forage fish, respectively.
4 Forage fish represent Lake Whitefish.

Table 5-5: Summary of Calculated Site-Specific Surface Water to Fish BAFs for Total Mercury and Methylmercury for the Chukuni River

Fish Sample	BAF Total Mercury [L/kg-WW]	BAF Methylmercury [L/kg-WW]	Description
Northern Pike (40 to 70 cm)	2.75×10^5	5.71×10^6	Based on paired samples from CR-REF (2022 and 2023); CR-DS (2023) and CR-FDP (2023) for a total of eight data points.
Walleye (28 to 53 cm)	3.50×10^5	5.76×10^6	Based on paired samples from CR-REF (2022 and 2023); CR-DS (2023) and CR-FDP (2023) for a total of four data points.
Forage Fish (>25 cm)	1.32×10^5	2.14×10^6	Based on paired samples from CR-REF (2023); CR-DS (2022 to 2024) and CR-FDP (2022 to 2024) for a total of ten data points.
Average	2.52×10^5	4.54×10^6	Average of Northern Pike, Walleye and Lake Whitefish

Table 5-6: Summary of Methylmercury BAFs from Literature Studies

Source	Fish Species	Methylmercury BAF [L/kg-WW]	Log BAF
Environment Canada 2003	Yellow Perch	1.46×10^6	6.16
	Juvenile Bass	1.93×10^6	6.29
Calder et al. 2016	Brook trout	6.31×10^6	6.80
Wu et al. 2019	Prey Fish	3.98×10^6	6.60
US EPA (1997) cited in Environment Canada (2003)	Level 3 Fish	1.60×10^6	6.20
	Level 4 Fish	6.80×10^6	6.83
Average		3.88×10^6	6.48

Table 5-7: Prediction Intervals for Fish Collected in the Chukuni River

Parameter	Fish Species	Lower Prediction Interval (5LCLM) [mg/kg-WW]	Upper Prediction Interval (95UCLM) [mg/kg-WW]
Total Mercury	Northern Pike	0.17	0.50
	Walleye	0.22	0.71
	Large Forage Fish	0.066	0.26
	Small Forage Fish	0.036	0.17
Methylmercury	Northern Pike	0.14	0.44
	Walleye	0.096	0.45
	Large Forage Fish	0.033	0.20
	Small Forage Fish	0.0091	0.14

Figure 5-1: Northern Pike Measured Baseline and Modelled Project-only and Baseline + Project Methylmercury Concentrations in Fish Tissue (mg/kg-ww) by River Segment

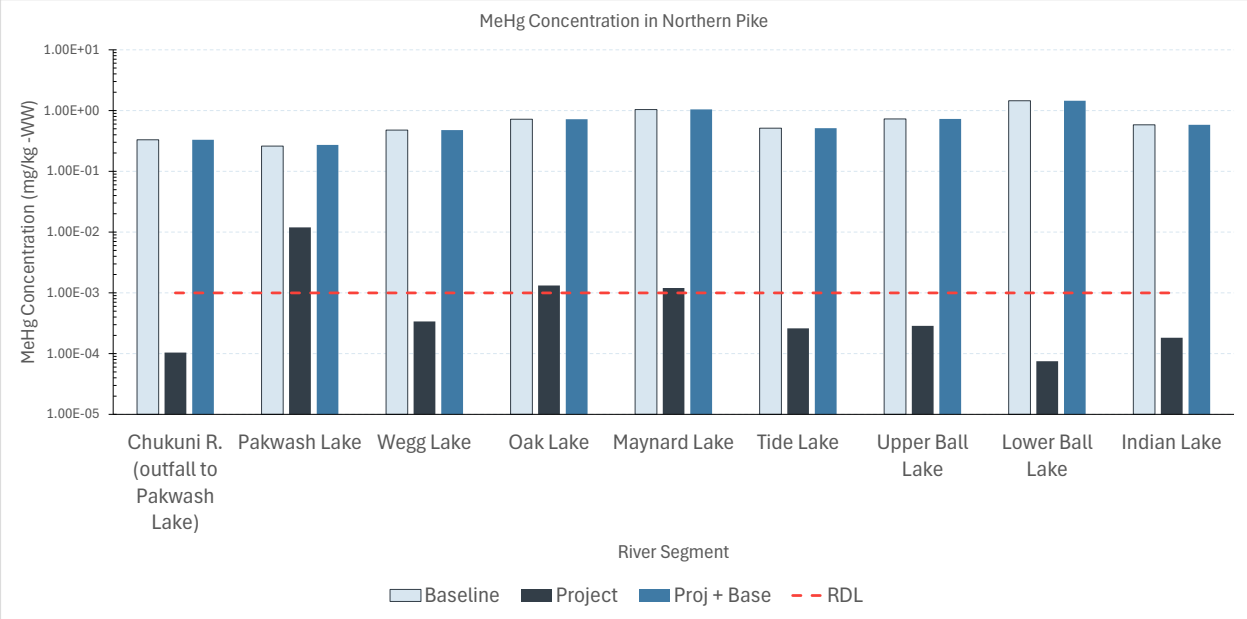


Figure 5-2: Walleye measured Baseline and Modelled Project-only and Baseline + Project Methylmercury Concentrations in Fish Tissue (mg/kg-ww) by River Segment

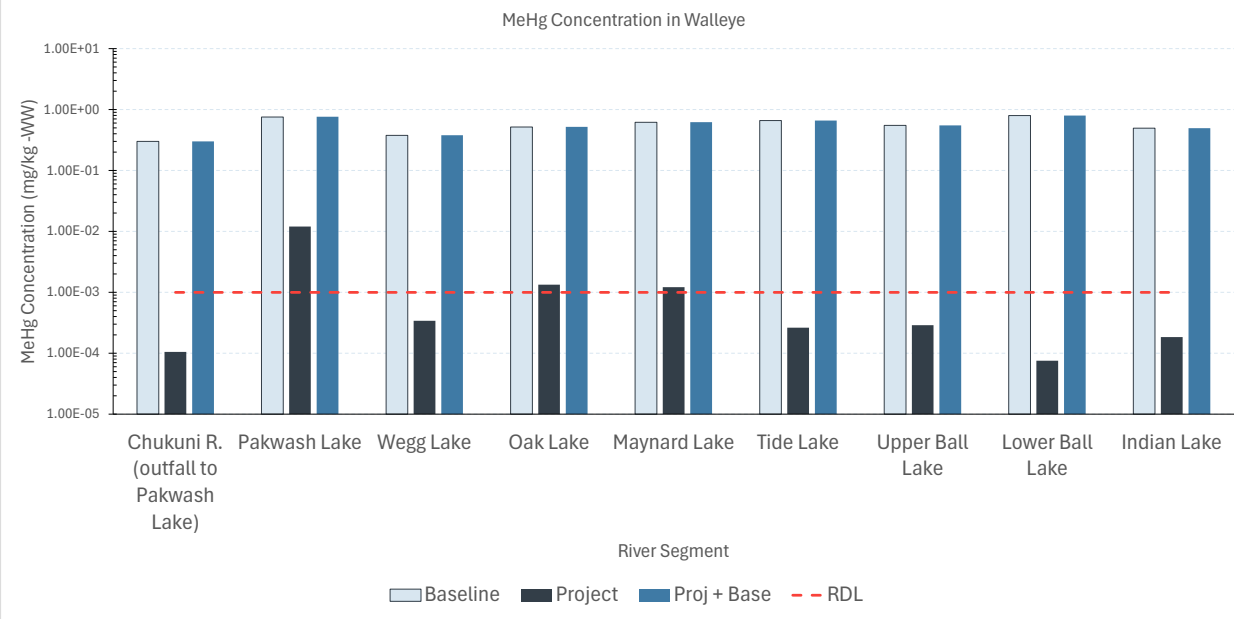


Figure 5-3: Lake Whitefish Measured Baseline and Modelled Project-only and Baseline + Project Methylmercury Concentrations in Fish Tissue (mg/kg-ww) by River Segment

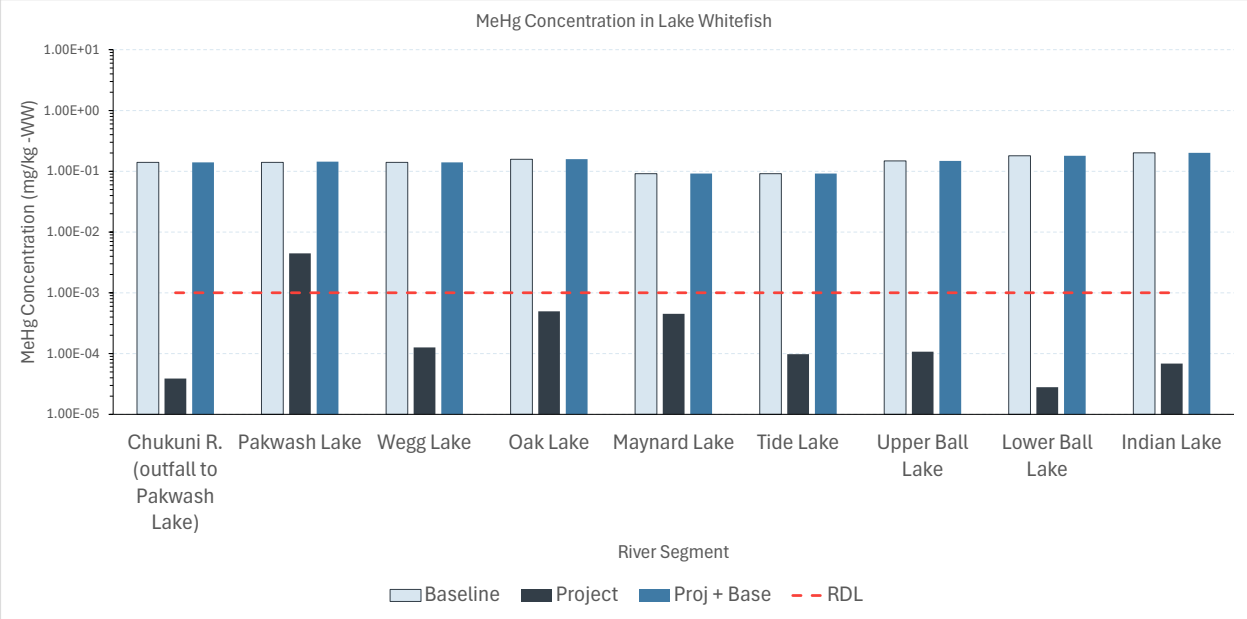


Figure 5-4: Northern Pike Measured Baseline and Modelled Project-only and Baseline + Project Inorganic Mercury Concentrations in Fish Tissue (mg/kg-ww) by River Segment

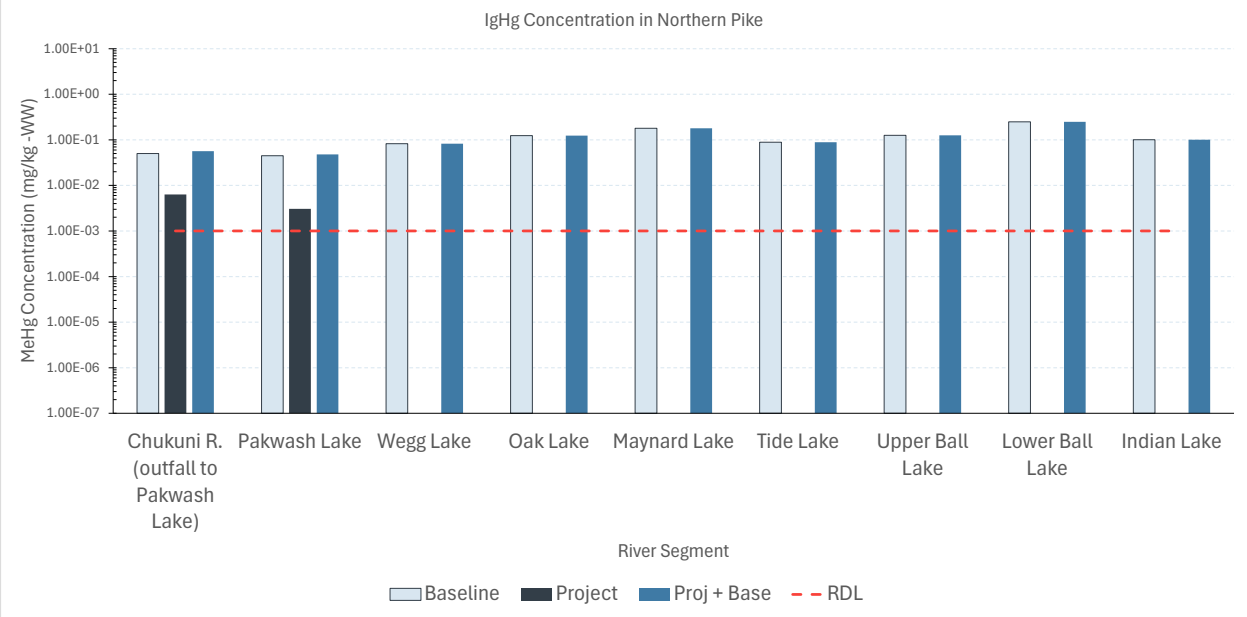


Figure 5-5: Walleye Measured Baseline and Modelled Project-only and Baseline + Project Inorganic Mercury Concentrations in Fish Tissue (mg/kg-ww) by River Segment

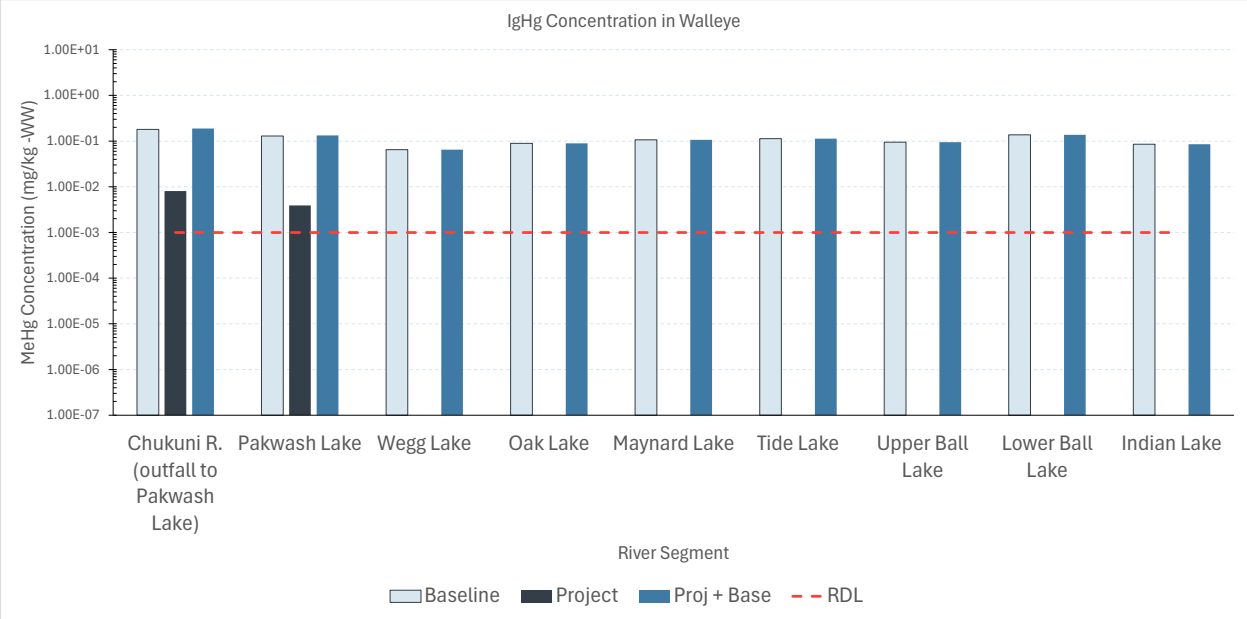
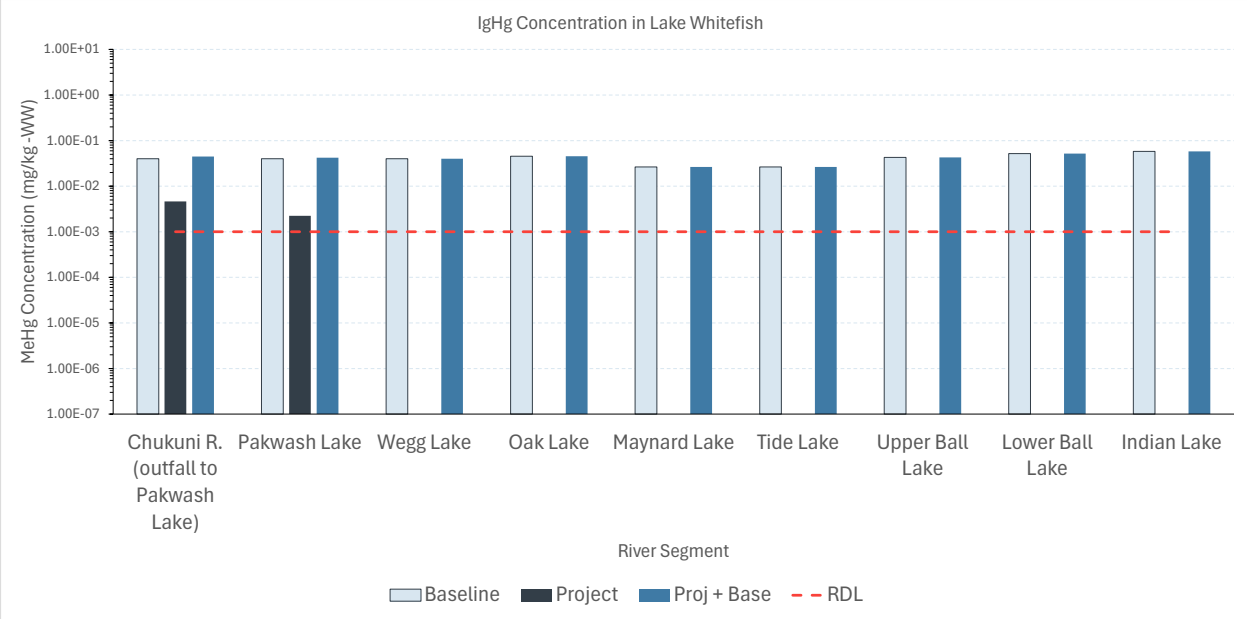


Figure 5-6: Lake Whitefish Measured Baseline and Modelled Project-only and Baseline + Project Inorganic Mercury Concentrations in Fish Tissue (mg/kg-ww) by River Segment



6 HUMAN HEALTH RISK ASSESSMENT

This section presents the HHRA for methylmercury and inorganic mercury exposure in downstream water bodies from the Project. An HHRA is the process of estimating the nature and probability of adverse health effects in humans who may be exposed to POPC in environmental media, now or in the future. All chemical parameters (from both anthropogenic and natural sources) have the potential to cause adverse effects. However, the magnitude of effect (risk) depends on the receptor being exposed, the route and duration of exposure and the inherent toxicity of the chemical. If all three components (receptor, exposure and hazard) are present, the possibility of risk exists. If one or more of the three components is missing, then there would be no risk.

The HHRA process involves the following fundamental steps, which will be discussed in the sections below:

- **Problem Formulation (Section 6.1):** includes three key aspects: identification of POPC (potential increased methylmercury and inorganic mercury in surface water due to the Project), characterizing receptors that could be exposed to methylmercury and inorganic mercury and characterizing the exposure pathways by which exposure to methylmercury and inorganic mercury may occur. The problem formulation evaluates which exposure pathways are considered complete to the human receptors. The exposure pathways may be direct (e.g., ingestion of surface water) or indirect (e.g., ingestion of fish exposed to surface water). It includes a description of the nutritional and cultural importance of fish consumption within the Project area.
- **Exposure Assessment (Section 6.2):** provides the assumptions used to characterize human exposure to methylmercury and inorganic mercury in environmental media (fish and surface water). It defines the receptor characteristics and chronic ingestion rates used to estimate exposure for each receptor type.
- **Toxicity Assessment (Section 6.3):** presents the toxicity reference values (TRVs) for methylmercury and inorganic mercury used in the HHRA and the toxicological rationale supporting their use.
- **Risk Characterization (Section 6.4):** involves qualitatively and quantitatively evaluating the risks to receptors resulting from exposure to methylmercury and inorganic mercury. The risk characterization involves the integration of exposure and toxicity assessments to calculate a risk value and comparison of the risk value to a regulatory benchmark of risk to determine the level of acceptability. Often multiple lines of evidence are used in risk characterization.
- **Uncertainty and Conservative Assumptions and Sensitivity Analysis (Section 6.5):** describes the conservative assumptions and associated uncertainties in the risk assessment. Uncertainty is an inherent aspect of the risk assessment process due to necessary assumptions regarding the Project site, receptor characteristics, scenarios, and mathematical modelling. Uncertainties may arise from a number of areas due to some inherent lack of precision about the true value of a parameter (e.g., body weight, inhalation rate, ingestion rate). Uncertainties are accounted for by assuming conservative receptor and exposure scenarios to prevent the underestimation of risks.

6.1 PROBLEM FORMULATION

The objective of this HHRA is to assess potential risks to human health associated with exposure to inorganic mercury and methylmercury from fish and surface water consumption, based on predicted changes in surface water and fish tissue concentrations resulting from treated effluent discharge.

6.1.1 IDENTIFICATION OF POPC

Methylmercury is the most toxic and bioavailable form of mercury and occurs in the environment through the biotransformation of inorganic mercury in sediment via SRB. Therefore, methylmercury and inorganic mercury were identified as the POPC for this HHRA. This selection is based on its toxicological impact on

biota and humans, concerns raised by local communities and the potential to increase under Project conditions.

6.1.2 IDENTIFICATION OF RECEPTORS

The HHRA evaluated human receptors who may be present within the Project RSA and downstream waterbodies (i.e., Chukuni River to Indian Lake) and may be exposed to Project-related changes in methylmercury and inorganic mercury concentrations in surface water and fish. Receptors were identified as Indigenous community members (toddler and adult) who were assumed to reside full-time in Indigenous communities surrounding the Project and may conduct traditional activities, such as harvesting fish for subsistence, in the waterbodies downstream of the Project effluent discharge which present relevant exposure pathways to methylmercury and inorganic mercury.

6.1.3 IDENTIFICATION OF EXPOSURE PATHWAYS

Exposure pathways refer to the methods by which methylmercury and inorganic mercury could reach various receptors. Pathways could be either direct in which the POPC could travel directly from the source to the receptor, or indirect in which POPC could be carried through environmental media (food) before reaching the human receptor.

The primary exposure media potentially impacted by the Project was identified to be surface water due to Project effluent releases. Subsequent changes were also considered to fish as a result of changes to surface water. Methylmercury and inorganic mercury in surface water may be incidentally ingested by humans during traditional practices or could accumulate in fish tissue as methylmercury (through their diet and water consumption) and taken up by humans through fish consumption.

The primary exposure pathways to methylmercury and inorganic mercury assessed in this study include the following:

- Fish ingestion
- Surface water ingestion.

Human exposure to methylmercury in the environment is primarily driven by consumption of fish, as mercury biomagnifies in aquatic food webs (ECCC 2016; ATSDR 2024). Consumption of surface water can also contribute to risk, to a lesser extent, where measurable increases in surface water methylmercury concentrations occur. Therefore, human exposure through fish consumption is the primary pathway of concern for this assessment.

6.2 EXPOSURE ASSESSMENT

Exposure is calculated as a total daily dose (total amount of methylmercury or inorganic mercury taken in per day) from ingestion of surface water and fish. This value is called the estimated daily intake (EDI) expressed in milligrams of methylmercury or inorganic mercury per kilogram of body weight per day (mg/kg bw/day). The estimated daily intake was calculated based on the concentration of methylmercury or inorganic mercury in fish and surface water, receptor-specific parameters such as body weight, food and water ingestion rate.

6.2.1 EXPOSURE POINT CONCENTRATIONS

Exposure Point Concentrations (EPC) are an estimate of POPC concentrations in each relevant media to which receptors were assumed to be exposed. For the HHRA, the 95UCLM was selected as the EPC for baseline fish concentrations where data was available. The annual average concentration of the predicted monthly concentrations was selected as the EPC for the Baseline and Project phases for surface water and fish (Table 4-1). All values used in the HHRA are presented in Attachment E.

6.2.2 RECEPTOR CHARACTERISTICS

The HHRA used fish consumption rates defined in the FNFNES for Ontario for average and heavy consumers only in Ecozone 1 (Chan et al. 2014), which are summarized in Table 6-1. It is noted that one of the local Indigenous communities (ANA) participated in the food consumption survey completed for Ecozone 1 (i.e., Boreal Shield / Subarctic) along with the following five communities:

- Kitchenuhmaykoosib Inninuwug First Nation
- Kingfisher Lake First Nation
- Wauzhushk Onigum Nation
- Webequie First Nation
- Fort William First Nation.

Evidence indicates that fish consumption rates for the ANA community on its own are dramatically reduced due to historical mercury contamination from the Dryden release in 1965 (Mergler 2015). As such, fish consumption rates in the community are likely reduced and would be likely reflected in the Chan et al. (2014) assessment as almost 30% of First Nations women of childbearing age living in the Boreal Shield/Subarctic area (Ecozone 1) exceeded the Health Canada hair mercury guideline (Chan et al. 2014). However, fish consumption rates in Ecozone 1 were based on multiple communities and the overall consumption rates likely provide a better estimate of consumption rates that are representative of rates unimpeded by potential environmental contamination and health concerns. The sum of fish consumption rates in Table 6-1 (i.e., sum of Northern Pike, Walleye and Whitefish) indicates that the adult (females + males) combined heavy consumer would consume 203 grams per day in Ecozone 1 (i.e., 95th percentile of consumers only combined adult males + females), which is similar to the adult fish consumption rate of 220 grams/day for eaters only reported by Richardson (1997). The Richardson (1997) consumption rates were derived from 24 hour recall studies investigating fish and wild game consumption data among a 2250 person sample of Indigenous peoples in Canada, from data collected in 1971 and 1972 as part of the Nutrition Canada Survey. Finally, a memo (GNLPT 2025) from ANA indicated that the pre-contamination fish consumption rate was 200 pounds/person/year, which is equivalent to 249 grams/day. This is almost equivalent to the sum of the adult male heavy consumer consumption rate in Ecozone 1 (242 grams per day, Table 6-1), which indicates that rates used in the assessment are representative of historical subsistence consumption rates as well.

The FNFNES study (Chan et al. 2014) does not present toddler consumption rates because the FNFNES study only surveyed adults. As such, the toddler consumption rates were calculated using the toddler-to-adult consumption ratio of 0.5 calculated with Richardson (1997). The ratio of 0.5 is based on the calculated ratio of toddler and adult female subsistence fish consumption rates of 180 and 95 grams/day, which indicates that the toddler consumption rate is approximately 50% of the adult female consumption rate (Richardson 1997). The toddler fish consumption rates are presented in Table 6-1 based on the adult female consumption rate for the average and heavy consumer. The adult female consumption rate was assumed as a proxy for the toddler consumption rate as it was assumed that the toddler consumption rate was better aligned with the adult female of the household rather than the adult male or combined sexes. Richardson (1997) demonstrates that the toddler consumption rate is 53% of the adult female consumption rate, where as the toddler is 35% of the adult male.

Receptor characteristics such as drinking water consumption rates and body weights were obtained from Richardson (1997), presented in Health Canada (2024), and are summarized below in Table 6-22.

6.3 TOXICITY ASSESSMENT

6.3.1 METHYLMERCURY

Oral TRVs for the protection of human health (sensitive individuals and general population) from exposure to methylmercury are available from government agencies. A summary of the toxicological basis of the methylmercury TRVs provided by Health Canada (2025) which were developed historically in consultation with the World Health Organization and Joint Expert Committee of Food Additives (Feeley and Lo 1998; WHO 2003), are presented in Table 6-3. The toxicological basis of the TRVs for the general population and sensitive individuals' group was neuro-developmental toxicity and the benchmark dose for the sensitive group was developed for the protection of pregnant women and children via delayed neurotoxicity from fetal exposure *in utero*. The calculated oral TRVs were based on pharmacokinetic models that were used to convert measured hair or blood concentrations associated with adverse neurocognitive outcomes to an oral dose (i.e., mg/kg/day). Table 6-3 presents the benchmark doses in hair or blood derived from the epidemiological studies, which were divided by uncertainty factors to estimate the associated oral dose via kinetic modelling. A summary of the toxicological basis of the TRVs is presented below.

The TRVs developed by Health Canada were based on the findings of two epidemiological studies, the Seychelles Islands in the Indian Ocean and the Faroe Islands in the North Atlantic Ocean and consulted the findings of the New Zealand cohort study. Adverse cognitive outcomes such as verbal memory, motor control or attention performance were observed based on neuropsychological tests in the Faroe Island cohort but not in the Seychelles cohort. There are differences in the dietary patterns and frequencies in fish consumption between the two studies. The Faroese population consumed fish one to two times per week on average and a considerable number of marine mammals (average mercury levels about 1.6 mg/kg in marine mammals; Clarkson and Magos 2006), whereas the Seychelles population consumed a lot of marine seafood but limited marine mammals.

The Seychelles cohort studies followed over 700 infant-mother pairs enrolled in 1989 to 1990 from birth until the age of 19 years (van Wijngaarden et al. 2013). There are important aspects worth consideration for this study, such as (ATSDR 2009):

- The consumption rate was high, and a variety of ocean fish was consumed (8 to 12 meals per week)
- The median total mercury concentration in fish was less than 1 mg/kg
- The Seychelles island is situated more than 1,600 km from any continent or large population centre
- The cohort study included a large sample size
- The study was based on standardized neurobehavioral tests.
- The most recent assessment of neurodevelopment in the cohort at age 19 (van Wijngaarden et al. 2013) did not find evidence of impairment, including scholastic achievement, problematic behaviours and intelligence quotient (IQ) deficits.

The Faroe Island cohort study included approximately 900 mother-child pairs, and the detailed study observed neuropsychological effects in children from prenatal mercury exposure (Grandjean et al. 1997). However, it has been pointed out by several authors that most of the mercury exposure came from episodic ingestion of whale meat with mercury concentrations ranging from 2 to 3 ppm and that whale meat would have contained other anthropogenic and persistent compounds like polychlorinated biphenyls and dichlorodiphenyldichloroethylene (Weihe and Joensen 2012). The Faroe Islands study found associations between prenatal cord blood mercury concentrations and decreased cognitive performance tests at age 7, 14 and 22 years of age (ATSDR 2024). The cognitive associations were not consistent among most tests, but consistent associations were observed with cord mercury levels and the Boston Naming Test, the Woodcock-Johnson test of synonyms and antonyms, Neurobehavioral Evaluation Systems Continuous Performance Test Hit Reaction Time latencies and Neurobehavioral Evaluation

Systems Finger Tapping tests. However, there is disagreement with government agencies about what constitutes an acceptable level of exposure to mercury, due to the selection of different dose-response models, uncertainty factors and datasets by agencies during the derivation of TRVs for the protection of human health. The lower confidence limits on the benchmark dose (BMD) for maternal hair mercury concentrations and neurodevelopmental endpoints (e.g., visual-motor coordination and cognitive ability) in children for other cohort studies (e.g., Nunavik region of arctic Canada, Amazonian riverine populations, Madeira Portugal) conservatively determined a lower BMD hair mercury concentration around 10 to 14 µg/g (ATSDR 2024), which is consistent with Health Canada (2025).

Measured blood and hair concentrations are used for estimating both exposure and risks from methylmercury in fish. Overall, Health Canada supports the following broad classifications regarding adverse effects (Health Canada cited in Feeley and Lo 1998; INAC 2009; Environment Canada 2010):

- Hair mercury concentrations less than 5 ppm (or 20 µg/L in blood) are considered to be normal.
- Hair mercury concentrations between 5 and 25 ppm (25 to 100 µg/L in blood) are considered increased risk.
- Hair mercury concentrations above 25 ppm (or 100 µg/L in blood) are considered to be at risk.

The HHRA used the following toxicity reference values to calculate risks based on predicted methylmercury exposures (Health Canada 2025a):

- An oral toxicity reference value of 0.0002 mg/kg/day was used for toddlers and females of childbearing age.
- An oral toxicity reference value of 0.00047 mg/kg/day was used for adult males and the general population.
- In 2025, Health Canada published an updated guidance document for their TRVs (Health Canada 2025a). For this revision, Health Canada reviewed emerging data and regulatory decisions from other jurisdictions since its last published 2021 guidance. The oral TRV for methylmercury was not updated from the previous 2021 version and has remained the same since its derivation in 2007. The TRV aligns with other regulatory bodies, such as provisional tolerable weekly intake of 1.6 µg/kg body weight for sensitive populations (i.e., children and people of child-bearing age) from the Joint FAO/WHO Expert Committee on Food Additives (JECFA 2007) and the tolerable weekly intake of 1.3 µg/kg bw from the European Food Safety Authority (EFSA 2012).

Health Canada has indicated that maternal mercury concentrations of 10 ppm in hair and / or 58 µg/L in blood are generally equal to the threshold for a 5% increased risk of developmentally delayed children (Health Canada 2021). Results from the Canadian Health Measures Survey in 2008 indicated that less than 1% of Canadian adults have total blood mercury concentrations above the Health Canada guideline value of 20 µg/L (Environmental Canada 2010).

6.3.2 INORGANIC MERCURY

Oral TRVs for the protection of human health from exposure to inorganic mercury are available from government agencies (i.e., Health Canada and United States Environmental Protection Agency; US EPA).

Health Canada (2025) provides a TRV for inorganic mercury of 3.0×10^{-4} mg/kgBW-day which is adopted from the US EPA RfD (Reference dose; 1995) as an oral tolerable daily intake (TDI).

The US EPA (1995) RfD is based on mercuric chloride (US EPA 1995), where the toxicological basis of the TRVs was autoimmune effects. The RfD for mercuric chloride is protective of the health of the human population, including sensitive groups. The RfD is derived from a Drinking Water Equivalent Level (DWEL) of 0.010 mg/L which is based on three rat studies that reported low observed adverse effect levels (LOAELs) of 0.226 mg/kg/day, 0.371 mg/kg/day and 0.633 mg/kg/day (Drue et al. 1978, Bernaudin et al. 1981, Andres 1984; as cited in US EPA 1995). To derive the DWEL, a 0.739 of factor was used to convert mercuric chloride to divalent mercury (Hg2+), a 100% factor was applied to account for subcutaneous to oral route of exposure and a time-weighted average was used to account for days/week

of dosing. A total uncertainty factor of 1000 (10 for use of subchronic studies, 10 for intraspecies variability, and 10 for interspecies variability) was then applied to derive the DWEL. The RfD was back calculated from DWEL to derive a value of 3.0×10^{-4} mg/kgBW-day, which was selected as the oral TRV for inorganic mercury in the assessment.

6.4 RISK CHARACTERIZATION

This section presents a comprehensive assessment of human health risks related to methylmercury and inorganic mercury exposure from surface water and fish consumption based on site-specific data and established toxicological frameworks. As is best practice, predicted human exposures are quantified using a model that incorporates local consumption rates, fish mercury levels and other receptor characteristics. Risk characterization integrates multiple lines of evidence comparing estimated exposures to reference doses.

The HHRA assessed human health risks from consumption of methylmercury and inorganic mercury containing fish and surface water for each segment and the following assessment cases:

- Baseline Case (baseline): representing total risk (Hazard Quotient; HQ) from consumption of fish and surface water at baseline concentrations, using measured methylmercury and inorganic mercury concentrations in fish (represented by the estimated 95UCLM of the available fish data where sufficient data is available or by the maximum concentration where data is limited). Surface water EPC in the HHRA were based on annual average of the predicted monthly concentrations (Table 4-1).
- Project Case (Project alone): representing incremental risk (HQ) from consumption of fish containing incremental methylmercury and inorganic mercury concentrations due to the Project on its own, based on the change in predicted methylmercury and inorganic mercury concentrations in fish using site-specific fish BAFs and surface water mercury (i.e., methylmercury and inorganic mercury) concentrations. The incremental increase in annual average concentrations of the predicted monthly concentrations was selected as the EPC for the Project phase for surface water (Table 4-1).
- Application Case (Project plus baseline): representing total predicted risk (HQ) from consumption of fish and surface water due to the Baseline Case combined with predicted changes associated with the Project (i.e., (Project plus baseline). Based on the predicted methylmercury and inorganic mercury concentrations in fish and surface water due to the Project. Section 5.3 presents the equations that were used to predict Project plus baseline fish concentrations used in the HHRA and Section 6.4.1 presents the equations that were used in the HHRA to estimate risks (i.e., HQ values).

Attachment E presents the HHRA model and a worked example.

6.4.1 HAZARD QUOTIENT (HQ) METHODS

The following equation was used in the HHRA model to calculate HQs for exposure to methylmercury and inorganic mercury:

$$HQ = \frac{EDI}{TRV} = \frac{\frac{\sum IR_i \times C_j + (WIR_i \times C_{sw})}{BW_i}}{TRV} \qquad \textit{Equation 5}$$

Where

HQ = Hazard quotient (unitless)

EDI = Estimated daily intake for methylmercury or inorganic mercury (mg/kg-BW/day)

IR_i = Fish Ingestion rate of i^{th} receptor lifestage (toddler, adult female and male; kg/day)

C_j = methylmercury or inorganic mercury concentration in j^{th} fish (Walleye, Pike and Forage fish; mg/kg-WW)

WIR_i = Water ingestion rate of i^{th} receptor lifestage (toddler, adult female and

male; L/day)

C_{sw} = methylmercury or inorganic mercury concentration in surface water (mg/L)

BW_i = Body weight of i^{th} receptor life stage (kg)

TRV (mg/kg/day) = Oral toxicity reference value for methylmercury or inorganic mercury

The predicted methylmercury and inorganic mercury HQs for the Project Case (Project alone) were added to Baseline Case (baseline) HQs to determine the Application Case (Project plus baseline) HQs to evaluate the potential additional risk associated with Project effluent. The methylmercury and inorganic mercury HQs were assessed for the following Indigenous receptor groups, consumer types, locations and exposure pathways:

- Indigenous receptor groups (life stages): adult female, adult male, combined adults (i.e., males plus females) and toddler
- Consumer types: Indigenous heavy and average fish consumer
- Locations (waterbody segments): HQ values were predicted for the waterbody segments that corresponded with measured site-specific or provincial fish concentrations (i.e., Segment #1 Chikuni River, Segment #2 Pakwash Lake, Segment #7 Wegg Lake, Segment #13 Oak Lake, Segment #15 Maynard Lake, Segment #16 Tide Lake, Segment #17 Upper Ball Lake, Segment #18 Lower Ball Lake, Segment #19 Indian Lake). While measured site-specific or provincial fish concentrations were not available for a portion of the 20 waterbody segments included in the predictive mercury water quality modelling, HQs calculated for the segments with available fish concentrations were considered to be representative of the other segments due to the high degree of interconnectivity of these waterbodies from the English River system.
- Exposure pathways: Consumption of Northern pike, Walleye and Whitefish and consumption of raw surface water as a drinking water source while practicing traditional activities.

The estimated daily intake (EDI) and HQs for each receptor group, consumer type and location are presented in Attachment E. These exposure (i.e., mg/day and mg/kg/day) and risk estimates reflect cumulative methylmercury and inorganic mercury intake from consumption of Northern Pike, Walleye and Whitefish, along with surface water intake across the 20 exposure segments for each receptor group.

6.4.2 INTERPRETING HQ VALUES

To estimate the potential health risks from methylmercury and inorganic mercury exposure, HQ values were calculated using Equation 5, and these values were interpreted based on the risk characterization approach outlined by Health Canada (2023). A Project plus baseline HQ value of less than 1, which takes into account all exposures from baseline conditions (i.e., background) and the Project treated effluent discharge, suggests that adverse health effects are unlikely, whereas a value greater than 1 indicates that further consideration is warranted. Health Canada (2023) indicates that "*Where an HHRA evaluates only project-related exposures (excluding background estimated daily intake for sources not related to the project, including consumer products, food, air, and water), a target HQ of less than or equal to 0.2 will be deemed negligible to compensate for the exposures not taken into consideratio*n".

The interpretation of risks associated with baseline and / or predicted Project plus baseline HQ values above the benchmark value of 1 incorporates multiple lines of evidence that considers the following:

- The magnitude of the HQ values
- The magnitude of the potential contribution from Project (are Project alone HQs >0.2)
- The conservatism incorporated in the modelling of predicted surface water and fish concentrations, exposure modelling and consumption rate assumptions
- Comparison of the HQ values predicted for the average and heavy consumer

- Comparison of Project plus baseline projections of fish concentrations to Baseline fish concentrations to assess whether the predicted change (Project only) in concentrations would be measurable (observable) outside the range of natural variability.
- Comparison of Baseline and Project plus baseline mercury concentrations to other regions in Canada.
- Evaluation of the potential for changes in MECP fish consumption advisories associated with the Project projections of methylmercury and inorganic mercury in fish
- Health benefits of fish consumption.

6.4.3 METHYLMERCURY HQ VALUES

A detailed description of the results is presented below, and Attachment E provides the exposure model, calculated EDI and HQ values, along with a worked example. The risk results (i.e., HQ values) for the Baseline Case were presented below as a range representing the HQ values in Segments #1 and #2 (i.e., RSA) and maximum HQ in the downstream segments (i.e., Wegg, Oak, Maynard, Tide, Ball and Indian Lake). Methylmercury HQs for the Project alone Case were predicted for all segments.

6.4.3.1 HEAVY CONSUMER

Figures 6-1 to 6-4 present the predicted HQ values for methylmercury for the heavy consumer receptors (i.e., toddler, adult females, adults males, and combined adults) for the Baseline Case, Project Case and Project plus baseline for each water body segment, with percent increases due to the Project shown in comment bubbles. For toddler heavy consumers, Baseline Case HQs ranged from 4.4 (i.e., Segment 1 Chukuni River) to 13.8 (i.e., Segment 18 Lower Ball Lake). Under the Project only Case, HQs ranged from 0.001 to 0.16 (all less than 0.2), with all water body segments below the target of 0.2. When considering the combined Project plus baseline, the range of HQs were essentially the same as the range of HQs for the Baseline Case (between 4.4 and 13.8). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

For the adult female group, Baseline Case HQs ranged from 2.3 (i.e., Segment #1 Chukuni River) to 7.2 (i.e., Segment # 18 Lower Ball Lake), Project Case HQs ranged from <0.001 to 0.085, (all less than 0.2), and the range of Project plus baseline HQs were the same as the range of Baseline Case HQs (2.3 to 7.2). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

For the adult male group, Baseline Case HQs ranged from 1.6 to 4.5, Project Case HQs ranged from <0.001 to 0.061(all less than 0.2), and the range of Project plus baseline HQs were the same as the range of Baseline Case HQs (1.6 to 4.5). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

For the combined adult group (i.e., females + males), Baseline Case HQs ranged from 1.6 (i.e., Segment #1 Chukuni River) to 4.5 (i.e., Segment # 18 Lower Ball Lake), Project Case HQs ranged from <0.001 to 0.059(all less than 0.2), and the range of Project plus baseline HQs were the same as the range of Baseline Case HQs (1.6 to 4.5). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

6.4.3.2 AVERAGE CONSUMER

Figures 6-5 to 6-8 present the predicted HQ values for methylmercury for the average consumer receptors (toddler, adult females, adult males, and combined adults) for the Baseline Case, Project Case and Project plus baseline for each water body segment. For toddler average consumers, Baseline Case HQs ranged from 1.2 to 3.7, with all water body segments greater than the threshold value of 1. Under the Project only Case, HQs ranged from <0.001 to 0.044, with all water body segments below 0.2. When considering the combined Project plus baseline, the range of HQs were the same as the range of Baseline Case HQs (between 1.2 to 3.7). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

For the adult female group, Baseline Case HQs ranged from 0.62 to 2.0 and Project Case HQs ranged from <0.001 to 0.023(all less than 0.2). The Project plus baseline range of HQs were the same as range of Baseline Case HQs (0.62 to 2.0). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

For the adult male group, Baseline Case HQs ranged from 0.39 to 1.1 and Project Case HQs ranged from <0.001 to 0.015(all less than 0.2). The Project plus baseline range of HQs were the same as range of Baseline Case HQs (0.39 to 1.1). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

For the combined adult group (i.e., females + males), Baseline Case HQs ranged from 0.33 to 1.0 and Project Case HQs ranged from <0.001 to 0.013(all less than 0.2). The Project plus baseline range of HQs were the same as range of Baseline Case HQs (0.33 to 1.0). Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

6.4.3.3 MAGNITUDE OF METHYLMERCURY HQ VALUES

Across all receptor groups and consumption scenarios, Baseline HQ values for methylmercury are often greater than the threshold value of 1, indicating potential health risks under existing conditions and assumed subsistence fish consumption rates. This is reflected in the presence of current MECP fish consumption advisories in the area. However, Project-related contributions to HQ values were negligible, with Project only HQ values ranged from <0.001 to 0.16, all below the Health Canada benchmark HQ value of 0.2 (Health Canada 2023) where a target HQ of less than or equal to 0.2 would be deemed negligible and the risk assessment may conclude that there is negligible anticipated increased human health risks associated with predicted increased exposure to methylmercury.

It is important to note that the negligible increases in HQ values associated with the Project should be considered conservative and are based on very small (undetectable) predicted increases in fish and surface water which are within the existing range of measured baseline concentrations. As noted in Section 5, the modelled Project only contributions to fish tissue methylmercury concentrations are so small (equal to or less than the RDL) that they would be analytically undetectable from baseline concentration variability.

Modelled Application concentrations (Baseline plus Project) remain within the range of existing baseline variability conditions (see baseline concentration intervals; Table 5-7) for each fish species. The HHRA exposure model also included the consumption of raw surface water on a chronic basis and in all instances the drinking water pathway contributed less than 0.1% to the HQs, as such the consumption of methyl mercury via surface water is not expected to result in unacceptable risks.

6.4.4 INORGANIC MERCURY HQ VALUES

A description of the results related to inorganic mercury is presented below. Attachment E provides all estimated HQ values and a worked example. The risk results (i.e., HQ values) for the baseline case were presented below as a range between the maximum HQ value in Segments #1 and #2 (i.e., the Project RSA) and the maximum HQ in the downstream waterbody segments (i.e., Wegg, Oak, Maynard, Tide, Ball and Indian Lake). Inorganic mercury HQs for the Project alone case were predicted for the RSA only.

6.4.4.1 HEAVY CONSUMER

Figures 6-9 to 6-12 present the predicted HQ values for inorganic mercury for the heavy consumer receptors (i.e., toddler, adult females, adults males, and combined adults) for the baseline case, Project case and Project plus baseline case for each relevant water body segment. For toddler heavy consumers, baseline case HQs ranged from a maximum of 1.0 within the Project RSA (i.e., Segment 1 Chukuni River) to a maximum of 1.7 within downstream waterbodies (i.e., Segment 18 Lower Ball Lake). Under the Project case, HQs ranged from 0.035 to 0.072 (less than the target of 0.2) within the RSA with no incremental change predicted in downstream waterbodies. When considering the combined Project plus baseline, the maximum HQ within the RSA was slightly higher (i.e., HQ value of 1.1 at Chukuni River versus 1.0 at baseline) based on conservative assumptions related to the mass balance and water quality

model. Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E and illustrated in Figure 6-9.

For the adult female group, baseline case HQs ranged from a maximum of 0.54 within the Project RSA (i.e., Segment 1 Chukuni River) to 0.87 within downstream waterbodies (i.e., Segment 18 Lower Ball Lake). Under the Project case, HQs ranged from 0.038 to 0.018 (less than the target of 0.2) within the RSA. When considering Project plus baseline, the range of HQs (0.57 in the RSA to 0.87 in downstream segments) were similar to the range of Baseline Case HQs. Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E and illustrated in Figure 6-10.

For the adult male group, baseline case HQs ranged from a maximum of 1.1 within the RSA (i.e., Segment 1 Chukuni River) to a maximum of 1.3 within downstream waterbodies (i.e., Segment 18 Lower Ball Lake). Under the Project case, HQs ranged from 0.033 to 0.07(less than the target of 0.2), and Project plus baseline range of HQs (1.2 in the RSA to 1.3 in downstream segments) were similar to the range of Baseline Case HQs. Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E and illustrated in Figure 6-11.

For the combined adult group (i.e., females + males), Baseline Case HQs ranged from a maximum of 1.1 within the RSA (i.e., Segment 1 Chukuni River) to a maximum of 1.3 in downstream waterbody segments (i.e., Segment 18 Lower Ball Lake). Under the Project case, HQs ranged from 0.031 to 0.06 (less than the target of 0.2), and Project plus baseline range of HQs (1.1 in the RSA to 1.3 in downstream segments) were similar to the range of Baseline Case HQs. Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E and illustrated in Figure 66-12.

6.4.4.2 AVERAGE CONSUMER

Figures 6-13 to 6-16 present the predicted HQ values for the average consumer receptors (i.e., toddler, adult females, adults males, and combined adults) for the baseline case, Project case and Project plus baseline for each water body segment. In all instances the predicted HQ values (i.e., Project plus baseline) for inorganic mercury and all receptors were below the target of 1.0 and all Project-related HQ values were less than the target of 0.2. As such, inorganic mercury risks to receptors based on average consumer consumption rates are not expected. Full results showing HQ values and percent increases for each segment and scenario are provided in Attachment E.

Further discussion and interpretation of the methylmercury (i.e., average and heavy consumer) and inorganic mercury (i.e., heavy consumer) risks are provided below.

6.4.4.3 MAGNITUDE OF THE INORGANIC MERCURY HQ VALUES

For the heavy consumer, baseline HQ values for inorganic mercury were above the threshold value of 1 in some waterbodies for all receptor groups except for adult females, indicating potential health risks under existing conditions. This is reflected in the presence of current MECP fish consumption advisories in the area. For the average consumer, baseline HQ values for inorganic mercury were below the threshold value of 1 for all receptor groups and waterbodies.

Project-related contributions to HQ values were very small, with Project alone HQ values below the Health Canada benchmark of 0.2 (Health Canada 2023), which is considered negligible. It is important to note that the negligible increases in HQ values associated with inorganic mercury and the Project should be considered conservative and are based on very small (undetectable) predicted increases in fish and surface water which are within the existing range of measured baseline concentrations. Therefore, the risk assessment may conclude that there is no anticipated increased human health risks associated with predicted increased exposure to inorganic mercury in fish and surface water.

Baseline HQ values for inorganic mercury have been predicted for waterbodies within the RSA (i.e., Chukuni River and Pakwash Lake) and downstream waterbody segments. Since no changes are predicted for inorganic mercury downstream of the RSA, Project-related inorganic mercury HQs are only calculated within the RSA. The HHRA exposure model also included the consumption of raw surface water on a chronic basis and in all instances the drinking water pathway contributed less than 0.1%, as such the consumption of inorganic mercury via surface water is not expected to result in unacceptable risks.

6.4.5 DISCUSSION OF MERCURY HQ VALUES

The highest predicted Project alone methylmercury HQ values were calculated for the heavy consumer toddler, with an HQ of 0.16 (i.e., Pakwash or Segment 2), which is associated with fish methylmercury concentrations ranging from 0.0045 to 0.012 mg/kg-WW (for all fish - Northern Pike, Walleye and Whitefish). Risks are entirely related to existing Baseline conditions, with maximum Project only HQ value of 0.16 for the toddler at Pakwash Lake, which is below the Health Canada target HQ of 0.2 which is considered negligible for Project related contributions.

The highest predicted Project alone inorganic mercury HQ values were calculated for the heavy consumer adult male in the RSA with an HQ of 0.067 (i.e., Chukuni River or Segment 1), which is associated with fish inorganic mercury concentrations ranging from 0.0046 to 0.0080 mg/kg-WW (for all fish - Northern Pike, Walleye and Whitefish). As with methylmercury exposures, the risks are entirely related to existing Baseline conditions. It is important to mention that all Project only HQ risks are below the HQ of 0.2 which is considered negligible for Project related contributions.

Multiple lines of evidence were used to help further characterize human health risks associated with mercury (i.e., inorganic mercury and methylmercury) exposure through fish consumption.

6.4.5.1 FISH CONCENTRATION COMPARISON TO OTHER REGIONS

Project plus baseline (Application case) total mercury concentrations in fish within the RSA (i.e., Chukuni River and Pakwash Lake) were compared to levels reported across Canada. In Alberta, fish mercury by the Regional Aquatics Monitoring Program between 2008 to 2014, showed total mercury concentrations in Northern Pike ranging from 0.08 mg/kg-ww to 0.44 mg/kg-ww, Walleye from 0.05 mg/kg-ww to 0.66 mg/kg-ww, and Whitefish from 0.03 mg/kg-ww to 0.11 mg/kg-ww (Government of Alberta 2019). A national assessment by Depew et al. (2012) of skinless fillet freshwater fish species (Canadian Fish Mercury Database 1967 to 2010) reported median mercury concentrations of 0.38 mg/kg-ww (range < detection limit [DL] to 10.9 mg/kg-ww) in Northern Pike, 0.41 mg/kg-ww (range < DL to 10.4 mg/kg-ww) in Walleye, and 0.09 mg/kg (range < DL to 3.73 mg/kg-ww) in Lake Whitefish. A more recent study by Jansen in 2021 also found similar concentrations in Lake Winnipeg, Manitoba (2010 to 2019) with Northern Pike ranging from 0.22 mg/kg-ww to 0.35 mg/kg-ww, Walleye ranging from 0.085 mg/kg-ww to 0.14 mg/kg-ww, and Lake Whitefish 0.011 mg/kg-ww to 0.028 mg/kg-ww. Finally, Gandhi et al. (2014) presented medium sized Walleye (50cm length) and Northern Pike (60cm length) mercury concentrations for northern Ontario fish between 2000 to 2012 that ranged from approximately 0.5 to 0.8 mg/kg-WW and 0.4 to 0.7 mg/kg-WW, respectively (i.e. based approximately on box plots presenting 25th and 75th percentiles). Baseline and predicted (Project plus baseline) concentrations from the RSA fell within or closely aligned with these ranges, indicating that levels in fish in the Project area are consistent with those found in regions across Canada, and that trophic position remains a key driver of mercury accumulation within top predators (Northern Pike and Walleye) having the highest concentrations in comparison to Lake Whitefish.

6.4.5.2 BIOMONITORING DATA

Historical biomonitoring data from the 1970s revealed elevated mercury concentrations in biomonitoring data (e.g., hair, blood, and / or umbilical cord samples) among ANA residents (Philibert et al. 2020, 2022). However, levels declined sharply through the late 1970s. More recent measurements from 2008 to 2016, reported by the FNFNES, indicate that participants from Ecozone 1 exhibited slightly higher mercury levels compared to other ecozones (Chan et al. 2014). Despite this, the vast majority of measured hair concentrations across all age groups, including women of childbearing age, remained well below Health Canada's guidance value of 6 µg/g in hair (Chan et al. 2014). The English-Wabigoon river system has been determined to remain impacted by mercury after the 1960-s discharge from the chlor-alkali plant in Dryden from remobilization of legacy mercury from riverbank erosion between Dryden and Clay Lake which stimulates methylmercury production in Clay Lake and Ball Lake (Rudd et al 2021).

6.4.5.3 AVERAGE VERSUS HEAVY CONSUMERS

Chan et al. (2014) presents consumption rates for the average and heavy consumers, and there is a stark contrast in the consumption of wild fish, organ meat and birds by heavy consumers compared to average consumers. Heavy consumer consumption rates for fish are 3.3 to 5.5 times higher than the average consumer. Also, it is important to note that the average consumer consumption rate is assumed to be more representative of typical consumption rates throughout the community; whereas, the heavy consumer conservatively represents a small portion of individuals in the community (i.e., <5%) as the heavy consumer consumption rates are based on the 95th percentile of consumption rates in surveyed population. The calculated HQs based on the heavy consumer are therefore considered conservative.

6.4.5.4 BENEFITS OF FISH CONSUMPTION

For Indigenous Peoples, connecting to the land through traditional practices such as harvesting traditional foods for sustenance and medicine is an integral part of supporting their human health and community well-being. Confidential reports prepared for Indigenous communities in the region, indicate that Indigenous Peoples have fished, hunted, and foraged plants, berries, and other resources across their traditional territories since time immemorial. Thus, effects to the environment can directly affect the quality of Indigenous foods.

There is good evidence that traditional foods provide nutritional benefits and can reduce risk factors for the development of certain health concerns such as chronic disease (Mozaffarian and Rimm 2006; Del Gobbo et al. 2010; Seabert et al. 2014). Historically, traditional foods were high in protein, nutrient-rich, low in fat and high in marine fats (Earle 2011). Numerous studies have reported that traditional diets are rich in sources of omega-3 fatty acids, docoasahexaenoic acid (DHA), eicosapentaenoic acid (EPA), micronutrients such as iron, zinc, copper, magnesium, manganese, phosphorus, potassium, selenium and vitamins A, C, D, E and B-6 (Earle 2011).

Fish consumption serves as an essential source of nutrition, especially for EPA and DHA (i.e., omega-3s), among other nutrients that are irreplaceable by other food substitutes (Tanamal et al. 2021). Omega-3s play important roles as components of cell membranes and as an energy source for the body and are used to form eicosanoids. Eicosanoids are signaling molecules with wide-ranging functions in the body's cardiovascular, pulmonary, immune and endocrine systems (NIH ODS 2024a). Minerals such as magnesium, copper, zinc, iron and selenium are important for optimal function of the immune system and support in regulating inflammation in the body (Weyh et al. 2022). Vitamins are essential for supporting various bodily functions. Vitamin A plays a role in vision, the immune system and reproduction, while Vitamin D supports bone strength. Both Vitamin C and E act as antioxidants in the body to protect against cell damage (NIH ODS 2021a, 2021b, 2024b, 2025).

A nationwide study on Indigenous Nations adults living on reserves across Canada and in 11 different ecozones was carried out between 2008 to 2016 (FNFNES 2021). The FNFNES is currently the most comprehensive study conducted within Canada that provides information on nutritional adequacy, quality and safety of traditional foods consumed by various Indigenous Peoples across different ecozones. One of the key findings from the FNFNES study was that traditional food has higher nutritional quality than store-bought foods, and the inclusion of traditional foods in one's diet significantly improves diet quality. It was determined that traditional foods are safe for consumption with two key exceptions:

- Large predatory fish (e.g., Walleye and Northern Pike) which may have higher levels of mercury in some areas of Canada
- Harvested mammals and birds that were hunted using lead-based ammunition can have high levels of lead in the meat.

Therefore, while an elevated risk of exposure to chemicals can occur from consumption of these fish and wild game tissues, avoiding certain fish species and using different forms of ammunition can reduce exposure to common chemicals in traditional foods. One key recommendation that came out of the FNFNES study was to promote the consumption of traditional foods as a healthy food source by supporting health communication on the importance of relying on traditional foods while decreasing the potential exposure to environmental chemicals, and the development of ecozone-specific fish consumption guidance. The recommendation to consume traditional foods is echoed by the First Nations

Health Authority (FNHA) who recommend increasing the use of traditional foods to reduce risks of chronic disease (FNHA 2014).

Thus, the consumption of wild fish provides a health benefit that can outweigh the risk of exposure to tissue-bound chemicals when consumed in the recommended limits (Mozaffarian and Rimm 2006). Despite this, sensitive populations such as children under the age of 15 and pregnant people or those who may become pregnant, should reduce consumption of higher trophic level predator species, as these species have an increased potential for the bioaccumulation of mercury (Chan et al. 2014).

6.4.5.5 FISH CONSUMPTION ADVISORIES

The MECP (2018) maintains a Fish Chemical Monitoring Program (FCMP), through which it issues fish consumption advisories for the protection of human health (i.e., general population). These advisories are created on a waterbody and species-specific basis and are based on measured fish tissue concentration data collected by the MECP. The consumption advisories are based on the most recent and relevant data as is available and are applicable to everyone. These advisories present the calculated maximum number of fish meals per month an individual is advised to consume based on the total parameter concentration measured in the fish tissue. The MECP advisories exist for the waterbody segments assessed for the HHRA (Pakwash Lake, Wegg Lake, Oak Lake, Maynard Lake, Tide Lake, Upper Ball Lake, Lower Ball Lake, Indian Lake, English River) except for Chukuni River It should be noted that mercury fish tissue burdens can fluctuate between waterbodies within the same system, While consumption advisories were not provided for Chukuni River, there is a high degree of interconnectivity of these waterbodies in the English River system, therefore advisories created for adjacent waterbodies can be insightful when considering risks related to fish consumption in waterbodies without consumption advisories.

The MECP has created consumption advisory benchmarks for total mercury based on the Health Canada methylmercury TRVs (Health Canada 2025a) to determine the acceptable number of fish meals per month an individual can consume. This assumes that total mercury in fish is 100% methylmercury. Benchmarks for the general population and sensitive populations have been created. Sensitive populations include children under the age of 15 and people who are pregnant or may become pregnant. The MECP fish consumption advisory benchmarks for total mercury can be found in Table 6-4. The advisories recommend consumption rates that would be lower than Indigenous subsistence (heavy) consumption rates. For example, if total mercury concentrations are measured to be between 0.25 to 0.5 mg/kg-WW in fish from a waterbody, then a sensitive individual is advised to only consume 4 meals per month (i.e., 1 meal per week), which is equivalent to 15 grams/day for a toddler (i.e., based on meal size of 227 grams and 31 days in a month). However, the HHRA assumed that an indigenous toddler would consume 15 or 57 grams/day for the average or heavy consumer, respectively. Therefore, the MECP consumption advisories recommend consumption rates that are below subsistence levels of consumption for the heavy consumer.

The FCMP uses baseline sample data to calculate a power regression relationship between chemical level and fish body length. This results in a function that is specific to each waterbody, chemical, and fish species, that can estimate tissue concentrations based on body length. This regression function is used to calculate chemical concentration of a particular fish species for every 5 cm size intervals relevant to human consumption. This relationship is determined for each commonly consumed species in the waterbody. To determine the fish consumption advisory, the predicted fish tissue concentration for all relevant size intervals is compared to the fish consumption advisory benchmarks (Table 6-5).

To understand the effects of the Project on mercury levels in fish, predicted Project related concentrations of methylmercury in fish were compared to the fish consumption advisory benchmarks. In this analysis, assumed baselines were set as the mid-point of the sensitive population tissue concentration benchmark for each meals per month category; this mid-point is calculated as the average between the top bound and the bottom bound of the benchmark, added to the bottom bound. The maximum project related incremental change in total mercury was added to the calculated mid-point for each species. This new Project + Baseline concentration was then compared to the relevant benchmark to conclude if a step to the next meals per month category would occur. Details of this analysis can be seen in Table 6-5.

The incremental change in mercury concentration in the tissues of all three species, when added to the mid-point of each benchmark, remains below the upper limit of the relevant benchmark in any of the

meals per month categories. This indicates that the Project is not anticipated to trigger a change in fish consumption advisories in the area. The maximum predicted incremental change to fish tissue mercury concentrations is very small when compared to the FCMP consumption benchmarks for mercury. The maximum Project related increase in tissue methylmercury, for all species, is less than 50% of the magnitude of the benchmark range for all benchmarks. Based on an assumed baseline of the mid-point of the benchmark range, the modelled addition of Project related mercury does not result in a need for a change in the recommended allowable meals per month.

6.5 UNCERTAINTY, CONSERVATIVE ASSUMPTIONS AND SENSITIVITY ANALYSIS

6.5.1 UNCERTAINTY ANALYSIS

As a result of the scientific investigations, literature reviews and risk assessment guidance followed in the preparation of this Mercury Study Report, it is believed that the risk assessment results present a reasonable yet conservative evaluation of the risk to human receptors from baseline exposure and predicted exposure from the Project. Uncertainty analysis investigates the lack of knowledge about a certain population or the value of model input parameters. Uncertainty can sometimes be reduced through further study and by collecting additional data (US EPA 2009). Where uncertainty was encountered in the development of the risk estimates, reasonable yet conservative assumptions were made, or data were selected, to prevent the underestimation of risks.

Table 6-6 presents a summary of the uncertainty identified and conservative assumptions used in the HHRA. The overall interpretation is that the risks are likely overstated, such that, risks are not underestimated and should be considered conservative.

The main areas of uncertainty and conservative assumptions in the HHRA are summarized as follows:

- **Differences in confidence of measured baseline mercury concentrations in fish sampled from waterbody** (i.e., Segment #1 Chikuni River, Segment #2 Pakwash Lake, Segment #7 Wegg Lake, Segment #13 Oak Lake, Segment #15 Maynard Lake, Segment #16 Tide Lake, Segment #17 Upper Ball Lake, Segment #18 Lower Ball Lake, Segment #19 Indian Lake) **:** There is robust and recent fish sample data from the Chukuni River (i.e., Segment 1); however, the sample data used to calculate baseline risks for Pakwash Lake (i.e., Segment 2) downstream to Indian Lake (i.e., Segment 19) are over 10 years old. There is a noticeable difference between recent fish sample mercury concentrations from Chukuni River compared to historical samples from Maynard Lake (Segment 15), Ball Lake (Segments 17 and 18), and Indian Lake (Segment 19), which are presented in Figure 6-17 to 6-19, respectively. Therefore, the baseline risks presented for lakes south of Pakwash Lake are likely similar or maybe overstated by using the available older baseline data. Additional fish sampling from water bodies downstream of Pakwash Lake was completed in the fall of 2025 but analytical results were still pending at the time of writing of this report.
- **Calculated site-specific BAF values used in the HHRA:** The calculated BAF values were based on co-located fish and surface water samples from the Chukuni River between 2022 to 2024. The fish samples used in the calculations were standardized to fish lengths for human consumption. A mathematical model was explored to determine relationships between plankton (benthic invertebrates and zooplankton), fish and surface water (i.e., food web model); however, the analysis indicated a weak relationship between plankton and surface water concentrations. As such, site-specific fish BAFs were based on measured surface water concentrations and fish (i.e., Northern Pike, Walleye and forage fish). The US EPA (1997) noted that the mean BAFs derived from field studies are believed to be better estimates of mercury bioaccumulation in natural systems than values derived from laboratory studies. The calculated BAFs are considered representative as they are based on measured field data that implicitly includes the mercury relationships between plankton (benthic

invertebrates and zooplankton), fish and surface water (i.e., food web model) and are in alignment with BAFs reported in literature.

- **Fish consumption rates assumed for average and heavy consumers:** Evidence indicates that fish consumption rates for the ANA community are dramatically reduced due to historical mercury contamination from the industrial plan release in 1965 (Mergler 2015). The HHRA used fish consumption rates defined in the FNFNES for Ontario for average and heavy consumers only in Ecozone 1 (Chan et al. 2014). The Chan et al (2014) study surveyed six communities in Ecozone 1, which included the ANA community. This study represents the best source of information for characterizing Indigenous traditional food consumption rates in Canada. A memo (GNLPT 2025) from ANA indicated that the pre-contamination fish consumption rate was 200 pounds/person/year, which is equivalent to 249 grams/day. The sum of the adult male heavy consumer consumption rate in Ecozone 1 (Chan et al 2014) was 242 grams per day, which indicates that consumption rates assumed in the assessment are likely representative of pre-contamination ANA subsistence rates. Further, the consumption rates are similar to the adult fish consumption rate of 220 grams/day for eaters only reported by Richardson (1997), which was derived from studies investigating wild game consumption data among a sample of 2250 Indigenous participants in Canada from data collected in 1971 and 1972 as part of the Nutrition Canada Survey. Therefore, the fish consumption rates from Chan et al (2014) were considered representative for use in the HHRA.

6.5.2 SENSITIVITY ANALYSIS

Sensitivity analysis is the study of how a model's response can be apportioned to changes in model inputs (US EPA 2009). Sensitivity analysis is an evaluation tool for characterizing the most and least important sources of uncertainty in exposure and risk models. Sensitivity analysis should not be confused with uncertainty analysis which investigates the lack of knowledge. A sensitivity analysis was completed based on the following:

- **Evaluation of risks based on US EPA MeHg TRV:** The HHRA calculated toddler and adult female risks based on the Health Canada (2025) methylmercury TRV of 0.0002 mg/kg/day which was recently updated based on a Health Canada toxicological review, including a review of the current US EPA TRV which is 0.0001 mg/kg/day. Since the USEPA TRV is two times lower than the Health Canada TRV, using the US EPA TRV as an input value to the HHRA model would increase the magnitude of the HQ values by a factor of 2. For, example, the Baseline Case HQs for the heavy consumer adult female group ranged across the water bodies from 2.3 (i.e., Chukuni River) to 7.2 (i.e., Lower Ball Lake), Project only Case HQs ranged from <0.001 to 0.085 (all less than 0.2), and the resulting range across water bodies of Project plus baseline HQs were the same as Baseline Case HQs (2.3 to 7.2) indicating no observable increase in risk from the Project. Using the US EPA TRV in the risk calculations would increase the Baseline Case HQs which would range from 4.6 (i.e., Chukuni River) to 14.4 (i.e., Lower Ball Lake), the Project Case HQs which would range from <0.001 to 0.17 (all less than 0.2), however the range of Project plus baseline HQs would still be the same as Baseline Case HQs (4.6 to 14.4), indicating no observable increase in risk from the Project.
- **Evaluation of risks based on different consumption patterns of fish:** The adult female heavy consumer was assumed to eat 38, 38 and 38 grams per day of Northern Pike, Walleye and Whitefish, respectively (sum = 113 grams per day for all fish combined). The Baseline and Project only HQs were calculated to be 2.3 and <0.001 at Chukuni River in the HHRA, respectively (see Attachment E). A sensitivity analysis was completed to evaluate the HQs if it was assumed the adult female preferred a single species. The Baseline Case HQs are predicted to be 3.0, 2.7 and 1.3 when total consumption (i.e., 113 grams/day) is based on Northern Pike, Walleye or Whitefish on its own, respectively. Similarly, the Project only Case HQs are predicted to be <0.001, <0.001 and <0.001 when total consumption (i.e., 113 grams/day) is based on a single species of Northern Pike, Walleye or Whitefish, respectively. The analysis indicates that shifting a diet or consumption pattern away from predatory fish (i.e., Northern Pike and Walleye) and increasing consumption of non-predatory fish (e.g., Lake Whitefish) can reduce risks. The analyses also illustrates that there is no observable increase in risk from the Project regardless of the fish species consumed.

- **Evaluation of Project risks based on more realistic sulphate effluent discharge rates:** The HHRA HQs were based on the upper case or most conservative Scenario 1 projections of MeHg surface water concentrations in Segment 1 to Segment 20 based on a maximum sulphate concentration of 400 mg/L and effluent rate of 1330 m^3/hour. Table 4-17 (Section 4) presents the predicted MeHg concentrations in surface water based on various assessment scenarios with more realistic sulphate concentrations and effluent rates. As such a sensitivity analysis was completed using the project MeHg concentrations based on Scenario 2, which assumed an average sulphate concentration of 250 mg/L at an effluent rate of 686 m^3/hour. Based on the more realistic effluent discharge rates the HQs in the HHRA for the Project would reduce by approximately 45%. For example, under Scenario 1 the toddler MeHg HQs for the heavy consumer in the Project only case are predicted to range from 0.001 to 0.16 (Segment 1 to 19); however, the HQs under Scenario 2 projections are reduced to a range of 0.00045 to 0.07.

Table 6-1: Estimates of Indigenous Fish Consumption Rates Employed for the Human Health Risk Assessment (HHRA)

Fish	Consumer	Consumption Rate (g/day)			
		Toddler[(1)]	Women	Men	Combined Women + Men (General Population)
Walleye	Average	5.2	10.32	26.53	18.15
	Heavy	18.7	37.48	116.4	100.6
Forage Fish (Lake Whitefish)	Average	4.9	9.84	17.27	13.18
	Heavy	18.9	37.7	85.51	62.47
Northern Pike	Average	5.1	10.15	12.21	11.43
	Heavy	18.9	37.70	40.24	40.24
Sum (Walleye, Northern Pike and Forage)	Average	15	30	56	43
	Heavy	57	113	242	203

Notes:
Consumption from (Chan et al. 2014).
1 Toddler consumption rate based on 50% of adult female consumption rate.

Table 6-2: Water Ingestion Rates and Body Weights Assumed in the Human Health Risk Assessment (HHRA)

Life Stage	Water Ingestion Rate (L/day)[1]	Body Weight (kg)[2]
Toddler	0.6	16.5
Adult Female	1.5	63.1
Adult Male	1.5	78.8
Adult (General Population)	1.5	70.7

Notes:
1 Health Canada (2024).
2 Health Canada (2024); Richardson (1997).

Table 6-3: Methylmercury Oral TRVs and the Toxicological Basis for the TRVs Applied in the Human Health Risk Assessment (HHRA)

Parameter	Health Canada Methylmercury TRVs (2025)	
	General Population[(1)]	Sensitive Individuals [(2)]
Oral TRV (µg/kg/day)	0.47	0.2
Blood guidance value (µg/L)	20[(3)]	8[(3)]
Benchmark dose blood (µg/L)	200	NA
Hair guidance level (µg/g or mg/kg)	6	2
Benchmark dose hair (µg/kg)	14 (maternal hair)	10 (maternal hair)
Uncertainty factor	6.4	5
Supporting study(s)	JECFA (1972) FAO/WHO (2007)	Feeley and Lo (1998) Grandjean et al. (1997) Davidson et al. (1998) Crump et al. (1998)
Study population	Iraq	Faroe Islands, Seychelles, and New Zealand

Notes:
1 Includes adult females that are non-childbearing and adult males.
2 Includes women of child-bearing age, infants, and children < 12 years.
3 Exposure limits derived by the World Health Organization and Joint Expert Committee of Food Additives were based as tolerable weekly intakes and converted to daily intakes Legrand et al. 2010).

Table 6-4: Fish Consumption Advisory Benchmarks for Total Mercury

Meals per Month	Calculated Intake per Day[(1)] (grams/day)	Total Mercury (µg/g wet weight)	
		Sensitive Population	General Population
0 (do not eat)	0	>0.5	>1.8
2	15	-	1.2 – 1.8
4	29	0.25 - 0.5	0.6 – 1.2
8	59	0.16 – 0.25	0.4 – 0.6
12	88	0.12 – 0.16	0.3 – 0.4
16	117	0.06 – 0.12	0.15 – 0.3
32	234	<0.06	<0.15

Notes:
1 Calculated intake per day assumed meal portion was 227 grams and there was 31 days in a month.

Table 6-5: Analysis of Changes to Fish Consumption Advisories in Northern Pike, Walleye, and Lake Whitefish

Meals per Month	Tissue Concentration Benchmark Range (µg/g wet weight)	Mid-point Baseline (µg/g wet weight)	Maximum Project Contribution (µg/g wet weight)	Project + Baseline Tissue Concentration (µg/g wet weight)	Project Contribution as Percent of Benchmark Range Magnitude (Target <50%)	Resulting Change in Advisory
Northern Pike						
0 (do not eat)	0.5	N/A	N/A	N/A	N/A	N/A
2	-	N/A	N/A	N/A	N/A	N/A
4	0.25 - 0.5	0.3750	0.0061	0.3811	2.46%	No Change
8	0.16 – 0.25	0.2050	0.0061	0.2111	6.83%	No Change
12	0.12 – 0.16	0.1400	0.0061	0.1461	15.37%	No Change
16	0.06 – 0.12	0.0900	0.0061	0.0961	10.25%	No Change
32	< 0.06	0.0300	0.0061	0.0361	10.25%	No Change
Walleye						
0 (do not eat)	0.5	N/A	N/A	N/A	N/A	N/A
2	-	N/A	N/A	N/A	N/A	N/A
4	0.25 - 0.5	0.3750	0.019	0.3937	7.49%	No Change
8	0.16 – 0.25	0.2050	0.019	0.2237	20.81%	No Change
12	0.12 – 0.16	0.1400	0.019	0.1587	46.82%	No Change
16	0.06 – 0.12	0.0900	0.019	0.1087	31.21%	No Change
32	< 0.06	0.0300	0.019	0.0487	31.21%	No Change
Lake Whitefish						
0 (do not eat)	> 0.5	N/A	N/A	N/A	N/A	N/A
2	-	N/A	N/A	N/A	N/A	N/A
4	0.25 - 0.5	0.3750	0.0057	0.3807	2.27%	No Change
8	0.16 – 0.25	0.2050	0.0057	0.2107	6.31%	No Change
12	0.12 – 0.16	0.1400	0.0057	0.1457	14.19%	No Change
16	0.06 – 0.12	0.0900	0.0057	0.0957	9.46%	No Change
32	< 0.06	0.0300	0.0057	0.0357	9.46%	No Change

Table 6-6: Evaluation of Assumptions/Uncertainties in the Human Health Risk Assessment

Risk Assessment Assumption / Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
Problem Formulation:		
Site-specific measured concentrations in media (i.e., surface water and fish) are representative of baseline conditions. Regional fish data obtained from the MECP were representative of baseline conditions but are dated (i.e., over 10 years old).	There were sufficient samples in each media to provide a reasonable estimate of representative chronic baseline concentrations, except for Lake Whitefish in Chukuni River where Forage Fish (Yellow Perch and White Sucker) was used as proxy. Due to a historical mercury spill in the region the MECP has conducted thorough fish tissue sampling in several lakes south of Pakwash Lake relevant to the mercury study HHRA. Sample sizes from 9 to 200 per species, per year give baseline assumptions a high degree of statistical robustness.	Neutral
Sediment, groundwater, and porewater were eliminated from consideration as a media source of human exposure during the problem formulations stage.	Surface water represents the most direct and bioavailable exposure pathway for fish and surface water consumption.	Overestimate to neutral
Benthic invertebrates and the lower trophic community (periphyton and zooplankton) were not included in the BAF model.	The calculated BAFs between baseline water concentrations and baseline fish concentration implicitly include the food web components and dynamics that leads to fish concentrations.	Underestimate to neutral
Sampling protocol	Sample sizes are large, methods are similar, fish sizes were standardized and spread across a large spatial and temporal boundary.	Neutral
Exposure Assessment:		
Surface Water Predictions (HESL 2026): – The water quality model incorporated data from published academic studies and site specific field data collected from project area to generate predicted surface water concentrations due to sulphate loading from the project. Other water and porewater chemistry that could limit methylmercury stimulation by sulphate were conservatively assumed to be non-limiting. Predicted changes in surface water do not have a relevant effect on human or ecological heath but rather are numerical changes that are intended to provide input terms to BAF calculations for the human health risk assessment.	The exposure assessment makes assumptions regarding the exposure regimes that the human receptors undergo. Uncertainties in the exposure assessment include: – The Project area is more likely to have some factors that limit methylmercury production regardless of sulphate availability. These factors include the absence of anoxia during certain parts of the year, higher temperatures then assumed, organic carbon limitation in lake sediments which have lower TOC then the source literature terms and concentration gradients that do not introduce sulphate to porewater reaction sites during specific times of the year. – Not all methylmercury generated in sediment will be released into the water column.	Overestimate
Surface Water Predictions (WSP 2025b): – The water quality model is intentionally conservative, meaning that predicted concentrations for most parameters, including mercury, are generally higher than what would occur under real-world conditions. Application of the conservative approach is deliberate, so that potential risks are not underestimated.	For receiving water quality, key conservative assumptions are the following: – Mass balance assumptions: The model assumes persistence of all modelled parameters, including mercury, without accounting for assimilation or natural attenuation processes that would occur in the receiving environment. For example, along the treated effluent discharge flow pathway, water quality parameters behave conservatively and are not reduced by mechanisms such as secondary mineral formation, attenuation through settling or sorption processes, or biogeochemical reactions such as assimilation or biodegradation. – For all modelled parameters, including mercury, geochemical loading terms (including influent and effluent qualities) applies the full detection limit when analytical results are below the RDL. This practice prevents underestimation of Project loadings and maintains a conservative bias in loading terms. – Steady-state groundwater modelling to simulate changes in surface water - groundwater interactions, as detailed in Section 7.5.3 of the Impact Statement. Steady-state modelling assumes infinite drawdown effects on surface water receiver(s), providing for less assimilation capacity. In reality however, potential effects to receivers will progress gradually due to the buffering effects of groundwater storage, with some receivers likely never experiencing the steady-state, maximum flow reduction values estimated by the groundwater model developed to support the Impact Statement (WSP 2025f). – Predicted quality of fugitive groundwater seepage from Project components is representative of all of the groundwater contributing to surface water features (i.e., is not diluted by or mixed with baseline groundwater), resulting in an overestimation for most parameters. – Fugitive groundwater seepage volumes reporting to the receiving environment have been conservatively predicted as detailed in WSP 2025f. Hydraulic conductivity values for bedrock are mainly based on site field tests, like packer and slug tests, which measure water movement through fractures near the borehole (within tens of metres). Many of these fractures do not connect over the larger distances relevant to this study (hundreds to thousands of metres). This means the test results tend to overestimate how easily water moves through the bedrock at a broader scale, adding a layer of conservatism to both fugitive groundwater seepage to surface water receivers and groundwater inflows to the underground mine and open pits, which contributes loadings to effluent quality Along fugitive groundwater seepage pathways from Project components to Dixie Creek, Unnamed Waterbody 6, Unnamed Watercourse 1, Unnamed Watercourse 2, Unnamed Watercourse 5, water quality parameters behave conservatively and are assumed to not be reduced by natural processes and mechanisms, such as secondary mineral formation, dilution by regional groundwater, attenuation through sorption processes or biogeochemical reactions such as assimilation or biodegradation, resulting in an overestimation for most parameters	Overestimate

Risk Assessment Assumption / Uncertainty	Discussion of Conservatism	Analyses of Risk Estimate (Overestimate / Neutral / Under-Estimate)
A 95UCLM of methylmercury concentration was selected for human exposure to fish tissue through consumption.	Conservative and in accordance with Health Canada Guidance. A 95UCLM incorporates the sampling variability into the estimate. This gives a high degree of probability that the estimate of exposure is at least realistic, if not higher.	Overestimate to neutral
Predicted concentrations in fish (Northern Pike, Walleye, and Forage Fish) were based on BAF values, predicted methylmercury and total mercury concentrations in surface water from the receiver water quality model and baseline fish concentrations.	Conservative and fish BAF values are similar to regulatory and literature values. It is important to note that the relative percent difference (RPD) between model baseline and predicted Project related concentrations of mercury and methyl mercury in surface water are <20% (which is considered an acceptable RPD for laboratory duplicates) and therefore would not be observable outside the range of natural variability. Although predicted changes would not be observable, they have been conservatively carried forward to fish concentration and risk predictions.	Overestimate to neutral
Receptor characteristics (e.g., body weight, fish ingestion rates, water ingestion rates were estimated from the literature (e.g., Chan et al. 2014; Richardson 1997; Health Canada 2024) and applicable to subsistence consumption rates for Indigenous communities in the region.	The receptor characteristics employed are considered to be reasonably conservative and unlikely to underestimate exposure by the use of eaters only consumption rates (i.e., average and heavy consumer) to reduce the likelihood of underestimating exposure with the Indigenous population. In addition, the HHRA model assumed that all drinking water was obtained from surface water.	Overestimate
Toddler receptor characteristics (estimated fish daily consumption) were not directly available as only adults were surveyed in the literature (Chan et al. 2014), therefore toddler consumption rates were estimated using the toddler-to-adult consumption rate of 0.5 (Richardson et al 1997).	This is a reasonable estimate and is in accordance with the Health Canada Guidance.	Overestimate to neutral
Assumptions about the size or length of fish relevant to human consumptions was made based on MECP consumption advisories and leaned towards larger fish to be conservative.	The MECP fish consumption advisories give a range of fish sizes likely to be found in nature. However, some samples collected in the field are greater than those size ranges. Since methylmercury tissue concentration is highly correlated and biomagnified to fish size and age, it was assumed that the fish concentrations relative to length were a reasonable and practical estimate.	Overestimate to neutral
The Exposure Point Characteristics used for environmental media are estimated based on measured and modelled data.	Conservative and in accordance with Health Canada Guidance	Overestimate to neutral
Toxicity Assessment :		
TRVs developed by Health Canada are designed to protect sensitive and susceptible individuals (i.e., infants and young children, women of childbearing age) and the general population incorporate assumptions that lead to varying degrees of uncertainty, such as those listed below: – TRVs are based on foreign cohort studies (Faroe Islands, Seychelles, New Zealand) with differing fish consumption habits, patterns, and rates, plus co-exposure to other chemicals in the fish. – The toxicological basis for the TRV for the general population and sensitive individuals' group was based on immunological effects and neurodevelopmental toxicity, respectively. – Government agencies (Health Canada 2021) indicate that maternal mercury concentrations of 10 ppm in hair and / or 58 µg/L in blood are generally equal to the threshold for a 5% increased risk of developmentally delayed children. – Calculation of oral TRVs was based on application of uncertainty factors, pharmacokinetic modelling, which involved conversion of measured hair and blood concentrations into oral TRVs.	Exposure limits (TRVs) developed by leading regulatory agencies typically incorporate safety / uncertainty factors to compensate for uncertainties. The process used to establish TRVs is more likely to overestimate than underestimate the risks. The Health Canada (2025) toxicity reference value was selected for the HHRA as Health Canada is the leading authority for health risk assessments in Canada undergoing regulatory review and in 2025, Health Canada published an updated guidance document for their toxicity reference values (Health Canada 2025a). For this revision, Health Canada reviewed emerging data and regulatory decisions from other jurisdictions since its last published 2021 guidance. The oral toxicity reference values for methylmercury was not updated from the previous 2021 version and has remained the same since its derivation in 2007. The toxicity reference value aligns with other regulatory bodies, such as provisional tolerable weekly intake of 1.6 µg/kg body weight for sensitive populations (i.e., children and people of child-bearing age) from the Joint FAO/WHO Expert Committee on Food Additives (JECFA 2007) and the tolerable weekly intake of 1.3 µg/kg bw from the European Food Safety Authority (EFSA 2012).	Overestimate to neutral
Risk Characterization:		
The level of conservatism associated with the characterization of risk, in particular from the Project, is relatively high due to the conservative assumptions incorporated into the modelling of predicted methylmercury concentrations in surface water and fish, as well as the use of fish consumption rates defined by Chan et al (2014) for the average and heavy consumer.	Overall, the human health risk estimates represent an overestimate of potential risk.	Overestimate

Note:
Overestimation of risk indicates that the assumption was conservative and could possibly overestimate the risks at the site (i.e., higher than actual). Underestimating the risk indicates that the assumptions made could slightly underestimate the level of risk at the site. Based on the assessment conducted at the site, the assumptions with underestimates are very slight and are not likely to pose a concern (i.e., assumption is acceptable).

Figure 6-1: Indigenous Toddler Heavy Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

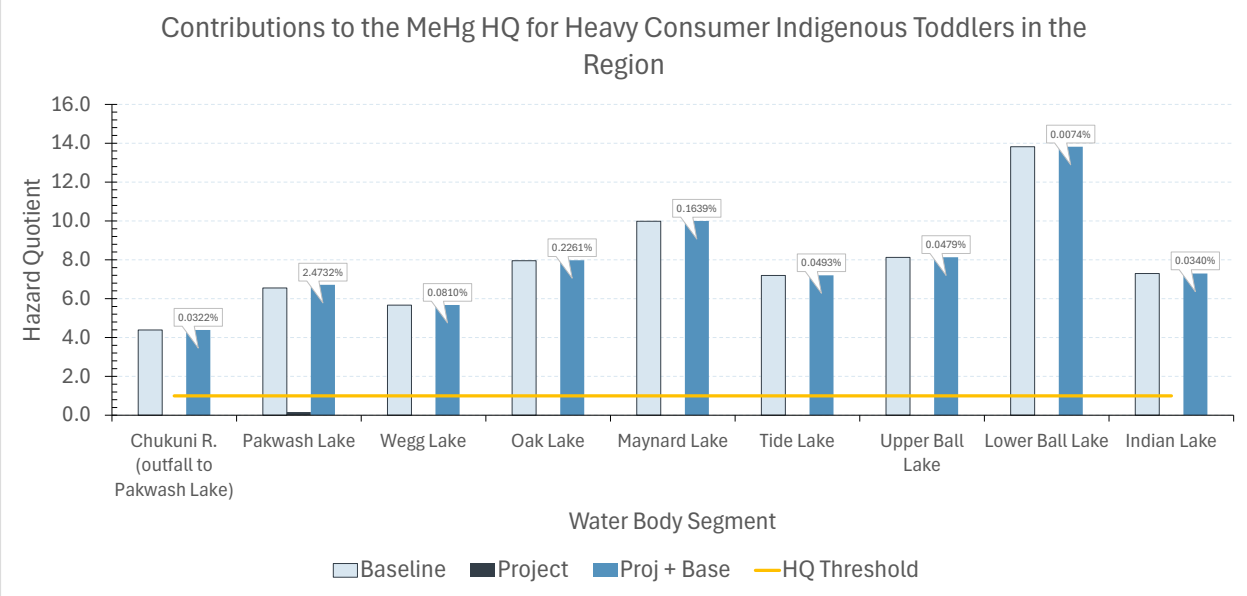
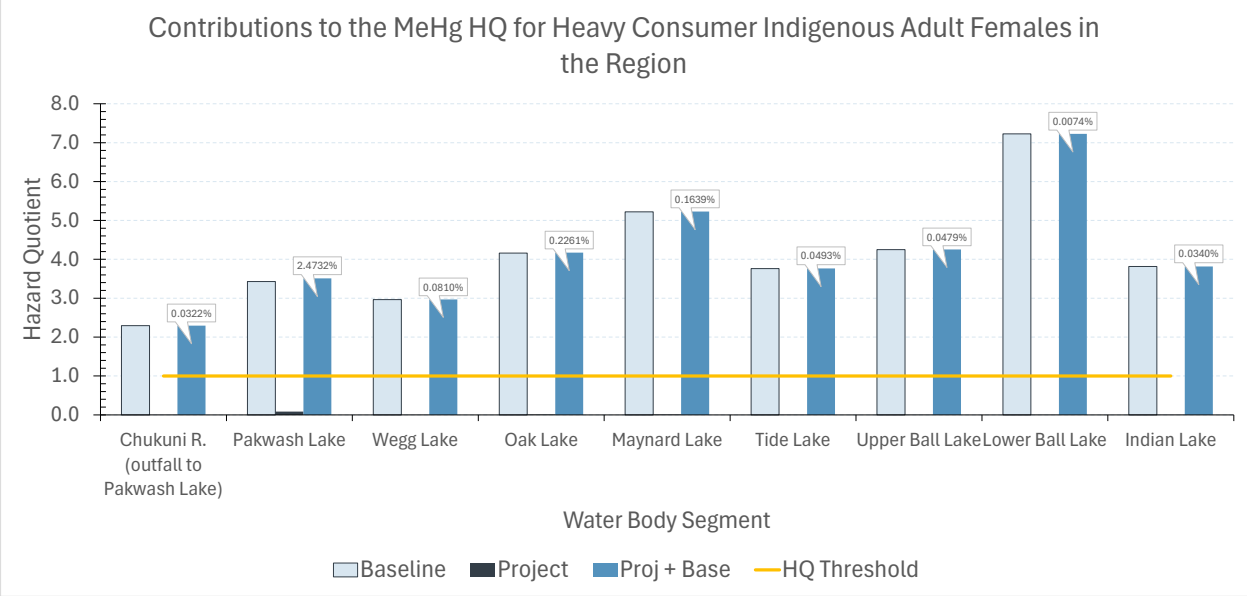


Figure 6-2: Indigenous Adult Female Heavy Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-3: Indigenous Adult Male Heavy Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

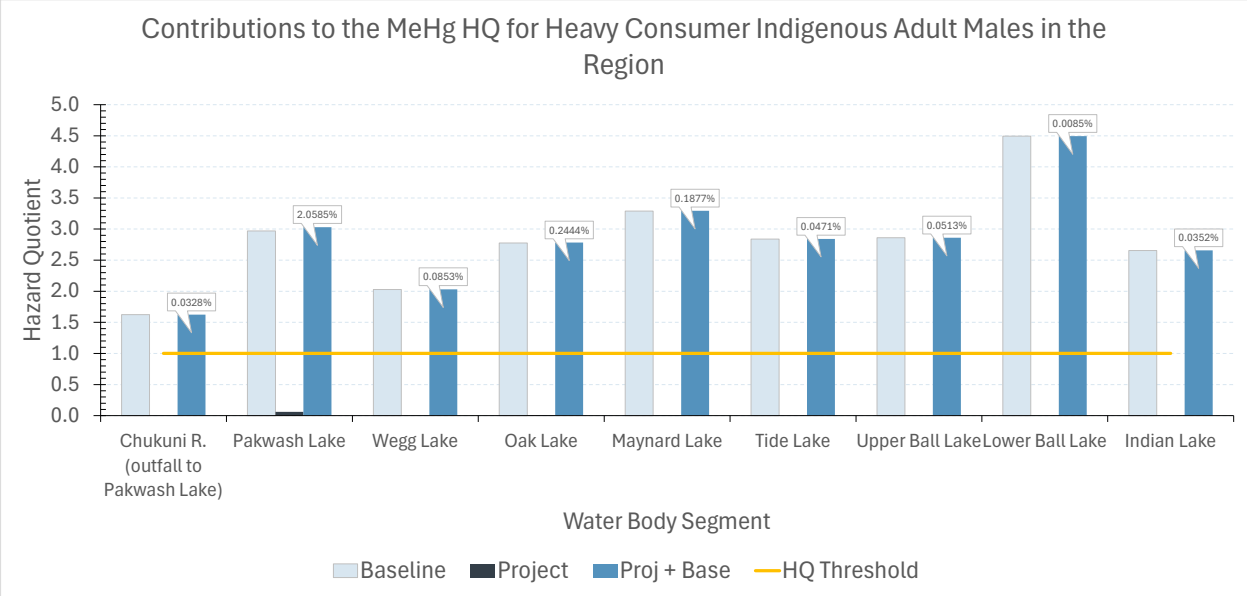
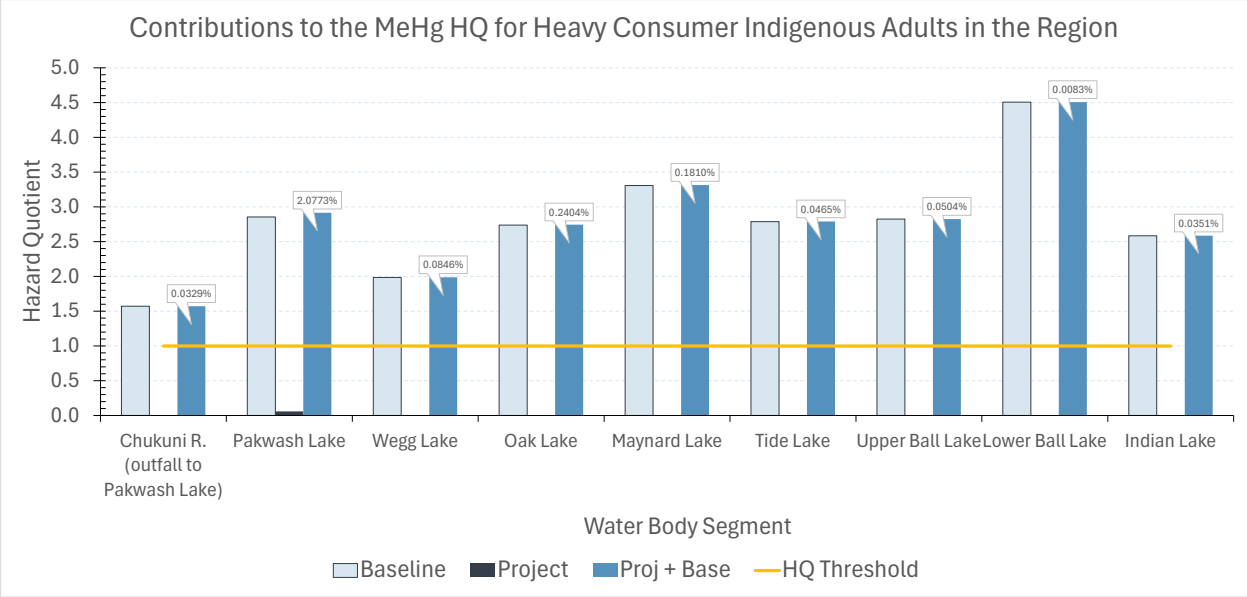


Figure 6-4: Indigenous Adults Heavy Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-5: Indigenous Toddler Average Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

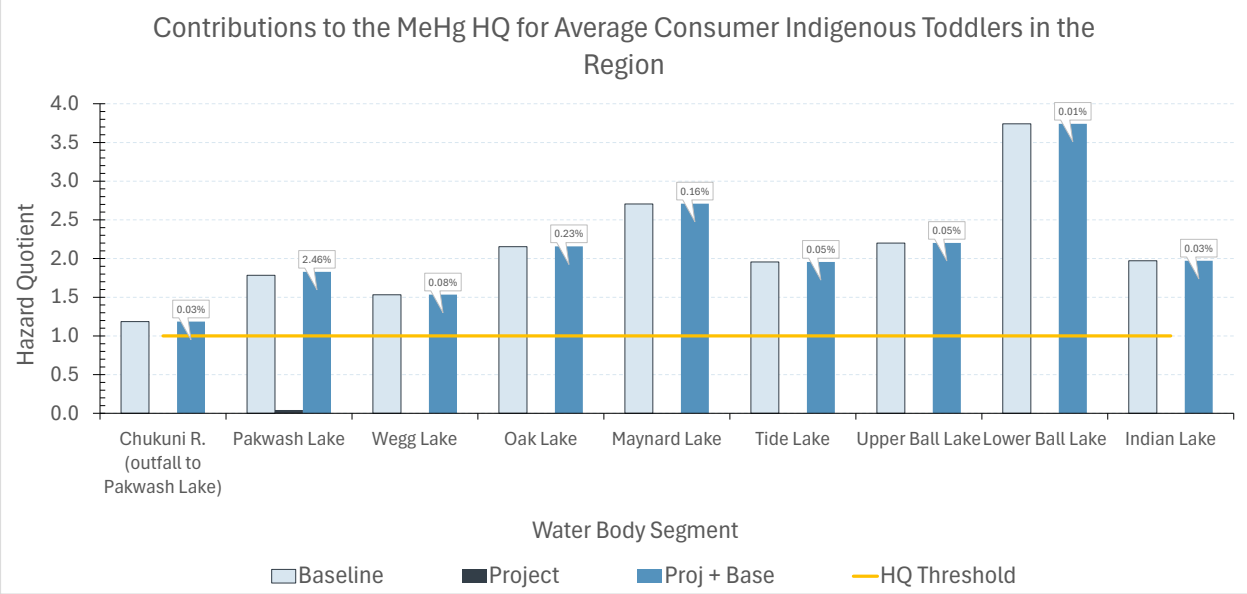
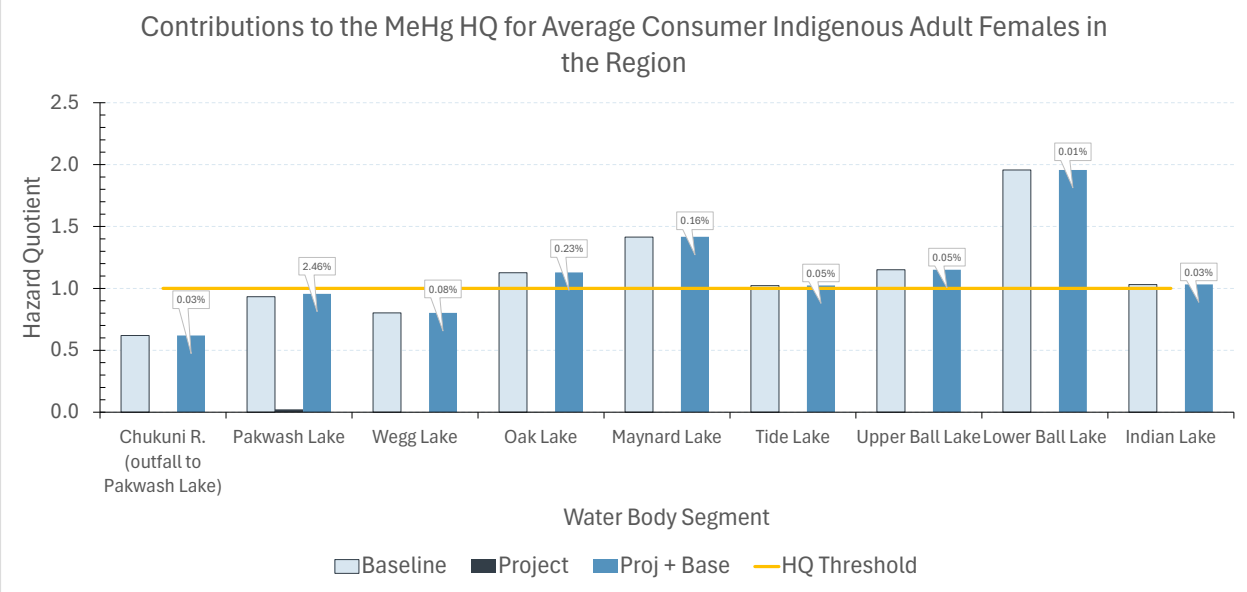


Figure 6-6: Indigenous Adult Female Average Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-7: Indigenous Adult Male Average Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

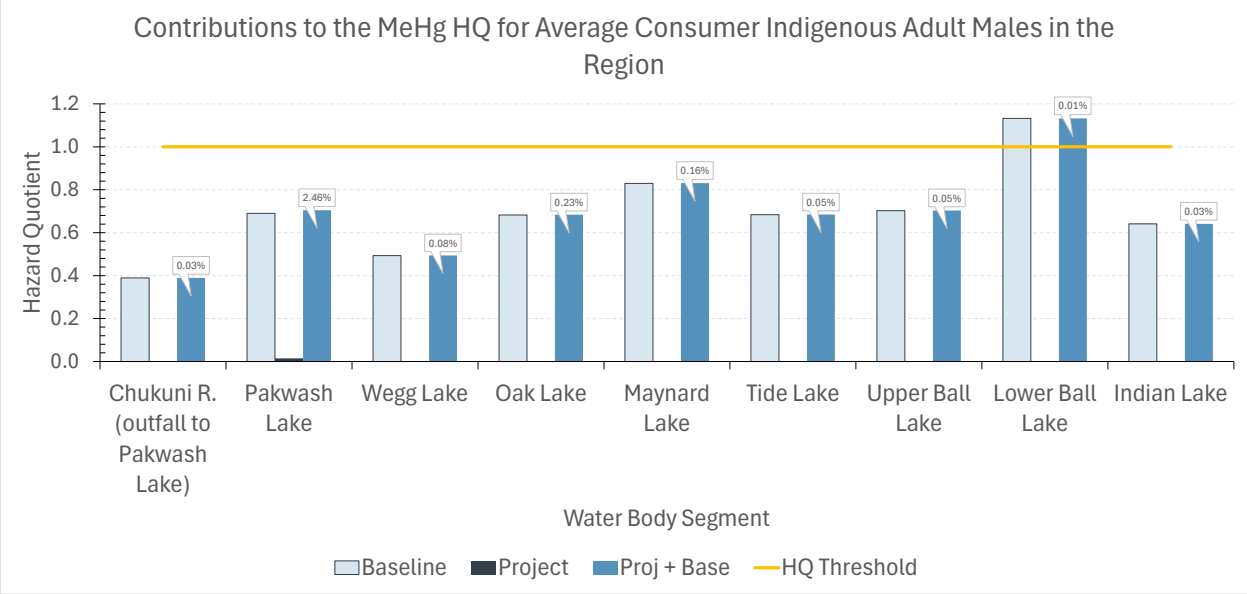
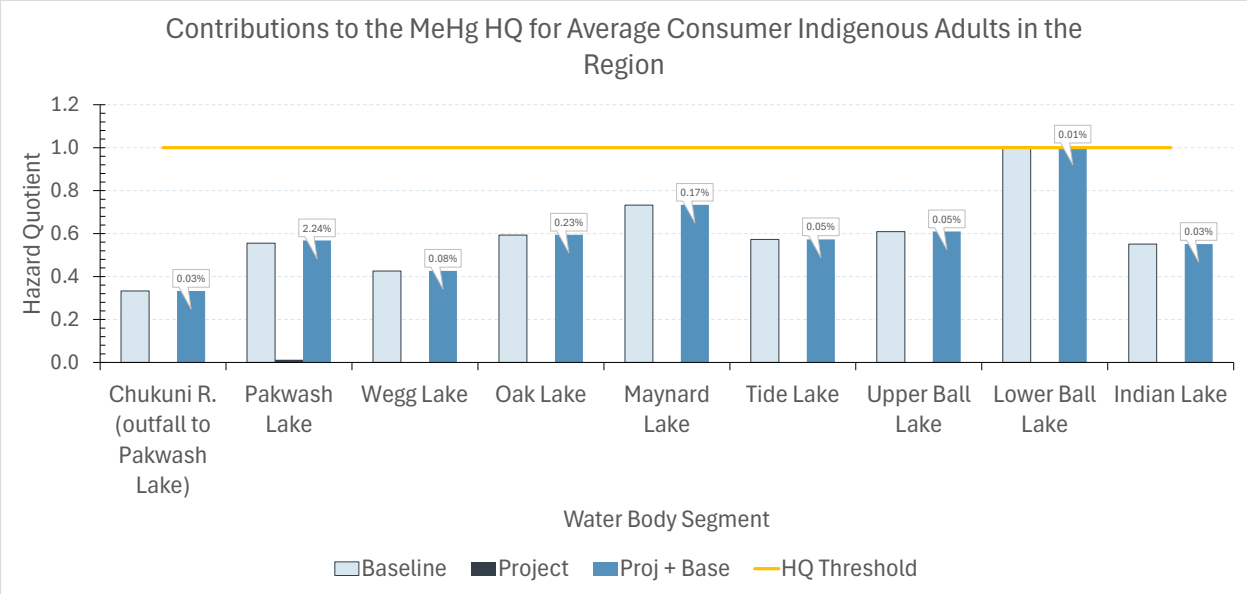


Figure 6-8: Indigenous Adult Average Consumer Methylmercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-9: Indigenous Toddler Heavy Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

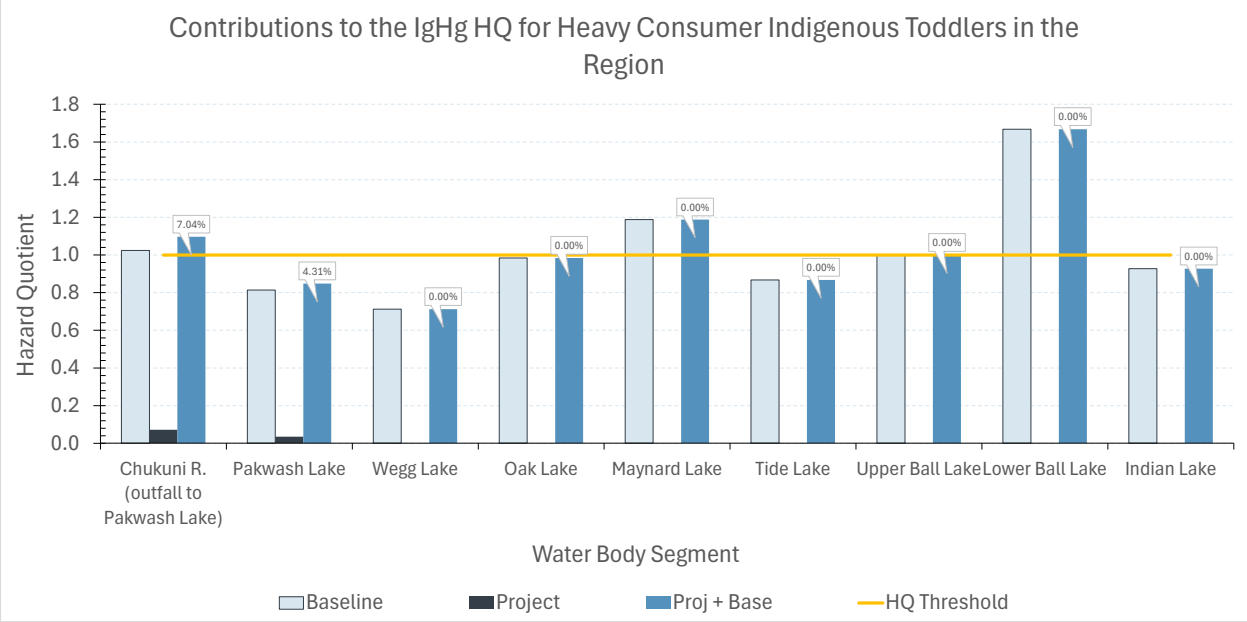
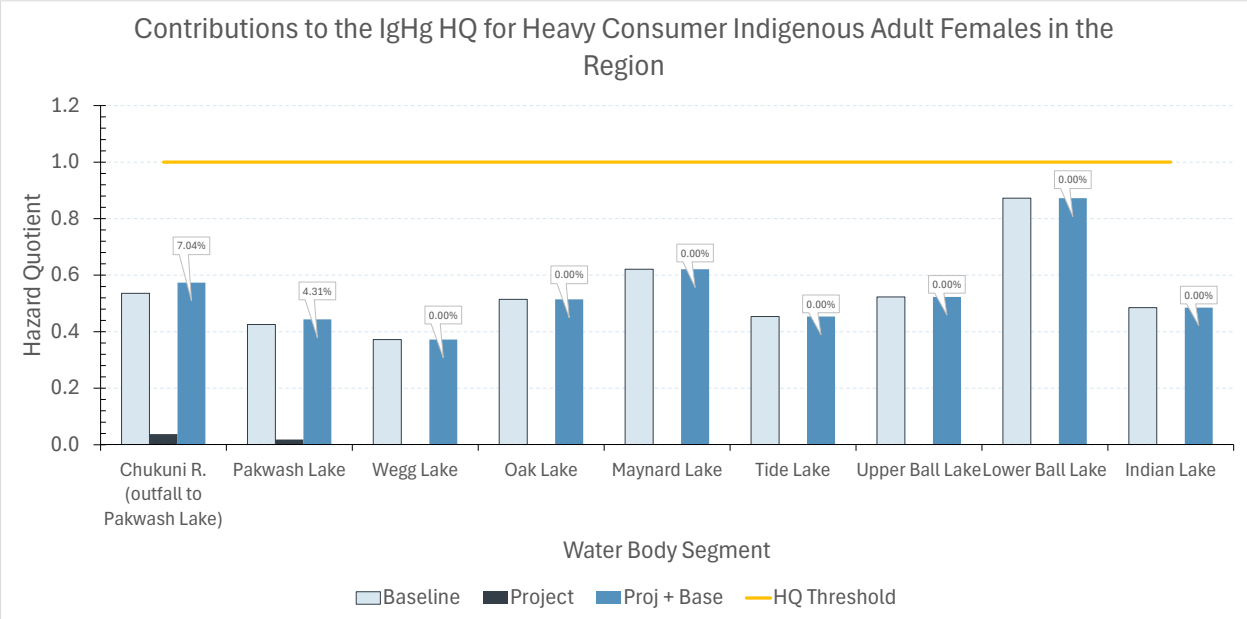


Figure 6-10: Indigenous Adult Female Heavy Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-11: Indigenous Adult Male Heavy Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

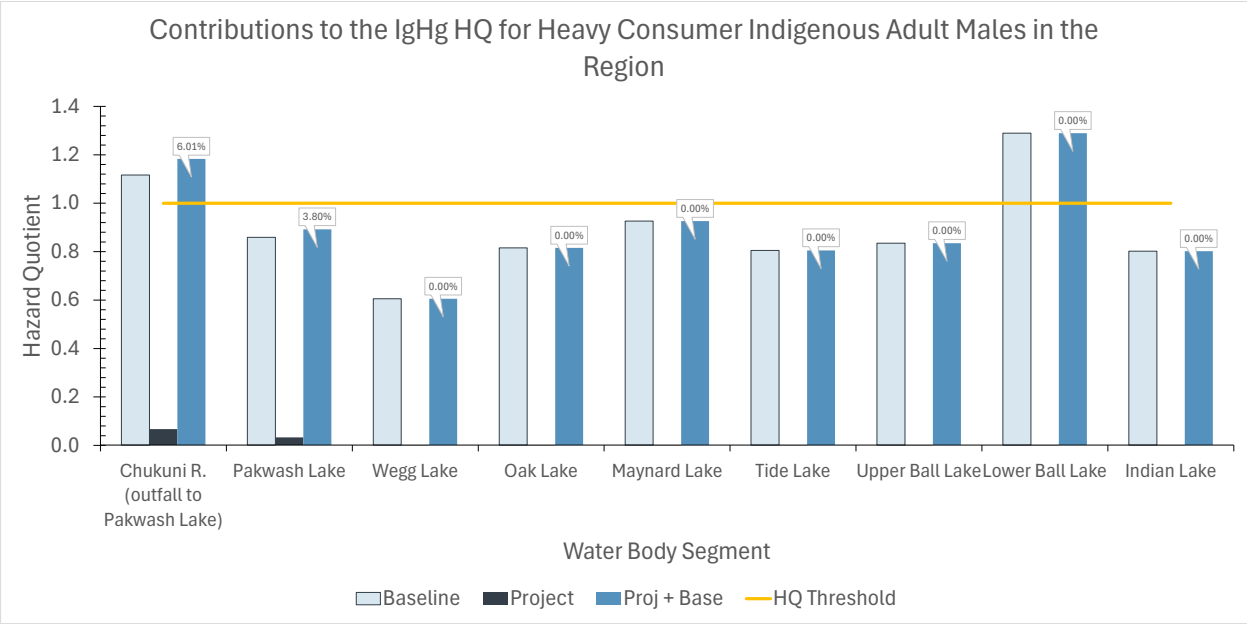
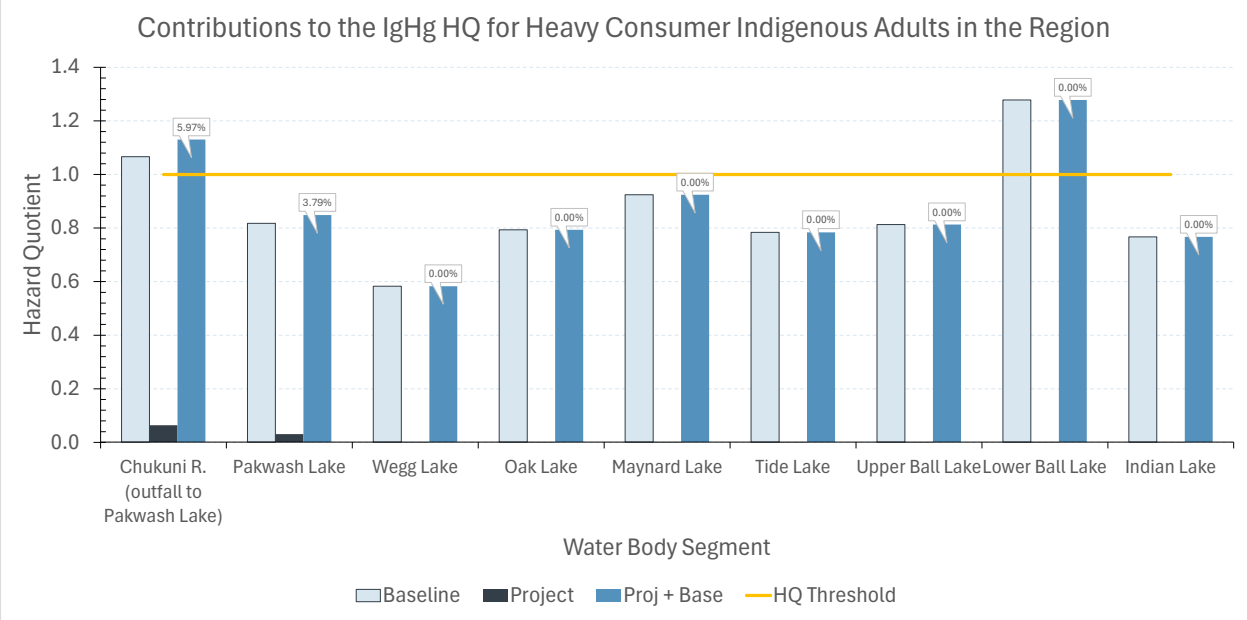


Figure 6-12: Indigenous Adults Heavy Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-13: Indigenous Toddler Average Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

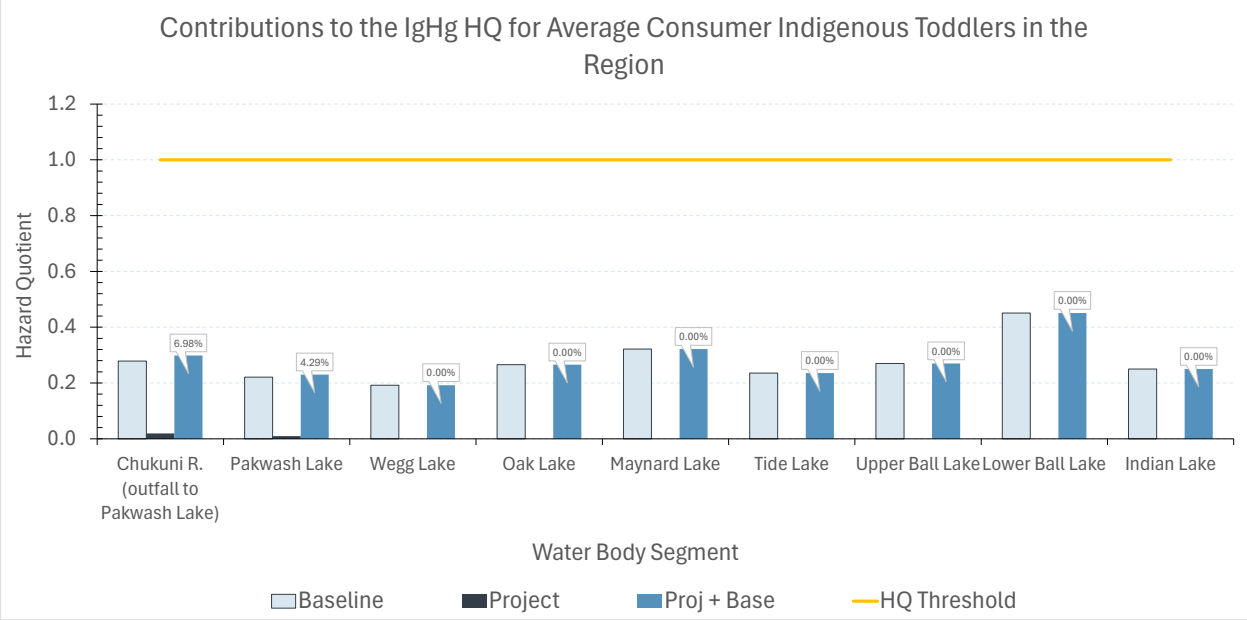


Figure 6-14: Indigenous Adult Female Average Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

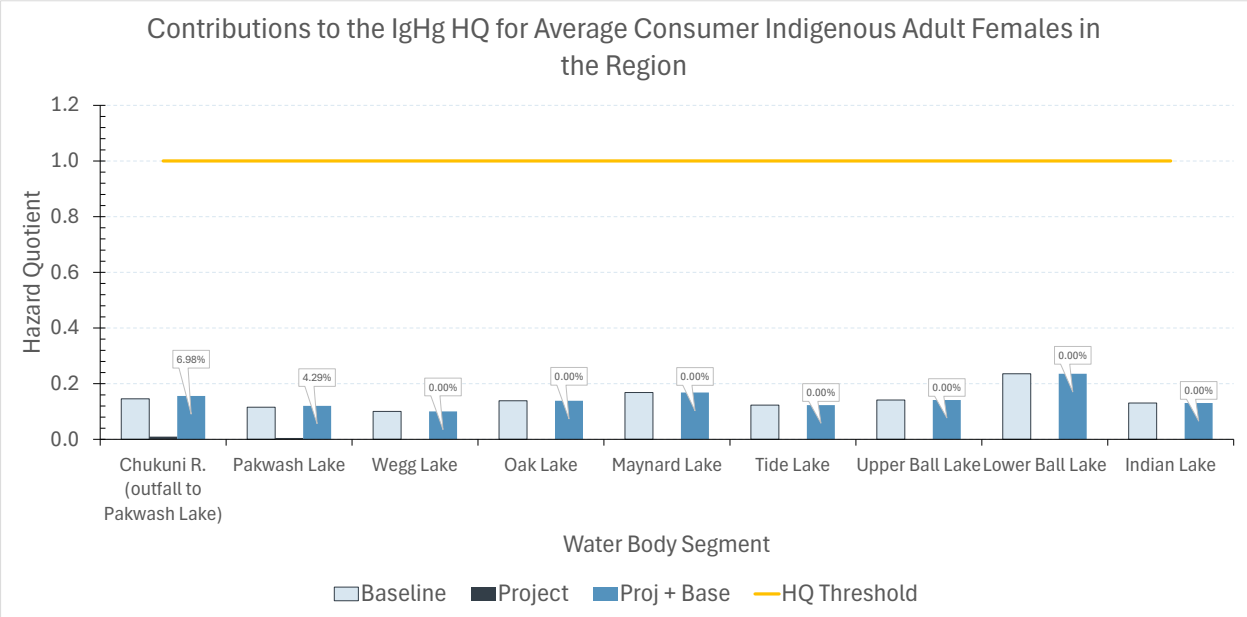


Figure 6-15: Indigenous Adult Male Average Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)

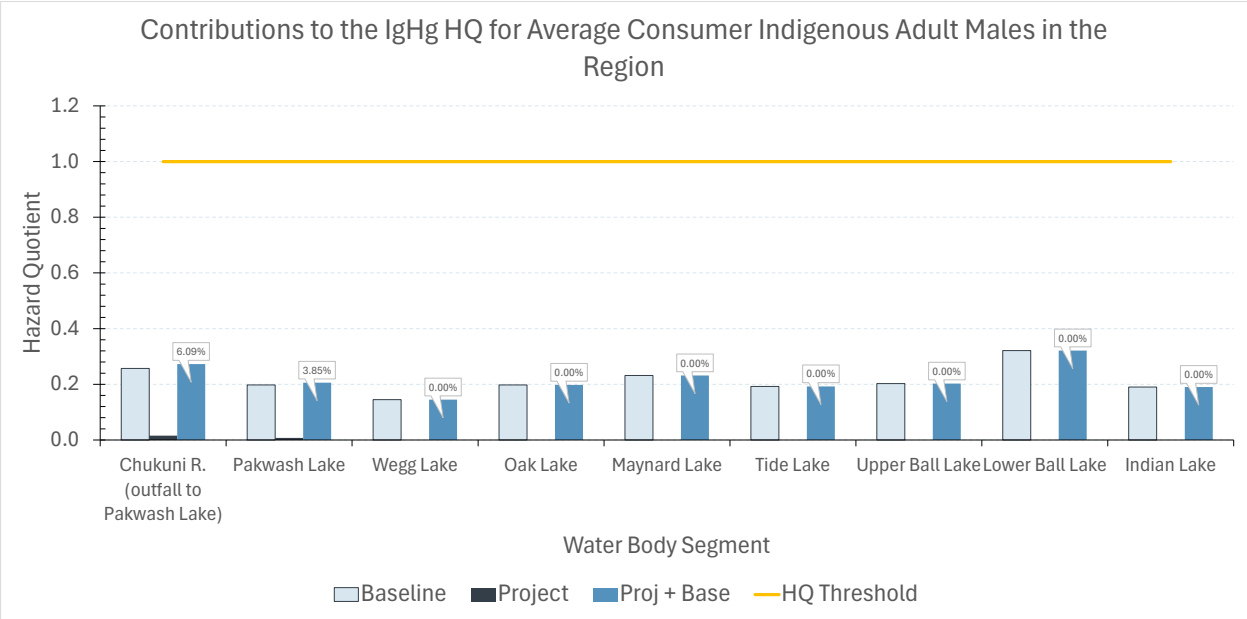
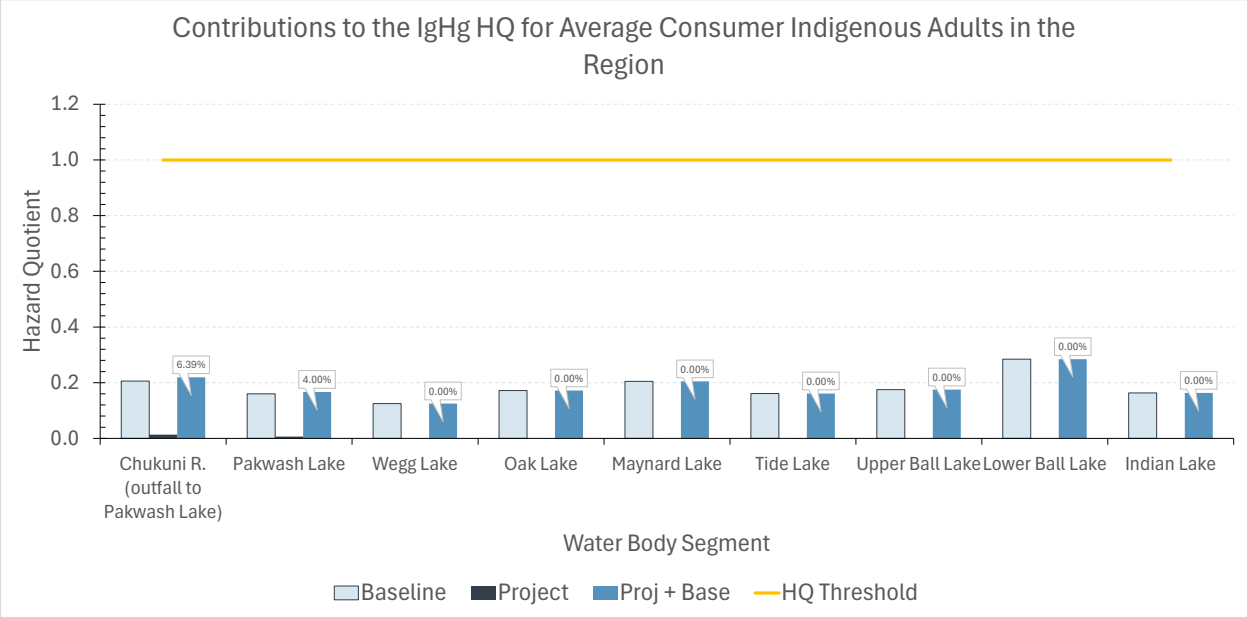


Figure 6-16: Indigenous Adult Average Consumer Inorganic Mercury HQ Values for the different Waterbody Segments and Project Cases (Baseline, Project, and Baseline + Project)



Project contribution may not be visible in figures as contributions are much smaller in comparison to baseline contributions.

