Keeyask Generation Project

Aquatic Effects Monitoring Plan

Benthic Macroinvertebrate Monitoring Report

AEMP-2015-07

Manitoba Hydro

KEEYASK

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KEEYASK GENERATION PROJECT

AQUATIC EFFECTS MONITORING REPORT

Report #AEMP–2015–07

Benthic Macroinvertebrate Monitoring in the Nelson River, 2014: Year 1 Construction

Prepared for

Manitoba Hydro

By

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SUMMARY

BACKGROUND

Construction of the Keeyask Generating Station (GS) at Gull Rapids began in July 2014. Before the government issued a licence to construct the generating station, the Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the generating station on the aquatic environment. Monitoring results will help the KHLP, government regulators, members of local First Nation communities, and the general public understand how construction and operation of the generating station will affect the environment, and whether or not more needs to be done to reduce harmful effects.

The benthic macroinvertebrate community is an important component of the overall plan to monitor the impacts of construction and operation of the Keeyask GS on the aquatic environment. Benthic macroinvertebrates are standard indicators of the health of aquatic environments and are used in monitoring programs worldwide. Macroinvertebrate community metrics (i.e., things measured like type and quantity) are particularly valuable as they integrate environmental conditions over time. Benthic macroinvertebrates are also an important food source for fish and important in describing the quality of fish habitat available for key life stages.

This report presents results of the benthic macroinvertebrate community monitoring conducted during fall, 2014, after the first two months of construction. Samples were collected upstream of construction activities (Burntwood River and Split Lake), and immediately downstream of activities and in Stephens Lake.

WHY IS THE STUDY BEING DONE?

The study is being done to address a key question:

Are construction activities changing the numbers and/or kinds of benthic macroinvertebrates living in the bottom substrate of the Nelson River downstream of the generating station into Stephens Lake in comparison to either upstream and/or pre-construction conditions?

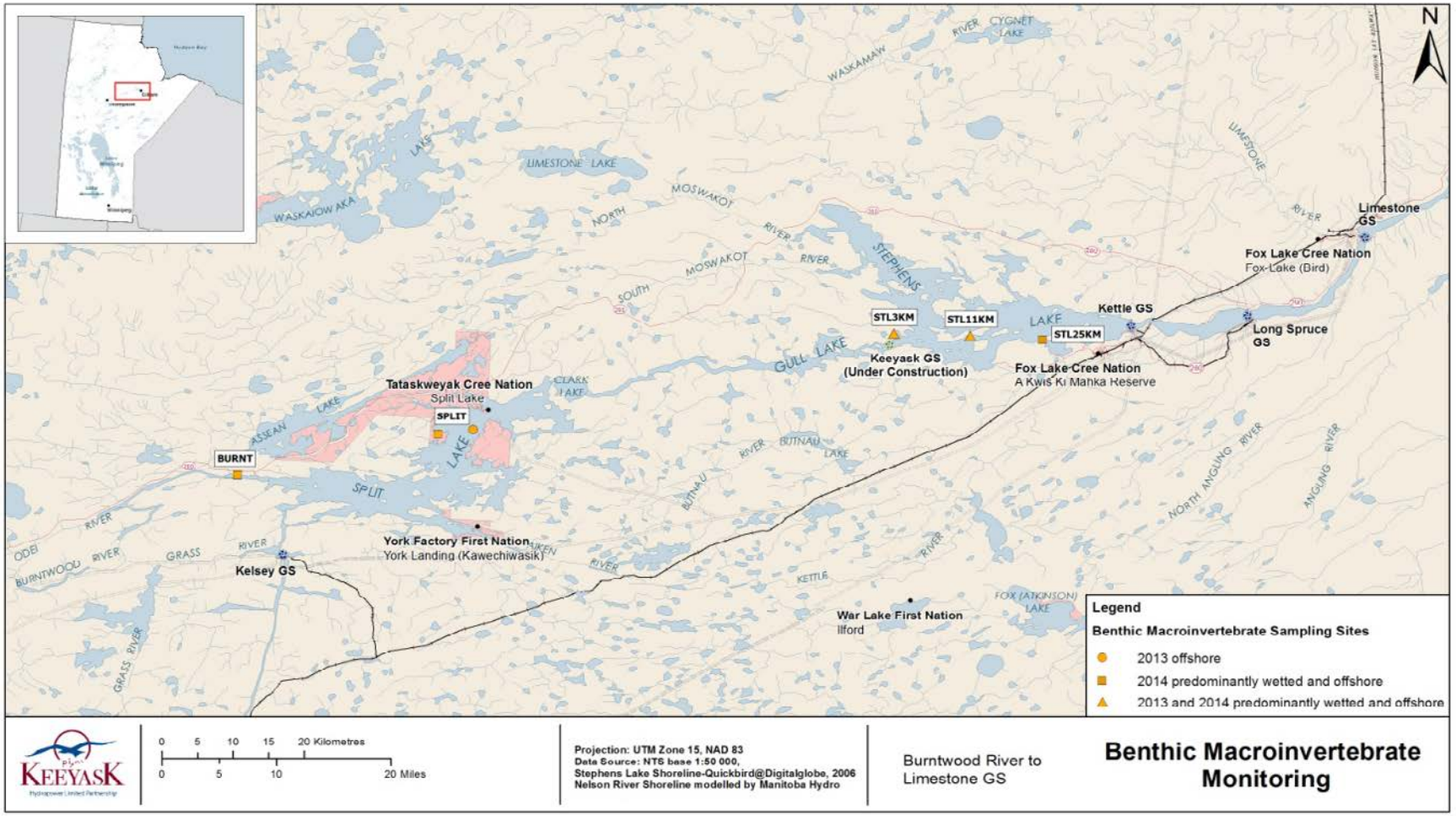
Monitoring addressed the effects of predicted increases in total suspended solids (TSS) due to in-stream construction activities in the Nelson River and sediment deposition in Stephens Lake on the benthic community. If there was a negative effect due to sediment inputs from construction, decreases in metrics such as mayfly abundance (number of mayfly), the percent of total mayfly, stonefly, and caddisfly abundance, and fingernail clam abundance would be seen. Because there is already a large variation in the amount of sediment in the river due to natural variability in river flows, it is expected that the benthic invertebrates living in the Nelson River would be able to withstand short-term increases in the amount of sediment in the water.

WHAT WAS DONE?

Benthic macroinvertebrates were collected in late August to late September of 2013 (pre-construction/baseline) and 2014 (Year 1 of construction).

Releasing the grab of an Ekman dredge filled with benthic macroinvertebrates

Benthic invertebrates were sampled in the Burntwood River just upstream of Split Lake and in Split Lake to indicate 'natural' (i.e., unaffected by construction activities) conditions. Benthic invertebrates were also sampled in three areas to monitor potential impacts of construction activities at increasing distance downstream of Gull Rapids and through Stephens Lake, including approximately 3 km (area immediately downstream), 11 km (near-field area), and 25 km (far-field area) downstream. The near-field area was where some effects on water quality were expected and the far-field area was used to determine if any effects observed at the near-field area extended further downstream or were confined to the area nearer the construction site. Within each sampling area, benthic invertebrates were sampled from both nearshore and offshore habitat types. Five stations were sampled in each of these two habitat types.



Map of the study area. Orange areas show the locations of the reference and impact benthic macroinvertebrate sampling locations during 2013 (pre-construction) and 2014 (Year 1 construction) on the Burntwood River, Split Lake, and the sites downstream of Gull Rapids and in Stephens Lake

WHAT WAS FOUND?

No change in the key metrics, total abundance, total richness (number of different species), and diversity (a calculation that uses the number of each species and the number of different species found) between 2013 (baseline) and 2014 (Year 1 construction) was observed at both Stephens Lake nearshore and offshore sampling locations, with the exception of diversity (which is expected to be negatively affected by increases in TSS) for the offshore sampling location 11 km downstream. Diversity was higher than the baseline mean (average) at this sampling location.

In nearshore habitat at the Stephens Lake 3 km sampling location, mayfly density (number of individuals counted per square metre) and percent mayflies, caddisflies and stoneflies (two metrics expected to be negatively affected by increases in TSS) were significantly higher than the pre-construction baseline mean.

In offshore habitat at Stephens Lake 3 km and 11 km, mayfly density and percent mayflies, caddisflies and stoneflies did not change between 2013 and 2014.

In the nearshore habitat, fingernail clam density (a metric also expected to be negatively affected by increases in TSS) at Stephens Lake 3 km was lower than the baseline mean. No change was seen in fingernail clam density between 2013 and 2014 11 km downstream.

In the offshore habitat, fingernail clam density at the Stephens Lake 3 km sampling location was higher than the pre-construction mean; clams were absent 11 km downstream in 2013 and 2014.

WHAT DOES IT MEAN?

Although some variability in metrics was noted, a response typical of the benthos to increases in TSS was not observed. As such, any changes in benthic community metrics observed between the baseline and Year 1 construction were more likely due to the natural variability in the benthos and minor physical habitat differences among sampling locations and not due to construction activities.

WHAT WILL BE DONE NEXT?

Benthic macroinvertebrate monitoring will be conducted in mid to late August 2015 (Year 2 of construction). Results of monitoring conducted in 2015 will be compared to baseline and Year 1 and presented in the Year 2 construction report.

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1.0 INTRODUCTION

Construction of the Keeyask Generation Project (the Project), a 695 megawatt hydroelectric generating station and associated facilities, began in July 2014. The Project is located at Gull Rapids on the lower Nelson River in northern Manitoba where Gull Lake flows into Stephens Lake, 35 km upstream of the existing Kettle Generating Station (Map 1).

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). As part of the licencing process for the Project, an Aquatic Effects Monitoring Plan (AEMP) was developed detailing the monitoring activities of various components of the aquatic environment including the focus of this report, specifically monitoring the benthic macroinvertebrate community, for the construction and operation phases of the Project.

1.1 PROGRAM DESCRIPTION

Construction monitoring will specifically address the biological effects of predicted increases in total suspended solids (TSS) on the benthic community due to in-stream work on the Nelson River and will complement the water quality program. Monitoring of benthic macroinvertebrates occurred immediately downstream of instream construction activities related to the Keeyask GS where effects, should they be measureable, would be greatest. A series of potentially affected locations extending further downstream would be monitored depending on water quality results (i.e., Long Spruce Reservoir, Limestone Reservoir and downstream of Limestone GS). Benthic macroinvertebrates were also assessed upstream of instream activities in unaffected waterbodies, such as the Burntwood River (First Rapids to Split Lake) and Split Lake (utilizing data collected as part of Manitoba and Manitoba Hydro's Coordinated Aquatic Monitoring Program (CAMP).

The results of the benthic monitoring program will be used to assess the biological effects of predicted increase in TSS due to in-stream work on the Nelson River (intended to complement water quality monitoring) and sediment deposition in Stephens Lake. The key questions that monitoring during construction will address are:

- To what degree will benthic invertebrate abundance and/or community composition change during construction activities in comparison to either upstream or pre-Project conditions?
- Are there any unexpected effects on benthic macroinvertebrates that may be related to GS construction activities?

Unlike water or sediment, where protection of aquatic life guidelines may be used to develop triggers or thresholds for effects assessment, there are no universal benchmarks for biological variables such as abundance or diversity. Rather, the magnitude of change or difference relative to expected conditions is used to establish an appropriate benchmark for biological variables. Based on guidance provided in the Metal Mining EEM document (EC 2012) and the scientific literature, experience with other AEMPs (e.g., Azimuth 2012), and power analysis utilizing CAMP data for a regional waterbody, an effect size of ±50% change in the mean of a metric (in comparison to reference areas and/or baseline data) was chosen as most appropriate to use (i.e., realistically achievable with a well-designed program) for the AEMP.

An adaptive management framework (AMF) was developed for the benthic macroinvertebrate monitoring program, as presented in the AEMP (AEMP Figure 1). In brief, the framework entails initially comparing monitoring results to the pre-established benchmark (Step 1). If the benchmark is not exceeded, the assessment would proceed to Response Level 1 – trend analysis. If the benchmark is exceeded, the assessment would proceed to Step 2 – determination of whether there is a statistical difference between upstream and downstream areas (i.e., control-impact), and/or relative to baseline conditions (before-after). If a statistical difference is not observed, the assessment would proceed to Response Level 1. Where statistical differences are identified for a metric, the assessment would proceed to Step 3, in which a determination of cause (i.e., is the difference Project-related) would be undertaken.

1.2 CONSTRUCTION SUMMARY

Construction of the Keeyask GS began in mid-July 2014, and flows were altered in the north and, later, central channels of Gull Rapids, diverting them into the south channel (Map 2). Between 22 July and 4 August, 2014, flow in the north channel was cut off by construction of the Quarry Cofferdam. As construction continued, flow in the central channel was gradually cut off (construction of the North Channel Cofferdam began on 10 September and dewatering continued to the end of October, 2014). The Powerhouse Cofferdam was constructed at the base of the north channel of Gull Rapids, and dewatered the remainder of the north channel between 2 and 26 October, 2014. Blasting occurred in quarries situated in the north channel intermittently from July to October 2014.

The following report presents the results of benthic macroinvertebrate monitoring completed in the fall of 2014 during Year 1 of construction. Results are assessed using the AMF as summarized above (Section 1.1) and detailed in the AEMP.

2.0 THE KEEYASK STUDY SETTING

Benthic macroinvertebrate community monitoring was conducted in the Burntwood River (First Rapids to Split Lake) and Split Lake to serve as a reference for 'natural' (i.e., unaffected by construction activities), and in a gradient downstream of Gull Rapids and through Stephens Lake at approximately 3 km (area immediately downstream), 11 km (near-field area), and 25 km (far-field area) downstream.

The Burntwood River flows swiftly in a north-easterly direction from First (Unetoianumayo) Rapids for approximately 35 km prior to emptying into the western arm of Split Lake (Map 1). Under high flow conditions, these rapids appear to be a natural barrier to upstream fish passage. Shorelines in this stretch are dominated by moderately sloping bedrock, which is often overlain by fine sediments near First Rapids and becomes increasingly exposed towards Split Lake. Hard substrates predominate in the main channel, while loose fine sediments and associated macrophyte growth occur in many off-current areas. The hydrology of the Burntwood River has been affected by the Churchill River Diversion (CRD). Outflow from the Burntwood River to Split Lake prior to CRD was estimated at 90.0 m^3/s at First Rapids, and increased nearly 10-fold following diversion to 849.0 m^3/s.

Split Lake is the largest lake on the lower Nelson River (Map 1). The surface area of Split Lake is 261.0 km^2, with a mean depth of 4.0 m and a maximum depth of 28 m, at a water surface elevation of 167 m (Kroeker 1999). Water levels on Split Lake are a function of the amount of water flowing into the lake and the narrow constriction at the outlet. Split Lake has defined channels that extend from the inlet of the lake through the central basin north and east to Clark Lake. These channels occur where flows appear to pass through narrows, or where flows diverge when passing groups of islands, which may be distant from the main channel. Split Lake has a complex shoreline and abundant shallow water habitat in areas away from the main basin of deep water, which includes the riverine channel. Most of the offshore area of the lake is deep water. The lake has complex bottom topography, as is shown by many areas of shallow water surrounded by deep water. Water velocities are typically low (less than 0.5 m/s) throughout Split Lake, but increase to over 1.5 m/s at the outlet. Lake substrates are primarily composed of fine mineral sediments (clay and silt) with small amounts of organic material. Macrophyte distributions in the lake are complex. Some of the main areas where plants are found are in shallow, standing water areas in large bays, or in relatively small areas among tightly grouped islands where exposure to wave action is low.

Gull Rapids is located approximately 3 km downstream of Caribou Island on the Nelson River (Map 1). Gull Rapids is the largest set of rapids in the Keeyask area with a drop of approximately 11 m across its approximately 2 km length. There are several islands and channels located in Gull Rapids. Gull Rapids is a dynamic environment, with new channels being cut periodically due to the erosive forces of the existing ice and water processes occurring in the area. Most of the flow (75% to 85%) passes through the south channel of Gull Rapids, with little to no flow being conveyed by the north channel during low Nelson River discharge. All

channels include rapid and turbulent flows featuring the highest velocities (greater than 1.5 m/s) found within the Keeyask area. The substrate and shoreline of Gull Rapids are composed of bedrock and boulders.

Just below Gull Rapids, the Nelson River enters Stephens Lake. Stephens Lake was formed in 1971 by construction of the Kettle GS. Between Gull Rapids and Stephens Lake there is an approximately 6 km long reach of the Nelson River that, although affected by water regulation at the Kettle GS, remains riverine habitat with moderate velocity. 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 (Map 1). Kettle GS is located approximately 40 km downstream of Gull Rapids.

3.0 APPROACH AND METHODS

The following sections provide a description of the study design, sampling sites, field and laboratory methods, and data analysis methods for the benthic macroinvertebrate construction monitoring program.

3.1 STUDY DESIGN

The benthic macroinvertebrate sampling uses a modified sampling design, which was adjusted from the sampling program used for the environmental studies (last conducted in 2006) based on input from regulators and experience gained from the CAMP and Wuskwatim AEMP monitoring programs. The AEMP sampling design is comparable to the current CAMP design, such that data generated by the latter program will be used to augment AEMP reporting. Sampling areas (i.e., polygons) were stratified by water depth and constrained by other aquatic habitat attributes (e.g., substrate type, presence/absence of aquatic plants, water velocity, etc.) such that sampling areas represent the predominant habitat types(s) within each water body and/or those habitat type(s) with predicted effects as defined in the AE SV. Sampling conducted in 2013 (pre-construction) was based on the sampling design refined during AEMP development in an attempt to minimize the inherent variability within the benthic invertebrate data. As such, results are directly comparable to data collected in 2014 (Year 1 of construction). The modifications from the sample design used for the environmental assessment studies will increase the statistical power of the data and comparability to other regional programs (e.g., CAMP, Wuskwatim AEMP).

The construction monitoring program is designed to facilitate comparisons of benthic macroinvertebrate metrics spatially (i.e., upstream and downstream of construction activities) to delineate Project-related effects. Specifically, the program is designed to facilitate statistical comparisons of community metrics in reference areas to those monitored downstream of construction activities (i.e., areas that are predicted to be most affected by the Project). The overall objective of monitoring during the construction period was to determine if in-stream activities resulted in or contributed to exceedances of the benchmark and to confirm predictions in the AE SV.

As TSS was not expected to be increased by more than 5 mg/L above background during Year 1 of construction, the downstream extent of benthic macroinvertebrate monitoring was restricted to Stephens Lake.

