Manitoba/Manitoba Hydro

Coordinated Aquatic Monitoring Pilot Program (CAMPP):

Three Year Summary Report (2008-2010) - Volume 8

Results of the Three Year Program

Section 5.7: Lower Nelson River Region

<u>VOLUME 8</u>

SECTION 5.7: LOWER NELSON RIVER REGION

Reference listing:

Coordinated Aquatic Monitoring Program (CAMP). 2014. Three Year Summary Report (2008-2010). Report prepared for the Manitoba/Manitoba Hydro MOU Working Group by North/South Consultants Inc., Winnipeg, MB.

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5.7 LOWER NELSON RIVER REGION

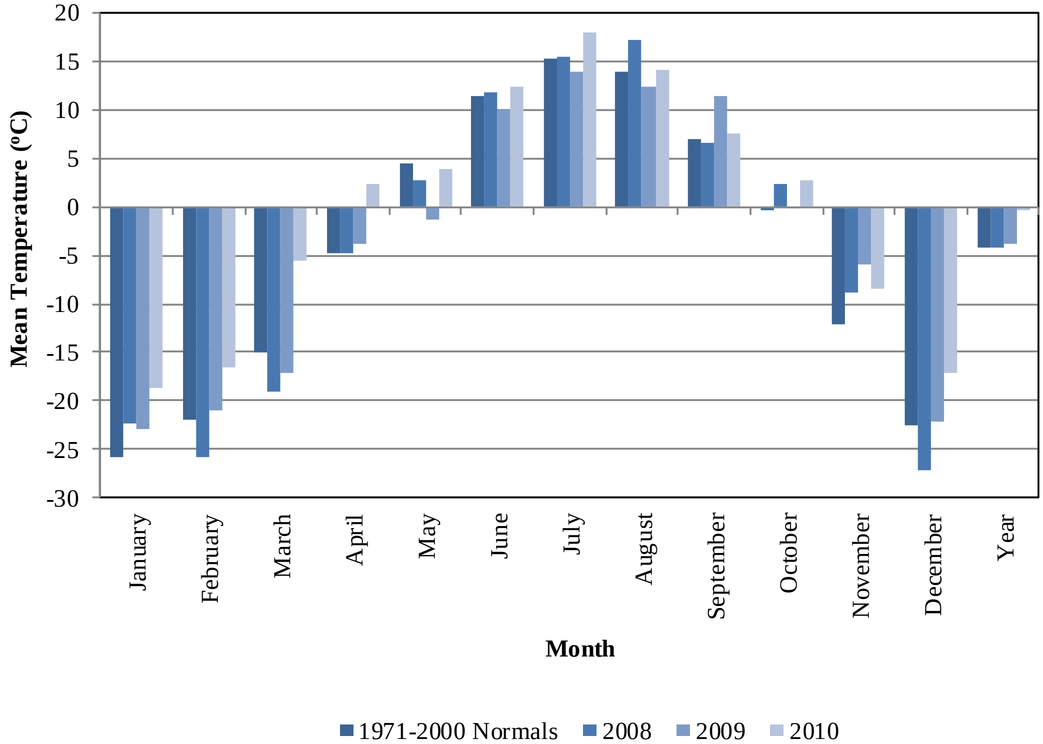
The following presents the results of the Coordinated Aquatic Monitoring Pilot Program (CAMPP) conducted over the period of 2008/2009 through 2010/2011 in the Lower Nelson River Region.

5.7.1 Climate

The mean annual temperature in 2008 and 2009 was similar to, and in 2010 slightly higher than, the 1971-2000 mean annual temperature normal (Figure 5.7.1-1). All months in 2010 except May, were consistently warmer than the monthly temperature normal. Considering the months of June through September, the period in which the open-water season monitoring was conducted under CAMPP, mean monthly temperatures in 2008 and 2009 were generally similar to the normals; exceptions included August 2008 and September 2009 which were notably warmer than the monthly normals.

Annual precipitation was similar to the annual precipitation normal in 2008 and 2009, and slightly higher than the normal in 2010 (Figure 5.7.1-1). Considering the months of June through September, total monthly precipitation was notably above normal in June 2009 and in July, August and September 2010. Conversely, June 2010 and August 2009 were notably drier than normal.

(A)



(B)

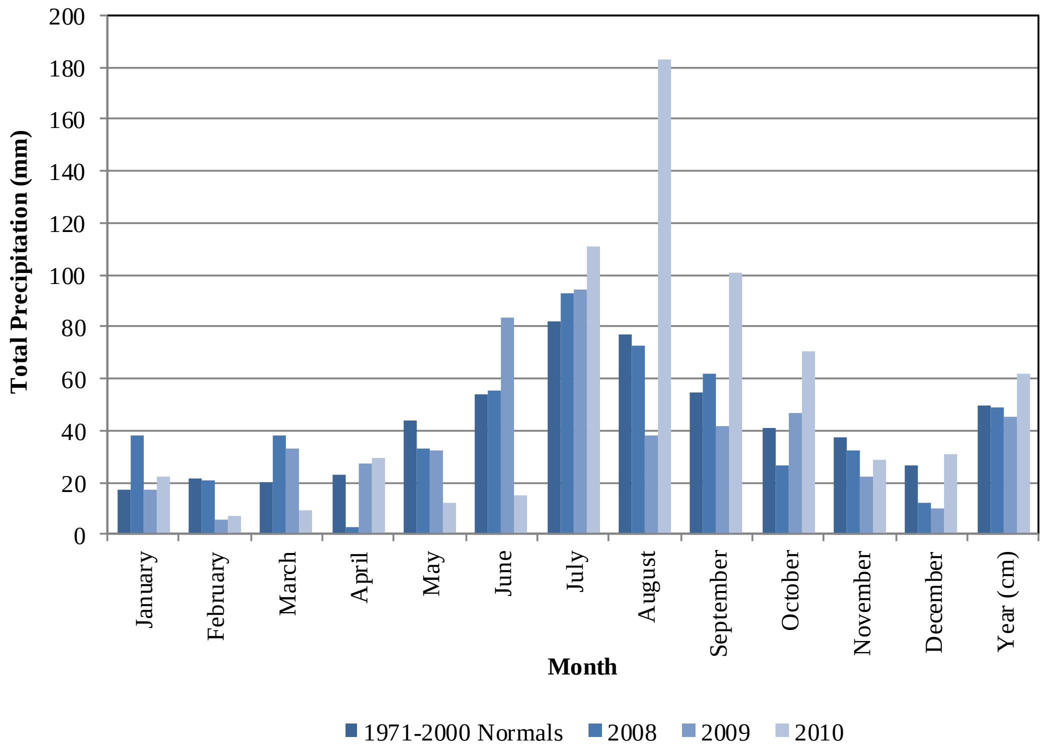


Figure 5.7.1-1. Monthly (A) mean air temperature and (B) total precipitation for 2008-2010 compared to climate normals (1971-2000), Gillam, MB.

5.7.2 Hydrology

The lower Nelson River drainage basin covers an area greater than one million square kilometers. lower Nelson River flows are influenced by regulation of Lake Winnipeg outflows and the Churchill River Diversion (CRD), which diverts the majority of the Churchill River flow into the Nelson River through the Rat-Burntwood River system. CAMPP water quality and biological monitoring occurred in Split Lake, Stephens Lake, the Limestone Generating Station (GS) Forebay, the lower Nelson River, and the Burntwood River near the inflow to Split Lake. Assean Lake and the Hayes River are the off-system water bodies for this region. Relative water levels for the lower Nelson River downstream of the Limestone GS can be inferred from lower Nelson River flows, which are reported at the Kettle GS. Lower Burntwood River flows are reported based on the gauge at Thompson.

From 2008 to 2010, Lower Burntwood River flows were near the upper quartile during the winter months due to flow releases at the Notigi Control Structure (CS) being at licensed maximum. Flows were reduced during part of each summer to near the lower quartile as the Notigi CS releases were reduced to avoid accentuating high flow conditions on the Nelson River (Figure 5.7.2-1).

Between 2008 and 2010, lower Nelson River flows, as measured at the Kettle GS, were above average most of the time reaching record highs in part of 2009 and 2010 (Figure 5.7.2-2). Record high flows were driven by high snowpack in 2009 and high precipitation in 2010 in the Winnipeg, Saskatchewan, and Nelson River drainage basins. Water levels on Split Lake generally followed a similar trend to lower Nelson River flows (Figure 5.7.2-3). Flows and water levels remained at or near record highs from January through March 2011.

2009 water levels on Stephens Lake generally varied between the lower and upper quartile during the winter months and remained near the upper license limit during the summer months (Figure 5.7.2-4). Water levels also varied between the upper and lower quartile from January through March in 2010.

Water levels in the Limestone GS forebay typically fluctuate within a fairly narrow range of 84.5 ft and 85.2 ft and in 2010 and early 2011 water levels were generally within the range (Figure 5.7.2-5).

Water level monitoring on Assean Lake was initiated in August 2009 in support of CAMPP. 2010 water levels on Assean Lake were generally stable from January to September and rose sharply in late October, likely as a result of local precipitation (Figure 5.7.2.6). Water levels in early 2011 were slightly higher than they were in 2010.

Hayes River flows were close to average from January through May in 2008, not measured from May-September, and above the upper quartile from September to December. In 2009, Hayes River flows were close to average for the first and last 3-4 months of the year and well above the upper quartile during the short period of record available in late-July. The Hayes River flow record in 2010 begins in mid-May and is at near record low until mid-August, before rising quickly above average and reaching record highs late in the year. Since the Hayes River is not regulated, flows are a direct result of the level of snowpack and precipitation in the drainage basin (Figure 5.7.2-7). In early 2011, flows dropped from near record high in January to close to average by the end of March.

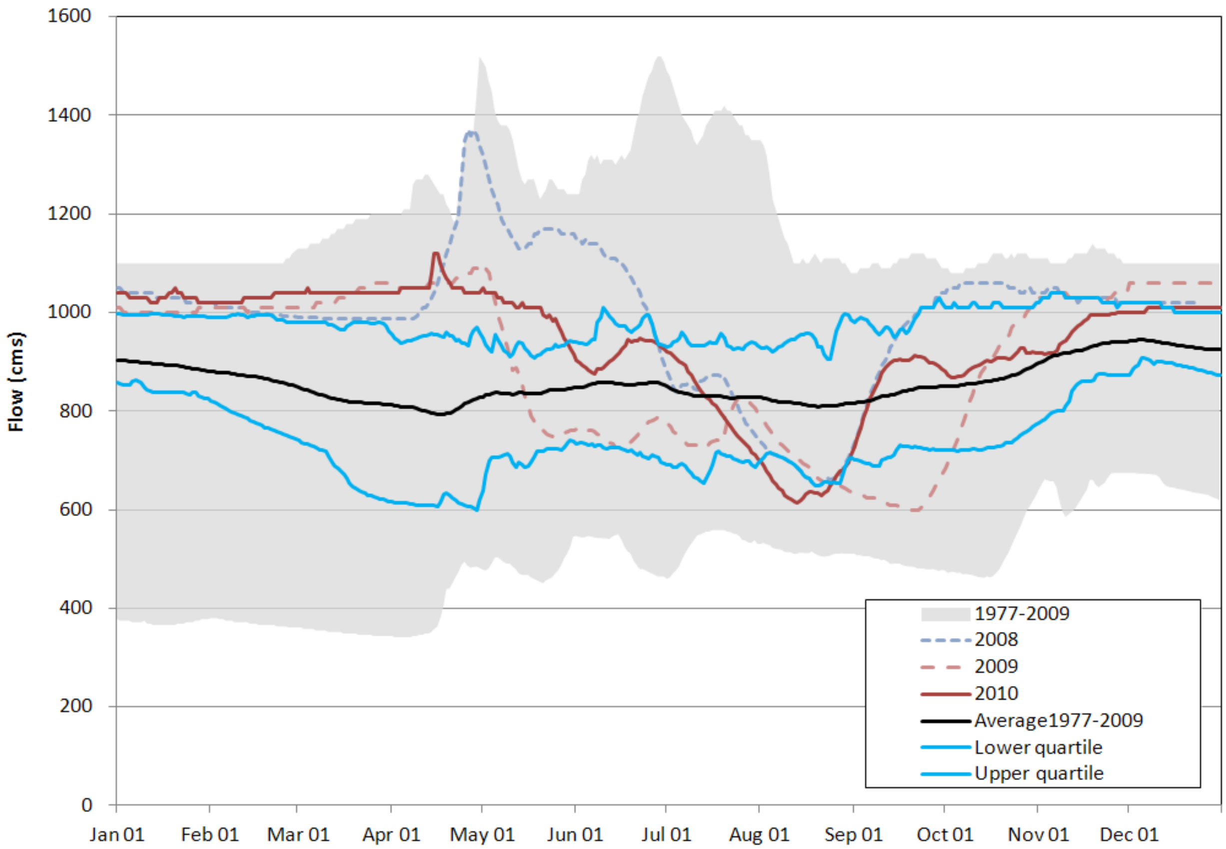


Figure 5.7.2-1. 2008-2010 Lower Burntwood River (05TG001) flow.

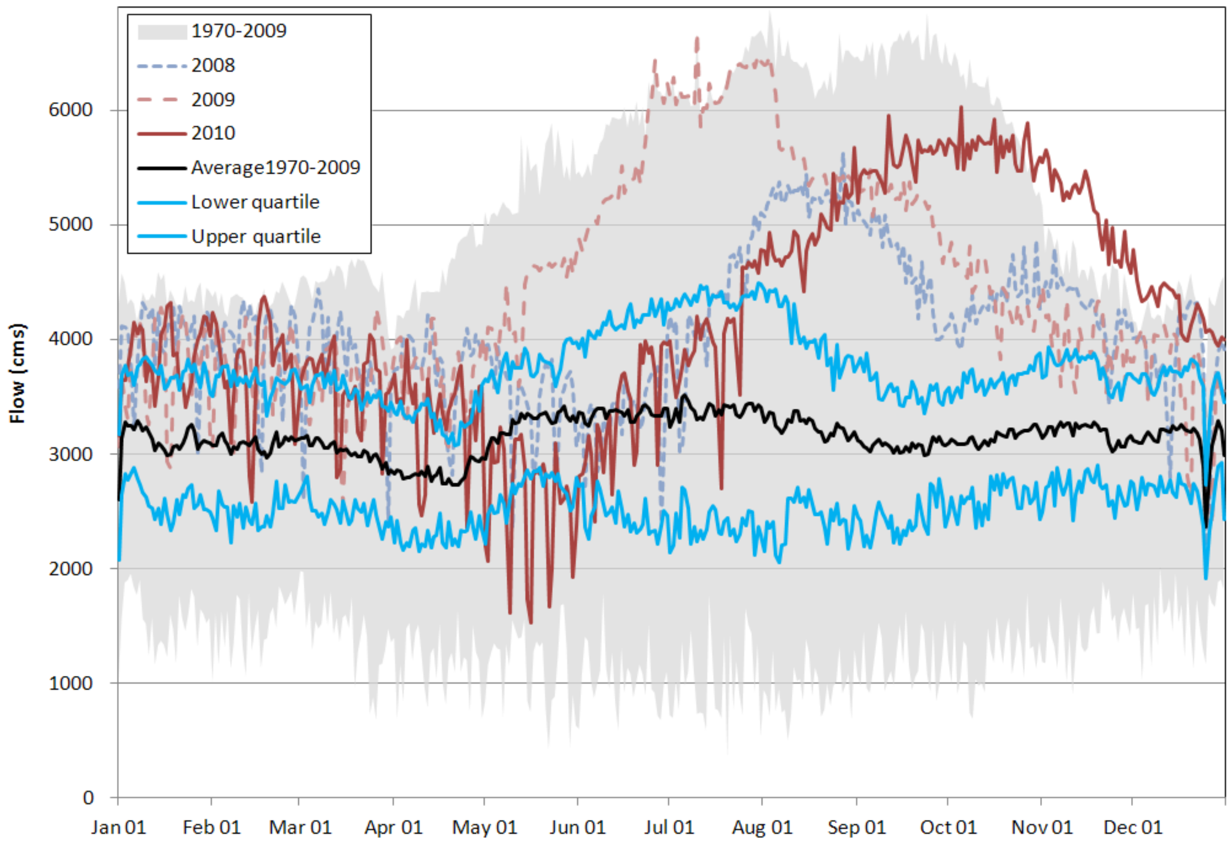


Figure 5.7.2-2. 2008-2010 Kettle Generating Station outflow.

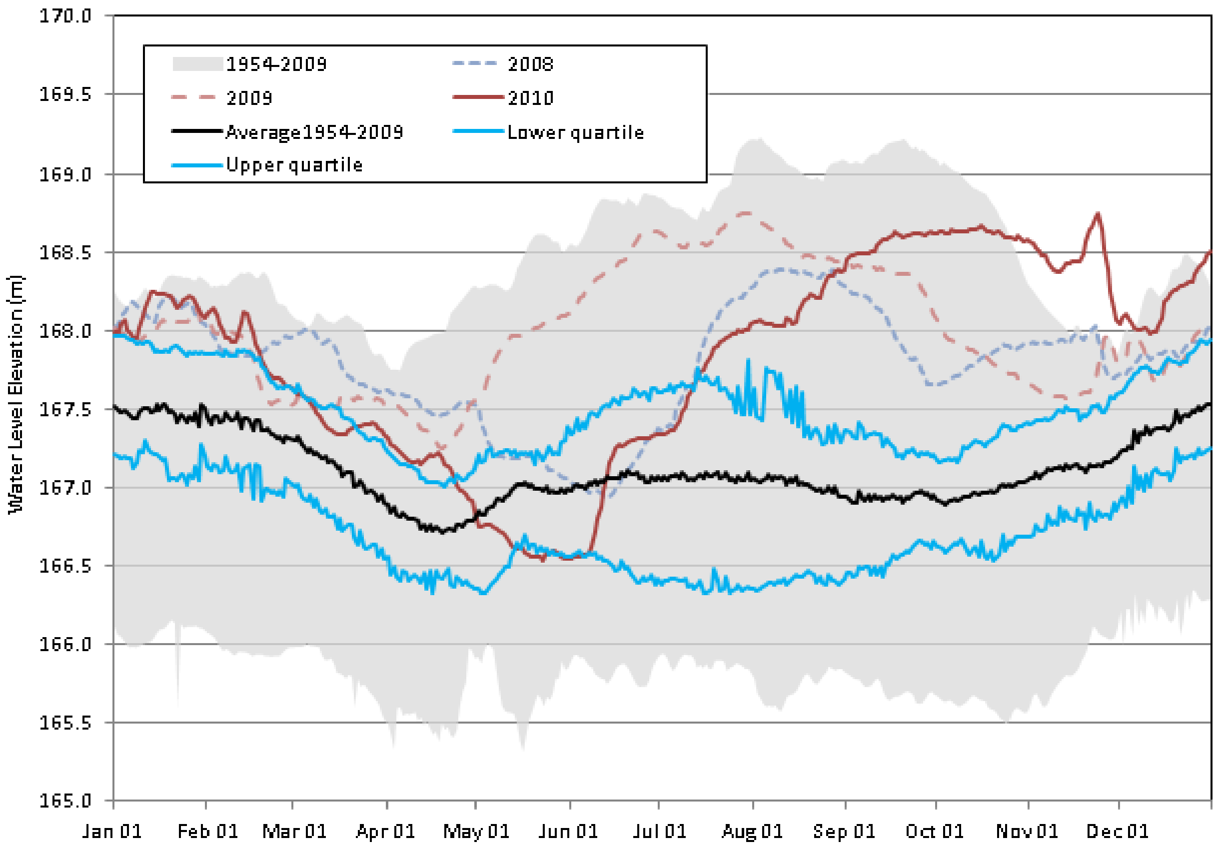


Figure 5.7.2-3. 2008-2010 Split Lake (05UF003) water level elevation.

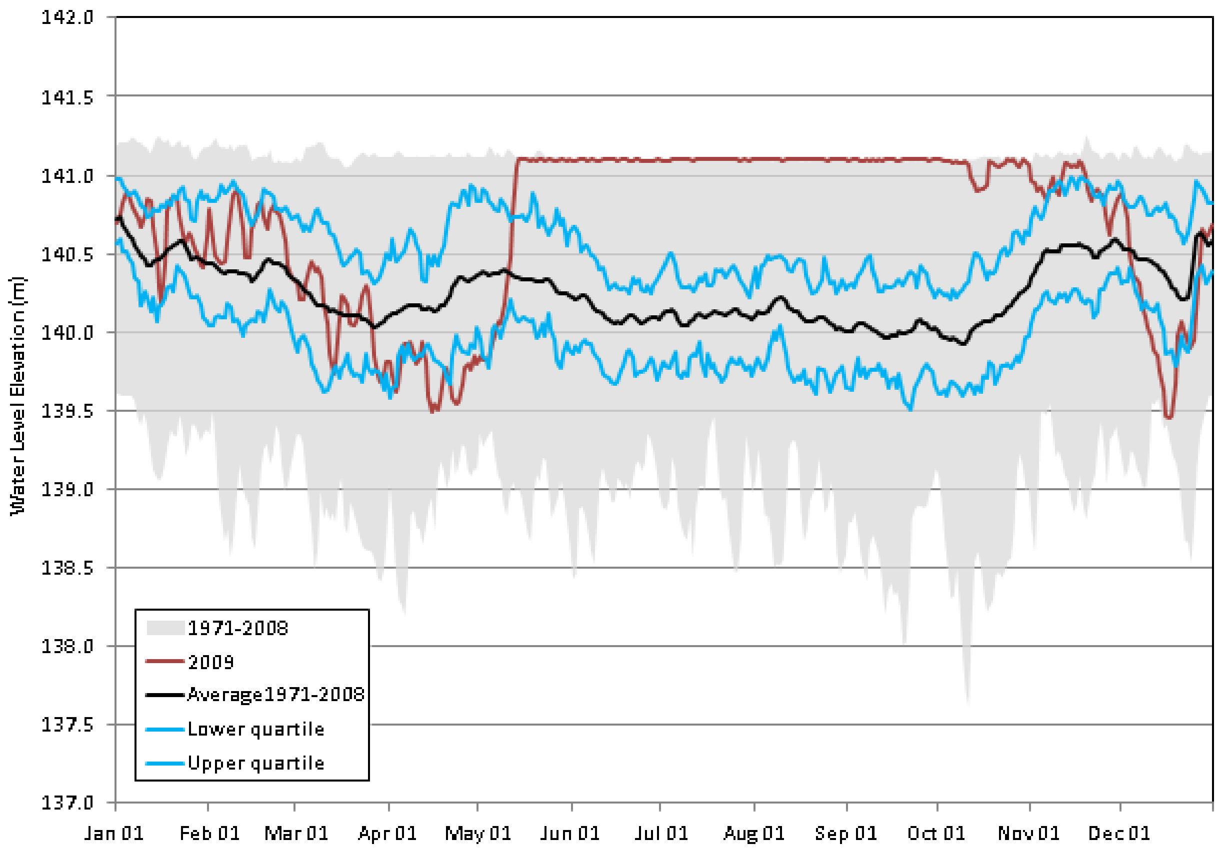


Figure 5.7.2-4. 2009 Kettle Generating Station Forebay (Stephens Lake; 05UF006) water level elevation.

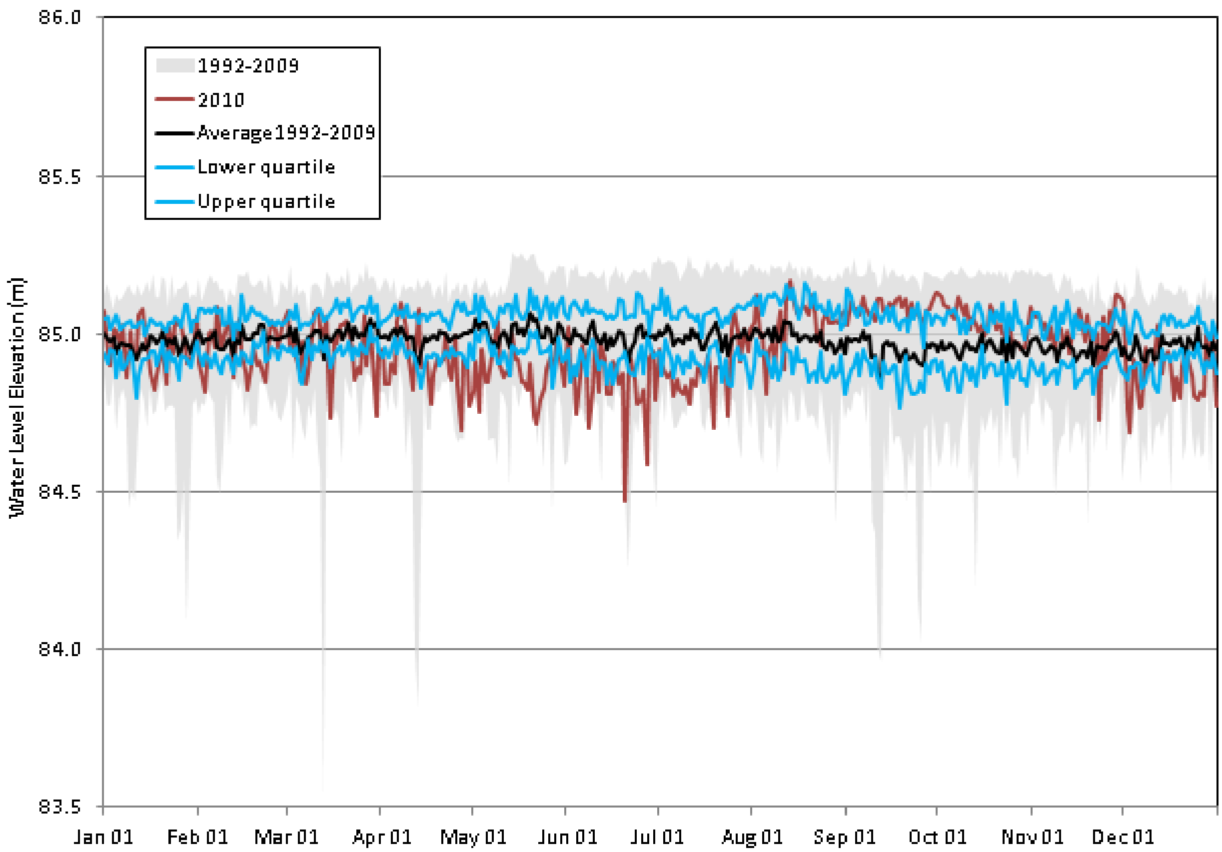


Figure 5.7.2-5. 2010 Limestone Generating Station Forebay (05UF008) water level elevation.