Figure 6-17: Historical Comparison of 95UCLM Total Mercury in Fish Concentrations in Maynard Lake to Recent Samples from Chukuni River

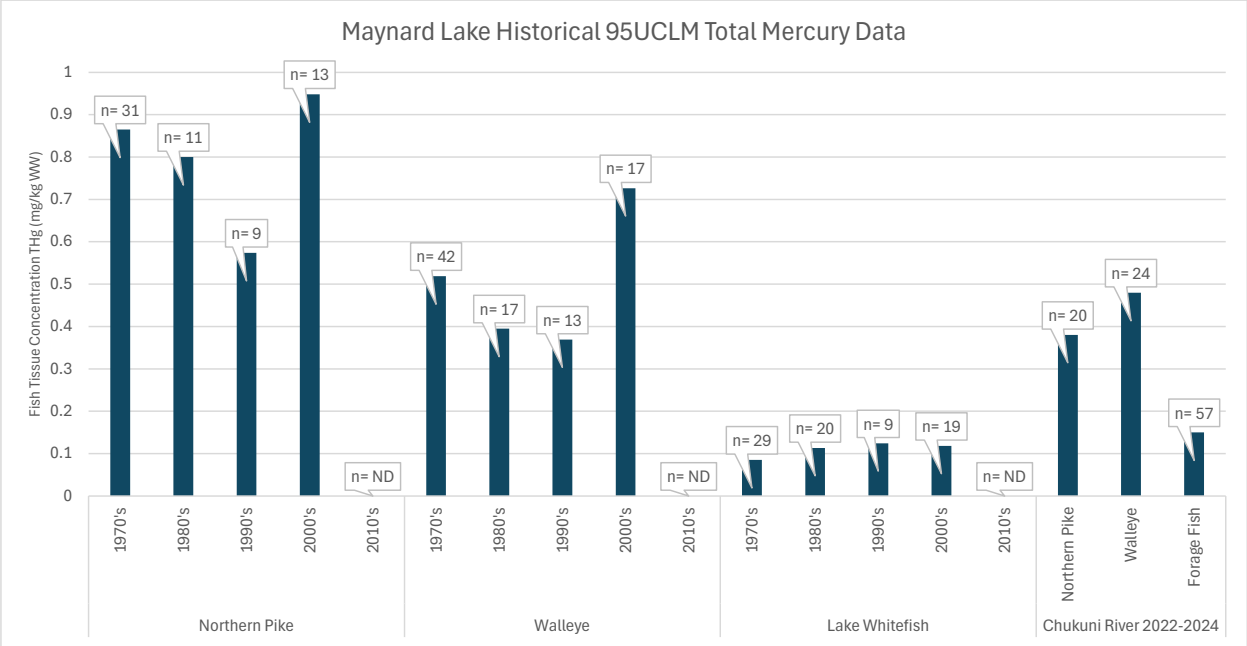


Figure 6-18: Historical Comparison of 95UCLM Total Mercury in Fish Concentrations in Ball Lake to Recent Samples from Chukuni River

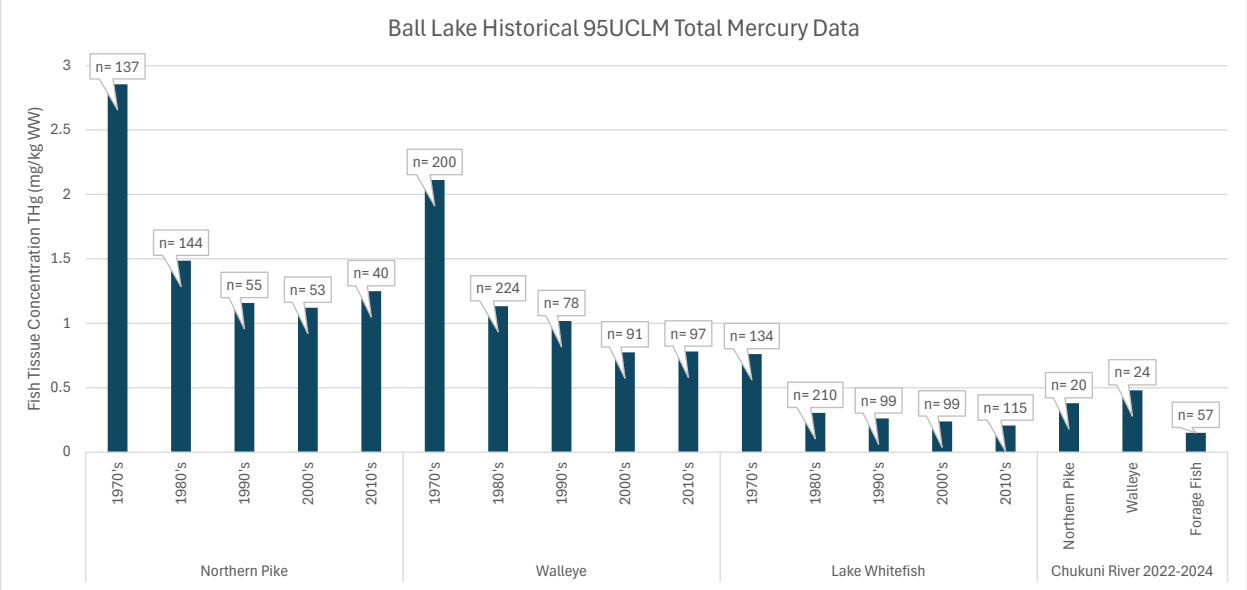
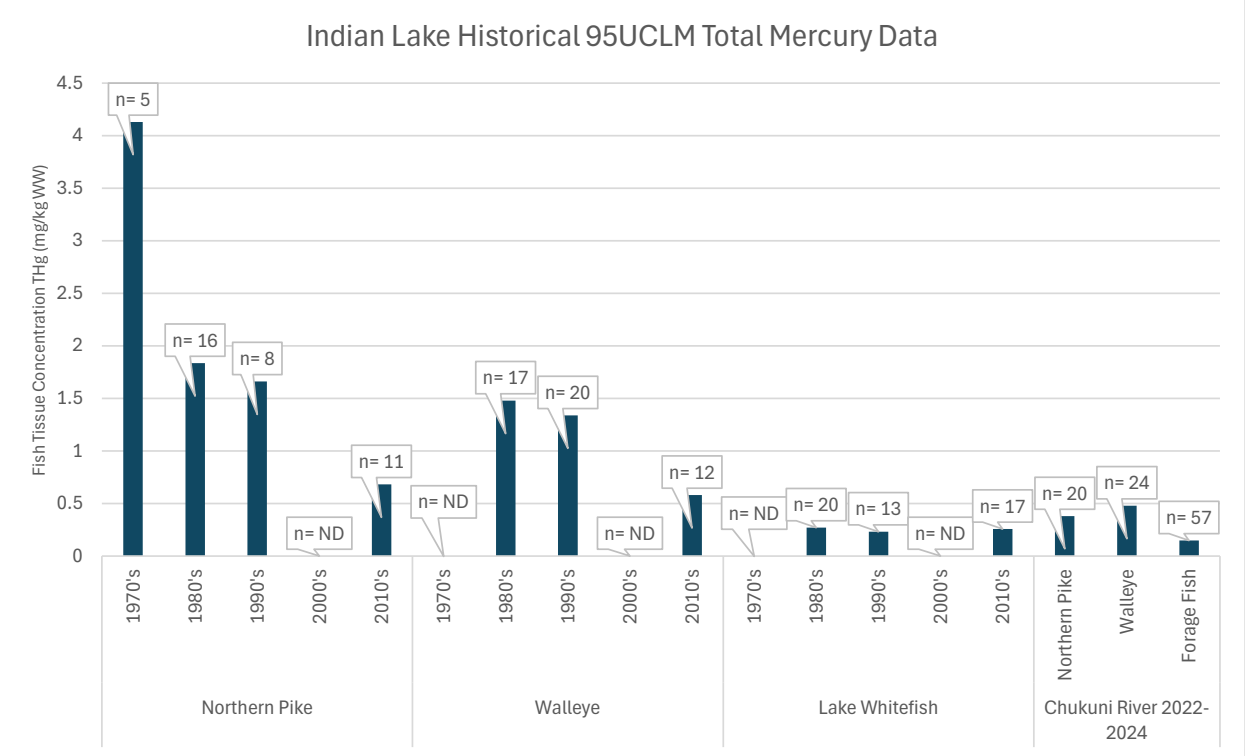


Figure 6-19: Historical Comparison of 95UCLM Total Mercury in Fish Concentrations in Indian Lake to Recent Samples from Chukuni River



7 CLOSING

The Mercury Study has assessed the potential for adverse inorganic mercury and methylmercury health effects to Indigenous peoples surrounding the Project based on subsistence consumption rates. This work included characterization of existing (i.e., Baseline) conditions, modelling future scenarios and identifying mitigation strategies to protect freshwater ecosystems and human health. This study has:

- Characterized baseline total mercury and methylmercury concentrations in groundwater, surface water, sediment, porewater, benthic invertebrates, and fish (forage and large-bodied species)
- Assessed potential human health risks from fish and surface water consumption due to existing and predicted changes in inorganic mercury and methylmercury levels resulting from the treated effluent discharge to the Chukuni River from the proposed Project.

Key findings of environmental baseline characterization studies were:

- Baseline results across the study area indicate that higher proportions of methylmercury relative to total mercury in surface water generally observed under environmental conditions that are known to support sulphate-reducing bacteria activity, such as anoxic or very low dissolved oxygen, wetland-type environments, and higher dissolved organic carbon. This pattern is consistent with current scientific understanding of mercury methylation processes (Section 1.4). These findings are presented as background context to help describe baseline conditions and are not intended to identify specific sources or causes. Natural variability across the system and limitations in assessing detailed methylation processes mean there is uncertainty in how and where methylmercury is produced and transformed. As such, the results support interpretation of baseline conditions while acknowledging this uncertainty.
- Baseline data characterization included comparison of observed mercury and methylmercury concentrations in surface water and groundwater to available WQG PAL. For surface water quality, 99% of samples collected between 2020 and 2024 were below the WQG PAL (26 ng/L for total mercury, 4 ng/L for methylmercury). All samples were below Health Canada's drinking water guideline for mercury (1,000 ng/L). For groundwater quality, all samples collected between 2021 and 2024 were below the WQG PAL (200 ng/L for dissolved mercury, 4 ng/L for methylmercury). All samples were below Health Canada's drinking water guideline (1,000 ng/L; Health Canada 2025b). WQG PAL are not applicable to groundwater quality, and this comparison is presented for information purposes only.
- Sediment quality: all measured values were below applicable sediment quality guidelines (e.g., CSQG ISQG, PSQG LEL, CSQG PEL, PSQG SEL).
- Fish tissue: across all fish species within all waterbodies, methylmercury comprised ~73% of total mercury in fish, consistent with publicly available national data (Health Canada, 2007). Most mercury in fish sample results were below Health Canada guidelines for mercury in retail fish (0.5 mg/kg-WW).

Water quality modelling was undertaken to forecast Project contributions of sulphate in effluent to methylmercury production in the Chukuni River and downstream watersheds via SRB (Section 4.4). In addition, water quality modelling (Section 4.3) was undertaken to forecast Project contributions of inorganic mercury to the Chukuni River and Pakwash Lake via effluent discharge. The mass balance and mercury (i.e., inorganic mercury and methylmercury) production models (Section 4.3, Section 4.4) predicted non-detectable changes in mercury concentrations in downstream watersheds. Upper case model results indicated that the predicted increase in methylmercury concentration in surface water ranged from 1.1E-06 ng/L to 2.1E-03 ng/L (i.e., Segments 1 to 20) and the increase in inorganic mercury concentrations ranged from 0.076 to 0.16 ng/L (i.e., Segments 1 to 2). These changes would not be detectable (measurable) relative to variability within existing concentrations. These values were conservatively used to assess the potential impact or changes on inorganic mercury and methylmercury levels in fish. This included assessment of bioaccumulation / biomagnification pathways.

The measured surface water and fish concentration data that was collected in the local assessment area between 2022 to 2024 were used to calculate site-specific methylmercury BAFs that ranged from 2.14×10^6 to 5.76×10^6 L/kg-WW for methylmercury. These BAF values were in alignment with BAFs

reported in the literature (EC 2003; Calder et al. 2016; US EPA 1997). The BAFs were used to calculate the predicted increase in fish concentrations associated with the Project Case. Measured methylmercury concentrations in fish and surface water were used to characterize human exposure in the Baseline Case via fish and surface water consumption while practicing traditional activities.

Overall, Whitefish exhibited the lowest mercury (i.e., inorganic mercury and methylmercury) concentrations, followed by Walleye, and Northern Pike had the highest. In all instances the predicted increase in methylmercury concentrations across all waterbody segments (i.e., Segment 1 to 20) were less than 0.012 mg/kg-WW and most concentrations were below the method detection limit (<0.001 mg/kg-WW) indicating that predicted changes in fish concentrations related to the Project are considered undetectable outside the range of Baseline. In all instances the predicted increase in inorganic mercury concentrations in fish in the waterbodies located within the RSA (i.e., Chukuni River and Pakwash Lake) were less than 0.022 mg/kg-WW and most predicted increases in concentrations were only slightly above the method detection limit (<0.001 mg/kg-WW). Except for Pakwash Lake, the Project-related fish methylmercury concentrations represented less than 0.5% increase over measured baseline levels, causing Baseline + Project concentrations to remain within the original baseline range for each species. Project-related fish methylmercury concentrations in Pakwash Lake represent about 2.3 to 4.6% increase over measured baseline levels; however, Baseline + Project concentrations also remain within the original baseline range for each fish species. The largest increase in Project-related fish concentrations was predicted in Chukuni River for inorganic mercury (i.e., 4 to 7%) based on conservative inputs to the water balance model, which included the following conservative assumptions:

- Mass balance assumptions: The model assumes persistence of all modelled parameters, including mercury, without accounting for assimilation or natural attenuation processes that would occur in the receiving environment.
- For all modelled parameters, including mercury, geochemical loading terms (including influent and effluent qualities) applies the full detection limit when analytical results are below the RDL. This practice prevents underestimation of Project loadings and maintains a conservative bias in loading terms.
- Steady-state groundwater modelling to simulate changes in surface water - groundwater interactions. Steady-state modelling assumes infinite drawdown effects on surface water receiver(s), providing for less assimilation capacity.
- Predicted quality of fugitive groundwater seepage from Project components is representative of all of the groundwater contributing to surface water features (i.e., is not diluted by or mixed with baseline groundwater), resulting in an overestimation for most parameters.
- Fugitive groundwater seepage volumes reporting to the receiving environment have been conservatively predicted.

Further details to these conservative assumptions is provided in Table 6-6.

The predicted changes to fish tissue concentrations from the Project are considered to be so small that they would be practically undetectable from baseline concentration variability. It is also noted that the maximum project related increase in tissue mercury and methylmercury concentrations, for all species, indicates that predicted concentrations in fish would not result in any recommended changes in existing local and provincial fish consumption advisories (allowable meals per month).

A detailed and quantitative HHRA was completed that evaluated risks from fish and surface water consumption. The following toxicity reference values (TRVs) from Health Canada (2021) were used to calculate risks (hazard quotients) based on predicted methylmercury and inorganic mercury exposures:

- An oral methylmercury toxicity reference value of 2.0E-04 mg/kg/day was used for toddlers and females of childbearing age.
- An oral methylmercury toxicity reference value of 4.7E-04 mg/kg/day was used for adult males and the general population.
- An oral inorganic mercury toxicity reference value of 3.0E-04 mg/kg/day was used for all life stages (i.e., toddler, adult female, adult male and general population).

The HHRA used fish consumption rates defined by Chan et al (2014) for the average and heavy consumers only in Ecozone 1 in Ontario. The Indigenous community at ANA was included in the food consumption survey for Ecozone 1 (i.e., Boreal Shield / Subarctic) along with 5 other indigenous communities and the consumption rates were assumed to be representative for subsistence fish consumption by Indigenous Peoples in the HHRA. The toddler consumption rates were estimated based on the toddler-to-adult female consumption ratio of 0.5 recommended by Richardson (1997). The predicted methylmercury HQ values were compared to baseline HQ values to evaluate the potential additional risk associated with Project.

The methylmercury and inorganic mercury hazard quotients were assessed for various life stages (i.e., adult female, adult male and toddler), consumers (i.e., heavy and average fish consumer), locations (i.e., HQ values predicted for Segment 1 to 20) and pathways (i.e., consumption of Northern pike, Walleye and Whitefish; including consumption of surface water as a drinking water source while practicing traditional activities). The interpretation of risks associated with predicted HQ values incorporated multiple lines of evidence.

Across all receptor groups and consumption scenarios, Baseline Case HQ values for inorganic mercury or methylmercury often were greater than the threshold value of 1, indicating potential health risks under existing conditions, which is reflected in the existing local fish consumption advisories from MECP. However, project-related contributions were negligible, with Project-related HQ values below the Health Canada benchmark of 0.2 (Health Canada 2023) where a target HQ of less than or equal to 0.2 would be deemed negligible and the risk assessment may conclude that there is no anticipated human health risks associated with predicted increased exposure to mercury (i.e., inorganic mercury and methylmercury).

The mercury study concluded that predicted Project-related changes in surface water and fish concentrations were non-detectable outside the range of Baseline, and associated HQ values were below the Health Canada benchmark of 0.2 (Health Canada 2023) where a target HQ of less than or equal to 0.2 would be deemed negligible.

Great Bear Resources will complete an environmental effects monitoring program to confirm predictions. The program will monitor surface water and fish tissue concentrations in the LSA (Chukuni River and Dixie Creek) and RSA (Pakwash Lake). The predicted changes in water quality and fish tissue quality south of Pakwash Lake (i.e., Segments 3 to 20) from Project-related sulphate and effluent related to mercury were determined to be indistinguishable from baseline conditions and/or below method detection limits.

8 REFERENCES

- ANA. 2025. Asubpeeschoseewagong Netum Anishinabek (ANA) comments on Great Bear Project Mercury Study Plan, January 31. 2025.
- ATSDR (Agency for Toxic Substances and Disease Registry). 2009. Toxicological Profile for Methylmercury. Agency for Toxic Substances and Disease Registry. March, 2009.
- ATSDR. 2024. Toxicological Profile for Mercury. October 2024.
- Barone, G., Storelli, A., Garofalo, R., Busco, V. P., Quaglia, N. C., Centrone, G., & Storelli, M. M. 2015. Assessment of mercury and cadmium via seafood consumption in Italy: estimated dietary intake (EWI) and target hazard quotient (THQ). *Food Additives & Chemicals: Part A*, *32*(8), 1277-1286.
- Barkay and Gu. 2021. Demethlyation, the other side of the Mercury Methylation Coin: A Critical Review. ACS Environ. Volume 2/ Issue 2. 77–97
- BC Environmental. 2001. Water Quality, Ambient Water Quality Guidelines for Mercury, Prepared pursuant to Section 2(e) of the Environment Management Act, 1981. Feb 2001.
- BC (British Columbia). 2003. British Columbia Field Sampling Manual. Water, Air and Climate Change Branch, Ministry of Water, Land and Air Protection, Victoria BC, Canada. 312 pp.
- Bento, B. and Hintelmann, H., 2024. Assessment of mercury methylation and methylmercury demethylation potentials in water and sediments along the Wabigoon River system. Science of The Total Environment, 951, p.175658.
- Branfireun, B.A., Roulet, N.T., Kelly, C.A., Rudd, J.W.M. 1999. In situ sulphate stimulation of mercury methylation in a boreal peatland: Toward a link between acid rain and methylmercury contamination in remote environments. Global Biogeochemical Cycles, 13: 743–750.
- Branfireun, B.A., Bishop, K., Roulet, N.T., Granberg, G., Nilsson, M. 2001. Mercury cycling in boreal ecosystems: The long-term effect of acid rain constituents on peatland pore water methylmercury concentrations. *Geophysical Research Letters*, 28: 1227–1230.
- Branfireun, B.A. 2024. Riverbank Mercury Methylation Study: Technical Report.
- Branfireun, B. 2025. Preliminary Review of Great Bear Project Mercury Plan, December 2024. January 27, 2025.
- Calder RS, Schartup AT, Li M, Valberg AP, Balcom PH, Sunderland EM. 2016. Future Impacts of Hydroelectric Power Development on Methylmercury Exposures of Canadian Indigenous Communities. Environ Sci Technol. 2016 Dec 6;50(23):13115-13122.
- CCME (Canadian Council of Ministers of the Environment). 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.
- CCME. 2001. Canadian sediment quality guidelines for the protection of aquatic life. Updated In: Canadian Environmental Quality Guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg. Summary table accessed at: http://ceqg-rcqe.ccme.ca/.
- CCME. 2011. Protocols manual for water quality sampling in Canada (PN 1461; ISBN 978-1-896997-77-0). https://ccme.ca/en/res/protocolsdocument_e_-final1.0.pdf
- Chan, L., Receveur, O., Batal, M., David, W., Schwartz, H., Ing, A., Fediuk, K., Black, A., & Tikhonov, C. 2014. First Nations Food, Nutrition and Environment Study (FNFNES): Results from Ontario (2011/2012). Ottawa: University of Ottawa, 2014. Print.
- Clarkson TW, Magos L. 2006. The toxicology of mercury and its chemical compounds. Crit Rev Toxicol, 2006 Sep; 36(8): 609-62.
- Compeau, G. C. and R. Bartha. 1985. Sulfate-reducing bacteria: Principal methylators of Hg in anoxic estuarine sediment. Applied and Environmental Microbiology 50 (2): 498-502.
- Crump, K.S., Kjellstrom, T., Shipp, A.M., Silvers, A. and Stewart, A. 1998. Influence of prenatal mercury exposure upon scholastic and psychological test performance: benchmark analysis of a New Zealand cohort. Risk Anal. 18:701-13. Cited In: EFSA, 2012.
- Davidson, P.W., Myers, G.J., Cox, C et al. 1998. Effects of prenatal and postnatal methylmercury exposure from fish consumption on neurodevelopment: outcomes at 65 months of age in the Seychelles Child Development Study. JAMA. 180:701-7.

- Del Gobbo, L.C., Archbold, J.A., Vanderlinden, L.D., Eckley, C.S., Diamond, M.L., and Robson, M. 2010. Risks and Benefits of Fish Consumption for Childbearing Women. Canadian Journal of Dietetic Practice and Research 2010; 71:41-45.
- Delongchamp, T.M., Lean, D.R.S., Ridal, J.J., Blais, J.M. 2009. Sediment mercury dynamics and historical trends of mercury deposition in the St. Lawrence River area of concern near Cornwall, Ontario, Canada. Science of the Total Environmental, 408: 4095–4104.
- Depew, D.C., Burgess, N.M., Anderson, M.R., Baker, R., Bhavsar, S.P., Bodaly, R.A., Eckley, C.S., Evans, M.S., Gantner, N., Graydon, J.A. and Jacobs, K. 2013. An overview of mercury concentrations in freshwater fish species: a national fish mercury dataset for Canada. *Canadian Journal of Fisheries and Aquatic Sciences*, *70*(3), pp.436-451.
- Driscoll, C.T., Mason, R.P., Chan, H.M., Jacob, D.J., Pirrone, N. 2013. Mercury as a global pollutant: Sources, pathways, and effects. Environmental Science and Technology, 47: 4967–4983.
- Earle, Lynda. 2011. National Collaborating Centre for Aboriginal Health. Accessed online: Traditional_AB_diets_and_health.pdf.
- Eckley, C. S., Watras, C. J., Hintelmann, H., Morrison, K., Kent, A. D., and O. Regnell. 2005. Mercury methylation in the hypolimnetic waters of lakes with and without connection to wetlands in northern Wisconsin. Canadian Journal of Fisheries and Aquatic Sciences 62 (2): 400-411.
- Eckley, C.S. and Hintelmann, H. 2006. Determination of mercury methylation potentials in the water column of lakes across Canada. Science of the Total Environment, 368(1), pp.111-125.
- EFSA (EFSA Panel on Contaminants in the Food Chain (CONTAM)). 2012. Scientific opinion on the risk for public health related to the presence of mercury and methylmercury in food. *Efsa Journal*, *10*(12), 2985.
- Environment Canada. 2002. Canadian Tissue Residue Guidelines for the Protection of Consumers of Aquatic Life: Methylmercury. Scientific Supporting Document. Ecosystem Health: Science-based Solutions Report No. 1-4. National Guidelines and Standards Office, Environmental Quality Branch, Environment Canada. Ottawa.
- Environment Canada. 2003. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Inorganic Mercury and Methylmercury. Report No. 1-7. Scientific Supporting Document. ISBN 0-662-34154-6. July 2003
- Environment Canada. 2010. Risk Management Strategy for Mercury. Gatineau, Quebec: Environment Canada. ISBN: 978-1-100-16002-3. Catalogue No.: En14-20/2010E-PDF
- Environment Canada. 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Ottawa, Ontario: Environment Canada. ISBN 978-1-100-20496-3. Catalogue No. En14-61/2012E-PDF.
- ECCC (Environment and Climate Change Canada). 2016. Canadian Mercury Science Assessment Report. ISBN 978-0-660-04499-6. Catalogue No. En84-130/3-2016E-PDF.
- ECCC. 2025. ECCC Water Science and Technology Directorate (WSTD) Comments on Great Bear Resources Ltd.’s Response to IAAC Comments on the Draft Mercury Study Plan (dated March 3, 2025). September 9, 2025.
- EPA. 1990. United States Environmental Protection Agency. Guidance for Data Useability in Risk Assessment. EPA/540/G-90/008.
- EPA. 1991. United States Environmental Protection Agency. Regional Guidance on Handling Chemical Concentration Data Near the Detection Limit in Risk Assessments. Regional Technical Guidance Manual, Risk Assessment.
- ETR. 2025. Expert Technical Review panel. Review of Great Bear Project Mercury Study Plan, submitted by Expert Technical Review panel, December 2025.
- FAO/WHO. 2007. Food and Agriculture Organization of the United Nations/World Health Organization (FAO/WHO) Expert Committee on Food Additives. Evaluation of certain food additives and chemicals. Sixty-seventh report of the Joint FAO/WHO Expert Committee on Food Additives). WHO Technical Report Series 940.
- Feeley, M.M. and Lo, M.T. 1998. Risk assessment for mercury in Health Canada – Development of the Provisional Tolerable Daily Intake (pTDI) value. Proceedings of the Conference on Mercury in Eastern Canada & the Northeast States.

- FNHA. 2014. First Nations Health Authority (FNHA) Healthy Food Guidelines for First Nations Communities. First Nations Health Authority – Health through wellness. 2014. Accessed online: healthy_food_guidelines_for_first_nations_communities.pdf.
- First Nations Food, Nutrition and Environment Study (FNFNES). 2021. Key Findings and Recommendations for Decision-Makers. October 2021. University of Ottawa, Universite de Montreal, Assembly of First Nations. Accessed online: FNFNES_Final_Key_Findings_and_Recommendations_20_Oct_2021.pdf.
- FNIGC (The First Nations Information Governance Centre). 2012. The First Nations Principles of OCAP. 2012. https://fnigc.ca/ocap.
- Fowlie, P. 2014. CALA Guide to Current Sampling Practices. April 2014.Jansen, W. 2021. Mercury concentrations in commercial fish species from Lake Winnipeg, 1971–2019. Journal of Great Lakes Research, 47(3), 648-662.
- Gandhi, N., Tang, R.W., Bhavsar, S.P. and Arhonditsis, G.B., 2014. Fish mercury levels appear to be increasing lately: a report from 40 years of monitoring in the province of Ontario, Canada. Environmental science & technology, 48(10), pp.5404-5414.
- Gilmour, C. G., Henry, E. A., Mitchell, R. 1992. Sulfate stimulation of mercury methylation in freshwater sediments. Environmental Science and Technology, 26: 2281–2287.
- GNLPT (Grassy Narrows Land Protection Team). 2025. Preliminary comments on fish consumption and risk assessment. Memorandum to Kinross Ontario Canada ETR Panel. Dated November 28 2025.
- Gobas, F.A.P.C., de Wolf, W., Verbruggen, E., Plotzke, K., and Burkhard, L. 2009. Revisiting bioaccumulation criteria for POPs and PBT assessments. Integr. Environ. Assess. Manag. 5: 624–637
- Government of Alberta. 2019. Fish Consumption Guidance: Mercury in Fish. Environmental Public Health Science Unit, Health Protection Branch, Public Health and Compliance Division, Alberta Health. Edmonton, Alberta.
- Government of Canada. 2023. Sources of Mercury. Environment and Climate Change Canada. September 27, 2023. https://www.canada.ca/en/environment-climate-change/services/pollutants/mercury-environment/about/sources.html
- Gilmour, C.C., E.A. Henry and R. Mitchell. 1992. Sulphate stimulation of Mercury Methylation in Freshwater Sediments. Environ. Sci. Technol., 26 (11): 2281-2287.
- Grandjean, P., Weihe, P., White, R.F. et al. 1997. Cognitive deficit in 7-year old children with prenatal exposure to methylmercury. Neurotoxicol. Teratol. 19:417-28.
- Harada, M. 1995. Minamata disease: methylmercury poisoning in Japan caused by environmental pollution. *Critical reviews in toxicology*, *25*(1), 1-24.
- Harmon, S.M., King, J.K., Gladden, J.B., Chandler, G.T., Newman, L.A. 2004. Methylmercury formation in a wetland mesocosm amended with sulphate. Environmental Science and Technology, 38: 650–656.
- Health Canada. 2007. Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption. Bureau of Chemical Safety Food Directorate Health Products and Food Branch. ISBN: 978-0-662-47023-6. March 2007.
- Health Canada. 2011. Food and Nutrition, Canadian Standards (Maximum Levels for Various Chemical Contaminants in Foods. Summary table accessed at: https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/maximum-levels-chemical-contaminants-foods.html#a2 (Last Updated: July 24, 2020).
- Health Canada. 2021. Sixth report on human biomonitoring of environmental chemicals in Canada. 14 December 2021. https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/environmental-contaminants/sixth-report-human-biomonitoring.html
- Health Canada. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: HUMAN HEALTH RISK ASSESSMENT. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
- Health Canada. 2024. Federal Contaminated Site Risk Assessment in Canada: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA)VERSION 4.0. ISBN: 978-0-660-68497-0. March 2024.

- Health Canada. 2025a. Federal Contaminated Site Risk Assessment in Canada: Toxicological Reference Values (TRVs). Version 4.0. ISBN: 978-0-660-78211-9. June 2025.
- Health Canada 2025b. Guidelines for Canadian Drinking Water Quality. Summary Tables, December 2025. Accessed online at summary-table-pdf-template-eng.pdf.
- Heron, Linda. 2013. Methylmercury – Impacts of Reservoir Flooding – Hydroelectric, Posted in Mercury, Impacts, Rivers at Risk, Studies & Reports, Ontario Rivers Alliance, April 7, 2013. https://www.ontarioriversalliance.ca/methylmercury-impacts-of-reservoir-flooding-hydroelectric/
- IAAC (Impact Assessment Agency Canada). 2025. Comments to Great Bear Resources Ltd. Comments on Great Bear Resources Ltd.'s on the Draft Mercury Study Plan. 3 March 2025.
- Ilyniak, N. 2014. Mercury poisoning in grassy narrows: environmental injustice, colonialism, and capitalist expansion in Canada. *McGill Sociological Review*, *4*, 43-66.INAC (Indian and Northern Affairs Canada). 2009. Canadian Arctic Chemicals and Health Assessment Report: Human Health 2009.
- Jansen, W. 2021. Mercury concentrations in commercial fish species from Lake Winnipeg, 1971–2019. *Journal of Great Lakes Research*, *47*(3), 648-662.
- Jeremiason, J.D, D.R. Engstrom, E.B. Swain, E.A. Nater, B.M. Johnson, J.E. Alemendinger, B.A. Monson and R.K. Kolka. 2006. Sulphate Addition Increases Methylmercury Production in and Experimental Wetland. Environ. Sci. Technol. 40(12): 3800 – 3806.
- JECFA (Joint Expert Committee on Food Additives). 1972. Evaluation of Mercury, Lead, Cadmium and the Food Additives. Series No. 4. Geneva: World Health Organization.
- JECFA (Joint Expert Committee on Food Additives). 2007. Evaluation of Certain Food Additives and Chemicals. Sixty-seventh report of the Joint FAO/WHO Expert Committee on Food Additives. Series No. 940. Geneva, Switzerland: World Health Organization, 2007.
- Lake of the Woods Control Board (LWCB). 2025. Reference: Percentile Data Page. https://www.lwcb.ca/percentiles/index.html. Accessed: 20 May 2025.
- LSFN and WFN. 2025. Lac Seul First Nation (LSFN) and Wabauskang First Nation (WFN) Review of Mercury Study Plan at the Great Bear Project – Kinross Gold Corp, January 30, 2025.
- Land Information Ontario (LIO). 2025. Ontario GeoHub – Bathymetry, Line. https://geohub.lio.gov.on.ca/datasets/8c66fb7f8be242f38fa11c096bd04da8_30/explore
- Legrand M, Feeley M, Tikhonov C, Schoen D, Li Muller A. 2010. Methylmercury blood guidance values for Canada. Can J Public Health. 2010 Jan-–-Feb;101(1):28-–-31.
- MOE (Ministry of the Environment). 2008. Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario: An Integrated Approach. May 2008. PIBS 6658e.
- MECP. 2018. Ministry of the Environment Conservation and Parks, Ontario data Catalogue Fish Chemicals. Fish Chemicals - Dataset - Ontario Data Catalogue
- MECP (Ministry of the Environment, Conservation and Parks). 2021a. Fish Consumption Advisory for Grassy Narrows Lake. Available at: https://www.ontario.ca/page/fish-consumption-report?id=50099359
- MECP (Ministry of Environment Conservation and Parks). 2021b. Fish Consumption Advisory for Pakwash Lake. Available at: https://www.ontario.ca/page/fish-consumption-report?id=50459330
- MECP. 2021c. Ministry of Environment Conservation and Parks, Fish Consumption Advisory for Gullrock Lake. Available at: https://www.ontario.ca/page/fish-consumption-report?id=50589340
- MECP (Ministry of the Environment, Conservation and Parks). 2024. Surface Water Review of the Impact Statement Work Plan and Mercury Study Plan (NRTSS).
- MECP (Ministry of Environment Conservation and Parks). 2025. 2024 Impact Statement Work Plan and 2024 Mercury Study Plan Great Bear Resources Ltd. (Kinross Gold Corporation). July 18, 2025.
- MECP. 2026. Great Bear Gold Project, 2025 Proposed Methylmercury Modelling Approach Great Bear Resources Ltd. (Kinross Gold Corporation). January 29, 2026.
- Mergler, D. 2015. Grassy Narrows General Mercury and Health Facts. Expert Report submitted in Grassy Narrows First Nation v Ontario (Minister of Natural Resources and Forestry), 2015 CV-15-531997 (Ont SCJ).
- Mergler, D., DaSilva, J., Fillion, M., & Philibert, A. 2019. The legacy of mercury poisoning in Grassy Narrows First Nation [Conference presentation]. First Nations Food, Nutrition and Environment

Forum, Ottawa. https://afn.ca/wp-content/uploads/2019/12/Judy-DaSilva-and-Myriam-Fillion-Presentation-Compressed.pdf
- Mergler, D., Philibert, A., Fillion, M., & Silva, J. D. 2025. Childhood mercury exposure and early death in Grassy Narrows First Nation, Canada: a retrospective study. *Environmental Health*, *24*(1), 39.
- MDAG. 2025. Minesite Drainage Assessment Group comments to Asubpeeschoseewagong Netum Anishinabek (ANA) on the Great Bear Mining Project – Preliminary Technical Review of the Mercury Study Plan dated December 2024. January 31, 2025
- MNR (Ministry of Natural Resources). 2025. Ontario Watershed Information Tool. https://www.lioapplications.lrc.gov.on.ca/OWIT/Index.html?viewer=OWIT.OWIT&locale=en-ca. Accessed: 7 May 2025.
- MNRF (Ministry of Natural Resources and Forestry). 2025. Ontario Hydro Network – Waterbody. https://geohub.lio.gov.on.ca/datasets/mnrf::ontario-hydro-network-ohn-waterbody/about
- Mitchell, C.P.J., Branfireun, B.A., Kolka, R.K. 2008. Assessing sulphate and carbon controls on net methylmercury production in peatlands: An in situ mesocosm approach. Applied Geochemistry, 23: 503–518.
- Mozaffarian, D., and Rimm, E.B. 2006. Fish Intake, Chemicals, and Human Health. Evaluating the Risks and the Benefits. JAMA 2006: 296:1885-1899.
- Neff MR, Bhavsar SP, Arhonditsis GB, Fletcher R, Jackson DA. 2012. Long-term changes in fish mercury levels in the historically impacted English-Wabigoon River system (Canada). J Environ Monit 2012; 14: 2327–37
- NIH ODS (National Institutes of Health Office of Dietary Supplements). 2021a. Vitamin and Mineral Supplement Fact Sheets for Health Professionals. Vitamin C. US Department of Health and Human Services. March 26, 2021. https://ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/.
- NIH ODS (National Institutes of Health Office of Dietary Supplements). 2021b. Vitamin and Mineral Supplement Fact Sheets for Health Professionals. Vitamin E. US Department of Health and Human Services. March 26, 2021. https://ods.od.nih.gov/factsheets/VitaminE-HealthProfessional/.
- NIH ODS (National Institutes of Health Office of Dietary Supplements). 2024a. Omega-3 Fatty Acids Fact Sheet for Health Professionals. US Department of Health and Human Services. December 17, 2024. https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/#disc.
- NIH ODS (National Institutes of Health Office of Dietary Supplements). 2024b. Vitamin and Mineral Supplement Fact Sheets for Health Professionals. Vitamin D. US Department of Health and Human Services. July 26, 2024. https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/.
- NIH ODS (National Institutes of Health Office of Dietary Supplements). 2025. Vitamin and Mineral Supplement Fact Sheets for Health Professionals. Vitamin A and Carotenoids. US Department of Health and Human Services. 10 March 2025. https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/Rheinberger, C.M., Hammitt, J.K. 2012. Risk Trade-Offs in Fish Consumption: A Public Health Perspective. Environmental Science & Technology 2012; 46: 12337-12346.
- NRCan (Natural Resource Canada). 2025. Comments on the Methylmercury Study Plan and Proposed Modelling. August 2025.
- NWOMC MNO. 2025. Northwestern Ontario Metis Community (NWOMC) and Metis Nation of Ontario (MNO) Comments on Great Bear Resources Ltd. Mercury Study Plan for the Great Bear Gold Project, February 4, 2025.
- Orem, W.H., Fitz, C., Krabbenhoft, D.P., Poulin, B.A., Varonka, M.S., Aiken, G.R. 2020. Ecosystem-Scale Modelling and Field Observations of Sulfate and Methylmercury Distributions in the Florida Everglades: Responses to Reductions in Sulfate Loading. Aquatic Geochemistry, 26:191–220.
- Philibert, A., Fillion, M. and Mergler, D. 2020. Mercury exposure and premature mortality in the Grassy Narrows First Nation community: a retrospective longitudinal study. The Lancet Planetary Health, 4(4), pp. e141–e148. Available at: https://doi.org/10.1016/s2542-5196(20)30057-7.
- Philibert, A., Fillion, M., Da Silva, J., Lena, T. S., & Mergler, D. 2022. Past mercury exposure and current symptoms of nervous system dysfunction in adults of a First Nation community (Canada). Environmental Health, 21(1), 34. https://doi.org/10.1186/s12940-022-00838-y
- Paranjape, A.R. and Hall, B.D. 2017, Recent advances in the study of mercury methylation in aquatic systems. FACETS (Vol 2, January 2017).

- Richardson G. Mark. 1997. Compendium of Canadian Human Exposure Factors for Risk Assessment, O'Connor Associates Environmental Inc. and G. Mark Richardson, 1997
- Robador, A., Müller, AL., Sawicka, J.E., Berry, D., Hubert, C.R.J., Loy, A., Jørgensen, B.B., Brüchert, V. 2016. Activity and community structures of sulphate-reducing microorganisms in polar, temperate and tropical marine sediments. ISME J, 10: 796–809.
- Rudd, J.W.M., Kelly, C.A., St. Louis, V., Hesslein, R.H., Furutani, A., Holoka, M.H. 1986. Microbial consumption of nitric and sulfuric acids in acidified north temperate lakes. Limnology and Oceanography, 31: 1267–1280.
- Rudd, J.W., Kelly, C.A., Sellers, P., Flett, R.J. and Townsend, B.E. 2021. Why the English–Wabigoon river system is still polluted by mercury 57 years after its contamination. Facets, 6(1), pp.2002-2027.
- Seabert, T.A., Pal, S., Pinet, B.M., Haman, F., Robidoux, M.A., Imbeault, P., Krummel, E.M., Kimpe, L.E., Blais, J.M. 2014. Elevated Contaminants Contrasted with Potential Benefits of Ω-3 Fatty Acids in Wild Food Consumers of Two Remote First Nations Communities in Northern Ontario, Canada. PLoS ONE 2014: 9(3).
- Tanamal, C., Blais ,Jules M., Yumvihoze ,Emmanuel, & and Chan, H. M. 2021. Health risk assessment of inorganic arsenic exposure through fish consumption in Yellowknife, Northwest Territories, Canada. Human and Ecological Risk Assessment: An International Journal, 27(4), 1072–1093. https://doi.org/10.1080/10807039.2020.1799187.
- Thomas, R.L. 1972. The Distribution of Mercury in the Sediments of Lake Ontario. Canadian Journal of Earth Sciences.
- Ullrich, S.M., T.W. Tanton and S.A. Abdrashitova. 2001. Mercury in the Aquatic Environment: A Review of Factors Affecting Methylation. Critical Reviews in Environmental Science and Technology 31(3): 241-293.
- US EPA (United States Environmental Protection Agency). 1995. IRIS Profile for Mercuric Chloride (HgCl2). Washington, DC. Accessed March 2025. Available at: https://iris.epa.gov/ChemicalLanding/&substance_nmbr=692.
- US EPA (United States Environmental Protection Agency). 1997. United States Environmental Protection Agency, Mercury Study Report to Congress, Volume VII: Characterization of Human Health and Wildlife Risks from Mercury Exposure in the United States. EPA-452/R-97-009. Office of Air Quality Planning and Standards and Office of Research and Development, U.S. EPA, Washington, DC.
- US EPA (United States Environmental Protection Agency). 2001. United States Environmental Protection Agency, Risk Assessment Guidance for Superfund: Volume III - Part A, Process for Conducting Probabilistic Risk Assessment. EPA 540-R-02-002. December 2001.
- US EPA (United States Environmental Protection Agency). 2009. Guidance on the Development, Evaluation, and Application of Environmental Models. Office of the Science Advisor Council for Regulatory Environmental Modelling. EPA/100/K-09/003 March 2009.
- US EPA (United States Environmental Protection Agency). 2022. United States Environmental Protection Agency, ProUCL Software (version 5.2.0). Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. Neptune and Company Incorporated. June 2022.
- Van Wijngaarden, E., Thurston, S.W., Myers, G.J. et al. 2013. Prenatal mercury exposure in relation to neurodevelopment and behavior at 19 years of age in the Seychelles Child Development Study. Neurotoxicology and Teratology. 39: 19-25.
- Weihe, P. and Joensen, H.D. 2012. Dietary recommendations regarding pilot whale meat and blubber in the Faroe Islands. Int J Circumpolar Health. Jul 10(71):18594.
- Weyh, C., Krüger, K., Peeling, P., & Castell, L. 2022. The Role of Minerals in the Optimal Functioning of the Immune System. Nutrients, 14(3), 644. https://doi.org/10.3390/nu14030644.
- Watras, C.J., Bloom, N.S., Claas, S.A., Morrison, K.A., Gilmour, C.C., Craig, S.R. 1995. Methylmercury production in the anoxic hypolimnion of a dimictic seepage lake. Water, Air, and Soil Pollution, 80: 735–745. doi:10.1007/BF01189725.
- Wheatley B & Paradis S. 1995. Exposure of Canadian Aboriginal peoples to methylmercury. Water, Air, Soi,l Pollution; 80: 3–11.

- World Health Organization (WHO). 2003. Joint FAO/WHO Expert Committee on Food Additives, Sixty-first meeting 10-19 June 2003, Summary and Conclusions. Available on-line: https://www.who.int/publications/i/item/9241209224
- Wu P, Kainz MJ, Bravo AG, Åkerblom S, Sonesten L, Bishop K. 2019. The importance of bioconcentration into the pelagic food web base for methylmercury biomagnification: A meta-analysis. Sci Total Environ. 2019 Jan 1;646:357-367.
- WSP Canada Inc. (WSP). 2024. Great Bear Project, Mercury Study Plan. December 2024.
- WSP. 2025a. Great Bear Project, Mine Site Water Balance. September 2025.
- WSP. 2025b. Great Bear Project, Receiver Water Quality Modelling Report. December 2025.
- WSP. 2025c). Great Bear Project, Hydrology Baseline Report. June 2025.
- WSP. 2025d. Great Bear Project, Water Quality Baseline Report. June 2025.
- WSP. 2025e. Great Bear Project, Aquatic Resources Baseline Report. November 2025.
- WSP. 2025f. Great Bear Project, Groundwater Modelling Report, December 2025
- WSP. 2026. Great Bear Project, Human Health and Ecological Risk Assessment, March 2026
- Yu, R.-Q., Flanders, J. R., Mack, E. E., Ralph Turner, R., Mirza, B. M. and T. Barkay. 2012. Contribution of coexisting sulphate and iron reducing bacteria to methylmercury production in freshwater river sediments. Environmental Science and Technology 46 (5): 2684-2691.Zeng, L. et al. 2016. Effects of sulphate-reducing bacteria on methylmercury at the sediment-water interface. J of Environmental Sciences (Vol 46; August 2016).

Attachment A
Baseline Water Quality Data

Table A-1 Baseline Summary Statistics Divided by Surface Water Quality Station

Waterbody	Station	Total Mercury (WQG PAL: 26 ng/L)						Dissolved Mercury (WQG PAL: 200 ng/L)						MethylImercury (WQG PAL: 4 ng/L)						Total Low-Level Detection Mercury (WQG PAL: 26 ng/L)						Percent Dissolved Mercury [1]						Percent MethylImercury [2]					
		Count	25th	Median	Average	75th	95th	Count	25th	Median	Average	75th	95th	Count	25th	Median	Average	75th	95th	Count	25th	Median	Average	75th	95th	Count	25th	Median	Average	75th	95th	Count	25th	Median	Average	75th	95th
Chukuni River	CR-REF	34	2.5	2.5	3.5	5.0	5.0	33	2.5	2.5	3.4	5.0	5.0	23	0.029	0.034	0.046	0.057	0.079	24	0.75	0.99	1.2	1.6	2.5	27	100	100	100	100	100	22	2.7	4.3	4.2	5.3	6.5
	CR-FDP	27	2.5	2.5	3.4	5.0	5.0	23	2.5	2.5	3.2	3.8	5.0	21	0.035	0.041	0.072	0.049	0.095	22	0.68	0.90	1.5	1.4	1.9	22	100	100	100	100	100	21	3.6	4.3	4.8	5.6	8.1
	CR-DS	25	2.5	2.5	5.5	5.0	7.0	24	2.5	2.5	3.8	5.0	5.0	16	0.050	0.056	0.055	0.062	0.068	17	0.76	1.1	1.2	1.8	1.9	21	100	100	102	100	100	16	3.7	4.6	5.4	7.9	8.8
Dixie Creek	SW-03	27	2.5	2.5	5.3	5.0	16.1	23	2.5	2.5	4.0	5.0	10.6	20	0.066	0.12	0.15	0.20	0.34	21	1.0	1.8	4.2	5.6	14.2	23	100	100	94.0	100	100	20	2.9	6.0	7.0	11.0	13.4
	SW-04	34	2.5	2.5	6.3	5.0	17.0	32	2.5	2.5	3.9	5.0	7.3	4	0.048	0.063	0.070	0.085	0.10	4	1.7	1.7	1.9	1.9	2.3	29	100	100	111	100	160	4	2.7	3.7	3.6	4.9	5.8
	SW-06	34	2.5	2.5	3.7	5.0	5.0	28	2.5	2.5	3.2	5.0	5.0	22	0.071	0.10	0.17	0.16	0.58	23	1.8	2.3	2.9	3.6	4.2	28	100	100	97.4	100	100	22	3.5	4.0	5.9	5.6	15.8
	SW-09	22	2.5	2.5	3.6	5.0	5.7	18	2.5	2.5	3.1	2.5	5.0	5	0.060	0.07	0.076	0.09	0.10	6	1.5	1.8	2.0	1.9	3.4	18	100	100	96.9	100	100	5	4.2	4.8	4.7	5.3	5.8
	SW-15	22	3.1	5.0	5.1	5.0	6.0	24	2.5	5.0	4.8	5.0	5.0	5	0.301	0.31	0.35	0.31	0.51	5	2.7	2.9	3.8	3.4	7.3	18	100	100	93.7	100	100	5	8.4	9.0	11.5	15.3	19.9
Unnamed Watercourses flowing into Dixie Creek	SW-02	11	5.0	5.0	4.5	5.0	5.0	6	3.1	5.0	4.2	5.0	5.0	0	-	-	-	-	-	0	-	-	-	-	-	6	100	100	100	100	100	0	-	-	-	-	-
	SW-05	2	-	-	7.5	-	-	2	-	-	7.5	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	100	-	-	0	-	-	-	-	-
	SW-06	3	-	-	8.5	-	-	3	-	-	8.7	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-	101	-	-	0	-	-	-	-	-
	SW-07	2	-	-	7.0	-	-	2	-	-	6.9	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	97	-	-	0	-	-	-	-	-
	SW-08	21	2.5	2.5	5.7	5.0	16.7	20	2.5	2.5	4.9	5.1	12.1	16	0.18	0.29	0.33	0.54	0.68	17	2.9	4.9	5.8	7.2	16.0	17	100	100	93	100	100	16	4.5	6.2	7.8	9.2	19.3
	SW-10	14	3.1	5.0	4.7	5.0	7.7	12	2.5	3.8	3.8	5.0	5.2	1	-	-	0.30	-	-	1	-	-	3.3	-	-	11	83	100	86	100	100	1	0.30	-	9.1	-	-
North-Flowing Unnamed Watercourses	SW-GL02	20	2.5	3.8	5.0	5.0	10.9	15	2.5	2.5	4.9	5.0	13.0	3	-	-	0.15	-	-	3	-	-	2.8	-	-	15	100	100	99	100	100	3	-	-	6.3	-	-
	SW-17	11	2.5	5.0	4.1	5.1	6.1	9	2.5	2.5	3.1	2.5	5.4	4	0.30	0.33	0.33	0.36	0.42	4	3.7	3.9	3.9	4.1	4.3	8	83	100	85	100	100	4	7.0	8.6	8.6	10.1	11.2
	SW-18	3	-	-	13.6	-	-	3	-	-	9.8	-	-	1	-	-	0.25	-	-	1	-	-	7.8	-	-	3	-	-	61	-	-	1	-	-	3.2	-	-
	SW-TR	28	2.5	5.1	10.7	7.5	10.0	24	2.5	2.5	10.8	6.6	10.0	20	0.20	0.35	0.88	1.24	2.74	21	5.0	6.1	6.6	7.4	10.5	24	50	100	99	100	224	20	3.0	7.2	14.1	16.9	54.4
Waterbody 6 and Genessee Lake Tributaries	SW-11	25	5.0	5.0	7.6	7.2	18.1	21	2.5	5.0	5.5	6.6	9.8	7	0.77	1.1	1.0	1.3	1.5	7	4.9	6.6	6.6	7.6	10.1	21	66	100	94	100	123	7	9.8	16.5	16.0	22.4	24.2
	SW-12	4	5.0	7.5	12.5	15.0	27.0	3	5.0	5.0	5.0	5.0	5.0	0	-	-	-	-	-	0	-	-	-	-	-	2	63	75	75	88	98	0	-	-	-	-	-
	SW-12D	8	2.5	2.5	5.1	7.9	10.8	8	2.5	2.5	3.7	5.5	8.1	1	-	-	0.21	-	-	1	-	-	2.8	-	-	8	82	100	87	100	100	1	-	-	7.6	-	-
	SW-13	4	5.0	5.0	5.0	5.0	5.0	3	-	-	5.0	-	-	0	-	-	-	-	-	2	-	-	-	-	-	2	-	-	100	-	-	0	-	-	-	-	-
	SW-16	3	-	-	5.0	-	-	2	-	-	5.0	-	-	2	-	-	0.70	-	-	2	-	-	5.6	-	-	1	-	-	100	-	-	2	-	-	13.0	-	-
	GL-Trib	6	2.5	2.5	2.5	2.5	2.5	6	2.5	2.5	2.5	2.5	2.5	1	-	-	0.11	-	-	1	-	-	1.5	-	-	6	100	100	100	100	100	1	-	-	7.2	-	-
Project Area Waterbodies	DL-Ref	8	2.5	2.5	2.5	2.5	2.5	8	2.5	2.5	2.5	2.5	2.5	8	0.048	0.071	0.078	0.104	0.139	8	1.5	1.8	2.2	2.5	3.8	8	100	100	100	100	100	8	3.0	3.3	3.7	3.7	6.2
	DC-US	15	2.5	5.0	4.0	5.0	5.0	17	2.5	5.0	4.1	5.0	5.0	1	-	-	0.043	-	-	1	-	-	1.4	-	-	11	100	100	100	100	100	1	-	-	3.5	-	-
	SW-GL	28	2.5	2.5	3.1	3.1	5.0	26	2.5	2.5	3.0	2.5	5.0	19	0.018	0.020	0.026	0.029	0.060	19	0.47	0.56	0.68	0.84	1.18	26	100	100	100	100	100	17	2.9	3.9	4.3	5.4	7.2
	SW-GL-B	15	2.5	2.5	2.5	2.5	2.5	16	2.5	2.5	2.5	2.5	2.5	3	-	-	0.239	-	-	3	-	-	0.97	-	-	15	100	100	100	100	100	3	-	-	16.0	-	-
	SW-01	32	2.5	4.8	4.4	5.0	8.8	30	2.5	2.5	4.3	5.0	10.0	4	0.273	0.276	0.280	0.283	0.296	5	4.2	5.6	5.6	6.2	7.3	27	100	100	100	100	115	4	4.5	4.8	5.0	5.3	6.4
	SW-14	17	2.5	5.0	4.9	5.0	8.0	15	2.5	5.0	4.9	5.0	5.0	10	0.030	0.039	0.049	0.065	0.094	10	1.9	2.2	2.5	2.7	4.5	13	100	100	100	100	100	10	1.6	1.7	2.0	2.4	3.0
	SW-14-B	7	2.5	2.5	2.5	2.5	2.5	7	2.5	2.5	2.5	2.5	2.5	1	-	-	0.027	-	-	1	-	-	2.1	-	-	7	100	100	100	100	100	1	-	-	1.3	-	-
Gullrock Lake	GRL-01	1	-	-	2.5	-	-	1	-	-	2.5	-	-	1	-	-	0.020	-	-	1	-	-	0.59	-	-	1	-	-	100	-	-	1	-	-	3.4	-	-
	GRL-01-B	1	-	-	2.5	-	-	1	-	-	2.5	-	-	1	-	-	0.016	-	-	1	-	-	0.59	-	-	1	-	-	100	-	-	1	-	-	2.2	-	-
	GRL-02	1	-	-	2.5	-	-	1	-	-	2.5	-	-	1	-	-	0.031	-	-	1	-	-	0.58	-	-	1	-	-	100	-	-	1	-	-	5.3	-	-
	GRL-02-B	1	-	-	2.5	-	-	1	-	-	2.5	-	-	1	-	-	0.030	-	-	1	-	-	0.56	-	-	1	-	-	100	-	-	1	-	-	5.4	-	-
	GRL-03	1	-	-	2.5	-	-	1	-	-	2.5	-	-	1	-	-	0.026	-	-	1	-	-	0.60	-	-	1	-	-	100	-	-	1	-	-	4.3	-	-
	GRL-03-B	1	-	-	2.5	-	-	1	-	-	2.5	-	-	1	-	-	0.030	-	-	1	-	-	0.57	-	-	1	-	-	100	-	-	1	-	-	5.3	-	-
Pakwash Lake	PL-01	8	2.5	2.5	2.5	2.5	2.5	8	2.5	2.5	2.5	2.5	2.5	8	0.048	0.050	0.053	0.054	0.075	8	0.83	1.0	1.2	1.5	2.2	8	100	100	100	100	100	8	3.5	4.5	4.8	5.7	7.3
	PL-01-B	3	-	-	2.5	-	-	3	-	-	2.5	-	-	3	-	-	0.079	-	-	3	-	-	1.3	-	-	3	-	-	100	-	-	3	-	-	5.8	-	-
	PL-02	8	2.5	2.5	2.5	2.5	2.5	8	2.5	2.5	2.5	2.5	2.5	8	0.035	0.047	0.044	0.054	0.065	8	0.87	1.4	1.6	1.8	3.1	8	100	100	100	100	100	8	2.4	2.8	3.2	3.3	5.3
	PL-02-B	3	-	-	2.5	-	-	3	-	-	2.5	-	-	3	-	-	0.063	-	-	3	-	-	3.3	-	-	3	-	-	100	-	-	3	-	-	2.6	-	-
	PL-03	8	2.5	2.5	2.5	2.5	2.5	8	2.5	2.5	2.5	2.5	2.5	8	0.026	0.032	0.031	0.037	0.042	8	0.84	0.98	1.1	1.2	1.8	8	100	100	100	100	100	8	2.4	3.1	3.0	3.3	3.8
	PL-03-B	3	-	-	2.5	-	-	3	-	-	2.5	-	-	3	-	-	0.037	-	-	3	-	-	1.2	-	-	3	-	-	100	-	-	3	-	-	3.0	-	-
	PL-04	7	2.5	2.5	2.5	2.5	2.5	7	2.5	2.5	2.5	2.5	2.5	7	0.022	0.029	0.026	0.031	0.033	7	0.78	1.0	1.0	1.2	1.5	7	100	100	100	100	100	7	2.2	2.7	2.7	3.1	3.5
	PL-04-B	2	-	-	2.5	-	-	2	-	-	2.5	-	-	2	-	-	0.032	-	-	2	-	-	1.0	-	-	2	-	-	100	-	-	2	-	-	3.1	-	-
	PL-05	7	2.5	2.5	2.5	2.5	2.5	7	2.5	2.5	2.5	2.5	2.5	7	0.021	0.025	0.025	0.027	0.034	7	0.64	0.9	0.87	1.1	1.2	7	100	100	100	100	100	7	2.5	3.2	2.9	3.4	3.4
	PL-05-B	2	-	-	2.5	-	-	2	-	-	2.5	-	-	2	-	-	0.036	-	-	2	-	-	1.5	-	-	2	-	-	100	-	-	2	-	-	2.4	-	-

Notes:

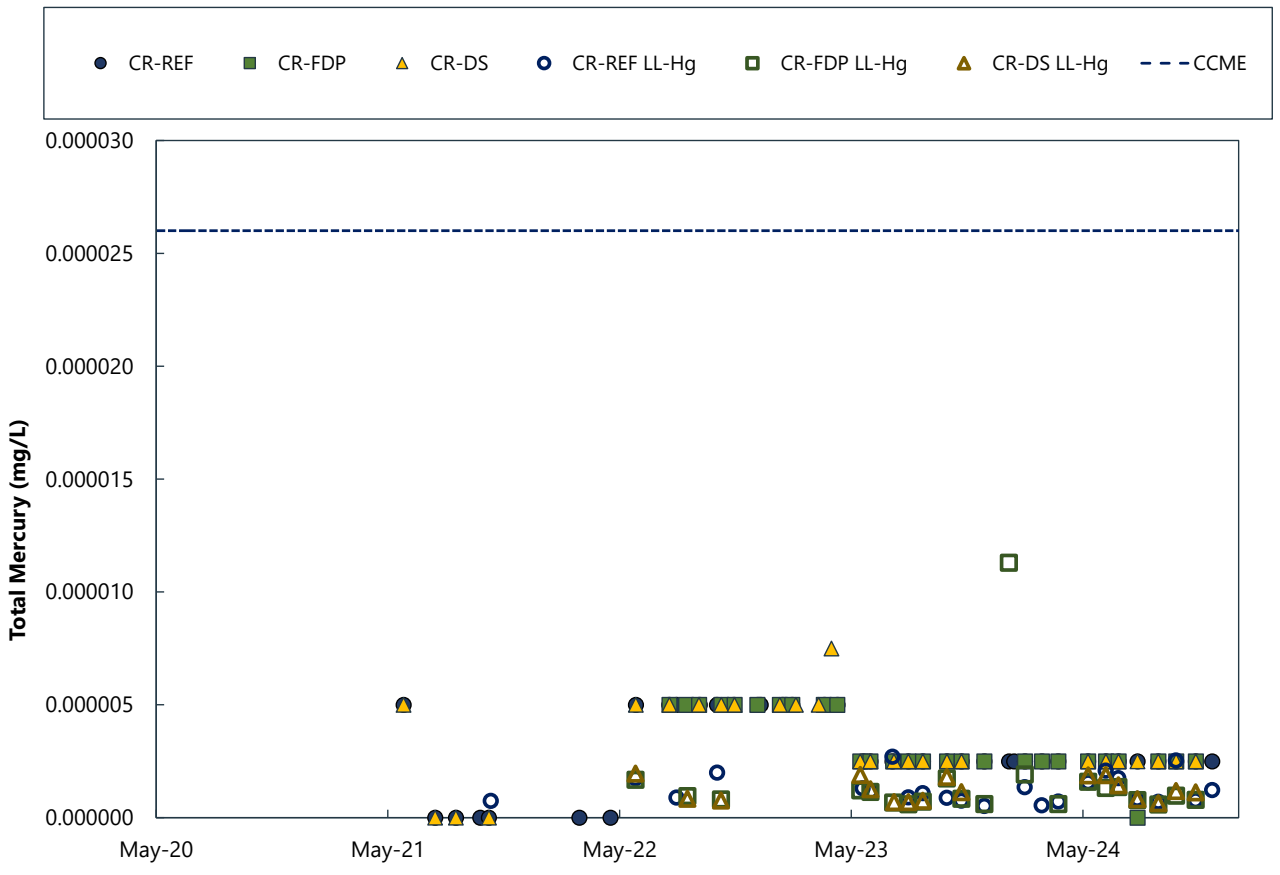
All units are ng/L (unless otherwise noted)

WQG PAL: Water Quality Guideline for the Protection of Aquatic Life

Grey highlighted values are greater than identified WQG PAL

1 Percent dissolved mercury was calculated for each individual samples and averaged afterwards. Percent dissolved mercury was calculated using total mercury (Dissolved Mercury / Total Mercury x 100)

2 Percent methylmercury was calculated for each individual samples and averaged afterwards. Percent methylmercury was calculated using low-level detection mercury (MeHg / Total Low-Level Hg x 100).



Notes:

1. CCME: Canadian Council of Ministers of the Environment

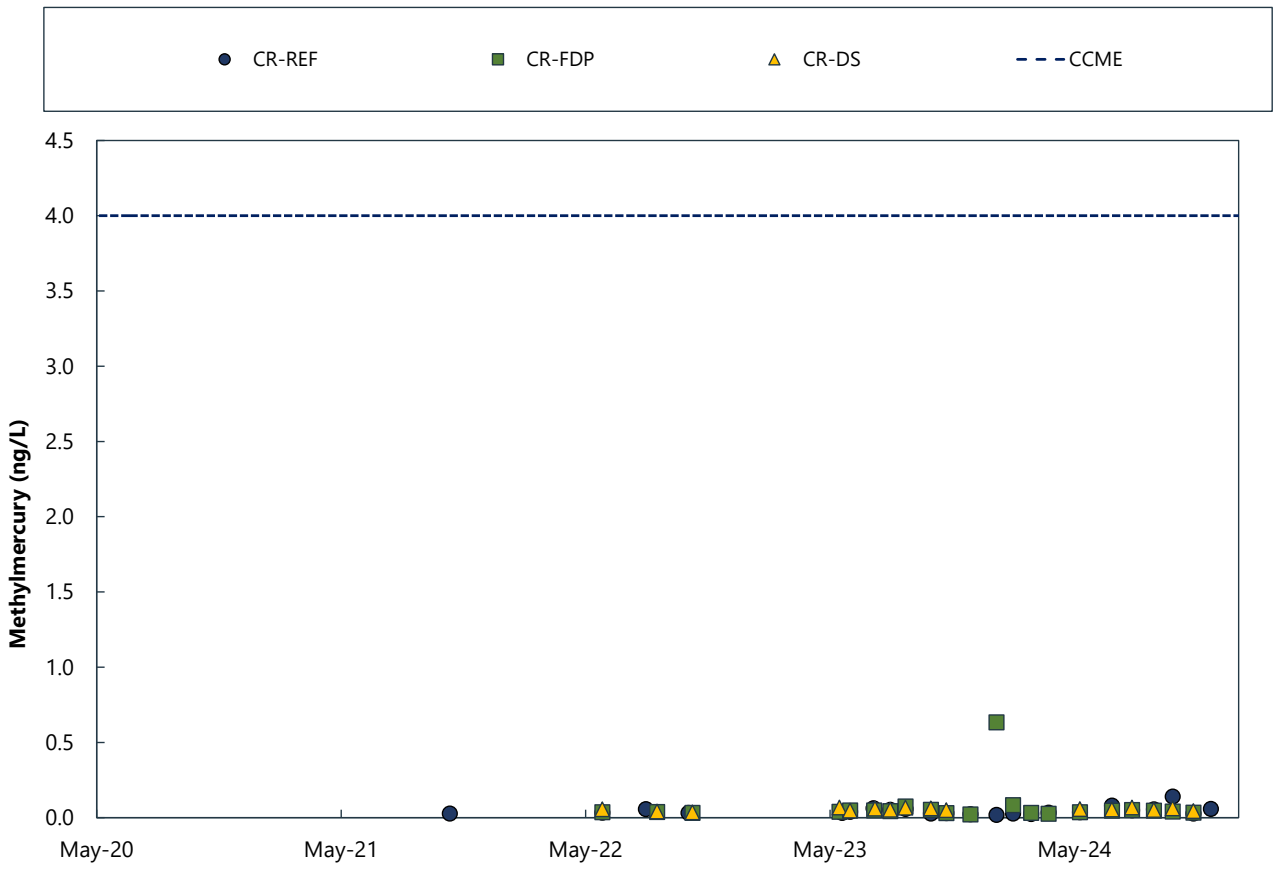
2. A CR-DS outlier (0.00005 mg/L Hg-T) was observed on August 23,2022. It has been removed from graphs for visual clarity but remains in the summary statistics

Total Mercury - Chukuni River

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-1



Notes:

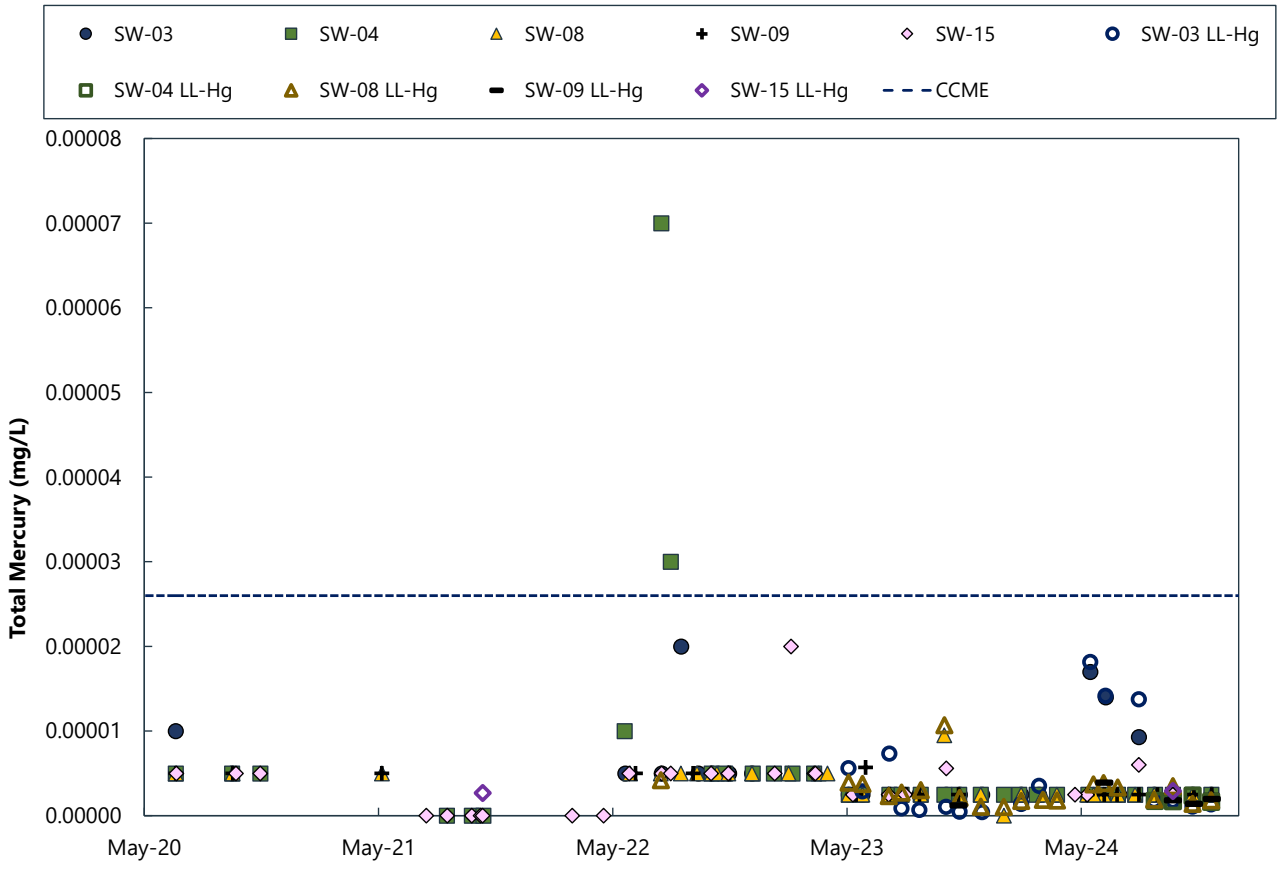
1. CCME: Canadian Council of Ministers of the Environment

Methylmercury - Chukuni River

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-2



Notes:

1. CCME: Canadian Council of Ministers of the Environment

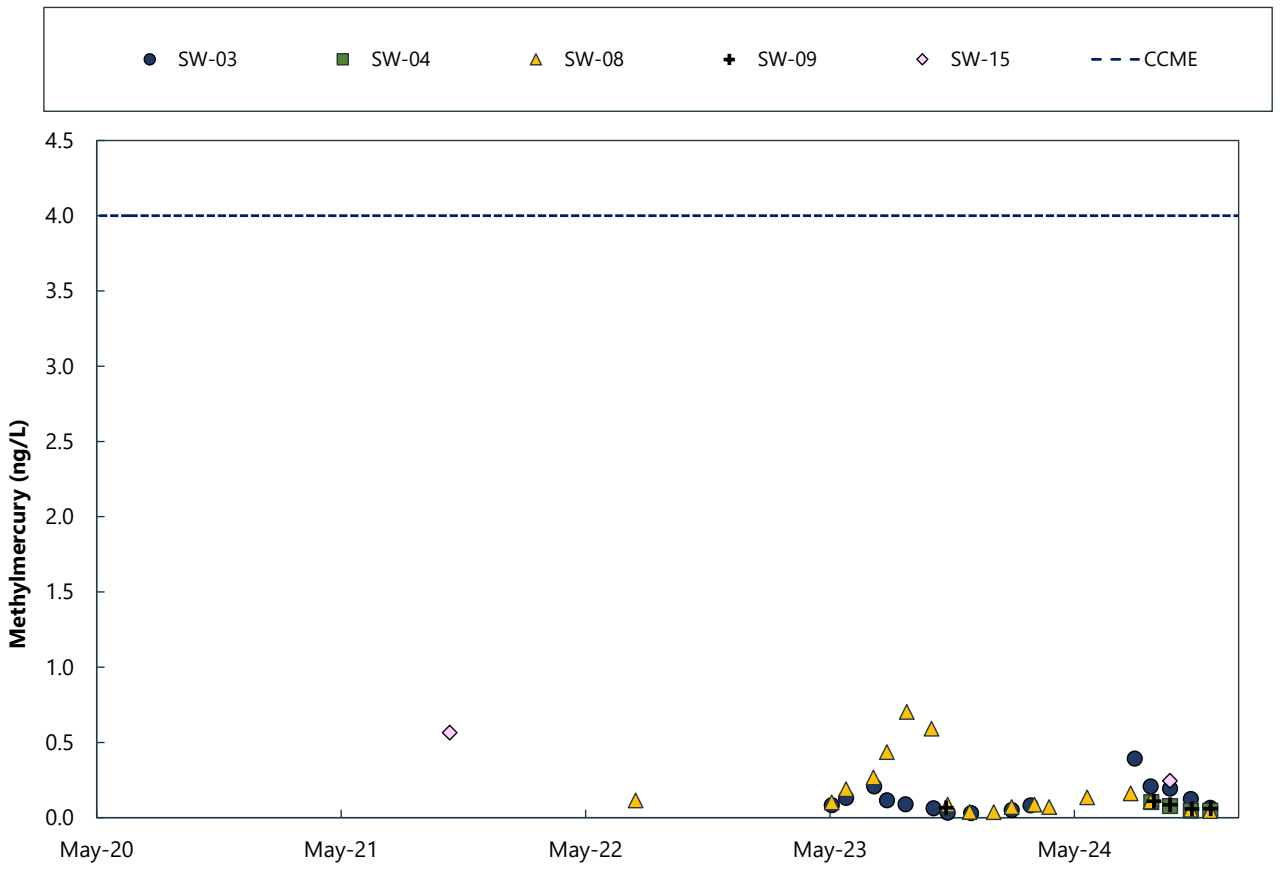
2. An SW-09 outlier (0.00005 mg/L Hg-T) was observed on August 23,2022. It has been removed from graphs for visual clarity but remains in the summary statistics

Total Mercury - Dixie Creek

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-3



Notes:

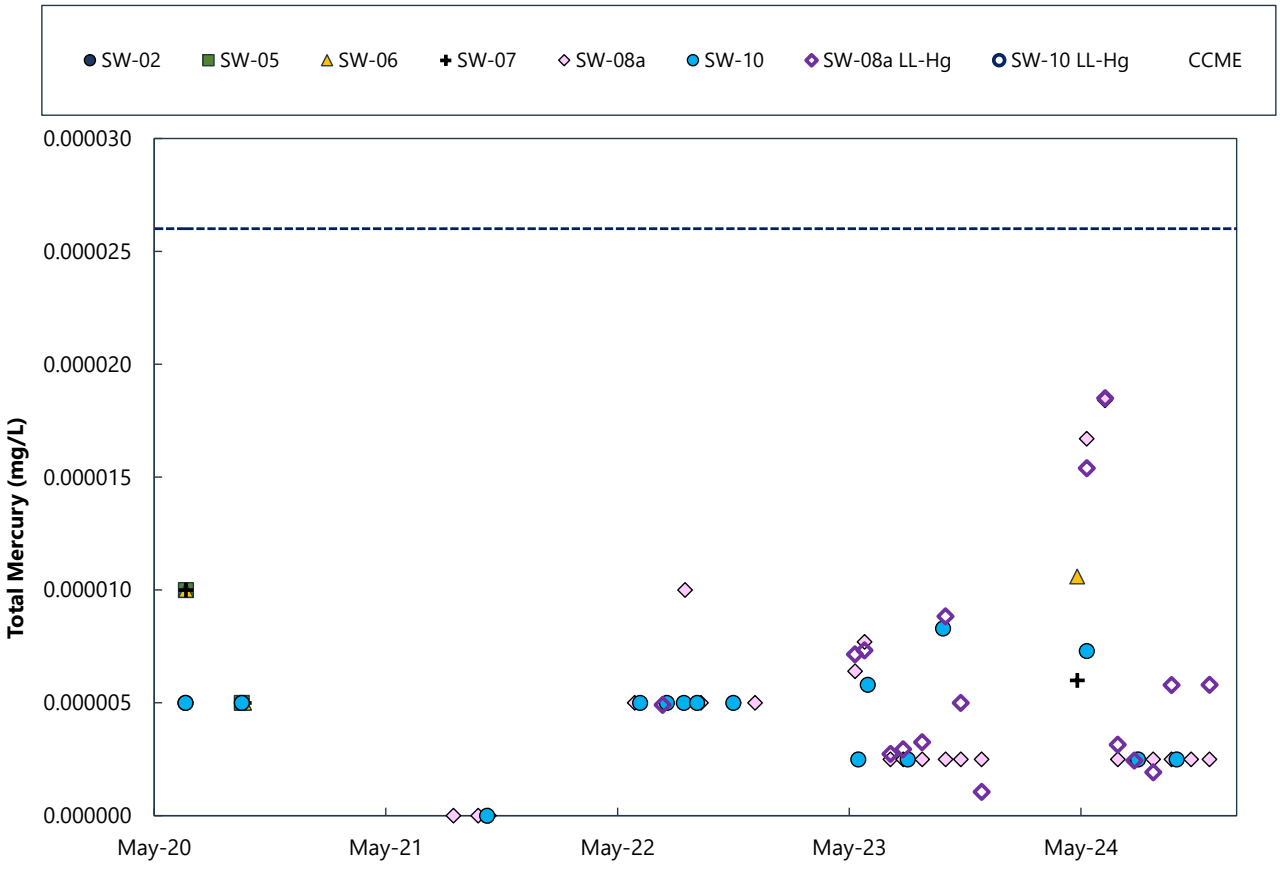
1. CCME: Canadian Council of Ministers of the Environment

Methylmercury - Dixie Creek

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-4



Notes:

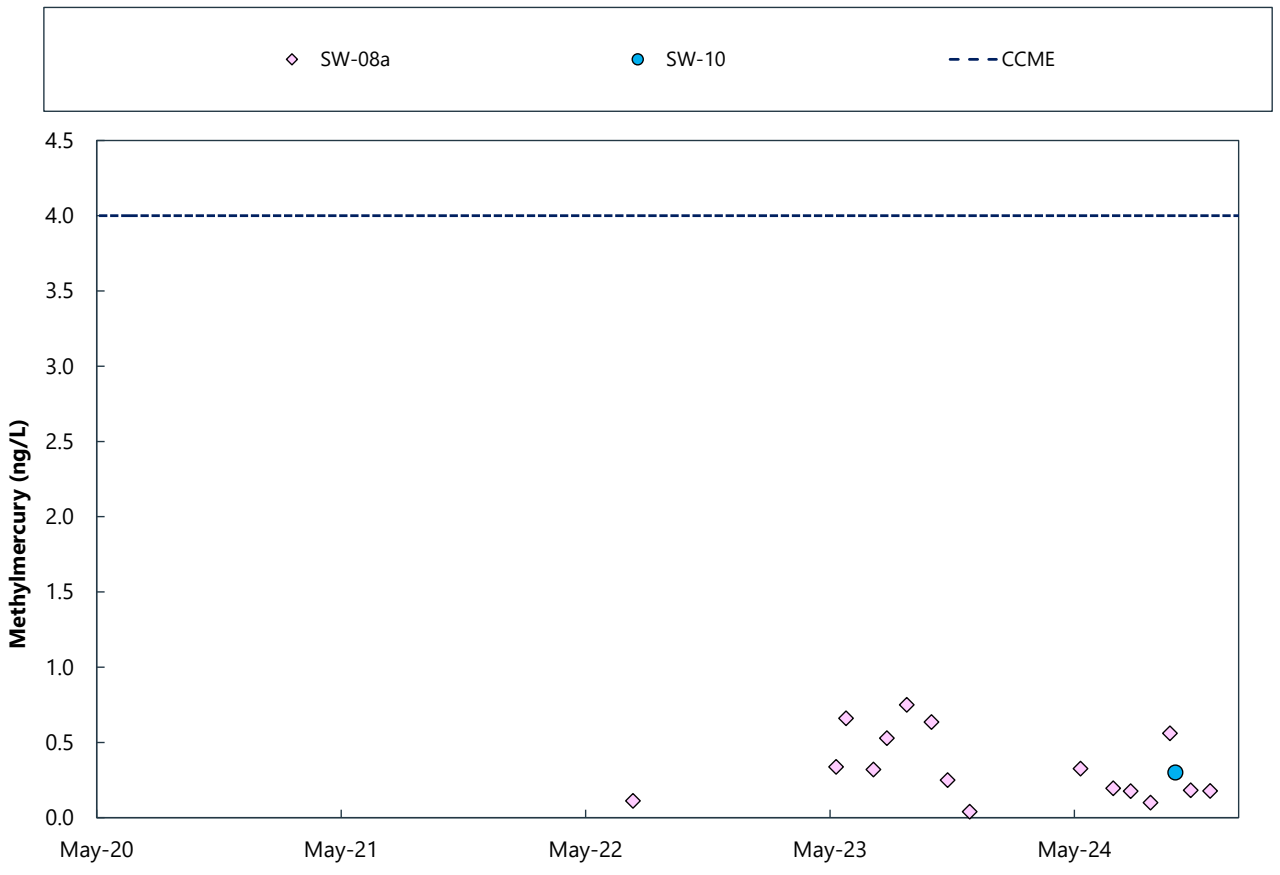
1. CCME: Canadian Council of Ministers of the Environment

Total Mercury - Dixie Creek Tributaries

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-5



Notes:

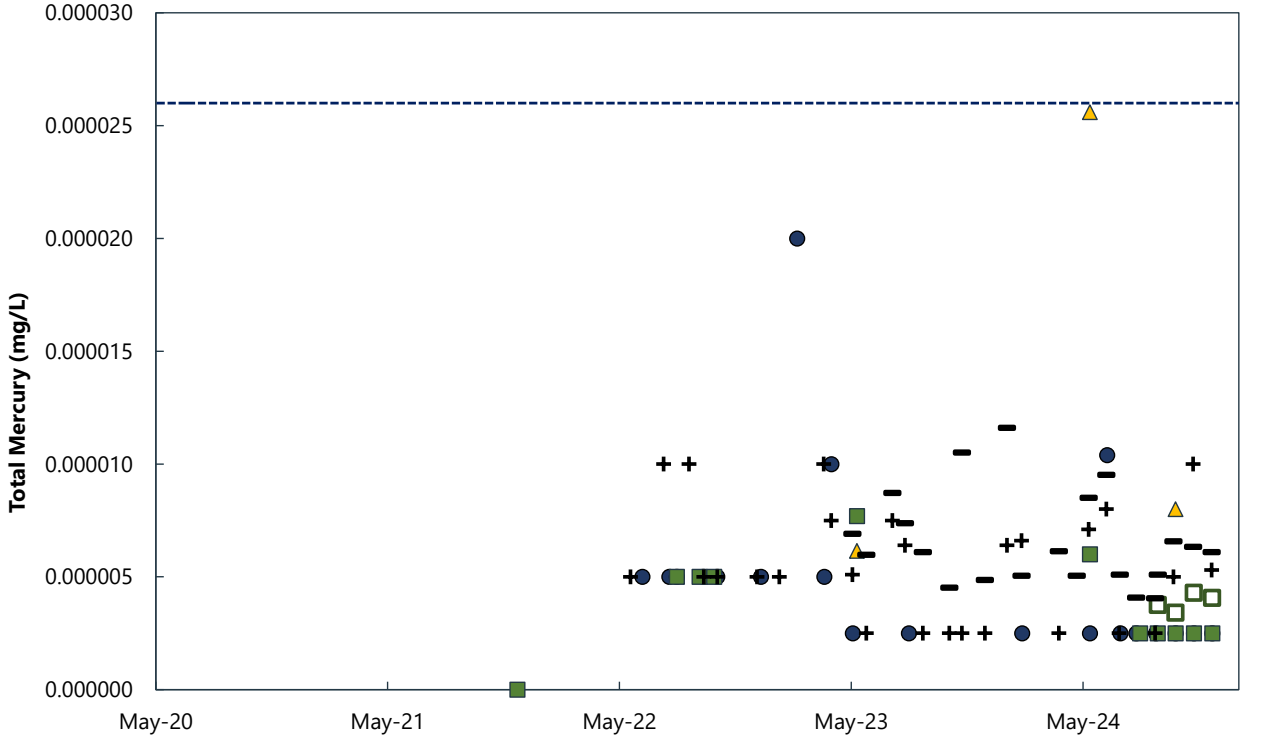
1. CCME: Canadian Council of Ministers of the Environment

Methylmercury - Dixie Creek Tributaries

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-6



Notes:

1. CCME: Canadian Council of Ministers of the Environment

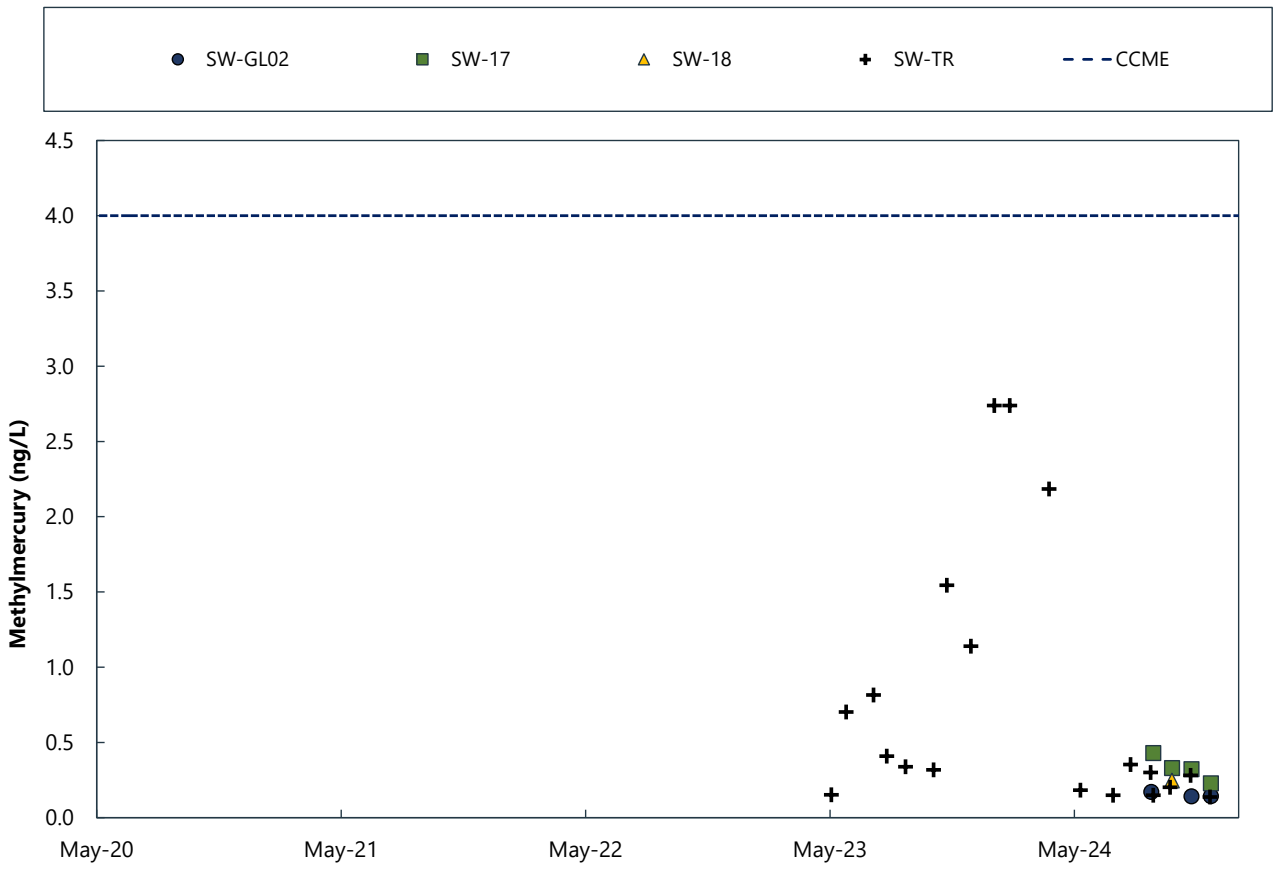
2. An SW-TR outlier (0.00015 mg/L Hg-T) was observed on February 13, 2023. It has been removed from graphs for visual clarity but remains in the summary statistics

Total Mercury - Unnamed Watercourses

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-7



Notes:

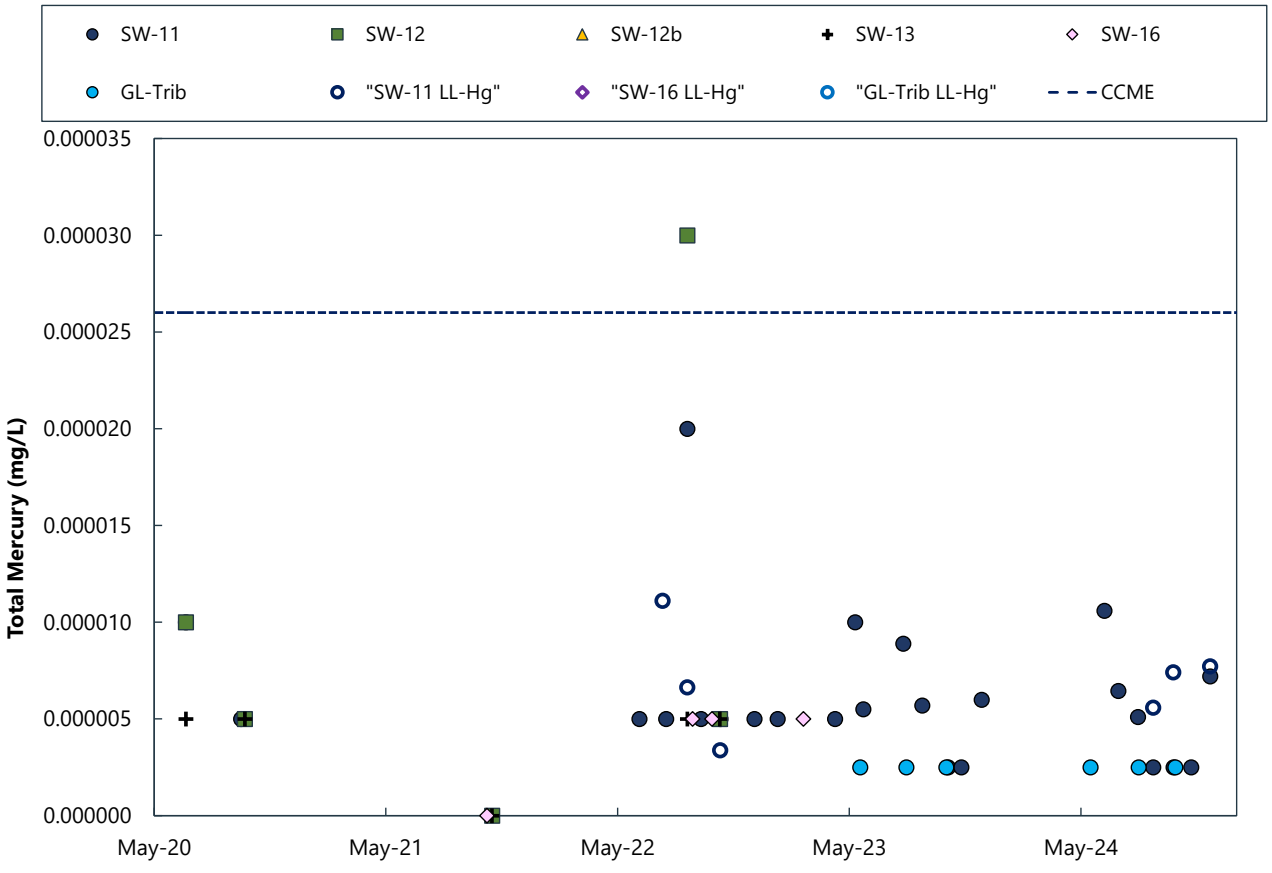
1. CCME: Canadian Council of Ministers of the Environment

Methylmercury - Unnamed Watercourses

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-8



Notes:

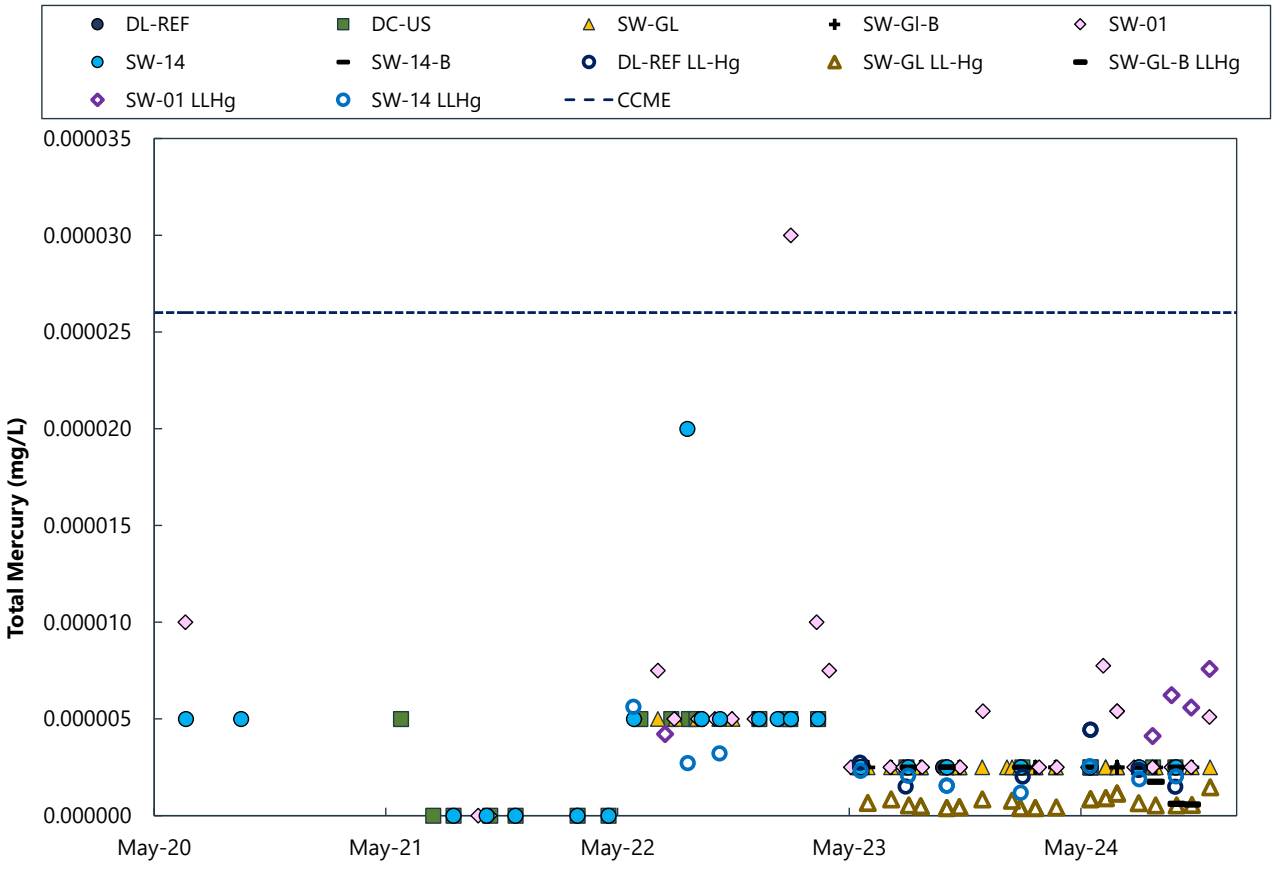
1. CCME: Canadian Council of Ministers of the Environment

Total Mercury - Waterbody 6 and Genesse Lake Tributaries

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-9



Notes:

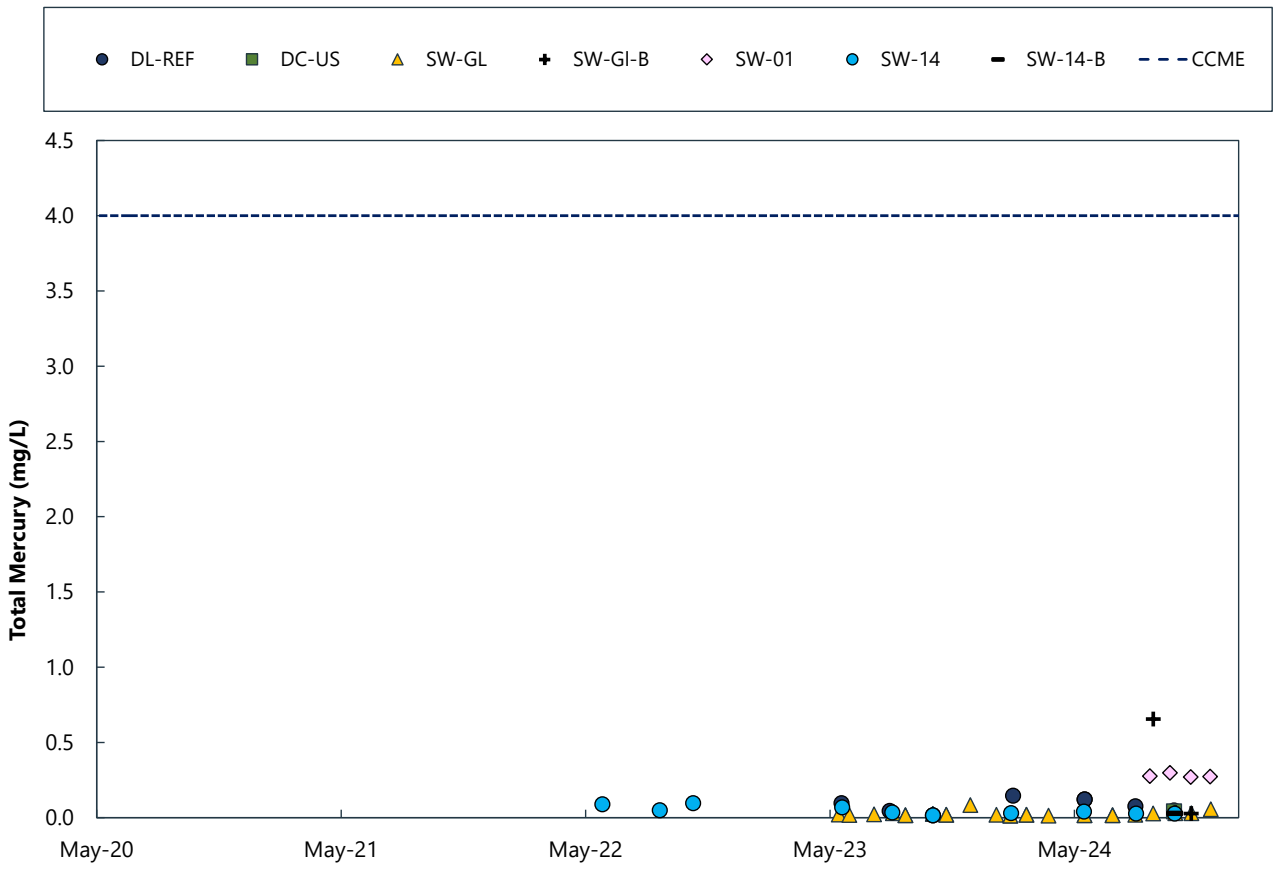
1. CCME: Canadian Council of Ministers of the Environment

Total Mercury - Project Area Waterbodies

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-10



Notes:

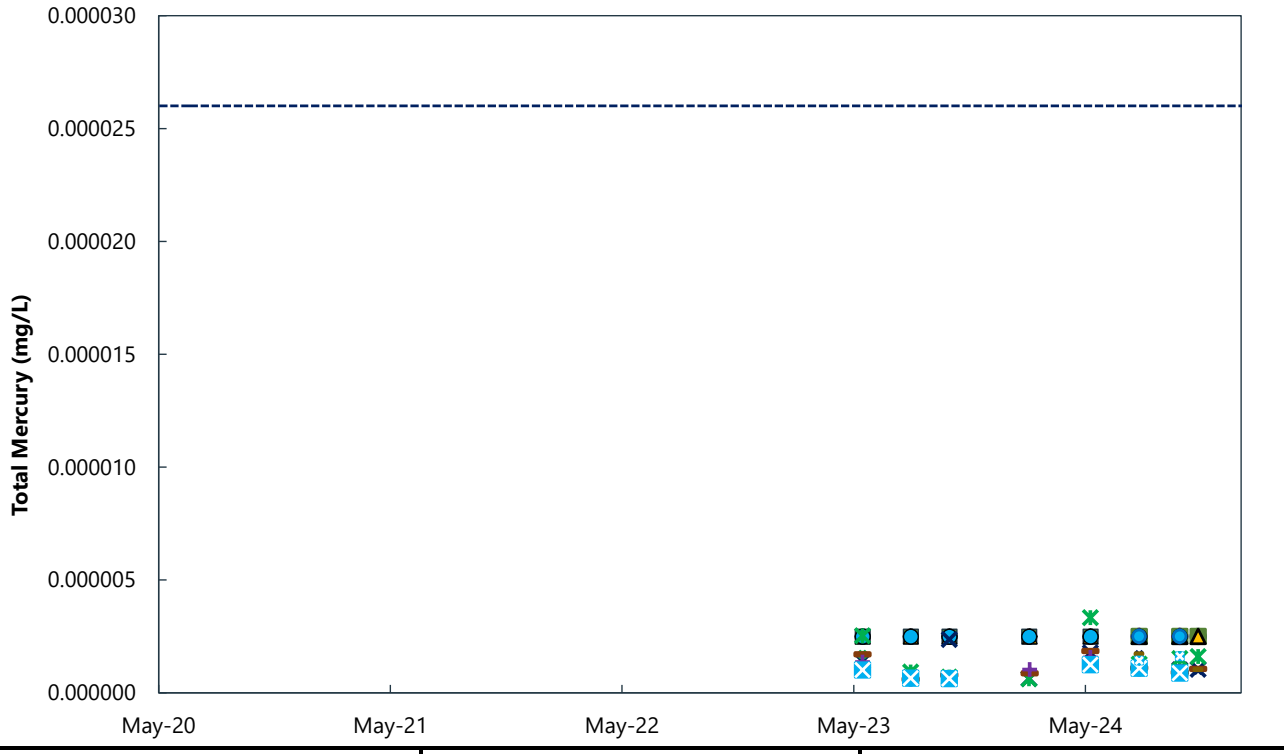
1. CCME: Canadian Council of Ministers of the Environment

Total Mercury - Project Area Waterbodies

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-11



Notes:

1 - CCME: Canadian Council of Ministers of the Environment

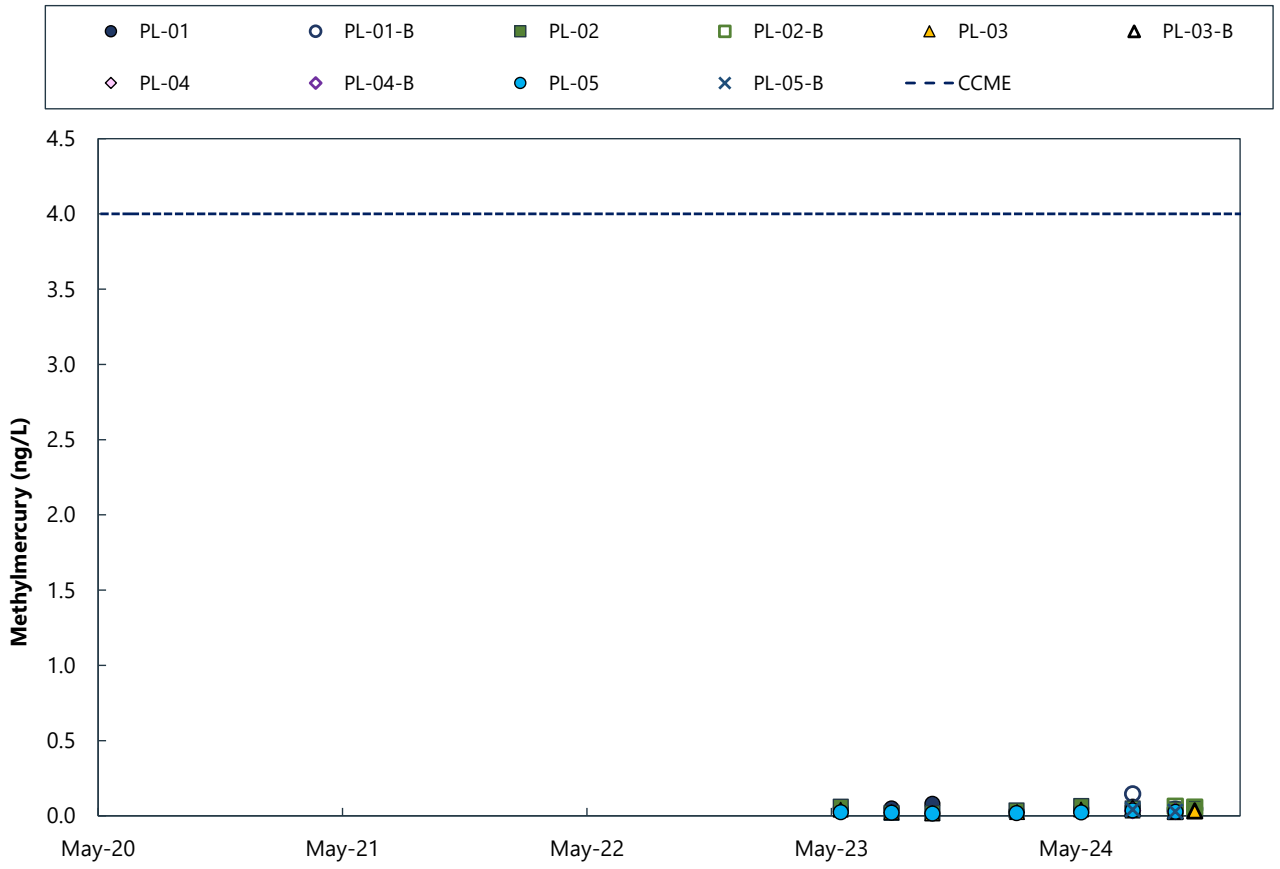
2. B denotes samples from the bottom of the lake

Total Mercury - Pakwash Lake

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-12



Notes:

1 - CCME: Canadian Council of Ministers of the Environment

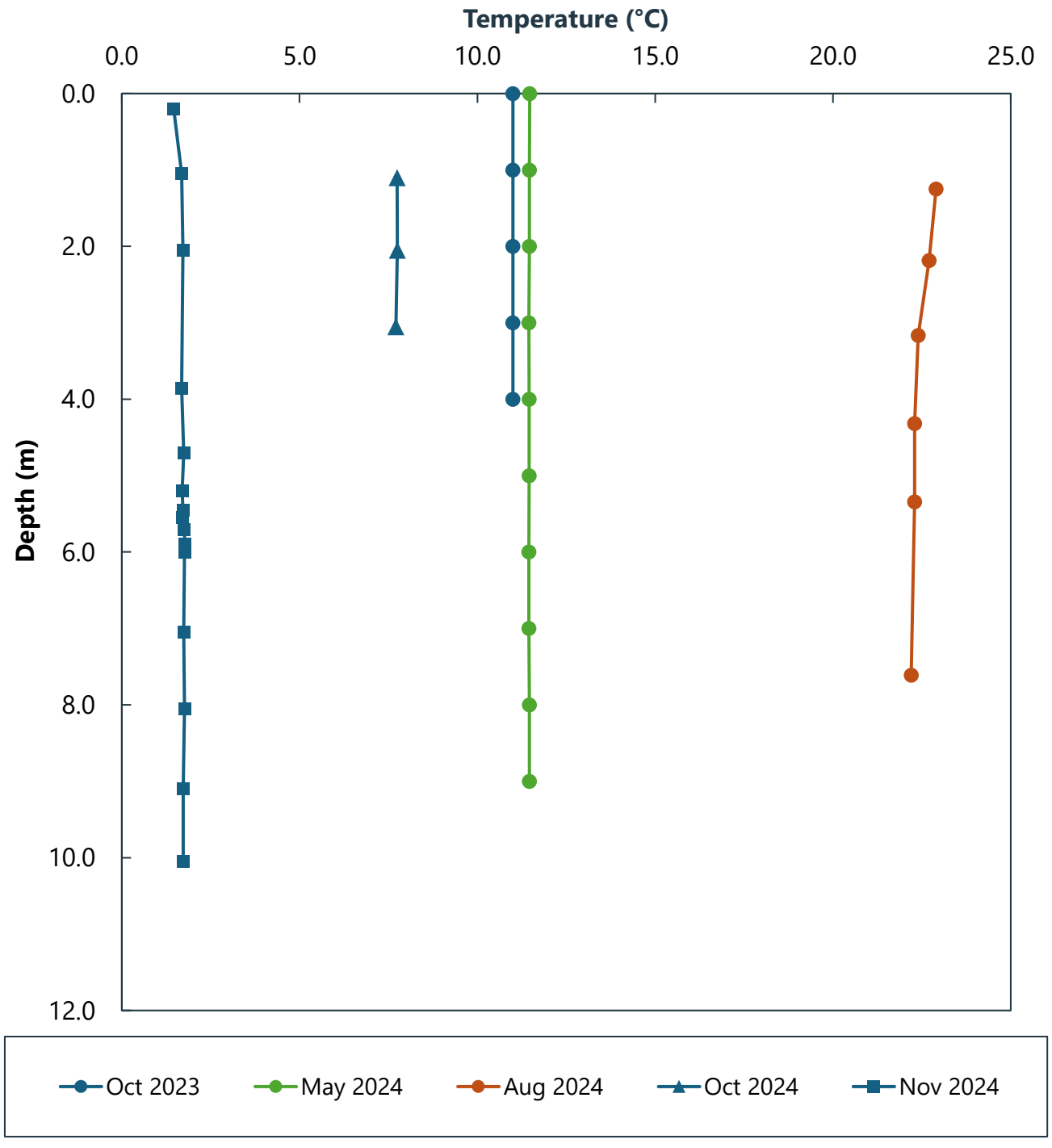
2. B denotes samples from the bottom of the lake

Methylmercury - Pakwash Lake

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A2-13

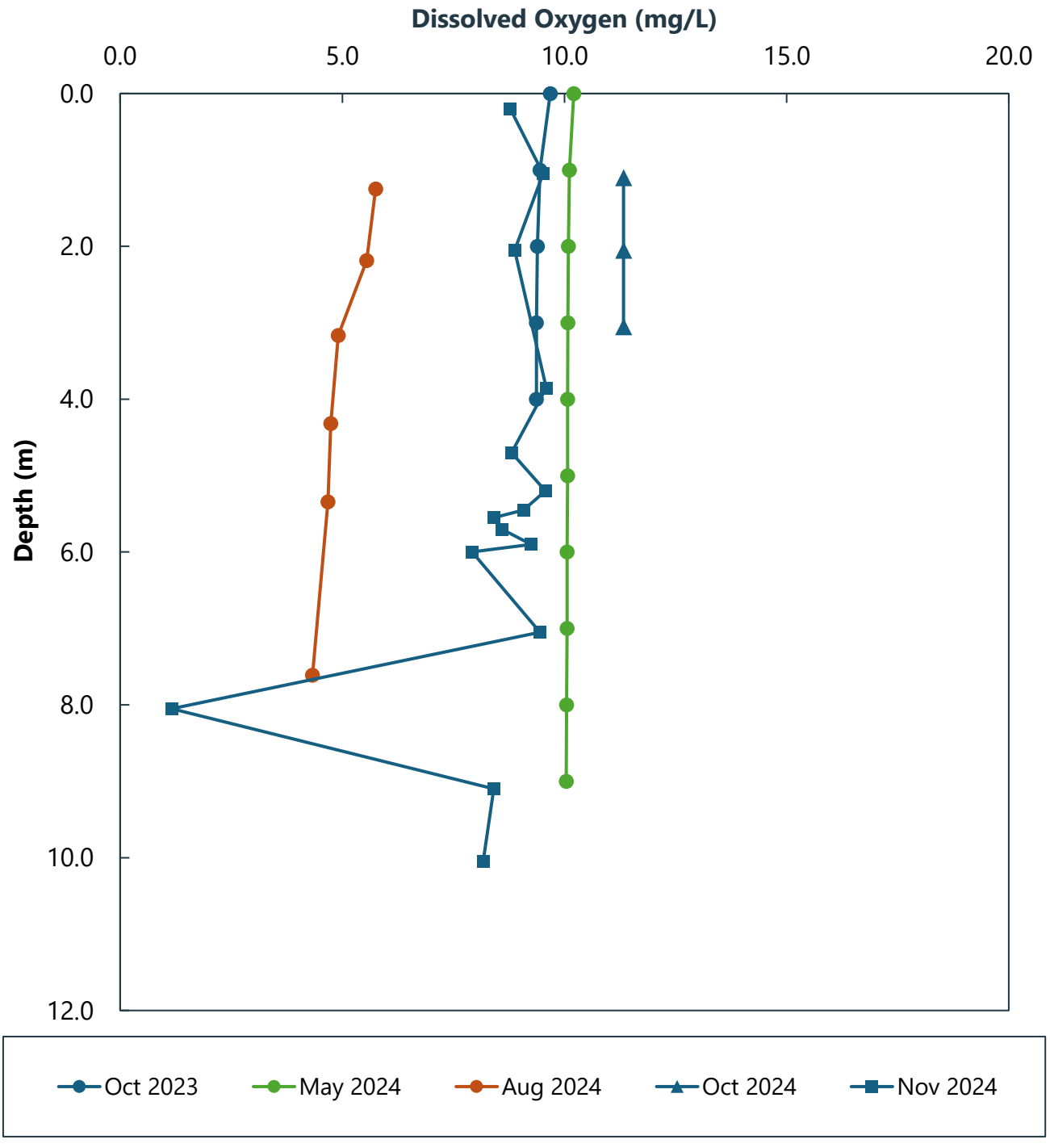


PL-01 Temperature Profile

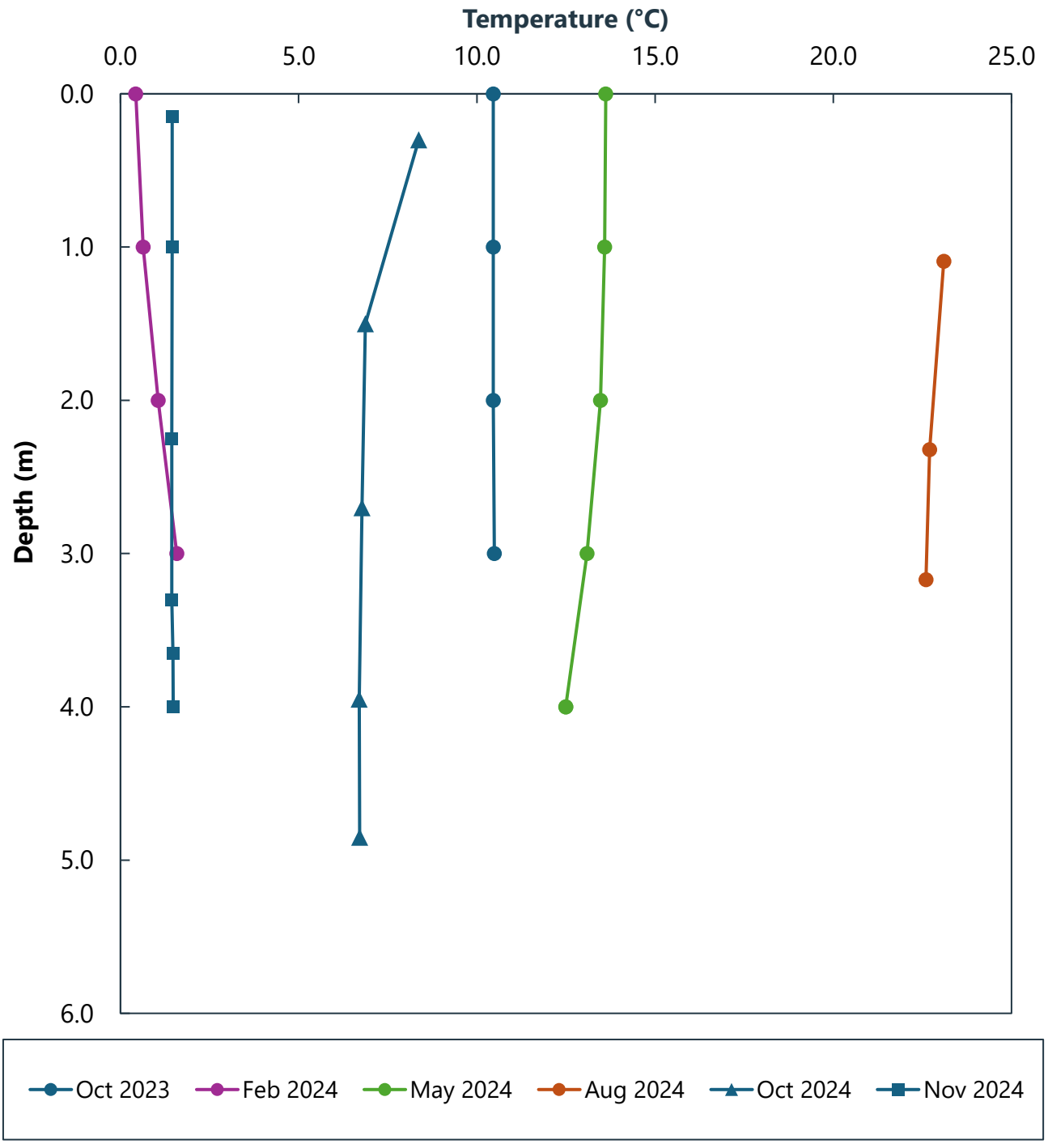
Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-1



PL-01 Dissolved Oxygen Profile	
Mercury Study Report	
Great Bear Project	
Drawn by: FL	Date Sept 2025
Checked by: AE	Figure A3-2

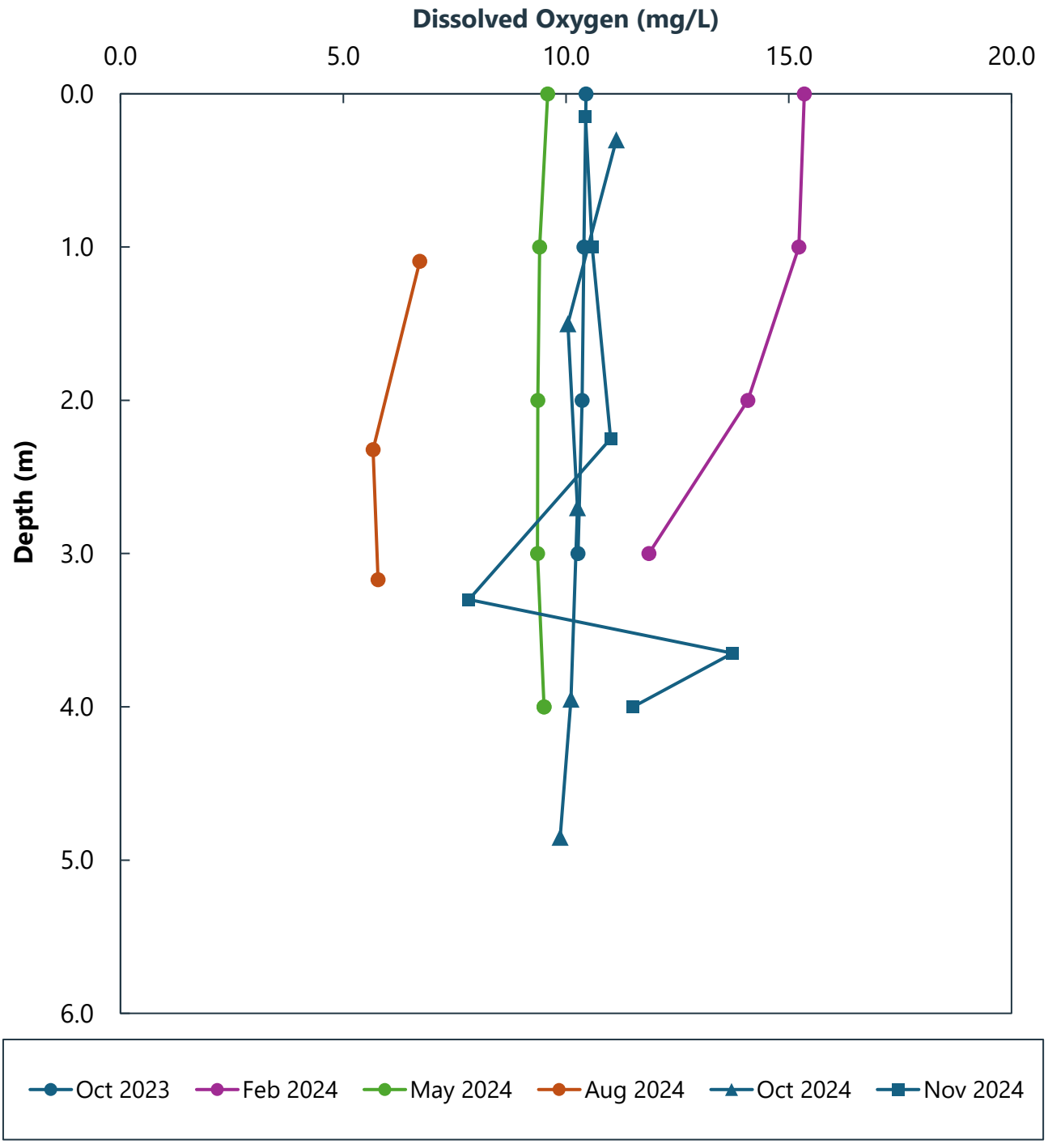


PL-02 Temperature Profile

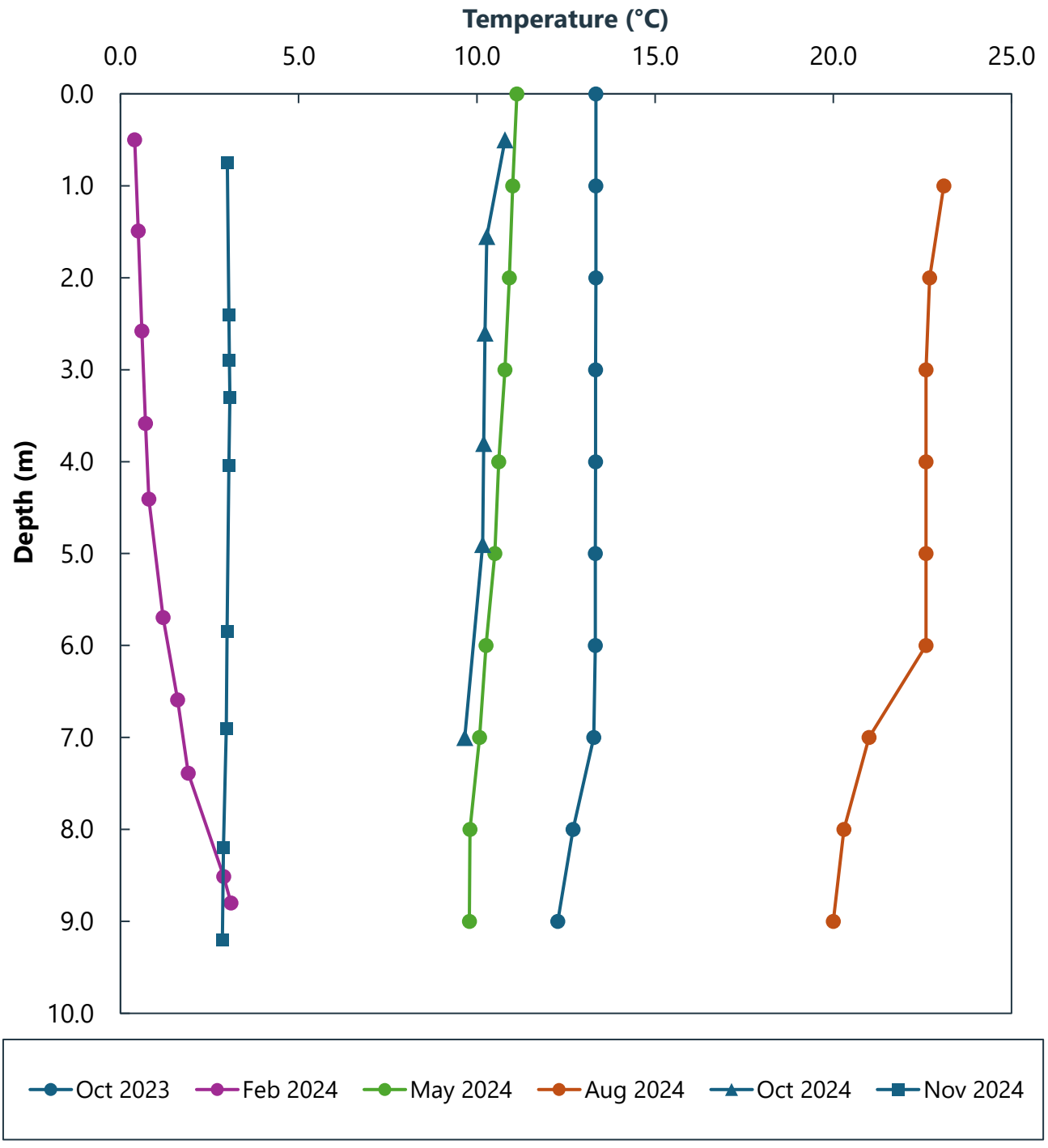
Mercury Study Report

Great Bear Project

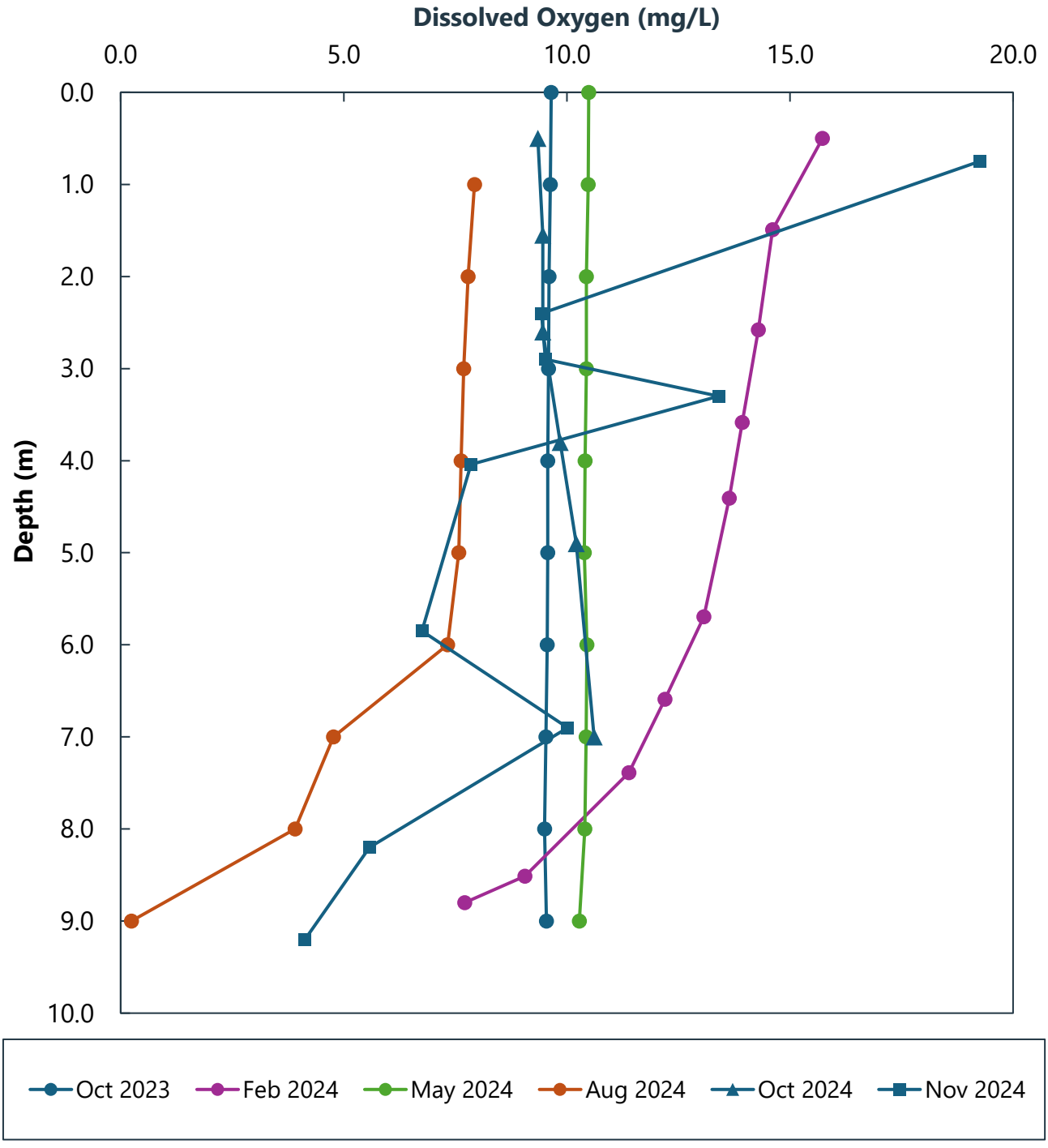
Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-3



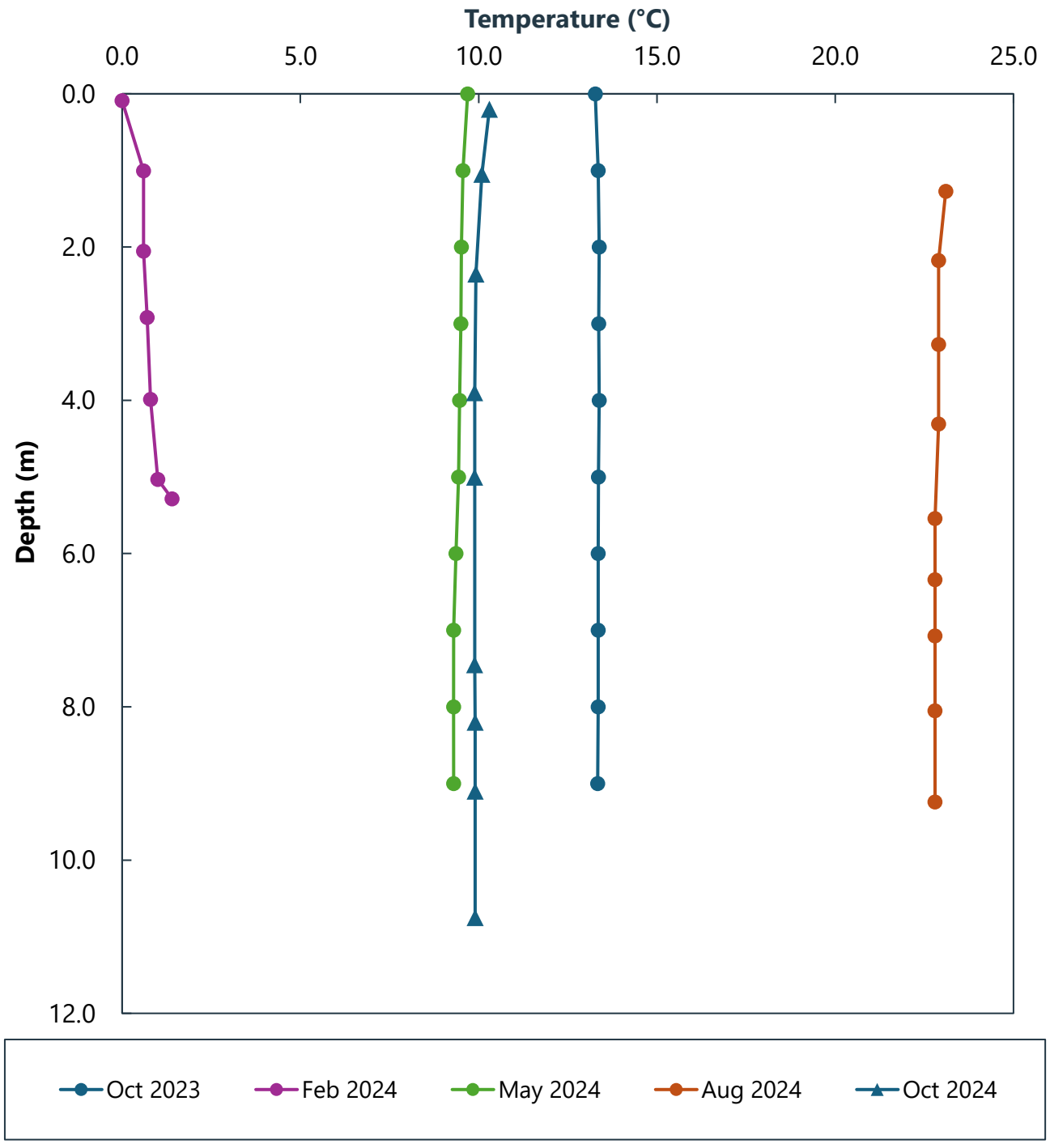
	PL-02 Temperature Profile
	Mercury Study Report
	Great Bear Project
Drawn by: FL	Date Sept 2025
Checked by: AE	Figure A3-4