3.2 SAMPLING LOCATIONS

Benthic macroinvertebrate sampling was conducted between 22 August and 26 September, 2013 (pre-construction) and 19 August and 17 September, 2014 (Year 1 construction) for the AEMP and CAMP (Table 1). To the extent possible and where feasible, sampling locations were selected such that sampling conducted pre-Project and during construction would be comparable, with monitoring conducted near established baseline sampling sites. Benthos were assessed in the Burntwood River (First Rapids to Split Lake) and Split Lake (used as reference locations; Map 3), and in a gradient downstream of Gull Rapids and through Stephens Lake (potentially affected areas at approximately 3 km, 11 km, and 25 km downstream; Map 4).

Within each sampling polygon, samples were collected from the nearshore in predominantly wetted (PW) habitat and in the deeper offshore (OS) habitat. For PW habitat, water depths of >1 to 3 m, areas with consistent water movement (i.e., standing water, low water velocity), and homogeneous substrate were targeted; areas with aquatic macrophyte beds were avoided. For the OS, sampling sites were constrained by the same habitat attributes, with the exception of water depth, which was >3 to 10 m. The spatial extent of a polygon was at least 100 m x 100 m, and large enough to adequately accommodate five replicate stations. For 2013 and 2014, the location of the five replicate stations were established by field crews and selected based on specific habitat attributes (i.e., water depth, substrate type, absence of aquatic plants, water velocity) and the spatial separation criteria outlined in the Metal Mining Technical Guidance for Environmental Effects Monitoring (EEM; EC 2012). By EEM definition, a replicate station is a specific, fixed sampling location within an area that can be determined recognized, re-sampled and defined quantitatively (e.g., UTM position and a written description). The geographic extent of each replicate station was minimally 10 m x 10 m and separated from other replicate stations by at least 20 m. Within the habitat type(s), a replicate station consisted of three to five randomly collected benthic invertebrate sub-samples; the sub-samples were composited to provide an estimate of the benthic community at each station. Field sub-samples were collected using a random number table and from designated sampling locations around an anchored boat within the 10 m x 10 m replicate station area.

3.3 FIELD SAMPLING AND LABORATORY METHODS

3.3.1 SUPPORTING IN SITU AND SEDIMENT

Supporting environmental variables measured/recorded at each replicate station included:

- water temperature (using a hand-held thermometer for water surface measurement);
- UTM position (using a hand-held GPS receiver);
- water transparency (using a Secchi disk);

- water velocity (using a Swoffer current velocity meter at approximately 20 cm below water surface or visually estimated);
- riparian vegetation (photographic record and visual description);
- aquatic macrophytes (description of relative abundance and dominant type); and,
- dominant and secondary substrate types.

An additional benthic grab was taken at each replicate station and sub-sampled with a 5 cm diameter core tube (0.002 m^2 surface area) to provide a sample of approximately 100 mL of sediment to characterize the general type of sediments in terms of total organic content (TOC) and particle size composition. Sediment samples were sent frozen in coolers to North/South Consultants Inc. (NSC) laboratory (Winnipeg, MB) and stored frozen/cold pending submission to the analytical laboratory. Sediment laboratory analyses were conducted by ALS Laboratory Group (ALS; Winnipeg, MB).

Supporting environmental variables measured/recorded at each sub-sample/grab site included:

- water depth (using a hand-held depth sounder or metered benthic dredge rope);
- presence/absence of aquatic macrophytes in sub-sample; and,
- substrate composition (visual description e.g., % cobble, gravel, silt, etc).

3.3.2 BENTHIC MACROINVERTEBRATES

Benthic invertebrates were sampled at sites using either a petite Ponar dredge or an Ekman dredge (both with 0.023 m^2 opening). All sites were accessed by boat.

At each site within a replicate station, one benthic invertebrate sample was retrieved to the surface and carefully sieved through a 500 µm mesh rinsing bag. An acceptable 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 is completed) and the procedure was repeated. All sampling equipment was rinsed before sampling at the next site. All material, including invertebrates, retained by the screen was transferred to labelled plastic jars and fixed with 10% formaldehyde. Fixed samples were shipped to the NSC laboratory (Winnipeg, MB) for processing.

At the laboratory, samples from all locations were rinsed with water through a 500 µm sieve and sorted under a 3X magnifying lamp. The 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 from Clifford (1991), Merritt and Cummins (1996), Peckarsky et al. (1990), Smith (2001), Stewart and Stark (2002), and Wiggins (2004) were used for taxonomic identification. Scientific names used followed the Integrated Taxonomic Information System (ITIS 2015) classification. Invertebrates were identified to major group (subclass, order,

or family) and Ephemeroptera were identified to genus. All invertebrate identification and enumeration was performed by an invertebrate taxonomist at NSC.

All samples were processed following NSC's Quality Assurance/Quality Control (QA/QC) guidelines (Appendix 1). All sorted samples are checked by a second 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. Ten percent (10%) of the in-house identifications were randomly selected and sent to an external taxonomy specialist for QA/QC. The accuracy of the sample subset is assessed for identification and enumeration. This specialist was also able to identify any uncertain or unknown organisms. 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 any in-house data discrepancies. For the 2013 and 2014 benthic macroinvertebrate monitoring program, the overall percent identification error at the family-level was 4.7% (95.3% accurate), and ranged between 0.0% and 15.0% (100% to 85.0% accurate) for individual samples. The identification error is the result of one particular group at a taxonomic level that has no influence on conclusions for this program. Recalculation of the identification error including that particular taxa group at a higher taxonomic level resulted in an overall percent identification error of only 0.5% (99.5% accurate).

All sorted samples will be retained and archived for the duration of the construction phase should further identification be required. A reference collection of benthic invertebrates will be maintained to ensure taxonomic consistency throughout the monitoring program duration.

3.4 DATA ANALYSIS

3.4.1 SUPPORTING SEDIMENTS

Summary statistics (mean, standard deviation [± SD], standard error [± SE], median, minimum, and maximum, coefficient of variation [COV (%)], and mean ±50%) were calculated to characterize the general type of sediments observed in each aquatic habitat type sampled within a polygon. To facilitate such calculations, any parameters measured below the analytical detection limit were assigned a value of one-half the detection limit. All parameters were reviewed and comparisons to ±50% difference in the mean of a metric in comparison to reference locations and/or baseline data were done to identify any potential physical habitat differences among sampling locations. For each parameter that was greater than 50% different, a statistical comparison was undertaken (as described in Section 3.4.2).

3.4.2 BENTHIC MACROINVERTEBRATES

To prepare data for analysis, abundance of invertebrates was converted to density (number of invertebrates per square meter [individuals/m^2]) by dividing the total number of invertebrates by the area of the sampling device (0.023 m^2). The mean, standard deviation (± SD), standard error (± SE), median, minimum, maximum, COV (%), and mean ±50% were calculated to characterize each aquatic habitat type sampled within a polygon for each waterbody.

Benthic invertebrate community descriptors were calculated for each replicate station and habitat type. Composition metrics included:

- Total macroinvertebrate density;
- Densities and relative proportions of major groups. (non-Insecta: Oligochaeta, Amphipoda, Bivalvia, Gastropoda; Insecta: Chironomidae, Ephemeroptera, Plecoptera, Trichoptera);
- Percent Ephemeroptera;
- Percent EPT (EPT index; Sullivan et al. 2004);
- Percent of total organisms made up of Oligochaeta and Chironomidae; and,
- Ratio of EPT to Chironomidae.

Richness measures included:

- Total taxonomic richness (family-level; total number of invertebrate families within a habitat polygon; Barbour et al. 1999; Klemm et al. 2002; Resh et al. 1997); and,
- EPT richness (family-level; total number of families of Ephemeroptera, Plecoptera, and Trichoptera within a habitat polygon).

Diversity indices included:

- Simpson's Diversity Index (EC 2012; Magurran 1988, 2004; Mandaville 2002).

The AEMP identified less variable (i.e., more sensitive to change) benthic macroinvertebrate community metrics and a benchmark to focus the monitoring program and provide a framework for adaptive management. The variability of numerous benthic macroinvertebrate metrics measured during the CAMP were evaluated and described to assist with identifying the most robust metrics for further statistical exploration and consideration under the AEMP. Less variable metrics (i.e., key metrics) identified through this process were:

- Total macroinvertebrate abundance;
- Total taxonomic richness; and
- Simpson's Diversity Index.

As summarized in Section 1.1, and detailed in the AEMP, results of the benthic macroinvertebrate monitoring program are to be subject to the steps identified within the AMF. This framework prescribes data analysis methods and other tasks to be undertaken based on

results of the monitoring program. Step 1 of the AMF entails comparison of the mean values of replicate samples for metrics to the benchmark identified in the AEMP. If the benchmark is not exceeded, the assessment would proceed to Response Level 1 – trend analysis. If the benchmark is exceeded, the assessment would proceed to Step 2 – determination of whether there is a statistical difference between upstream and downstream areas (i.e., control-impact) and/or relative to baseline conditions (before-after). If a statistical difference is not observed, the assessment would proceed to Response Level 1. Where statistical differences are identified, the assessment would proceed to Step 3, in which a determination of cause (i.e., is the difference Project-related) would be undertaken.

All metrics were reviewed and comparisons to the benchmark (i.e., ±50% change in the mean of a metric in comparison to reference locations and/or baseline data) were done to identify the potential for adverse effects on the benthic macroinvertebrate community. For each metric that exceeded the benchmark, a statistical comparison between reference and exposure locations and/or baseline data was undertaken. Prior to statistical analyses, macroinvertebrate metrics were tested for normality and homogeneity of variances and where the assumptions were met, were compared through a t-test or an Analysis of Variance (ANOVA) with Bonferroni pairwise comparison ($\alpha = 0.05$). Where these assumptions were not met, non-parametric analyses were applied such as the Mann-Whitney U-test or Kruskal-Wallis test followed by Dunn's multiple pairwise comparisons procedure ($\alpha = 0.05$). When data are non-normal, non-parametric tests are more powerful than parametric ones, i.e., non-parametric analyses may be able to detect significant differences in the data when parametric analyses would not (Zar 1999). Non-parametric analyses are performed on ranks of the data and therefore do not require transformation of data; thus, all analyses are performed on the raw data. All analyses were performed using a current version of XLStat.

4.0 RESULTS

4.1 SUPPORTING SEDIMENTS

Sediment data for individual replicate stations sampled in 2013 and 2014 are presented in Appendix 2.

4.1.1 NEARSHORE PREDOMINANTLY WETTED

Mean TOC (%) measured in predominantly wetted habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Stephens Lake 11 km (Table 2). The benchmark was exceeded at Stephens Lake 3 km and the TOC of sediments was significantly higher than that measured in 2013. Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km. Mean TOC measured in predominantly wetted habitat in Stephens Lake (3 km, 11 km, and 25 km) was within ±50% of the Split Lake (reference) mean; downstream data were not compared to the Burntwood River as it is more riverine in nature in comparison to Split and Stephens lakes.

Mean sand (%) in 2014 was within ±50% of the pre-construction mean at Stephens Lake 3 km and 11 km (Table 3). Sand content of sediments appeared to increase in a downstream direction through Stephens Lake. Mean sand content at Stephens Lake 11 km and 25 km was within ±50% of the Split Lake mean, however, the sand content at 3 km was lower than -50% of the Split Lake mean.

Mean silt (%) in 2014 was within ±50% of the pre-construction mean at Stephens Lake 3 km and 11 km (Table 4). Silt content of sediments appeared to decrease at the most downstream sampling location in Stephens Lake. Mean silt content at Stephens Lake 3 km and 11 km was within ±50% of the Split Lake mean, however, the silt content at 25 km was lower than -50% of the Split Lake mean.

Mean clay (%) in 2014 was within ±50% of the pre-construction mean at Stephens Lake 3 km and 11 km (Table 5). Clay content of sediments appeared to decrease in a downstream direction through Stephens Lake. Mean clay content at Stephens Lake 11 km and 25 km was within ±50% of the Split Lake mean, however, the clay content at 3 km was higher than +50% of the Split Lake mean.

Any variability noted was likely related to physical habitat differences between sampling locations, rather than construction activities.

4.1.2 OFFSHORE

Mean TOC (%) measured in offshore habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Split Lake and Stephens Lake 3 km (Table 6). The benchmark was exceeded at Stephens Lake 11 km; however the TOC of sediments was not significantly higher than that measured in 2013. Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25 km. Mean TOC measured in offshore habitat in Stephens Lake (3 km, 11 km, and 25 km) was within ±50% of the Split Lake (reference) mean, with the exception of Stephens Lake 11 km and 25 km in 2014 (higher than +50% of the Split Lake mean); downstream data were not compared to the Burntwood River as it is more riverine in nature in comparison to Split and Stephens lakes.

Mean sand (%) in 2014 was within ±50% of the pre-construction mean at Split Lake and Stephens Lake 11 km (Table 7). The benchmark was exceeded at Stephens Lake 3 km and sand content was significantly higher than that measured in 2013. Sand content of sediments appeared to decrease in a downstream direction through Stephens Lake. Mean sand content at Stephens Lake 3 km in 2014 was within ±50% of the Split Lake mean; sand content at 3 km in 2013 and further downstream (both years) was lower than -50% of the Split Lake mean.

Mean silt (%) in 2014 was within ±50% of the pre-construction mean at Split Lake, and Stephens Lake 3 km and 11 km (Table 8). Mean silt content at all Stephens Lake sampling locations was within ±50% of the Split Lake mean.

Mean clay (%) in 2014 was within ±50% of the pre-construction mean at Split Lake, and Stephens Lake 3 km and 11 km (Table 9). Mean clay content downstream throughout Stephens Lake was within ±50% of the Split Lake mean, with the exception of clay content at 3 km in 2013 that was higher than +50% of the Split Lake mean.

Any variability noted was likely related to physical habitat differences between sampling locations, rather than construction activities.

4.2 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrate data for individual replicate stations sampled in 2013 and 2014 are presented in Appendix 2. Summary statistics by habitat type for metrics not presented in the following sections are provided in Appendix 3.

Obvious differences among the benthic macroinvertebrate communities in Split Lake (reference) and Stephens Lake (impact) were noted for the baseline program (2013). For example, the mean total macroinvertebrate density measured in Stephens Lake in the offshore exceeded the benchmark (i.e., was less than) when compared to the same habitat type in Split Lake. As such, the assessment of potential effects of construction-related activities on the downstream benthos also included:

- Investigating the changes over time in metrics used to describe the community at each impact polygon in comparison to any observed changes over time at reference polygons, for the same aquatic habitat types sampled; and
- Relating any observed changes over time in benthic community metrics in sampled aquatic habitat types at impact polygons to changes in the input of total TSS.

4.2.1 KEY METRICS

4.2.1.1 TOTAL MACROINVERTEBRATE ABUNDANCE

4.2.1.1.1 NEARSHORE PREDOMINANTLY WETTED

Mean total macroinvertebrate density measured in predominantly wetted habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Stephens Lake 3 km and 11 km (Table 10). Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km; in 2014, mean total density appeared to increase somewhat in a downstream direction through Stephens Lake (Figure 2). Mean total macroinvertebrate density measured in predominantly wetted habitat in Stephens Lake (3 km, 11 km, and 25 km) was higher than +50% of the Split Lake (reference) mean; downstream data were not compared to the Burntwood River as it is more riverine in nature in comparison to Split and Stephens lakes.

4.2.1.1.2 OFFSHORE

Mean total macroinvertebrate density measured in offshore habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Split Lake, and Stephens Lake 3 km and 11 km (Table 11). Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25 km; in 2014, mean total density appeared to increase somewhat in a downstream direction through Stephens Lake (Figure 3). Mean total macroinvertebrate density measured in offshore habitat in 2013 and 2014 in Stephens Lake (3 km, 11 km, and 25 km [2014 only]) was lower than -50% of the Split Lake (reference) mean; downstream data were not compared to the Burntwood River as it is more riverine in nature in comparison to Split and Stephens lakes.

4.2.1.2 TOTAL TAXONOMIC RICHNESS

4.2.1.2.1 NEARSHORE PREDOMINANTLY WETTED

Mean total taxonomic richness (family level) measured in predominantly wetted habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Stephens Lake 3 km and 11 km (Table 12). Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km; in 2014, mean total richness was comparable

among Stephens Lake sampling locations (Figure 4). Mean total richness measured in predominantly wetted habitat in Stephens Lake (3 km, 11 km, and 25 km) was within ±50% of the Split Lake mean for comparable habitat.

4.2.1.2.2 OFFSHORE

Mean total richness measured in offshore habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Split Lake, and Stephens Lake 3 km and 11 km (Table 13). Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25 km; in 2014, mean total richness appeared to decrease slightly in a downstream direction through Stephens Lake (Figure 5). Mean total richness measured in offshore habitat in 2013 and 2014 in Stephens Lake (3 km and 11 km) was within ±50% of the Split Lake mean for comparable habitat; total richness at Stephens Lake 25 km (2014 only) was marginally lower than -50% of the Split Lake mean.

4.2.1.3 SIMPSON'S DIVERSITY INDEX

4.2.1.3.1 NEARSHORE PREDOMINANTLY WETTED

Mean Simpson's diversity measured in predominantly wetted habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Stephens Lake 3 km and 11 km (Table 14). Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km; in 2014, mean diversity appeared to increase somewhat in a downstream direction through Stephens Lake (Figure 6). Mean diversity measured in predominantly wetted habitat in Stephens Lake (3 km, 11 km, and 25 km) was within ±50% of the Split Lake mean for comparable habitat.

4.2.1.3.2 OFFSHORE

Mean Simpson's diversity measured in offshore habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Split Lake and Stephens Lake 3 km (Table 15). The benchmark was exceeded at Stephens Lake 11 km; however diversity was not significantly higher than that measured in 2013. Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25 km; in 2014, mean diversity was somewhat lower at Stephens Lake 11 km in comparison to 3 km and 25 km sampling locations (Figure 7). Mean total richness measured in offshore habitat in 2013 and 2014 in Stephens Lake (3 km ,11 km [2014 only], and 25 km [2014 only]) was within ±50% of the Split Lake mean for comparable habitat; total diversity at Stephens Lake 11 km in 2013 was somewhat lower than -50% of the Split Lake mean.

4.2.2 ADDITIONAL METRICS

Benthic macroinvertebrate metrics expected to be negatively affected by increases in TSS include a decrease in Ephemeroptera (mayfly) abundance, percent EPT (percent mayfly, stonefly, and caddisfly), and Pisidiidae (fingernail clam) abundance; as such, they are presented in the following sections.

4.2.2.1.1 NEARSHORE PREDOMINANTLY WETTED

Mean mayfly density measured in predominantly wetted habitat in 2014 at Stephens Lake 3 km was significantly higher than +50% of the pre-construction mean (Table 16). Mean mayfly density at Stephens Lake 11km was significantly less than -50% of the pre-construction mean. The variability in mayfly abundance at these sampling locations between 2013 and 2014 may be primarily attributed to Ephemeridae (*Hexagenia* sp.; burrowing mayfly). This genus of mayfly has a two-year life cycle with a larger cohort emerging on alternate years. Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km; in 2014, mean mayfly density appeared to increase between 3 km and 11 km downstream, but decreased at Stephens Lake 25 km. Mean mayfly density measured in predominantly wetted habitat in Stephens Lake (3 km, 11 km, and 25 km) was higher than +50% of the Split Lake (reference) mean; downstream data were not compared to the Burntwood River as it is more riverine in nature in comparison to Split and Stephens lakes.