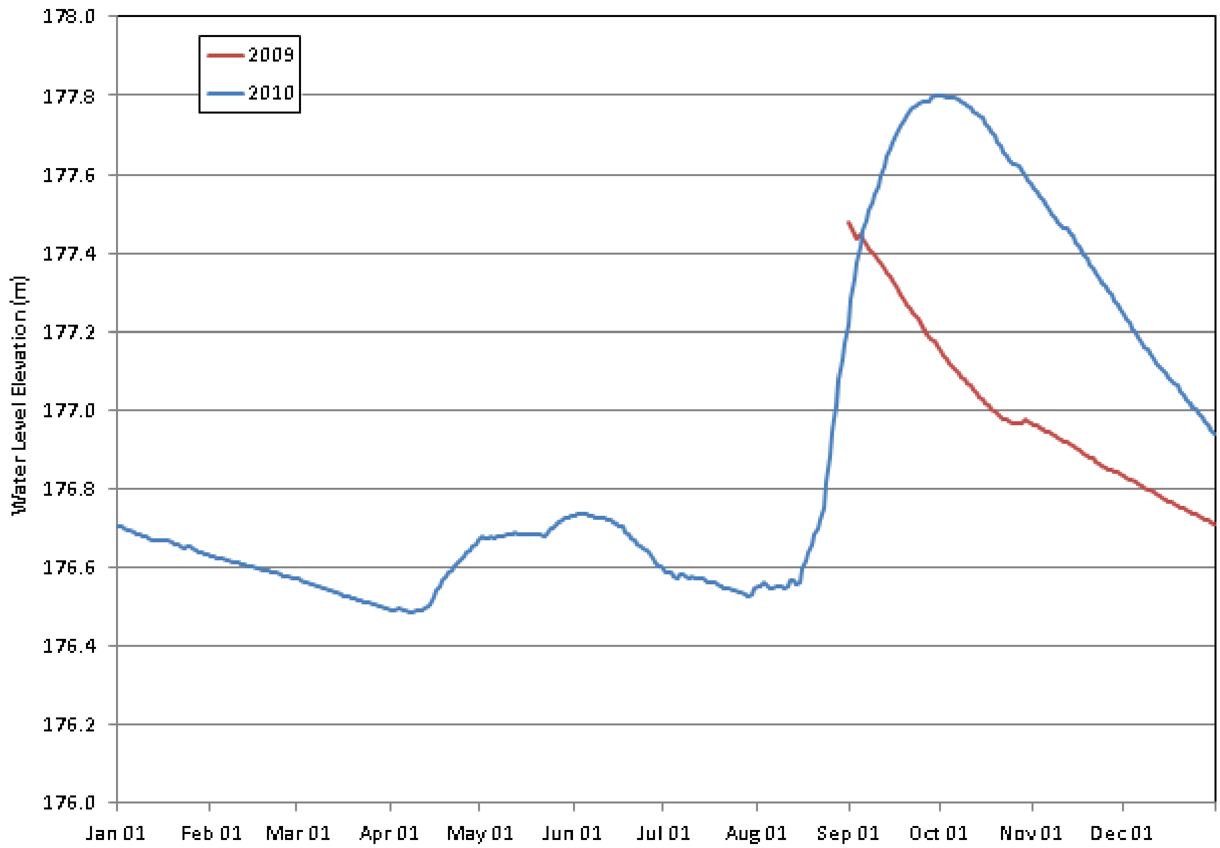


Figure 5.7.2-6. 2008-2010 Assean Lake (05UF605) water level elevation.

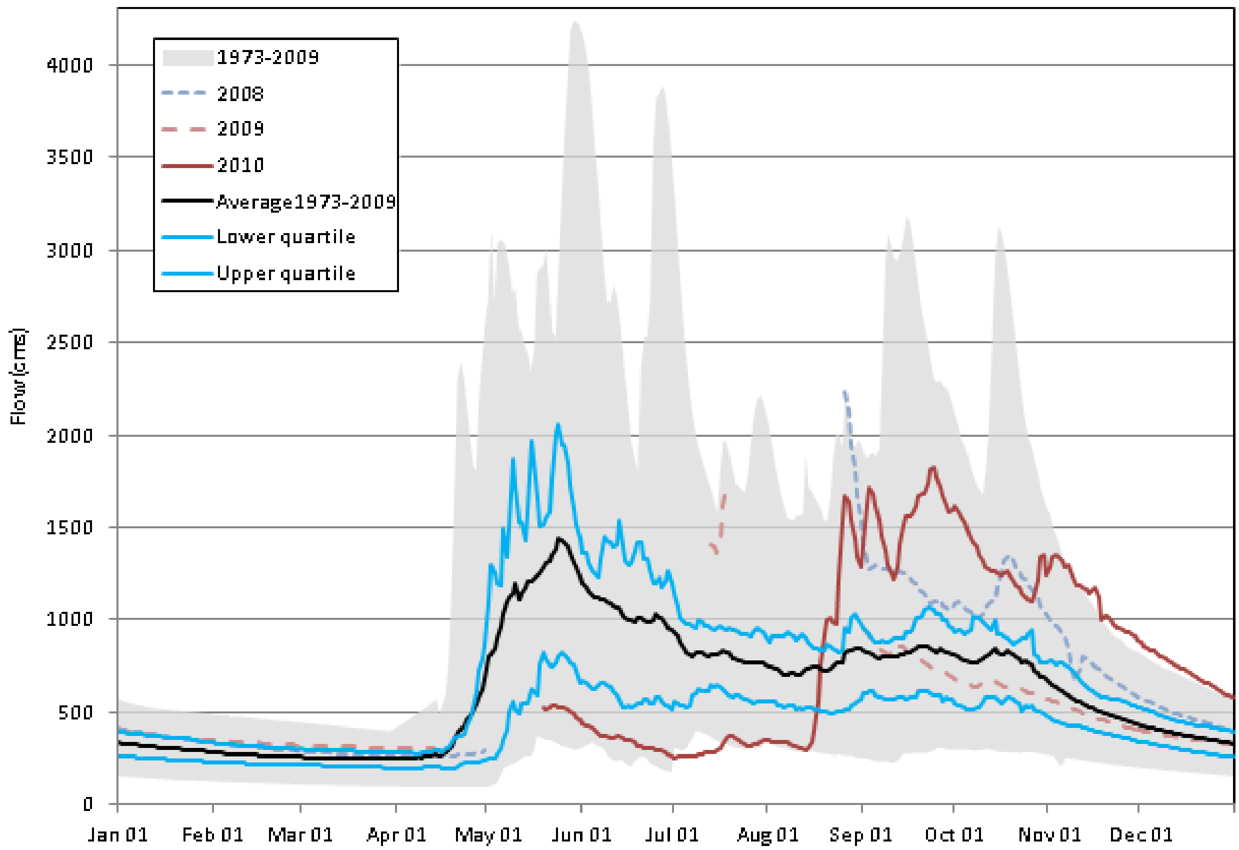


Figure 5.7.2-7. 2008-2010 Hayes River (05AB001) flow.

5.7.3 Aquatic Habitat

An aquatic habitat survey was conducted in Assean Lake in 2010 as part of CAMPP.

5.7.3.1 Overview

Assean Lake is located directly north of Split Lake (Figure 5.7.3-1). It owes its unique southwest to northeast linear character to a large fault line that originates near Thompson, Manitoba and extends out to Gull Rapids along the Nelson River to the northeast. The following sections describe the depth and substrate characteristics of the lake, resulting from studies conducted in 2010. A total of 7,565.24 ha of habitat were mapped. A brief summary of the general aquatic habitat characteristics follows.

5.7.3.2 Bathymetry

Approximately 60% of the Assean Lake is less than 3 m deep (Figure 5.7.3-2). The average depth of Assean Lake is 3.94 m, its deepest point is 19.88 m, and it has a total volume of 224,911,640 m^3 (Table 5.7.3-1). The bathymetric characteristics of five areas of Assean Lake (Figure 5.7.3-3) are summarized below.

Assean Lake proper and Burntwood Bay to its south comprise bathymetric Area 1 (Figure 5.7.3-4). This large shallow low-sloped basin of Assean Lake proper had a mean depth of just 2.14 m and a maximum depth of only 5.76 m (Table 5.7.3-1). A number of shallow reefs were found throughout the central basin of this area, while the shallow area between this basin and Burntwood Bay to the south was not surveyed due to visible rock hazards at the time of survey. The deepest areas of the lake were found in the u-shaped channelized arm (Area 2) running along a fault line that separates Assean Lake proper from Little Assean Lake to the northeast (Figure 5.7.3-4). The bank slopes were high in this area with an average slope of 4.25%, and a maximum slope of 62.94% (Table 5.7.3-1). The deepest areas of Assean Lake were found in Area 2 with depths approaching 20 metres, the deepest point being 19.88 m.

Area 3 is a shallow bay south of Area 2 (Figure 5.7.3-4). The bay had an average depth of 3.36 m and a maximum depth of 5.76 m. On average the slopes were higher than in Area 1, but were still generally very low.

Area 4, beginning in the vicinity of Awupak Narrows, is a narrow relatively shallow extension of Area 2 (Figure 5.7.3-5). The average depth in this area was 3.67 m with a maximum depth of 7.55 m (Table 5.7.3-1). Despite being shallower than Area 2, the banks in this area were still highly sloped. The average slope was calculated to be 5.42 % with a maximum of 48.66%.

Little Assean Lake comprises Area 5 of Assean Lake (Figure 5.7.3-5). The average depth of the Little Assean Lake area was 2.81 m (Table 5.7.3-1), and the maximum depth was 9.35 m. This area of Assean Lake consists of two moderately deep basins: one where the channel entering from Area 2 and 4 begins to broaden, and the other in the middle portion of Little Assean Lake before it becomes shallow in the northeast bay towards the outlet to the Crying River.

5.7.3.3 Substrate

The majority of Assean Lake's shoreline is bedrock. There was, however, a number of low-sloped nearshore areas consisting of peat, organic, and mud accumulations adjacent to wetland environments, and additionally a number of sand and sandy loam beaches interspersed between the rock out crops and low sloped areas. Rock, including bedrock sills, fractured and broken bedrock and nearshore unconsolidated boulder and cobble comprised 518.99 ha (6.86%) of the total substrate distribution (Figures 5.7.3-6 to 5.7.3-9; Table 5.7.3-2). Silt/clay dominated the lakes surficial substrate, accounting for 6,500.66 ha (85.93%) of the total substrate distribution. Compact clay contributed 424.51 ha (5.6%) to the total substrate distribution. Less than 2% of Assean Lake remains unclassified due to the inability to navigate some shallow areas during surveys.

Assean Lake proper was dominated by loose silt/clay substrates that are likely re-suspended by high wind and wave events throughout the shallow basin (Figure 5.7.3-6). There are a number of intermittent and sporadic reefs and bedrock outcrops found throughout the basin. Underlying thick compact clay substrates were fairly uniform, but may contain minor amounts of sands and gravels. The narrow reach between Assean Lake proper and Little Assean Lake had slightly different substrate characteristics (Figure 5.7.3-8). The higher slopes in this reach prevented excessive silt deposition in certain areas, meaning clean compact clay areas were more common.

5.7.3.4 Aquatic Habitat Summary

Assean Lake is a moderately sized lentic waterbody, with relatively low shoreline development. It has a large shallow littoral zone, which implies a high rate of photosynthesis potential per volume. Aquatic plants were observed during the surveys but were not quantified as the program was intentionally conducted earlier in the year to avoid large macrophyte beds which interfere with surveying. The lakes structure and substrates are conducive to plant production, but plant abundance and composition are not known at this time. Depths ranged from extensive shallow basins to deep narrow channel like environments with geological origins. The lake was dominated by fine substrates, although there were a number of shallow rocky shoal habitats and shorelines scattered throughout.

Table 5.7.3-1. Summary of depth, slope, and volume statistics of five areas of Assean Lake resulting from aquatic habitat surveys and mapping conducted in 2010.

Lake Area	Area (m^2)	Area (ha)	Maximum Depth (m)	Mean Depth (m)	Maximum Slope (%)	Mean Slope (%)	Volume (m^3)
Area 1	49,395,445	4,939.54	6.76	2.14	33.74	0.84	105,580,000
Area 2	8,457,519	845.75	19.88	7.72	62.94	4.25	64,987,200
Area 3	6,749,696	674.97	5.76	3.36	25.53	1.66	22,602,200
Area 4	1,081,676	108.17	7.55	3.67	48.66	5.42	3,918,240
Area 5	9,956,646	995.66	9.35	2.81	57.56	1.98	27,824,000
Total	75,640,981	7,564.10	19.88	3.94	62.94	2.83	224,911,640

Table 5.7.3-2. Summary of substrate distribution for Assean Lake resulting from aquatic habitat surveys and mapping conducted in 2010.

Substrate	Area (m^2)	Area (ha)	Total Area (%)
rock	5,189,927	518.99	6.86
silt/clay	65,006,619	6,500.66	85.93
clay	4,245,083	424.51	5.61
unclassified	1,210,790	121.08	1.60
Total	75,652,419	7,565.24	100.00

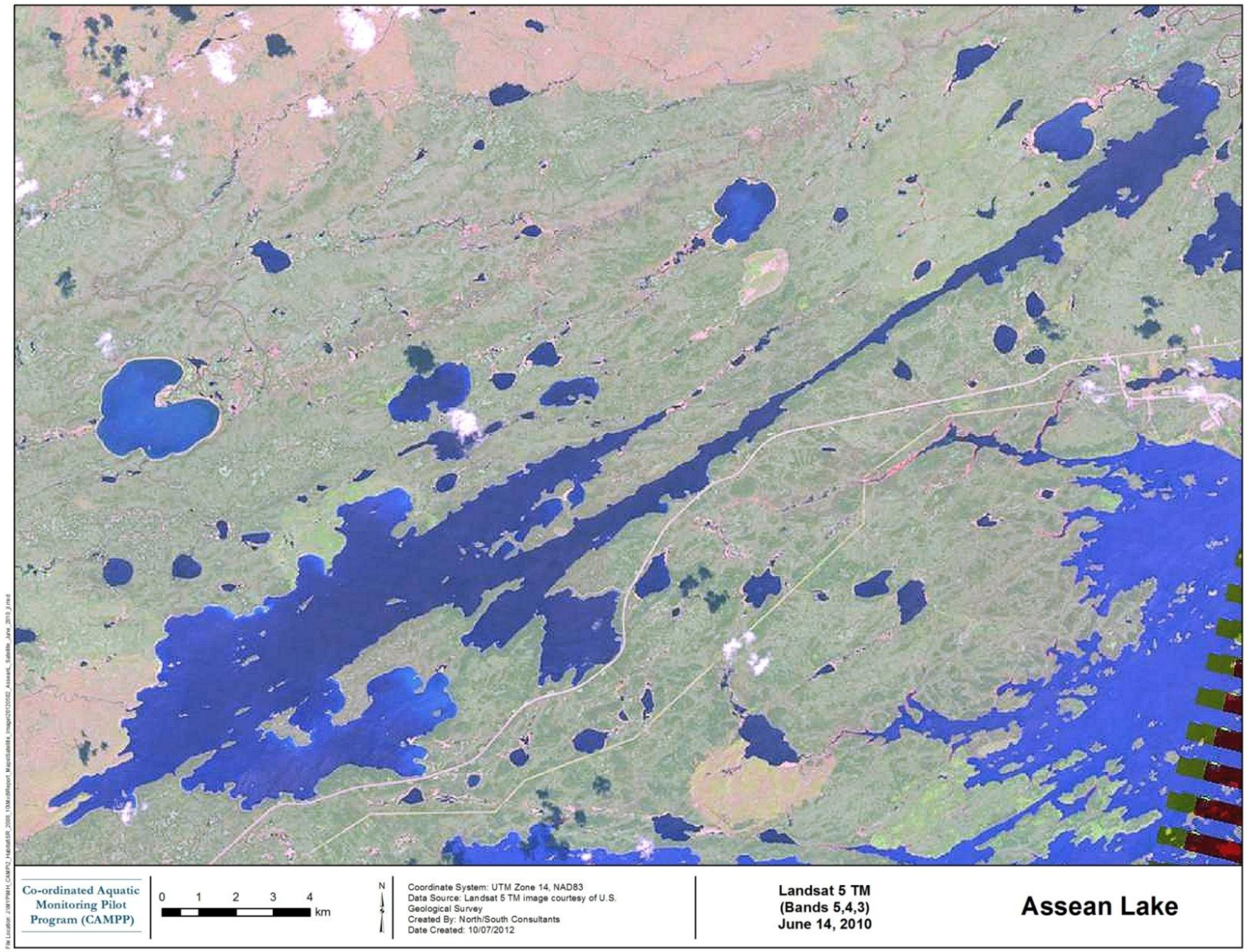


Figure 5.7.3-1. Landsat 5 TM false-colour composite image of Assean Lake acquired on June 14, 2010.

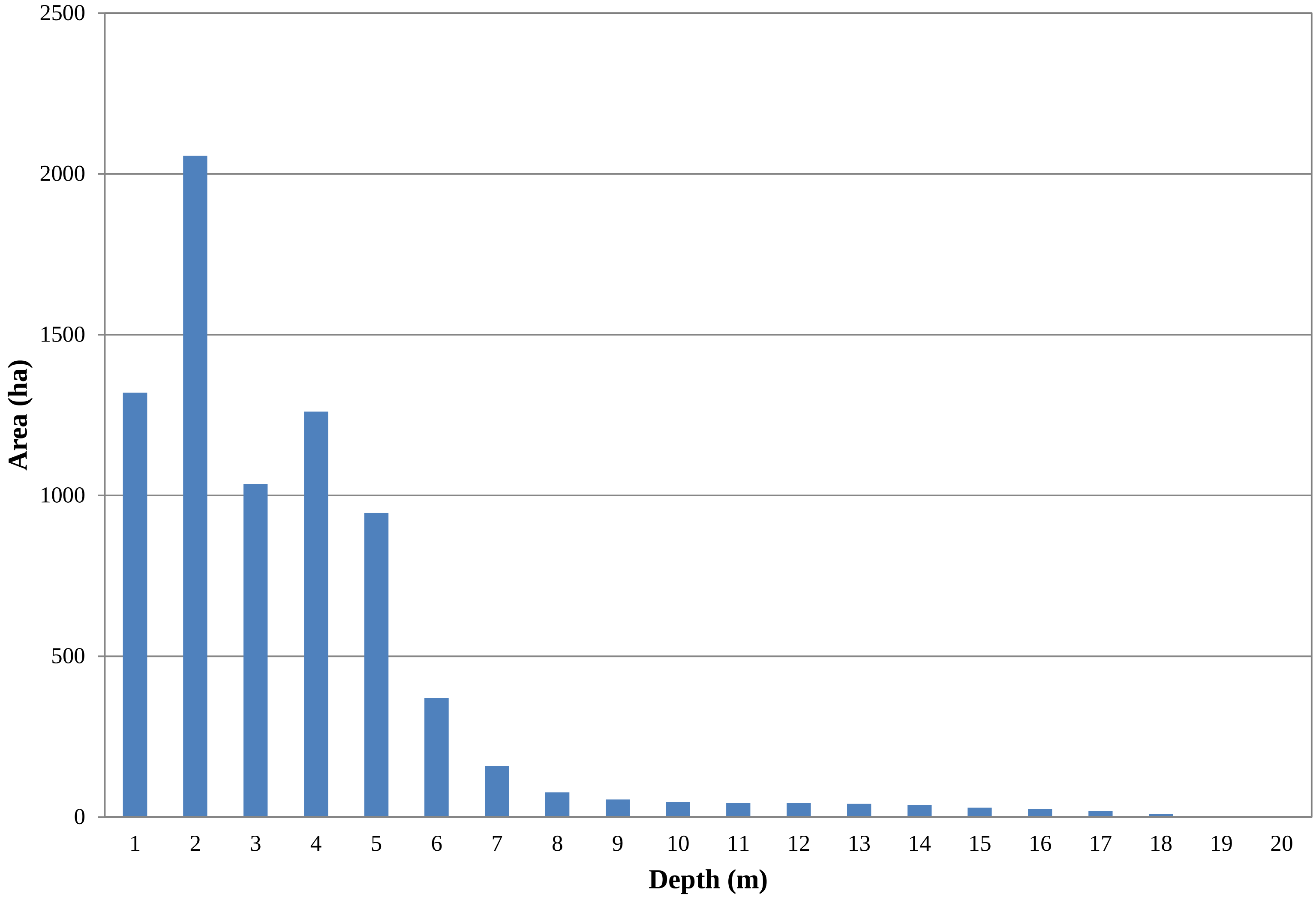


Figure 5.7.3-2. Histogram of depth distribution of Assean Lake at 1 metre depth increments.

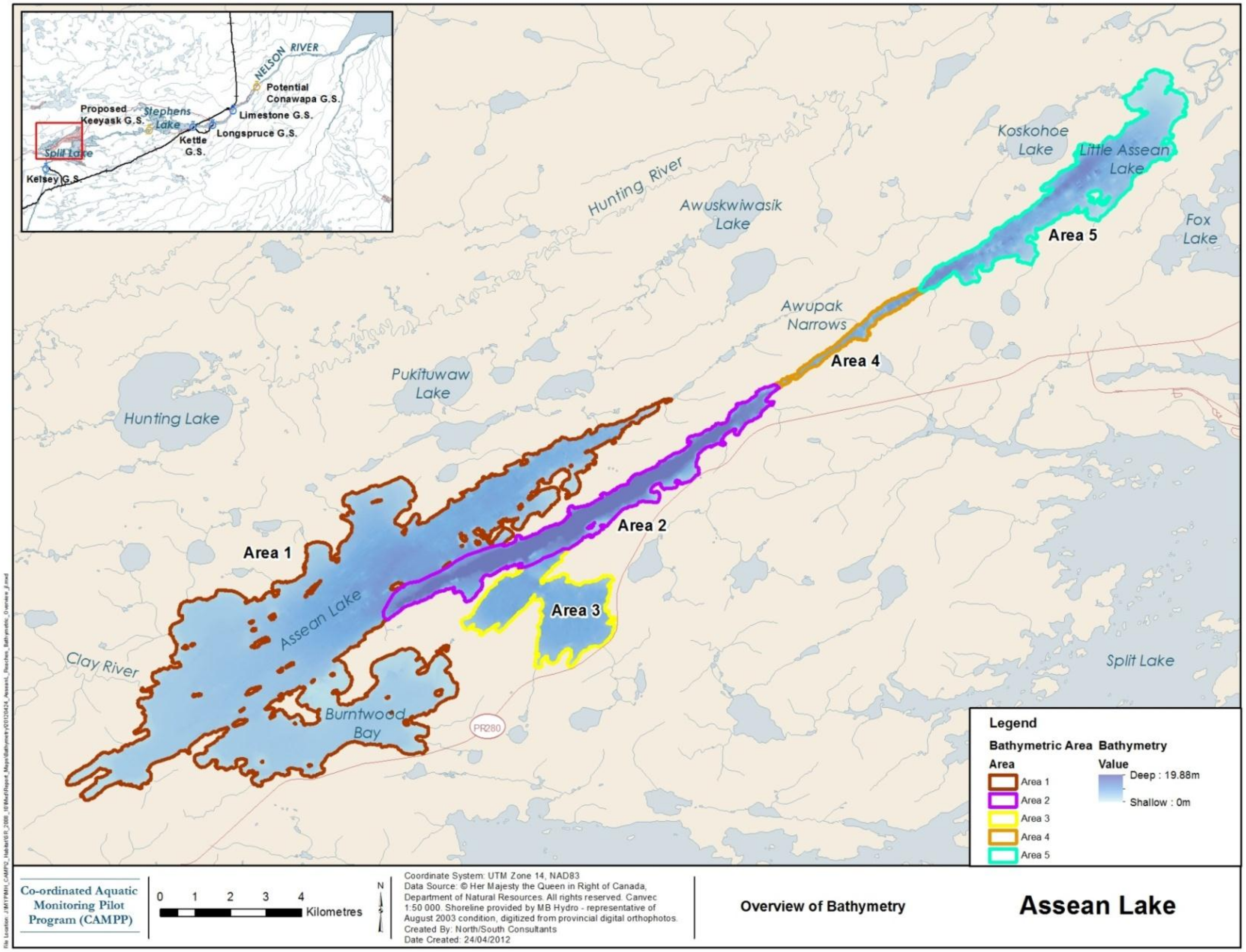


Figure 5.7.3-3. Overview bathymetric map of Assean Lake resulting from surveys conducted in 2010 (detail area maps follow).

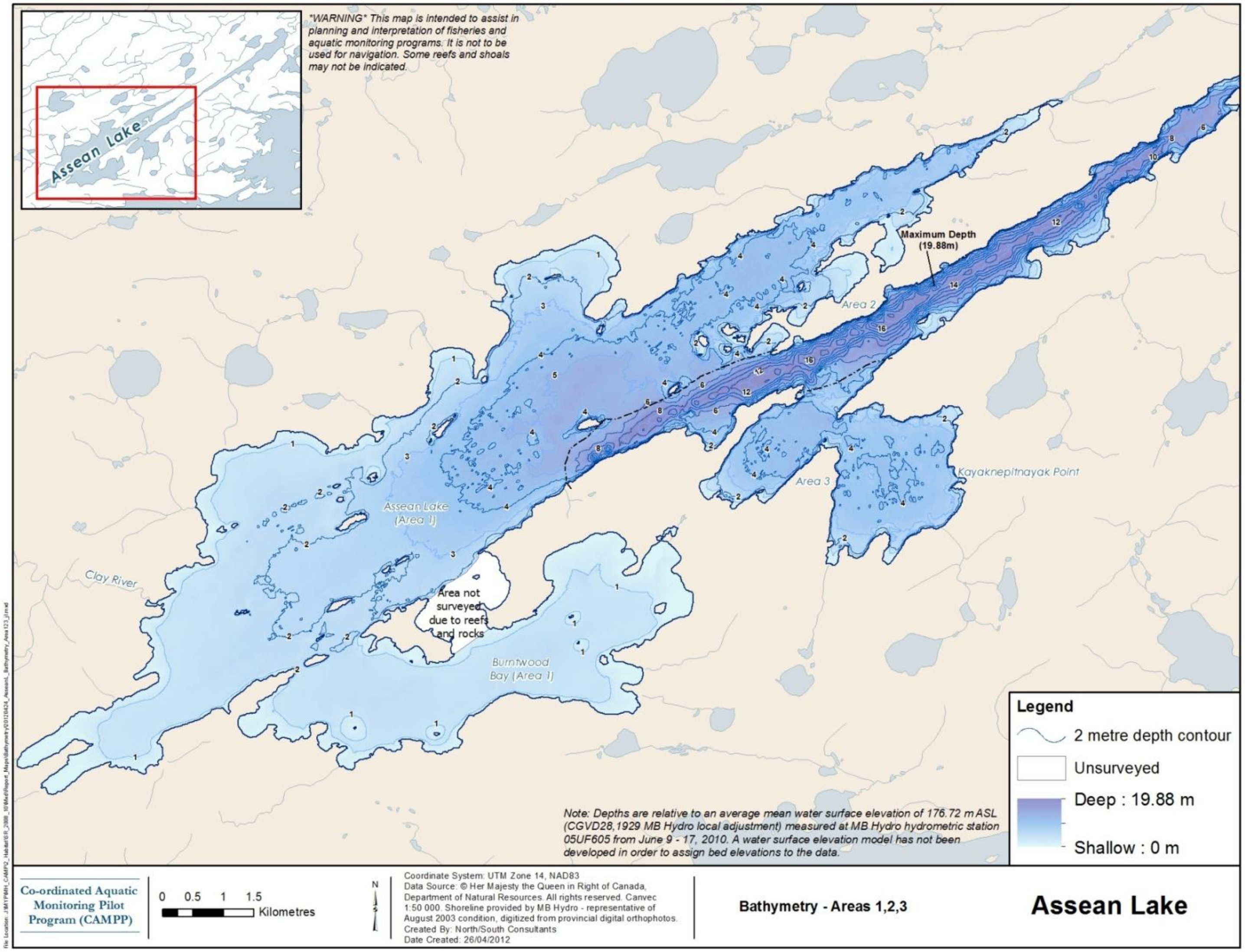


Figure 5.7.3-4. Bathymetric map of Assean Lake showing detail for Area 1,2, and 3.