	PL-03 Temperature Profile
	Mercury Study Report
	Great Bear Project
Drawn by: FL	Date Sept 2025
Checked by: AE	Figure A3-5



	PL-03 Dissolved Oxygen Profile
	Mercury Study Report
	Great Bear Project
Drawn by: FL	Date Sept 2025
Checked by: AE	Figure A3-6

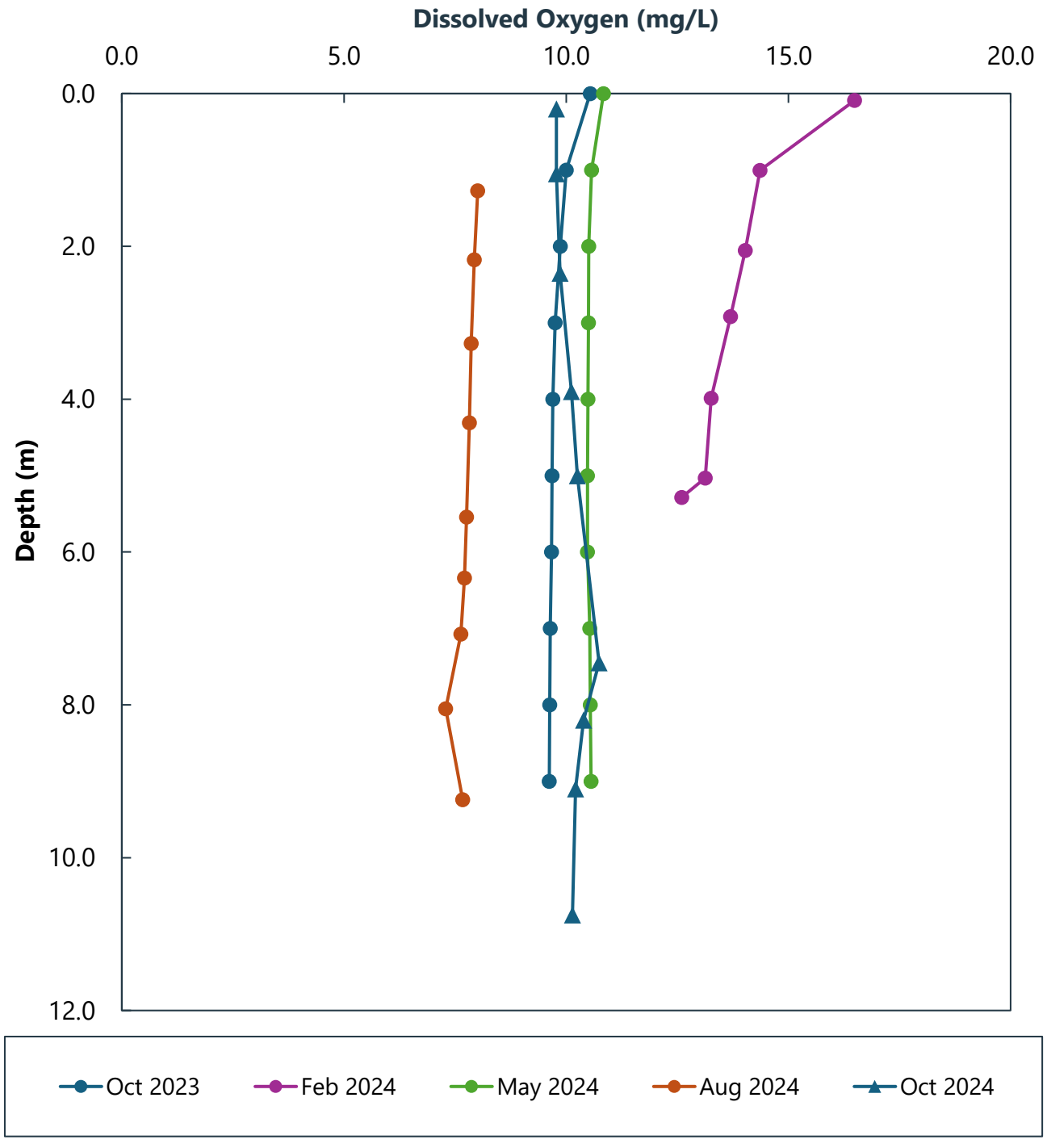


PL-04 Temperature Profile

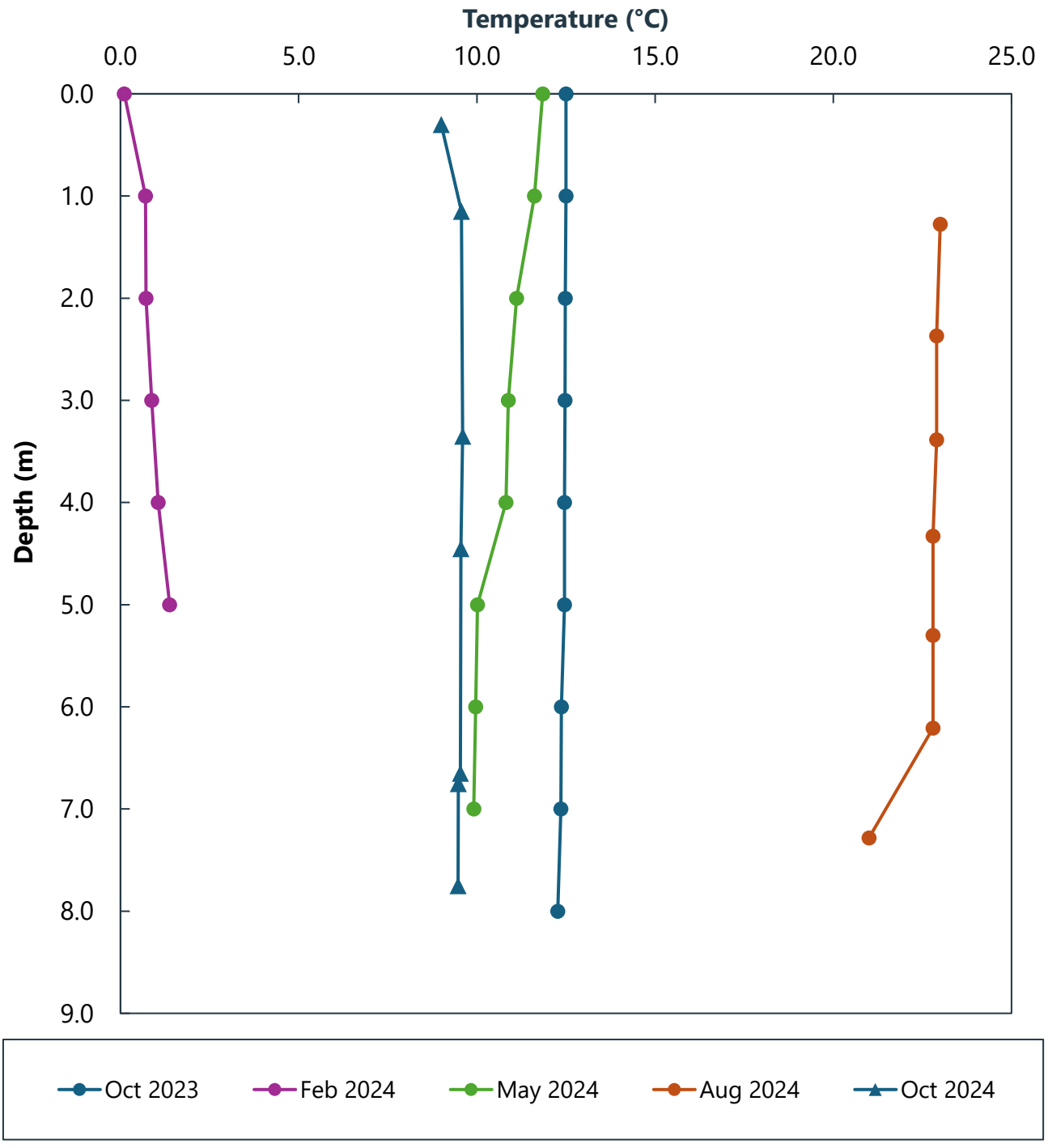
Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-7



	PL-04 Temperature Profile
	Mercury Study Report
	Great Bear Project
Drawn by: FL	Date Sept 2025
Checked by: AE	Figure A3-8

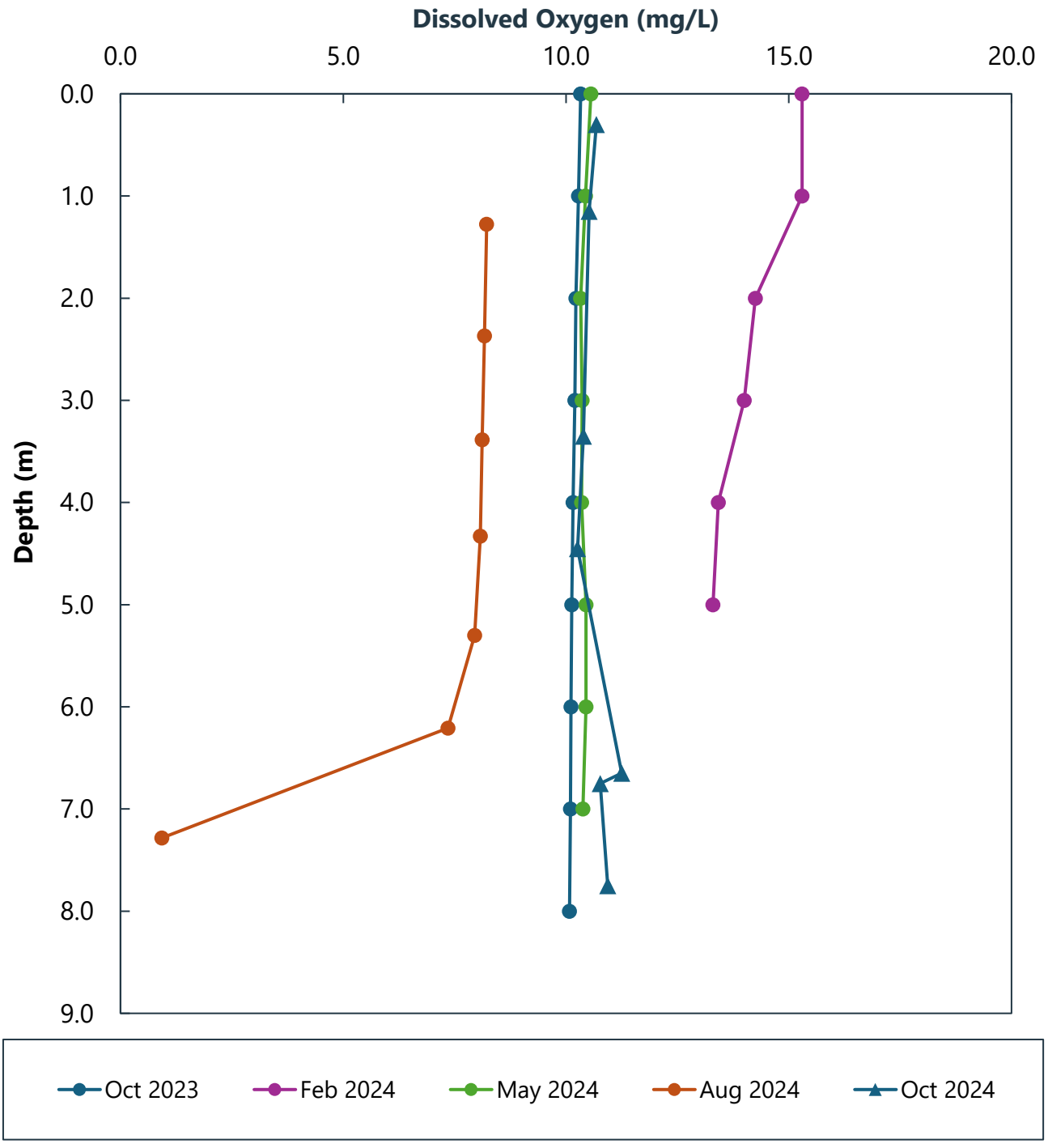


PL-05 Temperature Profile

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-9

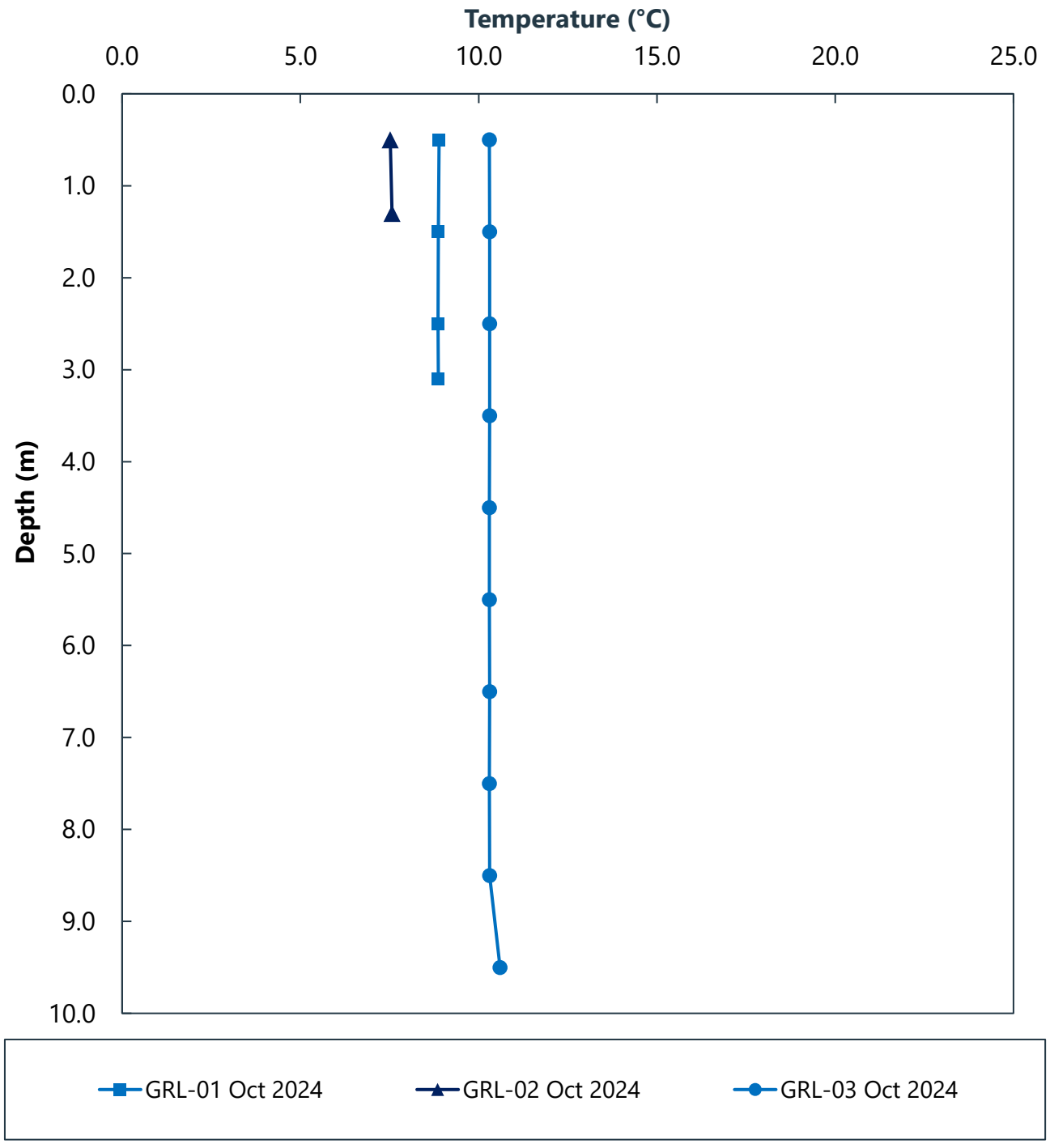


PL-05 Dissolved Oxygen Profile

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-10

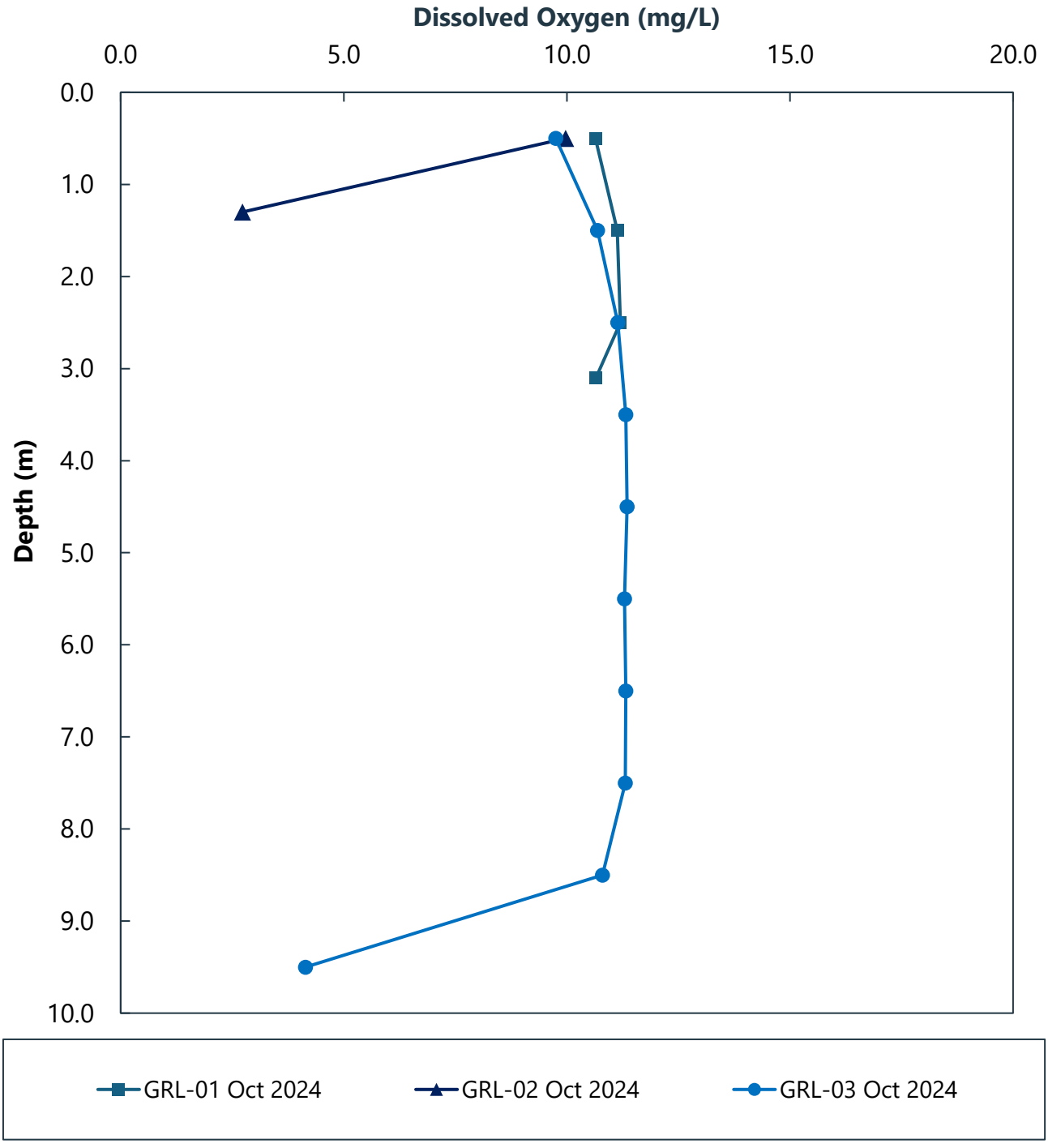


Gullrock Lake Temperature Profile

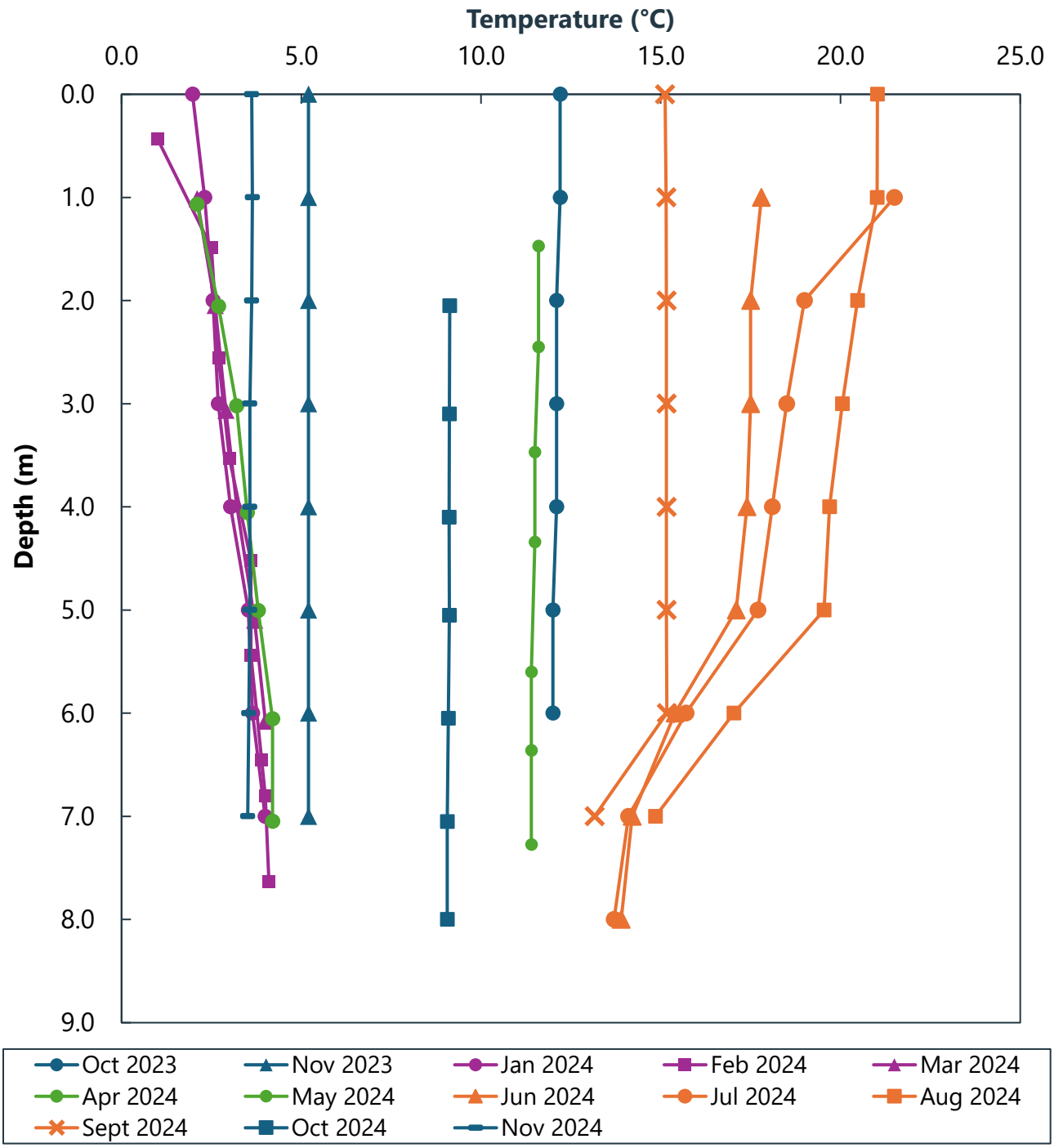
Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-11



	Gullrock Lake Dissolved Oxygen Profile
	Mercury Study Report
	Great Bear Project
Drawn by: FL	Date Sept 2025
Checked by: AE	Figure A3-12

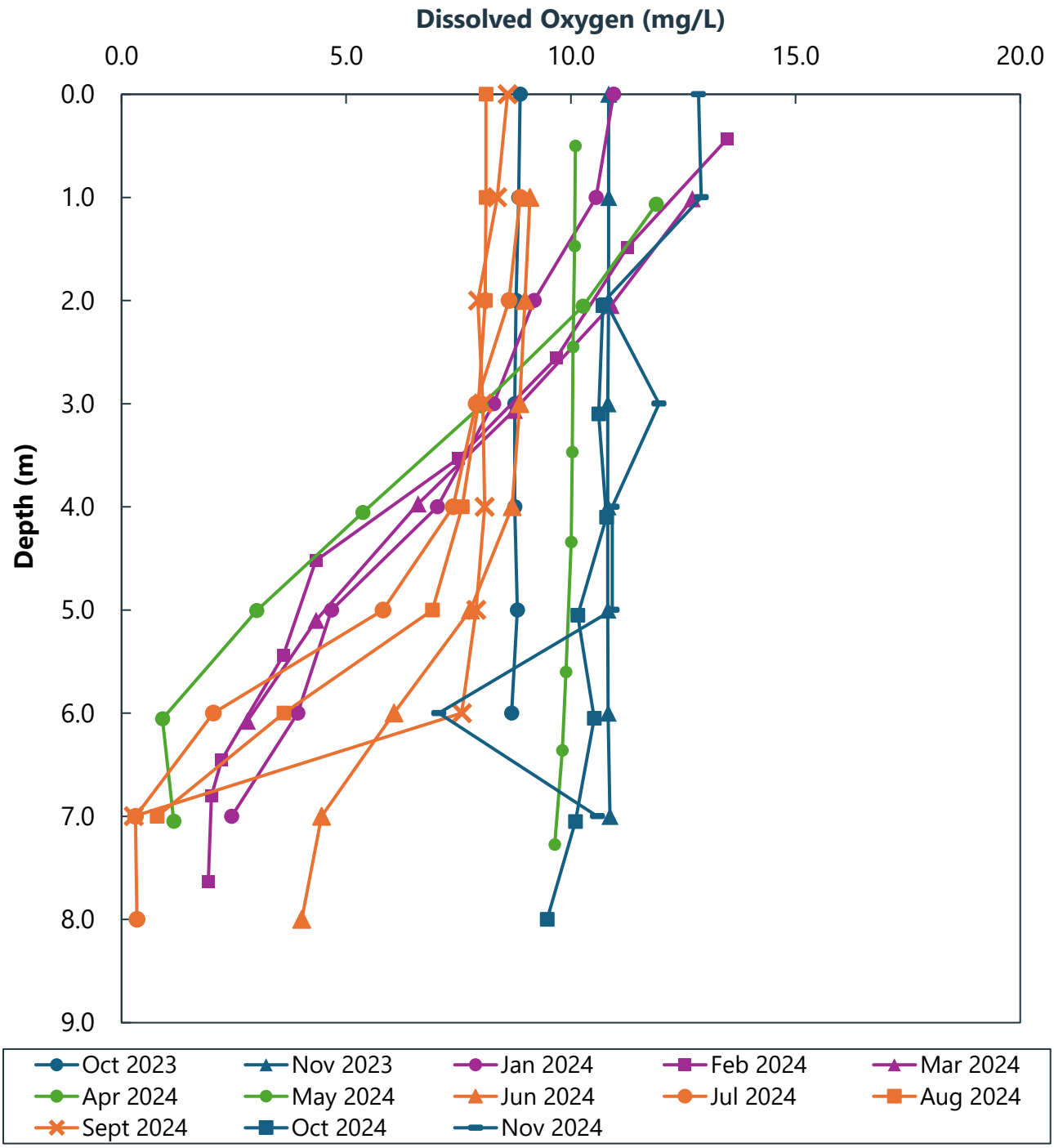


Genessee Lake Temperature Profile

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-13

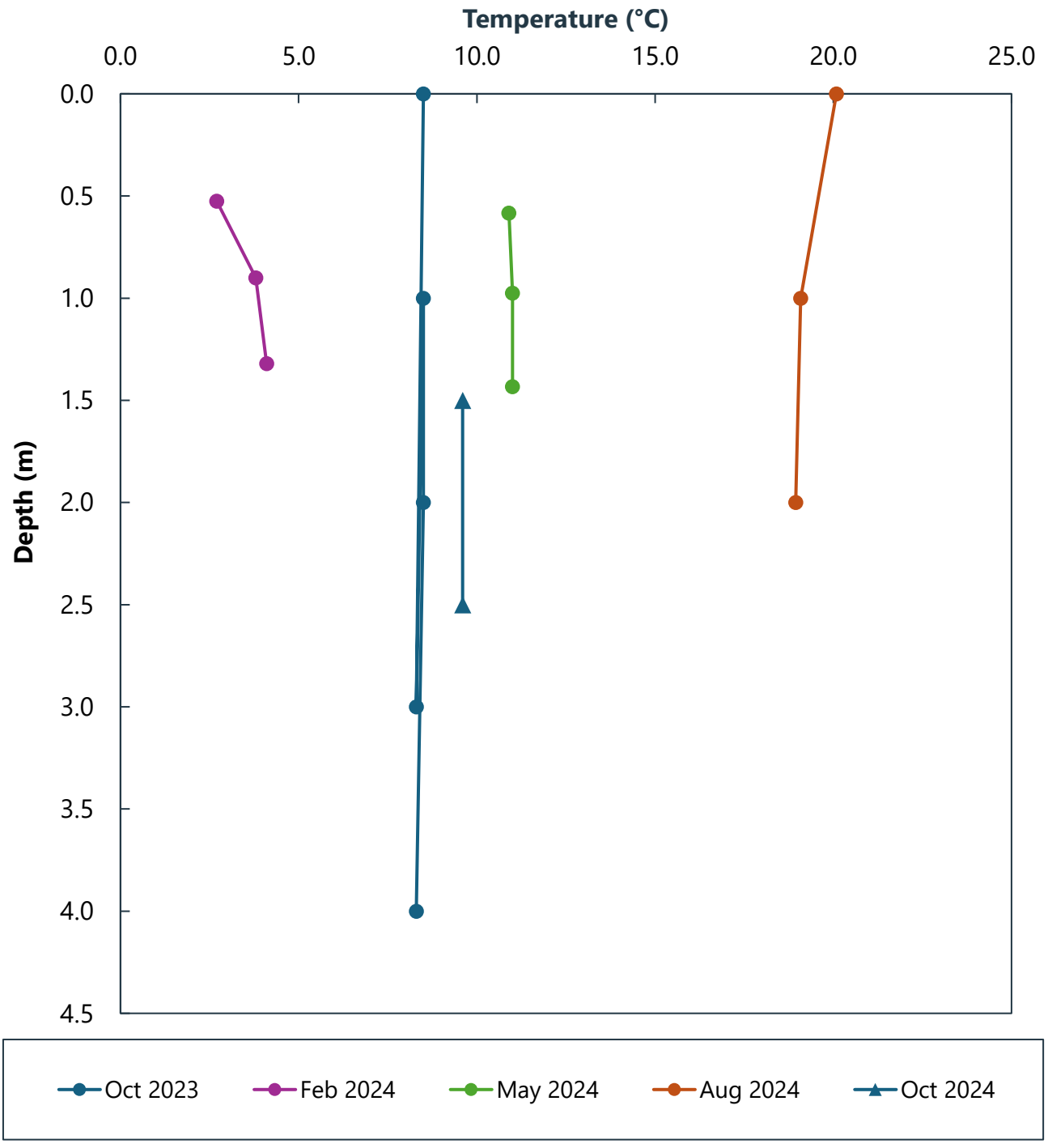


Genessee Lake Dissolved Oxygen Profile

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-14

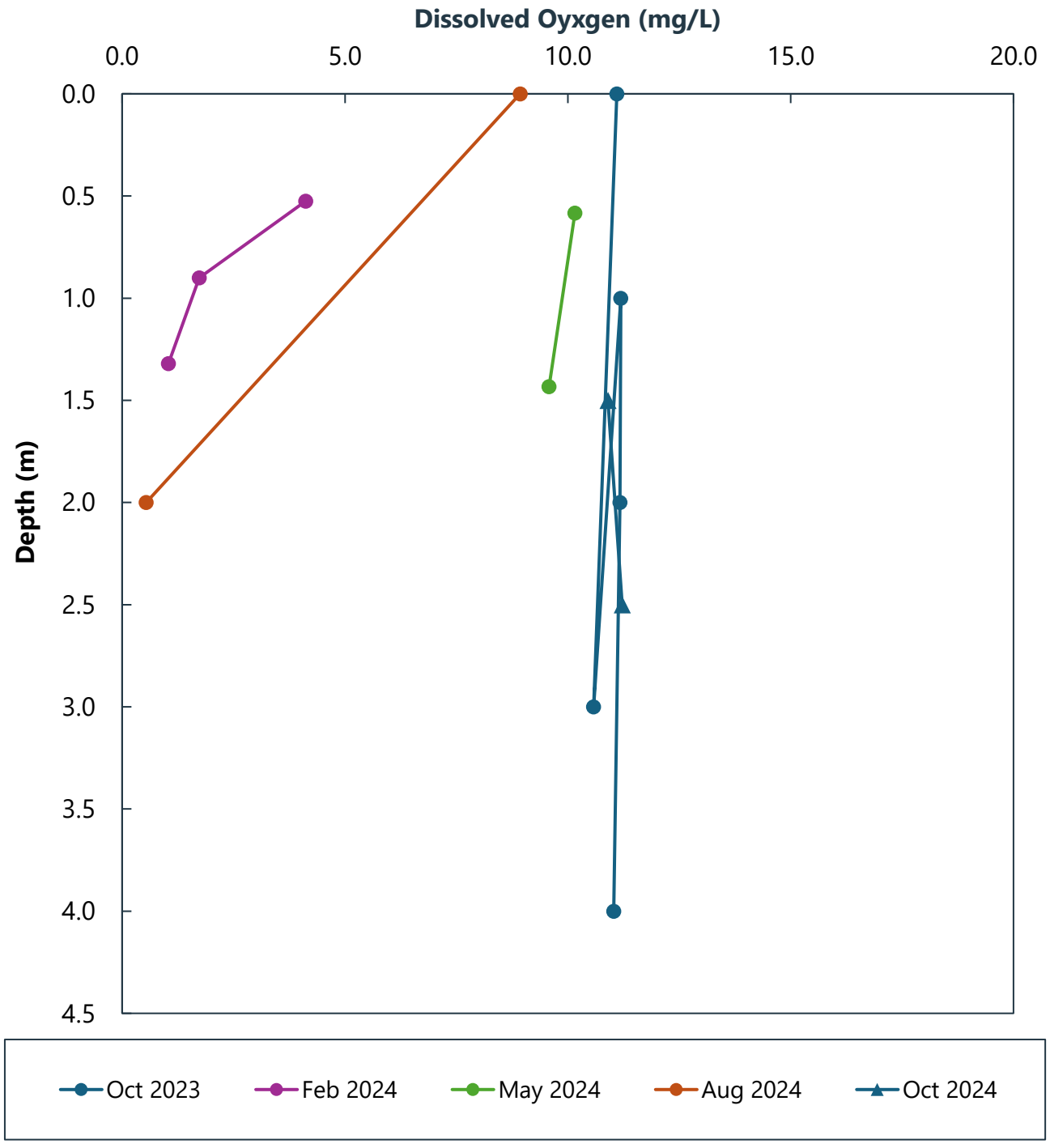


Waterbody 6 Temperature Profile

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-15

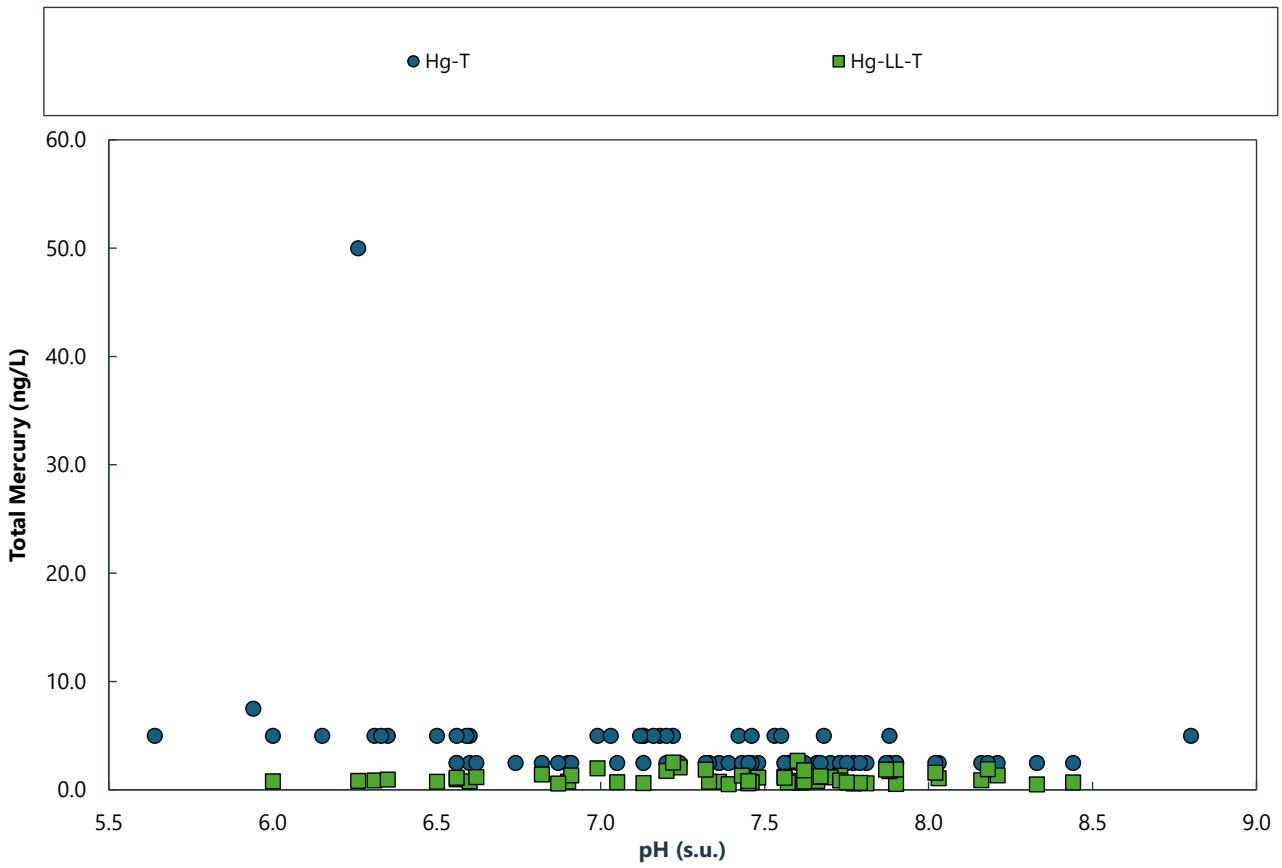


Waterbody 6 Dissolved Oxygen Profile

Mercury Study Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A3-16



Notes:

1 - pH shown is field pH

2 - Monitored stations: CR-REF, CR-FDP, CR-DS

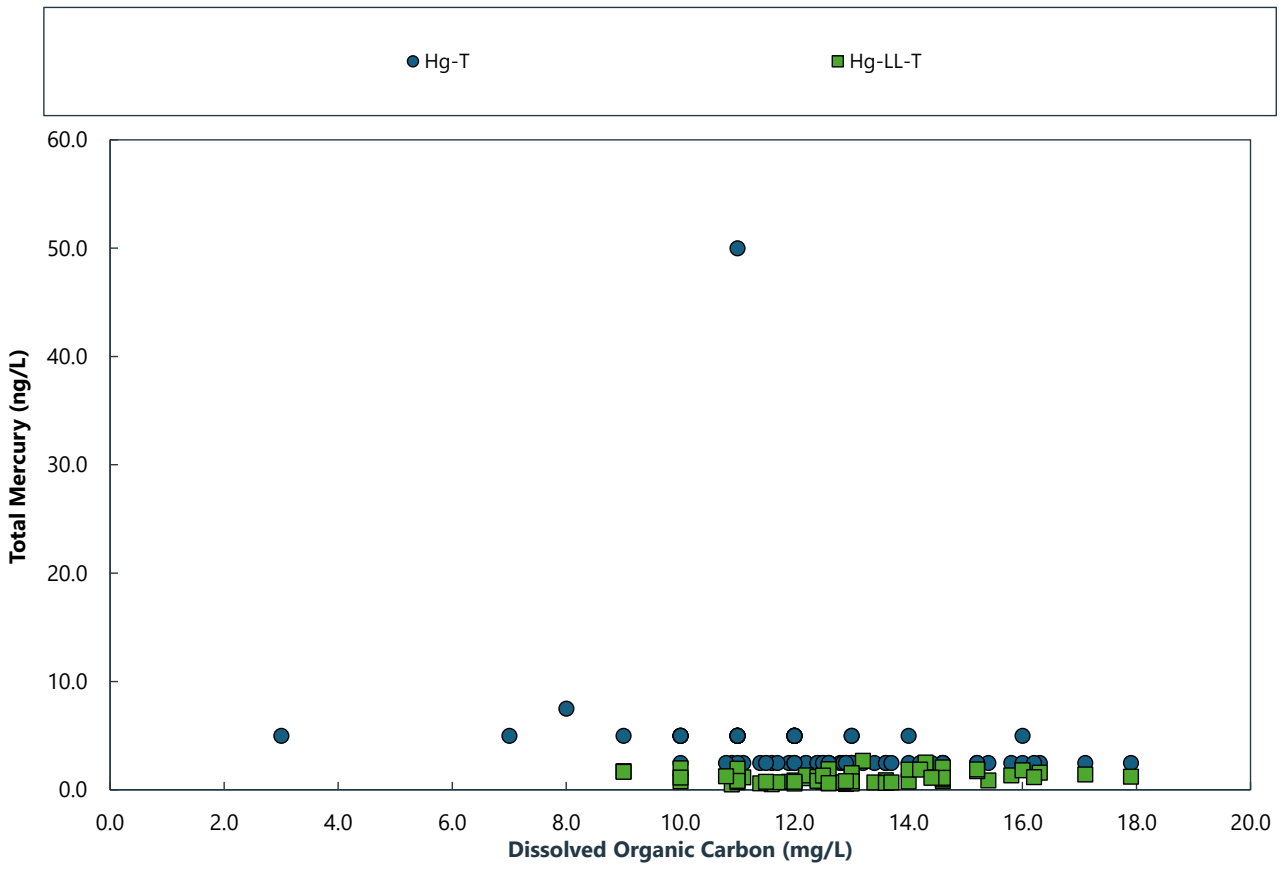
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs pH-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-1



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

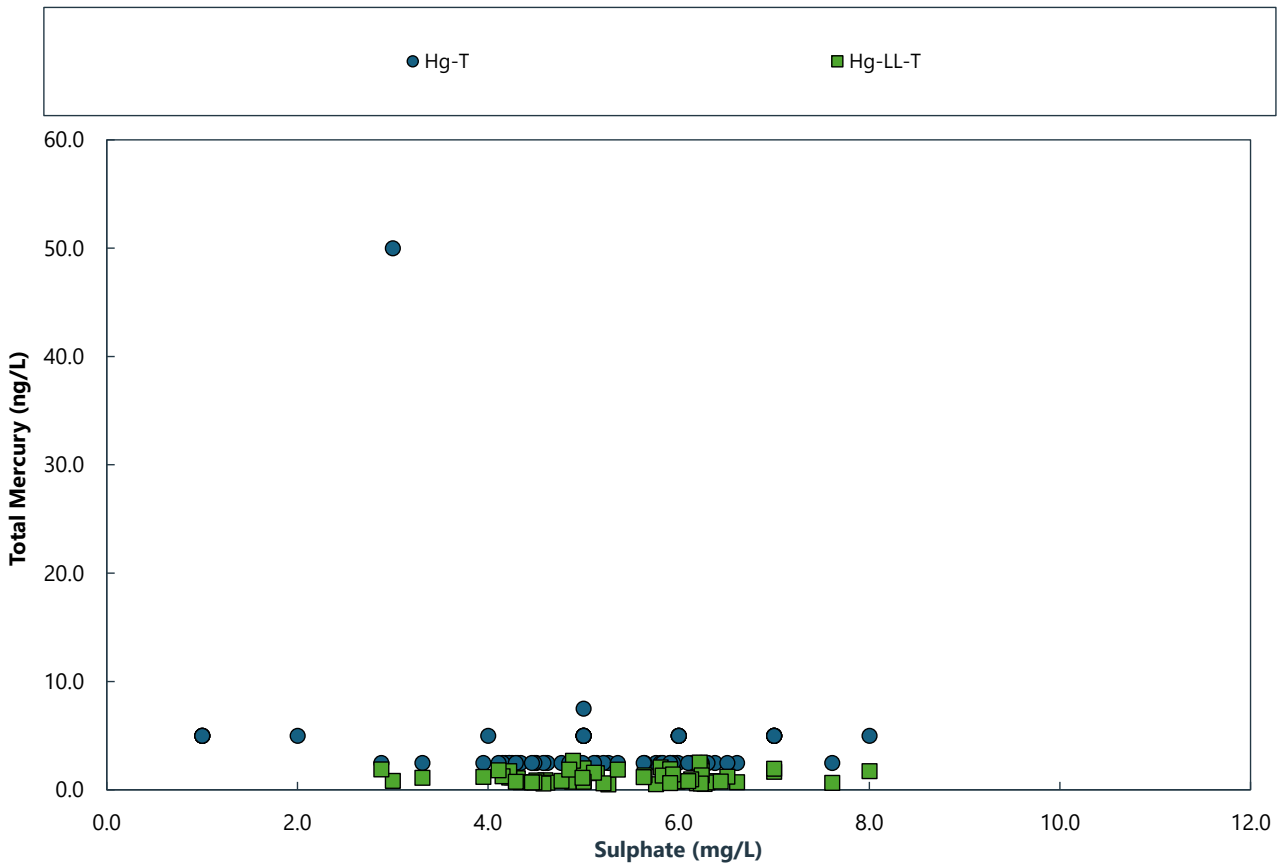
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DOC-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-2



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

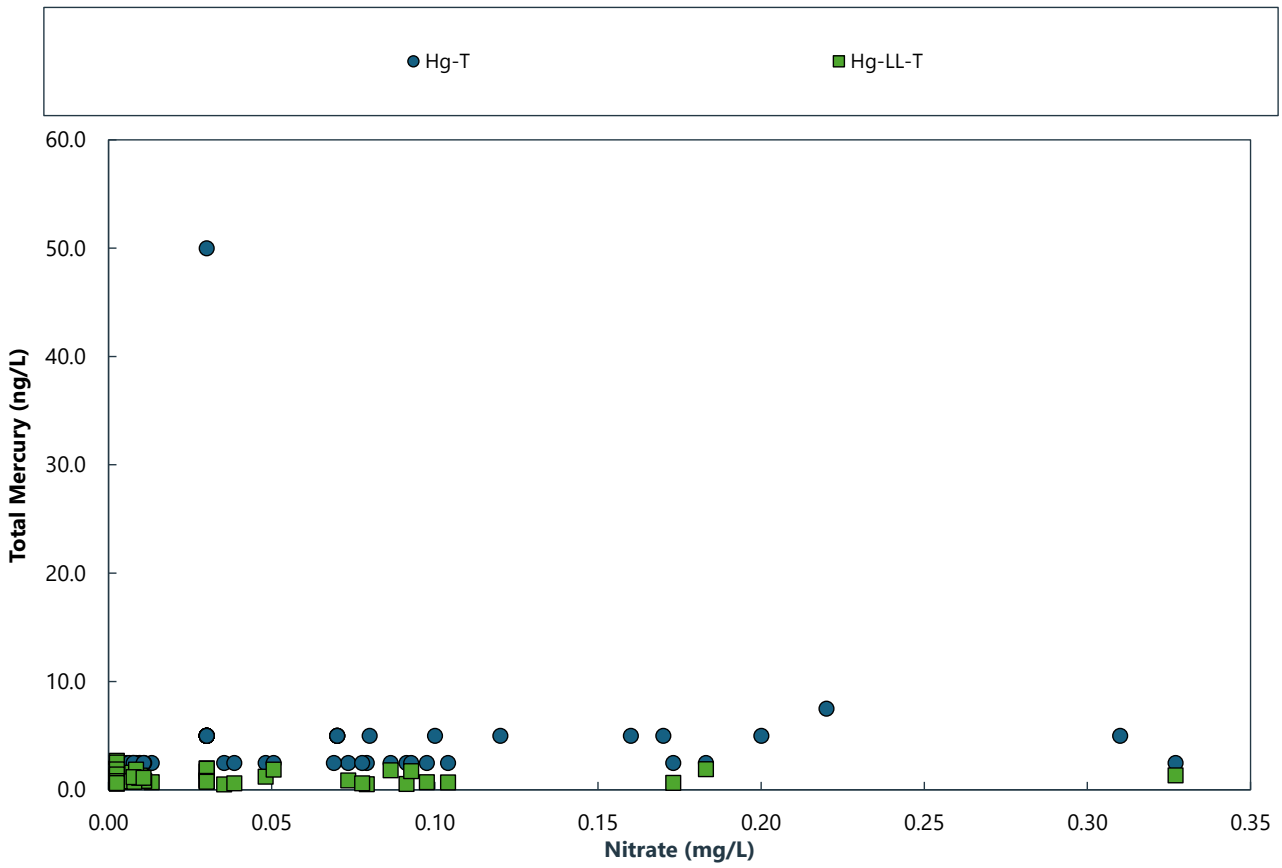
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs SO4-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-3



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

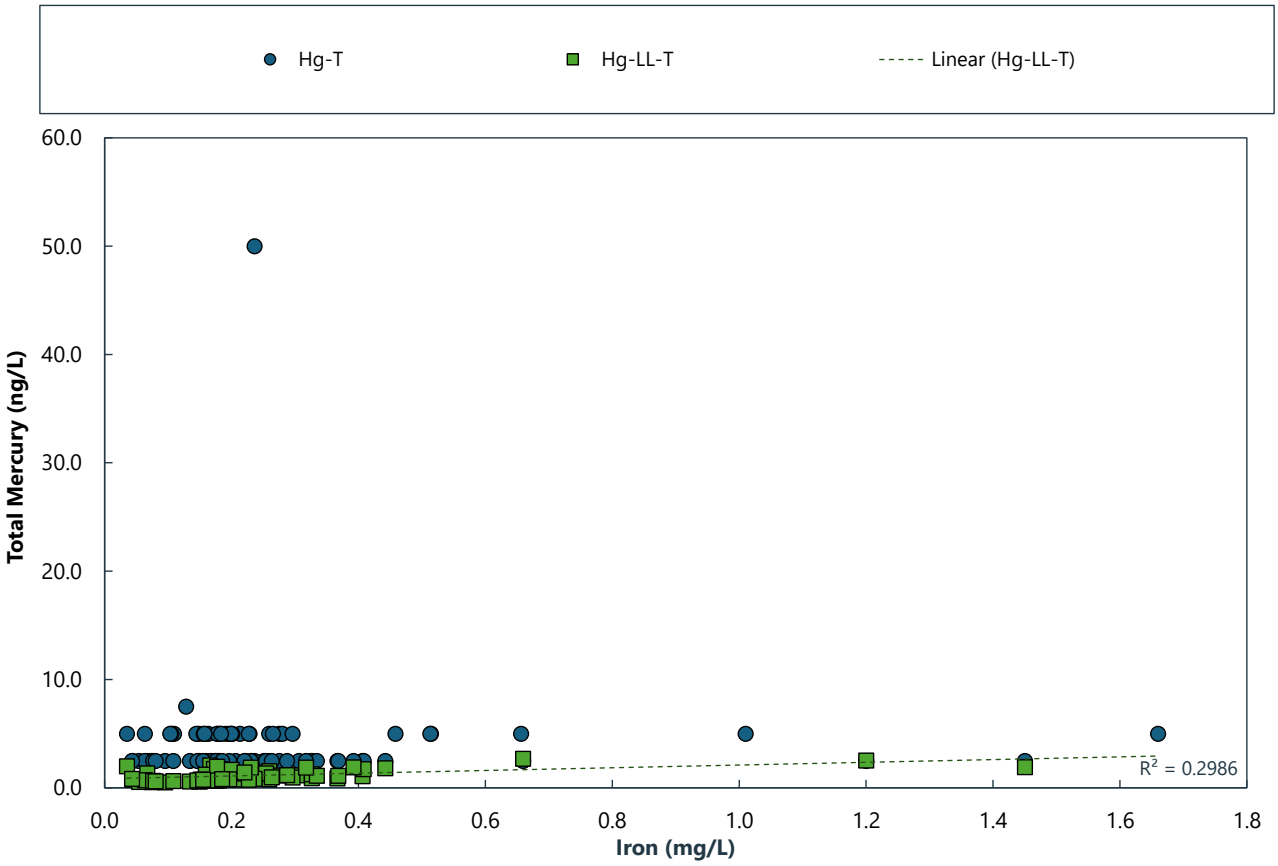
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs NO3-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-4



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

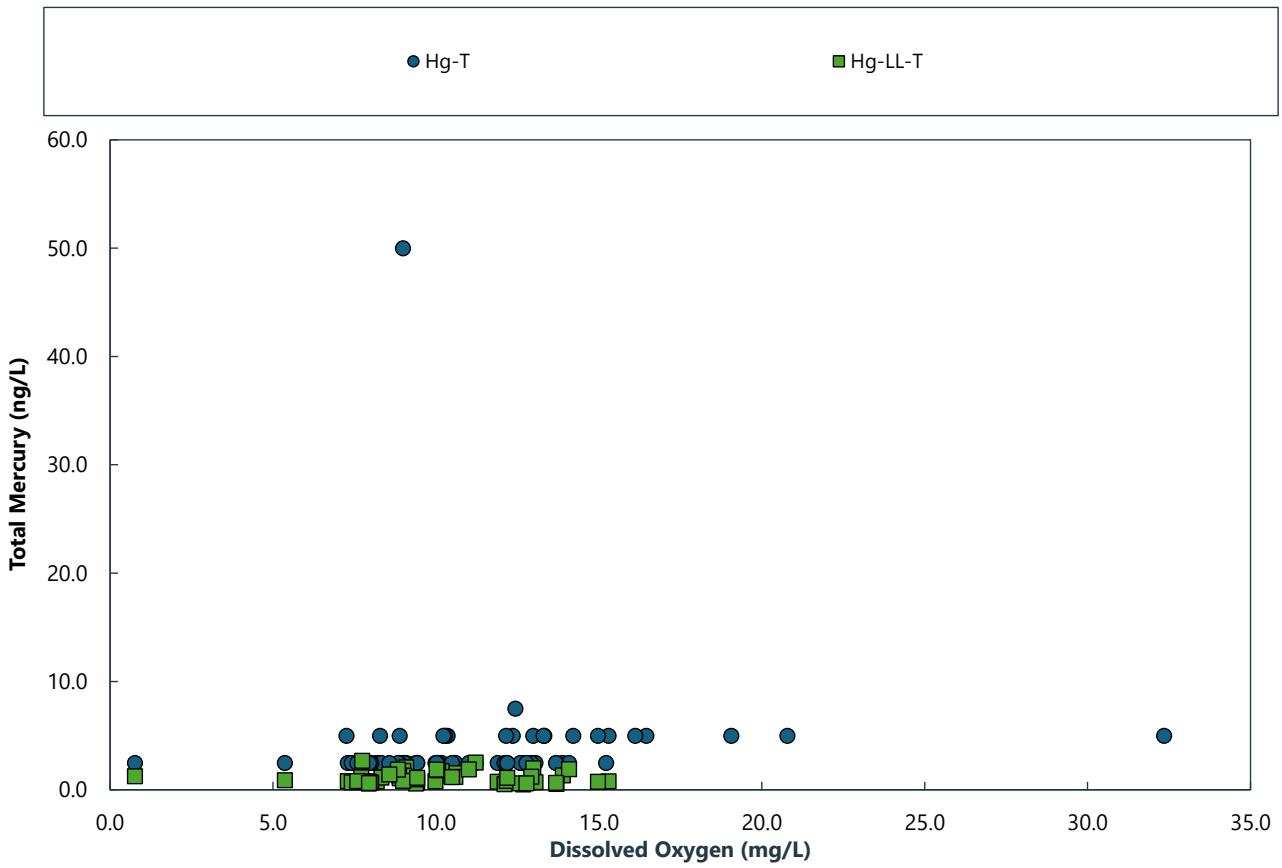
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Fe-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-5



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

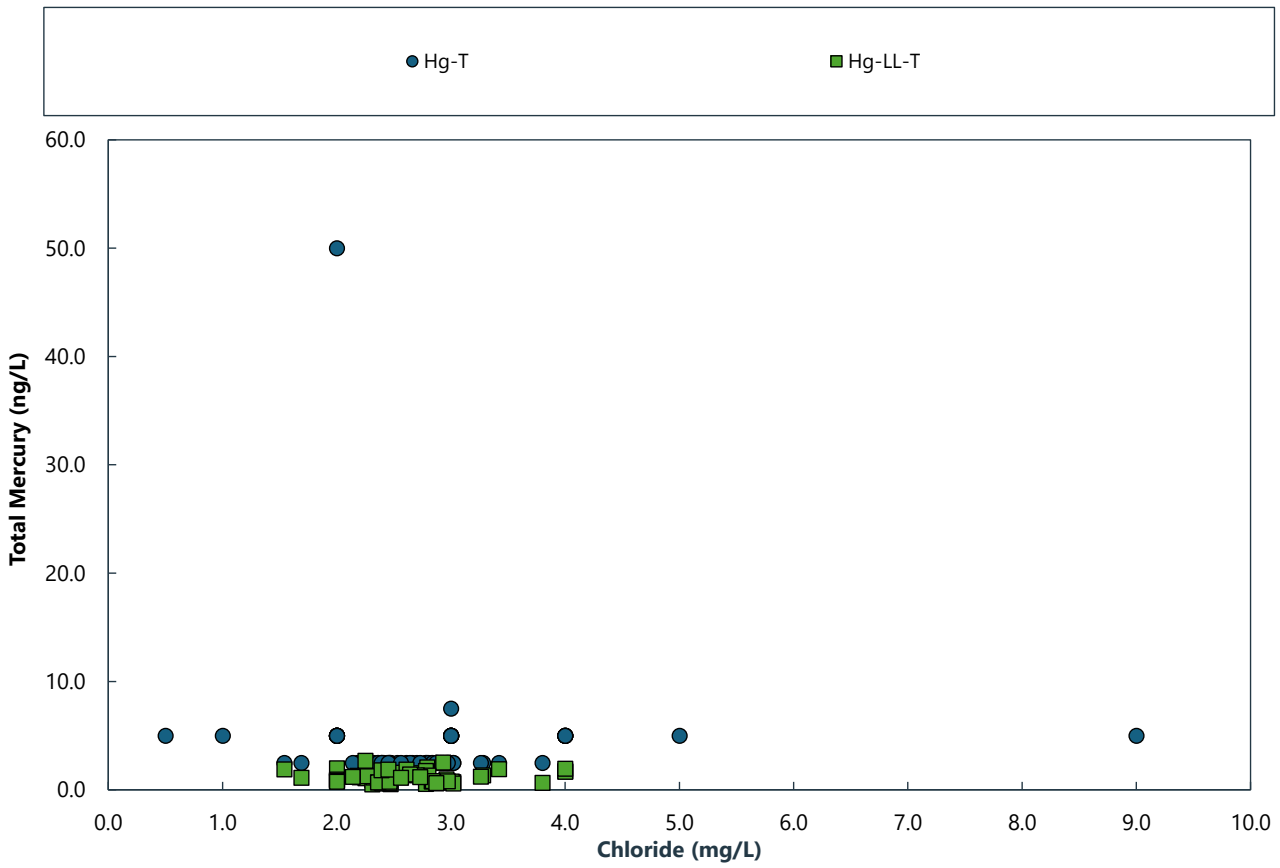
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DO-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-6



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

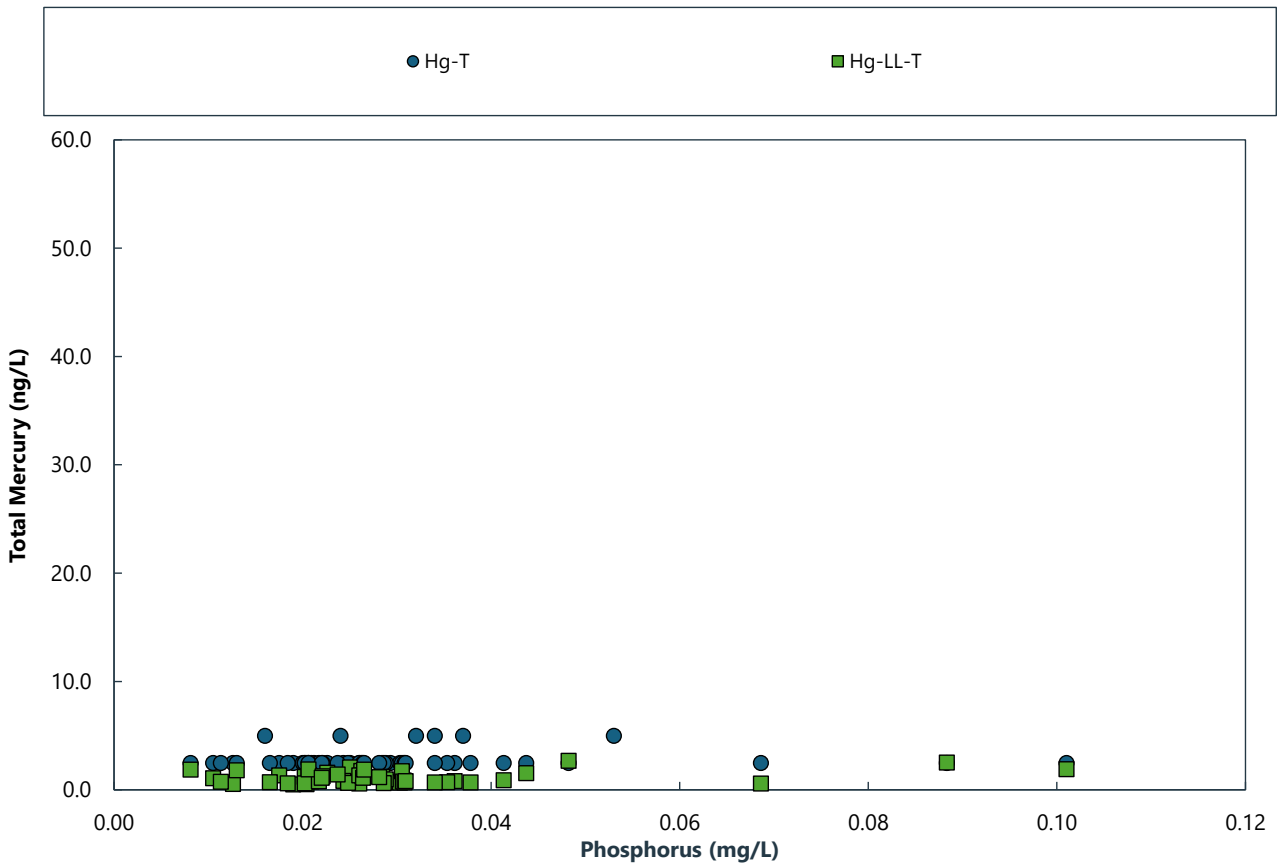
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Cl-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-7



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

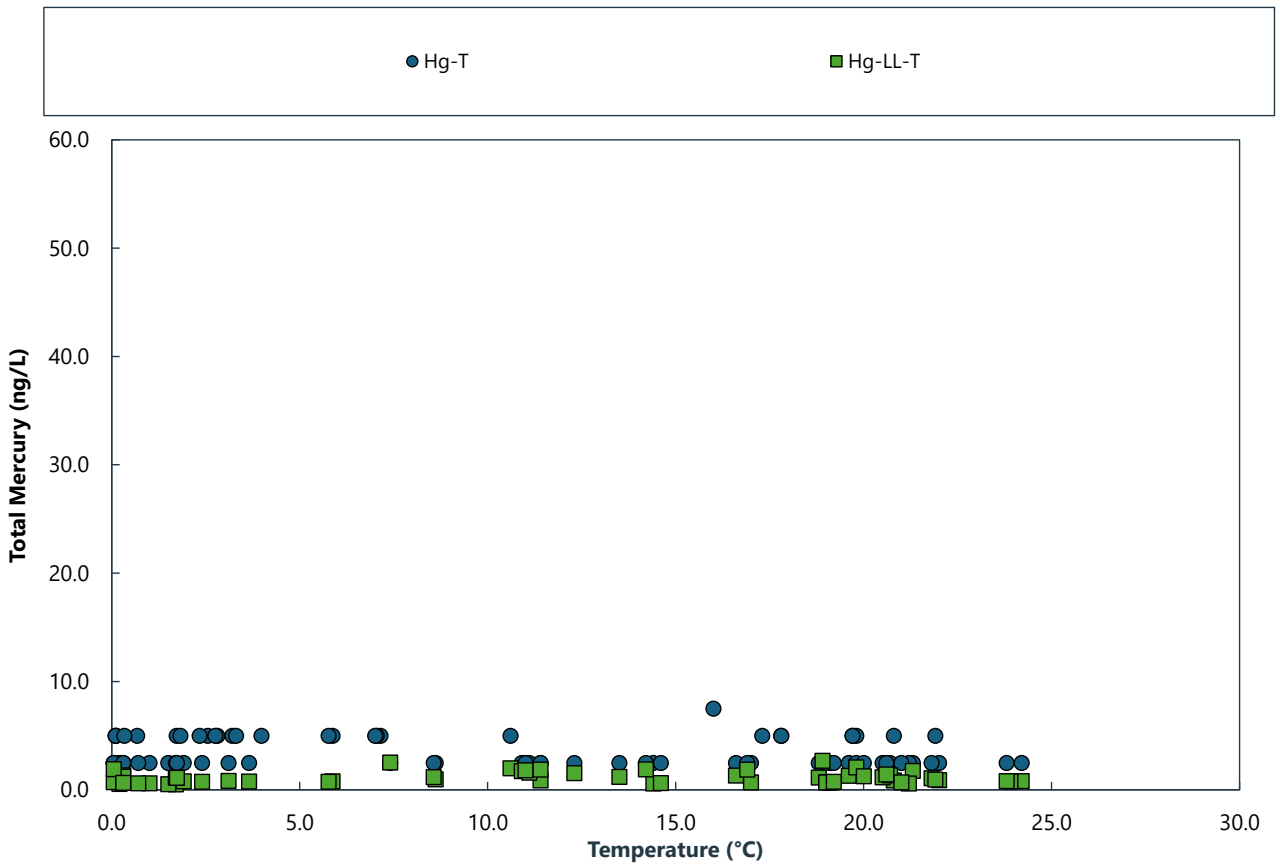
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs P-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-8



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

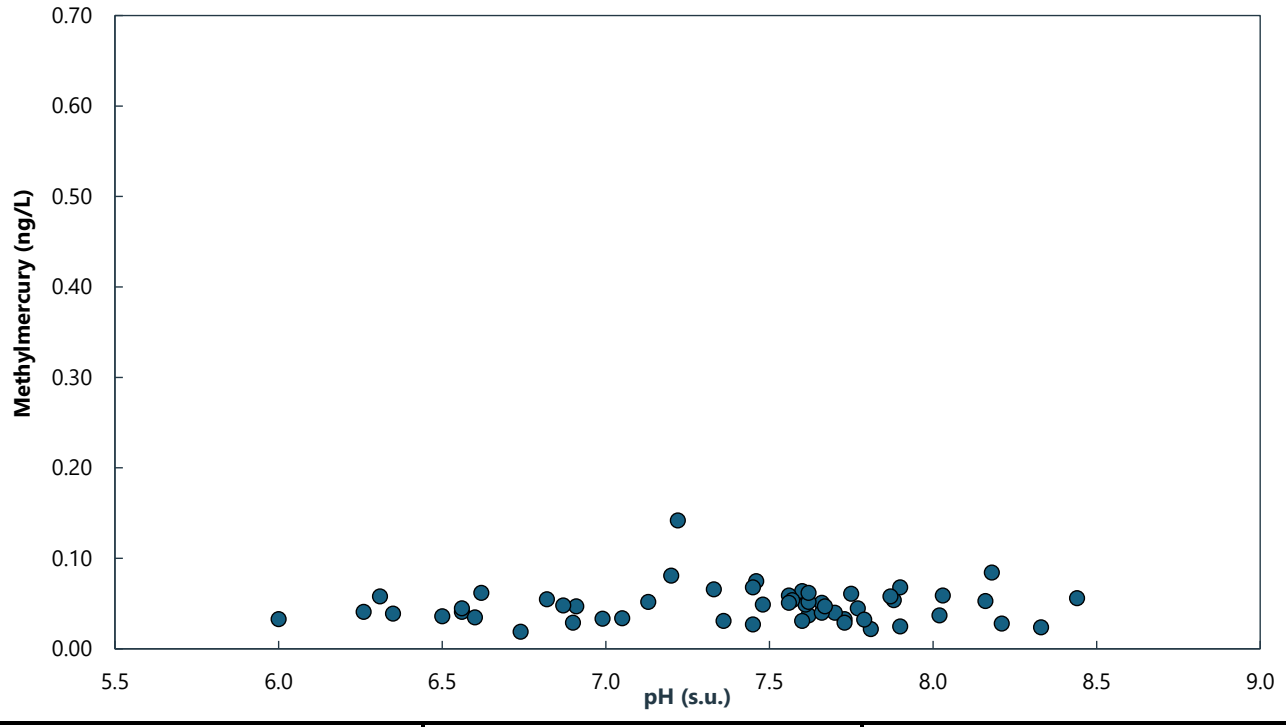
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Temp-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-9



Notes:

1 - pH shown is field pH

2 - Monitored stations: CR-REF, CR-FDP, CR-DS

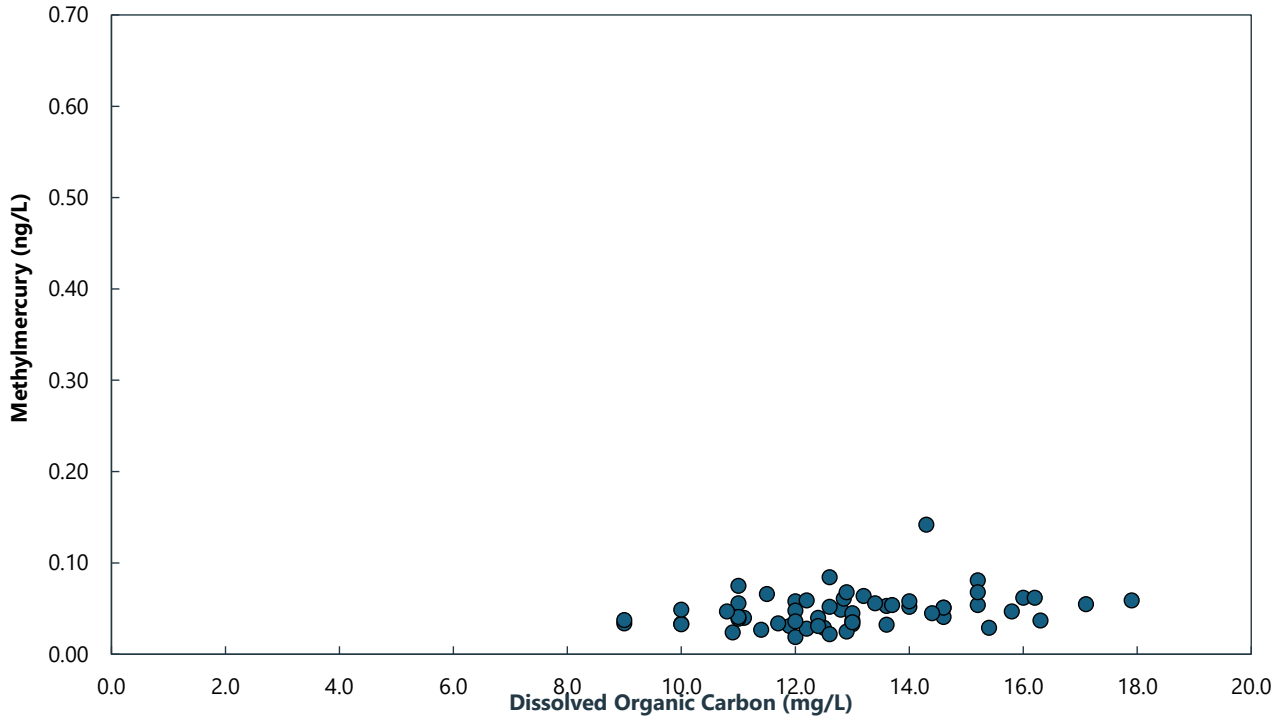
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs pH-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-10



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

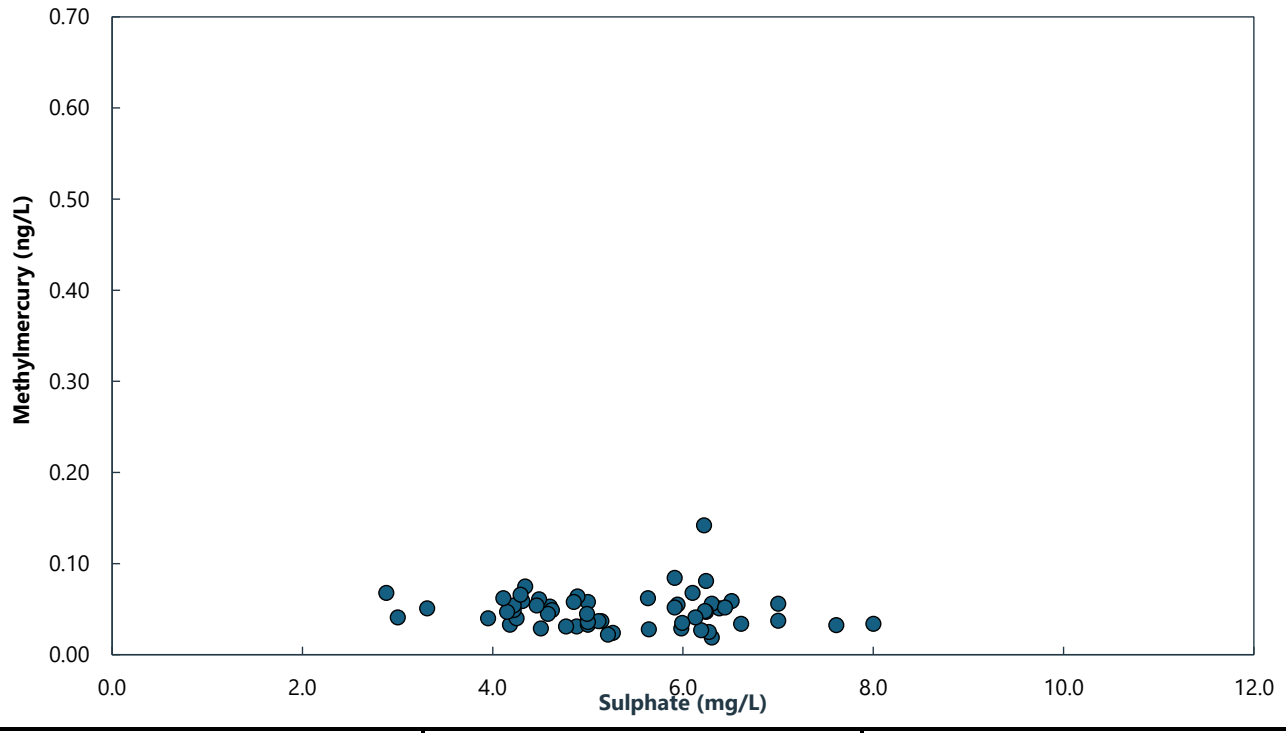
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DOC-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-11



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

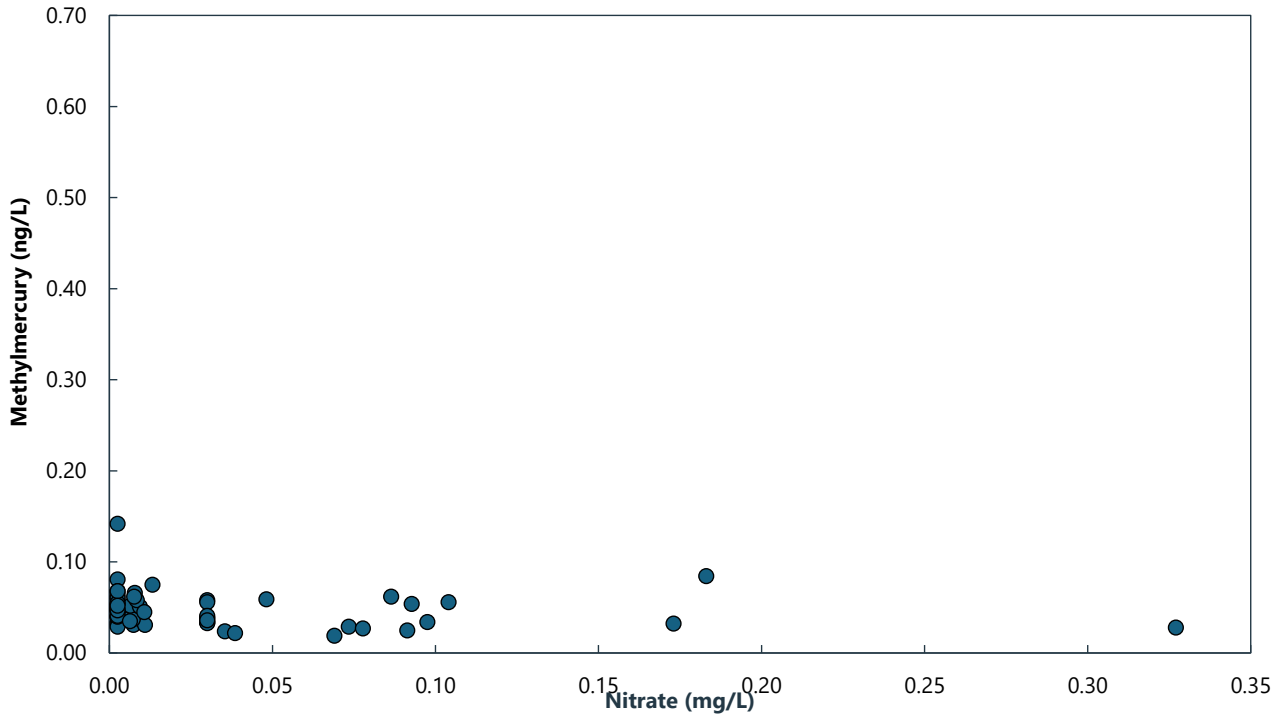
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs SO4-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-12



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

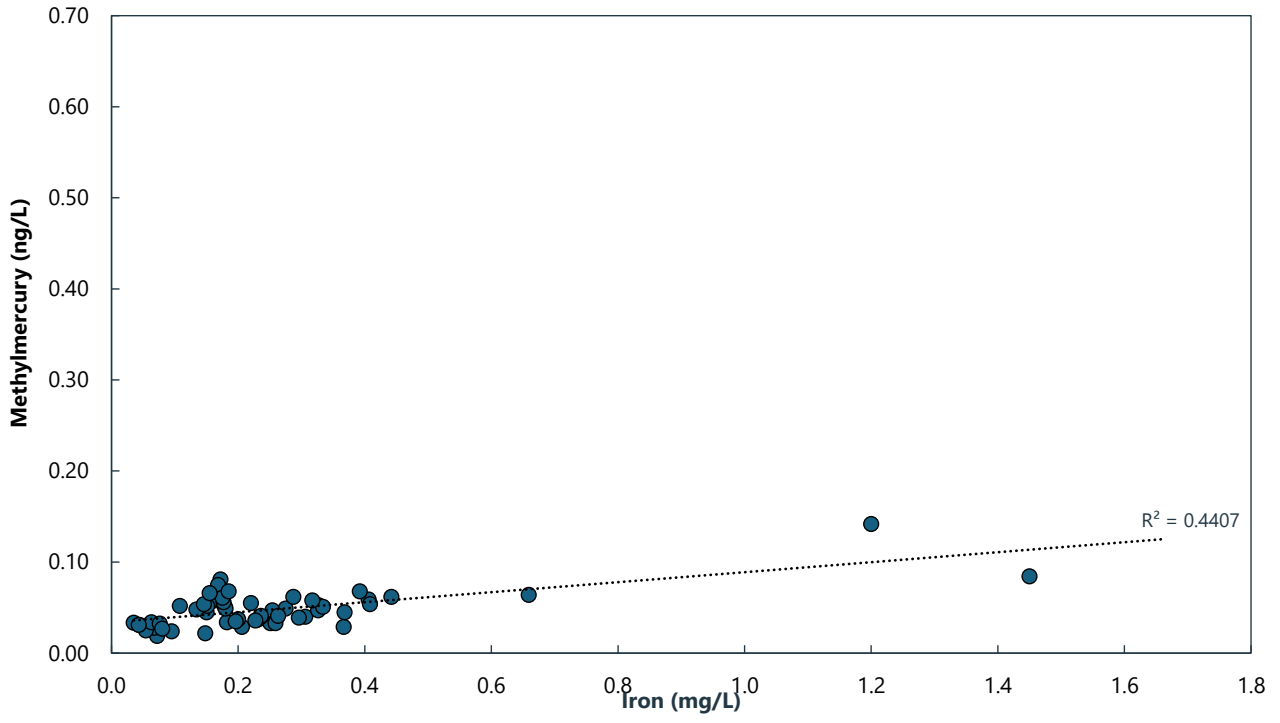
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs NO3-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-13



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

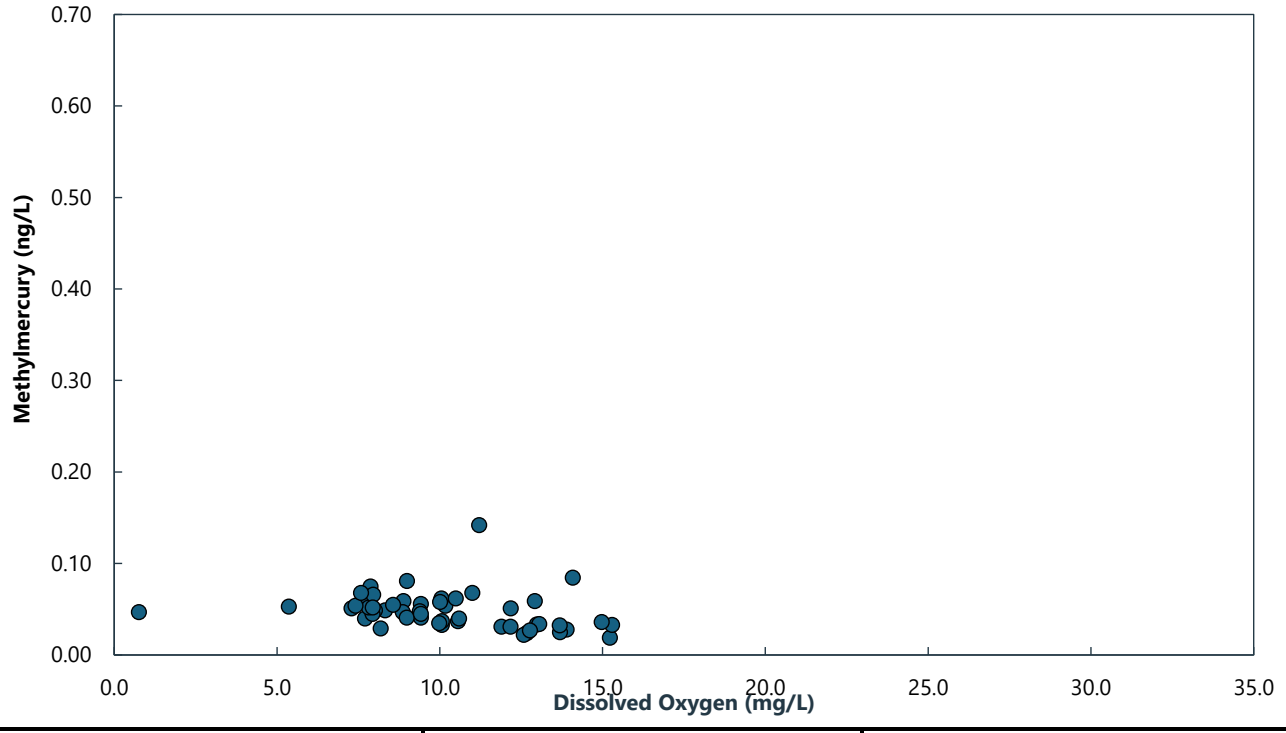
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Fe-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-14



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

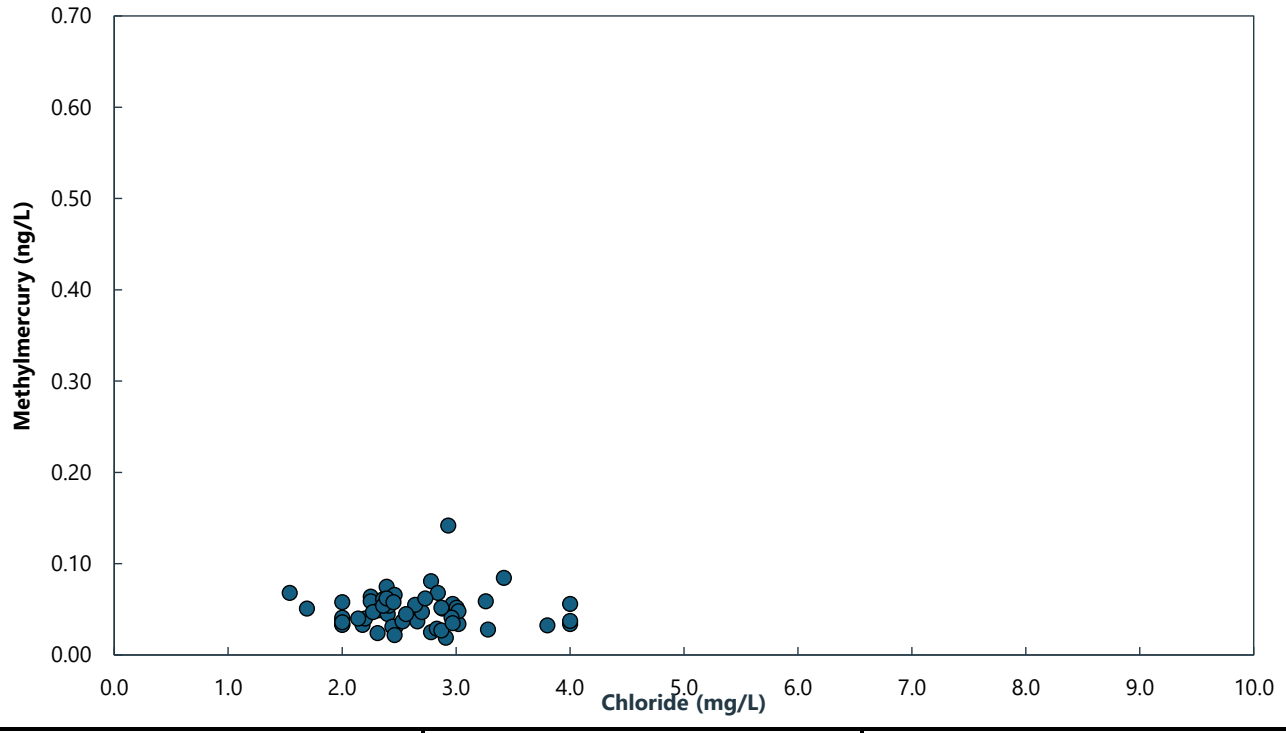
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DO-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-15



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

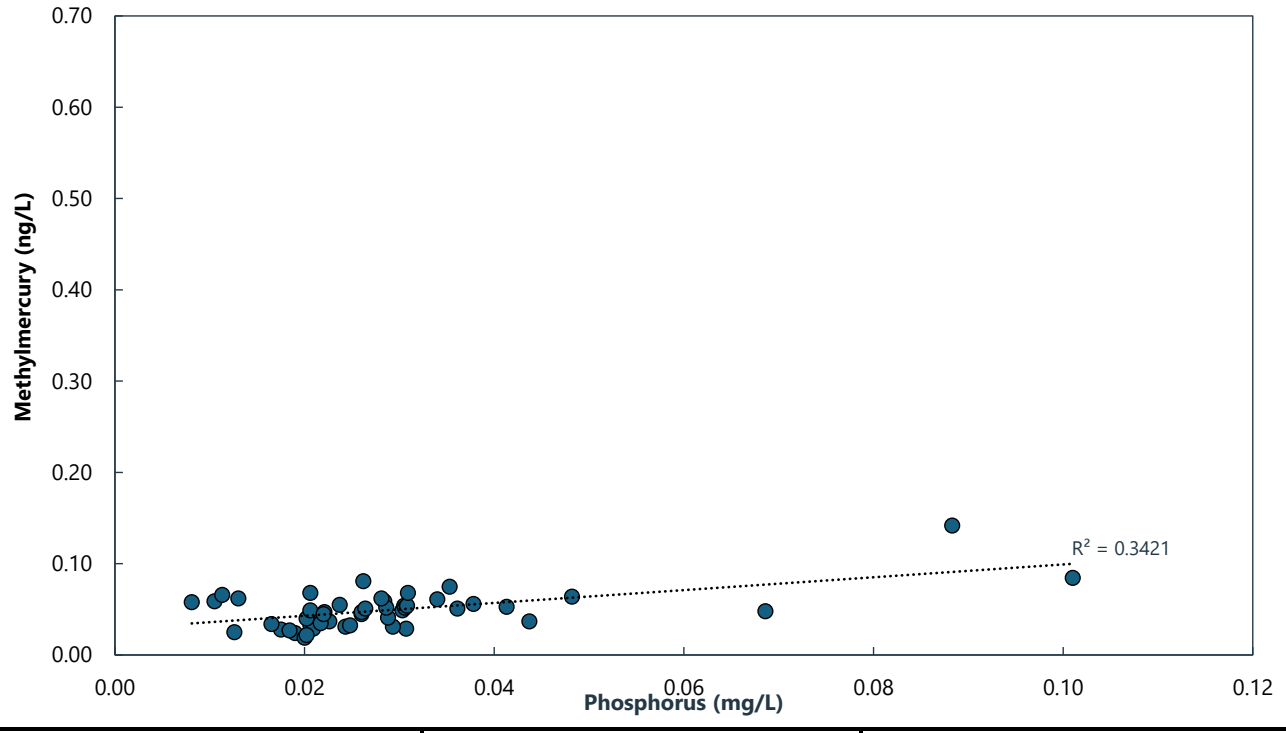
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Cl-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-16



Notes:

1 - Monitored stations: CR-REF, CR-FDP, CR-DS

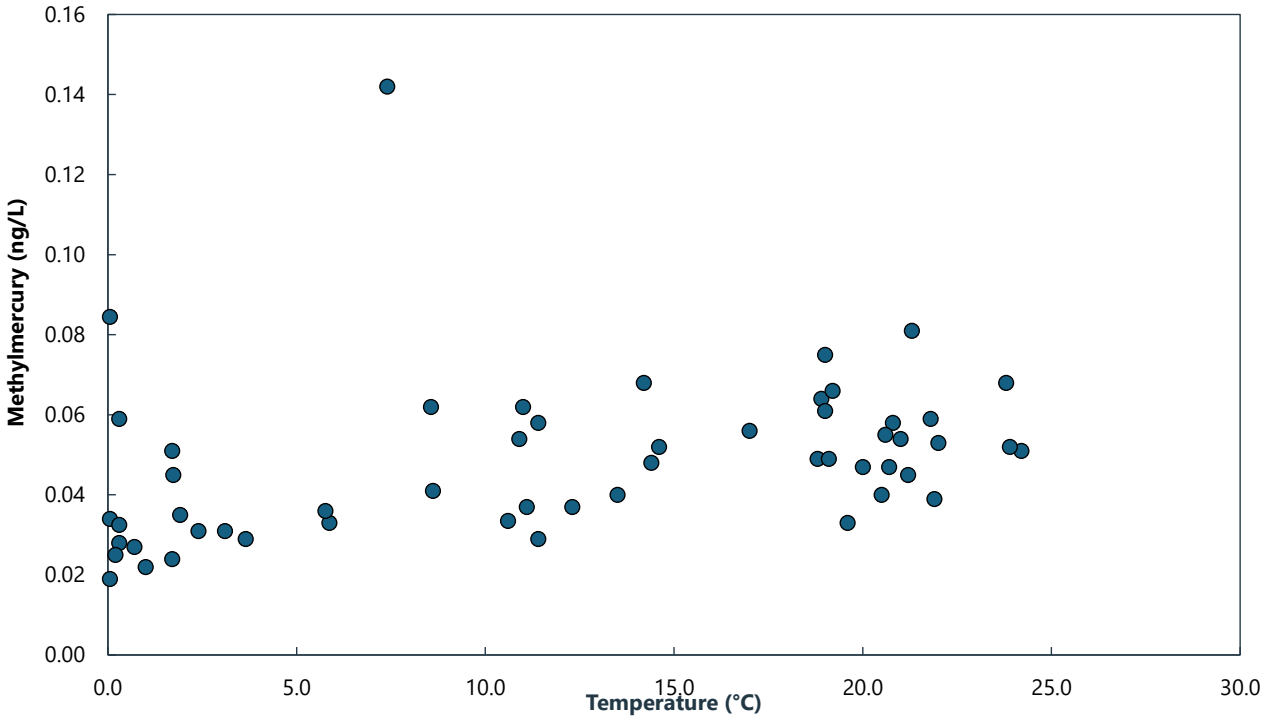
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs P-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-17



Notes:

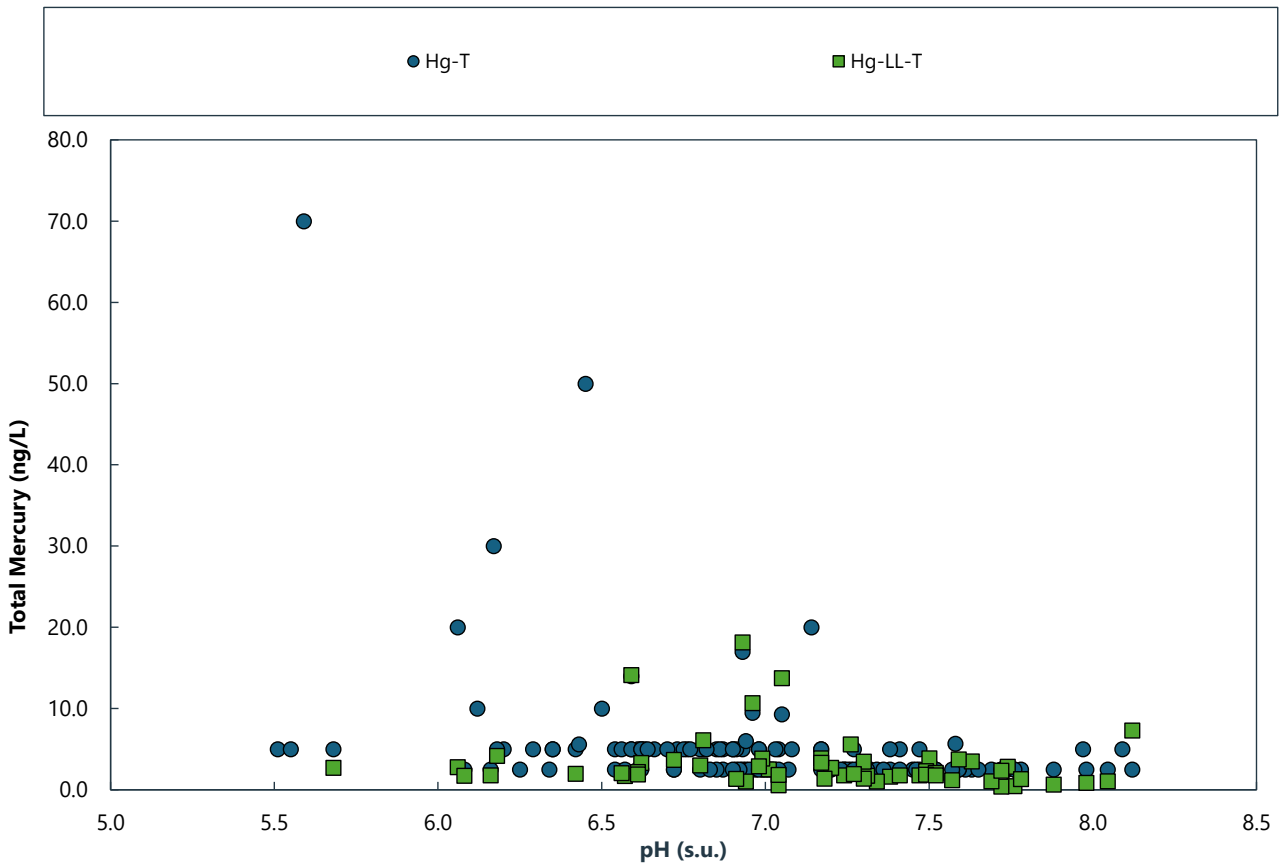
1 - Monitored stations: CR-REF, CR-FDP, CR-DS

MeHg vs Temp-Chukuni River

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-18



Notes:

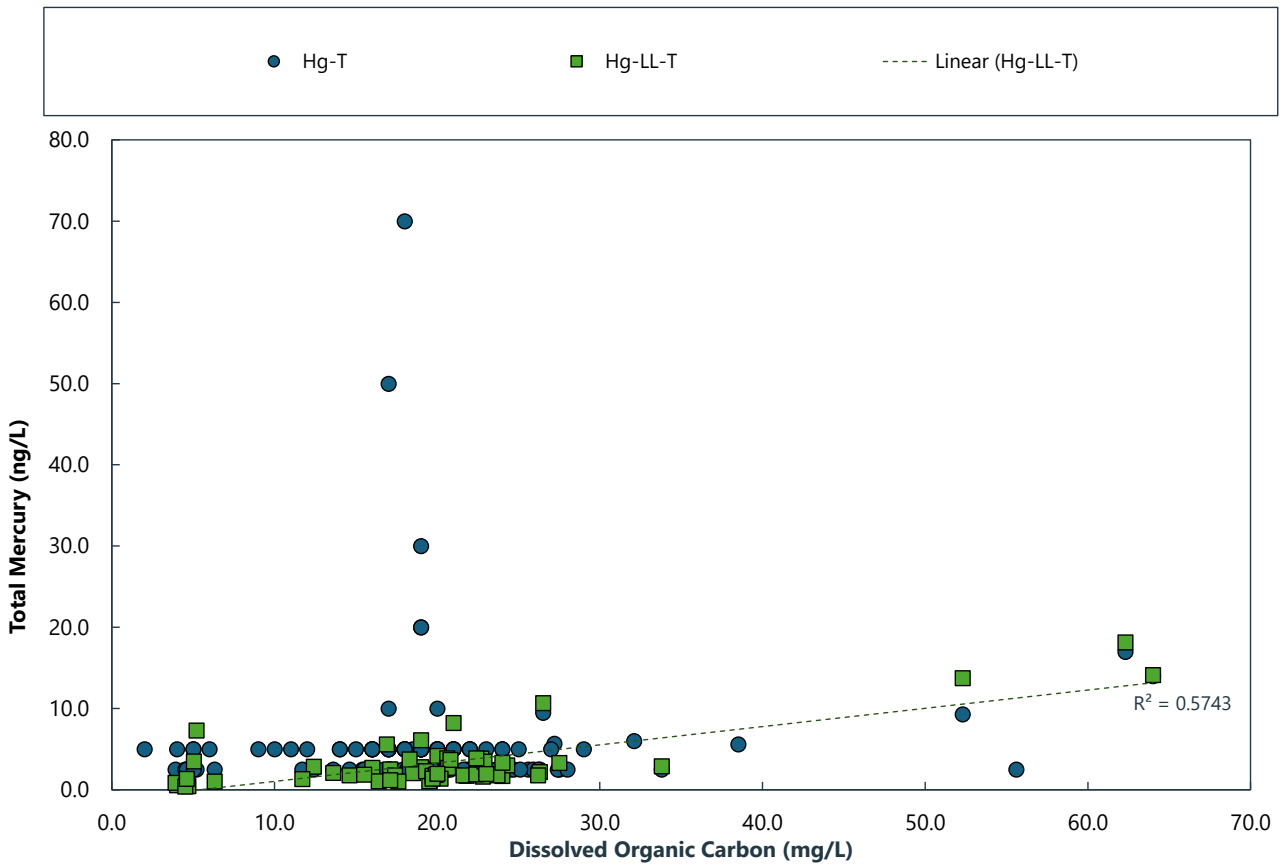
1 - pH shown is field pH
2 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs pH-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-19



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

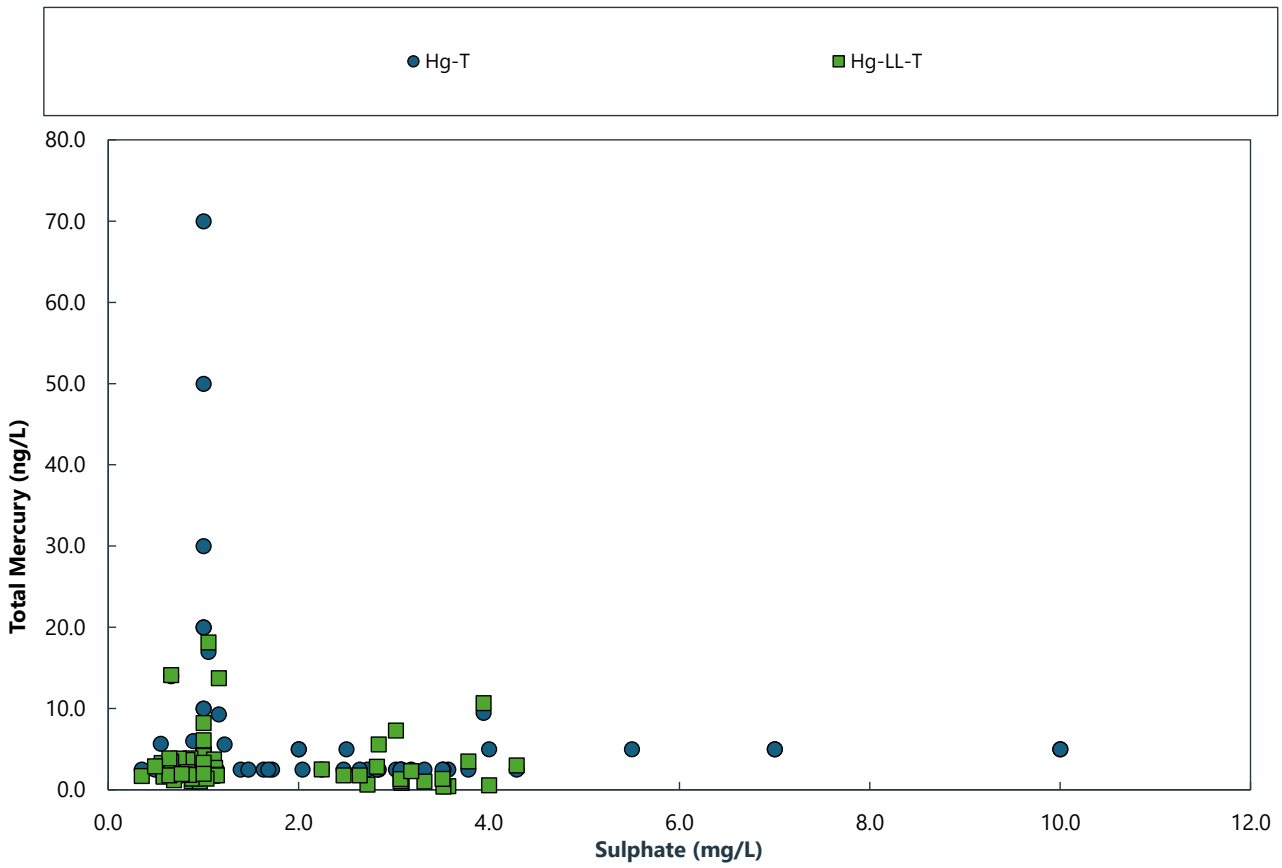
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DOC-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-20



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

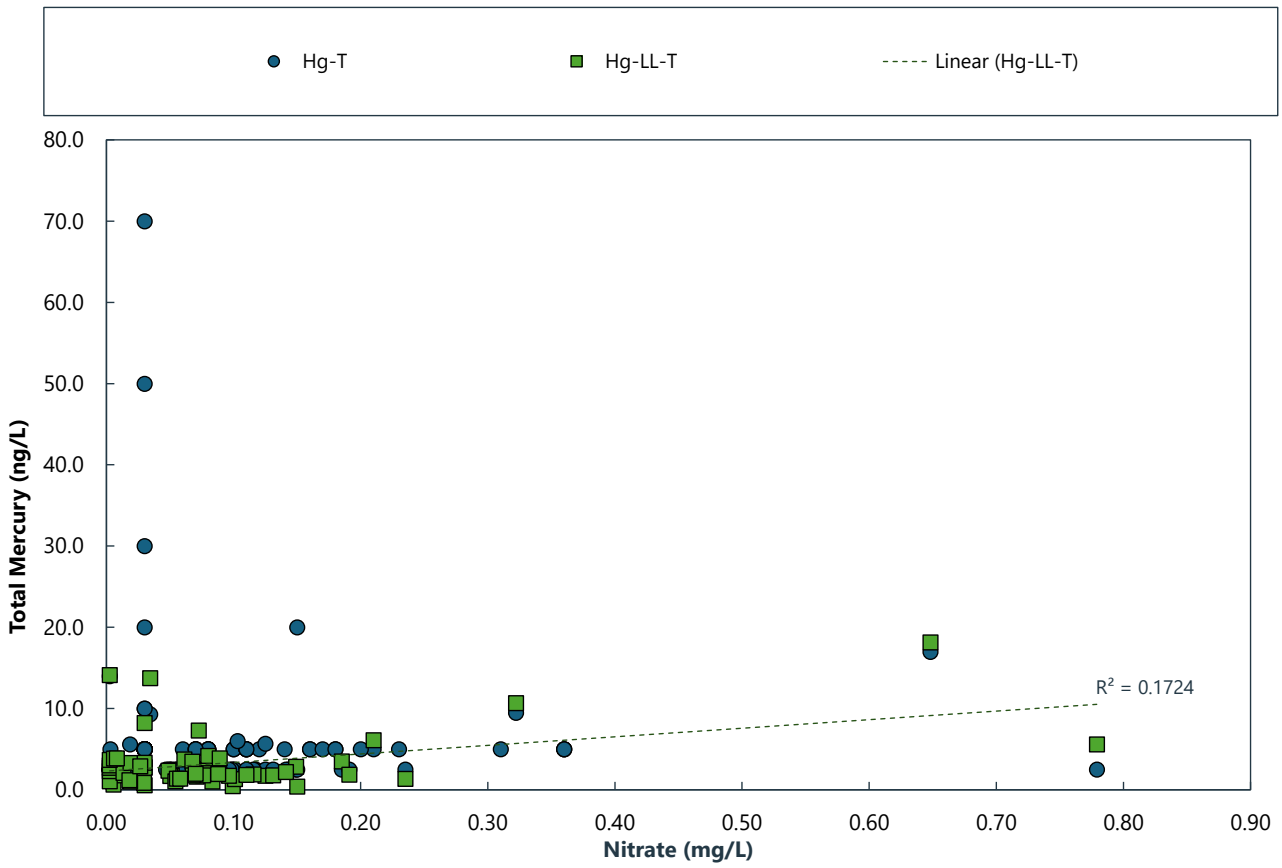
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs SO4-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-21



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

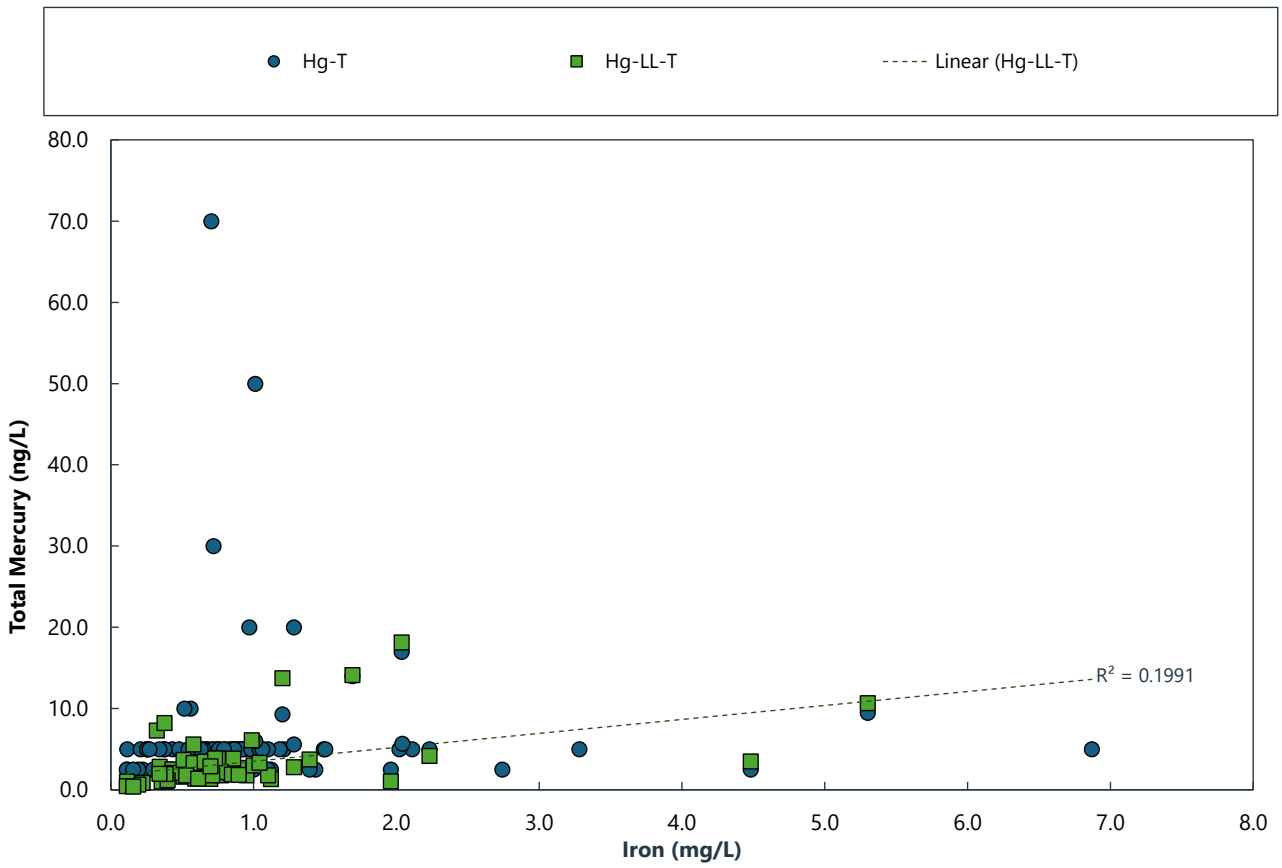
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs NO3-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-22



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

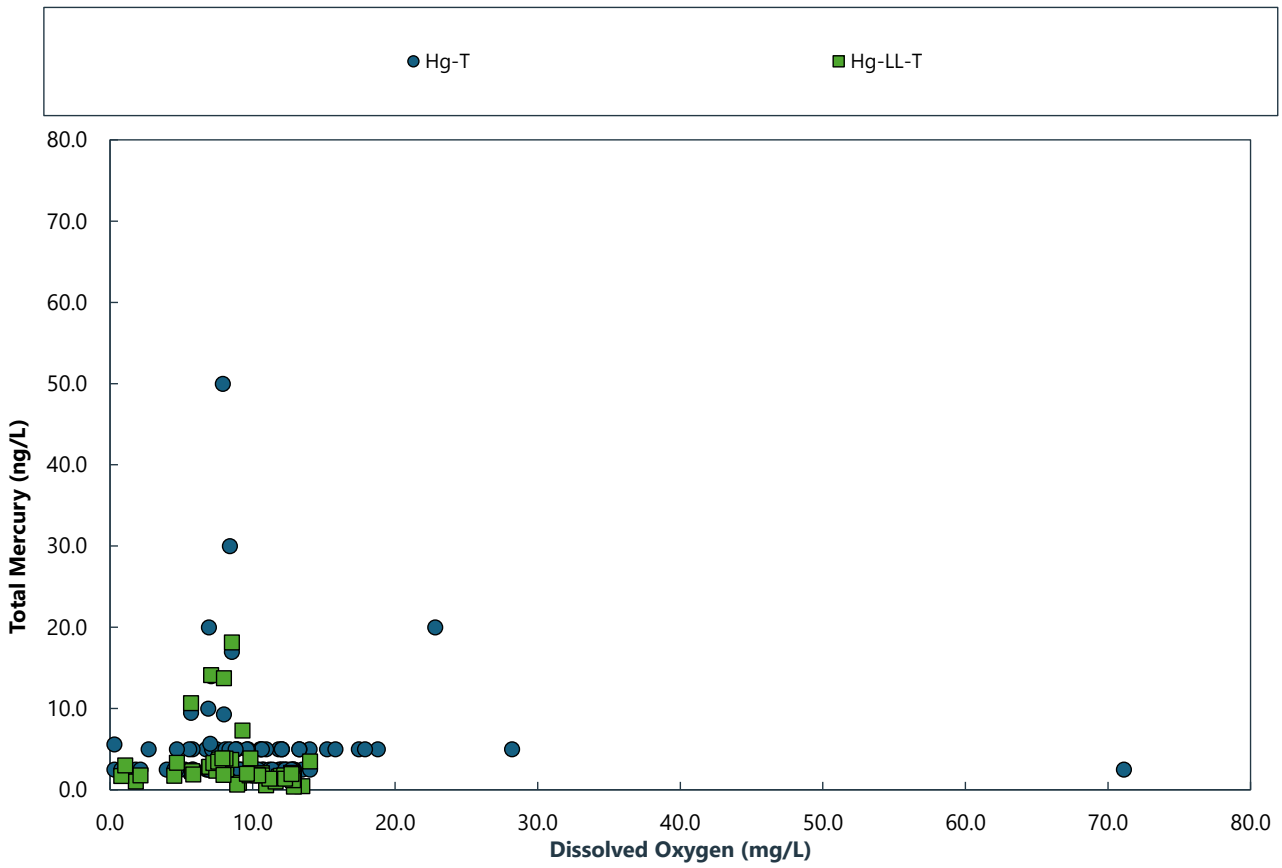
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Fe-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-23



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

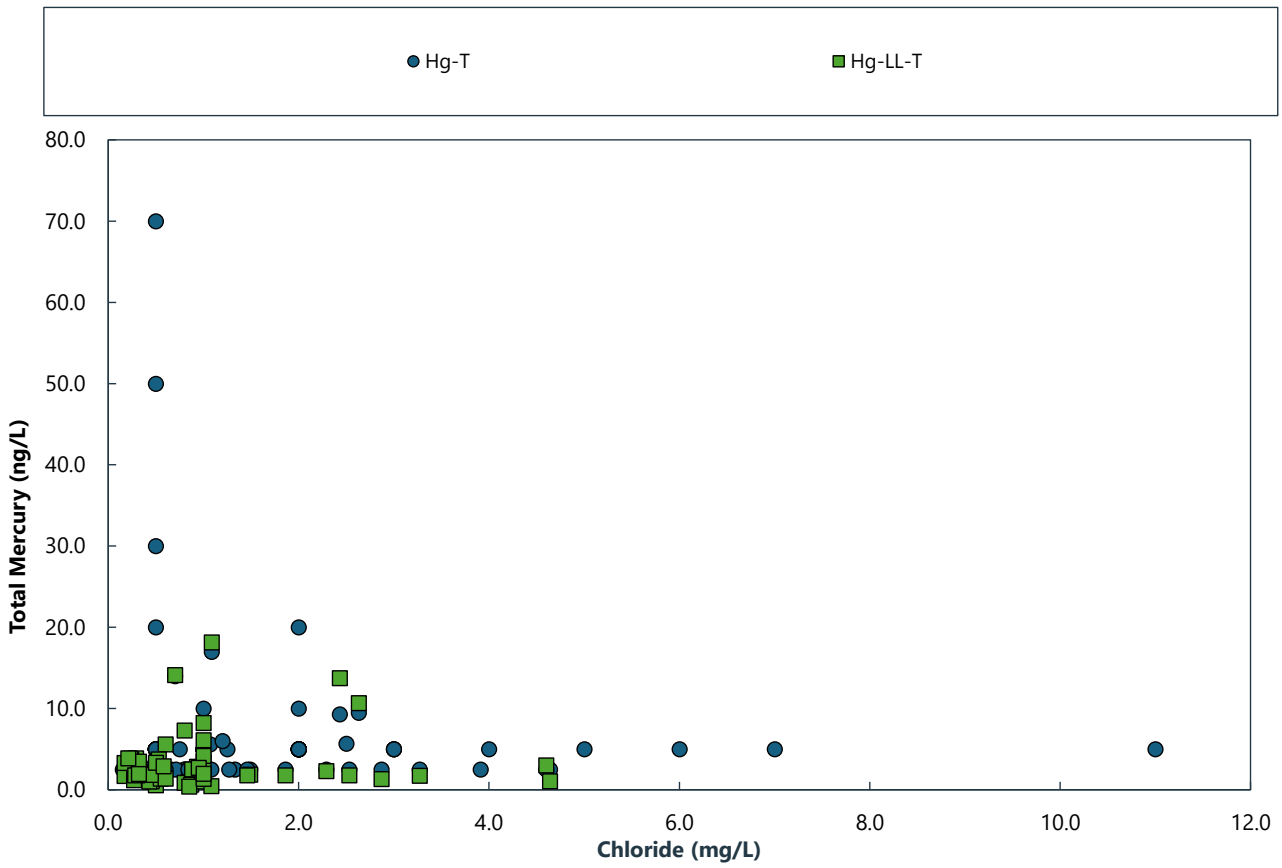
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DO-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-24



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

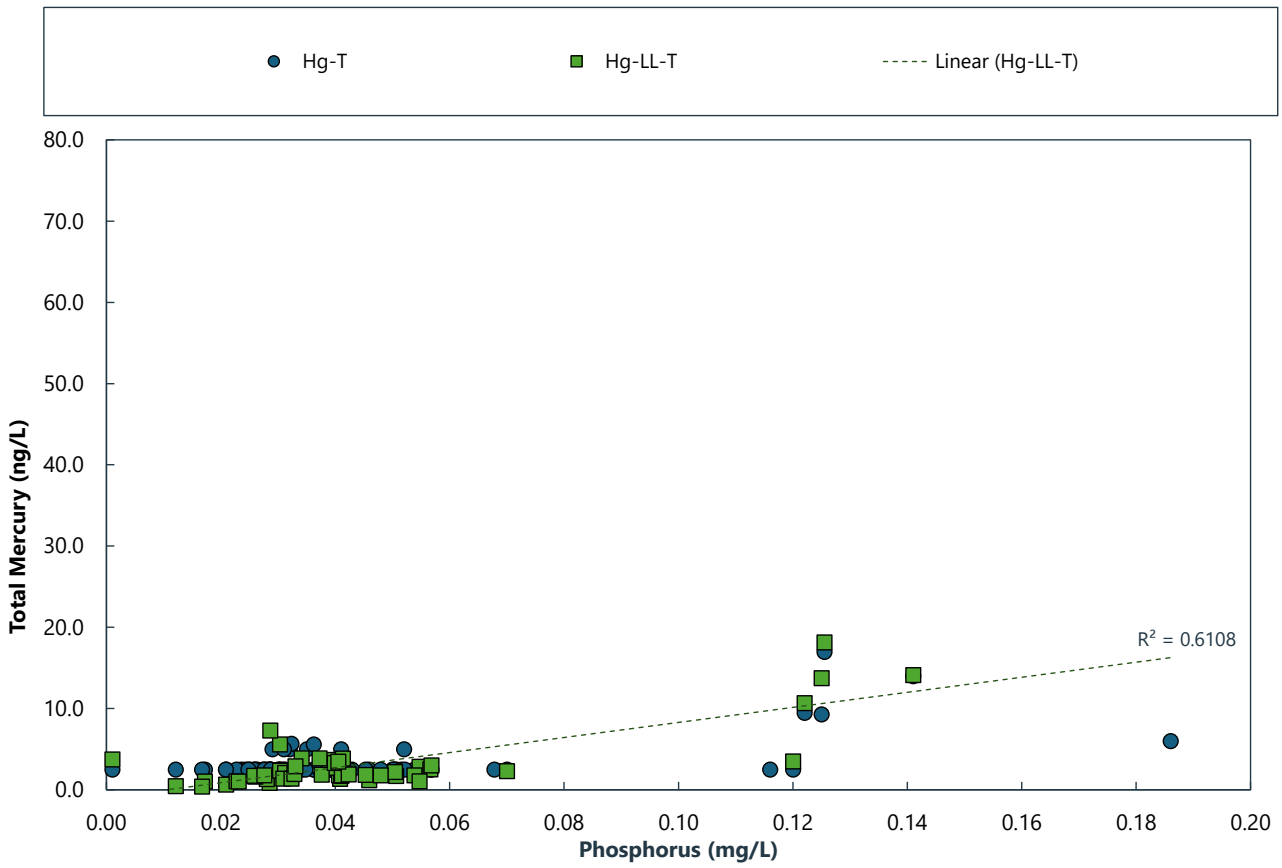
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Cl-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-25



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

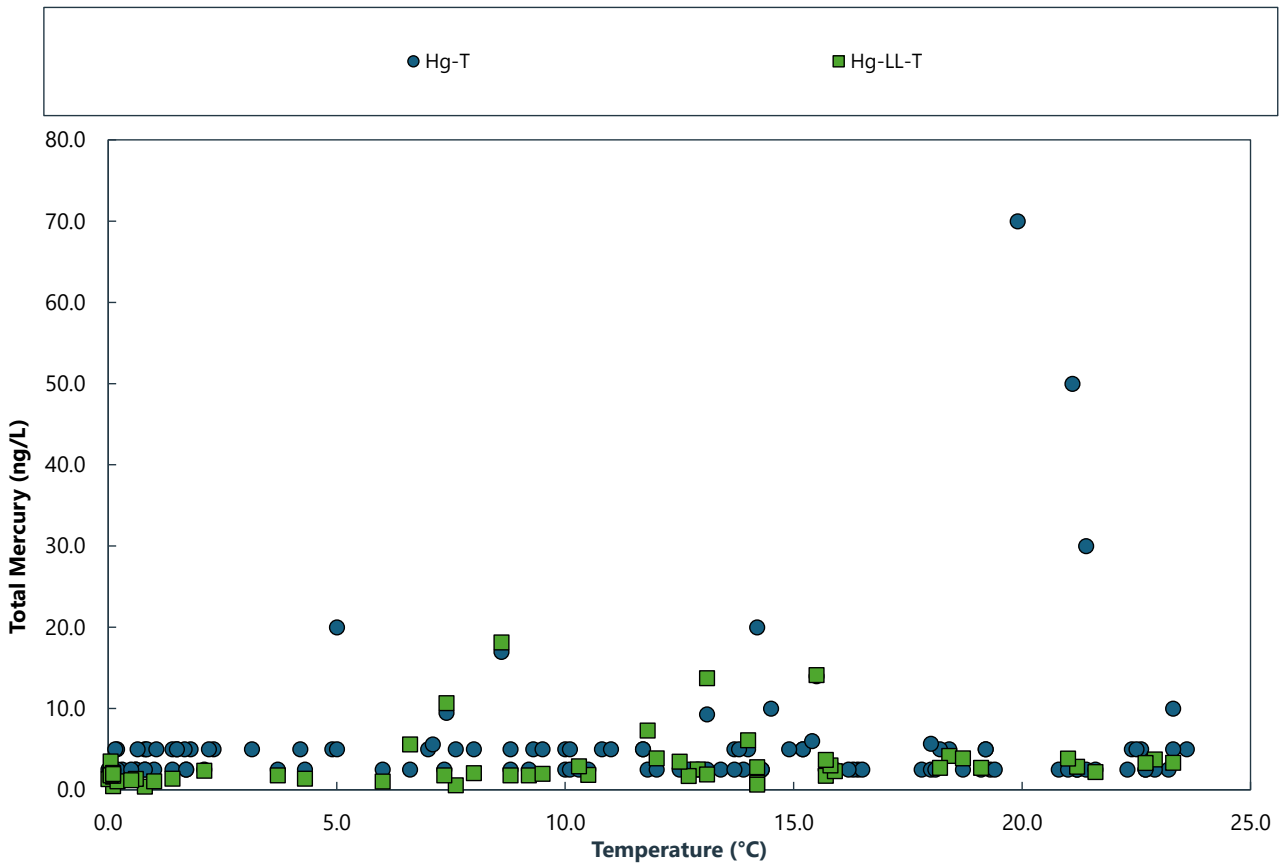
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs P-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-26



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

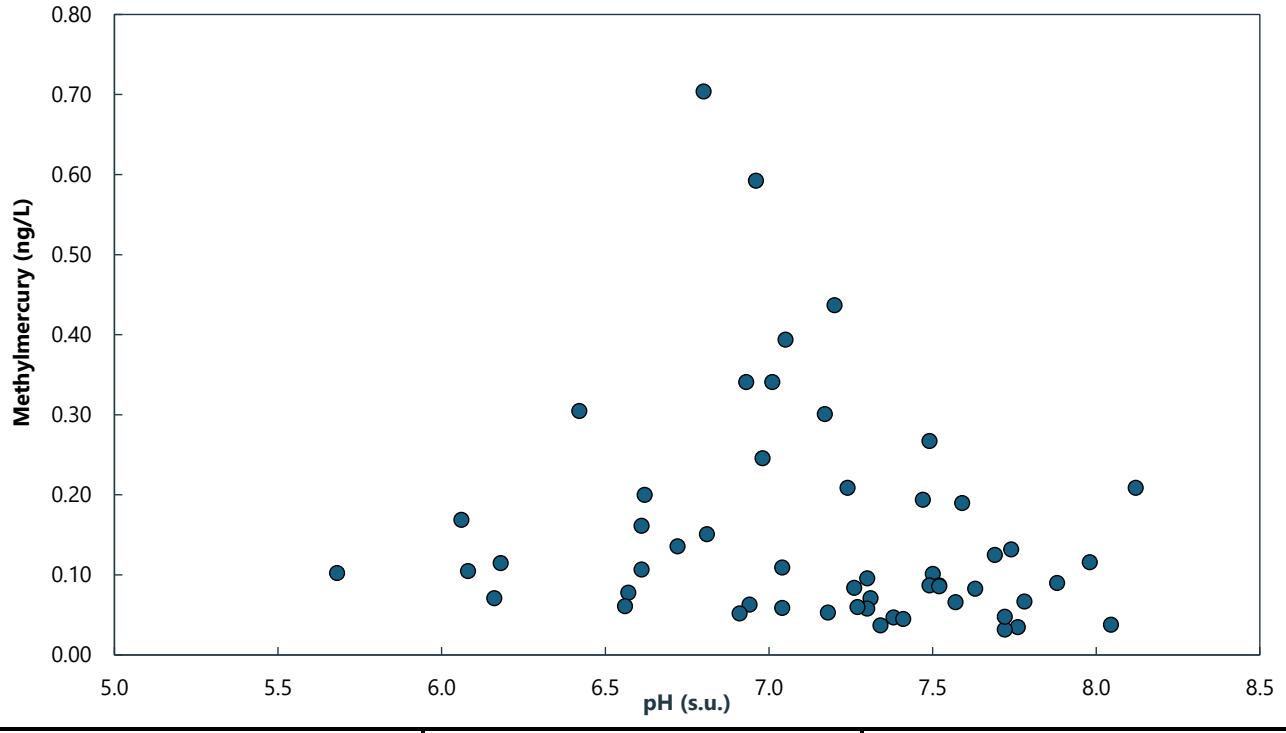
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Temp-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-27



Notes:

