Keeyask Generation Project

Aquatic Effects Monitoring Plan

Benthic Invertebrate Monitoring Report

AEMP-2023-12

KEEYASK

Manitoba Environment and Climate Client File 5550.00
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2022 -2023

KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING PLAN

REPORT #AEMP-2023-12

BENTHIC INVERTEBRATE MONITORING IN THE NELSON RIVER FROM SPLIT LAKE TO STEPHENS LAKE, FALL 2022

Prepared for

Manitoba Hydro

By

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SUMMARY

Background

The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the Keeyask Generating Station (GS) on the environment. Besides measuring the accuracy of the predictions made and actual effects of the GS on the environment, monitoring results will provide information on how the GS will affect the environment and if more needs to be done to reduce harmful effects.

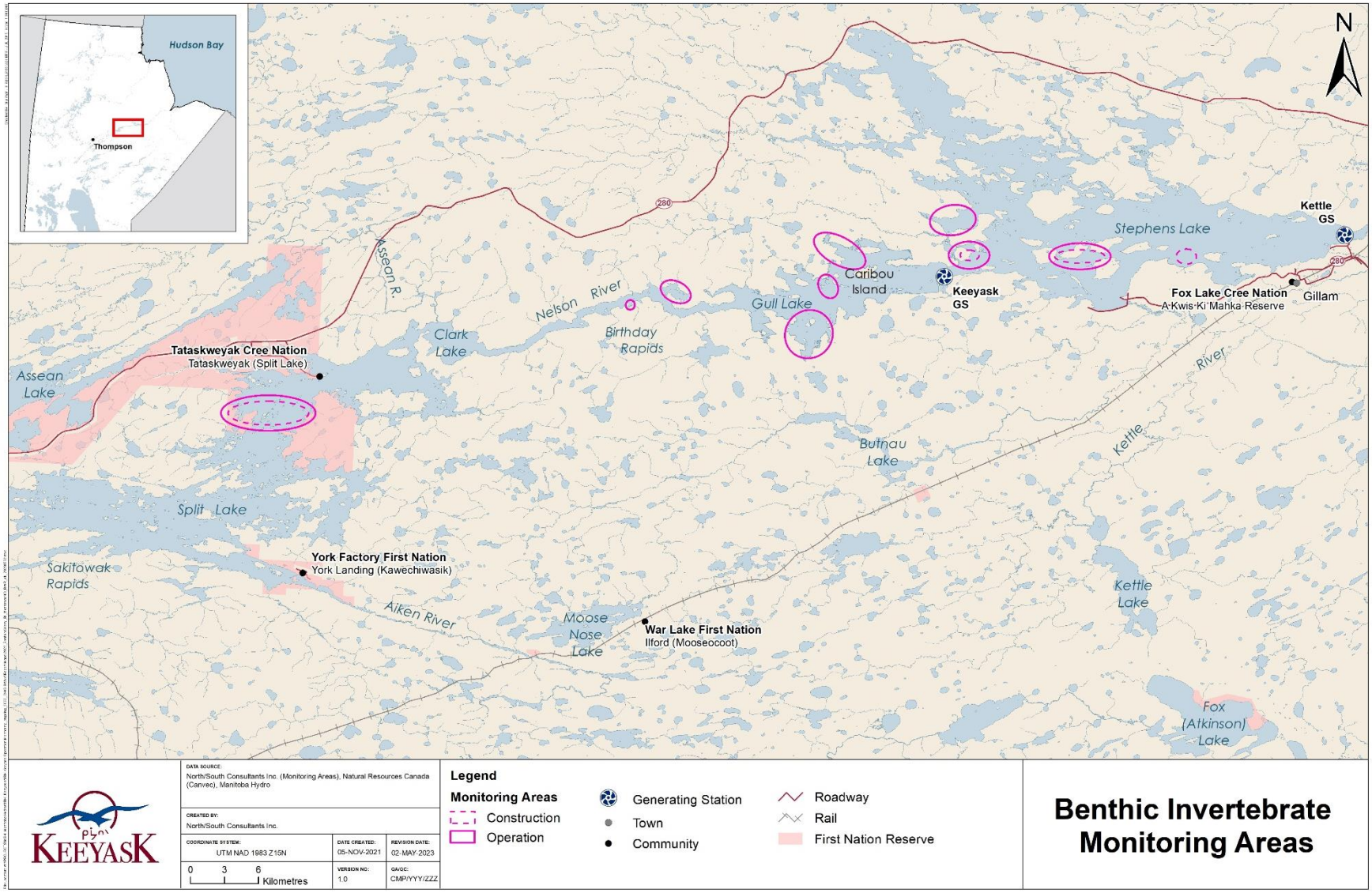
Construction of the Keeyask GS began in mid-July 2014 and instream work was completed in 2020. The reservoir was impounded with water levels being raised to full supply level between August 31 and September 5, 2020. Commissioning of the powerhouse turbines was initiated after impoundment. They were brought into service one at a time with the final of seven turbines completed on March 9, 2022.

Benthic macroinvertebrates are tiny animals without backbones, such as insect larvae and clams that live in or on the bottom of lakes and rivers. Monitoring the benthic invertebrate community is an important part of the overall plan to monitor the biological effects of the Keeyask GS on the aquatic environment. Benthic invertebrates are often used to determine habitat quality in lakes and rivers and are a valuable food source for many species of fish, including Lake Sturgeon.

This report describes the results of the benthic invertebrate sampling program conducted in fall 2022, two years after the Keeyask reservoir was impounded. Benthic invertebrate and supporting sediment samples were collected in Split Lake (an area not directly affected by the Keeyask GS); at sites upstream and downstream of the Keeyask GS (areas affected by the Project); and in O'Neil Bay in Stephens Lake (an area not directly affected by the Keeyask GS).

Why is the study being done?

Benthic macroinvertebrate monitoring is on-going to see how the abundance (how many bugs), composition (what kinds of bugs), and diversity (how many kinds of bugs) change over time. This is important because creating the Keeyask reservoir and operating the Keeyask GS changed the physical environment (*i.e.*, flooded terrestrial areas) and aquatic habitat (*i.e.*, water depth, velocity, and substrate). Benthic invertebrates are an important food source of many fishes and are commonly used as indicators of change to fish habitat quality over time.



Map showing the areas where benthic macroinvertebrate sampling was done in 2022.

What was done?

In 2022, benthic invertebrate and supporting sediment sampling was conducted in Split Lake, the Keeyask reservoir, and in Stephens Lake (see study map above). Split Lake was sampled to record the invertebrate community in an area not directly affected by the Keeyask GS and to show how the invertebrate community in a lake upstream can vary from year to year. Sites in the Keeyask reservoir (from Clark Lake to the Keeyask GS) were sampled to show how the invertebrate community may be affected by the Project from effects like flooding, fluctuating water levels, and changes in water quality. These sites were also sampled to record how newly flooded areas are colonized by invertebrates. Finally, sites in Stephens Lake within 3 km and 11 km of the Keeyask GS were sampled to show how the benthic invertebrate community may be affected by changes in flow. O'Neil Bay in Stephens Lake was also sampled to record the invertebrate community in an area that the Keeyask reservoir backbay sites may resemble in about 25 years (*i.e.*, reference site).

A total of 138 benthic invertebrate samples were collected in 2022. These included 15 samples from one site in Split Lake, 78 samples from six sites in the Keeyask reservoir, and 45 samples from three sites in Stephens Lake. Sampling was conducted in Split Lake on August 24 (these data are collected as part of the Coordinated Aquatic Monitoring Program (CAMP) and the Keeyask reservoir and Stephens Lake were sampled between September 17 and 26.

Three areas were sampled at each site: i) intermittently-exposed (IE; very close to shore measuring less than 1 m deep), ii) predominantly-wetted (PW; a little farther from shore measuring 1–3 m deep), iii) offshore (areas farthest from shore measuring 3–10 m deep).

Collecting substrate (right) at a benthic invertebrate sampling site with a petite Ponar dredge (left) in the Keeyask reservoir, fall 2022.

Benthic invertebrate samples were collected using a Ponar dredge (pictured above). The dredge was lowered to the bottom to rest on the substrate. The jaws were then closed, collecting a sample of the bottom. This sample was rinsed to get rid of the sediment and all of the invertebrates that were left were preserved and brought back to the lab for identification. In the shallowest areas (the IE sites), kicknetting (pictured below) is usually used to collect

invertebrates where a small net is kicked along the bottom. However, this is difficult in areas that contain lots of flooded terrestrial vegetation (like willows). So, a Ponar dredge was also used to collect samples from the IE sites in the Keeyask reservoir and Stephens Lake. A kicknet was used in the IE sites in Split Lake.


Using a kicknet to sample IE sites close to shore.

What was found?

In 2022, benthic invertebrates (bugs) colonized all newly flooded habitat. Scuds (side-swimmers) and bloodworms were the most abundant groups in this area. Invertebrates were found at a greater density in the sites closest to shore (IE sites) in the Keeyask reservoir backbays than the offshore sites (PW and OS), which is different that what was found in Split Lake and Stephens Lake. Substrates in the area closest to shore (IE) were silt (mud) with high levels of organic matter. Sample sites in deeper waters (both the PW and OS sites) had an abundance of bugs within the range seen in Split and Stephens lakes. Substrates in the offshore areas had less organic matter and more sand.

A bay to the north of the Keeyask GS in Stephens Lake (see map above) was sampled as a reference area as it was a flooded backbay when Stephens Lake was formed and is a similar physical environment to the newly flooded backbays in the Keeyask reservoir. The BMI community was different from the Keeyask reservoir. Few bugs were found at sites closest to shore and more worms, zebra mussels, and mayflies were found. This suggests that the invertebrate community in the Keeyask reservoir will likely change over time.

What does it mean?

Sampling in 2022 represents the second year of studying the changes in the benthic invertebrate community in the Keeyask reservoir. New habitats created from flooding terrestrial areas and the existing lake and river channels are still changing. The benthic invertebrate community appears to be adapting to the new physical environment and aquatic habitat created by the Project. In future years the invertebrate community in the Keeyask reservoir will be

compared to pre-Project to see how these sites have changed. It will also be compared to that of Split and Stephens lakes to see how the new reservoir compares to an old reservoir.

What will be done next?

Benthic invertebrate sampling will be repeated in 2023 using the same collection methods. Because more time will have passed since flooding in fall 2020, results will be compared between years so trends can be seen.

ACKNOWLEDGEMENTS

We would like to thank Manitoba Hydro for the opportunity and resources to conduct this study.

Patrick Connell, Kenneth Ouskun, and Terry Kitchekeesik of Tataskweyak Cree Nation (TCN) are thanked for their local expertise and assistance in conducting the field work.

The collection of biological samples described in this report was authorized by Natural Resources and Northern Development, Fish and Wildlife Branch, under terms of the Scientific Collection Permit #41767128 (SCP 08-2022).

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1.0 INTRODUCTION

The Keeyask Generation Project (the Project) is a 695-megawatt (MW) hydroelectric generating station at Gull Rapids on the lower Nelson River in northern Manitoba. The Project is approximately 725 kilometres (km) northeast of Winnipeg, 35 km upstream of the existing Kettle Generating Station, where Gull Lake flows into Stephens Lake, 60 km east of the community of Split Lake, 180 km east-northeast of Thompson and 30 km west of Gillam (Map 1). Construction of the Project began in July 2014.

The *Keeyask Generation Project: Response to EIS Guidelines*, completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. Technical supporting information for the aquatic environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs, is provided in the *Keeyask Generation Project Environmental Impact Statement: Aquatic Environment Supporting Volume* (AE SV) (KHLP 2012). As part of the licensing process for the Project, an *Aquatic Effects Monitoring Plan* (AEMP) was developed detailing the monitoring activities of various components of the aquatic environment (KHLP 2014). This includes monitoring of the benthic macroinvertebrate community for the construction and operation phases of the Project.

Benthic invertebrate baseline studies in the Keeyask study area were conducted between 1997 and 2006 in Split Lake, the Clark Lake to Gull Rapids reach of the Nelson River, and Stephens Lake (Lawrence and Fazakas 1997; Lawrence *et al*. 1999; Fazakas and Zrum 1999; Zrum and Neufeld 2001; Zrum and Bezte 2003; Zrum and Kroeker 2003; Juliano and Neufeld 2004, 2005; Sotiropoulos and Neufeld 2004; Neufeld 2007; and Capar 2008). Additional baseline data were collected in fall 2013 to augment the existing dataset and improve its utility for post-Project comparisons. As part of the Manitoba and Manitoba Hydro's Coordinated Aquatic Monitoring Program (CAMP), benthic invertebrate data were collected in Split Lake since 2009 (annually); and in Stephens Lake since 2009 (every three years) (CAMP 2014, 2017). These data were reviewed and used as an additional source of information for Project monitoring. Additionally, TSS, turbidity, and DO data collected during the PEMP and SMP were considered in the interpretation of benthic invertebrate baseline monitoring results.

Construction monitoring (2014 to 2019) specifically addressed questions related to the biological effects of predicted increases in TSS on the benthic community due to in-stream work on the Nelson River and complemented the water quality program (Zrum and Gill 2015, 2016; Dawson 2017, 2018, 2019; Dawson and Neufeld 2020). Overall, the results observed in Stephens Lake throughout construction monitoring suggested that observed changes in the benthic invertebrate community metrics were more likely related to natural variation as opposed to the Project-related activities.

Operation monitoring of the benthic invertebrate community specifically addresses the biological effects of flooding, as well as predicted sedimentation, and changes in surface water quality within the Keeyask reservoir and downstream of the Keeyask GS. Split Lake is upstream of the

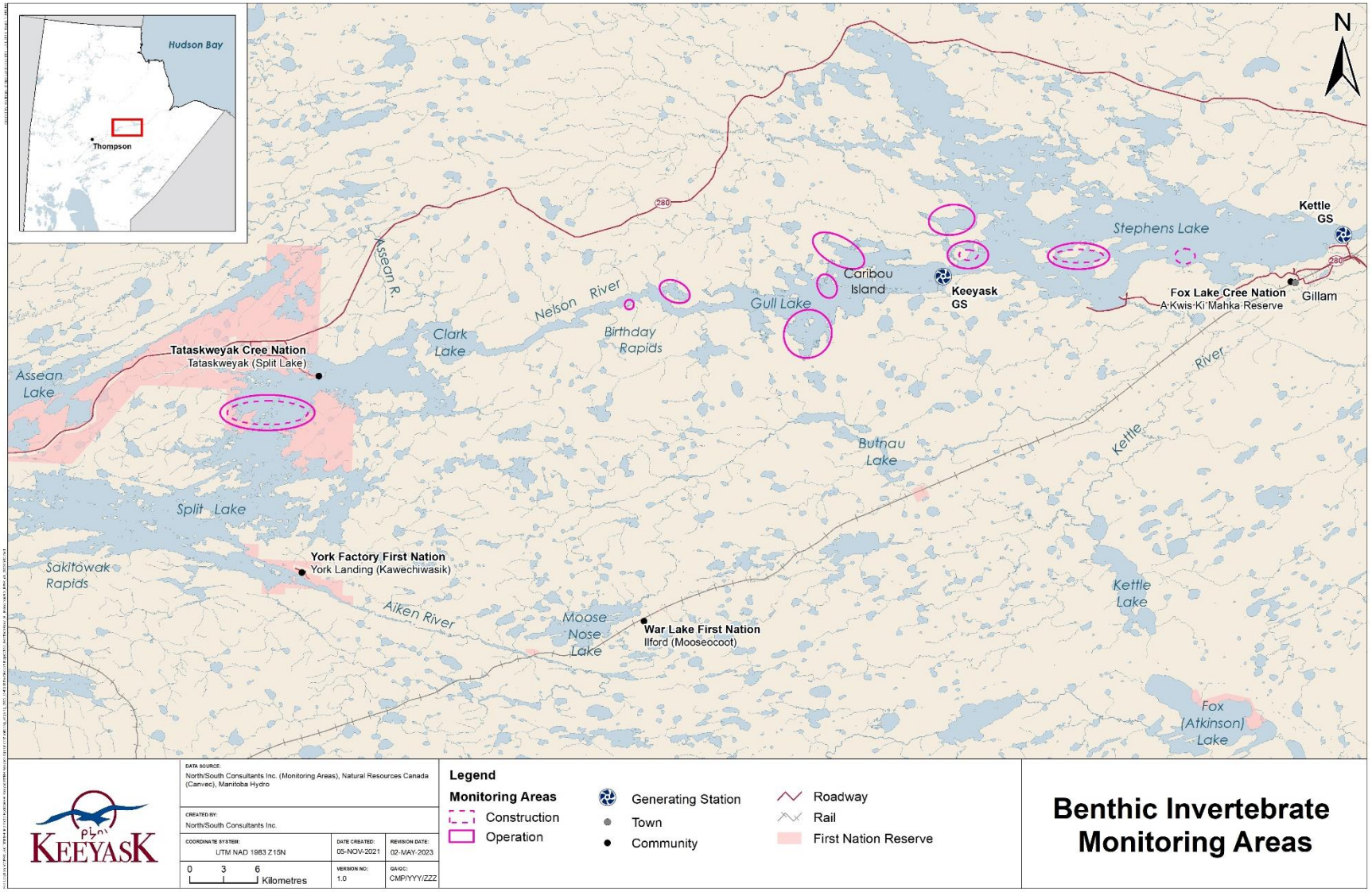
hydraulic zone of influence of the GS and was sampled as a reference site to indicate natural interannual variation in the invertebrate community. Data from Split Lake were collected as part of the CAMP. The key questions during operation monitoring within the Keeyask reservoir are:

- *Has an area-wide, large increase in benthic invertebrate abundance, and a change in community composition, occurred in the long-term in response to the increased availability of aquatic habitat and changes in substrates?*
- *Are benthic macroinvertebrate abundance and/or distribution in littoral habitat negatively affected by the increased frequency of water level fluctuations?*
- *Do low DO concentrations in areas of flooding and peat disintegration result in initially low levels of benthic abundance and richness?*
- *What is the ultimate abundance of benthos in the long-term if DO depletion continues to occur during the winter months?*
- *Are there any unexpected effects on the upstream benthic invertebrate community that may be related to GS operation?*

The biological effects of the predicted alteration of flow, water velocities, and water depths downstream of the Keeyask GS are addressed by these key questions:

- *Have irregular flow patterns contributed to a reduction in benthic macroinvertebrate taxa richness?*
- *Are there any unexpected effects on the downstream benthic invertebrate community that may be related to GS operation?*

This report presents the results of benthic invertebrate sampling conducted in 2022, two full years after impoundment of the Keeyask reservoir in September 2020. It is expected that the benthic invertebrate community in the reservoir and immediately downstream of the GS in Stephens Lake is still undergoing substantive changes in response to the large changes in habitat because of impoundment and diversion of flow from the spillway to the powerhouse. Therefore, a detailed analysis of the post-impoundment invertebrate community and comparison to the pre-Project condition will be completed after the third year of monitoring in 2023 after initial colonization would largely be complete. It is anticipated that the BMI community would continue to evolve over time as aquatic habitat in the reservoir matures; therefore, BMI monitoring would continue at a reduced frequency in the future. Monitoring of the BMI community in Split Lake, an upstream lake with regulated inflows, will provide a measure of the BMI community in a non-reservoir, including interannual variation. Comparisons to sites in Stephens Lake not immediately downstream of the GS will provide a measure of inter-annual variation in a reservoir where water levels are controlled, although water level fluctuations in Stephens Lake are greater than those that will be seen in the Keeyask reservoir.



Map 1: Map of Nelson River showing the site of Keeyask Generating Station and the benthic invertebrate study setting.

2.0 STUDY SETTING

The study area encompasses an approximately 110 km long reach of the Nelson River from Split Lake to Stephens Lake (Map 1). This section of river offers a diversity of physical habitat conditions, including a variety of substrate types, and variable water depths (range 0–30 m) and velocities.

Split Lake, which is immediately downstream of the Kelsey GS at the confluence of the Burntwood and Nelson rivers, is the second largest waterbody in the Keeyask study area. Due to large inflows from the Nelson and Burntwood rivers, the lake has a detectable current in several locations. Split Lake has maximum and mean depths of 28.0 m and 3.9 m respectively, at a water surface elevation of 167.0 m above sea level (ASL) (Lawrence *et al*. 1999). The surface area of Split Lake was determined to be 26,100 ha (excluding islands), with a total shoreline length, including islands, of 940.0 km (Lawrence *et al*. 1999). The numerous islands in Split Lake represent 411.6 km of the total shoreline.

Clark Lake is located immediately downstream of Split Lake, and approximately 42 km upstream of the Keeyask GS. Current is restricted to the main section of the lake, with off-current bays outside the main channel. The Assean River is the only major tributary to Clark Lake and flows into the north side. Downstream from the outlet of Clark Lake, the Nelson River narrows and water velocity increases for a 3 km stretch, known as Long Rapids. For the next 7 km, the river widens, and water velocity decreases. The area between Clark Lake and Birthday Rapids is referred to herein as the upper Keeyask reservoir.

Birthday Rapids is located approximately 10 km downstream of Clark Lake and 30 km upstream of the Keeyask GS and marks the upstream end of major water level changes because of impoundment by the Keeyask GS. The drop in elevation from the upstream to downstream side of Birthday Rapids was approximately 2 m prior to impoundment but is now nearly level, albeit a fast-flowing section of river. The 14 km reach of the Nelson River between Birthday Rapids and Gull Lake was characterized as a large and somewhat uniform channel with medium to high water velocities and a few large bays. This area is now within the Keeyask reservoir, though flooding was limited to mainly shoreline areas, and is referred to herein as the middle Keeyask reservoir.

Prior to impoundment, Gull Lake was a widening of the Nelson River, with moderate to low water velocity beginning approximately 20 km upstream the Keeyask GS. Water levels on Gull Lake increased by several metres following impoundment and flooding along the shoreline and small tributaries entering this reach was extensive. Although this area is larger than prior to impoundment, the portion of the Keeyask reservoir is referred to herein as Gull Lake.

Just below the Keeyask GS, the Nelson River enters Stephens Lake. Stephens Lake was formed in 1971 by construction of the Kettle GS. Construction of the Keeyask GS has altered the flow distribution immediately downstream of the station.

Construction of the Kettle GS flooded Moose Nose Lake (north arm) and several other small lakes that previously drained into the Nelson River, as well as the old channels of the Nelson River that now lie within the southern portion of the lake. Major tributaries of Stephens Lake include the North and South Moswakot rivers that enter the north arm of the lake. Looking Back Creek is a second order stream that drains into the north arm of Stephens Lake. Kettle GS is located approximately 40 km downstream of the Keeyask GS.