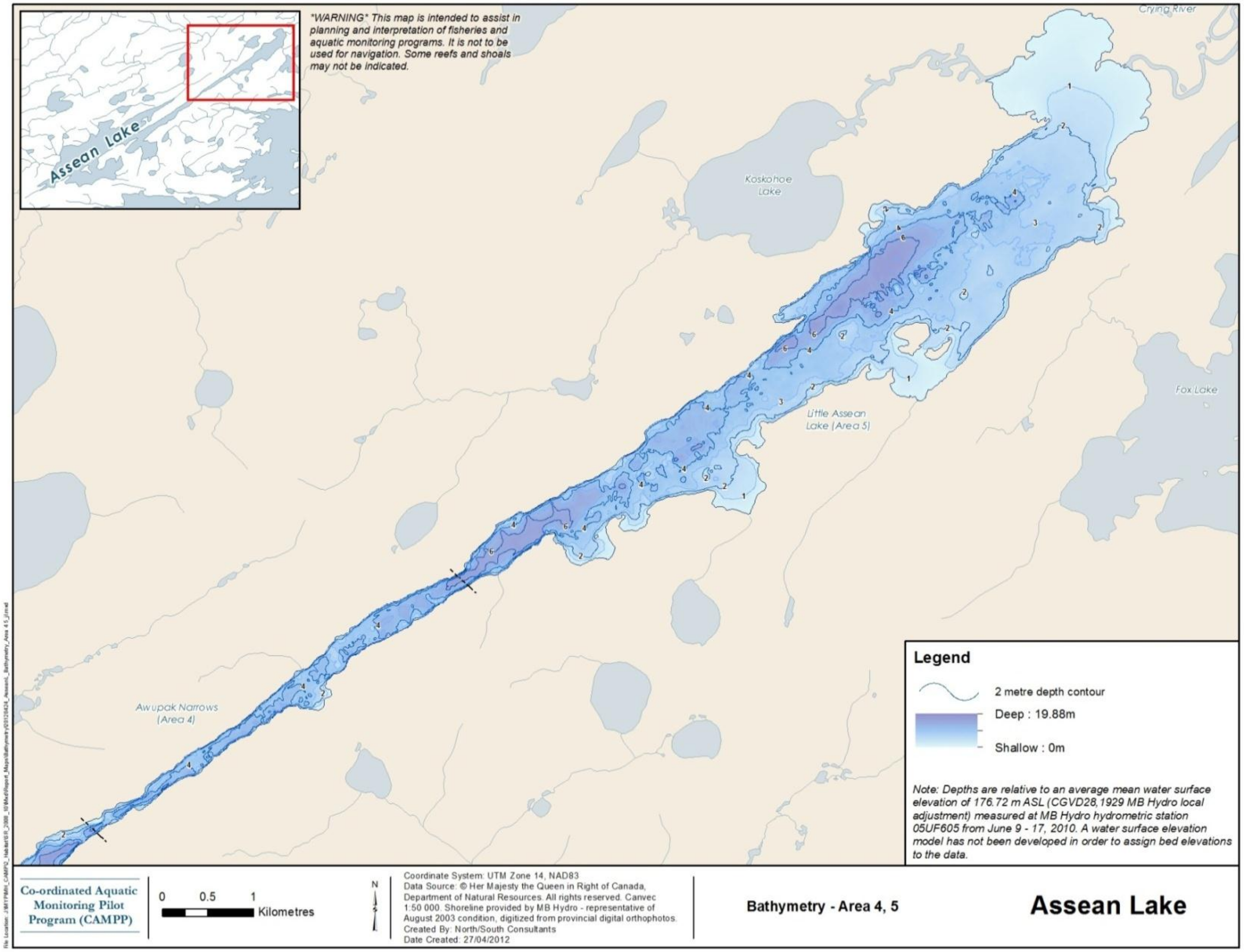


Figure 5.7.3-5. Bathymetric map of Assean Lake showing detail for Area 4 and 5.

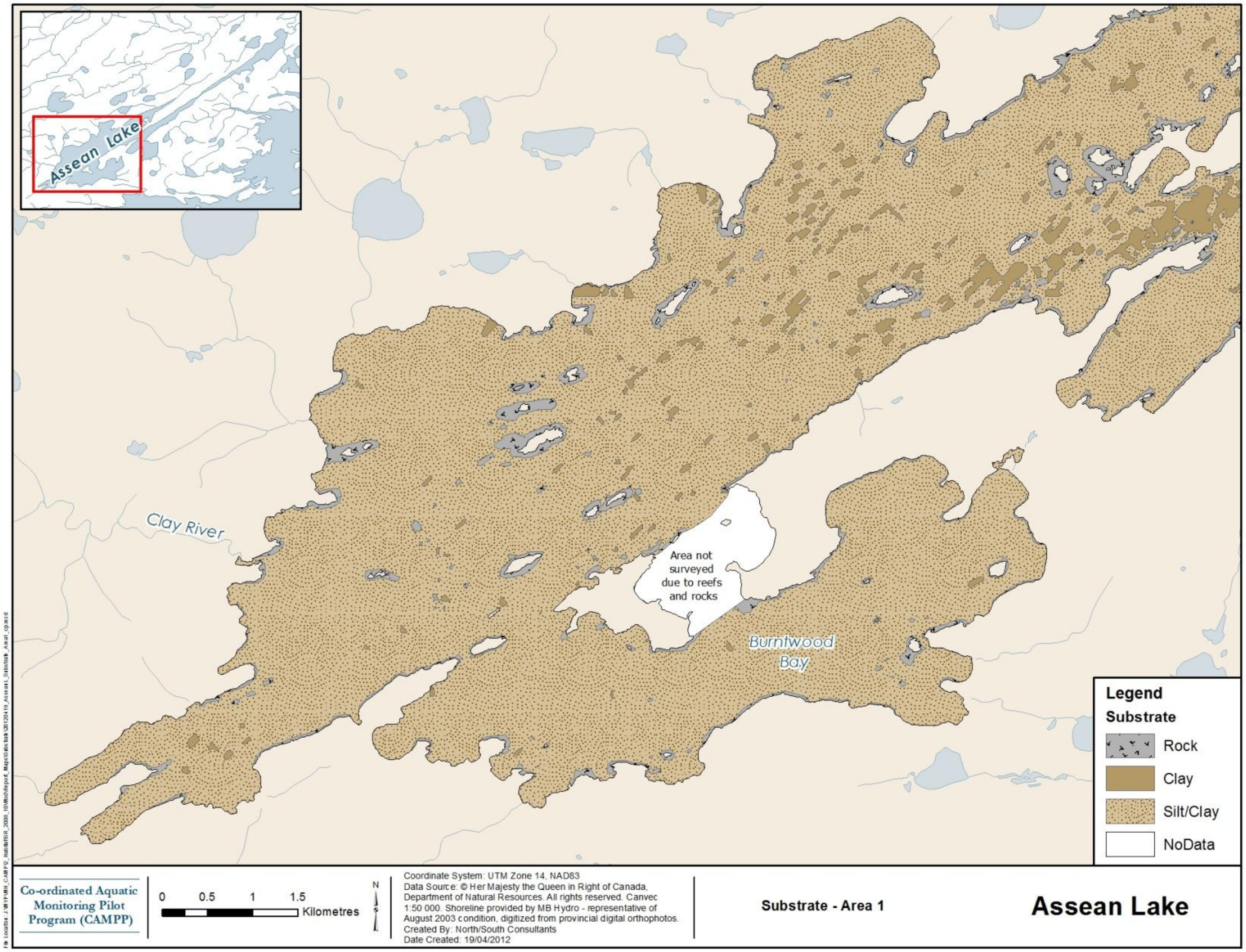


Figure 5.7.3-6. Substrate distribution map of Assean Lake showing detail of Assean Lake proper and Burntwood Bay.

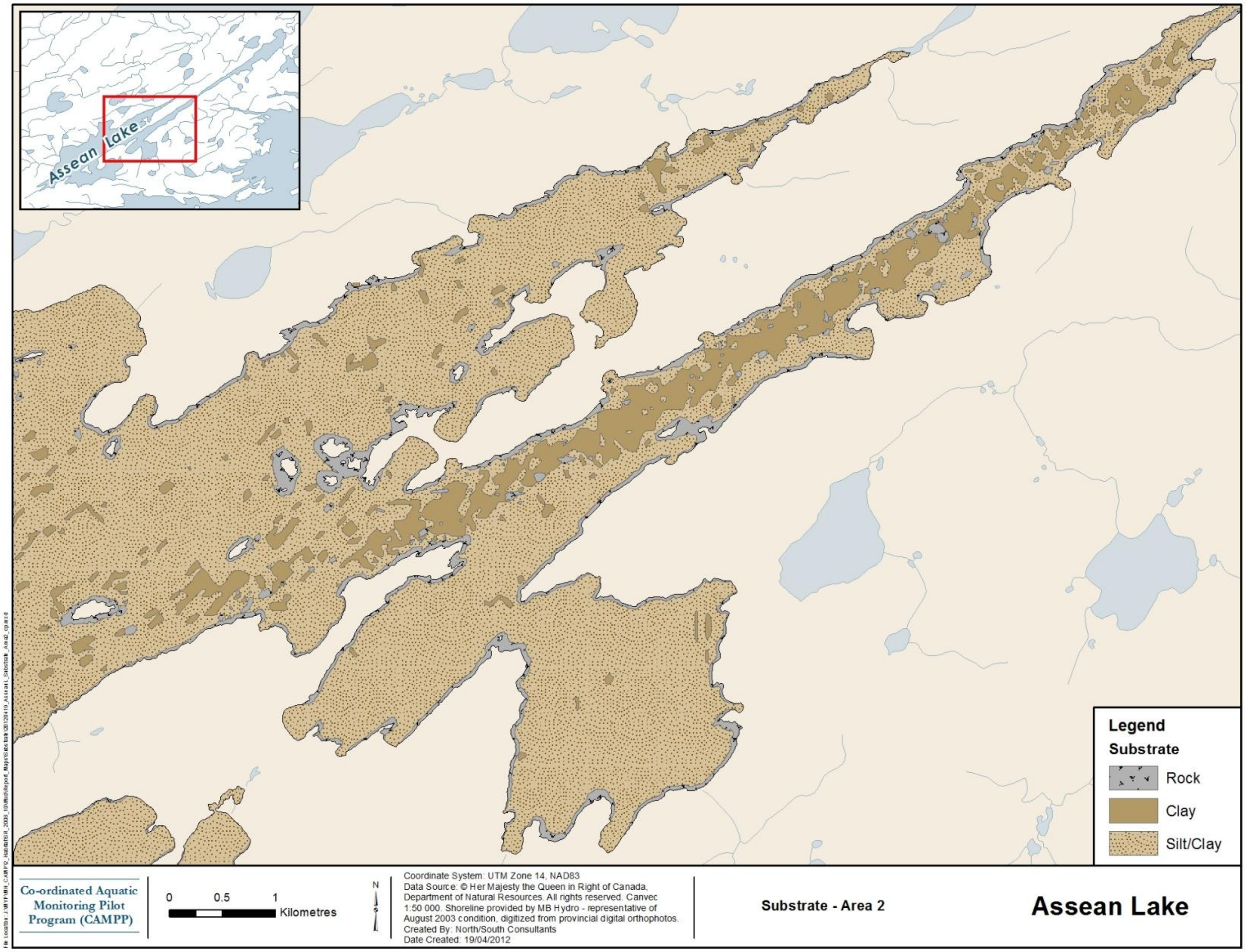


Figure 5.7.3-7. Substrate distribution map of Assean Lake showing detail of Area 2.

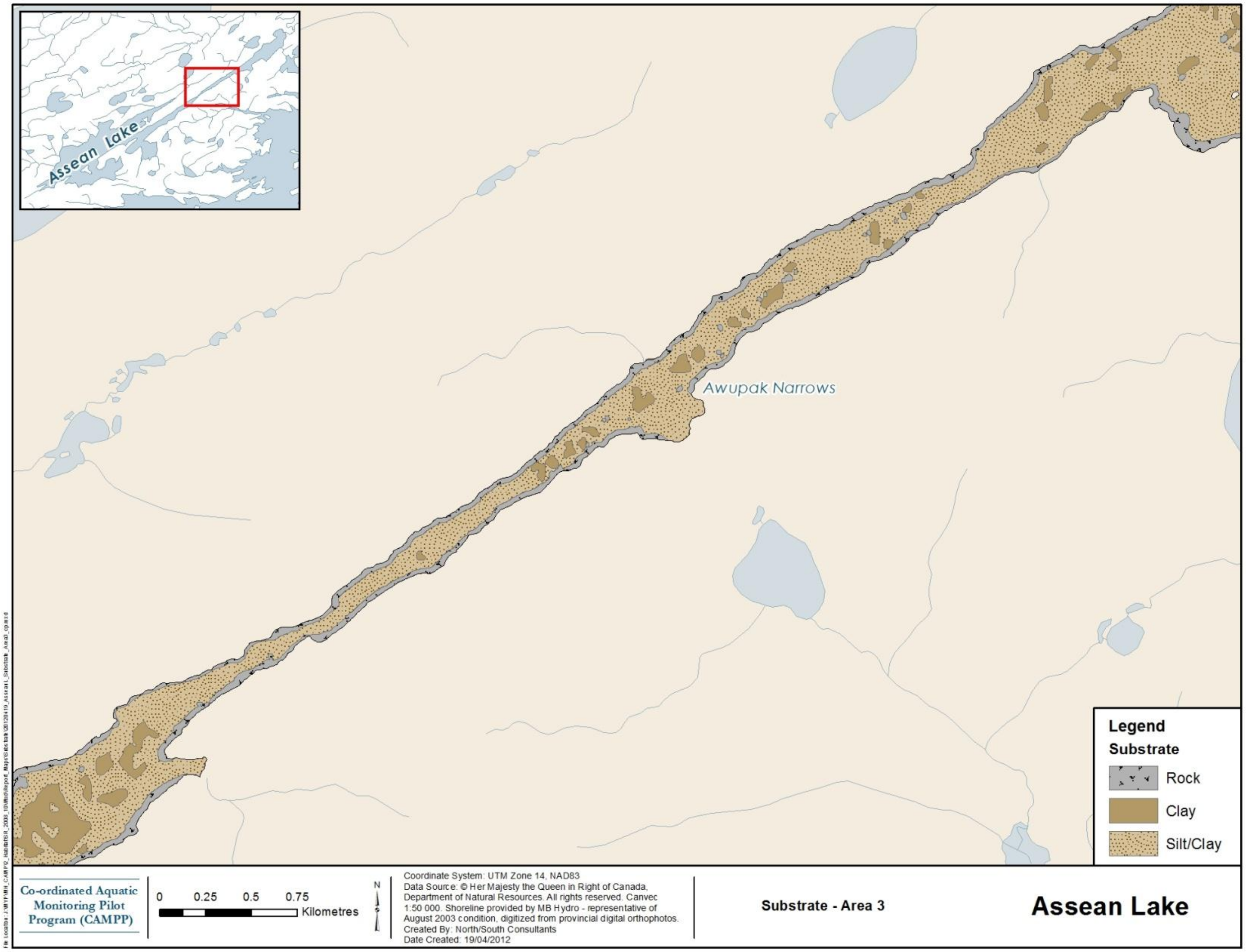


Figure 5.7.3-8. Substrate distribution map of Assean Lake showing detail of Awupak Narrows.

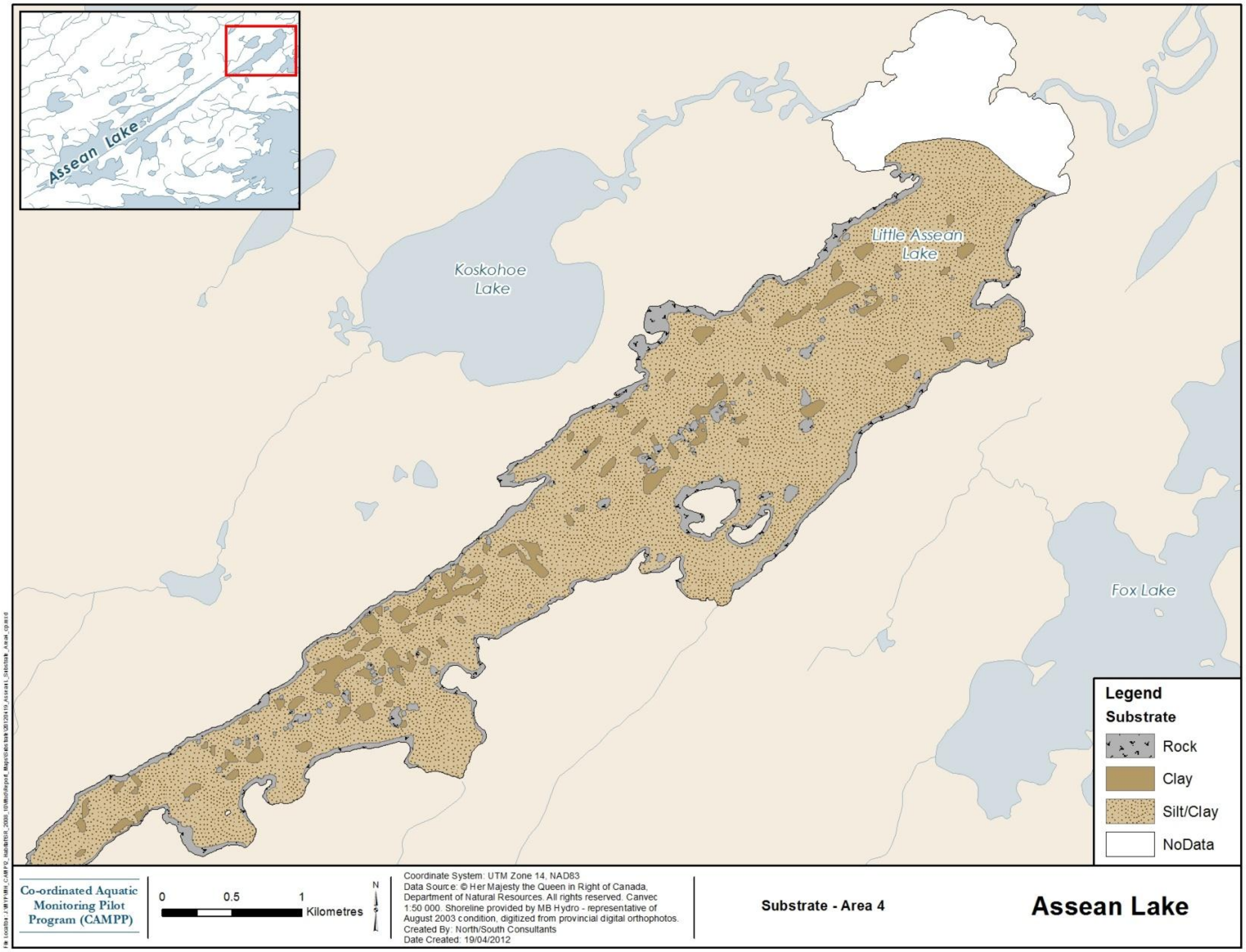


Figure 5.7.3-9. Substrate distribution map of Assean Lake showing detail of Little Assean Lake.

5.7.4 Water Quality

The following provides an overview of water quality conditions measured over the three year CAMPP program in the Lower Nelson River Region. Waterbodies sampled annually starting in 2008/09 included one on-system waterbody, the lower Nelson River (located approximately 38 km downstream of the Limestone generating station [GS] during the open-water season and in the Limestone Forebay during winter), and an off-system river (the Hayes River; Figure 5.7.4-1). Annual monitoring at additional waterbodies was initiated in 2009/2010 at the Burntwood River (at the inlet to Split Lake), Split Lake (near the community), and an off-system lake (Assean Lake). Water quality was also measured in the north basin and southern riverine area of Stephens Lake (referred to as Stephens Lake-North and Stephens Lake-South, respectively) in 2009/2010 and at the Limestone Forebay in 2010/2011. The latter areas are rotational sampling areas. Sampling times relative to air temperature are presented in Figure 5.7.4-2.

Water quality is described below for waterbodies located on the lower Nelson River (on-system waterbodies), Hayes River (off-system river), and Assean Lake (off-system lake), including results of statistical analyses conducted to evaluate seasonal variation, spatial differences, and temporal (i.e., interannual) differences. Water quality is also characterized through comparisons to Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOGs) for the protection of aquatic life (PAL) to evaluate overall ecosystem health (Manitoba Water Stewardship [MWS] 2011).

Several water quality parameters frequently vary seasonally in north-temperate freshwater ecosystems, most notably between the open-water and the ice-cover seasons, in relation to changes in water temperature, biological productivity (e.g., algal abundance), and differences in physical conditions such as the presence of ice or variability in tributaries or inflows over the year. For example, concentrations of the inorganic forms of nitrogen which are readily used by primary producers are typically higher in winter due to relatively lower algal abundance. Dissolved oxygen (DO) concentrations also vary with water temperature as warmer water holds less oxygen than colder water and because ice cover may reduce or eliminate atmospheric re-aeration of surface waters. It is of interest to identify seasonal variability as it may affect aquatic biota and because it is important to consider when assessing differences or changes in water quality conditions over time.

The primary objective of spatial comparisons (i.e., comparison between waterbodies) was to evaluate whether water quality conditions differ between sites on the lower Nelson River as it flows along the length of the river. Comparisons were also made between the waterbodies along the lower Nelson River and the off-system waterbodies not affected by Manitoba Hydro's hydraulic system (Hayes River and Assean Lake). Water quality would be expected to differ between on- and off-system waterbodies due to fundamental, inherent differences associated with the watersheds and waterbodies. The objective of the comparisons between the on- and off-system waterbodies was to formally identify differences between these areas to assist with interpretation of results of CAMP as the program continues.

Temporal comparisons were undertaken for each waterbody sampled annually in order to provide a preliminary assessment of temporal variability. As additional data are acquired, more formal trend analyses will be undertaken to evaluate potential longer-term changes.

Results of water quality monitoring conducted under CAMPP in the Lower Nelson River Region were also compared to MWQSOGs for PAL to provide a snap-shot assessment of ecosystem health. These comparisons are not intended to identify cause associated with a water quality variable being outside of the MWQSOGs. In addition, as these comparisons were restricted to the three years of data collected under CAMPP, they do not address historical conditions in the waterbodies.

5.7.4.1 Overview

Water quality of the Lower Nelson River Region can be generally described as moderately to highly nutrient-rich, slightly alkaline, moderately hard, and well-oxygenated with very low water clarity. The waterbodies along the mainstem did not stratify and except for one anomalous occasion in Split Lake, consistently maintained DO concentrations above the MWQSOGs for PAL (MWS 2011) across depth over the monitoring period.

Waterbodies located along the lower Nelson River are classified as meso-eutrophic or eutrophic on the basis of total phosphorus (TP) concentrations, oligotrophic to mesotrophic on the basis of chlorophyll *a*, and oligotrophic to mesotrophic on the basis of total nitrogen (TN). Nutrients were not significantly correlated to chlorophyll *a* at any of the annual sampling sites, possibly indicating factors other than nutrients are significant in limiting phytoplankton growth.

Most routine or conventional water quality parameters and metals were within the MWQSOGs for PAL at all sites in the Lower Nelson River Region. Exceptions included aluminum, copper, iron, mercury, selenium, silver, and TP. TP concentrations exceeded the Manitoba narrative nutrient guideline in 25-100% of the samples collected at each on-system site in the region.

Differences for some water quality parameters were observed between the Burntwood River and annual sites on the mainstem of the lower Nelson River (i.e., Split Lake and the lower Nelson River), but water quality in Split Lake and the lower Nelson River was similar. The Burntwood

River is softer, has a lower alkalinity, and is more dilute (i.e., contains lower levels of conductivity) than the lower Nelson River.

Although data were inadequate for statistical analysis for rotational sites, water quality appears to differ between sites on the main flow of the lower Nelson River and the north basin of Stephens Lake (Stephens Lake-North), which is located off of the main flow of the river. Stephens Lake-North appears to be less-nutrient rich and clearer than sites located along the main flow of the lower Nelson River.

Both off-system sites (i.e., the Hayes River and Assean Lake) were isothermal and maintained DO concentrations above the PAL guidelines, as observed along the lower Nelson River system. However, water quality of the off-system waterbodies exhibited some notable differences from the on-system sites. The Hayes River and Assean Lake were generally clearer, more dilute (i.e., having lower levels of conductivity), and contained lower concentrations of nutrients compared to sites on the Burntwood and lower Nelson rivers. In addition, the trophic categorization of the off-system waterbodies (mesotrophic to meso-eutrophic) on the basis of TP is slightly lower than on-system sites (eutrophic). Differences in water quality between the on- and off-system waterbodies are not unexpected due to inherent differences in the drainage basins, morphometries, and hydrological conditions.

For sites throughout the lower Nelson River Region, several water quality variables exhibited differences between one or more sampling periods, most notably when comparing open-water sampling periods to the winter period. As is commonly observed in north temperate freshwater ecosystems that experience long periods of ice cover, dissolved phosphorous and nitrate/nitrite (the forms of nutrients readily taken up by algae) were higher and chlorophyll *a* (an indicator of algal abundance) was lower in winter. These seasonal differences are common and typically reflect lower primary productivity under lower light and temperature conditions in winter.

There were few and inconsistent differences in water quality conditions between the three sampling years within the annual waterbodies indicating that water quality conditions in the Lower Nelson River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. Higher than average flows were measured during most periods between 2008/2009 and 2010/2011 (see Section 5.7.2 for a discussion of hydrological conditions) and the lack of interannual differences in water quality may reflect the lack of substantive flow variations over the monitoring period. Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.7.4.2 Limnology and In Situ Variables

Water temperatures were generally near zero degrees Celsius in the ice-cover season and ranged up to approximately 21 ^{o}C over the study period in waterbodies of the Lower Nelson River Region (Figures 5.7.4-3 to 5.7.4-7). The annual mean air temperatures at Gillam were similar to the 1971-2000 normal in 2008 and 2009 and above normal in 2010 (Figure 5.7.1-1).