1 - pH shown is field pH

2 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

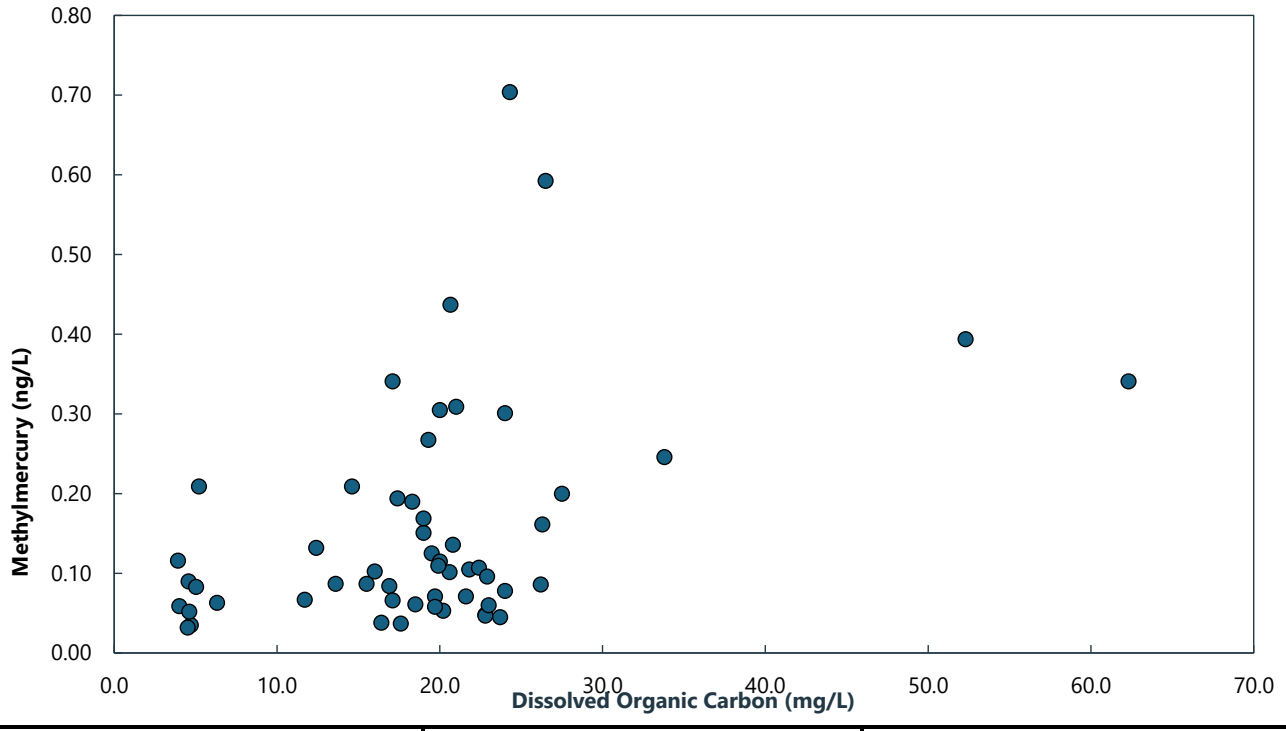
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs pH-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-28



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

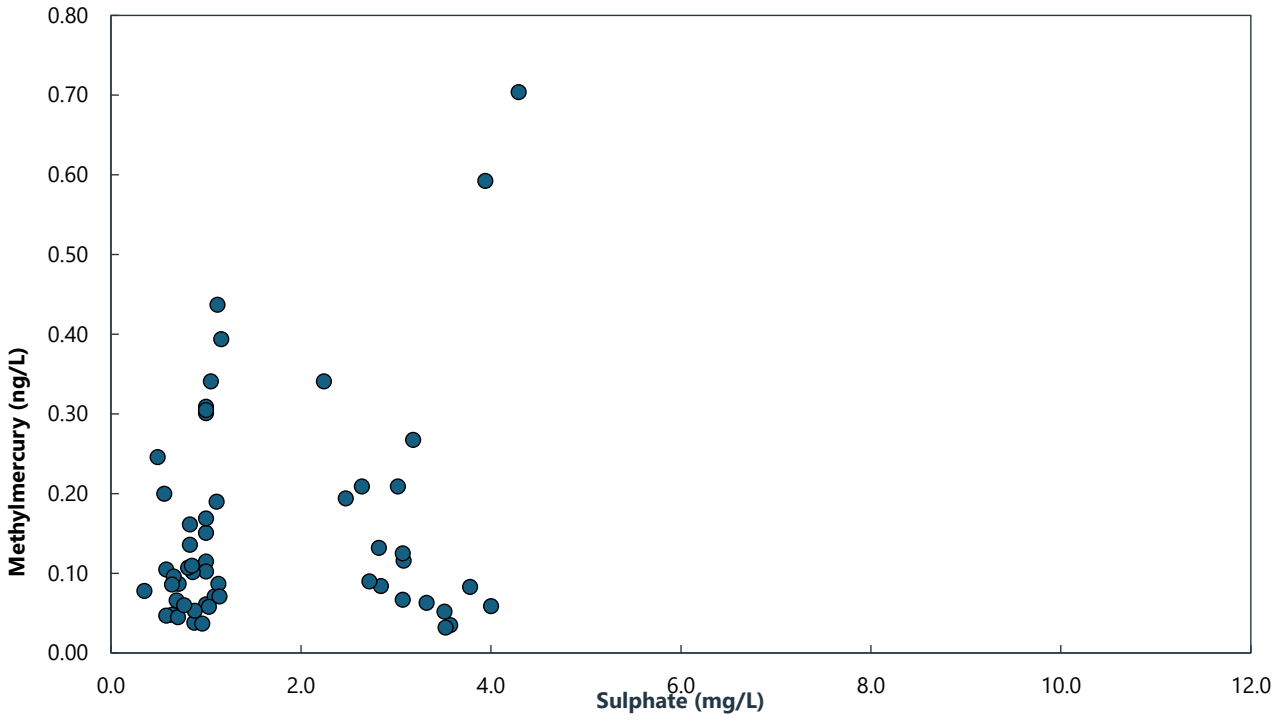
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DOC-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-29



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

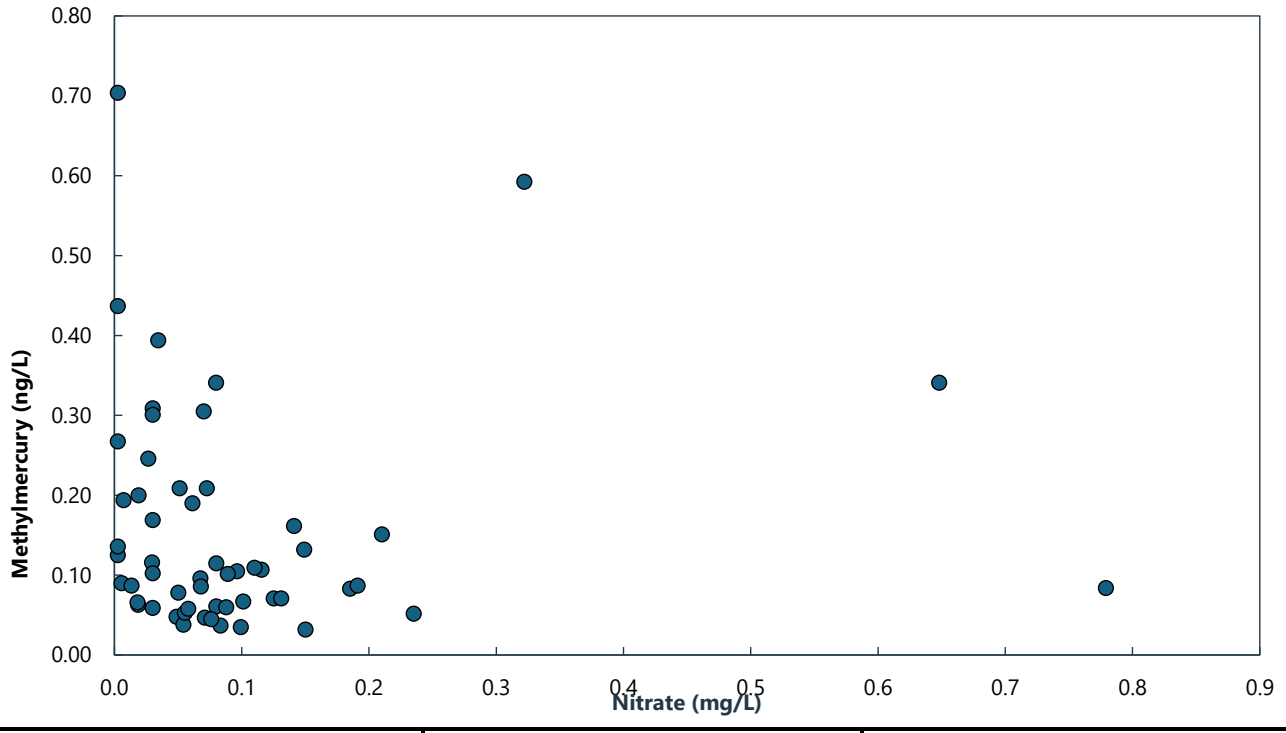
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs SO4-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-30



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

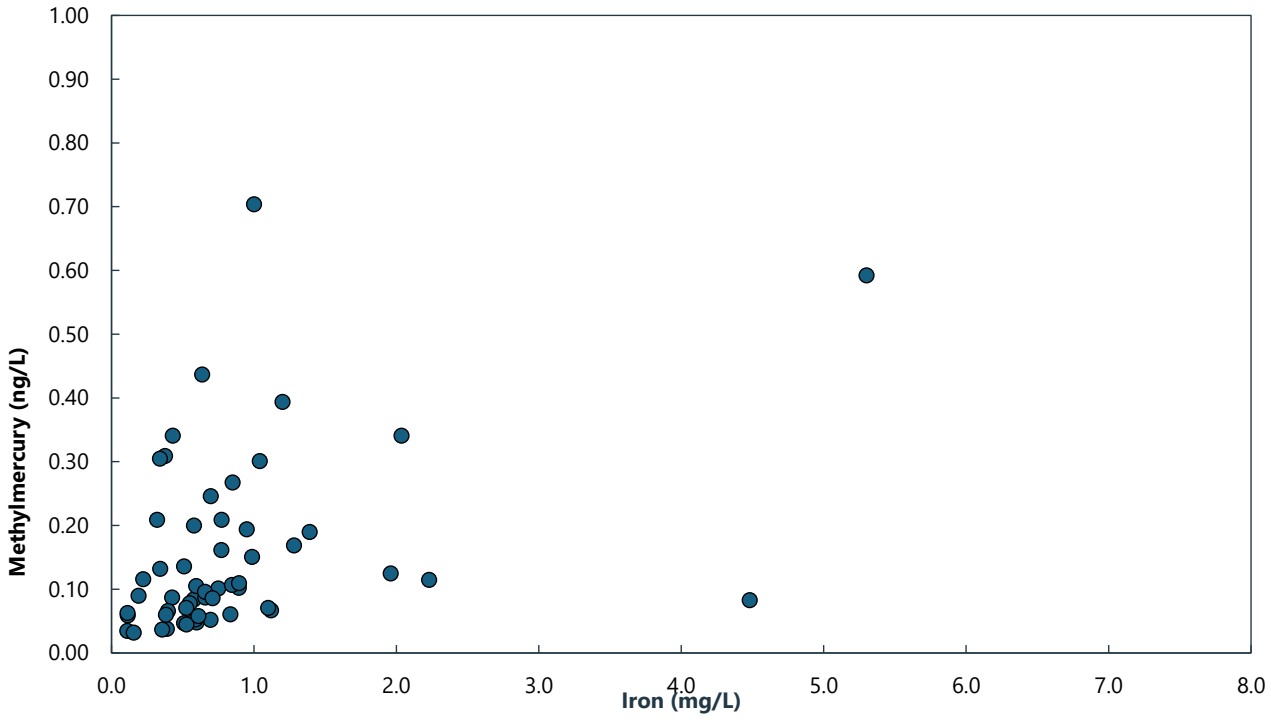
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs NO3-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-31



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

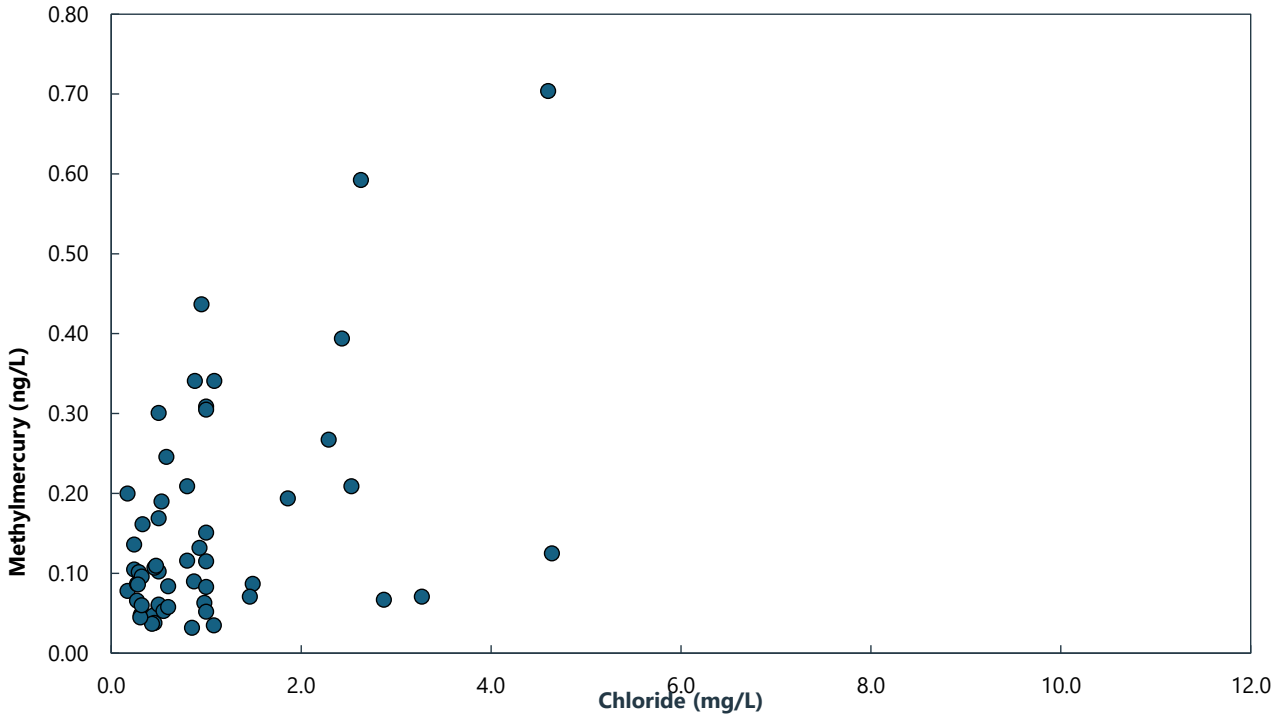
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Fe-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-32



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

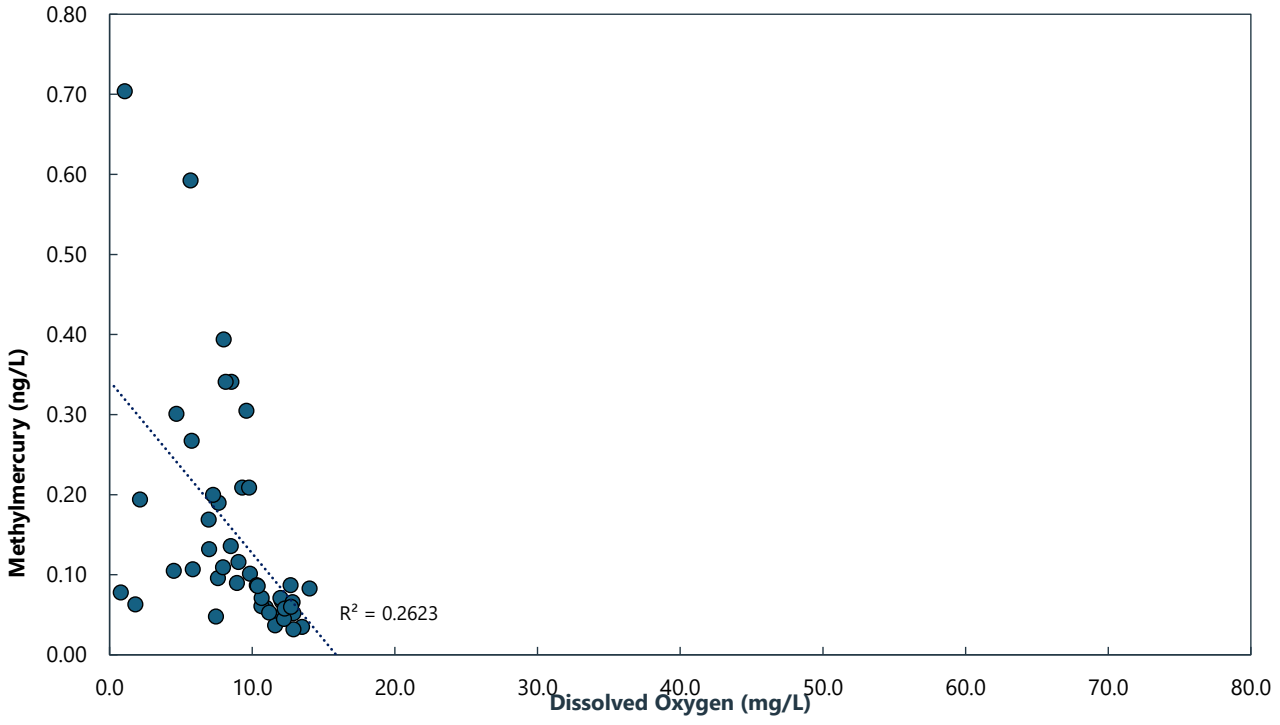
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Cl-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-34



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

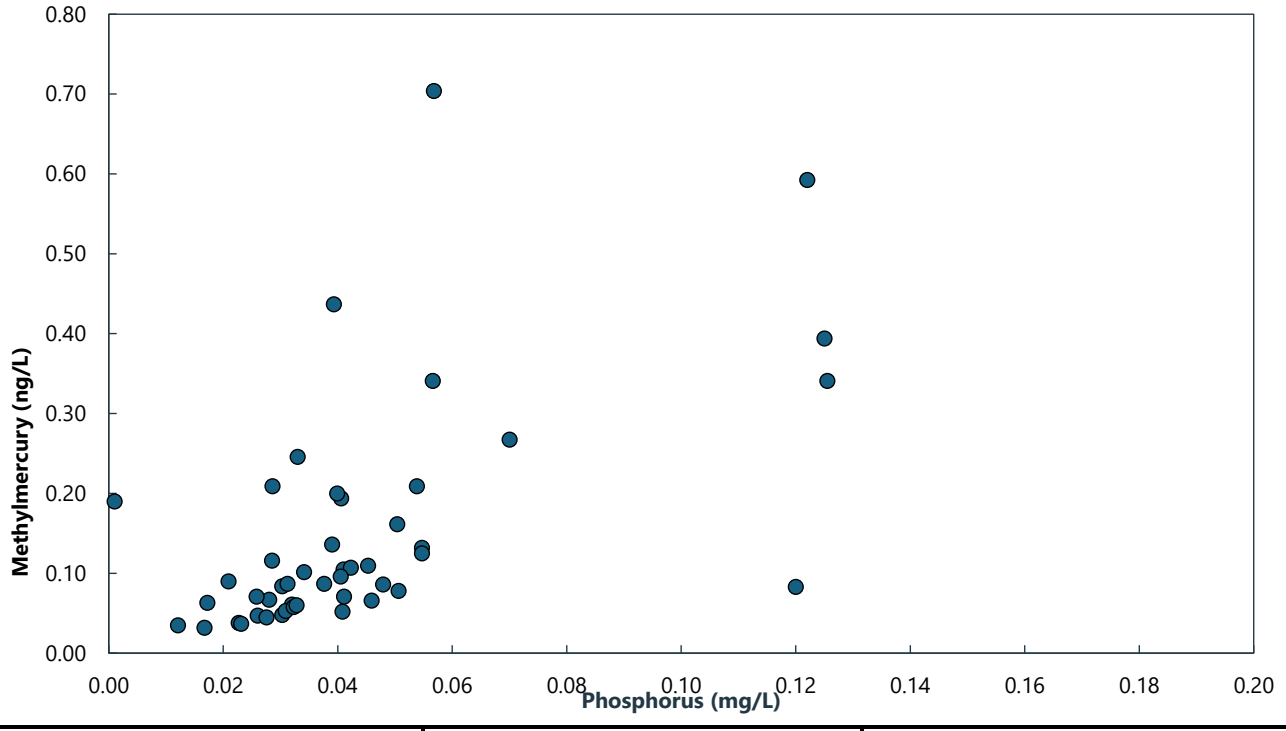
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DO-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-33



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

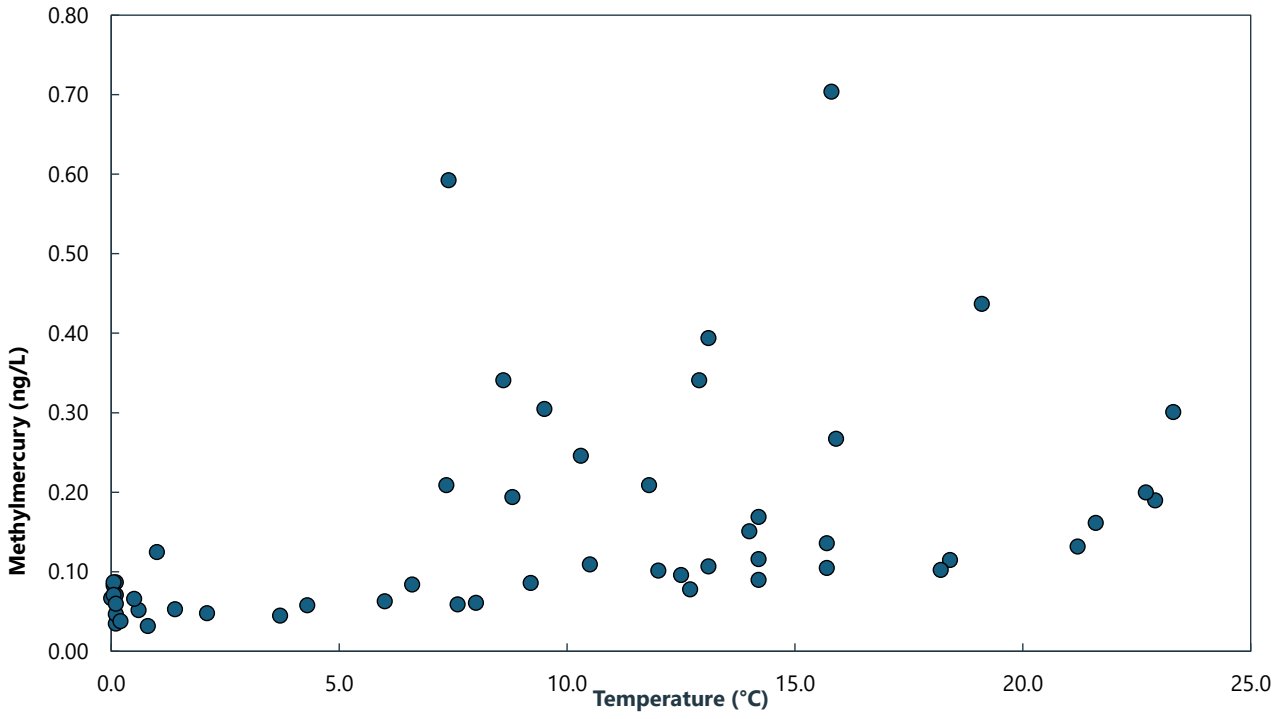
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs P-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-35



Notes:

1 - Monitored stations: SW-03, SW-04, SW-08, SW-09, SW-15

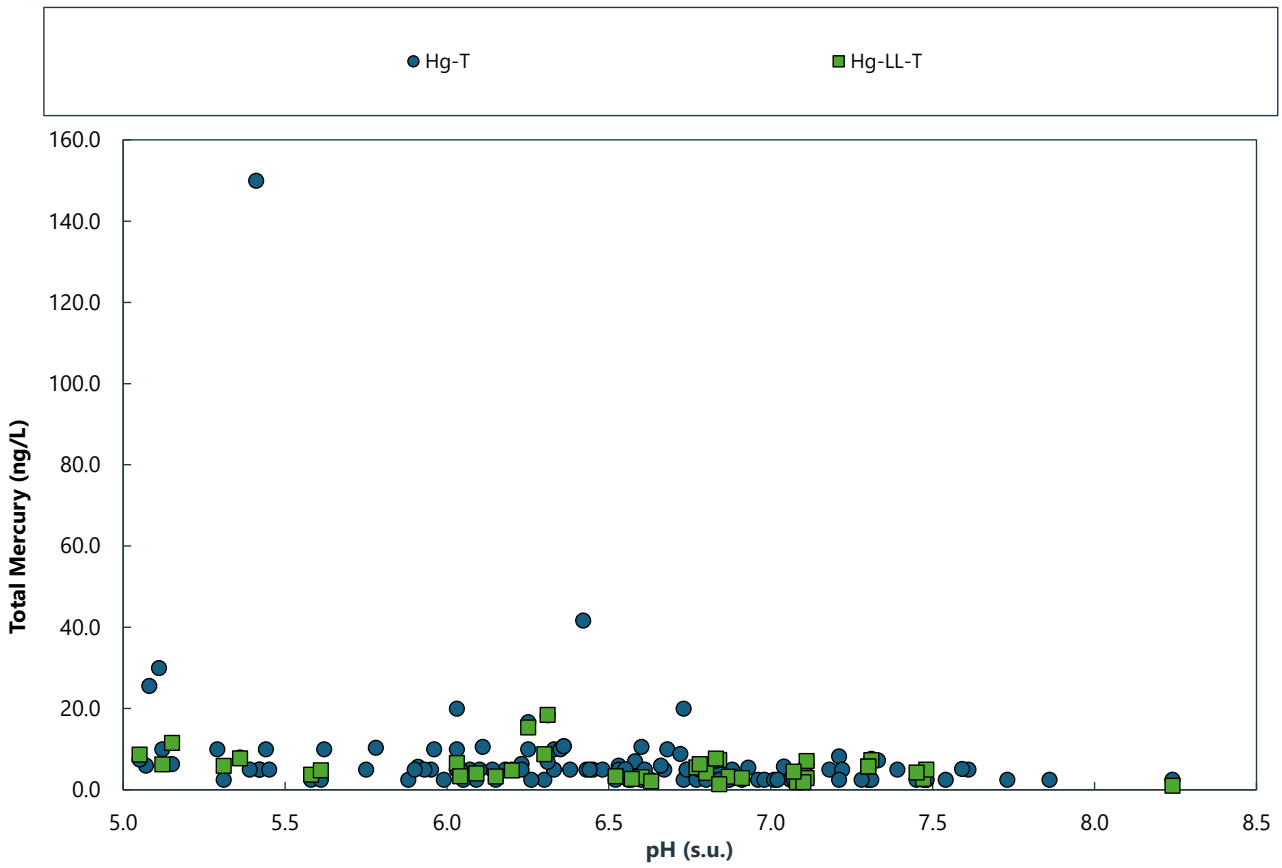
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Temp-Dixie Creek

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-36



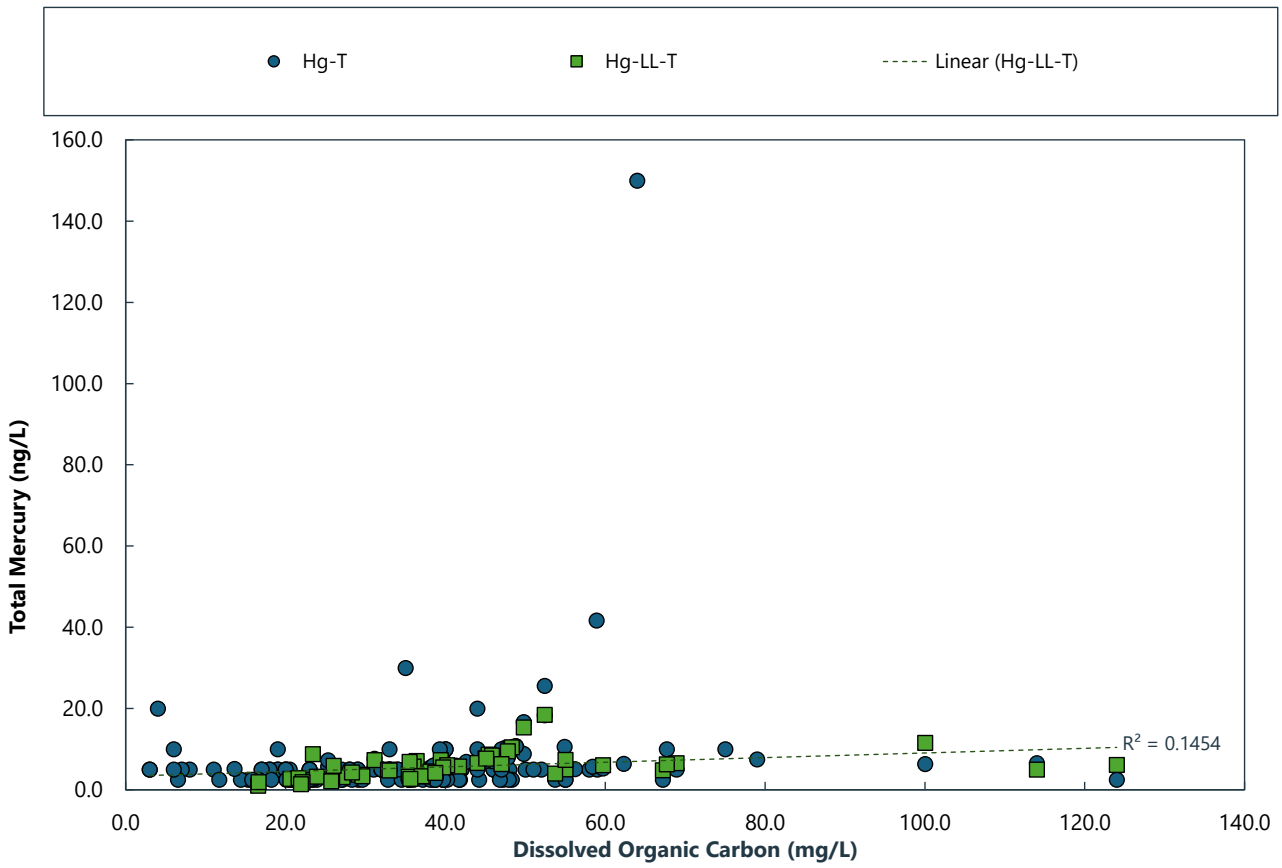
Notes:
1 - pH shown is field pH
2 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs pH-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-37



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

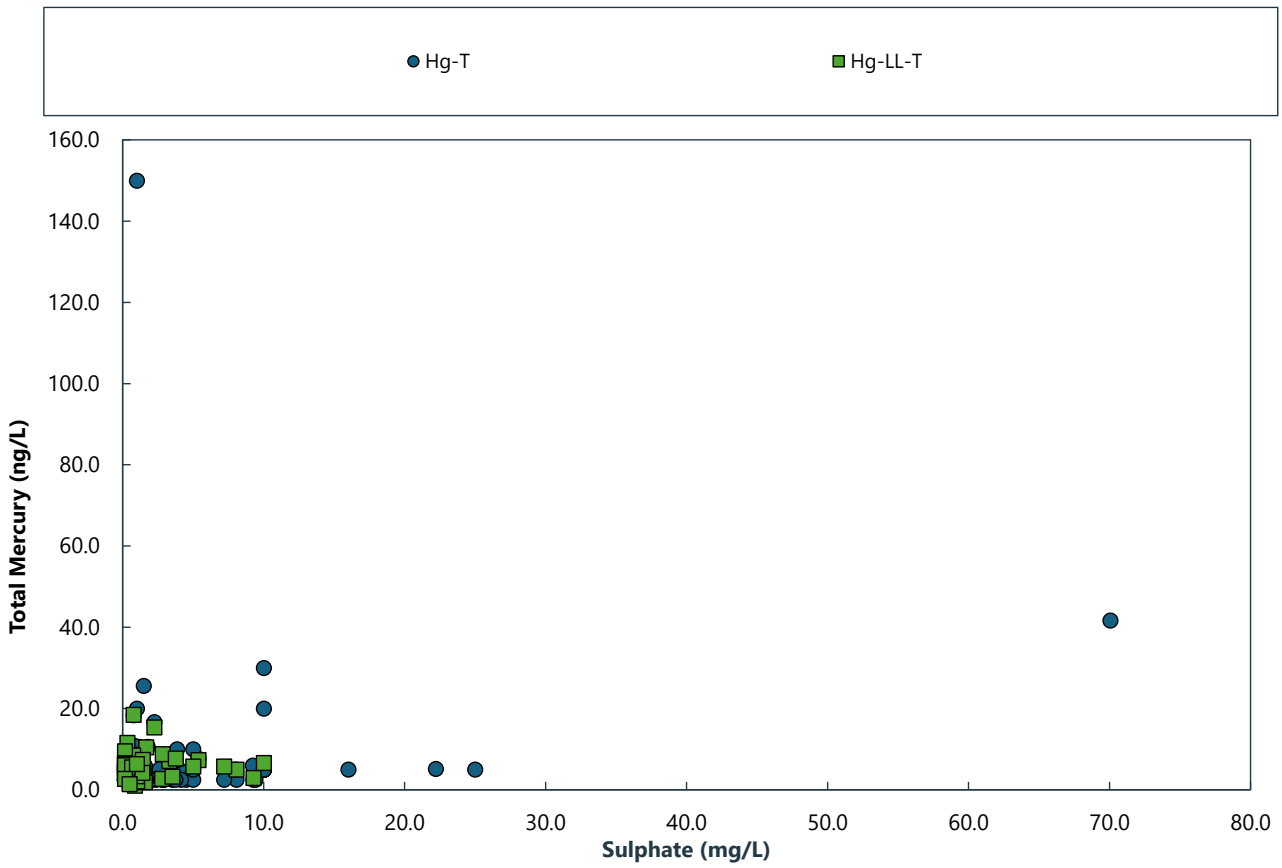
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DOC-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-38



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

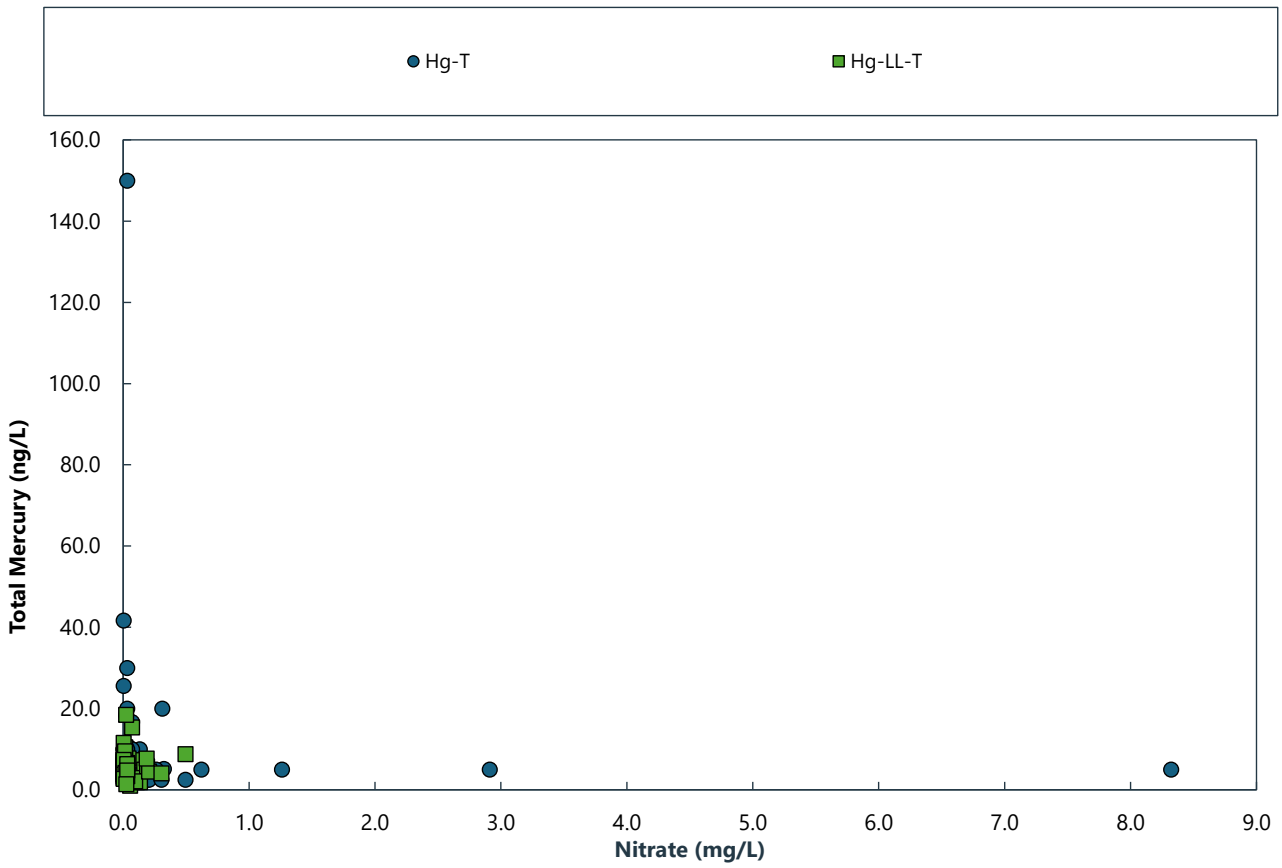
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs SO4-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-39



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

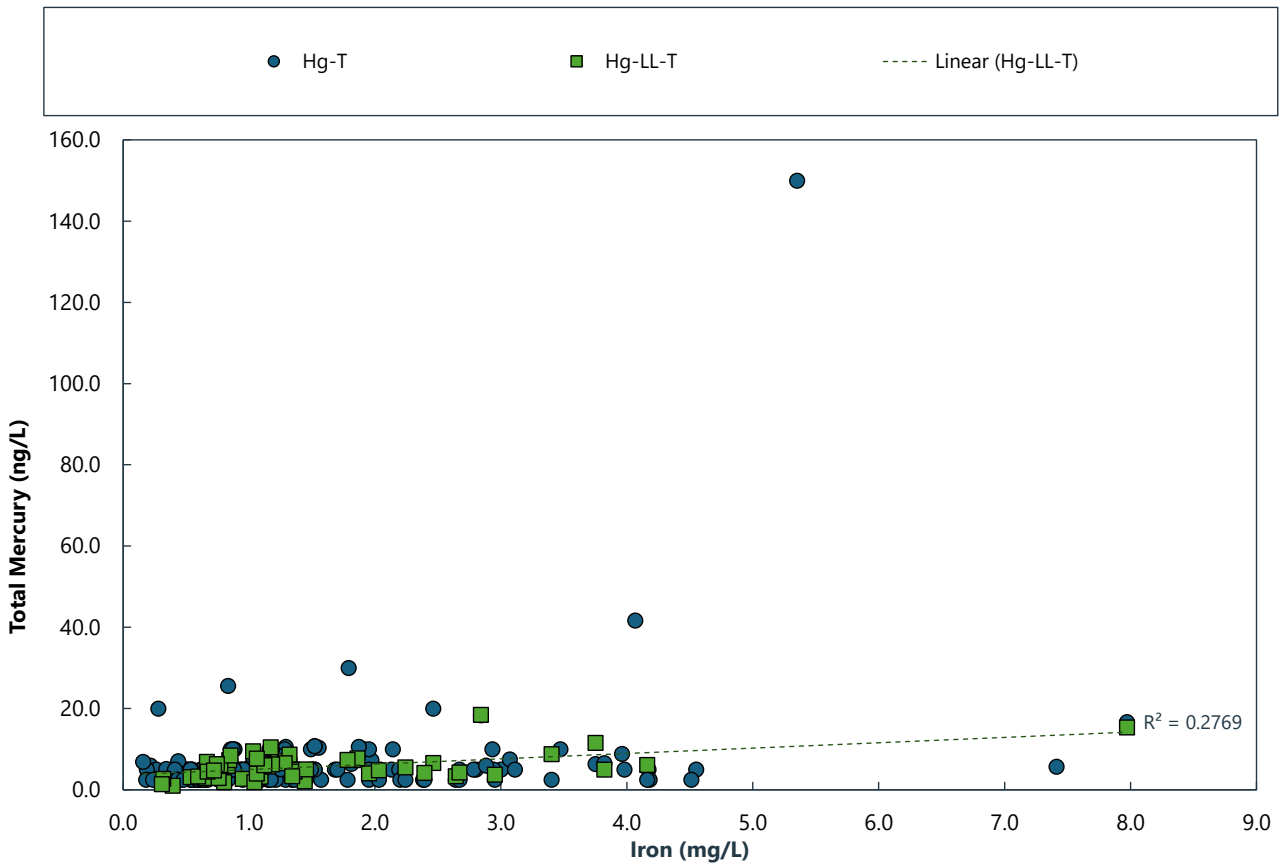
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs NO3-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-40



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

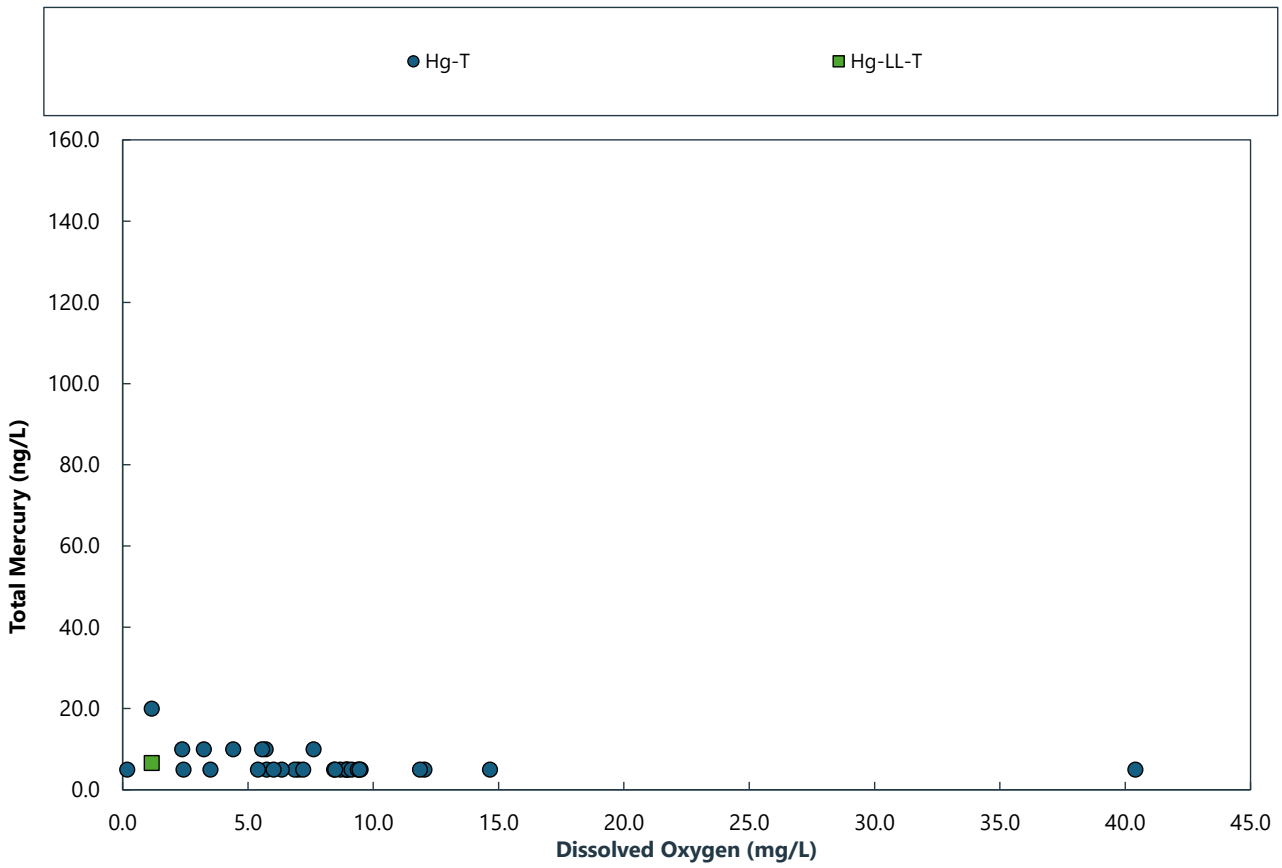
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Fe-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-41



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

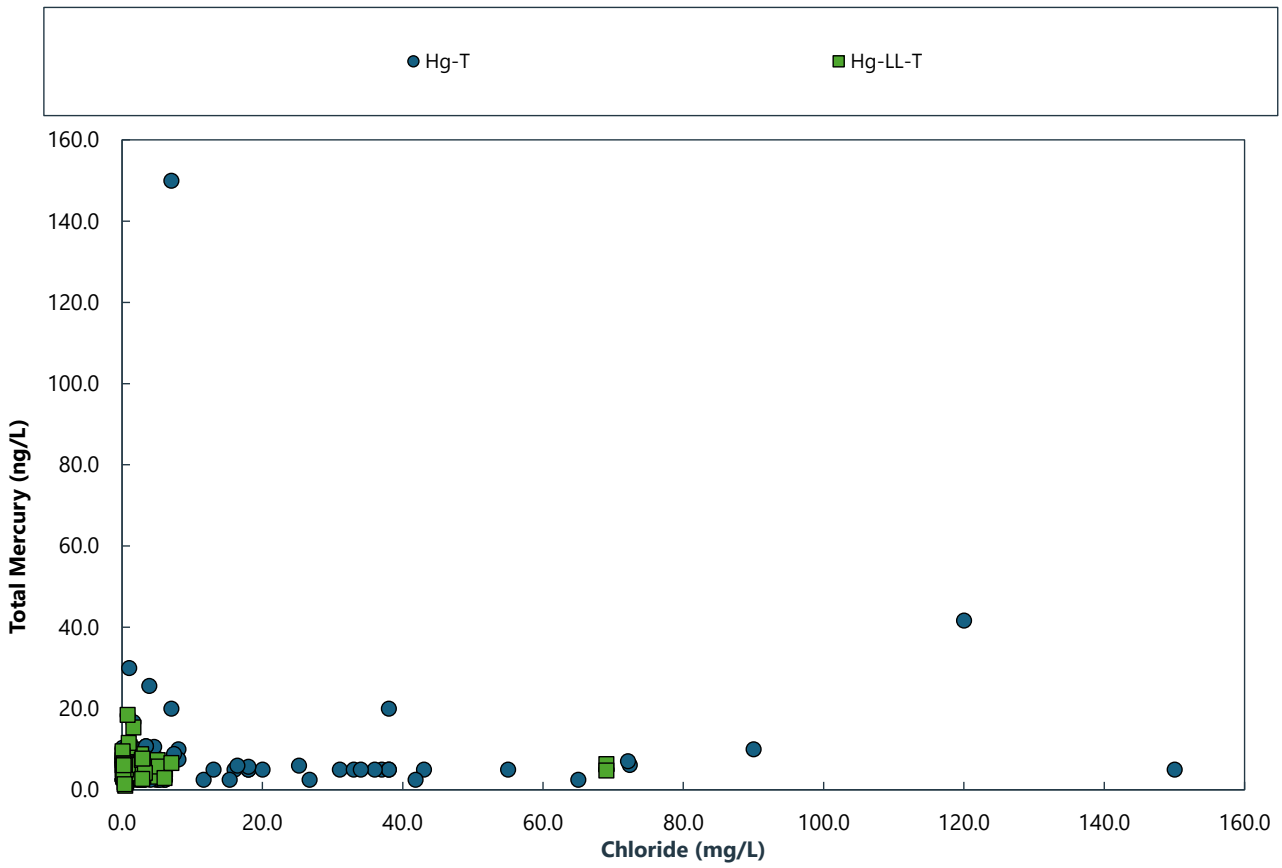
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DO-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-42



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

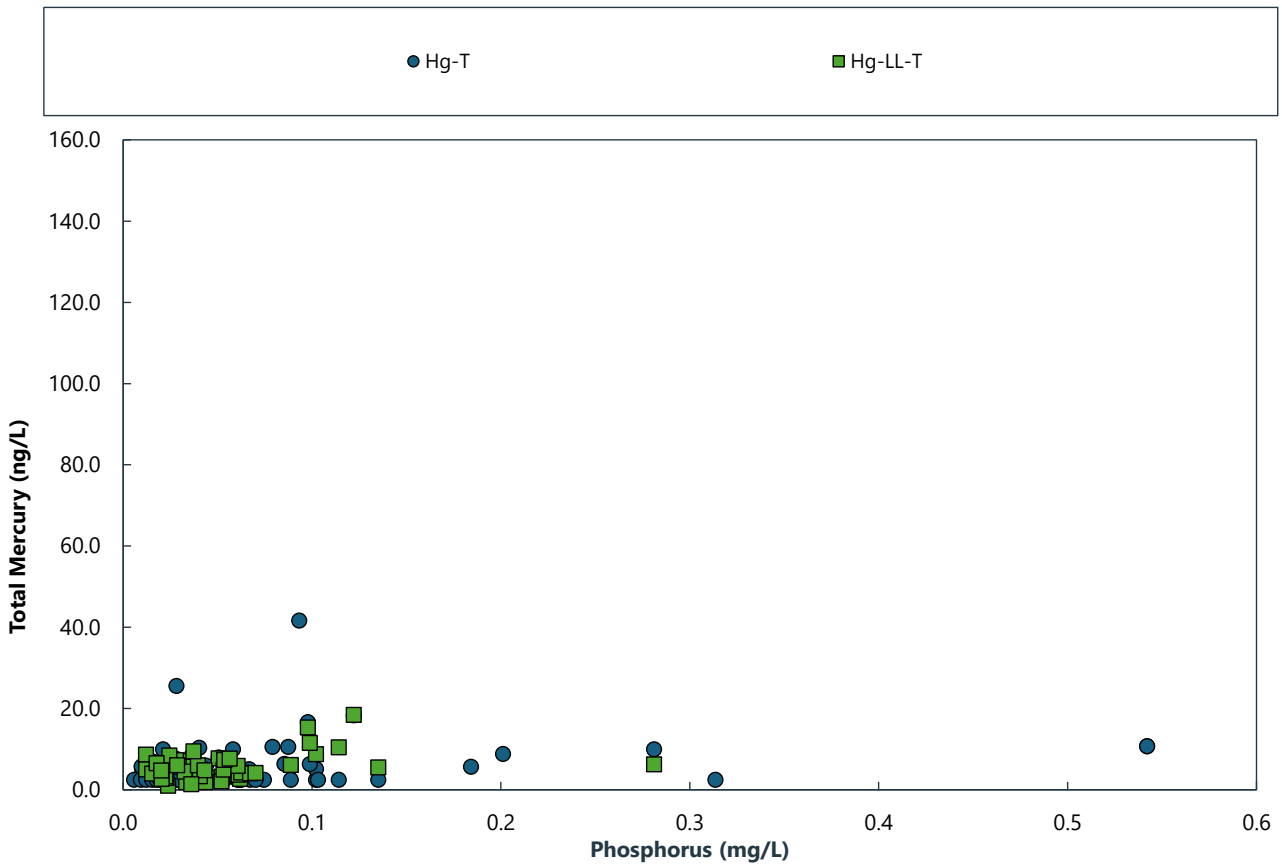
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Cl-Unnamed Watercourses

Hg vs Cl-Unnamed Watercourses

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-43



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

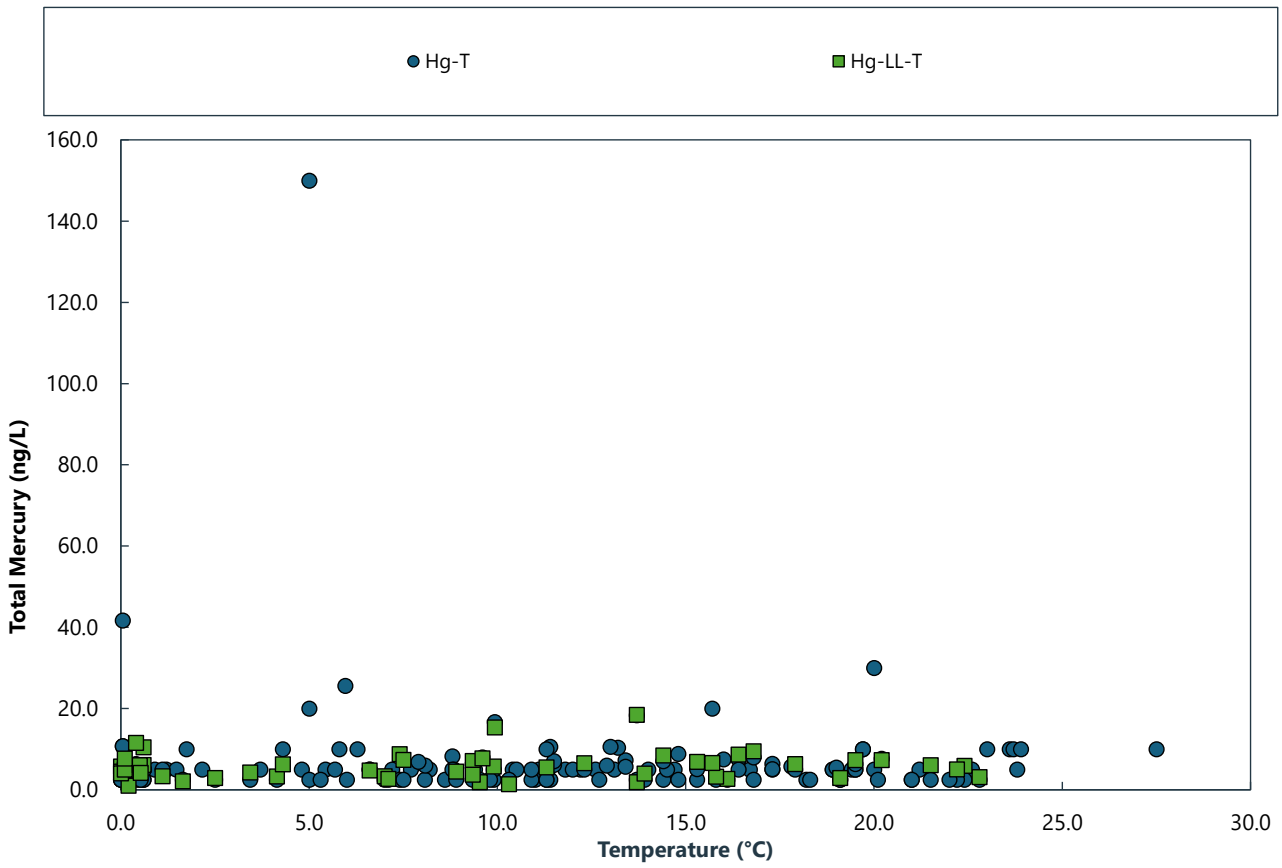
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs P-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-44



Notes:

1 - Monitored stations for SW-02, SW-05, SW-06, SW-07, SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12, SW-12b, SW-13, SW-16, GL-Trib

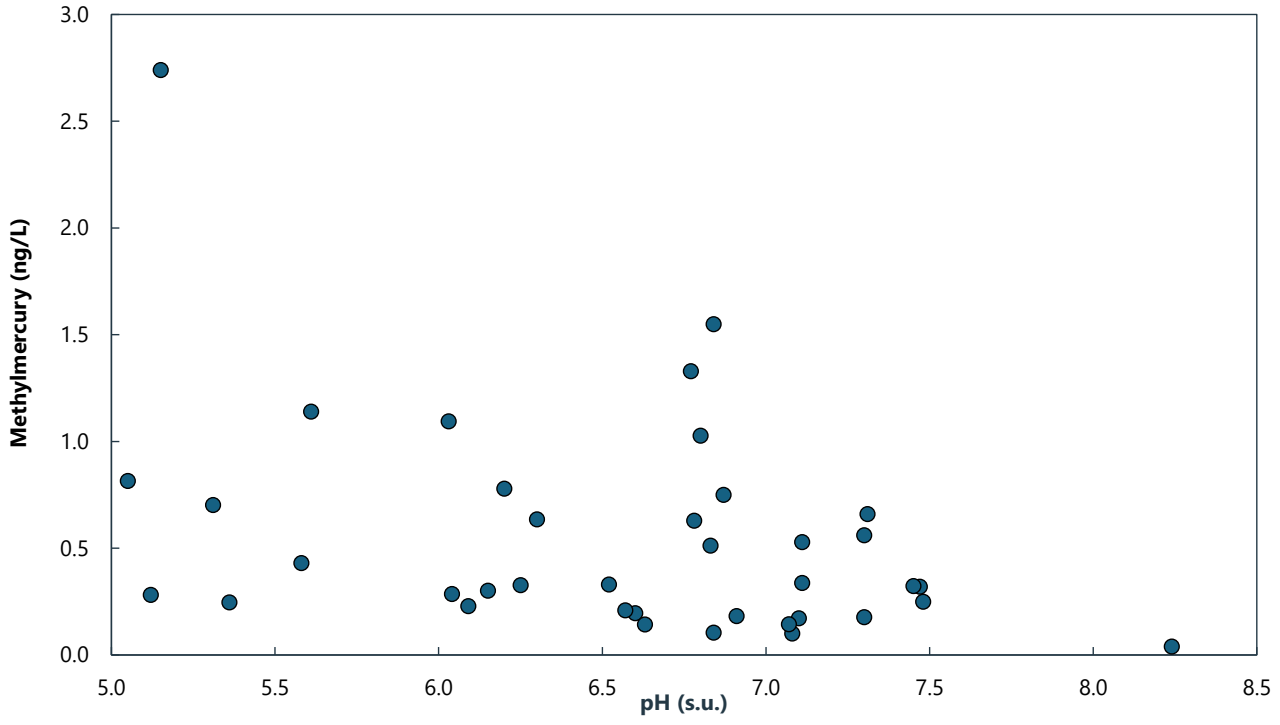
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Temp-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-45



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

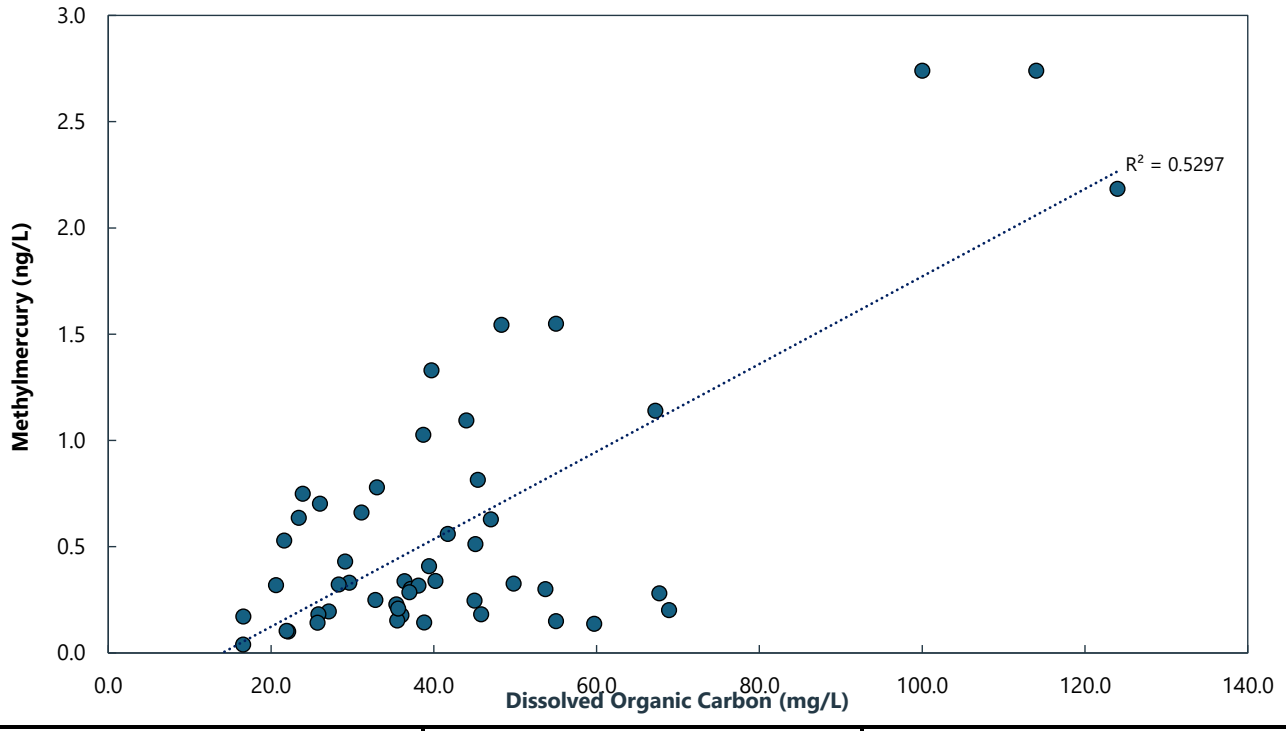
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs pH-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-46



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

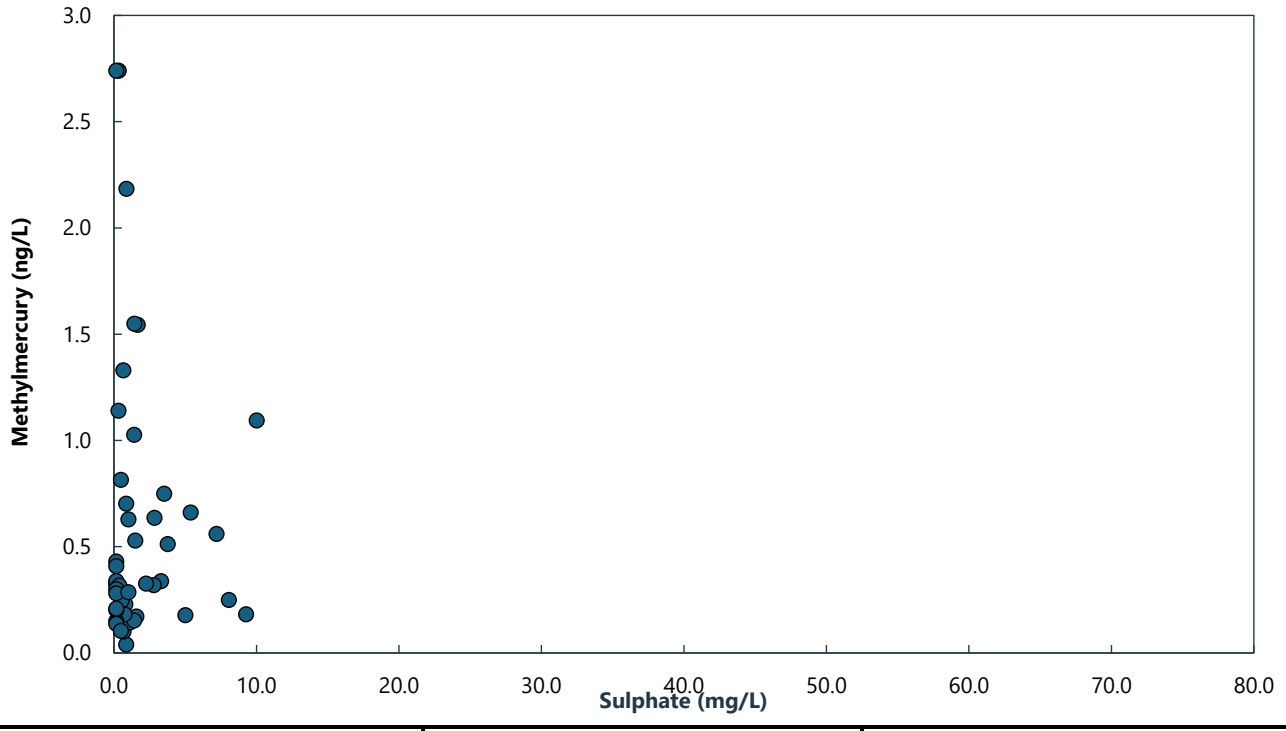
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DOC-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-47



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

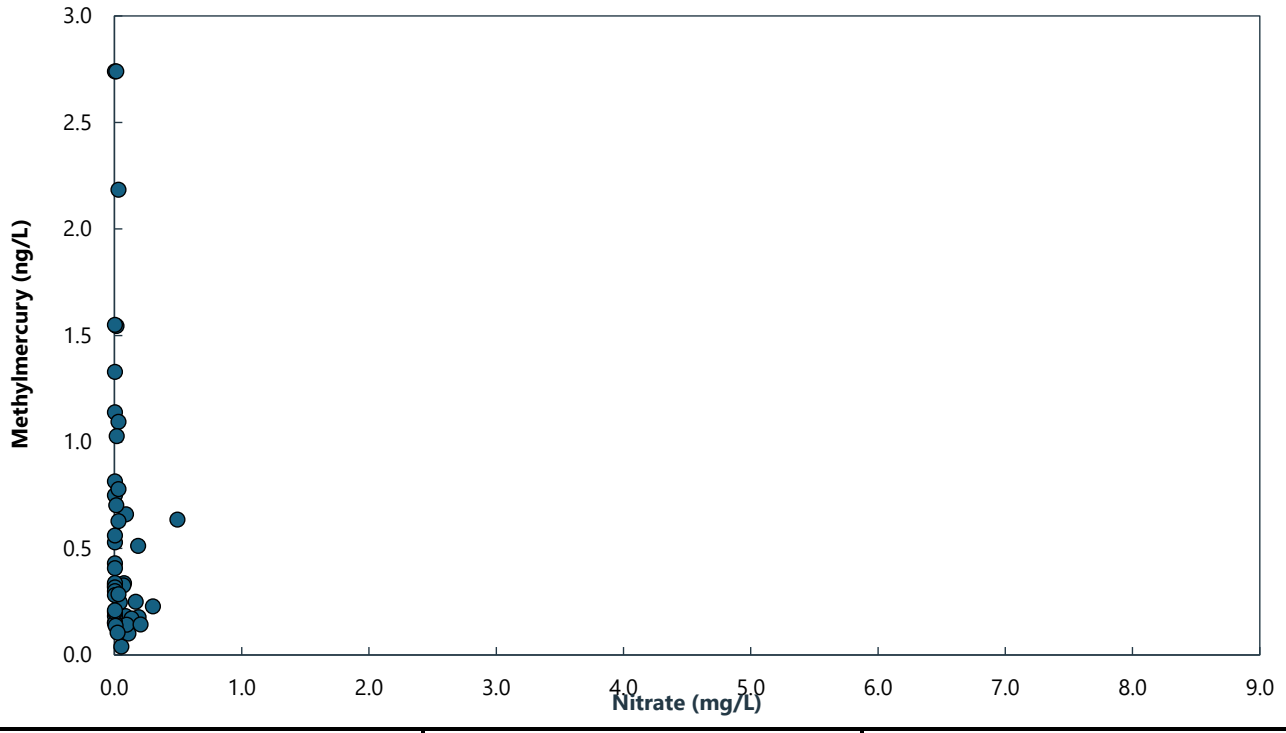
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs SO4-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-48



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

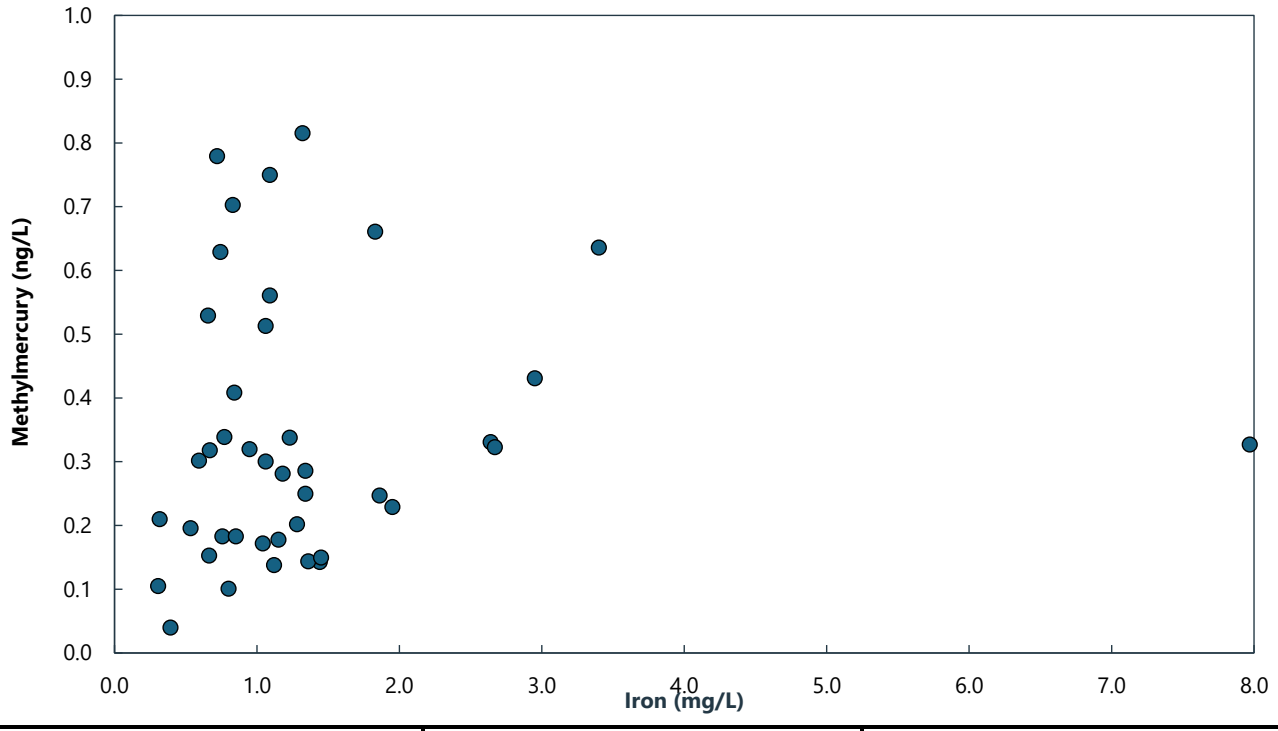
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs NO3-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-49



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

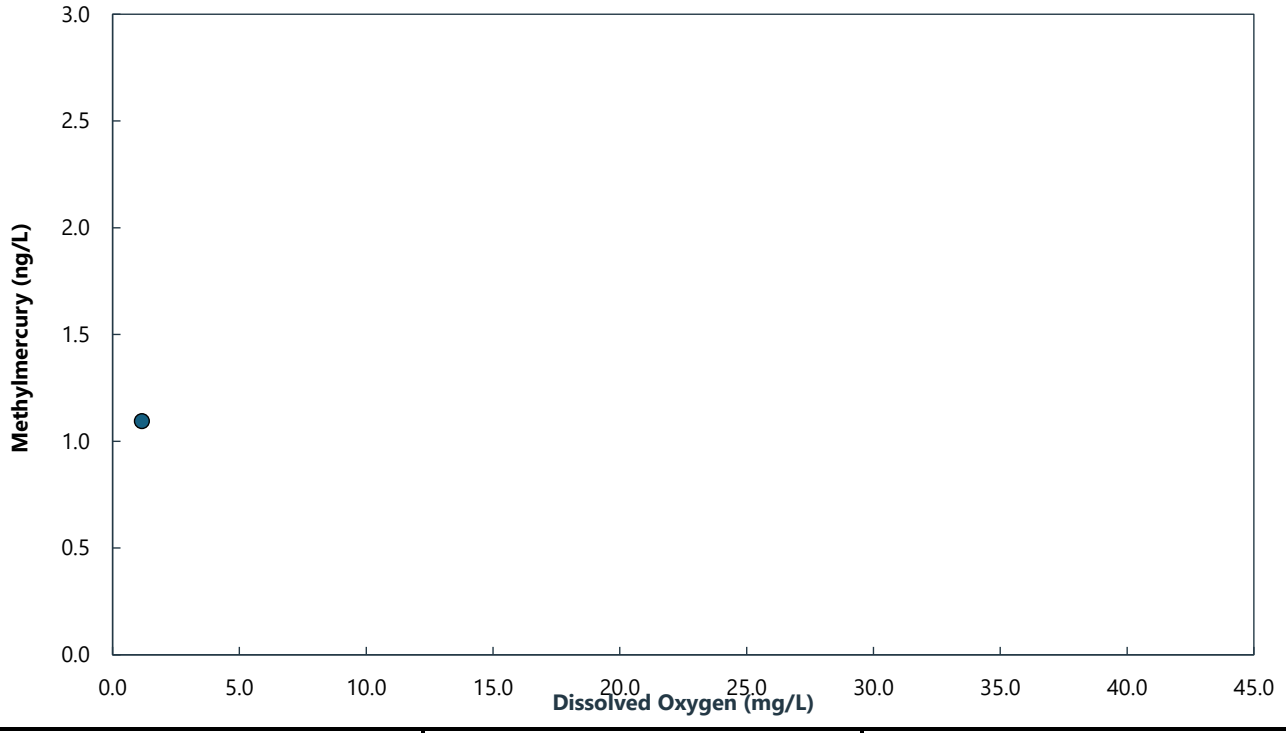
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Fe-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-50



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

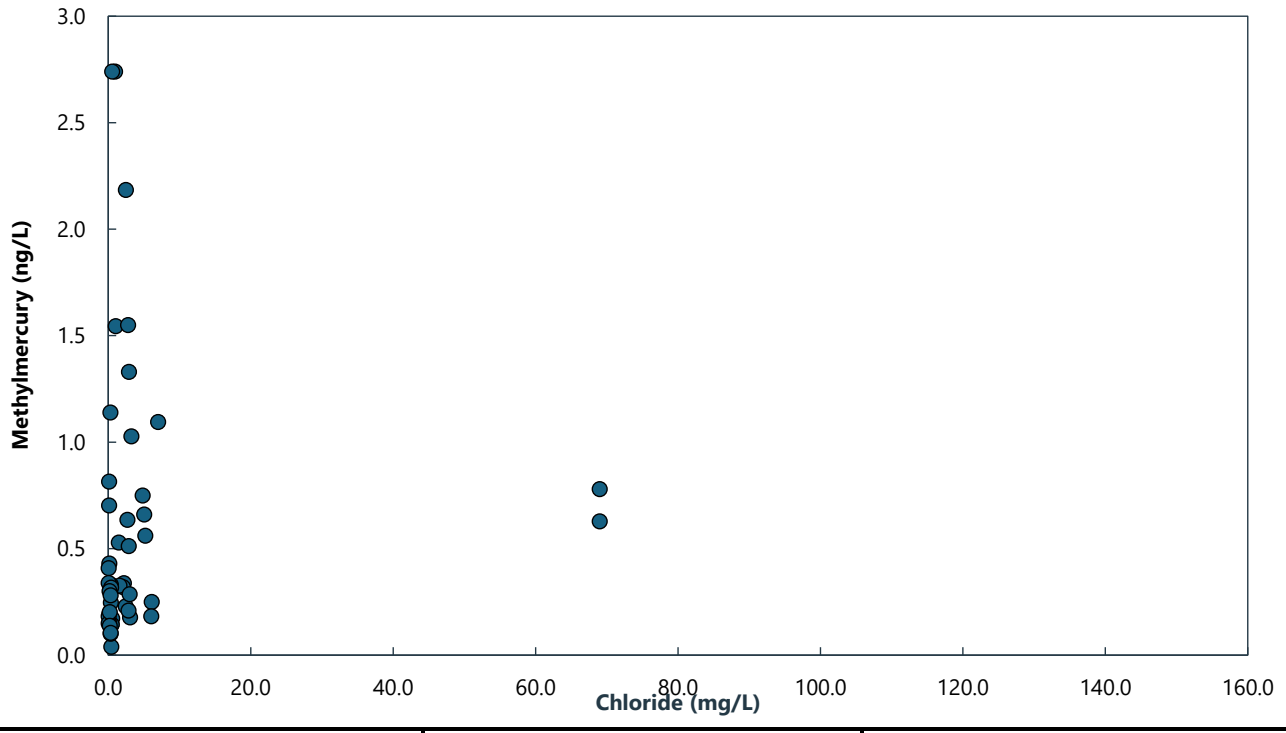
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DO-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-51



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

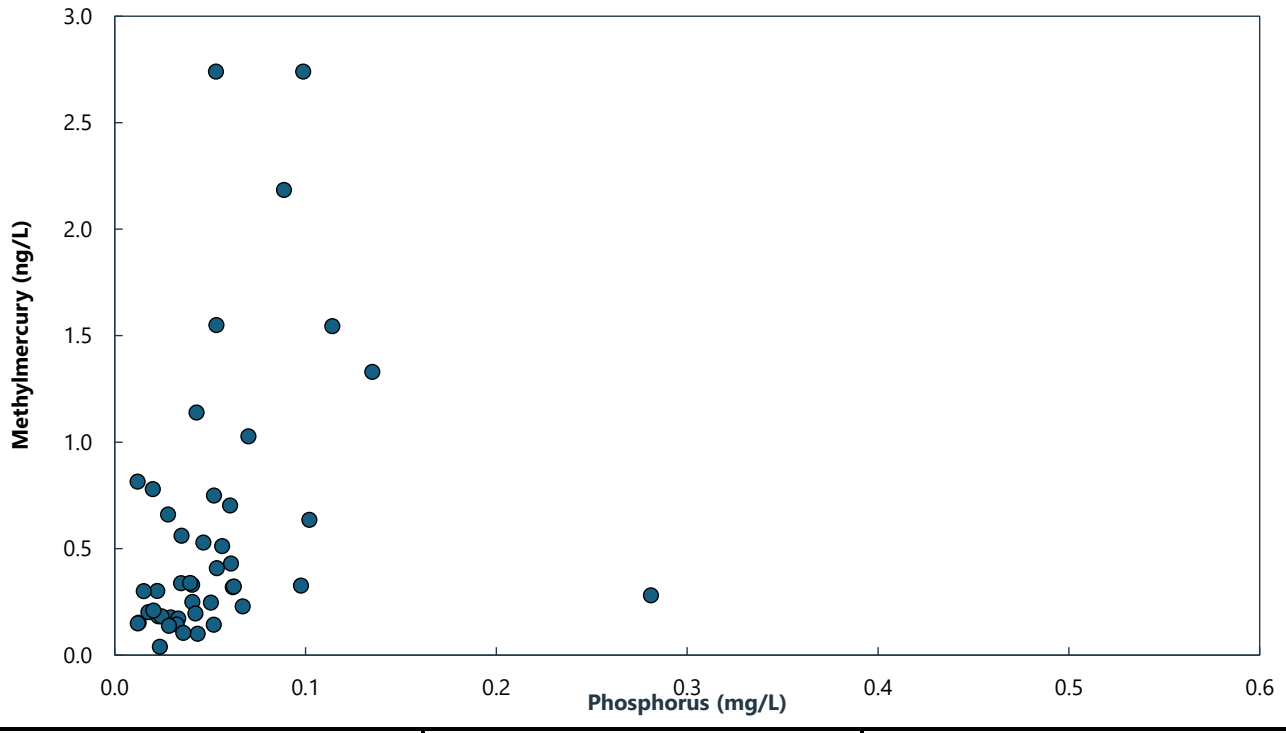
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Cl-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-52



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

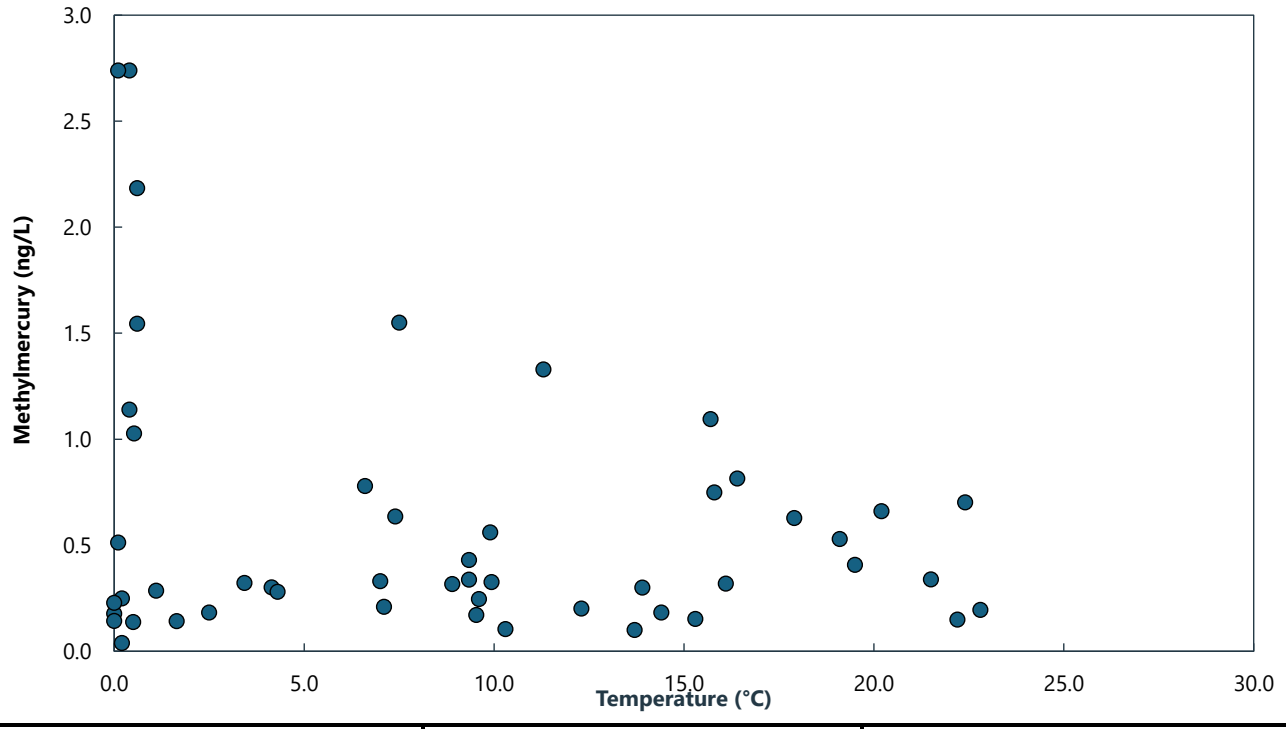
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs P-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-53



Notes:

1 - Monitored stations for SW-08a, SW-10, SW-GL02, SW-17, SW-18, SW-TR, SW-11, SW-12b, SW-16, GL-Trib

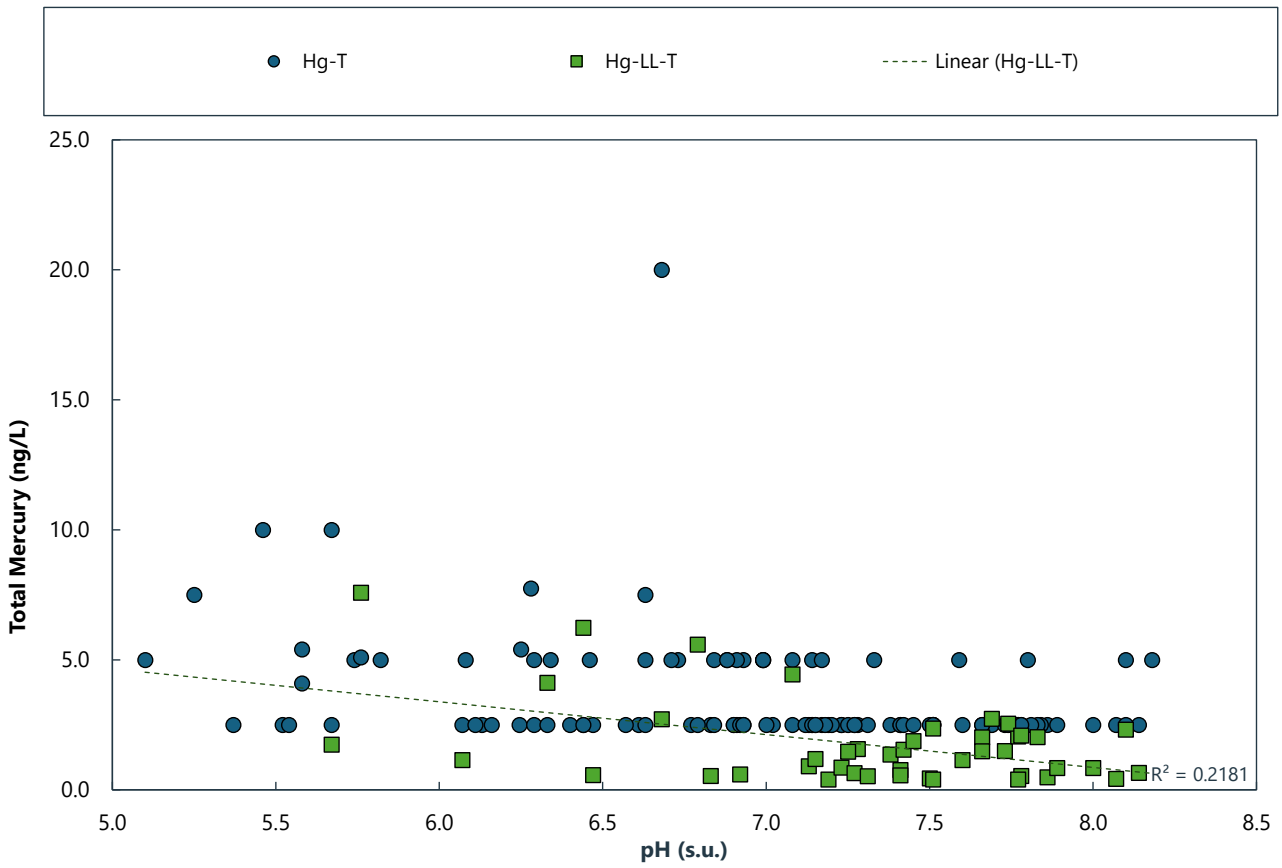
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Temp-Unnamed Watercourses

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-54



Notes:

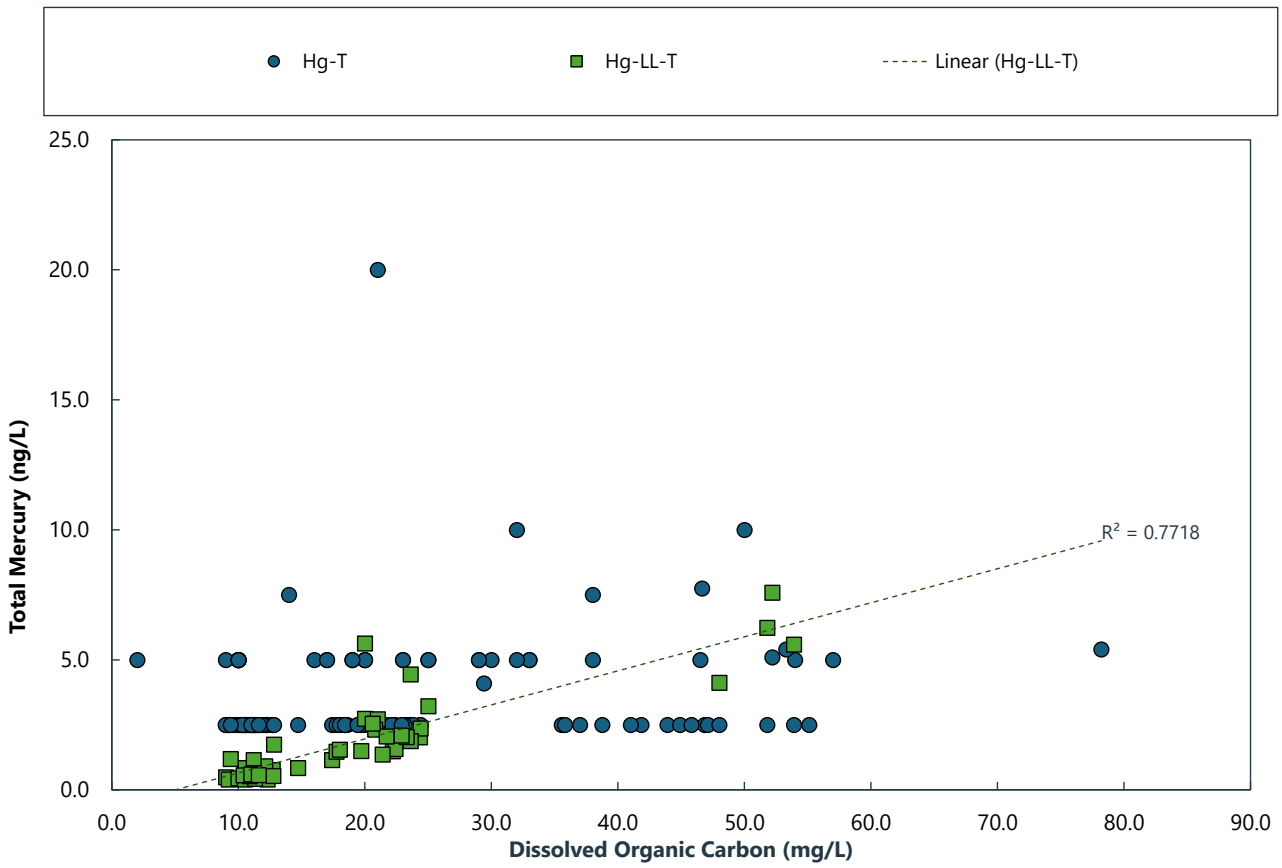
1 - pH shown is field pH
2 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs pH-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-55



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

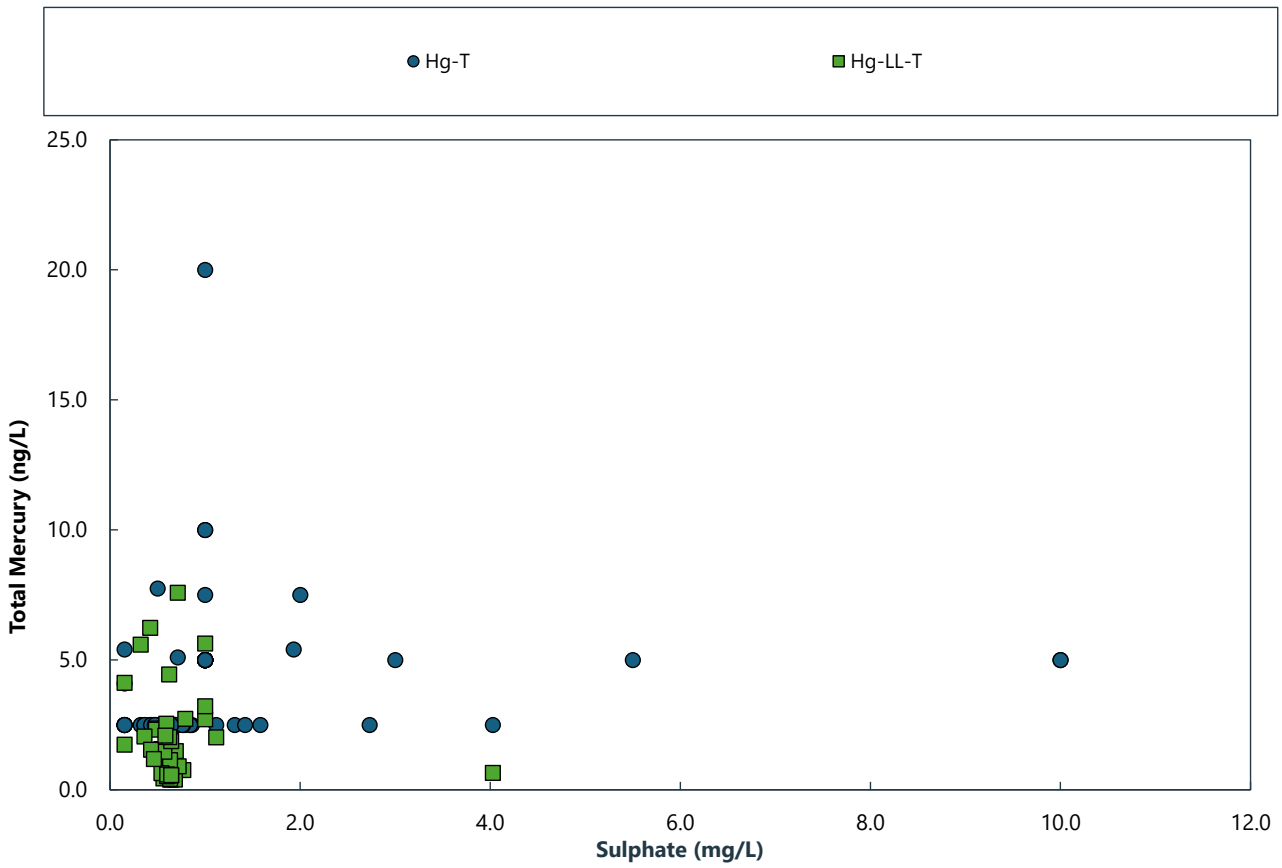
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DOC-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-56



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

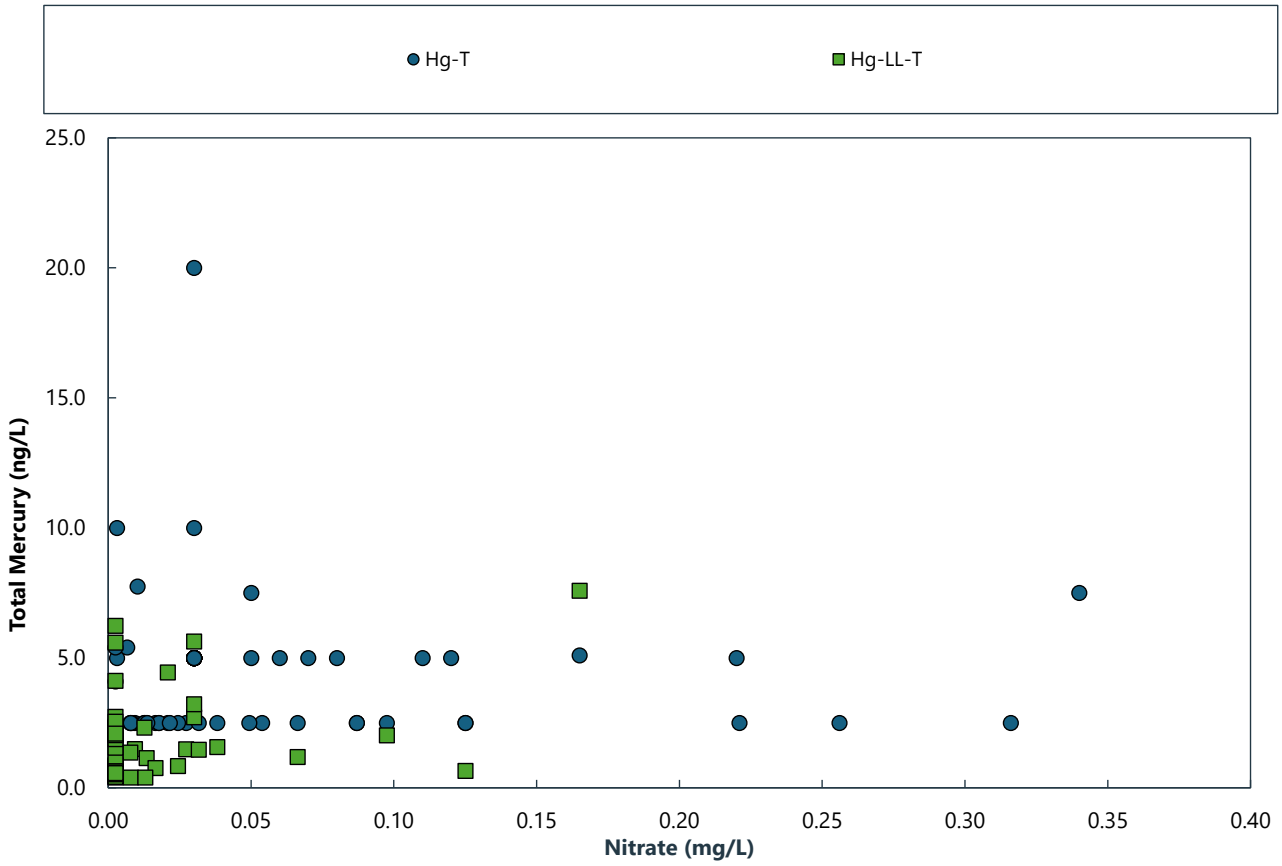
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs SO4-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-57



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

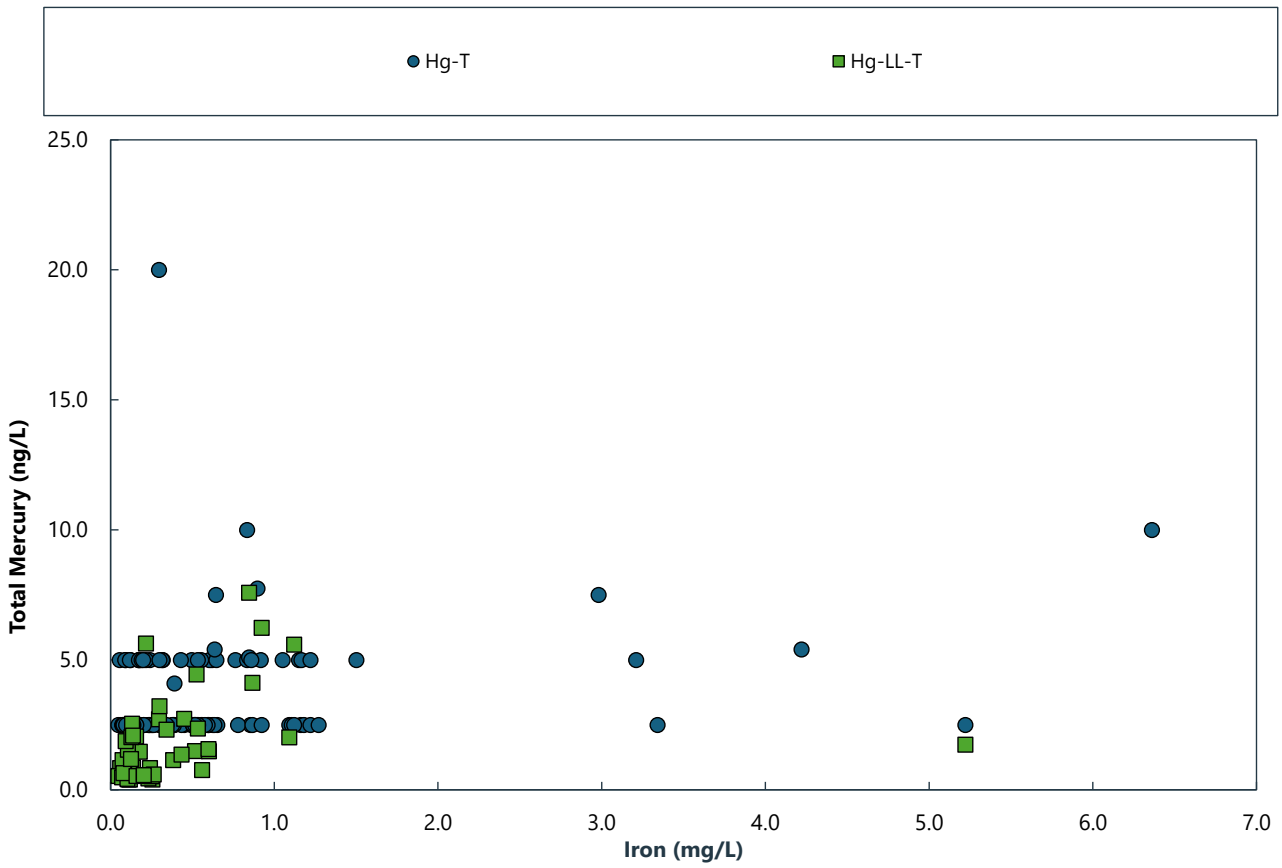
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs NO3-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-58



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

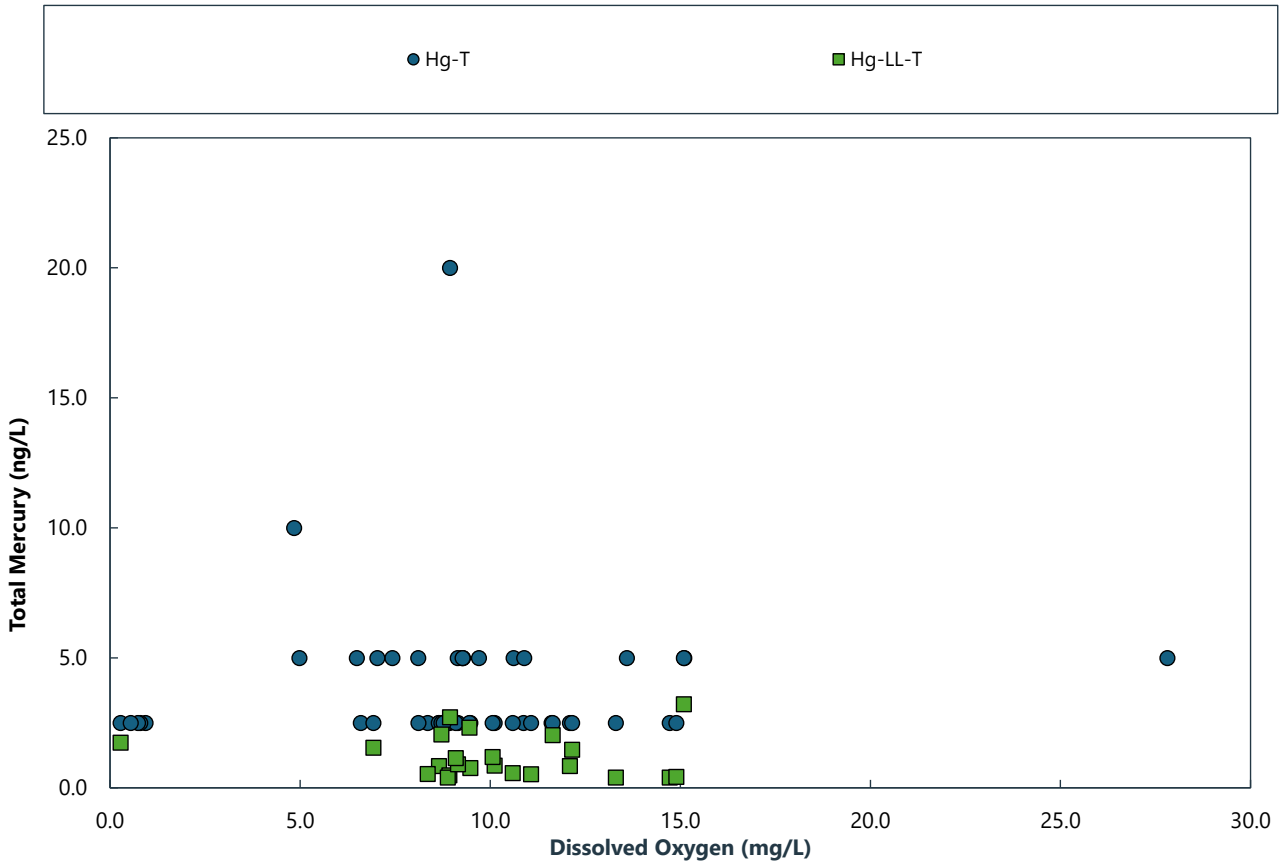
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Fe-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-59



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

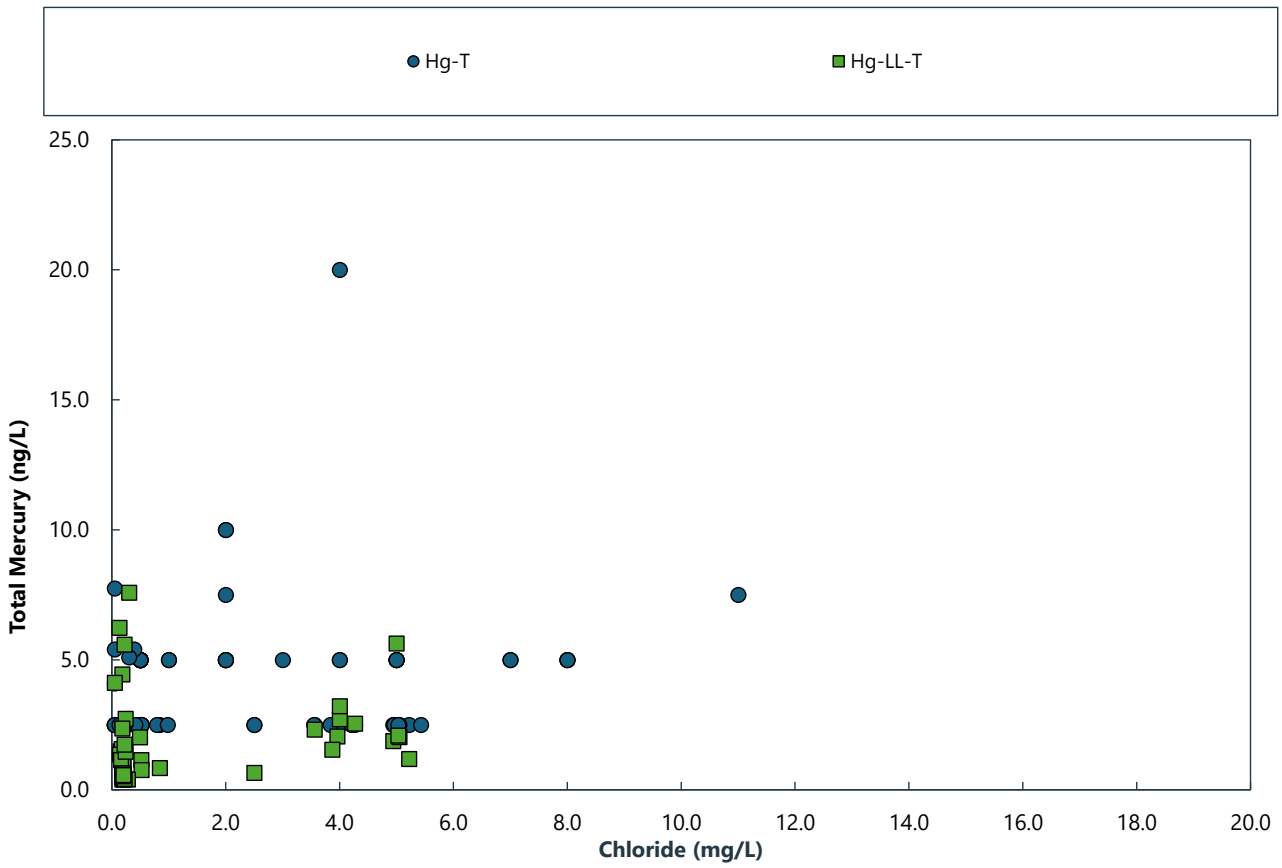
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DO-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-60



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

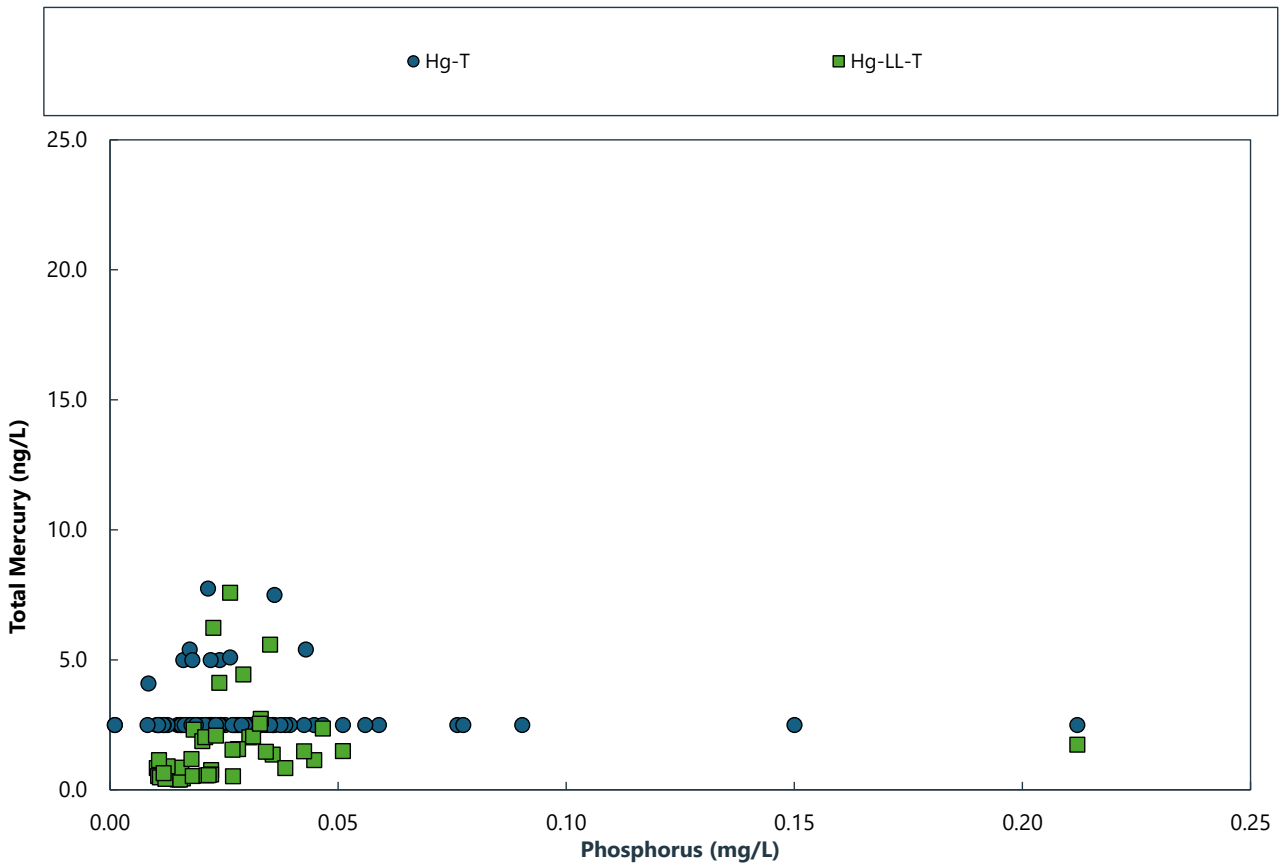
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Cl-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-61



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

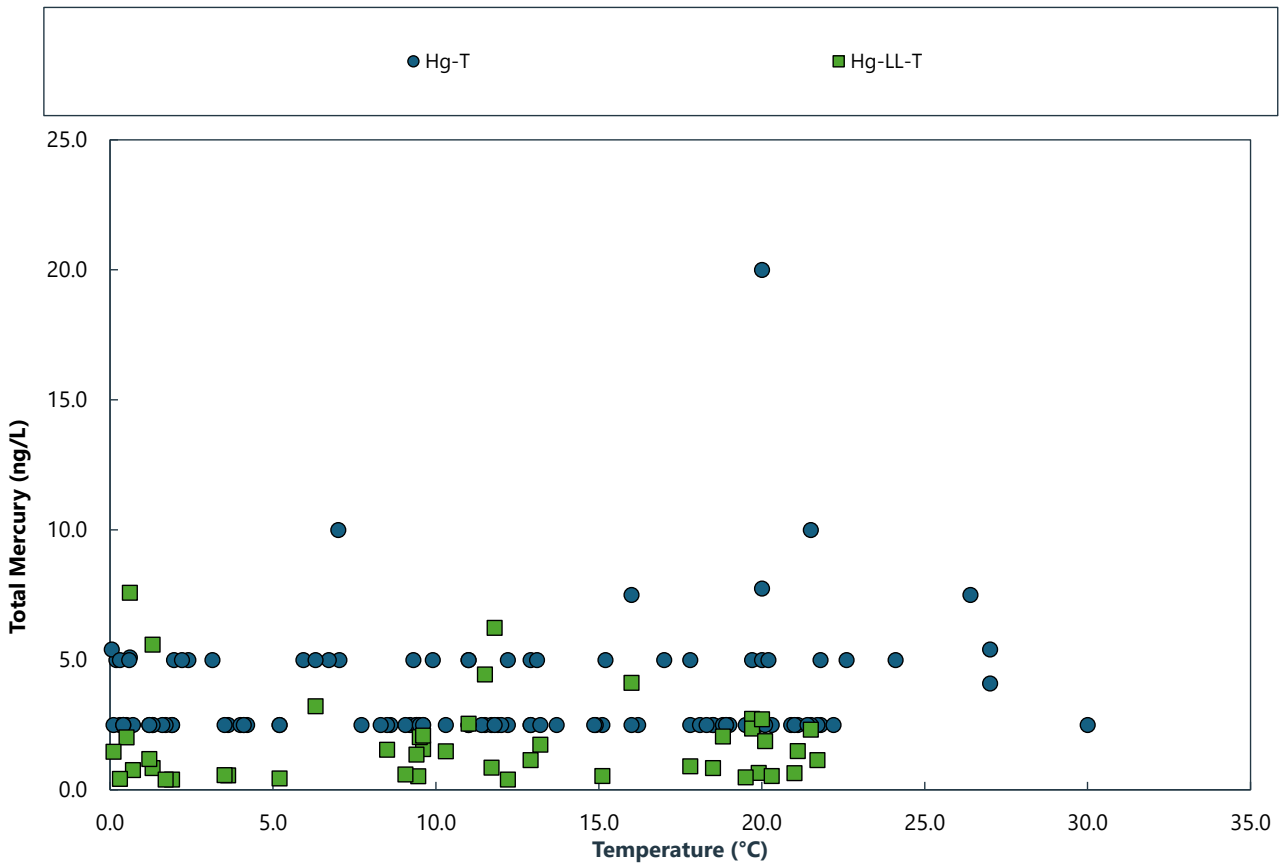
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs P-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-62



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

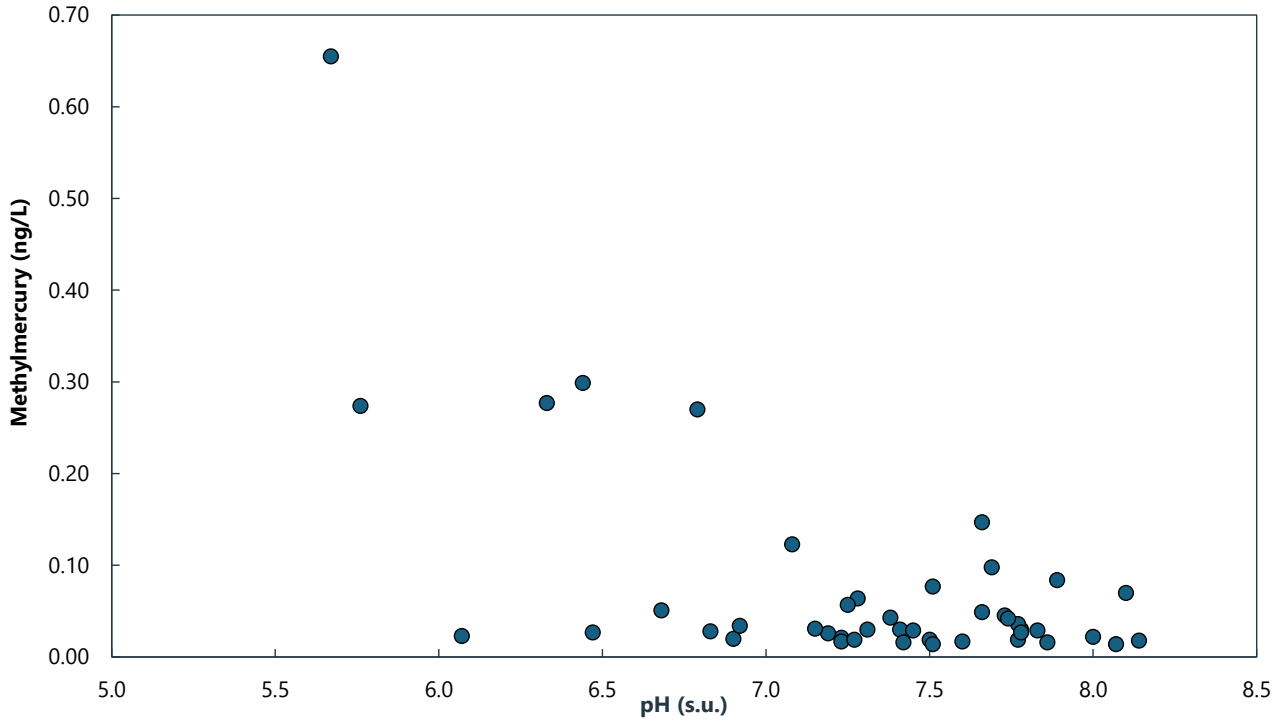
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Temp-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-63



Notes:

1 - pH shown is field pH

2 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

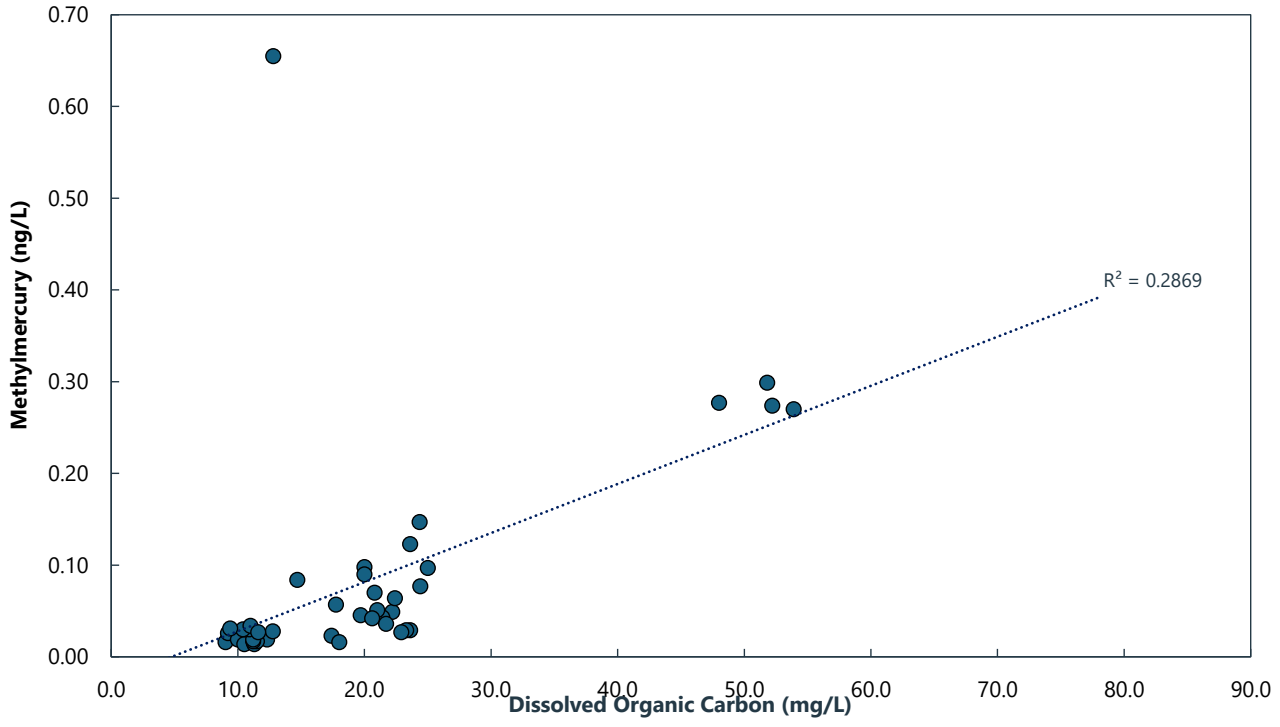
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs pH-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-64



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

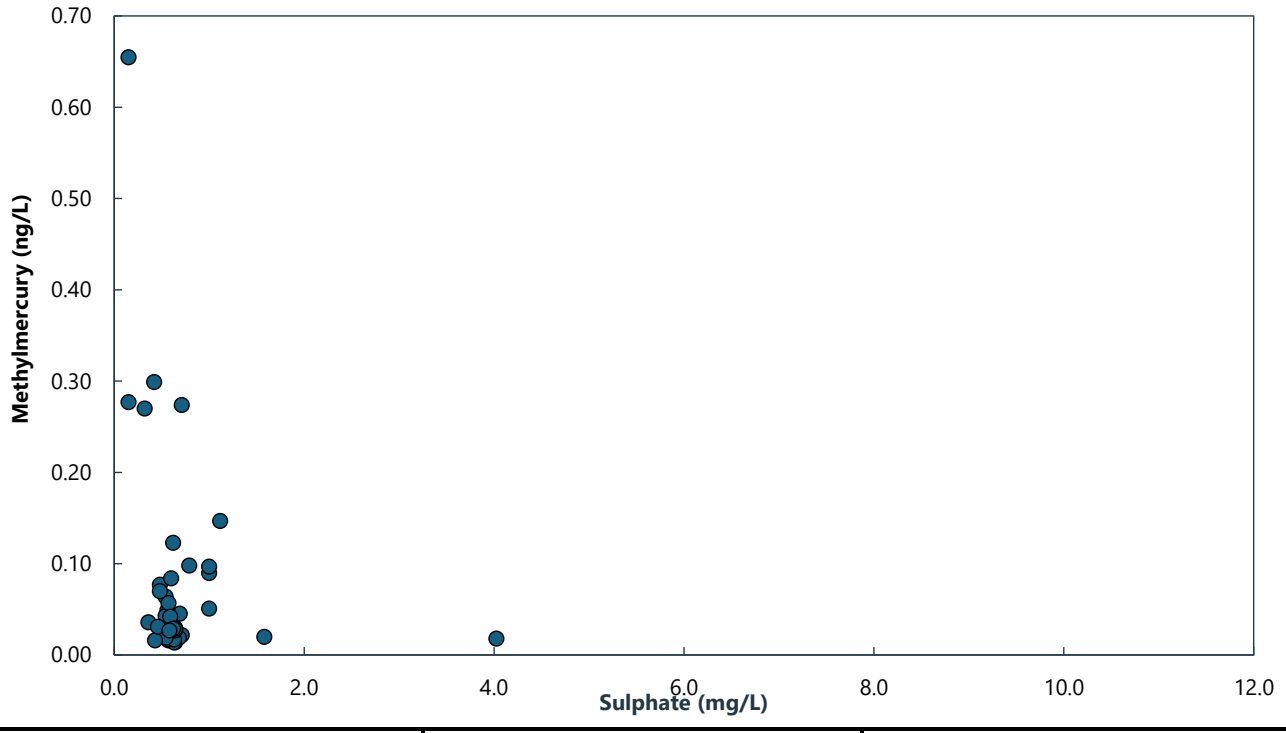
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DOC-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-65



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

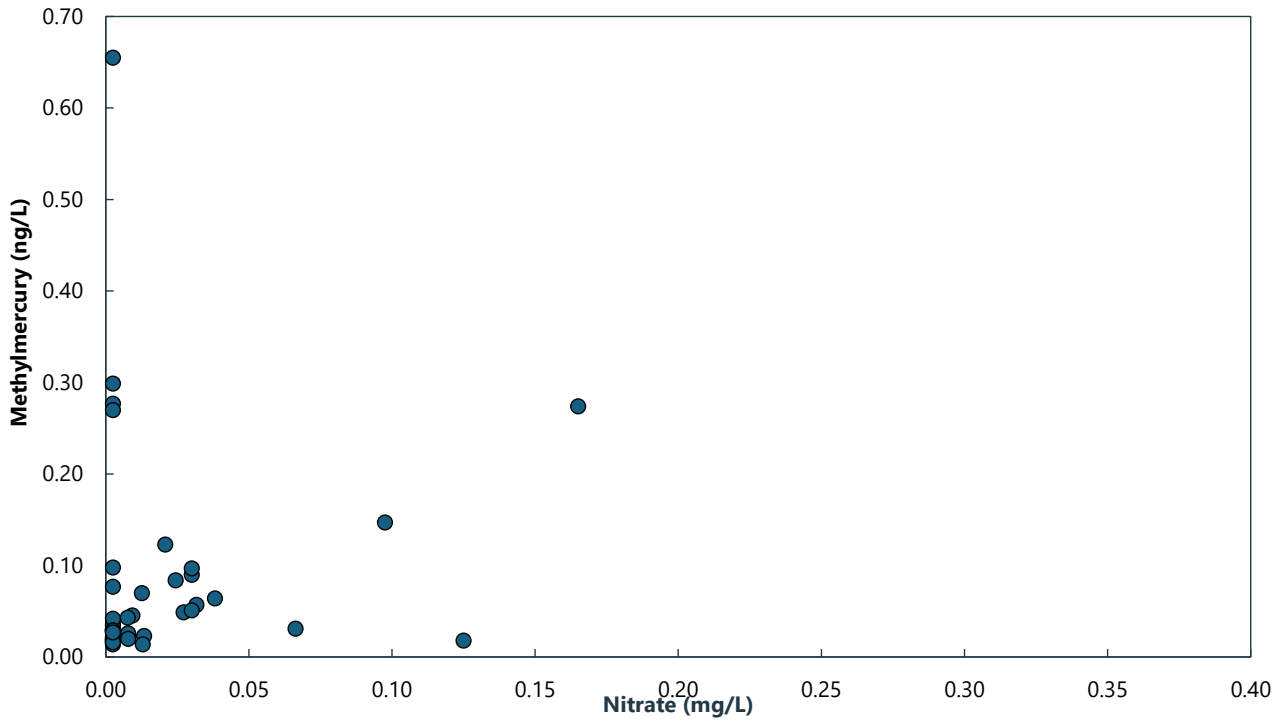
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs SO4-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-66



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

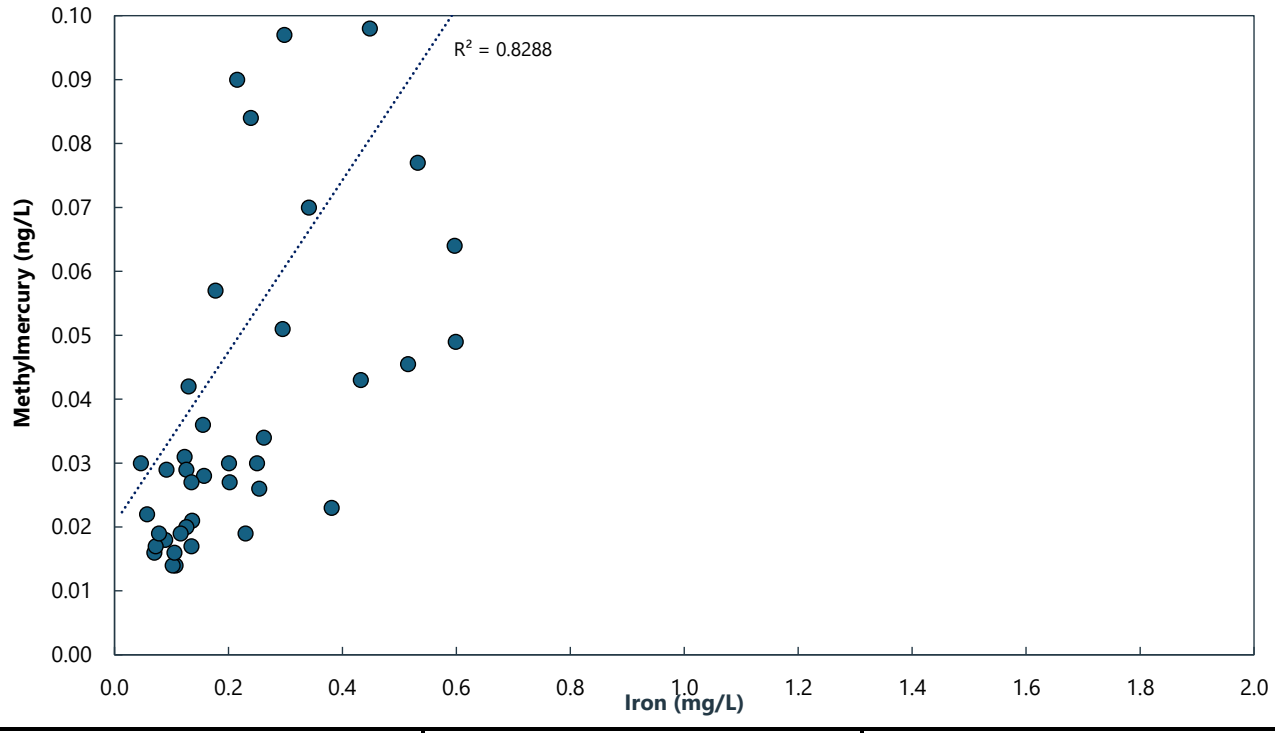
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs NO3-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-67



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

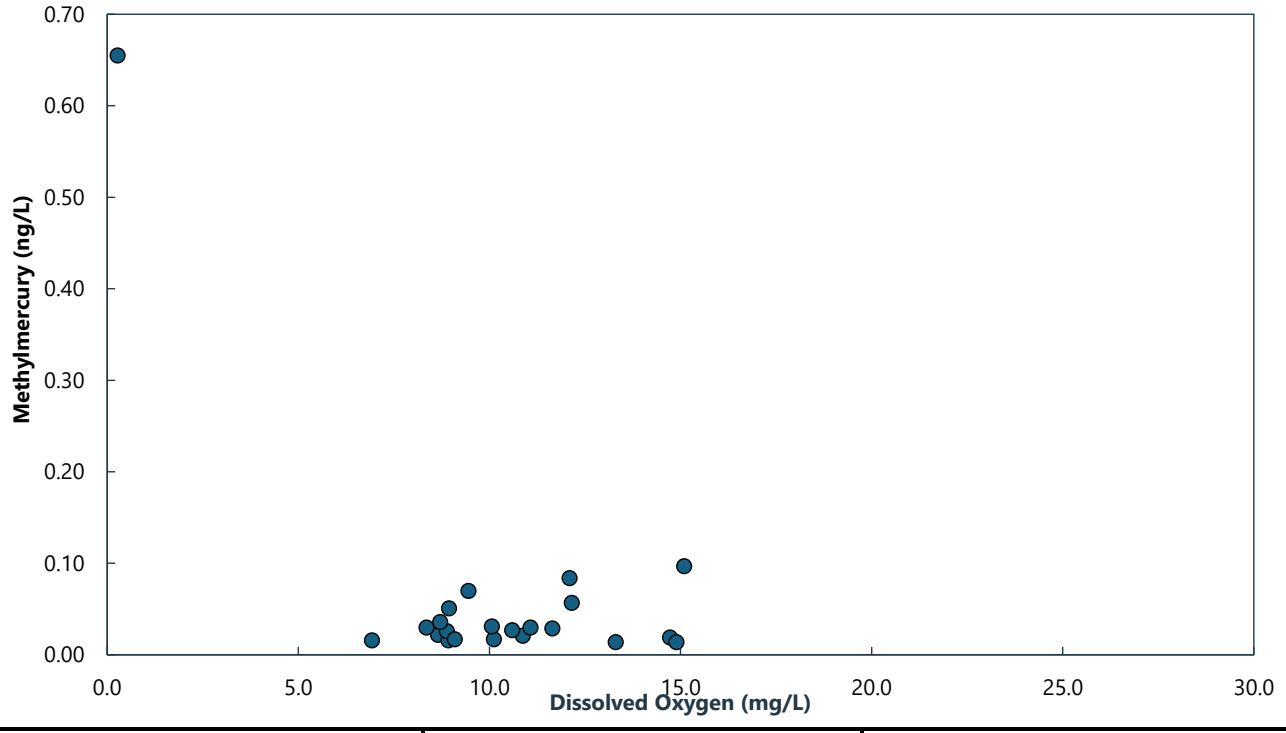
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Fe-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-68