3.0 METHODS

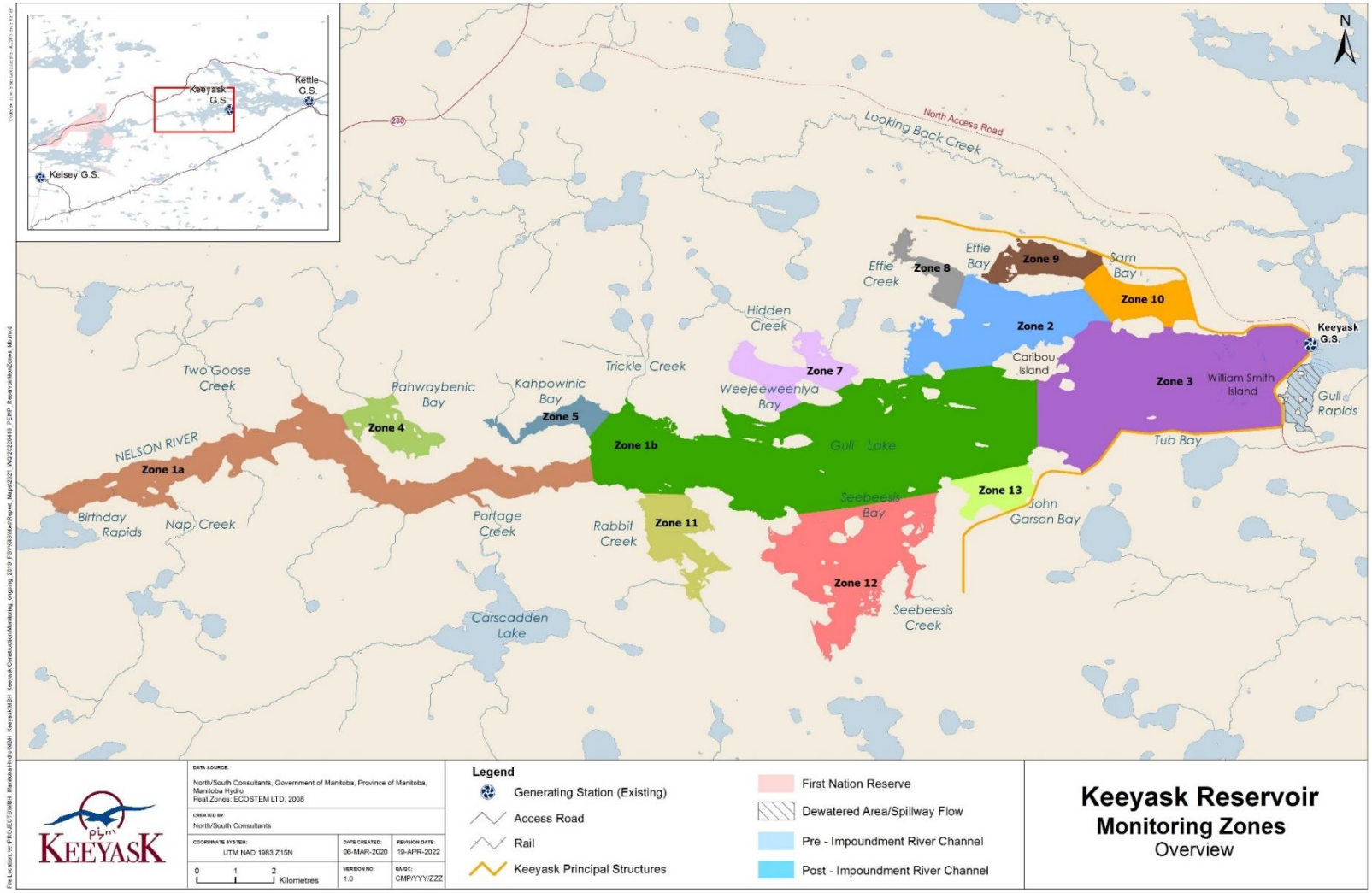
The AEMP is designed to compare benthic invertebrate community metrics at sites predicted to be most affected by the Project (*i.e.*, the Keeyask reservoir and Stephens Lake) to baseline and to upstream reference sites (*i.e.*, Split Lake). The AEMP sampling design is comparable to the current CAMP design whereby sampling areas (*i.e.*, habitat polygons) were stratified by water depth and constrained by other aquatic habitat attributes to minimize the inherent variability within the invertebrate data.

Invertebrate samples were collected from intermittently-exposed (IE; approximately 1 m deep), predominantly-wetted (PW; 1 to 3 m deep), and offshore (OS; 3 to 10 m deep) habitat polygons. Habitat attributes within sampling polygons were constrained to meet three criteria: consistent water movement (*i.e.*, standing water, low water velocity); homogeneous/consistent substrate; and no aquatic macrophyte beds. The spatial extent of a sampling polygon was at least 100 m x 100 m, and large enough to adequately accommodate five replicate stations. Within each polygon, the locations of the five replicate stations were established by field crews and selected based on specific habitat attributes (*i.e.*, water depth, water velocity, substrate type, and absence of aquatic plants) and the spatial separation criteria outlined in Metal Mining Technical Guidance for Environmental Effects Monitoring (EEM; Environment Canada 2012). By EEM definition, a replicate station is a specific, fixed sampling location that can be recognized, re-sampled, and defined quantitatively (*e.g.*, UTM position and a written description). The size of each replicate station was minimally 10 m x 10 m and separated from other replicate stations by at least 20 m.

3.1 FIELD PROCEDURES

The IE polygon in Split Lake was sampled using a kicknet. The IE polygon contained five replicate stations (n = 5). Three one-minute travelling kick and sweeps along a transect perpendicular to the shoreline (sub-samples) were collected in each replicate station and combined into a single sample for invertebrate analysis.

Within the Keeyask reservoir, sampling areas were selected to represent a range of post-impoundment habitat types, as defined by reservoir zones (Map 2). These include sites in the mainstem, the part of the reservoir through which most of the flow travels (zones 1a, 1b, and 3) and backbays, relatively shallow bays formed due to flooding of terrestrial areas (zones 4, 12, and 8). Site selection in 2021 was often impacted by the presence of flooded habitat and terrestrial vegetation (such as willows and Labrador tea). This especially impacted IE sampling areas where kicknetting could not be conducted. In some areas, this necessitated moving a sampling polygon from a target area. The approach for sampling within IE habitats was changed in 2022 so target areas could be sampled. Benthic invertebrates were sampled in the IE habitat using either a petite Ponar or Ekman dredge (each with an area of 0.023 m^2). The IE polygon



Map 2: **Map of the Keeyask reservoir showing the zones used to define benthic macroinvertebrate sampling areas. Zones includes sites in the mainstem (the part of the reservoir through which most of the flow travels; zones 1a, 1b, 2, and 3) and backbays (relatively shallow bays formed due to flooding of terrestrial areas; zones 4, 5, 7, 8, 9, 10, 11, 12, and 13.**

contained three replicate stations. Three benthic grabs (sub-samples) were collected in each replicate station from a boat and combined into a single sample for invertebrate analysis. The same sampling method was used for sites in Stephens Lake.

All PW and OS sites were sampled using either a petite Ponar or Ekman dredge. The PW and OS polygons contained five replicate stations. Three benthic grabs (sub-samples) were collected in each replicate station from a boat and combined into a single sample for invertebrate analysis.

An acceptable benthic grab sample required that the jaws be completely closed upon retrieval. If the jaws were not completely closed, the sample was discarded into a bucket (and disposed of once sampling was completed) and the procedure was repeated. All sampling equipment was rinsed before sampling at the next site.

Each BMI sample (whether collected using a kicknet, a petit Ponar, or an Ekman dredge) was sieved through a 500-micron (µm) mesh rinsing bucket. All material retained by the sieve bucket were transferred to labelled plastic jars and fixed with 10% formalin. Invertebrate samples were shipped to the NSC laboratory (Winnipeg, MB) for analysis.

One additional grab sample was collected in each replicate station for substrate analysis. The sediment grab was sub-sampled to provide approximately 500 millilitres (mL) of benthic material to analyze for total organic carbon (% TOC) and particle sizes (PSA; % sand, % silt, and % clay). Sediment samples were transferred into labelled plastic bags and refrigerated. Sediment samples were shipped to the ALS Laboratory Group (Winnipeg, MB) for analysis.

Water depths and descriptions of the benthic substrate were recorded with every sample. The following supporting variables were measured/recorded within each replicate station:

- UTM position (hand-held GPS receiver);
- Water temperature (hand-held thermometer, below surface);
- Water transparency (Secchi disk, down and up measures);
- Water velocity (Swoffer current velocity meter at approximately 20 centimetres [cm] below water surface or visually estimated); and
- Where applicable, a description of the riparian area, and presence of algae, aquatic vegetation, flooded terrestrial vegetation, and rafted logs or woody debris.

3.2 LAB PROCEDURES

At the NSC laboratory, BMI samples were rinsed with water through a 500 µm sieve and sorted under a 3X magnifying lamp. Invertebrates were transferred to 70% ethanol prior to being identified to the appropriate taxonomic level. A Leica Mz125 microscope (maximum 100x magnification) and reference texts listed in Appendix 1 were used for taxonomic identification. Scientific names used followed the Integrated Taxonomic Information System classification

(ITIS 2023). Invertebrates were identified to major group (subclass, order, or family) and Ephemeroptera were identified to genus. Invertebrate identification and enumeration was performed by an invertebrate taxonomist at NSC.

Samples were processed using NSC's BMI Sample Processing Protocol and Quality Assurance/Quality Control (QA/QC) Procedures (Appendix 2). Sorted samples will be retained and archived for the duration of the operation monitoring phase should further analysis be required. A reference collection of benthic invertebrates will be maintained to ensure taxonomic consistency throughout the duration of the monitoring program.

3.3 DATA ANALYSIS

The Split Lake IE invertebrate counts were reported as abundance and expressed as the total number of invertebrates per sample. Counts for the IE habitat in the Keeyask reservoir and Stephens Lake, and at all PW and OS sites were reported as abundance and expressed as the total number of invertebrates per square metre (no. per m^2); where density = [(invertebrate count ÷ no. of sub-samples) ÷ grab sampler area ($0.023m^2$)].

Abundance was used to characterize the invertebrate community in terms of quantity and relative proportions, these measures included: total invertebrates, major groups [Oligochaeta (aquatic worms), Crustacea (*e.g.*, amphipods), Mollusca (snails and clams), Coleoptera (beetles), Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies), Chironomidae (non-biting midges), Ceratopogonidae (biting midges), and the remaining aquatic taxa that were categorized as Other Taxa (*e.g.*, mites)], EPT index (percent Ephemeroptera, Plecoptera, and Trichoptera), percent Oligochaeta and Chironomidae, and ratio of EPT to Chironomidae.

Taxonomic richness (total and EPT) and Simpson's indices (diversity and evenness) were used to characterize the benthic invertebrate community in terms of diversity (to the family-level). Taxonomic richness is a measure of diversity and is the total number of taxa in a habitat (or sample). Simpson's diversity index was also used to quantify diversity as it provides more information about community structure than abundance or richness alone. Simpson's diversity index considers both richness and evenness and measures the probability that two individuals randomly selected from a sample will belong to the same taxon. Simpson's diversity index values (probabilities) range from zero (low diversity) to one (high diversity). Simpson's evenness index is calculated from the Simpson's diversity index and is a measure of the relative abundance of the different taxa making up the richness of a habitat (or sample). Evenness values range from zero (no evenness) to one (complete evenness).

Summary statistics (mean, minimum, maximum, 1st quartile, median, 3rd quartile, variance, standard deviation, and standard error) were reported for each metric based on habitat type and site.

4.0 RESULTS

Sampling was conducted at one site in Split Lake (Map 3) on August 24 as part of CAMP. Six sites were sampled within the Keeyask reservoir (Map 4) and three within Stephens Lake (Map 5) between September 17 and 26.

A total of 138 benthic invertebrate samples were collected in 2022. These included 15 samples in Split Lake, 78 samples in the Keeyask reservoir, and 45 in Stephens Lake. Sediment samples were not collected from every replicate station because some samples contained too much flooded terrestrial material to analyze. A total of 125 sediment samples were collected for TOC and PSA analysis, however, one sample from Stephens Lake (ONB-IE-R5) was lost in the lab so only 124 sediment samples were analyzed.

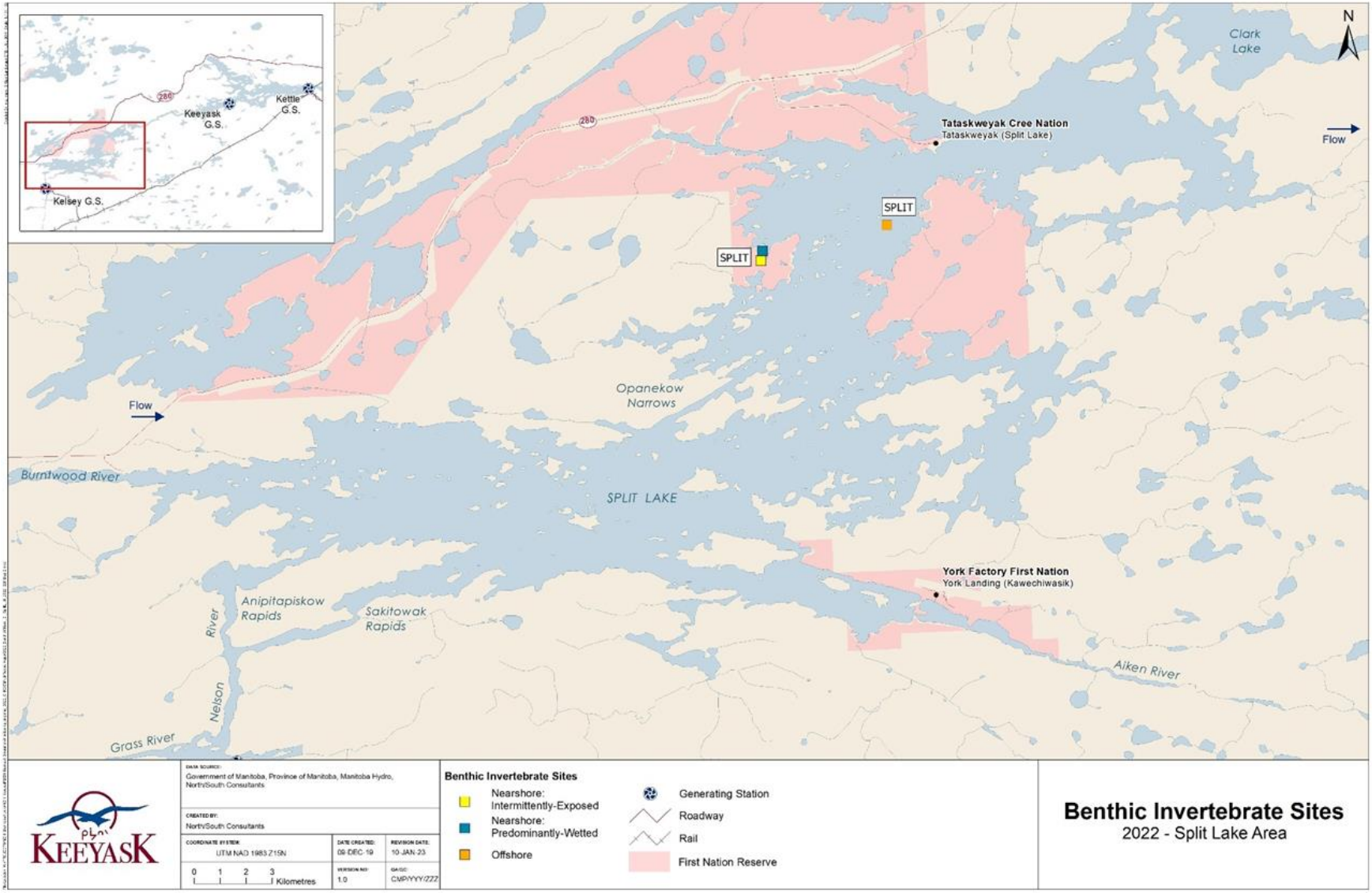
Invertebrate analysis output for individual replicate stations is presented in Appendix 3, sediment analysis output for individual replicate stations is presented in Appendix 4, and site and habitat data are presented in Appendix 5.

4.1 SPLIT LAKE

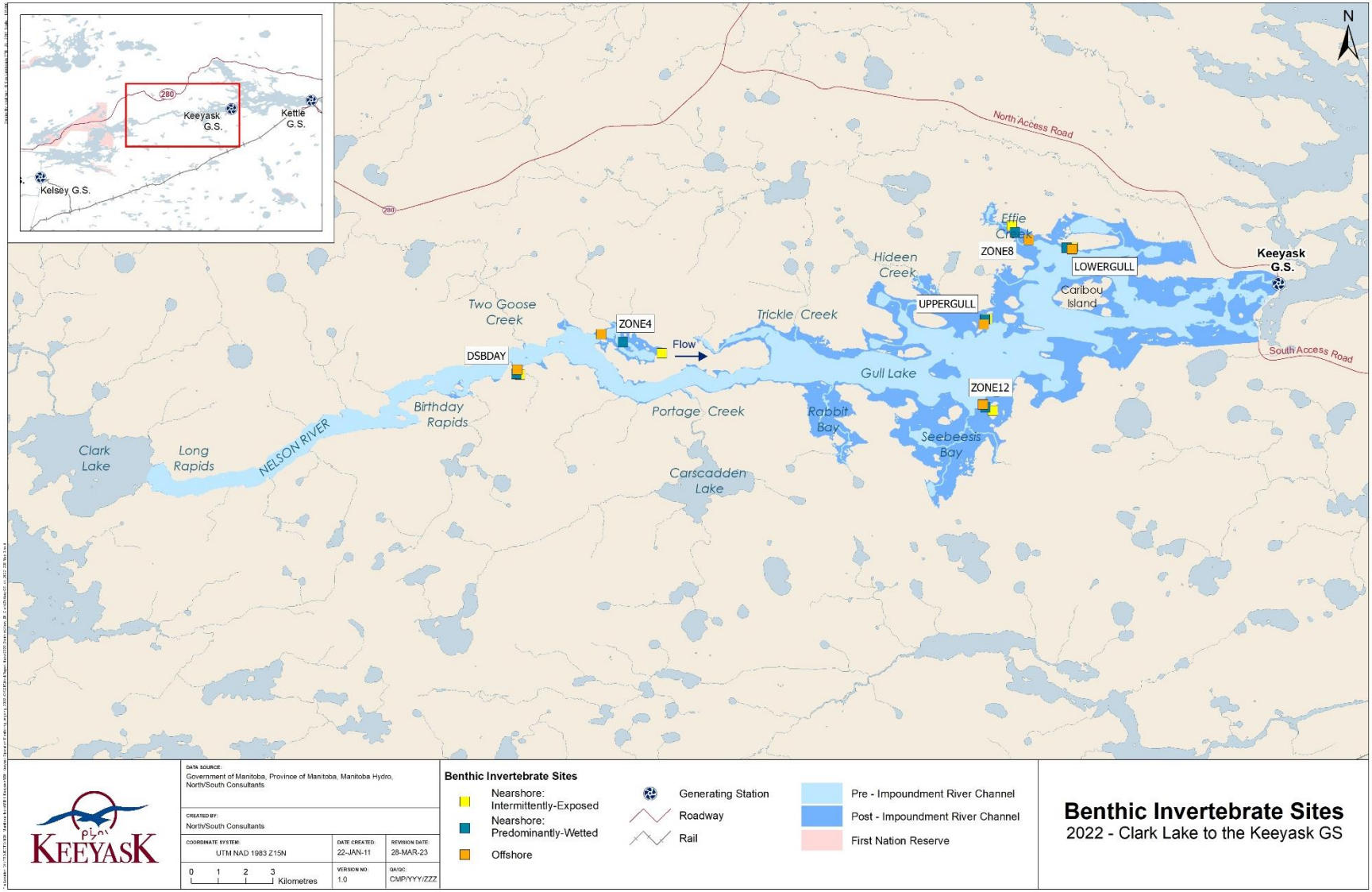
Substrate within the IE sampling polygon was largely sand (64%) and clay (27%) with 1% total organic carbon (Figure 1). Mean total abundance was 238 invertebrates per m^2 and total richness was ten taxa (Table 1). The most abundant taxa were Oligochaeta and Amphipoda, combining to represent more than 70% of the total abundance (Figure 2). Mean proportion of EPT was 2%, Simpson's diversity index was 0.69, and the Simpson's evenness index was 0.37.

Table 1: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in Split Lake in 2022.

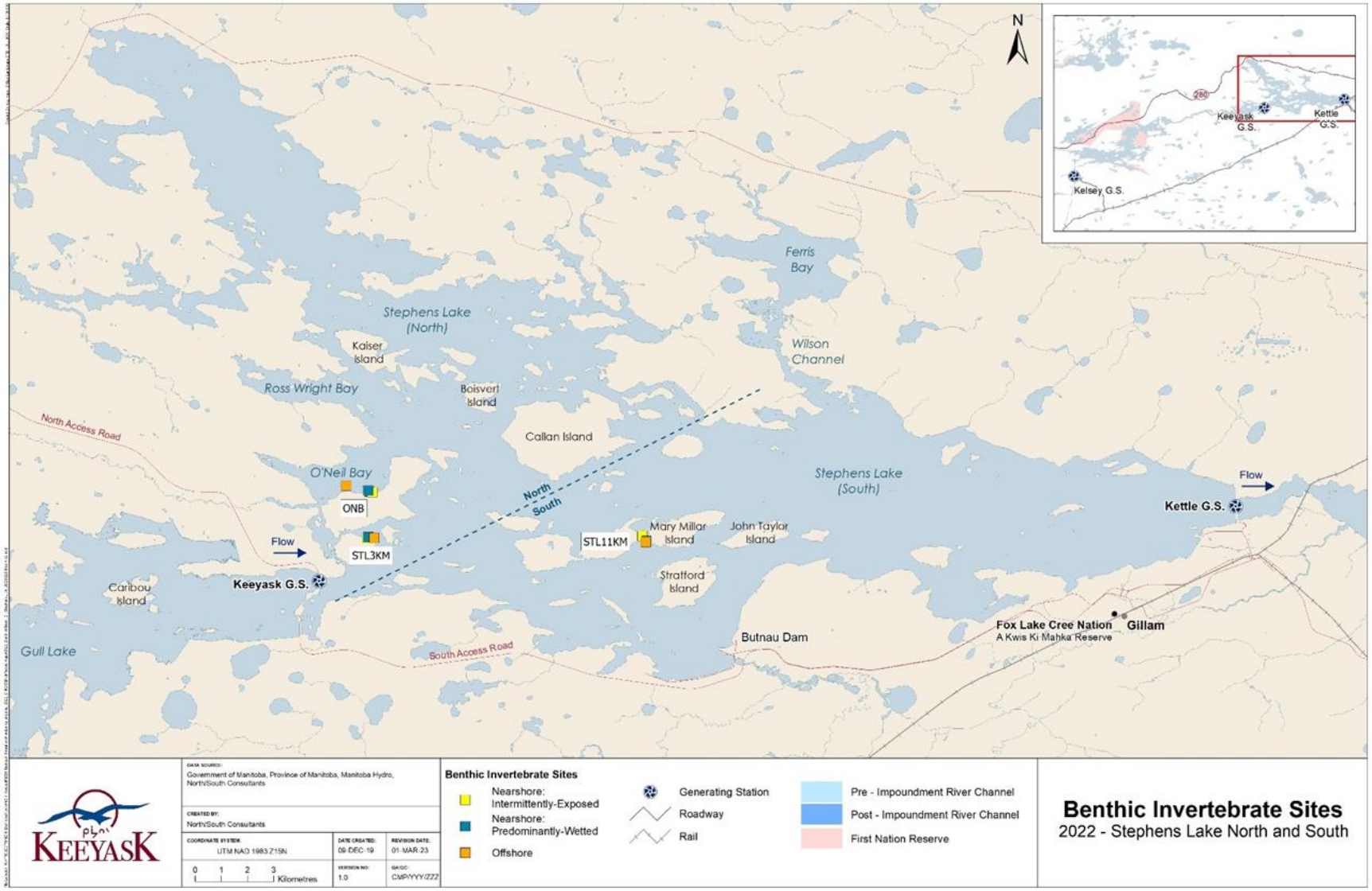
Split Lake - IE	Abundance (no./sample)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	238.00	2.10	9.60	2.20	0.69	0.37
Minimum	51.00	0.00	6.00	0.00	0.63	0.27
Maximum	666.00	4.65	12.00	4.00	0.73	0.55
1st Quartile	124.00	1.50	6.00	1.00	0.69	0.27
Median	129.00	1.61	12.00	3.00	0.69	0.30
3rd Quartile	220.00	2.73	12.00	3.00	0.70	0.46
Variance (n-1)	60838.50	2.98	10.80	2.70	0.00	0.02
Standard deviation (n-1)	246.65	1.73	3.29	1.64	0.03	0.13
Standard error of the mean	110.31	0.77	1.47	0.73	0.02	0.06



Map 3: Benthic invertebrate sampling sites in Split Lake, late summer 2022.