Lower Nelson River

None of the on-system waterbodies were thermally stratified during the period of study (Figures 5.7.4-3 to 5.7.4-7), though depth profiles were not collected at all sampling times in the riverine sites due to high velocities. DO concentrations were also generally similar across depth (where profiles were obtained) in the Lower Nelson River Region, though Stephens Lake-North developed a slight vertical difference in DO concentrations during winter 2009/2010 (Figures 5.7.4-8 to 5.7.4-12). With one exception, DO concentrations were above the most stringent MWQSOGs for the protection of cool-water and cold-water aquatic life (5.5 to 9.5 mg/L, depending on season) across depth during each sampling event at all waterbodies sampled along the Burntwood and lower Nelson rivers. The exception was Split Lake in summer 2009, where a surface DO concentration of 4.1 mg/L was measured (note: a depth profile was not obtained for this sampling site). This value is below the instantaneous minimum for the protection of cool-water aquatic life (5.0 mg/L) and near that for the protection of cold-water aquatic life (4.0 mg/L; MWS 2011). This value may be a result of sampling error, as DO in Split Lake was well above the most-stringent MWQSOGs for PAL at all other times sampled in 2009 and 2010. Furthermore, results of a water quality sampling program conducted for the proposed Keeyask GS found that DO was above PAL objectives in Split Lake in the open-water season of 2009 (Savard et al. 2010).

Other *in situ* variables including specific conductance (Figures 5.7.4-13 to 5.7.4-17), pH (Figures 5.7.4-18 to 5.7.4-22), and turbidity (Figures 5.7.4-23 to 5.7.4-27) were, with a few exceptions, similar across depth in each of the waterbodies. Specific conductance was occasionally lower near the surface in winter at some sites, and a slight increase in pH with depth within the first few metres was occasionally observed at some sites particularly during the open-water season. The former may reflect effects of ice melt during sample collection.

Secchi disk depths were very low at sites located along the main flow of the Burntwood/Nelson rivers, averaging less than 0.5 m (Figures 5.7.4-28 to 5.7.4-32), and water clarity of these sites would be classified as very low according to the Swedish Environmental Protection Agency (Swedish EPA 2000) classification system. Water clarity based on Secchi disk depth was higher in Stephens Lake-North (averaging just over 1 m) compared to sites located along the main flow of the Nelson River, though water clarity still ranked as low.

Off-system Waterbodies: Hayes River and Assean Lake

Due to water velocity issues, *in situ* depth profiles were not regularly collected in the Hayes River. When profiles were obtained for this site, all parameters were relatively consistent across depth (Figures 5.7.4-33 to 5.7.4-37). DO was always above the most stringent objectives for cool- and cold-water aquatic life (5.5 to 9.5 mg/L, depending on season; Figure 5.7.4-34) in the Hayes River. Secchi disk depth was rarely measured at the Hayes River but was at or near the depth of the entire water column when measured (Figure 5.7.4-38); on average, Secchi disk depth was 1.6 m.

Like the on-system waterbodies, Assean Lake was isothermal during all sampling periods (Figure 5.7.4-39) and DO concentrations were relatively stable across depth and consistently above the MWQSOG PAL objectives (5.5 to 9.5 mg/L, depending on season; Figure 5.7.4-40). Specific conductance (Figure 5.7.4-41), pH (Figure 5.7.4-42), and turbidity (Figure 5.7.4-43) were, with a few exceptions (e.g., turbidity increased at depth in summer 2009), generally similar across depth. Secchi disk depths at Assean Lake averaged 0.84 m and water clarity would therefore be considered very low for this lake (Figure 5.7.4-44). However, Secchi disk depths of Assean Lake were more similar to Stephens Lake–North than to sites located along the main flow in the Lower Nelson River Region.

Seasonal Differences

As only two years of data are available for the Burntwood River and Split Lake, seasonal differences could not be analysed statistically for these waterbodies (n=2 per season). Statistical analyses of seasonal differences in water quality were restricted to the lower Nelson River and the Hayes River, where three years of data were collected.

pH (Figure 5.7.4-45) and specific conductance (Figure 5.7.4-46) did not differ significantly across the sampling seasons in the lower Nelson or Hayes rivers. In contrast, DOwas significantly higher in winter than the other sampling seasons in the lower Nelson River (Figure 5.7.4-47). It is common for DO concentrations to be highest in winter due to the higher inherent capacity of water to hold more DO at lower water temperatures; however, change in the lower Nelson River site location (for safety reasons) during winter may also have contributed to the difference.

At the Hayes River, *in situ* turbidity (Figure 5.7.4-48) was significantly higher in fall than winter and oxidative reductive potential (Figure 5.7.4-49) was higher in winter than either summer or fall.

Spatial Comparisons

Only one statistically significant difference was observed between the three annual on-system waterbodies in the Lower Nelson River Region (i.e., Burntwood River, Split Lake, and the lower Nelson River). The sole significant difference occurred for specific conductance, which was lower in the Burntwood River in comparison to Split Lake and the lower Nelson River (Figure 5.7.4-50).

Two water quality variables (specific conductance and turbidity) differed significantly between the on-system sites (Split Lake, and the Burntwood and lower Nelson rivers) and the off-system waterbodies (the Hayes River and Assean Lake; Figures 5.7.4-50 and 5.7.4-51). Specific conductance was lower in the Hayes River than either Split Lake or the lower Nelson River. *In situ* turbidity was also lower at both of the off-system sites than either the Burntwood or lower Nelson rivers (Figure 5.7.4-51). Due to the size and characteristics of the drainage basins, clearer and more dilute (i.e., lower levels of conductivity) conditions on the Hayes River and Assean Lake are not unexpected.

While statistical analyses did not incorporate the Stephens Lake sites or the Limestone Forebay due to limited data (i.e., only one year of data), qualitatively water quality was relatively similar across sites located on the main flow of the Nelson River. Conversely, some water quality conditions in the north basin of Stephens Lake (Stephens Lake–North), which is located off of the main flow of the Nelson River, differed from sites located along the main flow of the lower Nelson River. The north basin of Stephens Lake is clearer than the mainstem locations, as indicated by both *in situ* turbidity (Figure 5.7.4-51) and Secchi disk depth (Figure 5.7.4-52). Statistical differences will be re-assessed in the future when additional data are acquired for this upstream waterbody.

Temporal Comparisons

Statistical comparisons between sampling years for annual waterbodies revealed few significant differences. Inter-annual differences observed for *in situ* water quality variables were restricted to: pH was lower in 2009 than 2010 in the Burntwood River (Figure 5.7.4-53); and DO was highest in 2009 in the Hayes River (Figure 5.7.4-54). This lack of interannual differences in water quality for on-system sites may reflect the higher than average lower Nelson River flows that were measured during most periods between 2008/2009 and 2010/2011 (see Section 5.7.2

for a discussion of hydrological conditions). The flow record for the Hayes River and the water level record for Assean Lake is incomplete and therefore inadequate for an evaluation of the potential effects of flow/water levels on water quality. Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.7.4.3 Routine Laboratory Variables

Routine laboratory variables described below include nutrients, such as nitrogen (N) and phosphorus (P), pH, alkalinity, total dissolved solids (TDS)/conductivity, total suspended solids (TSS), turbidity, and true colour.

Lower Nelson River

Measurements of laboratory pH (Figure 5.7.4-55; MWQSOG: 6.5-9), ammonia (Figure 5.7.4-56; MWQSOGs vary with pH and temperature), and nitrate/nitrite (Figure 5.7.4-57; MWQSOG: 2.93 mg N/L) were within MWQSOGs for PAL at all sites and sampling times in the Burntwood River and the lower Nelson River sites. Conversely, 25% of samples from Stephens Lake-North and 87-100% of samples from the Burntwood River, Split Lake, Stephens Lake-South, and the Limestone Forebay exceeded the Manitoba narrative guideline for TP for lakes, reservoirs, ponds, and tributaries at the point of entry to such waterbodies (0.025 mg/L; MWS 2011; Figure 5.7.4-58). The TP guideline for rivers and streams (0.050 mg/L) was also exceeded at the lower Nelson River site in 25% of samples. Acid sensitivity of the Burntwood River and lower Nelson River sites is classified as low to least based on pH, calcium, and total alkalinity and low to moderate based on TDS (Table 5.7.4-1).

Dissolved phosphorus (DP) generally comprised an equal or greater fraction of TP than the particulate fraction at sites located on the lower Nelson River; in the Burntwood River, TP was dominated by particulate phosphorus (Figure 5.7.4-59). TN (Figure 5.7.4-60) was dominated by organic nitrogen at sites on the lower Nelson and Burntwood rivers (Figure 5.7.4-61) and, of the dissolved inorganic nitrogen (DIN) pool, nitrate/nitrate was present in higher concentrations than ammonia. Molar TN:TP ratios indicate that phosphorus limitation occurred at all sites during most sampling events (Figure 5.7.4-62).

Off-system Waterbodies: Hayes River and Assean Lake

Like the lower Nelson River sites, pH, ammonia, and nitrate/nitrite were within MWQSOGs for PAL in the Hayes River and Assean Lake (Figures 5.7.4-55 to 5.7.4-57) and acid sensitivity of both sites ranked as least (Table 5.7.4-1). Relative to sites on the main flow of the lower Nelson River, a slightly lower frequency of exceedance (25%) of the narrative Manitoba guideline for

TP in lakes, reservoirs, and ponds (0.025 mg/L) occurred for Assean Lake, and no samples from the Hayes River exceeded the guideline for rivers and streams (0.050 mg/L; Figure 5.7.4-58).

The composition of TN and TP in the off-system waterbodies was relatively similar to that observed on the lower Nelson and Burntwood rivers. Like the Burntwood River, TP in the Hayes River was dominated by phosphorus in particulate form. Like sites on the lower Nelson River, particulate phosphorus and DP comprised approximately equal portions of TP in Assean Lake (Figure 5.7.4-59). TN was dominated by organic nitrogen at both off-system sites (Figure 5.7.4-61) and like on-system sites, nitrate/nitrite was present in higher concentrations than ammonia in the Hayes River. Conversely, concentrations of nitrate/nitrite and ammonia were approximately equal, on average, in Assean Lake. As observed along the Burntwood and lower Nelson rivers, molar TN:TP ratios (Figure 5.7.4-62) indicate phosphorus limitation in the Hayes River and Assean Lake; however, phosphorus limitation was stronger in the on-system waterbodies.

Seasonal Variability

Statistical analysis of data collected at the lower Nelson and Hayes river sites (i.e., annual waterbodies with three years of data) indicated that ammonia, organic nitrogen, total Kjeldahl nitrogen (TKN), TN, TP, dissolved organic carbon (DOC), total organic carbon (TOC), TDS, turbidity (laboratory), true colour, total alkalinity, conductivity, and chlorophyll *a* did not differ between sampling seasons. Other routine variables exhibited significant seasonal differences in at least one of these waterbodies and all differences were related to the ice-cover season: DP (Figure 5.7.4-63), nitrate/nitrite (Figure 5.7.4-64), and DIN (Figure 5.7.4-65) were higher in the winter than spring in the lower Nelson River. Additionally, TSS (Figure 5.7.4-66) and TPP (Figure 5.7.4-67) were lower in winter in the Hayes River. Qualitative differences suggest that some additional seasonal differences may exist in these waterbodies that were not statistically significant with the existing data set. These potential seasonal differences include lower pH (Figure 5.7.4-68) and lower concentrations of chlorophyll *a* (Figure 5.7.4-69) in winter.

Spatial Comparisons

Similar to the *in situ* water quality parameters, only a few routine water quality laboratory variables were significantly different between the annual sites on the lower Nelson River (i.e., Burntwood River, Split Lake, and lower Nelson River). The Burntwood River has a lower alkalinity (Figures 5.7.4-70 and 5.7.4-71), is more dilute (Figures 5.7.4-72 and 5.7.4-73), and contains less total inorganic carbon (TIC; Figure 5.7.4-74) than the lower Nelson River sites.

While statistical analyses did not incorporate Stephens Lake-South, Stephens Lake-North, or the Limestone Forebay due to limited data, a few water quality parameters qualitatively indicated potential spatial differences. Specifically, Stephens Lake-North, which is located off of the main flow of the lower Nelson River, qualitatively appears to be less nutrient-rich (Figures 5.7.4-58 and 5.7.4-75) and more clear (Figures 5.7.4-76 and 5.7.4-77) relative to sites located along the main flow of the lower Nelson River. Statistical differences will be re-assessed in the future when additional data are acquired for this upstream waterbody.

Statistical differences were observed for a number of routine laboratory water quality variables between Assean Lake and the lower Nelson River sites (i.e., Burntwood River, Split Lake, and lower Nelson River); fewer spatial differences were noted for the Hayes River. Water quality variables that were significantly lower in the Hayes River and/or Assean Lake than one or more of the lower Nelson River sites were: DP (Figure 5.7.4-75); TPP (Figure 5.7.4-78); TP (Figure 5.7.4-58); TSS (Figure 5.7.4-77); and turbidity (Figure 5.7.4-76). Laboratory conductivity (Figure 5.7.4-73) and TDS (Figure 5.7.4-72) were also lower in the off-system waterbodies than Split Lake and the lower Nelson River, but were higher than the Burntwood River. Variables that were significantly higher at Assean Lake than at least one of the on-system sites were: total and bicarbonate alkalinity (Figures 5.7.4-70 and 5.7.4-71); DOC (Figure 5.7.4-79); TOC (Figure 5.7.4-80); TIC (Figure 5.7.4-74); and laboratory pH (Figure 5.7.4-55). As previously discussed, differences in water quality between the on- and off-system waterbodies would be expected due to inherent differences in the lakes' and rivers' drainage basins, morphometries, and hydrological conditions.

Temporal Comparisons

Statistical comparisons between sampling years for annual waterbodies revealed few significant differences. Differences observed for routine laboratory variables were restricted to: DP was higher in 2010 than 2009 in Split Lake, DP was lower in 2010 than 2009 in the Hayes River (Figure 5.7.4-81); and TKN was higher in 2009 than 2010 in Assean Lake (Figure 5.7.4-82).

The lack of consistent year-to-year differences indicates that water quality conditions in the Lower Nelson River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. Specifically, the lack of interannual differences in water quality on the lower Nelson River may reflect the higher than average flows that were measured during most periods between 2008/2009 and 2010/2011 (see Section 5.7.2 for a discussion of hydrological conditions). The flow record for the Hayes River and the water level record for Assean Lake is incomplete and therefore inadequate for an evaluation of the potential effects of flow/water levels on water quality. Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.7.4.4 Trophic Status

Lower Nelson River

Lakes and reservoirs located along the lower Nelson River are classified as eutrophic on the basis of mean open-water TP concentrations (Table 5.7.4-2); the exception is Stephens Lake-North, which is classified as mesotrophic. Conversely, all lakes/reservoirs are classified as oligotrophic to mesotrophic on the basis of mean open-water chlorophyll *a* (Table 5.7.4-3) and mesotrophic on the basis of TN (Table 5.7.4-4). River sites (Burntwood River and lower Nelson River) are also eutrophic on the basis of TP (Table 5.7.4-2) but are oligotrophic on the basis of TN (Table 5.7.4-5) and chlorophyll *a* (Table 5.7.4-6). Neither TN nor TP were significantly correlated to chlorophyll *a* at any of the annual sites located along the lower Nelson River, indicating that factors other than nutrients may be limiting or co-limiting to phytoplankton (Figures 5.7.4-83 to 5.7.4-85). However, as the data available for analysis are relatively limited, relationships should be revisited when additional data are acquired.

Off-system Waterbodies: Hayes River and Assean Lake

Trophic status of the off-system Assean Lake and Hayes River are somewhat lower than the on-system lake and river sites. Assean Lake is mesotrophic/meso-eutrophic based on mean open-water TP (Table 5.7.4-2), mesotrophic based on TN (Table 5.7.4-4), and oligotrophic based on chlorophyll *a* (Table 5.7.4-3). The Hayes River is also mesotrophic/meso-eutrophic based on TP (Table 5.7.4-2) but is oligotrophic based on TN (Table 5.7.4-5) and chlorophyll *a* (Table 5.7.4-6). Like the on-system waterbodies, neither TN nor TP were significantly correlated to chlorophyll *a* in Assean Lake or the Hayes River (Figures 5.7.4-86 and 5.7.4-87), suggesting that nutrients are not the primary limiting factor. However, as the data available for analysis are relatively limited, relationships should be revisited when additional data are acquired.

5.7.4.5 Escherichia coli

Lower Nelson River

E. coli was detected on at least one occasion in the Burntwood River and all sites sampled along the lower Nelson River from 2008-2010 (Table 5.7.4-7). Of the annual waterbodies, *E. coli* was detected the most frequently and at the highest concentrations in the Burntwood River. *E. coli* was above the Manitoba water quality objective for primary recreation of 200 colony forming units (CFU)/100 mL in the Burntwood River in March 2010; however, this guideline only applies to the recreational season and would therefore not be applicable. Concentrations were low in all other on-system waterbodies (≤13 CFU/100 mL) and other than the single measurement from the Burntwood River, measurements were well below the objective for primary recreation.

Off-system Waterbodies: Hayes River and Assean Lake

E. coli was detected in 25% and 64% of samples collected from Assean Lake and the Hayes River, respectively (Table 5.7.4-7). However, all measurements were low (≤6 CFU/100 mL) and well below the Manitoba water quality objective for primary recreation of 200 CFU/100 mL.

5.7.4.6 Metals and Major Ions

Lower Nelson River

The dominant cation in the lower Nelson River is calcium, followed by sodium (Figure 5.7.4-88), and hardness measurements indicated that waters are generally moderately hard to hard (Figure 5.7.4-89). The Burntwood River is softer (moderately hard on average; Figure 5.7.4-89) than sites on the lower Nelson River and although the dominant cation (calcium) is consistent with the lower Nelson River, the next most abundant major cation is magnesium (Figure 5.7.4-88). Chloride concentrations are low to moderate along the lower Nelson River (i.e., 1.0 to 22 mg/L; Figure 5.7.4-90), and well below the CCME PAL guideline of 120 mg/L for a long-term exposure (Canadian Council of Ministers of the Environment [CCME] 1999; updated to 2013). Sulphate concentrations were consistently less than 31 mg/L, averaged less than 19 mg/L across sites (Figure 5.7.4-90), and fell on the lower range of concentrations reported across Canada (Canadian Council of Resource and Environment Ministers [CCREM] 1987) . While there is currently no Manitoba or CCME PAL guideline for sulphate, concentrations were consistently below the British Columbia Ministry of Environment (BCMOE) guidelines which range from 128 to 429 mg/L for waters ranging from soft to very hard (Meays and Nordin 2013).

Of the 38 metals/metalloids measured along the lower Nelson River and in the Burntwood River, only four were never detected at any site (beryllium, bismuth, tellurium; and tungsten; Table 5.7.4-8). Metals that were consistently detected at all sites and times included: aluminum; barium; copper; iron; lithium; magnesium; manganese; potassium; rubidium; silicon; sodium; strontium; titanium; uranium; and zirconium. The remaining metals were detected at varying frequencies, although antimony, mercury, selenium, silver, thallium, and zinc were detected in less than 30% of samples in each waterbody.

Most metals were present in concentrations below the MWQSOGs for PAL at all sites and sampling times in waterbodies along the Burntwood and lower Nelson rivers; the exceptions included aluminum, iron, mercury, selenium, and silver (Table 5.7.4-9). All samples collected from the on-system waterbodies exceeded the PAL guideline of 0.1 mg/L for aluminum (0.1

mg/L; Figure 5.7.4-91) and iron exceeded the PAL guideline (0.3 mg/L) on the lower Nelson and Burntwood rivers in 50-100% of samples (Figure 5.7.4-92). One sample collected in the lower Nelson River downstream of the Limestone GS was marginally above the PAL for selenium (i.e., 0.001 mg/L), which is equivalent to the analytical detection limit (DL; Table 5.7.4-9). In addition, one sample from the Burntwood River contained silver at a concentration marginally above the analytical DL which is also equivalent to the PAL guideline (i.e., 0.0001 mg/L). However, measurements that are at or near analytical DLs are associated with relatively high uncertainty and there is low confidence that an actual exceedance of a PAL guideline has occurred when the measurement is at or near the analytical DL.

The analytical DLs for mercury varied over the study period and were frequently above the current MWQSOG PAL guideline (0.000026 mg/L). Therefore comparison of analytical results to the PAL guideline could not be undertaken for all samples. Considering only the results of analyses where the analytical detection limit was sufficiently low to facilitate this comparison, one measurement from the Burntwood River (0.00008 mg/L) was above the current MWQSOG PAL (Table 5.7.4-9).

Off-system Waterbodies: Hayes River and Assean Lake

Like the Burntwood and lower Nelson rivers, the dominant cation in the Hayes River and Assean Lake is calcium (Figure 5.7.4-88). The second most abundant major cation is magnesium, which is consistent with the Burntwood River. On average, the Hayes River is moderately hard whereas Assean Lake is hard (Figure 5.7.4-89). Chloride concentrations in the off-system waterbodies are lower than on the lower Nelson River (i.e., < 1.8 mg/L; Figure 5.7.4-90) and well below the CCME PAL guideline of 120 mg/L for a long-term exposure (CCME 1999; updated to 2013). Sulphate concentrations were consistently less than 9 mg/L (Figure 5.7.4-90), fell on the lower range of concentrations reported across Canada (CCREM 1987), and were well below the BCMOE guidelines (Meays and Nordin 2013).

Of the 38 metals/metalloids measured in the Hayes River and Assean Lake, nine were never detected (beryllium, bismuth, boron, cesium, mercury, nickel, tellurium, thallium, and zinc; Table 5.7.4-8). Metals that were consistently detected included: aluminum; barium; calcium; magnesium; manganese; potassium; rubidium; silicon; sodium; and strontium. The remaining metals were detected at varying frequencies, although antimony, chromium, cobalt, lithium, molybdenum, selenium, silver, tin, and tungsten were detected in less than 30% of samples collected in the off-system waterbodies.

With the exceptions of aluminum, copper, iron, selenium, and silver, metals were present in concentrations below the MWQSOGs for PAL in surface samples collected from the Hayes

River and Assean Lake (Table 5.7.4-9). Though the majority of samples from Assean Lake (88%) and the Hayes River (55%) exceeded the PAL guideline for aluminum (0.1 mg/L; Figure 5.7.4-91), the frequency of exceedance was lower than observed at the on-system sites. Unlike the on-system sites, copper exceeded the PAL objective in one sample (most stringent objective: 0.0053 mg/L; Table 5.7.4-9) from the Hayes River. Iron was also above the PAL guideline (0.3 mg/L) in 50% of samples collected from Assean Lake and in 36% of samples from the Hayes River (Figure 5.7.4-92). One sample from the Hayes River contained selenium at the analytical detection limit (0.001 mg/L), which is equivalent to the PAL, and silver exceeded the PAL guideline (0.0001 mg/L; Table 5.7.4-9) in a separate sample collected at this site. As previously stated, measurements that are at or near analytical DLs are associated with relatively high uncertainty and there is low confidence that an actual exceedance of a PAL guideline has occurred when the measurement is at or near the DL. Mercury was not detected in any of the samples where mercury was analysed using a detection limit lower than the current PAL guideline.

Seasonal Variability

As only two years of data are available for the Burntwood River and Split Lake, seasonal differences could not be analysed statistically for these waterbodies (n=2 per season). Statistical analyses of seasonal differences in water quality were restricted to the lower Nelson River and the Hayes River, where three years of data were collected.

Only two of the metals and major ions exhibited statistically significant seasonal differences in the Lower Nelson River Region. These included chloride in the lower Nelson River (Figure 5.7.4-93) and potassium in the Hayes River (Figure 5.7.4-94), both of which were higher in winter than during the open-water season.

Spatial Comparisons

No significant differences for metals and major ions were observed between Split Lake and the lower Nelson River. Eleven statistically significant differences were observed between the Burntwood River and sites along the lower Nelson River (i.e., Split Lake and the lower Nelson River). Hardness (Figure 5.7.4-89) and concentrations of arsenic (Figure 5.7.4-95), calcium (Figure 5.7.4-96), magnesium (Figure 5.7.4-97), molybdenum (Figure 5.7.4-98), strontium (Figure 5.7.4-99), sulphate (Figure 5.7.4-90), and uranium (Figure 5.7.4-100) were lower in the Burntwood River than both of the sites on the mainstem of the lower Nelson River. In addition, concentrations of rubidium (Figure 5.7.4-101) were significantly higher in the Burntwood River relative to Split Lake and chloride (Figure 5.7.4-90) was lower in the Burntwood River relative to the site on the lower Nelson River.

While statistical analyses did not incorporate Stephens Lake-South, Stephens Lake-North, or the Limestone Forebay due to limited data, none of the metals qualitatively indicated differences along the river from upstream to downstream. However, as with limnological and routine variables, sulphate (Figure 5.7.4-90), arsenic (Figure 5.7.4-95), barium (Figure 5.7.4-102), and potassium (Figure 5.7.4-103) concentrations were qualitatively lower in Stephens Lake-North than in the mainstem sites, suggesting that water quality conditions were more similar to the off-system lake (Assean Lake). Statistical differences will be re-assessed in the future when additional data are acquired for the region.

Virtually all metals that were detected in the region were significantly lower in the Hayes River and/or Assean Lake compared to at least one of the on-system waterbodies, including: aluminum (Figure 5.7.4-91); arsenic (Figure 5.7.4-95); barium (Figure 5.7.4-102); boron (Figure 5.7.4-104); chloride (Figure 5.7.4-90); chromium (Figure 5.7.4-105); cobalt (Figure 5.7.4-106); copper (Figure 5.7.4-107); iron (Figure 5.7.4-92); lead (Figure 5.7.4-108); lithium (Figure 5.7.4-109); magnesium (Figure 5.7.4-97); molybdenum (Figure 5.7.4-98); potassium (Figure 5.7.4-103); rubidium (Figure 5.7.4-101); silicon (Figure 5.7.4-110); sodium (Figure 5.7.4-111); strontium (Figure 5.7.4-99); sulphate (Figure 5.7.4-90); thorium (Figure 5.7.4-112); titanium (Figure 5.7.4-113); uranium (Figure 5.7.4-100); vanadium (Figure 5.7.4-114); and zirconium (Figure 5.7.4-115). Calcium (Figure 5.7.4-96) was also higher in the Hayes River and Assean Lake compared to at least one of the on-system waterbodies, and the off-system sites had harder water than the Burntwood River (Figure 5.7.4-89).

<u>Temporal Comparisons</u>

Statistical comparisons between sampling years for annual waterbodies revealed few significant differences. The small number of exceptions included: lead was lower in 2010 than 2009 in the Burntwood River (Figure 5.7.4-116); in Split Lake, copper and manganese were higher and sodium was lower in 2010 (Figures 5.7.4-117 to 5.7.4-119); and sulphate was higher in 2009 in the Hayes River and Assean Lake (Figure 5.7.4-120). Boron and chloride were also higher in 2009 compared to 2010; however, these differences were due to the higher analytical detection limit used in 2009 (e.g., all four boron samples analysed in 2009 were <0.030 mg/L; Figures 5.7.4-121 and 5.7.4-122).