Mean percent (%) EPT measured in predominantly wetted habitat in 2014 at Stephens Lake 3 km was significantly higher than +50% of the pre-construction mean (Table 17). Mean % EPT at Stephens Lake 11km was within ±50% of the pre-construction mean. Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km; in 2014, mean % EPT appeared to increase between 3 km and 11 km downstream, but decreased at Stephens Lake 25 km. Mean % EPT measured in predominantly wetted habitat in Stephens Lake (3 km, 11 km, and 25 km) was within ±50% of the Split Lake mean.

Mean fingernail clam density measured in predominantly wetted habitat in 2014 at Stephens Lake 3 km was lower than -50% of the pre-construction mean; however, this result was not significant (Table 18). Mean fingernail clam density at Stephens Lake 11km was within ±50% of the pre-construction mean. Predominantly wetted habitat was only sampled in 2014 in the Burntwood River, Split Lake, and Stephens Lake 25 km; in 2014, fingernail clam density appeared to increase in a downstream direction through Stephens Lake. Mean fingernail clam density measured in predominantly wetted habitat in Stephens Lake 3 km was somewhat lower than -50% of the Split Lake mean; density at 11 km and 25 km was notably higher than +50% of the reference mean.

4.2.2.1.2 OFFSHORE

Mean mayfly density measured in offshore habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Split Lake, and Stephens Lake 3 km and 11 km (Table 19). Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25

km; in 2014, mean mayfly density was notably higher at 11 km and 25 km in comparison to Stephens Lake 3 km. Mean mayfly density measured in offshore habitat in 2013 and 2014 at Stephens Lake 3 km was lower than -50% of the Split Lake mean. Mayfly density at 11 km (2013) and 25 km (2014) was within ±50% of the Split Lake mean; density at 11 km in 2014 was higher than +50% of the reference mean.

Mean percent EPT measured in offshore habitat in 2014 was within the benchmark value (±50% of the pre-construction mean) at Stephens Lake 3 km and 11 km (Table 20); % EPT in Split Lake in 2014 was lower than -50% of the 2013 mean, however this result was not significant. Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25 km; in 2014, mean % EPT was notably higher at 11 km and 25 km in comparison to Stephens Lake 3 km. Mean % EPT measured in offshore habitat at Stephens Lake 3 km was lower than -50% of the Split Lake mean in 2013, but within ±50% of the mean in 2014. Percent EPT at Stephens Lake 11 km (2013 and 2014) and 25 km (2014 only) was higher than +50% of the reference mean.

Mean fingernail clam density measured in offshore habitat in 2014 was higher than the benchmark value (+50% of the pre-construction mean) at Stephens Lake 3 km, however this result was not significant (Table 21); fingernail clam density in Split Lake in 2014 was within ±50% of the 2013 mean. Offshore habitat was only sampled in 2014 in the Burntwood River and Stephens Lake 25 km. In 2014, mean fingernail clam density was lower at 11 km (0 individuals/m^2) and 25 km in comparison to Stephens Lake 3 km; however densities were relatively low at all sampling locations in Stephens Lake. Mean fingernail clam density measured in offshore habitat at Stephens Lake 3 km (2013 and 2014), 11 km (2013 and 2014), and 25 km (2014 only) was considerably lower than -50% of the Split Lake mean.

5.0 DISCUSSION

A response typical of the benthos to increases in TSS was not observed in Stephens Lake (3 km, 11 km, and 25 km downstream sampling locations). This was supported by the following observations:

- No change in key metrics (total macroinvertebrate abundance, total taxonomic richness, and Simpson's diversity index) between 2013 (baseline) and 2014 (Year 1 construction) at Stephens Lake sampling locations in both nearshore predominantly wetted and offshore habitats, with the exception of diversity (a metric expected to be negatively affected by increases in TSS) for offshore habitat at 11km; diversity was higher than +50% of the baseline mean, but not significantly so.
- In nearshore habitat in 2014, mayfly density and percent EPT (two metrics expected to be negatively affected by increases in TSS) were significantly higher than +50% of the pre-construction mean at Stephens Lake 3 km.
- In offshore habitat in 2014, mayfly density and % EPT were within the benchmark values (±50% of the pre-construction mean) at Stephens Lake 3 km and 11 km.
- In the nearshore habitat in 2014, fingernail clam density (a metric expected to be negatively affected by increases in TSS) was lower (not significant) than -50% of the baseline mean at Stephens Lake 3 km (relatively low density of clams), but within ±50% of the pre-construction mean at 11 km (relatively higher density of clams).
- In the offshore habitat in 2014, fingernail clam density (relatively low density of clams) was higher (not significant) than +50% of the pre-construction mean at Stephens Lake 3 km; clams were absent from 11 km in 2013 and 2014.

The water quality monitoring data collected during major in-stream construction activities in the open-water season of 2014 collectively showed that there was no marked effect on the water quality in the local study area and, in particular, there was no evidence that activities affected long-term TSS concentrations in the local study area (Wyn and Cooley 2015). The benthos inhabiting the Nelson River should be able to withstand very short-term increases (i.e., days to a few weeks) in suspended and benthic sediments with negligible effects over the long-term. This characteristic of the benthos, in combination with no marked effect on the water quality (including TSS concentration) during 2014 in-stream construction activities, makes it highly unlikely that any response of the benthos to the inputs of TSS occurred.

Although some variability in metrics was noted, a response typical of the benthos to increases in TSS was not observed. As such, any changes in benthic community descriptors observed between the baseline and Year 1 construction were more likely due to the inherent natural variability, both spatial and temporal, in the benthos and minor physical habitat differences among sampling locations.

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TABLES

Table 1: Coordinates and supporting habitat variables measured at benthic macroinvertebrate monitoring sites sampled in 2013 (pre-construction) and 2014 (Year 1 construction).

Waterbody	Site ID	Habitat Type	Sample Date	Study Year	UTM (NAD 83)			Water Temperature	Water Velocity	Water Depth (mean)	Secchi Depth (mean)	Substrate
					Zone	Easting	Northing					
Units								°C	m/sec	meters	meters	description
Stephens Lake	STL3KM-PW	Nearshore: predominantly-wetted	25-Sep-13	2013	15	365672	6248917	14	0	2.8	0.33	clay
Stephens Lake	STL11KM-PW	Nearshore: predominantly-wetted	26-Sep-13	2013	15	376454	6248753	11	0	2.4	0.58	clay
Split Lake	SPLIT-OS	Offshore	22-Aug-13	2013	14	678461	6233976	17	0	7.4	0.46	clay
Stephens Lake	STL3KM-OS	Offshore	25-Sep-13	2013	15	366128	6248908	14	0.02	6.1	0.30	clay
Stephens Lake	STL11KM-OS	Offshore	26-Sep-13	2013	15	376340	6248573	11	0	6.9	0.70	clay
Burntwood River	BURNT-PW	Nearshore: predominantly-wetted	19-Aug-14	2014	14	645413	6224249	18	0.17	2.5	0.45	clay
Split Lake	SPLIT-PW	Nearshore: predominantly-wetted	23-Aug-14	2014	14	673602	6232992	17	0	2.6	0.30	clay
Stephens Lake	STL3KM-PW	Nearshore: predominantly-wetted	16-Sep-14	2014	15	365666	6248912	10	0	2.8	0.30	silt/OM
Stephens Lake	STL11KM-PW	Nearshore: predominantly-wetted	16-Sep-14	2014	15	376451	6248753	10	0	2.2	0.30	silt/clay/OM
Stephens Lake	STL25KM-PW	Nearshore: predominantly-wetted	17-Sep-14	2014	15	386545	6247951	10	0	2.5	0.35	silt/clay

Waterbody	Site ID	Habitat Type	Sample Date	Study Year	UTM (NAD 83)			Water Temperature	Water Velocity	Water Depth (mean)	Secchi Depth (mean)	Substrate
					Zone	Easting	Northing					
Units								**°C**	**m/sec**	**meters**	**meters**	**description**
Burntwood River	BURNT-OS	Offshore	19-Aug-14	2014	14	646090	6224449	18	0.32	8.3	0.35	clay/ organic matter
Split Lake	SPLIT-OS	Offshore	23-Aug-14	2014	14	678466	6233977	18	0	7.8	0.52	clay
Stephens Lake	STL3KM-OS	Offshore	16-Sep-14	2014	15	376451	6248753	10	0	6.0	0.30	silt/clay
Stephens Lake	STL11KM-OS	Offshore	16-Sep-14	2014	15	376354	6248567	10	0	6.8	0.30	clay
Stephens Lake	STL25KM-OS	Offshore	17-Sep-14	2014	15	385548	6248048	10	0	9.1	0.35	clay

Table 2: Summary statistics for total organic carbon (TOC, percent) measured in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Total Organic Carbon (TOC, percent)**						
n	5	5	5	5	5	5	5
Mean	1.34	2.17	1.28	2.38	1.86	2.51	1.16
Minimum	1.14	1.51	1.13	1.67	0.49	1.26	0.35
Maximum	1.51	3.97	1.48	3.13	3.61	5.60	2.52
Median	1.38	1.65	1.25	2.28	1.68	1.64	0.40
Standard deviation (n-1)	0.14	1.05	0.16	0.61	1.13	1.78	1.08
Standard error of the mean	0.06	0.47	0.07	0.27	0.50	0.80	0.48
COV (%)	10.11	48.24	12.33	25.47	60.39	70.98	93.80
+50% Mean	2.01	3.26	1.92	3.56	2.80	3.77	1.73
-50% Mean	0.67	1.09	0.64	1.19	0.93	1.26	0.58
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Table 3: Summary statistics for sand (%) measured in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric				**Sand (%)**			
n	5	5	5	5	5	5	5
Mean	27.09	39.30	11.22	10.18	38.84	41.86	74.86
Minimum	6.54	25.90	9.38	3.46	4.01	10.60	54.00
Maximum	39.60	55.00	12.60	18.20	75.70	55.50	90.40
Median	29.80	40.60	11.40	9.60	49.60	52.90	74.10
Standard deviation (n-1)	13.05	10.78	1.41	5.43	30.62	19.27	15.76
Standard error of the mean	5.83	4.82	0.63	2.43	13.69	8.62	7.05
COV (%)	48.17	27.42	12.61	53.33	78.83	46.04	21.05
+50% Mean	40.63	58.95	16.82	15.27	58.26	62.79	112.29
-50% Mean	13.54	19.65	5.61	5.09	19.42	20.93	37.43
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 4: Summary statistics for silt (%) measured in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric				**Silt (%)**			
n	5	5	5	5	5	5	5
Mean	52.84	41.32	41.46	49.96	46.58	41.72	14.80
Minimum	41.60	30.00	38.20	42.10	16.50	34.90	4.72
Maximum	70.50	49.10	42.80	61.20	71.60	51.40	27.40
Median	49.90	40.20	42.80	50.80	40.30	36.10	17.70
Standard deviation (n-1)	11.19	7.54	2.04	7.67	24.17	8.67	9.66
Standard error of the mean	5.00	3.37	0.91	3.43	10.81	3.88	4.32
COV (%)	21.18	18.25	4.91	15.36	51.90	20.77	65.29
+50% Mean	79.26	61.98	62.19	74.94	69.87	62.58	22.20
-50% Mean	26.42	20.66	20.73	24.98	23.29	20.86	7.40
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 5: Summary statistics for clay (%) measured in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric				**Clay (%)**			
n	5	5	5	5	5	5	5
Mean	20.06	19.38	47.32	39.82	14.58	16.39	10.34
Minimum	17.70	15.00	44.60	35.30	7.82	8.36	4.18
Maximum	23.00	25.00	52.40	48.60	25.00	37.90	27.20
Median	20.30	19.10	45.80	38.20	11.90	12.20	6.88
Standard deviation (n-1)	2.03	3.60	3.37	5.16	6.96	12.17	9.55
Standard error of the mean	0.91	1.61	1.51	2.31	3.11	5.44	4.27
COV (%)	10.10	18.57	7.13	12.96	47.74	74.25	92.42
+50% Mean	30.09	29.07	70.98	59.73	21.88	24.59	15.51
-50% Mean	10.03	9.69	23.66	19.91	7.29	8.20	5.17
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 6: Summary statistics for total organic carbon (TOC, Percent) measured in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Total Organic Carbon (TOC, percent)**							
n	5	5	5	5	5	5	5	5
Mean	1.68	1.07	1.28	1.12	1.47	1.24	2.21	2.03
Minimum	1.34	1.01	1.10	0.75	0.77	1.11	1.27	1.88
Maximum	1.80	1.15	1.34	1.59	2.43	1.36	5.71	2.23
Median	1.76	1.05	1.32	1.16	1.51	1.23	1.30	2.01
Standard deviation (n-1)	0.19	0.05	0.10	0.32	0.65	0.10	1.96	0.14
Standard error of the mean	0.09	0.02	0.05	0.14	0.29	0.04	0.88	0.06
COV (%)	11.52	4.99	7.91	28.18	44.58	7.71	88.75	6.82
+50% Mean	2.52	1.60	1.92	1.68	2.20	1.86	3.31	3.04
-50% Mean	0.84	0.53	0.64	0.56	0.73	0.62	1.10	1.01
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A

Table 7: Summary statistics for sand (%) measured in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric					**Sand (%)**			
n	5	5	5	5	5	5	5	5
Mean	11.51	18.58	18.52	2.05	15.17	0.47	0.29	0.18
Minimum	3.55	17.60	14.80	1.08	2.18	0.27	0.11	0.11
Maximum	35.90	19.50	24.20	3.51	45.20	0.57	0.48	0.31
Median	5.42	19.00	17.70	1.90	9.63	0.50	0.29	0.14
Standard deviation (n-1)	13.70	0.83	3.61	0.90	17.50	0.12	0.15	0.08
Standard error of the mean	6.13	0.37	1.62	0.40	7.83	0.05	0.07	0.04
COV (%)	119.01	4.48	19.51	43.99	115.35	24.94	52.13	46.98
+50% Mean	17.27	27.87	27.78	3.08	22.76	0.70	0.44	0.27
-50% Mean	5.76	9.29	9.26	1.03	7.59	0.23	0.15	0.09
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Table 8: Summary statistics for silt (%) measured in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric					**Silt (%)**			
n	5	5	5	5	5	5	5	5
Mean	57.84	61.40	53.42	37.20	50.08	72.48	66.28	72.66
Minimum	39.10	50.50	50.00	21.50	30.60	68.10	59.90	66.20
Maximum	63.10	79.70	56.60	52.30	61.30	75.70	68.60	76.70
Median	62.70	55.60	53.50	40.20	51.80	73.70	67.40	72.30
Standard deviation (n-1)	10.49	11.69	2.51	12.84	12.40	3.36	3.61	4.33
Standard error of the mean	4.69	5.23	1.12	5.74	5.55	1.50	1.61	1.94
COV (%)	18.14	19.04	4.70	34.51	24.77	4.63	5.44	5.96
+50% Mean	86.76	92.10	80.13	55.80	75.12	108.72	99.42	108.99
-50% Mean	28.92	30.70	26.71	18.60	25.04	36.24	33.14	36.33
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 9: Summary statistics for clay (%) measured in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric					**Clay (%)**			
n	5	5	5	5	5	5	5	5
Mean	30.64	20.00	28.04	60.76	34.76	27.04	33.44	27.14
Minimum	24.90	2.72	20.90	46.10	24.20	23.70	31.20	23.10
Maximum	33.80	30.40	31.40	75.00	38.60	31.70	40.00	33.60
Median	31.50	25.30	28.80	57.60	36.50	25.80	32.10	27.60
Standard deviation (n-1)	3.55	10.94	4.16	12.15	6.02	3.50	3.69	4.33
Standard error of the mean	1.59	4.89	1.86	5.43	2.69	1.57	1.65	1.94
COV (%)	11.57	54.67	14.83	20.00	17.31	12.94	11.04	15.95
+50% Mean	45.96	30.01	42.06	91.14	52.14	40.56	50.16	40.71
-50% Mean	15.32	10.00	14.02	30.38	17.38	13.52	16.72	13.57
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 10: Summary statistics for total macroinvertebrate abundance (density, no. per m^2) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Total Invertebrate Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	1409.28	689.64	1204.99	1480.26	3034.97	1751.50	2461.33
Minimum	761.77	403.97	727.15	476.11	1566.83	1428.32	1168.63
Maximum	1999.65	865.65	1523.55	2351.69	4241.69	2495.96	4429.25
Median	1307.13	721.38	1263.85	1514.89	3298.13	1529.32	2669.09
Standard deviation (n-1)	470.26	179.74	301.52	851.38	1081.24	445.22	1320.63
Standard error of the mean	210.31	80.38	134.84	380.75	483.55	199.11	590.61
COV (%)	33.37	26.06	25.02	57.52	35.63	25.42	53.66
+50% Mean	2113.92	1034.45	1807.48	2220.39	4552.46	2627.25	3692.00
-50% Mean	704.64	344.82	602.49	740.13	1517.49	875.75	1230.67
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 11: Summary statistics for total macroinvertebrate abundance (density, no. per m^2) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Total Invertebrate Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	515.93	7978.42	8973.92	1101.11	1465.84	1878.46	1488.92	2767.20
Minimum	199.10	4039.70	6174.98	709.83	403.97	0.00	1139.77	2135.27
Maximum	969.53	10806.21	11311.17	1679.36	2683.52	2778.74	1890.00	3231.76
Median	441.48	8281.39	9060.48	900.28	1428.32	2198.75	1312.90	2856.65
Standard deviation (n-1)	303.20	2521.25	2377.87	415.67	841.05	1079.20	340.56	447.53
Standard error of the mean	135.60	1127.54	1063.42	185.89	376.13	482.63	152.30	200.14
COV (%)	58.77	31.60	26.50	37.75	57.38	57.45	22.87	16.17
+50% Mean	773.89	11967.62	13460.87	1651.66	2198.75	2817.69	2233.38	4150.80
-50% Mean	257.96	3989.21	4486.96	550.55	732.92	939.23	744.46	1383.60
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 12: Summary statistics for total richness (Family-level) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Total Richness (Family level)**						
n	5	5	5	5	5	5	5
Mean	8.80	7.60	9.40	7.80	9.40	7.20	8.20
Minimum	8.00	6.00	8.00	6.00	8.00	6.00	5.00
Maximum	10.00	10.00	11.00	10.00	12.00	9.00	11.00
Median	9.00	7.00	9.00	8.00	9.00	7.00	8.00
Standard deviation (n-1)	0.84	1.52	1.14	1.79	1.67	1.30	2.39
Standard error of the mean	0.37	0.68	0.51	0.80	0.75	0.58	1.07
COV (%)	9.51	19.95	12.13	22.93	17.80	18.11	29.12
+50% Mean	13.20	11.40	14.10	11.70	14.10	10.80	12.30
-50% Mean	4.40	3.80	4.70	3.90	4.70	3.60	4.10
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 13: Summary statistics for total richness (Family-level) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Total Richness (Family level)**							
n	5	5	5	5	5	5	5	5
Mean	6.80	8.60	8.80	7.40	5.40	4.80	5.00	4.20
Minimum	5.00	7.00	7.00	5.00	3.00	0.00	3.00	3.00
Maximum	9.00	10.00	10.00	10.00	7.00	6.00	6.00	5.00
Median	7.00	9.00	9.00	8.00	6.00	6.00	5.00	5.00
Standard deviation (n-1)	1.48	1.52	1.30	2.30	1.52	2.68	1.22	1.10
Standard error of the mean	0.66	0.68	0.58	1.03	0.68	1.20	0.55	0.49
COV (%)	21.81	17.63	14.82	31.11	28.08	55.90	24.49	26.08
+50% Mean	10.20	12.90	13.20	11.10	8.10	7.20	7.50	6.30
-50% Mean	3.40	4.30	4.40	3.70	2.70	2.40	2.50	2.10
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 14: Summary statistics for Simpson's diversity index in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Simpson's Diversity Index**						
n	5	5	5	5	5	5	5
Mean	0.71	0.73	0.69	0.65	0.57	0.68	0.71
Minimum	0.67	0.64	0.57	0.53	0.48	0.62	0.60
Maximum	0.78	0.81	0.79	0.71	0.69	0.73	0.76
Median	0.70	0.77	0.69	0.68	0.56	0.68	0.73
Standard deviation (n-1)	0.04	0.08	0.10	0.07	0.09	0.04	0.07
Standard error of the mean	0.02	0.04	0.04	0.03	0.04	0.02	0.03
COV (%)	5.59	10.74	14.40	10.95	16.29	6.23	9.45
+50% Mean	1.07	1.10	1.03	0.98	0.85	1.02	1.06
-50% Mean	0.36	0.37	0.34	0.33	0.28	0.34	0.35
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 15: Summary statistics for Simpson's diversity index in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Simpson's Diversity Index**							
n	5	5	5	5	5	5	5	5
Mean	0.58	0.64	0.57	0.50	0.53	0.24	0.40	0.53
Minimum	0.40	0.48	0.48	0.37	0.51	0.00	0.16	0.50
Maximum	0.72	0.76	0.61	0.59	0.57	0.32	0.52	0.56
Median	0.61	0.69	0.59	0.54	0.52	0.31	0.44	0.53
Standard deviation (n-1)	0.14	0.12	0.05	0.11	0.02	0.14	0.14	0.02
Standard error of the mean	0.06	0.05	0.02	0.05	0.01	0.06	0.06	0.01
COV (%)	24.79	18.67	9.05	21.36	4.61	57.37	35.73	4.12
+50% Mean	0.87	0.96	0.85	0.75	0.79	0.35	0.60	0.80
-50% Mean	0.29	0.32	0.28	0.25	0.26	0.12	0.20	0.27
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A