Map 4: Benthic invertebrate sampling sites in the Keeyask reservoir, fall 2022.



Map 5: Benthic invertebrate sampling sites in Stephens Lake, fall 2022.

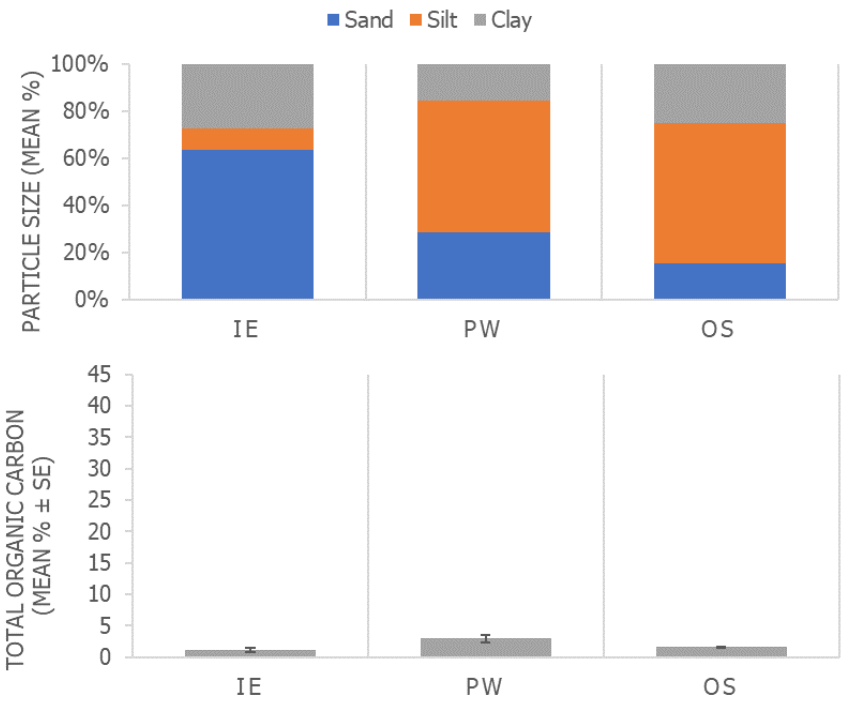


Figure 1: **Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in Split Lake in 2022.**

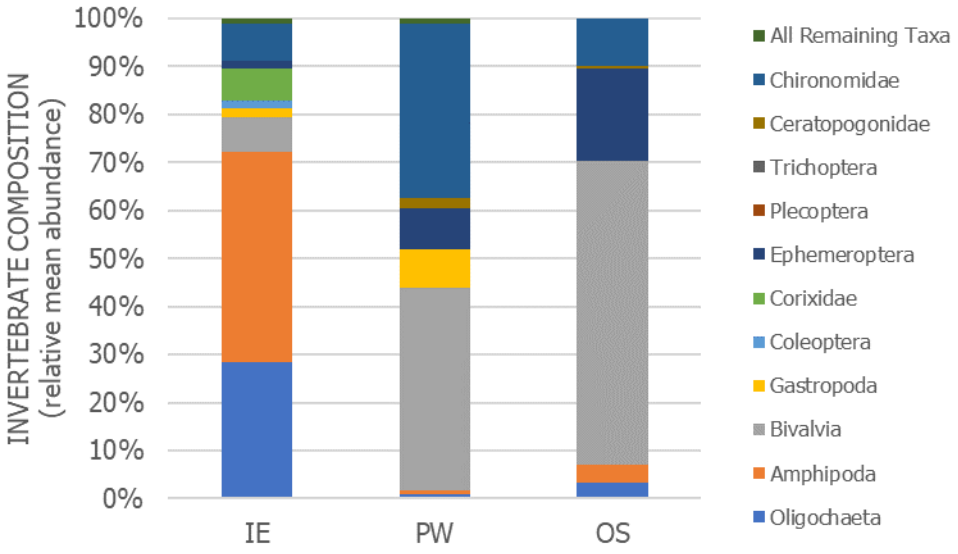


Figure 2: **Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of Split Lake in 2022.**

Sediment content in the PW polygon was largely silt (56%) and sand (29%) with 3% total organic carbon (Figure 1). Total abundance was 3,229 invertebrates per m^2, with a mean total richness of 9 taxa (Table 2). Bivalvia (mainly zebra mussels) and Chironomidae were the dominant taxa, comprising 40% and 35% of the total abundance, respectively (Figure 2). Mean proportion of EPT was 13%, Simpson's diversity index was 0.67, and the Simpson's evenness index was 0.38.

Table 2: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in Split Lake in 2022.

Split Lake - PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	3228.88	13.15	9.40	1.60	0.67	0.38
Minimum	1168.63	4.70	7.00	1.00	0.57	0.21
Maximum	5222.76	36.47	13.00	3.00	0.80	0.71
1st Quartile	1226.34	6.39	7.00	1.00	0.66	0.22
Median	3837.72	8.31	9.00	1.00	0.66	0.34
3rd Quartile	4688.94	9.88	11.00	2.00	0.67	0.42
Variance (n-1)	3683208.83	173.79	6.80	0.80	0.01	0.04
Standard deviation (n-1)	1919.17	13.18	2.61	0.89	0.08	0.20
Standard error of the mean	858.28	5.90	1.17	0.40	0.04	0.09

Sediment composition within the OS sampling polygon was largely silt (60%) and clay (25%), with 2% total organic carbon (Figure 1). Mean total abundance was 537 invertebrates per m^2, with a mean total richness of 4 taxa (Table 3). Bivalvia (entirely comprised of zebra mussels) was the dominant invertebrate group accounting for 62% of the total abundance (Figure 2; Table A3-1). Mean proportion of EPT was 35% of the total abundance, Simpson's diversity index was 0.48, and the Simpson's evenness index was 0.53.

Table 3: Summary statistics for benthic invertebrates in the offshore sampling polygon in Split Lake in 2022.

Split Lake - OS	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	536.70	35.36	4.40	1.40	0.48	0.53
Minimum	216.41	3.90	3.00	1.00	0.12	0.27
Maximum	1110.92	55.56	7.00	3.00	0.64	0.75
1st Quartile	245.27	16.95	4.00	1.00	0.47	0.29
Median	259.70	47.06	4.00	1.00	0.55	0.65
3rd Quartile	851.22	53.33	4.00	1.00	0.61	0.69
Variance (n-1)	173225.11	549.17	2.30	0.80	0.04	0.05
Standard deviation (n-1)	416.20	23.43	1.52	0.89	0.21	0.23
Standard error of the mean	186.13	10.48	0.68	0.40	0.09	0.10

4.2 KEEYASK RESERVOIR DOWNSTREAM OF BIRTHDAY RAPIDS ZONE 1A

Substrate within the IE sampling polygon was mainly composed of silt (81%) with 32% total organic carbon (Figure 3). Mean total abundance was 1,380 invertebrates per m^2 and total richness was nine taxa (Table 4). The most abundant taxa were Chironomidae and Amphipoda, representing 34% and 33% of the total abundance, respectively (Figure 4). EPT made up 2% of the total abundance, Simpson's diversity index was 0.71, and the Simpson's evenness index was 0.46.

Table 4: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in the Keeyask reservoir downstream of Birthday Rapids (Zone 1a) in 2022.

Zone 1a - IE	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	3	3	3	3	3	3
Mean	1380.23	2.42	8.67	2.33	0.71	0.46
Minimum	1341.76	1.08	8.00	1.00	0.58	0.26
Maximum	1399.47	3.09	9.00	3.00	0.81	0.66
1st Quartile	1370.61	2.08	8.50	2.00	0.67	0.36
Median	1399.47	3.09	9.00	3.00	0.75	0.45
3rd Quartile	1399.47	3.09	9.00	3.00	0.78	0.56
Variance (n-1)	1110.15	1.36	0.33	1.33	0.02	0.04
Standard deviation (n-1)	33.32	1.16	0.58	1.15	0.12	0.20
Standard error of the mean	19.24	0.67	0.33	0.67	0.07	0.12

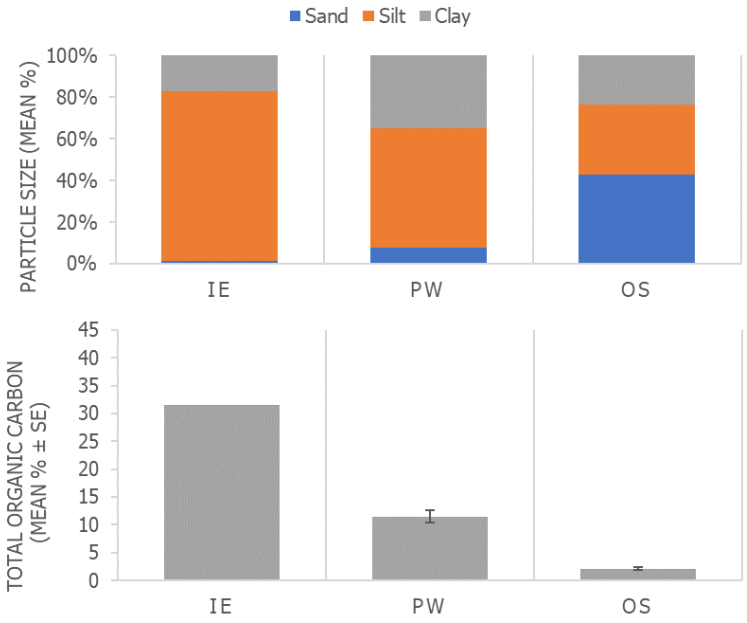


Figure 3: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons of the Keeyask reservoir downstream of Birthday Rapids (Zone 1a) in 2022.

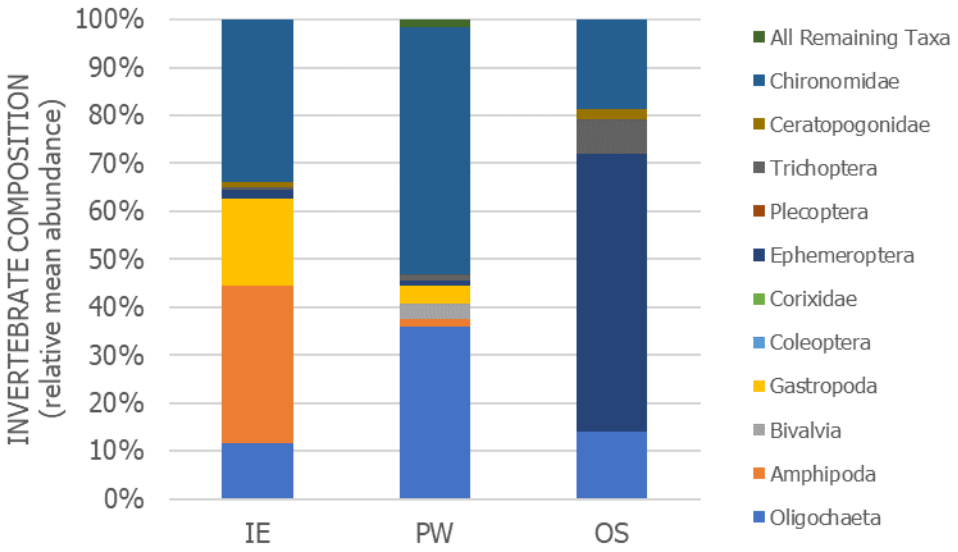


Figure 4: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of the Keeyask reservoir downstream of Birthday Rapids (Zone 1a) in 2022.

Sediment content in the PW polygon was largely silt (58%) and clay (36%) with 12% total organic carbon (Figure 3). Total abundance was 3,067 invertebrates per m^2, with a mean total richness of seven taxa (Table 5). Chironomidae and Oligochaeta were the dominant taxa, making up 50% and 35% of the total abundance, respectively (Figure 4). EPT accounted for 2% of the mean total abundance, Simpson's diversity index was 0.54, and the Simpson's evenness index was 0.34.

Table 5: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in the Keeyask reservoir downstream of Birthday Rapids (Zone 1a) in 2022.

Zone 1a - PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	3067.29	2.41	7.20	1.60	0.54	0.34
Minimum	735.80	0.28	5.00	1.00	0.40	0.24
Maximum	5092.91	4.86	10.00	3.00	0.60	0.45
1st Quartile	2409.40	1.96	5.00	1.00	0.56	0.24
Median	2943.21	1.96	6.00	1.00	0.58	0.33
3rd Quartile	4155.12	2.99	10.00	2.00	0.58	0.42
Variance (n-1)	2792646.08	2.82	6.70	0.80	0.01	0.01
Standard deviation (n-1)	1671.12	1.68	2.59	0.89	0.08	0.10
Standard error of the mean	747.35	0.75	1.16	0.40	0.04	0.04

Sediment composition in the OS sampling polygon was 43% sand, 34% silt, and 23% clay, with 2% total organic carbon (Figure 3). Mean total abundance was 124 invertebrates per m^2, with a mean richness of three taxa (Table 6). The most dominant group was the Ephemeroptera, with a single genus (*Hexagenia*) comprising 58% of the total invertebrate composition (Figure 4).

The proportion of EPT was 63% of the mean total abundance, mean Simpson's diversity index was 0.52, and the Simpson's evenness index was 0.79.

Table 6: Summary statistics for benthic invertebrates in the offshore sampling polygon in the Keeyask reservoir downstream of Birthday Rapids (Zone 1a) in 2022.

Zone 1a - OS	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	124.08	63.30	3.20	1.40	0.52	0.79
Minimum	57.71	50.00	2.00	1.00	0.28	0.54
Maximum	230.84	83.33	5.00	2.00	0.76	1.06
1st Quartile	57.71	50.00	2.00	1.00	0.38	0.65
Median	86.57	56.25	3.00	1.00	0.51	0.70
3rd Quartile	187.56	76.92	4.00	2.00	0.69	1.02
Variance (n-1)	6411.12	247.60	1.70	0.30	0.04	0.05
Standard deviation (n-1)	80.07	15.74	1.30	0.55	0.20	0.23
Standard error of the mean	35.81	7.04	0.58	0.24	0.09	0.10

4.3 KEEYASK RESERVOIR BACKBAY ZONE 4

Substrate in the IE sampling polygon was largely silt (85%) with total organic carbon of 41% (Figure 5). Mean total abundance was 25,994 invertebrates per m^2 and mean total richness was six taxa (Table 7). Almost 90% of total invertebrate abundance was comprised of two taxa: Chironomidae and Amphipoda (Figure 6). EPT were absent from the area, while mean Simpson's diversity index was 0.50, and the Simpson's evenness index was 0.35.

Table 7: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in the Keeyask reservoir backbay Zone 4 in 2022.

Zone 4 - IE	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	3	3	3	3	3	3
Mean	25993.57	0.00	6.33	0.00	0.50	0.35
Minimum	12191.25	0.00	4.00	0.00	0.27	0.32
Maximum	41666.67	0.00	8.00	0.00	0.67	0.38
1st Quartile	18157.03	0.00	5.50	0.00	0.41	0.33
Median	24122.81	0.00	7.00	0.00	0.55	0.34
3rd Quartile	32894.74	0.00	7.50	0.00	0.61	0.36
Variance (n-1)	219824859.39	0.00	4.33	0.00	0.04	0.00
Standard deviation (n-1)	14826.49	0.00	2.08	0.00	0.20	0.03
Standard error of the mean	8560.08	0.00	1.20	0.00	0.12	0.02

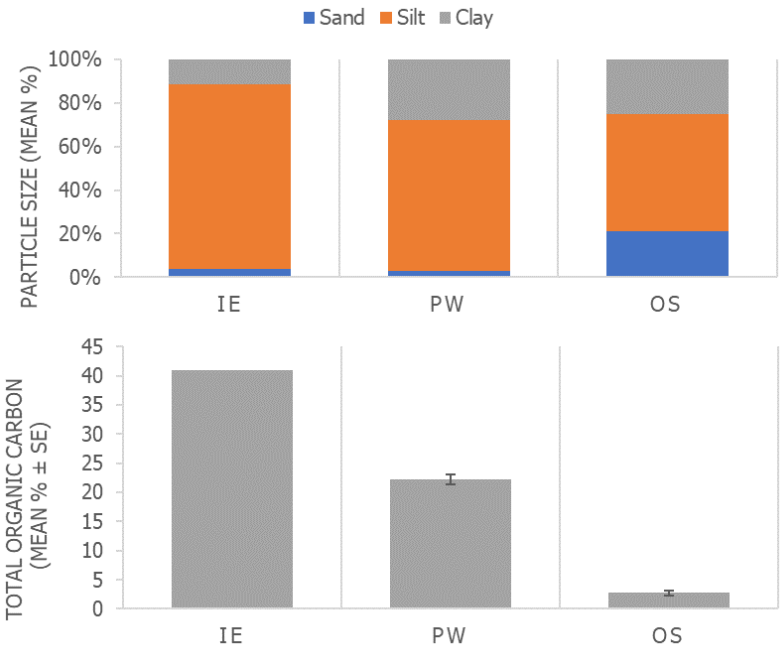


Figure 5: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in the Keeyask reservoir backbay Zone 4 in 2022.

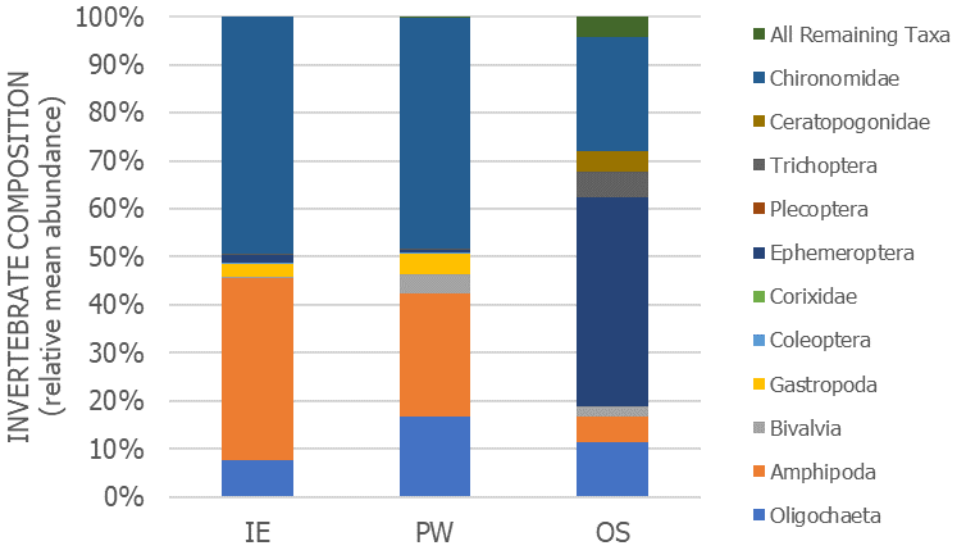


Figure 6: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of the Keeyask reservoir backbay Zone 4 in 2022.

Sediment composition of the PW polygon was largely silt (70%) with 22% total organic carbon (Figure 5). Total abundance was 1,348 invertebrates per m^2, with a mean total richness of six

taxa (Table 8). Chironomidae (47%), Amphipoda (25%) and Oligochaeta (17%) accounted for almost 90% of the total mean invertebrate abundance (Figure 6). EPT accounted for a small (less than 2%) proportion of total abundance, while mean Simpson's diversity index was 0.65, and the Simpson's evenness index was 0.53.

Table 8: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in the Keeyask reservoir backbay Zone 4 in 2022.

Zone 4 - PW	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	1347.53	1.40	6.40	0.60	0.65	0.53
Minimum	331.83	0.00	4.00	0.00	0.50	0.28
Maximum	2770.08	7.02	13.00	3.00	0.73	0.71
1st Quartile	822.37	0.00	4.00	0.00	0.58	0.50
Median	1183.06	0.00	5.00	0.00	0.71	0.58
3rd Quartile	1630.31	0.00	6.00	0.00	0.72	0.60
Variance (n-1)	859527.10	9.85	14.30	1.80	0.01	0.03
Standard deviation (n-1)	927.11	3.14	3.78	1.34	0.10	0.16
Standard error of the mean	414.61	1.40	1.69	0.60	0.05	0.07

The benthic substrate in the OS sampling polygon was described in the field as predominantly clay with woody debris. Sediment composition analysis showed 21% sand, 54% silt, 25% clay, with 3% total organic carbon (Figure 5). Mean total abundance at the site was 277 invertebrates per m², with a mean total richness of five taxa (Table 9). The two dominant invertebrate groups were the Ephemeroptera (mainly *Hexagenia)* and Chironomidae, representing 43% and 24% of the mean total abundance, respectively (Figure 6). EPT taxa (exclusively *Hexagenia* mayflies and Dipseudopsidae caddisflies) comprised 50% of the total abundance, and mean Simpson's diversity and evenness indices were both 0.69.

Table 9: Summary statistics for benthic invertebrates in the offshore sampling polygon in the Keeyask reservoir backbay Zone 4 in 2022.