The lack of consistent year-to-year differences indicates that water quality conditions in the Lower Nelson River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region; evaluation of the role of water levels and flows will also be undertaken in the future with acquisition of data for a range of conditions.

Table 5.7.4-1. Saffran and Trew (1996) categorization of acid sensitivity of aquatic ecosystems and sensitivity ranking for the Lower Nelson River Region.

Parameter	Units	Acid Sensitivity											
		High	Moderate	Low	Least	Burntwood River	Split Lake	Stephens L-South	Stephens L-North	Limestone Forebay	Lower Nelson R	Hayes River	Assean Lake
pH	-	<6.5	6.6-7.0	7.1-7.5	>7.5	Least	Least	Least	Least	Least	Least	Least	Least
Total Alkalinity	mg/L (as $CaCO_3$)	0-10	11-20	21-40	>40	Least	Least	Least	Least	Least	Least	Least	Least
Calcium	mg/L	0-4	5-8	9-25	>25	Low	Least	Least	Least	Least	Least	Least	Least
Total Dissolved Solids	mg/L	0-50	51-200	201-500	>500	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate

Table 5.7.4-2. Total phosphorus concentrations (open-water season and annual means) measured in the Lower Nelson River Region and CCME (1999; updated to 2013) trophic categorization: 2008-2010.

Waterbody	Period	Trophic Status Based on Total Phosphorus (mg/L)						Years Sampled
		Ultra-oligotrophic	Oligotrophic	Mesotrophic	Meso-eutrophic	Eutrophic	Hyper-eutrophic	
		<0.004	0.004 - 0.010	0.010 - 0.020	0.020 - 0.035	0.035 - 0.100	> 0.100	
Burntwood River	Open-water season					0.044		2009
	Annual					0.041		2009/2010
	Open-water season				0.032			2010
	Annual				0.033			2010/2011
	Open-water season					0.038		2009/2010-2010/2011
	Annual					0.037		2009/2010-2010/2011
Split Lake	Open-water season				0.035			2009
	Annual				0.031			2009/2010
	Open-water season					0.046		2010
	Annual					0.045		2010/2011
	Open-water season					0.041		2009/2010-2010/2011
	Annual					0.038		2009/2010-2010/2011
Stephens Lake-South	Open-water season					0.038		2009
	Annual					0.041		2009/2010
Stephens Lake-North	Open-water season			0.015				2009
	Annual				0.023			2009/2010
Limestone Forebay	Open-water season					0.044		2010
	Annual					0.045		2010/2011

Table 5.7.4-2. continued.

Waterbody	Period	Trophic Status Based on Total Phosphorus (mg/L)						Years Sampled
		Ultra-oligotrophic <0.004	Oligotrophic 0.004 - 0.010	Mesotrophic 0.010 - 0.020	Meso-eutrophic 0.020 - 0.035	Eutrophic 0.035 - 0.100	Hyper-eutrophic > 0.100	
Lower Nelson River	Open-water season					0.040		2008
	Annual					0.039		2008/2009
	Open-water season					0.038		2009
	Annual					0.041		2009/2010
	Open-water season					0.045		2010
	Annual					0.045		2010/2011
	Open-water season					0.041		2008/2009-2010/2011
	Annual					0.042		2008/2009-2010/2011
Hayes River	Open-water season			0.018				2008
	Annual			0.018[a]				2008/2009
	Open-water season				0.026			2009
	Annual				0.023			2009/2010
	Open-water season			0.014[b]				2010
	Annual			0.013[b]				2010/2011
	Open-water season			0.020[b]				2008/2009-2010/2011
	Annual			0.018[a,b]				2008/2009-2010/2011
Assean Lake	Open-water season			0.020				2009
	Annual			0.020				2009/2010
	Open-water season			0.020				2010
	Annual			0.020				2010/2011
	Open-water season			0.020				2009/2010-2010/2011
	Annual			0.020				2009/2010-2010/2011

[a] No sample was obtained in March 2009 at the Hayes River.
[b] No sample was obtained in August 2010 at the Hayes River.

Table 5.7.4-3. Chlorophyll *a* concentrations (open-water season and annual means) measured in the Lower Nelson River Region and the OECD (1982) trophic categorization schemes for lakes: 2008/2009-2010/2011.

Waterbody	Period	Lake Trophic Status Based on Chlorophyll *a* (µg/L)						Years Sampled
		Ultra-oligotrophic -	Oligotrophic <2.5	Mesotrophic 2.5 - 8	Meso-eutrophic -	Eutrophic 8 - 25	Hyper-eutrophic > 25	
Split Lake	Open-water season			5.1				2009
	Annual			4.0				2009/2010
	Open-water season			3.8				2010
	Annual			2.9				2010/2011
	Open-water season			4.4				2009/2010-2010/2011
	Annual			3.5				2009/2010-2010/2011
Stephens Lake-South	Open-water season			4.2				2009
	Annual			3.3				2009/2010
Stephens Lake-North	Open-water season		1.4					2009
	Annual		1.1					2009/2010
Limestone Forebay	Open-water season		2.3					2010
	Annual		1.8					2010/2011
Assean Lake	Open-water season		2.2					2009
	Annual		1.9					2009/2010
	Open-water season		1.3					2010
	Annual		1.5					2010/2011
	Open-water season		1.8					2009/2010-2010/2011
	Annual		1.6					2009/2010-2010/2011

Table 5.7.4-4. Total nitrogen concentrations (open-water season and annual means) measured in lakes and reservoirs in the Lower Nelson River Region and comparison to a trophic categorization scheme (Nürnberg 1996): 2008/2009-2010/2011.

Waterbody	Period	Lake Trophic Status Based on Total Nitrogen (mg/L)						Years Sampled
		Ultra-oligotrophic	Oligotrophic	Mesotrophic	Meso-eutrophic	Eutrophic	Hyper-eutrophic	
		-	<0.350	0.350-0.650	-	0.651-1.2	>1.2	
Split Lake	Open-water season			0.41				2009
	Annual			0.45				2009/2010
	Open-water season			0.53				2010
	Annual			0.52				2010/2011
	Open-water season			0.49				2009/2010-2010/2011
	Annual			0.47				2009/2010-2010/2011
Stephens Lake-South	Open-water season			0.53				2009
	Annual			0.50				2009/2010
Stephens Lake-North	Open-water season			0.44				2009
	Annual			0.36				2009/2010
Limestone Forebay	Open-water season			0.44				2010
	Annual			0.40				2010/2011
Assean Lake	Open-water season			0.46				2009
	Annual			0.49				2009/2010
	Open-water season			0.39				2010
	Annual			0.42				2010/2011
	Open-water season			0.45				2009/2010-2010/2011
	Annual			0.42				2009/2010-2010/2011

Table 5.7.4-5. Mean (open-water season and annual) concentrations of TN in the Burntwood, lower Nelson and Hayes rivers and comparison to a trophic categorization scheme for rivers/streams (Dodds et al. 1998).

Waterbody	Period	River Trophic Status Based on Total Nitrogen (mg/L)						Years Sampled
		Ultra-oligotrophic	Oligotrophic	Mesotrophic	Meso-eutrophic	Eutrophic	Hyper-eutrophic	
		-	<0.7	0.7-1.5	-	>1.5	-	
Burntwood River	Open-water season		0.62					2009
	Annual		0.58					2009/2010
	Open-water season		0.35					2010
	Annual		0.34					2010/2011
	Open-water season		0.46					2009/2010-2010/2011
	Annual		0.48					2009/2010-2010/2011
Lower Nelson River	Open-water season			0.77				2008
	Annual		0.68					2008/2009
	Open-water season		0.48					2009
	Annual		0.53					2009/2010
	Open-water season		0.42					2010
	Annual		0.46					2010/2011
	Open-water season		0.55					2008/2009-2010/2011
	Annual		0.56					2008/2009-2010/2011
Hayes River	Open-water season		0.61					2008
	Annual		0.61 [a]					2008/2009
	Open-water season		0.48					2009
	Annual		0.50					2009/2010
	Open-water season		0.40 [b]					2010
	Annual		0.39 [b]					2010/2011
	Open-water season		0.50 [b]					2008/2009-2010/2011
	Annual		0.49 [a,b]					2008/2009-2010/2011

[a] No sample was obtained in March 2009 at the Hayes River.
[b] No sample was obtained in August 2010 at the Hayes River.

Table 5.7.4-6. Mean (open-water season and annual) concentrations of chlorophyll *a* in the Burntwood, lower Nelson, and Hayes rivers and comparison to a trophic categorization scheme for rivers/streams (Dodds et al. 1998).

Waterbody	Period	River Trophic Status Based on Chlorophyll *a* (µg/L)						Years Sampled
		Ultra-oligotrophic	Oligotrophic	Mesotrophic	Meso-eutrophic	Eutrophic	Hyper-eutrophic	
		-	<10	10-30	-	>30	-	
Burntwood River	Open-water season		2.4					2009
	Annual		1.9					2009/2010
	Open-water season		1.1					2010
	Annual		0.9					2010/2011
	Open-water season		1.9					2009/2010-2010/2011
	Annual		1.4					2009/2010-2010/2011
Lower Nelson River	Open-water season		7.0					2008
	Annual		5.4					2008/2009
	Open-water season		4.2					2009
	Annual		3.3					2009/2010
	Open-water season		2.1					2010
	Annual		1.5					2010/2011
	Open-water season		4.7					2008/2009-2010/2011
	Annual		3.6					2008/2009-2010/2011
Hayes River	Open-water season		2.3					2008
	Annual		2.3[a]					2008/2009
	Open-water season		2.7					2009
	Annual		2.1					2009/2010
	Open-water season		1.3[b]					2010
	Annual		0.9[b]					2010/2011
	Open-water season		2.2[b]					2008/2009-2010/2011
	Annual		1.8[a,b]					2008/2009-2010/2011

[a] No sample was obtained in March 2009 at the Hayes River.
[b] No sample was obtained in August 2010 at the Hayes River.

Table 5.7.4-7. Detection frequency and summary statistics for *E. coli* (CFU/100 mL) measured in the Lower Nelson River Region.

Waterbody	Sample Years	# Detected	n	% Detected	Mean	Median	Max
Burntwood River	2009-2010	4	5	80	52	16	>200[1]
Split Lake	2009-2010	3	7	43	<10	<10	13
Stephens Lake-South	2009	1	1	100	4	4	4
Stephens Lake-North	2009	1	1	100	1	1	1
Limestone Forebay	2008-2010	3	6	50	2	2	5
Lower Nelson River	2008, 2010	1	6	17	<1	<1	1
Hayes River	2008-2010	7	11	64	2	1	6
Assean Lake	2009-2010	2	8	25	<1	<1	1

Table 5.7.4-8. Frequency of detection of metals and major ions measured in the Lower Nelson River Region: 2008-2010. Values in bold indicate annual sites where detection frequencies ≥30%.

Waterbody	Sample Years		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chloride-Dissolved	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum
Burntwood River	2009-2010	n	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	4	8	8	8	8
		# Detected	8	2	6	8	0	0	3	4	8	6	5	8	7	8	8	8	4	8	8	1	2
		% Detected	**100**	25	**75**	**100**	0	0	**38**	**50**	**100**	**75**	**63**	**100**	**88**	**100**	**100**	**100**	**100**	**100**	**100**	13	25
Split Lake	2009-2010	n	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	8	8	8	8
		# Detected	8	0	8	8	0	0	7	4	5	0	8	3	7	8	8	7	7	8	8	0	8
		% Detected	**100**	0	**100**	**100**	0	0	**88**	**50**	**63**	0	**100**	**38**	**88**	**100**	**100**	**88**	**100**	**100**	**100**	0	**100**
Stephens Lake North	2009	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	4	4	4	4
		# Detected	4	0	**4**	4	0	0	0	1	4	0	4	1	3	4	4	0	0	4	4	0	4
		% Detected	**100**	0	**100**	**100**	0	0	0	25	**100**	0	**100**	25	**75**	**100**	**100**	0	-	**100**	**100**	0	**100**
Stephens Lake South	2009	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	4	4	4	4
		# Detected	4	0	4	4	0	0	0	1	4	1	4	2	3	4	4	1	0	4	4	0	4
		% Detected	**100**	0	**100**	**100**	0	0	0	25	**100**	25	**100**	**50**	**75**	**100**	**100**	25	-	**100**	**100**	0	**100**
Limestone Forebay	2010	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		# Detected	4	1	4	4	0	0	4	3	4	1	4	3	3	4	4	4	4	4	4	0	4
		% Detected	**100**	25	**100**	**100**	0	0	**100**	**75**	**100**	25	**100**	**75**	**75**	**100**	**100**	**100**	**100**	**100**	**100**	0	**100**
Lower Nelson River	2008-2010	n	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	4	12	12	12	12
		# Detected	12	1	12	12	0	0	5	6	12	1	12	9	10	12	12	6	4	12	12	0	12
		% Detected	**100**	8	**100**	**100**	0	0	**42**	**50**	**100**	8	**100**	**75**	**83**	**100**	**100**	**50**	**100**	**100**	**100**	0	**100**
Hayes River	2009-2010	n	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	4	11	11	11	11
		# Detected	11	1	8	11	0	0	0	5	11	0	11	3	3	5	11	4	1	11	11	0	1
		% Detected	**100**	9	**73**	**100**	0	0	0	**45**	**100**	0	**100**	27	27	**45**	**100**	**36**	25	**100**	**100**	0	9
Assean Lake	2008-2010	n	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	4	8	8	8	8
		# Detected	8	1	7	8	0	0	0	4	8	0	8	0	2	8	7	4	1	8	8	0	0
		% Detected	**100**	13	**88**	**100**	0	0	0	**50**	**100**	0	**100**	0	25	**100**	**88**	**50**	25	**100**	**100**	0	0

Table 5.7.4-8. continued.

Waterbody	Sample Years		Nickel	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate-Dissolved	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
Burntwood River	2009-2010	n	8	8	8	8	4	8	8	8	7	8	8	4	8	8	8	8	8	8	8
		# Detected	5	8	8	0	4	1	8	8	6	0	0	4	2	8	0	8	7	0	8
		% Detected	**63**	**100**	**100**	0	**100**	13	**100**	**100**	**86**	0	0	**100**	25	**100**	0	**100**	**88**	0	**100**
Split Lake	2009-2010	n	8	8	8	8	4	8	8	8	8	8	8	7	8	8	8	8	8	8	8
		# Detected	0	8	8	0	4	0	8	8	8	0	0	6	3	8	0	8	8	0	8
		% Detected	0	**100**	**100**	0	**100**	0	**100**	**100**	**100**	0	0	**86**	**38**	**100**	0	**100**	**100**	0	**100**
Stephens Lake North	2009	n	4	4	4	4	0	4	4	4	4	4	4	0	4	4	4	4	4	4	4
		# Detected	0	4	4	0	0	0	4	4	3	0	0	0	0	4	0	4	3	0	4
		% Detected	0	**100**	**100**	0	-	0	**100**	**100**	**75**	0	0	-	0	**100**	0	**100**	**75**	0	**100**
Stephens Lake South	2009	n	4	4	4	4	0	4	4	4	4	4	4	0	4	4	4	4	4	4	4
		# Detected	2	4	4	0	0	0	4	4	4	0	0	0	0	4	0	4	4	0	4
		% Detected	**50**	**100**	**100**	0	-	0	**100**	**100**	**100**	0	0	-	0	**100**	0	**100**	**100**	0	**100**
Limestone Forebay	2010	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		# Detected	1	4	4	0	4	0	4	4	4	0	0	4	1	4	0	4	4	0	4
		% Detected	25	**100**	**100**	0	**100**	0	**100**	**100**	**100**	0	0	**100**	25	**100**	0	**100**	**100**	0	**100**
Lower Nelson River	2008-2010	n	12	12	12	12	4	12	12	12	12	12	12	4	12	12	12	12	12	12	12
		# Detected	6	12	12	1	4	0	12	12	12	0	2	4	2	12	0	12	12	1	12
		% Detected	**50**	**100**	**100**	8	**100**	0	**100**	**100**	**100**	0	17	**100**	17	**100**	0	**100**	**100**	8	**100**
Hayes River	2009-2010	n	11	11	11	11	4	11	11	11	11	11	11	4	11	11	11	11	11	11	11
		# Detected	0	11	11	1	4	1	11	11	6	0	0	0	3	11	1	7	6	0	2
		% Detected	0	**100**	**100**	9	**100**	9	**100**	**100**	**55**	0	0	0	27	**100**	9	**64**	**55**	0	18
Assean Lake	2008-2010	n	8	8	8	8	4	8	8	8	8	8	8	4	8	8	8	8	8	8	8
		# Detected	0	8	8	0	4	0	8	8	8	0	0	2	1	7	0	8	6	0	6
		% Detected	0	**100**	**100**	0	**100**	0	**100**	**100**	**100**	0	0	**50**	13	**88**	0	**100**	**75**	0	**75**

Table 5.7.4-9. Frequency of exceedances of MWQSOGs for PAL for total metals measured in the Lower Nelson River Region: 2008-2010. Values in bold indicate exceedances occurred at a given site.

Waterbody	Years		Aluminum	Arsenic	Boron	Cadmium	Chromium	Copper	Iron	Lead	Mercury[1]	Molybdenum	Nickel	Selenium	Silver	Thallium	Uranium	Zinc
		MWQSOGs PAL (mg/L)	0.1	0.15	1.5	0.00017-0.00041	0.050-0.137	0.0053-0.0151	0.3	0.00138-0.00653	0.000026	0.073	0.030-0.084	0.001	0.0001	0.0008	0.015	0.069-0.193
Burntwood River	2009-2010	n	8	8	8	8	8	8	8	8	3	8	8	8	8	8	8	8
		# Exceedances	8	0	0	0	0	0	8	0	1	0	0	0	1	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**100**	0	**33**	0	0	0	**13**	0	0	0
Split Lake	2009-2010	n	8	8	8	8	8	8	8	8	0	8	8	8	8	8	8	8
		# Exceedances	8	0	0	0	0	0	5	0	-	0	0	0	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**63**	0	-	0	0	0	0	0	0	0
Stephens Lake North	2009	n	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4
		# Exceedances	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**50**	0	0	0	0	0	0	0	0	0
Stephens Lake South	2009	n	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4
		# Exceedances	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**75**	0	0	0	0	0	0	0	0	0
Limestone Forebay	2010	n	4	4	4	4	4	4	4	4	0	4	4	4	4	4	4	4
		# Exceedances	4	0	0	0	0	0	4	0	-	0	0	0	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**100**	0	-	0	0	0	0	0	0	0
Lower Nelson River	2008-2010	n	12	12	12	12	12	12	12	12	3	12	12	12	12	12	12	12
		# Exceedances	12	0	0	0	0	0	10	0	0	0	0	1	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**83**	0	0	0	0	**8**	0	0	0	0
Assean Lake	2009-2010	n	8	8	8	8	8	8	8	8	3	8	8	8	8	8	8	8
		# Exceedances	7	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
		% Exceedances	**88**	0	0	0	0	0	**50**	0	0	0	0	0	0	0	0	0
Hayes River	2008-2010	n	11	11	11	11	11	11	11	11	3	11	11	11	11	11	11	11
		# Exceedances	6	0	0	0	0	1	4	0	0	0	0	1	1	0	0	0
		% Exceedances	**55**	0	0	0	0	**9**	**36**	0	0	0	0	**9**	**9**	0	0	0

[1] Includes samples analysed at an analytical detection limit lower than the PAL guideline (i.e., <0.000026 mg/L).

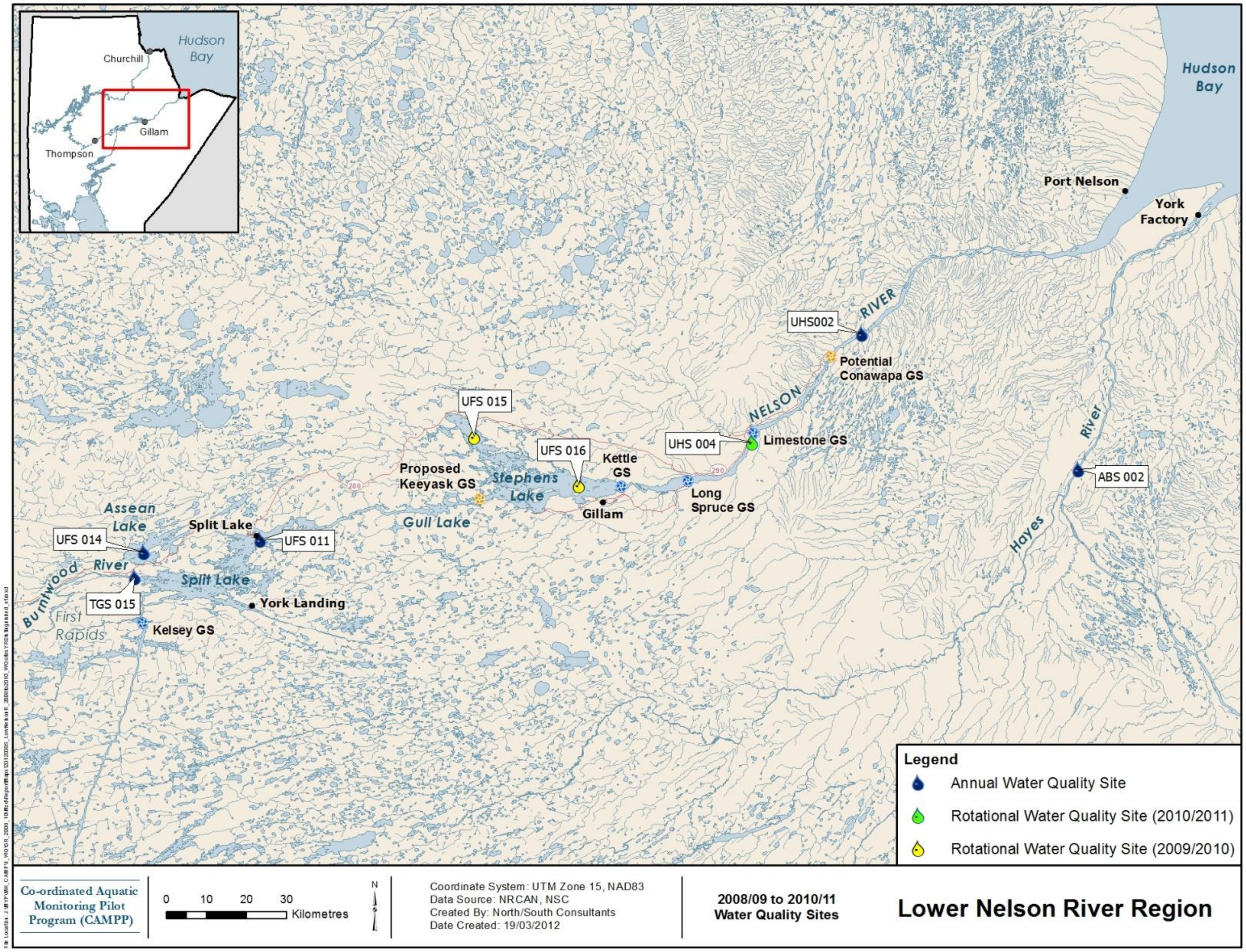


Figure 5.7.4-1. Water quality and phytoplankton monitoring sites in the Lower Nelson River Region.

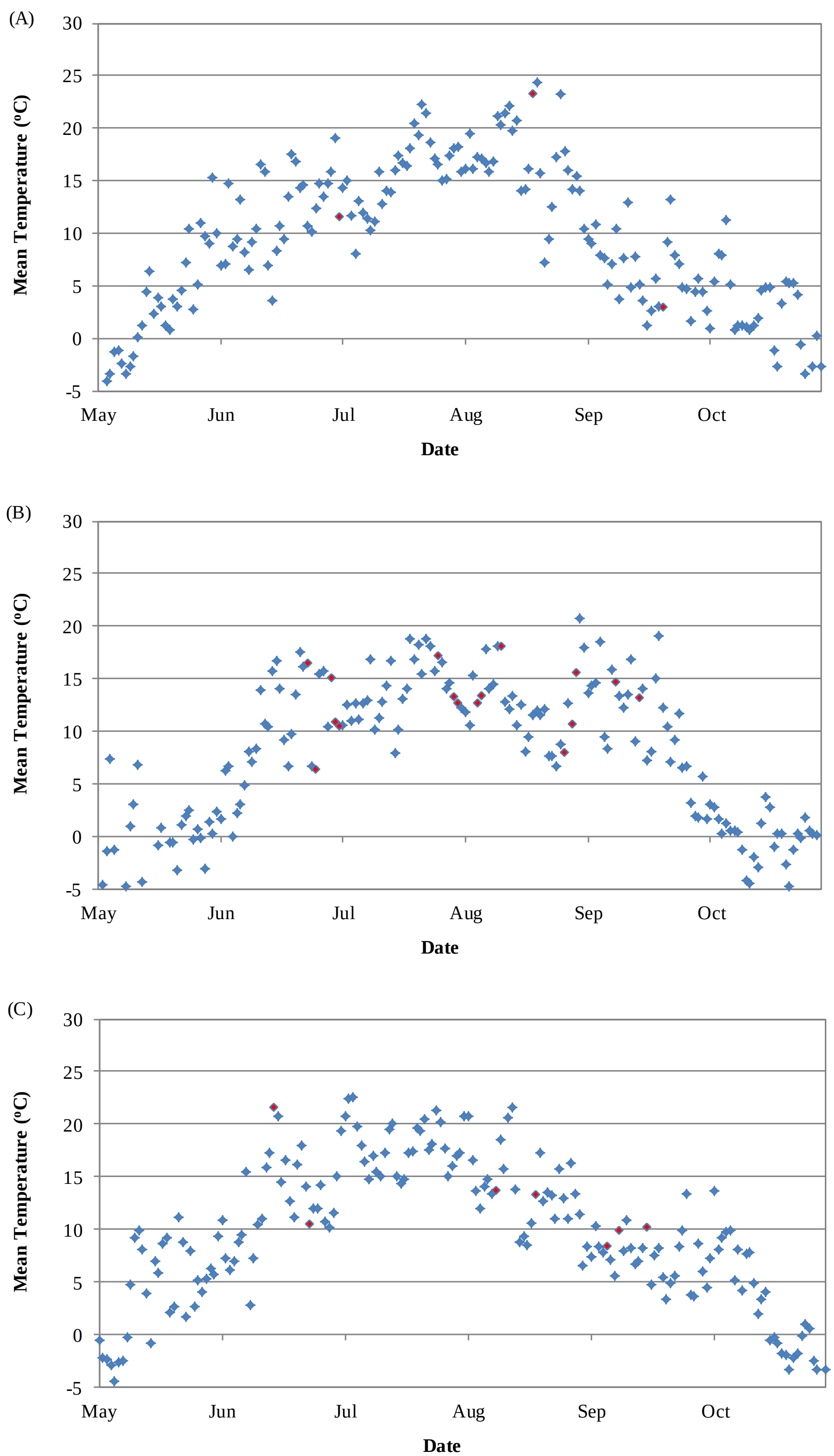


Figure 5.7.4-2. Mean daily air temperatures and water quality sampling dates (indicated in red) for the Lower Nelson River Region: (A) 2008; (B) 2009; and (C) 2010.