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

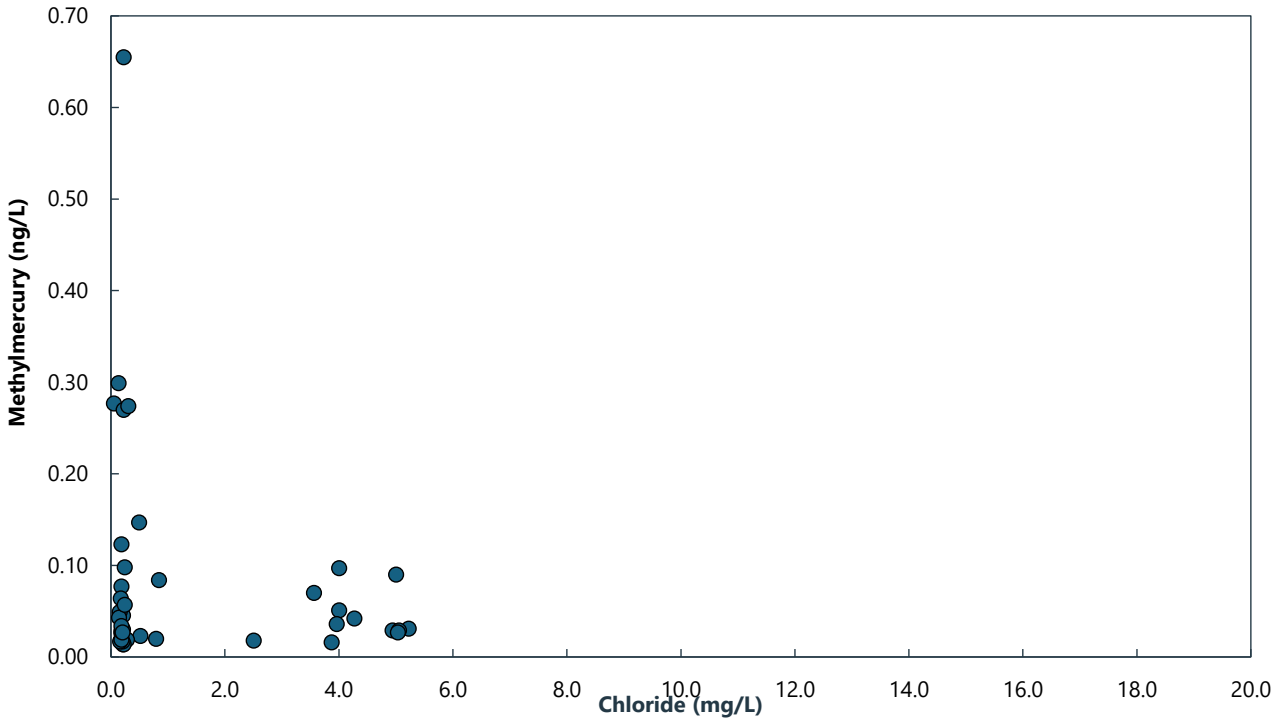
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DO-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-69



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

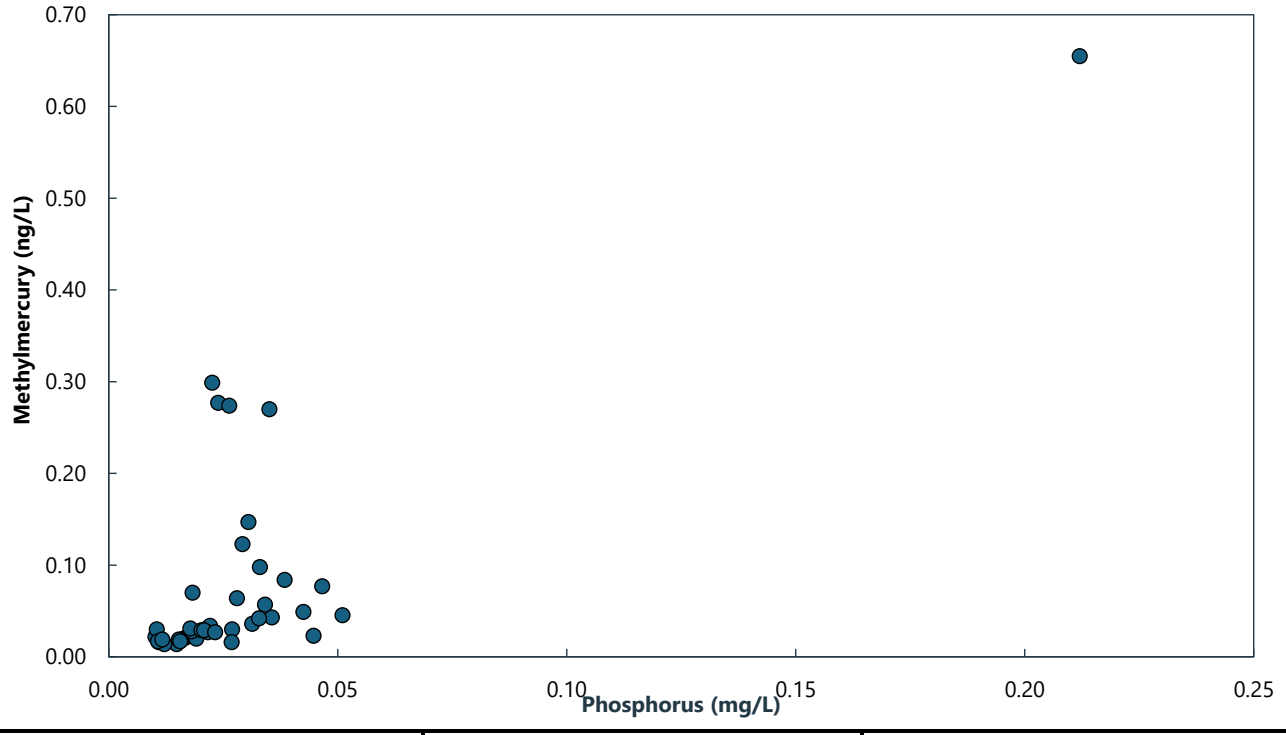
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Cl-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-70



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

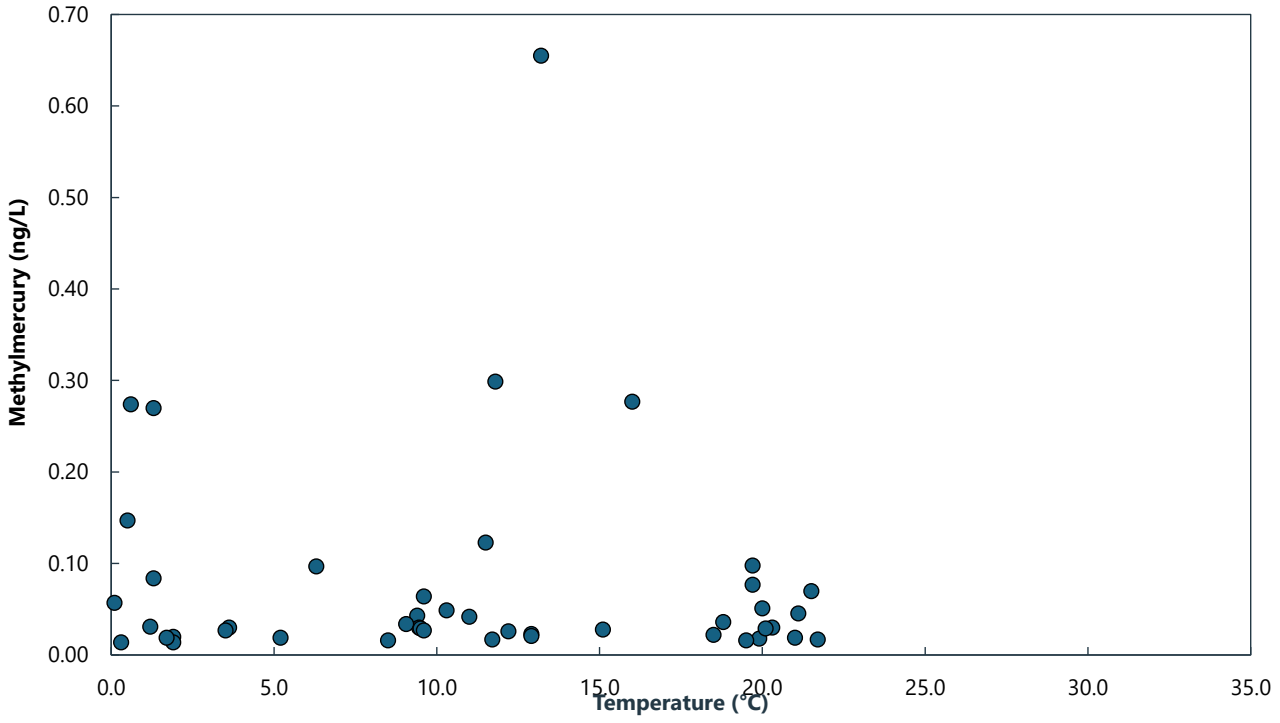
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs P-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-71



Notes:

1 - Monitored stations: SW-14 and SW-GL including samples from the bottom of the lake

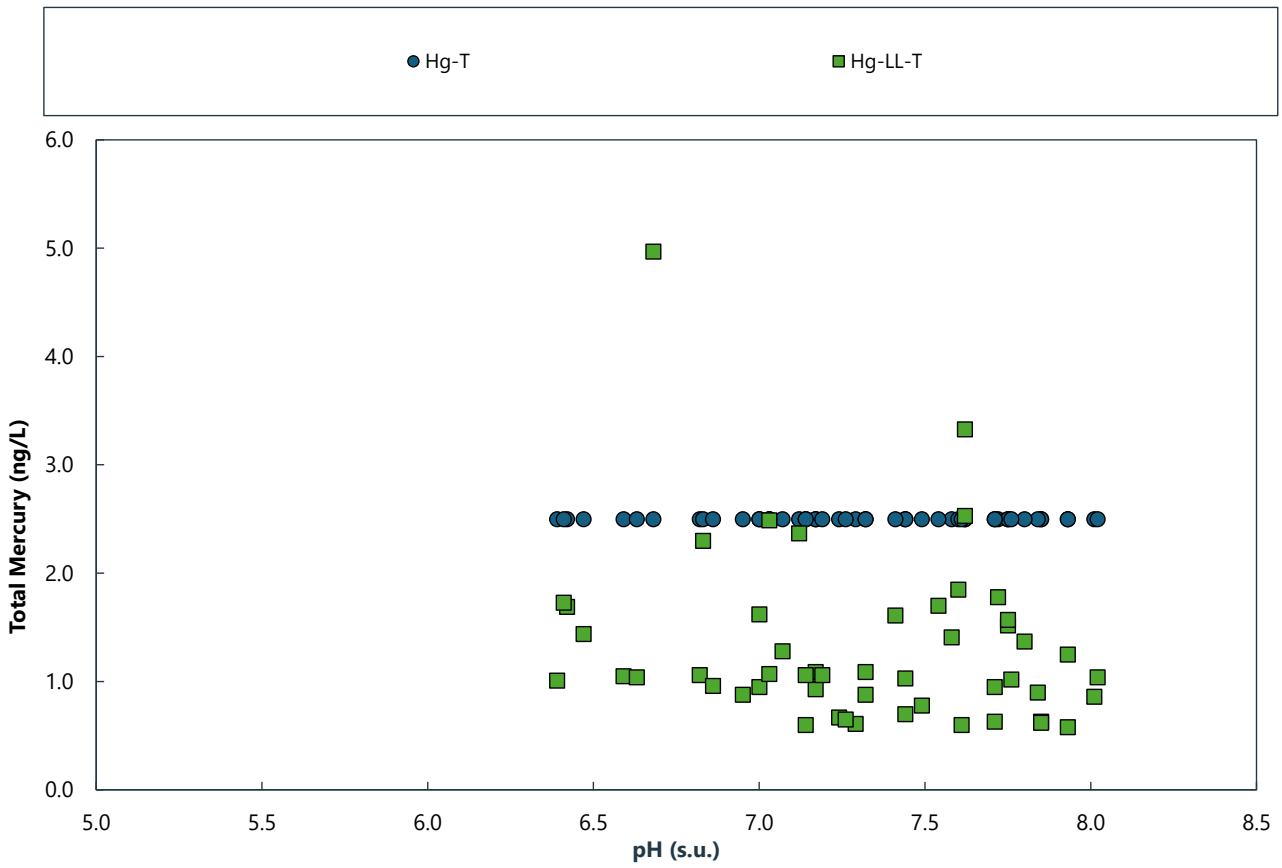
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Temp-Local Area Waterbodies

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-72



Notes:

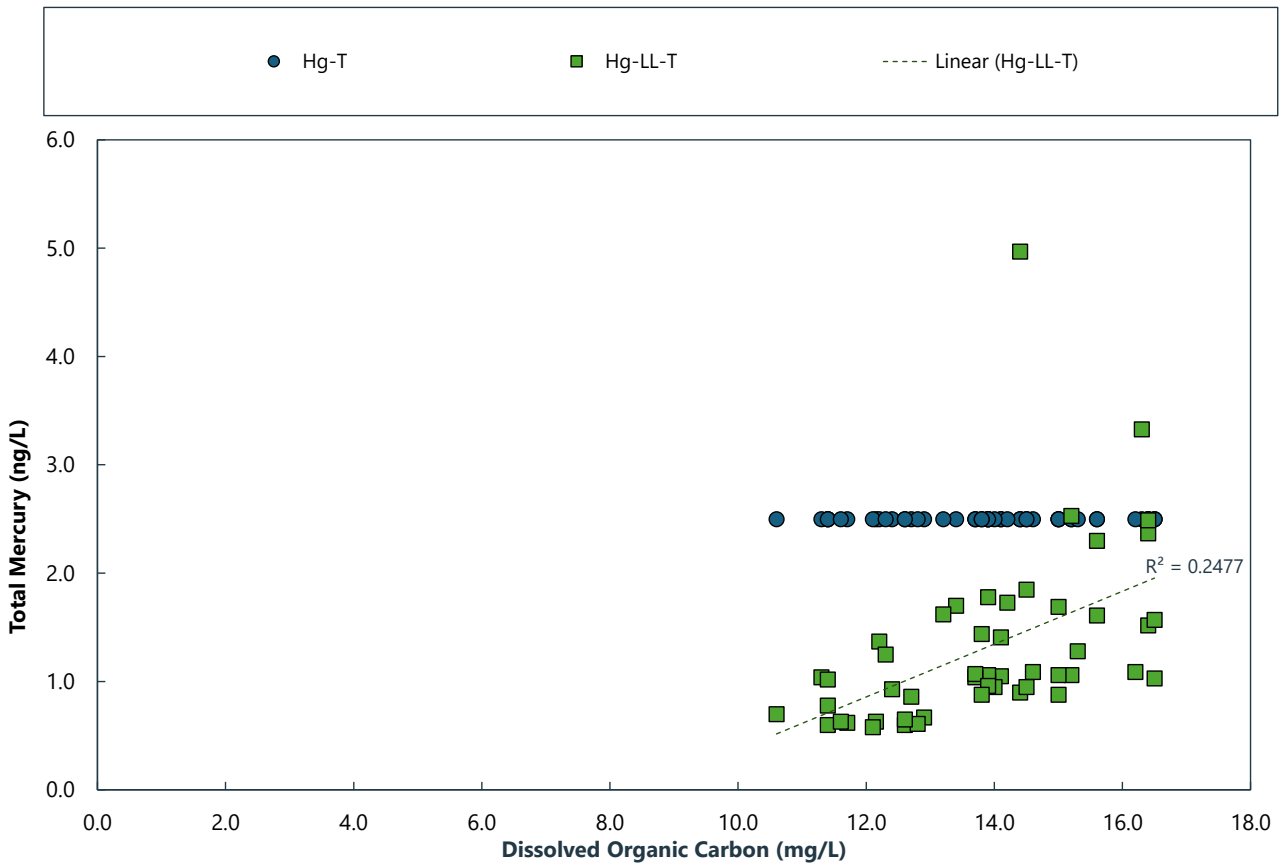
1 - pH shown is field pH
2 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs pH-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-73



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

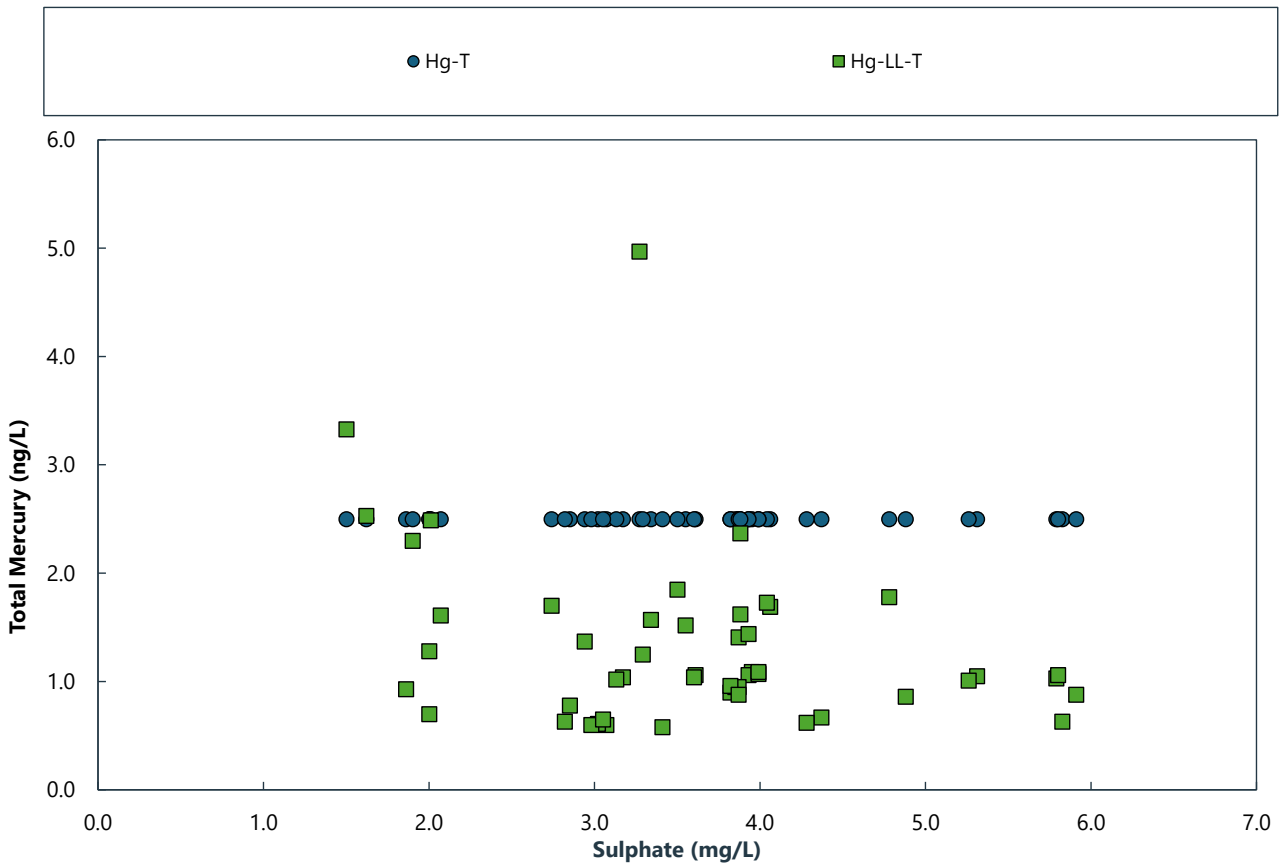
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DOC-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-74



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

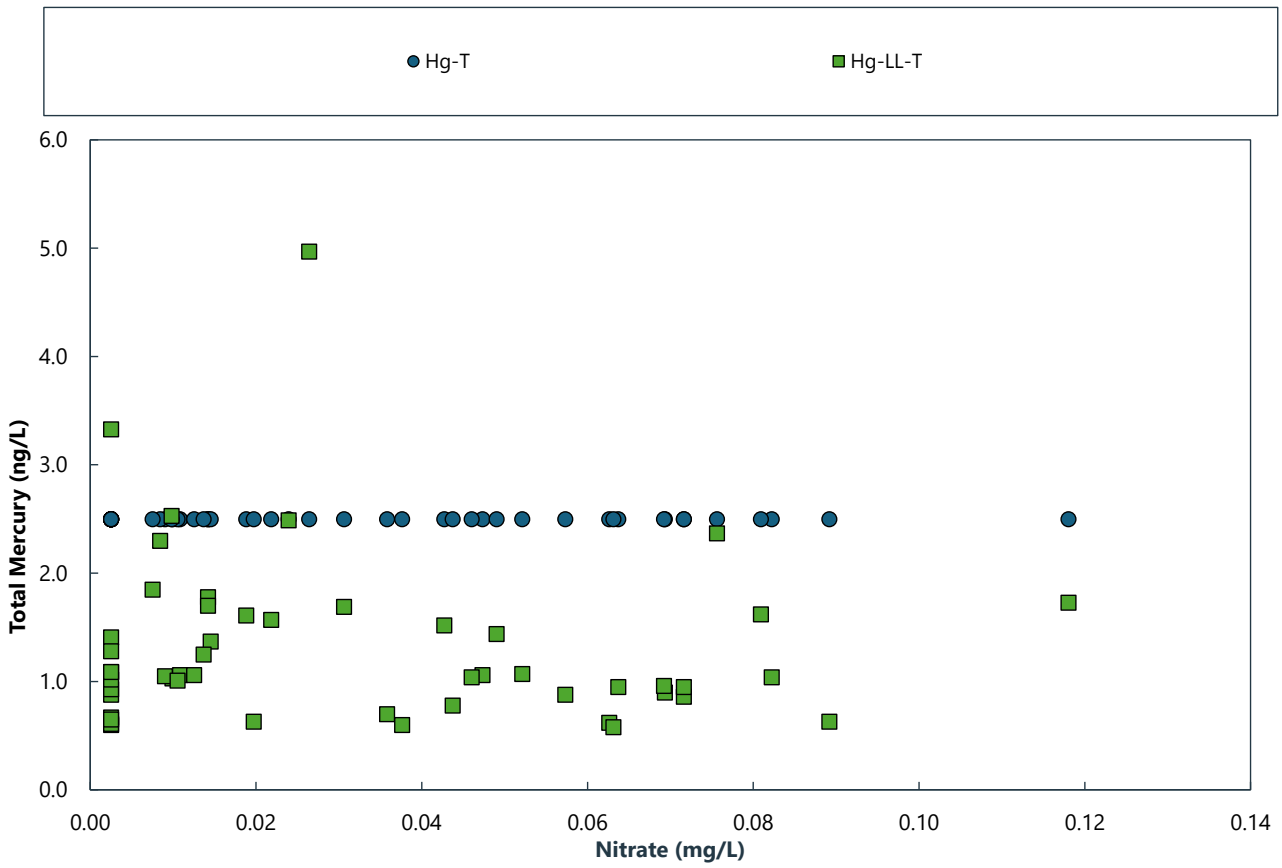
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs SO4-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-75



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

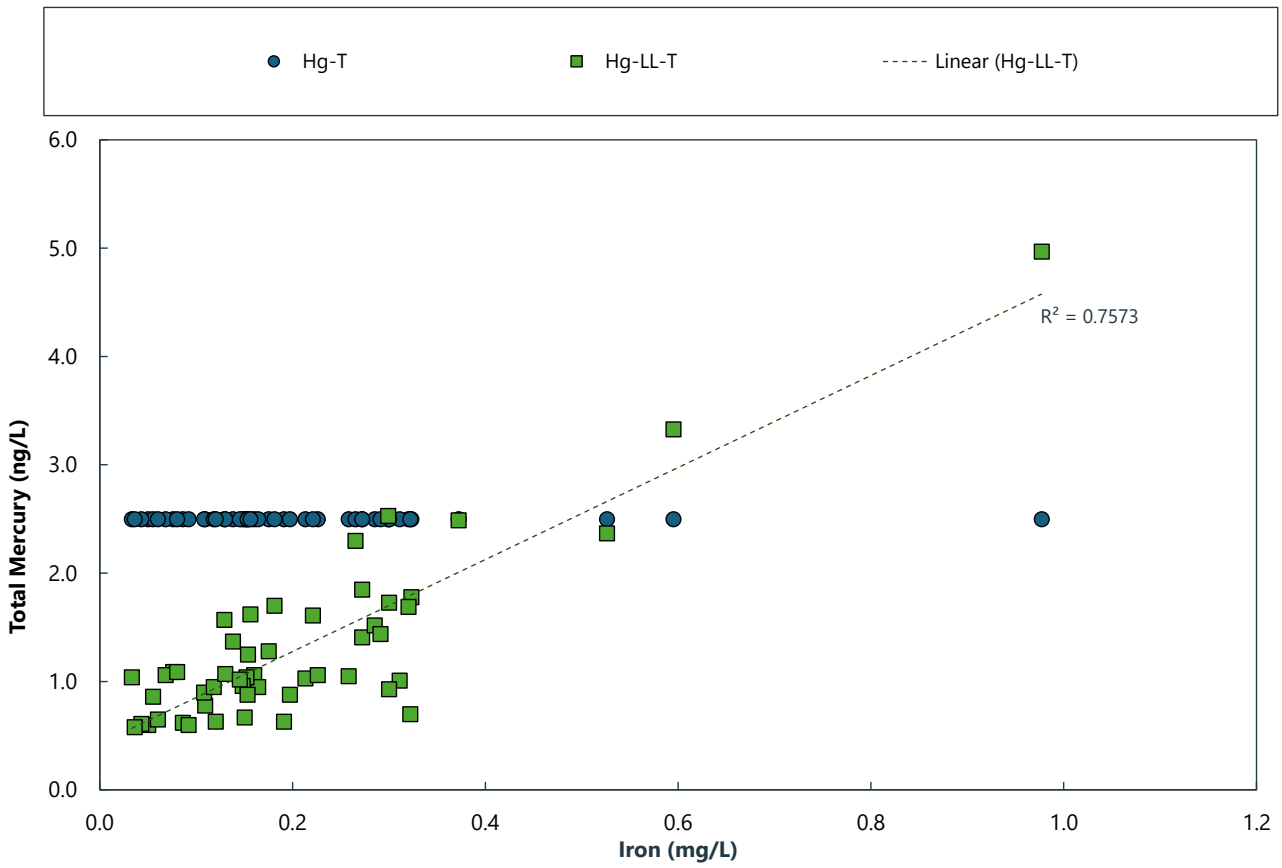
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs NO3-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-76



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

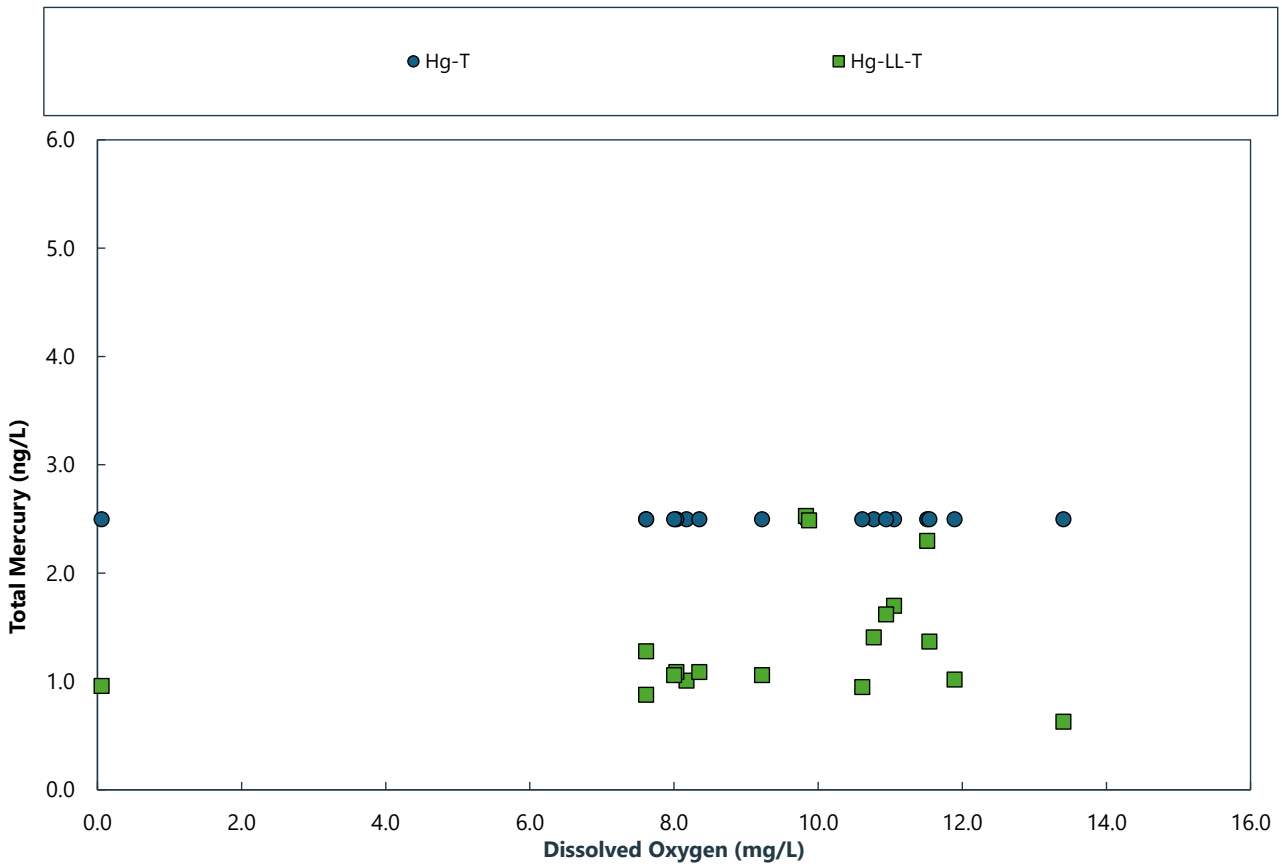
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Fe-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-77



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

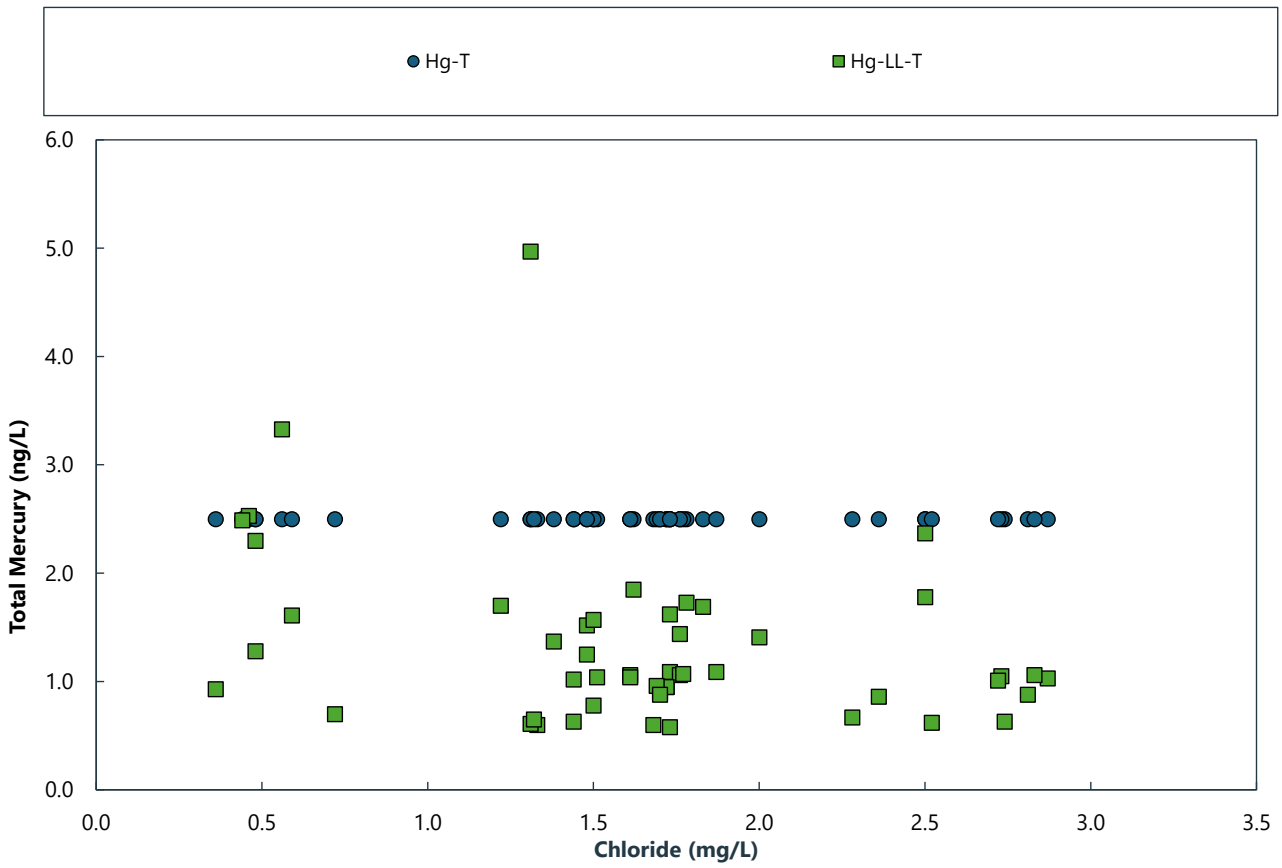
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs DO-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-78



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

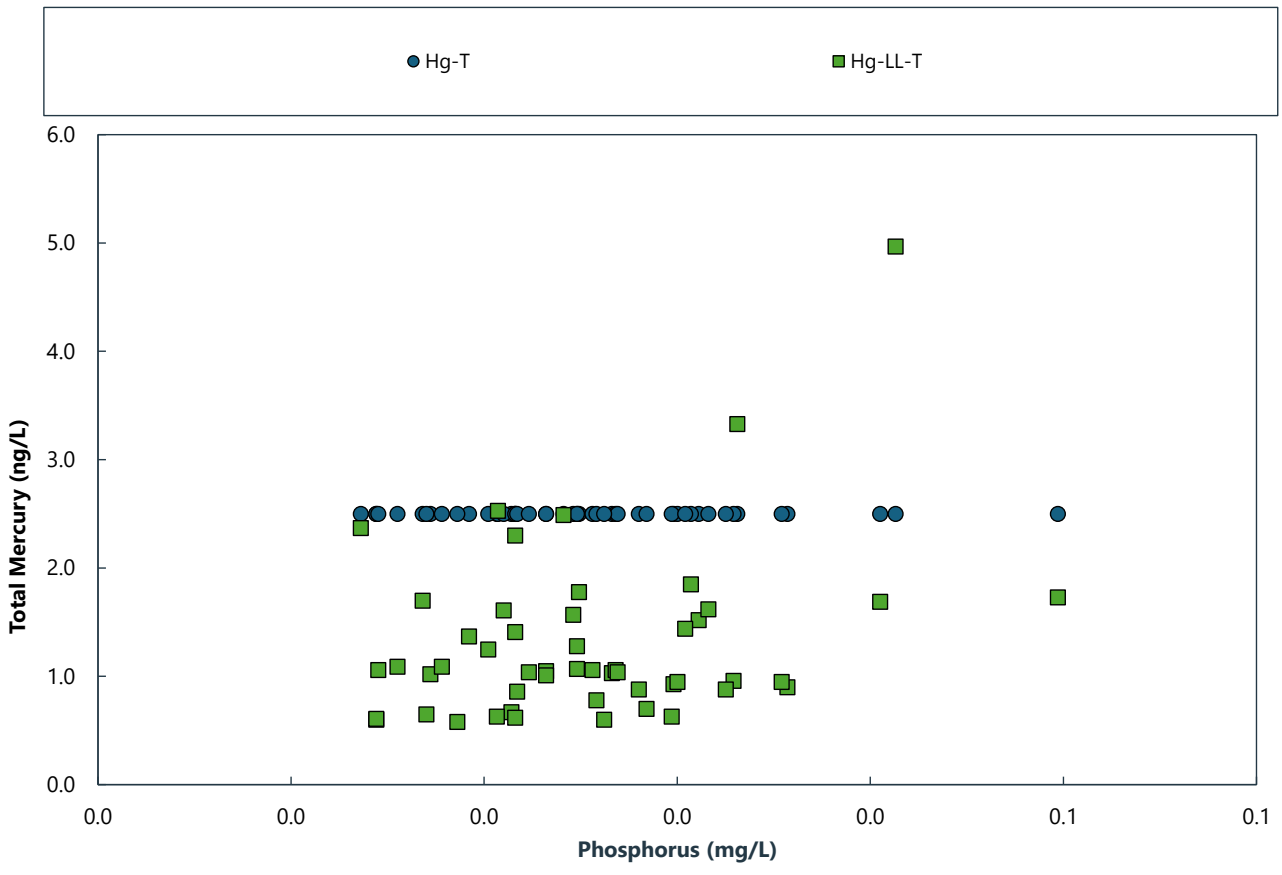
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Cl-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-79



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

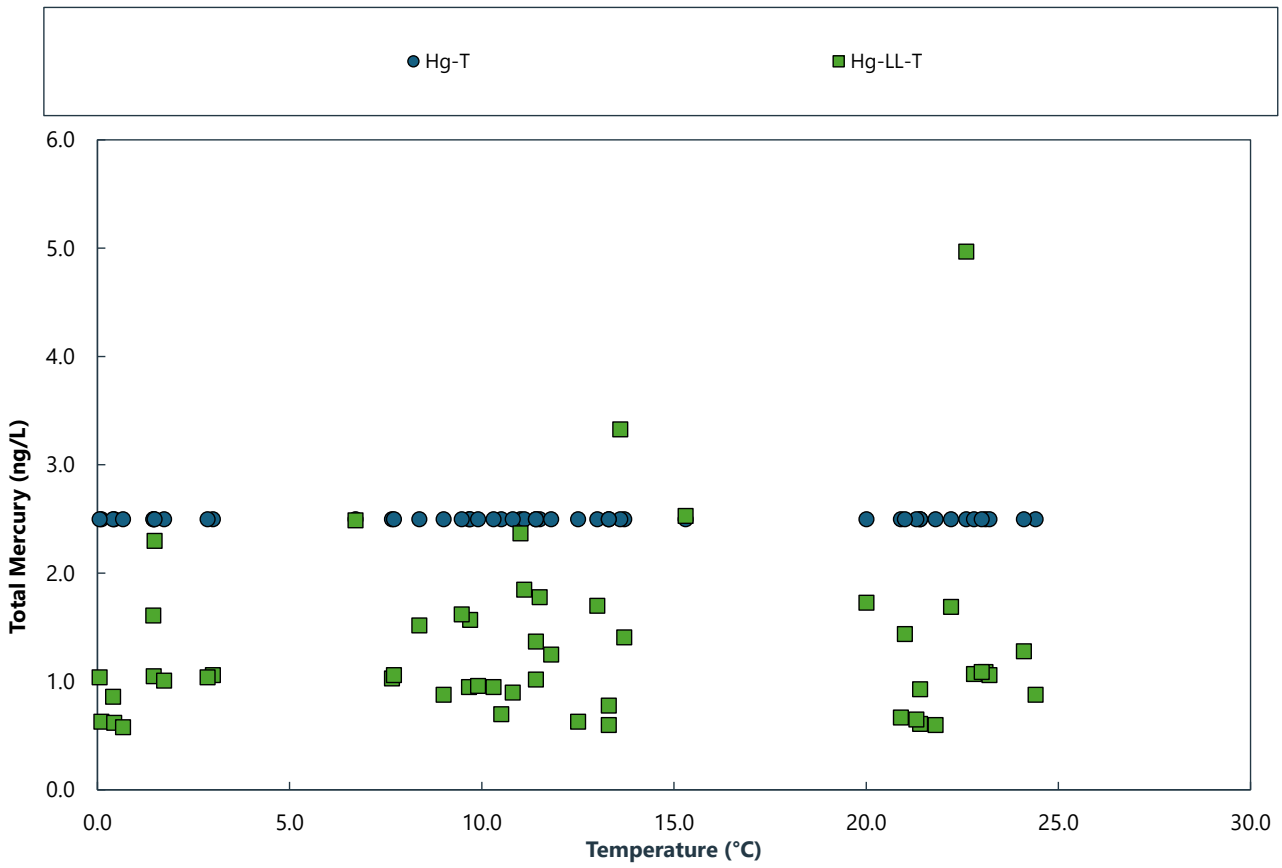
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs P-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-80



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

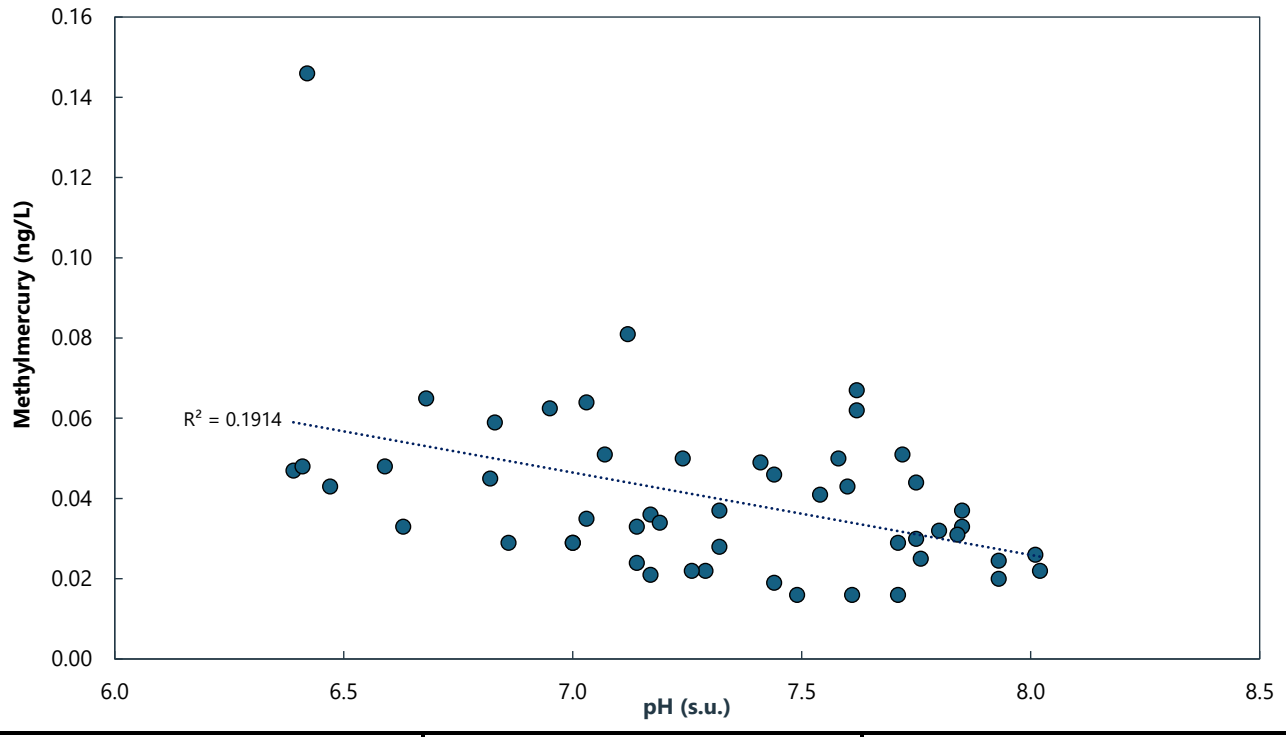
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

Hg vs Temp-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-81



Notes:

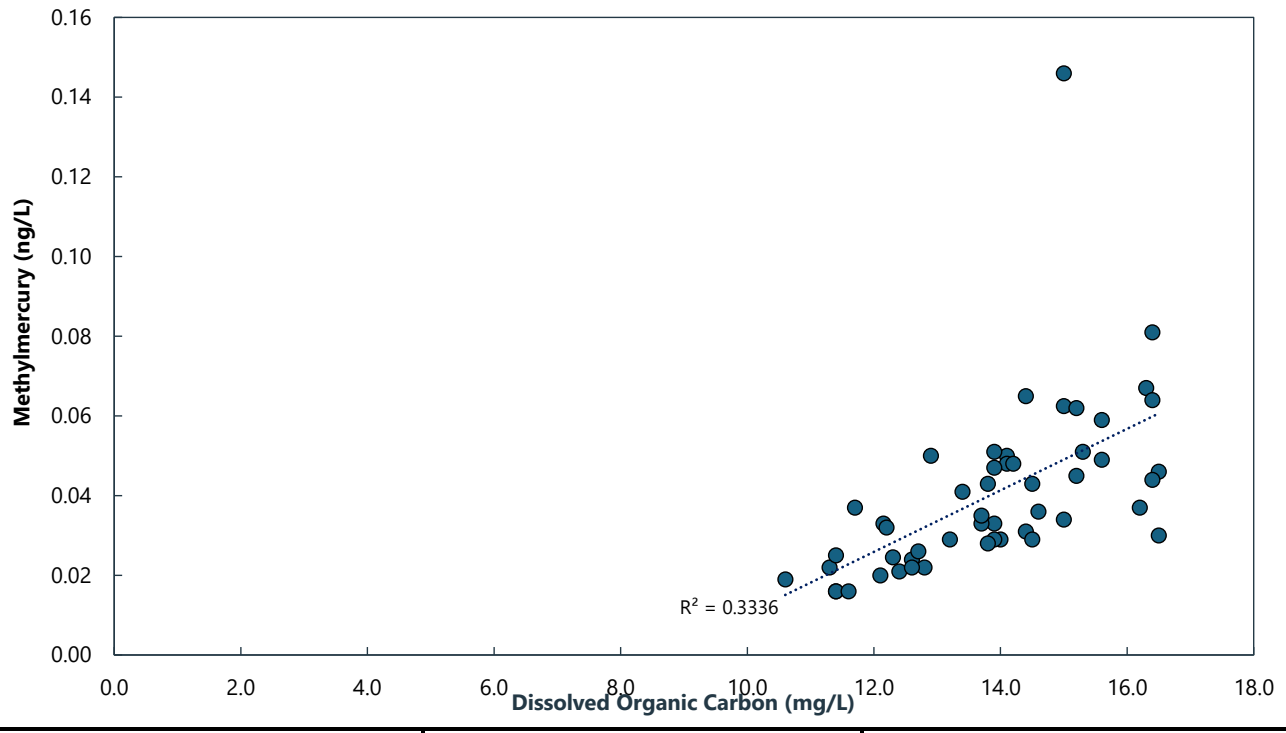
1 - pH shown is field pH
2 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)
3 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs pH-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-83



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

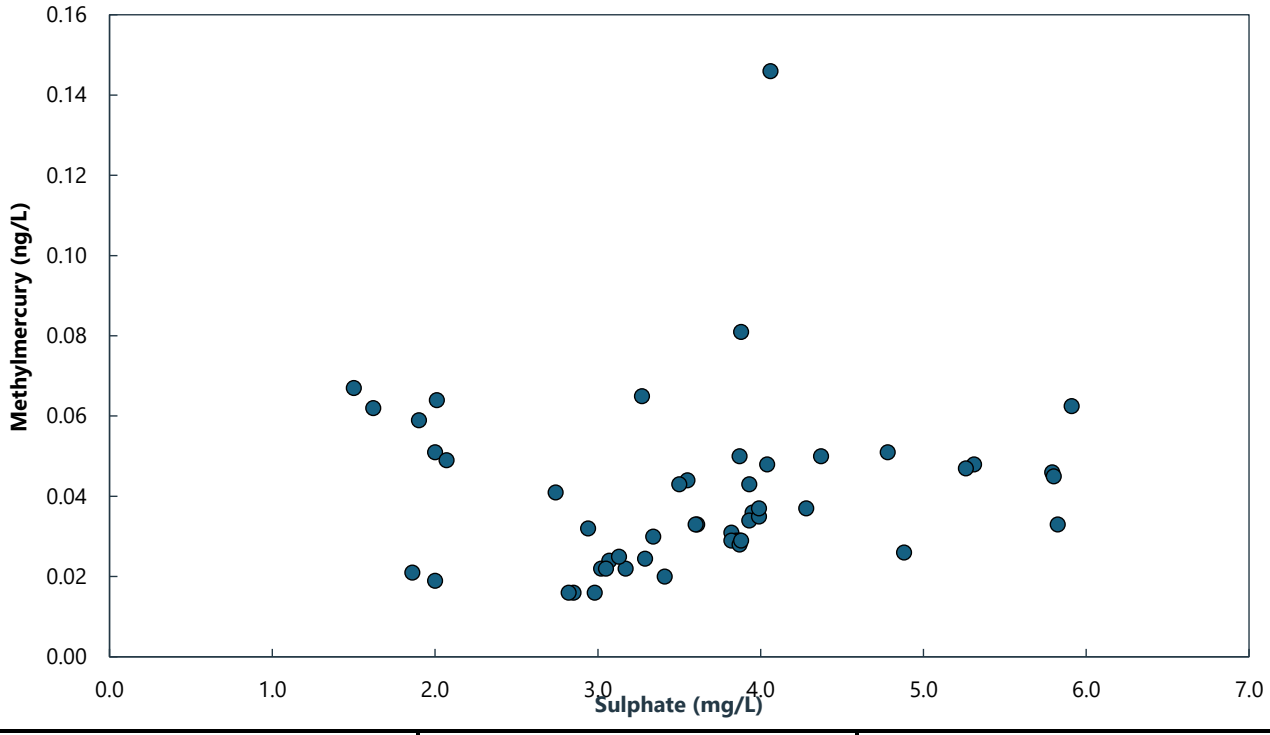
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DOC-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-84



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

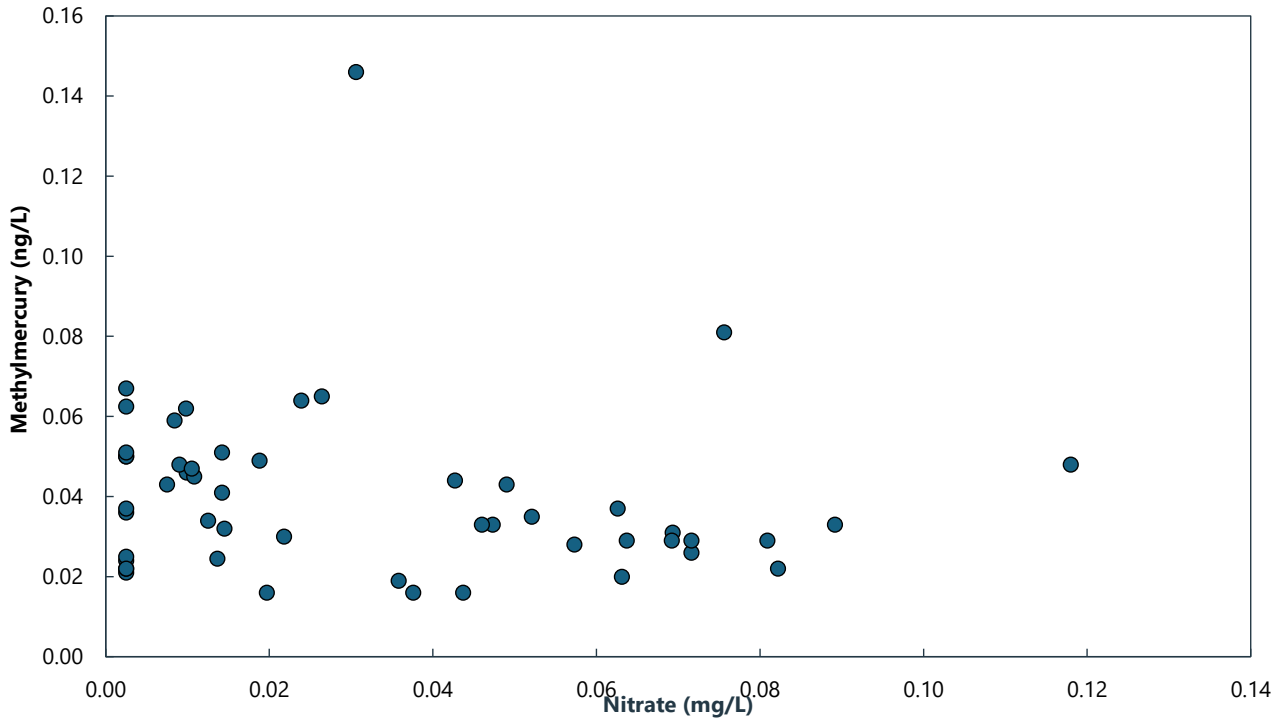
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs SO4-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-85



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

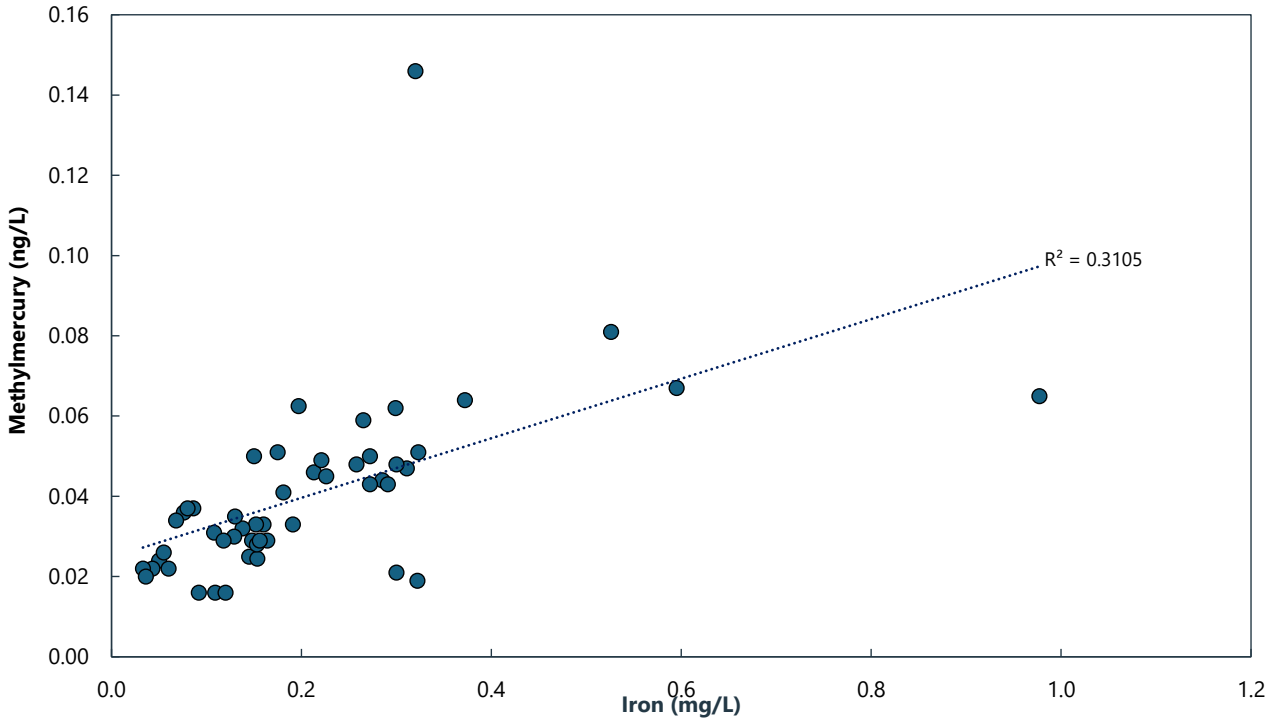
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs NO3-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-86



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

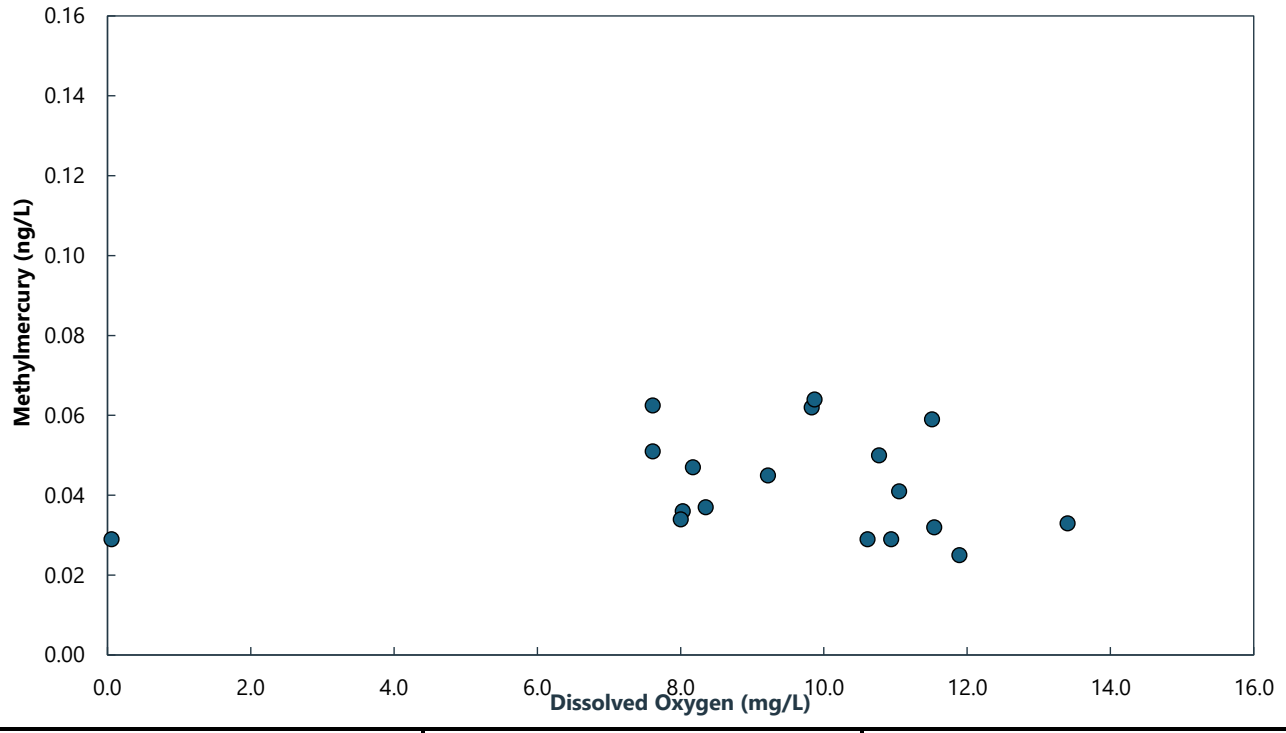
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Fe-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-87



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

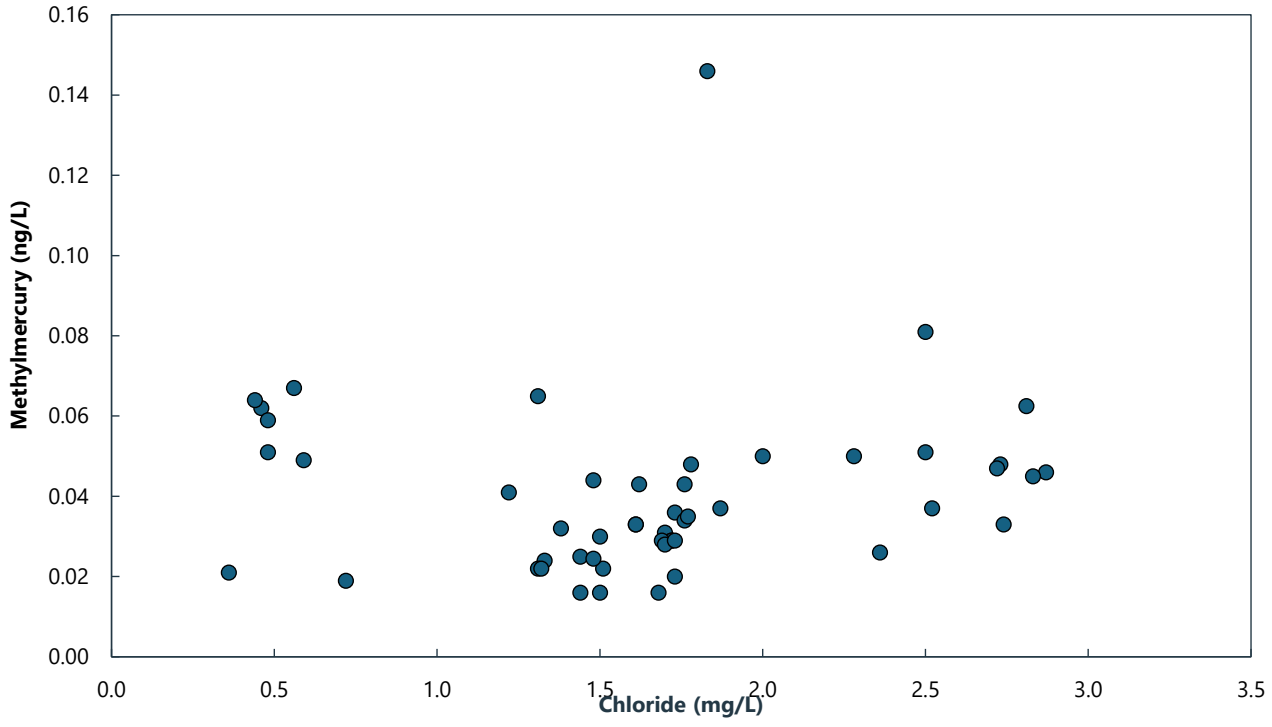
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs DO-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-88



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

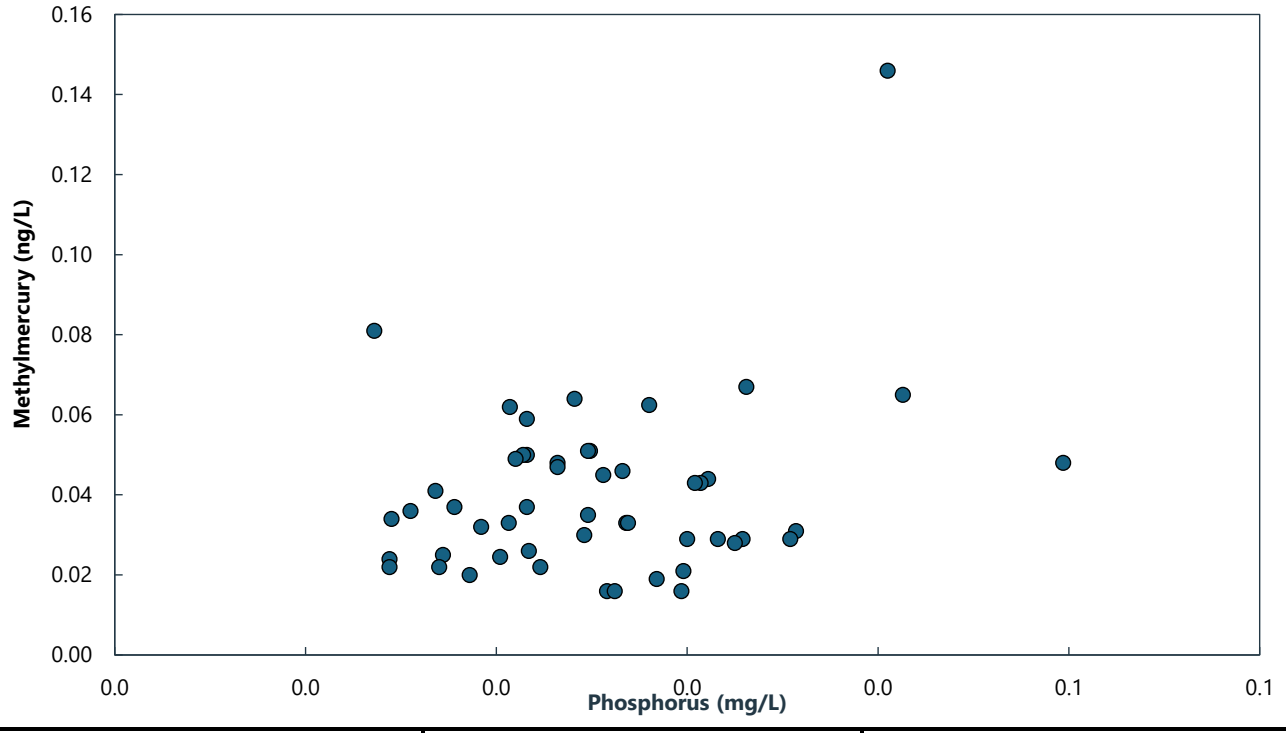
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs Cl-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-89



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

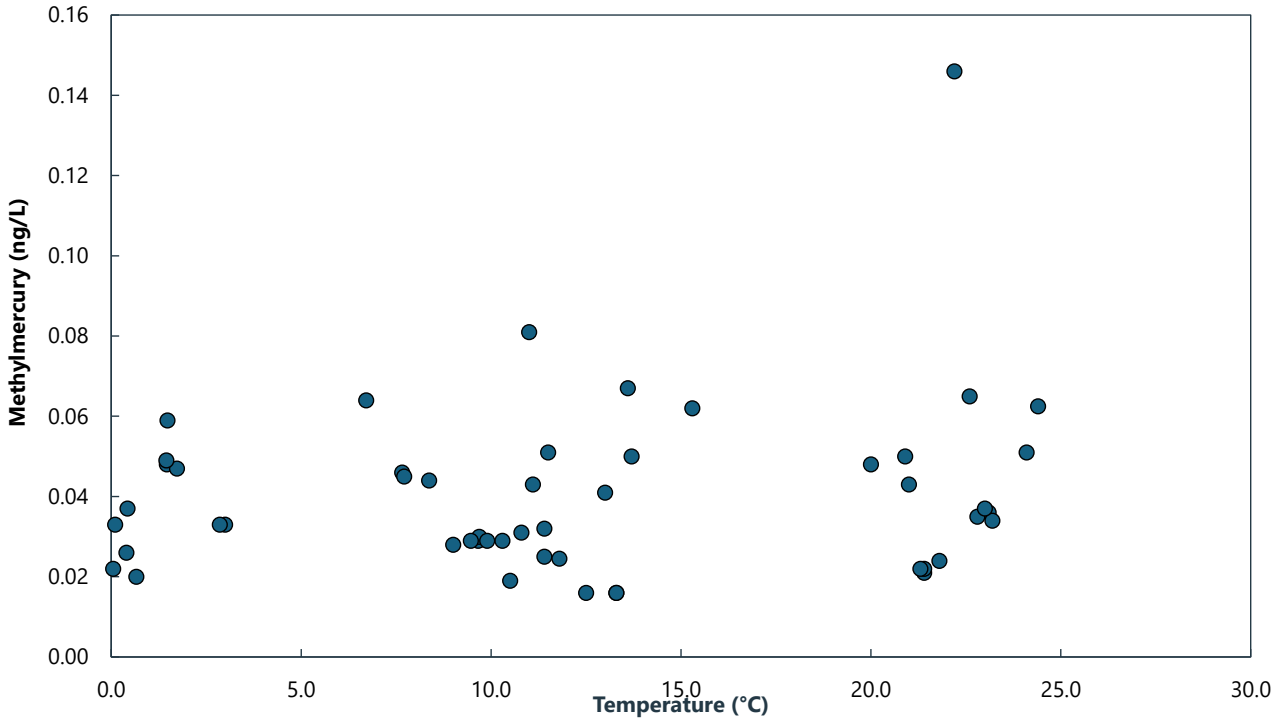
2 - Results below laboratory minimum detection limits were replaced with a value equal to 50% of the MDL

MeHg vs P-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-90



Notes:

1 - Monitored stations: PL-01, PL-02, PL-03, PL-04, PL-05 (including bottom of the lake samples)

MeHg vs Temp-Pakwash Lake

Mercury Baseline Report

Great Bear Project

Drawn by:	FL	Date	Sept 2025
Checked by:	AE	Figure	A-91

Attachment B
Sediment, Porewater, and Invertebrates Data

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	CSQG ISQG		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Dixie Creek	DC01-S01	27-Oct-22	0.025
	DC01-S02	27-Oct-22	0.025
	DC01-S03	27-Oct-22	0.025
	DC02-S01	22-Oct-22	0.025
	DC02-S02	22-Oct-22	0.025
	DC02-S03	22-Oct-22	0.025
	DC03-S01	23-Oct-22	0.025
	DC03-S02	23-Oct-22	0.025
	DC03-S03	23-Oct-22	0.025
	DC04-S01	25-Oct-22	0.025
	DC04-S02	25-Oct-22	0.025
	DC04-S03	25-Oct-22	0.025
	DC-01-S1	01-Oct-2023	0.015
	DC-01-S2	01-Oct-2023	0.11
	DC-01-S3	01-Oct-2023	0.024
	DC-02-S1	29-Sep-2023	0.013
	DC-02-S2	29-Sep-2023	0.020
	DC-02-S3	29-Sep-2023	0.020
	DC-03-S1	28-Sep-2023	0.014
	DC-03-S2	28-Sep-2023	0.015
	DC-03-S3	28-Sep-2023	0.015
	DC-04-S1	30-Sep-2023	0.023
	DC-04-S2	30-Sep-2023	0.026
	DC-04-S3	30-Sep-2023	0.027
		Count	24
		Mean	0.026
		Median	0.025
		Minimum	0.013
		Maximum	0.112
		25th Percentile	0.020
		75th Percentile	0.025
		95th Percentile	0.027
		Standard Deviation	0.019

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	CSQG ISQG		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Chukuni River	CR-REF-S01	29-Oct-22	0.025
	CR-REF-S02	29-Oct-22	0.025
	CR-REF-S03	29-Oct-22	0.060
	CR-REF-S04	29-Oct-22	0.025
	CR-REF-S05	29-Oct-22	0.025
	CR-FDP-S01	28-Oct-22	0.025
	CR-FDP-S02	28-Oct-22	0.025
	CR-FDP-S03	28-Oct-22	0.025
	CR-FDP-S04	28-Oct-22	0.025
	CR-FDP-S05	28-Oct-22	0.025
	CR-DS-S01	29-Oct-22	0.025
	CR-DS-S02	29-Oct-22	0.025
	CR-DS-S03	29-Oct-22	0.025
	CR-DS-S04	29-Oct-22	0.025
	CR-DS-S05	29-Oct-22	0.025
	CR-REF-S1	26-Sep-2023	0.045
	CR-REF-S2	26-Sep-2023	0.035
	CR-REF-S3	26-Sep-2023	0.049
	CR-REF-S4	26-Sep-2023	0.041
	CR-REF-S5	26-Sep-2023	0.038
	CR-FDP-S1	27-Sep-2023	0.023
	CR-FDP-S2	27-Sep-2023	0.012
	CR-FDP-S3	27-Sep-2023	0.019
	CR-FDP-S4	27-Sep-2023	0.009
	CR-FDP-S5	27-Sep-2023	0.009
	CR-DS-S1	30-Sep-2023	0.013
	CR-DS-S2	30-Sep-2023	0.009
	CR-DS-S3	30-Sep-2023	0.010
	CR-DS-S4	30-Sep-2023	0.012
	CR-DS-S5	30-Sep-2023	0.014
	CR-REF-S1	14-Sep-2024	0.012
	CR-REF-S2	14-Sep-2024	0.022
	CR-REF-S3	14-Sep-2024	0.013
	CR-REF-S4	14-Sep-2024	0.015
	CR-REF-S5	14-Sep-2024	0.008
	CR-FDP-S1	13-Sep-2024	0.022
	CR-FDP-S2	13-Sep-2024	0.012
	CR-FDP-S3	13-Sep-2024	0.019
	CR-FDP-S4	13-Sep-2024	0.0090
	CR-FDP-S5	13-Sep-2024	0.0071
	CR-DS-S1	12-Sep-2024	0.011
	CR-DS-S2	12-Sep-2024	0.008
	CR-DS-S3	12-Sep-2024	0.012
	CR-DS-S4	12-Sep-2024	0.012
	CR-DS-S5	12-Sep-2024	0.018
	Count		45
	Mean		0.021
	Median		0.022
	Minimum		0.0071
	Maximum		0.060
	25th Percentile		0.012
	75th Percentile		0.025
	95th Percentile		0.044
	Standard Deviation		0.012

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	**CSQG ISQG**		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Pakwash Lake	PKD-S1	14-Sep-2024	0.035
	PKD-S2	14-Sep-2024	0.030
	PKD-S3	14-Sep-2024	0.046
	PKL-S-S1	18-Sep-2024	0.017
	PKL-S-S2	18-Sep-2024	0.016
	PKL-S-S3	18-Sep-2024	0.012
	PKL-C-S1	18-Sep-2024	0.018
	PKL-C-S2	18-Sep-2024	0.045
	PKL-C-S3	18-Sep-2024	0.061
		Count	9
		Mean	0.031
		Median	0.030
		Minimum	0.012
		Maximum	0.061
		25th Percentile	0.017
		75th Percentile	0.045
		95th Percentile	0.055
		Standard Deviation	0.017
Genessee Lake	GenL-S01	27-Oct-22	0.120
	GenL-S02	27-Oct-22	0.090
	GenL-S03	26-Oct-22	0.025
	GL-S1	16-Sep-2023	0.027
	GL-S2	16-Sep-2023	0.087
	GL-S3	16-Sep-2023	0.082
	GL-S1	15-Sep-2024	0.005
	GL-S2	15-Sep-2024	0.068
	GL-S3	15-Sep-2024	0.083
		Count	9
		Mean	0.065
		Median	0.082
		Minimum	0.0051
		Maximum	0.12
		25th Percentile	0.027
		75th Percentile	0.087
		95th Percentile	0.11
		Standard Deviation	0.038

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	CSQG ISQG		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Unnamed Waterbody 1	WB-1-S01	27-Oct-22	0.18
	WB-1-S02	27-Oct-22	0.18
	WB-1-S03	27-Oct-22	0.13
	WB-1-S1	10-Sep-2023	0.10
	WB-1-S2	10-Sep-2023	0.10
	WB-1-S3	10-Sep-2023	0.088
		Count	6
		Mean	0.13
		Median	0.12
		Minimum	0.088
		Maximum	0.18
		25th Percentile	0.10
		75th Percentile	0.17
		95th Percentile	0.18
		Standard Deviation	0.042
Unnamed Waterbody 2	WB-2-S01	27-Oct-22	0.15
	WB-2-S02	27-Oct-22	0.22
	WB-2-S03	27-Oct-22	0.21
	WB-2-S1	09-Sep-2023	0.20
	WB-2-S2	09-Sep-2023	0.19
	WB-2-S3	09-Sep-2023	0.16
		Count	6
		Mean	0.19
		Median	0.19
		Minimum	0.15
		Maximum	0.22
		25th Percentile	0.17
		75th Percentile	0.21
		95th Percentile	0.22
		Standard Deviation	0.027
Unnamed Waterbody 3	WB-3-S1	02-Oct-2023	0.13
	WB-3-S2	02-Oct-2023	0.084
	WB-3-S3	02-Oct-2023	0.13
		Count	3
		Mean	0.11
		Median	0.13
		Minimum	0.084
		Maximum	0.13
		25th Percentile	0.11
		75th Percentile	0.13
		95th Percentile	0.13
		Standard Deviation	0.026
Unnamed Waterbody 5	WB-5-S01	28-Oct-22	0.025
	WB-5-S02	28-Oct-22	0.025
	WB-5-S03	28-Oct-22	0.025
		Count	3
		Mean	0.025
		Median	0.025
		Minimum	0.025
		Maximum	0.025
		25th Percentile	0.025
		75th Percentile	0.025
		95th Percentile	0.025
		Standard Deviation	0.00

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	CSQG ISQG		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Unnamed Waterbody 6	WB-6-S01	26-Oct-22	0.18
	WB-6-S02	26-Oct-22	0.14
	WB-6-S03	26-Oct-22	0.11
	WB-6-S1	02-Oct-2023	0.122
	WB-6-S2	02-Oct-2023	0.0767
	WB-6-S3	02-Oct-2023	0.118
	WB-6-S1	21-Sep-2024	0.117
	WB-6-S2	21-Sep-2024	0.116
	WB-6-S3	21-Sep-2024	0.107
		Count	9
		Mean	0.12
		Median	0.12
		Minimum	0.08
		Maximum	0.18
		25th Percentile	0.11
		75th Percentile	0.12
		95th Percentile	0.16
		Standard Deviation	0.028
Unnamed Watercourse 3	WC-3-S01	25-Oct-22	0.025
	WC-3-S03	25-Oct-22	0.025
	WC-3A-S01	22-Oct-22	0.025
	WC-3A-S02	22-Oct-22	0.025
	WC-3A-S03	22-Oct-22	0.025
	WC-3B-S01	21-Oct-22	0.025
	WC-3B-S02	21-Oct-22	0.025
	WC-3B-S03	21-Oct-22	0.025
	WC-3B-S1	12-Sep-2023	0.026
	WC-3B-S2	12-Sep-2023	0.028
		Count	10
		Mean	0.025
		Median	0.025
		Minimum	0.025
		Maximum	0.028
		25th Percentile	0.025
		75th Percentile	0.025
		95th Percentile	0.027
		Standard Deviation	0.00089
Unnamed Watercourse 4	WC-4-S01	20-Oct-22	0.025
	WC-4-S02	20-Oct-22	0.025
	WC-4-S03	20-Oct-22	0.025
	WC-4-S1	11-Sep-2023	0.018
	WC-4-S2	11-Sep-2023	0.016
	WC-4-S3	11-Sep-2023	0.013
		Count	6
		Mean	0.020
		Median	0.021
		Minimum	0.013
		Maximum	0.025
		25th Percentile	0.016
		75th Percentile	0.025
		95th Percentile	0.025
		Standard Deviation	0.0053

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	CSQG ISQG		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Unnamed Watercourse 5	WC-5-S01	19-Oct-22	0.025
	WC-5-S02	19-Oct-22	0.025
	WC-5-S03	19-Oct-22	0.025
	WC-5-S3	07-Sep-2023	0.033
	WC-5-S2	07-Sep-2023	0.028
	WC-5-S1	07-Sep-2023	0.022
		Count	6
		Mean	0.026
		Median	0.025
		Minimum	0.022
		Maximum	0.033
		25th Percentile	0.025
		75th Percentile	0.027
		95th Percentile	0.032
		Standard Deviation	0.0038
Unnamed Watercourse 6	WC-6A-US-S1	09-Sep-2023	0.047
	WC-6A-US-S2	09-Sep-2023	0.043
	WC-6A-US-S3	09-Sep-2023	0.052
	WC-6B-01-S01	23-Oct-22	0.025
	WC-6B-01-S02	23-Oct-22	0.025
	WC-6B-01-S03	23-Oct-22	0.025
	WC-6B-S01	23-Oct-22	0.025
	WC-6B-S03	23-Oct-22	0.025
	WC-6B-S1	14-Sep-2023	0.039
	WC-6B-S2	14-Sep-2023	0.012
	WC-6B-S3	14-Sep-2023	0.024
	WC-6B-01-S1	14-Sep-2023	0.036
	WC-6B-01-S2	14-Sep-2023	0.038
	WC-6B-01-S3	14-Sep-2023	0.011
	WC-6C-S01	24-Oct-22	0.025
	WC-6C-S02	24-Oct-22	0.025
	WC-6C-S03	24-Oct-22	0.025
	WC-6C-S1	16-Sep-2023	0.010
	WC-6C-S2	16-Sep-2023	0.013
	WC-6C-S3	16-Sep-2023	0.033
		Count	20
		Mean	0.028
		Median	0.025
		Minimum	0.010
		Maximum	0.052
		25th Percentile	0.025
		75th Percentile	0.037
		95th Percentile	0.047
		Standard Deviation	0.012
Unnamed Watercourse 7	WC-7-S01	24-Oct-22	0.025
	WC-7-S02	24-Oct-22	0.050
	WC-7-S03	24-Oct-22	0.060
	WC-7-S1	30-Sep-2023	0.029
	WC-7-S2	30-Sep-2023	0.035
	WC-7-S3	30-Sep-2023	0.066
	WC-7A-03-S01	20-Oct-22	0.11
	WC-7A-03-S02	20-Oct-22	0.080
	WC-7A-03-S03	20-Oct-22	0.060
	WC-7A-07-S01	22-Oct-22	0.025
	WC-7A-07-S02	22-Oct-22	0.060
	WC-7A-07-S03	22-Oct-22	0.025
	WC-7A-08-S01	20-Oct-22	0.050
	WC-7A-08-S02	20-Oct-22	0.050
	WC-7A-08-S03	20-Oct-22	0.090
		Count	15
		Mean	0.054
		Median	0.050
		Minimum	0.025
		Maximum	0.11
		25th Percentile	0.032
		75th Percentile	0.063
		95th Percentile	0.096
		Standard Deviation	0.025

Table B-1: 2022 - 2024 Sediment Data

Waterbody	Sample ID	Date	Mercury (mg/kg)
Screening levels:	CSQG ISQG		0.17
	CSQG PEL		0.49
	PSQG LEL		0.20
	PSQG SEL		2.0
Unnamed Watercourse 8	WC-8-S01	25-Oct-22	0.025
	WC-8-S02	25-Oct-22	0.025
	WC-8-S03	25-Oct-22	0.025
	WC-8-S1	11-Sep-2023	0.0025
	WC-8-S2	11-Sep-2023	0.0025
	WC-8-S3	11-Sep-2023	0.0080
		Count	6
		Mean	0.015
		Median	0.017
		Minimum	0.003
		Maximum	0.025
		25th Percentile	0.004
		75th Percentile	0.025
		95th Percentile	0.025
		Standard Deviation	0.011

Notes:

1. PSQG; Provincial Sediment Quality Guidelines for the protection and management of aquatic sediment quality in Ontario
2. CSQG; Canadian Council of Ministers of the Environment Canadian Sediment Quality Guidelines for the protection of aquatic life
3. All values expressed as mg/kg unless otherwise indicated
4. For values below the detection limit, half the DL was used
5. Dark blue shaded values indicate concentrations that exceed the PSQG LEL
6. Gray shaded values indicate concentrations that exceed the PSQG SEL and LEL
7. Blue shaded values indicate concentrations that exceed the CCME ISQG
8. Light blue shaded values indicate concentrations that exceed the CCME ISQG and PEL

Table B-2: 2024 Porewater Data

Waterbody	Sample ID	Date	Mercury Dissolved (ng/L)	Methylmercury, Dissolved (ng/L)
Lowest Detection Limit:			**0.10**	**0.020**
WQG PAL:			**200**	**4**
Chukuni River	CR-FDP-PW-0	25-Oct-2024	-	0.089
	CR-FDP-PW-2	25-Oct-2024	-	0.12
	CR-FDP-PW-20	25-Oct-2024	-	0.19
	CR-DS-PW-0	25-Oct-2024	-	0.039
	CR-DS-PW-10	25-Oct-2024	-	0.080
	CR-DS-PW-20	25-Oct-2024	-	0.080
	CR-REF-PW-0	26-Oct-2024	-	0.077
	CR-REF-PW-1	26-Oct-2024	-	0.11
	CR-REF-PW-2	26-Oct-2024	-	0.049
	CR-REF-PW-5	26-Oct-2024	-	0.076
	CR-REF-PW-10	26-Oct-2024	-	0.10
	CR-DS-PW-1	19-Sep-2024	0.84	0.14
	CR-DS-PW-2	19-Sep-2024	1.2	0.084
	CR-DS-PW-5	19-Sep-2024	1.5	0.091
	CR-FDP-PW-1	19-Sep-2024	1.5	0.21
	CR-FDP-PW-5	19-Sep-2024	1.7	0.12
	CR-FDP-PW-10	19-Sep-2024	0.80	0.070
	CR-REF-PW-0	17-Sep-2024	-	0.14
		Count	6	18
		Mean	1.2	0.10
		Median	1.3	0.090
		Minimum	0.80	0.039
		Maximum	1.7	0.21
		25th Percentile	0.93	0.078
		75th Percentile	1.5	0.12
		95th Percentile	1.6	0.19
		Standard Deviation	0.36	0.044

Table B-2: 2024 Porewater Data

Waterbody	Sample ID	Date	Mercury Dissolved (ng/L)	Methylmercury, Dissolved (ng/L)
Lowest Detection Limit:			**0.10**	**0.020**
WQG PAL:			**200**	**4**
Dixie Creek	DC-01-PW-0	26-Oct-2024	-	0.024
	DC-01-PW-1	26-Oct-2024	-	0.10
	DC-01-PW-2	26-Oct-2024	-	0.19
	DC-01-PW-5	26-Oct-2024	-	0.03
	DC-01-PW-10	26-Oct-2024	-	0.044
	DC-01-PW-20	26-Oct-2024	-	0.010
	DC-04-PW-0	20-Sep-2024	-	0.10
	DC-04-PW-1	20-Sep-2024	-	0.60
	DC-04-PW-2	20-Sep-2024	-	0.18
	DC-04-PW-10	20-Sep-2024	-	0.24
	DC-04-PW-20	20-Sep-2024	-	0.21
	DC-02-PW-1	20-Sep-2024	-	0.061
	DC-02-PW-2	20-Sep-2024	-	0.073
	DC-04-PW5	20-Sep-2024	-	0.24
		Count	-	14
		Mean	-	0.15
		Median	-	0.10
		Minimum	-	0.010
		Maximum	-	0.60
		25th Percentile	-	0.048
		75th Percentile	-	0.20
		95th Percentile	-	0.37
		Standard Deviation	-	0.15
Pakwash Lake	PKL-S-PW-10	24-Oct-2024	0.87	0.10
	PKL-S-PW-20	24-Oct-2024	1.3	0.20
	PKL-C-PW-0	24-Oct-2024	-	0.24
	PKL-C-PW-1	24-Oct-2024	-	0.040
	PKL-C-PW-2	24-Oct-2024	-	0.040
	PKL-C-PW-5	24-Oct-2024	-	0.071
	PKL-C-PW-10	24-Oct-2024	-	0.063
	PKL-C-PW-20	24-Oct-2024	-	0.12
	PKL-N-PW-0	24-Oct-2024	-	0.053
	PKL-N-PW-1	24-Oct-2024	-	0.032
	PKL-N-PW-2	24-Oct-2024	-	0.13
	PKL-N-PW-5	24-Oct-2024	-	0.051
	PKL-S-PW-0	18-Sep-2024	0.76	0.057
	PKL-S-PW-1	18-Sep-2024	0.42	0.025
	PKL-S-PW-2	18-Sep-2024	0.67	0.054
	PKL-S-PW-5	18-Sep-2024	0.22	0.040
	PKL-N-PW-10	19-Sep-2024	2.9	0.32
	PKL-N-PW-20	19-Sep-2024	1.2	0.070
		Count	8	18
		Mean	1.0	0.094
		Median	0.82	0.060
		Minimum	0.22	0.025
		Maximum	2.9	0.32
		25th Percentile	0.61	0.043
		75th Percentile	1.2	0.11
		95th Percentile	2.3	0.25
		Standard Deviation	0.8	0.1

Table B-2: 2024 Porewater Data

Waterbody	Sample ID	Date	Mercury Dissolved (ng/L)	Methylmercury, Dissolved (ng/L)
Lowest Detection Limit:			**0.10**	**0.020**
WQG PAL:			**200**	**4**
Genesse Lake	GL-PW-10	27-Oct-2024	10.30	0.26
	GL-PW-20	27-Oct-2024	14.00	0.48
	GL-PW0	17-Sep-2024	4.0	0.62
	GL-PW-1	17-Sep-2024	2.0	0.71
	GL-PW-2	17-Sep-2024	1.6	0.24
	GL-PW-5	17-Sep-2024	22	1.4
		Count	6	6
		Mean	8.9	0.62
		Median	7.1	0.55
		Minimum	1.6	0.24
		Maximum	22	1.4
		25th Percentile	2.5	0.32
		75th Percentile	13	0.69
		95th Percentile	20	1.2
		Standard Deviation	7.9	0.43
Waterbody 6	WB-6-PW-0	27-Oct-2024	2.2	0.11
	WB-6-PW-1	27-Oct-2024	0.46	0.05
	WB-6-PW-2	27-Oct-2024	0.56	0.11
	WB-6-PW-5	27-Oct-2024	0.56	0.40
	WB-6-PW-10	27-Oct-2024	0.57	0.40
	WB-6-PW-20	27-Oct-2024	0.68	0.11
		Count	6	6
		Mean	0.84	0.20
		Median	0.57	0.11
		Minimum	0.46	0.05
		Maximum	2.22	0.40
		25th Percentile	0.56	0.11
		75th Percentile	0.65	0.33
		95th Percentile	1.8	0.40
		Standard Deviation	0.68	0.16

Notes:

All units are ng/L (unless otherwise noted)

All concentrations are dissolved (unless otherwise indicated)

WQG PAL: Water Quality Guideline for the Protection of Aquatic Life

Rose highlighted values are greater than identified WQG PAL

Table B-3: 2024 Benthic Data

Waterbody	Sample ID	Date	Mercury (mg/kg)	Methylmercury (mg/kg)	% Methylmercury
Dixie Creek	DC-03-AES-COMP1	September 17, 2024	0.17	0.16	94%
	DC-03-AES-COMP2	September 17, 2024	0.20	0.19	96%
	DC-03-AES-COMP3	September 17, 2024	0.20	0.20	98%
	DC-03-LET-COMP1	September 17, 2024	0.14	0.14	97%
	DC-03-LET-COMP2	September 17, 2024	0.091	0.086	94%
	DC-01-AES-COMP1	September 15, 2024	0.13	0.11	85%
	DC-01-AES-COMP2	September 15, 2024	0.084	0.087	104%
	DC-01-AES-COMP3	September 15, 2024	0.10	0.10	102%
	DC-01-AES-COMP4	September 15, 2024	0.082	0.083	101%
	DC-01-AES-COMP5	September 15, 2024	0.079	0.072	92%
	DC-01-LET-COMP1	September 15, 2024	0.066	0.064	97%
	DC-02-AES-COMP1	September 18, 2024	0.11	0.11	98%
	DC-02-AES-COMP2	September 18, 2024	0.13	0.12	89%
	DC-02-AES-COMP3	September 18, 2024	0.094	0.10	105%
	DC-02-AES-COMP4	September 18, 2024	0.089	0.09	105%
	DC-02-LET-COMP1	September 18, 2024	0.12	0.11	98%
	DC-02-LET-COMP2	September 18, 2024	0.09	0.09	99%
	DC-02-LET-COMP3	September 18, 2024	0.12	0.13	102%
	DC-04-AES-COMP1	September 19, 2024	0.14	0.15	104%
	DC-04-AES-COMP2	September 19, 2024	0.16	0.16	98%
	DC-04-AES-COMP3	September 19, 2024	0.13	0.14	104%
	DC-04-AES-COMP4	September 19, 2024	0.15	0.15	103%
	DC-04-AES-COMP5	September 19, 2024	0.15	0.15	101%
	DC-04-LET-COMP1	September 19, 2024	0.079	0.077	98%
		Count	24	24	24
		Mean	0.12	0.12	98%
		Median	0.12	0.11	98%
		Minimum	0.066	0.064	85%
		Maximum	0.20	0.20	105%
		25th Percentile	0.089	0.087	96%
		75th Percentile	0.14	0.15	102%
		95th Percentile	0.19	0.18	105%
		Standard Deviation	0.038	0.037	5%

Table B-3: 2024 Benthic Data

Waterbody	Sample ID	Date	Mercury (mg/kg)	Methylmercury (mg/kg)	% Methylmercury
Chukuni River	CR-DS-AES-COMP1	September 13, 2024	0.13	0.13	98%
	CR-DS-AES-COMP2	September 13, 2024	0.13	0.14	101%
	CR-DS-AES-COMP3	September 13, 2024	0.14	0.14	100%
	CR-DS-AES-COMP4	September 13, 2024	0.14	0.14	99%
	CR-DS-AES-COMP5	September 13, 2024	0.14	0.14	99%
	CR-DS-LET-COMP1	September 13, 2024	0.079	0.078	99%
	CR-DS-LET-COMP2	September 13, 2024	1.4	1.3	91%
	CR-FDP-AES-COMP1	September 13, 2024	0.15	0.15	101%
	CR-FDP-AES-COMP2	September 13, 2024	0.17	0.15	85%
	CR-FDP-LET-COMP1	September 13, 2024	0.084	0.087	104%
	CR-REF-AES-COMP1	September 14, 2024	0.072	0.077	107%
	CR-REF-LET-COMP1	September 14, 2024	0.082	0.088	107%
	CR-REF-LET-COMP2	September 14, 2024	0.060	0.056	94%
		Count	13	13	13
		Mean	0.21	0.20	99%
		Median	0.13	0.14	99%
		Minimum	0.060	0.056	85%
		Maximum	1.4	1.3	107%
		25th Percentile	0.082	0.087	98%
		75th Percentile	0.14	0.14	101%
		95th Percentile	0.66	0.60	107%
		Standard Deviation	0.36	0.32	6%
Pakwash Lake	PKL-N-AES-COMP1	September 14, 2024	0.17	0.18	102%
	PKL-N-AES-COMP2	September 14, 2024	0.16	0.16	101%
	PKL-N-AES-COMP3	September 14, 2024	0.17	0.18	102%
	PKL-N-LET-COMP1	September 14, 2024	0.25	0.25	103%
	PKL-C-AES-COMP1	September 20, 2024	0.11	0.11	106%
	PKL-C-AES-COMP2	September 20, 2024	0.15	0.15	99%
	PKL-C-AES-COMP3	September 20, 2024	0.12	0.12	98%
	PKL-C-LET-COMP1	September 20, 2024	0.25	0.27	108%
	PKL-S-AES-COMP1	September 20, 2024	0.18	0.18	98%
	PKL-S-AES-COMP2	September 20, 2024	0.20	0.19	98%
	PKL-S-AES-COMP3	September 20, 2024	0.17	0.17	101%
	PKL-S-AES-COMP4	September 20, 2024	0.19	0.18	96%
	PKL-S-AES-COMP5	September 20, 2024	0.20	0.20	100%
	PKL-S-LET-COMP1	September 20, 2024	0.36	0.34	95%
	PKL-S-LET-COMP2	September 20, 2024	0.092	0.093	100%
		Count	15	15	15
		Mean	0.19	0.19	100%
		Median	0.17	0.18	100%
		Minimum	0.092	0.093	95%
		Maximum	0.36	0.34	108%
		25th Percentile	0.16	0.16	98%
		75th Percentile	0.20	0.20	102%
		95th Percentile	0.28	0.29	106%
		Standard Deviation	0.065	0.064	4%

Table B-3: 2024 Benthic Data

Waterbody	Sample ID	Date	Mercury (mg/kg)	Methylmercury (mg/kg)	% Methylmercury
Genesse Lake	GL-AES-COMP1	September 15, 2024	0.072	0.064	89%
	GL-AES-COMP2	September 15, 2024	0.069	0.067	96%
	GL-LET-COMP1	September 15, 2024	0.12	0.11	97%
	GL-LET-COMP2	September 15, 2024	0.16	0.15	95%
	GL-LET-COMP3	September 15, 2024	0.088	0.080	91%
		Count	5	5	5
		Mean	0.10	0.095	94%
		Median	0.088	0.080	95%
		Minimum	0.069	0.064	89%
		Maximum	0.16	0.15	97%
		25th Percentile	0.072	0.067	91%
		75th Percentile	0.12	0.11	96%
		95th Percentile	0.15	0.14	97%
		Standard Deviation	0.038	0.037	3%
Waterbody 6	WB-6-AES-COMP1	October 27, 2024	0.056	0.057	103%
	WB-6-AES-COMP2	October 27, 2024	0.056	0.054	97%
	WB-6-AES-COMP3	October 27, 2024	0.055	0.052	95%
		Count	3	3	3
		Mean	0.055	0.054	98%
		Median	0.056	0.054	97%
		Minimum	0.055	0.052	95%
		Maximum	0.056	0.057	103%
		25th Percentile	0.055	0.053	96%
		75th Percentile	0.056	0.056	100%
		95th Percentile	0.056	0.057	102%
		Standard Deviation	0.0005	0.0026	4%

Notes:

1. All values expressed as mg/kg dry weight unless otherwise indicated

2. For values below the detection limit, half the DL was used

Table B-4: 2024 Periphyton Data

Waterbody	Sample ID	Date	Mercury (mg/kg)	MethylImercury (mg/kg)	% MethylImercury
Chukuni River	CR-REF-Peri-1	September 10, 2024	0.038	0.0023	6%
	CR-REF-Peri-2	September 10, 2024	~0.024	0.0018	-
	CR-REF-Peri-3	September 10, 2024	0.044	0.0032	7%
	CR-REF-Peri-4	September 10, 2024	0.032	0.0038	12%
	CR-REF-Peri-5	September 10, 2024	0.034	0.0019	6%
	CR-FDP-Peri-1	September 11, 2024	0.021	0.0014	7%
	CR-FDP-Peri-2	September 11, 2024	0.034	0.0014	4%
	CR-FDP-Peri-3	September 11, 2024	~0.0123	0.0010	-
	CR-FDP-Peri-4	September 11, 2024	~0.0164	0.0012	-
	CR-FDP-Peri-5	September 11, 2024	~0.0247	0.0016	-
	CR-DS-Peri-1	September 13, 2024	~0.0195	0.0011	-
	CR-DS-Peri-2	September 13, 2024	~0.0195	0.0015	-
	CR-DS-Peri-3	September 13, 2024	~0.0108	0.0006	-
	CR-DS-Peri-4	September 13, 2024	~0.0372	0.0028	-
	CR-DS-Peri-5	September 13, 2024	~0.0209	0.0010	-
	Count		6	15	6
	Mean		0.034	0.0018	7%
	Median		0.034	0.0015	6%
	Minimum		0.021	0.0006	4%
	Maximum		0.044	0.0038	12%
	25th Percentile		0.032	0.0012	6%
	75th Percentile		0.037	0.0021	7%
	95th Percentile		0.043	0.0034	11%
	Standard Deviation		0.0078	0.00090	3%
Dixie Creek	DC-01-Peri-1	September 15, 2024	~0.0145	0.00056	-
	DC-01-Peri-2	September 15, 2024	0.042	0.0036	9%
	DC-01-Peri-3	September 15, 2024	0.041	0.0021	5%
	DC-02-Peri-1	September 18, 2024	~0.02065	0.00062	-
	DC-02-Peri-2	September 18, 2024	~0.0198	0.0013	-
	DC-02-Peri-3	September 18, 2024	~0.0172	0.00086	-
	DC-03-Peri-1	September 17, 2024	0.015	0.00051	3%
	DC-03-Peri-2	September 17, 2024	0.024	0.0010	4%
	DC-03-Peri-3	September 17, 2024	~0.0187	0.00049	-
	DC-04-Peri-1	September 11, 2024	0.039	0.0025	6%
	DC-04-Peri-2	September 11, 2024	0.044	0.0026	6%
	DC-04-Peri-3	September 11, 2024	0.038	0.0014	4%
	Count		7	12	7
	Mean		0.035	0.0015	5%
	Median		0.039	0.0011	5%
	Minimum		0.015	0.00049	3%
	Maximum		0.044	0.0036	9%
	25th Percentile		0.031	0.00061	4%
	75th Percentile		0.041	0.0022	6%
	95th Percentile		0.043	0.0031	8%
	Standard Deviation		0.011	0.0010	2%

Notes:

1. Metal concentration values are expressed in mg/kg dry weight.
2. "~" = Values below the minimum level (ML) as flagged by the lab and not included in summary stats
3. For values below the detection limit, half the DL was used

Table B-5: 2024 Zooplankton Data

Waterbody	Sample ID	Date	Mercury (mg/kg)	MethylImercury (mg/kg)	% MethylImercury
Chukuni River	CR-REF	September 14, 2024	0.0365	0.0024	7%
	CR-FDP	September 14, 2024	~ 0.0244	0.00020	-
	CR-DS	September 14, 2024	NR	~ 0.00129	-
		Count	-	2	-
		Mean	-	0.0013	-
		Median	-	0.0013	-
		Minimum	-	0.00020	-
		Maximum	-	0.0024	-
		25th Percentile	-	0.00075	-
		75th Percentile	-	0.0019	-
		95th Percentile	-	0.0023	-
		Standard Deviation	-	0.0016	-
Dixie Creek	DC-01	September 15, 2024	0.018	0.0040	22%
	DC-02	September 18, 2024	0.036	~ 0.00102	-
	DC-03	September 17, 2024	0.018	0.0000020	0%
	DC-04	September 19, 2024	0.042	0.0028	7%
		Count	4	3	3
		Mean	0.028	0.002	10%
		Median	0.027	0.003	7%
		Minimum	0.018	0.000002	0%
		Maximum	0.042	0.0040	22%
		25th Percentile	0.018	0.0014	3%
		75th Percentile	0.037	0.0034	14%
		95th Percentile	0.041	0.0038	21%
		Standard Deviation	0.012	0.0020	11%
Pakwash Lake	PKL-N	September 14, 2024	0.015	0.0048	32%
	PKL-C	September 20, 2024	0.013	0.0030	23%
	PKL-S	September 20, 2024	0.022	0.0071	32%
	PKL-D	October 24, 2024	0.019	0.0066	35%
		Count	4	4	4
		Mean	0.017	0.0054	30%
		Median	0.017	0.0057	32%
		Minimum	0.013	0.0030	23%
		Maximum	0.022	0.0071	35%
		25th Percentile	0.014	0.0043	30%
		75th Percentile	0.020	0.0067	33%
		95th Percentile	0.022	0.0070	34%
		Standard Deviation	0.004	0.0019	5%
Genesse Lake	GL	September 15, 2024	0.023	0.0050	22%
Waterbody 6	WB-6	October 27, 2024	0.043	0.0040	9%

Notes:

1. Metal concentration values are expressed in mg/kg dry weight.
2. "~" = Values below the minimum level (ML) as flagged by the lab and not included in summary stats
3. Summary statistics not applicable for sample size of n=1
4. For values below the detection limit, half the DL was used
5. NR = Not Reportable

Attachment C
Baseline Fish Data

Table C-1: 2022-2024 Large-bodied, Skinless, Boneless Dorsal Muscle Fillet Data								
Waterbody	**Species**	**Year**	**Sample ID**	**otal Length (cr**	**otal Weight (g**	**Mercury (mg/kg)**	**Methylmercury (mg/kg)**	**% Methylmercury**
Screening levels:	MOECC/HC[1]			**-**	**-**	0.5	-	-
	MOECC [2]			**-**	**-**	1.8	-	-
	CCME [3]			**-**	**-**	-	0.033	-
Dixie Creek	Northern Pike	2022	DC03-GN3-F1-NRPK	350	210	0.4	**0.21**	51%
			DC04-GN1-F1-NRPK	595	1070	0.21	**0.12**	56%
			DC04-GN1-F2-NRPK	535	810	0.3	**0.14**	48%
			DC04-GN1-F3-NRPK	512	750	0.28	**0.1**	37%
			DC04-GN2-F4-NRPK	643	1680	0.48	**0.21**	43%
			DC04-GN2-F5-NRPK	268	120	0.28	**0.14**	50%
			DC04-GN3-F6-NRPK	468	590	0.39	**0.21**	55%
			DC04-GN3-F7-NRPK	360	230	0.4	**0.47**	118%
			DC04-GN3-F8-NRPK	359	270	0.3	**0.33**	112%
			DC04-GN4-F9-NRPK	410	440	0.31	**0.39**	128%
			DC04-GN4-F10-NRPK	335	210	0.37	**0.52**	143%
		2023	DC-02-GN1-F1-NP	195	-	0.02	0.025	102%
			DC-02-GN1-F2-NP	285	-	0.04	0.033	74%
			DC-02-GN2-F4-NP	300	-	0.07	**0.049**	72%
			DC-03-GN1-F1-NP	221	28	0.11	**0.083**	75%
			DC-03-GN1-F2-NP	235	30	0.1	**0.06**	60%
			DC-04-GN1-F1-NP-L	485	-	0.81	**0.42**	51%
			DC-04-GN1-F2-NP-L	405	389	0.37	**0.23**	62%
			Count	18	14	18	18	18
			Mean	387	488	0.29	0.21	74%
			Median	360	330	0.3	0.18	61%
			Minimum	195	28	0.02	0.025	37%
			Maximum	643	1680	0.81	0.52	143%
			25th Percentile	289	210	0.14	0.09	51%
			75th Percentile	481	710	0.39	0.31	96%
			95th Percentile	602	1284	0.53	0.48	131%
			Standard Deviation	130	462	0.2	0.2	32%
	White Sucker	2022	DC04-GN4-F11-WHSK	229	110	0.103	**0.131**	127%
		2023	DC-02-GN1-F3-WS	115	-	0.037	0.033	88%
			Count	2	1	2	2	2
			Mean	172	110	0.07	0.082	108%
			Median	172	110	0.07	0.082	108%
			Minimum	115	110	0.037	0.033	88%
			Maximum	229	110	0.1	0.13	127%
			25th Percentile	144	110	0.054	0.057	98%
			75th Percentile	201	110	0.087	0.106	117%
			95th Percentile	223	110	0.1	0.13	125%
			Standard Deviation	81	-	0.047	0.07	28%
	Yellow Perch	2023	DC-02-GN2-F5-YP	158	-	0.034	0.025	73%
			DC-02-GN2-F6-YP	154	-	0.037	0.023	63%
			DC-04-GN1-F3-YP	167	50	0.13	**0.083**	65%
			DC-04-GN1-F4-YP	142	31	0.11	**0.066**	58%
			DC-04-GN1-F5-YP	150	33	0.19	**0.11**	55%
			Count	5	3	5	5	5
			Mean	154	-	0.101	0.0606	63%
			Median	154	-	0.114	0.0662	63%
			Minimum	142	-	0.0339	0.0233	55%
			Maximum	167	-	0.194	0.106	73%
			25th Percentile	150	32	0.037	0.025	58%
			75th Percentile	157	42	0.1	0.1	65%
			95th Percentile	165	48	0.2	0.1	72%
			Standard Deviation	9	10	0.0672	0.0362	7%

	Lake Whitefish	2022	CR-FDP-GN1-F2-LWF	420	1180	0.064	**0.08**	126%
		2023	CR-FDP-GN1-F12-LKWF-L	420	830	0.096	**0.0536**	56%
			Count	2	2	2	2	2
			Mean	420	1005	0.08	0.067	91%
			Median	420	1005	0.08	0.067	91%
			Minimum	420	830	0.064	0.054	56%
			Maximum	420	1180	0.096	0.08	126%
			25th Percentile	420	918	0.072	0.06	74%
			75th Percentile	420	1093	0.088	0.074	109%
			95th Percentile	420	1163	0.094	0.079	123%
			Standard Deviation	0	247	0.023	0.019	50%
	Northern Pike	2022	CR-REF-GN1-F1-NRPK	440	410	0.204	**0.154**	75%
			CR-REF-GN2-F2-NRPK	475	509	0.172	**0.145**	84%
			CR-DS-GN1-F2-NRPK	583	1100	0.32	**0.397**	124%
			CR-DS-GN1-F3-NRPK	440	460	0.226	**0.309**	137%
			CR-DS-GN2-F4-NRPK	420	440	0.2	**0.259**	130%
		2023	CR-REF-GN3-F16-NP-L	470	510	0.411	**0.401**	98%
			CR-REF-GN3-F17-NP-L	668	1950	0.332	**0.277**	83%
			CR-REF-GN3-F18-NP-L	550	790	0.312	**0.22**	71%
			CR-FDP-GN1-F1-NP-L	480	520	0.481	**0.39**	81%
			CR-FDP-GN2-F4-NP-L	500	640	0.301	**0.174**	58%
			CR-FDP-GN3-F15-NP-L	620	1110	0.608	**0.244**	40%
			CR-DS-GN3-F14-NP-L	455	510	0.293	**0.27**	92%
		2024	CR-REF-F1-NRPK	540	-	0.44	**0.401**	91%
			CR-FDP-F1-NRPK	430	-	0.329	**0.195**	59%
			CR-FDP-F2-NRPK	470	-	0.317	**0.33**	104%
			CR-FDP-F3-NRPK	450	-	0.458	**0.406**	89%
			CR-FDP-F4-NRPK	465	-	0.246	**0.173**	70%
			CR-FDP-F5-NRPK	385	-	0.164	**0.166**	101%
			CR-FDP-F6-NRPK	360	-	0.124	**0.134**	108%
			CR-DS-F1-NRPK	531	-	0.42	**0.442**	105%
			CR-DS-F2-NRPK	-	-	0.666	**0.507**	76%
			CR-DS-F5-NRPK	415	-	0.37	**0.386**	104%
			CR-DS-F6-NRPK	480	-	0.316	**0.296**	94%
			Count	22	12	23	23	23
			Mean	483	746	0.34	0.29	90%
			Median	470	515	0.32	0.28	91%
			Minimum	360	410	0.12	0.13	40%
			Maximum	668	1950	0.67	0.51	137%
			25th Percentile	440	497	0.24	0.18	76%
			75th Percentile	523	868	0.42	0.39	104%
			95th Percentile	618	1488	0.6	0.44	129%
			Standard Deviation	74	450	0.14	0.11	23%
	Walleye	2022	CR-REF-GN1-F3-WAL	435	600	0.43	**0.22**	51%
			CR-REF-GN2-F4-WAL	355	350	0.26	**0.32**	127%
			CR-DS-GN1-F1-WAL	616	2190	0.5	**0.53**	104%
		2023	CR-REF-GN3-F30-WAE-L	330	280	0.29	**0.24**	85%
			CR-REF-GN3-F31-WAE-L	320	260	0.36	**0.24**	66%
			CR-REF-GN3-F32-WAE-L	401	600	0.37	**0.25**	68%
			CR-REF-GN3-F33-WAE-L	418	640	0.48	**0.45**	94%
			CR-FDP-GN1-F4-WAE-L	391	490	0.31	**0.12**	39%
			CR-FDP-GN1-F5-WAE-L	404	510	0.37	**0.13**	35%
			CR-FDP-GN1-F6-WAE-L	385	480	0.34	**0.15**	44%
			CR-FDP-GN1-F7-WAE-L	313	260	0.21	**0.09**	42%
			CR-FDP-GN1-F8-WAE-L	460	870	0.86	**0.43**	50%
			CR-FDP-GN1-F9-WAE-L	513	1010	0.76	**0.39**	52%
			CR-FDP-GN1-F10-WAE-L	492	1030	0.62	**0.28**	45%
			CR-FDP-GN2-F3-WAE-WB	260	150	0.14	**0.08**	56%
			CR-DS-GN1-F5-WAE-L	415	650	0.32	**0.16**	50%
			CR-DS-GN1-F6-WAE-L	429	640	0.5	**0.23**	46%
			CR-DS-GN1-F7-WAE-L	425	690	0.31	**0.12**	38%
			CR-DS-GN2-F2-WAE-L	320	310	0.28	**0.3**	106%
			CR-DS-GN2-F3-WAE-L	438	690	0.8	**0.5**	63%
			CR-DS-GN3-F1-WAE-L	329	350	0.41	**0.36**	88%
			CR-DS-GN3-F2-WAE-L	320	300	0.3	**0.16**	53%
			CR-DS-GN3-F3-WAE-L	300	250	0.24	**0.17**	71%
			CR-DS-GN3-F4-WAE-L	406	570	0.34	**0.21**	62%
			CR-DS-GN3-F5-WAE-L	470	800	0.44	**0.37**	86%
			CR-DS-GN3-F6-WAE-L	430	680	0.35	**0.32**	91%

Chukuni River			**Count**	26	26	26	26	26
			Mean	399	602	0.41	0.26	66%
			Median	405	585	0.35	0.24	59%
			Minimum	260	150	0.14	0.078	35%
			Maximum	616	2190	0.86	0.53	127%
			25th Percentile	329	320	0.3	0.16	47%
			75th Percentile	434	688	0.47	0.35	86%
			95th Percentile	508	1025	0.79	0.49	106%
			Standard Deviation	78	401	0.18	0.13	25%
	White Sucker	2022	CR-FDP-GN1-F1-WHSK	510	1450	0.16	**0.19**	119%
			CR-DS-GN2-F5-WHSK	530	1920	0.25	**0.33**	134%
			CR-DS-GN3-F6-WHSK	473	1180	0.23	**0.082**	35%
			CR-DS-GN3-F7-WHSK	409	810	0.065	**0.08**	122%
		2023	CR-REF-GN3-F15-WHSC-L	420	720	0.075	**0.078**	105%
			CR-FDP-GN3-F9-WHSC-L	280	240	0.051	0.025	49%
			CR-FDP-GN3-F10-WHSC-L	300	270	0.063	0.03	48%
			CR-FDP-GN3-F11-WHSC-L	345	420	0.073	0.026	36%
			CR-FDP-GN3-F12-WHSC-L	361	570	0.071	0.031	44%
			CR-FDP-GN3-F13-WHSC-L	448	910	0.1	0.031	31%
			CR-FDP-GN3-F14-WHSC-L	480	1430	0.14	**0.074**	53%
			CR-DS-GN1-F1-WHSC-L	390	700	0.095	**0.045**	47%
			CR-DS-GN1-F2-WSHC-L	410	800	0.164	**0.093**	57%
			CR-DS-GN1-F3-WHSC-L	272	240	0.094	**0.045**	47%
			CR-DS-GN1-F4-WHSC-L	362	540	0.068	**0.037**	54%
		2024	CR-FDP-F7-WS	390	-	0.12	**0.12**	93%
			CR-FDP-F8-WS	400	-	0.14	**0.13**	94%
			CR-FDP-F9-WS	485	-	0.11	**0.12**	105%
			CR-FDP-F10-WS	560	-	0.32	**0.27**	83%
			CR-DS-F3-WS	418	-	0.072	**0.073**	101%
			CR-DS-F4-WS	431	-	0.14	**0.14**	101%
			CR-DS-F7-WS	410	-	0.22	**0.2**	89%
			CR-DS-F8-WS	465	-	0.17	**0.16**	99%
			CR-DS-F9-WS	415	-	0.089	**0.074**	82%
			CR-DS-F10-WS	410	-	0.11	**0.13**	112%
			Count	25	15	25	25	25
			Mean	415	813	0.13	0.1	78%
			Median	410	720	0.11	0.08	83%
			Minimum	272	240	0.051	0.025	31%
			Maximum	560	1920	0.32	0.33	134%
			25th Percentile	390	480	0.073	0.045	48%
			75th Percentile	465	1045	0.16	0.13	101%
			95th Percentile	526	1591	0.25	0.25	122%
			Standard Deviation	72	494	0.068	0.078	32%
	Silver Redhorse	2023	CR-FDP-GN1-F11-SVRH-L	513	1510	0.18	**0.08**	43%
	Yellow Perch	2023	CR-REF-GN2-F1-YLP	180	70	0.03	0.03	88%
			CR-REF-GN3-F19-YLP	340	420	0.24	**0.2**	84%
			CR-REF-GN3-F20-YLP	280	220	0.11	**0.08**	72%
			CR-REF-GN3-F21-YLP	281	330	0.2	**0.15**	74%
			CR-REF-GN3-F22-YLP	295	350	0.15	**0.1**	68%
			CR-REF-GN3-F23-YLP	275	280	0.13	**0.13**	99%
			CR-REF-GN3-F24-YLP	260	230	0.13	**0.12**	93%
			CR-REF-GN3-F25-YLP	242	200	0.06	**0.04**	66%
			CR-REF-GN3-F26-YLP	263	300	0.08	**0.05**	68%
			CR-REF-GN3-F27-YLP	228	150	0.048	0.019	39%
			CR-REF-GN3-F28-YLP	241	190	0.078	**0.078**	99%
			CR-FDP-GN1-F2-YLP-L	251	170	0.087	**0.041**	47%
			CR-FDP-GN1-F3-YLP-L	254	210	0.14	**0.06**	44%
			CR-FDP-GN2-F1-YP	225	140	0.13	**0.081**	60%
			CR-FDP-GN2-F2-YP-L	262	230	0.24	**0.11**	45%
			CR-FDP-GN3-F6-YLP-L	260	240	0.13	**0.045**	34%
			CR-FDP-GN3-F7-YLP-L	272	290	0.24	**0.079**	33%
			CR-FDP-GN3-F8-YLP-L	272	270	0.25	**0.084**	34%
			CR-DS-GN1-F8-YLP-L	241	170	0.12	**0.046**	37%
			CR-DS-GN1-F9-YLP-L	241	200	0.15	**0.055**	37%
			CR-DS-GN1-F10-YLP-L	231	180	0.09	**0.086**	93%
			CR-DS-GN1-F11-YLP-L	211	130	0.1	**0.069**	67%
			CR-DS-GN2-F1-YLP-L	233	150	0.16	**0.15**	94%
			CR-DS-GN3-F7-YLP-L	230	160	0.13	**0.13**	99%
			CR-DS-GN3-F8-YLP-L	325	150	0.14	**0.09**	63%
			CR-DS-GN3-F9-YLP-L	236	170	0.12	**0.11**	92%
			CR-DS-GN3-F10-YLP-L	350	200	0.12	**0.11**	95%
			CR-DS-GN3-F11-YLP-L	352	210	0.12	**0.1**	81%
			CR-DS-GN3-F12-YLP-L	270	250	0.3	**0.2**	66%
			CR-DS-GN3-F13-YLP-L	284	250	0.24	**0.23**	94%
			Count	30	30	30	30	30
			Mean	263	217	0.143	0.096	69%
			Median	260	205	0.131	0.085	68%
			Minimum	180	70	0.028	0.019	33%
			Maximum	352	420	0.3	0.227	99%
			25th Percentile	237	170	0.1	0.1	45%
			75th Percentile	279	250	0.2	0.1	93%
			95th Percentile	346	341	0.2	0.2	99%
			Standard Deviation	40	73	0.066	0.052	23%

Genessee Lake	Yellow Perch	2022	GL-GN1-F4-YLP	220	90	0.15	**0.16**	107%
			GL-GN1-F5-YLP	165	40	0.072	**0.05**	69%
			GL-GN1-F6-YLP	155	37	0.091	**0.065**	71%
			GL-GN1-F7-YLP	156	35	0.049	**0.056**	114%
			GL-GN1-F8-YLP	146	27	0.052	**0.052**	99%
			GL-GN1-F9-YLP	146	32	0.055	**0.04**	72%
			GL-GN1-F10-YLP	157	37	0.056	**0.036**	64%
			GL-GN1-F11-YLP	162	45	0.088	**0.06**	68%
		2023	GL-GN3-F1-YLPR	97	9	0.034	0.029	86%
			GL-GN2-F2-YLPR	182	63	0.12	**0.08**	67%
			GL-GN2-F3-YLPR	153	34	0.083	**0.065**	78%
			GL-GN2-F6-YLPR	158	41	0.073	**0.057**	79%
			GL-GN2-F7-YLPR	165	48	0.071	**0.054**	75%
			GL-GN2-F8-YLPR	151	38	0.061	**0.046**	75%
			GL-GN2-F9-YLPR	163	42	0.08	**0.064**	81%
			GL-GN2-F10-YLPR	165	48	0.058	**0.036**	62%
			GL-GN2-F11-YLPR	149	33	0.051	**0.041**	81%
			GL-GN2-F12-YLPR	148	32	0.064	**0.044**	68%
			Count	18	18	18	18	18
			Mean	158	41	0.072	0.057	79%
			Median	157	37	0.068	0.053	75%
			Minimum	97	9.3	0.034	0.029	62%
			Maximum	220	90	0.146	0.156	114%
			25th Percentile	150	33	0.055	0.042	69%
			75th Percentile	165	44	0.082	0.063	81%
			95th Percentile	188	67	0.123	0.091	108%
			Standard Deviation	23	16	0.027	0.028	15%
	Northern Pike	2022	GL-GN1-F1-NRPK	545	880	0.26	**0.31**	120%
			GL-GN2-F1-NRPK	490	680	0.2	**0.16**	80%
			GL-GN2-F2-NRPK	415	360	0.065	**0.064**	98%
			GL-GN2-F3-NRPK	470	560	0.15	**0.12**	79%
			GL-GN2-F4-NRPK	450	480	0.16	**0.13**	80%
			GL-GN2-F5-NRPK	935	5670	0.67	**0.49**	74%
			GL-GN3-F1-NRPK	234	50	0.094	**0.066**	70%
			GL-GN4-F1-NRPK	545	790	0.46	**0.33**	72%
			GL-GN4-F2-NRPK	855	2920	1.18	**1.4**	119%
		2023	GL-GN2-F1-NRPK-L	550	930	0.39	**0.23**	58%
			GL-GN2-F5-NRPK-L	640	1340	0.87	**0.58**	66%
			GL-GN1-F3-NRPK-L	612	1380	0.65	**0.32**	49%
			GL-GN1-F8-NRPK-L	420	434	0.21	**0.12**	57%
			GL-SN1-F1-NP-WB	220	45	0.091	**0.067**	74%
			Count	14	14	14	14	14
			Mean	527	1180	0.39	0.31	78%
			Median	518	735	0.23	0.19	74%
			Minimum	220	45	0.065	0.064	49%
			Maximum	935	5670	1.2	1.4	120%
			25th Percentile	428	445	0.16	0.12	67%
			75th Percentile	597	1238	0.6	0.33	80%
			95th Percentile	883	3883	0.98	0.86	119%
			Standard Deviation	198	1480	0.34	0.35	21%
	Walleye	2023	GL-GN1-F1-WALL-L	332	303	0.24	**0.18**	76%
			GL-GN1-F2-WALL-L	343	315	0.42	**0.27**	64%
			GL-GN1-F4-WALL-L	465	890	0.51	**0.38**	74%
			GL-GN1-F5-WALL-L	346	354	0.29	**0.26**	91%
			GL-GN1-F6-WALL-L	501	1139	0.42	**0.25**	59%
			GL-GN1-F7-WALL-L	351	344	0.32	**0.15**	48%
			Count	6	6	6	6	6
			Mean	390	557	0.36	0.25	69%
			Median	349	349	0.37	0.25	69%
			Minimum	332	303	0.24	0.15	48%
			Maximum	501	1139	0.51	0.38	91%
			25th Percentile	344	323	0.3	0.2	60%
			75th Percentile	437	756	0.4	0.3	75%
			95th Percentile	492	1077	0.5	0.4	87%
			Standard Deviation	73	363	0.1	0.079	15%
	White Sucker	2023	GL-GN2-F4-WHSC	160	44	0.016	0.014	89%
Unnamed Waterbody 2	Northern Pike	2022	WB-2-GN1-F1-NRPK	475	600	0.58	**0.28**	48%
		2023	WB-2-MT1-F1-NRP	124	8.8	0.062	**0.041**	66%
			WB-2-GN3-F1-NRP	457	526	0.37	**0.17**	46%
			WB-2-GN2-F1-NRP	643	1522	0.64	**0.32**	51%
			WB-2-GN2-F2-NRP	349	248	0.18	**0.082**	46%
			Count	5	5	5	5	5
			Mean	410	581	0.37	0.18	51%
			Median	457	526	0.37	0.17	48%
			Minimum	124	9	0.062	0.041	46%
			Maximum	643	1522	0.64	0.32	66%
			25th Percentile	349	248	0.18	0.08	46%
			75th Percentile	475	600	0.58	0.28	51%
			95th Percentile	609	1338	0.63	0.31	63%
			Standard Deviation	191	576	0.25	0.12	9%

Unnamed Waterbody 6	Northern Pike	2022	WB-6-GN1-F1-NRPK	591	1280	0.25	**0.12**	48%
			WB-6-GN1-F2-NRPK	544	950	0.24	**0.11**	45%
			WB-6-GN1-F3-NRPK	585	1180	0.26	**0.11**	42%
			WB-6-GN1-F4-NRPK	586	1300	0.26	**0.1**	40%
			WB-6-GN2-F1-NRPK	531	870	0.21	**0.1**	46%
			WB-6-GN2-F2-NRPK	520	960	0.24	**0.1**	42%
			WB-6-GN2-F3-NRPK	536	860	0.19	**0.1**	54%
			WB-6-GN2-F4-NRPK	543	940	0.21	**0.09**	44%
			WB-6-GN4-F1-NRPK	556	270	0.37	**0.21**	57%
			WB-6-GN4-F2-NRPK	539	800	0.33	**0.2**	62%
		2023	WB-6-GN1-F1-NP-L	475	556	0.36	**0.25**	69%
			Count	11	11	11	11	11
			Mean	546	906	0.27	0.14	50%
			Median	543	940	0.25	0.11	46%
			Minimum	475	270	0.19	0.095	40%
			Maximum	591	1300	0.37	0.25	69%
			25th Percentile	534	830	0.23	0.1	43%
			75th Percentile	571	1070	0.29	0.16	56%
			95th Percentile	589	1290	0.37	0.23	65%
			Standard Deviation	34	303	0.06	0.056	9%
	Yellow Perch	2023	WB-6-GN1-F2-YP	145	35	0.061	**0.044**	72%
			WB-6-GN1-F3-YP	175	66	0.037	0.027	72%
			WB-6-GN1-F4-YP	190	72	0.049	0.018	37%
			WB-6-GN1-F5-YP	185	66	0.085	**0.046**	55%
			WB-6-GN1-F6-YP	185	75	0.046	0.028	61%
			WB-6-GN1-F7-YP	161	46	0.064	0.026	40%
			WB-6-GN1-F8-YP	142	33	0.058	**0.042**	72%
			WB-6-GN1-F9-YP	168	41	0.036	0.025	69%
			WB-6-GN1-F10-YP	173	50	0.079	**0.055**	70%
			WB-6-SN1-F1-YP-WB	100	10	0.045	0.026	58%
			WB-6-GN2-F1-YP	132	28	0.039	0.028	72%
			WB-6-GN2-F2-YP	150	37	0.061	**0.035**	58%
			Count	12	12	12	12	12
			Mean	159	47	0.055	0.033	61%
			Median	165	44	0.053	0.028	65%
			Minimum	100	10	0.036	0.018	37%
			Maximum	190	75	0.085	0.055	72%
			25th Percentile	144	35	0.044	0.026	57%
			75th Percentile	178	66	0.062	0.042	72%
			95th Percentile	187	73	0.082	0.05	72%
			Standard Deviation	26	19.87	0.016	0.011	12%
Unnamed Watercourse 7	Northern Pike	2022	WC-7-GN4-F1-NRPK	340	210	0.31	**0.13**	42%
		2023	WC-7-GN1-F1-NP-L	330	181	0.25	**0.15**	62%
			WC-7-GN1-F2-NP-L	360	277	0.54	**0.36**	66%
			Count	3	3	3	3	3
			Mean	343	223	0.37	0.21	57%
			Median	340	210	0.31	0.15	62%
			Minimum	330	181	0.25	0.13	42%
			Maximum	360	277	0.54	0.36	66%
			25th Percentile	335	196	0.28	0.14	52%
			75th Percentile	350	244	0.43	0.25	64%
			95th Percentile	358	270	0.52	0.34	65%
			Standard Deviation	15	49	0.16	0.12	13%
	Yellow Perch	2023	WC-7-GN1-F3-YP	100	10	0.064	**0.054**	84%
nnamed Watercourse	Northern Pike	2023	WC-1-EF3-F1-NRP	163	23	0.089	**0.06**	67%
			WC-1-EF3-F2-NRP	160	25	0.1	**0.08**	78%
			WC-1-EF1-F1-NRP	145	18	0.056	**0.044**	78%
			Count	3	3	3	3	3
			Mean	156	22	0.082	0.0611	74%
			Median	160	23	0.089	0.0598	78%
			Minimum	145	18	0.056	0.0438	67%
			Maximum	163	25	0.102	0.0798	78%
			25th Percentile	153	20	0.073	0.052	73%
			75th Percentile	162	24	0.096	0.07	78%
			95th Percentile	163	25	0.101	0.078	78%
			Standard Deviation	10	3.5	0.024	0.018	6%
Unnamed Watercourse 3	White Sucker	2023	WC-3-EF1-77-WS	172	58	0.078	**0.08**	102%
			WC-3-EF1-78-WS	192	86	0.041	0.03	73%
			Count	2	2	2	2	2
			Mean	182	72	0.06	0.055	88%
			Median	182	72	0.06	0.055	88%
			Minimum	172	58	0.041	0.03	73%
			Maximum	192	86	0.078	0.08	102%
			25th Percentile	177	65	0.05	0.043	81%
			75th Percentile	187	79	0.069	0.068	95%
			95th Percentile	191	84	0.076	0.078	101%
			Standard Deviation	14	20	0.026	0.035	20%

Notes:

1. Shaded values indicate concentrations that exceed the MOECC guideline developed for women of child-bearing age and children and the HC maximum contaminant concentration