Zone 4 - OS	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	277.01	50.11	5.00	1.60	0.69	0.69
Minimum	100.99	44.00	4.00	1.00	0.62	0.53
Maximum	403.97	57.14	6.00	2.00	0.78	0.92
1st Quartile	173.13	45.83	4.00	1.00	0.66	0.59
Median	346.26	50.00	5.00	2.00	0.69	0.66
3rd Quartile	360.69	53.57	6.00	2.00	0.72	0.74
Variance (n-1)	17422.42	29.27	1.00	0.30	0.00	0.02
Standard deviation (n-1)	131.99	5.41	1.00	0.55	0.06	0.15
Standard error of the mean	59.03	2.42	0.45	0.24	0.03	0.07

4.4 KEEYASK RESERVOIR BACKBAY ZONE 12

Substrate within the IE sampling polygon was comprised largely of silt (76%) with 28% total organic carbon (Figure 7). Mean total abundance was 4,703 invertebrates per m^2 and total richness was ten taxa (Table 10). The Chironomidae taxon was dominant in this habitat, representing 65% of the total (Figure 8). EPT represented only 2% of the total abundance, Simpson's diversity index was 0.72, and the Simpson's evenness index was 0.40.

Table 10: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in the Keeyask reservoir backbay Zone 12 in 2022.

Zone 12 - IE	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	3	3	3	3	3	3
Mean	4703.37	2.21	10.00	2.33	0.72	0.40
Minimum	3231.76	0.00	9.00	0.00	0.66	0.24
Maximum	5612.30	3.34	12.00	5.00	0.81	0.60
1st Quartile	4248.90	1.64	9.00	1.00	0.68	0.31
Median	5266.04	3.29	9.00	2.00	0.70	0.37
3rd Quartile	5439.17	3.31	10.50	3.50	0.76	0.48
Variance (n-1)	1654193.66	3.66	3.00	6.33	0.01	0.03
Standard deviation (n-1)	1286.15	1.91	1.73	2.52	0.08	0.18
Standard error of the mean	742.56	1.11	1.00	1.45	0.05	0.10

Sediment content in the PW polygon was largely silt (93%) with 40% total organic carbon (Figure 7). Total abundance was 244 invertebrates per m^2, with a mean total richness of three taxa (Table 11). Amphipoda was the dominant taxa, making up 71% of the total (Figure 8). EPT were not captured in PW habitat in 2022. Mean Simpson's diversity index was 0.39 and the Simpson's evenness index was 0.65.

Table 11: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in the Keeyask reservoir backbay Zone 12 in 2022.

ZONE12-PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	243.54	0.00	2.60	0.00	0.39	0.65
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	418.40	0.00	5.00	0.00	0.74	1.00
1st Quartile	222.18	0.00	1.00	0.00	0.00	0.57
Median	230.84	0.00	3.00	0.00	0.56	0.76
3rd Quartile	346.26	0.00	4.00	0.00	0.63	0.90
Variance (n-1)	25263.97	0.00	4.30	0.00	0.13	0.16
Standard deviation (n-1)	158.95	0.00	2.07	0.00	0.36	0.39
Standard error of the mean	71.08	0.00	0.93	0.00	0.16	0.18

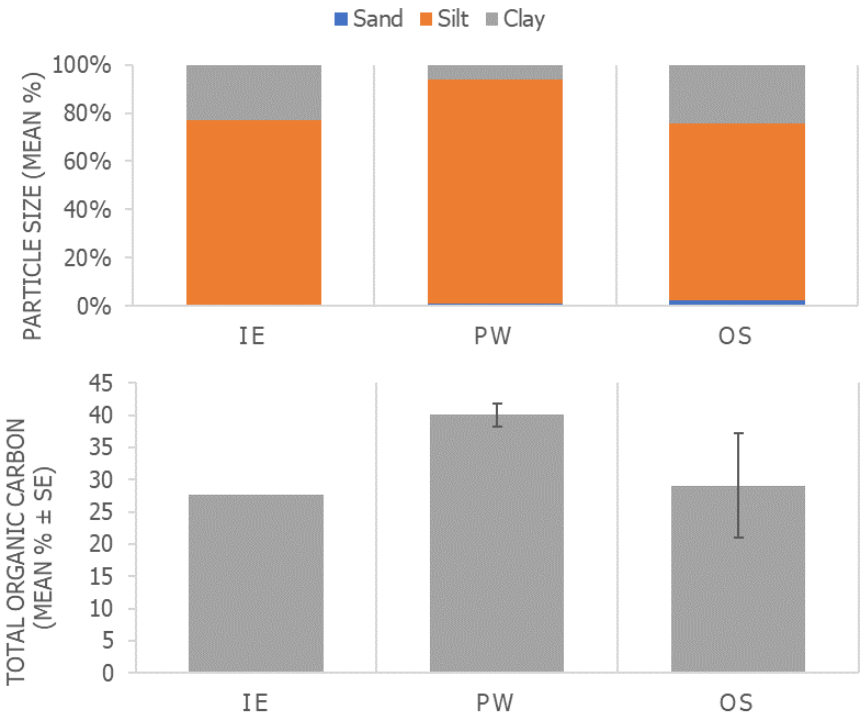


Figure 7: **Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in the Keeyask reservoir backbay Zone 12 in 2022.**

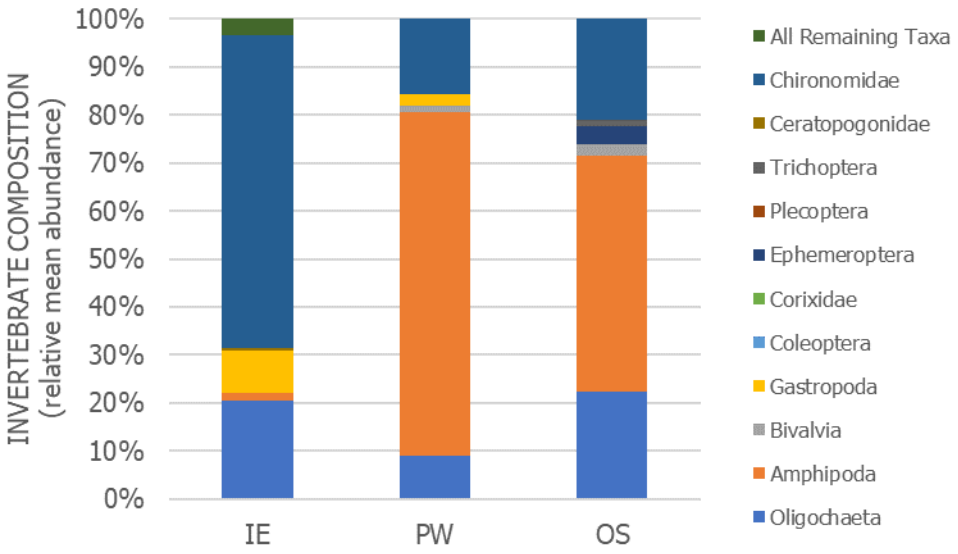


Figure 8: **Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of the Keeyask reservoir backbay Zone 12 in 2022.**

The benthic substrate within the OS sampling polygon was described as predominantly silt (74%) with 29% total organic carbon (Figure 7). Mean total abundance was 413 invertebrates per m^2, with a mean total richness of five taxa (Table 12). Amphipoda was the dominant taxon (49%) with Oligochaeta (22%) and Chironomidae (21%) representing most of the remaining invertebrates in the sample (Figure 8). Five different EPT taxa comprised 14% of the total invertebrates. Mean Simpson's diversity index was 0.64, and mean Simpson's evenness index was 0.63.

Table 12: Summary statistics for benthic invertebrates in the offshore sampling polygon in the Keeyask reservoir backbay Zone 12 in 2022.

Zone 12 - OS	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	412.63	14.36	5.00	1.20	0.64	0.63
Minimum	100.99	0.00	3.00	0.00	0.49	0.32
Maximum	865.65	53.57	6.00	2.00	0.70	0.93
1st Quartile	245.27	0.00	4.00	0.00	0.64	0.53
Median	403.97	6.45	6.00	2.00	0.69	0.53
3rd Quartile	447.25	11.76	6.00	2.00	0.69	0.84
Variance (n-1)	82907.43	504.81	2.00	1.20	0.01	0.06
Standard deviation (n-1)	287.94	22.47	1.41	1.10	0.09	0.25
Standard error of the mean	128.77	10.05	0.63	0.49	0.04	0.11

4.5 UPPER GULL LAKE ZONE 1B

Substrate within the IE sampling polygon was comprised largely of silt (86%) with 36% total organic carbon (Figure 9). Mean total abundance was 15,976 invertebrates per m^2 and mean total richness was nine taxa (Table 13). The most abundant taxa were Amphipoda and Chironomidae, representing 40% and 32% of the total abundance, respectively (Figure 10). EPT accounted for 2% of the total abundance, Simpson's diversity index was 0.58, and the Simpson's evenness index was 0.26.

Table 13: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in the Keeyask reservoir in upper Gull Lake (Zone 1b) in 2022.

Zone 1b - IE	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	3	3	3	3	3	3
Mean	15976.07	2.23	9.33	2.67	0.58	0.26
Minimum	9983.84	0.63	9.00	2.00	0.48	0.22
Maximum	20732.34	4.05	10.00	4.00	0.63	0.29
1st Quartile	13597.93	1.32	9.00	2.00	0.55	0.24
Median	17212.03	2.01	9.00	2.00	0.62	0.27
3rd Quartile	18972.18	3.03	9.50	3.00	0.62	0.28
Variance (n-1)	30028253.26	2.96	0.33	1.33	0.01	0.00
Standard deviation (n-1)	5479.80	1.72	0.58	1.15	0.08	0.04
Standard error of the mean	3163.77	0.99	0.33	0.67	0.05	0.02

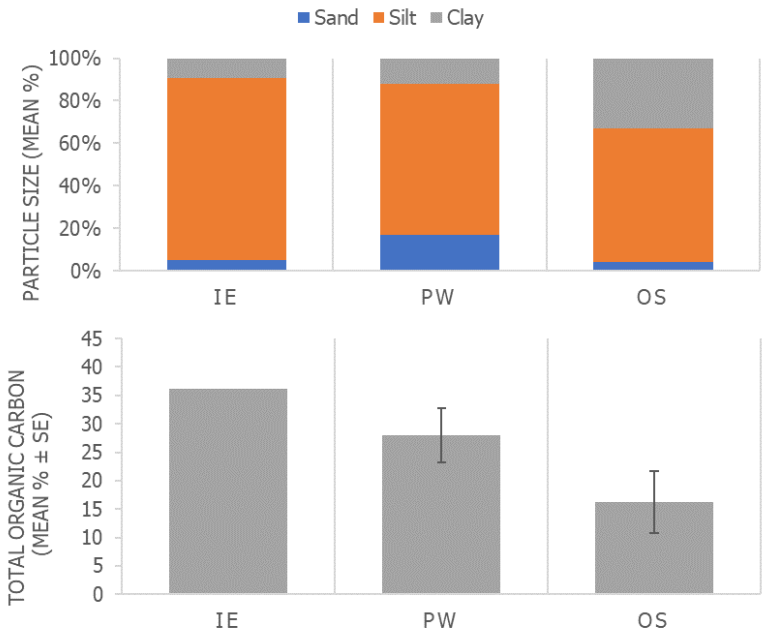


Figure 9: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in the Keeyask reservoir in upper Gull Lake (Zone 1b) in 2022.

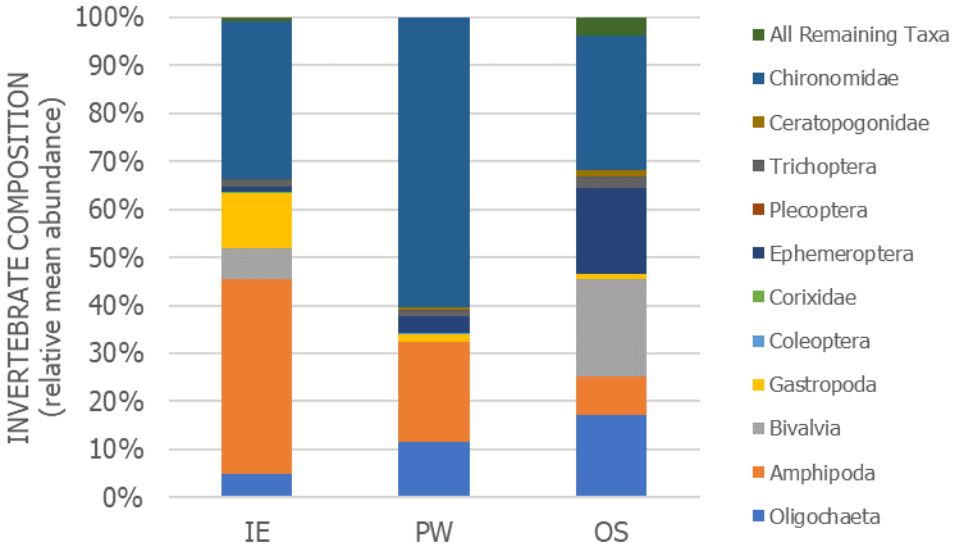


Figure 10: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of the Keeyask reservoir in upper Gull Lake (Zone 1b) in 2022.

Sediment content in the PW polygon was largely silt (71%) with 28% total organic carbon (Figure 9). Total abundance was 1,578 invertebrates per m^2, with a mean total richness of eight

taxa (Table 14). Chironomidae was the dominant taxon, comprising 60% of the total abundance (Figure 10). EPT made up 5% of the total abundance, Simpson's diversity index was 0.58, and the Simpson's evenness index was 0.31.

Table 14: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in the Keeyask reservoir in upper Gull Lake (Zone 1b) in 2022.

Zone 1b - PW	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	1578.37	5.14	7.80	2.20	0.58	0.31
Minimum	605.96	1.90	6.00	1.00	0.47	0.27
Maximum	3924.28	13.16	9.00	3.00	0.67	0.36
1st Quartile	750.23	2.38	7.00	2.00	0.53	0.27
Median	1096.49	3.85	8.00	2.00	0.54	0.33
3rd Quartile	1514.89	4.41	9.00	3.00	0.66	0.34
Variance (n-1)	1842738.85	21.14	1.70	0.70	0.01	0.00
Standard deviation (n-1)	1357.48	4.60	1.30	0.84	0.09	0.04
Standard error of the mean	607.08	2.06	0.58	0.37	0.04	0.02

Sediment composition in the OS sampling polygon was largely silt (63%) and clay (33%) with 16% total organic carbon (Figure 9). Mean total abundance was 918 invertebrates per m^2, with a mean richness of six taxa (Table 15). No taxon was particularly dominant with the four most common taxa (Chironomidae, Bivalvia, Ephemeroptera, and Oligochaeta) each representing 17–27% of the total abundance (Figure 10). Bivalvia were entirely comprised of zebra mussels and Ephemeroptera were almost exclusively the genus *Hexagenia*. EPT accounted for 25% of the total abundance, Simpson's diversity index was 0.72, and the Simpson's evenness index was 0.68.

Table 15: Summary statistics for benthic invertebrates in the offshore sampling polygon in the Keeyask reservoir upstream of Gull Lake (Zone 1b) in 2022.

Zone 1b - OS	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	917.59	25.19	5.80	1.80	0.72	0.68
Minimum	216.41	6.25	4.00	1.00	0.58	0.45
Maximum	1832.29	50.00	8.00	3.00	0.79	1.01
1st Quartile	230.84	19.69	4.00	1.00	0.73	0.60
Median	1154.20	20.00	6.00	2.00	0.74	0.64
3rd Quartile	1154.20	30.00	7.00	2.00	0.75	0.68
Variance (n-1)	477982.24	263.66	3.20	0.70	0.01	0.04
Standard deviation (n-1)	691.36	16.24	1.79	0.84	0.08	0.21
Standard error of the mean	309.19	7.26	0.80	0.37	0.04	0.09

4.6 KEEYASK RESERVOIR BACKBAY ZONE 8

Substrate within the IE sampling polygon was comprised largely of silt (89%) with 44% total organic carbon (Figure 11). Mean total abundance was 4,795 invertebrates per m^2 and total richness was six taxa (Table 16). The most abundant taxa were Chironomidae and Amphipoda, representing 59% and 25% of the total abundance, respectively (Figure 12). EPT accounted for less than 1% of the total abundance. Mean Simpson's diversity index was 0.54 and the Simpson's evenness index was 0.36.

Table 16: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in the Keeyask reservoir backbay Zone 8 in 2022.

Zone 8 - IE	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	3	3	3	3	3	3
Mean	4794.74	0.46	6.33	0.67	0.54	0.36
Minimum	2669.09	0.00	6.00	0.00	0.44	0.30
Maximum	6867.50	0.84	7.00	1.00	0.65	0.41
1st Quartile	3758.37	0.27	6.00	0.50	0.49	0.33
Median	4847.65	0.54	6.00	1.00	0.54	0.36
3rd Quartile	5857.57	0.69	6.50	1.00	0.60	0.39
Variance (n-1)	4408754.64	0.18	0.33	0.33	0.01	0.00
Standard deviation (n-1)	2099.70	0.43	0.58	0.58	0.11	0.06
Standard error of the mean	1212.26	0.25	0.33	0.33	0.06	0.03

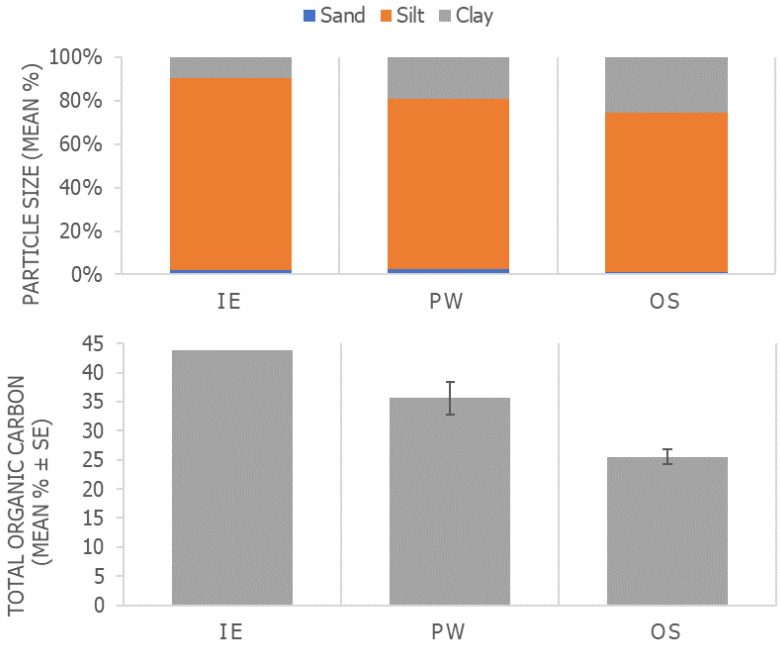


Figure 11: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in the Keeyask reservoir backbay Zone 8 in 2022.

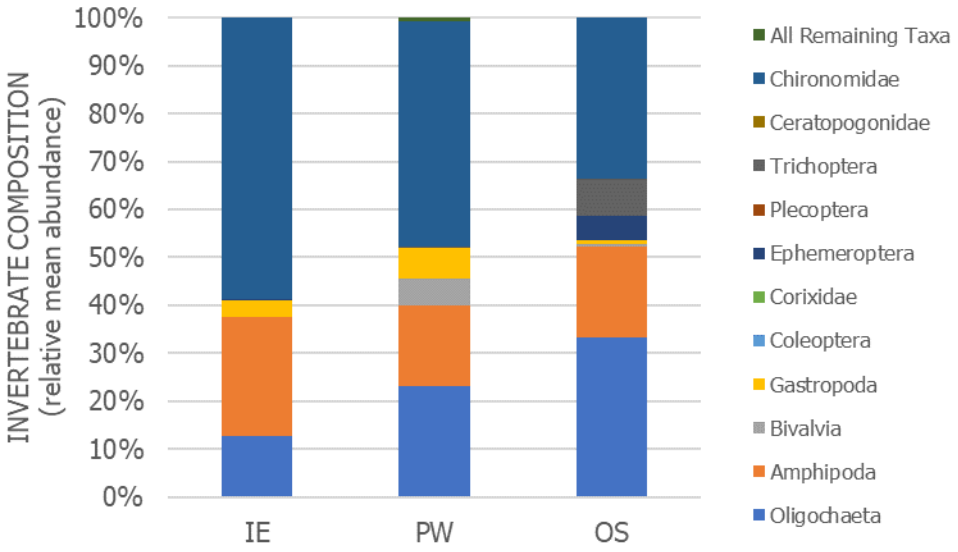


Figure 12: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of the Keeyask reservoir backbay Zone 8 in 2022.

Sediment content in the PW polygon was largely silt (79%) with 36% total organic carbon (Figure 11). Total abundance was 1,385 invertebrates per m^2, with a mean total richness of seven taxa (Table 17). Most of the invertebrate abundance in this habitat was comprised of Chironomidae (44%), Oligochaeta (22%) and Amphipoda (16%) (Figure 12). EPT represented less than 1% of the total abundance. Mean Simpson's diversity index was 0.67 and the Simpson's evenness index was 0.48.

Table 17: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in the Keeyask reservoir backbay Zone 8 in 2022.

Zone 8 - PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	1385.04	0.33	7.00	0.20	0.67	0.48
Minimum	375.12	0.00	4.00	0.00	0.49	0.39
Maximum	3058.63	1.64	10.00	1.00	0.74	0.61
1st Quartile	880.08	0.00	6.00	0.00	0.68	0.40
Median	1168.63	0.00	7.00	0.00	0.71	0.49
3rd Quartile	1442.75	0.00	8.00	0.00	0.73	0.50
Variance (n-1)	1031503.29	0.54	5.00	0.20	0.01	0.01
Standard deviation (n-1)	1015.63	0.73	2.24	0.45	0.10	0.09
Standard error of the mean	454.20	0.33	1.00	0.20	0.05	0.04

Sediment composition in the OS sampling polygon was largely silt (73%) with 26% total organic carbon (Figure 11). Mean total abundance was 592 invertebrates per m^2, comprising four taxa (Table 18). Chironomidae and Oligochaeta each accounted for approximately one third of total

invertebrate abundance (Figure 12). EPT accounted for 8% of total invertebrate abundance, mean Simpson's diversity index was 0.69, and the Simpson's evenness index was 0.83.

Table 18: Summary statistics for benthic invertebrates in the offshore sampling polygon in the Keeyask reservoir backbay Zone 8 in 2022.

Zone 8 - OS	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	591.53	7.73	4.20	1.00	0.69	0.83
Minimum	158.70	0.00	3.00	0.00	0.62	0.51
Maximum	1327.33	21.74	6.00	2.00	0.77	1.00
1st Quartile	259.70	0.00	3.00	0.00	0.67	0.86
Median	577.10	5.56	4.00	1.00	0.67	0.87
3rd Quartile	634.81	11.36	5.00	2.00	0.72	0.91
Variance (n-1)	210234.75	83.42	1.70	1.00	0.00	0.04
Standard deviation (n-1)	458.51	9.13	1.30	1.00	0.06	0.19
Standard error of the mean	205.05	4.08	0.58	0.45	0.03	0.08

4.7 LOWER GULL LAKE ZONE 3

Substrate within the IE sampling polygon was made largely of sand (82%) with less than 1% total organic carbon (Figure 13). Mean total abundance was 385 invertebrates per m^2 and mean total richness was three taxa (Table 19). The overwhelmingly dominant taxon was Amphipoda, representing 95% of the total (Figure 14). EPT taxa were rare, representing less than 1% of the total abundance, Simpson's diversity index was 0.06, and the Simpson's evenness index was 0.73.