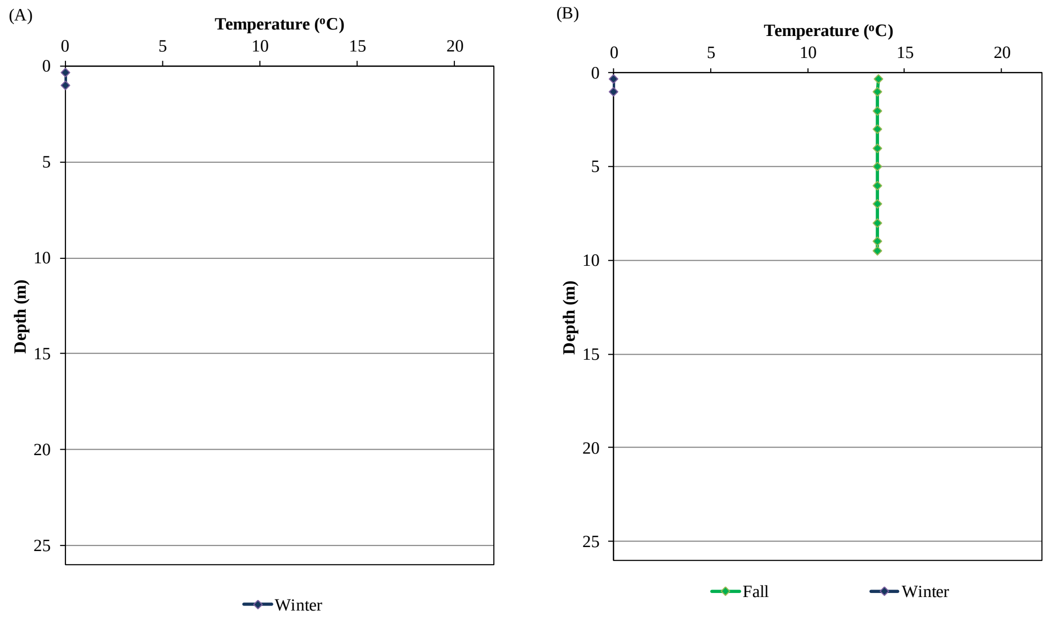


Figure 5.7.4-3. Water temperature profiles measured in the Burntwood River: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles were not collected during other sampling periods at this site.

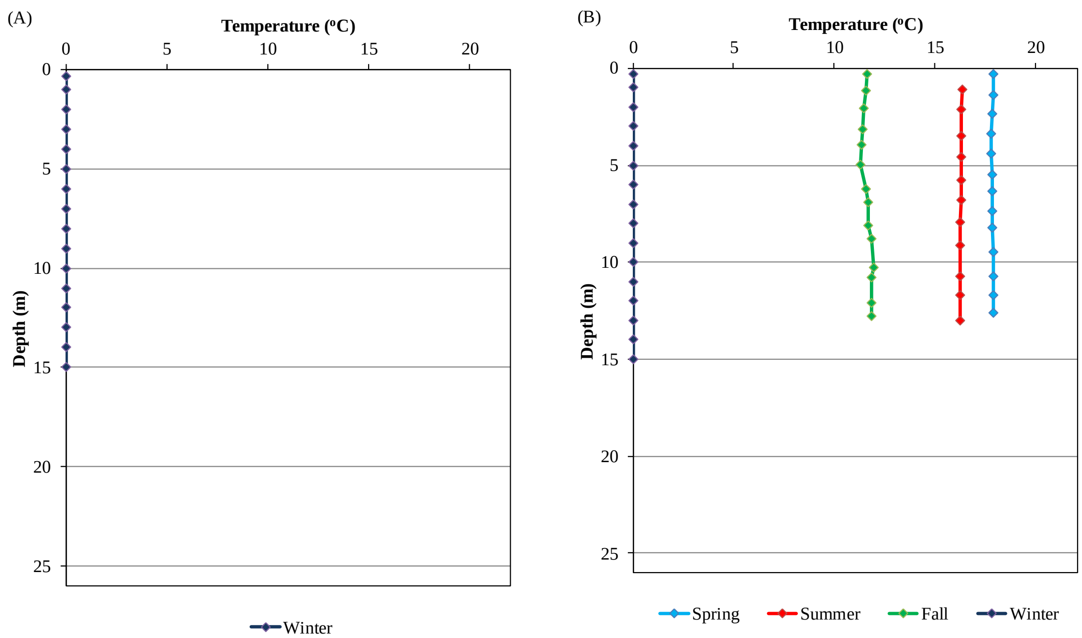


Figure 5.7.4-4. Water temperature profiles measured in Split Lake: (A) 2009/2010; and (B) 2010/2011.Note: depth profiles not collected during other sampling periods at this site in 2009/2010.

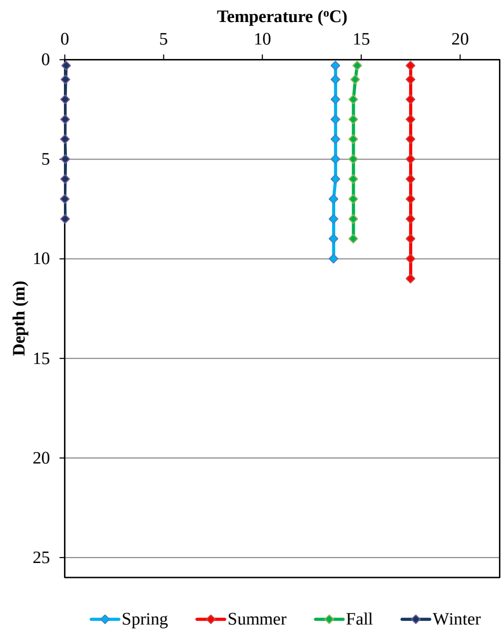


Figure 5.7.4-5. Water temperature profiles measured in Stephens Lake-South: 2009/2010.

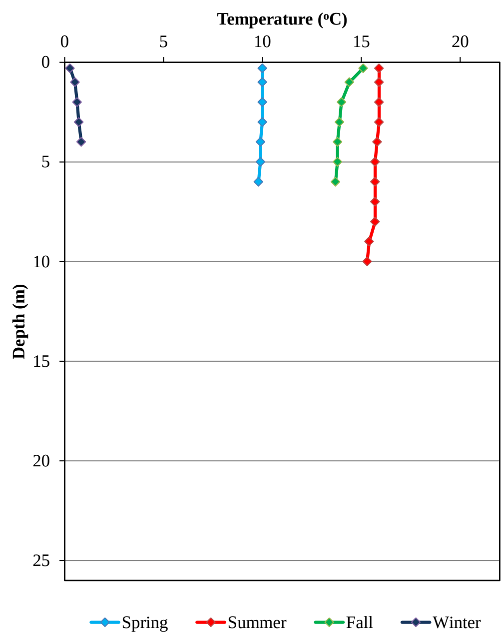


Figure 5.7.4-6. Water temperature profiles measured in Stephens Lake-North: 2009/2010.

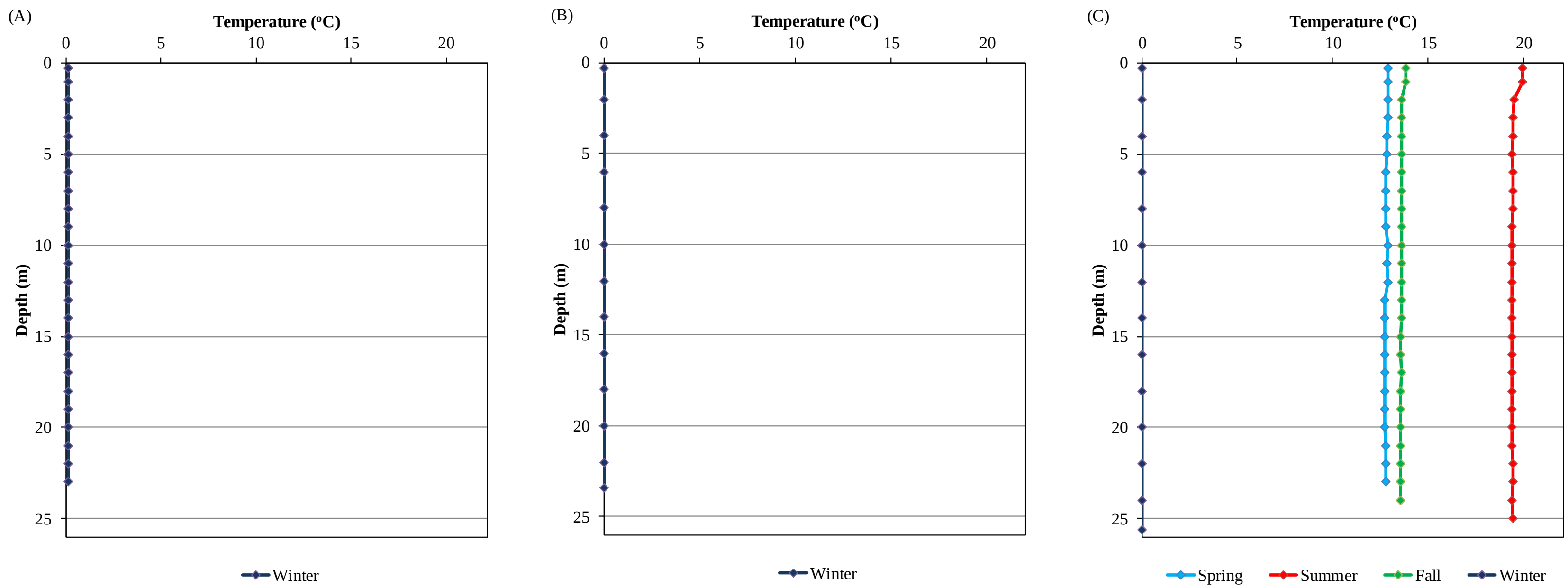


Figure 5.7.4-7. Water temperature profiles measured in the Limestone Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles were not collected during other sampling periods at this site.

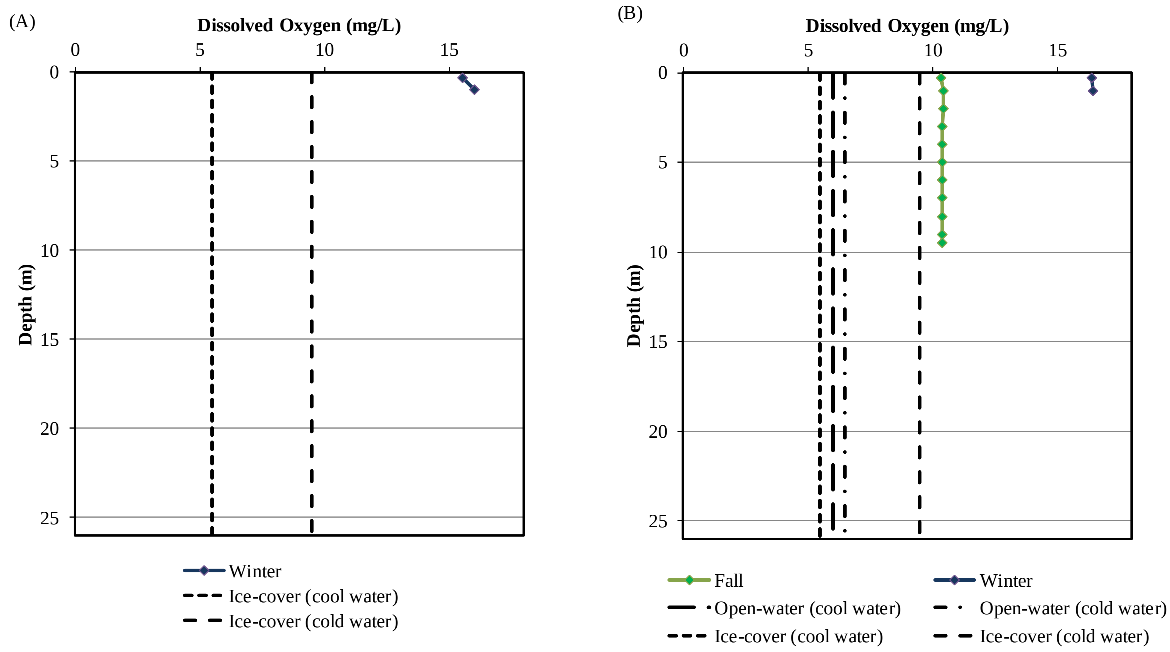


Figure 5.7.4-8. Dissolved oxygen depth profiles measured in the Burntwood River: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

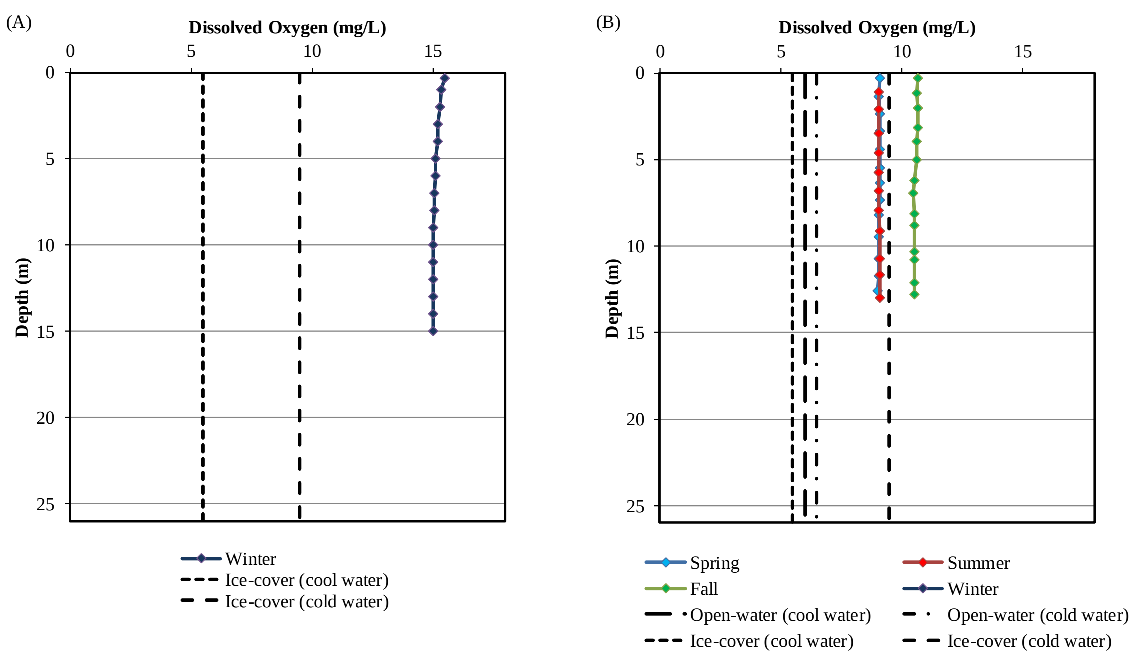


Figure 5.7.4-9. Dissolved oxygen depth profiles measured in Split Lake: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

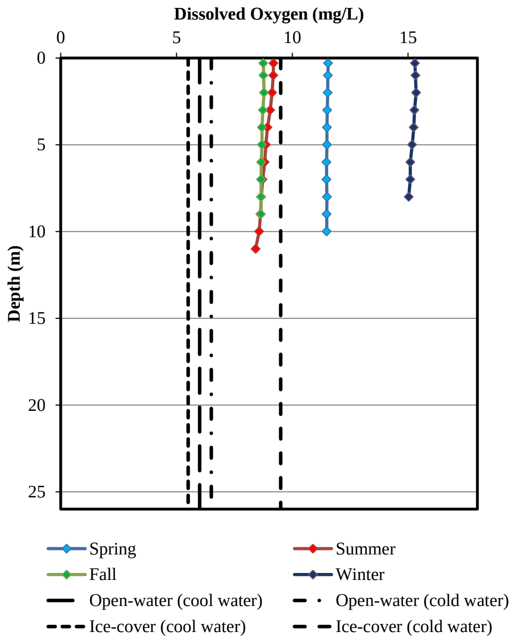


Figure 5.7.4-10. Dissolved oxygen depth profiles measured in Stephens Lake-South: 2009/2010.

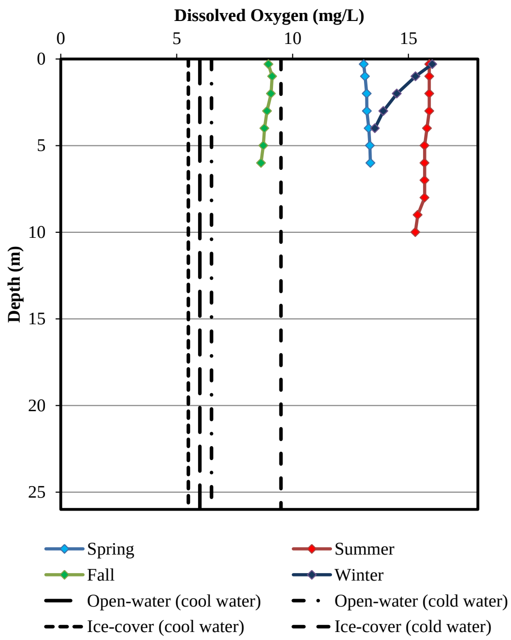


Figure 5.7.4-11. Dissolved oxygen depth profiles measured in Stephens Lake-North: 2009/2010.

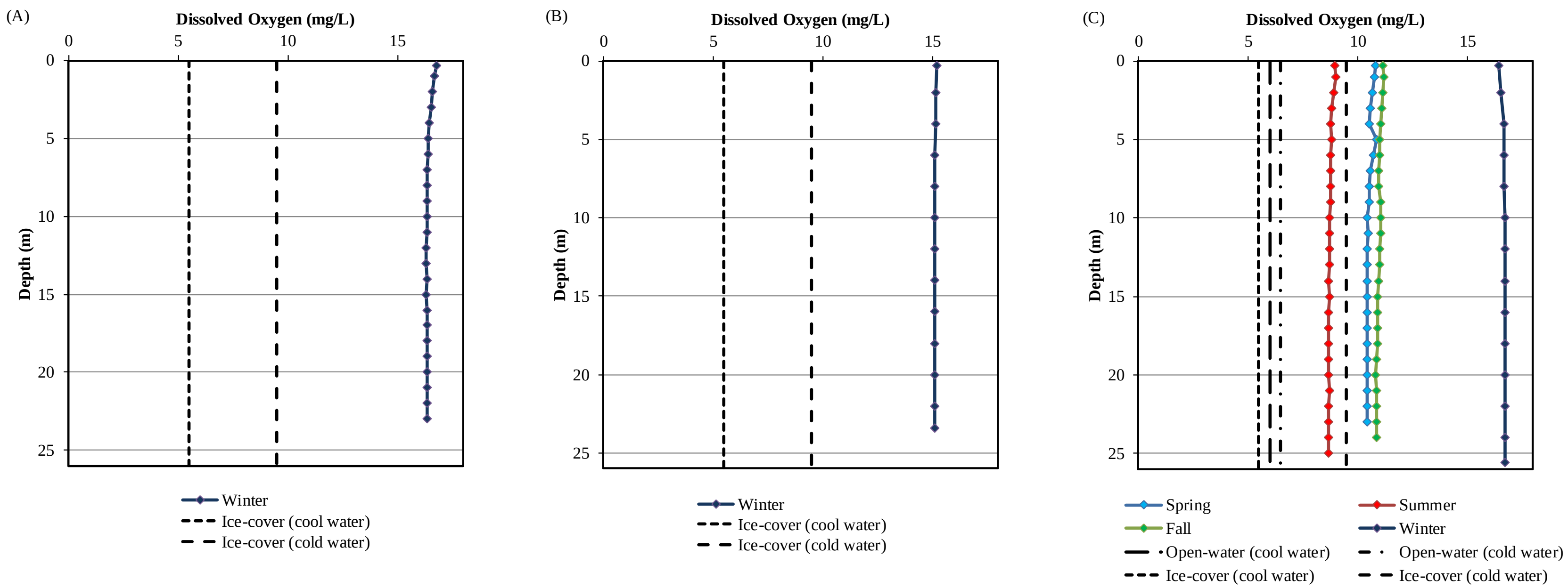


Figure 5.7.4-12. Dissolved oxygen depth profiles measured in the Limestone Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles were not collected during other sampling periods at this site.

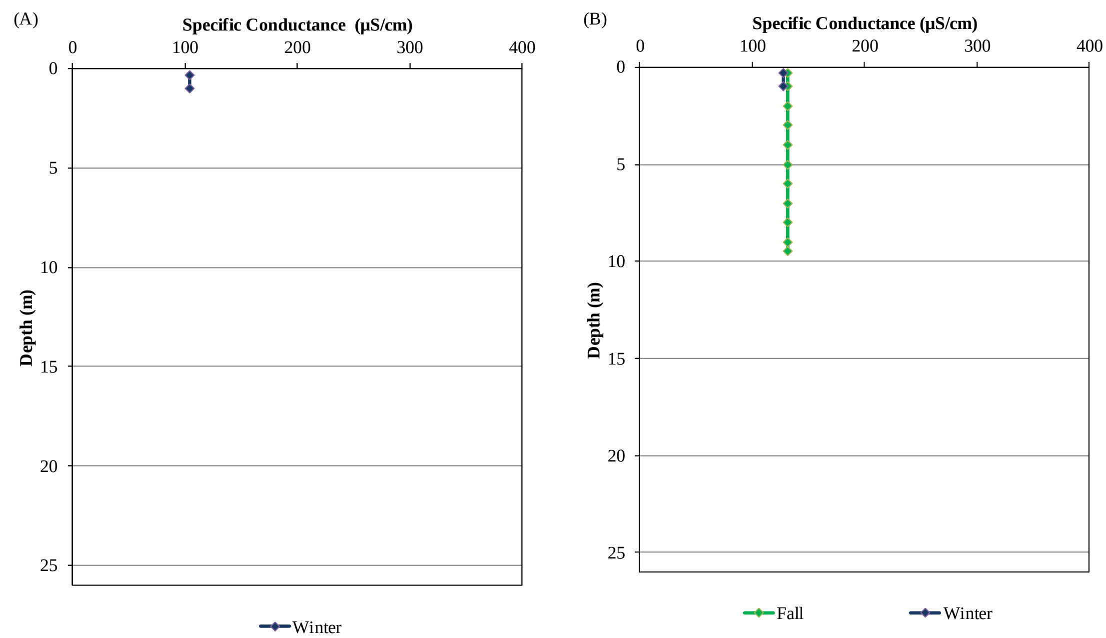


Figure 5.7.4-13. Specific conductance depth profiles measured in the Burntwood River: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

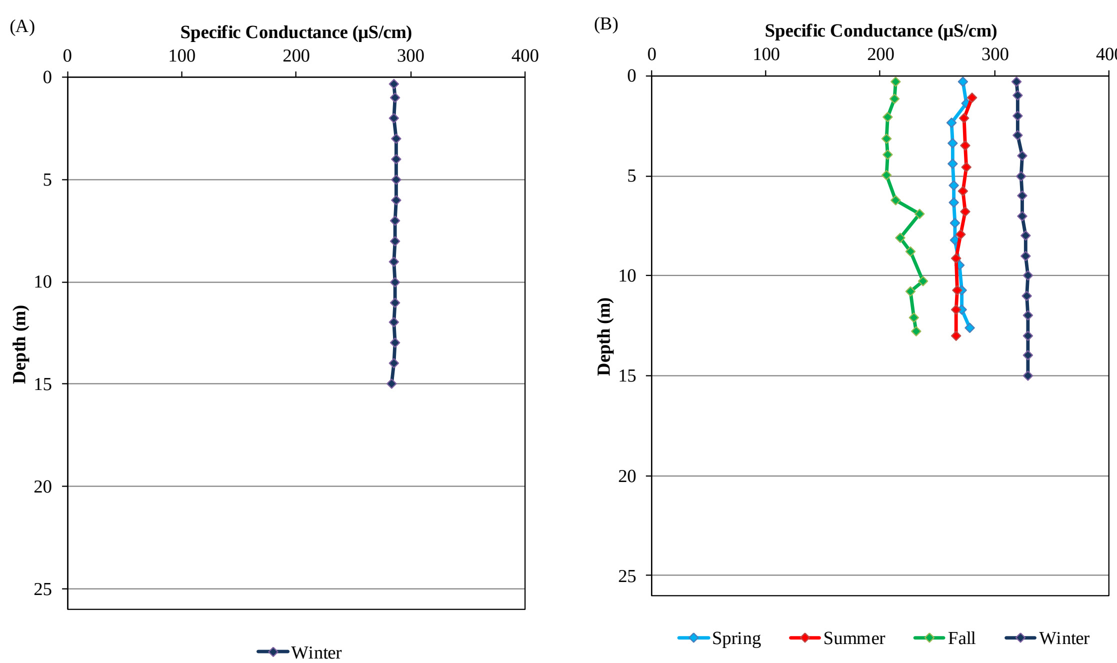


Figure 5.7.4-14. Specific conductance depth profiles measured in Split Lake: (A) 2009/2010; and (B) 2010/2011 Note: depth profiles not collected during other sampling periods at this site.

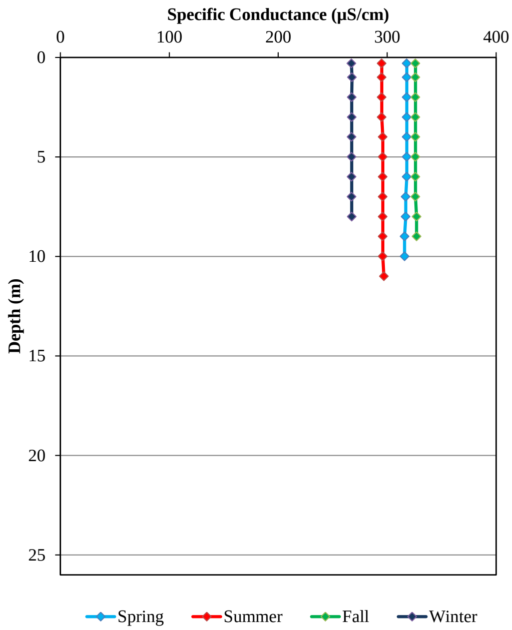


Figure 5.7.4-15. Specific conductance depth profiles measured in Stephens Lake-South: 2009/2010.

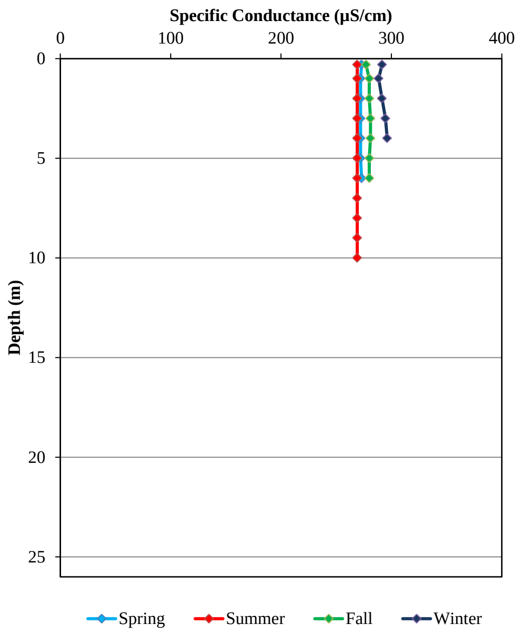


Figure 5.7.4-16. Specific conductance depth profiles measured in Stephens Lake-North: 2009/2010.