Table 16: Summary statistics for Ephemeroptera abundance (density, no. per m^2) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Ephemeroptera Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	379.16	193.33	64.06	496.31	1944.25	718.49	346.26
Minimum	138.50	158.70	34.63	57.71	787.74	216.41	201.99
Maximum	640.58	245.27	103.88	923.36	3003.81	1226.34	649.24
Median	294.32	187.56	69.25	634.81	2328.60	822.37	245.27
Standard deviation (n-1)	219.37	37.62	27.10	356.57	908.57	416.33	186.72
Standard error of the mean	98.11	16.83	12.12	159.46	406.33	186.19	83.51
COV (%)	57.86	19.46	42.30	71.84	46.73	57.94	53.93
+50% Mean	568.73	289.99	96.09	744.46	2916.38	1077.74	519.39
-50% Mean	189.58	96.66	32.03	248.15	972.13	359.25	173.13
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	Yes	N/A

Table 17: Summary statistics for percent EPT (EPT index) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Percent EPT (EPT Index)**						
n	5	5	5	5	5	5	5
Mean	29.04	31.11	7.43	31.11	62.14	39.77	19.58
Minimum	15.58	22.00	3.80	12.12	51.38	15.69	5.54
Maximum	46.94	50.00	13.10	42.86	71.63	53.77	49.45
Median	22.52	28.33	6.82	32.91	63.66	49.13	15.34
Standard deviation (n-1)	13.14	10.88	3.75	12.14	9.55	16.92	17.32
Standard error of the mean	5.88	4.87	1.68	5.43	4.27	7.56	7.74
COV (%)	45.24	34.98	50.42	39.03	15.37	42.53	88.45
+50% Mean	43.56	46.67	11.15	46.66	93.21	59.65	29.37
-50% Mean	14.52	15.56	3.72	15.55	31.07	19.88	9.79
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Table 18: Summary statistics for Pisidiidae abundance (density, no. per m^2) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Pisidiidae Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	410.32	23.08	27.70	8.66	119.46	129.85	409.74
Minimum	147.16	0.00	8.66	0.00	25.97	28.86	187.56
Maximum	865.65	57.71	51.94	28.86	242.38	173.13	1038.78
Median	277.01	14.43	25.97	0.00	138.50	144.28	274.12
Standard deviation (n-1)	293.53	21.88	16.65	12.90	90.46	57.71	355.98
Standard error of the mean	131.27	9.79	7.45	5.77	40.45	25.81	159.20
COV (%)	71.54	94.79	60.11	149.07	75.72	44.44	86.88
+50% Mean	615.48	34.63	41.55	12.98	179.19	194.77	614.61
-50% Mean	205.16	11.54	13.85	4.33	59.73	64.92	204.87
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	No	N/A	N/A	N/A

Table 19: Summary statistics for Ephemeroptera abundance (density, no. per m^2) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Ephemeroptera Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	38.09	1281.16	643.47	64.06	54.82	1563.37	1093.61	831.02
Minimum	17.31	375.12	346.26	8.66	0.00	0.00	937.79	692.52
Maximum	69.25	1587.03	1038.78	95.22	100.99	2276.66	1240.77	966.64
Median	34.63	1558.17	533.82	69.25	43.28	1817.87	1038.78	851.22
Standard deviation (n-1)	19.93	520.83	277.07	36.01	40.03	894.76	133.56	115.24
Standard error of the mean	8.91	232.92	123.91	16.10	17.90	400.15	59.73	51.54
COV (%)	52.32	40.65	43.06	56.21	73.02	57.23	12.21	13.87
+50% Mean	57.13	1921.75	965.20	96.09	82.24	2345.05	1640.41	1246.54
-50% Mean	19.04	640.58	321.73	32.03	27.41	781.68	546.80	415.51
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 20: Summary statistics for percent EPT (EPT index) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Percent EPT (EPT Index)**							
n	5	5	5	5	5	5	5	5
Mean	19.67	19.60	8.09	8.34	5.14	66.65	75.29	30.29
Minimum	4.00	5.23	4.14	2.11	0.00	0.00	64.89	27.44
Maximum	34.78	41.79	13.08	14.63	10.67	87.40	91.14	34.46
Median	16.22	17.47	8.44	8.25	5.83	81.93	74.16	28.13
Standard deviation (n-1)	11.89	13.44	3.61	4.43	4.19	37.33	10.22	3.54
Standard error of the mean	5.32	6.01	1.61	1.98	1.87	16.70	4.57	1.58
COV (%)	60.46	68.57	44.63	53.15	81.38	56.01	13.57	11.68
+50% Mean	29.51	29.40	12.14	12.51	7.72	99.98	112.94	45.44
-50% Mean	9.84	9.80	4.05	4.17	2.57	33.33	37.65	15.15
Benchmark Exceedance (temporal comparison)	N/A	-	Yes	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A

Table 21: Summary statistics for Pisidiidae abundance (density, no. per m^2) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Pisidiidae Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	302.98	888.73	753.12	1.73	11.54	0.00	0.00	2.89
Minimum	0.00	331.83	259.70	0.00	0.00	0.00	0.00	0.00
Maximum	545.36	1125.35	1240.77	8.66	43.28	0.00	0.00	14.43
Median	320.29	981.07	649.24	0.00	0.00	0.00	0.00	0.00
Standard deviation (n-1)	228.46	325.60	418.20	3.87	18.81	0.00	0.00	6.45
Standard error of the mean	102.17	145.61	187.02	1.73	8.41	0.00	0.00	2.89
COV (%)	75.40	36.64	55.53	223.61	162.98	-	-	223.61
+50% Mean	454.47	1333.10	1129.67	2.60	17.31	0.00	0.00	4.33
-50% Mean	151.49	444.37	376.56	0.87	5.77	0.00	0.00	1.44
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A

FIGURES

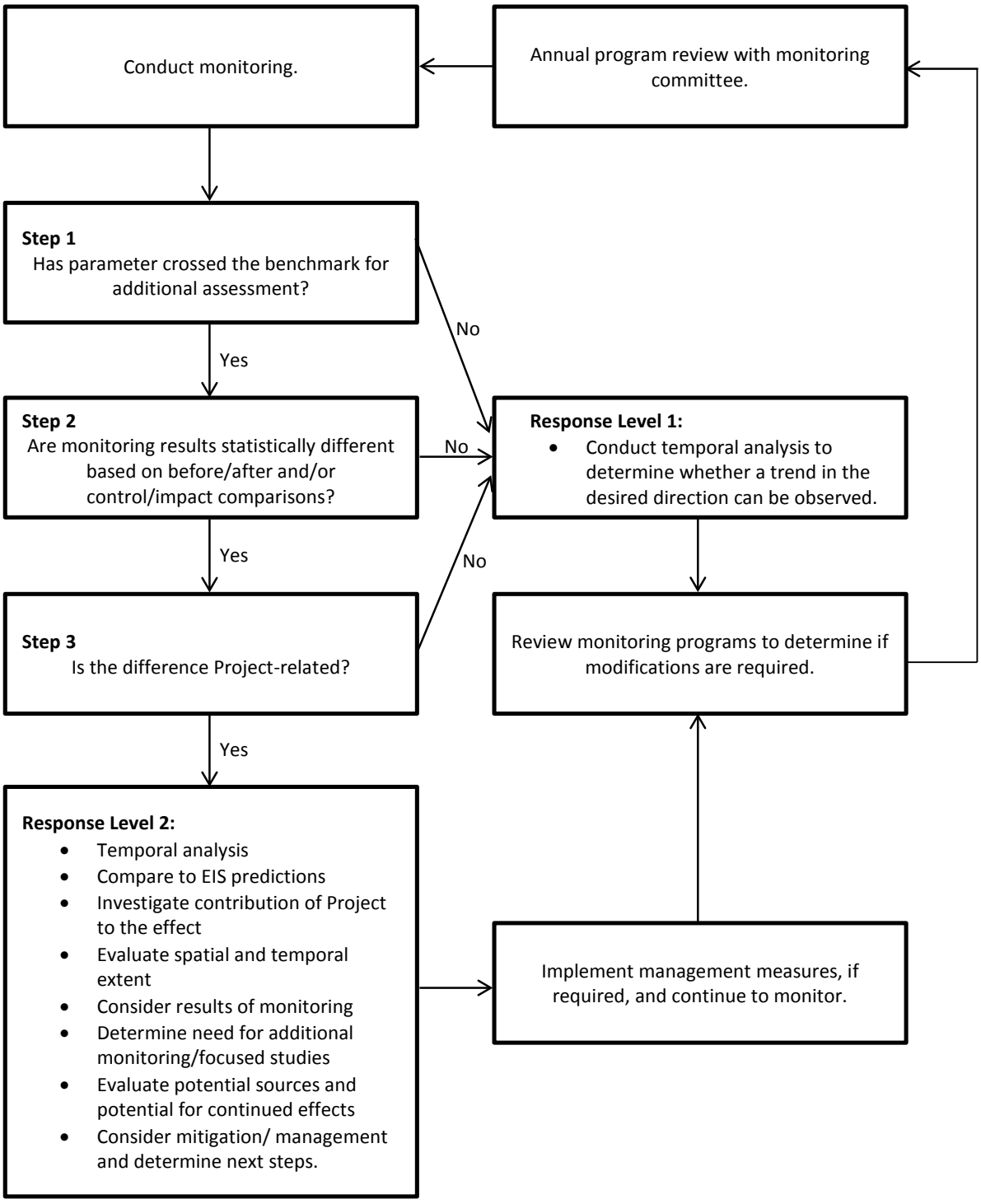


Figure 1: Benthic macroinvertebrate assessment management framework (AMF).

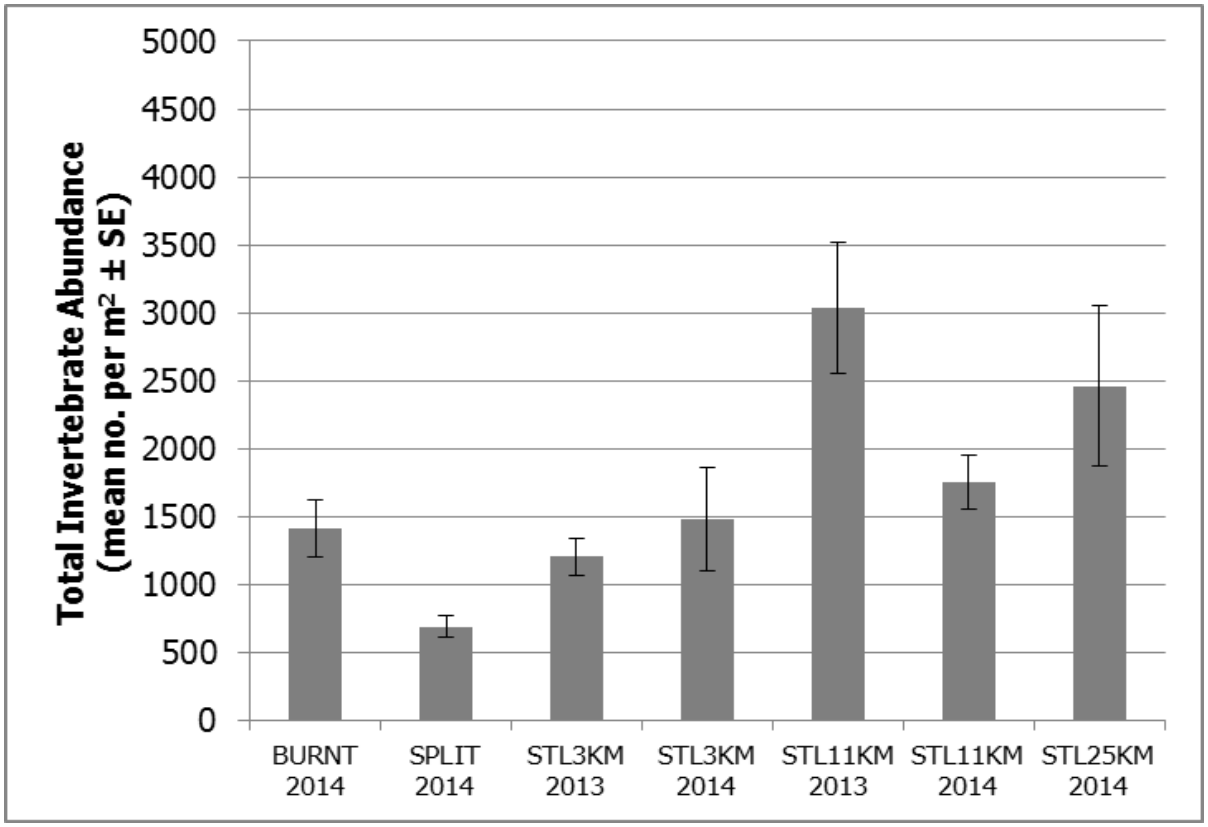


Figure 2: **Total macroinvertebrate abundance (density, mean no. per m^2 ± SE) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).**

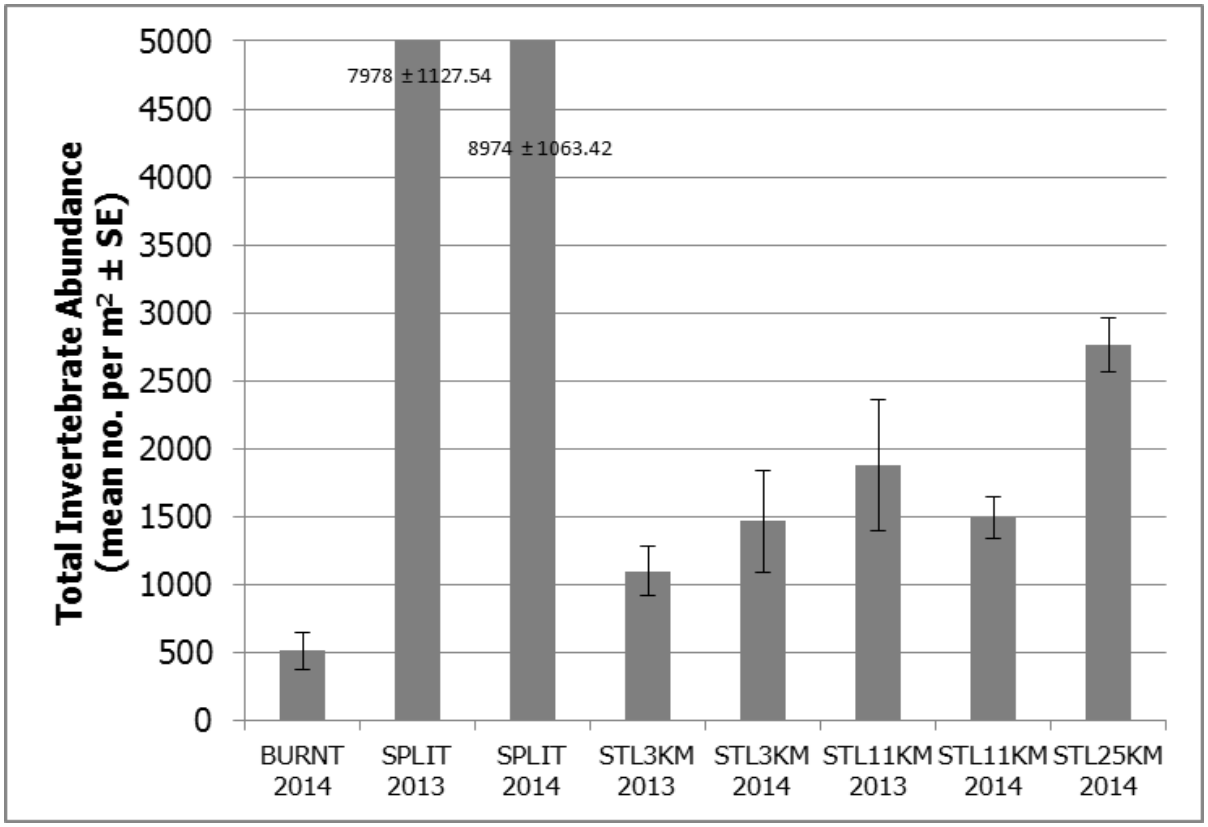


Figure 3: Total macroinvertebrate abundance (density, mean no. per m^2 ± SE) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