Table 19: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in the Keeyask reservoir in lower Gull Lake (Zone 3) in 2022.

Zone 3 - IE	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	3	3	3	3	3	3
Mean	384.73	0.43	2.67	0.33	0.06	0.73
Minimum	14.43	0.00	1.00	0.00	0.00	0.20
Maximum	1110.92	1.30	6.00	1.00	0.17	1.00
1st Quartile	21.64	0.00	1.00	0.00	0.00	0.60
Median	28.86	0.00	1.00	0.00	0.00	1.00
3rd Quartile	569.89	0.65	3.50	0.50	0.09	1.00
Variance (n-1)	395560.51	0.56	8.33	0.33	0.01	0.21
Standard deviation (n-1)	628.94	0.75	2.89	0.58	0.10	0.46
Standard error of the mean	363.12	0.43	1.67	0.33	0.06	0.27

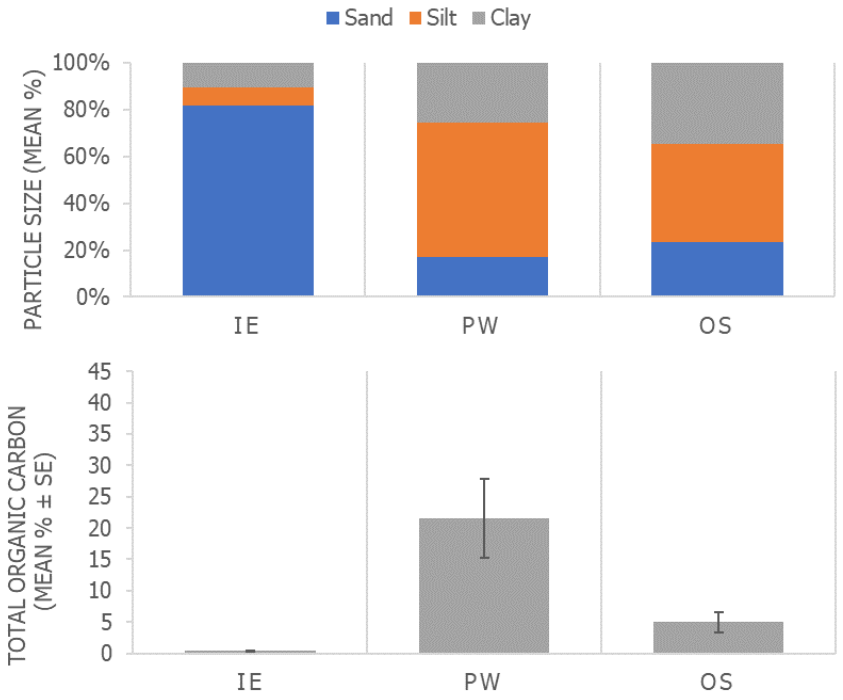


Figure 13: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in the Keeyask reservoir in lower Gull Lake (Zone 3) in 2022.

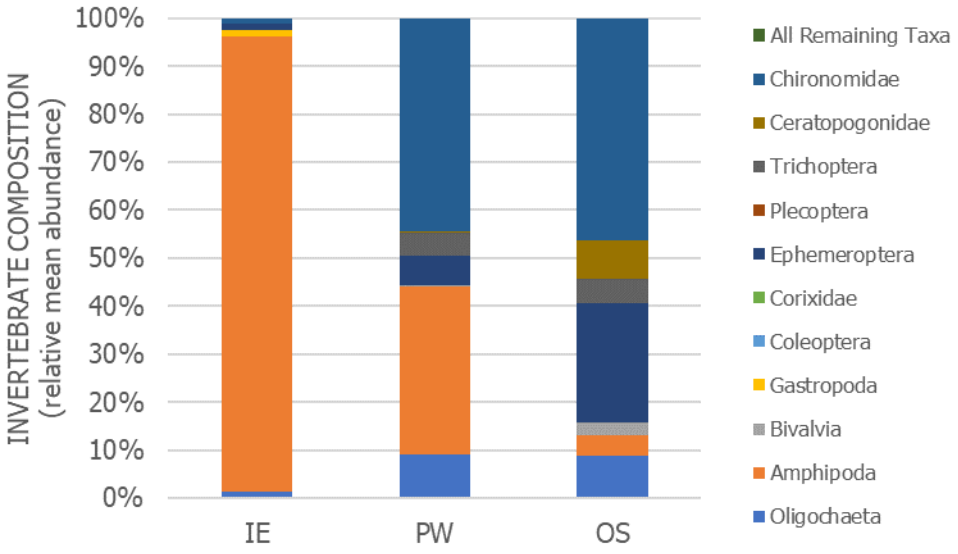


Figure 14: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat of the Keeyask reservoir in lower Gull Lake (Zone 3) in 2022.

Sediment content in the PW polygon was largely silt (57%) and clay (25%) with 22% total organic carbon (Figure 13). Total abundance was 1,186 invertebrates per m^2, with a mean total richness of six taxa (Table 20). Chironomidae (45%) and Amphipoda (35%) were the dominant taxa (Figure 14). EPT made up 11% of the total abundance, Simpson's diversity index was 0.58, and the Simpson's evenness index was 0.48.

Table 20: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in the Keeyask reservoir in lower Gull Lake in 2022.

Zone 3 - PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	1185.94	11.24	5.60	2.20	0.58	0.48
Minimum	461.68	6.06	3.00	1.00	0.41	0.36
Maximum	1904.43	17.20	9.00	4.00	0.72	0.57
1st Quartile	836.80	6.90	5.00	2.00	0.45	0.39
Median	1341.76	12.50	5.00	2.00	0.65	0.51
3rd Quartile	1385.04	13.54	6.00	2.00	0.67	0.56
Variance (n-1)	306651.33	22.04	4.80	1.20	0.02	0.01
Standard deviation (n-1)	553.76	4.69	2.19	1.10	0.14	0.10
Standard error of the mean	247.65	2.10	0.98	0.49	0.06	0.04

Sediment composition in the OS sampling polygon was 42% silt, 35% clay, and 23% sand, with 5% total organic carbon (Figure 13). Mean total abundance was 618 invertebrates per m^2, comprising six taxa (Table 21). Chironomidae and Ephemeroptera accounted for 46% and 25% of the total abundance, respectively (Figure 14). EPT (primarily *Hexagenia*) accounted for 39% of total abundance, Simpson's diversity index was 0.64, and the Simpson's evenness index was 0.49.

Table 21: Summary statistics for benthic invertebrates in the offshore sampling polygon in the Keeyask reservoir in lower Gull Lake in 2022.

Zone 3 - OS	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	617.50	38.52	6.00	2.00	0.64	0.49
Minimum	158.70	11.43	4.00	1.00	0.55	0.39
Maximum	1009.93	58.33	8.00	3.00	0.69	0.65
1st Quartile	331.83	16.13	5.00	2.00	0.62	0.40
Median	692.52	52.17	6.00	2.00	0.63	0.44
3rd Quartile	894.51	54.55	7.00	2.00	0.69	0.54
Variance (n-1)	132114.85	517.78	2.50	0.50	0.00	0.01
Standard deviation (n-1)	363.48	22.75	1.58	0.71	0.06	0.11
Standard error of the mean	162.55	10.18	0.71	0.32	0.03	0.05

4.8 STEPHENS LAKE – O'NEIL BAY

Substrate within the IE sampling polygon was almost entirely sand (94%) with 3% total organic carbon (Figure 15). Mean total abundance was very low at only 11 invertebrates per m^2 (Table

22). Oligochaeta, Bivalvia (exclusively zebra mussels), and Corixidae each represented one third of the total abundance (Figure 16). EPT taxa were absent, Simpson's diversity index was 0.13, and the Simpson's evenness index was 0.51.

Table 22: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in O'Neil Bay in Stephens Lake (ONB) in 2022.

O'Neil Bay - IE	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	4	4	4	4	4	4
Mean	10.82	0.00	0.75	0.00	0.13	0.51
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	28.86	0.00	2.00	0.00	0.52	1.04
1st Quartile	0.00	0.00	0.00	0.00	0.00	0.00
Median	7.21	0.00	0.50	0.00	0.00	0.50
3rd Quartile	18.03	0.00	1.25	0.00	0.13	1.01
Variance (n-1)	190.81	0.00	0.92	0.00	0.07	0.35
Standard deviation (n-1)	13.81	0.00	0.96	0.00	0.26	0.59
Standard error of the mean	7.98	0.00	0.55	0.00	0.15	0.34

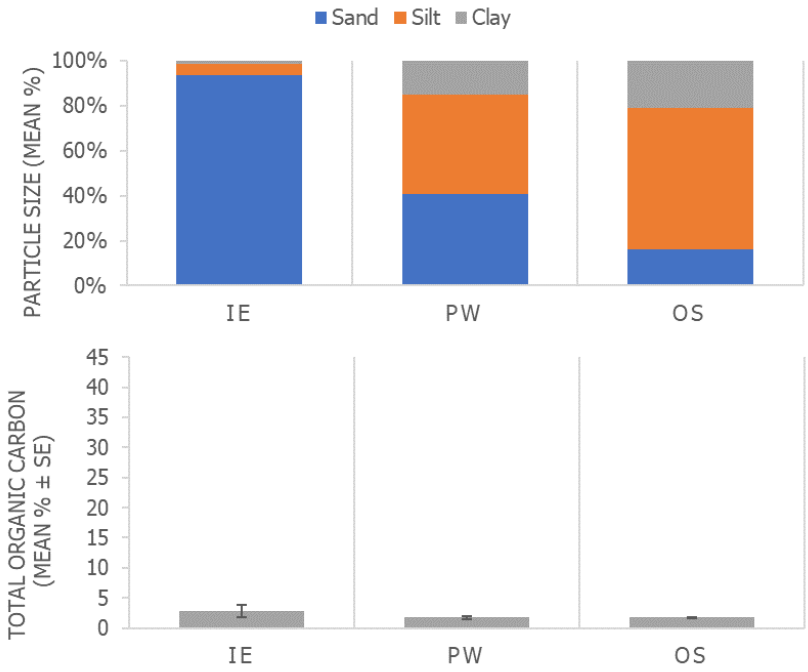


Figure 15: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in O'Neil Bay in Stephens Lake (ONB) in 2022.

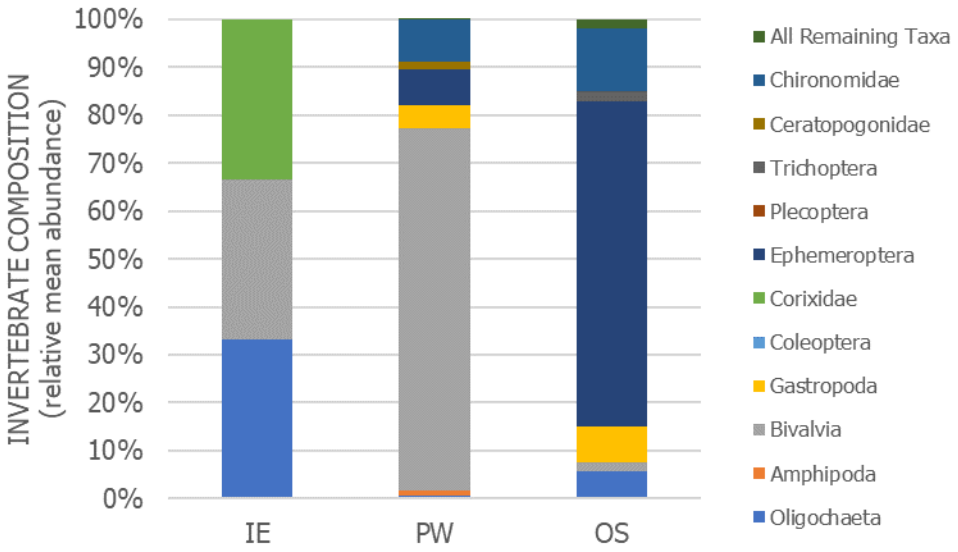


Figure 16: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat in O'Neil Bay in Stephens Lake (ONB) in 2022.

Sediment content in the PW polygon was silt (44%) and sand (41%) with 2% total organic carbon (Figure 15). Total abundance was 2,063 invertebrates per m^2, with a mean total richness of seven taxa (Table 23). Bivalvia (mostly comprised of zebra mussels) was the dominant taxa, accounting for 75% of the total abundance (Figure 16). EPT (mainly *Hexagenia*) represented 19% of the total abundance, Simpson's diversity index was 0.62, and the Simpson's evenness index was 0.51.

Table 23: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in O'Neil Bay in Stephens Lake (ONB) in 2022.

O'Neil Bay - PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	2063.13	18.79	6.60	1.00	0.62	0.51
Minimum	375.12	0.00	4.00	0.00	0.11	0.28
Maximum	7790.86	38.46	9.00	2.00	0.79	0.69
1st Quartile	634.81	2.22	6.00	1.00	0.69	0.52
Median	750.23	23.08	7.00	1.00	0.74	0.53
3rd Quartile	764.66	30.19	7.00	1.00	0.79	0.54
Variance (n-1)	10276524.60	290.71	3.30	0.50	0.08	0.02
Standard deviation (n-1)	3205.70	17.05	1.82	0.71	0.29	0.15
Standard error of the mean	1433.63	7.63	0.81	0.32	0.13	0.07

The sediment composition in the OS sampling polygon was 63% silt, 21% clay and 16% sand with 2% total organic carbon (Figure 15). Mean total abundance was 153 invertebrates per m^2, with a mean total richness of three taxa (Table 24). EPT taxa (largely *Hexagenia*) were

dominant and comprised 69% of the invertebrate total (Figure 16). Mean Simpson's diversity index was 0.47, and mean Simpson's evenness was 0.67.

Table 24: Summary statistics for benthic invertebrates in the offshore sampling polygon in O'Neil Bay in Stephens Lake (ONB) in 2022.

O'Neil Bay - OS	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	152.93	68.77	3.40	1.20	0.47	0.67
Minimum	57.71	50.00	2.00	1.00	0.17	0.46
Maximum	230.84	90.91	6.00	2.00	0.64	0.92
1st Quartile	144.28	56.25	2.00	1.00	0.32	0.60
Median	158.70	66.67	3.00	1.00	0.60	0.63
3rd Quartile	173.13	80.00	4.00	1.00	0.64	0.74
Variance (n-1)	3913.28	282.43	2.80	0.20	0.05	0.03
Standard deviation (n-1)	62.56	16.81	1.67	0.45	0.22	0.17
Standard error of the mean	27.98	7.52	0.75	0.20	0.10	0.08

4.9 STEPHENS LAKE – 3 KM DOWNSTREAM OF THE KEEYASK GS

Substrate within the IE sampling polygon was comprised largely of silt (53%) and clay (36%) with 1% total organic carbon (Figure 17). Mean total abundance was 1,417 invertebrates per m^2 with a mean richness of ten taxa (Table 25). Chironomidae (54%) was the most abundant taxon with four other taxa (Amphipoda, Gastropoda, Ephemeroptera, and Ceratopogonidae) each representing 8–11% of the total (Figure 18). EPT taxa accounted for 11% of the total abundance, mean Simpson's diversity index was 0.63, and the Simpson's evenness index was 0.30.

Table 25: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in Stephens Lake 3 km downstream of the Keeyask GS (STL3KM) in 2022.

Stephens Lake 3 km - IE	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	1416.78	11.40	9.80	3.00	0.63	0.30
Minimum	721.38	5.32	8.00	2.00	0.50	0.20
Maximum	2034.28	15.60	11.00	4.00	0.73	0.45
1st Quartile	1110.92	11.69	10.00	3.00	0.60	0.25
Median	1356.19	12.00	10.00	3.00	0.66	0.29
3rd Quartile	1861.15	12.40	10.00	3.00	0.69	0.29
Variance (n-1)	289894.99	14.02	1.20	0.50	0.01	0.01
Standard deviation (n-1)	538.42	3.74	1.10	0.71	0.09	0.10
Standard error of the mean	310.86	2.16	0.63	0.41	0.05	0.06

Sediment content in the PW polygon was largely silt (63%) with 3% organic carbon (Figure 17). Total abundance was 476 invertebrates per m^2, with a mean total richness of six taxa (Table

26). More than two-thirds of the sample was comprised of Ephemeroptera (36%) and Chironomidae (33%) (Figure 18). EPT represented 40% of the total abundance (mainly *Hexagenia*), mean Simpson's diversity index was 0.72, and the Simpson's evenness index was 0.62.

Table 26: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in Stephens Lake 3 km downstream of the Keeyask GS (STL3KM) in 2022.

Stephens Lake 3 km - PW	Abundance (no./m²)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	476.11	39.63	6.20	2.40	0.72	0.62
Minimum	245.27	29.41	5.00	1.00	0.67	0.52
Maximum	678.09	47.73	10.00	5.00	0.81	0.70
1st Quartile	375.12	36.17	5.00	2.00	0.71	0.57
Median	447.25	38.71	5.00	2.00	0.71	0.61
3rd Quartile	634.81	46.15	6.00	2.00	0.72	0.68
Variance (n-1)	32575.98	56.34	4.70	2.30	0.00	0.01
Standard deviation (n-1)	180.49	7.51	2.17	1.52	0.05	0.08
Standard error of the mean	80.72	3.36	0.97	0.68	0.02	0.03

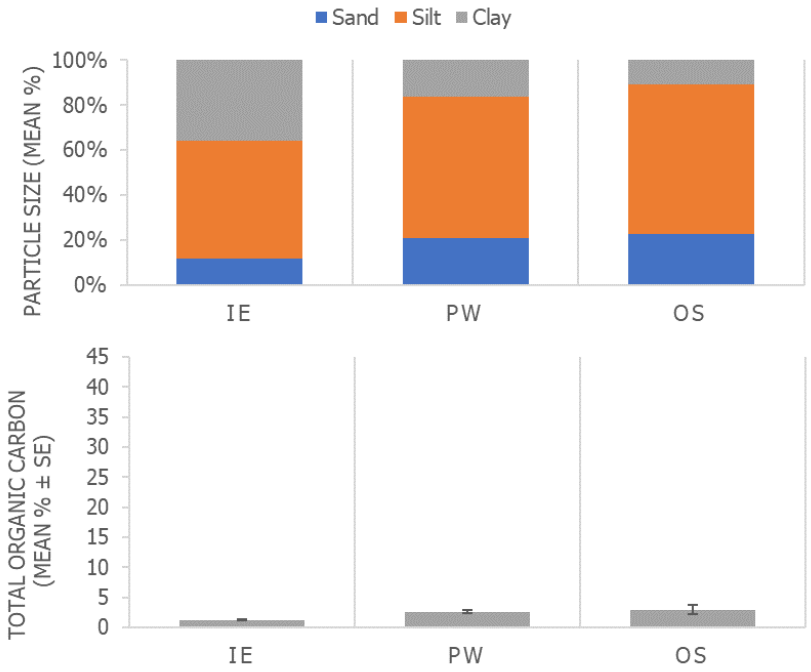


Figure 17: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in Stephens Lake 3 km downstream of the Keeyask GS in 2022.

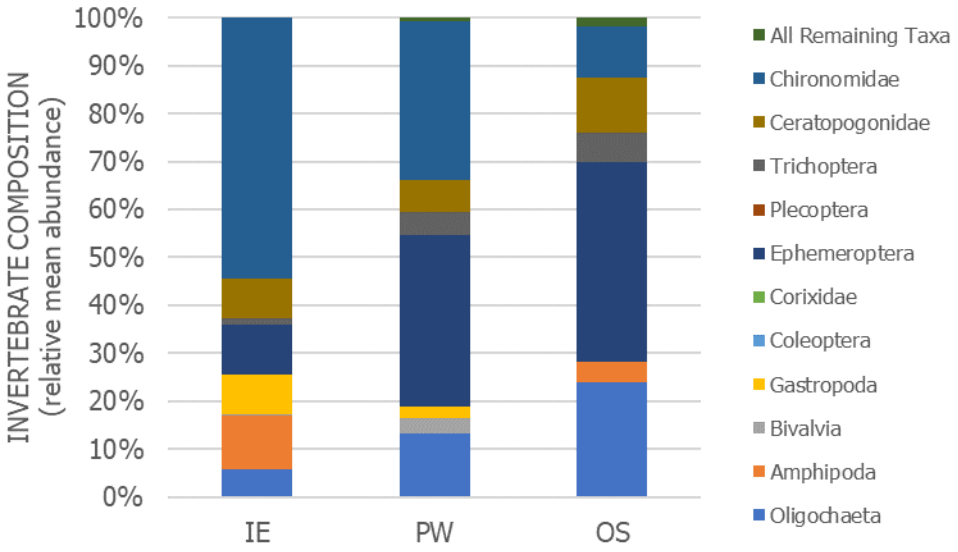


Figure 18: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat in Lake 3 km downstream of the Keeyask GS in 2022.

Sediment composition in the OS sampling polygon was largely silt (67%) with 3% total organic carbon (Figure 17). Mean total abundance was 326 invertebrates per m^2, with a mean richness of six taxa (Table 27). Ephemeroptera and Oligochaeta were the most abundant taxa, representing 42% and 24% of the total invertebrates (Figure 18). EPT taxa accounted for 45% of the total abundance (mainly *Hexagenia*). Mean Simpson's diversity index was 0.70, and the Simpson's evenness index was 0.63.

Table 27: Summary statistics for benthic invertebrates in the offshore sampling polygon in Stephens Lake 3 km downstream of the Keeyask GS (STL3KM) in 2022.

Stephens Lake 3 km - OS	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	326.06	44.84	5.60	2.00	0.70	0.63
Minimum	230.84	18.75	5.00	1.00	0.57	0.47
Maximum	403.97	71.43	7.00	3.00	0.76	0.81
1st Quartile	288.55	40.00	5.00	2.00	0.69	0.59
Median	346.26	44.00	5.00	2.00	0.73	0.61
3rd Quartile	360.69	50.00	6.00	2.00	0.75	0.65
Variance (n-1)	4537.74	359.60	0.80	0.50	0.01	0.02
Standard deviation (n-1)	67.36	18.96	0.89	0.71	0.08	0.12
Standard error of the mean	30.13	8.48	0.40	0.32	0.03	0.06

4.10 STEPHENS LAKE – 11 KM DOWNSTREAM OF THE KEEYASK GS

Substrate within the IE sampling polygon was comprised largely of sand (95%) with less than 1% total organic carbon (Figure 19). Mean total abundance was 3,070 invertebrates per m^2 comprising ten taxa (Table 28). Chironomidae (66%) was the dominant taxon with most of the remaining invertebrate abundance comprised of Gastropoda (27%) (Figure 20). EPT taxa represented 3% of the total abundance, mean Simpson's diversity index was 0.46, and the Simpson's evenness index was 0.25.

Table 28: Summary statistics for benthic invertebrates in the intermittently-exposed sampling polygon in Stephens Lake 11 km downstream of the Keeyask GS (STL11KM) in 2022.