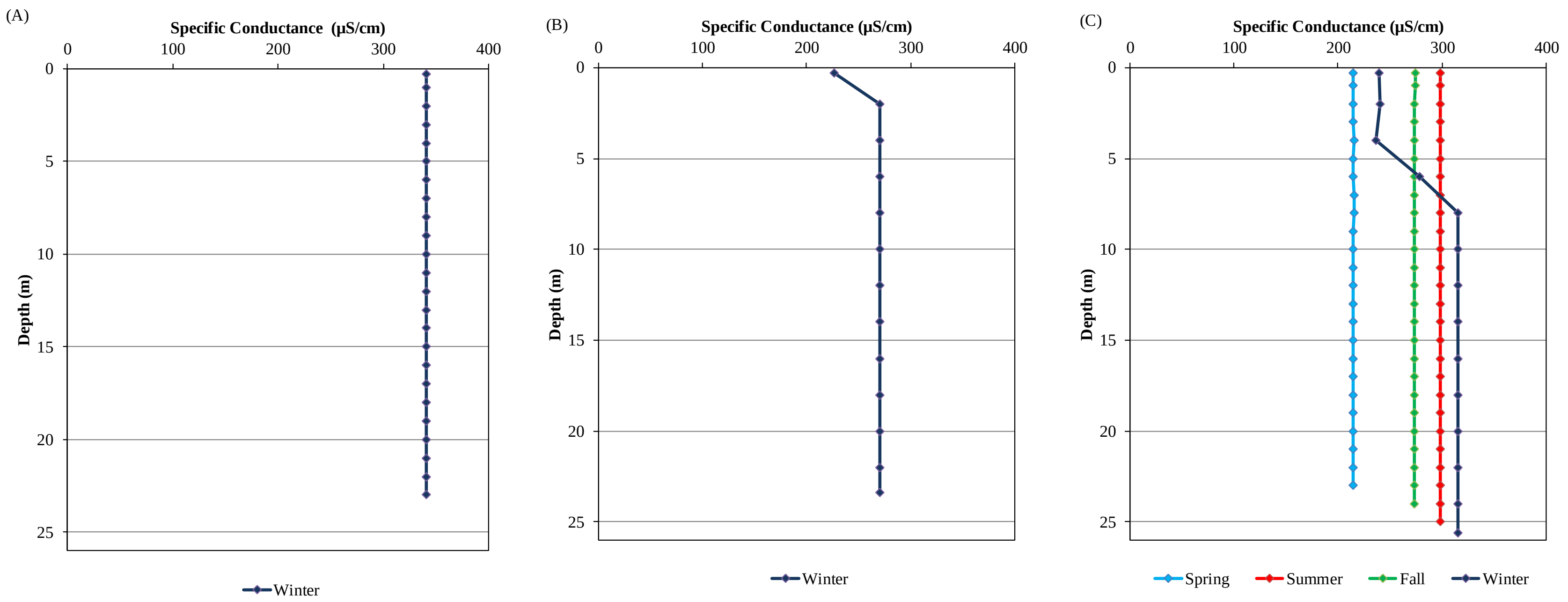


Figure 5.7.4-17. Specific conductance depth profiles measured in the Limestone Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles were not collected during other sampling periods at this site.

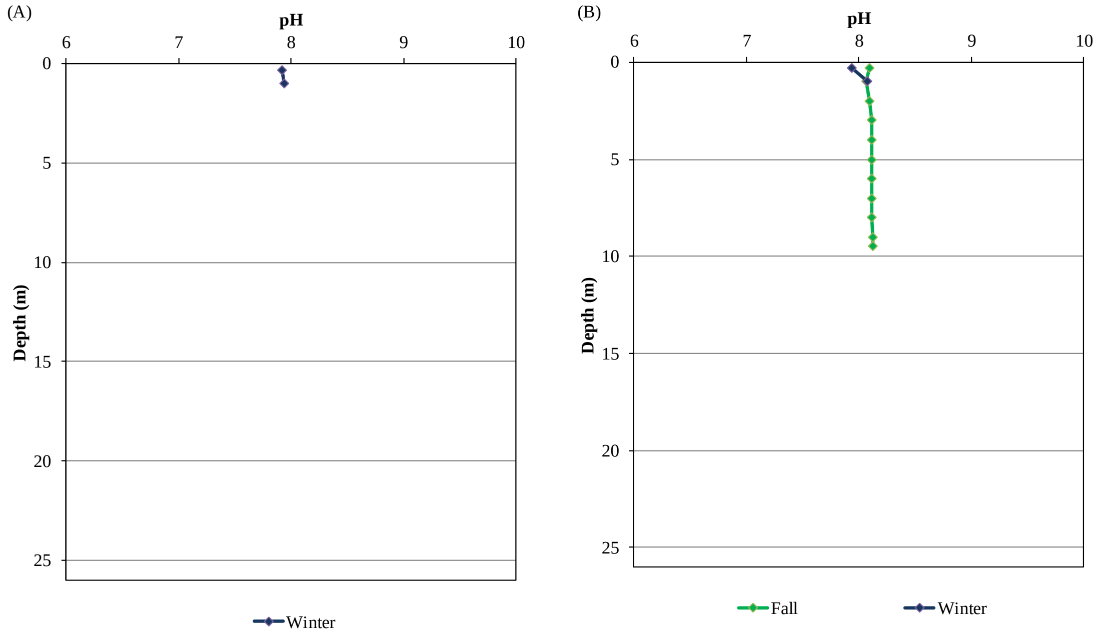


Figure 5.7.4-18. pH depth profiles measured in the Burntwood River: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

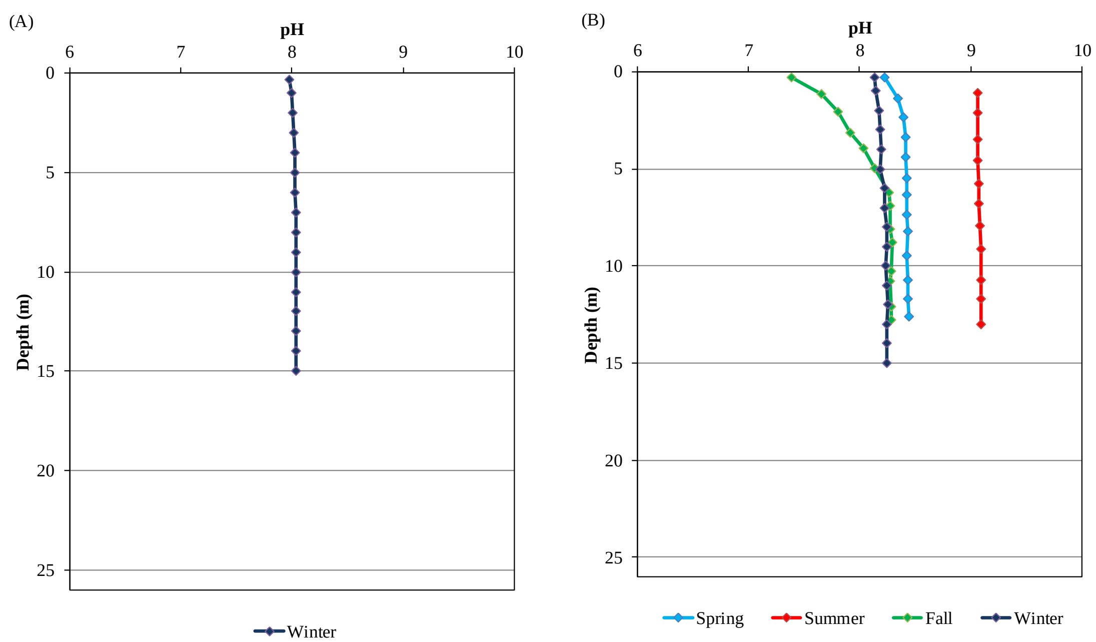


Figure 5.7.4-19. pH depth profiles measured in Split Lake: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

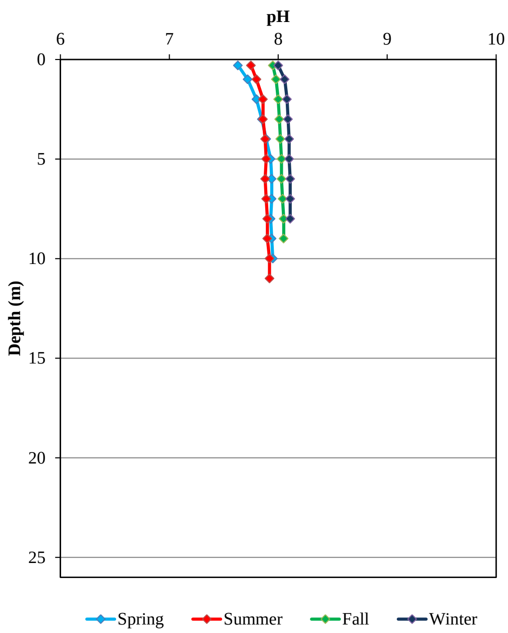


Figure 5.7.4-20. pH depth profiles measured in Stephens Lake-South: 2009/2010.

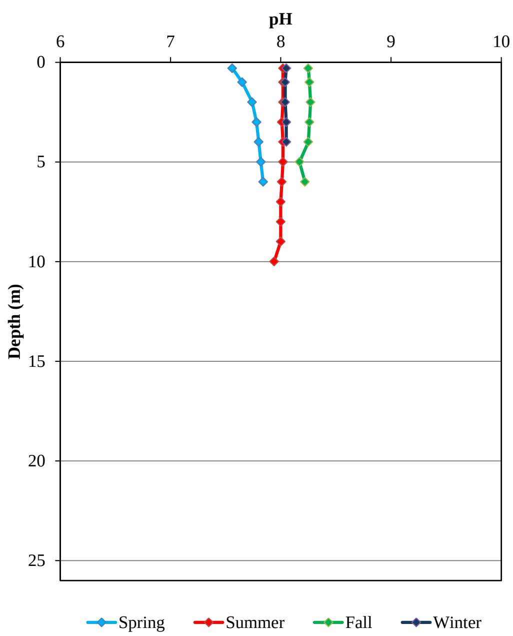


Figure 5.7.4-21. pH depth profiles measured in Stephens Lake-North: 2009/2010.

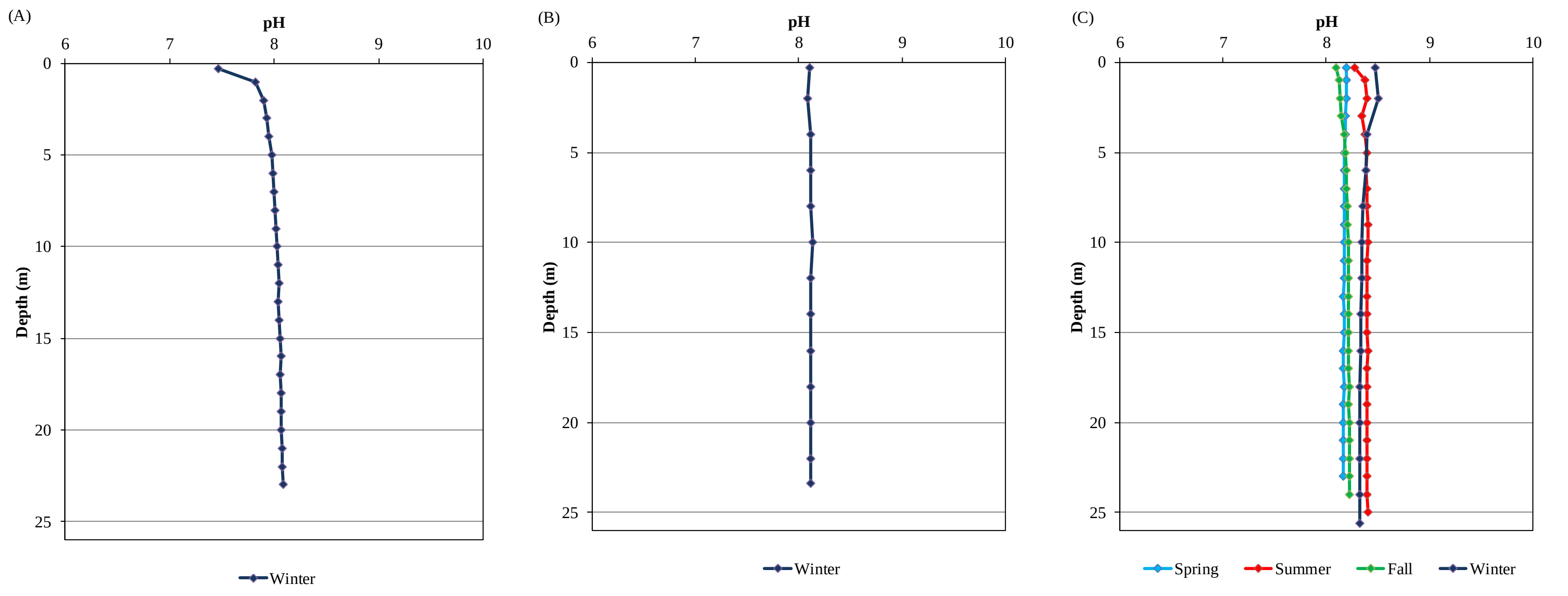


Figure 5.7.4-22. pH depth profiles measured in the Limestone Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles were not collected during other sampling periods at this site.

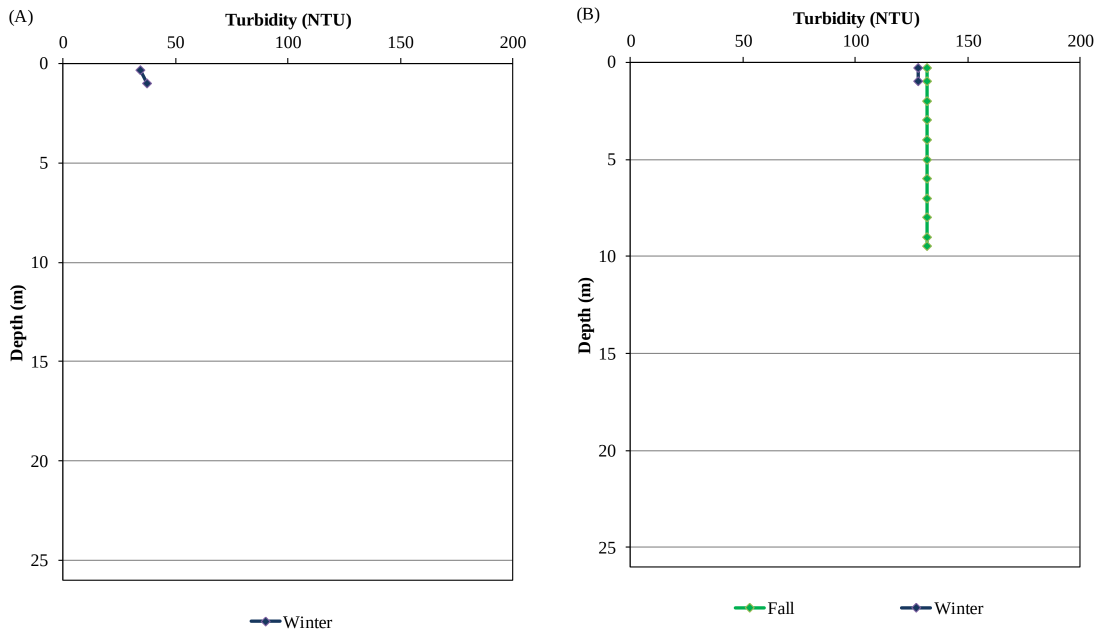


Figure 5.7.4-23. Turbidity depth profiles measured in the Burntwood River: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

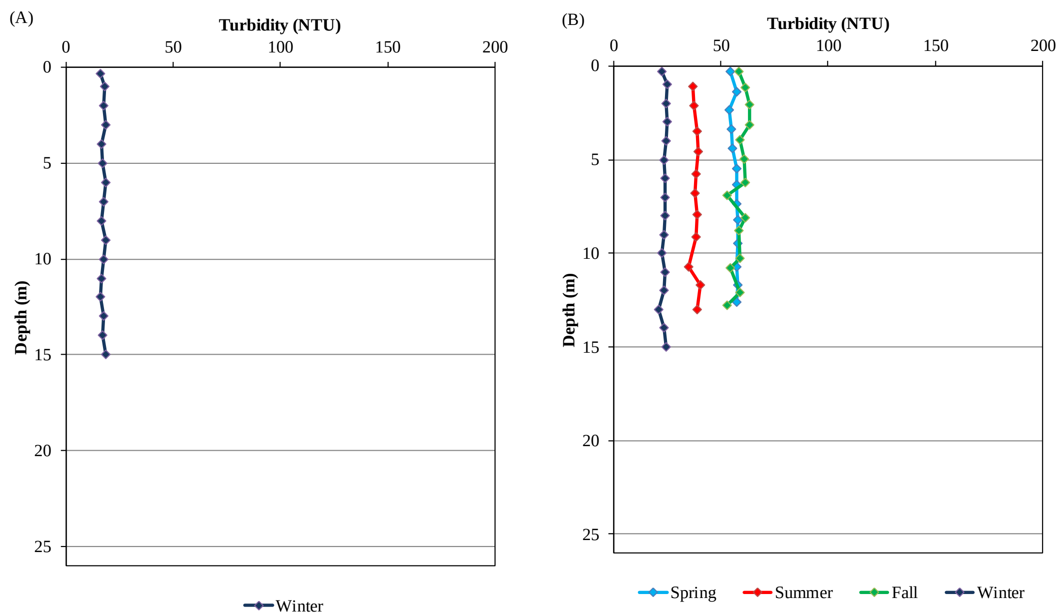


Figure 5.7.4-24. Turbidity depth profiles measured in Split Lake: (A) 2009/2010; and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

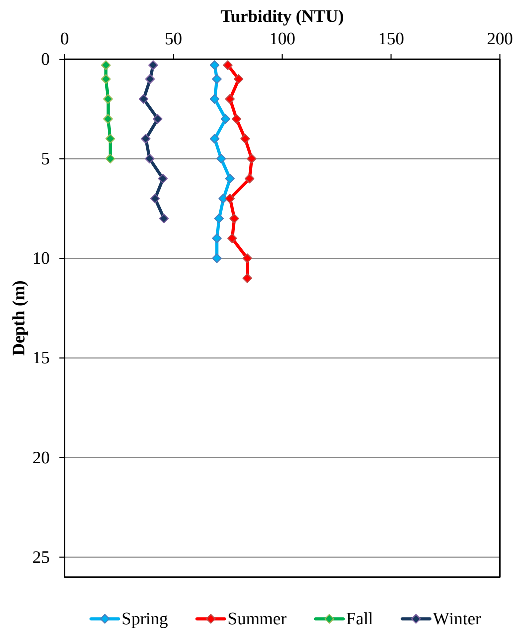


Figure 5.7.4-25. Turbidity depth profiles measured in Stephens Lake-South: 2009/2010.

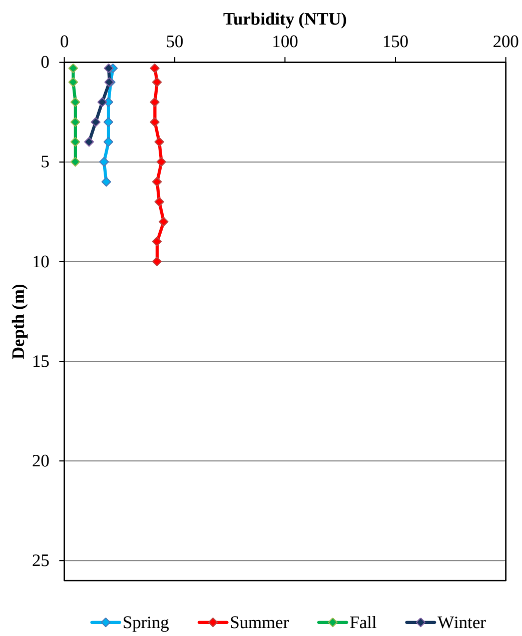


Figure 5.7.4-26. Turbidity depth profiles measured in Stephens Lake-North: 2009/2010.

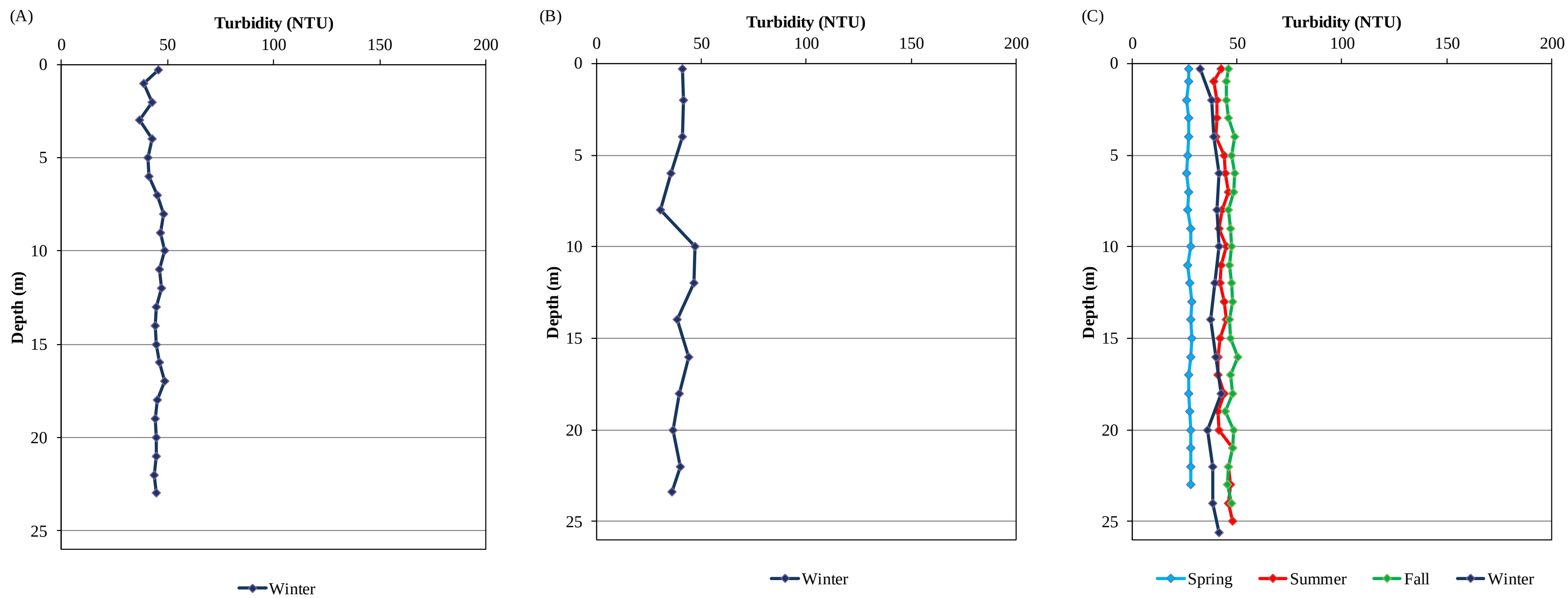


Figure 5.7.4-27. Turbidity depth profiles measured in the Limestone Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles were not collected during other sampling periods at this site.

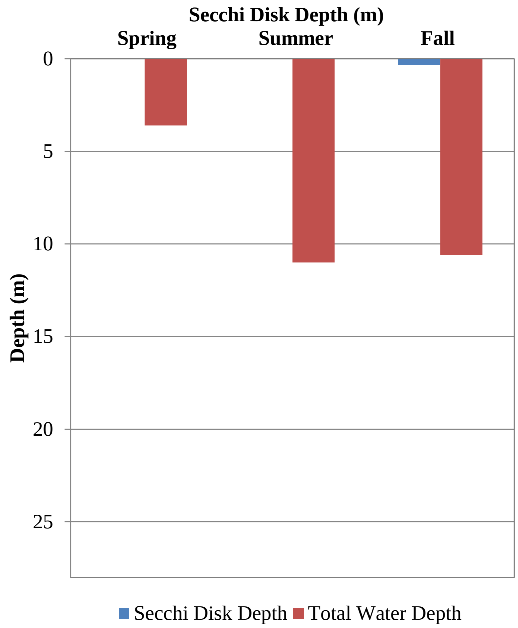


Figure 5.7.4-28. Secchi disk depths measured in the Burntwood River: 2010/2011.

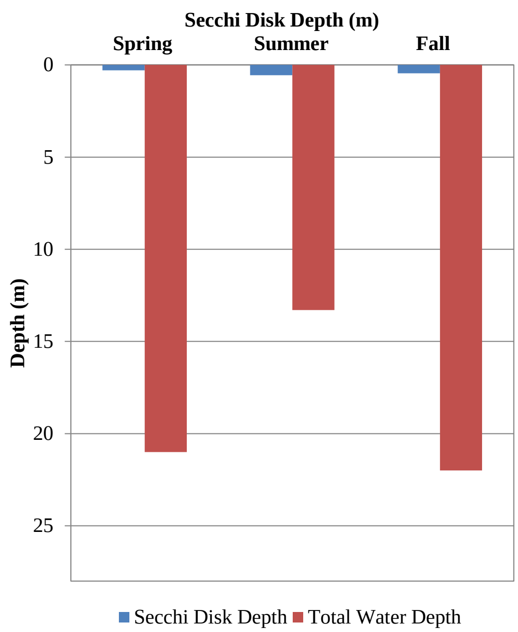


Figure 5.7.4-29. Secchi disk depths measured in Split Lake: 2010/2011.

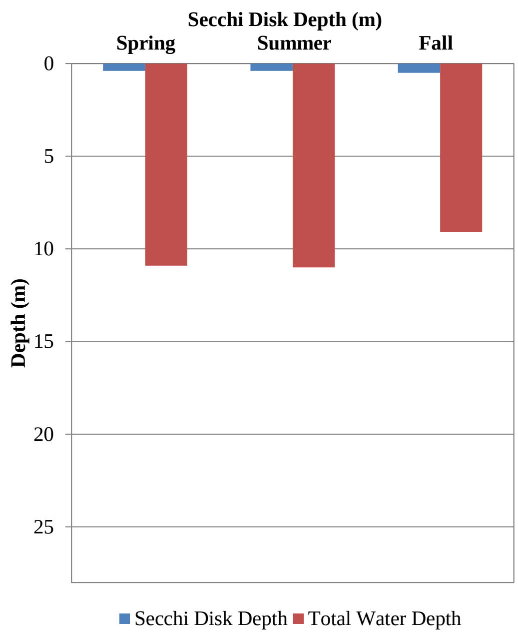


Figure 5.7.4-30. Secchi disk depths measured in Stephens Lake-South: 2009/2010.