2. *Italic values indicate concentrations that exceed the Ontario consumption guidelines developed for the general population*

3. **Bold values indicate methylmercury concentrations that exceed the CCME guideline for the protection of wildlife consumers of aquatic biota**

4. MOECC; Ministry of the Environment, Conservation and Parks

5. HC; Health Canada

6. CCME; Canadian Council of Ministers of the Environment

7. Metal concentration values are expressed in mg/kg wet weight.

8. "-" summary statistics not applicable for sample size of n=1

9. Values below the detection limit were set at the detection limit for summary statistics

Attachment D
Site-specific Data and BAFs

Table D-1: Summary of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Dixie Creek and Chukuni River

All Fish Sample Data									
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
Parameter	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
Average	0.35	0.24	69%	0.40	0.26	64%	0.11	0.078	71%
StDev	0.17	0.12	21%	0.16	0.11	20%	0.06	0.057	21%
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
	0.204	0.154	75%	0.431	0.22	51%	0.163	0.194	100%
	0.172	0.145	84%	0.256	0.324	100%	0.249	0.333	100%
	0.32	0.397	100%	0.287	0.243	85%	0.233	0.0819	35%
	0.226	0.309	100%	0.355	0.236	66%	0.0654	0.0801	100%
	0.2	0.259	100%	0.372	0.252	68%	0.146	0.156	100%
	0.411	0.401	98%	0.477	0.446	94%	0.0721	0.0501	69%
	0.332	0.277	83%	0.305	0.12	39%	0.0912	0.065	71%
	0.312	0.22	71%	0.367	0.129	35%	0.0494	0.0562	100%
	0.481	0.39	81%	0.339	0.149	44%	0.0518	0.0515	99%
	0.301	0.174	58%	0.207	0.0865	42%	0.0552	0.0396	72%
	0.608	0.244	40%	0.857	0.426	50%	0.056	0.0359	64%
	0.293	0.27	92%	0.755	0.39	52%	0.0881	0.0603	68%
	0.44	0.401	91%	0.624	0.279	45%	0.0372	0.0327	88%
	0.329	0.195	59%	0.318	0.158	50%	0.0339	0.0249	73%
	0.317	0.33	100%	0.504	0.23	46%	0.037	0.0233	63%
	0.458	0.406	89%	0.31	0.118	38%	0.126	0.0825	65%
	0.246	0.173	70%	0.282	0.3	100%	0.114	0.0662	58%
	0.42	0.442	100%	0.796	0.498	63%	0.194	0.106	55%
	0.37	0.386	100%	0.409	0.358	88%	0.0957	0.0536	56%
	0.316	0.296	94%	0.304	0.16	53%	0.18	0.0772	43%
	0.21	0.118	56%	0.239	0.169	71%	0.075	0.0784	100%
	0.301	0.144	48%	0.338	0.21	62%	0.0509	0.0248	49%
	0.278	0.102	37%	0.436	0.374	86%	0.0631	0.03	48%
	0.482	0.206	43%	0.352	0.321	91%	0.0731	0.0262	36%
	0.39	0.214	55%	0.24	0.182	76%	0.0714	0.0313	44%
	0.306	0.393	100%	0.415	0.266	64%	0.0999	0.0312	31%
	0.813	0.416	51%	0.51	0.379	74%	0.14	0.0735	53%
	0.374	0.232	62%	0.285	0.259	91%	0.0946	0.0445	47%
	0.255	0.305	100%	0.415	0.245	59%	0.164	0.0931	57%
	0.195	0.156	80%	0.315	0.152	48%	0.094	0.0446	47%
	0.0652	0.0636	98%				0.0681	0.0366	54%
	0.154	0.122	79%				0.0284	0.025	88%
	0.161	0.129	80%				0.243	0.204	84%
	0.67	0.494	74%				0.111	0.08	72%
	0.457	0.33	72%				0.203	0.151	74%
	0.389	0.225	58%				0.151	0.102	68%
	0.873	0.576	66%				0.131	0.13	99%
	0.645	0.318	49%				0.13	0.121	93%
	0.209	0.12	57%				0.0639	0.0419	66%
	0.58	0.278	48%				0.0781	0.0528	68%
	0.373	0.17	46%				0.0483	0.0187	39%
	0.639	0.323	51%				0.0784	0.0777	99%
	0.245	0.117	48%				0.0871	0.041	47%
	0.236	0.106	45%				0.137	0.0602	44%
	0.26	0.109	42%				0.134	0.0807	60%
	0.262	0.104	40%				0.238	0.106	45%
	0.211	0.0976	46%				0.133	0.0451	34%
	0.244	0.103	42%				0.238	0.0786	33%
	0.193	0.104	54%				0.249	0.0835	34%
	0.214	0.0948	44%				0.122	0.0455	37%
	0.369	0.212	57%				0.146	0.0547	37%
	0.325	0.202	62%				0.0926	0.0864	93%
							0.103	0.0694	67%
							0.16	0.151	94%
							0.128	0.127	99%
							0.144	0.0902	63%
							0.119	0.11	92%
							0.116	0.11	95%
							0.124	0.0999	81%
							0.299	0.197	66%
							0.242	0.227	94%

Table D-1: Summary of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Dixie Creek and Chukuni River

All Fish Sample Data									
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
Parameter	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
Average	0.35	0.24	69%	0.40	0.26	64%	0.11	0.078	71%
StDev	0.17	0.12	21%	0.16	0.11	20%	0.06	0.057	21%
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
							0.0161	0.0144	89%
							0.0338	0.0292	86%
							0.119	0.0793	67%
							0.0832	0.0652	78%
							0.0725	0.0572	79%
							0.0711	0.0535	75%
							0.0614	0.0458	75%
							0.0795	0.0643	81%
							0.0579	0.036	62%
							0.0508	0.0413	81%
							0.064	0.0437	68%
							0.0609	0.0439	72%
							0.0371	0.0268	72%
							0.0491	0.0184	37%
							0.0848	0.0464	55%
							0.0458	0.028	61%
							0.0639	0.0258	40%
							0.0578	0.0415	72%
							0.036	0.0248	69%
							0.0789	0.0552	70%
							0.0454	0.0264	58%
							0.0386	0.0278	72%
							0.0605	0.035	58%
							0.0783	0.08	100%
							0.0409	0.03	73%
							0.0641	0.0539	84%
							0.124	0.115	93%
							0.142	0.133	94%
							0.11	0.116	100%
							0.323	0.269	83%
							0.0723	0.0733	100%
							0.136	0.138	100%
							0.222	0.197	89%
							0.165	0.164	99%
							0.0893	0.0735	82%
							0.112	0.125	100%

Notes:

1) When MeHg/THg ratio >100% assumed equivalent to 100%

Table D-2: 95 UCLMs of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Dixie Creek and Chukuni River

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-06-12 12:30:45 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Pike THg [mg/kg-WW]

General Statistics

Total Number of Observations	52	Number of Distinct Observations	51
		Number of Missing Observations	0
Minimum	0.0652	Mean	0.349
Maximum	0.873	Median	0.314
SD	0.167	Std. Error of Mean	0.0232
Coefficient of Variation	0.479	Skewness	1.268

Normal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	1.3991E-4	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.141	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.388	95% Adjusted-CLT UCL (Chen-1995)	0.391
		95% Modified-t UCL (Johnson-1978)	0.388

Gamma GOF Test

A-D Test Statistic	0.538	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.098	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.123	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.911	k star (bias corrected MLE)	4.64
Theta hat (MLE)	0.071	Theta star (bias corrected MLE)	0.0752
nu hat (MLE)	510.7	nu star (bias corrected)	482.6
MLE Mean (bias corrected)	0.349	MLE Sd (bias corrected)	0.162
		Approximate Chi Square Value (0.05)	432.7
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	431.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.389	95% Adjusted Gamma UCL	0.39

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.509	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0736	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.112	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.73	Mean of logged Data	-1.159
Maximum of Logged Data	-0.136	SD of logged Data	0.47

Assuming Lognormal Distribution

95% H-UCL	0.396	90% Chebyshev (MVUE) UCL	0.421
95% Chebyshev (MVUE) UCL	0.454	97.5% Chebyshev (MVUE) UCL	0.499

99% Chebyshev (MVUE) UCL	0.587

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.387	95% BCA Bootstrap UCL	0.395
95% Standard Bootstrap UCL	0.388	95% Bootstrap-t UCL	0.393
95% Hall's Bootstrap UCL	0.393	95% Percentile Bootstrap UCL	0.388
90% Chebyshev(Mean, Sd) UCL	0.418	95% Chebyshev(Mean, Sd) UCL	0.45
97.5% Chebyshev(Mean, Sd) UCL	0.493	99% Chebyshev(Mean, Sd) UCL	0.579

Suggested UCL to Use

95% Approximate Gamma UCL	0.389

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Pike MeHg [mg/kg-WW]

General Statistics

Total Number of Observations	52	Number of Distinct Observations	49
		Number of Missing Observations	0
Minimum	0.0636	Mean	0.241
Maximum	0.576	Median	0.217
SD	0.123	Std. Error of Mean	0.0171
Coefficient of Variation	0.51	Skewness	0.615

Normal GOF Test

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0.00446	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.141	Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.27	95% Adjusted-CLT UCL (Chen-1995)	0.271
		95% Modified-t UCL (Johnson-1978)	0.27

Gamma GOF Test

A-D Test Statistic	0.702	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0977	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.124	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.866	k star (bias corrected MLE)	3.656
Theta hat (MLE)	0.0624	Theta star (bias corrected MLE)	0.066
nu hat (MLE)	402.1	nu star (bias corrected)	380.2
MLE Mean (bias corrected)	0.241	MLE Sd (bias corrected)	0.126
		Approximate Chi Square Value (0.05)	336
Adjusted Level of Significance	0.0454	Adjusted Chi Square Value	334.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.273	95% Adjusted Gamma UCL	0.274

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	0.0656	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0958	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.112	Data appear Lognormal at 10% Significance Level	

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.755	Mean of logged Data	-1.556
Maximum of Logged Data	-0.552	SD of logged Data	0.538

Assuming Lognormal Distribution

95% H-UCL	0.281	90% Chebyshev (MVUE) UCL	0.3
95% Chebyshev (MVUE) UCL	0.327	97.5% Chebyshev (MVUE) UCL	0.363
99% Chebyshev (MVUE) UCL	0.434		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.269	95% BCA Bootstrap UCL	0.272
95% Standard Bootstrap UCL	0.27	95% Bootstrap-t UCL	0.272
95% Hall's Bootstrap UCL	0.271	95% Percentile Bootstrap UCL	0.27
90% Chebyshev(Mean, Sd) UCL	0.293	95% Chebyshev(Mean, Sd) UCL	0.316
97.5% Chebyshev(Mean, Sd) UCL	0.348	99% Chebyshev(Mean, Sd) UCL	0.411

Suggested UCL to Use

95% Student's-t UCL	0.27

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Walleye THg [mg/kg-WW]

General Statistics

Total Number of Observations	30	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	0.207	Mean	0.403
Maximum	0.857	Median	0.354
SD	0.164	Std. Error of Mean	0.0299
Coefficient of Variation	0.406	Skewness	1.529

Normal GOF Test

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.9	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.185	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.454	95% Adjusted-CLT UCL (Chen-1995)	0.461
		95% Modified-t UCL (Johnson-1978)	0.455

Gamma GOF Test

A-D Test Statistic	0.899	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.141	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.769	k star (bias corrected MLE)	7.015
Theta hat (MLE)	0.0519	Theta star (bias corrected MLE)	0.0575
nu hat (MLE)	466.2	nu star (bias corrected)	420.9
MLE Mean (bias corrected)	0.403	MLE Sd (bias corrected)	0.152
		Approximate Chi Square Value (0.05)	374.3
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	371.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.454	95% Adjusted Gamma UCL	0.457

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.939	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.117	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.146	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.575	Mean of logged Data	-0.974
Maximum of Logged Data	-0.154	SD of logged Data	0.355

Assuming Lognormal Distribution

95% H-UCL	0.454	90% Chebyshev (MVUE) UCL	0.481
95% Chebyshev (MVUE) UCL	0.517	97.5% Chebyshev (MVUE) UCL	0.567
99% Chebyshev (MVUE) UCL	0.666		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.452	95% BCA Bootstrap UCL	0.462
95% Standard Bootstrap UCL	0.452	95% Bootstrap-t UCL	0.47
95% Hall's Bootstrap UCL	0.465	95% Percentile Bootstrap UCL	0.455
90% Chebyshev(Mean, Sd) UCL	0.493	95% Chebyshev(Mean, Sd) UCL	0.534
97.5% Chebyshev(Mean, Sd) UCL	0.59	99% Chebyshev(Mean, Sd) UCL	0.701

Suggested UCL to Use

95% Adjusted Gamma UCL	0.457

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Walleye MeHg [mg/kg-WW]

General Statistics

Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	0.0865	Mean	0.256
Maximum	0.498	Median	0.244
SD	0.107	Std. Error of Mean	0.0196
Coefficient of Variation	0.419	Skewness	0.483

Normal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.9	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.0961	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.185	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.289	95% Adjusted-CLT UCL (Chen-1995)	0.29
		95% Modified-t UCL (Johnson-1978)	0.29

Gamma GOF Test

A-D Test Statistic	0.209	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0831	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.701	k star (bias corrected MLE)	5.153
Theta hat (MLE)	0.0449	Theta star (bias corrected MLE)	0.0497
nu hat (MLE)	342	nu star (bias corrected)	309.2
MLE Mean (bias corrected)	0.256	MLE Sd (bias corrected)	0.113
		Approximate Chi Square Value (0.05)	269.4
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	267.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.294	95% Adjusted Gamma UCL	0.296

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.939	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0849	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.146	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.448	Mean of logged Data	-1.453
Maximum of Logged Data	-0.697	SD of logged Data	0.444

Assuming Lognormal Distribution

95% H-UCL	0.302	90% Chebyshev (MVUE) UCL	0.322
95% Chebyshev (MVUE) UCL	0.351	97.5% Chebyshev (MVUE) UCL	0.392
99% Chebyshev (MVUE) UCL	0.472		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.288	95% BCA Bootstrap UCL	0.288
95% Standard Bootstrap UCL	0.288	95% Bootstrap-t UCL	0.292
95% Hall's Bootstrap UCL	0.291	95% Percentile Bootstrap UCL	0.287
90% Chebyshev(Mean, Sd) UCL	0.315	95% Chebyshev(Mean, Sd) UCL	0.341
97.5% Chebyshev(Mean, Sd) UCL	0.378	99% Chebyshev(Mean, Sd) UCL	0.451

Suggested UCL to Use

95% Student's-t UCL	0.289

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Forage THg [mg/kg-WW]

General Statistics

Total Number of Observations	97	Number of Distinct Observations	91
		Number of Missing Observations	0
Minimum	0.0161	Mean	0.108
Maximum	0.323	Median	0.0893
SD	0.0645	Std. Error of Mean	0.00655
Coefficient of Variation	0.598	Skewness	1.217

Normal GOF Test

Shapiro Wilk Test Statistic	0.885	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	2.666E-10	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.104	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.119	95% Adjusted-CLT UCL (Chen-1995)	0.119
		95% Modified-t UCL (Johnson-1978)	0.119

Gamma GOF Test

A-D Test Statistic	0.646	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0792	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0915	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.142	k star (bias corrected MLE)	3.052
Theta hat (MLE)	0.0343	Theta star (bias corrected MLE)	0.0353
nu hat (MLE)	609.6	nu star (bias corrected)	592.1
MLE Mean (bias corrected)	0.108	MLE Sd (bias corrected)	0.0617
		Approximate Chi Square Value (0.05)	536.6
Adjusted Level of Significance	0.0475	Adjusted Chi Square Value	535.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.119	95% Adjusted Gamma UCL	0.119

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.659	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0475	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0825	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.129	Mean of logged Data	-2.395
Maximum of Logged Data	-1.13	SD of logged Data	0.59

Assuming Lognormal Distribution

95% H-UCL	0.122	90% Chebyshev (MVUE) UCL	0.129
95% Chebyshev (MVUE) UCL	0.139	97.5% Chebyshev (MVUE) UCL	0.152
99% Chebyshev (MVUE) UCL	0.178		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.119	95% BCA Bootstrap UCL	0.12
95% Standard Bootstrap UCL	0.119	95% Bootstrap-t UCL	0.12
95% Hall's Bootstrap UCL	0.12	95% Percentile Bootstrap UCL	0.119
90% Chebyshev(Mean, Sd) UCL	0.127	95% Chebyshev(Mean, Sd) UCL	0.136
97.5% Chebyshev(Mean, Sd) UCL	0.149	99% Chebyshev(Mean, Sd) UCL	0.173

Suggested UCL to Use

95% Approximate Gamma UCL 0.119

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Forage MeHg [mg/kg-WW]

General Statistics

Total Number of Observations	97	Number of Distinct Observations	89
		Number of Missing Observations	0
Minimum	0.0144	Mean	0.0778
Maximum	0.333	Median	0.0603
SD	0.0572	Std. Error of Mean	0.0058
Coefficient of Variation	0.735	Skewness	1.88

Normal GOF Test

Shapiro Wilk Test Statistic	0.827	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.104	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0875	95% Adjusted-CLT UCL (Chen-1995)	0.0886
		95% Modified-t UCL (Johnson-1978)	0.0877

Gamma GOF Test

A-D Test Statistic	0.963	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.762	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0836	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0918	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.408	k star (bias corrected MLE)	2.34
Theta hat (MLE)	0.0323	Theta star (bias corrected MLE)	0.0333
nu hat (MLE)	467.1	nu star (bias corrected)	454
MLE Mean (bias corrected)	0.0778	MLE Sd (bias corrected)	0.0509
		Approximate Chi Square Value (0.05)	405.6
Adjusted Level of Significance	0.0475	Adjusted Chi Square Value	404.9

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.0871	95% Adjusted Gamma UCL	0.0873

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.438	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0537	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0825	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.241	Mean of logged Data	-2.775
Maximum of Logged Data	-1.1	SD of logged Data	0.662

Assuming Lognormal Distribution

95% H-UCL	0.0887	90% Chebyshev (MVUE) UCL	0.0945
95% Chebyshev (MVUE) UCL	0.102	97.5% Chebyshev (MVUE) UCL	0.113
99% Chebyshev (MVUE) UCL	0.134		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0874	95% BCA Bootstrap UCL	0.0891
95% Standard Bootstrap UCL	0.0875	95% Bootstrap-t UCL	0.0889
95% Hall's Bootstrap UCL	0.0889	95% Percentile Bootstrap UCL	0.088
90% Chebyshev(Mean, Sd) UCL	0.0952	95% Chebyshev(Mean, Sd) UCL	0.103
97.5% Chebyshev(Mean, Sd) UCL	0.114	99% Chebyshev(Mean, Sd) UCL	0.136

Suggested UCL to Use

95% Approximate Gamma UCL	0.0871

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table D-3: Summary of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Chukuni River

Fish Sample Data for the Chukuni River									
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
Parameter	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
Average	0.34	0.29	84%	0.41	0.26	63%	0.14	0.098	70%
StDev	0.11	0.10	17%	0.18	0.11	21%	0.07	0.064	25%
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
	0.204	0.154	75%	0.431	0.22	51%	0.163	0.194	100%
	0.172	0.145	84%	0.256	0.324	100%	0.249	0.333	100%
	0.32	0.397	100%	0.287	0.243	85%	0.233	0.0819	35%
	0.226	0.309	100%	0.355	0.236	66%	0.0654	0.0801	100%
	0.2	0.259	100%	0.372	0.252	68%	0.0957	0.0536	56%
	0.411	0.401	98%	0.477	0.446	94%	0.18	0.0772	43%
	0.332	0.277	83%	0.305	0.12	39%	0.075	0.0784	100%
	0.312	0.22	71%	0.367	0.129	35%	0.0509	0.0248	49%
	0.481	0.39	81%	0.339	0.149	44%	0.0631	0.03	48%
	0.301	0.174	58%	0.207	0.0865	42%	0.0731	0.0262	36%
	0.608	0.244	40%	0.857	0.426	50%	0.0714	0.0313	44%
	0.293	0.27	92%	0.755	0.39	52%	0.0999	0.0312	31%
	0.44	0.401	91%	0.624	0.279	45%	0.14	0.0735	53%
	0.329	0.195	59%	0.318	0.158	50%	0.0946	0.0445	47%
	0.317	0.33	100%	0.504	0.23	46%	0.164	0.0931	57%
	0.458	0.406	89%	0.31	0.118	38%	0.094	0.0446	47%
	0.246	0.173	70%	0.282	0.3	100%	0.0681	0.0366	54%
	0.42	0.442	100%	0.796	0.498	63%	0.0284	0.025	88%
	0.37	0.386	100%	0.409	0.358	88%	0.243	0.204	84%
	0.316	0.296	94%	0.304	0.16	53%	0.111	0.08	72%
				0.239	0.169	71%	0.203	0.151	74%
				0.338	0.21	62%	0.151	0.102	68%
				0.436	0.374	86%	0.131	0.13	99%
				0.352	0.321	91%	0.13	0.121	93%
							0.0639	0.0419	66%
							0.0781	0.0528	68%
							0.0483	0.0187	39%
							0.0784	0.0777	99%
							0.0871	0.041	47%
							0.137	0.0602	44%
							0.134	0.0807	60%
							0.238	0.106	45%
							0.133	0.0451	34%
							0.238	0.0786	33%
							0.249	0.0835	34%
							0.122	0.0455	37%
							0.146	0.0547	37%
							0.0926	0.0864	93%
							0.103	0.0694	67%
							0.16	0.151	94%
							0.128	0.127	99%
							0.144	0.0902	63%
							0.119	0.11	92%
							0.116	0.11	95%
							0.124	0.0999	81%
							0.299	0.197	66%
							0.242	0.227	94%
							0.124	0.115	93%
							0.142	0.133	94%
							0.11	0.116	100%
							0.323	0.269	83%
							0.0723	0.0733	100%
							0.136	0.138	100%
							0.222	0.197	89%
							0.165	0.164	99%
							0.0893	0.0735	82%
							0.112	0.125	100%

Notes:

1) When MeHg/THg ratio >100% assumed equivalent to 100%

Table D-4: 95 UCLMs of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Chukuni River

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-06-12 12:57:55 PM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Pike THg [mg/kg-WW]

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	0.172	Mean	0.338
Maximum	0.608	Median	0.319
SD	0.108	Std. Error of Mean	0.0242
Coefficient of Variation	0.32	Skewness	0.671

Normal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.38	95% Adjusted-CLT UCL (Chen-1995)	0.381
		95% Modified-t UCL (Johnson-1978)	0.38

Gamma GOF Test

A-D Test Statistic	0.277	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.131	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.44	k star (bias corrected MLE)	8.91
Theta hat (MLE)	0.0323	Theta star (bias corrected MLE)	0.0379
nu hat (MLE)	417.7	nu star (bias corrected)	356.4
MLE Mean (bias corrected)	0.338	MLE Sd (bias corrected)	0.113
		Approximate Chi Square Value (0.05)	313.7
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	310.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.384	95% Adjusted Gamma UCL	0.388

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.76	Mean of logged Data	-1.134
Maximum of Logged Data	-0.498	SD of logged Data	0.323

Assuming Lognormal Distribution

95% H-UCL	0.389	90% Chebyshev (MVUE) UCL	0.412
95% Chebyshev (MVUE) UCL	0.446	97.5% Chebyshev (MVUE) UCL	0.493

99% Chebyshev (MVUE) UCL	0.585

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.378	95% BCA Bootstrap UCL	0.379
95% Standard Bootstrap UCL	0.376	95% Bootstrap-t UCL	0.384
95% Hall's Bootstrap UCL	0.385	95% Percentile Bootstrap UCL	0.377
90% Chebyshev(Mean, Sd) UCL	0.41	95% Chebyshev(Mean, Sd) UCL	0.443
97.5% Chebyshev(Mean, Sd) UCL	0.489	99% Chebyshev(Mean, Sd) UCL	0.578

Suggested UCL to Use

95% Student's-t UCL 0.38

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Pike MeHg [mg/kg-WW]

General Statistics

Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	0.145	Mean	0.293
Maximum	0.442	Median	0.287
SD	0.0968	Std. Error of Mean	0.0216
Coefficient of Variation	0.33	Skewness	-0.0592

Normal GOF Test

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.331	95% Adjusted-CLT UCL (Chen-1995)	0.329
		95% Modified-t UCL (Johnson-1978)	0.331

Gamma GOF Test

A-D Test Statistic	0.575	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.853	k star (bias corrected MLE)	7.559
Theta hat (MLE)	0.0331	Theta star (bias corrected MLE)	0.0388
nu hat (MLE)	354.1	nu star (bias corrected)	302.3
MLE Mean (bias corrected)	0.293	MLE Sd (bias corrected)	0.107
		Approximate Chi Square Value (0.05)	263.1
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	260.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.337	95% Adjusted Gamma UCL	0.341

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.173	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.931	Mean of logged Data	-1.284
Maximum of Logged Data	-0.816	SD of logged Data	0.358

Assuming Lognormal Distribution

95% H-UCL	0.345	90% Chebyshev (MVUE) UCL	0.367
95% Chebyshev (MVUE) UCL	0.399	97.5% Chebyshev (MVUE) UCL	0.445
99% Chebyshev (MVUE) UCL	0.534		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.329	95% BCA Bootstrap UCL	0.327
95% Standard Bootstrap UCL	0.329	95% Bootstrap-t UCL	0.33
95% Hall's Bootstrap UCL	0.327	95% Percentile Bootstrap UCL	0.33
90% Chebyshev(Mean, Sd) UCL	0.358	95% Chebyshev(Mean, Sd) UCL	0.388
97.5% Chebyshev(Mean, Sd) UCL	0.429	99% Chebyshev(Mean, Sd) UCL	0.509

Suggested UCL to Use

95% Student's-t UCL	0.331

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Walleye THg [mg/kg-WW]

General Statistics

Total Number of Observations	24	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.207	Mean	0.413
Maximum	0.857	Median	0.354
SD	0.176	Std. Error of Mean	0.036
Coefficient of Variation	0.426	Skewness	1.434

Normal GOF Test

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.884	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.205	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.475	95% Adjusted-CLT UCL (Chen-1995)	0.484
		95% Modified-t UCL (Johnson-1978)	0.477

Gamma GOF Test

A-D Test Statistic	0.928	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.184	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.178	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.067	k star (bias corrected MLE)	6.212
Theta hat (MLE)	0.0585	Theta star (bias corrected MLE)	0.0665

nu hat (MLE)	339.2	nu star (bias corrected)	298.2
MLE Mean (bias corrected)	0.413	MLE Sd (bias corrected)	0.166
		Approximate Chi Square Value (0.05)	259.2
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	256.6

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.476	95% Adjusted Gamma UCL	0.48

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.93	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.162	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.575	Mean of logged Data	-0.956
Maximum of Logged Data	-0.154	SD of logged Data	0.374

Assuming Lognormal Distribution

95% H-UCL	0.477	90% Chebyshev (MVUE) UCL	0.507
95% Chebyshev (MVUE) UCL	0.551	97.5% Chebyshev (MVUE) UCL	0.611
99% Chebyshev (MVUE) UCL	0.73		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.472	95% BCA Bootstrap UCL	0.48
95% Standard Bootstrap UCL	0.47	95% Bootstrap-t UCL	0.496
95% Hall's Bootstrap UCL	0.484	95% Percentile Bootstrap UCL	0.471
90% Chebyshev(Mean, Sd) UCL	0.521	95% Chebyshev(Mean, Sd) UCL	0.57
97.5% Chebyshev(Mean, Sd) UCL	0.638	99% Chebyshev(Mean, Sd) UCL	0.771

Suggested UCL to Use

95% H-UCL	0.477

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Walleye MeHg [mg/kg-WW]

General Statistics

Total Number of Observations	24	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.0865	Mean	0.258
Maximum	0.498	Median	0.24
SD	0.115	Std. Error of Mean	0.0234
Coefficient of Variation	0.444	Skewness	0.436

Normal GOF Test

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.884	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.205	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.298	95% Adjusted-CLT UCL (Chen-1995)	0.299
		95% Modified-t UCL (Johnson-1978)	0.299

Gamma GOF Test

A-D Test Statistic	0.222	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.103	**Kolmogorov-Smirnov Gamma GOF Test**	

5% K-S Critical Value	0.178	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.058	k star (bias corrected MLE)	4.454
Theta hat (MLE)	0.051	Theta star (bias corrected MLE)	0.058
nu hat (MLE)	242.8	nu star (bias corrected)	213.8
MLE Mean (bias corrected)	0.258	MLE Sd (bias corrected)	0.122
		Approximate Chi Square Value (0.05)	181
Adjusted Level of Significance	0.0392	Adjusted Chi Square Value	178.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.305	95% Adjusted Gamma UCL	0.309

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.93	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0841	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.162	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.448	Mean of logged Data	-1.456
Maximum of Logged Data	-0.697	SD of logged Data	0.475

Assuming Lognormal Distribution

95% H-UCL	0.317	90% Chebyshev (MVUE) UCL	0.338
95% Chebyshev (MVUE) UCL	0.374	97.5% Chebyshev (MVUE) UCL	0.423
99% Chebyshev (MVUE) UCL	0.52		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.297	95% BCA Bootstrap UCL	0.297
95% Standard Bootstrap UCL	0.296	95% Bootstrap-t UCL	0.302
95% Hall's Bootstrap UCL	0.299	95% Percentile Bootstrap UCL	0.297
90% Chebyshev(Mean, Sd) UCL	0.328	95% Chebyshev(Mean, Sd) UCL	0.36
97.5% Chebyshev(Mean, Sd) UCL	0.404	99% Chebyshev(Mean, Sd) UCL	0.491

Suggested UCL to Use

95% Student's-t UCL 0.298

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Forage THg [mg/kg-WW]

General Statistics

Total Number of Observations	57	Number of Distinct Observations	54
		Number of Missing Observations	0
Minimum	0.0284	Mean	0.136
Maximum	0.323	Median	0.124
SD	0.0659	Std. Error of Mean	0.00873
Coefficient of Variation	0.485	Skewness	0.922

Normal GOF Test

Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	7.4447E-4	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.135	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL **95% UCLs (Adjusted for Skewness)**

95% Student's-t UCL	0.151	95% Adjusted-CLT UCL (Chen-1995)	0.152
		95% Modified-t UCL (Johnson-1978)	0.151

Gamma GOF Test

A-D Test Statistic	0.447	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0805	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.118	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.509	k star (bias corrected MLE)	4.283
Theta hat (MLE)	0.0302	Theta star (bias corrected MLE)	0.0318
nu hat (MLE)	514	nu star (bias corrected)	488.3
MLE Mean (bias corrected)	0.136	MLE Sd (bias corrected)	0.0657
		Approximate Chi Square Value (0.05)	438
Adjusted Level of Significance	0.0458	Adjusted Chi Square Value	436.8

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.152	95% Adjusted Gamma UCL	0.152

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.635	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0648	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.107	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.561	Mean of logged Data	-2.11
Maximum of Logged Data	-1.13	SD of logged Data	0.494

Assuming Lognormal Distribution

95% H-UCL	0.155	90% Chebyshev (MVUE) UCL	0.165
95% Chebyshev (MVUE) UCL	0.178	97.5% Chebyshev (MVUE) UCL	0.195
99% Chebyshev (MVUE) UCL	0.23		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.15	95% BCA Bootstrap UCL	0.151
95% Standard Bootstrap UCL	0.15	95% Bootstrap-t UCL	0.153
95% Hall's Bootstrap UCL	0.152	95% Percentile Bootstrap UCL	0.15
90% Chebyshev(Mean, Sd) UCL	0.162	95% Chebyshev(Mean, Sd) UCL	0.174
97.5% Chebyshev(Mean, Sd) UCL	0.191	99% Chebyshev(Mean, Sd) UCL	0.223

Suggested UCL to Use

95% Approximate Gamma UCL	0.152

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Forage MeHg [mg/kg-WW]

General Statistics

Total Number of Observations	57	Number of Distinct Observations	53
		Number of Missing Observations	0
Minimum	0.0187	Mean	0.0983
Maximum	0.333	Median	0.0807
SD	0.0639	Std. Error of Mean	0.00846
Coefficient of Variation	0.649	Skewness	1.458

Normal GOF Test

Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**

1% Shapiro Wilk P Value	7.9837E-6	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.135	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.112	95% Adjusted-CLT UCL (Chen-1995)	0.114
		95% Modified-t UCL (Johnson-1978)	0.113

Gamma GOF Test

A-D Test Statistic	0.299	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0676	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.119	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.696	k star (bias corrected MLE)	2.566
Theta hat (MLE)	0.0365	Theta star (bias corrected MLE)	0.0383
nu hat (MLE)	307.3	nu star (bias corrected)	292.5
MLE Mean (bias corrected)	0.0983	MLE Sd (bias corrected)	0.0614
		Approximate Chi Square Value (0.05)	253.9
Adjusted Level of Significance	0.0458	Adjusted Chi Square Value	253

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.113	95% Adjusted Gamma UCL	0.114

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.633	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.107	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.107	Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.979	Mean of logged Data	-2.516
Maximum of Logged Data	-1.1	SD of logged Data	0.648

Assuming Lognormal Distribution

95% H-UCL	0.118	90% Chebyshev (MVUE) UCL	0.127
95% Chebyshev (MVUE) UCL	0.139	97.5% Chebyshev (MVUE) UCL	0.157
99% Chebyshev (MVUE) UCL	0.191		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.112	95% BCA Bootstrap UCL	0.113
95% Standard Bootstrap UCL	0.112	95% Bootstrap-t UCL	0.114
95% Hall's Bootstrap UCL	0.115	95% Percentile Bootstrap UCL	0.112
90% Chebyshev(Mean, Sd) UCL	0.124	95% Chebyshev(Mean, Sd) UCL	0.135
97.5% Chebyshev(Mean, Sd) UCL	0.151	99% Chebyshev(Mean, Sd) UCL	0.182

Suggested UCL to Use

95% Approximate Gamma UCL	0.113

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table D-5: Summary of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Dixie Creek

Fish Sample Data for Dixie Creek									
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
Parameter	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
Average	0.39	0.23	56%	NO DATA	NO DATA	NO DATA	0.090	0.056	67%
StDev	0.19	0.12	19%	NO DATA	NO DATA	NO DATA	0.065	0.034	12%
	Northern Pike [mg/kg-WW]			Walleye [mg/kg-WW]			Forage Fish [mg/kg-WW]		
	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]	Mercury	Methylmercury	Ratio MeHg/THg[1]
	0.21	0.118	56%	NO DATA	NO DATA	NO DATA	0.0372	0.0327	88%
	0.301	0.144	48%				0.0339	0.0249	73%
	0.278	0.102	37%				0.037	0.0233	63%
	0.482	0.206	43%				0.126	0.0825	65%
	0.39	0.214	55%				0.114	0.0662	58%
	0.306	0.393	100%				0.194	0.106	55%
	0.813	0.416	51%						
	0.374	0.232	62%						

Notes:

1) When MeHg/THg ratio >100% assumed equivalent to 100%

Table D-6: 95 UCLMs of Mercury and Methylmercury Tissue Concentrations in All Collected Fish in Dixie Creek and Chukuni River

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-05-14 2:18:28 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Pike THg Dixie [mg/kg-WW]

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.21	Mean	0.394
Maximum	0.813	Median	0.34
SD	0.188	Std. Error of Mean	0.0665
Coefficient of Variation	0.477	Skewness	1.857

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7). The Chebyshev UCL often results in gross overestimates of the mean. Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.52	95% Adjusted-CLT UCL (Chen-1995)	0.55
		95% Modified-t UCL (Johnson-1978)	0.527

Gamma GOF Test

A-D Test Statistic	0.413	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.208	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	6.399	k star (bias corrected MLE)	4.082
Theta hat (MLE)	0.0616	Theta star (bias corrected MLE)	0.0966
nu hat (MLE)	102.4	nu star (bias corrected)	65.32
MLE Mean (bias corrected)	0.394	MLE Sd (bias corrected)	0.195
		Approximate Chi Square Value (0.05)	47.72
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	43.94

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.54	95% Adjusted Gamma UCL	0.586

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.183	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-1.561	Mean of logged Data	-1.011
Maximum of Logged Data	-0.207	SD of logged Data	0.409

Assuming Lognormal Distribution

95% H-UCL	0.557	90% Chebyshev (MVUE) UCL	0.562
95% Chebyshev (MVUE) UCL	0.64	97.5% Chebyshev (MVUE) UCL	0.747
99% Chebyshev (MVUE) UCL	0.958		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.504	95% BCA Bootstrap UCL	0.546
95% Standard Bootstrap UCL	0.497	95% Bootstrap-t UCL	0.657
95% Hall's Bootstrap UCL	1.05	95% Percentile Bootstrap UCL	0.504
90% Chebyshev(Mean, Sd) UCL	0.594	95% Chebyshev(Mean, Sd) UCL	0.684
97.5% Chebyshev(Mean, Sd) UCL	0.809	99% Chebyshev(Mean, Sd) UCL	1.056

Suggested UCL to Use

95% Student's-t UCL 0.52

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Pike MeHg Dixie [mg/kg-WW]

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.102	Mean	0.228
Maximum	0.416	Median	0.21
SD	0.119	Std. Error of Mean	0.0419
Coefficient of Variation	0.519	Skewness	0.82

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).
The Chebyshev UCL often results in gross overestimates of the mean.
Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level
Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.308	95% Adjusted-CLT UCL (Chen-1995)	0.31
		95% Modified-t UCL (Johnson-1978)	0.31

Gamma GOF Test

A-D Test Statistic	0.349	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.173	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level
Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	4.467	k star (bias corrected MLE)	2.876
Theta hat (MLE)	0.0511	Theta star (bias corrected MLE)	0.0793
nu hat (MLE)	71.48	nu star (bias corrected)	46.01
MLE Mean (bias corrected)	0.228	MLE Sd (bias corrected)	0.135
		Approximate Chi Square Value (0.05)	31.45
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	28.43

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.334	95% Adjusted Gamma UCL	0.369

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.851	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.265	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-2.283	Mean of logged Data	-1.594
Maximum of Logged Data	-0.877	SD of logged Data	0.515

Assuming Lognormal Distribution

95% H-UCL	0.369	90% Chebyshev (MVUE) UCL	0.354
95% Chebyshev (MVUE) UCL	0.411	97.5% Chebyshev (MVUE) UCL	0.49
99% Chebyshev (MVUE) UCL	0.645		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.297	95% BCA Bootstrap UCL	0.306
95% Standard Bootstrap UCL	0.293	95% Bootstrap-t UCL	0.359
95% Hall's Bootstrap UCL	0.464	95% Percentile Bootstrap UCL	0.297
90% Chebyshev(Mean, Sd) UCL	0.354	95% Chebyshev(Mean, Sd) UCL	0.411
97.5% Chebyshev(Mean, Sd) UCL	0.49	99% Chebyshev(Mean, Sd) UCL	0.645

Suggested UCL to Use

95% Student's-t UCL	0.308

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Forage Fish THg Dixie [mg/kg-WW]

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.0339	Mean	0.0904
Maximum	0.194	Median	0.0756
SD	0.0655	Std. Error of Mean	0.0267
Coefficient of Variation	0.725	Skewness	0.738

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).
The Chebyshev UCL often results in gross overestimates of the mean.
Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.846	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.292	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.144	95% Adjusted-CLT UCL (Chen-1995)	0.143
		95% Modified-t UCL (Johnson-1978)	0.146

Gamma GOF Test

A-D Test Statistic	0.593	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.703	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.322	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.336	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	2.249	k star (bias corrected MLE)	1.235
Theta hat (MLE)	0.0402	Theta star (bias corrected MLE)	0.0731
nu hat (MLE)	26.98	nu star (bias corrected)	14.83
MLE Mean (bias corrected)	0.0904	MLE Sd (bias corrected)	0.0813
		Approximate Chi Square Value (0.05)	7.14
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	5.332

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.188	95% Adjusted Gamma UCL	0.251

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.301	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.298	Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-3.384	Mean of logged Data	-2.643
Maximum of Logged Data	-1.64	SD of logged Data	0.768

Assuming Lognormal Distribution

95% H-UCL	0.305	90% Chebyshev (MVUE) UCL	0.175
95% Chebyshev (MVUE) UCL	0.213	97.5% Chebyshev (MVUE) UCL	0.266
99% Chebyshev (MVUE) UCL	0.37		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.134	95% BCA Bootstrap UCL	0.134
95% Standard Bootstrap UCL	0.13	95% Bootstrap-t UCL	0.161
95% Hall's Bootstrap UCL	0.127	95% Percentile Bootstrap UCL	0.13
90% Chebyshev(Mean, Sd) UCL	0.171	95% Chebyshev(Mean, Sd) UCL	0.207
97.5% Chebyshev(Mean, Sd) UCL	0.257	99% Chebyshev(Mean, Sd) UCL	0.356

Suggested UCL to Use

95% Student's-t UCL	0.144

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Forage Fish MeHg Dixie [mg/kg-WW]

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.0233	Mean	0.0559
Maximum	0.106	Median	0.0495
SD	0.0343	Std. Error of Mean	0.014
Coefficient of Variation	0.613	Skewness	0.506

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7). The Chebyshev UCL often results in gross overestimates of the mean. Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0842	95% Adjusted-CLT UCL (Chen-1995)	0.0821
		95% Modified-t UCL (Johnson-1978)	0.0846

Gamma GOF Test

A-D Test Statistic	0.415	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.248	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	3.082	k star (bias corrected MLE)	1.652
Theta hat (MLE)	0.0181	Theta star (bias corrected MLE)	0.0339
nu hat (MLE)	36.99	nu star (bias corrected)	19.83
MLE Mean (bias corrected)	0.0559	MLE Sd (bias corrected)	0.0435
		Approximate Chi Square Value (0.05)	10.72
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	8.416

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.103	95% Adjusted Gamma UCL	0.132

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-3.759	Mean of logged Data	-3.054
Maximum of Logged Data	-2.244	SD of logged Data	0.652

Assuming Lognormal Distribution

95% H-UCL	0.141	90% Chebyshev (MVUE) UCL	0.101

95% Chebyshev (MVUE) UCL	0.121	97.5% Chebyshev (MVUE) UCL	0.149
99% Chebyshev (MVUE) UCL	0.204		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.079	95% BCA Bootstrap UCL	0.079
95% Standard Bootstrap UCL	0.0767	95% Bootstrap-t UCL	0.0878
95% Hall's Bootstrap UCL	0.0728	95% Percentile Bootstrap UCL	0.0777
90% Chebyshev(Mean, Sd) UCL	0.098	95% Chebyshev(Mean, Sd) UCL	0.117
97.5% Chebyshev(Mean, Sd) UCL	0.143	99% Chebyshev(Mean, Sd) UCL	0.195

Suggested UCL to Use

95% Student's-t UCL	0.0842

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table D-7: 95 UCLMs of Mercury and Methylmercury Tissue Concentrations in Small Forage Fish in Dixie Creek and Chukuni River

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-05-28 12:47:15 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

THg

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	38
Minimum	0.0161	Mean	0.0708
Maximum	0.145	Median	0.0619
SD	0.0373	Std. Error of Mean	0.00998
Coefficient of Variation	0.528	Skewness	0.752

Normal GOF Test

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.263	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0884	95% Adjusted-CLT UCL (Chen-1995)	0.0893
		95% Modified-t UCL (Johnson-1978)	0.0888

Gamma GOF Test

A-D Test Statistic	0.182	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0972	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.23	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.691	k star (bias corrected MLE)	2.948
Theta hat (MLE)	0.0192	Theta star (bias corrected MLE)	0.024
nu hat (MLE)	103.4	nu star (bias corrected)	82.54
MLE Mean (bias corrected)	0.0708	MLE Sd (bias corrected)	0.0412
		Approximate Chi Square Value (0.05)	62.61
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	60.31

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.0933	95% Adjusted Gamma UCL	0.0969

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.895	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.101	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.208	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.129	Mean of logged Data	-2.79
Maximum of Logged Data	-1.933	SD of logged Data	0.581

Assuming Lognormal Distribution

95% H-UCL	0.103	90% Chebyshev (MVUE) UCL	0.106
95% Chebyshev (MVUE) UCL	0.122	97.5% Chebyshev (MVUE) UCL	0.144

99% Chebyshev (MVUE) UCL	0.187

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0872	95% BCA Bootstrap UCL	0.0894
95% Standard Bootstrap UCL	0.0869	95% Bootstrap-t UCL	0.0917
95% Hall's Bootstrap UCL	0.0916	95% Percentile Bootstrap UCL	0.0877
90% Chebyshev(Mean, Sd) UCL	0.101	95% Chebyshev(Mean, Sd) UCL	0.114
97.5% Chebyshev(Mean, Sd) UCL	0.133	99% Chebyshev(Mean, Sd) UCL	0.17

Suggested UCL to Use

95% Student's-t UCL 0.0884

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MeHg

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	38
Minimum	0.0144	Mean	0.0498
Maximum	0.0849	Median	0.0527
SD	0.0228	Std. Error of Mean	0.00608
Coefficient of Variation	0.457	Skewness	0.0615

Normal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.263	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0606	95% Adjusted-CLT UCL (Chen-1995)	0.0599
		95% Modified-t UCL (Johnson-1978)	0.0606

Gamma GOF Test

A-D Test Statistic	0.371	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.163	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.23	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.433	k star (bias corrected MLE)	3.53
Theta hat (MLE)	0.0112	Theta star (bias corrected MLE)	0.0141
nu hat (MLE)	124.1	nu star (bias corrected)	98.85
MLE Mean (bias corrected)	0.0498	MLE Sd (bias corrected)	0.0265
		Approximate Chi Square Value (0.05)	76.91
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	74.35

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.064	95% Adjusted Gamma UCL	0.0662

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.895	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.183	**Lilliefors Lognormal GOF Test**

10% Lilliefors Critical Value	0.208	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.241	Mean of logged Data	-3.116
Maximum of Logged Data	-2.466	SD of logged Data	0.531

Assuming Lognormal Distribution

95% H-UCL	0.069	90% Chebyshev (MVUE) UCL	0.0726
95% Chebyshev (MVUE) UCL	0.0827	97.5% Chebyshev (MVUE) UCL	0.0966
99% Chebyshev (MVUE) UCL	0.124		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0598	95% BCA Bootstrap UCL	0.06
95% Standard Bootstrap UCL	0.0596	95% Bootstrap-t UCL	0.061
95% Hall's Bootstrap UCL	0.0593	95% Percentile Bootstrap UCL	0.0596
90% Chebyshev(Mean, Sd) UCL	0.0681	95% Chebyshev(Mean, Sd) UCL	0.0763
97.5% Chebyshev(Mean, Sd) UCL	0.0878	99% Chebyshev(Mean, Sd) UCL	0.11

Suggested UCL to Use

95% Student's-t UCL	0.0606

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table D-8: 95 UCLMs of Mercury and Methylmercury Tissue Concentrations in Large Forage Fish in Dixie Creek and Chukuni River

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-05-28 12:49:27 PM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

THg

General Statistics

Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	26
Minimum	0.075	Mean	0.146
Maximum	0.238	Median	0.148
SD	0.0525	Std. Error of Mean	0.0151
Coefficient of Variation	0.36	Skewness	0.227

Normal GOF Test

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.805	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.281	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.173	95% Adjusted-CLT UCL (Chen-1995)	0.172
		95% Modified-t UCL (Johnson-1978)	0.173

Gamma GOF Test

A-D Test Statistic	0.332	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.17	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.246	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.071	k star (bias corrected MLE)	6.109
Theta hat (MLE)	0.0181	Theta star (bias corrected MLE)	0.0239
nu hat (MLE)	193.7	nu star (bias corrected)	146.6
MLE Mean (bias corrected)	0.146	MLE Sd (bias corrected)	0.059
		Approximate Chi Square Value (0.05)	119.6
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	115.9

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.179	95% Adjusted Gamma UCL	0.184

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.883	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.223	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.59	Mean of logged Data	-1.989
Maximum of Logged Data	-1.435	SD of logged Data	0.378

Assuming Lognormal Distribution

95% H-UCL	0.185	90% Chebyshev (MVUE) UCL	0.195
95% Chebyshev (MVUE) UCL	0.216	97.5% Chebyshev (MVUE) UCL	0.247

99% Chebyshev (MVUE) UCL	0.307

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.171	95% BCA Bootstrap UCL	0.169
95% Standard Bootstrap UCL	0.169	95% Bootstrap-t UCL	0.174
95% Hall's Bootstrap UCL	0.17	95% Percentile Bootstrap UCL	0.17
90% Chebyshev(Mean, Sd) UCL	0.191	95% Chebyshev(Mean, Sd) UCL	0.212
97.5% Chebyshev(Mean, Sd) UCL	0.24	99% Chebyshev(Mean, Sd) UCL	0.296

Suggested UCL to Use

95% Student's-t UCL 0.173

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MeHg

General Statistics

Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	26
Minimum	0.0362	Mean	0.0976
Maximum	0.194	Median	0.0778
SD	0.0521	Std. Error of Mean	0.015
Coefficient of Variation	0.534	Skewness	0.704

Normal GOF Test

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.805	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.281	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.125	95% Adjusted-CLT UCL (Chen-1995)	0.126
		95% Modified-t UCL (Johnson-1978)	0.125

Gamma GOF Test

A-D Test Statistic	0.366	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.182	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.246	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.963	k star (bias corrected MLE)	3.028
Theta hat (MLE)	0.0246	Theta star (bias corrected MLE)	0.0322
nu hat (MLE)	95.12	nu star (bias corrected)	72.67
MLE Mean (bias corrected)	0.0976	MLE Sd (bias corrected)	0.0561
		Approximate Chi Square Value (0.05)	54.04
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	51.6

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.131	95% Adjusted Gamma UCL	0.137

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.883	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.148	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.223	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.32	Mean of logged Data	-2.458
Maximum of Logged Data	-1.64	SD of logged Data	0.539

Assuming Lognormal Distribution

95% H-UCL	0.141	90% Chebyshev (MVUE) UCL	0.144
95% Chebyshev (MVUE) UCL	0.166	97.5% Chebyshev (MVUE) UCL	0.195
99% Chebyshev (MVUE) UCL	0.253		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.122	95% BCA Bootstrap UCL	0.123
95% Standard Bootstrap UCL	0.121	95% Bootstrap-t UCL	0.129
95% Hall's Bootstrap UCL	0.122	95% Percentile Bootstrap UCL	0.122
90% Chebyshev(Mean, Sd) UCL	0.143	95% Chebyshev(Mean, Sd) UCL	0.163
97.5% Chebyshev(Mean, Sd) UCL	0.192	99% Chebyshev(Mean, Sd) UCL	0.247

Suggested UCL to Use

95% Student's-t UCL	0.125

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table D-9: 95 UCLMs of Mercury and Methylmercury Tissue Concentrations in Large Forage Fish in Chukuni River

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-05-28 2:28:29 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

THg

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	27
Minimum	0.075	Mean	0.147
Maximum	0.238	Median	0.148
SD	0.0543	Std. Error of Mean	0.0172
Coefficient of Variation	0.369	Skewness	0.225

Normal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.781	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.304	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.179	95% Adjusted-CLT UCL (Chen-1995)	0.177
		95% Modified-t UCL (Johnson-1978)	0.179

Gamma GOF Test

A-D Test Statistic	0.233	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.774	k star (bias corrected MLE)	5.508
Theta hat (MLE)	0.0189	Theta star (bias corrected MLE)	0.0267
nu hat (MLE)	155.5	nu star (bias corrected)	110.2
MLE Mean (bias corrected)	0.147	MLE Sd (bias corrected)	0.0628
		Approximate Chi Square Value (0.05)	86.94
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	83.36

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.187	95% Adjusted Gamma UCL	0.195

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.869	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.166	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.241	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.59	Mean of logged Data	-1.981
Maximum of Logged Data	-1.435	SD of logged Data	0.39

Assuming Lognormal Distribution

95% H-UCL	0.195	90% Chebyshev (MVUE) UCL	0.203
95% Chebyshev (MVUE) UCL	0.228	97.5% Chebyshev (MVUE) UCL	0.263

99% Chebyshev (MVUE) UCL	0.331

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.176	95% BCA Bootstrap UCL	0.178
95% Standard Bootstrap UCL	0.174	95% Bootstrap-t UCL	0.18
95% Hall's Bootstrap UCL	0.176	95% Percentile Bootstrap UCL	0.175
90% Chebyshev(Mean, Sd) UCL	0.199	95% Chebyshev(Mean, Sd) UCL	0.222
97.5% Chebyshev(Mean, Sd) UCL	0.255	99% Chebyshev(Mean, Sd) UCL	0.318

Suggested UCL to Use

95% Student's-t UCL 0.179

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

MeHg

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	27
Minimum	0.0362	Mean	0.104
Maximum	0.194	Median	0.0922
SD	0.0549	Std. Error of Mean	0.0174
Coefficient of Variation	0.528	Skewness	0.404

Normal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.781	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.304	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.136	95% Adjusted-CLT UCL (Chen-1995)	0.135
		95% Modified-t UCL (Johnson-1978)	0.136

Gamma GOF Test

A-D Test Statistic	0.277	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.268	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.776	k star (bias corrected MLE)	2.71
Theta hat (MLE)	0.0276	Theta star (bias corrected MLE)	0.0384
nu hat (MLE)	75.52	nu star (bias corrected)	54.2
MLE Mean (bias corrected)	0.104	MLE Sd (bias corrected)	0.0632
		Approximate Chi Square Value (0.05)	38.28
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	35.97

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.147	95% Adjusted Gamma UCL	0.157

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.869	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.241	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.32	Mean of logged Data	-2.401
Maximum of Logged Data	-1.64	SD of logged Data	0.57

Assuming Lognormal Distribution

95% H-UCL	0.166	90% Chebyshev (MVUE) UCL	0.163
95% Chebyshev (MVUE) UCL	0.189	97.5% Chebyshev (MVUE) UCL	0.225
99% Chebyshev (MVUE) UCL	0.297		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.133	95% BCA Bootstrap UCL	0.134
95% Standard Bootstrap UCL	0.131	95% Bootstrap-t UCL	0.141
95% Hall's Bootstrap UCL	0.132	95% Percentile Bootstrap UCL	0.132
90% Chebyshev(Mean, Sd) UCL	0.156	95% Chebyshev(Mean, Sd) UCL	0.18
97.5% Chebyshev(Mean, Sd) UCL	0.212	99% Chebyshev(Mean, Sd) UCL	0.277

Suggested UCL to Use

95% Student's-t UCL	0.136

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Table D-10: Summary of Mercury and Methylmercury Bioaccumulation Factors of Northern Pike in Chukuni River

Parameter	BAF THg [L/kg]	BAF MeHg [L/kg]	Average % MeHg
Average	2.75E+05	5.71E+06	84%
StDev	1.17E+05	1.89E+06	

Northern Pike and restritcted to 40 to 70 cm length					Target Length	55+/-15=40-70cm			Fish Average			Surface Water Average		Calculated BAF	
Species	Waterbody	Year	Sample ID	Mercury	Methylmercury	Length	Percent MeHg	Label	Mercury	Methylmercury	Length	Mercury	Methylmercury	BCF THg [L/kg]	BCF MeHg [L/kg]
Northern Pike	Chukuni River	2022	CR-REF-GN1-F1-NRPK	0.204	0.154	440	75%	2022-NRPK-CR-REF	0.188	0.1495	457.5	1.541666667	0.041833333	1.22E+05	3.57E+06
Northern Pike	Chukuni River	2022	CR-REF-GN2-F2-NRPK	0.172	0.145	475	84%								
Northern Pike	Chukuni River	2022	CR-DS-GN1-F2-NRPK	0.32	0.397	583	100%	2022-NRPK-CR-DS	0.248666667	0.321666667	481	1.186666667	0.044333333	2.10E+05	7.26E+06
Northern Pike	Chukuni River	2022	CR-DS-GN1-F3-NRPK	0.226	0.309	440	100%								
Northern Pike	Chukuni River	2022	CR-DS-GN2-F4-NRPK	0.2	0.259	420	100%								
Northern Pike	Chukuni River	2023	CR-REF-GN3-F16-NP-L	0.411	0.401	470	98%	2023-NP-L-CR-REF	0.351666667	0.299333333	562.6666667	1.16125	0.041625	3.03E+05	7.19E+06
Northern Pike	Chukuni River	2023	CR-REF-GN3-F17-NP-L	0.332	0.277	668	83%								
Northern Pike	Chukuni River	2023	CR-REF-GN3-F18-NP-L	0.312	0.22	550	71%								
Northern Pike	Chukuni River	2023	CR-FDP-GN1-F1-NP-L	0.481	0.39	480	81%	2023-NP-L-CR-FDP	0.463333333	0.269333333	533.3333333	0.94	0.045625	4.93E+05	5.90E+06
Northern Pike	Chukuni River	2023	CR-FDP-GN2-F4-NP-L	0.301	0.174	500	58%								
Northern Pike	Chukuni River	2023	CR-FDP-GN3-F15-NP-L	0.608	0.244	620	40%								
Northern Pike	Chukuni River	2023	CR-DS-GN3-F14-NP-L	0.293	0.27	455	92%	2023-NP-L-CR-DS	0.293	0.27	455	1.175714286	0.058428571	2.49E+05	4.62E+06
Northern Pike	Chukuni River	2024	CR-REF-F1-NRPK	0.44	0.401	540	91%	2024-NRPK-CR-REF	0.44	0.401	540	1.214583333	0.051	3.62E+05	7.86E+06
Northern Pike	Chukuni River	2024	CR-FDP-F1-NRPK	0.329	0.195	430	59%	2024-NRPK-CR-FDP	0.3375	0.276	453.75	1.989545455	0.1038	1.70E+05	2.66E+06
Northern Pike	Chukuni River	2024	CR-FDP-F2-NRPK	0.317	0.33	470	100%								
Northern Pike	Chukuni River	2024	CR-FDP-F3-NRPK	0.458	0.406	450	89%								
Northern Pike	Chukuni River	2024	CR-FDP-F4-NRPK	0.246	0.173	465	70%								
Northern Pike	Chukuni River	2024	CR-DS-F1-NRPK	0.42	0.442	531	100%	2024-NRPK-CR-DS	0.368666667	0.374666667	475.3333333	1.281428571	0.056666667	2.88E+05	6.61E+06
Northern Pike	Chukuni River	2024	CR-DS-F5-NRPK	0.37	0.386	415	100%								
Northern Pike	Chukuni River	2024	CR-DS-F6-NRPK	0.316	0.296	480	94%								

Table D-11: Summary of Mercury and Methylmercury Bioaccumulation Factors of Walleye in Chukuni River

Parameter	BAF THg [L/kg]	BAF MeHg [L/kg]	Average % MeHg
Average	3.50E+05	5.76E+06	60%
StDev	1.26E+05	1.22E+06	

Walleye and restricted to 28 to 52 cm					Target Length	40 +/- 12 = 28 to 52			Fish Average			Surface Water Average		Calculated BAF	
Species	Waterbody	Year	Sample ID	Mercury	Methylmercury	Length	Percent MeHg	Label	Mercury	Methylmercury	Length	Mercury	Methylmercury	BCF THg [L/kg]	BCF MeHg [L/kg]
Walleye	Chukuni River	2022	CR-REF-GN1-F3-WAL	0.431	0.22	435	51%	2022-WAL-CR-REF	0.3435	0.272	395	1.541666667	0.041833333	2.23E+05	6.50E+06
Walleye	Chukuni River	2022	CR-REF-GN2-F4-WAL	0.256	0.324	355	100%								
Walleye	Chukuni River	2023	CR-REF-GN3-F30-WAE-L	0.287	0.243	330	85%	2023-WAE-L-CR-REF	0.37275	0.29425	367.25	1.16125	0.041625	3.21E+05	7.07E+06
Walleye	Chukuni River	2023	CR-REF-GN3-F31-WAE-L	0.355	0.236	320	66%								
Walleye	Chukuni River	2023	CR-REF-GN3-F32-WAE-L	0.372	0.252	401	68%								
Walleye	Chukuni River	2023	CR-REF-GN3-F33-WAE-L	0.477	0.446	418	94%								
Walleye	Chukuni River	2023	CR-FDP-GN1-F4-WAE-L	0.305	0.12	391	39%	2023-WAEL-L-CR-FDP	0.493428571	0.225642857	422.5714286	0.94	0.045625	5.25E+05	4.95E+06
Walleye	Chukuni River	2023	CR-FDP-GN1-F5-WAE-L	0.367	0.129	404	35%								
Walleye	Chukuni River	2023	CR-FDP-GN1-F6-WAE-L	0.339	0.149	385	44%								
Walleye	Chukuni River	2023	CR-FDP-GN1-F7-WAE-L	0.207	0.0865	313	42%								
Walleye	Chukuni River	2023	CR-FDP-GN1-F8-WAE-L	0.857	0.426	460	50%								
Walleye	Chukuni River	2023	CR-FDP-GN1-F9-WAE-L	0.755	0.39	513	52%								
Walleye	Chukuni River	2023	CR-FDP-GN1-F10-WAE-L	0.624	0.279	492	45%								
Walleye	Chukuni River	2023	CR-DS-GN1-F5-WAE-L	0.318	0.158	415	50%	2023-WAE-L-CR-DS	0.389818182	0.263272727	389.2727273	1.175714286	0.058428571	3.32E+05	4.51E+06
Walleye	Chukuni River	2023	CR-DS-GN1-F6-WAE-L	0.504	0.23	429	46%								
Walleye	Chukuni River	2023	CR-DS-GN1-F7-WAE-L	0.31	0.118	425	38%								
Walleye	Chukuni River	2023	CR-DS-GN2-F2-WAE-L	0.282	0.3	320	100%								
Walleye	Chukuni River	2023	CR-DS-GN2-F3-WAE-L	0.796	0.498	438	63%								
Walleye	Chukuni River	2023	CR-DS-GN3-F1-WAE-L	0.409	0.358	329	88%								
Walleye	Chukuni River	2023	CR-DS-GN3-F2-WAE-L	0.304	0.16	320	53%								
Walleye	Chukuni River	2023	CR-DS-GN3-F3-WAE-L	0.239	0.169	300	71%								
Walleye	Chukuni River	2023	CR-DS-GN3-F4-WAE-L	0.338	0.21	406	62%								
Walleye	Chukuni River	2023	CR-DS-GN3-F5-WAE-L	0.436	0.374	470	86%								
Walleye	Chukuni River	2023	CR-DS-GN3-F6-WAE-L	0.352	0.321	430	91%								

Table D-12: Summary of Mercury and Methylmercury Bioaccumulation Factors of Forage Fish in Chukuni River

<250 mm	Parameter	BAF THg [L/kg]	BAF MeHg [L/kg]	Average % MeHg
	Average	1.12E+05	1.68E+06	68%
	StDev	2.85E+04	9.84E+04	
>250 mm	Parameter	BAF THg [L/kg]	BAF MeHg [L/kg]	
	Average	1.32E+05	2.14E+06	
	StDev	6.16E+04	1.40E+06	

										Average			Surface Water Average		Calculated BAF	
Species	Waterbody	Year	Sample ID	Mercury	Methylmercury	Length	Percent MeHg	Length <250	Label	Mercury	Methylmercury	Length	Mercury	Methylmercury	BCF THg [L/kg]	BCF MeHg [L/kg]
White Sucker	Chukuni River	2022	CR-FDP-GN1-F1-WHSK	0.163	0.194	510	100%	N	2022-WHSK-CR-FDP	0.163	0.194	510	1.15	0.03675	1.42E+05	5.28E+06
White Sucker	Chukuni River	2022	CR-DS-GN2-F5-WHSK	0.249	0.333	530	100%	N	2022-WHSK-CR-DS	0.182466667	0.165	470.6666667	1.186666667	0.044333333	1.54E+05	3.72E+06
White Sucker	Chukuni River	2022	CR-DS-GN3-F6-WHSK	0.233	0.0819	473	35%	N								
White Sucker	Chukuni River	2022	CR-DS-GN3-F7-WHSK	0.0654	0.0801	409	100%	N								
White Sucker	Chukuni River	2023	CR-REF-GN3-F15-WHSC-L	0.075	0.0784	420	100%	N	2023-WHSC-L-CR-REF	0.075	0.0784	420	1.16125	0.041625	6.46E+04	1.88E+06
White Sucker	Chukuni River	2023	CR-FDP-GN3-F9-WHSC-L	0.0509	0.0248	280	49%	N	2023-WHSC-L-CR-FDP	0.083066667	0.036166667	369	0.94	0.045625	8.84E+04	7.93E+05
White Sucker	Chukuni River	2023	CR-FDP-GN3-F10-WHSC-L	0.0631	0.03	300	48%	N								
White Sucker	Chukuni River	2023	CR-FDP-GN3-F11-WHSC-L	0.0731	0.0262	345	36%	N								
White Sucker	Chukuni River	2023	CR-FDP-GN3-F12-WHSC-L	0.0714	0.0313	361	44%	N								
White Sucker	Chukuni River	2023	CR-FDP-GN3-F13-WHSC-L	0.0999	0.0312	448	31%	N								
White Sucker	Chukuni River	2023	CR-FDP-GN3-F14-WHSC-L	0.14	0.0735	480	53%	N								
White Sucker	Chukuni River	2023	CR-DS-GN1-F1-WHSC-L	0.0946	0.0445	390	47%	N	2023-WHSC-L-CR-DS	0.105175	0.0547	358.5	1.175714286	0.058428571	8.95E+04	9.36E+05
White Sucker	Chukuni River	2023	CR-DS-GN1-F2-WSHC-L	0.164	0.0931	410	57%	N								
White Sucker	Chukuni River	2023	CR-DS-GN1-F3-WHSC-L	0.094	0.0446	272	47%	N								
White Sucker	Chukuni River	2023	CR-DS-GN1-F4-WHSC-L	0.0681	0.0366	362	54%	N								
White Sucker	Chukuni River	2024	CR-FDP-F7-WS	0.124	0.115	390	93%	N	2024-WS-CR-FDP	0.17475	0.15825	458.75	1.989545455	0.1038	8.78E+04	1.52E+06
White Sucker	Chukuni River	2024	CR-FDP-F8-WS	0.142	0.133	400	94%	N								
White Sucker	Chukuni River	2024	CR-FDP-F9-WS	0.11	0.116	485	100%	N								
White Sucker	Chukuni River	2024	CR-FDP-F10-WS	0.323	0.269	560	83%	N								
White Sucker	Chukuni River	2024	CR-DS-F3-WS	0.0723	0.0733	418	100%	N	2024-WS-CR-DS	0.132766667	0.128466667	424.8333333	1.281428571	0.056666667	1.04E+05	2.27E+06
White Sucker	Chukuni River	2024	CR-DS-F4-WS	0.136	0.138	431	100%	N								
White Sucker	Chukuni River	2024	CR-DS-F7-WS	0.222	0.197	410	89%	N								
White Sucker	Chukuni River	2024	CR-DS-F8-WS	0.165	0.164	465	99%	N								
White Sucker	Chukuni River	2024	CR-DS-F9-WS	0.0893	0.0735	415	82%	N								
White Sucker	Chukuni River	2024	CR-DS-F10-WS	0.112	0.125	410	100%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F19-YLP	0.243	0.204	340	84%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F20-YLP	0.111	0.08	280	72%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F21-YLP	0.203	0.151	281	74%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F22-YLP	0.151	0.102	295	68%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F23-YLP	0.131	0.13	275	99%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F24-YLP	0.13	0.121	260	93%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F26-YLP	0.0781	0.0528	263	68%	N								
Yellow Perch	Chukuni River	2023	CR-FDP-GN1-F2-YLP-L	0.0871	0.041	251	47%	N	2023-YLP-L-CR-FDP	0.11205	0.0506	252.5	0.94	0.045625	1.19E+05	1.11E+06
Yellow Perch	Chukuni River	2023	CR-FDP-GN1-F3-YLP-L	0.137	0.0602	254	44%	N								
Yellow Perch	Chukuni River	2023	CR-FDP-GN2-F2-YP-L	0.238	0.106	262	45%	N	2023-YP-L-CR-FDP	0.238	0.106	262	0.94	0.045625	2.53E+05	2.32E+06
Yellow Perch	Chukuni River	2023	CR-FDP-GN3-F6-YLP-L	0.133	0.0451	260	34%	N	2023-YLP-L-CR-FDP	0.206666667	0.069066667	268	0.94	0.045625	2.20E+05	1.51E+06
Yellow Perch	Chukuni River	2023	CR-FDP-GN3-F7-YLP-L	0.238	0.0786	272	33%	N								
Yellow Perch	Chukuni River	2023	CR-FDP-GN3-F8-YLP-L	0.249	0.0835	272	34%	N								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F8-YLP-L	0.144	0.0902	325	63%	N								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F10-YLP-L	0.116	0.11	350	95%	N								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F11-YLP-L	0.124	0.0999	352	81%	N								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F12-YLP-L	0.299	0.197	270	66%	N								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F13-YLP-L	0.242	0.227	284	94%	N								
Yellow Perch	Chukuni River	2023	CR-REF-GN2-F1-YLP	0.0284	0.025	180	88%	Y	2023-YLP-CR-REF	0.100418182	0.070727273	227.5454545	1.16125	0.041625	8.65E+04	1.70E+06
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F25-YLP	0.0639	0.0419	242	66%	Y								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F27-YLP	0.0483	0.0187	228	39%	Y								
Yellow Perch	Chukuni River	2023	CR-REF-GN3-F28-YLP	0.0784	0.0777	241	99%	Y								
Yellow Perch	Chukuni River	2023	CR-FDP-GN2-F1-YP	0.134	0.0807	225	60%	Y	2023-YP-CR-FDP	0.134	0.0807	225	0.94	0.045625	1.43E+05	1.77E+06
Yellow Perch	Chukuni River	2023	CR-DS-GN1-F8-YLP-L	0.122	0.0455	241	37%	Y	2023-YLP-L-CR-DS	0.124371429	0.092	231.8571429	1.175714286	0.058428571	1.06E+05	1.57E+06
Yellow Perch	Chukuni River	2023	CR-DS-GN1-F9-YLP-L	0.146	0.0547	241	37%	Y								
Yellow Perch	Chukuni River	2023	CR-DS-GN1-F10-YLP-L	0.0926	0.0864	231	93%	Y								
Yellow Perch	Chukuni River	2023	CR-DS-GN1-F11-YLP-L	0.103	0.0694	211	67%	Y								
Yellow Perch	Chukuni River	2023	CR-DS-GN2-F1-YLP-L	0.16	0.151	233	94%	Y								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F7-YLP-L	0.128	0.127	230	99%	Y								
Yellow Perch	Chukuni River	2023	CR-DS-GN3-F9-YLP-L	0.119	0.11	236	92%	Y								

Table D-13: Regional Fish Tissue Mercury Data for Segments 1-23 of the English River

Pakwash Lake Mercury	Pakwash Lake Detection	Wegg Lake Mercury	Wegg Lake Detection	Oak Lake Mercury	Oak Lake Detection	Maynard Lake Mercury	Maynard Lake Detection	Tide Lake Mercury	Tide Lake Detection	Ball Lake North Basin Mercury	Ball Lake North Basin Detection	Ball Lake South Basin Mercury	Ball Lake South Basin Detection	Indian Lake Mercury	Indian Lake Detection	Pakwash Lake Mercury	Pakwash Lake Detection	Wegg Lake Mercury	Wegg Lake Detection
[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]	
Northern Pike		Northern Pike		Northern Pike		Northern Pike		Northern Pike		Northern Pike		Northern Pike		Northern Pike		Walleye		Walleye	
0.24	1	0.76	1	0.47	1	0.2	1	0.58	1	0.67	1	1.7	1	0.85	1	0.98	1	0.45	1
0.29	1	0.87	1	0.94	1	0.92	1	0.5	1	0.57	1	2.6	1	0.4	1	0.71	1	0.39	1
0.32	1	0.58	1	0.22	1	2.8	1	0.54	1	0.41	1	1.3	1	0.78	1	0.47	1	0.31	1
0.26	1	0.32	1	0.57	1	1.2	1	0.38	1	2	1	0.95	1	0.7	1	0.43	1	0.37	1
0.26	1	0.25	1	0.83	1	1.8	1			0.79	1	1.8	1	0.29	1	0.97	1	0.42	1
		0.51	1	0.99	1	0.75	1			0.42	1	2.2	1	0.64	1	0.28	1	0.45	1
		0.31	1	0.97	1	0.21	1			0.31	1	1.7	1	0.58	1			0.26	1
		0.5	1	1.1	1	1.9	1			0.37	1	2.5	1	0.88	1			0.44	1
		0.37	1	0.33	1	0.65	1			0.32	1	1.6	1	0.29	1			0.35	1
		0.3	1	0.31	1	0.5	1			0.3	1	2	1	0.48	1			0.48	1
		0.46	1	1.3	1	1.8	1			0.85	1	1.7	1	0.18	1			0.49	1
		0.2	1	1.3	1	0.87	1			0.79	1	0.59	1					0.31	1
				0.28	1	0.55	1			0.93	1	1.6	1					0.36	1
				0.63	1	1	1			1.4	1	0.35	1					0.29	1
				0.27	1	0.52	1			0.78	1	1.2	1					0.63	1
				0.31	1	0.28	1			0.75	1	1.2	1						
						0.52	1			0.54	1	0.72	1						
						0.87	1			0.9	1	0.83	1						
						0.61	1			0.5	1	1.5	1						
										0.25	1	1.2	1						

Oak Lake Mercury	Oak Lake Detection	Maynard Lake Mercury	Maynard Lake Detection	Tide Lake Mercury	Tide Lake Detection	Ball Lake North Basin Mercury	Ball Lake North Basin Detection	Ball Lake South Basin Mercury	Ball Lake South Basin Detection	Indian Lake Mercury	Indian Lake Detection	Pakwash Lake Mercury	Pakwash Lake Detection	Wegg Lake Mercury	Wegg Lake Detection	Oak Lake Mercury	Oak Lake Detection	Maynard Lake Mercury	Maynard Lake Detection
[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]	
Walleye		Walleye		Walleye		Walleye		Walleye		Walleye		All Forage Fish		All Forage Fish		All Forage Fish		All Forage Fish	
0.56	1	0.77	1	0.82	1	1	1	0.77	1	0.5	1					0.07	1	0.09	1
0.73	1	0.47	1	0.54	1	0.46	1	0.4	1	0.56	1					0.1	1	0.09	1
0.57	1	0.36	1	0.45	1	0.48	1	0.8	1	0.86	1					0.04	1	0.08	1
0.55	1	0.58	1	0.48	1	0.49	1	0.69	1	0.67	1					0.19	1	0.08	1
0.71	1	0.68	1			0.55	1	0.41	1	0.48	1					0.32	1	0.05	1
0.51	1	0.28	1			0.95	1	0.44	1	0.54	1					0.16	1	0.15	1
0.6	1	0.48	1			0.26	1	0.47	1	0.44	1					0.15	1	0.11	1
0.54	1	0.54	1			1	1	1.4	1	0.5	1					0.17	1	0.11	1
0.3	1	0.43	1			1.2	1	1.3	1	0.46	1					0.15	1	0.06	1
0.57	1	0.48	1			0.59	1	1.2	1	0.37	1					0.26	1	0.14	1
0.31	1	0.58	1			0.56	1	0.66	1	0.38	1					0.25	1	0.16	1
0.47	1	0.42	1			0.42	1	1.2	1	0.27	1					0.21	1	0.13	1
0.24	1	0.38	1			0.51	1	0.81	1							0.22	1	0.13	1
0.68	1	0.97	1			1	1	1.3	1							0.11	1	0.11	1
0.73	1	0.32	1			0.51	1	0.42	1							0.19	1	0.11	1
		0.55	1			0.31	1	0.84	1							0.21	1	0.14	1
		1.6	1			0.92	1	1.2	1							0.18	1	0.06	1
						0.82	1	0.86	1							0.17	1	0.08	1
						0.52	1	0.93	1							0.2	1	0.07	1
						0.37	1	0.91	1							0.2	1	0.12	1
						0.27	1	1.3	1										
						0.49	1	1.2	1										
						0.24	1	1.1	1										
						0.69	1	0.72	1										
						0.4	1	0.73	1										
						0.26	1	1.7	1										
						0.32	1	1.1	1										
						0.47	1	0.91	1										
						0.55	1	0.46	1										
						1	1	1	1										
						0.36	1	0.86	1										
						0.79	1	0.78	1										
						0.84	1	0.5	1										
						0.9	1	0.5	1										
						0.36	1	0.76	1										
						0.65	1	1	1										
						0.62	1	1.4	1										
						0.87	1	1.7	1										
						0.49	1	0.22	1										
						0.5	1	0.58	1										
						0.41	1	0.99	1										
						0.34	1	0.53	1										
						0.64	1	0.85	1										
						0.44	1	0.77	1										
						0.64	1	0.67	1										
						0.35	1	0.66	1										
								1.2	1										
								0.65	1										
								0.61	1										
								0.5	1										
								0.63	1										

Tide Lake Mercury	Tide Lake Detection	Ball Lake North Basin Mercury	Ball Lake North Basin Detection	Ball Lake South Basin Mercury	Ball Lake South Basin Detection	Indian Lake Mercury	Indian Lake Detection	Pakwash Lake Mercury	Pakwash Lake Detection	Wegg Lake Mercury	Wegg Lake Detection	Oak Lake Mercury	Oak Lake Detection	Maynard Lake Mercury	Maynard Lake Detection	Tide Lake Mercury	Tide Lake Detection	Ball Lake North Basin Mercury	Ball Lake North Basin Detection
[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]	
All Forage Fish		All Forage Fish		All Forage Fish		All Forage Fish		Forage Fish <25 cm		Forage Fish <25 cm		Forage Fish <25 cm		Forage Fish <25 cm		Forage Fish <25 cm		Forage Fish <25 cm	
		0.11	1	0.24	1	0.35	1							0.08	1				
		0.26	1	0.24	1	0.44	1												
		0.21	1	0.22	1	0.27	1												
		0.08	1	0.25	1	0.28	1												
		0.36	1	0.39	1	0.26	1												
		0.15	1	0.29	1	0.18	1												
		0.39	1	0.22	1	0.1	1												
		0.24	1	0.49	1	0.17	1												
		0.16	1	0.26	1	0.28	1												
		0.11	1	0.23	1	0.21	1												
		0.23	1	0.26	1	0.22	1												
		0.17	1	0.19	1	0.13	1												
		0.17	1	0.28	1	0.22	1												
		0.17	1	0.23	1	0.17	1												
		0.14	1	0.18	1	0.19	1												
		0.21	1	0.25	1	0.21	1												
		0.21	1	0.18	1	0.11	1												
		0.22	1	0.24	1														
		0.14	1	0.15	1														
		0.23	1	0.18	1														
		0.27	1	0.26	1														
		0.19	1	0.24	1														
		0.23	1	0.27	1														
		0.28	1	0.18	1														
		0.2	1	0.29	1														
		0.24	1	0.68	1														
		0.25	1	0.18	1														
		0.13	1	0.15	1														
		0.23	1	0.33	1														
		0.19	1	0.25	1														
		0.14	1	0.19	1														
		0.11	1	0.18	1														
		0.12	1	0.18	1														
		0.13	1	0.19	1														
		0.12	1	0.31	1														
		0.13	1	0.15	1														
		0.26	1	0.15	1														
		0.09	1	0.15	1														
		0.12	1	0.1	1														
		0.09	1	0.17	1														
		0.35	1	0.19	1														
		0.2	1	0.12	1														
		0.2	1	0.14	1														
		0.15	1	0.08	1														
		0.13	1	0.14	1														
		0.23	1	0.15	1														
		0.43	1	0.13	1														
		0.1	1	0.14	1														
		0.08	1	0.12	1														
		0.14	1	0.11	1														
		0.07	1	0.1	1														
		0.16	1	0.12	1														
		0.13	1	0.18	1														
		0.15	1	0.21	1														
		0.07	1	0.12	1														
		0.07	1																
		0.07	1																
		0.08	1																
		0.06	1																
		0.07	1																

Ball Lake South Basin Mercury	Ball Lake South Basin Detection	Indian Lake Mercury	Indian Lake Detection	Pakwash Lake Mercury	Pakwash Lake Detection	Wegg Lake Mercury	Wegg Lake Detection	Oak Lake Mercury	Oak Lake Detection	Maynard Lake Mercury	Maynard Lake Detection	Tide Lake Mercury	Tide Lake Detection	Ball Lake North Basin Mercury	Ball Lake North Basin Detection	Ball Lake South Basin Mercury	Ball Lake South Basin Detection	Indian Lake Mercury	Indian Lake Detection
[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]		[mg/kg bw]	
Forage Fish <25 cm		Forage Fish <25 cm		Forage Fish >25 cm		Forage Fish >25 cm		Forage Fish >25 cm		Forage Fish >25 cm		Forage Fish >25 cm		Forage Fish >25 cm		Forage Fish >25 cm		Forage Fish >25 cm	
								0.07	1	0.09	1			0.11	1	0.24	1	0.35	1
								0.1	1	0.09	1			0.26	1	0.24	1	0.44	1
								0.04	1	0.08	1			0.21	1	0.22	1	0.27	1
								0.19	1	0.05	1			0.08	1	0.25	1	0.28	1
								0.32	1	0.15	1			0.36	1	0.39	1	0.26	1
								0.16	1	0.11	1			0.15	1	0.29	1	0.18	1
								0.15	1	0.11	1			0.39	1	0.22	1	0.1	1
								0.17	1	0.06	1			0.24	1	0.49	1	0.17	1
								0.15	1	0.14	1			0.16	1	0.26	1	0.28	1
								0.26	1	0.16	1			0.11	1	0.23	1	0.21	1
								0.25	1	0.13	1			0.23	1	0.26	1	0.22	1
								0.21	1	0.13	1			0.17	1	0.19	1	0.13	1
								0.22	1	0.11	1			0.17	1	0.28	1	0.22	1
								0.11	1	0.11	1			0.17	1	0.23	1	0.17	1
								0.19	1	0.14	1			0.14	1	0.18	1	0.19	1
								0.21	1	0.06	1			0.21	1	0.25	1	0.21	1
								0.18	1	0.08	1			0.21	1	0.18	1	0.11	1
								0.17	1	0.07	1			0.22	1	0.24	1		
								0.2	1	0.12	1			0.14	1	0.15	1		
								0.2	1					0.23	1	0.18	1		
														0.27	1	0.26	1		
														0.19	1	0.24	1		
														0.23	1	0.27	1		
														0.28	1	0.18	1		
														0.2	1	0.29	1		
														0.24	1	0.68	1		
														0.25	1	0.18	1		
														0.13	1	0.15	1		
														0.23	1	0.33	1		
														0.19	1	0.25	1		
														0.14	1	0.19	1		
														0.11	1	0.18	1		
														0.12	1	0.18	1		
														0.13	1	0.19	1		
														0.12	1	0.31	1		
														0.13	1	0.15	1		
														0.26	1	0.15	1		
														0.09	1	0.15	1		
														0.12	1	0.1	1		
														0.09	1	0.17	1		
														0.35	1	0.19	1		
														0.2	1	0.12	1		
														0.2	1	0.14	1		
														0.15	1	0.08	1		
														0.13	1	0.14	1		
														0.23	1	0.15	1		
														0.43	1	0.13	1		
														0.1	1	0.14	1		
														0.08	1	0.12	1		
														0.14	1	0.11	1		
														0.07	1	0.1	1		
														0.16	1	0.12	1		
														0.13	1	0.18	1		
														0.15	1	0.21	1		
														0.07	1	0.12	1		
														0.07	1				
														0.07	1				
														0.08	1				
														0.06	1				
														0.07	1				

Notes:
Fish tissue samples considered for the HHRA were 40-70 cm for northern pike and 28-52 cm for walleye
Detection columns differentiate a detection with a value of 1, and a non-detect with a value of 0

Table D-14: Regional Fish Tissue Mercury Data UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.2 2025-06-05 2:41:36 PM
From File	Fish merc UCL inputs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Packwash_N Pike

General Statistics

Total Number of Observations	5	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.24	Mean	0.274
Maximum	0.32	Median	0.26
SD	0.0313	Std. Error of Mean	0.014
Coefficient of Variation	0.114	Skewness	0.769

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,
refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,
but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).
The Chebyshev UCL often results in gross overestimates of the mean.
Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.396	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.304	95% Adjusted-CLT UCL (Chen-1995)	0.302
		95% Modified-t UCL (Johnson-1978)	0.305

Gamma GOF Test

A-D Test Statistic	0.317	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.285	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	98.45	k star (bias corrected MLE)	39.51
Theta hat (MLE)	0.00278	Theta star (bias corrected MLE)	0.00693
nu hat (MLE)	984.5	nu star (bias corrected)	395.1
MLE Mean (bias corrected)	0.274	MLE Sd (bias corrected)	0.0436
		Approximate Chi Square Value (0.05)	350.1
Adjusted Level of Significance	0.0086	Adjusted Chi Square Value	331.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.309	95% Adjusted Gamma UCL	0.327

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.806	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.264	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.319	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-1.427	Mean of logged Data	-1.3
Maximum of Logged Data	-1.139	SD of logged Data	0.112

Assuming Lognormal Distribution

95% H-UCL	0.308	90% Chebyshev (MVUE) UCL	0.315
95% Chebyshev (MVUE) UCL	0.334	97.5% Chebyshev (MVUE) UCL	0.36
99% Chebyshev (MVUE) UCL	0.411		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.297	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.316	95% Chebyshev(Mean, Sd) UCL	0.335
97.5% Chebyshev(Mean, Sd) UCL	0.361	99% Chebyshev(Mean, Sd) UCL	0.413

Suggested UCL to Use

95% Student's-t UCL	0.304

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Wegg_N Pike

General Statistics

Total Number of Observations	12	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	0.2	Mean	0.453
Maximum	0.87	Median	0.415
SD	0.205	Std. Error of Mean	0.0593
Coefficient of Variation	0.454	Skewness	0.889

Normal GOF Test

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.805	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.281	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.559	95% Adjusted-CLT UCL (Chen-1995)	0.566
		95% Modified-t UCL (Johnson-1978)	0.561

Gamma GOF Test

A-D Test Statistic	0.237	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.154	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.246	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.664	k star (bias corrected MLE)	4.304
Theta hat (MLE)	0.0799	Theta star (bias corrected MLE)	0.105
nu hat (MLE)	135.9	nu star (bias corrected)	103.3
MLE Mean (bias corrected)	0.453	MLE Sd (bias corrected)	0.218
		Approximate Chi Square Value (0.05)	80.83
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	77.81

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.578	95% Adjusted Gamma UCL	0.601

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.883	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.223	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.609	Mean of logged Data	-0.884
Maximum of Logged Data	-0.139	SD of logged Data	0.445

Assuming Lognormal Distribution

95% H-UCL	0.602	90% Chebyshev (MVUE) UCL	0.63
95% Chebyshev (MVUE) UCL	0.71	97.5% Chebyshev (MVUE) UCL	0.821
99% Chebyshev (MVUE) UCL	1.041		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.55	95% BCA Bootstrap UCL	0.568
95% Standard Bootstrap UCL	0.547	95% Bootstrap-t UCL	0.59
95% Hall's Bootstrap UCL	0.606	95% Percentile Bootstrap UCL	0.552
90% Chebyshev(Mean, Sd) UCL	0.63	95% Chebyshev(Mean, Sd) UCL	0.711
97.5% Chebyshev(Mean, Sd) UCL	0.823	99% Chebyshev(Mean, Sd) UCL	1.042

Suggested UCL to Use

95% Student's-t UCL 0.559

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Oak_N Pike

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	0.22	Mean	0.676
Maximum	1.3	Median	0.6
SD	0.384	Std. Error of Mean	0.096
Coefficient of Variation	0.568	Skewness	0.358

Normal GOF Test

Shapiro Wilk Test Statistic	0.89	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.844	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.248	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.844	95% Adjusted-CLT UCL (Chen-1995)	0.843

95% Modified-t UCL (Johnson-1978)	0.846	

Gamma GOF Test

A-D Test Statistic	0.648	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.197	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.217	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.08	k star (bias corrected MLE)	2.544
Theta hat (MLE)	0.22	Theta star (bias corrected MLE)	0.266
nu hat (MLE)	98.57	nu star (bias corrected)	81.42
MLE Mean (bias corrected)	0.676	MLE Sd (bias corrected)	0.424
		Approximate Chi Square Value (0.05)	61.63
Adjusted Level of Significance	0.0335	Adjusted Chi Square Value	59.67

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.893	95% Adjusted Gamma UCL	0.923

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.906	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.185	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.196	Data appear Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.514	Mean of logged Data	-0.562
Maximum of Logged Data	0.262	SD of logged Data	0.623

Assuming Lognormal Distribution

95% H-UCL	0.984	90% Chebyshev (MVUE) UCL	1.017
95% Chebyshev (MVUE) UCL	1.168	97.5% Chebyshev (MVUE) UCL	1.378
99% Chebyshev (MVUE) UCL	1.79		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.834	95% BCA Bootstrap UCL	0.836
95% Standard Bootstrap UCL	0.824	95% Bootstrap-t UCL	0.846
95% Hall's Bootstrap UCL	0.827	95% Percentile Bootstrap UCL	0.834
90% Chebyshev(Mean, Sd) UCL	0.964	95% Chebyshev(Mean, Sd) UCL	1.095
97.5% Chebyshev(Mean, Sd) UCL	1.276	99% Chebyshev(Mean, Sd) UCL	1.631

Suggested UCL to Use

95% Student's-t UCL	0.844

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Maynard_N Pike

General Statistics

Total Number of Observations	19	Number of Distinct Observations	16
		Number of Missing Observations	0
Minimum	0.2	Mean	0.945
Maximum	2.8	Median	0.75
SD	0.683	Std. Error of Mean	0.157
Coefficient of Variation	0.722	Skewness	1.376

Normal GOF Test

Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.863	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.216	95% Adjusted-CLT UCL (Chen-1995)	1.255
		95% Modified-t UCL (Johnson-1978)	1.224

Gamma GOF Test

A-D Test Statistic	0.347	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.116	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.201	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.26	k star (bias corrected MLE)	1.939
Theta hat (MLE)	0.418	Theta star (bias corrected MLE)	0.487
nu hat (MLE)	85.9	nu star (bias corrected)	73.67
MLE Mean (bias corrected)	0.945	MLE Sd (bias corrected)	0.679
		Approximate Chi Square Value (0.05)	54.9
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	53.49

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.268	95% Adjusted Gamma UCL	1.301

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.18	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.609	Mean of logged Data	-0.294
Maximum of Logged Data	1.03	SD of logged Data	0.725

Assuming Lognormal Distribution

95% H-UCL	1.423	90% Chebyshev (MVUE) UCL	1.461
95% Chebyshev (MVUE) UCL	1.691	97.5% Chebyshev (MVUE) UCL	2.01
99% Chebyshev (MVUE) UCL	2.637		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.202	95% BCA Bootstrap UCL	1.247
95% Standard Bootstrap UCL	1.196	95% Bootstrap-t UCL	1.287
95% Hall's Bootstrap UCL	1.29	95% Percentile Bootstrap UCL	1.216
90% Chebyshev(Mean, Sd) UCL	1.414	95% Chebyshev(Mean, Sd) UCL	1.627
97.5% Chebyshev(Mean, Sd) UCL	1.923	99% Chebyshev(Mean, Sd) UCL	2.503

Suggested UCL to Use

95% Student's-t UCL 1.216

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Tide_N Pike

General Statistics

Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.38	Mean	0.5
Maximum	0.58	Median	0.52
SD	0.0864	Std. Error of Mean	0.0432
Coefficient of Variation	0.173	Skewness	-1.19

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,

refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,

but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).

The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.25	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.602	95% Adjusted-CLT UCL (Chen-1995)	0.544
		95% Modified-t UCL (Johnson-1978)	0.597

Gamma GOF Test

A-D Test Statistic	0.357	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.271	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	40.94	k star (bias corrected MLE)	10.4
Theta hat (MLE)	0.0122	Theta star (bias corrected MLE)	0.0481
nu hat (MLE)	327.5	nu star (bias corrected)	83.21
MLE Mean (bias corrected)	0.5	MLE Sd (bias corrected)	0.155
		Approximate Chi Square Value (0.05)	63.18
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.658	95% Adjusted Gamma UCL	N/A

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.276	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-0.968	Mean of logged Data	-0.705
Maximum of Logged Data	-0.545	SD of logged Data	0.185

Assuming Lognormal Distribution

95% H-UCL	0.651	90% Chebyshev (MVUE) UCL	0.639
95% Chebyshev (MVUE) UCL	0.701	97.5% Chebyshev (MVUE) UCL	0.789
99% Chebyshev (MVUE) UCL	0.959		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.571	95% BCA Bootstrap UCL	N/A

95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.63	95% Chebyshev(Mean, Sd) UCL	0.688
97.5% Chebyshev(Mean, Sd) UCL	0.77	99% Chebyshev(Mean, Sd) UCL	0.93

Suggested UCL to Use

95% Student's-t UCL 0.602

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Ball NB_N Pike

General Statistics

Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	0.25	Mean	0.693
Maximum	2	Median	0.62
SD	0.419	Std. Error of Mean	0.0937
Coefficient of Variation	0.605	Skewness	1.81

Normal GOF Test

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.854	95% Adjusted-CLT UCL (Chen-1995)	0.887
		95% Modified-t UCL (Johnson-1978)	0.861

Gamma GOF Test

A-D Test Statistic	0.391	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.123	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.612	k star (bias corrected MLE)	3.103
Theta hat (MLE)	0.192	Theta star (bias corrected MLE)	0.223
nu hat (MLE)	144.5	nu star (bias corrected)	124.1
MLE Mean (bias corrected)	0.693	MLE Sd (bias corrected)	0.393
		Approximate Chi Square Value (0.05)	99.4

Adjusted Level of Significance	0.038	Adjusted Chi Square Value	97.65

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.865	95% Adjusted Gamma UCL	0.88

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.386	Mean of logged Data	-0.512
Maximum of Logged Data	0.693	SD of logged Data	0.541

Assuming Lognormal Distribution

95% H-UCL	0.895	90% Chebyshev (MVUE) UCL	0.948
95% Chebyshev (MVUE) UCL	1.066	97.5% Chebyshev (MVUE) UCL	1.229
99% Chebyshev (MVUE) UCL	1.551		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.847	95% BCA Bootstrap UCL	0.878
95% Standard Bootstrap UCL	0.844	95% Bootstrap-t UCL	0.926
95% Hall's Bootstrap UCL	1.153	95% Percentile Bootstrap UCL	0.857
90% Chebyshev(Mean, Sd) UCL	0.973	95% Chebyshev(Mean, Sd) UCL	1.101
97.5% Chebyshev(Mean, Sd) UCL	1.277	99% Chebyshev(Mean, Sd) UCL	1.624

Suggested UCL to Use

95% Student's-t UCL	0.854

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ball SB_N Pike

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	0.35	Mean	1.462
Maximum	2.6	Median	1.55
SD	0.606	Std. Error of Mean	0.135
Coefficient of Variation	0.414	Skewness	0.0902

Normal GOF Test

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.0972	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.696	95% Adjusted-CLT UCL (Chen-1995)	1.688
		95% Modified-t UCL (Johnson-1978)	1.697

Gamma GOF Test

A-D Test Statistic	0.345	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.141	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.034	k star (bias corrected MLE)	4.313
Theta hat (MLE)	0.29	Theta star (bias corrected MLE)	0.339
nu hat (MLE)	201.4	nu star (bias corrected)	172.5
MLE Mean (bias corrected)	1.462	MLE Sd (bias corrected)	0.704
		Approximate Chi Square Value (0.05)	143.1
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	141

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.762	95% Adjusted Gamma UCL	1.788

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.175	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.05	Mean of logged Data	0.277
Maximum of Logged Data	0.956	SD of logged Data	0.503

Assuming Lognormal Distribution

95% H-UCL	1.891	90% Chebyshev (MVUE) UCL	2.007
95% Chebyshev (MVUE) UCL	2.243	97.5% Chebyshev (MVUE) UCL	2.57
99% Chebyshev (MVUE) UCL	3.213		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	1.685	95% BCA Bootstrap UCL	1.688
95% Standard Bootstrap UCL	1.679	95% Bootstrap-t UCL	1.706
95% Hall's Bootstrap UCL	1.694	95% Percentile Bootstrap UCL	1.68
90% Chebyshev(Mean, Sd) UCL	1.868	95% Chebyshev(Mean, Sd) UCL	2.052
97.5% Chebyshev(Mean, Sd) UCL	2.308	99% Chebyshev(Mean, Sd) UCL	2.81

Suggested UCL to Use

95% Student's-t UCL 1.696

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Indian_N Pike

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	0.18	Mean	0.552
Maximum	0.88	Median	0.58
SD	0.241	Std. Error of Mean	0.0728
Coefficient of Variation	0.437	Skewness	-0.117

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.792	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.291	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.684	95% Adjusted-CLT UCL (Chen-1995)	0.669
		95% Modified-t UCL (Johnson-1978)	0.683

Gamma GOF Test

A-D Test Statistic	0.332	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.149	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.792	k star (bias corrected MLE)	3.546
Theta hat (MLE)	0.115	Theta star (bias corrected MLE)	0.156
nu hat (MLE)	105.4	nu star (bias corrected)	78.01
MLE Mean (bias corrected)	0.552	MLE Sd (bias corrected)	0.293
		Approximate Chi Square Value (0.05)	58.66
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	55.94

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.734	95% Adjusted Gamma UCL	0.77

Lognormal GOF Test		
Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.876	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.165	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.231	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.715	Mean of logged Data	-0.702
Maximum of Logged Data	-0.128	SD of logged Data	0.518

Assuming Lognormal Distribution

95% H-UCL	0.812	90% Chebyshev (MVUE) UCL	0.827
95% Chebyshev (MVUE) UCL	0.948	97.5% Chebyshev (MVUE) UCL	1.116
99% Chebyshev (MVUE) UCL	1.447		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.672	95% BCA Bootstrap UCL	0.662
95% Standard Bootstrap UCL	0.666	95% Bootstrap-t UCL	0.684
95% Hall's Bootstrap UCL	0.66	95% Percentile Bootstrap UCL	0.665
90% Chebyshev(Mean, Sd) UCL	0.77	95% Chebyshev(Mean, Sd) UCL	0.869
97.5% Chebyshev(Mean, Sd) UCL	1.006	99% Chebyshev(Mean, Sd) UCL	1.276

Suggested UCL to Use

95% Student's-t UCL 0.684

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Packwash_Walleye

General Statistics

Total Number of Observations	6	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.28	Mean	0.64
Maximum	0.98	Median	0.59
SD	0.294	Std. Error of Mean	0.12
Coefficient of Variation	0.459	Skewness	0.174

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7). The Chebyshev UCL often results in gross overestimates of the mean. Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.373	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.882	95% Adjusted-CLT UCL (Chen-1995)	0.847
		95% Modified-t UCL (Johnson-1978)	0.883

Gamma GOF Test

A-D Test Statistic	0.334	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	5.268	k star (bias corrected MLE)	2.745
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.233
nu hat (MLE)	63.22	nu star (bias corrected)	32.94
MLE Mean (bias corrected)	0.64	MLE Sd (bias corrected)	0.386
		Approximate Chi Square Value (0.05)	20.82
Adjusted Level of Significance	0.0122	Adjusted Chi Square Value	17.43

Assuming Gamma Distribution

95% Approximate Gamma UCL	1.013	95% Adjusted Gamma UCL	1.21

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.826	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.182	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.298	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-1.273	Mean of logged Data	-0.544
Maximum of Logged Data	-0.0202	SD of logged Data	0.499

Assuming Lognormal Distribution

95% H-UCL	1.183	90% Chebyshev (MVUE) UCL	1.035
95% Chebyshev (MVUE) UCL	1.213	97.5% Chebyshev (MVUE) UCL	1.459

99% Chebyshev (MVUE) UCL	1.944

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.837	95% BCA Bootstrap UCL	0.815
95% Standard Bootstrap UCL	0.82	95% Bootstrap-t UCL	0.898
95% Hall's Bootstrap UCL	0.863	95% Percentile Bootstrap UCL	0.815
90% Chebyshev(Mean, Sd) UCL	1	95% Chebyshev(Mean, Sd) UCL	1.163
97.5% Chebyshev(Mean, Sd) UCL	1.389	99% Chebyshev(Mean, Sd) UCL	1.834

Suggested UCL to Use

95% Student's-t UCL	0.882

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Wegg_Walleye

General Statistics

Total Number of Observations	15	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.26	Mean	0.4
Maximum	0.63	Median	0.39
SD	0.0954	Std. Error of Mean	0.0246
Coefficient of Variation	0.238	Skewness	0.758

Normal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.835	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.255	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.443	95% Adjusted-CLT UCL (Chen-1995)	0.446
		95% Modified-t UCL (Johnson-1978)	0.444

Gamma GOF Test

A-D Test Statistic	0.199	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.11	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.221	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	19.64	k star (bias corrected MLE)	15.76
Theta hat (MLE)	0.0204	Theta star (bias corrected MLE)	0.0254
nu hat (MLE)	589.2	nu star (bias corrected)	472.7
MLE Mean (bias corrected)	0.4	MLE Sd (bias corrected)	0.101
		Approximate Chi Square Value (0.05)	423.3
Adjusted Level of Significance	0.0324	Adjusted Chi Square Value	417.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.447	95% Adjusted Gamma UCL	0.453

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.901	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.103	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.202	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.347	Mean of logged Data	-0.942
Maximum of Logged Data	-0.462	SD of logged Data	0.234

Assuming Lognormal Distribution

95% H-UCL	0.449	90% Chebyshev (MVUE) UCL	0.473
95% Chebyshev (MVUE) UCL	0.506	97.5% Chebyshev (MVUE) UCL	0.552
99% Chebyshev (MVUE) UCL	0.642		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.441	95% BCA Bootstrap UCL	0.444
95% Standard Bootstrap UCL	0.439	95% Bootstrap-t UCL	0.451
95% Hall's Bootstrap UCL	0.458	95% Percentile Bootstrap UCL	0.438
90% Chebyshev(Mean, Sd) UCL	0.474	95% Chebyshev(Mean, Sd) UCL	0.507
97.5% Chebyshev(Mean, Sd) UCL	0.554	99% Chebyshev(Mean, Sd) UCL	0.645

Suggested UCL to Use

95% Student's-t UCL 0.443

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Oak_Walleye

General Statistics

Total Number of Observations	15	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.24	Mean	0.538
Maximum	0.73	Median	0.56
SD	0.154	Std. Error of Mean	0.0398
Coefficient of Variation	0.287	Skewness	-0.668

Normal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.835	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.255	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.608	95% Adjusted-CLT UCL (Chen-1995)	0.596

95% Modified-t UCL (Johnson-1978)	0.607

Gamma GOF Test

A-D Test Statistic	0.838	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.737	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.221	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.6	k star (bias corrected MLE)	8.524
Theta hat (MLE)	0.0508	Theta star (bias corrected MLE)	0.0631
nu hat (MLE)	318	nu star (bias corrected)	255.7
MLE Mean (bias corrected)	0.538	MLE Sd (bias corrected)	0.184
		Approximate Chi Square Value (0.05)	219.7
Adjusted Level of Significance	0.0324	Adjusted Chi Square Value	215.6

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.626	95% Adjusted Gamma UCL	0.638

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.846	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.901	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.227	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.202	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.427	Mean of logged Data	-0.668
Maximum of Logged Data	-0.315	SD of logged Data	0.34

Assuming Lognormal Distribution

95% H-UCL	0.647	90% Chebyshev (MVUE) UCL	0.686
95% Chebyshev (MVUE) UCL	0.752	97.5% Chebyshev (MVUE) UCL	0.843
99% Chebyshev (MVUE) UCL	1.021		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.603	95% BCA Bootstrap UCL	0.597
95% Standard Bootstrap UCL	0.602	95% Bootstrap-t UCL	0.601
95% Hall's Bootstrap UCL	0.599	95% Percentile Bootstrap UCL	0.6
90% Chebyshev(Mean, Sd) UCL	0.657	95% Chebyshev(Mean, Sd) UCL	0.712
97.5% Chebyshev(Mean, Sd) UCL	0.787	99% Chebyshev(Mean, Sd) UCL	0.934

Suggested UCL to Use

95% Student's-t UCL 0.608

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Maynard_Walleye

General Statistics

Total Number of Observations	17	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	0.28	Mean	0.582
Maximum	1.6	Median	0.48
SD	0.313	Std. Error of Mean	0.0759
Coefficient of Variation	0.538	Skewness	2.417

Normal GOF Test

Shapiro Wilk Test Statistic	0.746	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.851	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.241	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.714	95% Adjusted-CLT UCL (Chen-1995)	0.754
		95% Modified-t UCL (Johnson-1978)	0.722

Gamma GOF Test

A-D Test Statistic	0.666	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.21	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.21	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.349	k star (bias corrected MLE)	4.445
Theta hat (MLE)	0.109	Theta star (bias corrected MLE)	0.131
nu hat (MLE)	181.9	nu star (bias corrected)	151.1
MLE Mean (bias corrected)	0.582	MLE Sd (bias corrected)	0.276
		Approximate Chi Square Value (0.05)	123.7
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	121.1

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.711	95% Adjusted Gamma UCL	0.726

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.91	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.177	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.19	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.273	Mean of logged Data	-0.638
Maximum of Logged Data	0.47	SD of logged Data	0.423

Assuming Lognormal Distribution

95% H-UCL	0.711	90% Chebyshev (MVUE) UCL	0.755
95% Chebyshev (MVUE) UCL	0.837	97.5% Chebyshev (MVUE) UCL	0.951
99% Chebyshev (MVUE) UCL	1.175		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.707	95% BCA Bootstrap UCL	0.754
95% Standard Bootstrap UCL	0.701	95% Bootstrap-t UCL	0.842
95% Hall's Bootstrap UCL	1.321	95% Percentile Bootstrap UCL	0.711
90% Chebyshev(Mean, Sd) UCL	0.809	95% Chebyshev(Mean, Sd) UCL	0.913
97.5% Chebyshev(Mean, Sd) UCL	1.056	99% Chebyshev(Mean, Sd) UCL	1.337

Suggested UCL to Use

95% Adjusted Gamma UCL	0.726

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Tide_Walleye

General Statistics

Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.45	Mean	0.573
Maximum	0.82	Median	0.51

SD	0.169	Std. Error of Mean	0.0846
Coefficient of Variation	0.296	Skewness	1.72

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach, refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance, but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7). The Chebyshev UCL often results in gross overestimates of the mean. Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test

Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.326	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.772	95% Adjusted-CLT UCL (Chen-1995)	0.789
		95% Modified-t UCL (Johnson-1978)	0.784

Gamma GOF Test

A-D Test Statistic	0.48	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics

k hat (MLE)	17.39	k star (bias corrected MLE)	4.513
Theta hat (MLE)	0.0329	Theta star (bias corrected MLE)	0.127
nu hat (MLE)	139.1	nu star (bias corrected)	36.1
MLE Mean (bias corrected)	0.573	MLE Sd (bias corrected)	0.269
		Approximate Chi Square Value (0.05)	23.35
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.885	95% Adjusted Gamma UCL	N/A

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.856	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.792	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.293	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.346	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal Statistics

Minimum of Logged Data	-0.799	Mean of logged Data	-0.587
Maximum of Logged Data	-0.198	SD of logged Data	0.27

Assuming Lognormal Distribution

95% H-UCL	0.875	90% Chebyshev (MVUE) UCL	0.801
95% Chebyshev (MVUE) UCL	0.905	97.5% Chebyshev (MVUE) UCL	1.05
99% Chebyshev (MVUE) UCL	1.334		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.712	95% BCA Bootstrap UCL	N/A
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
90% Chebyshev(Mean, Sd) UCL	0.826	95% Chebyshev(Mean, Sd) UCL	0.941
97.5% Chebyshev(Mean, Sd) UCL	1.101	99% Chebyshev(Mean, Sd) UCL	1.414

Suggested UCL to Use

95% Student's-t UCL	0.772

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ball NB_Walleye

General Statistics

Total Number of Observations	46	Number of Distinct Observations	36
		Number of Missing Observations	0
Minimum	0.24	Mean	0.583
Maximum	1.2	Median	0.51
SD	0.246	Std. Error of Mean	0.0363
Coefficient of Variation	0.422	Skewness	0.699

Normal GOF Test

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.927	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.146	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.151	Data appear Normal at 1% Significance Level	

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.644	95% Adjusted-CLT UCL (Chen-1995)	0.646
		95% Modified-t UCL (Johnson-1978)	0.644

Gamma GOF Test

A-D Test Statistic	0.573	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0975	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.131	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.984	k star (bias corrected MLE)	5.608
Theta hat (MLE)	0.0974	Theta star (bias corrected MLE)	0.104
nu hat (MLE)	550.5	nu star (bias corrected)	516
MLE Mean (bias corrected)	0.583	MLE Sd (bias corrected)	0.246
		Approximate Chi Square Value (0.05)	464.3
Adjusted Level of Significance	0.0448	Adjusted Chi Square Value	462.7

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.648	95% Adjusted Gamma UCL	0.65

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.953	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0841	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.119	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.427	Mean of logged Data	-0.626
Maximum of Logged Data	0.182	SD of logged Data	0.421

Assuming Lognormal Distribution

95% H-UCL	0.656	90% Chebyshev (MVUE) UCL	0.696
95% Chebyshev (MVUE) UCL	0.747	97.5% Chebyshev (MVUE) UCL	0.817
99% Chebyshev (MVUE) UCL	0.956		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.642	95% BCA Bootstrap UCL	0.642
95% Standard Bootstrap UCL	0.643	95% Bootstrap-t UCL	0.648
95% Hall's Bootstrap UCL	0.647	95% Percentile Bootstrap UCL	0.64
90% Chebyshev(Mean, Sd) UCL	0.692	95% Chebyshev(Mean, Sd) UCL	0.741
97.5% Chebyshev(Mean, Sd) UCL	0.809	99% Chebyshev(Mean, Sd) UCL	0.944

Suggested UCL to Use

95% Student's-t UCL	0.644

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ball SB_Walleye

General Statistics

Total Number of Observations	51	Number of Distinct Observations	35
		Number of Missing Observations	0
Minimum	0.22	Mean	0.855
Maximum	1.7	Median	0.8
SD	0.34	Std. Error of Mean	0.0477
Coefficient of Variation	0.398	Skewness	0.568

Normal GOF Test

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	0.105	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.102	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.143	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.935	95% Adjusted-CLT UCL (Chen-1995)	0.937
		95% Modified-t UCL (Johnson-1978)	0.935

Gamma GOF Test

A-D Test Statistic	0.233	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0835	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.124	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.244	k star (bias corrected MLE)	5.89
Theta hat (MLE)	0.137	Theta star (bias corrected MLE)	0.145
nu hat (MLE)	636.9	nu star (bias corrected)	600.7
MLE Mean (bias corrected)	0.855	MLE Sd (bias corrected)	0.352
		Approximate Chi Square Value (0.05)	544.9

Adjusted Level of Significance	0.0453	Adjusted Chi Square Value	543.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.942	95% Adjusted Gamma UCL	0.945

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	0.49	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0762	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.113	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.514	Mean of logged Data	-0.239
Maximum of Logged Data	0.531	SD of logged Data	0.422

Assuming Lognormal Distribution

95% H-UCL	0.96	90% Chebyshev (MVUE) UCL	1.017
95% Chebyshev (MVUE) UCL	1.089	97.5% Chebyshev (MVUE) UCL	1.188
99% Chebyshev (MVUE) UCL	1.383		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.933	95% BCA Bootstrap UCL	0.936
95% Standard Bootstrap UCL	0.932	95% Bootstrap-t UCL	0.938
95% Hall's Bootstrap UCL	0.937	95% Percentile Bootstrap UCL	0.934
90% Chebyshev(Mean, Sd) UCL	0.998	95% Chebyshev(Mean, Sd) UCL	1.063
97.5% Chebyshev(Mean, Sd) UCL	1.152	99% Chebyshev(Mean, Sd) UCL	1.329

Suggested UCL to Use

95% Student's-t UCL	0.935

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Indian_Walleye

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.27	Mean	0.503
Maximum	0.86	Median	0.49
SD	0.152	Std. Error of Mean	0.0438

Coefficient of Variation	0.302	Skewness	1.047

Normal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.805	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.281	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.581	95% Adjusted-CLT UCL (Chen-1995)	0.589
		95% Modified-t UCL (Johnson-1978)	0.583

Gamma GOF Test

A-D Test Statistic	0.267	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.245	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.71	k star (bias corrected MLE)	9.587
Theta hat (MLE)	0.0395	Theta star (bias corrected MLE)	0.0524
nu hat (MLE)	305	nu star (bias corrected)	230.1
MLE Mean (bias corrected)	0.503	MLE Sd (bias corrected)	0.162
		Approximate Chi Square Value (0.05)	196
Adjusted Level of Significance	0.029	Adjusted Chi Square Value	191.2

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.59	95% Adjusted Gamma UCL	0.605

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.883	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.141	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.223	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.309	Mean of logged Data	-0.728
Maximum of Logged Data	-0.151	SD of logged Data	0.295

Assuming Lognormal Distribution

95% H-UCL	0.598	90% Chebyshev (MVUE) UCL	0.632
95% Chebyshev (MVUE) UCL	0.69	97.5% Chebyshev (MVUE) UCL	0.772
99% Chebyshev (MVUE) UCL	0.931		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.575	95% BCA Bootstrap UCL	0.584
95% Standard Bootstrap UCL	0.572	95% Bootstrap-t UCL	0.608
95% Hall's Bootstrap UCL	0.699	95% Percentile Bootstrap UCL	0.575
90% Chebyshev(Mean, Sd) UCL	0.634	95% Chebyshev(Mean, Sd) UCL	0.693
97.5% Chebyshev(Mean, Sd) UCL	0.776	99% Chebyshev(Mean, Sd) UCL	0.938

Suggested UCL to Use

95% Student's-t UCL 0.581

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Oak_Forage All

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	0.04	Mean	0.178
Maximum	0.32	Median	0.185
SD	0.0651	Std. Error of Mean	0.0146
Coefficient of Variation	0.367	Skewness	-0.139

Normal GOF Test

Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.203	95% Adjusted-CLT UCL (Chen-1995)	0.201
		95% Modified-t UCL (Johnson-1978)	0.203

Gamma GOF Test

A-D Test Statistic	0.717	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.198	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.888	k star (bias corrected MLE)	5.038
Theta hat (MLE)	0.0301	Theta star (bias corrected MLE)	0.0352
nu hat (MLE)	235.5	nu star (bias corrected)	201.5
MLE Mean (bias corrected)	0.178	MLE Sd (bias corrected)	0.0791
		Approximate Chi Square Value (0.05)	169.7
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	167.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.211	95% Adjusted Gamma UCL	0.214

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.232	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.219	Mean of logged Data	-1.816
Maximum of Logged Data	-1.139	SD of logged Data	0.476

Assuming Lognormal Distribution

95% H-UCL	0.227	90% Chebyshev (MVUE) UCL	0.241
95% Chebyshev (MVUE) UCL	0.268	97.5% Chebyshev (MVUE) UCL	0.306
99% Chebyshev (MVUE) UCL	0.379		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.201	95% BCA Bootstrap UCL	0.2
95% Standard Bootstrap UCL	0.201	95% Bootstrap-t UCL	0.201
95% Hall's Bootstrap UCL	0.201	95% Percentile Bootstrap UCL	0.201
90% Chebyshev(Mean, Sd) UCL	0.221	95% Chebyshev(Mean, Sd) UCL	0.241
97.5% Chebyshev(Mean, Sd) UCL	0.268	99% Chebyshev(Mean, Sd) UCL	0.322

Suggested UCL to Use

95% Student's-t UCL 0.203

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Maynard_Forage All

General Statistics

Total Number of Observations	20	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.05	Mean	0.104
Maximum	0.16	Median	0.11
SD	0.0322	Std. Error of Mean	0.00719
Coefficient of Variation	0.311	Skewness	0.0383

Normal GOF Test

Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.116	95% Adjusted-CLT UCL (Chen-1995)	0.115
		95% Modified-t UCL (Johnson-1978)	0.116

Gamma GOF Test

A-D Test Statistic	0.358	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.168	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.13	k star (bias corrected MLE)	8.648
Theta hat (MLE)	0.0102	Theta star (bias corrected MLE)	0.012
nu hat (MLE)	405.4	nu star (bias corrected)	345.9
MLE Mean (bias corrected)	0.104	MLE Sd (bias corrected)	0.0352
		Approximate Chi Square Value (0.05)	303.8
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	300.7

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.118	95% Adjusted Gamma UCL	0.119

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.996	Mean of logged Data	-2.318
Maximum of Logged Data	-1.833	SD of logged Data	0.334

Assuming Lognormal Distribution

95% H-UCL	0.12	90% Chebyshev (MVUE) UCL	0.127
95% Chebyshev (MVUE) UCL	0.138	97.5% Chebyshev (MVUE) UCL	0.153
99% Chebyshev (MVUE) UCL	0.182		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.115	95% BCA Bootstrap UCL	0.115
95% Standard Bootstrap UCL	0.115	95% Bootstrap-t UCL	0.116
95% Hall's Bootstrap UCL	0.115	95% Percentile Bootstrap UCL	0.115
90% Chebyshev(Mean, Sd) UCL	0.125	95% Chebyshev(Mean, Sd) UCL	0.135
97.5% Chebyshev(Mean, Sd) UCL	0.148	99% Chebyshev(Mean, Sd) UCL	0.175

Suggested UCL to Use

95% Student's-t UCL	0.116

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ball NB_Forage All

General Statistics

Total Number of Observations	60	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	0.06	Mean	0.174
Maximum	0.43	Median	0.155
SD	0.0826	Std. Error of Mean	0.0107
Coefficient of Variation	0.476	Skewness	0.984

Normal GOF Test

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	6.1158E-4	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.113	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.132	Data appear Normal at 1% Significance Level	

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.191	95% Adjusted-CLT UCL (Chen-1995)	0.193
		95% Modified-t UCL (Johnson-1978)	0.192

Gamma GOF Test

A-D Test Statistic	0.386	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0665	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.115	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.735	k star (bias corrected MLE)	4.51
Theta hat (MLE)	0.0367	Theta star (bias corrected MLE)	0.0385
nu hat (MLE)	568.3	nu star (bias corrected)	541.2
MLE Mean (bias corrected)	0.174	MLE Sd (bias corrected)	0.0818
		Approximate Chi Square Value (0.05)	488.2
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	487

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.193	95% Adjusted Gamma UCL	0.193

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.181	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0834	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.104	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.813	Mean of logged Data	-1.86
Maximum of Logged Data	-0.844	SD of logged Data	0.478

Assuming Lognormal Distribution

95% H-UCL	0.196	90% Chebyshev (MVUE) UCL	0.208
95% Chebyshev (MVUE) UCL	0.223	97.5% Chebyshev (MVUE) UCL	0.244
99% Chebyshev (MVUE) UCL	0.286		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.191	95% BCA Bootstrap UCL	0.193
95% Standard Bootstrap UCL	0.191	95% Bootstrap-t UCL	0.193
95% Hall's Bootstrap UCL	0.193	95% Percentile Bootstrap UCL	0.191
90% Chebyshev(Mean, Sd) UCL	0.206	95% Chebyshev(Mean, Sd) UCL	0.22
97.5% Chebyshev(Mean, Sd) UCL	0.24	99% Chebyshev(Mean, Sd) UCL	0.28

Suggested UCL to Use

95% Student's-t UCL 0.191

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ball SB_Forage All

General Statistics

Total Number of Observations	55	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.08	Mean	0.211
Maximum	0.68	Median	0.19
SD	0.0991	Std. Error of Mean	0.0134
Coefficient of Variation	0.469	Skewness	2.419

Normal GOF Test

Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	4.0829E-9	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.138	Data Not Normal at 1% Significance Level

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.234	95% Adjusted-CLT UCL (Chen-1995)	0.238
		95% Modified-t UCL (Johnson-1978)	0.234

Gamma GOF Test

A-D Test Statistic	0.699	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.113	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.12	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.159	k star (bias corrected MLE)	5.835
Theta hat (MLE)	0.0343	Theta star (bias corrected MLE)	0.0362
nu hat (MLE)	677.4	nu star (bias corrected)	641.8
MLE Mean (bias corrected)	0.211	MLE Sd (bias corrected)	0.0875
		Approximate Chi Square Value (0.05)	584.1

Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	582.6

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.232	95% Adjusted Gamma UCL	0.233

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk P Value	0.572	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.0864	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.109	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.526	Mean of logged Data	-1.638
Maximum of Logged Data	-0.386	SD of logged Data	0.398

Assuming Lognormal Distribution

95% H-UCL	0.232	90% Chebyshev (MVUE) UCL	0.245
95% Chebyshev (MVUE) UCL	0.261	97.5% Chebyshev (MVUE) UCL	0.283
99% Chebyshev (MVUE) UCL	0.326		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.233	95% BCA Bootstrap UCL	0.24
95% Standard Bootstrap UCL	0.233	95% Bootstrap-t UCL	0.241
95% Hall's Bootstrap UCL	0.249	95% Percentile Bootstrap UCL	0.235
90% Chebyshev(Mean, Sd) UCL	0.251	95% Chebyshev(Mean, Sd) UCL	0.27
97.5% Chebyshev(Mean, Sd) UCL	0.295	99% Chebyshev(Mean, Sd) UCL	0.344

Suggested UCL to Use

95% Approximate Gamma UCL	0.232

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Indian_Forage All

General Statistics

Total Number of Observations	17	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.1	Mean	0.223
Maximum	0.44	Median	0.21
SD	0.0862	Std. Error of Mean	0.0209

Coefficient of Variation	0.386	Skewness	0.918

Normal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.851	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.161	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.241	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.259	95% Adjusted-CLT UCL (Chen-1995)	0.262
		95% Modified-t UCL (Johnson-1978)	0.26

Gamma GOF Test

A-D Test Statistic	0.209	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.112	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.209	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.379	k star (bias corrected MLE)	6.116
Theta hat (MLE)	0.0302	Theta star (bias corrected MLE)	0.0364
nu hat (MLE)	250.9	nu star (bias corrected)	208
MLE Mean (bias corrected)	0.223	MLE Sd (bias corrected)	0.0901
		Approximate Chi Square Value (0.05)	175.6
Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	172.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.264	95% Adjusted Gamma UCL	0.269

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.91	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.19	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	-1.57
Maximum of Logged Data	-0.821	SD of logged Data	0.388

Assuming Lognormal Distribution

95% H-UCL	0.27	90% Chebyshev (MVUE) UCL	0.288
95% Chebyshev (MVUE) UCL	0.317	97.5% Chebyshev (MVUE) UCL	0.357
99% Chebyshev (MVUE) UCL	0.436		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.257	95% BCA Bootstrap UCL	0.262
95% Standard Bootstrap UCL	0.257	95% Bootstrap-t UCL	0.268
95% Hall's Bootstrap UCL	0.275	95% Percentile Bootstrap UCL	0.258
90% Chebyshev(Mean, Sd) UCL	0.286	95% Chebyshev(Mean, Sd) UCL	0.314
97.5% Chebyshev(Mean, Sd) UCL	0.353	99% Chebyshev(Mean, Sd) UCL	0.431

Suggested UCL to Use

95% Student's-t UCL	0.259

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Maynard_Forage Small

General Statistics

Total Number of Observations	1	Number of Distinct Observations	1
		Number of Missing Observations	0
Minimum	0.08	Mean	0.08
Maximum	0.08	Median	0.08

Warning: This data set only has 1 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable Maynard_Forage Small was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Oak_Forage Large

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	0.04	Mean	0.178
Maximum	0.32	Median	0.185
SD	0.0651	Std. Error of Mean	0.0146
Coefficient of Variation	0.367	Skewness	-0.139

Normal GOF Test

Shapiro Wilk Test Statistic	0.975	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.203	95% Adjusted-CLT UCL (Chen-1995)	0.201
		95% Modified-t UCL (Johnson-1978)	0.203

Gamma GOF Test

A-D Test Statistic	0.717	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.198	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.888	k star (bias corrected MLE)	5.038
Theta hat (MLE)	0.0301	Theta star (bias corrected MLE)	0.0352
nu hat (MLE)	235.5	nu star (bias corrected)	201.5
MLE Mean (bias corrected)	0.178	MLE Sd (bias corrected)	0.0791
		Approximate Chi Square Value (0.05)	169.7
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	167.4

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.211	95% Adjusted Gamma UCL	0.214

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.232	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.219	Mean of logged Data	-1.816
Maximum of Logged Data	-1.139	SD of logged Data	0.476

Assuming Lognormal Distribution

95% H-UCL	0.227	90% Chebyshev (MVUE) UCL	0.241
95% Chebyshev (MVUE) UCL	0.268	97.5% Chebyshev (MVUE) UCL	0.306
99% Chebyshev (MVUE) UCL	0.379		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.201	95% BCA Bootstrap UCL	0.2
95% Standard Bootstrap UCL	0.201	95% Bootstrap-t UCL	0.201
95% Hall's Bootstrap UCL	0.201	95% Percentile Bootstrap UCL	0.201
90% Chebyshev(Mean, Sd) UCL	0.221	95% Chebyshev(Mean, Sd) UCL	0.241
97.5% Chebyshev(Mean, Sd) UCL	0.268	99% Chebyshev(Mean, Sd) UCL	0.322

Suggested UCL to Use

95% Student's-t UCL 0.203

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Maynard_Forage Large

General Statistics

Total Number of Observations	19	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	0.05	Mean	0.105
Maximum	0.16	Median	0.11
SD	0.0326	Std. Error of Mean	0.00747
Coefficient of Variation	0.311	Skewness	-0.0649

Normal GOF Test

Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.863	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.143	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.229	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.118	95% Adjusted-CLT UCL (Chen-1995)	0.117
		95% Modified-t UCL (Johnson-1978)	0.118

Gamma GOF Test

A-D Test Statistic	0.385	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.182	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.199	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.946	k star (bias corrected MLE)	8.411
Theta hat (MLE)	0.0105	Theta star (bias corrected MLE)	0.0125
nu hat (MLE)	378	nu star (bias corrected)	319.6
MLE Mean (bias corrected)	0.105	MLE Sd (bias corrected)	0.0361
		Approximate Chi Square Value (0.05)	279.2
Adjusted Level of Significance	0.0369	Adjusted Chi Square Value	275.9

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.12	95% Adjusted Gamma UCL	0.121

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.917	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.195	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.18	Data Not Lognormal at 10% Significance Level

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.996	Mean of logged Data	-2.307
Maximum of Logged Data	-1.833	SD of logged Data	0.339

Assuming Lognormal Distribution

95% H-UCL	0.122	90% Chebyshev (MVUE) UCL	0.13
95% Chebyshev (MVUE) UCL	0.141	97.5% Chebyshev (MVUE) UCL	0.157
99% Chebyshev (MVUE) UCL	0.188		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.117	95% BCA Bootstrap UCL	0.116
95% Standard Bootstrap UCL	0.117	95% Bootstrap-t UCL	0.117
95% Hall's Bootstrap UCL	0.116	95% Percentile Bootstrap UCL	0.117
90% Chebyshev(Mean, Sd) UCL	0.127	95% Chebyshev(Mean, Sd) UCL	0.137
97.5% Chebyshev(Mean, Sd) UCL	0.151	99% Chebyshev(Mean, Sd) UCL	0.179

Suggested UCL to Use

95% Student's-t UCL	0.118

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Ball NB_Forage Large

General Statistics

Total Number of Observations	60	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	0.06	Mean	0.174
Maximum	0.43	Median	0.155
SD	0.0826	Std. Error of Mean	0.0107
Coefficient of Variation	0.476	Skewness	0.984

Normal GOF Test

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
1% Shapiro Wilk P Value	6.1158E-4	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.113	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.132	Data appear Normal at 1% Significance Level

Data appear Approximate Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.191	95% Adjusted-CLT UCL (Chen-1995)	0.193
		95% Modified-t UCL (Johnson-1978)	0.192

Gamma GOF Test

A-D Test Statistic	0.386	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0665	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.115	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.735	k star (bias corrected MLE)	4.51
Theta hat (MLE)	0.0367	Theta star (bias corrected MLE)	0.0385
nu hat (MLE)	568.3	nu star (bias corrected)	541.2
MLE Mean (bias corrected)	0.174	MLE Sd (bias corrected)	0.0818
		Approximate Chi Square Value (0.05)	488.2
Adjusted Level of Significance	0.046	Adjusted Chi Square Value	487

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.193	95% Adjusted Gamma UCL	0.193

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.181	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0834	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.104	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.813	Mean of logged Data	-1.86
Maximum of Logged Data	-0.844	SD of logged Data	0.478

Assuming Lognormal Distribution

95% H-UCL	0.196	90% Chebyshev (MVUE) UCL	0.208
95% Chebyshev (MVUE) UCL	0.223	97.5% Chebyshev (MVUE) UCL	0.244
99% Chebyshev (MVUE) UCL	0.286		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.191	95% BCA Bootstrap UCL	0.193
95% Standard Bootstrap UCL	0.191	95% Bootstrap-t UCL	0.193
95% Hall's Bootstrap UCL	0.193	95% Percentile Bootstrap UCL	0.191
90% Chebyshev(Mean, Sd) UCL	0.206	95% Chebyshev(Mean, Sd) UCL	0.22
97.5% Chebyshev(Mean, Sd) UCL	0.24	99% Chebyshev(Mean, Sd) UCL	0.28

Suggested UCL to Use

95% Student's-t UCL 0.191

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Ball SB_Forage Large

General Statistics

Total Number of Observations	55	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.08	Mean	0.211
Maximum	0.68	Median	0.19
SD	0.0991	Std. Error of Mean	0.0134
Coefficient of Variation	0.469	Skewness	2.419

Normal GOF Test

Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	4.0829E-9	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.138	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.234	95% Adjusted-CLT UCL (Chen-1995)	0.238
		95% Modified-t UCL (Johnson-1978)	0.234

Gamma GOF Test

A-D Test Statistic	0.699	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.113	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.12	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.159	k star (bias corrected MLE)	5.835
Theta hat (MLE)	0.0343	Theta star (bias corrected MLE)	0.0362
nu hat (MLE)	677.4	nu star (bias corrected)	641.8
MLE Mean (bias corrected)	0.211	MLE Sd (bias corrected)	0.0875
		Approximate Chi Square Value (0.05)	584.1
Adjusted Level of Significance	0.0456	Adjusted Chi Square Value	582.6

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.232	95% Adjusted Gamma UCL	0.233

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	0.572	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0864	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.109	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.526	Mean of logged Data	-1.638
Maximum of Logged Data	-0.386	SD of logged Data	0.398

Assuming Lognormal Distribution

95% H-UCL	0.232	90% Chebyshev (MVUE) UCL	0.245
95% Chebyshev (MVUE) UCL	0.261	97.5% Chebyshev (MVUE) UCL	0.283
99% Chebyshev (MVUE) UCL	0.326		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.233	95% BCA Bootstrap UCL	0.24
95% Standard Bootstrap UCL	0.233	95% Bootstrap-t UCL	0.241

95% Hall's Bootstrap UCL	0.249	95% Percentile Bootstrap UCL	0.235
90% Chebyshev(Mean, Sd) UCL	0.251	95% Chebyshev(Mean, Sd) UCL	0.27
97.5% Chebyshev(Mean, Sd) UCL	0.295	99% Chebyshev(Mean, Sd) UCL	0.344

Suggested UCL to Use

95% Approximate Gamma UCL 0.232

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Indian_Forage Large

General Statistics

Total Number of Observations	17	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.1	Mean	0.223
Maximum	0.44	Median	0.21
SD	0.0862	Std. Error of Mean	0.0209
Coefficient of Variation	0.386	Skewness	0.918

Normal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.851	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.161	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.241	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.259	95% Adjusted-CLT UCL (Chen-1995)	0.262
		95% Modified-t UCL (Johnson-1978)	0.26

Gamma GOF Test

A-D Test Statistic	0.209	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.112	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.209	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.379	k star (bias corrected MLE)	6.116
Theta hat (MLE)	0.0302	Theta star (bias corrected MLE)	0.0364
nu hat (MLE)	250.9	nu star (bias corrected)	208
MLE Mean (bias corrected)	0.223	MLE Sd (bias corrected)	0.0901
		Approximate Chi Square Value (0.05)	175.6

Adjusted Level of Significance	0.0346	Adjusted Chi Square Value	172.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.264	95% Adjusted Gamma UCL	0.269

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.91	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.19	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.303	Mean of logged Data	-1.57
Maximum of Logged Data	-0.821	SD of logged Data	0.388

Assuming Lognormal Distribution

95% H-UCL	0.27	90% Chebyshev (MVUE) UCL	0.288
95% Chebyshev (MVUE) UCL	0.317	97.5% Chebyshev (MVUE) UCL	0.357
99% Chebyshev (MVUE) UCL	0.436		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.257	95% BCA Bootstrap UCL	0.262
95% Standard Bootstrap UCL	0.257	95% Bootstrap-t UCL	0.268
95% Hall's Bootstrap UCL	0.275	95% Percentile Bootstrap UCL	0.258
90% Chebyshev(Mean, Sd) UCL	0.286	95% Chebyshev(Mean, Sd) UCL	0.314
97.5% Chebyshev(Mean, Sd) UCL	0.353	99% Chebyshev(Mean, Sd) UCL	0.431

Suggested UCL to Use

95% Student's-t UCL	0.259

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment E
Human Health Exposure Model

APPENDIX E: HUMAN HEALTH EXPOSURE AND RISK MODEL

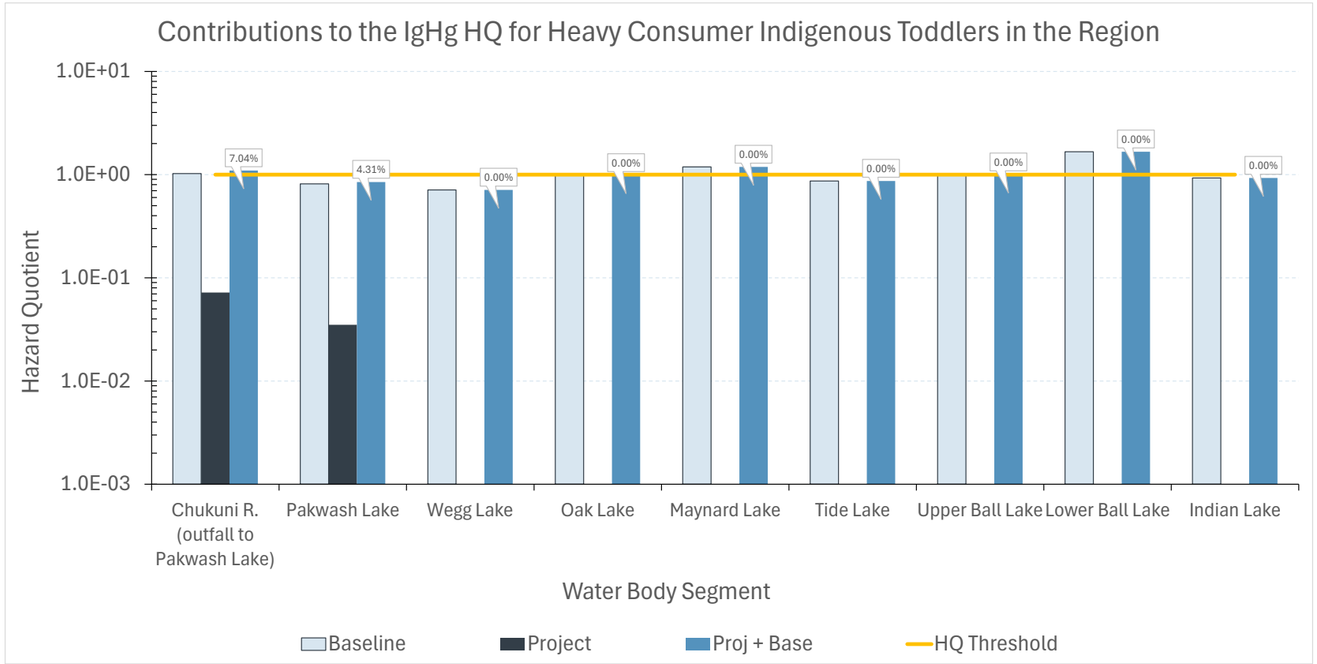
In the HHRA model the assessment cases are represented by the following terms:
Baseline: Environmental conditions that predate any influence of the Project.
Project: The period of time at which the Project is in operations but does not consider the influence of background conditions (Project alone).
Baseline+Project: The cumulative scenario that considers influences from baseline and Project conditions.