Stephens Lake 11 km - IE	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	3070.18	2.53	9.80	2.60	0.46	0.25
Minimum	1096.49	0.00	4.00	0.00	0.15	0.12
Maximum	5367.04	5.26	16.00	5.00	0.78	0.38
1st Quartile	1918.86	0.33	6.00	1.00	0.41	0.16
Median	2611.38	3.31	11.00	3.00	0.45	0.29
3rd Quartile	4357.11	3.76	12.00	4.00	0.50	0.30
Variance (n-1)	3090804.76	5.21	23.20	4.30	0.05	0.01
Standard deviation (n-1)	1758.07	2.28	4.82	2.07	0.22	0.11
Standard error of the mean	1015.02	1.32	2.78	1.20	0.13	0.06

Sediment content in the PW polygon was largely sand (52%) and silt (35%) with 2% total organic carbon (Figure 19). Total abundance was 2,228 invertebrates per m^2, with a mean total richness of 12 taxa (Table 29). Chironomidae was the dominant taxon, representing up 67% of the total (Figure 20). EPT taxa accounted for 12% of the total abundance, mean Simpson's diversity index was 0.62, and the Simpson's evenness index was 0.29.

Table 29: Summary statistics for benthic invertebrates in the predominantly-wetted sampling polygon in Stephens Lake 11 km downstream of the Keeyask GS (STL11KM) in 2022.

Stephens Lake 11 km - PW	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	5	5	5	5	5	5
Mean	2227.61	12.40	11.80	2.60	0.62	0.29
Minimum	1009.93	1.66	10.00	2.00	0.24	0.12
Maximum	5208.33	21.43	15.00	4.00	0.82	0.47
1st Quartile	1284.05	7.79	10.00	2.00	0.61	0.19
Median	1413.90	14.29	11.00	2.00	0.64	0.25
3rd Quartile	2221.84	16.85	13.00	3.00	0.79	0.43
Variance (n-1)	2979983.98	60.36	4.70	0.80	0.05	0.02
Standard deviation (n-1)	1726.26	7.77	2.17	0.89	0.23	0.15
Standard error of the mean	772.01	3.47	0.97	0.40	0.10	0.07

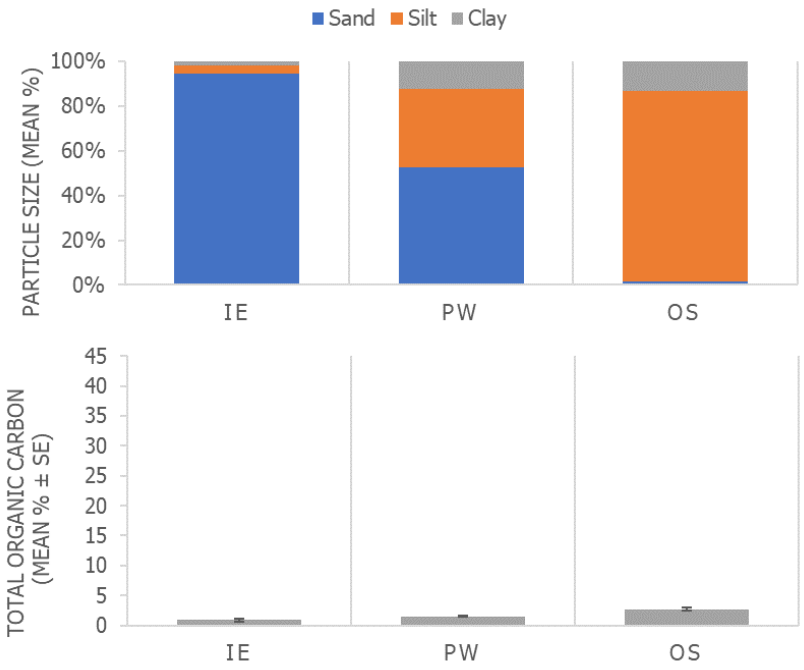


Figure 19: Supporting substrate metrics for the intermittently-exposed (IE), predominantly-wetted (PW), and offshore (OS) sampling polygons in Stephens Lake 11 km downstream of the Keeyask GS in 2022.

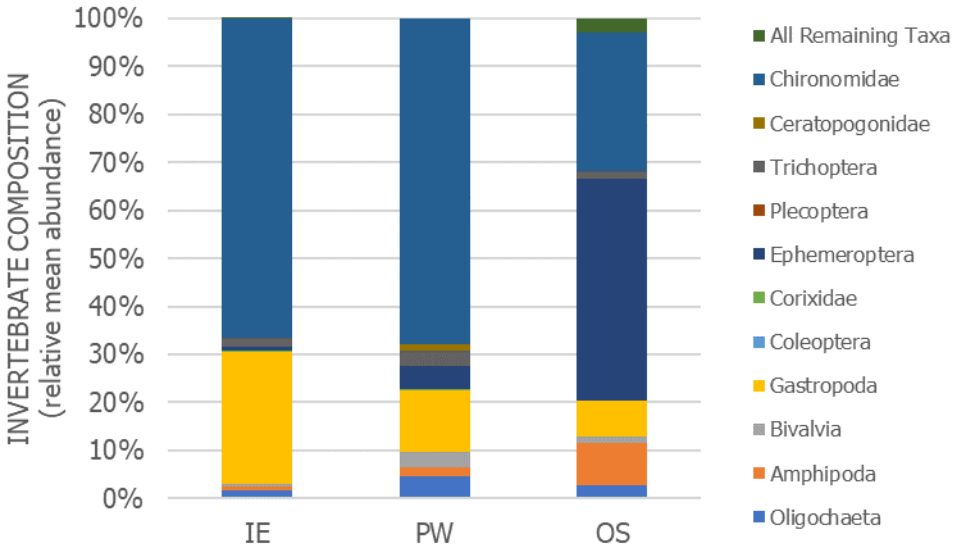


Figure 20: Composition of major invertebrate groups in intermittently-exposed, predominantly-wetted, and offshore habitat in Stephens Lake 11 km downstream of the Keeyask GS in 2022.

Sediment composition in the OS sampling polygon was largely silt (85%) with 3% total organic carbon (Figure 19). Mean total abundance was 199 invertebrates per m^2, with a mean richness of four taxa (Table 30). Ephemeroptera (46%) and Chironomidae (29%) were the most abundant taxa in OS habitat (Figure 20). EPT taxa represented 48% (mainly *Hexagenia*) of total abundance, mean Simpson's diversity index was 0.62, and the Simpson's evenness index was 0.85.

Table 30: Summary statistics for benthic invertebrates in the offshore sampling polygon in Stephens Lake 11 km downstream of the Keeyask GS (STL11KM) in 2022.

Stephens Lake 11 km - OS	Abundance (no./m^2)	% EPT	Total Richness	EPT Richness	Simpson's Diversity	Simpson's Evenness
No. of samples (n)	4	4	4	4	4	4
Mean	199.10	48.08	3.80	1.40	0.62	0.85
Minimum	100.99	25.00	2.00	1.00	0.49	0.64
Maximum	447.25	66.67	6.00	3.00	0.77	1.20
1st Quartile	129.85	40.00	2.00	1.00	0.53	0.71
Median	144.28	51.61	3.00	1.00	0.58	0.72
3rd Quartile	173.13	57.14	6.00	1.00	0.74	0.99
Variance (n-1)	19920.26	259.51	4.20	0.80	0.01	0.06
Standard deviation (n-1)	141.14	16.11	2.05	0.89	0.12	0.24
Standard error of the mean	63.12	7.20	0.92	0.40	0.05	0.11

5.0 DISCUSSION

Benthic invertebrate community monitoring is being conducted to record effects of habitat changes on established and newly created habitats (*i.e*., colonization of newly flooded terrestrial habitat) within the Keeyask reservoir. Specific effects of flooding, sedimentation, increased frequency of water level fluctuations along the margins of the reservoir, and changes in water quality in backbays (such as reduced DO concentrations) will be assessed as set out in the key questions identified in Section 1.0. Downstream of the Keeyask GS, monitoring is being conducted to assess the biological effects of habitat changes caused by predicted alteration of flows, water velocities, and depths. The benthic macroinvertebrate community was sampled within intermittently-exposed (IE) (*i.e.,* <1m deep), predominantly-wetted (PW) (*i.e.,* 1 to 3 m deep), and offshore (OS) (*i.e.,* 3 to 20 m) areas. One location in Split Lake, six in the Keeyask reservoir between Birthday Rapids and the Keeyask GS, and three in Stephens Lake were sampled in 2022, the second year following reservoir impoundment.

Substrates within all three habitat types in Split Lake were comprised largely of silt, sand, and clay with little total organic carbon. Mean total invertebrate abundance was highest at PW sites where Bivalvia and Chironomidae were the dominant taxa. Oligochaeta and Amphipoda dominated IE sites while Bivalvia were most commonly present in OS areas. The large number of bivalves observed were largely comprised of zebra mussels.

O'Neil Bay in Stephens Lake was sampled as a reference area as it is considered a future proxy for the flooded backbays in the Keeyask reservoir. As in 2021, this area showed a marked difference from sites in the Keeyask reservoir. Invertebrate abundance was much lower in the IE areas, measuring only 11 invertebrates/m^2, compared to 385–25,994 invertebrates/m^2 in the Keeyask reservoir. Oligochaeta, Bivalvia (exclusively zebra mussels), and Corixidae were the only benthic macroinvertebrates present. Sediment at IE sites was composed almost entirely of sand with little total organic carbon (3%), compared to silt substrates with high levels of total organic carbon found at the majority of IE sites in the Keeyask reservoir. Invertebrate density was high in PW habitats and consisted largely of Bivalvia. This is different from PW habitats in the Keeyask reservoir where Amphipoda and Chironomidae were the most abundant taxa. Ephemeroptera were dominant at OS sites and %EPT was high (69%). As in Split Lake, the large number of bivalves observed in O'Neil Bay were largely comprised of zebra mussels. When O'Neil Bay was selected as a reference area during studies conducted as part of the EIS, zebra mussels were not present within the Nelson River and the benthic macroinvertebrate community within O'Neil Bay was different than at present. Therefore, data collected from O'Neil Bay during the EIS are no longer relevant and may not be used for comparisons to the Keeyask reservoir as planned. Although zebra mussels were not present in the Keeyask reservoir backbays in 2022, it is expected that as conditions become more like those in O'Neil Bay, the BMI community will also change and will likely include zebra mussels.

The benthic macroinvertebrate community was also monitored at two sites in Stephens Lake approximately 3 and 11 km downstream of the Keeyask GS. As observed at the Keeyask

reservoir sites, the total abundance of invertebrates was highest in IE areas with Chironomidae the most dominant taxon observed. Sediments within the IE area differed between the two Stephens Lake sites, containing largely silt at 3 km and sand at 11 km. Both areas showed little total organic carbon. Both the PW and OS areas generally contained high abundances of Chironimidae and Ephemeroptera.

The six areas within the Keeyask reservoir, included three flooded backbays (zones 4, 8, and 12), one area downstream of Birthday Rapids, one area within upper Gull Lake (Zone 1b), and one area in lower Gull Lake (Zone 3). Substrates within the Keeyask reservoir differed with distance from shore. In the IE and PW areas, silt-dominant substrate and high total organic carbon concentrations (12–44%) were found at all sites except for in lower Gull Lake. Because IE and PW sites are close to shore, they largely consist of flooded terrestrial habitat. OS sites represent permanently wetted aquatic habitat. OS sites in the Keeyask reservoir generally contained less silt, more sand, and had lower levels of total organic carbon.

In 2022, all flooded former terrestrial habitats in the Keeyask reservoir had been colonized by aquatic macroinvertebrates. Aquatic invertebrate densities at IE sites were higher than at either PW or OS sites in each of the reservoir backbays and the area sampled in upper Gull Lake. Densities were also higher than those measured in IE areas in Split or Stephens lakes. Amphipoda and Chironomidae were the most abundant taxa. Densities of invertebrates in the PW, which comprised both pre-existing shoreline and flooded terrestrial habitat depending on location in the reservoir, were generally lower than those observed in Split or Stephens lakes. Dominant invertebrate taxa were the same as observed at IE sites. As in Split and Stephens lakes, OS sites in the Keeyask reservoir showed the lowest invertebrate density when compared to IE and PW sites. The most dominant taxa in this area were Amphipoda, Chironomidae, Ephemeroptera, and Oligochaeta.

Monitoring results from 2022, the second year after impoundment of the Keeyask reservoir indicate that benthic macroinvertebrates have continued to colonize flooded former terrestrial habitats and that previously wetted aquatic habitat continues to support invertebrates. In the short-term, it is expected the invertebrate communities will continue to evolve as the aquatic habitat changes and that the abundance and species composition will change rapidly as colonization continues. In the long-term, is it expected the Keeyask reservoir will be comparable to Stephens Lake in terms of benthic habitat and invertebrate communities. Benthic macroinvertebrate sampling will be repeated in 2023. A comprehensive report will follow that includes a detailed analysis of the post-impoundment invertebrate community and comparison to the pre-Project condition.

6.0 SUMMARY AND CONCLUSIONS

- Monitoring was conducted in Split Lake the Keeyask reservoir and downstream of the Keeyask GS to assess effects of aquatic habitat changes on the benthic macroinvertebrate community.
- Benthic macroinvertebrates and sediment were sampled at one site in Split Lake, six sites within the Keeyask reservoir between Birthday Rapids and the Keeyask GS, and at three sites in Stephens Lake. Each site contained three habitat polygons defined by water depth: intermittently-exposed (IE) (*i.e.*, <1m deep), predominantly-wetted (PW) (*i.e.*, 1 to 3 m deep), and offshore (OS) (*i.e.*, 3 to 10 m) areas.
- Substrates within all three habitat types in Split Lake were comprised largely of silt, sand, and clay with little total organic carbon. Mean total invertebrate abundance was highest at PW sites where Bivalvia and Chironomidae were the dominant taxa. Oligochaeta and Amphipoda dominated IE sites while Bivalvia were most commonly present in OS areas. The majority of bivalves observed in both the PW and OS sites were zebra mussels.
- O'Neil Bay in Stephens Lake was sampled as a reference area as it is considered a future proxy for the flooded backbays in the Keeyask reservoir. As in 2021, the BMI community in O'Neil Bay was markedly different from the newly flooded backbay sites. Zebra mussels were abundant in both IE and PW areas within O'Neil Bay but were absent from flooded backbays within the Keeyask reservoir. When O'Neil Bay was selected as a reference area during studies conducted as part of the EIS, zebra mussels were not present within the Nelson River and the benthic macroinvertebrate community within O'Neil Bay was different than at present. Therefore, data collected from O'Neil Bay during the EIS are no longer relevant and may not be used for comparisons to the Keeyask reservoir as planned. Over the long-term, it is expected that conditions in the Keeyask reservoir backbays will resemble those of O'Neil Bay and the BMI community will change to reflect these new environments.
- The benthic macroinvertebrate community was also monitored at two sites in Stephens Lake approximately 3 and 11 km downstream of the Keeyask GS. As observed in the Keeyask reservoir sites, the total abundance of invertebrates was highest in IE areas with Chironomidae the most dominant taxon observed. Both the PW and OS areas generally contained a high abundance of Chironimidae and Ephemeroptera.
- Within the Keeyask reservoir IE sites largely consist of flooded former terrestrial habitat. Silt-dominant substrate and high total organic carbon concentrations (12–44%) were found at all IE and PW sites within the Keeyask reservoir except for at the one in lower Gull Lake. OS sites in the Keeyask reservoir generally contained less silt, more sand, and had lower levels of total organic carbon.

- In 2022, all flooded former terrestrial habitats in the Keeyask reservoir had been colonized by aquatic macroinvertebrates. Aquatic invertebrate densities at IE sites were higher than at either PW or OS sites in each of the reservoir backbays and the area sampled in upper Gull Lake. Amphipoda, and Chironomidae were the most abundant taxa. Densities in these areas were also higher than those measured in IE areas in Split or Stephens lakes. Densities of invertebrates in PW areas, which comprised both pre-existing shoreline and flooded terrestrial habitat depending on location in the reservoir, were generally lower than those observed in Split or Stephens lakes. Dominant invertebrate taxa were the same as observed at IE sites. As in Split and Stephens lakes, OS sites in the Keeyask reservoir showed the lowest invertebrate density. The most dominant taxa were Amphipoda, Chironomidae, Ephemeroptera, and Oligochaeta.
- As 2022 represents the second year of benthic macroinvertebrate monitoring following impoundment of the Keeyask reservoir, it is too early to make conclusions regarding changes to these communities as a result of the Project.
- Benthic invertebrate sampling will be repeated in 2023 and a comprehensive report will follow that includes a detailed analysis of the post-impoundment invertebrate community and comparison to the pre-Project condition and key questions outlined in the AEMP will be addressed.

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APPENDICES

APPENDIX 1: TAXONOMIC REFERENCES USED FOR BENTHIC MACROINVERTEBRATE IDENTIFICATIONS

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APPENDIX 2:
BMI SAMPLE PROCESSING PROTOCOL AND QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) PROCEDURES

Detailed sample processing protocols are developed on a project-by-project-basis depending on the specific needs of each client. The following provides an overview of standard QA/QC procedures employed for each project.

Large &/or Rare Search for Samples Requiring Sub-Sampling

- Sample is washed and sieved using appropriate sized mesh;
- Entire sample is scanned for large &/or rare invertebrates in an appropriately sized tray. This scan is conducted on a per sample basis to avoid under-representing taxa that tend to occur singly or in few numbers that may be missed as a result of sub-sampling;
- Large organisms tend to occur in small numbers (*e.g.*, Belostomatidae, crayfish); these organisms are rare in relation to the overall number of organisms in the sample being processed. Based on the overall number of organisms in the sample, if an organism tends to occur rarely with respect to the rest of the organisms in the sample, this organism is removed (or more, if > 1) and retained in a separate vial for taxonomic identification; and
- Large &/or rare organisms are not included in the split correction and this is indicated clearly on the bench sheet. It is noted that there is a separate vial containing large &/or rare organisms.

Sample Processing

Sub-Sampling

- Most samples are sub-sampled (unless requested by the client) to decrease processing time. A minimum of 300 organisms processed ensures the inclusion of more rare taxa and permits comparisons of richness among sites;
- The entire sample is examined in a large tray and estimate the number of splits necessary to produce the appropriate number of aliquots needed to achieve a 300-organism target;
- If a sample contains > 300 organisms, large &/or rare invertebrates and any small fish are removed from the whole sample before sub-sampling (see above);
- When > 300 organisms are present, the sample is split into halves. In order to reduce any bias created by the mixing/splitting process, the well-cleaned and mixed sample is split using a 1.0 or 4.0 L [specific to sample volume] Folsom Plankton Splitter. Each sub-sample is subsequently sorted until at least 300 animals are counted. When the 300-organism count

is achieved part way through a sub-sample, the remainder of this fraction is sorted so that a known fraction is sorted. All splitting information is recorded on the bench sheet.

- In sparse samples (*i.e.*, containing ~300 animals or less), the entire sample is processed;
- To be counted, a specimen must have enough intact body parts to permit its identification to the targeted level, and it must have a head (this prevents a body and detached head from being counted as two animals);
- Larval exuviae (exoskeleton remains), and empty shells (snails and clams) and cases (caddisflies) are not counted in the 300-fixed count. If there are no "live" molluscs in the sample, a few empty shells are set aside for identification; these are placed into vial with the large &/or rare specimens;
- The taxa Porifera, Nemata, Copepoda, Cladocera, Rotifera, Platyhelminthes, Ostracoda, and non-aquatic (terrestrial) taxa are not included in the 300 organism count because they are not considered as part of the benthic macroinvertebrate community. Typically, they are counted and their numbers recorded on the bench sheet.

Sorting Samples

- Sorting aquatic samples involves removing aquatic macroinvertebrates from organic and inorganic materials within each sample;
- All sorting is conducted with a 3x desktop magnifier or stereomicroscope [specific to Project];
- All sorted samples are checked by a 2nd laboratory technician (QA/QC technician);
- Any additional invertebrates collected during the QA/QC process are combined with the original sample, but counted separately;
- Sorting efficiency must be ≥ 95%. The QA/QC technician checks on a tray-by-tray basis so that the sample is handled as few times as possible; the QA/QC technician will sort any remaining invertebrates from the tray and record the number of missed invertebrates per tray;
- The QA/QC technician will also check the bench sheet data to ensure it matches the sample data; and
- Sorted invertebrate samples are stored in 70% ethanol prior to delivery to the taxonomist.

Verification of Taxonomic Identification

- NSC taxonomists regularly communicate with external taxonomic specialists to ensure accuracy and consistency.

Sample Identifications

- Samples are identified to the appropriate taxonomic level [specific to client] by an in-house or external taxonomist. Ten percent (10%) of the in-house identifications are randomly

selected and sent to an external taxonomy specialist for QA/QC. The accuracy of the sample subset is assessed for identification and enumeration; all unknown invertebrates are sent to an external specialist; incorrect identifications and/or enumeration discrepancies are noted on the laboratory datasheet;

- The target overall accuracy level for in-house invertebrate identifications and enumeration is 95% at the Family level and 90% at the Genus level. Corrected identifications and enumeration values received from the external taxonomist are used in place of in-house data discrepancies. If the average error rate of audited samples is outside the target, the entire project must be re-identified by someone other than the original taxonomist.

Data Processing

- Data from field books and laboratory bench sheets are entered into an MS Excel® data template;
- Data templates specify the Project Name, Study Area, Site Location/Description, GPS coordinates (Global Positioning System), Site Label, Sampling Date, Time of Day, Gear Type, Sieve Mesh Size in Field/Laboratory, Presence or Absence of Vegetation/Algae, Water Temperature, Water Depth, Velocity, Substrate Type, Number of Splits, Taxonomic List, Life Stage, and Enumeration List;
- A 2nd and 3rd technician sequentially verify all entered data and formulae to original field book and laboratory bench sheets (*i.e.*, verification is done twice) and a final verification is conducted by the project biologist and/or report author.

APPENDIX 3:
BENTHIC INVERTEBRATE DATA FOR THE KEEYASK STUDY AREA, 2022

Table A3-1: Benthic invertebrate taxonomic analysis output, Split Lake Area, 2022. Units for IE are no. of invertebrates per sample, units for PW and OS are no. of invertebrates per m².