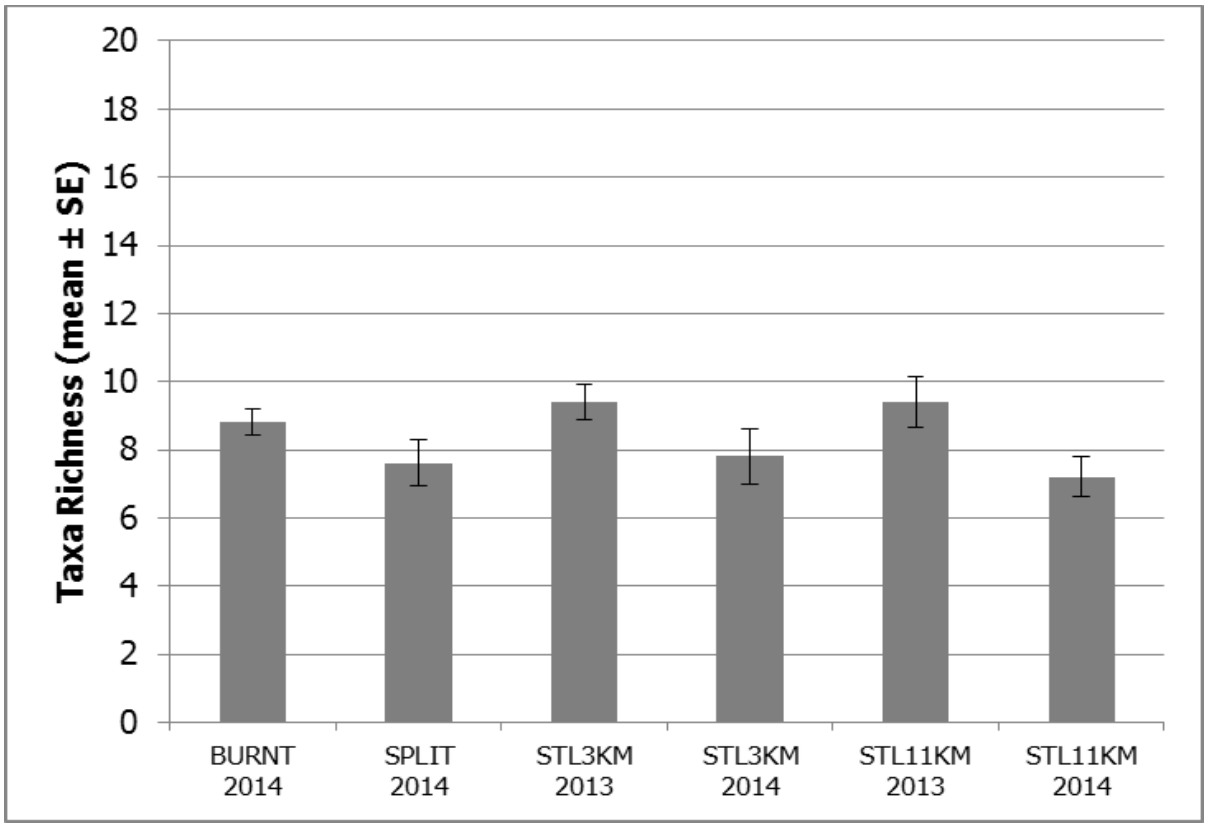


Figure 4: Total richness (Family-level, mean ± SE) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

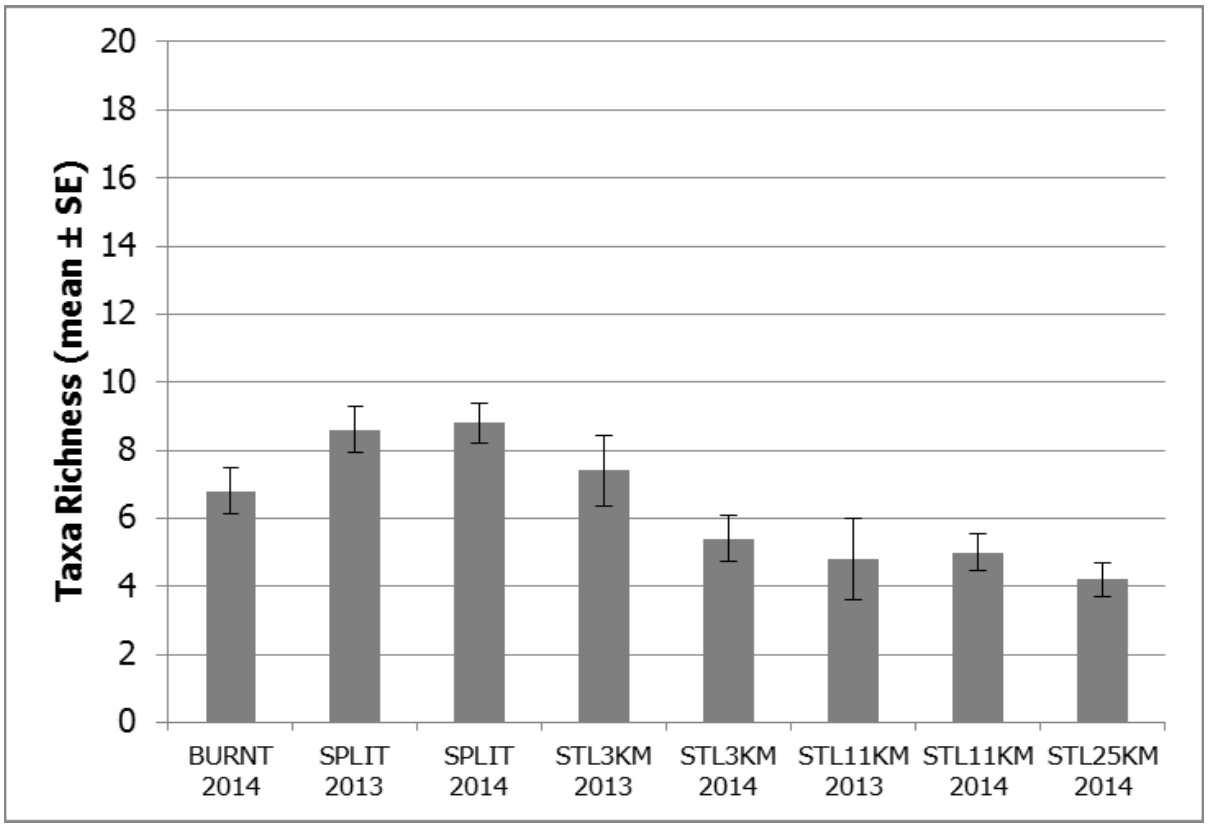


Figure 5: Total richness (Family-level, mean ± SE) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

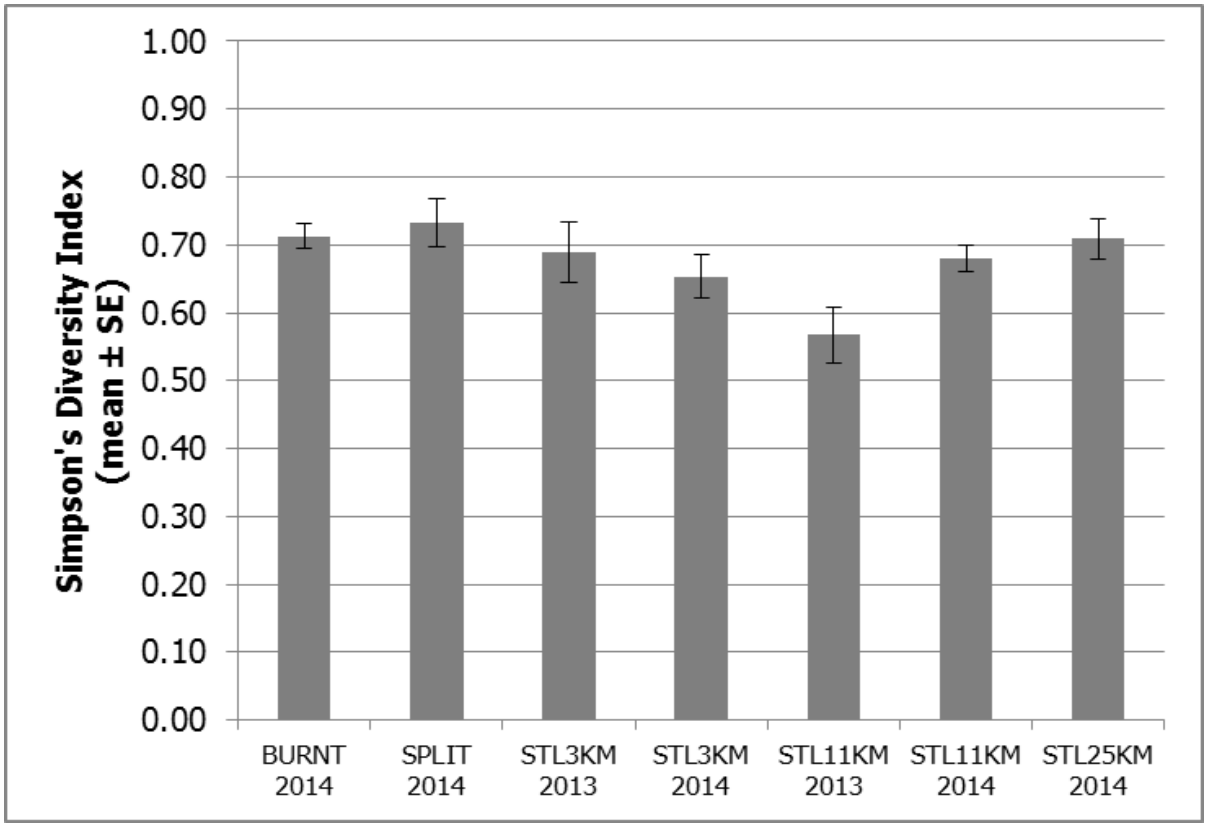


Figure 6: Simpson's diversity index (mean ± SE) in predominantly wetted habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

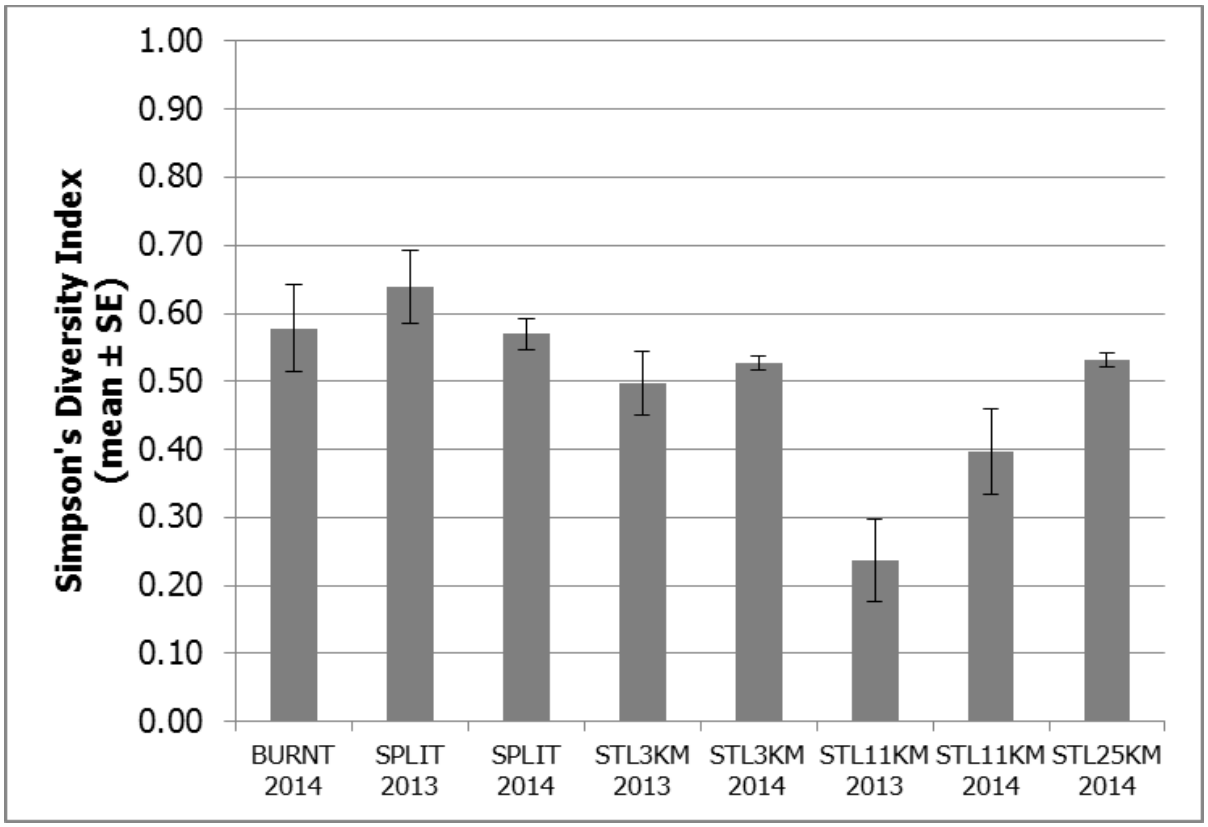
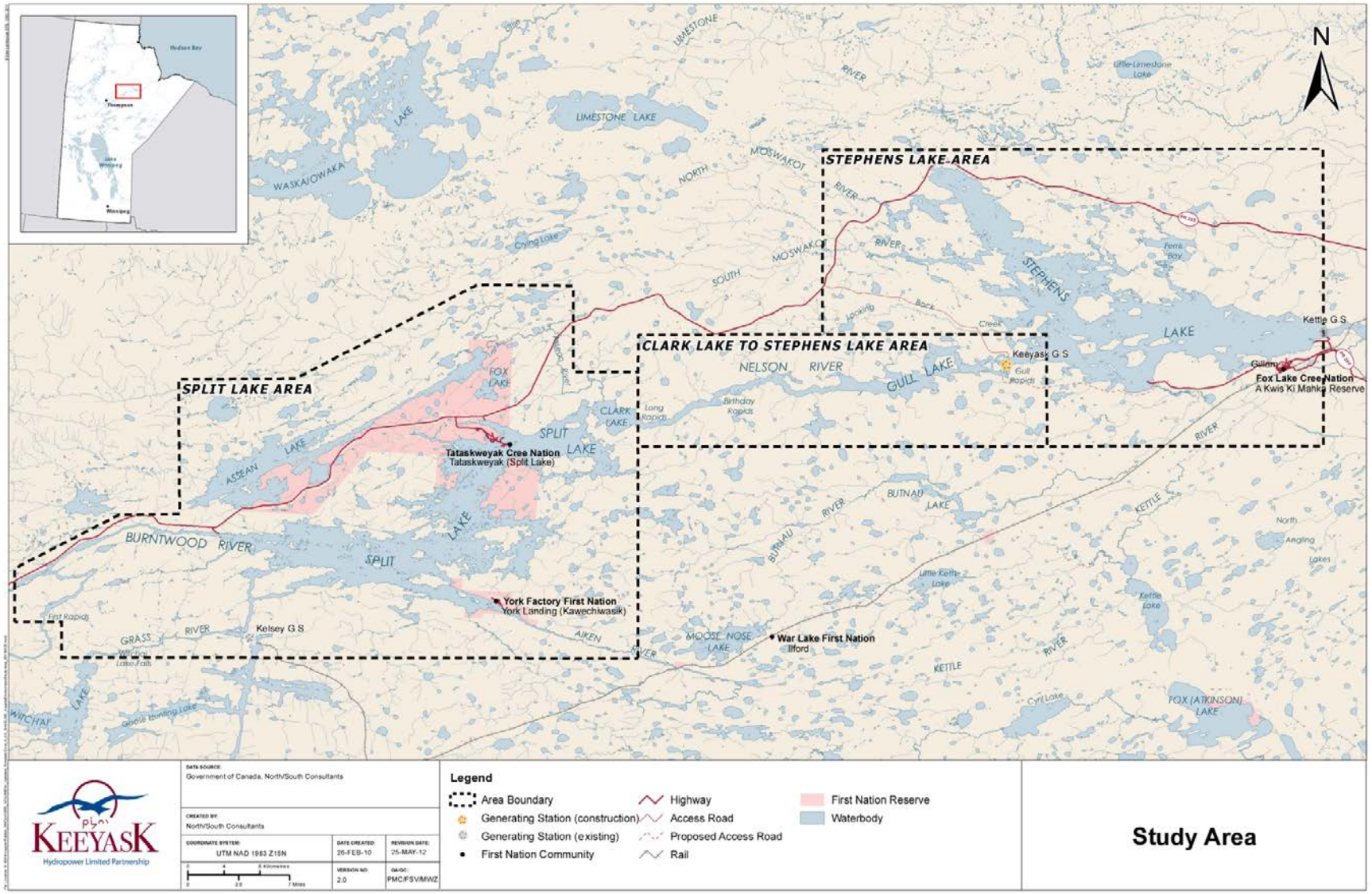
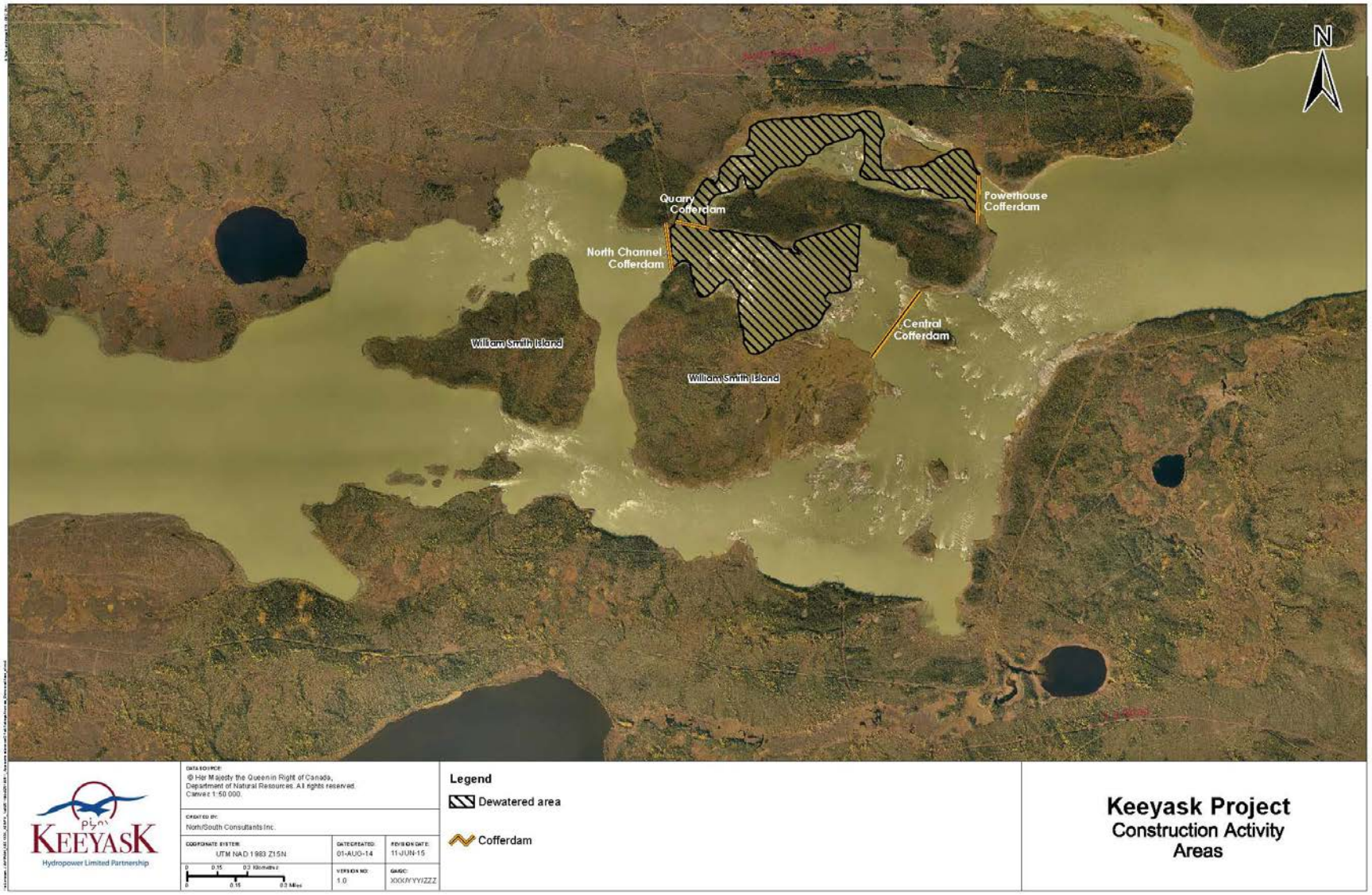


Figure 7: Simpson's diversity index (mean ± SE) in offshore habitat in 2013 (pre-construction) and 2014 (Year 1 construction).