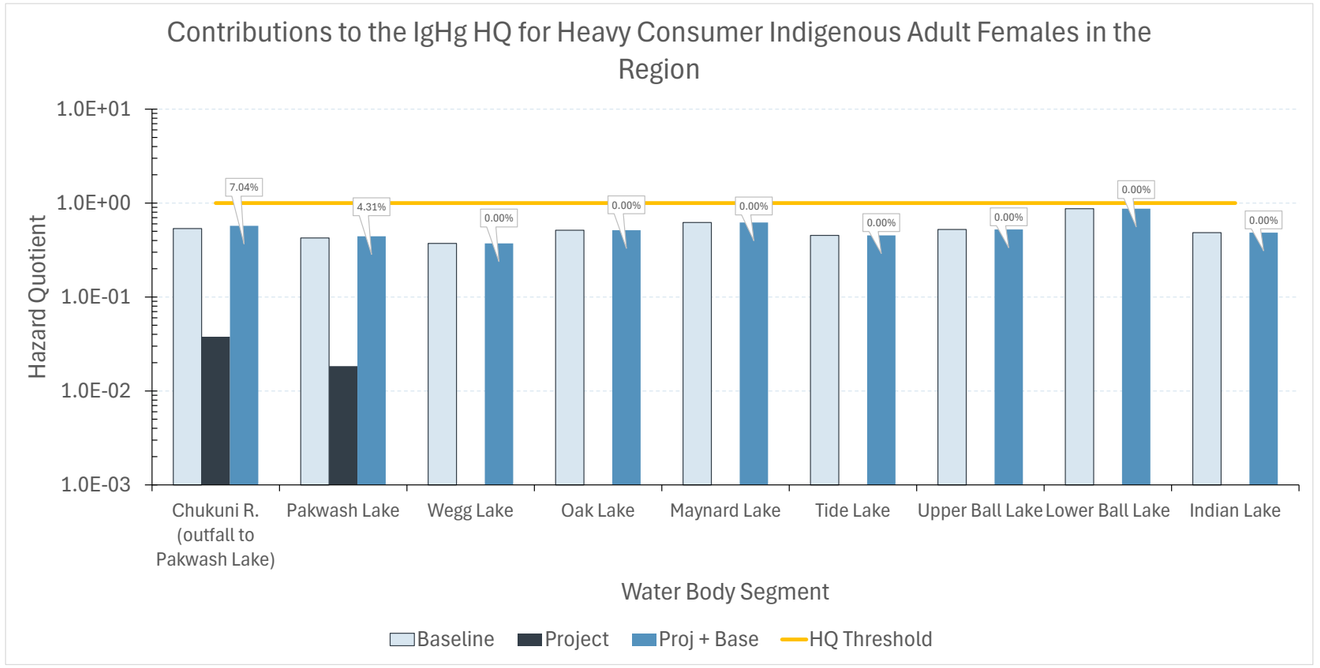
In the HHRA model the receptors are represented by the following terms:
Toddler: Receptor aged between 6 months to 5 years and is considered the most sensitive by Health Canada
AdultFem: Adult female receptor
AdultMal: Adult male receptor
AdultGen: General Adult population

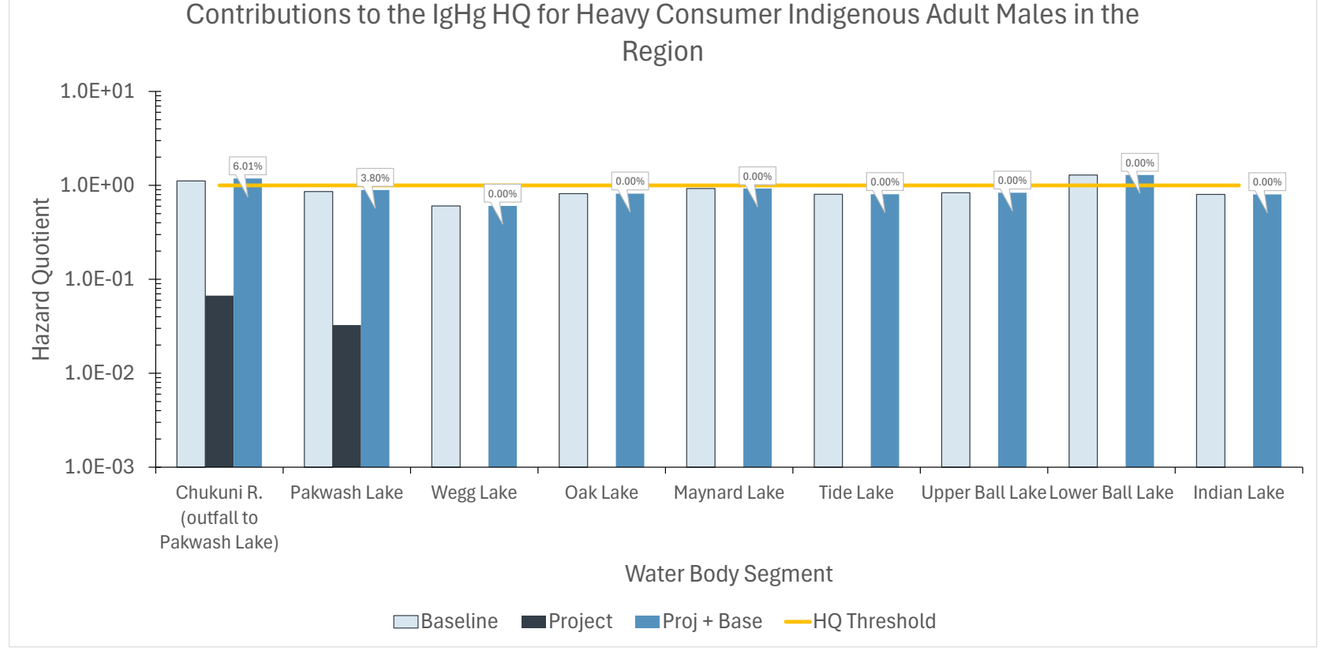
Abbreviations:
AdultFem= Adult female receptor
AdultGen= General Adult population
AdultMal= Adult male receptor
HQ= Hazard quotient
INDG= Indigenous
L.= Lake
MeHg= Methylmercury
mg/day= Milligrams per day
mg/kg= Milligrams per kilograms
mg/kg/day= Milligrams per kilogram of body weight per day
mg/L=Milligrams per liter
ng/L= Nanograms per liter
pg/L= Picograms per liter
R.= River
UCLM= Upper confidence limit of the mean
WW= Wet weight

Table E-1: Inorganic Mercury Risk Summary for the Heavy Consumer

Predicted HQ Values for Heavy Consumer Exposure to Inorganic Mercury [Unitless]																
		Toddler				AdultFEM				AdultMAL				AdultGEN			
Segment	ID	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase
1	Chukuni R. (outfall to Pakwash Lake)	1.0	0.072	1.1	7.04%	0.54	0.038	0.57	7.04%	1.1	0.067	1.2	6.01%	1.1	0.064	1.1	5.97%
2	Pakwash Lake	0.81	0.035	0.85	4.31%	0.43	0.018	0.44	4.31%	0.86	0.033	0.89	3.80%	0.82	0.031	0.85	3.79%
7	Wegg Lake	0.71	0.0000	0.71	0.00%	0.37	0.0000	0.37	0.00%	0.61	0.0000	0.61	0.00%	0.58	0.0000	0.58	0.00%
13	Oak Lake	0.98	0.0000	0.98	0.00%	0.51	0.0000	0.51	0.00%	0.82	0.0000	0.82	0.00%	0.79	0.0000	0.79	0.00%
15	Maynard Lake	1.2	0.0000	1.2	0.00%	0.62	0.0000	0.62	0.00%	0.93	0.0000	0.93	0.00%	0.92	0.0000	0.92	0.00%
16	Tide Lake	0.87	0.0000	0.87	0.00%	0.45	0.0000	0.45	0.00%	0.81	0.0000	0.81	0.00%	0.78	0.0000	0.78	0.00%
17	Upper Ball Lake	1.0	0.0000	1.0	0.00%	0.52	0.0000	0.52	0.00%	0.83	0.0000	0.83	0.00%	0.81	0.0000	0.81	0.00%
18	Lower Ball Lake	1.7	0.0000	1.7	0.00%	0.87	0.0000	0.87	0.00%	1.3	0.0000	1.3	0.00%	1.3	0.0000	1.3	0.00%
19	Indian Lake	0.93	0.0000	0.93	0.00%	0.48	0.0000	0.48	0.00%	0.80	0.0000	0.80	0.00%	0.77	0.0000	0.77	0.00%


Contributions to the IgHg HQ for Heavy Consumer Indigenous Toddlers in the Region
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
Hazard Quotient
7.04%
4.31%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the IgHg HQ for Heavy Consumer Indigenous Adult Females in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
7.04%
4.31%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the IgHg HQ for Heavy Consumer Indigenous Adult Males in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
6.01%
3.80%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

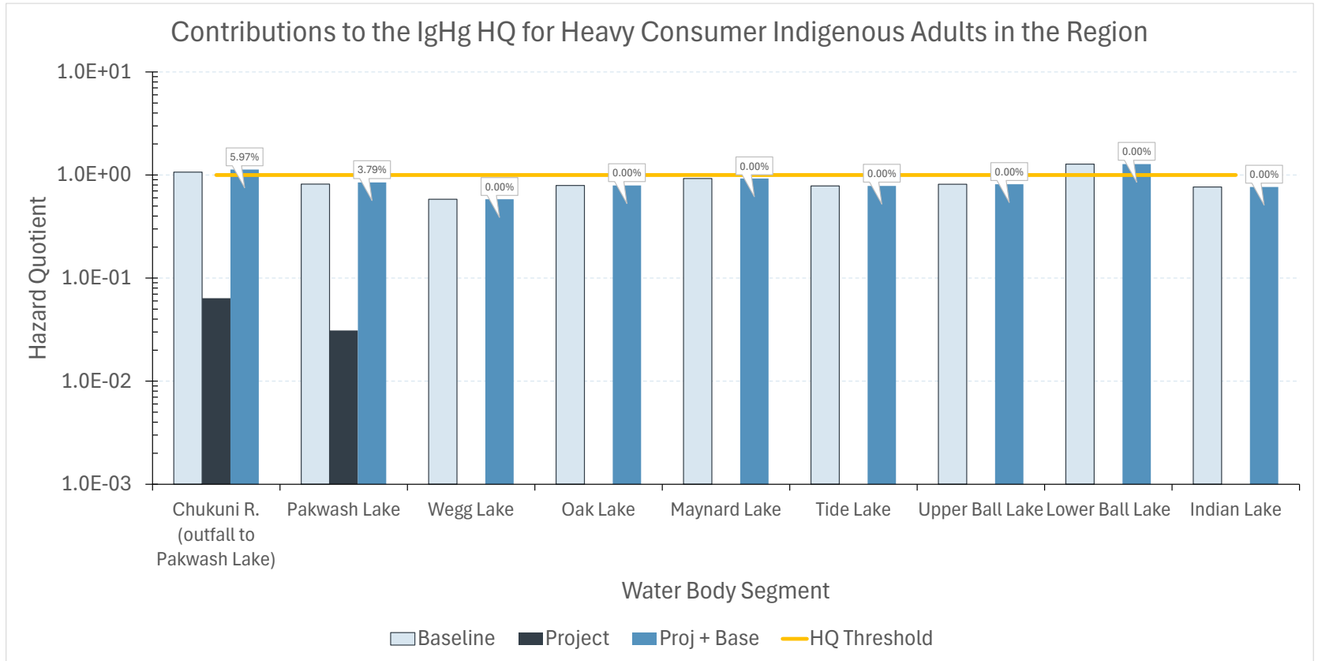
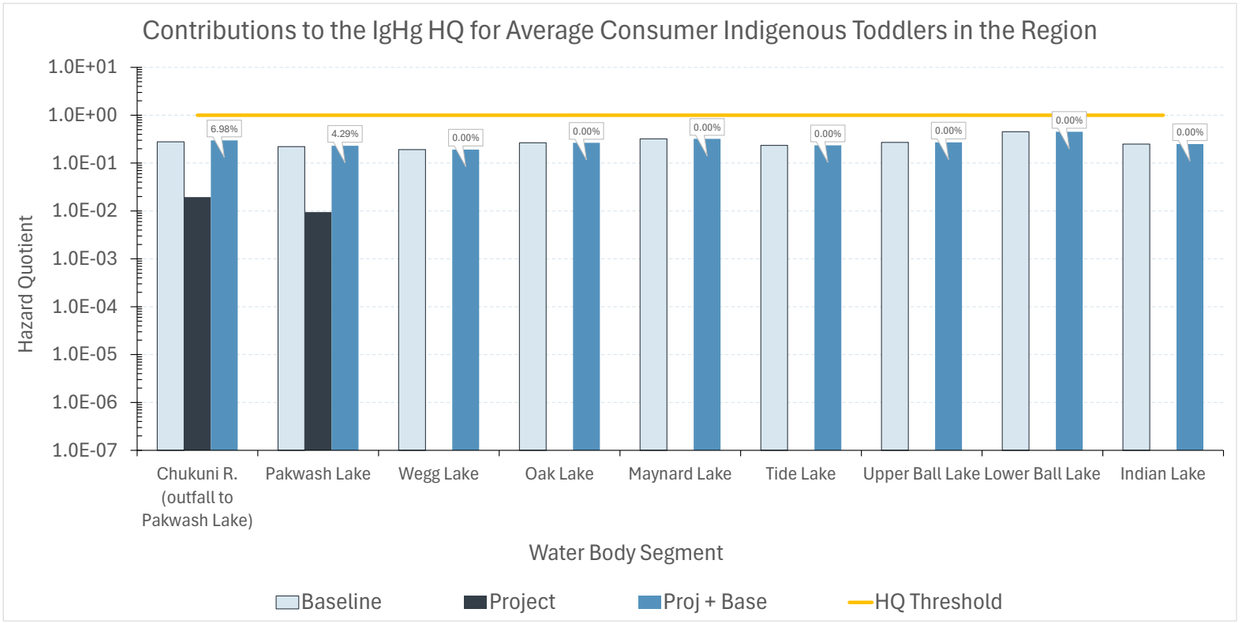
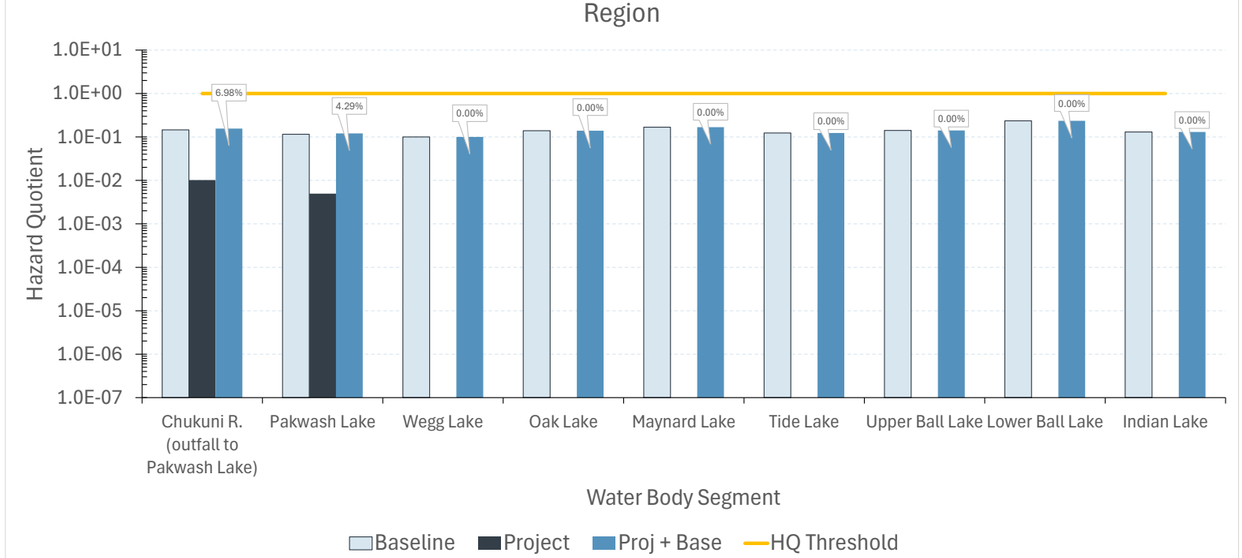
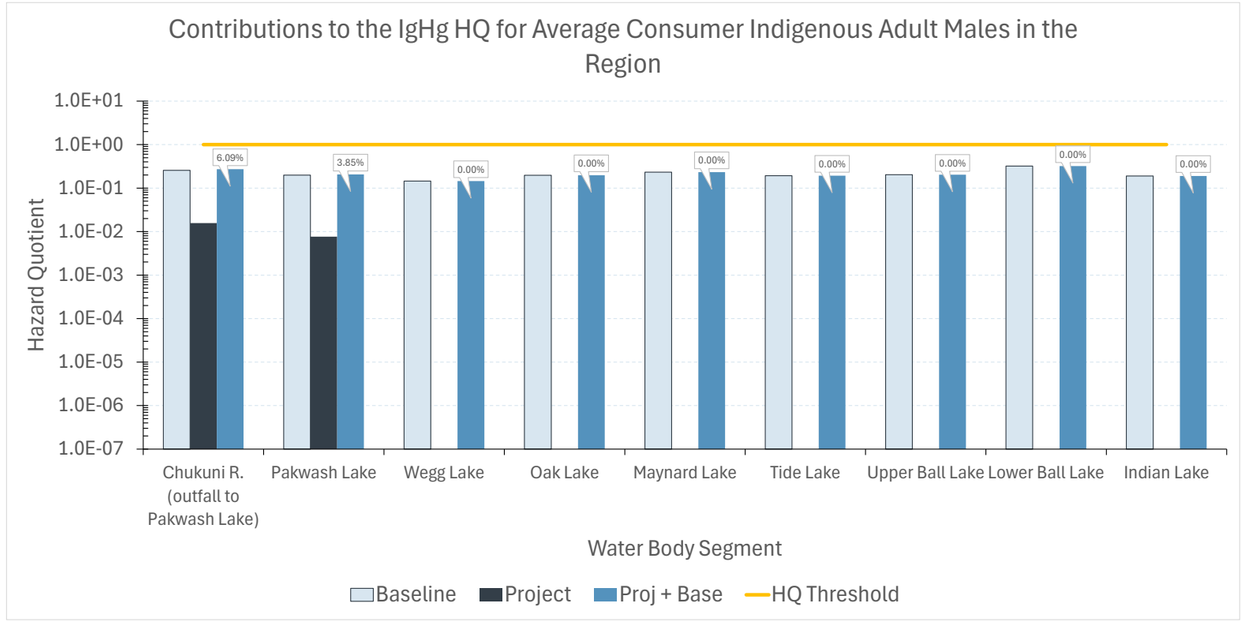

Contributions to the IgHg HQ for Heavy Consumer Indigenous Adults in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
5.97%
3.79%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

Table E-2: Inorganic Mercury Risk Summary for the Average Consumer

Predicted HQ Values for Average Consumer Exposure to Inorganic Mercury [Unitless]																	
		Toddler				AdultFEM				AdultMAL				AdultGEN			
Segment	ID	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase
1	Chukuni R. (outfall to Pakwash Lake)	0.28	0.019	0.30	6.98%	0.15	0.0102	0.16	6.98%	0.26	0.0157	0.27	6.09%	0.21	0.0132	0.22	6.39%
2	Pakwash Lake	0.22	0.009	0.23	4.29%	0.12	0.0050	0.12	4.29%	0.20	0.0076	0.21	3.85%	0.16	0.0064	0.17	4.00%
7	Wegg Lake	0.19	0.000	0.19	0.00%	0.10	0.0000	0.10	0.00%	0.14	0.0000	0.14	0.00%	0.12	0.0000	0.12	0.00%
13	Oak Lake	0.27	0.000	0.27	0.00%	0.14	0.0000	0.14	0.00%	0.20	0.0000	0.20	0.00%	0.17	0.0000	0.17	0.00%
15	Maynard Lake	0.32	0.000	0.32	0.00%	0.17	0.0000	0.17	0.00%	0.23	0.0000	0.23	0.00%	0.20	0.0000	0.20	0.00%
16	Tide Lake	0.24	0.000	0.24	0.00%	0.12	0.0000	0.12	0.00%	0.19	0.0000	0.19	0.00%	0.16	0.0000	0.16	0.00%
17	Upper Ball Lake	0.27	0.000	0.27	0.00%	0.14	0.0000	0.14	0.00%	0.20	0.0000	0.20	0.00%	0.18	0.0000	0.18	0.00%
18	Lower Ball Lake	0.45	0.000	0.45	0.00%	0.24	0.0000	0.24	0.00%	0.32	0.0000	0.32	0.00%	0.28	0.0000	0.28	0.00%
19	Indian Lake	0.25	0.000	0.25	0.00%	0.13	0.0000	0.13	0.00%	0.19	0.0000	0.19	0.00%	0.16	0.0000	0.16	0.00%


Contributions to the IgHg HQ for Average Consumer Indigenous Toddlers in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
6.98%
4.29%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the IgHg HQ for Average Consumer Indigenous Adult Females in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
6.98%
4.29%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the IgHg HQ for Average Consumer Indigenous Adult Males in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
6.09%
3.85%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

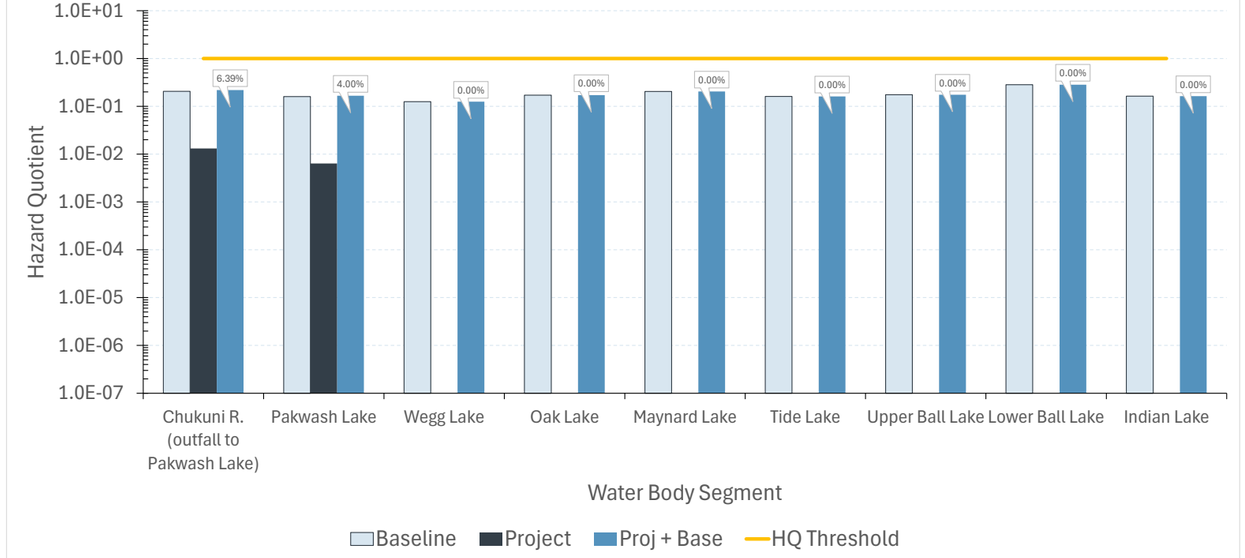
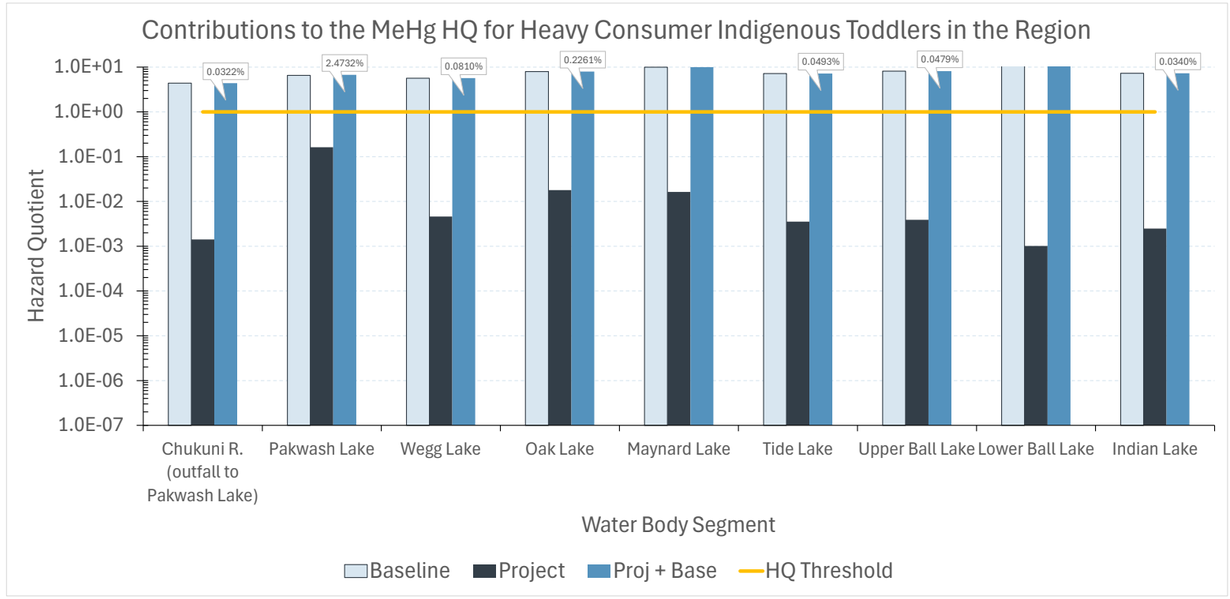
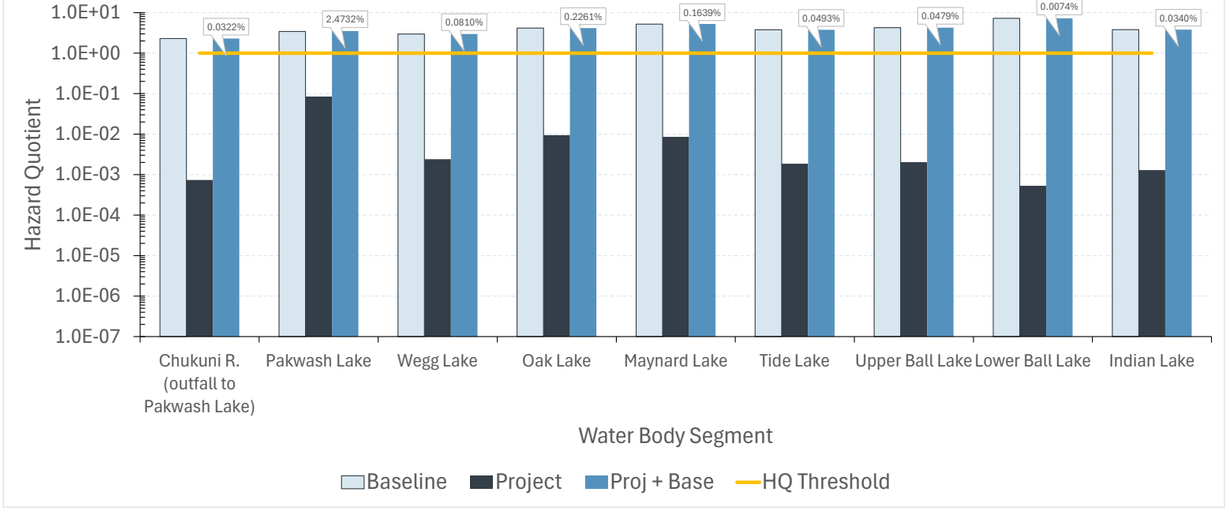
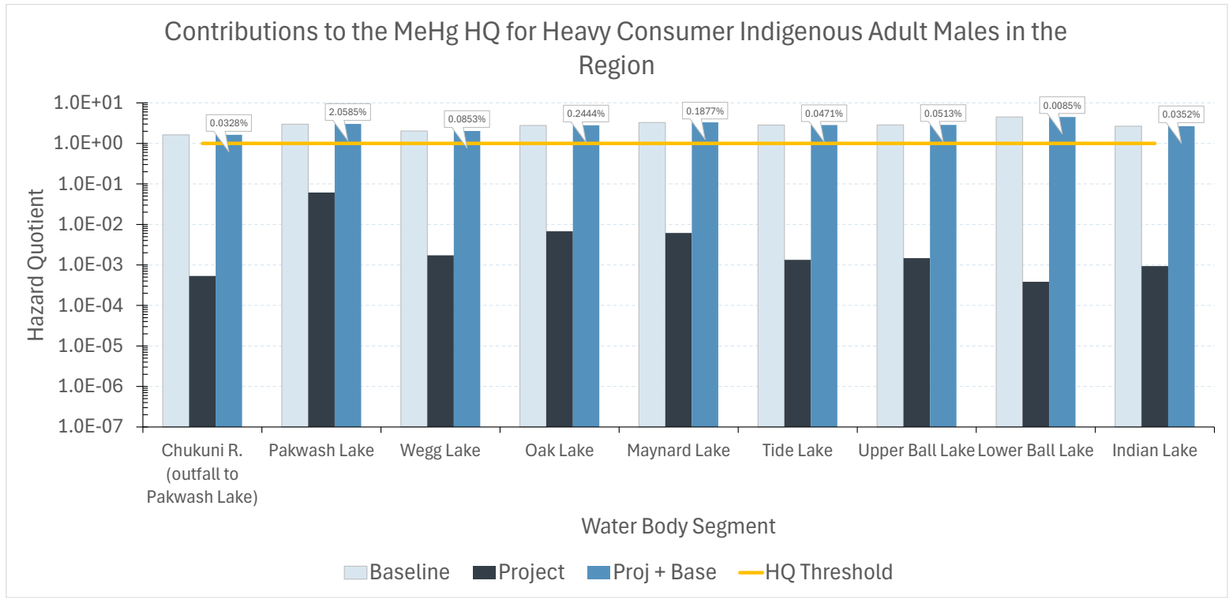

Contributions to the IgHg HQ for Average Consumer Indigenous Adults in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
6.39%
4.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

Table E-3: Methylmercury Risk Summary for the Heavy Consumer

Predicted HQ Values for Heavy Consumer Exposure to Methylmercury [Unitless]																	
		Toddler				AdultFEM				AdultMAL				AdultGEN			
Segment	ID	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase
1	Chukuni R. (outfall to Pakwash Lake)	4.4	1.41E-03	4.4	0.0322%	2.3	7.38E-04	2.3	0.0322%	1.6	5.32E-04	1.6	0.0328%	1.6	5.16E-04	1.6	0.0329%
2	Pakwash Lake	6.6	1.62E-01	6.7	2.4732%	3.4	8.48E-02	3.5	2.4732%	3.0	6.11E-02	3.0	2.0585%	2.9	5.93E-02	2.9	2.0773%
7	Wegg Lake	5.7	4.59E-03	5.7	0.0810%	3.0	2.40E-03	3.0	0.0810%	2.0	1.73E-03	2.0	0.0853%	2.0	1.68E-03	2.0	0.0846%
13	Oak Lake	8.0	1.80E-02	8.0	0.2261%	4.2	9.41E-03	4.2	0.2261%	2.8	6.79E-03	2.8	0.2444%	2.7	6.58E-03	2.7	0.2404%
15	Maynard Lake	10.0	1.64E-02	10.0	0.1639%	5.2	8.56E-03	5.2	0.1639%	3.3	6.17E-03	3.3	0.1877%	3.3	5.99E-03	3.3	0.1810%
16	Tide Lake	7.2	3.54E-03	7.2	0.0493%	3.8	1.85E-03	3.8	0.0493%	2.8	1.34E-03	2.8	0.0471%	2.8	1.30E-03	2.8	0.0465%
17	Upper Ball Lake	8.1	3.89E-03	8.1	0.0479%	4.3	2.04E-03	4.3	0.0479%	2.9	1.47E-03	2.9	0.0513%	2.8	1.42E-03	2.8	0.0504%
18	Lower Ball Lake	13.8	1.02E-03	13.8	0.0074%	7.2	5.31E-04	7.2	0.0074%	4.5	3.83E-04	4.5	0.0085%	4.5	3.72E-04	4.5	0.0083%
19	Indian Lake	7.3	2.48E-03	7.3	0.0340%	3.8	1.30E-03	3.8	0.0340%	2.7	9.36E-04	2.7	0.0352%	2.6	9.08E-04	2.6	0.0351%


Contributions to the MeHg HQ for Heavy Consumer Indigenous Toddlers in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.0322%
2.4732%
0.0810%
0.2261%
0.0493%
0.0479%
0.0340%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the MeHg HQ for Heavy Consumer Indigenous Adult Females in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.0322%
2.4732%
0.0810%
0.2261%
0.1639%
0.0493%
0.0479%
0.0074%
0.0340%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the MeHg HQ for Heavy Consumer Indigenous Adult Males in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.0328%
2.0585%
0.0853%
0.2444%
0.1877%
0.0471%
0.0513%
0.0085%
0.0352%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

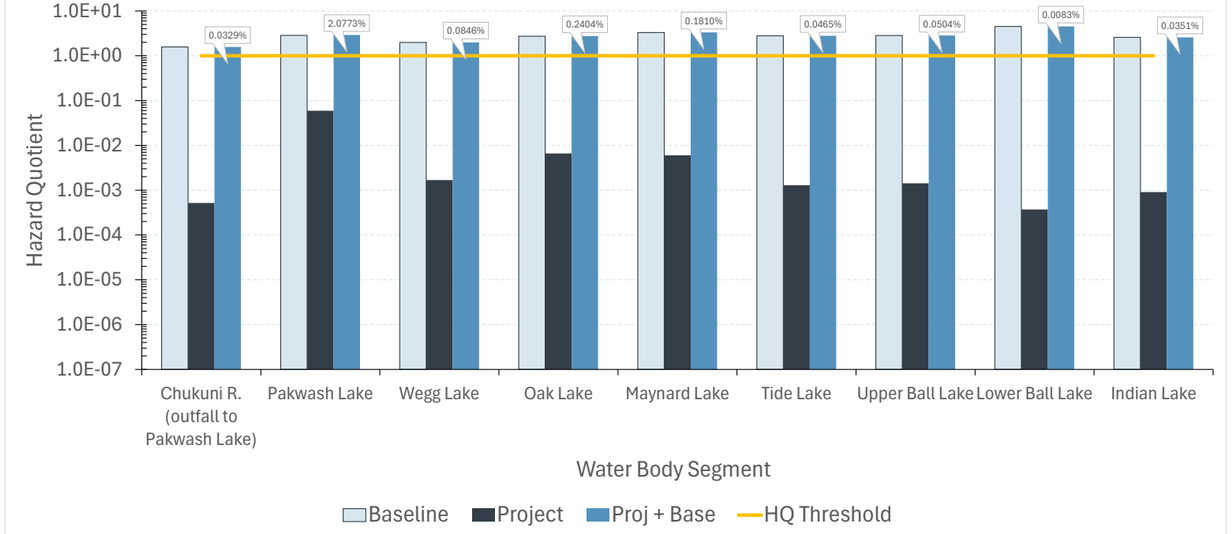
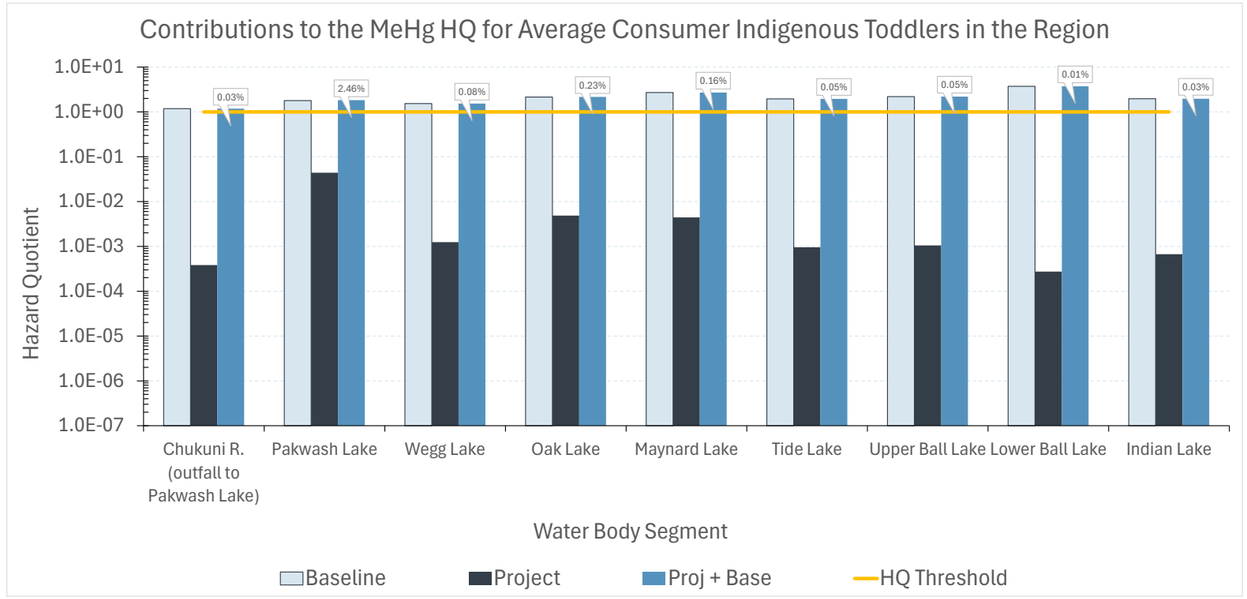
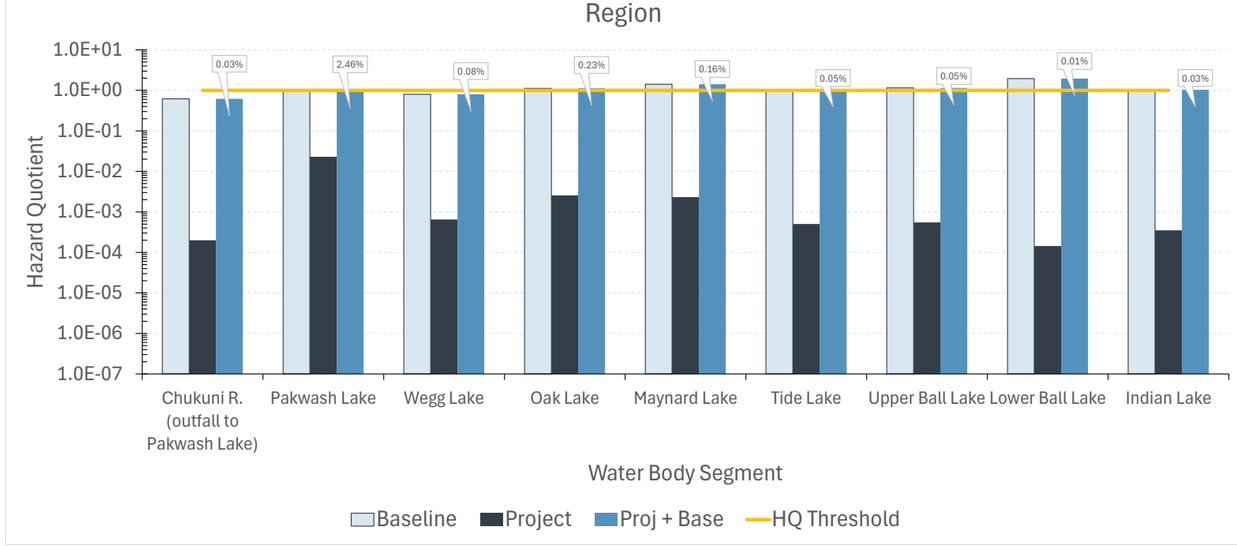
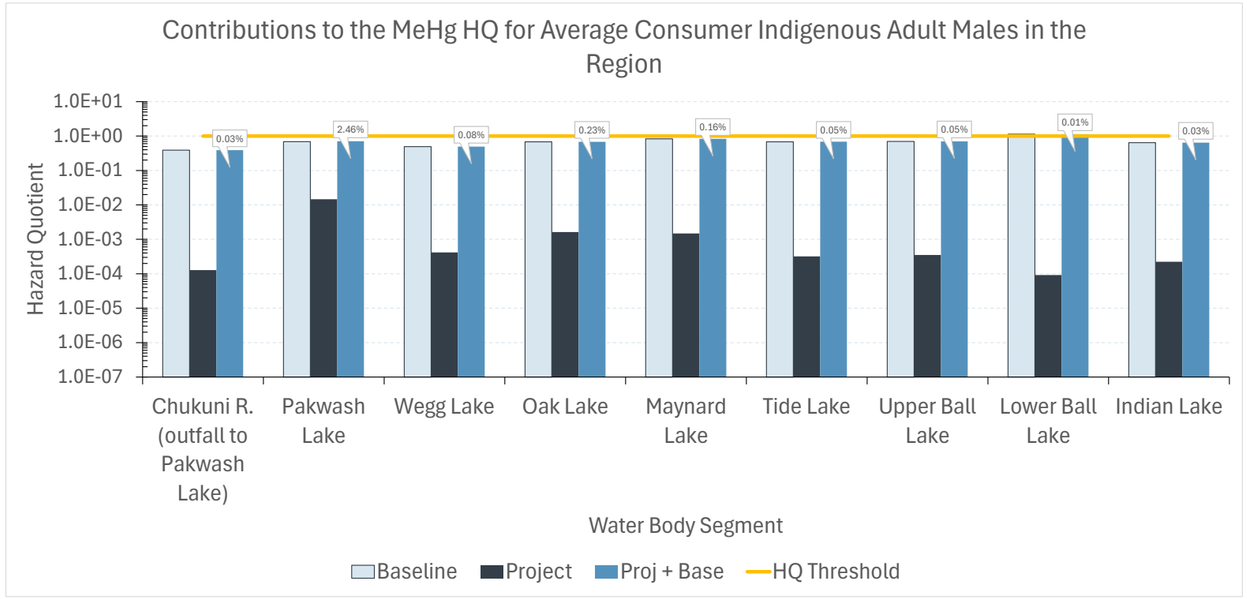

Contributions to the MeHg HQ for Heavy Consumer Indigenous Adults in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.0329%
2.0773%
0.0846%
0.2404%
0.1810%
0.0465%
0.0504%
0.0083%
0.0351%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

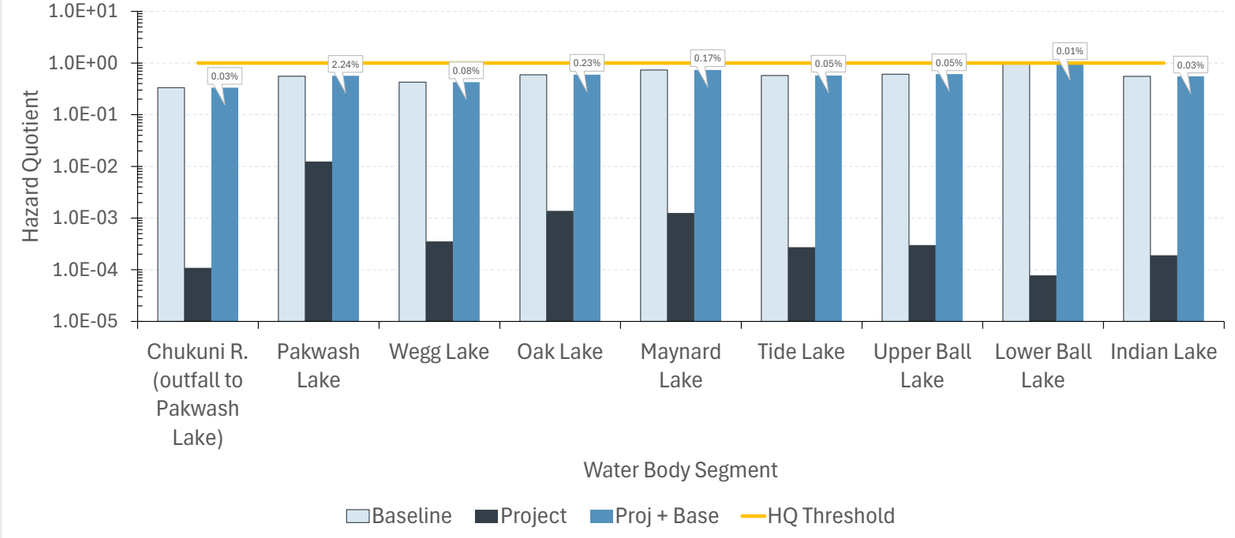
Table E-4: Methylmercury Risk Summary for the Average Consumer

Predicted HQ Values for Average Consumer Exposure to Methylmercury [Unitless]																	
		Toddler				AdultFEM				AdultMAL				AdultGEN			
Segment	ID	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase	Baseline	Project	Proj + Base	%Increase
1	Chukuni R. (outfall to Pakwash Lake)	1.2	3.82E-04	1.2	0.03%	0.62	2.00E-04	0.62	0.03%	0.39	1.28E-04	0.39	0.03%	0.33	1.08E-04	0.33	0.03%
2	Pakwash Lake	1.8	4.38E-02	1.8	2.46%	0.93	2.29E-02	0.96	2.46%	0.69	1.46E-02	0.70	2.12%	0.56	1.25E-02	0.57	2.24%
7	Wegg Lake	1.5	1.24E-03	1.5	0.08%	0.80	6.50E-04	0.80	0.08%	0.49	4.15E-04	0.49	0.08%	0.43	3.53E-04	0.43	0.08%
13	Oak Lake	2.2	4.87E-03	2.2	0.23%	1.1	2.55E-03	1.1	0.23%	0.68	1.63E-03	0.68	0.24%	0.59	1.38E-03	0.59	0.23%
15	Maynard Lake	2.7	4.43E-03	2.7	0.16%	1.4	2.31E-03	1.4	0.16%	0.83	1.48E-03	0.83	0.18%	0.73	1.26E-03	0.73	0.17%
16	Tide Lake	2.0	9.59E-04	2.0	0.05%	1.0	5.01E-04	1.0	0.05%	0.68	3.20E-04	0.68	0.05%	0.57	2.72E-04	0.57	0.05%
17	Upper Ball Lake	2.2	1.05E-03	2.2	0.05%	1.2	5.51E-04	1.2	0.05%	0.70	3.52E-04	0.70	0.05%	0.61	2.99E-04	0.61	0.05%
18	Lower Ball Lake	3.7	2.75E-04	3.7	0.01%	2.0	1.44E-04	2.0	0.01%	1.13	9.18E-05	1.1	0.01%	1.00	7.81E-05	1.00	0.01%
19	Indian Lake	2.0	6.71E-04	2.0	0.03%	1.0	3.51E-04	1.0	0.03%	0.64	2.24E-04	0.64	0.03%	0.55	1.91E-04	0.55	0.03%


Contributions to the MeHg HQ for Average Consumer Indigenous Toddlers in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.03%
2.46%
0.08%
0.23%
0.16%
0.05%
0.05%
0.01%
0.03%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the MeHg HQ for Average Consumer Indigenous Adult Females in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.03%
2.46%
0.08%
0.23%
0.16%
0.05%
0.05%
0.01%
0.03%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the MeHg HQ for Average Consumer Indigenous Adult Males in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
1.0E-06
1.0E-07
0.03%
2.46%
0.08%
0.23%
0.16%
0.05%
0.05%
0.01%
0.03%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold


Contributions to the MeHg HQ for Average Consumer Indigenous Adults in the Region
Hazard Quotient
1.0E+01
1.0E+00
1.0E-01
1.0E-02
1.0E-03
1.0E-04
1.0E-05
0.03%
2.24%
0.08%
0.23%
0.17%
0.05%
0.05%
0.01%
0.03%
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
Water Body Segment
Baseline
Project
Proj + Base
HQ Threshold

Predicted Fish Concentrations and Risks for the Project																							
								Incremental Increase		Fish Concentrations			Fish Consumption Rates				Exposure Rate						
								SW		Pike	Walleye	Whitefish	Pike	Walleye	Whitefish	Total	Pike	Walleye	Whitefish	WIR	Total	EDI	HQ
Segment	Description	Scenario	Receptor	Type	Lifestage	Chemical	Variable	[ng/L]	[mg/L]	[mg/kg-WW]			[kg/day]				[mg/day]					[mg/kg/day]	[Unitless]
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultFEM	MeHg	1_Project_INDG_Heavy_AdultFEM_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.92E-06	3.93E-06	1.47E-06	2.73E-11	9.32E-06	1.48E-07	7.4E-04
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultMAL	MeHg	1_Project_INDG_Heavy_AdultMAL_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.18E-06	1.22E-05	3.33E-06	2.73E-11	1.97E-05	2.50E-07	5.3E-04
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	Toddler	MeHg	1_Project_INDG_Heavy_Toddler_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.96E-06	1.96E-06	7.34E-07	1.09E-11	4.66E-06	2.82E-07	1.4E-03
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultGEN	MeHg	1_Project_INDG_Heavy_AdultGEN_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.18E-06	1.05E-05	2.43E-06	2.73E-11	1.72E-05	2.43E-07	5.2E-04
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultFEM	MeHg	1_Project_INDG_Average_AdultFEM_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.05E-06	1.08E-06	3.83E-07	2.73E-11	2.52E-06	3.99E-08	2.0E-04
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultMAL	MeHg	1_Project_INDG_Average_AdultMAL_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.27E-06	2.78E-06	6.73E-07	2.73E-11	4.72E-06	5.99E-08	1.3E-04
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	Toddler	MeHg	1_Project_INDG_Average_Toddler_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	5.08E-03	5.16E-03	4.92E-03	1.52E-02	5.27E-07	5.41E-07	1.92E-07	1.09E-11	1.26E-06	7.64E-08	3.8E-04
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultGEN	MeHg	1_Project_INDG_Average_AdultGEN_MeHg	1.82E-05	1.82E-11	1.04E-04	1.05E-04	3.89E-05	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.19E-06	1.90E-06	5.13E-07	2.73E-11	3.60E-06	5.10E-08	1.1E-04
2	Pakwash Lake	Project	INDG	Heavy	AdultFEM	MeHg	2_Project_INDG_Heavy_AdultFEM_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	3.77E-02	3.75E-02	3.77E-02	1.13E-01	4.50E-04	4.51E-04	1.69E-04	3.14E-09	1.07E-03	1.70E-05	8.5E-02
2	Pakwash Lake	Project	INDG	Heavy	AdultMAL	MeHg	2_Project_INDG_Heavy_AdultMAL_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.80E-04	1.40E-03	3.82E-04	3.14E-09	2.26E-03	2.87E-05	6.1E-02
2	Pakwash Lake	Project	INDG	Heavy	Toddler	MeHg	2_Project_INDG_Heavy_Toddler_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.25E-04	2.26E-04	8.43E-05	1.25E-09	5.35E-04	3.24E-05	1.6E-01
2	Pakwash Lake	Project	INDG	Heavy	AdultGEN	MeHg	2_Project_INDG_Heavy_AdultGEN_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.80E-04	1.21E-03	2.79E-04	3.14E-09	1.97E-03	2.79E-05	5.9E-02
2	Pakwash Lake	Project	INDG	Average	AdultFEM	MeHg	2_Project_INDG_Average_AdultFEM_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.21E-04	1.24E-04	4.40E-05	3.14E-09	2.89E-04	4.59E-06	2.3E-02
2	Pakwash Lake	Project	INDG	Average	AdultMAL	MeHg	2_Project_INDG_Average_AdultMAL_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.46E-04	3.19E-04	7.72E-05	3.14E-09	5.42E-04	6.88E-06	1.5E-02
2	Pakwash Lake	Project	INDG	Average	Toddler	MeHg	2_Project_INDG_Average_Toddler_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	5.08E-03	5.16E-03	4.92E-03	1.52E-02	6.06E-05	6.21E-05	2.20E-05	1.25E-09	1.45E-04	8.77E-06	4.4E-02
2	Pakwash Lake	Project	INDG	Average	AdultGEN	MeHg	2_Project_INDG_Average_AdultGEN_MeHg	2.09E-03	2.09E-09	1.19E-02	1.20E-02	4.47E-03	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.36E-04	2.18E-04	5.89E-05	3.14E-09	4.14E-04	5.85E-06	1.2E-02
7	Wegg Lake	Project	INDG	Heavy	AdultFEM	MeHg	7_Project_INDG_Heavy_AdultFEM_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.27E-05	1.28E-05	4.78E-06	8.88E-11	3.03E-05	4.80E-07	2.4E-03
7	Wegg Lake	Project	INDG	Heavy	AdultMAL	MeHg	7_Project_INDG_Heavy_AdultMAL_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.36E-05	3.97E-05	1.08E-05	8.88E-11	6.41E-05	8.14E-07	1.7E-03
7	Wegg Lake	Project	INDG	Heavy	Toddler	MeHg	7_Project_INDG_Heavy_Toddler_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	1.89E-02	1.87E-02	1.89E-02	5.64E-02	6.37E-06	6.39E-06	2.39E-06	3.55E-11	1.52E-05	9.18E-07	4.6E-03
7	Wegg Lake	Project	INDG	Heavy	AdultGEN	MeHg	7_Project_INDG_Heavy_AdultGEN_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.36E-05	3.43E-05	7.91E-06	8.88E-11	5.58E-05	7.90E-07	1.7E-03
7	Wegg Lake	Project	INDG	Average	AdultFEM	MeHg	7_Project_INDG_Average_AdultFEM_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	1.02E-02	1.03E-02	9.84E-03	3.03E-02	3.43E-06	3.52E-06	1.25E-06	8.88E-11	8.20E-06	1.30E-07	6.5E-04
7	Wegg Lake	Project	INDG	Average	AdultMAL	MeHg	7_Project_INDG_Average_AdultMAL_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	1.22E-02	2.65E-02	1.73E-02	5.60E-02	4.13E-06	9.05E-06	2.19E-06	8.88E-11	1.54E-05	1.95E-07	4.1E-04
7	Wegg Lake	Project	INDG	Average	Toddler	MeHg	7_Project_INDG_Average_Toddler_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.72E-06	1.76E-06	6.23E-07	3.55E-11	4.10E-06	2.48E-07	1.2E-03
7	Wegg Lake	Project	INDG	Average	AdultGEN	MeHg	7_Project_INDG_Average_AdultGEN_MeHg	5.92E-05	5.92E-11	3.38E-04	3.41E-04	1.27E-04	1.14E-02	1.82E-02	1.32E-02	4.28E-02	3.86E-06	6.19E-06	1.67E-06	8.88E-11	1.17E-05	1.66E-07	3.5E-04
13	Oak Lake	Project	INDG	Heavy	AdultFEM	MeHg	13_Project_INDG_Heavy_AdultFEM_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	3.77E-02	3.75E-02	3.77E-02	1.13E-01	4.99E-05	5.01E-05	1.87E-05	3.48E-10	1.19E-04	1.88E-06	9.4E-03
13	Oak Lake	Project	INDG	Heavy	AdultMAL	MeHg	13_Project_INDG_Heavy_AdultMAL_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	4.02E-02	1.16E-01	8.55E-02	2.42E-01	5.33E-05	1.56E-04	4.25E-05	3.48E-10	2.51E-04	3.19E-06	6.8E-03
13	Oak Lake	Project	INDG	Heavy	Toddler	MeHg	13_Project_INDG_Heavy_Toddler_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.50E-05	2.50E-05	9.36E-06	1.39E-10	5.94E-05	3.60E-06	1.8E-02
13	Oak Lake	Project	INDG	Heavy	AdultGEN	MeHg	13_Project_INDG_Heavy_AdultGEN_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	4.02E-02	1.01E-01	6.25E-02	2.03E-01	5.33E-05	1.34E-04	3.10E-05	3.48E-10	2.19E-04	3.09E-06	6.6E-03
13	Oak Lake	Project	INDG	Average	AdultFEM	MeHg	13_Project_INDG_Average_AdultFEM_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.34E-05	1.38E-05	4.89E-06	3.48E-10	3.21E-05	5.09E-07	2.5E-03
13	Oak Lake	Project	INDG	Average	AdultMAL	MeHg	13_Project_INDG_Average_AdultMAL_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.62E-05	3.55E-05	8.57E-06	3.48E-10	6.02E-05	7.64E-07	1.6E-03
13	Oak Lake	Project	INDG	Average	Toddler	MeHg	13_Project_INDG_Average_Toddler_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	5.08E-03	5.16E-03	4.92E-03	1.52E-02	6.72E-06	6.90E-06	2.44E-06	1.39E-10	1.61E-05	9.73E-07	4.9E-03
13	Oak Lake	Project	INDG	Average	AdultGEN	MeHg	13_Project_INDG_Average_AdultGEN_MeHg	2.32E-04	2.32E-10	1.32E-03	1.34E-03	4.96E-04	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.51E-05	2.43E-05	6.54E-06	3.48E-10	4.59E-05	6.50E-07	1.4E-03
15	Maynard Lake	Project	INDG	Heavy	AdultFEM	MeHg	15_Project_INDG_Heavy_AdultFEM_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	3.77E-02	3.75E-02	3.77E-02	1.13E-01	4.54E-05	4.56E-05	1.70E-05	3.17E-10	1.08E-04	1.71E-06	8.6E-03
15	Maynard Lake	Project	INDG	Heavy	AdultMAL	MeHg	15_Project_INDG_Heavy_AdultMAL_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.85E-05	1.41E-04	3.86E-05	3.17E-10	2.29E-04	2.90E-06	6.2E-03
15	Maynard Lake	Project	INDG	Heavy	Toddler	MeHg	15_Project_INDG_Heavy_Toddler_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.27E-05	2.28E-05	8.51E-06	1.27E-10	5.40E-05	3.27E-06	1.6E-02
15	Maynard Lake	Project	INDG	Heavy	AdultGEN	MeHg	15_Project_INDG_Heavy_AdultGEN_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.85E-05	1.22E-04	2.82E-05	3.17E-10	1.99E-04	2.81E-06	6.0E-03
15	Maynard Lake	Project	INDG	Average	AdultFEM	MeHg	15_Project_INDG_Average_AdultFEM_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.22E-05	1.25E-05	4.44E-06	3.17E-10	2.92E-05	4.63E-07	2.3E-03
15	Maynard Lake	Project	INDG	Average	AdultMAL	MeHg	15_Project_INDG_Average_AdultMAL_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.47E-05	3.22E-05	7.80E-06	3.17E-10	5.48E-05	6.95E-07	1.5E-03
15	Maynard Lake	Project	INDG	Average	Toddler	MeHg	15_Project_INDG_Average_Toddler_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	5.08E-03	5.16E-03	4.92E-03	1.52E-02	6.11E-06	6.27E-06	2.22E-06	1.27E-10	1.46E-05	8.85E-07	4.4E-03
15	Maynard Lake	Project	INDG	Average	AdultGEN	MeHg	15_Project_INDG_Average_AdultGEN_MeHg	2.11E-04	2.11E-10	1.20E-03	1.22E-03	4.52E-04	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.38E-05	2.21E-05	5.95E-06	3.17E-10	4.18E-05	5.91E-07	1.3E-03
16	Tide Lake	Project	INDG	Heavy	AdultFEM	MeHg	16_Project_INDG_Heavy_AdultFEM_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	3.77E-02	3.75E-02	3.77E-02	1.13E-01	9.84E-06	9.87E-06	3.69E-06	6.86E-11	2.34E-05	3.71E-07	1.9E-03
16	Tide Lake	Project	INDG	Heavy	AdultMAL	MeHg	16_Project_INDG_Heavy_AdultMAL_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.05E-05	3.06E-05	8.36E-06	6.86E-11	4.95E-05	6.28E-07	1.3E-03
16	Tide Lake	Project	INDG	Heavy	Toddler	MeHg	16_Project_INDG_Heavy_Toddler_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	1.89E-02	1.87E-02	1.89E-02	5.64E-02	4.92E-06	4.93E-06	1.84E-06	2.74E-11	1.17E-05	7.09E-07	3.5E-03
16	Tide Lake	Project	INDG	Heavy	AdultGEN	MeHg	16_Project_INDG_Heavy_AdultGEN_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.05E-05	2.65E-05	6.11E-06	6.86E-11	4.31E-05	6.09E-07	1.3E-03
16	Tide Lake	Project	INDG	Average	AdultFEM	MeHg	16_Project_INDG_Average_AdultFEM_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	1.02E-02	1.03E-02	9.84E-03	3.03E-02	2.65E-06	2.72E-06	9.62E-07	6.86E-11	6.33E-06	1.00E-07	5.0E-04
16	Tide Lake	Project	INDG	Average	AdultMAL	MeHg	16_Project_INDG_Average_AdultMAL_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	1.22E-02	2.65E-02	1.73E-02	5.60E-02	3.19E-06	6.98E-06	1.69E-06	6.86E-11	1.19E-05	1.50E-07	3.2E-04
16	Tide Lake	Project	INDG	Average	Toddler	MeHg	16_Project_INDG_Average_Toddler_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.32E-06	1.36E-06	4.81E-07	2.74E-11	3.16E-06	1.92E-07	9.6E-04
16	Tide Lake	Project	INDG	Average	AdultGEN	MeHg	16_Project_INDG_Average_AdultGEN_MeHg	4.57E-05	4.57E-11	2.61E-04	2.63E-04	9.78E-05	1.14E-02	1.82E-02	1.32E-02	4.28E-02	2.98E-06	4.78E-06	1.29E-06	6.86E-11	9.05E-06	1.28E-07	2.7E-04
17	Upper Ball Lake	Project	INDG	Heavy	AdultFEM	MeHg	17_Project_INDG_Heavy_AdultFEM_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.08E-05	1.08E-05	4.05E-06	7.53E-11	2.57E-05	4.07E-07	2.0E-03
17	Upper Ball Lake	Project	INDG	Heavy	AdultMAL	MeHg	17_Project_INDG_Heavy_AdultMAL_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.15E-05	3.37E-05	9.19E-06	7.53E-11	5.44E-05	6.90E-07	1.5E-03
17	Upper Ball Lake	Project	INDG	Heavy	Toddler	MeHg	17_Project_INDG_Heavy_Toddler_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	1.89E-02	1.87E-02	1.89E-02	5.64E-02	5.40E-06	5.42E-06	2.03E-06	3.01E-11	1.28E-05	7.79E-07	3.9E-03
17	Upper Ball Lake	Project	INDG	Heavy	AdultGEN	MeHg	17_Project_INDG_Heavy_AdultGEN_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.15E-05	2.91E-05	6.71E-06	7.53E-11	4.73E-05	6.70E-07	1.4E-03
17	Upper Ball Lake	Project	INDG	Average	AdultFEM	MeHg	17_Project_INDG_Average_AdultFEM_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	1.02E-02	1.03E-02	9.84E-03	3.03E-02	2.91E-06	2.98E-06	1.06E-06	7.53E-11	6.95E-06	1.10E-07	5.5E-04
17	Upper Ball Lake	Project	INDG	Average	AdultMAL	MeHg	17_Project_INDG_Average_AdultMAL_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	1.22E-02	2.65E-02	1.73E-02	5.60E-02	3.50E-06	7.67E-06	1.86E-06	7.53E-11	1.30E-05	1.65E-07	3.5E-04
17	Upper Ball Lake	Project	INDG	Average	Toddler	MeHg	17_Project_INDG_Average_Toddler_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.45E-06	1.49E-06	5.29E-07	3.01E-11	3.48E-06	2.11E-07	1.1E-03
17	Upper Ball Lake	Project	INDG	Average	AdultGEN	MeHg	17_Project_INDG_Average_AdultGEN_MeHg	5.02E-05	5.02E-11	2.87E-04	2.89E-04	1.07E-04	1.14E-02	1.82E-02	1.32E-02	4.28E-02	3.28E-06	5.25E-06	1.42E-06	7.53E-11	9.94E-06	1.41E-07	3.0E-04
18	Lower Ball Lake	Project	INDG	Heavy	AdultFEM	MeHg	18_Project_INDG_Heavy_AdultFEM_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.82E-06	2.83E-06	1.06E-06	1.97E-11	6.70E-06	1.06E-07	5.3E-04
18	Lower Ball Lake	Project	INDG	Heavy	AdultMAL	MeHg	18_Project_INDG_Heavy_AdultMAL_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	4.02E-02	1.16E-01	8.55E-02	2.42E-01	3.01E-06	8.78E-06	2.40E-06	1.97E-11	1.42E-05	1.80E-07	3.8E-04
18	Lower Ball Lake	Project	INDG	Heavy	Toddler	MeHg	18_Project_INDG_Heavy_Toddler_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.41E-06	1.41E-06	5.28E-07	7.86E-12	3.35E-06	2.03E-07	1.0E-03
18	Lower Ball Lake	Project	INDG	Heavy	AdultGEN	MeHg	18_Project_INDG_Heavy_AdultGEN_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	4.02E-02	1.01E-01	6.25E-02	2.03E-01	3.01E-06	7.59E-06	1.75E-06	1.97E-11	1.24E-05	1.75E-07	3.7E-04
18	Lower Ball Lake	Project	INDG	Average	AdultFEM	MeHg	18_Project_INDG_Average_AdultFEM_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	1.02E-02	1.03E-02	9.84E-03	3.03E-02	7.59E-07	7.79E-07	2.76E-07	1.97E-11	1.81E-06	2.87E-08	1.4E-04
18	Lower Ball Lake	Project	INDG	Average	AdultMAL	MeHg	18_Project_INDG_Average_AdultMAL_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	1.22E-02	2.65E-02	1.73E-02	5.60E-02	9.13E-07	2.00E-06	4.84E-07	1.97E-11	3.40E-06	4.31E-08	9.2E-05
18	Lower Ball Lake	Project	INDG	Average	Toddler	MeHg	18_Project_INDG_Average_Toddler_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	5.08E-03	5.16E-03	4.92E-03	1.52E-02	3.80E-07	3.89E-07	1.38E-07	7.86E-12	9.07E-07	5.50E-08	2.7E-04
18	Lower Ball Lake	Project	INDG	Average	AdultGEN	MeHg	18_Project_INDG_Average_AdultGEN_MeHg	1.31E-05	1.31E-11	7.48E-05	7.55E-05	2.80E-05	1.14E-02	1.82E-02	1.32E-02	4.28E-02	8.55E-07	1.37E-06	3.69E-07	1.97E-11	2.59E-06	3.67E-08	7.8E-05
19	Indian Lake	Project	INDG	Heavy	AdultFEM	MeHg	19_Project_INDG_Heavy_AdultFEM_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	3.77E-02	3.75E-02	3.77E-02	1.13E-01	6.89E-06	6.91E-06	2.58E-06	4.80E-11	1.64E-05	2.60E-07	1.3E-03
19	Indian Lake	Project	INDG	Heavy	AdultMAL	MeHg	19_Project_INDG_Heavy_AdultMAL_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	4.02E-02	1.16E-01	8.55E-02	2.42E-01	7.35E-06	2.15E-05	5.86E-06	4.80E-11	3.47E-05	4.40E-07	9.4E-04
19	Indian Lake	Project	INDG	Heavy	Toddler	MeHg	19_Project_INDG_Heavy_Toddler_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	1.89E-02	1.87E-02	1.89E-02	5.64E-02	3.44E-06	3.45E-06	1.29E-06	1.92E-11	8.19E-06	4.96E-07	2.5E-03
19	Indian Lake	Project	INDG	Heavy	AdultGEN	MeHg	19_Project_INDG_Heavy_AdultGEN_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	4.02E-02	1.01E-01	6.25E-02	2.03E-01	7.35E-06	1.85E-05	4.28E-06	4.80E-11	3.02E-05	4.27E-07	9.1E-04
19	Indian Lake	Project	INDG	Average	AdultFEM	MeHg	19_Project_INDG_Average_AdultFEM_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.85E-06	1.90E-06	6.74E-07	4.80E-11	4.43E-06	7.02E-08	3.5E-04
19	Indian Lake	Project	INDG	Average	AdultMAL	MeHg	19_Project_INDG_Average_AdultMAL_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	1.22E-02	2.65E-02	1.73E-02	5.60E-02	2.23E-06	4.89E-06	1.18E-06	4.80E-11	8.30E-06	1.05E-07	2.2E-04
19	Indian Lake	Project	INDG	Average	Toddler	MeHg	19_Project_INDG_Average_Toddler_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	5.08E-03	5.16E-03	4.92E-03	1.52E-02	9.27E-07	9.51E-07	3.37E-07	1.92E-11	2.22E-06	1.34E-07	6.7E-04
19	Indian Lake	Project	INDG	Average	AdultGEN	MeHg	19_Project_INDG_Average_AdultGEN_MeHg	3.20E-05	3.20E-11	1.83E-04	1.84E-04	6.85E-05	1.14E-02	1.82E-02	1.32E-02	4.28E-02	2.09E-06	3.35E-06	9.03E-07	4.80E-11	6.34E-06	8.96E-08	1.9E-04

Table E-5: Exposure Summary for the Project Scenario

Predicted Fish Concentrations and Risks for the Project																							
								Incremental Increase		Fish Concentrations			Fish Consumption Rates				Exposure Rate						
								SW		Pike	Walleye	Whitefish	Pike	Walleye	Whitefish	Total	Pike	Walleye	Whitefish	WIR	Total	EDI	HQ
Segment	Description	Scenario	Receptor	Type	Lifestage	Chemical	Variable	[ng/L]	[mg/L]	[mg/kg-WW]			[kg/day]				[mg/day]					[mg/kg/day]	[Unitless]
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultFEM	THg	1_Project_INDG_Heavy_AdultFEM_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.62E-03	2.05E-03	7.77E-04	2.34E-07	4.45E-03	7.05E-05	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultMAL	THg	1_Project_INDG_Heavy_AdultMAL_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.73E-03	6.36E-03	1.76E-03	2.34E-07	9.86E-03	1.25E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	Toddler	THg	1_Project_INDG_Heavy_Toddler_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	8.10E-04	1.02E-03	3.89E-04	9.37E-08	2.22E-03	1.35E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultGEN	THg	1_Project_INDG_Heavy_AdultGEN_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.73E-03	5.50E-03	1.29E-03	2.34E-07	8.52E-03	1.20E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultFEM	THg	1_Project_INDG_Average_AdultFEM_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	4.36E-04	5.64E-04	2.03E-04	2.34E-07	1.20E-03	1.91E-05	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultMAL	THg	1_Project_INDG_Average_AdultMAL_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	5.25E-04	1.45E-03	3.56E-04	2.34E-07	2.33E-03	2.96E-05	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	Toddler	THg	1_Project_INDG_Average_Toddler_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.18E-04	2.82E-04	1.01E-04	9.37E-08	6.02E-04	3.65E-05	-
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultGEN	THg	1_Project_INDG_Average_AdultGEN_THg	1.56E-01	1.56E-07	4.30E-02	5.47E-02	2.06E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	4.91E-04	9.92E-04	2.72E-04	2.34E-07	1.76E-03	2.48E-05	-
2	Pakwash Lake	Project	INDG	Heavy	AdultFEM	THg	2_Project_INDG_Heavy_AdultFEM_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	7.88E-04	9.98E-04	3.78E-04	1.14E-07	2.16E-03	3.43E-05	-
2	Pakwash Lake	Project	INDG	Heavy	AdultMAL	THg	2_Project_INDG_Heavy_AdultMAL_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	8.41E-04	3.10E-03	8.58E-04	1.14E-07	4.80E-03	6.09E-05	-
2	Pakwash Lake	Project	INDG	Heavy	Toddler	THg	2_Project_INDG_Heavy_Toddler_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	3.94E-04	4.99E-04	1.89E-04	4.56E-08	1.08E-03	6.56E-05	-
2	Pakwash Lake	Project	INDG	Heavy	AdultGEN	THg	2_Project_INDG_Heavy_AdultGEN_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	8.41E-04	2.68E-03	6.27E-04	1.14E-07	4.15E-03	5.86E-05	-
2	Pakwash Lake	Project	INDG	Average	AdultFEM	THg	2_Project_INDG_Average_AdultFEM_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	2.12E-04	2.75E-04	9.88E-05	1.14E-07	5.86E-04	9.28E-06	-
2	Pakwash Lake	Project	INDG	Average	AdultMAL	THg	2_Project_INDG_Average_AdultMAL_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	2.55E-04	7.06E-04	1.73E-04	1.14E-07	1.13E-03	1.44E-05	-
2	Pakwash Lake	Project	INDG	Average	Toddler	THg	2_Project_INDG_Average_Toddler_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.06E-04	1.37E-04	4.94E-05	4.56E-08	2.93E-04	1.78E-05	-
2	Pakwash Lake	Project	INDG	Average	AdultGEN	THg	2_Project_INDG_Average_AdultGEN_THg	7.60E-02	7.60E-08	2.09E-02	2.66E-02	1.00E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	2.39E-04	4.83E-04	1.32E-04	1.14E-07	8.54E-04	1.21E-05	-
7	Wegg Lake	Project	INDG	Heavy	AdultFEM	THg	7_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Heavy	AdultMAL	THg	7_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Heavy	Toddler	THg	7_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Heavy	AdultGEN	THg	7_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Average	AdultFEM	THg	7_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Average	AdultMAL	THg	7_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Average	Toddler	THg	7_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
7	Wegg Lake	Project	INDG	Average	AdultGEN	THg	7_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Heavy	AdultFEM	THg	13_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Heavy	AdultMAL	THg	13_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Heavy	Toddler	THg	13_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Heavy	AdultGEN	THg	13_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Average	AdultFEM	THg	13_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Average	AdultMAL	THg	13_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Average	Toddler	THg	13_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
13	Oak Lake	Project	INDG	Average	AdultGEN	THg	13_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Heavy	AdultFEM	THg	15_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Heavy	AdultMAL	THg	15_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Heavy	Toddler	THg	15_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Heavy	AdultGEN	THg	15_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Average	AdultFEM	THg	15_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Average	AdultMAL	THg	15_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Average	Toddler	THg	15_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
15	Maynard Lake	Project	INDG	Average	AdultGEN	THg	15_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Heavy	AdultFEM	THg	16_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Heavy	AdultMAL	THg	16_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Heavy	Toddler	THg	16_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Heavy	AdultGEN	THg	16_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Average	AdultFEM	THg	16_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Average	AdultMAL	THg	16_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Average	Toddler	THg	16_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
16	Tide Lake	Project	INDG	Average	AdultGEN	THg	16_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Heavy	AdultFEM	THg	17_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Heavy	AdultMAL	THg	17_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Heavy	Toddler	THg	17_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Heavy	AdultGEN	THg	17_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Average	AdultFEM	THg	17_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Average	AdultMAL	THg	17_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Average	Toddler	THg	17_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
17	Upper Ball Lake	Project	INDG	Average	AdultGEN	THg	17_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Heavy	AdultFEM	THg	18_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Heavy	AdultMAL	THg	18_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Heavy	Toddler	THg	18_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Heavy	AdultGEN	THg	18_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Average	AdultFEM	THg	18_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Average	AdultMAL	THg	18_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Average	Toddler	THg	18_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
18	Lower Ball Lake	Project	INDG	Average	AdultGEN	THg	18_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Heavy	AdultFEM	THg	19_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Heavy	AdultMAL	THg	19_Project_INDG_Heavy_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Heavy	Toddler	THg	19_Project_INDG_Heavy_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Heavy	AdultGEN	THg	19_Project_INDG_Heavy_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Average	AdultFEM	THg	19_Project_INDG_Average_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Average	AdultMAL	THg	19_Project_INDG_Average_AdultMAL_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Average	Toddler	THg	19_Project_INDG_Average_Toddler_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
19	Indian Lake	Project	INDG	Average	AdultGEN	THg	19_Project_INDG_Average_AdultGEN_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
20	English River	Project	INDG	Heavy	AdultFEM	THg	20_Project_INDG_Heavy_AdultFEM_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-

Predicted Fish Concentrations and Risks for the Project																							
								Incremental Increase SW		Fish Concentrations			Fish Consumption Rates				Exposure Rate						
Segment	Description	Scenario	Receptor	Type	Lifestage	Chemical	Variable	[ng/L]	[mg/L]	Pike	Walleye	Whitefish	Pike	Walleye	Whitefish	Total	Pike	Walleye	Whitefish	WIR	Total	EDI	HQ
										[mg/kg-WW]			[kg/day]				[mg/day]					[mg/kg/day]	[Unitless]
	USED TOTAL MERCURY TO MODEL INORGANIC MERCURY																						
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultFEM	IgHg	1_Project_INDG_Heavy_AdultFEM_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.38E-04	3.01E-04	1.74E-04	2.34E-07	7.14E-04	1.13E-05	3.8E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultMAL	IgHg	1_Project_INDG_Heavy_AdultMAL_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.54E-04	9.36E-04	3.95E-04	2.34E-07	1.58E-03	2.01E-05	6.7E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	Toddler	IgHg	1_Project_INDG_Heavy_Toddler_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.19E-04	1.51E-04	8.71E-05	9.37E-08	3.57E-04	2.16E-05	7.2E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Heavy	AdultGEN	IgHg	1_Project_INDG_Heavy_AdultGEN_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.54E-04	8.09E-04	2.89E-04	2.34E-07	1.35E-03	1.91E-05	6.4E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultFEM	IgHg	1_Project_INDG_Average_AdultFEM_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	1.02E-02	1.03E-02	9.84E-03	3.03E-02	6.41E-05	8.29E-05	4.55E-05	2.34E-07	1.93E-04	3.05E-06	1.0E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultMAL	IgHg	1_Project_INDG_Average_AdultMAL_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	1.22E-02	2.65E-02	1.73E-02	5.60E-02	7.71E-05	2.13E-04	7.98E-05	2.34E-07	3.70E-04	4.70E-06	1.6E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	Toddler	IgHg	1_Project_INDG_Average_Toddler_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	5.08E-03	5.16E-03	4.92E-03	1.52E-02	3.20E-05	4.15E-05	2.27E-05	9.37E-08	9.63E-05	5.84E-06	1.9E-02
1	Chukuni R. (outfall to Pakwash Lake)	Project	INDG	Average	AdultGEN	IgHg	1_Project_INDG_Average_AdultGEN_IgHg	1.56E-01	1.56E-07	6.32E-03	8.04E-03	4.62E-03	1.14E-02	1.82E-02	1.32E-02	4.28E-02	7.22E-05	1.46E-04	6.09E-05	2.34E-07	2.79E-04	3.95E-06	1.3E-02
2	Pakwash Lake	Project	INDG	Heavy	AdultFEM	IgHg	2_Project_INDG_Heavy_AdultFEM_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.16E-04	1.47E-04	8.48E-05	1.14E-07	3.47E-04	5.51E-06	1.8E-02
2	Pakwash Lake	Project	INDG	Heavy	AdultMAL	IgHg	2_Project_INDG_Heavy_AdultMAL_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.24E-04	4.55E-04	1.92E-04	1.14E-07	7.71E-04	9.79E-06	3.3E-02
2	Pakwash Lake	Project	INDG	Heavy	Toddler	IgHg	2_Project_INDG_Heavy_Toddler_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	1.89E-02	1.87E-02	1.89E-02	5.64E-02	5.79E-05	7.33E-05	4.24E-05	4.56E-08	1.74E-04	1.05E-05	3.5E-02
2	Pakwash Lake	Project	INDG	Heavy	AdultGEN	IgHg	2_Project_INDG_Heavy_AdultGEN_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.24E-04	3.94E-04	1.40E-04	1.14E-07	6.58E-04	9.30E-06	3.1E-02
2	Pakwash Lake	Project	INDG	Average	AdultFEM	IgHg	2_Project_INDG_Average_AdultFEM_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	1.02E-02	1.03E-02	9.84E-03	3.03E-02	3.12E-05	4.04E-05	2.21E-05	1.14E-07	9.38E-05	1.49E-06	5.0E-03
2	Pakwash Lake	Project	INDG	Average	AdultMAL	IgHg	2_Project_INDG_Average_AdultMAL_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	1.22E-02	2.65E-02	1.73E-02	5.60E-02	3.75E-05	1.04E-04	3.88E-05	1.14E-07	1.80E-04	2.29E-06	7.6E-03
2	Pakwash Lake	Project	INDG	Average	Toddler	IgHg	2_Project_INDG_Average_Toddler_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.56E-05	2.02E-05	1.11E-05	4.56E-08	4.69E-05	2.84E-06	9.5E-03
2	Pakwash Lake	Project	INDG	Average	AdultGEN	IgHg	2_Project_INDG_Average_AdultGEN_IgHg	7.60E-02	7.60E-08	3.07E-03	3.91E-03	2.25E-03	1.14E-02	1.82E-02	1.32E-02	4.28E-02	3.51E-05	7.10E-05	2.96E-05	1.14E-07	1.36E-04	1.92E-06	6.4E-03
7	Wegg Lake	Project	INDG	Heavy	AdultFEM	IgHg	7_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Heavy	AdultMAL	IgHg	7_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Heavy	Toddler	IgHg	7_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Heavy	AdultGEN	IgHg	7_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Average	AdultFEM	IgHg	7_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Average	AdultMAL	IgHg	7_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Average	Toddler	IgHg	7_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
7	Wegg Lake	Project	INDG	Average	AdultGEN	IgHg	7_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Heavy	AdultFEM	IgHg	13_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Heavy	AdultMAL	IgHg	13_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Heavy	Toddler	IgHg	13_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Heavy	AdultGEN	IgHg	13_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Average	AdultFEM	IgHg	13_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Average	AdultMAL	IgHg	13_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Average	Toddler	IgHg	13_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
13	Oak Lake	Project	INDG	Average	AdultGEN	IgHg	13_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Heavy	AdultFEM	IgHg	15_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Heavy	AdultMAL	IgHg	15_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Heavy	Toddler	IgHg	15_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Heavy	AdultGEN	IgHg	15_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Average	AdultFEM	IgHg	15_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Average	AdultMAL	IgHg	15_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Average	Toddler	IgHg	15_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
15	Maynard Lake	Project	INDG	Average	AdultGEN	IgHg	15_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Heavy	AdultFEM	IgHg	16_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Heavy	AdultMAL	IgHg	16_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Heavy	Toddler	IgHg	16_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Heavy	AdultGEN	IgHg	16_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Average	AdultFEM	IgHg	16_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Average	AdultMAL	IgHg	16_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Average	Toddler	IgHg	16_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
16	Tide Lake	Project	INDG	Average	AdultGEN	IgHg	16_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Heavy	AdultFEM	IgHg	17_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Heavy	AdultMAL	IgHg	17_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Heavy	Toddler	IgHg	17_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Heavy	AdultGEN	IgHg	17_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Average	AdultFEM	IgHg	17_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Average	AdultMAL	IgHg	17_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Average	Toddler	IgHg	17_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
17	Upper Ball Lake	Project	INDG	Average	AdultGEN	IgHg	17_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Heavy	AdultFEM	IgHg	18_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Heavy	AdultMAL	IgHg	18_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Heavy	Toddler	IgHg	18_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Heavy	AdultGEN	IgHg	18_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Average	AdultFEM	IgHg	18_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Average	AdultMAL	IgHg	18_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Average	Toddler	IgHg	18_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
18	Lower Ball Lake	Project	INDG	Average	AdultGEN	IgHg	18_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Heavy	AdultFEM	IgHg	19_Project_INDG_Heavy_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-02	3.75E-02	3.77E-02	1.13E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Heavy	AdultMAL	IgHg	19_Project_INDG_Heavy_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.16E-01	8.55E-02	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Heavy	Toddler	IgHg	19_Project_INDG_Heavy_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-02	1.87E-02	1.89E-02	5.64E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Heavy	AdultGEN	IgHg	19_Project_INDG_Heavy_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	1.01E-01	6.25E-02	2.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Average	AdultFEM	IgHg	19_Project_INDG_Average_AdultFEM_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-02	1.03E-02	9.84E-03	3.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Average	AdultMAL	IgHg	19_Project_INDG_Average_AdultMAL_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	2.65E-02	1.73E-02	5.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Average	Toddler	IgHg	19_Project_INDG_Average_Toddler_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-03	5.16E-03	4.92E-03	1.52E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00
19	Indian Lake	Project	INDG	Average	AdultGEN	IgHg	19_Project_INDG_Average_AdultGEN_IgHg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.82E-02	1.32E-02	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0E+00

Assumed IgHg = THg
Used THg and Portion Inorganic Mercury

Table E-6: Exposure Summary for the Baseline Scenario

Predicted Fish Concentrations and Risks for the Baseline

								Baseline SW		Fish Concentrations			Fish Consumption Rates				Exposure Rate						
								Concentration		Pike	Walleye	Whitefish	Pike	Walleye	Whitefish	Total	Pike	Walleye	Whitefish	WIR	Total	EDI	HQ
Segment	Description	Scenario	Receptor	Type	Lifestage	Chemical	Variable	[ng/L]	[mg/L]	[mg/kg-WW]			[kg/day]				[mg/day]					[mg/kg/day]	[Unitless]
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultFEM	MeHg	1_Baseline_INDG_Heavy_AdultFEM_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.24E-02	1.12E-02	5.28E-03	8.14E-08	2.90E-02	4.59E-04	2.3E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultMAL	MeHg	1_Baseline_INDG_Heavy_AdultMAL_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.33E-02	3.49E-02	1.20E-02	8.14E-08	6.02E-02	7.64E-04	1.6E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	Toddler	MeHg	1_Baseline_INDG_Heavy_Toddler_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	6.22E-03	5.62E-03	2.64E-03	3.26E-08	1.45E-02	8.78E-04	4.4E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultGEN	MeHg	1_Baseline_INDG_Heavy_AdultGEN_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.33E-02	3.02E-02	8.75E-03	8.14E-08	5.22E-02	7.38E-04	1.6E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultFEM	MeHg	1_Baseline_INDG_Average_AdultFEM_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	3.35E-03	3.10E-03	1.38E-03	8.14E-08	7.82E-03	1.24E-04	6.2E-01
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultMAL	MeHg	1_Baseline_INDG_Average_AdultMAL_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	4.03E-03	7.96E-03	2.42E-03	8.14E-08	1.44E-02	1.83E-04	3.9E-01
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	Toddler	MeHg	1_Baseline_INDG_Average_Toddler_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.67E-03	1.55E-03	6.89E-04	3.26E-08	3.91E-03	2.37E-04	1.2E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultGEN	MeHg	1_Baseline_INDG_Average_AdultGEN_MeHg	5.43E-02	5.43E-08	3.30E-01	3.00E-01	1.40E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	3.77E-03	5.45E-03	1.85E-03	8.14E-08	1.11E-02	1.56E-04	3.3E-01
2	Pakwash Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	2_Baseline_INDG_Heavy_AdultFEM_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	9.78E-03	2.82E-02	5.28E-03	8.02E-08	4.33E-02	6.85E-04	3.4E+00
2	Pakwash Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	2_Baseline_INDG_Heavy_AdultMAL_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.04E-02	8.76E-02	1.20E-02	8.02E-08	1.10E-01	1.40E-03	3.0E+00
2	Pakwash Lake	Baseline	INDG	Heavy	Toddler	MeHg	2_Baseline_INDG_Heavy_Toddler_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	4.89E-03	1.41E-02	2.64E-03	3.21E-08	2.16E-02	1.31E-03	6.6E+00
2	Pakwash Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	2_Baseline_INDG_Heavy_AdultGEN_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.04E-02	7.57E-02	8.75E-03	8.02E-08	9.49E-02	1.34E-03	2.9E+00
2	Pakwash Lake	Baseline	INDG	Average	AdultFEM	MeHg	2_Baseline_INDG_Average_AdultFEM_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	2.63E-03	7.76E-03	1.38E-03	8.02E-08	1.18E-02	1.87E-04	9.3E-01
2	Pakwash Lake	Baseline	INDG	Average	AdultMAL	MeHg	2_Baseline_INDG_Average_AdultMAL_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	3.17E-03	2.00E-02	2.42E-03	8.02E-08	2.55E-02	3.24E-04	6.9E-01
2	Pakwash Lake	Baseline	INDG	Average	Toddler	MeHg	2_Baseline_INDG_Average_Toddler_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.32E-03	3.88E-03	6.89E-04	3.21E-08	5.89E-03	3.57E-04	1.8E+00
2	Pakwash Lake	Baseline	INDG	Average	AdultGEN	MeHg	2_Baseline_INDG_Average_AdultGEN_MeHg	5.34E-02	5.34E-08	2.59E-01	7.52E-01	1.40E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	2.96E-03	1.37E-02	1.85E-03	8.02E-08	1.85E-02	2.61E-04	5.6E-01
7	Wegg Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	7_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.80E-02	1.42E-02	5.28E-03	7.46E-08	3.74E-02	5.93E-04	3.0E+00
7	Wegg Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	7_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.92E-02	4.40E-02	1.20E-02	7.46E-08	7.51E-02	9.54E-04	2.0E+00
7	Wegg Lake	Baseline	INDG	Heavy	Toddler	MeHg	7_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	8.99E-03	7.08E-03	2.64E-03	2.99E-08	1.87E-02	1.13E-03	5.7E+00
7	Wegg Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	7_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.92E-02	3.80E-02	8.75E-03	7.46E-08	6.59E-02	9.33E-04	2.0E+00
7	Wegg Lake	Baseline	INDG	Average	AdultFEM	MeHg	7_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	4.84E-03	3.90E-03	1.38E-03	7.46E-08	1.01E-02	1.60E-04	8.0E-01
7	Wegg Lake	Baseline	INDG	Average	AdultMAL	MeHg	7_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	5.82E-03	1.00E-02	2.42E-03	7.46E-08	1.83E-02	2.32E-04	4.9E-01
7	Wegg Lake	Baseline	INDG	Average	Toddler	MeHg	7_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.42E-03	1.95E-03	6.89E-04	2.99E-08	5.06E-03	3.07E-04	1.5E+00
7	Wegg Lake	Baseline	INDG	Average	AdultGEN	MeHg	7_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	4.77E-01	3.78E-01	1.40E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	5.45E-03	6.86E-03	1.85E-03	7.46E-08	1.42E-02	2.00E-04	4.3E-01
13	Oak Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	13_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.71E-02	1.94E-02	5.94E-03	7.46E-08	5.25E-02	8.32E-04	4.2E+00
13	Oak Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	13_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.90E-02	6.04E-02	1.35E-02	7.46E-08	1.03E-01	1.30E-03	2.8E+00
13	Oak Lake	Baseline	INDG	Heavy	Toddler	MeHg	13_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.36E-02	9.72E-03	2.97E-03	2.99E-08	2.63E-02	1.59E-03	8.0E+00
13	Oak Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	13_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.90E-02	5.22E-02	9.84E-03	7.46E-08	9.10E-02	1.29E-03	2.7E+00
13	Oak Lake	Baseline	INDG	Average	AdultFEM	MeHg	13_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	7.31E-03	5.35E-03	1.55E-03	7.46E-08	1.42E-02	2.25E-04	1.1E+00
13	Oak Lake	Baseline	INDG	Average	AdultMAL	MeHg	13_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	8.79E-03	1.38E-02	2.72E-03	7.46E-08	2.53E-02	3.21E-04	6.8E-01
13	Oak Lake	Baseline	INDG	Average	Toddler	MeHg	13_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	3.65E-03	2.68E-03	7.75E-04	2.99E-08	7.10E-03	4.31E-04	2.2E+00
13	Oak Lake	Baseline	INDG	Average	AdultGEN	MeHg	13_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	7.20E-01	5.19E-01	1.58E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	8.23E-03	9.41E-03	2.08E-03	7.46E-08	1.97E-02	2.79E-04	5.9E-01
15	Maynard Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	15_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.92E-02	2.32E-02	3.45E-03	7.46E-08	6.59E-02	1.04E-03	5.2E+00
15	Maynard Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	15_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.19E-02	7.21E-02	7.83E-03	7.46E-08	1.22E-01	1.55E-03	3.3E+00
15	Maynard Lake	Baseline	INDG	Heavy	Toddler	MeHg	15_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.96E-02	1.16E-02	1.73E-03	2.99E-08	3.29E-02	2.00E-03	1.0E+01
15	Maynard Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	15_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.19E-02	6.23E-02	5.72E-03	7.46E-08	1.10E-01	1.55E-03	3.3E+00
15	Maynard Lake	Baseline	INDG	Average	AdultFEM	MeHg	15_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.06E-02	6.39E-03	9.01E-04	7.46E-08	1.79E-02	2.83E-04	1.4E+00
15	Maynard Lake	Baseline	INDG	Average	AdultMAL	MeHg	15_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.27E-02	1.64E-02	1.58E-03	7.46E-08	3.07E-02	3.90E-04	8.3E-01
15	Maynard Lake	Baseline	INDG	Average	Toddler	MeHg	15_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	5.28E-03	3.20E-03	4.51E-04	2.99E-08	8.93E-03	5.41E-04	2.7E+00
15	Maynard Lake	Baseline	INDG	Average	AdultGEN	MeHg	15_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	1.04E+00	6.19E-01	9.16E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.19E-02	1.12E-02	1.21E-03	7.46E-08	2.43E-02	3.44E-04	7.3E-01
16	Tide Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	16_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.94E-02	2.47E-02	3.45E-03	7.46E-08	4.75E-02	7.53E-04	3.8E+00
16	Tide Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	16_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.07E-02	7.67E-02	7.83E-03	7.46E-08	1.05E-01	1.33E-03	2.8E+00
16	Tide Lake	Baseline	INDG	Heavy	Toddler	MeHg	16_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	9.68E-03	1.23E-02	1.73E-03	2.99E-08	2.37E-02	1.44E-03	7.2E+00
16	Tide Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	16_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.07E-02	6.62E-02	5.72E-03	7.46E-08	9.26E-02	1.31E-03	2.8E+00
16	Tide Lake	Baseline	INDG	Average	AdultFEM	MeHg	16_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	5.21E-03	6.80E-03	9.01E-04	7.46E-08	1.29E-02	2.05E-04	1.0E+00
16	Tide Lake	Baseline	INDG	Average	AdultMAL	MeHg	16_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	6.27E-03	1.75E-02	1.58E-03	7.46E-08	2.53E-02	3.21E-04	6.8E-01
16	Tide Lake	Baseline	INDG	Average	Toddler	MeHg	16_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.61E-03	3.40E-03	4.51E-04	2.99E-08	6.45E-03	3.91E-04	2.0E+00
16	Tide Lake	Baseline	INDG	Average	AdultGEN	MeHg	16_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	5.14E-01	6.59E-01	9.16E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	5.87E-03	1.20E-02	1.21E-03	7.46E-08	1.90E-02	2.69E-04	5.7E-01
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	17_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.75E-02	2.06E-02	5.59E-03	7.46E-08	5.36E-02	8.50E-04	4.3E+00
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	17_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.93E-02	6.39E-02	1.27E-02	7.46E-08	1.06E-01	1.34E-03	2.9E+00
17	Upper Ball Lake	Baseline	INDG	Heavy	Toddler	MeHg	17_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.37E-02	1.03E-02	2.79E-03	2.99E-08	2.68E-02	1.63E-03	8.1E+00
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	17_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.93E-02	5.53E-02	9.26E-03	7.46E-08	9.38E-02	1.33E-03	2.8E+00
17	Upper Ball Lake	Baseline	INDG	Average	AdultFEM	MeHg	17_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	7.39E-03	5.67E-03	1.46E-03	7.46E-08	1.45E-02	2.30E-04	1.2E+00
17	Upper Ball Lake	Baseline	INDG	Average	AdultMAL	MeHg	17_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	8.89E-03	1.46E-02	2.56E-03	7.46E-08	2.60E-02	3.30E-04	7.0E-01
17	Upper Ball Lake	Baseline	INDG	Average	Toddler	MeHg	17_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	3.70E-03	2.83E-03	7.29E-04	2.99E-08	7.26E-03	4.40E-04	2.2E+00
17	Upper Ball Lake	Baseline	INDG	Average	AdultGEN	MeHg	17_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	7.28E-01	5.49E-01	1.48E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	8.33E-03	9.97E-03	1.95E-03	7.46E-08	2.03E-02	2.86E-04	6.1E-01
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	18_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	5.45E-02	2.99E-02	6.79E-03	7.46E-08	9.12E-02	1.45E-03	7.2E+00
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	18_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	5.82E-02	9.28E-02	1.54E-02	7.46E-08	1.66E-01	2.11E-03	4.5E+00
18	Lower Ball Lake	Baseline	INDG	Heavy	Toddler	MeHg	18_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.73E-02	1.49E-02	3.39E-03	2.99E-08	4.56E-02	2.76E-03	1.4E+01
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	18_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	5.82E-02	8.02E-02	1.12E-02	7.46E-08	1.50E-01	2.12E-03	4.5E+00
18	Lower Ball Lake	Baseline	INDG	Average	AdultFEM	MeHg	18_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.47E-02	8.23E-03	1.77E-03	7.46E-08	2.47E-02	3.91E-04	2.0E+00
18	Lower Ball Lake	Baseline	INDG	Average	AdultMAL	MeHg	18_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.77E-02	2.12E-02	3.11E-03	7.46E-08	4.19E-02	5.32E-04	1.1E+00
18	Lower Ball Lake	Baseline	INDG	Average	Toddler	MeHg	18_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	7.34E-03	4.12E-03	8.86E-04	2.99E-08	1.23E-02	7.48E-04	3.7E+00
18	Lower Ball Lake	Baseline	INDG	Average	AdultGEN	MeHg	18_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	1.45E+00	7.98E-01	1.80E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.65E-02	1.45E-02	2.37E-03	7.46E-08	3.34E-02	4.72E-04	1.0E+00
19	Indian Lake	Baseline	INDG	Heavy	AdultFEM	MeHg	19_Baseline_INDG_Heavy_AdultFEM_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.20E-02	1.86E-02	7.58E-03	7.46E-08	4.81E-02	7.63E-04	3.8E+00
19	Indian Lake	Baseline	INDG	Heavy	AdultMAL	MeHg	19_Baseline_INDG_Heavy_AdultMAL_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.35E-02	5.77E-02	1.72E-02	7.46E-08	9.84E-02	1.25E-03	2.7E+00
19	Indian Lake	Baseline	INDG	Heavy	Toddler	MeHg	19_Baseline_INDG_Heavy_Toddler_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.10E-02	9.29E-03	3.79E-03	2.99E-08	2.41E-02	1.46E-03	7.3E+00
19	Indian Lake	Baseline	INDG	Heavy	AdultGEN	MeHg	19_Baseline_INDG_Heavy_AdultGEN_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.35E-02	4.99E-02	1.26E-02	7.46E-08	8.59E-02	1.21E-03	2.6E+00
19	Indian Lake	Baseline	INDG	Average	AdultFEM	MeHg	19_Baseline_INDG_Average_AdultFEM_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	5.92E-03	5.11E-03	1.98E-03	7.46E-08	1.30E-02	2.06E-04	1.0E+00
19	Indian Lake	Baseline	INDG	Average	AdultMAL	MeHg	19_Baseline_INDG_Average_AdultMAL_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	7.12E-03	1.31E-02	3.47E-03	7.46E-08	2.37E-02	3.01E-04	6.4E-01
19	Indian Lake	Baseline	INDG	Average	Toddler	MeHg	19_Baseline_INDG_Average_Toddler_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.96E-03	2.56E-03	9.89E-04	2.99E-08	6.51E-03	3.94E-04	2.0E+00
19	Indian Lake	Baseline	INDG	Average	AdultGEN	MeHg	19_Baseline_INDG_Average_AdultGEN_MeHg	4.98E-02	4.98E-08	5.83E-01	4.96E-01	2.01E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	6.67E-03	9.00E-03	2.65E-03	7.46E-08	1.83E-02	2.59E-04	5.5E-01

Table E-6: Exposure Summary for the Baseline Scenario

Predicted Fish Concentrations and Risks for the Baseline																						
								Baseline SW		Fish Concentrations			Fish Consumption Rates				Exposure Rate					EDI	HQ
								Concentration		Pike	Walleye	Whitefish	Pike	Walleye	Whitefish	Total	Pike	Walleye	Whitefish	WIR	Total		
Segment	Description	Scenario	Receptor	Type	Lifestage	Chemical	Variable	[ng/L]	[mg/L]	[mg/kg-WW]			[kg/day]				[mg/day]					[mg/kg/day]	[Unitless]
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultFEM	THg	1_Baseline_INDG_Heavy_AdultFEM_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.43E-02	1.80E-02	6.79E-03	1.99E-06	3.91E-02	6.20E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultMAL	THg	1_Baseline_INDG_Heavy_AdultMAL_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.53E-02	5.59E-02	1.54E-02	1.99E-06	8.66E-02	1.10E-03	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	Toddler	THg	1_Baseline_INDG_Heavy_Toddler_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	7.16E-03	9.00E-03	3.39E-03	7.94E-07	1.96E-02	1.18E-03	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultGEN	THg	1_Baseline_INDG_Heavy_AdultGEN_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.53E-02	4.83E-02	1.12E-02	1.99E-06	7.48E-02	1.06E-03	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultFEM	THg	1_Baseline_INDG_Average_AdultFEM_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	3.86E-03	4.95E-03	1.77E-03	1.99E-06	1.06E-02	1.68E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultMAL	THg	1_Baseline_INDG_Average_AdultMAL_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	4.64E-03	1.27E-02	3.11E-03	1.99E-06	2.05E-02	2.60E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	Toddler	THg	1_Baseline_INDG_Average_Toddler_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.93E-03	2.48E-03	8.86E-04	7.94E-07	5.29E-03	3.21E-04	-
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultGEN	THg	1_Baseline_INDG_Average_AdultGEN_THg	1.32E+00	1.32E-06	3.80E-01	4.80E-01	1.80E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	4.34E-03	8.71E-03	2.37E-03	1.99E-06	1.54E-02	2.18E-04	-
2	Pakwash Lake	Baseline	INDG	Heavy	AdultFEM	THg	2_Baseline_INDG_Heavy_AdultFEM_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.15E-02	3.31E-02	1.51E-03	1.95E-06	4.60E-02	7.29E-04	-
2	Pakwash Lake	Baseline	INDG	Heavy	AdultMAL	THg	2_Baseline_INDG_Heavy_AdultMAL_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.22E-02	1.03E-01	3.42E-03	1.95E-06	1.18E-01	1.50E-03	-
2	Pakwash Lake	Baseline	INDG	Heavy	Toddler	THg	2_Baseline_INDG_Heavy_Toddler_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	5.73E-03	1.65E-02	7.54E-04	7.82E-07	2.30E-02	1.39E-03	-
2	Pakwash Lake	Baseline	INDG	Heavy	AdultGEN	THg	2_Baseline_INDG_Heavy_AdultGEN_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.22E-02	8.87E-02	2.50E-03	1.95E-06	1.03E-01	1.46E-03	-
2	Pakwash Lake	Baseline	INDG	Average	AdultFEM	THg	2_Baseline_INDG_Average_AdultFEM_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	3.09E-03	9.10E-03	3.94E-04	1.95E-06	1.26E-02	1.99E-04	-
2	Pakwash Lake	Baseline	INDG	Average	AdultMAL	THg	2_Baseline_INDG_Average_AdultMAL_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	3.71E-03	2.34E-02	6.91E-04	1.95E-06	2.78E-02	3.53E-04	-
2	Pakwash Lake	Baseline	INDG	Average	Toddler	THg	2_Baseline_INDG_Average_Toddler_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.54E-03	4.55E-03	1.97E-04	7.82E-07	6.29E-03	3.81E-04	-
2	Pakwash Lake	Baseline	INDG	Average	AdultGEN	THg	2_Baseline_INDG_Average_AdultGEN_THg	1.30E+00	1.30E-06	3.04E-01	8.82E-01	4.00E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	3.47E-03	1.60E-02	5.27E-04	1.95E-06	2.00E-02	2.83E-04	-
7	Wegg Lake	Baseline	INDG	Heavy	AdultFEM	THg	7_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.11E-02	1.66E-02	1.51E-03	1.82E-06	3.92E-02	6.21E-04	-
7	Wegg Lake	Baseline	INDG	Heavy	AdultMAL	THg	7_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.25E-02	5.16E-02	3.42E-03	1.82E-06	7.75E-02	9.83E-04	-
7	Wegg Lake	Baseline	INDG	Heavy	Toddler	THg	7_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.05E-02	8.30E-03	7.54E-04	7.28E-07	1.96E-02	1.19E-03	-
7	Wegg Lake	Baseline	INDG	Heavy	AdultGEN	THg	7_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.25E-02	4.46E-02	2.50E-03	1.82E-06	6.96E-02	9.84E-04	-
7	Wegg Lake	Baseline	INDG	Average	AdultFEM	THg	7_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	5.67E-03	4.57E-03	3.94E-04	1.82E-06	1.06E-02	1.69E-04	-
7	Wegg Lake	Baseline	INDG	Average	AdultMAL	THg	7_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	6.83E-03	1.18E-02	6.91E-04	1.82E-06	1.93E-02	2.45E-04	-
7	Wegg Lake	Baseline	INDG	Average	Toddler	THg	7_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.84E-03	2.29E-03	1.97E-04	7.28E-07	5.32E-03	3.22E-04	-
7	Wegg Lake	Baseline	INDG	Average	AdultGEN	THg	7_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	5.59E-01	4.43E-01	4.00E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	6.39E-03	8.04E-03	5.27E-04	1.82E-06	1.50E-02	2.12E-04	-
13	Oak Lake	Baseline	INDG	Heavy	AdultFEM	THg	13_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.18E-02	2.28E-02	7.65E-03	1.82E-06	6.23E-02	9.87E-04	-
13	Oak Lake	Baseline	INDG	Heavy	AdultMAL	THg	13_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	3.40E-02	7.08E-02	1.74E-02	1.82E-06	1.22E-01	1.55E-03	-
13	Oak Lake	Baseline	INDG	Heavy	Toddler	THg	13_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.59E-02	1.14E-02	3.83E-03	7.28E-07	3.11E-02	1.89E-03	-
13	Oak Lake	Baseline	INDG	Heavy	AdultGEN	THg	13_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	3.40E-02	6.12E-02	1.27E-02	1.82E-06	1.08E-01	1.52E-03	-
13	Oak Lake	Baseline	INDG	Average	AdultFEM	THg	13_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	8.57E-03	6.27E-03	2.00E-03	1.82E-06	1.68E-02	2.67E-04	-
13	Oak Lake	Baseline	INDG	Average	AdultMAL	THg	13_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.03E-02	1.61E-02	3.51E-03	1.82E-06	2.99E-02	3.80E-04	-
13	Oak Lake	Baseline	INDG	Average	Toddler	THg	13_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	4.28E-03	3.14E-03	9.99E-04	7.28E-07	8.42E-03	5.10E-04	-
13	Oak Lake	Baseline	INDG	Average	AdultGEN	THg	13_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	8.44E-01	6.08E-01	2.03E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	9.65E-03	1.10E-02	2.68E-03	1.82E-06	2.34E-02	3.30E-04	-
15	Maynard Lake	Baseline	INDG	Heavy	AdultFEM	THg	15_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	4.60E-02	2.72E-02	4.45E-03	1.82E-06	7.77E-02	1.23E-03	-
15	Maynard Lake	Baseline	INDG	Heavy	AdultMAL	THg	15_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.91E-02	8.45E-02	1.01E-02	1.82E-06	1.44E-01	1.82E-03	-
15	Maynard Lake	Baseline	INDG	Heavy	Toddler	THg	15_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.30E-02	1.36E-02	2.22E-03	7.28E-07	3.88E-02	2.35E-03	-
15	Maynard Lake	Baseline	INDG	Heavy	AdultGEN	THg	15_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.91E-02	7.30E-02	7.37E-03	1.82E-06	1.30E-01	1.83E-03	-
15	Maynard Lake	Baseline	INDG	Average	AdultFEM	THg	15_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.24E-02	7.49E-03	1.16E-03	1.82E-06	2.10E-02	3.33E-04	-
15	Maynard Lake	Baseline	INDG	Average	AdultMAL	THg	15_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.49E-02	1.93E-02	2.04E-03	1.82E-06	3.62E-02	4.59E-04	-
15	Maynard Lake	Baseline	INDG	Average	Toddler	THg	15_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	6.19E-03	3.75E-03	5.81E-04	7.28E-07	1.05E-02	6.38E-04	-
15	Maynard Lake	Baseline	INDG	Average	AdultGEN	THg	15_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	1.22E+00	7.26E-01	1.18E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.39E-02	1.32E-02	1.56E-03	1.82E-06	2.87E-02	4.06E-04	-
16	Tide Lake	Baseline	INDG	Heavy	AdultFEM	THg	16_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.27E-02	2.89E-02	4.45E-03	1.82E-06	5.61E-02	8.89E-04	-
16	Tide Lake	Baseline	INDG	Heavy	AdultMAL	THg	16_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.42E-02	8.99E-02	1.01E-02	1.82E-06	1.24E-01	1.58E-03	-
16	Tide Lake	Baseline	INDG	Heavy	Toddler	THg	16_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.13E-02	1.45E-02	2.22E-03	7.28E-07	2.80E-02	1.70E-03	-
16	Tide Lake	Baseline	INDG	Heavy	AdultGEN	THg	16_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.42E-02	7.77E-02	7.37E-03	1.82E-06	1.09E-01	1.55E-03	-
16	Tide Lake	Baseline	INDG	Average	AdultFEM	THg	16_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	6.11E-03	7.97E-03	1.16E-03	1.82E-06	1.52E-02	2.42E-04	-
16	Tide Lake	Baseline	INDG	Average	AdultMAL	THg	16_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	7.35E-03	2.05E-02	2.04E-03	1.82E-06	2.99E-02	3.79E-04	-
16	Tide Lake	Baseline	INDG	Average	Toddler	THg	16_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	3.06E-03	3.98E-03	5.81E-04	7.28E-07	7.62E-03	4.62E-04	-
16	Tide Lake	Baseline	INDG	Average	AdultGEN	THg	16_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	6.02E-01	7.72E-01	1.18E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	6.88E-03	1.40E-02	1.56E-03	1.82E-06	2.24E-02	3.18E-04	-
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultFEM	THg	17_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.22E-02	2.41E-02	7.20E-03	1.82E-06	6.35E-02	1.01E-03	-
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultMAL	THg	17_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	3.44E-02	7.50E-02	1.63E-02	1.82E-06	1.26E-01	1.59E-03	-
17	Upper Ball Lake	Baseline	INDG	Heavy	Toddler	THg	17_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.61E-02	1.21E-02	3.60E-03	7.28E-07	3.18E-02	1.93E-03	-
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultGEN	THg	17_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	3.44E-02	6.48E-02	1.19E-02	1.82E-06	1.11E-01	1.57E-03	-
17	Upper Ball Lake	Baseline	INDG	Average	AdultFEM	THg	17_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	8.67E-03	6.65E-03	1.88E-03	1.82E-06	1.72E-02	2.73E-04	-
17	Upper Ball Lake	Baseline	INDG	Average	AdultMAL	THg	17_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.04E-02	1.71E-02	3.30E-03	1.82E-06	3.08E-02	3.91E-04	-
17	Upper Ball Lake	Baseline	INDG	Average	Toddler	THg	17_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	4.33E-03	3.32E-03	9.40E-04	7.28E-07	8.60E-03	5.21E-04	-
17	Upper Ball Lake	Baseline	INDG	Average	AdultGEN	THg	17_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	8.54E-01	6.44E-01	1.91E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	9.76E-03	1.17E-02	2.52E-03	1.82E-06	2.40E-02	3.39E-04	-
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultFEM	THg	18_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	6.39E-02	3.50E-02	8.75E-03	1.82E-06	1.08E-01	1.71E-03	-
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultMAL	THg	18_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	6.82E-02	1.09E-01	1.98E-02	1.82E-06	1.97E-01	2.50E-03	-
18	Lower Ball Lake	Baseline	INDG	Heavy	Toddler	THg	18_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	3.20E-02	1.75E-02	4.37E-03	7.28E-07	5.39E-02	3.26E-03	-
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultGEN	THg	18_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	6.82E-02	9.41E-02	1.45E-02	1.82E-06	1.77E-01	2.50E-03	-
18	Lower Ball Lake	Baseline	INDG	Average	AdultFEM	THg	18_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.72E-02	9.65E-03	2.28E-03	1.82E-06	2.91E-02	4.62E-04	-
18	Lower Ball Lake	Baseline	INDG	Average	AdultMAL	THg	18_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	2.07E-02	2.48E-02	4.01E-03	1.82E-06	4.95E-02	6.28E-04	-
18	Lower Ball Lake	Baseline	INDG	Average	Toddler	THg	18_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	8.61E-03	4.82E-03	1.14E-03	7.28E-07	1.46E-02	8.83E-04	-
18	Lower Ball Lake	Baseline	INDG	Average	AdultGEN	THg	18_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	1.70E+00	9.35E-01	2.32E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.94E-02	1.70E-02	3.06E-03	1.82E-06	3.94E-02	5.57E-04	-
19	Indian Lake	Baseline	INDG	Heavy	AdultFEM	THg	19_Baseline_INDG_Heavy_AdultFEM_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	3.77E-02	3.75E-02	3.77E-02	1.13E-01	2.58E-02	2.18E-02	9.76E-03	1.82E-06	5.73E-02	9.09E-04	-
19	Indian Lake	Baseline	INDG	Heavy	AdultMAL	THg	19_Baseline_INDG_Heavy_AdultMAL_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.75E-02	6.76E-02	2.21E-02	1.82E-06	1.17E-01	1.49E-03	-
19	Indian Lake	Baseline	INDG	Heavy	Toddler	THg	19_Baseline_INDG_Heavy_Toddler_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.29E-02	1.09E-02	4.88E-03	7.28E-07	2.87E-02	1.74E-03	-
19	Indian Lake	Baseline	INDG	Heavy	AdultGEN	THg	19_Baseline_INDG_Heavy_AdultGEN_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.75E-02	5.84E-02	1.62E-02	1.82E-06	1.02E-01	1.44E-03	-
19	Indian Lake	Baseline	INDG	Average	AdultFEM	THg	19_Baseline_INDG_Average_AdultFEM_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	1.02E-02	1.03E-02	9.84E-03	3.03E-02	6.00E-03	2.55E-03	1.82E-06	1.55E-02	2.45E-04	-
19	Indian Lake	Baseline	INDG	Average	AdultMAL	THg	19_Baseline_INDG_Average_AdultMAL_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	1.22E-02	2.65E-02	1.73E-02	5.60E-02	8.35E-03	1.54E-02	4.47E-03	1.82E-06	2.82E-02	3.58E-04	-
19	Indian Lake	Baseline	INDG	Average	Toddler	THg	19_Baseline_INDG_Average_Toddler_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	5.08E-03	5.16E-03	4.92E-03	1.52E-02	3.47E-03	3.00E-03	1.27E-03	7.28E-07	7.74E-03	4.69E-04	-
19	Indian Lake	Baseline	INDG	Average	AdultGEN	THg	19_Baseline_INDG_Average_AdultGEN_THg	1.21E+00	1.21E-06	6.84E-01	5.81E-01	2.59E-01	1.14E-02	1.82E-02	1.32E-02	4.28E-02	7.82E-03	1.05E-02	3.41E-03	1.82E-06	2.18E-02	3.08E-04	-

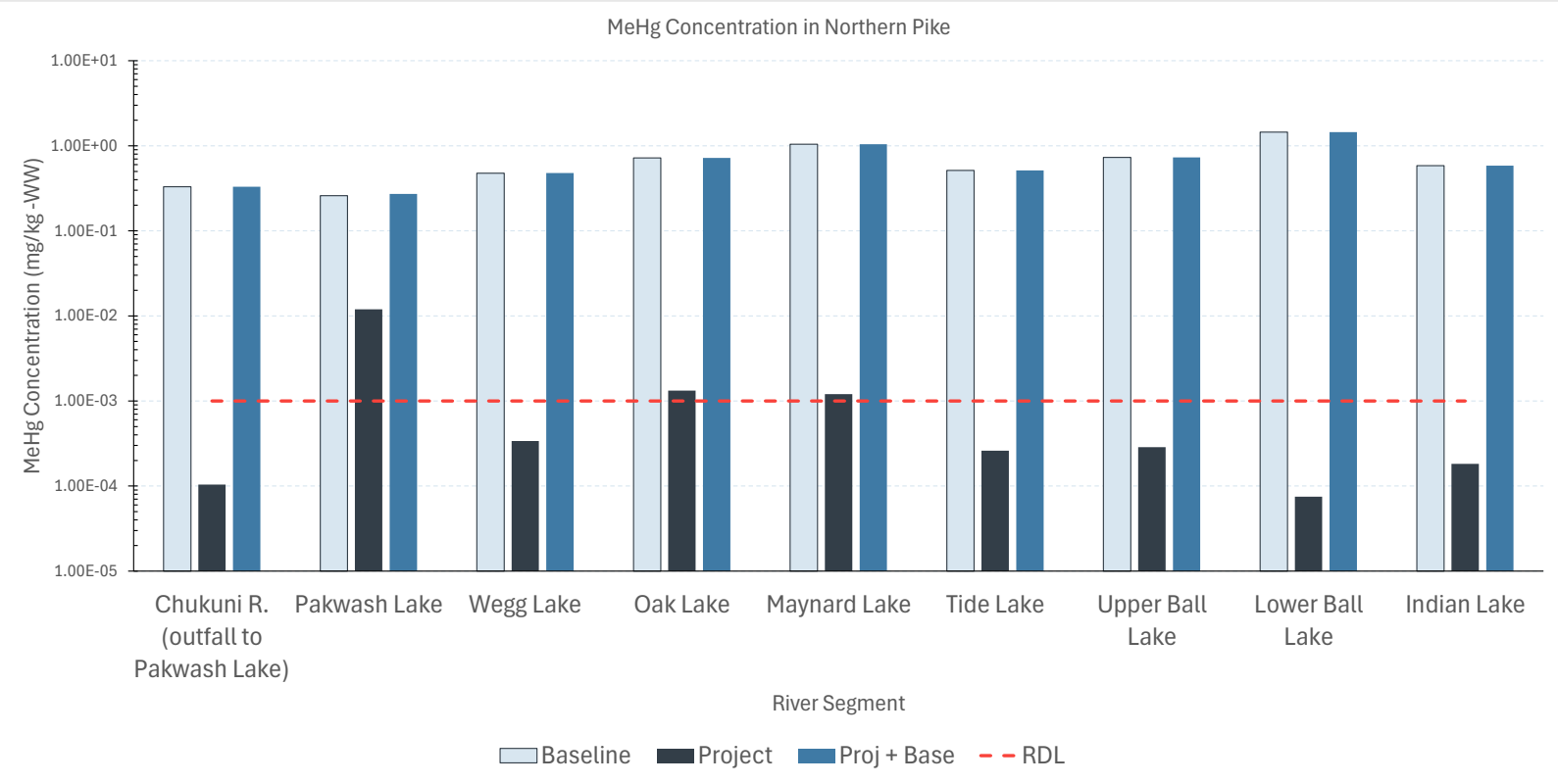
Table E-6: Exposure Summary for the Baseline Scenario