Split		Lake														(SPLIT)
	Sample ID	**SPLIT-IE-R1**	**SPLIT-IE-R2**	**SPLIT-IE-R3**	**SPLIT-IE-R4**	**SPLIT-IE-R5**	**SPLIT-PW-R1**	**SPLIT-PW-R2**	**SPLIT-PW-R3**	**SPLIT-PW-R4**	**SPLIT-PW-R5**	**SPLIT-OS-R1**	**SPLIT-OS-R2**	**SPLIT-OS-R3**	**SPLIT-OS-R4**	**SPLIT-OS-R5**
	Water Depth (mean,m)	1.0	1.0	1.0	1.1	1.0	3.3	2.8	3.0	3.4	3.5	8.3	6.9	9.2	7.4	10.2
Taxa	Sub-sampling correction factor	0.5	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	54	29	55	162	35	0	0	115	0	0	0	29	0	0	58
Crustacea	Gammaridae	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0
	Hyalellidae	38	5	37	320	111	0	14	72	43	0	0	0	14	0	0
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	58	14	0	0	14
	Laevicaudata (clam shrimps)	0	0	0	0	1	0	0	14	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	4	9	11	56	7	58	3232	995	1688	87	0	0	1039	14	606
	Pisidiidae (fingernail clams)	0	0	0	0	0	144	245	202	115	0	0	0	0	0	0
	Gastropoda (snails) - unidentified	0	0	0	2	0	43	159	130	0	188	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	87	115	202	274	58	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	0	0	0	12	5	0	0	0	0	0	0	0	0	0	0
	Planorbidae	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Valvatidae	0	0	0	0	0	0	43	14	0	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	4	8	6	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	2	0	0	0	0	0	0	14	0	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	115	216	332	245	447	144	115	43	115	87
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	0	0	0	0	0	29	29	0	0	0	0	0	0	14
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	1	4	0	0	0	0	0	0	0	0	0	0	43
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	0	0	43	43	0	72	173	14	0	0	0	0
Chironomidae	Chironomidae (larvae + pupae)	14	6	10	50	12	649	1082	2525	1342	245	43	87	14	87	29
All Other Taxa	Hirudinida (leeches)	0	1	0	0	0	0	0	14	0	14	0	0	0	0	0
	Hydrachnidae (water mites)	12	0	0	0	0	29	29	0	29	14	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	14	14	29	0	0	0	0	0	0
	Corixidae (water boatmen)	0	1	1	40	36	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-2: Benthic invertebrate taxonomic analysis output, Keeyask reservoir, 2022. Units are no. of invertebrates per m².
Nelson River Back Bay at unnamed creek downstream of Birthday Rapids (ZONE1A).

	Sample ID	ZONE1A-IE-R1	ZONE1A-IE-R2	ZONE1A-IE-R3	ZONE1A-PW-R1	ZONE1A-PW-R2	ZONE1A-PW-R3	ZONE1A-PW-R4	ZONE1A-PW-R5	ZONE1A-OS-R1	ZONE1A-OS-R2	ZONE1A-OS-R3	ZONE1A-OS-R4	ZONE1A-OS-R5
	Water Depth (mean,m)	1.0	0.8	1.0	2.3	2.4	2.1	2.2	2.7	5.0	5.0	4.8	3.8	4.2
Taxa	Sub-sampling correction factor	0	0	0	0	0.25	0	0.25	0.25	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	144	29	289	880	1270	43	1674	1616	29	0	29	14	14
Crustacea	Gammaridae	29	130	101	0	0	0	0	0	0	0	0	0	0
	Hyalellidae	231	491	390	29	115	72	0	0	0	0	0	0	0
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pisidiidae (fingernail clams)	0	0	0	43	58	0	173	231	0	0	0	0	0
	Gastropoda (snails) - unidentified	0	0	14	0	0	0	0	0	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	0	43	72	0	0	0	0	0	0	0	0	0	0
	Planorbidae	72	332	216	14	0	0	0	0	0	0	0	0	0
	Valvatidae	0	0	0	43	115	43	58	289	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	14	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	14	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	14	14	14	0	115	0	0	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	0	0	0	0	14	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	0	0	0	29	72	130	14	101
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	0	14	58	0	0	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	58	29	0	58	14	0	0	0	14	29
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Limnephilidae (larvae)	0	14	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	14	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	0	14	0	0	0	0	0	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	43	14	0	0	0	0	0	0	0	0	14
Chironomidae	Chironomidae (larvae + pupae)	866	332	202	1284	2366	563	750	2943	0	14	14	14	72
All Other Taxa	Hirudinida (leeches)	14	0	0	29	14	0	0	0	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	231	0	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae (water boatmen)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	14	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-2: Benthic invertebrate taxonomic analysis output, Keeyask reservoir, 2022 (continued). Units are no. of invertebrates per m².
Keeyask reservoir backbay Zone 4 (ZONE4)

	Sample ID	ZONE4-IE-R1	ZONE4-IE-R2	ZONE4-IE-R3	ZONE4-PW-R1	ZONE4-PW-R2	ZONE4-PW-R3	ZONE4-PW-R4	ZONE4-PW-R5	ZONE4-OS-R1	ZONE4-OS-R2	ZONE4-OS-R3	ZONE4-OS-R4	ZONE4-OS-R5
	Water Depth (mean,m)	1.0	0.9	0.8	2.5	2.0	2.0	2.2	2.0	4.9	4.6	4.9	4.1	5.0
Taxa	Sub-sampling correction factor	0.25	0.125	0.125	0	0	0	0.25	0	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	5482	8541	1962	375	43	0	577	130	0	72	72	14	0
Crustacea	Gammaridae	519	0	0	0	29	29	58	72	0	0	0	0	0
	Hyalellidae	577	231	0	188	159	101	808	289	58	0	0	14	0
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	0	144	43	0	0	0	0	14	0	0	0
	Pisidiidae (fingernail clams)	0	0	0	0	14	0	58	0	0	0	0	0	14
	Gastropoda (snails) - unidentified	58	0	0	14	0	0	58	29	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	58	231	0	0	14	0	0	0	0	0	0	0	0
	Planorbidae	1212	3693	1500	0	14	0	0	0	0	0	0	0	0
	Valvatidae	0	0	0	0	43	14	115	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	115	0	14	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	29	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	0	0	0	202	144	159	58	43
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	0	14	14	0	0	43
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	0	0	14	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	14	0	0	0	0	0	0	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	115	0	231	0	0	0	0	0	43	0	14	0	0
Chironomidae	Chironomidae (larvae + pupae)	4155	26200	20429	447	390	188	1096	1111	72	87	115	14	43
All Other Taxa	Hirudinida (leeches)	14	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrozoa (hydra)	0	2655	0	0	14	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	14	14	0	0	29
	Corixidae (water boatmen)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-2: Benthic invertebrate taxonomic analysis output, Keeyask reservoir, 2022 (continued). Units are no. of invertebrates per m^2.
Keeyask reservoir backbay Zone 12 (ZONE12)

	Sample ID	ZONE12-IE-R1	ZONE12-IE-R2	ZONE12-IE-R3	ZONE12-PW-R1	ZONE12-PW-R2	ZONE12-PW-R3	ZONE12-PW-R4	ZONE12-PW-R5	ZONE12-OS-R1	ZONE12-OS-R2	ZONE12-OS-R3	ZONE12-OS-R4	ZONE12-OS-R5
	Water Depth (mean,m)	0.8	0.9	0.6	2.3	2.7	2.2	2.6	2.4	3.8	3.0	3.8	4.0	3.6
Taxa	Sub-sampling correction factor	0.5	0.5	0.125	0.25	0.125	0.125	0	0.0625	0	0	0.25	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	144	317	231	0	0	0	101	0	87	14	231	43	43
Crustacea	Gammaridae	159	29	231	58	0	0	43	14	0	14	0	0	0
	Hyalellidae	2236	2049	1039	115	0	346	144	72	216	173	404	29	115
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	29	173	577	0	0	0	0	0	29	0	0	0	14
	Pisidiidae (fingernail clams)	0	0	115	0	0	0	0	14	0	0	0	0	0
	Gastropoda (snails) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	43	0	115	0	0	0	14	14	0	0	0	0	0
	Planorbidae	952	260	231	0	0	0	0	0	0	0	0	0	0
	Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	58	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	14
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	14
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	0	0	0	14	0	0	0	0
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	14	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	101	0	0	0	0	0	0	0	0	14	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	29	0	0	0	0	0	0	0	0	0	0	0
	Limnephilidae (larvae)	0	29	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	14	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	72	58	0	0	0	0	0	0	14	0	0	0	14
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	Chironomidae (larvae + pupae)	1529	2539	577	58	0	0	115	0	87	14	231	14	58
All Other Taxa	Hirudinida (leeches)	0	0	0	0	0	0	0	0	0	0	0	14	0
	Hydrachnidae (water mites)	0	0	115	0	0	0	0	0	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae (water boatmen)	0	58	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-2: Benthic invertebrate taxonomic analysis output, Keeyask reservoir, 2022 (continued). Units are no. of invertebrates per m².
Nelson River upstream extent of Gull Lake (ZONE 1B)

	Sample ID	ZONE 1B-IE-R1	ZONE 1B-IE-R2	ZONE 1B-IE-R3	ZONE 1B-PW-R1	ZONE 1B-PW-R2	ZONE 1B-PW-R3	ZONE 1B-PW-R4	ZONE 1B-PW-R5	ZONE 1B-OS-R1	ZONE 1B-OS-R2	ZONE 1B-OS-R3	ZONE 1B-OS-R4	ZONE 1B-OS-R5
	Water Depth (mean,m)	0.9	0.9	0.9	2.0	1.9	2.2	1.8	2.4	4.3	4.8	4.4	5.0	3.2
Taxa	Sub-sampling correction factor	0.125	0.25	0.25	0	0	0	0	0.25	0	0.25	0.125	0.25	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	1616	1096	866	87	58	43	101	519	0	231	231	0	317
Crustacea	Gammaridae	231	58	462	14	14	14	72	58	0	0	0	0	29
	Hyalellidae	8426	5136	3924	274	87	130	433	563	0	0	115	0	216
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	58	0	0	0	0	0	0	115	779	0	43
	Pisidiidae (fingernail clams)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gastropoda (snails) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	115	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	0	58	0	0	0	0	101	0	0	0	0	0	0
	Planorbidae	0	231	923	0	0	0	14	0	29	0	0	0	14
	Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	14	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	115	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	115	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	115	173	115	87	0	0	0	58	0	0	0	58	58
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	29	14	0	0	58	43	173	361	58	14
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	58	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	231	0	0	0	0	14	14	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	58	0	0	0	0	0	0	0	0	0	0	0
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	14	0	0	0	14	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	58	0	29	14	0	0	58	0	115	0	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	14	29	0	0	0	0	58	0	0	0
Chironomidae	Chironomidae (larvae + pupae)	6348	3001	14312	548	534	390	750	2539	130	404	231	58	462
All Other Taxa	Hirudinida (leeches)	14	0	58	14	0	14	0	72	14	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	115	58	0
	Corixidae (water boatmen)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-2: Benthic invertebrate taxonomic analysis output, Keeyask reservoir, 2022 (continued). Units are no. of invertebrates per m².
Keeyask reservoir backbay Zone 8 (ZONE 8)

	Sample ID	ZONE8-IE-R1	ZONE8-IE-R2	ZONE8-IE-R3	ZONE8-PW-R1	ZONE8-PW-R2	ZONE8-PW-R3	ZONE8-PW-R4	ZONE8-PW-R5	ZONE8-OS-R1	ZONE8-OS-R2	ZONE8-OS-R3	ZONE8-OS-R4	ZONE8-OS-R5
	Water Depth (mean,m)	1.0	1.0	0.8	2.8	2.6	2.2	2.3	2.1	4.2	4.9	3.2	4.3	4.7
Taxa	Sub-sampling correction factor	0.25	0.25	0.5	0	0	0	0.5	0.25	25	0	0.25	0.5	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	1500	231	87	462	173	289	462	115	404	101	58	231	188
Crustacea	Gammaridae	58	58	29	115	14	14	87	0	0	0	0	0	0
	Hyalellidae	1904	404	1096	245	29	144	231	289	346	29	43	87	58
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	0	0	14	0	0	0	0	0	0	0	14
	Pisidiidae (fingernail clams)	0	0	0	0	14	14	346	0	0	0	0	0	0
	Gastropoda (snails) - unidentified	0	0	0	0	0	0	87	0	0	29	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	58	0	0	0	0	29	29	0	0	0	0	0	0
	Planorbidae	0	231	144	0	43	29	202	0	0	0	0	0	0
	Valvatidae	58	0	0	29	0	0	0	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	58	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	0	0	0	115	0	0	0	29
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	14	0	0	0	14	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	0	0	0	0	173	14	0	0	43
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomidae	Chironomidae (larvae + pupae)	3232	1731	3463	289	87	303	1587	981	289	87	58	260	303
All Other Taxa	Hirudinida (leeches)	0	0	29	0	0	14	29	58	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	29	0	0	0	0	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	29	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae (water boatmen)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-2: Benthic invertebrate taxonomic analysis output, Keeyask reservoir, 2022 (continued). Units are no. of invertebrates per m^2.
Nelson River lower extent of Gull Lake (Zone3)

	Sample ID	ZONE3-IE-R1	ZONE3-IE-R2	ZONE3-IE-R3	ZONE3-PW-R1	ZONE3-PW-R2	ZONE3-PW-R3	ZONE3-PW-R4	ZONE3-PW-R5	ZONE3-OS-R1	ZONE3-OS-R2	ZONE3-OS-R3	ZONE3-OS-R4	ZONE3-OS-R5
	Water Depth (mean,m)	0.5	0.5	0.4	2.7	2.0	2.7	2.2	2.1	4.9	4.0	4.6	4.8	4.9
Taxa	Sub-sampling correction factor	0	0	0	0	0.25	0.25	0	0.25	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	14	0	0	72	0	58	115	289	14	14	202	14	29
Crustacea	Gammaridae	43	0	0	29	58	0	0	0	0	0	0	0	0
	Hyalellidae	1010	29	14	548	346	115	404	577	72	0	43	0	14
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	0	0	0	0	14	0	0	0	72	0	0
	Pisidiidae (fingernail clams)	0	0	0	0	0	0	0	0	0	0	0	0	14
	Gastropoda (snails) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	0	0	0	0	0	0	0	0	0	0	0	0	0
	Planorbidae	14	0	0	0	0	0	0	0	0	0	0	0	0
	Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	14	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	0	0	0	0	0	29	72	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	29	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	115	0	0	72	0	159	115	87	87	317
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	0	0	0	0	0	58	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	72	58	0	43	0	0	29	0	0	72
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	14
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	0	29	14	58	14	0	29	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	0	0	0	14	0	14	173	14	14	29
Chironomidae	Chironomidae (larvae + pupae)	14	0	0	548	0	606	563	923	58	563	563	43	202
All Other Taxa	Hirudinida (leeches)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae (water boatmen)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-3: Benthic invertebrate taxonomic analysis output, Stephens Lake Area, 2022. Units are no. of invertebrates per m^2.
Stephens Lake - O'Neil Bay (ONB)

	Sample ID	ONB-IE-R1	ONB-IE-R2	ONB-IE-R3	ONB-IE-R4	ONB-IE-R5	ONB-PW-R1	ONB-PW-R2	ONB-PW-R3	ONB-PW-R4	ONB-PW-R5	ONB-OS-R1	ONB-OS-R2	ONB-OS-R3	ONB-OS-R4	ONB-OS-R5
	Water Depth (mean,m)	0.8	0.7	0.6	0.6	0.8	1.8	2.2	2.2	2.1	2.4	4.5	4.8	4.8	3.6	4.9
Taxa	Sub-sampling correction factor	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	0	0	0	14	0	0	43	0	0	14	43	0	0	0	0
Crustacea	Gammaridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hyalellidae	0	0	0	0	0	0	14	115	0	0	0	0	0	0	0
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	14	0	0	0	0	317	43	7329	43	0	0	0	0	0	0
	Pisidiidae (fingernail clams)	0	0	0	0	0	43	0	0	0	14	14	0	0	0	0
	Gastropoda (snails) - unidentified	0	0	0	0	0	0	14	0	0	29	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	0	0	0	0	0	87	14	0	87	29	0	0	14	0	29
	Lymnaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Physidae	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0
	Planorbidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Valvatidae	0	0	0	0	0	58	29	0	58	58	14	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	0	87	173	216	289	130	115	29	144	101
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	0	0	14	0	0	72	87	0	0	0	0	0
Chironomidae	Chironomidae (larvae + pupae)	0	0	0	0	0	115	130	173	245	231	14	29	14	14	29
All Other Taxa	Hirudinida (leeches)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	0	0	14	0	14	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Corixidae (water boatmen)	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-3: Benthic invertebrate taxonomic analysis output, Stephens Lake Area, 2022 (continued). Units are no. of invertebrates per m².
Stephens Lake - 3 km downstream of Gull Rapids (at inlet to Stephens Lake) (STL-3KM)

	Sample ID	STL3KM-IE--R1	STL3KM-IE--R2	STL3KM-IE--R3	STL3KM-IE--R4	STL3KM-IE--R5	STL3KM-PW-R1	STL3KM-PW-R2	STL3KM-PW-R3	STL3KM-PW-R4	STL3KM-PW-R5	STL3KM-OS-R1	STL3KM-OS-R2	STL3KM-OS-R3	STL3KM-OS-R4	STL3KM-OS-R5
	Water Depth (mean,m)	0.7	0.6	0.9	0.5	0.7	3.0	2.7	2.7	2.3	2.3	4.6	4.7	4.3	4.3	4.3
Taxa	Sub-sampling correction factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	115	58	58	58	130	72	29	58	115	43	43	87	87	58	115
Crustacea	Gammaridae	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
	Hyalellidae	0	14	707	43	14	0	0	0	0	0	43	14	0	14	0
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	0	0	0	0	0	72	0	0	0	0	0	0	0
	Pisidiidae (fingernail clams)	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gastropoda (snails) - unidentified	14	0	0	0	29	0	0	0	14	0	0	0	0	0	0
	Ancylidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrobiidae	14	0	0	0	43	0	0	0	0	0	0	0	0	0	0
	Lymnaeidae	72	29	0	58	58	0	0	0	0	0	0	0	0	0	0
	Physidae	14	0	14	0	0	0	0	0	0	0	0	0	0	0	0
	Planorbidae	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0
	Valvatidae	58	43	14	29	87	0	0	14	0	0	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	14	43	188	29	72	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	29	58	29	58	101	0	14	14	14	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	14	0	58	0	29	159	58	202	216	159	43	245	144	144	101
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	14	0	14	0	14	0	43	14	14	14
	Helicopsychidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	14	29	29	0	29	0	0	14	14	0	0	0	14	0	0
	Limnephilidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	0	0	0	43	0	0	0	0	0	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	173	43	43	101	231	29	29	58	14	29	0	14	58	72	43
Chironomidae	Chironomidae (larvae + pupae)	822	779	866	346	1039	101	101	130	289	173	87	0	29	43	14
All Other Taxa	Hirudinida (leeches)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	0	0	0	0	14	0	0	14	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
	Corixidae (water boatmen)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A3-3: Benthic invertebrate taxonomic analysis output, Stephens Lake Area, 2022 (continued). Units are no. of invertebrates per m².

Stephens Lake - 11 km downstream of Gull Rapids (STL11KM)

	Sample ID	STL11KM -IE-R1	STL11KM -IE-R2	STL11KM -IE-R3	STL11KM -IE-R4	STL11KM -IE-R5	STL11KM -PW-R1	STL11KM -PW-R2	STL11KM -PW-R3	STL11KM -PW-R4	STL11KM -PW-R5	STL11KM -OS-R1	STL11KM -OS-R2	STL11KM -OS-R3	STL11KM -OS-R4	STL11KM -OS-R5
	Water Depth (mean,m)	0.9	0.8	1.0	0.7	0.8	2.2	1.4	2.1	1.6	1.4	3.7	4.5	3.9	3.4	3.2
Taxa	Sub-sampling correction factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligochaeta	Clitellata (aquatic oligochaete worms)	29	29	14	29	159	29	14	72	231	173	0	29	0	0	0
Crustacea	Gammaridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hyalellidae	72	0	0	14	58	14	14	0	144	43	72	0	0	0	0
	Pontoporeiidae	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0
	Laevicaudata (clam shrimps)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Dreissenidae (zebra mussels)	0	0	29	0	0	0	72	0	115	0	0	0	0	14	0
	Pisidiidae (fingernail clams)	14	0	29	0	0	0	43	0	72	29	0	0	0	0	0
	Gastropoda (snails) - unidentified	43	0	0	0	0	58	58	43	43	144	0	0	0	14	43
	Ancylidae	0	0	29	0	0	0	43	14	0	0	0	0	0	0	0
	Hydrobiidae	14	0	43	0	0	43	159	58	14	14	0	14	0	0	0
	Lymnaeidae	188	0	115	0	72	0	0	29	14	43	0	0	0	0	0
	Physidae	130	173	216	0	216	29	101	0	14	0	0	0	0	0	0
	Planorbidae	130	0	101	0	0	29	0	14	29	14	0	0	0	0	0
	Valvatidae	707	1082	895	43	14	101	58	159	43	72	0	0	0	0	0
Coleoptera	Dytiscidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Gyrinidae (larvae + adults)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haliplidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	Baetidae (larvae) - unidentified	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0
	Baetidae: *Callibaetis* (larvae)	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0
	Baetidae: *Procloeon* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Baetiscidae: *Baetisca* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Caenidae: *Caenis* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ephemeridae: *Ephemera* (larvae)	29	0	58	0	0	29	14	0	72	0	0	0	0	0	0
	Ephemeridae: *Hexagenia* (larvae)	0	0	0	0	0	72	101	173	43	29	14	58	58	87	231
	Heptageniidae: *Stenacron* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Heptageniidae: *Stenonema* (larvae)	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
	Leptophlebiidae: unidentified (larvae)	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0
	Leptohyphidae: *Tricoryhyphes* (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	Dipseudopsidae (larvae)	0	0	0	0	0	0	0	0	14	0	14	0	0	0	0
	Helicopsychidae (larvae)	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
	Hydroptilidae (larvae)	0	0	0	0	0	0	87	0	0	0	0	0	0	0	0
	Leptoceridae (larvae)	43	0	101	0	29	101	0	43	0	58	0	0	0	0	0
	Limnephilidae (larvae)	29	0	14	0	29	0	0	0	0	0	0	0	0	0	0
	Molannidae (larvae)	0	14	14	0	14	0	0	0	29	0	0	0	0	0	0
	Phryganeidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Polycentropodidae (larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogonidae	Ceratopogonidae (larvae)	0	0	0	0	0	43	29	0	43	43	0	0	0	0	0
Chironomidae	Chironomidae (larvae + pupae)	491	3044	3679	1010	1977	866	476	390	1284	4545	43	14	43	14	173
All Other Taxa	Hirudinida (leeches)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrachnidae (water mites)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hydrozoa (hydra)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sialidae (larvae)	0	0	0	0	0	0	0	0	0	0	14	14	0	0	0
	Corixidae (water boatmen)	0	0	14	0	29	0	0	14	0	0	0	0	0	0	0
	Sciomyzidae (pupae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tabanidae (larvae)	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 4:
BENTHIC SEDIMENT DATA FOR THE KEEYASK STUDY AREA, 2022