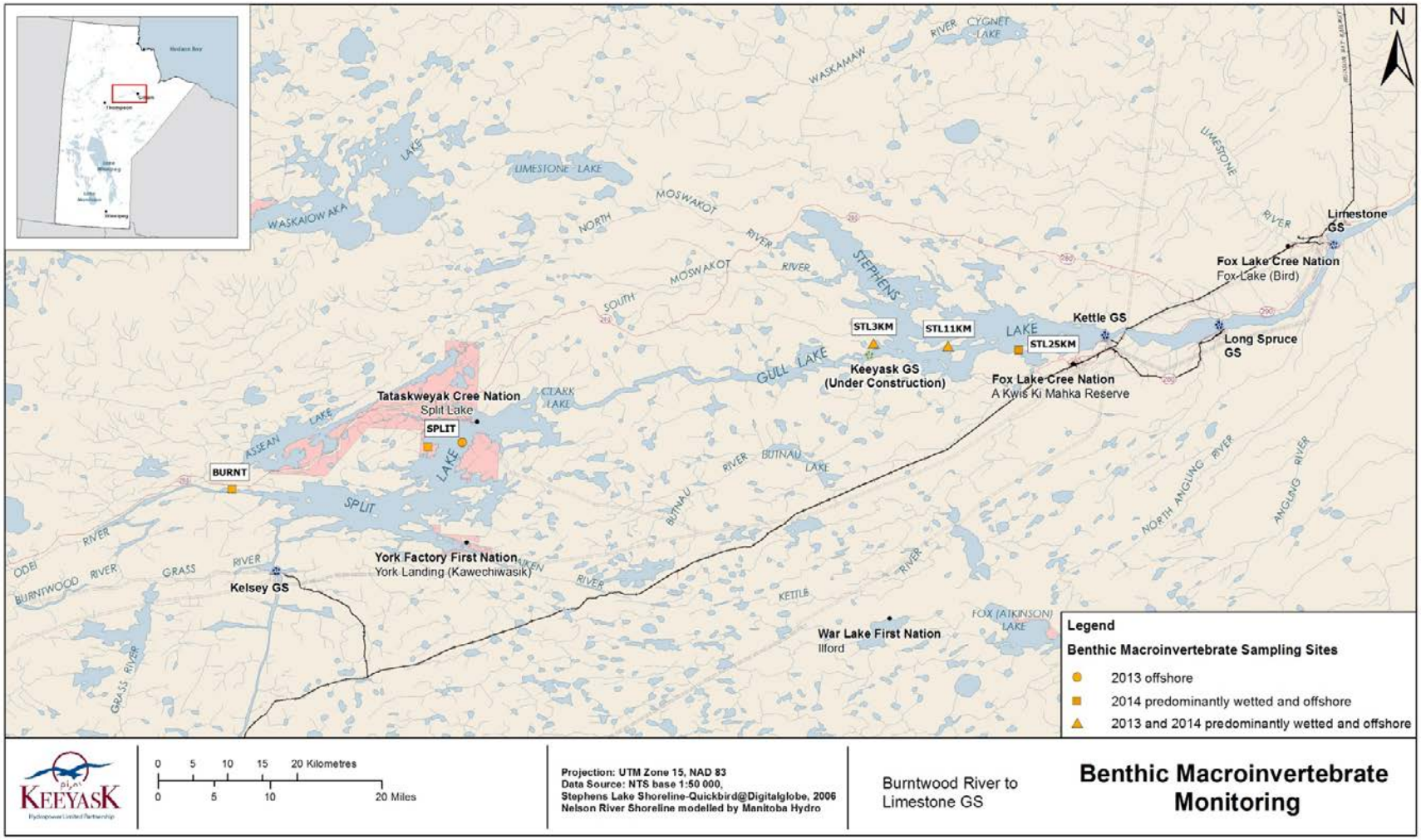
MAPS



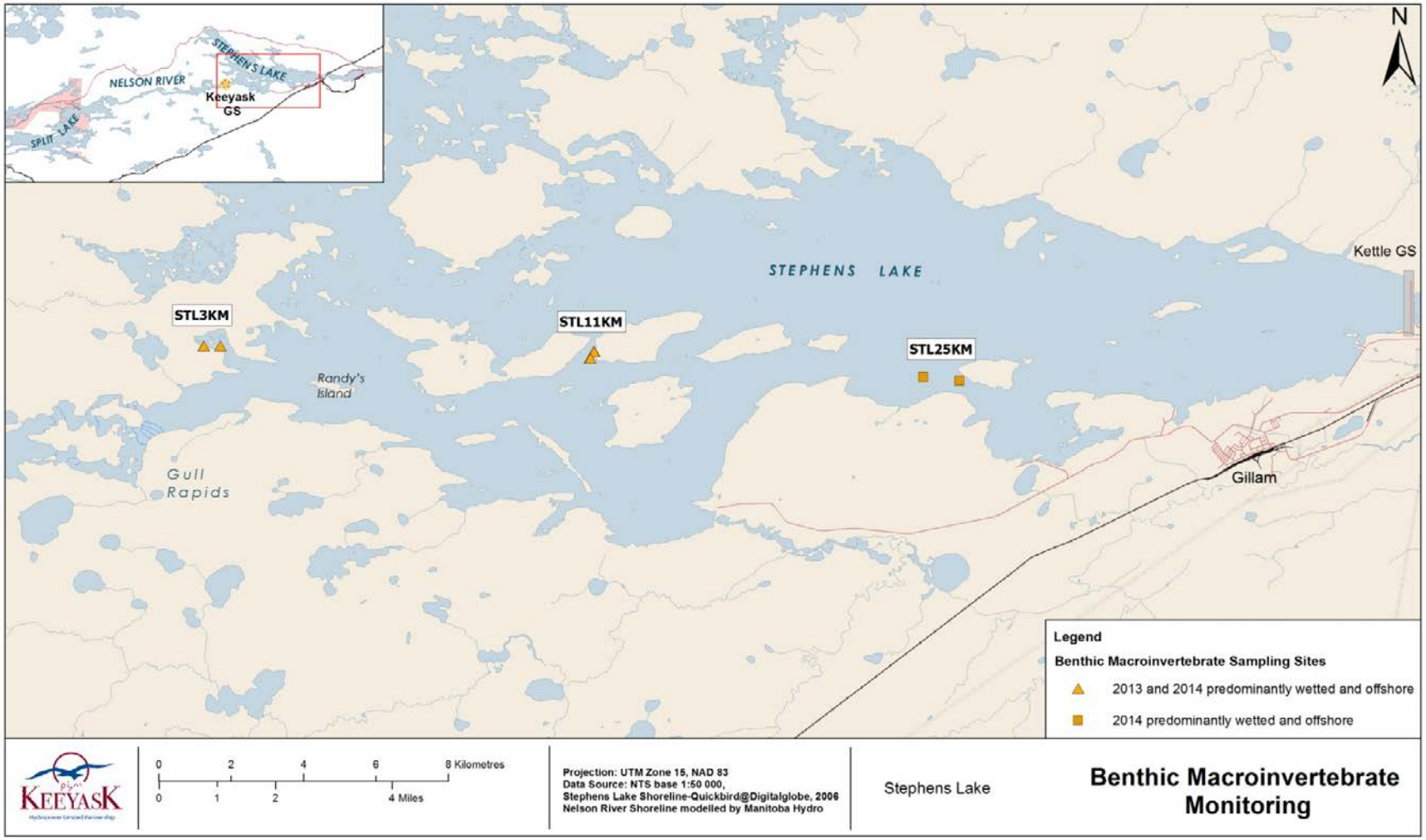
Map 1: Map of the Keeyask Study Area showing hydroelectric development



Map 2: Locations of construction activities within the north and central channels of Gull Lake, July to October 2014



Map 3: Benthic macroinvertebrate sampling locations in the regional study area, 2013 (pre-construction) and 2014 (Year 1 construction)



Map 4: Benthic macroinvertebrate sampling locations in Stephens Lake, 2013 (pre-construction) and 2014 (Year 1 construction)

APPENDICES

Appendix 1: Quality assurance and quality control (QA/QC) procedures for aquatic macroinvertebrate sample processing.

Detailed sample processing protocols are developed on a 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 2: Means of benthic macroinvertebrate metrics and benthic sediment results by replicate station for 2013 (pre-construction) and 2014 (Year 1 construction). Note results for each site continue over three pages.

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Water Depth	Total Invertebrate Density	Oligochaeta Density	Amphipoda Density	Bivalvia Density	Pisidiidae Density	Gastropoda Density
Units					**meters**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP2	2.4	1273	0	0	277	277	139
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP3	2.5	1307	0	0	537	537	355
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP4	2.6	762	26	0	234	225	208
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP5	2.3	2000	26	9	866	866	710
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP6	2.2	1705	17	0	156	147	641
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP1	2.6	808	14	115	0	0	144
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP2	2.9	721	0	0	29	29	29
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP3	2.6	649	144	0	14	14	58
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP4	2.4	866	29	0	58	58	202
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP5	2.5	404	14	0	14	14	14
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP1	3.0	1264	164	9	35	35	338

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Water Depth	Total Invertebrate Density	Oligochaeta Density	Amphipoda Density	Bivalvia Density	Pisidiidae Density	Gastropoda Density
Units					**meters**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP2	2.8	1524	26	0	26	26	866
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP3	3.1	727	17	0	52	52	216
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP4	2.6	1143	35	0	9	9	511
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP5	2.5	1368	156	0	17	17	883
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP1	3.0	779	0	0	0	0	43
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP2	3.1	476	58	0	29	29	87
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP3	3.0	2352	231	0	0	0	289
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP4	2.7	2280	101	0	0	0	188
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP5	2.2	1515	144	14	14	14	231
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP1	3.0	3298	78	0	242	242	416
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP2	2.2	2329	130	0	156	156	649
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP3	2.2	3740	312	9	139	139	641
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP4	2.1	1567	78	0	26	26	476
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP5	2.6	4242	130	0	35	35	286

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Water Depth	Total Invertebrate Density	Oligochaeta Density	Amphipoda Density	Bivalvia Density	Pisidiidae Density	Gastropoda Density
Units					**meters**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP1	3.4	1832	58	29	173	173	390
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP2	2.1	1529	58	0	144	144	433
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP3	2.0	2496	115	0	159	159	808
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP4	1.9	1472	0	0	29	29	606
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP5	1.5	1428	144	0	144	144	43
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP1	2.9	1169	14	43	188	188	707
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP2	2.5	2669	462	0	332	332	1039
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP3	1.9	2727	245	0	289	274	1197
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP4	3.2	1313	188	0	216	216	159
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP5	2.3	4429	476	14	1039	1039	2539
Burntwood River	Offshore	2014	reference	BURNT-OS-REP1	7.5	441	0	0	320	320	0
Burntwood River	Offshore	2014	reference	BURNT-OS-REP2	8.6	970	9	0	545	545	0
Burntwood River	Offshore	2014	reference	BURNT-OS-REP3	8.2	649	9	0	502	493	0
Burntwood River	Offshore	2014	reference	BURNT-OS-REP4	8.4	320	0	17	156	156	9
Burntwood River	Offshore	2014	reference	BURNT-OS-REP5	8.6	199	17	0	9	0	0

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Water Depth	Total Invertebrate Density	Oligochaeta Density	Amphipoda Density	Bivalvia Density	Pisidiidae Density	Gastropoda Density
Units					**meters**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**
Split Lake	Offshore	2013	reference	SPLIT-OS-REP1	7.0	4040	14	1544	332	332	130
Split Lake	Offshore	2013	reference	SPLIT-OS-REP2	6.3	9248	29	1818	1140	1125	4069
Split Lake	Offshore	2013	reference	SPLIT-OS-REP3	9.1	7517	58	1919	1111	1111	2626
Split Lake	Offshore	2013	reference	SPLIT-OS-REP4	6.4	10806	0	895	909	895	6983
Split Lake	Offshore	2013	reference	SPLIT-OS-REP5	8.3	8281	29	895	981	981	5800
Split Lake	Offshore	2014	reference	SPLIT-OS-REP1	7.2	6175	29	1371	260	260	3506
Split Lake	Offshore	2014	reference	SPLIT-OS-REP2	6.8	7012	29	1212	649	649	4415
Split Lake	Offshore	2014	reference	SPLIT-OS-REP3	9.3	11311	58	2308	1125	1125	6983
Split Lake	Offshore	2014	reference	SPLIT-OS-REP4	6.9	11311	29	1241	1241	1241	6896
Split Lake	Offshore	2014	reference	SPLIT-OS-REP5	8.9	9060	0	1789	491	491	6233
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP1	6.3	1394	0	9	0	0	744
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP2	6.0	710	9	0	0	0	164
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP3	6.0	822	0	0	0	0	424
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP4	6.2	900	17	0	0	0	121
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP5	6.2	1679	35	0	9	9	156
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP1	6.5	404	0	0	14	14	216

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Water Depth	Total Invertebrate Density	Oligochaeta Density	Amphipoda Density	Bivalvia Density	Pisidiidae Density	Gastropoda Density
Units					**meters**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP2	6.1	1082	14	29	0	0	202
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP3	6.1	1428	0	43	0	0	491
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP4	5.1	2684	29	14	43	43	1630
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP5	6.3	1731	0	14	0	0	1111
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP1	6.6	2190	0	130	52	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP2	7.3	2225	9	130	9	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP3	7.1	2779	26	69	9	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP4	7.2	2199	35	69	0	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP5	6.6	0	0	0	0	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP1	6.4	1284	0	202	43	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP2	6.8	1818	14	361	0	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP3	6.5	1890	14	433	0	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP4	7.6	1140	0	72	0	0	0
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP5	6.9	1313	0	72	0	0	0

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Water Depth	Total Invertebrate Density	Oligochaeta Density	Amphipoda Density	Bivalvia Density	Pisidiidae Density	Gastropoda Density
Units					**meters**	**no. per m^2**	**no. per m^2**	**no. per m^2**	**no. per m^2**	**no. per m^2**	**no. per m^2**
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP1	9.1	2857	0	1616	14	14	0
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP2	9.2	3102	14	2020	0	0	0
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP3	8.6	3232	43	2034	0	0	0
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP4	9.5	2135	0	1226	0	0	0
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP5	9.2	2510	0	1544	0	0	0

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Chironomidae Density	Ephemeroptera Density	Plecoptera Density	Trichoptera Density	EPT Density	Percent Ephemeroptera
Units					**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**%**
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP2	225	580	0	17	597	45.58
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP3	104	242	0	52	294	18.54
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP4	121	139	0	26	164	18.18
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP5	69	294	0	17	312	14.72
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP6	208	641	0	17	658	37.56
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP1	274	216	0	14	231	26.79
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP2	390	159	0	0	159	22.00
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP3	159	159	0	14	173	24.44
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP4	231	245	0	0	245	28.33
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP5	144	188	0	14	202	46.43
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP1	398	69	0	43	113	5.48
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP2	398	104	0	0	104	6.82
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP3	208	69	0	26	95	9.52
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP4	390	43	0	9	52	3.79

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Chironomidae Density	Ephemeroptera Density	Plecoptera Density	Trichoptera Density	EPT Density	Percent Ephemeroptera
Units					**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**%**
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP5	190	35	0	17	52	2.53
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP1	491	202	0	14	216	25.93
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP2	245	58	0	0	58	12.12
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP3	837	923	0	14	938	39.26
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP4	1183	664	0	87	750	29.11
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP5	462	635	0	14	649	41.90
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP1	173	2329	0	9	2337	70.60
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP2	147	1229	0	9	1238	52.79
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP3	225	2372	0	9	2381	63.43
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP4	147	788	0	17	805	50.28
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP5	718	3004	0	35	3038	70.82
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP1	216	952	0	0	952	51.97
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP2	58	822	0	0	822	53.77
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP3	188	1226	0	0	1226	49.13