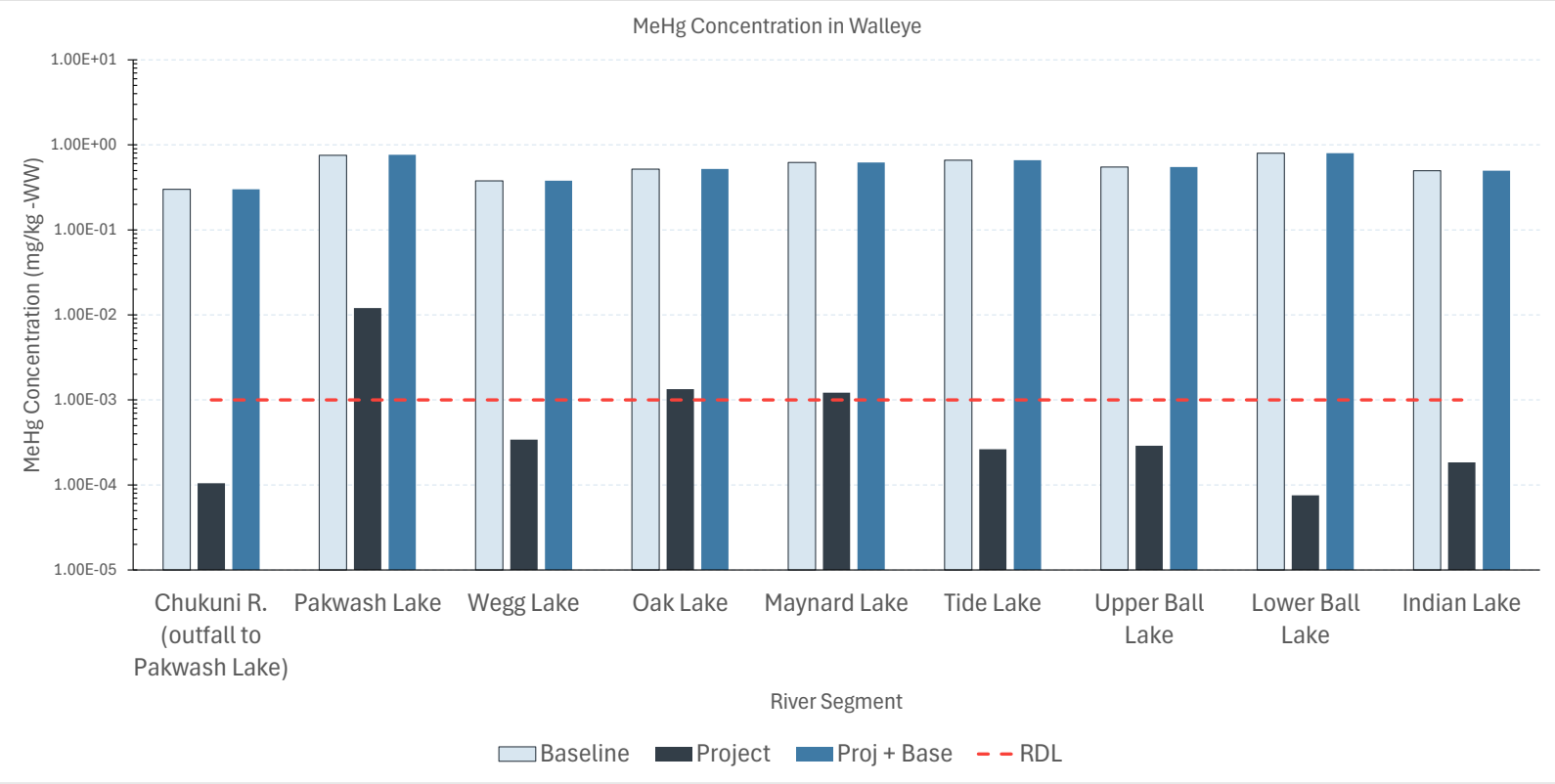
Predicted Fish Concentrations and Risks for the Baseline																							
								Baseline SW Concentration		Fish Concentrations			Fish Consumption Rates				Exposure Rate					EDI	HQ
Segment	Description	Scenario	Receptor	Type	Lifestage	Chemical	Variable	[ng/L]	[mg/L]	Pike	Walleye	Whitefish	Pike	Walleye	Whitefish	Total	Pike	Walleye	Whitefish	WIR	Total	[mg/kg/day]	[Unitless]
										[mg/kg-WW]			[kg/day]				[mg/day]						
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultFEM	lgHg	1_Baseline_INDG_Heavy_AdultFEM_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.89E-03	6.75E-03	1.51E-03	1.99E-06	1.01E-02	1.61E-04	5.4E-01
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultMAL	lgHg	1_Baseline_INDG_Heavy_AdultMAL_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	2.01E-03	2.10E-02	3.42E-03	1.99E-06	2.64E-02	3.35E-04	1.1E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	Toddler	lgHg	1_Baseline_INDG_Heavy_Toddler_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	9.43E-04	3.37E-03	7.54E-04	7.94E-07	5.07E-03	3.07E-04	1.0E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Heavy	AdultGEN	lgHg	1_Baseline_INDG_Heavy_AdultGEN_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	2.01E-03	1.81E-02	2.50E-03	1.99E-06	2.26E-02	3.20E-04	1.1E+00
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultFEM	lgHg	1_Baseline_INDG_Average_AdultFEM_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	5.08E-04	1.86E-03	3.94E-04	1.99E-06	2.76E-03	4.38E-05	1.5E-01
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultMAL	lgHg	1_Baseline_INDG_Average_AdultMAL_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	6.11E-04	4.78E-03	6.91E-04	1.99E-06	6.08E-03	7.71E-05	2.6E-01
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	Toddler	lgHg	1_Baseline_INDG_Average_Toddler_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.54E-04	9.29E-04	1.97E-04	7.94E-07	1.38E-03	8.36E-05	2.8E-01
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	INDG	Average	AdultGEN	lgHg	1_Baseline_INDG_Average_AdultGEN_lgHg	1.32E+00	1.32E-06	5.00E-02	1.80E-01	4.00E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	5.72E-04	3.27E-03	5.27E-04	1.99E-06	4.37E-03	6.18E-05	2.1E-01
2	Pakwash Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	2_Baseline_INDG_Heavy_AdultFEM_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	1.68E-03	4.86E-03	1.51E-03	1.95E-06	8.05E-03	1.28E-04	4.3E-01
2	Pakwash Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	2_Baseline_INDG_Heavy_AdultMAL_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.80E-03	1.51E-02	3.42E-03	1.95E-06	2.03E-02	2.58E-04	8.6E-01
2	Pakwash Lake	Baseline	INDG	Heavy	Toddler	lgHg	2_Baseline_INDG_Heavy_Toddler_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	8.42E-04	2.43E-03	7.54E-04	7.82E-07	4.03E-03	2.44E-04	8.1E-01
2	Pakwash Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	2_Baseline_INDG_Heavy_AdultGEN_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.80E-03	1.30E-02	2.50E-03	1.95E-06	1.73E-02	2.45E-04	8.2E-01
2	Pakwash Lake	Baseline	INDG	Average	AdultFEM	lgHg	2_Baseline_INDG_Average_AdultFEM_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	4.54E-04	1.34E-03	3.94E-04	1.95E-06	2.19E-03	3.47E-05	1.2E-01
2	Pakwash Lake	Baseline	INDG	Average	AdultMAL	lgHg	2_Baseline_INDG_Average_AdultMAL_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	5.46E-04	3.44E-03	6.91E-04	1.95E-06	4.68E-03	5.94E-05	2.0E-01
2	Pakwash Lake	Baseline	INDG	Average	Toddler	lgHg	2_Baseline_INDG_Average_Toddler_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	2.27E-04	6.69E-04	1.97E-04	7.82E-07	1.09E-03	6.63E-05	2.2E-01
2	Pakwash Lake	Baseline	INDG	Average	AdultGEN	lgHg	2_Baseline_INDG_Average_AdultGEN_lgHg	1.30E+00	1.30E-06	4.47E-02	1.30E-01	4.00E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	5.11E-04	2.35E-03	5.27E-04	1.95E-06	3.39E-03	4.80E-05	1.6E-01
7	Wegg Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	7_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.10E-03	2.44E-03	1.51E-03	1.82E-06	7.05E-03	1.12E-04	3.7E-01
7	Wegg Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	7_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	3.31E-03	7.58E-03	3.42E-03	1.82E-06	1.43E-02	1.82E-04	6.1E-01
7	Wegg Lake	Baseline	INDG	Heavy	Toddler	lgHg	7_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.55E-03	1.22E-03	7.54E-04	7.28E-07	3.52E-03	2.14E-04	7.1E-01
7	Wegg Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	7_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	3.31E-03	6.55E-03	2.50E-03	1.82E-06	1.24E-02	1.75E-04	5.8E-01
7	Wegg Lake	Baseline	INDG	Average	AdultFEM	lgHg	7_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	8.34E-04	6.72E-04	3.94E-04	1.82E-06	1.90E-03	3.01E-05	1.0E-01
7	Wegg Lake	Baseline	INDG	Average	AdultMAL	lgHg	7_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.00E-03	1.73E-03	6.91E-04	1.82E-06	3.42E-03	4.34E-05	1.4E-01
7	Wegg Lake	Baseline	INDG	Average	Toddler	lgHg	7_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	4.17E-04	3.36E-04	1.97E-04	7.28E-07	9.51E-04	5.76E-05	1.9E-01
7	Wegg Lake	Baseline	INDG	Average	AdultGEN	lgHg	7_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	8.22E-02	6.51E-02	4.00E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	9.39E-04	1.18E-03	5.27E-04	1.82E-06	2.65E-03	3.75E-05	1.2E-01
13	Oak Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	13_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	4.68E-03	3.35E-03	1.71E-03	1.82E-06	9.74E-03	1.54E-04	5.1E-01
13	Oak Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	13_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.99E-03	1.04E-02	3.89E-03	1.82E-06	1.93E-02	2.45E-04	8.2E-01
13	Oak Lake	Baseline	INDG	Heavy	Toddler	lgHg	13_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.34E-03	1.67E-03	8.57E-04	7.28E-07	4.87E-03	2.95E-04	9.8E-01
13	Oak Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	13_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.99E-03	8.99E-03	2.84E-03	1.82E-06	1.68E-02	2.38E-04	7.9E-01
13	Oak Lake	Baseline	INDG	Average	AdultFEM	lgHg	13_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.26E-03	9.22E-04	4.47E-04	1.82E-06	2.63E-03	4.17E-05	1.4E-01
13	Oak Lake	Baseline	INDG	Average	AdultMAL	lgHg	13_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.51E-03	2.37E-03	7.85E-04	1.82E-06	4.67E-03	5.93E-05	2.0E-01
13	Oak Lake	Baseline	INDG	Average	Toddler	lgHg	13_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	6.30E-04	4.61E-04	2.24E-04	7.28E-07	1.32E-03	7.97E-05	2.7E-01
13	Oak Lake	Baseline	INDG	Average	AdultGEN	lgHg	13_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	1.24E-01	8.94E-02	4.55E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.42E-03	1.62E-03	5.99E-04	1.82E-06	3.64E-03	5.15E-05	1.7E-01
15	Maynard Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	15_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	6.76E-03	4.00E-03	9.96E-04	1.82E-06	1.18E-02	1.86E-04	6.2E-01
15	Maynard Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	15_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	7.22E-03	1.24E-02	2.26E-03	1.82E-06	2.19E-02	2.78E-04	9.3E-01
15	Maynard Lake	Baseline	INDG	Heavy	Toddler	lgHg	15_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	4.98E-04	7.28E-07	5.88E-03	3.56E-04	1.2E+00		
15	Maynard Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	15_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	7.22E-03	1.07E-02	1.65E-03	1.82E-06	1.96E-02	2.77E-04	9.2E-01
15	Maynard Lake	Baseline	INDG	Average	AdultFEM	lgHg	15_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.82E-03	1.10E-03	2.60E-04	1.82E-06	3.18E-03	5.05E-05	1.7E-01
15	Maynard Lake	Baseline	INDG	Average	AdultMAL	lgHg	15_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	2.19E-03	2.83E-03	4.56E-04	1.82E-06	5.48E-03	6.95E-05	2.3E-01
15	Maynard Lake	Baseline	INDG	Average	Toddler	lgHg	15_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	9.10E-04	5.51E-04	1.30E-04	7.28E-07	1.59E-03	9.65E-05	3.2E-01
15	Maynard Lake	Baseline	INDG	Average	AdultGEN	lgHg	15_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	1.79E-01	1.07E-01	2.64E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	2.05E-03	1.94E-03	3.48E-04	1.82E-06	4.34E-03	6.13E-05	2.0E-01
16	Tide Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	16_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.34E-03	4.25E-03	9.96E-04	1.82E-06	8.59E-03	1.36E-04	4.5E-01
16	Tide Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	16_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	3.56E-03	1.32E-02	2.26E-03	1.82E-06	1.90E-02	2.42E-04	8.1E-01
16	Tide Lake	Baseline	INDG	Heavy	Toddler	lgHg	16_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.67E-03	2.13E-03	4.98E-04	7.28E-07	4.29E-03	2.60E-04	8.7E-01
16	Tide Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	16_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	3.56E-03	1.14E-02	1.65E-03	1.82E-06	1.66E-02	2.35E-04	7.8E-01
16	Tide Lake	Baseline	INDG	Average	AdultFEM	lgHg	16_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	8.98E-04	1.17E-03	2.60E-04	1.82E-06	2.33E-03	3.69E-05	1.2E-01
16	Tide Lake	Baseline	INDG	Average	AdultMAL	lgHg	16_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.08E-03	3.01E-03	4.56E-04	1.82E-06	4.55E-03	5.77E-05	1.9E-01
16	Tide Lake	Baseline	INDG	Average	Toddler	lgHg	16_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	4.49E-04	5.86E-04	1.30E-04	7.28E-07	1.17E-03	7.06E-05	2.4E-01
16	Tide Lake	Baseline	INDG	Average	AdultGEN	lgHg	16_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	8.85E-02	1.13E-01	2.64E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.01E-03	2.06E-03	3.48E-04	1.82E-06	3.42E-03	4.84E-05	1.6E-01
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	17_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	4.73E-03	3.55E-03	1.61E-03	1.82E-06	9.90E-03	1.57E-04	5.2E-01
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	17_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	5.05E-03	1.10E-02	3.66E-03	1.82E-06	1.97E-02	2.50E-04	8.3E-01
17	Upper Ball Lake	Baseline	INDG	Heavy	Toddler	lgHg	17_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	2.37E-03	1.77E-03	8.06E-04	7.28E-07	4.95E-03	3.00E-04	1.0E+00
17	Upper Ball Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	17_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	5.05E-03	9.52E-03	2.67E-03	1.82E-06	1.72E-02	2.44E-04	8.1E-01
17	Upper Ball Lake	Baseline	INDG	Average	AdultFEM	lgHg	17_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.27E-03	9.77E-04	4.21E-04	1.82E-06	2.67E-03	4.24E-05	1.4E-01
17	Upper Ball Lake	Baseline	INDG	Average	AdultMAL	lgHg	17_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.53E-03	2.51E-03	7.39E-04	1.82E-06	4.79E-03	6.07E-05	2.0E-01
17	Upper Ball Lake	Baseline	INDG	Average	Toddler	lgHg	17_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	6.37E-04	4.88E-04	2.10E-04	7.28E-07	1.34E-03	8.10E-05	2.7E-01
17	Upper Ball Lake	Baseline	INDG	Average	AdultGEN	lgHg	17_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	1.26E-01	9.47E-02	4.28E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.43E-03	1.72E-03	5.64E-04	1.82E-06	3.72E-03	5.26E-05	1.8E-01
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	18_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	9.40E-03	5.15E-03	1.96E-03	1.82E-06	1.65E-02	2.62E-04	8.7E-01
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	18_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	1.00E-02	1.60E-02	4.44E-03	1.82E-06	3.05E-02	3.87E-04	1.3E+00
18	Lower Ball Lake	Baseline	INDG	Heavy	Toddler	lgHg	18_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	4.70E-03	2.58E-03	9.80E-04	7.28E-07	8.26E-03	5.00E-04	1.7E+00
18	Lower Ball Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	18_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	1.00E-02	1.38E-02	3.25E-03	1.82E-06	2.71E-02	3.83E-04	1.3E+00
18	Lower Ball Lake	Baseline	INDG	Average	AdultFEM	lgHg	18_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	2.53E-03	1.42E-03	5.11E-04	1.82E-06	4.46E-03	7.07E-05	2.4E-01
18	Lower Ball Lake	Baseline	INDG	Average	AdultMAL	lgHg	18_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	3.04E-03	3.65E-03	8.97E-04	1.82E-06	7.59E-03	9.63E-05	3.2E-01
18	Lower Ball Lake	Baseline	INDG	Average	Toddler	lgHg	18_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	1.27E-03	7.09E-04	2.56E-04	7.28E-07	2.23E-03	1.35E-04	4.5E-01
18	Lower Ball Lake	Baseline	INDG	Average	AdultGEN	lgHg	18_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	2.49E-01	1.37E-01	5.20E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	2.85E-03	2.49E-03	6.85E-04	1.82E-06	6.03E-03	8.53E-05	2.8E-01
19	Indian Lake	Baseline	INDG	Heavy	AdultFEM	lgHg	19_Baseline_INDG_Heavy_AdultFEM_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	3.77E-02	3.75E-02	3.77E-02	1.13E-01	3.79E-03	3.20E-03	2.19E-03	1.82E-06	9.18E-03	1.45E-04	4.8E-01
19	Indian Lake	Baseline	INDG	Heavy	AdultMAL	lgHg	19_Baseline_INDG_Heavy_AdultMAL_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	4.02E-02	1.16E-01	8.55E-02	2.42E-01	4.05E-03	9.94E-03	4.96E-03	1.82E-06	1.90E-02	2.40E-04	8.0E-01
19	Indian Lake	Baseline	INDG	Heavy	Toddler	lgHg	19_Baseline_INDG_Heavy_Toddler_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	1.89E-02	1.87E-02	1.89E-02	5.64E-02	1.90E-03	1.60E-03	1.09E-03	7.28E-07	4.59E-03	2.78E-04	9.3E-01
19	Indian Lake	Baseline	INDG	Heavy	AdultGEN	lgHg	19_Baseline_INDG_Heavy_AdultGEN_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	4.02E-02	1.01E-01	6.25E-02	2.03E-01	4.05E-03	8.59E-03	3.62E-03	1.82E-06	1.63E-02	2.30E-04	7.7E-01
19	Indian Lake	Baseline	INDG	Average	AdultFEM	lgHg	19_Baseline_INDG_Average_AdultFEM_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	1.02E-02	1.03E-02	9.84E-03	3.03E-02	1.02E-03	8.81E-04	5.71E-04	1.82E-06	2.47E-03	3.92E-05	1.3E-01
19	Indian Lake	Baseline	INDG	Average	AdultMAL	lgHg	19_Baseline_INDG_Average_AdultMAL_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	1.22E-02	2.65E-02	1.73E-02	5.60E-02	1.23E-03	2.27E-03	1.00E-03	1.82E-06	4.50E-03	5.71E-05	1.9E-01
19	Indian Lake	Baseline	INDG	Average	Toddler	lgHg	19_Baseline_INDG_Average_Toddler_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	5.08E-03	5.16E-03	4.92E-03	1.52E-02	5.10E-04	4.41E-04	2.85E-04	7.28E-07	1.24E-03	7.50E-05	2.5E-01
19	Indian Lake	Baseline	INDG	Average	AdultGEN	lgHg	19_Baseline_INDG_Average_AdultGEN_lgHg	1.21E+00	1.21E-06	1.01E-01	8.54E-02	5.80E-02	1.14E-02	1.82E-02	1.32E-02	4.28E-02	1.15E-03	1.55E-03	7.65E-04	1.82E-06	3.47E-03	4.90E-05	1.6E-01

Assumed lgHg = THg

Table E-7: Exposure Point Fish Tissue Concentrations for Methylmercury

ID	Project	Baseline	Measured Baseline and Projected Fish Tissue Concentrations for Methylmercury [mg/kg-WW]								
			Pike			Walleye			Whitefish		
			Baseline	Project	Proj + Base	Baseline	Project	Proj + Base	Baseline	Project	Proj + Base
Chukuni R.	1_Project_INDG_Heavy_Toddler_MeHg	1_Baseline_INDG_Heavy_Toddler_MeHg	3.30E-01	1.04E-04	3.30E-01	3.00E-01	1.05E-04	3.00E-01	1.40E-01	3.89E-05	1.40E-01
Pakwash L	2_Project_INDG_Heavy_Toddler_MeHg	2_Baseline_INDG_Heavy_Toddler_MeHg	2.59E-01	1.19E-02	2.71E-01	7.52E-01	1.20E-02	7.64E-01	1.40E-01	4.47E-03	1.44E-01
Wegg Lake	7_Project_INDG_Heavy_Toddler_MeHg	7_Baseline_INDG_Heavy_Toddler_MeHg	4.77E-01	3.38E-04	4.77E-01	3.78E-01	3.41E-04	3.78E-01	1.40E-01	1.27E-04	1.40E-01
Oak Lake	13_Project_INDG_Heavy_Toddler_MeHg	13_Baseline_INDG_Heavy_Toddler_MeHg	7.20E-01	1.32E-03	7.21E-01	5.19E-01	1.34E-03	5.20E-01	1.58E-01	4.96E-04	1.58E-01
Maynard La	15_Project_INDG_Heavy_Toddler_MeHg	15_Baseline_INDG_Heavy_Toddler_MeHg	1.04E+00	1.20E-03	1.04E+00	6.19E-01	1.22E-03	6.20E-01	9.16E-02	4.52E-04	9.20E-02
Tide Lake	16_Project_INDG_Heavy_Toddler_MeHg	16_Baseline_INDG_Heavy_Toddler_MeHg	5.14E-01	2.61E-04	5.14E-01	6.59E-01	2.63E-04	6.59E-01	9.16E-02	9.78E-05	9.17E-02
Upper Ball	17_Project_INDG_Heavy_Toddler_MeHg	17_Baseline_INDG_Heavy_Toddler_MeHg	7.28E-01	2.87E-04	7.29E-01	5.49E-01	2.89E-04	5.50E-01	1.48E-01	1.07E-04	1.48E-01
Lower Ball	18_Project_INDG_Heavy_Toddler_MeHg	18_Baseline_INDG_Heavy_Toddler_MeHg	1.45E+00	7.48E-05	1.45E+00	7.98E-01	7.55E-05	7.98E-01	1.80E-01	2.80E-05	1.80E-01
Indian Lake	19_Project_INDG_Heavy_Toddler_MeHg	19_Baseline_INDG_Heavy_Toddler_MeHg	5.83E-01	1.83E-04	5.84E-01	4.96E-01	1.84E-04	4.96E-01	2.01E-01	6.85E-05	2.01E-01


MeHg Concentration in Northern Pike
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Proj + Base
RDL


MeHg Concentration in Walleye
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Proj + Base
RDL

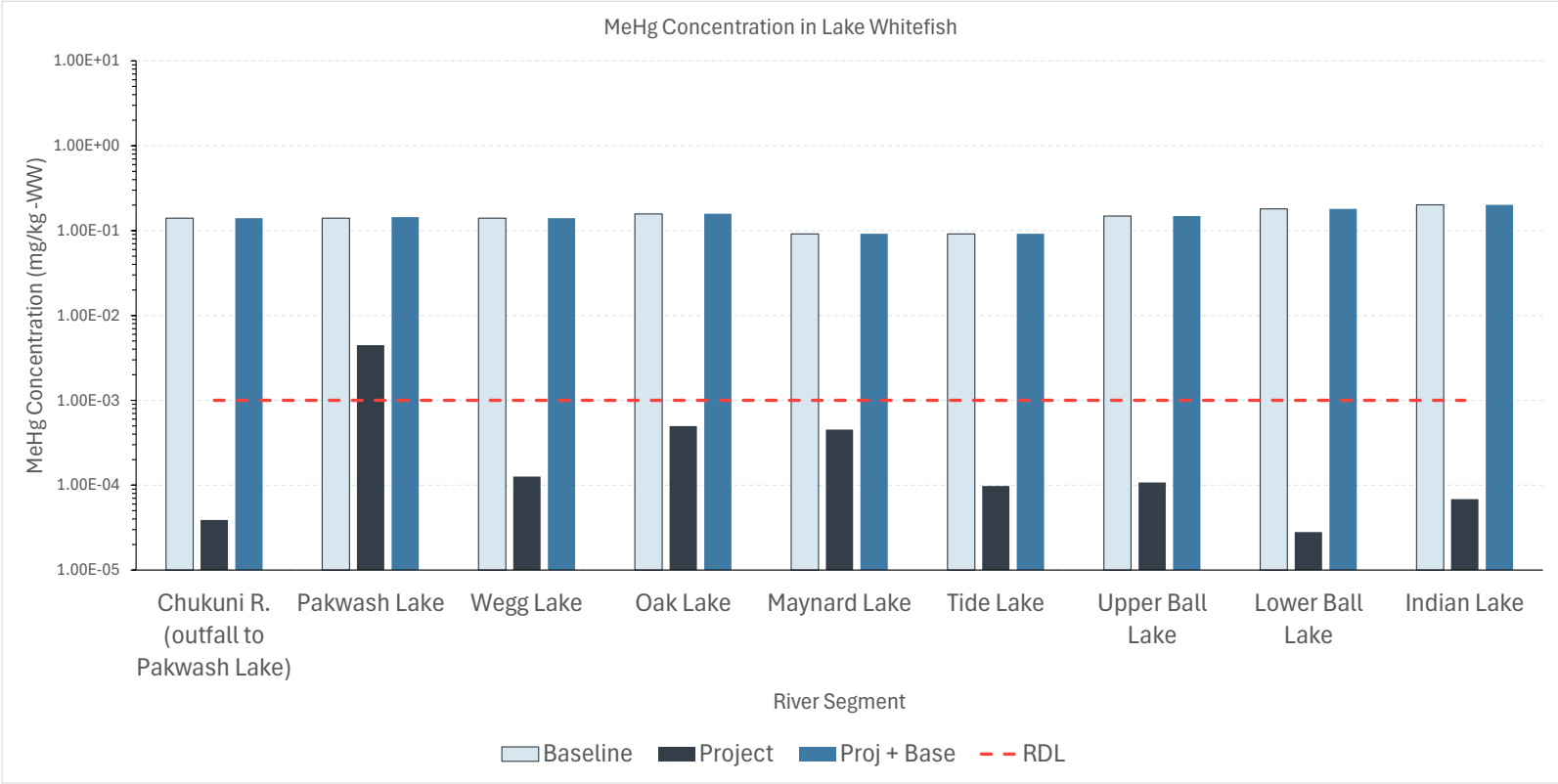
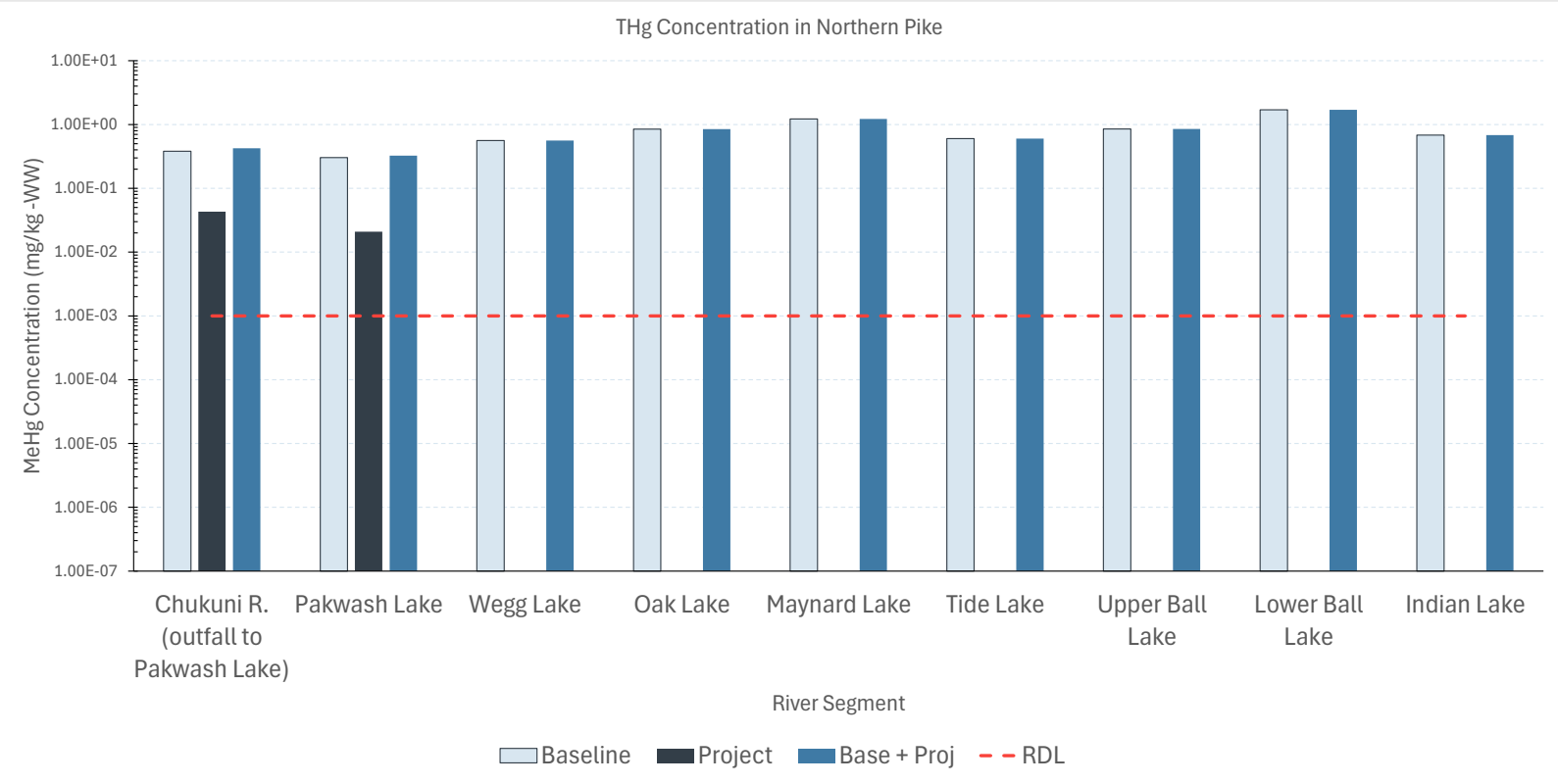
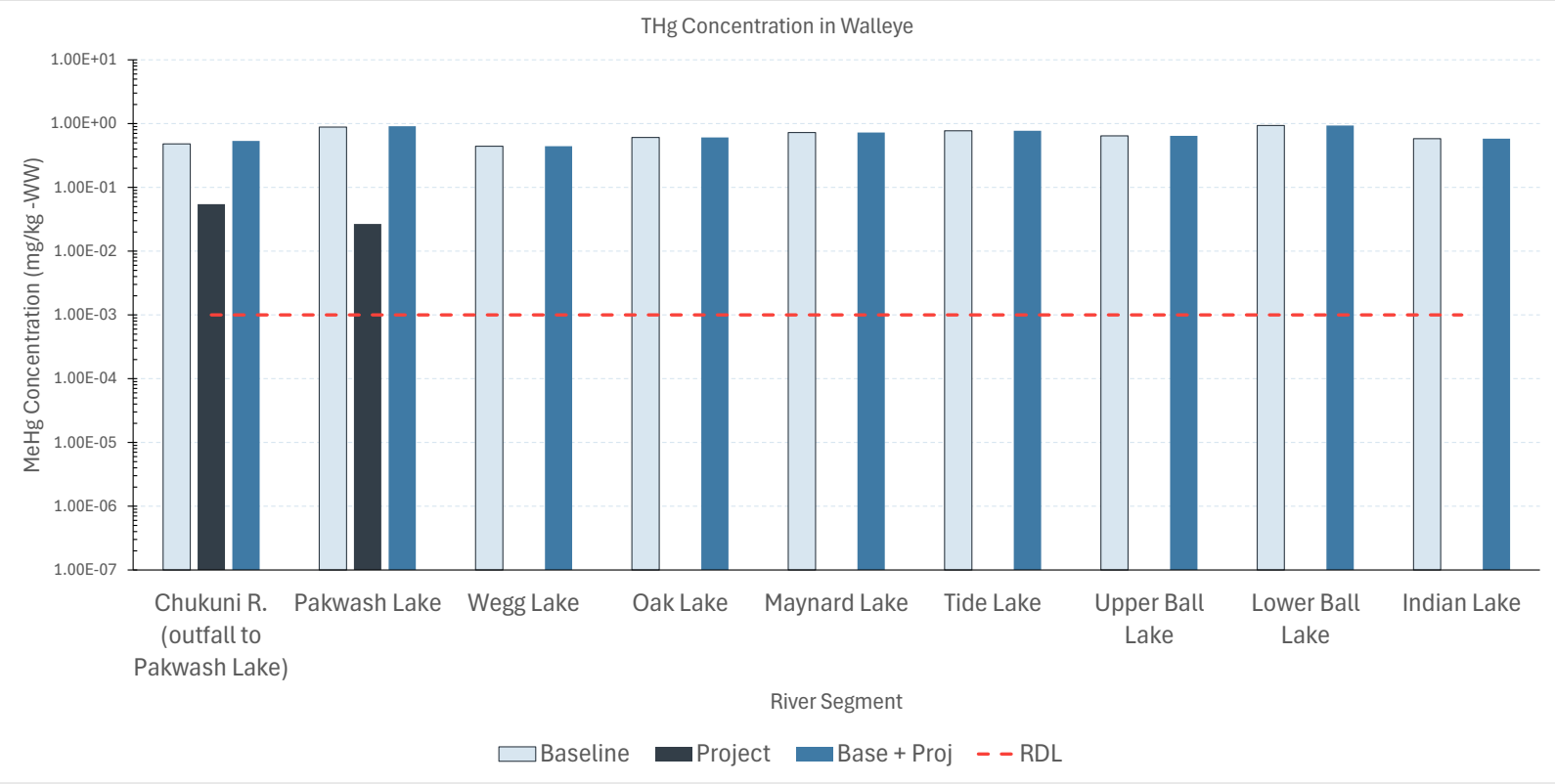

MeHg Concentration in Lake Whitefish
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Proj + Base
RDL

Table E-8: Exposure Point Fish Tissue Concentrations for Total Mercury

ID	k	Baseline	Measured Baseline and Projected Fish Tissue Concentrations for Total Mercury [mg/kg-WW]								
			Pike			Walleye			Whitefish		
			Baseline	Project	Base + Proj	Baseline	Project	Base + Proj	Baseline	Project	Base + Proj
Chukuni R.	1_Project_INDG_Heavy_Toddler_THg	1_Baseline_INDG_Heavy_Toddler_THg	3.80E-01	4.30E-02	4.23E-01	4.80E-01	5.47E-02	5.35E-01	1.80E-01	2.06E-02	2.01E-01
Pakwash L	2_Project_INDG_Heavy_Toddler_THg	2_Baseline_INDG_Heavy_Toddler_THg	3.04E-01	2.09E-02	3.25E-01	8.82E-01	2.66E-02	9.09E-01	4.00E-02	1.00E-02	5.00E-02
Wegg Lake	7_Project_INDG_Heavy_Toddler_THg	7_Baseline_INDG_Heavy_Toddler_THg	5.59E-01	0.00E+00	5.59E-01	4.43E-01	0.00E+00	4.43E-01	4.00E-02	0.00E+00	4.00E-02
Oak Lake	13_Project_INDG_Heavy_Toddler_THg	13_Baseline_INDG_Heavy_Toddler_THg	8.44E-01	0.00E+00	8.44E-01	6.08E-01	0.00E+00	6.08E-01	2.03E-01	0.00E+00	2.03E-01
Maynard La	15_Project_INDG_Heavy_Toddler_THg	15_Baseline_INDG_Heavy_Toddler_THg	1.22E+00	0.00E+00	1.22E+00	7.26E-01	0.00E+00	7.26E-01	1.18E-01	0.00E+00	1.18E-01
Tide Lake	16_Project_INDG_Heavy_Toddler_THg	16_Baseline_INDG_Heavy_Toddler_THg	6.02E-01	0.00E+00	6.02E-01	7.72E-01	0.00E+00	7.72E-01	1.18E-01	0.00E+00	1.18E-01
Upper Ball	17_Project_INDG_Heavy_Toddler_THg	17_Baseline_INDG_Heavy_Toddler_THg	8.54E-01	0.00E+00	8.54E-01	6.44E-01	0.00E+00	6.44E-01	1.91E-01	0.00E+00	1.91E-01
Lower Ball	18_Project_INDG_Heavy_Toddler_THg	18_Baseline_INDG_Heavy_Toddler_THg	1.70E+00	0.00E+00	1.70E+00	9.35E-01	0.00E+00	9.35E-01	2.32E-01	0.00E+00	2.32E-01
Indian Lake	19_Project_INDG_Heavy_Toddler_THg	19_Baseline_INDG_Heavy_Toddler_THg	6.84E-01	0.00E+00	6.84E-01	5.81E-01	0.00E+00	5.81E-01	2.59E-01	0.00E+00	2.59E-01


THg Concentration in Northern Pike
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Base + Proj
RDL


THg Concentration in Walleye
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Base + Proj
RDL

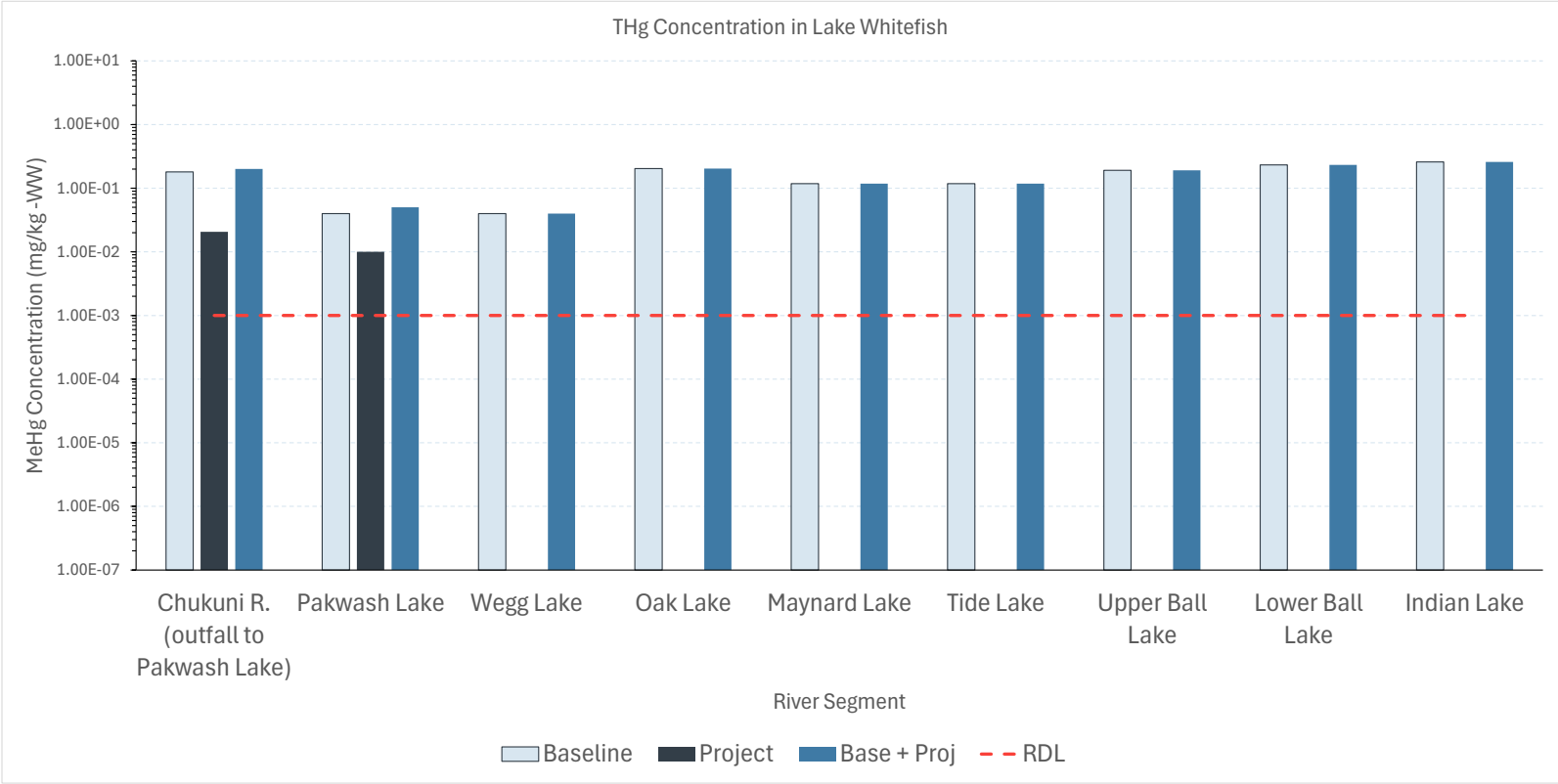
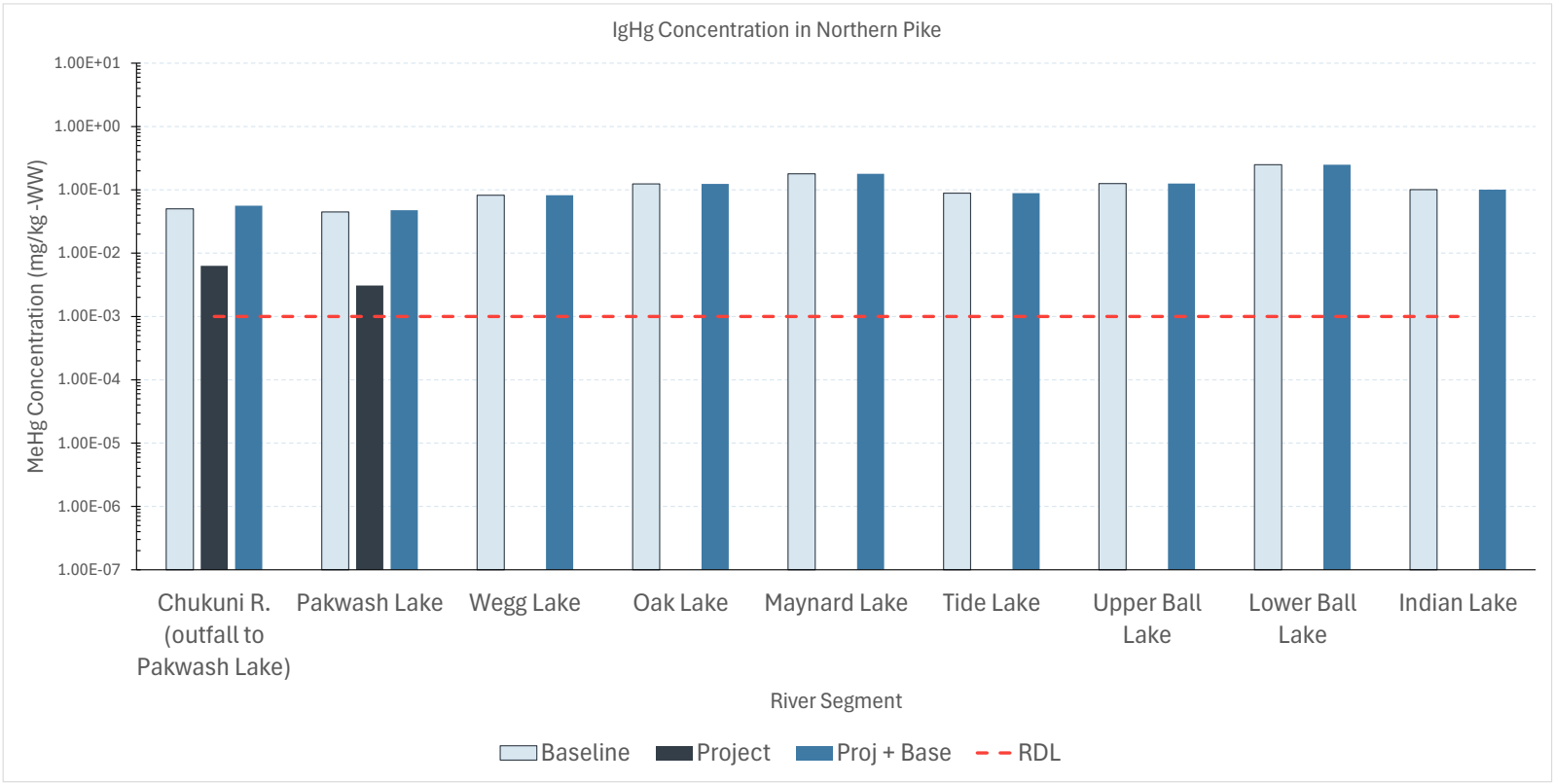
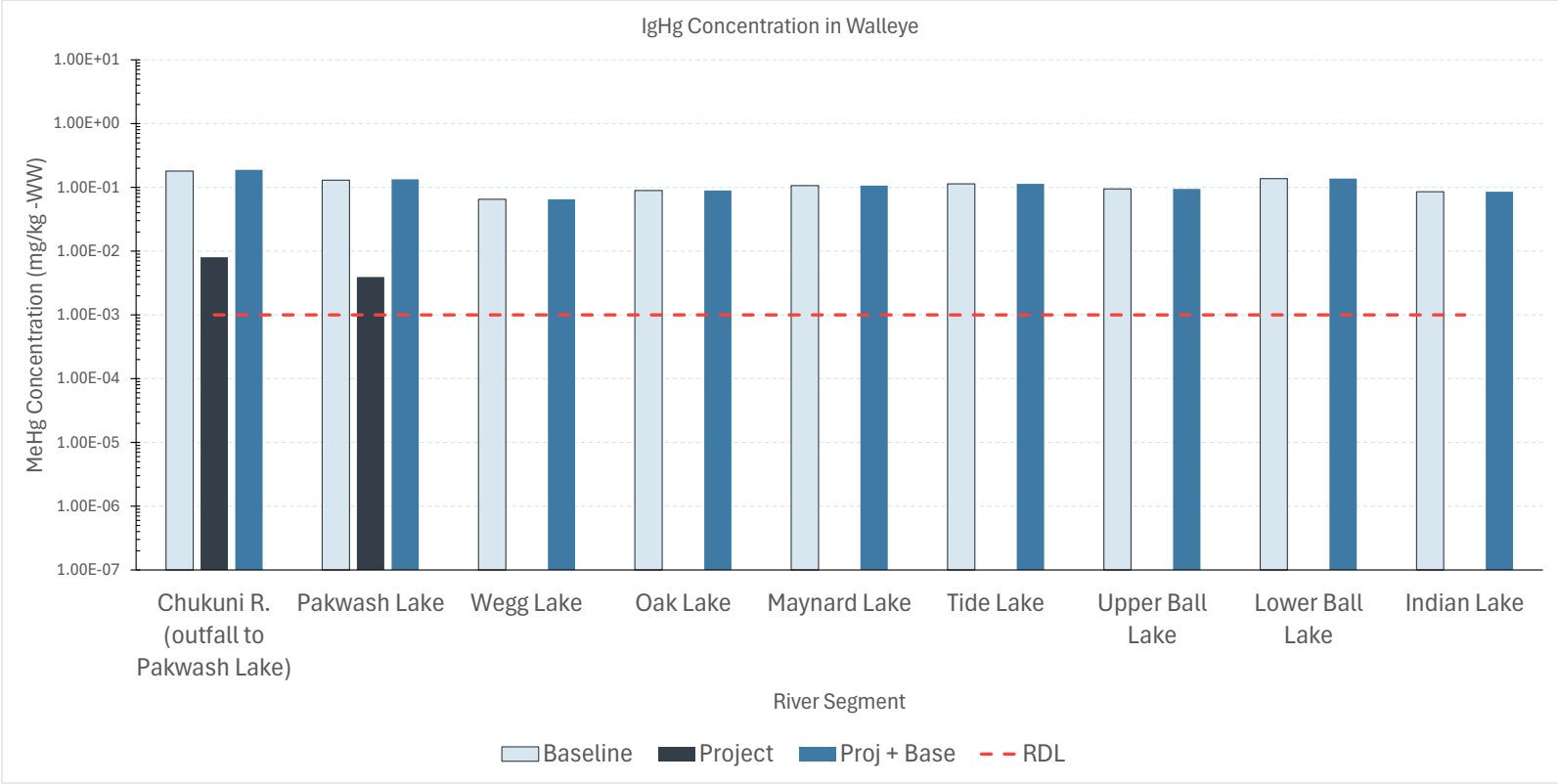

THg Concentration in Lake Whitefish
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Base + Proj
RDL

Table E-9: Exposure Point Fish Tissue Concentrations for Inorganic Mercury

ID	Project	Baseline	Measured Baseline and Projected Fish Tissue Concentrations for Inorganic Mercury [mg/kg-WW]								
			Pike			Walleye			Whitefish		
			Baseline	Project	Proj + Base	Baseline	Project	Proj + Base	Baseline	Project	Proj + Base
Chukuni R.	1_Project_INDG_Heavy_Toddler_lgHg	1_Baseline_INDG_Heavy_Toddler_lgHg	5.00E-02	6.32E-03	5.63E-02	1.80E-01	8.04E-03	1.88E-01	4.00E-02	4.62E-03	4.46E-02
Pakwash L	2_Project_INDG_Heavy_Toddler_lgHg	2_Baseline_INDG_Heavy_Toddler_lgHg	4.47E-02	3.07E-03	4.78E-02	1.30E-01	3.91E-03	1.34E-01	4.00E-02	2.25E-03	4.22E-02
Wegg Lake	7_Project_INDG_Heavy_Toddler_lgHg	7_Baseline_INDG_Heavy_Toddler_lgHg	8.22E-02	0.00E+00	8.22E-02	6.51E-02	0.00E+00	6.51E-02	4.00E-02	0.00E+00	4.00E-02
Oak Lake	13_Project_INDG_Heavy_Toddler_lgHg	13_Baseline_INDG_Heavy_Toddler_lgHg	1.24E-01	0.00E+00	1.24E-01	8.94E-02	0.00E+00	8.94E-02	4.55E-02	0.00E+00	4.55E-02
Maynard La	15_Project_INDG_Heavy_Toddler_lgHg	15_Baseline_INDG_Heavy_Toddler_lgHg	1.79E-01	0.00E+00	1.79E-01	1.07E-01	0.00E+00	1.07E-01	2.64E-02	0.00E+00	2.64E-02
Tide Lake	16_Project_INDG_Heavy_Toddler_lgHg	16_Baseline_INDG_Heavy_Toddler_lgHg	8.85E-02	0.00E+00	8.85E-02	1.13E-01	0.00E+00	1.13E-01	2.64E-02	0.00E+00	2.64E-02
Upper Ball	17_Project_INDG_Heavy_Toddler_lgHg	17_Baseline_INDG_Heavy_Toddler_lgHg	1.26E-01	0.00E+00	1.26E-01	9.47E-02	0.00E+00	9.47E-02	4.28E-02	0.00E+00	4.28E-02
Lower Ball	18_Project_INDG_Heavy_Toddler_lgHg	18_Baseline_INDG_Heavy_Toddler_lgHg	2.49E-01	0.00E+00	2.49E-01	1.37E-01	0.00E+00	1.37E-01	5.20E-02	0.00E+00	5.20E-02
Indian Lake	19_Project_INDG_Heavy_Toddler_lgHg	19_Baseline_INDG_Heavy_Toddler_lgHg	1.01E-01	0.00E+00	1.01E-01	8.54E-02	0.00E+00	8.54E-02	5.80E-02	0.00E+00	5.80E-02


IgHg Concentration in Northern Pike
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Proj + Base
RDL


IgHg Concentration in Walleye
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Proj + Base
RDL

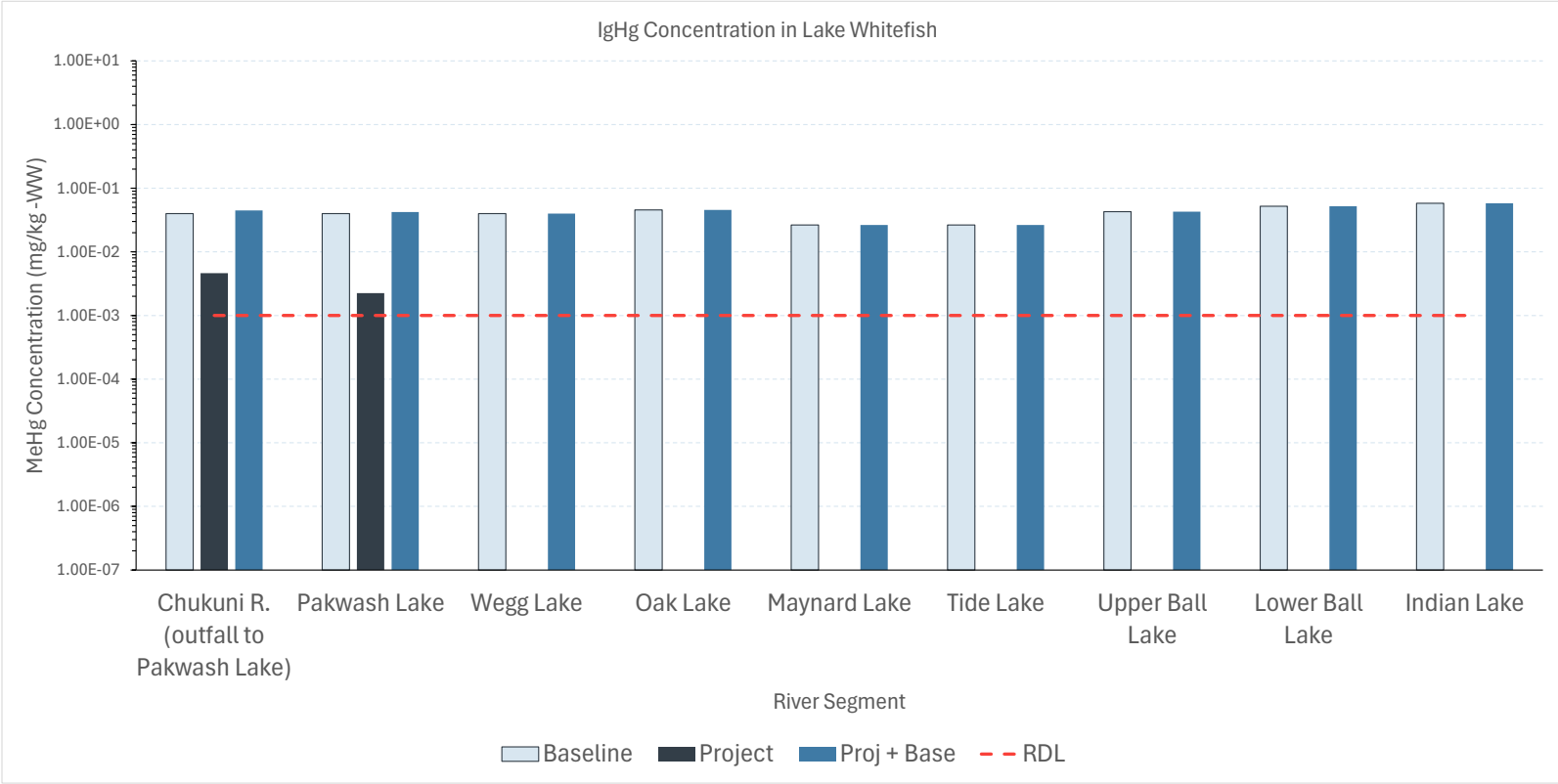

IgHg Concentration in Lake Whitefish
MeHg Concentration (mg/kg -WW)
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
Chukuni R. (outfall to Pakwash Lake)
Pakwash Lake
Wegg Lake
Oak Lake
Maynard Lake
Tide Lake
Upper Ball Lake
Lower Ball Lake
Indian Lake
River Segment
Baseline
Project
Proj + Base
RDL

Table E-11: Summary of Exposure Point Surface Water Concentrations

Segment	Description	Projected SW Concentrations [ng/L]							
		MeHg				THg			
		Baseline	Project	Base + Proj	Portion	Baseline	Project	Base + Proj	Portion
1	Chukuni R. (outfall to Pakwash Lake) - CHK_1	5.43E-02	1.82E-05	5.43E-02	0.034%	1.32E+00	1.56E-01	1.48E+00	12%
2	Pakwash Lake - PAK_L	5.34E-02	2.09E-03	5.55E-02	3.911%	1.30E+00	7.60E-02	1.38E+00	6%
3	Chukuni R. (Pakwash to English R.) - PAK_O	4.98E-02	9.51E-05	4.99E-02	0.191%	1.21E+00	1.04E-01	1.32E+00	9%

Baseline concentrations based on WSP WQ Model for total mercury

Baseline concentrations based on WSP WQ Model for total mercury x 4.1% MeHg

MeHg Project (Scenario 2 incremental change) based on Hutchinson Model

IgHg Project (maximum annual incremental change) based on WSP WQ Model

Table E-10: Exposure Point Surface Water Concentrations

Predicted Surface Water Increase in Methylmercury Concentrations [ng/L]									
Segment	Description	Scenario	Chemical	Variable	Value [ng/L]	Hutchinson Value [ng/L]	WSP Value Adjust with MeHg Portion [ng/L]	WSP THg Water Quality Value [mg/L]	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	MeHg	1_Baseline_MeHg	5.43E-02	0.00E+00	5.43E-02	1.32E-06	WSP Maximum Annual Average CHK_1
2	Pakwash Lake	Baseline	MeHg	2_Baseline_MeHg	5.34E-02	0.00E+00	5.34E-02	1.30E-06	WSP Maximum Annual Average PAK_L
3	Chukuni R. (Pakwash to English R.)	Baseline	MeHg	3_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	WSP Maximum Annual Average PAK_O
4	Camping Lake	Baseline	MeHg	4_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
5	English River	Baseline	MeHg	5_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
6	Barnston Lake	Baseline	MeHg	6_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
7	Wegg Lake	Baseline	MeHg	7_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
8	English River	Baseline	MeHg	8_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
9	Goose Lake	Baseline	MeHg	9_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
10	English River	Baseline	MeHg	10_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
11	Wilcox Lake	Baseline	MeHg	11_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
12	English River	Baseline	MeHg	12_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
13	Oak Lake	Baseline	MeHg	13_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
14	English River	Baseline	MeHg	14_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
15	Maynard Lake	Baseline	MeHg	15_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
16	Tide Lake	Baseline	MeHg	16_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
17	Upper Ball Lake	Baseline	MeHg	17_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
18	Lower Ball Lake	Baseline	MeHg	18_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
19	Indian Lake	Baseline	MeHg	19_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
20	English River	Baseline	MeHg	20_Baseline_MeHg	4.98E-02	0.00E+00	4.98E-02	1.21E-06	Assumed same as Segment #3
1	Chukuni R. (outfall to Pakwash Lake)	Project	MeHg	1_Project_MeHg	1.82E-05	1.82E-05	0.00E+00	1.56E-07	Hutchinson 2025 Max Effluent SO4 + Flow; Used Operation THg incremental increase
2	Pakwash Lake	Project	MeHg	2_Project_MeHg	2.09E-03	2.09E-03	0.00E+00	7.60E-08	Hutchinson 2025 Max Effluent SO4 + Flow; Used Operation THg incremental increase
3	Chukuni R. (Pakwash to English R.)	Project	MeHg	3_Project_MeHg	9.51E-05	9.51E-05	0.00E+00	1.04E-07	Hutchinson 2025 Max Effluent SO4 + Flow; Used Operation THg incremental increase
4	Camping Lake	Project	MeHg	4_Project_MeHg	2.57E-05	2.57E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
5	English River	Project	MeHg	5_Project_MeHg	1.35E-05	1.35E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
6	Barnston Lake	Project	MeHg	6_Project_MeHg	1.03E-05	1.03E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
7	Wegg Lake	Project	MeHg	7_Project_MeHg	5.92E-05	5.92E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
8	English River	Project	MeHg	8_Project_MeHg	1.09E-06	1.09E-06	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
9	Goose Lake	Project	MeHg	9_Project_MeHg	1.99E-05	1.99E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
10	English River	Project	MeHg	10_Project_MeHg	1.91E-06	1.91E-06	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
11	Wilcox Lake	Project	MeHg	11_Project_MeHg	4.64E-05	4.64E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
12	English River	Project	MeHg	12_Project_MeHg	1.15E-06	1.15E-06	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
13	Oak Lake	Project	MeHg	13_Project_MeHg	2.32E-04	2.32E-04	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
14	English River	Project	MeHg	14_Project_MeHg	2.82E-06	2.82E-06	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
15	Maynard Lake	Project	MeHg	15_Project_MeHg	2.11E-04	2.11E-04	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
16	Tide Lake	Project	MeHg	16_Project_MeHg	4.57E-05	4.57E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
17	Upper Ball Lake	Project	MeHg	17_Project_MeHg	5.02E-05	5.02E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
18	Lower Ball Lake	Project	MeHg	18_Project_MeHg	1.31E-05	1.31E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
19	Indian Lake	Project	MeHg	19_Project_MeHg	3.20E-05	3.20E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
20	English River	Project	MeHg	20_Project_MeHg	4.82E-05	4.82E-05	0.00E+00	0.00E+00	Hutchinson 2025 Max Effluent SO4 + Flow
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	THg	1_Baseline_THg	1.32E+00	0.00E+00	1.32E+00	1.32E-06	WSP 95th Percentile App E-1 CHK_1
2	Pakwash Lake	Baseline	THg	2_Baseline_THg	1.30E+00	0.00E+00	1.30E+00	1.30E-06	WSP 95th Percentile App E-1 PAK_L
3	Chukuni R. (Pakwash to English R.)	Baseline	THg	3_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	WSP 95th Percentile App E-1 PAK_O
4	Camping Lake	Baseline	THg	4_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
5	English River	Baseline	THg	5_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
6	Barnston Lake	Baseline	THg	6_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
7	Wegg Lake	Baseline	THg	7_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
8	English River	Baseline	THg	8_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
9	Goose Lake	Baseline	THg	9_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
10	English River	Baseline	THg	10_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
11	Wilcox Lake	Baseline	THg	11_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
12	English River	Baseline	THg	12_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
13	Oak Lake	Baseline	THg	13_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
14	English River	Baseline	THg	14_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
15	Maynard Lake	Baseline	THg	15_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
16	Tide Lake	Baseline	THg	16_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
17	Upper Ball Lake	Baseline	THg	17_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
18	Lower Ball Lake	Baseline	THg	18_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
19	Indian Lake	Baseline	THg	19_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3
20	English River	Baseline	THg	20_Baseline_THg	1.21E+00	0.00E+00	1.21E+00	1.21E-06	Assumed same as Segment #3

Table E-10: Exposure Point Surface Water Concentrations

Predicted Surface Water Increase in Methylmercury Concentrations [ng/L]									
Segment	Description	Scenario	Chemical	Variable	Value [ng/L]	Hutchinson Value [ng/L]	WSP Value Adjust with MeHg Portion [ng/L]	WSP THg Water Quality Value [mg/L]	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Project	THg	1_Project_THg	1.56E-01	0.00E+00	1.56E-01	1.56E-07	WSP 95th Percentile App E-1 CHK_1 Operations minus Existing
2	Pakwash Lake	Project	THg	2_Project_THg	7.60E-02	0.00E+00	7.60E-02	7.60E-08	WSP 95th Percentile App E-1 PAK_L Operations minus Existing
3	Chukuni R. (Pakwash to English R.)	Project	THg	3_Project_THg	1.04E-01	0.00E+00	1.04E-01	1.04E-07	WSP 95th Percentile App E-1 PAK_O Operations minus Existing
4	Camping Lake	Project	THg	4_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
5	English River	Project	THg	5_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
6	Barnston Lake	Project	THg	6_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
7	Wegg Lake	Project	THg	7_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
8	English River	Project	THg	8_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
9	Goose Lake	Project	THg	9_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
10	English River	Project	THg	10_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
11	Wilcox Lake	Project	THg	11_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
12	English River	Project	THg	12_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
13	Oak Lake	Project	THg	13_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
14	English River	Project	THg	14_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
15	Maynard Lake	Project	THg	15_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
16	Tide Lake	Project	THg	16_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
17	Upper Ball Lake	Project	THg	17_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
18	Lower Ball Lake	Project	THg	18_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
19	Indian Lake	Project	THg	19_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash
20	English River	Project	THg	20_Project_THg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Assumed total mercury impacts from effluent does not extend beyond Pakwash

Notes:

Assumed Surface Water Portion of MeHg /THg

4.10% Average Percent (%) Methylmercury in Surface Water for Chukuni River Used in HHRA Exposure Modelling

0.00% Assume a value of zero to eliminate MeHg production in the water column

Low-level mercury detection limit in surface water is ~0.04 ng/L or 4.0E-8 mg/L for total mercury and ~0.0035 ng/L or 3.5E-9

Table E-12: Total Mercury Summary Statistics from Surface Water Quality Model at Selected Water Quality Nodes

Predicted Total Mercury Summary Statistics from Surface Water Quality Model at Selected Water Quality Nodes for the Mercury Study												
			Model Baseline Water Quality		Predicted Overall Range (Operations)		Predicted Increase from Operations		Percent Change (+ve - increase)		Relative Percent Increase	
SW Node	Water Quality Guideline[1]	Source	Median	95th	Median	95th	Median	95th	Median	95th	Median	95th
CHK_1	2.60E-05	CCME	8.14E-07	1.32E-06	9.22E-07	1.48E-06	1.09E-07	1.56E-07	13%	12%	13%	11%
CHK_2	2.60E-05	CCME	8.81E-07	1.42E-06	9.75E-07	1.51E-06	9.34E-08	9.00E-08	11%	6%	10%	6%
PAK_IN	2.60E-05	CCME	8.82E-07	1.42E-06	9.75E-07	1.51E-06	9.28E-08	9.06E-08	11%	6%	10%	6%
PAK_L	2.60E-05	CCME	1.18E-06	1.30E-06	1.24E-06	1.38E-06	6.61E-08	7.60E-08	6%	6%	5%	6%
PAK_O	2.60E-05	CCME	1.19E-06	1.21E-06	1.26E-06	1.32E-06	7.09E-08	1.04E-07	6%	9%	6%	8%

[1] Where applicable, receiving environment benchmarks are here calculated using 25th percentile hardness and pH of baseline monitoring station to be conservative

Table E-13: Methylmercury and Inorganic Mercury Apportionment Assumed in Fish

Methylmercury and Inorganic Mercury Apportionment Assumed in Fish [%]				
Fish	Methylmercury	Inorganic Mercury	Total	Reference Comment
Pike	85.3%	14.7%	100.0%	Based on measured average MeHg to total Hg in LSA large bodied fish
Walleye	85.3%	14.7%	100.0%	Assumed same as Pike as measured site-specific Walleye MeHg was considered low at 68.7%
Whitefish	77.6%	22.4%	100.0%	Based on measured average MeHg to total Hg in LSA large bodied fish

Table E-14: Site-Specific Bioaccumulation Factors

Site-Specific Bioaccumulation Factors [L/kg-WW]						
Segment	Description	Fish	Chemical	Variable	Value	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Pike	MeHg	1_Pike_MeHg	5.71E+06	Site-specific BAF Chukuni River
1	Chukuni R. (outfall to Pakwash Lake)	Walleye	MeHg	1_Walleye_MeHg	5.76E+06	Site-specific BAF Chukuni River
1	Chukuni R. (outfall to Pakwash Lake)	Whitefish	MeHg	1_Whitefish_MeHg	2.14E+06	Site-specific BAF Chukuni River
2	Pakwash Lake	Pike	MeHg	2_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
2	Pakwash Lake	Walleye	MeHg	2_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
2	Pakwash Lake	Whitefish	MeHg	2_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Pike	MeHg	3_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Walleye	MeHg	3_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Whitefish	MeHg	3_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Pike	MeHg	4_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Walleye	MeHg	4_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Whitefish	MeHg	4_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
5	English River	Pike	MeHg	5_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
5	English River	Walleye	MeHg	5_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
5	English River	Whitefish	MeHg	5_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Pike	MeHg	6_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Walleye	MeHg	6_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Whitefish	MeHg	6_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Pike	MeHg	7_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Walleye	MeHg	7_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Whitefish	MeHg	7_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
8	English River	Pike	MeHg	8_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
8	English River	Walleye	MeHg	8_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
8	English River	Whitefish	MeHg	8_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Pike	MeHg	9_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Walleye	MeHg	9_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Whitefish	MeHg	9_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
10	English River	Pike	MeHg	10_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
10	English River	Walleye	MeHg	10_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
10	English River	Whitefish	MeHg	10_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Pike	MeHg	11_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Walleye	MeHg	11_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Whitefish	MeHg	11_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
12	English River	Pike	MeHg	12_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
12	English River	Walleye	MeHg	12_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
12	English River	Whitefish	MeHg	12_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Pike	MeHg	13_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Walleye	MeHg	13_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Whitefish	MeHg	13_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
14	English River	Pike	MeHg	14_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
14	English River	Walleye	MeHg	14_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
14	English River	Whitefish	MeHg	14_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Pike	MeHg	15_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Walleye	MeHg	15_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Whitefish	MeHg	15_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Pike	MeHg	16_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Walleye	MeHg	16_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Whitefish	MeHg	16_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Pike	MeHg	17_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Walleye	MeHg	17_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Whitefish	MeHg	17_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Pike	MeHg	18_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Walleye	MeHg	18_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Whitefish	MeHg	18_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Pike	MeHg	19_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Walleye	MeHg	19_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Whitefish	MeHg	19_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River
20	English River	Pike	MeHg	20_Pike_MeHg	5.71E+06	Assumed same as Segment #1 - Chukuni River
20	English River	Walleye	MeHg	20_Walleye_MeHg	5.76E+06	Assumed same as Segment #1 - Chukuni River
20	English River	Whitefish	MeHg	20_Whitefish_MeHg	2.14E+06	Assumed same as Segment #1 - Chukuni River

Table E-14: Site-Specific Bioaccumulation Factors

Site-Specific Bioaccumulation Factors [L/kg-WW]						
Segment	Description	Fish	Chemical	Variable	Value	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Pike	lgHg	1_Pike_lgHg	4.40E+04	Site-specific BAF Chukuni River for total mercury adjusted with lgHg content
1	Chukuni R. (outfall to Pakwash Lake)	Walleye	lgHg	1_Walleye_lgHg	5.60E+04	Site-specific BAF Chukuni River for total mercury adjusted with lgHg content
1	Chukuni R. (outfall to Pakwash Lake)	Whitefish	lgHg	1_Whitefish_lgHg	2.90E+04	Site-specific BAF Chukuni River for total mercury adjusted with lgHg content
2	Pakwash Lake	Pike	lgHg	2_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
2	Pakwash Lake	Walleye	lgHg	2_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
2	Pakwash Lake	Whitefish	lgHg	2_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Pike	lgHg	3_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Walleye	lgHg	3_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Whitefish	lgHg	3_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Pike	lgHg	4_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Walleye	lgHg	4_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Whitefish	lgHg	4_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
5	English River	Pike	lgHg	5_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
5	English River	Walleye	lgHg	5_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
5	English River	Whitefish	lgHg	5_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Pike	lgHg	6_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Walleye	lgHg	6_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Whitefish	lgHg	6_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Pike	lgHg	7_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Walleye	lgHg	7_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Whitefish	lgHg	7_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
8	English River	Pike	lgHg	8_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
8	English River	Walleye	lgHg	8_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
8	English River	Whitefish	lgHg	8_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Pike	lgHg	9_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Walleye	lgHg	9_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Whitefish	lgHg	9_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
10	English River	Pike	lgHg	10_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
10	English River	Walleye	lgHg	10_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
10	English River	Whitefish	lgHg	10_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Pike	lgHg	11_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Walleye	lgHg	11_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Whitefish	lgHg	11_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
12	English River	Pike	lgHg	12_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
12	English River	Walleye	lgHg	12_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
12	English River	Whitefish	lgHg	12_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Pike	lgHg	13_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Walleye	lgHg	13_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Whitefish	lgHg	13_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
14	English River	Pike	lgHg	14_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
14	English River	Walleye	lgHg	14_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
14	English River	Whitefish	lgHg	14_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Pike	lgHg	15_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Walleye	lgHg	15_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Whitefish	lgHg	15_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Pike	lgHg	16_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Walleye	lgHg	16_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Whitefish	lgHg	16_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Pike	lgHg	17_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Walleye	lgHg	17_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Whitefish	lgHg	17_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Pike	lgHg	18_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Walleye	lgHg	18_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Whitefish	lgHg	18_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Pike	lgHg	19_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Walleye	lgHg	19_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Whitefish	lgHg	19_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River
20	English River	Pike	lgHg	20_Pike_lgHg	4.40E+04	Assumed same as Segment #1 - Chukuni River
20	English River	Walleye	lgHg	20_Walleye_lgHg	5.60E+04	Assumed same as Segment #1 - Chukuni River
20	English River	Whitefish	lgHg	20_Whitefish_lgHg	2.90E+04	Assumed same as Segment #1 - Chukuni River

Table E-14: Site-Specific Bioaccumulation Factors

Site-Specific Bioaccumulation Factors [L/kg-WW]						
Segment	Description	Fish	Chemical	Variable	Value	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Pike	THg	1_Pike_THg	2.75E+05	Site-specific BAF Chukuni River for total mercury
1	Chukuni R. (outfall to Pakwash Lake)	Walleye	THg	1_Walleye_THg	3.50E+05	Site-specific BAF Chukuni River for total mercury
1	Chukuni R. (outfall to Pakwash Lake)	Whitefish	THg	1_Whitefish_THg	1.32E+05	Site-specific BAF Chukuni River for total mercury
2	Pakwash Lake	Pike	THg	2_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
2	Pakwash Lake	Walleye	THg	2_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
2	Pakwash Lake	Whitefish	THg	2_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Pike	THg	3_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Walleye	THg	3_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
3	Chukuni R. (Pakwash to English R.)	Whitefish	THg	3_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Pike	THg	4_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Walleye	THg	4_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
4	Camping Lake	Whitefish	THg	4_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
5	English River	Pike	THg	5_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
5	English River	Walleye	THg	5_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
5	English River	Whitefish	THg	5_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Pike	THg	6_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Walleye	THg	6_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
6	Barnston Lake	Whitefish	THg	6_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Pike	THg	7_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Walleye	THg	7_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
7	Wegg Lake	Whitefish	THg	7_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
8	English River	Pike	THg	8_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
8	English River	Walleye	THg	8_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
8	English River	Whitefish	THg	8_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Pike	THg	9_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Walleye	THg	9_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
9	Goose Lake	Whitefish	THg	9_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
10	English River	Pike	THg	10_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
10	English River	Walleye	THg	10_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
10	English River	Whitefish	THg	10_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Pike	THg	11_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Walleye	THg	11_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
11	Wilcox Lake	Whitefish	THg	11_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
12	English River	Pike	THg	12_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
12	English River	Walleye	THg	12_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
12	English River	Whitefish	THg	12_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Pike	THg	13_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Walleye	THg	13_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
13	Oak Lake	Whitefish	THg	13_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
14	English River	Pike	THg	14_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
14	English River	Walleye	THg	14_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
14	English River	Whitefish	THg	14_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Pike	THg	15_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Walleye	THg	15_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
15	Maynard Lake	Whitefish	THg	15_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Pike	THg	16_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Walleye	THg	16_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
16	Tide Lake	Whitefish	THg	16_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Pike	THg	17_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Walleye	THg	17_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
17	Upper Ball Lake	Whitefish	THg	17_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Pike	THg	18_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Walleye	THg	18_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
18	Lower Ball Lake	Whitefish	THg	18_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Pike	THg	19_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Walleye	THg	19_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
19	Indian Lake	Whitefish	THg	19_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River
20	English River	Pike	THg	20_Pike_THg	2.75E+05	Assumed same as Segment #1 - Chukuni River
20	English River	Walleye	THg	20_Walleye_THg	3.50E+05	Assumed same as Segment #1 - Chukuni River
20	English River	Whitefish	THg	20_Whitefish_THg	1.32E+05	Assumed same as Segment #1 - Chukuni River

Table E-15: Measured Baseline Fish Concentrations

Measured Baseline Fish Concentrations [mg/kg-WW]							
Segment	Description	Scenario	Fish	Chemical	Variable	Value	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Pike	MeHg	1_Baseline_Pike_MeHg	0.33	Chukuni River 95UCLM
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Walleye	MeHg	1_Baseline_Walleye_MeHg	0.30	Chukuni River 95UCLM
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Whitefish	MeHg	1_Baseline_Whitefish_MeHg	0.14	Chukuni River 95UCLM
2	Pakwash Lake	Baseline	Pike	MeHg	2_Baseline_Pike_MeHg	0.26	Pakwash 95 UCLM from 2014 sampling
2	Pakwash Lake	Baseline	Walleye	MeHg	2_Baseline_Walleye_MeHg	0.75	Pakwash 95 UCLM from 2014 sampling
2	Pakwash Lake	Baseline	Whitefish	MeHg	2_Baseline_Whitefish_MeHg	0.14	Assumed measured value from Chukuni River
3	Chukuni R. (Pakwash to English R.)	Baseline	Pike	MeHg	3_Baseline_Pike_MeHg	0.00	No sample data
3	Chukuni R. (Pakwash to English R.)	Baseline	Walleye	MeHg	3_Baseline_Walleye_MeHg	0.00	No sample data
3	Chukuni R. (Pakwash to English R.)	Baseline	Whitefish	MeHg	3_Baseline_Whitefish_MeHg	0.00	No sample data
4	Camping Lake	Baseline	Pike	MeHg	4_Baseline_Pike_MeHg	0.00	No sample data
4	Camping Lake	Baseline	Walleye	MeHg	4_Baseline_Walleye_MeHg	0.00	No sample data
4	Camping Lake	Baseline	Whitefish	MeHg	4_Baseline_Whitefish_MeHg	0.00	No sample data
5	English River	Baseline	Pike	MeHg	5_Baseline_Pike_MeHg	0.00	No sample data
5	English River	Baseline	Walleye	MeHg	5_Baseline_Walleye_MeHg	0.00	No sample data
5	English River	Baseline	Whitefish	MeHg	5_Baseline_Whitefish_MeHg	0.00	No sample data
6	Barnston Lake	Baseline	Pike	MeHg	6_Baseline_Pike_MeHg	0.00	No sample data
6	Barnston Lake	Baseline	Walleye	MeHg	6_Baseline_Walleye_MeHg	0.00	No sample data
6	Barnston Lake	Baseline	Whitefish	MeHg	6_Baseline_Whitefish_MeHg	0.00	No sample data
7	Wegg Lake	Baseline	Pike	MeHg	7_Baseline_Pike_MeHg	0.48	Wegg 95UCLM from sample 2013 data
7	Wegg Lake	Baseline	Walleye	MeHg	7_Baseline_Walleye_MeHg	0.38	Wegg 95UCLM from sample 2013 data
7	Wegg Lake	Baseline	Whitefish	MeHg	7_Baseline_Whitefish_MeHg	0.14	Assumed measured value from Chukuni River
8	English River	Baseline	Pike	MeHg	8_Baseline_Pike_MeHg	0.00	No sample data
8	English River	Baseline	Walleye	MeHg	8_Baseline_Walleye_MeHg	0.00	No sample data
8	English River	Baseline	Whitefish	MeHg	8_Baseline_Whitefish_MeHg	0.00	No sample data
9	Goose Lake	Baseline	Pike	MeHg	9_Baseline_Pike_MeHg	0.00	No sample data
9	Goose Lake	Baseline	Walleye	MeHg	9_Baseline_Walleye_MeHg	0.00	No sample data
9	Goose Lake	Baseline	Whitefish	MeHg	9_Baseline_Whitefish_MeHg	0.00	No sample data
10	English River	Baseline	Pike	MeHg	10_Baseline_Pike_MeHg	0.00	No sample data
10	English River	Baseline	Walleye	MeHg	10_Baseline_Walleye_MeHg	0.00	No sample data
10	English River	Baseline	Whitefish	MeHg	10_Baseline_Whitefish_MeHg	0.00	No sample data
11	Wilcox Lake	Baseline	Pike	MeHg	11_Baseline_Pike_MeHg	0.00	No sample data
11	Wilcox Lake	Baseline	Walleye	MeHg	11_Baseline_Walleye_MeHg	0.00	No sample data
11	Wilcox Lake	Baseline	Whitefish	MeHg	11_Baseline_Whitefish_MeHg	0.00	No sample data
12	English River	Baseline	Pike	MeHg	12_Baseline_Pike_MeHg	0.00	No sample data
12	English River	Baseline	Walleye	MeHg	12_Baseline_Walleye_MeHg	0.00	No sample data
12	English River	Baseline	Whitefish	MeHg	12_Baseline_Whitefish_MeHg	0.00	No sample data
13	Oak Lake	Baseline	Pike	MeHg	13_Baseline_Pike_MeHg	0.72	Oak Lake 95UCLM from 2006 sample data
13	Oak Lake	Baseline	Walleye	MeHg	13_Baseline_Walleye_MeHg	0.52	Oak Lake 95UCLM from 2006 sample data
13	Oak Lake	Baseline	Whitefish	MeHg	13_Baseline_Whitefish_MeHg	0.16	Oak Lake 95UCLM from 2006 sample data
14	English River	Baseline	Pike	MeHg	14_Baseline_Pike_MeHg	0.00	No sample data
14	English River	Baseline	Walleye	MeHg	14_Baseline_Walleye_MeHg	0.00	No sample data
14	English River	Baseline	Whitefish	MeHg	14_Baseline_Whitefish_MeHg	0.00	No sample data
15	Maynard Lake	Baseline	Pike	MeHg	15_Baseline_Pike_MeHg	1.04	Maynard Lake 95UCLM from 2006 sample data
15	Maynard Lake	Baseline	Walleye	MeHg	15_Baseline_Walleye_MeHg	0.62	Maynard Lake 95UCLM from 2006 sample data
15	Maynard Lake	Baseline	Whitefish	MeHg	15_Baseline_Whitefish_MeHg	0.092	Maynard Lake 95UCLM from 2006 sample data
16	Tide Lake	Baseline	Pike	MeHg	16_Baseline_Pike_MeHg	0.51	Tide Lake 95UCLM from 2014 sample data
16	Tide Lake	Baseline	Walleye	MeHg	16_Baseline_Walleye_MeHg	0.66	Tide Lake 95UCLM from 2014 sample data
16	Tide Lake	Baseline	Whitefish	MeHg	16_Baseline_Whitefish_MeHg	0.09	Assumed equal to Maynard Lake
17	Upper Ball Lake	Baseline	Pike	MeHg	17_Baseline_Pike_MeHg	0.73	Ball Lake N. Basin 95UCLM sample data from 2010-2016
17	Upper Ball Lake	Baseline	Walleye	MeHg	17_Baseline_Walleye_MeHg	0.55	Ball Lake N. Basin 95UCLM sample data from 2010-2016
17	Upper Ball Lake	Baseline	Whitefish	MeHg	17_Baseline_Whitefish_MeHg	0.15	Ball Lake N. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Pike	MeHg	18_Baseline_Pike_MeHg	1.45	Ball Lake S. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Walleye	MeHg	18_Baseline_Walleye_MeHg	0.80	Ball Lake S. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Whitefish	MeHg	18_Baseline_Whitefish_MeHg	0.18	Ball Lake S. Basin 95UCLM sample data from 2010-2016
19	Indian Lake	Baseline	Pike	MeHg	19_Baseline_Pike_MeHg	0.58	Indian Lake 95UCLM sample data from 2014
19	Indian Lake	Baseline	Walleye	MeHg	19_Baseline_Walleye_MeHg	0.50	Indian Lake 95UCLM sample data from 2014
19	Indian Lake	Baseline	Whitefish	MeHg	19_Baseline_Whitefish_MeHg	0.20	Indian Lake 95UCLM sample data from 2014
20	English River	Baseline	Pike	MeHg	20_Baseline_Pike_MeHg	0.00	No sample data
20	English River	Baseline	Walleye	MeHg	20_Baseline_Walleye_MeHg	0.00	No sample data
20	English River	Baseline	Whitefish	MeHg	20_Baseline_Whitefish_MeHg	0.00	No sample data

Table E-15: Measured Baseline Fish Concentrations

Measured Baseline Fish Concentrations [mg/kg-WW]							
Segment	Description	Scenario	Fish	Chemical	Variable	Value	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Pike	lgHg	1_Baseline_Pike_lgHg	0.05	Chukuni River 95UCLM
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Walleye	lgHg	1_Baseline_Walleye_lgHg	0.18	Chukuni River 95UCLM
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Whitefish	lgHg	1_Baseline_Whitefish_lgHg	0.04	Chukuni River 95UCLM
2	Pakwash Lake	Baseline	Pike	lgHg	2_Baseline_Pike_lgHg	0.04	Pakwash 95 UCLM from 2014 sampling
2	Pakwash Lake	Baseline	Walleye	lgHg	2_Baseline_Walleye_lgHg	0.13	Pakwash 95 UCLM from 2014 sampling
2	Pakwash Lake	Baseline	Whitefish	lgHg	2_Baseline_Whitefish_lgHg	0.04	Assumed measured value from Chukuni River
3	Chukuni R. (Pakwash to English R.)	Baseline	Pike	lgHg	3_Baseline_Pike_lgHg	0.00	No sample data
3	Chukuni R. (Pakwash to English R.)	Baseline	Walleye	lgHg	3_Baseline_Walleye_lgHg	0.00	No sample data
3	Chukuni R. (Pakwash to English R.)	Baseline	Whitefish	lgHg	3_Baseline_Whitefish_lgHg	0.00	No sample data
4	Camping Lake	Baseline	Pike	lgHg	4_Baseline_Pike_lgHg	0.00	No sample data
4	Camping Lake	Baseline	Walleye	lgHg	4_Baseline_Walleye_lgHg	0.00	No sample data
4	Camping Lake	Baseline	Whitefish	lgHg	4_Baseline_Whitefish_lgHg	0.00	No sample data
5	English River	Baseline	Pike	lgHg	5_Baseline_Pike_lgHg	0.00	No sample data
5	English River	Baseline	Walleye	lgHg	5_Baseline_Walleye_lgHg	0.00	No sample data
5	English River	Baseline	Whitefish	lgHg	5_Baseline_Whitefish_lgHg	0.00	No sample data
6	Barnston Lake	Baseline	Pike	lgHg	6_Baseline_Pike_lgHg	0.00	No sample data
6	Barnston Lake	Baseline	Walleye	lgHg	6_Baseline_Walleye_lgHg	0.00	No sample data
6	Barnston Lake	Baseline	Whitefish	lgHg	6_Baseline_Whitefish_lgHg	0.00	No sample data
7	Wegg Lake	Baseline	Pike	lgHg	7_Baseline_Pike_lgHg	0.08	Wegg 95UCLM from sample 2013 data
7	Wegg Lake	Baseline	Walleye	lgHg	7_Baseline_Walleye_lgHg	0.07	Wegg 95UCLM from sample 2013 data
7	Wegg Lake	Baseline	Whitefish	lgHg	7_Baseline_Whitefish_lgHg	0.04	Assumed measured value from Chukuni River
8	English River	Baseline	Pike	lgHg	8_Baseline_Pike_lgHg	0.00	No sample data
8	English River	Baseline	Walleye	lgHg	8_Baseline_Walleye_lgHg	0.00	No sample data
8	English River	Baseline	Whitefish	lgHg	8_Baseline_Whitefish_lgHg	0.00	No sample data
9	Goose Lake	Baseline	Pike	lgHg	9_Baseline_Pike_lgHg	0.00	No sample data
9	Goose Lake	Baseline	Walleye	lgHg	9_Baseline_Walleye_lgHg	0.00	No sample data
9	Goose Lake	Baseline	Whitefish	lgHg	9_Baseline_Whitefish_lgHg	0.00	No sample data
10	English River	Baseline	Pike	lgHg	10_Baseline_Pike_lgHg	0.00	No sample data
10	English River	Baseline	Walleye	lgHg	10_Baseline_Walleye_lgHg	0.00	No sample data
10	English River	Baseline	Whitefish	lgHg	10_Baseline_Whitefish_lgHg	0.00	No sample data
11	Wilcox Lake	Baseline	Pike	lgHg	11_Baseline_Pike_lgHg	0.00	No sample data
11	Wilcox Lake	Baseline	Walleye	lgHg	11_Baseline_Walleye_lgHg	0.00	No sample data
11	Wilcox Lake	Baseline	Whitefish	lgHg	11_Baseline_Whitefish_lgHg	0.00	No sample data
12	English River	Baseline	Pike	lgHg	12_Baseline_Pike_lgHg	0.00	No sample data
12	English River	Baseline	Walleye	lgHg	12_Baseline_Walleye_lgHg	0.00	No sample data
12	English River	Baseline	Whitefish	lgHg	12_Baseline_Whitefish_lgHg	0.00	No sample data
13	Oak Lake	Baseline	Pike	lgHg	13_Baseline_Pike_lgHg	0.12	Oak Lake 95UCLM from 2006 sample data
13	Oak Lake	Baseline	Walleye	lgHg	13_Baseline_Walleye_lgHg	0.09	Oak Lake 95UCLM from 2006 sample data
13	Oak Lake	Baseline	Whitefish	lgHg	13_Baseline_Whitefish_lgHg	0.05	Oak Lake 95UCLM from 2006 sample data
14	English River	Baseline	Pike	lgHg	14_Baseline_Pike_lgHg	0.00	No sample data
14	English River	Baseline	Walleye	lgHg	14_Baseline_Walleye_lgHg	0.00	No sample data
14	English River	Baseline	Whitefish	lgHg	14_Baseline_Whitefish_lgHg	0.00	No sample data
15	Maynard Lake	Baseline	Pike	lgHg	15_Baseline_Pike_lgHg	0.18	Maynard Lake 95UCLM from 2006 sample data
15	Maynard Lake	Baseline	Walleye	lgHg	15_Baseline_Walleye_lgHg	0.11	Maynard Lake 95UCLM from 2006 sample data
15	Maynard Lake	Baseline	Whitefish	lgHg	15_Baseline_Whitefish_lgHg	0.03	Maynard Lake 95UCLM from 2006 sample data
16	Tide Lake	Baseline	Pike	lgHg	16_Baseline_Pike_lgHg	0.09	Tide Lake 95UCLM from 2014 sample data
16	Tide Lake	Baseline	Walleye	lgHg	16_Baseline_Walleye_lgHg	0.11	Tide Lake 95UCLM from 2014 sample data
16	Tide Lake	Baseline	Whitefish	lgHg	16_Baseline_Whitefish_lgHg	0.03	Assumed equal to Maynard Lake
17	Upper Ball Lake	Baseline	Pike	lgHg	17_Baseline_Pike_lgHg	0.13	Ball Lake N. Basin 95UCLM sample data from 2010-2016
17	Upper Ball Lake	Baseline	Walleye	lgHg	17_Baseline_Walleye_lgHg	0.09	Ball Lake N. Basin 95UCLM sample data from 2010-2016
17	Upper Ball Lake	Baseline	Whitefish	lgHg	17_Baseline_Whitefish_lgHg	0.04	Ball Lake N. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Pike	lgHg	18_Baseline_Pike_lgHg	0.25	Ball Lake S. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Walleye	lgHg	18_Baseline_Walleye_lgHg	0.14	Ball Lake S. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Whitefish	lgHg	18_Baseline_Whitefish_lgHg	0.05	Ball Lake S. Basin 95UCLM sample data from 2010-2016
19	Indian Lake	Baseline	Pike	lgHg	19_Baseline_Pike_lgHg	0.10	Indian Lake 95UCLM sample data from 2014
19	Indian Lake	Baseline	Walleye	lgHg	19_Baseline_Walleye_lgHg	0.09	Indian Lake 95UCLM sample data from 2014
19	Indian Lake	Baseline	Whitefish	lgHg	19_Baseline_Whitefish_lgHg	0.06	Indian Lake 95UCLM sample data from 2014
20	English River	Baseline	Pike	lgHg	20_Baseline_Pike_lgHg	0.00	No sample data
20	English River	Baseline	Walleye	lgHg	20_Baseline_Walleye_lgHg	0.00	No sample data
20	English River	Baseline	Whitefish	lgHg	20_Baseline_Whitefish_lgHg	0.00	No sample data

Table E-15: Measured Baseline Fish Concentrations

Measured Baseline Fish Concentrations [mg/kg-WW]							
Segment	Description	Scenario	Fish	Chemical	Variable	Value	Reference / Comment
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Pike	THg	1_Baseline_Pike_THg	0.38	Chukuni River 95UCLM
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Walleye	THg	1_Baseline_Walleye_THg	0.48	Chukuni River 95UCLM
1	Chukuni R. (outfall to Pakwash Lake)	Baseline	Whitefish	THg	1_Baseline_Whitefish_THg	0.18	Chukuni River 95UCLM
2	Pakwash Lake	Baseline	Pike	THg	2_Baseline_Pike_THg	0.30	Pakwash 95 UCLM from 2014 sampling
2	Pakwash Lake	Baseline	Walleye	THg	2_Baseline_Walleye_THg	0.88	Pakwash 95 UCLM from 2014 sampling
2	Pakwash Lake	Baseline	Whitefish	THg	2_Baseline_Whitefish_THg	0.04	Assumed measured value from Chukuni River
3	Chukuni R. (Pakwash to English R.)	Baseline	Pike	THg	3_Baseline_Pike_THg	0.00	No sample data
3	Chukuni R. (Pakwash to English R.)	Baseline	Walleye	THg	3_Baseline_Walleye_THg	0.00	No sample data
3	Chukuni R. (Pakwash to English R.)	Baseline	Whitefish	THg	3_Baseline_Whitefish_THg	0.00	No sample data
4	Camping Lake	Baseline	Pike	THg	4_Baseline_Pike_THg	0.00	No sample data
4	Camping Lake	Baseline	Walleye	THg	4_Baseline_Walleye_THg	0.00	No sample data
4	Camping Lake	Baseline	Whitefish	THg	4_Baseline_Whitefish_THg	0.00	No sample data
5	English River	Baseline	Pike	THg	5_Baseline_Pike_THg	0.00	No sample data
5	English River	Baseline	Walleye	THg	5_Baseline_Walleye_THg	0.00	No sample data
5	English River	Baseline	Whitefish	THg	5_Baseline_Whitefish_THg	0.00	No sample data
6	Barnston Lake	Baseline	Pike	THg	6_Baseline_Pike_THg	0.00	No sample data
6	Barnston Lake	Baseline	Walleye	THg	6_Baseline_Walleye_THg	0.00	No sample data
6	Barnston Lake	Baseline	Whitefish	THg	6_Baseline_Whitefish_THg	0.00	No sample data
7	Wegg Lake	Baseline	Pike	THg	7_Baseline_Pike_THg	0.56	Wegg 95UCLM from sample 2013 data
7	Wegg Lake	Baseline	Walleye	THg	7_Baseline_Walleye_THg	0.44	Wegg 95UCLM from sample 2013 data
7	Wegg Lake	Baseline	Whitefish	THg	7_Baseline_Whitefish_THg	0.04	Assumed measured value from Chukuni River
8	English River	Baseline	Pike	THg	8_Baseline_Pike_THg	0.00	No sample data
8	English River	Baseline	Walleye	THg	8_Baseline_Walleye_THg	0.00	No sample data
8	English River	Baseline	Whitefish	THg	8_Baseline_Whitefish_THg	0.00	No sample data
9	Goose Lake	Baseline	Pike	THg	9_Baseline_Pike_THg	0.00	No sample data
9	Goose Lake	Baseline	Walleye	THg	9_Baseline_Walleye_THg	0.00	No sample data
9	Goose Lake	Baseline	Whitefish	THg	9_Baseline_Whitefish_THg	0.00	No sample data
10	English River	Baseline	Pike	THg	10_Baseline_Pike_THg	0.00	No sample data
10	English River	Baseline	Walleye	THg	10_Baseline_Walleye_THg	0.00	No sample data
10	English River	Baseline	Whitefish	THg	10_Baseline_Whitefish_THg	0.00	No sample data
11	Wilcox Lake	Baseline	Pike	THg	11_Baseline_Pike_THg	0.00	No sample data
11	Wilcox Lake	Baseline	Walleye	THg	11_Baseline_Walleye_THg	0.00	No sample data
11	Wilcox Lake	Baseline	Whitefish	THg	11_Baseline_Whitefish_THg	0.00	No sample data
12	English River	Baseline	Pike	THg	12_Baseline_Pike_THg	0.00	No sample data
12	English River	Baseline	Walleye	THg	12_Baseline_Walleye_THg	0.00	No sample data
12	English River	Baseline	Whitefish	THg	12_Baseline_Whitefish_THg	0.00	No sample data
13	Oak Lake	Baseline	Pike	THg	13_Baseline_Pike_THg	0.84	Oak Lake 95UCLM from 2006 sample data
13	Oak Lake	Baseline	Walleye	THg	13_Baseline_Walleye_THg	0.61	Oak Lake 95UCLM from 2006 sample data
13	Oak Lake	Baseline	Whitefish	THg	13_Baseline_Whitefish_THg	0.20	Oak Lake 95UCLM from 2006 sample data
14	English River	Baseline	Pike	THg	14_Baseline_Pike_THg	0.00	No sample data
14	English River	Baseline	Walleye	THg	14_Baseline_Walleye_THg	0.00	No sample data
14	English River	Baseline	Whitefish	THg	14_Baseline_Whitefish_THg	0.00	No sample data
15	Maynard Lake	Baseline	Pike	THg	15_Baseline_Pike_THg	1.22	Maynard Lake 95UCLM from 2006 sample data
15	Maynard Lake	Baseline	Walleye	THg	15_Baseline_Walleye_THg	0.73	Maynard Lake 95UCLM from 2006 sample data
15	Maynard Lake	Baseline	Whitefish	THg	15_Baseline_Whitefish_THg	0.12	Maynard Lake 95UCLM from 2006 sample data
16	Tide Lake	Baseline	Pike	THg	16_Baseline_Pike_THg	0.60	Tide Lake 95UCLM from 2014 sample data
16	Tide Lake	Baseline	Walleye	THg	16_Baseline_Walleye_THg	0.77	Tide Lake 95UCLM from 2014 sample data
16	Tide Lake	Baseline	Whitefish	THg	16_Baseline_Whitefish_THg	0.12	Assumed equal to Maynard Lake
17	Upper Ball Lake	Baseline	Pike	THg	17_Baseline_Pike_THg	0.85	Ball Lake N. Basin 95UCLM sample data from 2010-2016
17	Upper Ball Lake	Baseline	Walleye	THg	17_Baseline_Walleye_THg	0.64	Ball Lake N. Basin 95UCLM sample data from 2010-2016
17	Upper Ball Lake	Baseline	Whitefish	THg	17_Baseline_Whitefish_THg	0.19	Ball Lake N. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Pike	THg	18_Baseline_Pike_THg	1.70	Ball Lake S. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Walleye	THg	18_Baseline_Walleye_THg	0.94	Ball Lake S. Basin 95UCLM sample data from 2010-2016
18	Lower Ball Lake	Baseline	Whitefish	THg	18_Baseline_Whitefish_THg	0.23	Ball Lake S. Basin 95UCLM sample data from 2010-2016
19	Indian Lake	Baseline	Pike	THg	19_Baseline_Pike_THg	0.68	Indian Lake 95UCLM sample data from 2014
19	Indian Lake	Baseline	Walleye	THg	19_Baseline_Walleye_THg	0.58	Indian Lake 95UCLM sample data from 2014
19	Indian Lake	Baseline	Whitefish	THg	19_Baseline_Whitefish_THg	0.26	Indian Lake 95UCLM sample data from 2014

Table E-16: Human Exposure Variables

Human Exposure Variables							
Receptor	Type	Lifestage	Parameter	Variable	Value	Units	Reference / Comment
INDG	Heavy	AdultFEM	Walleye	INDG_Heavy_AdultFEM_Walleye	3.75E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	AdultMAL	Walleye	INDG_Heavy_AdultMAL_Walleye	1.16E-01	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	Toddler	Walleye	INDG_Heavy_Toddler_Walleye	1.87E-02	kg/day	Health Canada 2007; Ratio of adult to toddler consumption rate for subsistence fisher is 0.5 of adult male+female
INDG	Heavy	AdultGEN	Walleye	INDG_Heavy_AdultGEN_Walleye	1.01E-01	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	AdultFEM	Walleye	INDG_Average_AdultFEM_Walleye	1.03E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	AdultMAL	Walleye	INDG_Average_AdultMAL_Walleye	2.65E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	Toddler	Walleye	INDG_Average_Toddler_Walleye	5.16E-03	kg/day	Health Canada 2007; Ratio of adult to toddler consumption rate for subsistence fisher is 0.5 of adult male+female
INDG	Average	AdultGEN	Walleye	INDG_Average_AdultGEN_Walleye	1.82E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	AdultFEM	Pike	INDG_Heavy_AdultFEM_Pike	3.77E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	AdultMAL	Pike	INDG_Heavy_AdultMAL_Pike	4.02E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	Toddler	Pike	INDG_Heavy_Toddler_Pike	1.89E-02	kg/day	Health Canada 2007; Ratio of adult to toddler consumption rate for subsistence fisher is 0.5 of adult male+female
INDG	Heavy	AdultGEN	Pike	INDG_Heavy_AdultGEN_Pike	4.02E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	AdultFEM	Pike	INDG_Average_AdultFEM_Pike	1.02E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	AdultMAL	Pike	INDG_Average_AdultMAL_Pike	1.22E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	Toddler	Pike	INDG_Average_Toddler_Pike	5.08E-03	kg/day	Health Canada 2007; Ratio of adult to toddler consumption rate for subsistence fisher is 0.5 of adult male+female
INDG	Average	AdultGEN	Pike	INDG_Average_AdultGEN_Pike	1.14E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	AdultFEM	Whitefish	INDG_Heavy_AdultFEM_Whitefish	3.77E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	AdultMAL	Whitefish	INDG_Heavy_AdultMAL_Whitefish	8.55E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	Toddler	Whitefish	INDG_Heavy_Toddler_Whitefish	1.89E-02	kg/day	Health Canada 2007; Ratio of adult to toddler consumption rate for subsistence fisher is 0.5 of adult male+female
INDG	Heavy	AdultGEN	Whitefish	INDG_Heavy_AdultGEN_Whitefish	6.25E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	AdultFEM	Whitefish	INDG_Average_AdultFEM_Whitefish	9.84E-03	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	AdultMAL	Whitefish	INDG_Average_AdultMAL_Whitefish	1.73E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Average	Toddler	Whitefish	INDG_Average_Toddler_Whitefish	4.92E-03	kg/day	Health Canada 2007; Ratio of adult to toddler consumption rate for subsistence fisher is 0.5 of adult male+female
INDG	Average	AdultGEN	Whitefish	INDG_Average_AdultGEN_Whitefish	1.32E-02	kg/day	Chan et al. (2014); Table 9b to 10b
INDG	Heavy	AdultFEM	WIR	INDG_Heavy_AdultFEM_WIR	1.50E+00	L/day	Body weight [kg]; Richardson 1997
INDG	Heavy	AdultMAL	WIR	INDG_Heavy_AdultMAL_WIR	1.50E+00	L/day	Body weight [kg]; Richardson 1997
INDG	Heavy	Toddler	WIR	INDG_Heavy_Toddler_WIR	6.00E-01	L/day	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Heavy	AdultGEN	WIR	INDG_Heavy_AdultGEN_WIR	1.50E+00	L/day	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Average	AdultFEM	WIR	INDG_Average_AdultFEM_WIR	1.50E+00	L/day	Body weight [kg]; Richardson 1997
INDG	Average	AdultMAL	WIR	INDG_Average_AdultMAL_WIR	1.50E+00	L/day	Body weight [kg]; Richardson 1997
INDG	Average	Toddler	WIR	INDG_Average_Toddler_WIR	6.00E-01	L/day	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Average	AdultGEN	WIR	INDG_Average_AdultGEN_WIR	1.50E+00	L/day	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Heavy	AdultFEM	BW	INDG_Heavy_AdultFEM_BW	6.31E+01	kg	Body weight [kg]; Richardson 1997
INDG	Heavy	AdultMAL	BW	INDG_Heavy_AdultMAL_BW	7.88E+01	kg	Body weight [kg]; Richardson 1997
INDG	Heavy	Toddler	BW	INDG_Heavy_Toddler_BW	1.65E+01	kg	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Heavy	AdultGEN	BW	INDG_Heavy_AdultGEN_BW	7.07E+01	kg	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Average	AdultFEM	BW	INDG_Average_AdultFEM_BW	6.31E+01	kg	Body weight [kg]; Richardson 1997
INDG	Average	AdultMAL	BW	INDG_Average_AdultMAL_BW	7.88E+01	kg	Body weight [kg]; Richardson 1997
INDG	Average	Toddler	BW	INDG_Average_Toddler_BW	1.65E+01	kg	Body weight [kg]; Health Canada 2024 & Richardson 1997
INDG	Average	AdultGEN	BW	INDG_Average_AdultGEN_BW	7.07E+01	kg	Body weight [kg]; Health Canada 2024 & Richardson 1997

Table E-17:Toxicity Reference Values

Toxicity Reference Values [mg/kg/day]				
Lifestage	Chemical	Variable	Value	Reference / Comment
AdultFEM	MeHg	AdultFEM_MeHg	2.00E-04	Health Canada 2025
AdultMAL	MeHg	AdultMAL_MeHg	4.70E-04	Health Canada 2025
Toddler	MeHg	Toddler_MeHg	2.00E-04	Health Canada 2025
AdultGEN	MeHg	AdultGEN_MeHg	4.70E-04	Health Canada 2025
AdultFEM	IgHg	AdultFEM_IgHg	3.00E-04	Health Canada 2025
AdultMAL	IgHg	AdultMAL_IgHg	3.00E-04	Health Canada 2025
Toddler	IgHg	Toddler_IgHg	3.00E-04	Health Canada 2025
AdultGEN	IgHg	AdultGEN_IgHg	3.00E-04	Health Canada 2025

1 WORKED EXAMPLE

This appendix presents the equations and sample calculations for the human health risk assessment for methylmercury and inorganic mercury exposure from the Project. Sample calculations of exposure doses (estimated daily intake) and risk estimates (i.e., hazard quotients) were completed for the Indigenous toddler, heavy consumer receptor exposed to methylmercury and inorganic mercury for the Baseline and Project Cases at Segment #1/Chukuni River.

1.1 PREDICTED FISH CONCENTRATIONS

Methylmercury and inorganic mercury concentrations for the Baseline Case is based on measured site-specific total mercury and methylmercury concentration data in fish samples collected in the Chukuni River. Methylmercury and inorganic mercury concentrations for the Project Case (Project alone) was calculated as follows:

Methylmercury

$$C_{fish-MeHg} = C_{sw-MeHg} \times BAF_{fish-MeHg} \qquad \textit{Equation1}$$

Where

$C_{fish-MeHg}$ = Predicted fish methylmercury concentration from Project alone [mg/kg-WW]

$\Delta C_{sw-MeHg}$ = Predicted change in methylmercury in surface water concentration based on HESL (2026) [mg/L]

$BAF_{fish-MeHg}$ = Site-specific fish BAF for methylmercury [L/kg-WW]

Inorganic Mercury

$$C_{fish-THg} = C_{sw-THg} \times BAF_{fish-THg} \qquad \textit{Equation 2}$$

$$C_{fish-IgHg} = C_{fish-THg} \times P_{IgHg} \qquad \textit{Equation 3}$$

Where

$C_{fish-THg}$ = Predicted fish total mercury concentration from Project alone [mg/kg-WW]

$\Delta C_{sw\text{-}THg}$ = Predicted change in mercury in surface water concentration based on predicted total mercury concentrations from WSP 2025 [mg/L]

$BAF_{fish\text{-}THg}$ = Site-specific fish BAF for total mercury [L/kg-WW]

$C_{fish\text{-}IgHg}$ = Predicted fish inorganic mercury concentration from Project alone [mg/kg-WW]

P_{IgHg} = Portion of inorganic mercury in fish [%]

1.1.1 SAMPLE CALCULATIONS

The following sample calculations for methylmercury and inorganic mercury concentrations in fish are calculated for northern pike concentrations for the Project Case (Project alone) at Segment #1/Chukuni River.

Methylmercury

$$C_{fish-MeHg} = (1.82 \times 10^{-11} mg/L) \times (5.74 \times 10^{6} L/kg - WW) \quad \textit{Equation1}$$

$$C_{fish-MeHg} = 1.04 \times 10^{-4}\ mg/kg - WW$$

Inorganic Mercury

$$C_{fish-THg} = (1.56 \times 10^{-7} mg/L) \times (2.75 \times 10^{5} L/kg - WW) \quad \textit{Equation 2}$$

$$C_{fish-THg} = 4.30 \times 10^{-2}\ mg/kg - WW$$

$$C_{fish-IgHg} = (4.30 \times 10^{-2}\ mg/kg - WW) \times (0.147) \quad \textit{Equation 3}$$

$$C_{fish-IgHg} = 6.32 \times 10^{-3}\ mg/kg - WW$$

1.2 HHRA MODEL EQUATIONS

The estimated daily intake (EDI), otherwise known as exposure dose, from consumption of raw surface water as a drinking water source and consumption of fish (i.e., Northern Pike, Walleye and Lake Whitefish) was calculated as follows:

$$EDI = \frac{\sum IR_i \times C_j + (WIR_i \times C_{sw})}{BW_i} \quad \textit{Equation 4}$$

EDI = Estimated daily intake for inorganic or methylmercury (mg/kg-BW/day)

IR_i = Fish Ingestion rate of ith receptor lifestage (toddler, adult female and/or male; kg/day)

C_j = methylmercury or inorganic mercury concentration in jth fish (Walleye, Pike and Forage fish; mg/kg-WW)

WIR_i = Water ingestion rate of ith receptor lifestage (toddler, adult female and/or male; L/day)

C_{sw} = methylmercury or inorganic mercury concentration in surface water (mg/L)

BW_i = Body weight of ith receptor life stage (kg)

The following overall equations are used to calculate HQs for exposure to methylmercury and inorganic mercury was used in the HHRA model:

$$HQ_{MeHg} = {EDI_{MeHg}}/{TRV_{MeHg}} \qquad \textit{Equation 5}$$

Where

HQ_{MeHg} = Hazard quotient for exposure to methylmercury(unitless)

EDI_{MeHg} = Estimated daily intake of methylmercury(mg/kg/day)

TRV_{MeHg} = Oral toxicity reference value for methylmercury (mg/kg/day)

$$HQ_{IgHg} = {EDI_{IgHg}}/{TRV_{IgHg}} \qquad \textit{Equation 6}$$

Where

HQ_{IgHg} = Hazard quotient for exposure to inorganic mercury(unitless)

EDI_{IgHg} = Estimated daily intake of inorganic mercury(mg/kg/day)

TRV_{IgHg} = Oral toxicity reference value for inorganic mercury (mg/kg/day)

1.2.1 SAMPLE CALCULATIONS

Following are sample calculations of exposure doses (estimated daily intake) and risk estimates (i.e., hazard quotients) completed for the Indigenous toddler, heavy consumer receptor exposed to methylmercury and inorganic mercury for the Baseline and Project Cases at Segment #1/Chukuni River.

1.2.1.1 *METHYLMERCURY*

1.2.1.1.1 BASELINE

Estimated Daily Intake (Equation 4)

$$EDI = \frac{\left[\left(0.33\frac{mg}{kg\,WW} \times 0.0189\frac{kg}{day}\right) + \left(0.30\frac{mg}{kg\,WW} \times 0.0187\frac{kg}{day}\right) + \left(0.14\frac{mg}{kg\,WW} \times 0.0189\frac{kg}{day}\right)\right] + (5.43 \times 10^{-8}\frac{mg}{L} \times 0.6\,\frac{L}{day})}{16.5\,kg}$$

$$EDI = \frac{(6.22 \times 10^{-3}\,\frac{mg}{day} + 5.62 \times 10^{-3}\,\frac{mg}{day} + 2.64 \times 10^{-3}\,\frac{mg}{day}) + 3.26 \times 10^{-8}\,\frac{mg}{day}}{16.5\,kg}$$

$$EDI = \frac{1.45 \times 10^{-2}\,\frac{mg}{day}}{16.5\,kg}$$

$$EDI = 8.78 \times 10^{-4}\,mg\,/kg\,/day$$

Hazard Quotient (Equation 5)

$$HQ = \frac{8.78 \times 10^{-4}\,mg\,/kg\,/day}{2.0 \times 10^{-4}\,mg\,/kg\,/day}$$

$$HQ = 4.4$$

1.2.1.1.2 PROJECT

Estimated Daily Intake (Equation 4)

$$EDI = \frac{\left[\left(1.04 \times 10^{-4}\frac{mg}{kg\,WW} \times 0.0189\frac{kg}{day}\right) + \left(1.05 \times 10^{-4}\frac{mg}{kg\,WW} \times 0.0187\frac{kg}{day}\right) + \left(3.89 \times 10^{-5}\frac{mg}{kg\,WW} \times 0.0189\frac{kg}{day}\right)\right] + (1.82 \times 10^{-11}\frac{mg}{L} \times 0.6\,\frac{L}{day})}{16.5\,kg}$$

$$EDI = \frac{(1.96 \times 10^{-6}\,\frac{mg}{day} + 1.96 \times 10^{-6}\,\frac{mg}{day} + 7.34 \times 10^{-7}\,\frac{mg}{day}) + 1.09 \times 10^{-11}\,\frac{mg}{day}}{16.5\,kg}$$

$$EDI = \frac{4.66 \times 10^{-6}\,\frac{mg}{day}}{16.5\,kg}$$

$$EDI = 2.82 \times 10^{-7}\,mg\,/kg\,/day$$

Hazard Quotient (Equation 5)

$$HQ = \frac{2.82 \times 10^{-7}\ mg\ /kg\ /day}{2.0 \times 10^{-4}\ mg\ /kg\ /day}$$

HQ =0.0014

1.2.1.2 *INORGANIC MERCURY*

1.2.1.2.1 BASELINE

Equation 4

$$EDI = \frac{\left[\left(0.05\frac{mg}{kg\ WW} \times 0.0189\frac{kg}{day}\right) + \left(0.18\frac{mg}{kg\ WW} \times 0.0187\frac{kg}{day}\right) + \left(0.04\frac{mg}{kg\ WW} \times 0.0189\frac{kg}{day}\right)\right] + (1.32 \times 10^{-6}\frac{mg}{L} \times 0.6\ \frac{L}{day})}{16.5\ kg}$$

$$EDI = \frac{(9.34 \times 10^{-4}\ \frac{mg}{day} + 3.37 \times 10^{-3}\ \frac{mg}{day} + 7.54 \times 10^{-4}\ \frac{mg}{day}) + 7.94 \times 10^{-7}\ \frac{mg}{day}}{16.5\ kg}$$

$$EDI = \frac{5.07 \times 10^{-3}\ \frac{mg}{day}}{16.5\ kg}$$

$$EDI = 3.07 \times 10^{-4}\ mg\ /kg\ /day$$

Equation 6

$$HQ = \frac{3.07 \times 10^{-4}\ mg\ /kg\ /day}{3.0 \times 10^{-4}\ mg\ /kg\ /day}$$

HQ =1.0

1.2.1.2.2 PROJECT

Equation 4

$$EDI = \frac{\left[\left(0.00632\frac{mg}{kg\ WW} \times 0.0189\frac{kg}{day}\right) + \left(0.008\frac{mg}{kg\ WW} \times 0.0187\frac{kg}{day}\right) + \left(0.0046\frac{mg}{kg\ WW} \times 0.0189\frac{kg}{day}\right)\right] + (1.56 \times 10^{-7}\frac{mg}{L} \times 0.6\ \frac{L}{day})}{16.5\ kg}$$

$$EDI = \frac{(1.19 \times 10^{-4}\ \frac{mg}{day} + 1.51 \times 10^{-4}\ \frac{mg}{day} + 8.71 \times 10^{-5}\ \frac{mg}{day}) + 9.37 \times 10^{-8}\ \frac{mg}{day}}{16.5\ kg}$$

$$EDI = \frac{3.57 \times 10^{-4}\ \frac{mg}{day}}{16.5\ kg}$$

$$EDI = 2.16 \times 10^{-5}\ mg\ /kg\ /day$$

Equation 6

Attachment E

$$HQ = \frac{2.16 \times 10^{-5}\ mg\ /kg\ /day}{3.0 \times 10^{-4}\ mg\ /kg\ /day}$$

$$HQ = 0.072$$

Attachment F
Fish Tissue Power Analysis

TECHNICAL MEMORANDUM

DATE March 2026 **Reference No.** CA0031271.9255

TO Great Bear Resources

FROM Jill LaPorte and Karl Bresee **EMAIL jill.laporte@wsp.com; karl.bresee@wsp.com**

GREAT BEAR RESOURCES – NORMAL RANGE AND POWER ANALYSIS FOR FISH TISSUE IN THE RED LAKE MINING DISTRICT

In support of the development of the proposed gold mine in Red Lake mining district of northwestern Ontario, owned by Great Bear Resources Ltd. (Great Bear Resources), WSP Canada Inc. (WSP) prepared this technical memorandum to indicate the normal range of total mercury and methyl mercury in the tissue of fish in the Chukuni River for monitoring future changes to fish tissue concentrations with reference to appropriate protocols.

The normal range in this situation refers to conditions before the start of production of the gold mine by Great Bear Resources (the Project). Historical impacts in the region that may have influenced the mercury levels began with the 1927 construction of the Snowshoe Rapids Dam to raise water levels upstream of the receiving area in the Chukini River. Afterwards, gold mining began with the Howey Gold Mine from 1930 to 1941 and was followed by other relatively small productions afterwards. Currently, the Dickenson Mine (Goldcorp Red Lake Gold Mines; MDI52N04SE00012) is in operation today in the region. Increasing global mercury emissions also affect the region.

Six species were included in the analysis: Northern Pike (*Esox lucius*), Walleye (*Sander vitreus*), Yellow Perch (*Perca flavescens*), White Sucker (*Catostomus commersonii*), Lake Whitefish (*Coregonus clupeaformis*), Silver Redhorse (*Moxostoma anisurum*). Fish were grouped to size ranges that reflected potential risks to human health associated with fish consumption. Pike were restricted to 40 to 70 cm and walleye to 28 to 52 cm. White Sucker, Lake Whitefish, and Silver Redhorse were grouped as large and small “forage fish”, with fish larger than 25 cm considered potentially impactful to humans via human consumption and fish smaller than 25 cm considered ecologically impactful via fish consumption. From 2022 to 2024, the normal range calculation considered 20 pike, 25 walleye, 45 large forage fish, and 12 small forage fish.

The normal range was calculated as the prediction intervals (PI) following the procedures outlined in Barrett et al. (2015) with an a = 0.15 and *m* = 1. Data were first filtered by removing values below the detection limit, checking for outliers using a studentized residual outlier test (SR = 3.5). Next, the distribution of the data were assessed for normality using a Shapiro-Wilk test (a = 0.05). If data were non-parametric, it was transformed using a box-cox transformation and reassessed. The results of the outlier and parametric analyses are provided in Table 2 and visually in Figure 1 and Figure 2.

Future exceedances in the mean annual concentrations of mercury or methylmercury in any fish species will trigger an investigation of cause. Future comparisons assume eight fish per area are used, consistent with fish tissue collection recommendations in the Environmental Effects Monitoring (EEM) Technical Guidance Document (Environment Canada, 2012, Section 3.11.2). The PI can be updated in the future based on additional sampling prior to the Project commencement.

The normal range of mercury was compared to the Health Canada maximum level for contaminants in food. For total mercury, the limit is 0.5 mg/kg for the edible portion of fish (Health Canada, 2000). The normal range of methylmercury was compared to Environment Canada's Canadian Council of Ministers of the Environment (CCME) guideline for methylmercury in tissue for the protection of aquatic biota. For methylmercury, the Environment Canada limit is 0.033 mg/kg. It should be noted that this limit is highly conservative, derived from the lowest available reference condition in mammals and birds – the Wilson's Storm-petrel (*Oceanites oceanicus*). This seabird consumes almost its entire body weight each day thus leading to very high bioaccumulation of methylmercury.

To better contextualize the methylmercury concentrations in the collected fish tissue, Table 2 illustrates the reference conditions for a larger collection of Canadian birds and mammals Environment Canada's Tissue Residue Guidelines for the Protection of Consumers of Aquatic Life (Environment Canada, 2002). All considered reference concentrations are for female animals. For aquatic invertebrate consuming birds, the mean methylmercury reference condition is 0.075 mg/kg wet weight (ww), with a 95% upper confidence limit of the mean (UCLM) of 0.106 mg/kg ww. For piscivorous birds the mean reference condition is 0.100 mg/kg ww, with a 95% UCLM of 0.149 mg/kg ww. The reference condition for birds with available data is 0.097 mg/kg ww, with a 95% UCLM of 0.125 mg/kg ww. In contrast, all mammals with available data are carnivorous and reference condition of 0.166 mg/kg ww and a 95% UCLM of 0.207 mg/kg ww. The normal range for Northern Pike and Walleye exceed the mean and 95% UCLM reference conditions for birds and mammals. In contrast, forage fish, in particular small individuals, fall closer to the reference conditions.

Table 1: Prediction Intervals for Fish Collected in the Red Lake Mining District for the Chukuni River

Parameter	Species	Distribution	*n*	Prediction Interval	
				Lower (5LCLM) (mg/kg ww)	Upper (96UCLM) (mg/kg ww)
Mercury	Northern Pike	Parametric	20	0.1715	0.5041
	Walleye	Nonparametric	25	0.2170	0.7090
	Large Forage Fish	Nonparametric	45	0.0656	0.2636
	Small Forage Fish	Parametric	12	0.0364	0.1674
Methylmercury	Northern Pike	Parametric	20	0.1447	0.4422
	Walleye	Parametric	20	0.0962	0.4536
	Large Forage Fish	Nonparametric	44	0.0325	0.2004
	Small Forage Fish	Parametric	12	0.0091	0.1390

Note: *n* is the number of fish included after outliers were removed; mg/kg ww is milligrams per kilogram wet weight. Pike were restricted to 40 to 70 cm; walleye to 28 to 52 cm. Forage fish included White Sucker, Lake Whitefish, and Silver Redhorse. Large forage fish were >25 cm in total length, small forage fish were <25 cm in total length.

Table 2: Reference Conditions for Methylmercury in Canadian Wildlife

Animals	*n*	Median (mg/kg ww)	Mean (mg/kg ww)	95% UCLM
Aquatic invertebrate consuming birds	6	0.085	0.074	0.106
Piscivorous birds	14	0.100	0.116	0.149
Omnivorous birds	2	0.121	0.121	0.299
Herbivorous birds	2	0.093	0.093	0.144
All birds	**24**	**0.097**	**0.104**	**0.125**
All mammals	**9**	**0.183**	**0.166**	**0.207**

Note: *n* is the number of species included in the calculation. All included values are for female animals. mg/kg ww is milligrams per kilogram wet weight; UCLM is the upper confidence limit of the mean.

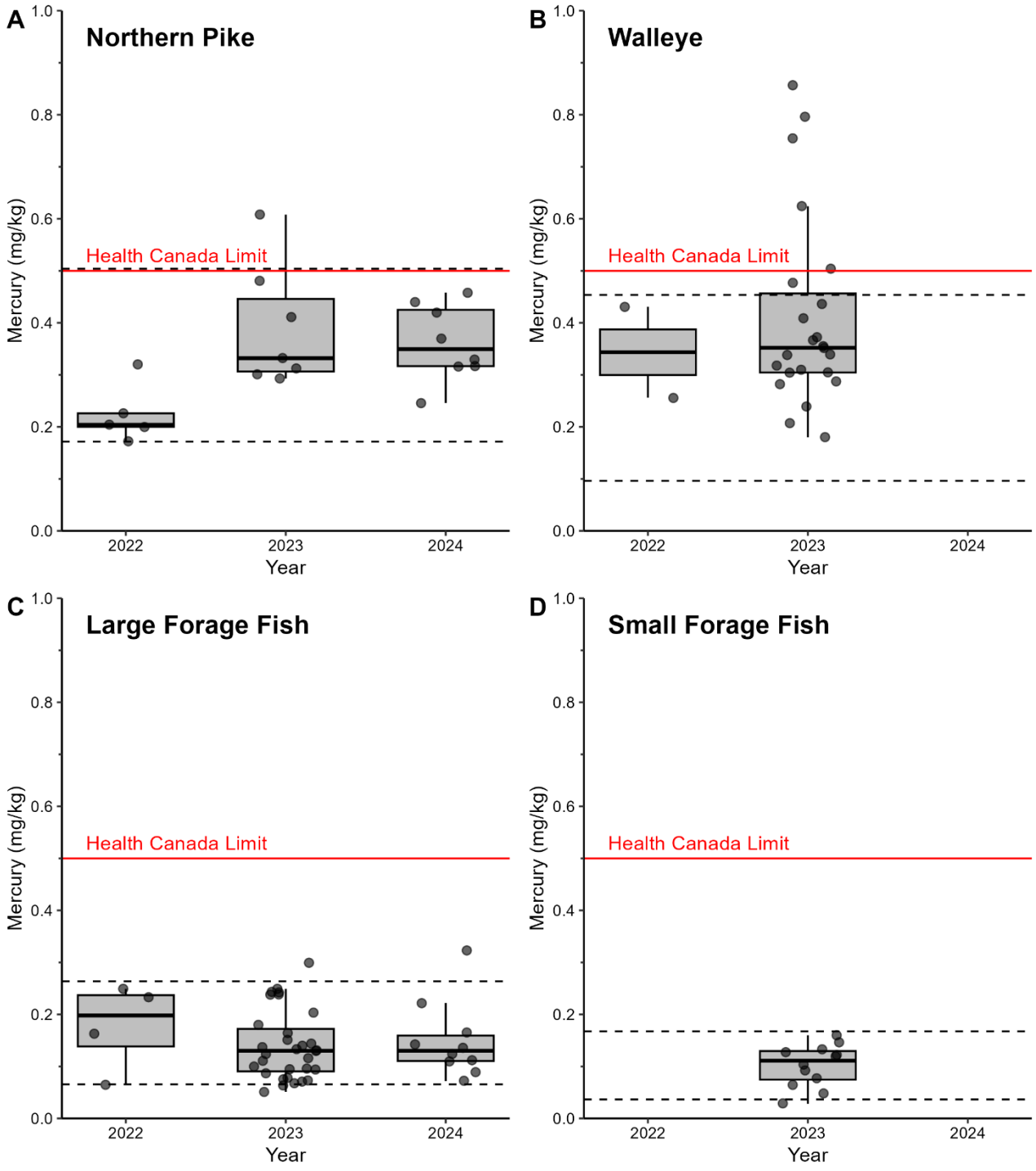


Figure 1: Normal Range of Mercury in Fish the Red Lake Mining District

Notes: Boxplots show the distribution of values for each year. The horizontal line inside each box represents the median. The lower and upper edges of the box correspond to the interquartile range. Whiskers extend to values within 1.5 x IQR from the box. Dashed lines indicate the estimated normal range. The red line indicates the Health Canada's Maximum Levels for Chemical Contaminants in Foods (2020).

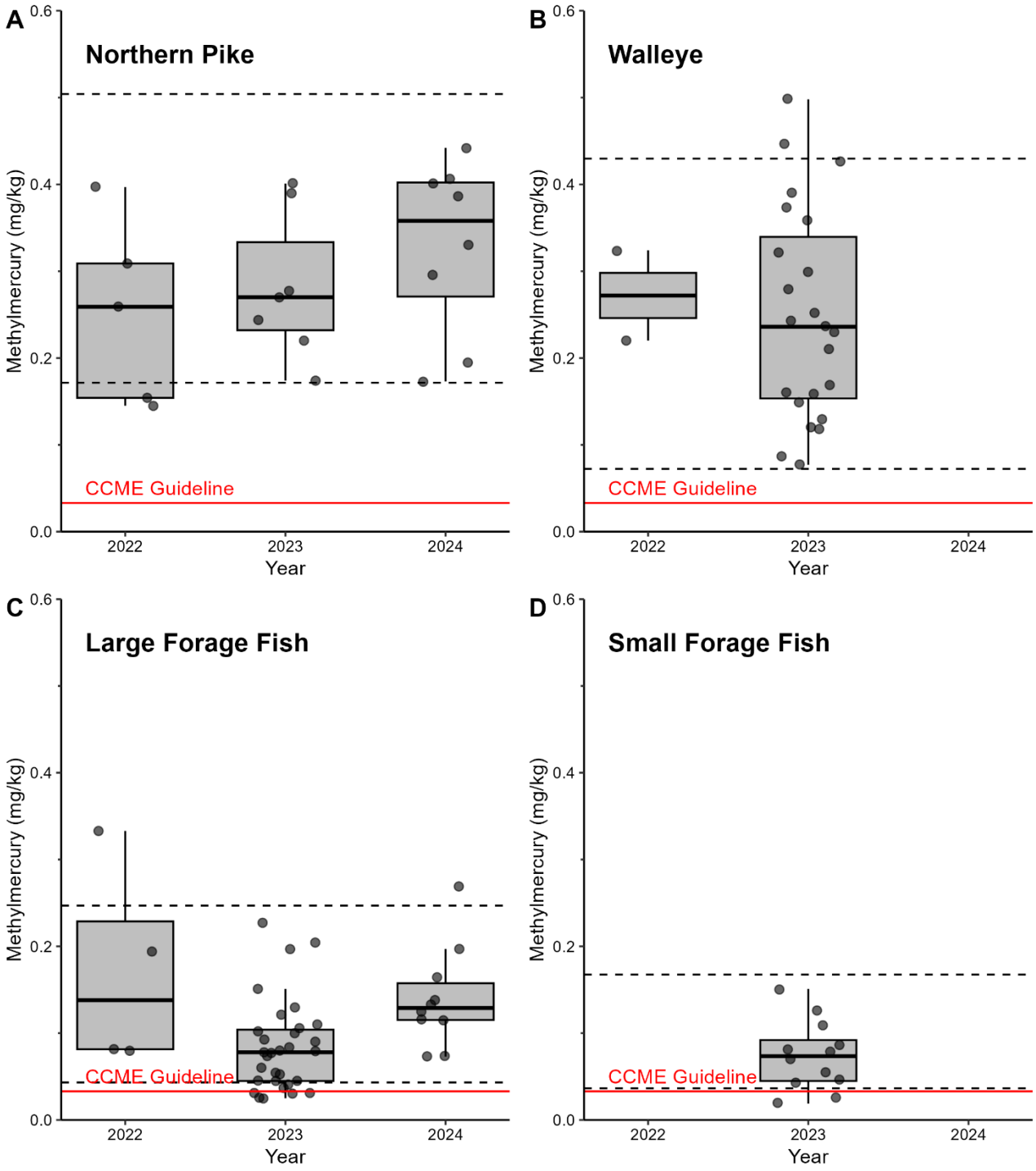


Figure 2: Normal Range of Methylmercury in Fish the Red Lake Mining District

Notes: Boxplots show the distribution of values for each year. The horizontal line inside each box represents the median. The lower and upper edges of the box correspond to the interquartile range. Whiskers extend to values within 1.5 x IQR from the box. Dashed lines indicate the estimated normal range. The red line indicates Environment Canada's CCME guideline for methylmercury in tissue (2000).

WSP Canada Inc.

Original Signed

Jill LaPorte, BSc
Senior Aquatic Ecologist

Original Signed

Karl Bresee, BSc, PBiol, RPBio
Senior Manager, Ontario Ecology

JL/KB/ar

https://wsponlinecan.sharepoint.com/sites/ca-great-bear-impact/shared documents/z_app_t_mercury_bioaccum/appt-1_hg_report/7_final/attachments_final/att f fish tissue power analyses/technical memorandum - great bear mercury in tissue.docx

References

Barrett TJ, Hille KA, Sharpe RL, Harris KM, Machtans, HM, Chapman PM. 2015. Quantifying natural variability as a method to detect environmental change: Definitions of the normal range for a single observation and the mean of *m* observations. Environ Toxicol Chem, 34: 1185-1195.

Canadian Council of Ministers of the Environment [CCME]. 2000. Canadian Environmental Quality Guidelines for the Protection of Wildlife Consumers of Aquatic Biota: Methylmercury.

Environment Canada. 2002. Canadian Tissue Residue Guidelines for the Protection of Consumers of Aquatic Life: methylmercury. Scientific Supporting Document. Ecosystem Health: Science-based Solutions Report No. 1-4. National Guidelines and Standards Office, Environmental Quality Brach, Environment Canada. Ottawa.

Health Canada. 2020. Health Canada's Maximum Levels for Chemical Contaminants in Foods. https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/maximum-levels-chemical-contaminants-foods.html