Table A4-1: Benthic sediment analysis output, Split Lake Area, 2022.
Split Lake (SPLIT)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	SPLIT-IE-R1	0.5	0.91	7.54	1.53	0.63	43.3	12	44.7	Clay
	SPLIT-IE-R2	0.5	0.39	3.23	0.73	0.34	83.5	2.9	13.6	Sandy loam / Loamy sand
	SPLIT-IE-R3	0.5	1.82	15.2	3.28	1.46	40.9	12.1	47	Clay
	SPLIT-IE-R4	0.6	3.16	26.3	5.18	2	78.7	11.7	9.6	Sandy loam
	SPLIT-IE-R5	0.5	1.78	14.8	2.96	1.18	71.7	7.2	21.1	Sandy clay loam
Predominantly Wetted	SPLIT-PW-R1	3.3	2.11	17.6	5.14	3	8.5	71.4	20.1	Silt loam
	SPLIT-PW-R2	2.8	2.14	17.9	6.59	4.45	29.4	53.9	16.7	Silt loam
	SPLIT-PW-R3	3	1.91	15.9	6.09	4.18	25.5	61.6	12.9	Silt loam
	SPLIT-PW-R4	3.4	1.47	12.3	3.02	1.55	47.2	42.3	10.5	Loam
	SPLIT-PW-R5	3.5	1.83	15.3	3.45	1.62	32.1	50.0	17.9	Silt loam
Offshore	SPLIT-OS-R1	8.3	1.74	14.5	3.62	1.88	9.4	54.7	35.9	Silty clay loam
	SPLIT-OS-R2	6.9	1.77	14.7	3.46	1.69	10.6	56	33.4	Silty clay loam
	SPLIT-OS-R3	9.2	1.65	13.8	3.17	1.52	18.5	73.1	8.4	Silt loam
	SPLIT-OS-R4	7.4	1.69	14.1	3.22	1.53	13.1	53.8	33.1	Silty clay loam
	SPLIT-OS-R5	10.2	1.7	14.2	3.18	1.48	24.1	60.9	15	Silt loam

Table A4-2: Benthic sediment analysis output, Keeyask reservoir, 2022.
Nelson River Back Bay at unnamed creek downstream of Birthday Rapids (ZONE1A)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently-Exposed	ZONE1A-IE-R3*	1.0	0.450	3.75	32.0	31.6	1.5	81.4	17.1	Silt loam
Predominantly-Wetted	ZONE1A-PW-R1*	2.1	0.593	4.94	12.7	12.1	2.2	57.7	40.1	Silt Clay loam / Silty clay
	ZONE1A-PW-R2*	2.7	0.656	5.46	10.9	10.2	4.8	61.4	33.8	Silty clay loam
	ZONE1A-PW-R3*	2.2	0.543	4.52	14.9	14.4	<1.0	57.8	41.7	Silty clay
	ZONE1A-PW-R4	2.8	0.220	1.83	8.35	8.13	16.2	45.7	38.0	Silty clay loam
	ZONE1A-PW-R5*	2.7	0.462	3.85	13.3	12.8	8.4	67.4	24.1	Silt loam
Offshore	ZONE1A-OS-R1	5.0	1.35	11.2	3.40	2.05	46.6	33.2	20.2	Loam
	ZONE1A-OS-R2	5.0	1.40	11.6	3.40	2	40.6	35.6	23.7	Loam
	ZONE1A-OS-R3	5.0	1.38	11.5	3.11	1.73	50.4	29.8	19.8	Loam
	ZONE1A-OS-R4	3.2	0.366	3.05	2.54	2.17	45.9	28.4	25.7	Loam
	ZONE1A-OS-R5*	3.7	1.29	10.7	4.11	2.82	29.5	42.9	27.6	Loam / Clay loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-2: Benthic sediment analysis output, Keeyask reservoir, 2022 (continued).
Zone 4 Pahwaybenic Bay (ZONE4)

Habitat Type	Site/ Sample ID	Water Depth SED (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	ZONE4-IE-R1*	1	0.556	4.63	41.6	41	3.8	84.9	11.3	Silt
Predominantly Wetted	ZONE4-PW-R2*	2.0	0.334	2.78	20.2	19.9	1.5	61.4	37.0	Silty clay loam
	ZONE4-PW-R3*	2.2	0.291	2.43	23.3	23	1.8	72.3	25.9	Silt loam
	ZONE4-PW-R4*	2.4	0.345	2.88	22.8	22.5	4.3	68.6	27.0	Silt loam / Silty clay loam
	ZONE4-PW-R5*	1.9	0.355	2.96	24.0	23.6	3.2	75.5	21.3	Silt loam
Offshore	ZONE4-OS-R1*	4.8	1.52	12.7	4.45	2.93	4.6	61.8	33.6	Silty clay loam
	ZONE4-OS-R2	4.2	1.48	12.3	5.58	4.1	11.6	61.9	26.5	Silt loam
	ZONE4-OS-R3	4.8	1.61	13.4	4.42	2.81	28.5	53.0	18.5	Silt loam
	ZONE4-OS-R4	4.1	1.07	8.94	2.23	1.16	53.2	29.5	17.3	Sandy loam
	ZONE4-OS-R5	5.0	1.68	14	4.31	2.63	8.8	62.0	29.2	Silty clay loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-2: Benthic sediment analysis output, Keeyask reservoir, 2022 (continued).
Zone 12 Nelson River Back Bay at Seebeesis Creek (ZONE12)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	ZONE12-IE-R1*	0.9	0.647	5.39	28.2	27.6	<1.0	76.4	22.8	Silt loam
Predominantly Wetted	ZONE12-PW-R1*	2.3	0.647	5.39	41.9	41.3	<1.0	94.8	4.6	Silt
	ZONE12-PW-R2*	2.3	0.628	5.23	43.2	42.6	1.0	95.5	3.5	Silt
	ZONE12-PW-R3*	2.2	0.641	5.34	43.5	42.9	1.2	93.4	5.4	Silt
	ZONE12-PW-R4*	2.7	0.689	5.74	40.7	40	<1.0	95.0	4.1	Silt
	ZONE12-PW-R5*	2.3	0.597	4.98	34.0	33.4	<1.0	87.3	12.0	Silt loam
Offshore	ZONE12-OS-R1*	3.7	0.846	7.04	17.3	16.5	2.0	58.1	39.9	Silty clay loam
	ZONE12-OS-R2*	3.0	0.533	4.44	44.7	44.2	<1.0	94.6	4.5	Silt
	ZONE12-OS-R5*	3.5	0.919	7.66	27.3	26.4	3.0	67.9	29.0	Silty clay loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-2: Benthic sediment analysis output, and Keeyask reservoir, 2022 (continued).
Nelson River upstream extent of Gull Lake (NRGULL)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	ZONE 1B-IE-R1*	0.9	0.582	4.85	36.8	36.2	5.3	85.5	9.2	Silt
Predominantly Wetted	ZONE 1B-PW-R1*	2.0	0.678	5.65	35.9	35.2	4.6	76.4	19.0	Silt loam
	ZONE 1B-PW-R2*	2.0	0.297	2.48	12.4	12.1	41.6	50.8	7.5	Silt loam
	ZONE 1B-PW-R3*	2.0	0.576	4.8	31.4	30.8	4.8	79.2	16.0	Silt loam
	ZONE 1B-PW-R4*	1.8	0.368	3.07	23.2	22.8	33.1	56.4	10.4	Silt loam
	ZONE 1B-PW-R5*	2.1	0.654	5.45	39.8	39.1	1.0	91.3	7.7	Silt
Offshore	ZONE 1B-OS-R1	4.2	0.552	4.6	2.33	1.78	17.0	66.1	17.0	Silt loam
	ZONE 1B-OS-R2*	4.8	0.429	3.58	14.3	13.9	<1.0	59.7	40.2	Silt Clay loam / Silty clay
	ZONE 1B-OS-R3*	4.8	0.535	4.46	17.4	16.9	<1.0	61.8	38.1	Silty clay loam
	ZONE 1B-OS-R4*	5.0	0.263	2.19	13.3	13	<1.0	56.6	42.7	Silty clay
	ZONE 1B-OS-R5*	3.0	0.407	3.39	35.7	35.3	<1.0	71.9	27.5	Silt loam / Silty clay loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-2: Benthic sediment analysis output, Keeyask reservoir, 2022 (continued).
Zone 8 Effie Creek (ZONE8)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	ZONE8-IE-R2*	1.0	0.440	3.67	44.2	43.8	1.9	88.5	9.6	Silt
Predominantly Wetted	ZONE8-PW-R1*	2.8	0.611	5.09	32.3	31.7	1.9	73.6	24.5	Silt loam
	ZONE8-PW-R3*	2.4	0.571	4.76	41.2	40.6	3.3	77.1	19.6	Silt loam
	ZONE8-PW-R4*	2.4	0.573	4.77	30.6	30	<1.0	81.1	18.4	Silt loam
	ZONE8-PW-R5*	2.1	0.479	3.99	40.7	40.2	2.1	83.7	14.2	Silt loam
Offshore	ZONE8-OS-R1*	4.3	0.523	4.35	27.1	26.6	<1.0	77.3	22.2	Silt loam
	ZONE8-OS-R2*	4.9	0.674	5.62	24.3	23.6	1.1	68.4	30.4	Silty clay loam
	ZONE8-OS-R3*	3.4	0.541	4.51	23.0	22.5	<1.0	69.3	30.0	Silty clay loam
	ZONE8-OS-R4*	4.7	0.603	5.03	30.3	29.7	1.5	77.9	20.5	Silt loam
	ZONE8-OS-R5*	4.0	0.538	4.48	25.7	25.2	1.4	73.9	24.6	Silt loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-2: Benthic sediment analysis output, Keeyask reservoir, 2022 (continued).
Gull Lake (GULL)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	ZONE3-IE-R1	0.5	0.463	3.86	0.90	0.44	81.9	7.3	10.8	Loamy sand
	ZONE3-IE-R2	0.5	1.17	9.72	1.53	0.36	94.2	2.8	3.0	Sand
	ZONE3-IE-R3	0.4	0.771	6.43	0.87	<0.17	97.5	1.4	1.1	Sand
Predominantly Wetted	ZONE3-PW-R1*	2.6	0.414	3.45	9.84	9.43	36.0	48.5	15.5	Loam
	ZONE3-PW-R2*	1.7	0.476	3.96	22.6	22.1	12.0	74.3	13.7	Silt loam
	ZONE3-PW-R3	2.6	0.261	2.17	5.96	5.7	25.7	36.9	37.3	Clay loam
	ZONE3-PW-R4*	2.0	0.466	3.88	31.8	31.3	2.5	66.8	30.7	Silty clay loam
	ZONE3-PW-R5*	2.2	0.497	4.14	39.4	38.9	10.2	60.0	29.8	Silty clay loam
Offshore	ZONE3-OS-R1	5.0	1.67	13.9	3.33	1.66	50.9	42.0	7.1	Loam / Sandy loam
	ZONE3-OS-R2*	3.8	0.733	6.1	10.4	9.67	4.7	61.4	33.9	Silty clay loam
	ZONE3-OS-R3	4.9	1.00	8.34	8.29	7.29	6.4	43.9	49.6	Silty clay
	ZONE3-OS-R4	4.8	0.247	2.06	1.63	1.38	23.5	19.4	57.1	Clay
	ZONE3-OS-R5	5.0	0.993	8.27	6.06	5.07	30.8	43.8	25.4	Loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-3: Benthic sediment analysis output, Stephens Lake Area, 2022.
Stephens Lake - O'Neil Bay (ONB)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	ONB-IE-R1	0.8	1.42	11.8	4.84	3.42	93.7	4.6	1.7	Sand
	ONB-IE-R2	0.7	0.798	6.65	6.24	5.44	71.7	19.0	9.3	Sandy loam
	ONB-IE-R3	0.6	1.47	12.2	2.70	1.23	35.7	55.0	9.2	Silt loam
	ONB-IE-R4	0.8	2.07	17.2	3.10	1.03	41.6	35.3	23.1	Loam
	ONB-IE-R5	0.8	3.98	33.1	4.49	<0.90	4.5	56.9	38.6	Silty clay loam
Predominantly Wetted	ONB-PW-R1	1.8	1.79	14.9	2.69	0.9	76.9	18.2	5.0	Loamy sand
	ONB-PW-R2	2.2	2.47	20.6	4.45	1.98	20.6	56.9	22.4	Silt loam
	ONB-PW-R3	2.1	2.36	19.6	4.23	1.87	39.7	46.8	13.5	Loam
	ONB-PW-R4	2.2	1.92	16	3.30	1.38	60.9	23.7	15.4	Sandy loam
	ONB-PW-R5	2.5	2.64	22	5.25	2.6	6.5	74.2	19.3	Silt loam
Offshore	ONB-OS-R1	4.4	2.52	21	4.13	1.61	16.6	63.6	19.9	Silt loam
	ONB-OS-R2	4.8	2.52	21	4.78	2.26	16.2	61.3	22.5	Silt loam
	ONB-OS-R3	4.8	2.71	22.6	4.11	1.4	2.8	78.2	18.9	Silt loam
	ONB-OS-R4	3.1	2.62	21.8	4.23	1.61	23.2	56.0	20.8	Silt loam
	ONB-OS-R5	4.8	2.55	21.2	4.27	1.72	21.4	55.5	23.0	Silt loam

Table A4-3: Benthic sediment analysis output, Stephens Lake Area, 2022 (continued).
Stephens Lake - 3 km downstream of Gull Rapids (at inlet to Stephens Lake) (STL3KM)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	STL3KM-IE-R1	0.7	3.23	26.9	4.26	1.03	11.6	52.5	35.9	Silty clay loam
	STL3KM-IE-R2	0.8	3.08	25.6	4.09	1.01	9.2	61.3	29.5	Silty clay loam
	STL3KM-IE-R3	0.9	1.54	12.9	2.84	1.3	35.2	57.4	7.4	Silt loam
	STL3KM-IE-R4	0.7	1.79	14.9	3.05	1.26	17.0	59.0	24.1	Silt loam
	STL3KM-IE-R5	0.7	1.55	12.9	3.09	1.54	19.3	58.1	22.6	Silt loam
Predominantly Wetted	STL3KM-PW-R1	3.0	2.25	18.7	5.20	3	13.7	67.7	18.6	Silt loam
	STL3KM-PW-R2	2.3	2.60	21.6	4.54	1.94	12.5	75.3	12.2	Silt loam
	STL3KM-PW-R3*	2.8	2.16	18	5.52	3.4	39.3	48.4	12.3	Loam
	STL3KM-PW-R4	2.8	2.49	20.8	4.23	1.74	24.5	57.6	17.9	Silt loam
	STL3KM-PW-R5	2.3	2.04	17	5.13	3.1	15.5	63.4	21.1	Silt loam
Offshore	STL3KM-OS-R1	4.5	1.97	16.5	4.34	2.37	27.9	66.7	5.3	Silt loam
	STL3KM-OS-R2	4.8	1.73	14.4	8.02	6.29	32.9	54.8	12.3	Silt loam
	STL3KM-OS-R3	4.2	2.06	17.2	3.96	1.9	24.6	62.2	13.2	Silt loam
	STL3KM-OS-R4	4.4	2.12	17.7	4.30	2.18	17.2	73.0	9.9	Silt loam
	STL3KM-OS-R5	4.3	2.34	19.5	4.43	2.09	11.6	75.7	12.7	Silt loam

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

Table A4-3: Benthic sediment analysis output, Stephens Lake Area, 2022 (continued).
Stephens Lake - 11 km downstream of Gull Rapids (STL11KM)

Habitat Type	Site/ Sample ID	Water Depth (m)	Inorganic Carbon (%)	$CaCO_3$ Equivalent	Total Carbon by Combustion (%)	Total Organic Carbon (%)	% Sand (2.0-0.05 mm)	% Silt (0.05 mm-2 µm)	% Clay (<2 µm)	Texture
Intermittently Exposed	STL11KM-IE-R1	0.9	3.06	25.5	4.70	1.64	89.7	8.4	1.9	Sand
	STL11KM-IE-R2	0.8	2.63	21.9	3.15	<0.63	95.0	2.9	2.1	Sand
	STL11KM-IE-R3	1.0	1.67	13.9	2.17	0.5	94.8	3.0	2.2	Sand
	STL11KM-IE-R4	0.7	2.23	18.6	2.97	0.74	95.9	2.5	1.6	Sand
	STL11KM-IE-R5	0.8	3.06	25.5	3.86	0.8	97.1	1.4	1.6	Sand
Predominantly Wetted	STL11KM-PW-R1	2.0	2.19	18.3	3.94	1.75	46.7	43.1	10.2	Loam
	STL11KM-PW-R2	1.5	3.63	30.3	4.53	<0.91	20.6	52.1	27.2	Silt loam /Silty clay loam /Clay loam
	STL11KM-PW-R3	2.0	1.39	11.6	2.75	1.36	71.9	26.1	1.9	Sandy loam / Loamy sand
	STL11KM-PW-R4	1.5	1.54	12.9	3.19	1.65	61.5	27.9	10.6	Sandy loam
	STL11KM-PW-R5	1.2	1.47	12.2	2.70	1.23	61.4	26.9	11.7	Sandy loam
Offshore	STL11KM-OS-R1	3.7	2.44	20.3	4.37	1.93	1.2	86.0	12.8	Silt loam
	STL11KM-OS-R2	4.4	2.37	19.8	5.99	3.6	<1.0	83.7	15.4	Silt loam
	STL11KM-OS-R3	3.9	2.38	19.8	4.57	2.19	1.9	83.6	14.5	Silt loam
	STL11KM-OS-R4	3.4	2.36	19.6	5.31	3	1.7	84.4	13.9	Silt loam
	STL11KM-OS-R5	3.1	2.39	19.9	5.26	2.9	1.3	87.7	11.0	Silt

*PSAL - Limited sample was available for Particle Size Analysis (100g minimum is standard). Measurement uncertainty for PSA results may be higher than usual.

APPENDIX 5:
BENTHIC MACROINVERTEBRATE MONITORING SITE AND HABITAT DATA FOR THE KEEYASK STUDY AREA, 2022

Table A5-1: Site and habitat data measured at benthic invertebrate monitoring sites sampled in the Split Lake Area, 2022.

Site ID	Habitat Type	Date	UTM coordinates (Zone 14U)		Water Temp (°C)	Water Depth (mean, m)	Water Velocity (mean, m/sec)	Secchi Depth (mean, m)	Algae Type	Dominant Substrate
			Easting	Northing						
SPLIT-IE	Intermittently Exposed	24-Aug	673601	6232627	20	1	<0.20	0.65	Attached	sand/clay
SPLIT-PW	Predominantly Wetted	24-Aug	673663	6233005	18.5	3.3	not measured	0.9	None	clay/organic matter
SPLIT-OS	Offshore	24-Aug	678455	6233993	18.5	8.3	0.31	1.95	None	clay/shell pieces/sand

Table A5-2: Site and habitat data measured at benthic invertebrate monitoring sites sampled in the Keeyask reservoir, 2022.

Site ID	Habitat Type	Date	UTM coordinates (Zone 15U)		Water Temp (°C)	Water Depth (mean, m)	Water Velocity (mean, m/sec)	Secchi Depth (mean, m)	Algae Type	Dominant Substrate
			Easting	Northing						
ZONE1A-IE	Intermittently Exposed	17-Sep	336043	6243866	15	1.0	<0.20	>1	Floating	organic matter/silt
ZONE1A-PW	Predominantly Wetted	17-Sep	335910	6243895	15	2.3	<0.20	1.5	None	organic matter/silt
ZONE1A-OS	Offshore	17-Sep	335944	6244048	15	5.0	<0.20	1.5	None	clay/silt/sand/organic matter
ZONE4-IE	Intermittently Exposed	18-Sep	341254	6244655	-	1	<0.20	>1	Attached	organic matter
ZONE4-PW	Predominantly Wetted	18-Sep	339829	6245060	-	2.5	<0.20	1.3	Attached	organic matter/silt
ZONE4-OS	Offshore	18-Sep	339036	6245352	-	4.9	<0.20	1.5	None	silty clay/organic matter
ZONE12-IE	Intermittently Exposed	23-Sep	353422	6242549	-	0.8	<0.20	>1	Attached	organic matter/silt
ZONE12-PW	Predominantly Wetted	23-Sep	353138	6242677	-	2.3	<0.20	1.4	None	organic matter
ZONE12-OS	Offshore	23-Sep	353061	6242770	-	3.8	<0.20	1.4	None	silt/organic matter
ZONE1B-IE	Intermittently Exposed	19-Sep	353217	6245908	-	0.9	<0.20	>1	Attached	organic matter
ZONE1B -PW	Predominantly Wetted	19-Sep	353131	6245893	-	2.0	<0.20	1.5	Attached	organic matter/silt
ZONE1B -OS	Offshore	19-Sep	353094	6245711	-	4.3	<0.20	1.4	None	sandy clay/gravel/organic matter
ZONE8-IE	Intermittently Exposed	21-Sep	354112	6249328	-	1.0	<0.20	>1	Attached	organic matter
ZONE8-PW	Predominantly Wetted	21-Sep	354231	6249088	-	2.8	<0.20	1.6	None	organic matter
ZONE8-OS	Offshore	20-Sep	354742	6248813	-	4.2	<0.20	1.5	None	organic matter/silt
ZONE3-IE	Intermittently Exposed	21-Sep	356356	6248537	-	0.5	<0.20	>1	Attached	cobble/sandy clay/organic matter
ZONE3-PW	Predominantly Wetted	21-Sep	356127	6248532	-	2.7	<0.20	1.4	None	organic matter/silt
ZONE3-OS	Offshore	21-Sep	356325	6248477	-	4.9	<0.20	1.3	None	sandy clay/silt/organic matter

Table A5-3: Site and habitat data measured at benthic invertebrate monitoring sites sampled in Stephens Lake Area, 2022.

Site ID	Habitat Type	Date	UTM coordinates (Zone 15U)		Water Depth (mean, m)	Water Velocity (mean, m/sec)	Secchi Depth (mean, m)	Algae Type	Dominant Substrate
			Easting	Northing					
ONB-IE	Intermittently Exposed	26-Sep	365970	6250600	0.8	<0.20	0.4	Attached	clay/organic matter/sand
ONB-PW	Predominantly Wetted	26-Sep	365819	6250668	1.8	<0.20	0.5	Slime	sandy clay/silt/organic matter
ONB-OS	Offshore	24-Sep	364967	6250850	4.5	<0.20	1.4	None	clay/silt/organic matter
STL3KM-IE	Intermittently Exposed	22-Sep	365775	6248810	0.7	<0.20	>1	None	silty clay/organic matter
STL3KM-PW	Predominantly Wetted	22-Sep	365815	6248876	3.0	<0.20	1.4	None	silty sandy clay/organic matter
STL3KM-OS	Offshore	22-Sep	366038	6248852	4.6	<0.20	1.4	None	silty clay/sand/organic matter
STL11KM-IE	Intermittently Exposed	24-Sep	376323	6248945	0.9	<0.20	>1	Attached	sand/gravel/organic matter
STL11KMPW	Predominantly Wetted	24-Sep	376460	6248738	2.2	<0.20	1.25	Slime	clay/sand/gravel/silt/organic matter
STL11KM-OS	Offshore	24-Sep	376462	6248830	3.4	<0.20	1.3	None	clay/silt/organic matter