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Chironomidae Density	Ephemeroptera Density	Plecoptera Density	Trichoptera Density	EPT Density	Percent Ephemeroptera
Units					**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**%**
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP4	606	216	0	14	231	14.71
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP5	606	375	0	29	404	26.26
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP1	0	202	0	0	202	17.28
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP2	505	231	0	43	274	8.65
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP3	491	404	0	14	418	14.81
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP4	101	649	0	0	649	49.45
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP5	101	245	0	0	245	5.54
Burntwood River	Offshore	2014	reference	BURNT-OS-REP1	26	43	0	26	69	9.80
Burntwood River	Offshore	2014	reference	BURNT-OS-REP2	147	17	0	251	268	1.79
Burntwood River	Offshore	2014	reference	BURNT-OS-REP3	87	26	0	0	26	4.00
Burntwood River	Offshore	2014	reference	BURNT-OS-REP4	69	35	0	17	52	10.81
Burntwood River	Offshore	2014	reference	BURNT-OS-REP5	69	69	0	0	69	34.78
Split Lake	Offshore	2013	reference	SPLIT-OS-REP1	216	1587	0	101	1688	39.29
Split Lake	Offshore	2013	reference	SPLIT-OS-REP2	462	1558	0	58	1616	16.85
Split Lake	Offshore	2013	reference	SPLIT-OS-REP3	418	1298	0	58	1356	17.27
Split Lake	Offshore	2013	reference	SPLIT-OS-REP4	346	1587	0	87	1674	14.69

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Chironomidae Density	Ephemeroptera Density	Plecoptera Density	Trichoptera Density	EPT Density	Percent Ephemeroptera
Units					**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**%**
Split Lake	Offshore	2013	reference	SPLIT-OS-REP5	144	375	0	58	433	4.53
Split Lake	Offshore	2014	reference	SPLIT-OS-REP1	159	808	0	0	808	13.08
Split Lake	Offshore	2014	reference	SPLIT-OS-REP2	72	534	0	58	592	7.61
Split Lake	Offshore	2014	reference	SPLIT-OS-REP3	231	491	0	87	577	4.34
Split Lake	Offshore	2014	reference	SPLIT-OS-REP4	173	1039	0	58	1096	9.18
Split Lake	Offshore	2014	reference	SPLIT-OS-REP5	144	346	0	29	375	3.82
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP1	493	69	0	43	113	4.97
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP2	424	95	0	9	104	13.41
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP3	364	9	0	9	17	1.05
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP4	684	52	0	26	78	5.77
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP5	1324	95	0	43	139	5.67
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP1	173	0	0	0	0	0.00
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP2	721	101	0	14	115	9.33
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP3	794	87	0	14	101	6.06
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP4	909	43	0	14	58	1.61

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Chironomidae Density	Ephemeroptera Density	Plecoptera Density	Trichoptera Density	EPT Density	Percent Ephemeroptera
Units					**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**%**
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP5	505	43	0	58	101	2.50
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP1	173	1801	0	0	1801	82.21
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP2	242	1818	0	0	1818	81.71
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP3	390	2277	0	0	2277	81.93
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP4	164	1922	0	0	1922	87.40
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP5	0	0	0	0	0	0.00
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP1	72	938	0	14	952	73.03
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP2	188	1241	0	0	1241	68.25
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP3	216	1226	0	0	1226	64.89
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP4	29	1039	0	0	1039	91.14
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP5	173	1024	0	0	1024	78.02
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP1	245	967	0	0	967	33.84
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP2	216	851	0	0	851	27.44
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP3	231	909	0	0	909	28.13

Waterbody / Site Location	Habitat Type	Study Year	Site Type	Site ID	Chironomidae Density	Ephemeroptera Density	Plecoptera Density	Trichoptera Density	EPT Density	Percent Ephemeroptera
Units					**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**no. per m²**	**%**
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP4	173	736	0	0	736	34.46
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP5	274	693	0	0	693	27.59

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Percent EPT (EPT Index)	Ratio of EPT to Chironomidae	Percent of Oligochaeta and Chironomidae	Total Richness (Family-level)	EPT Richness (Family-level)	Simpson's Diversity Index
Units					**%**	**-**	**%**	**-**	**-**	**-**
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP2	46.9	2.7	17.69	8	3	0.70
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP3	22.5	2.8	7.95	9	4	0.72
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP4	21.6	1.4	19.32	8	2	0.78
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP5	15.6	4.5	4.76	9	2	0.67
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP6	38.6	3.2	13.20	10	2	0.70
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP1	28.6	0.8	35.71	8	2	0.77
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP2	22.0	0.4	54.00	6	1	0.64
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP3	26.7	1.1	46.67	10	2	0.81
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP4	28.3	1.1	30.00	7	1	0.78
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP5	50.0	1.4	39.29	7	2	0.65
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP1	8.9	0.3	44.52	11	3	0.79
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP2	6.8	0.3	27.84	8	1	0.61
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP3	13.1	0.5	30.95	9	3	0.78

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Percent EPT (EPT Index)	Ratio of EPT to Chironomidae	Percent of Oligochaeta and Chironomidae	Total Richness (Family-level)	EPT Richness (Family-level)	Simpson's Diversity Index
Units					**%**	**-**	**%**	**-**	**-**	**-**
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP4	4.5	0.1	37.12	10	3	0.69
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP5	3.8	0.3	25.32	9	2	0.57
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP1	27.8	0.4	62.96	6	2	0.53
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP2	12.1	0.2	63.64	6	1	0.68
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP3	39.9	1.1	45.40	9	2	0.70
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP4	32.9	0.6	56.33	10	4	0.64
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP5	42.9	1.4	40.00	8	2	0.71
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP1	70.9	13.5	7.61	8	3	0.48
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP2	53.2	8.4	11.90	8	2	0.63
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP3	63.7	10.6	14.35	9	2	0.56
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP4	51.4	5.5	14.36	10	3	0.69
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP5	71.6	4.2	20.00	12	5	0.48
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP1	52.0	4.4	14.96	8	1	0.66

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Percent EPT (EPT Index)	Ratio of EPT to Chironomidae	Percent of Oligochaeta and Chironomidae	Total Richness (Family-level)	EPT Richness (Family-level)	Simpson's Diversity Index
Units					%	-	%	-	-	-
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP2	53.8	14.3	7.55	6	1	0.62
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP3	49.1	6.5	12.14	7	2	0.71
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP4	15.7	0.4	41.18	6	2	0.68
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP5	28.3	0.7	52.53	9	3	0.73
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP1	17.3		1.23	8	2	0.76
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP2	10.3	0.5	36.22	10	4	0.76
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP3	15.3	0.9	26.98	11	2	0.73
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP4	49.5	6.4	21.98	5	1	0.69
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP5	5.5	2.4	13.03	7	1	0.60
Burntwood River	Offshore	2014	reference	BURNT-OS-REP1	15.7	2.7	5.88	7	4	0.46
Burntwood River	Offshore	2014	reference	BURNT-OS-REP2	27.7	1.8	16.07	6	3	0.61
Burntwood River	Offshore	2014	reference	BURNT-OS-REP3	4.0	0.3	14.67	7	1	0.40
Burntwood River	Offshore	2014	reference	BURNT-OS-REP4	16.2	0.8	21.62	9	3	0.70
Burntwood River	Offshore	2014	reference	BURNT-OS-REP5	34.8	1.0	43.48	5	1	0.72
Split Lake	Offshore	2013	reference	SPLIT-OS-REP1	41.8	7.8	5.71	10	3	0.69

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Percent EPT (EPT Index)	Ratio of EPT to Chironomidae	Percent of Oligochaeta and Chironomidae	Total Richness (Family-level)	EPT Richness (Family-level)	Simpson's Diversity Index
Units					**%**	**-**	**%**	**-**	**-**	**-**
Split Lake	Offshore	2013	reference	SPLIT-OS-REP2	17.5	3.5	5.30	10	2	0.72
Split Lake	Offshore	2013	reference	SPLIT-OS-REP3	18.0	3.2	6.33	9	2	0.76
Split Lake	Offshore	2013	reference	SPLIT-OS-REP4	15.5	4.8	3.20	7	2	0.55
Split Lake	Offshore	2013	reference	SPLIT-OS-REP5	5.2	3.0	2.09	7	2	0.48
Split Lake	Offshore	2014	reference	SPLIT-OS-REP1	13.1	5.1	3.04	8	1	0.61
Split Lake	Offshore	2014	reference	SPLIT-OS-REP2	8.4	8.2	1.44	10	3	0.56
Split Lake	Offshore	2014	reference	SPLIT-OS-REP3	5.1	2.5	2.55	10	3	0.60
Split Lake	Offshore	2014	reference	SPLIT-OS-REP4	9.7	6.3	1.79	9	2	0.59
Split Lake	Offshore	2014	reference	SPLIT-OS-REP5	4.1	2.6	1.59	7	2	0.48
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP1	8.1	0.2	35.40	9	3	0.59
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP2	14.6	0.2	60.98	8	3	0.59
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP3	2.1	0.0	44.21	5	2	0.54
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP4	8.7	0.1	77.88	5	2	0.40
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP5	8.2	0.1	80.93	10	3	0.37
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP1	0.0	0.0	42.86	3	0	0.53

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Percent EPT (EPT Index)	Ratio of EPT to Chironomidae	Percent of Oligochaeta and Chironomidae	Total Richness (Family-level)	EPT Richness (Family-level)	Simpson's Diversity Index
Units					**%**	**-**	**%**	**-**	**-**	**-**
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP2	10.7	0.2	68.00	6	2	0.51
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP3	7.1	0.1	55.56	5	2	0.57
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP4	2.2	0.1	34.95	7	2	0.52
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP5	5.8	0.2	29.17	6	2	0.51
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP1	82.2	10.4	7.91	6	1	0.31
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP2	81.7	7.5	11.28	6	1	0.32
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP3	81.9	5.8	14.95	6	1	0.31
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP4	87.4	11.7	9.06	6	2	0.24
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP5	0.0	0.00	0.00	0	0	0.00
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP1	74.2	13.2	5.62	6	2	0.44
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP2	68.3	6.6	11.11	6	1	0.49
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP3	64.9	5.7	12.21	5	1	0.52
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP4	91.1	36.0	2.53	3	1	0.16

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Percent EPT (EPT Index)	Ratio of EPT to Chironomidae	Percent of Oligochaeta and Chironomidae	Total Richness (Family-level)	EPT Richness (Family-level)	Simpson's Diversity Index
Units					**%**	**-**	**%**	**-**	**-**	**-**
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP5	78.0	5.9	13.19	5	1	0.37
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP1	33.8	3.9	8.59	5	1	0.56
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP2	27.4	3.9	7.44	5	1	0.50
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP3	28.1	3.9	8.48	5	1	0.52
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP4	34.5	4.3	8.11	3	1	0.55
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP5	27.6	2.5	10.92	3	1	0.53

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Total Organic Carbon	Sand	Silt	Clay	Texture
Units					%	%	%	%	-
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP2	1.51	6.5	70.5	23.0	Silty clay loam
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP3	1.14	39.6	41.6	18.7	Silty clay loam
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP4	1.30	36.1	46.2	17.7	Silty clay loam
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP5	1.38	29.8	49.9	20.3	Silty clay loam
Burntwood River	Nearshore: predominantly-wetted	2014	reference	BURNT-PW-REP6	1.38	23.4	56.0	20.6	Loam
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP1	3.97	25.9	49.1	25.0	Silt loam
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP2	1.51	55.0	30.0	15.0	Loam
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP3	2.21	40.6	40.0	19.4	Loam
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP4	1.65	33.6	47.3	19.1	Silt loam
Split Lake	Nearshore: predominantly-wetted	2014	reference	SPLIT-PW-REP5	1.51	41.4	40.2	18.4	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP1	1.48	12.6	42.8	44.6	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP2	1.13	11.4	42.8	45.8	Silt
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP3	1.14	9.4	38.2	52.4	Silty clay loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP4	1.25	10.2	40.7	49.1	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL3KM-PW-REP5	1.41	12.5	42.8	44.7	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP1	1.96	3.5	61.2	35.3	Silty clay loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP2	1.67	11.8	50.8	37.3	Silty clay loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP3	3.13	7.8	43.5	48.6	Silty clay loam

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Total Organic Carbon	Sand	Silt	Clay	Texture
Units					**%**	**%**	**%**	**%**	**-**
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP4	2.84	9.6	52.2	38.2	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL3KM-PW-REP5	2.28	18.2	42.1	39.7	Silty clay loam
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP1	1.97	4.0	71.0	25.0	Silty clay
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP2	0.49	75.7	16.5	7.8	Silty clay
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP3	1.57	54.6	33.5	11.9	Clay
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP4	1.68	49.6	40.3	10.1	Silty clay
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2013	impact	STL11KM-PW-REP5	3.61	10.3	71.6	18.1	Clay
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP1	2.47	35.7	51.0	13.3	Silt loam
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP2	1.26	52.9	34.9	12.2	Sandy loam
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP3	1.59	54.6	35.2	10.2	Loam
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP4	1.64	55.5	36.1	8.4	Loam
Stephens Lake 11 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL11KM-PW-REP5	5.60	10.6	51.4	37.9	Loam
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP1	0.36	54.0	18.8	27.2	Silty clay loam
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP2	2.52	74.1	17.7	8.3	Silty clay loam
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP3	0.35	90.4	5.4	4.2	Loam
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP4	2.15	65.7	27.4	6.9	Silty clay loam
Stephens Lake 25 km downstream of Gull Rapids	Nearshore: predominantly-wetted	2014	impact	STL25KM-PW-REP5	0.40	90.1	4.7	5.2	Silty clay loam
Burntwood River	Offshore	2014	reference	BURNT-OS-REP1	1.8	7.37	62.7	29.9	Silty clay loam

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Total Organic Carbon	Sand	Silt	Clay	Texture
Units					%	%	%	%	-
Burntwood River	Offshore	2014	reference	BURNT-OS-REP2	1.79	3.55	62.7	33.8	Silty clay loam
Burntwood River	Offshore	2014	reference	BURNT-OS-REP3	1.76	5.32	61.6	33.1	Silty clay
Burntwood River	Offshore	2014	reference	BURNT-OS-REP4	1.72	5.42	63.1	31.5	Silty clay loam
Burntwood River	Offshore	2014	reference	BURNT-OS-REP5	1.34	35.9	39.1	24.9	Silty clay loam
Split Lake	Offshore	2013	reference	SPLIT-OS-REP1	1.08	17.8	66.0	16.2	Silty clay
Split Lake	Offshore	2013	reference	SPLIT-OS-REP2	1.15	17.6	79.7	2.7	Silty clay
Split Lake	Offshore	2013	reference	SPLIT-OS-REP3	1.04	19.0	50.5	30.4	Clay
Split Lake	Offshore	2013	reference	SPLIT-OS-REP4	1.01	19.5	55.2	25.3	Silty clay
Split Lake	Offshore	2013	reference	SPLIT-OS-REP5	1.05	19.0	55.6	25.4	Silty clay
Split Lake	Offshore	2014	reference	SPLIT-OS-REP1	1.34	19.5	50.0	30.5	Silty clay loam
Split Lake	Offshore	2014	reference	SPLIT-OS-REP2	1.31	14.8	56.6	28.6	Silt Clay loam / Silty clay
Split Lake	Offshore	2014	reference	SPLIT-OS-REP3	1.32	17.7	53.5	28.8	Silty clay loam
Split Lake	Offshore	2014	reference	SPLIT-OS-REP4	1.10	24.2	54.8	20.9	Silty clay loam
Split Lake	Offshore	2014	reference	SPLIT-OS-REP5	1.33	16.4	52.2	31.4	Silty clay loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP1	1.16	1.1	45.3	53.7	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP2	0.75	2.1	40.2	57.6	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP3	1.59	3.5	21.5	75.0	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP4	1.16	1.7	52.3	46.1	Silty clay loam

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Total Organic Carbon	Sand	Silt	Clay	Texture
Units					%	%	%	%	-
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2013	impact	STL3KM-OS-REP5	0.93	1.9	26.7	71.4	Silty clay loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP1	1.67	14.8	46.8	38.5	Silt loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP2	2.43	9.6	51.8	38.6	Loam / Sandy loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP3	0.77	45.2	30.6	24.2	Sandy loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP4	0.96	2.2	61.3	36.5	Sandy loam
Stephens Lake 3 km downstream of Gull Rapids	Offshore	2014	impact	STL3KM-OS-REP5	1.51	4.1	59.9	36.0	Silty clay loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP1	1.11	0.5	73.7	25.8	Silt loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP2	1.36	0.5	75.7	23.7	Sandy loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP3	1.23	0.6	75.1	24.3	Sandy loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP4	1.20	0.5	69.8	29.7	Loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2013	impact	STL11KM-OS-REP5	1.30	0.3	68.1	31.7	Silt loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP1	1.48	0.5	67.4	32.1	Silt loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP2	5.71	0.1	59.9	40.0	Silt loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP3	1.30	0.4	67.3	32.3	Silty clay loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP4	1.28	0.3	68.6	31.2	Silty clay loam
Stephens Lake 11 km downstream of Gull Rapids	Offshore	2014	impact	STL11KM-OS-REP5	1.27	0.2	68.2	31.6	Silt loam / Silty clay loam
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP1	1.88	0.1	76.7	23.1	Sandy clay loam
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP2	1.93	0.2	76.6	23.2	Sandy loam

Waterbody/ Site Location	Habitat Type	Study Year	Site Type	Site ID	Total Organic Carbon	Sand	Silt	Clay	Texture
Units					**%**	**%**	**%**	**%**	**-**
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP3	2.23	0.3	71.5	28.2	Sand
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP4	2.01	0.1	66.2	33.6	Sandy loam
Stephens Lake 25 km downstream of Gull Rapids	Offshore	2014	impact	STL25KM-OS-REP5	2.09	0.1	72.3	27.6	Sand

Appendix 3: Summary statistics for additional metrics by habitat type for the benthic macroinvertebrate monitoring program, 2013 (pre-construction) and 2014 (Year 1 construction).

Predominantly-Wetted Nearshore Habitat

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Oligochaeta Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	13.85	40.40	79.64	106.76	145.43	75.02	277.01
Minimum	0.00	0.00	17.31	0.00	77.91	0.00	14.43
Maximum	25.97	144.28	164.47	230.84	311.63	144.28	476.11
Median	17.31	14.43	34.63	100.99	129.85	57.71	245.27
Standard deviation (n-1)	13.13	58.96	73.81	87.52	96.47	56.25	194.74
Standard error of the mean	5.87	26.37	33.01	39.14	43.14	25.16	87.09
COV (%)	94.79	145.95	92.68	81.98	66.34	74.98	70.30
+50% Mean	20.78	60.60	119.46	160.15	218.14	112.53	415.51
-50% Mean	6.93	20.20	39.82	53.38	72.71	37.51	138.50
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Amphipoda Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	1.73	23.08	1.73	2.89	1.73	5.77	11.54
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	8.66	115.42	8.66	14.43	8.66	28.86	43.28
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Standard deviation (n-1)	3.87	51.62	3.87	6.45	3.87	12.90	18.81
Standard error of the mean	1.73	23.08	1.73	2.89	1.73	5.77	8.41
COV (%)	223.61	223.61	223.61	223.61	223.61	223.61	162.98
+50% Mean	2.60	34.63	2.60	4.33	2.60	8.66	17.31
-50% Mean	0.87	11.54	0.87	1.44	0.87	2.89	5.77
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	No	N/A	No	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Bivalvia Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	413.78	23.08	27.70	8.66	119.46	129.85	412.63
Minimum	155.82	0.00	8.66	0.00	25.97	28.86	187.56
Maximum	865.65	57.71	51.94	28.86	242.38	173.13	1038.78
Median	277.01	14.43	25.97	0.00	138.50	144.28	288.55
Standard deviation (n-1)	290.24	21.88	16.65	12.90	90.46	57.71	354.66
Standard error of the mean	129.80	9.79	7.45	5.77	40.45	25.81	158.61
COV (%)	70.14	94.79	60.11	149.07	75.72	44.44	85.95
+50% Mean	620.67	34.63	41.55	12.98	179.19	194.77	618.94
-50% Mean	206.89	11.54	13.85	4.33	59.73	64.92	206.31
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Gastropoda Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	410.32	89.45	562.67	167.36	493.42	455.91	1128.23
Minimum	138.50	14.43	216.41	43.28	285.66	43.28	158.70
Maximum	709.83	201.99	882.96	288.55	649.24	807.94	2539.24
Median	354.92	57.71	510.73	187.56	476.11	432.83	1038.78
Standard deviation (n-1)	255.30	80.59	303.16	101.30	154.49	283.57	883.35
Standard error of the mean	114.17	36.04	135.58	45.30	69.09	126.81	395.05
COV (%)	62.22	90.09	53.88	60.53	31.31	62.20	78.29
+50% Mean	615.48	134.18	844.01	251.04	740.13	683.86	1692.35
-50% Mean	205.16	44.73	281.34	83.68	246.71	227.95	564.12
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Chironomidae Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	145.43	239.50	316.83	643.47	282.20	334.72	239.50
Minimum	69.25	144.28	190.44	245.27	147.16	57.71	0.00
Maximum	225.07	389.54	398.20	1183.06	718.49	605.96	504.96
Median	121.19	230.84	389.54	490.54	173.13	216.41	100.99
Standard deviation (n-1)	67.72	99.23	107.70	368.62	245.96	254.72	239.38
Standard error of the mean	30.29	44.37	48.17	164.85	110.00	113.91	107.06
COV (%)	46.57	41.43	33.99	57.29	87.16	76.10	99.95
+50% Mean	218.14	359.25	475.24	965.20	423.30	502.08	359.25
-50% Mean	72.71	119.75	158.41	321.73	141.10	167.36	119.75
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Plecoptera Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Standard deviation (n-1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Standard error of the mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COV (%)	-	-	-	-	-	-	-
+50% Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50% Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benchmark Exceedance (temporal comparison)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Trichoptera Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	25.97	8.66	19.04	25.97	15.58	8.66	11.54
Minimum	17.31	0.00	0.00	0.00	8.66	0.00	0.00
Maximum	51.94	14.43	43.28	86.57	34.63	28.86	43.28
Median	17.31	14.43	17.31	14.43	8.66	0.00	0.00
Standard deviation (n-1)	14.99	7.90	16.65	34.45	11.29	12.90	18.81
Standard error of the mean	6.71	3.53	7.45	15.40	5.05	5.77	8.41
COV (%)	57.74	91.29	87.43	132.64	72.44	149.07	162.98
+50% Mean	38.95	12.98	28.57	38.95	23.37	12.98	17.31
-50% Mean	12.98	4.33	9.52	12.98	7.79	4.33	5.77
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**EPT Density (no. per m^2)**						
n	5	5	5	5	5	5	5
Mean	405.12	201.99	83.10	522.28	1959.83	727.15	357.80
Minimum	164.47	158.70	51.94	57.71	805.06	230.84	201.99
Maximum	657.89	245.27	112.53	937.79	3038.43	1226.34	649.24
Median	311.63	201.99	95.22	649.24	2337.26	822.37	274.12
Standard deviation (n-1)	211.99	36.78	29.10	370.85	913.45	406.10	182.04
Standard error of the mean	94.80	16.45	13.01	165.85	408.51	181.61	81.41
COV (%)	52.33	18.21	35.02	71.01	46.61	55.85	50.88
+50% Mean	607.69	302.98	124.65	783.41	2939.75	1090.72	536.70
-50% Mean	202.56	100.99	41.55	261.14	979.92	363.57	178.90
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	No	N/A	Yes	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Percent Ephemeroptera**						
n	5	5	5	5	5	5	5
Mean	26.92	29.60	5.63	29.67	61.58	39.17	19.15
Minimum	14.72	22.00	2.53	12.12	50.28	14.71	5.54
Maximum	45.58	46.43	9.52	41.90	70.82	53.77	49.45
Median	18.54	26.79	5.48	29.11	63.43	49.13	14.81
Standard deviation (n-1)	13.76	9.71	2.72	11.87	9.69	17.62	17.58
Standard error of the mean	6.15	4.34	1.22	5.31	4.33	7.88	7.86
COV (%)	51.10	32.80	48.32	40.03	15.73	44.98	91.81
+50% Mean	40.38	44.40	8.44	44.50	92.37	58.75	28.72
-50% Mean	13.46	14.80	2.81	14.83	30.79	19.58	9.57
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Ratio of EPT to Chironomidae**						
n	5	5	5	5	5	5	5
Mean	2.90	0.96	0.28	0.77	8.44	5.25	2.56
Minimum	1.36	0.41	0.13	0.24	4.23	0.38	0.54
Maximum	4.50	1.40	0.46	1.41	13.50	14.25	6.43
Median	2.83	1.06	0.27	0.63	8.41	4.40	1.64
Standard deviation (n-1)	1.13	0.37	0.12	0.48	3.77	5.66	2.71
Standard error of the mean	0.50	0.16	0.05	0.22	1.68	2.53	1.35
COV (%)	38.82	38.27	41.16	63.17	44.63	107.85	105.57
+50% Mean	4.35	1.44	0.42	1.15	12.66	7.87	3.84
-50% Mean	1.45	0.48	0.14	0.38	4.22	2.62	1.28
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	No	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Percent of Oligochaeta + Chironomidae**						
n	5	5	5	5	5	5	5
Mean	12.58	41.13	33.15	53.67	13.64	25.67	19.89
Minimum	4.76	30.00	25.32	40.00	7.61	7.55	1.23
Maximum	19.32	54.00	44.52	63.64	20.00	52.53	36.22
Median	13.20	39.29	30.95	56.33	14.35	14.96	21.98
Standard deviation (n-1)	6.21	9.39	7.74	10.58	4.50	19.92	13.38
Standard error of the mean	2.78	4.20	3.46	4.73	2.01	8.91	5.98
COV (%)	49.39	22.84	23.34	19.72	32.95	77.62	67.29
+50% Mean	18.87	61.70	49.73	80.50	20.47	38.50	29.83
-50% Mean	6.29	20.57	16.58	26.83	6.82	12.83	9.94
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	Yes	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	Yes	N/A	No	N/A

Site	BURNT 2014	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**EPT Richness (Family level)**						
n	5	5	5	5	5	5	5
Mean	2.60	1.60	2.40	2.20	3.00	1.80	2.00
Minimum	2.00	1.00	1.00	1.00	2.00	1.00	1.00
Maximum	4.00	2.00	3.00	4.00	5.00	3.00	4.00
Median	2.00	2.00	3.00	2.00	3.00	2.00	2.00
Standard deviation (n-1)	0.89	0.55	0.89	1.10	1.22	0.84	1.22
Standard error of the mean	0.40	0.24	0.40	0.49	0.55	0.37	0.55
COV (%)	34.40	34.23	37.27	49.79	40.82	46.48	61.24
+50% Mean	3.90	2.40	3.60	3.30	4.50	2.70	3.00
-50% Mean	1.30	0.80	1.20	1.10	1.50	0.90	1.00
Benchmark Exceedance (temporal comparison)	N/A	N/A	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Offshore Habitat

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Oligochaeta Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	6.93	25.97	28.86	12.12	8.66	13.85	5.77	11.54
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	17.31	57.71	57.71	34.63	28.86	34.63	14.43	43.28
Median	8.66	28.86	28.86	8.66	0.00	8.66	0.00	0.00
Standard deviation (n-1)	7.24	21.40	20.40	14.49	12.90	15.73	7.90	18.81
Standard error of the mean	3.24	9.57	9.12	6.48	5.77	7.03	3.53	8.41
COV (%)	104.58	82.40	70.71	119.52	149.07	113.54	136.93	162.98
+50% Mean	10.39	38.95	43.28	18.18	12.98	20.78	8.66	17.31
-50% Mean	3.46	12.98	14.43	6.06	4.33	6.93	2.89	5.77
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Amphipoda Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	3.46	1413.90	1584.14	1.73	20.20	79.64	227.95	1688.02
Minimum	0.00	894.51	1211.91	0.00	0.00	0.00	72.14	1226.34
Maximum	17.31	1918.86	2308.40	8.66	43.28	129.85	432.83	2034.28
Median	0.00	1543.74	1370.61	0.00	14.43	69.25	201.99	1615.88
Standard deviation (n-1)	7.74	493.60	465.99	3.87	16.45	53.85	164.94	342.48
Standard error of the mean	3.46	220.75	208.40	1.73	7.36	24.08	73.76	153.16
COV (%)	223.61	34.91	29.42	223.61	81.44	67.62	72.36	20.29
+50% Mean	5.19	2120.84	2376.21	2.60	30.30	119.46	341.93	2532.03
-50% Mean	1.73	706.95	792.07	0.87	10.10	39.82	113.98	844.01
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	Yes	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	Yes	N/A	No	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Bivalvia Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	306.44	894.51	753.12	1.73	11.54	0.00	0.00	2.89
Minimum	8.66	331.83	259.70	0.00	0.00	0.00	0.00	0.00
Maximum	545.36	1139.77	1240.77	8.66	43.28	0.00	0.00	14.43
Median	320.29	981.07	649.24	0.00	0.00	0.00	0.00	0.00
Standard deviation (n-1)	227.44	328.36	418.20	3.87	18.81	0.00	0.00	6.45
Standard error of the mean	101.71	146.85	187.02	1.73	8.41	0.00	0.00	2.89
COV (%)	74.22	36.71	55.53	223.61	162.98	-	-	223.61
+50% Mean	459.66	1341.76	1129.67	2.60	17.31	0.00	0.00	4.33
-50% Mean	153.22	447.25	376.56	0.87	5.77	0.00	0.00	1.44
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Gastropoda Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	1.73	3921.40	5606.53	322.02	730.03	13.85	8.66	0.00
Minimum	0.00	129.85	3505.89	121.19	201.99	0.00	0.00	0.00
Maximum	8.66	6982.92	6982.92	744.46	1630.31	51.94	43.28	0.00
Median	0.00	4068.56	6232.69	164.47	490.54	8.66	0.00	0.00
Standard deviation (n-1)	3.87	2691.54	1563.89	265.36	623.61	21.73	19.36	0.00
Standard error of the mean	1.73	1203.69	699.39	118.67	278.89	9.72	8.66	0.00
COV (%)	223.61	68.64	27.89	82.40	85.42	156.87	223.61	-
+50% Mean	2.60	5882.10	8409.80	483.03	1095.05	20.78	12.98	0.00
-50% Mean	0.87	1960.70	2803.27	161.01	365.02	6.93	4.33	0.00
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	Yes	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Chironomidae Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	79.64	317.41	155.82	657.89	620.38	193.91	135.62	227.95
Minimum	25.97	144.28	72.14	363.57	173.13	0.00	28.86	173.13
Maximum	147.16	461.68	230.84	1324.45	908.93	389.54	216.41	274.12
Median	69.25	346.26	158.70	493.42	721.38	173.13	173.13	230.84
Standard deviation (n-1)	43.88	134.18	57.17	391.56	290.17	141.00	80.72	37.34
Standard error of the mean	19.63	60.01	25.57	175.11	129.77	63.06	36.10	16.70
COV (%)	55.10	42.28	36.69	59.52	46.77	72.71	59.52	16.38
+50% Mean	119.46	476.11	233.73	986.84	930.57	290.86	203.43	341.93
-50% Mean	39.82	158.70	77.91	328.95	310.19	96.95	67.81	113.98
Benchmark Exceedance (temporal comparison)	N/A	-	Yes	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Plecoptera Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Standard deviation (n-1)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Standard error of the mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COV (%)	-	-	-	-	-	-	-	-
+50% Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-50% Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benchmark Exceedance (temporal comparison)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Trichoptera Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	58.86	72.14	46.17	25.97	20.20	0.00	2.89	0.00
Minimum	0.00	57.71	0.00	8.66	0.00	0.00	0.00	0.00
Maximum	251.04	100.99	86.57	43.28	57.71	0.00	14.43	0.00
Median	17.31	57.71	57.71	25.97	14.43	0.00	0.00	0.00
Standard deviation (n-1)	108.02	20.40	32.90	17.31	21.88	0.00	6.45	0.00
Standard error of the mean	48.31	9.12	14.71	7.74	9.79	0.00	2.89	0.00
COV (%)	183.50	28.28	71.26	66.67	108.33	-	223.61	-
+50% Mean	88.30	108.21	69.25	38.95	30.30	0.00	4.33	0.00
-50% Mean	29.43	36.07	23.08	12.98	10.10	0.00	1.44	0.00
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	Yes	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**EPT Density (no. per m^2)**							
n	5	5	5	5	5	5	5	5
Mean	96.95	1353.30	689.64	90.03	75.02	1563.37	1096.49	831.02
Minimum	25.97	432.83	375.12	17.31	0.00	0.00	952.22	692.52
Maximum	268.35	1688.02	1096.49	138.50	115.42	2276.66	1240.77	966.64
Median	69.25	1615.88	591.53	103.88	100.99	1817.87	1038.78	851.22
Standard deviation (n-1)	97.44	531.71	274.20	46.05	47.19	894.76	129.45	115.24
Standard error of the mean	43.58	237.79	122.63	20.59	21.11	400.15	57.89	51.54
COV (%)	100.50	39.29	39.76	51.15	62.91	57.23	11.81	13.87
+50% Mean	145.43	2029.95	1034.45	135.04	112.53	2345.05	1644.74	1246.54
-50% Mean	48.48	676.65	344.82	45.01	37.51	781.68	548.25	415.51
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Percent Ephemeroptera**							
n	5	5	5	5	5	5	5	5
Mean	12.24	18.52	7.61	6.18	3.90	66.65	75.07	30.29
Minimum	1.79	4.53	3.82	1.05	0.00	0.00	64.89	27.44
Maximum	34.78	39.29	13.08	13.41	9.33	87.40	91.14	34.46
Median	9.80	16.85	7.61	5.67	2.50	81.93	73.03	28.13
Standard deviation (n-1)	13.17	12.71	3.79	4.49	3.76	37.33	10.26	3.54
Standard error of the mean	5.89	5.68	1.70	2.01	1.68	16.70	4.59	1.58
COV (%)	107.59	68.60	49.84	72.66	96.41	56.01	13.67	11.68
+50% Mean	18.35	27.79	11.41	9.26	5.85	99.98	112.60	45.44
-50% Mean	6.12	9.26	3.80	3.09	1.95	33.33	37.53	15.15
Benchmark Exceedance (temporal comparison)	N/A	-	Yes	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Ratio of EPT to Chironomidae**							
n	5	5	5	5	5	5	5	5
Mean	1.31	4.47	4.94	0.15	0.11	7.09	13.48	3.72
Minimum	0.30	3.00	2.50	0.05	0.00	0.00	5.67	2.53
Maximum	2.67	7.80	8.20	0.24	0.20	11.68	36.00	4.25
Median	1.00	3.50	5.09	0.11	0.13	7.50	6.62	3.94
Standard deviation (n-1)	0.94	1.99	2.45	0.09	0.08	4.58	12.97	0.68
Standard error of the mean	0.42	0.89	1.10	0.04	0.04	2.05	5.80	0.30
COV (%)	71.86	44.46	49.56	57.53	72.00	64.69	96.20	18.28
+50% Mean	1.96	6.71	7.42	0.22	0.17	10.63	20.22	5.58
-50% Mean	0.65	2.24	2.47	0.07	0.06	3.54	6.74	1.86
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	Yes	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	No	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**Percent of Oligochaeta + Chironomidae**							
n	5	5	5	5	5	5	5	5
Mean	20.34	4.53	2.08	59.88	46.11	8.64	8.93	8.71
Minimum	5.88	2.09	1.44	35.40	29.17	0.00	2.53	7.44
Maximum	43.48	6.33	3.04	80.93	68.00	14.95	13.19	10.92
Median	16.07	5.30	1.79	60.98	42.86	9.06	11.11	8.48
Standard deviation (n-1)	14.11	1.80	0.68	20.08	15.74	5.53	4.63	1.32
Standard error of the mean	6.31	0.81	0.31	8.98	7.04	2.47	2.07	0.59
COV (%)	69.36	39.75	32.87	33.54	34.13	63.98	51.78	15.11
+50% Mean	30.52	6.79	3.12	89.82	69.16	12.96	13.40	13.06
-50% Mean	10.17	2.26	1.04	29.94	23.05	4.32	4.47	4.35
Benchmark Exceedance (temporal comparison)	N/A	-	Yes	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A

Site	BURNT 2014	SPLIT 2013	SPLIT 2014	STL3KM 2013	STL3KM 2014	STL11KM 2013	STL11KM 2014	STL25KM 2014
Metric	**EPT Richness (Family level)**							
n	5	5	5	5	5	5	5	5
Mean	2.40	2.20	2.20	2.60	1.60	1.00	1.20	1.00
Minimum	1.00	2.00	1.00	2.00	0.00	0.00	1.00	1.00
Maximum	4.00	3.00	3.00	3.00	2.00	2.00	2.00	1.00
Median	3.00	2.00	2.00	3.00	2.00	1.00	1.00	1.00
Standard deviation (n-1)	1.34	0.45	0.84	0.55	0.89	0.71	0.45	0.00
Standard error of the mean	0.60	0.20	0.37	0.24	0.40	0.32	0.20	0.00
COV (%)	55.90	20.33	38.03	21.07	55.90	70.71	37.27	0.00
+50% Mean	3.60	3.30	3.30	3.90	2.40	1.50	1.80	1.50
-50% Mean	1.20	1.10	1.10	1.30	0.80	0.50	0.60	0.50
Benchmark Exceedance (temporal comparison)	N/A	-	No	-	No	-	No	N/A
Significant Inter-annual Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A