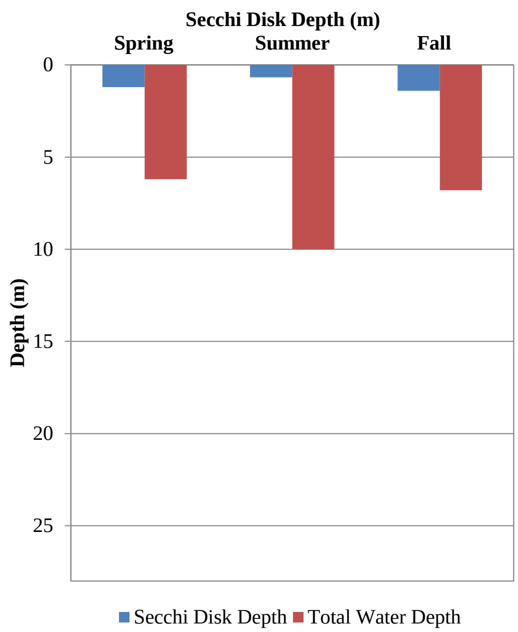


Figure 5.7.4-31. Secchi disk depths measured in Stephens Lake-North: 2009/2010.

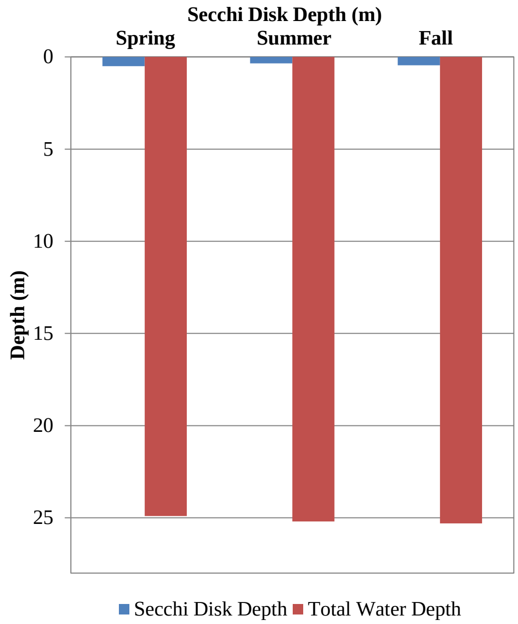


Figure 5.7.4-32. Secchi disk depths measured in the Limestone Forebay: 2010/2011.

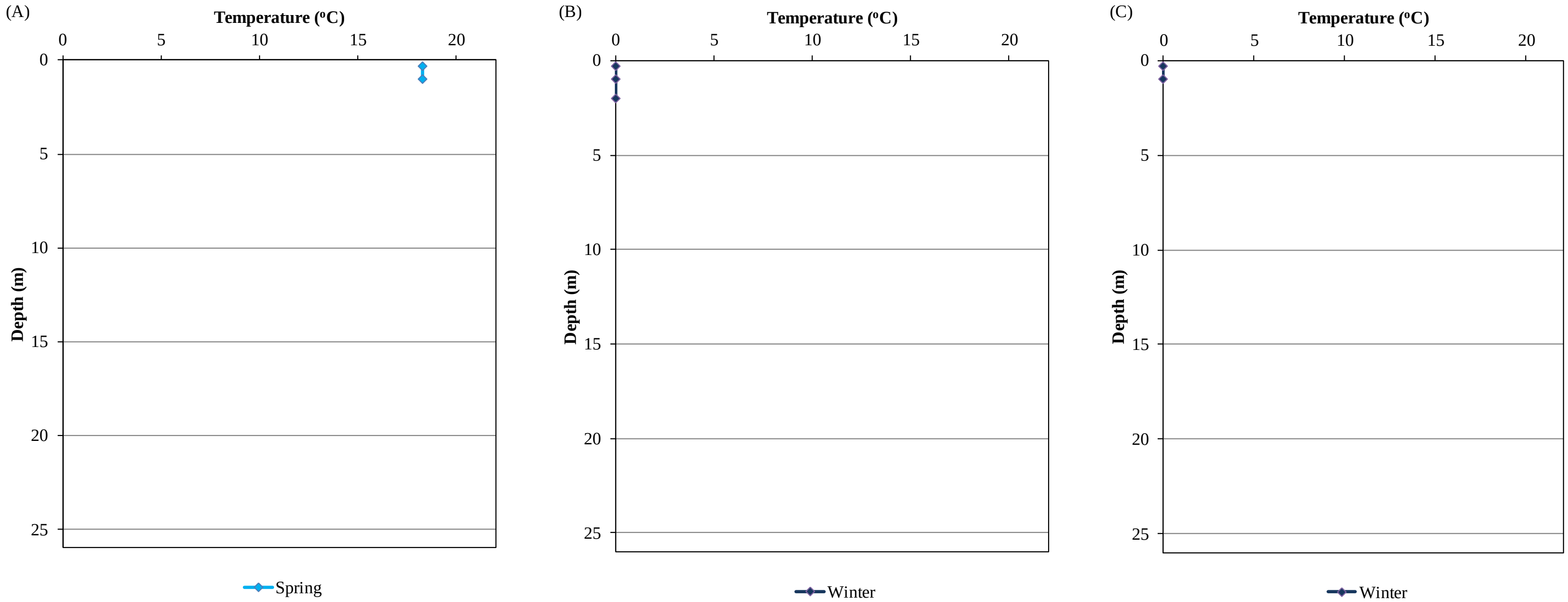


Figure 5.7.4-33. Water temperature profiles measured in the Hayes River: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

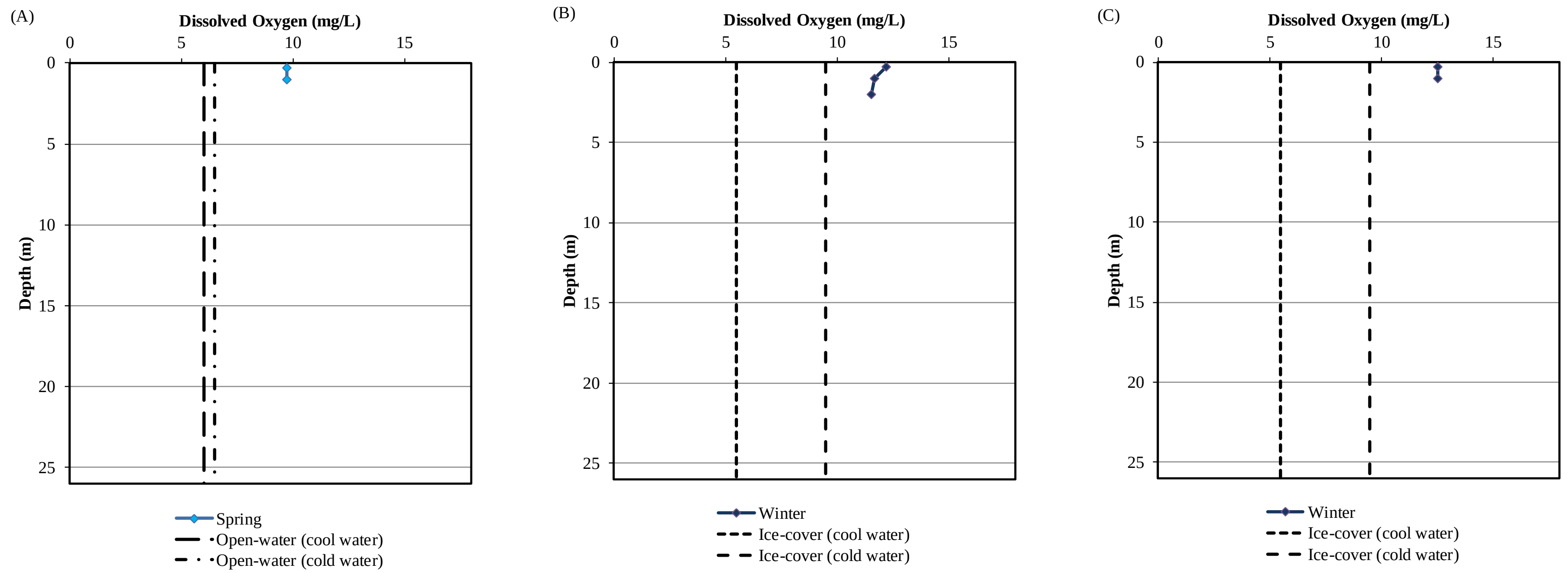


Figure 5.7.4-34. Dissolved oxygen depth profiles measured in the Hayes River: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

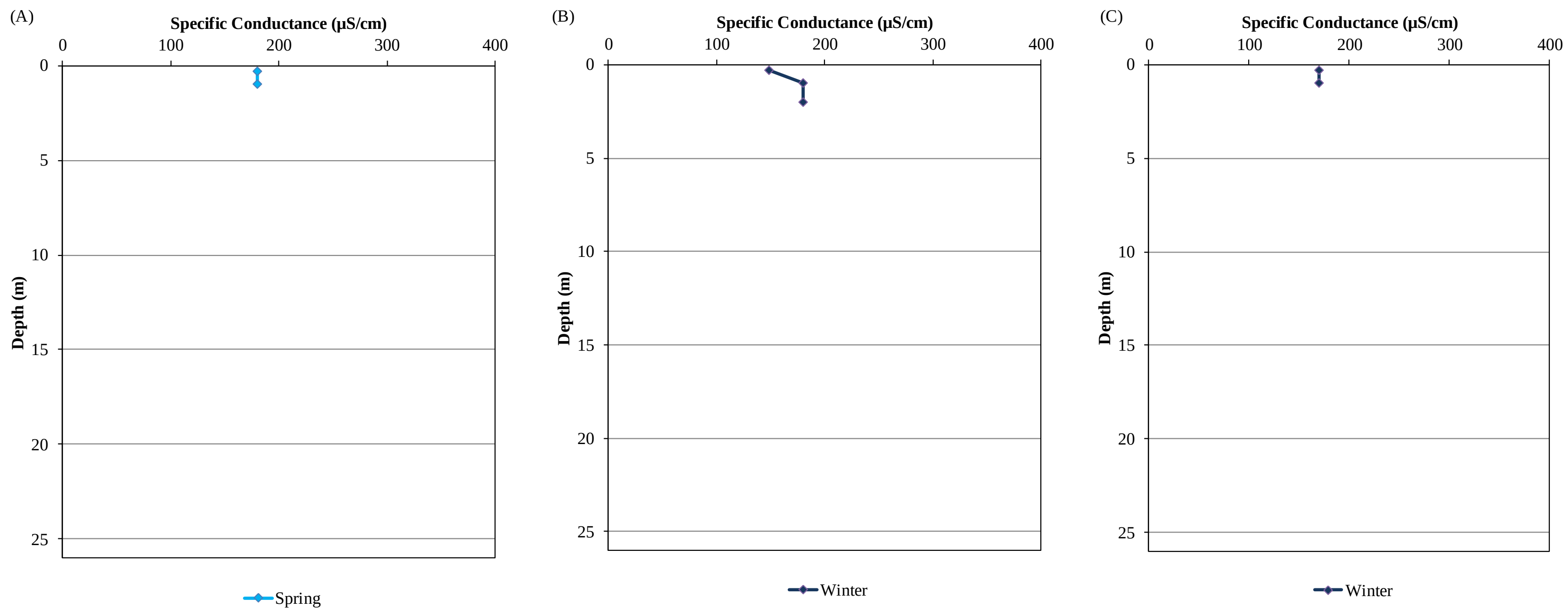


Figure 5.7.4-35. Specific conductance depth profiles measured in the Hayes River: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

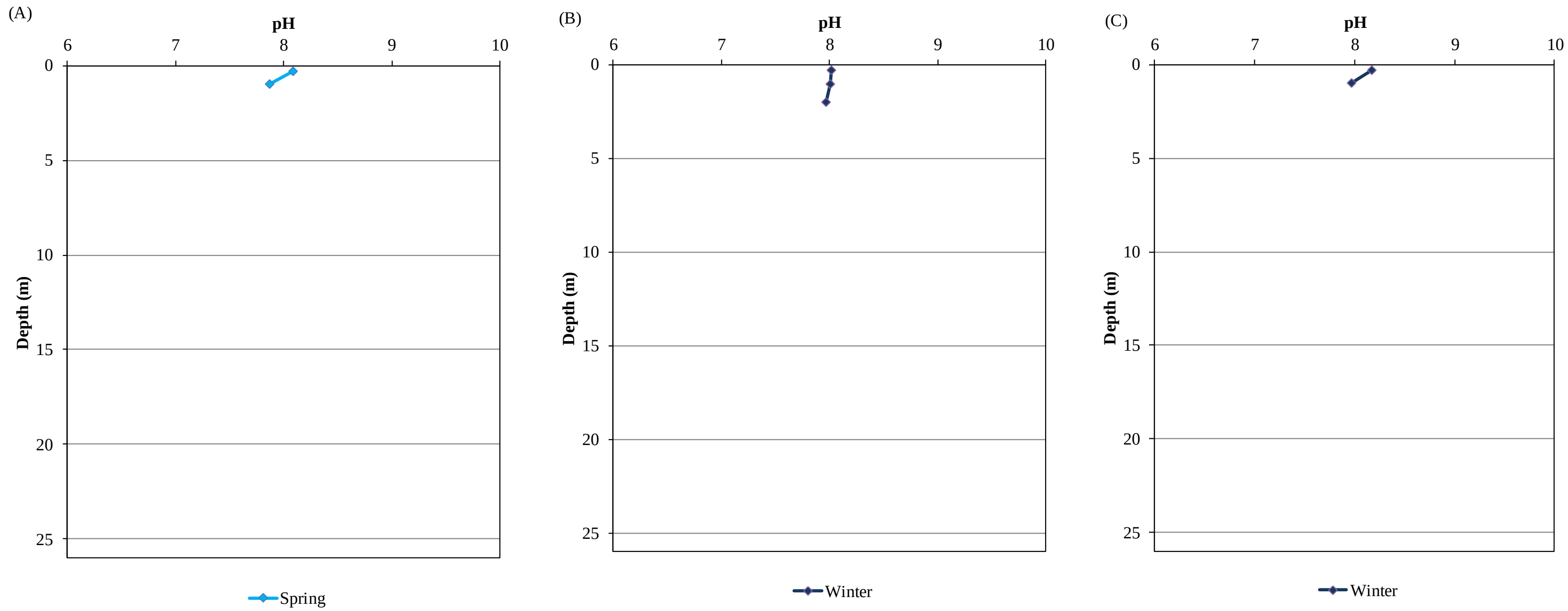


Figure 5.7.4-36. pH depth profiles measured in the Hayes River: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

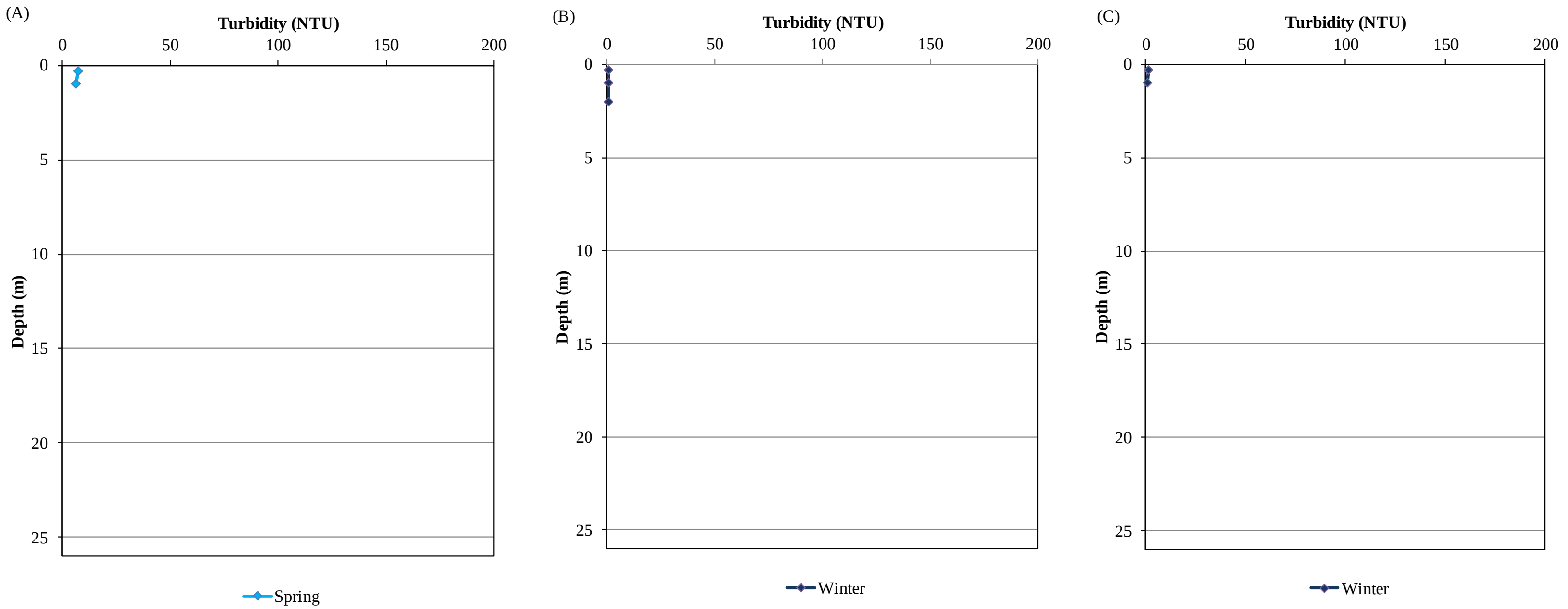


Figure 5.7.4-37. Turbidity depth profiles measured in the Hayes River: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

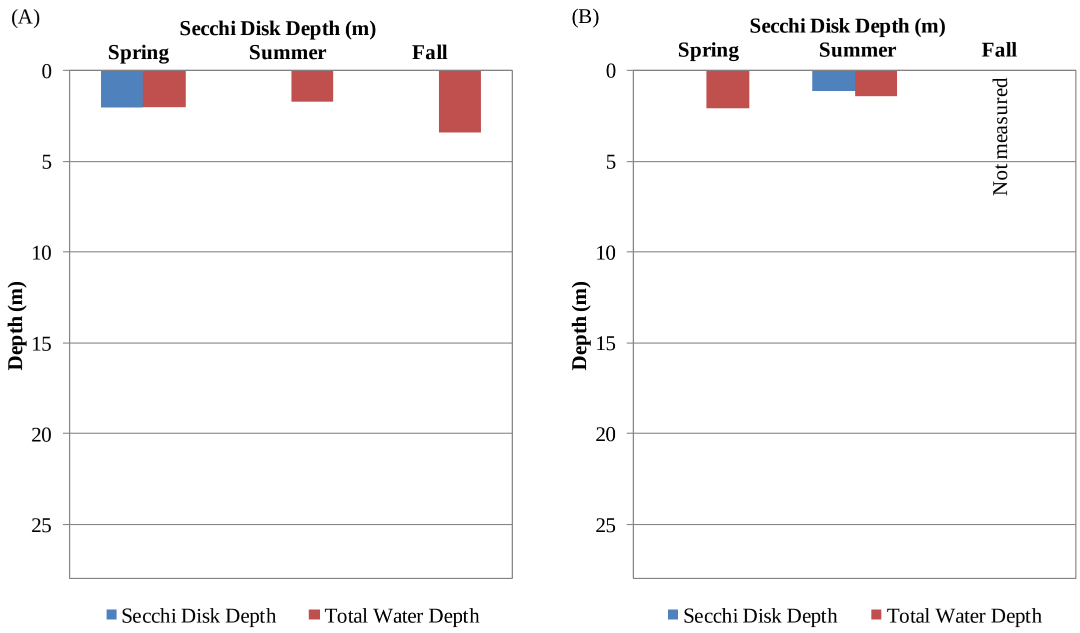


Figure 5.7.4-38. Secchi disk depths measured in the Hayes River: (A) 2008/2009; (B) 2010/2011.

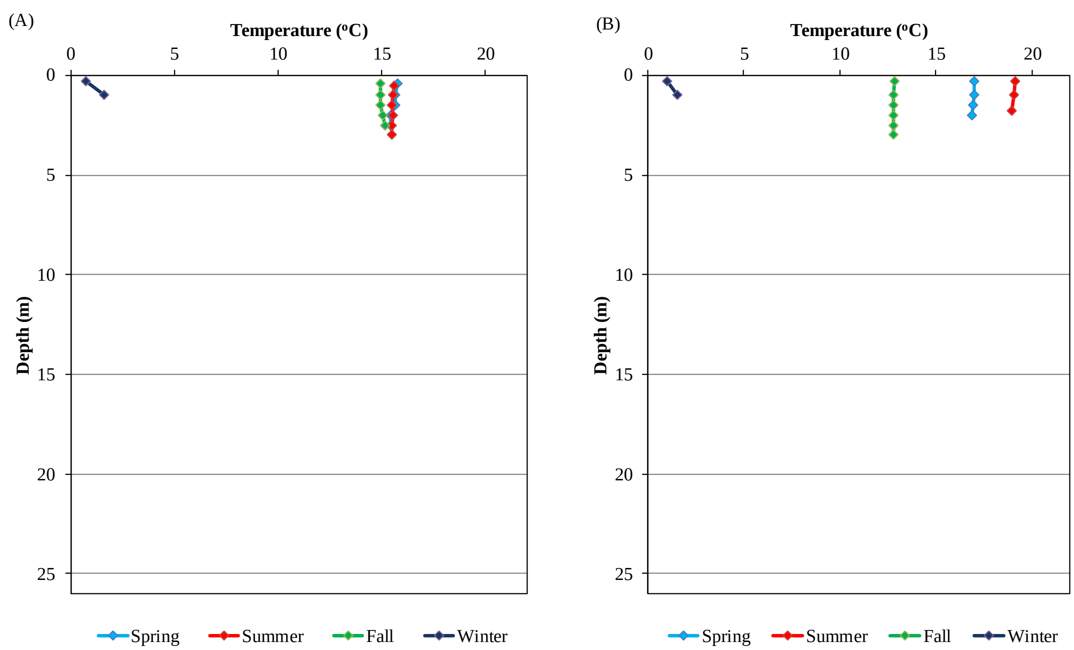


Figure 5.7.4-39. Water temperature profiles measured in Assean Lake: (A) 2009/2010; and (B) 2010/2011.

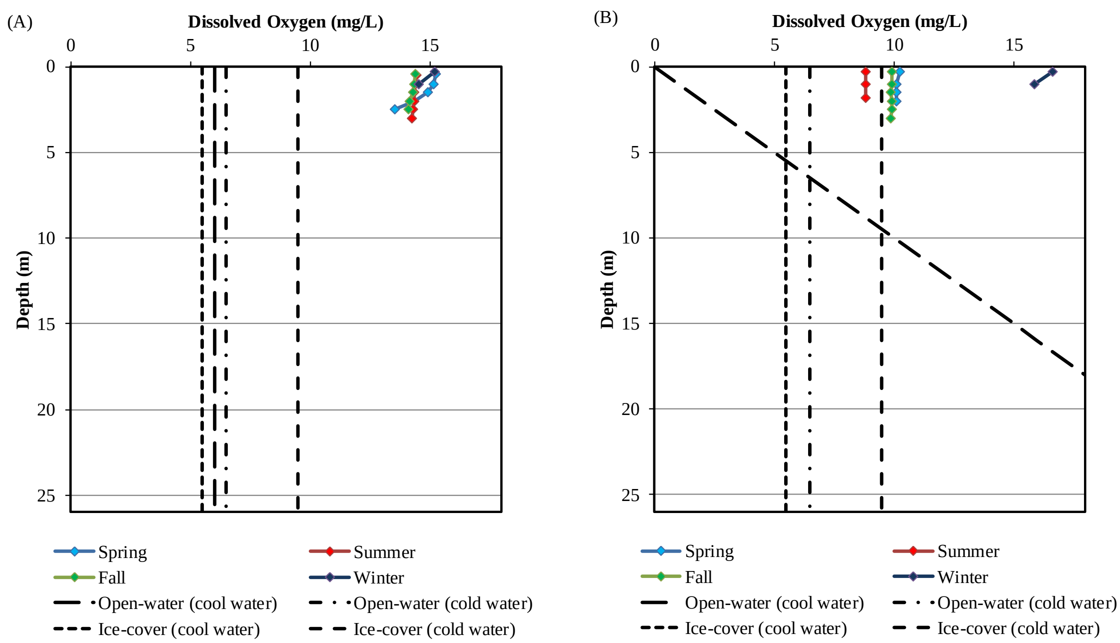


Figure 5.7.4-40. Dissolved oxygen depth profiles measured in Assean Lake: (A) 2009/2010; and (B) 2010/2011.

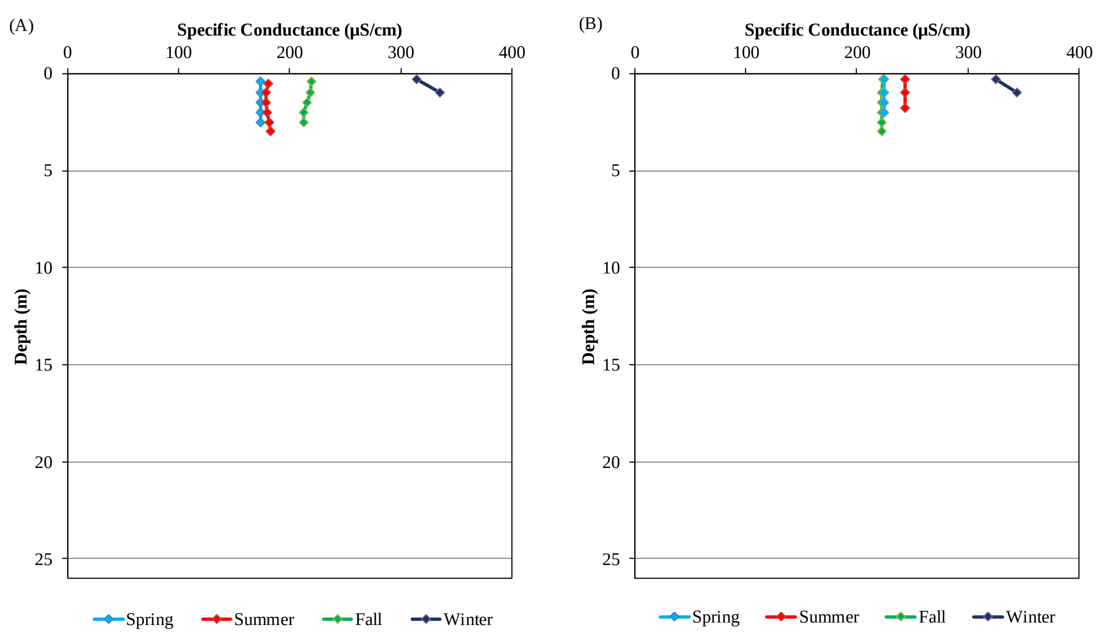


Figure 5.7.4-41. Specific conductance depth profiles measured in Assean Lake: (A) 2009/2010; and (B) 2010/2011.

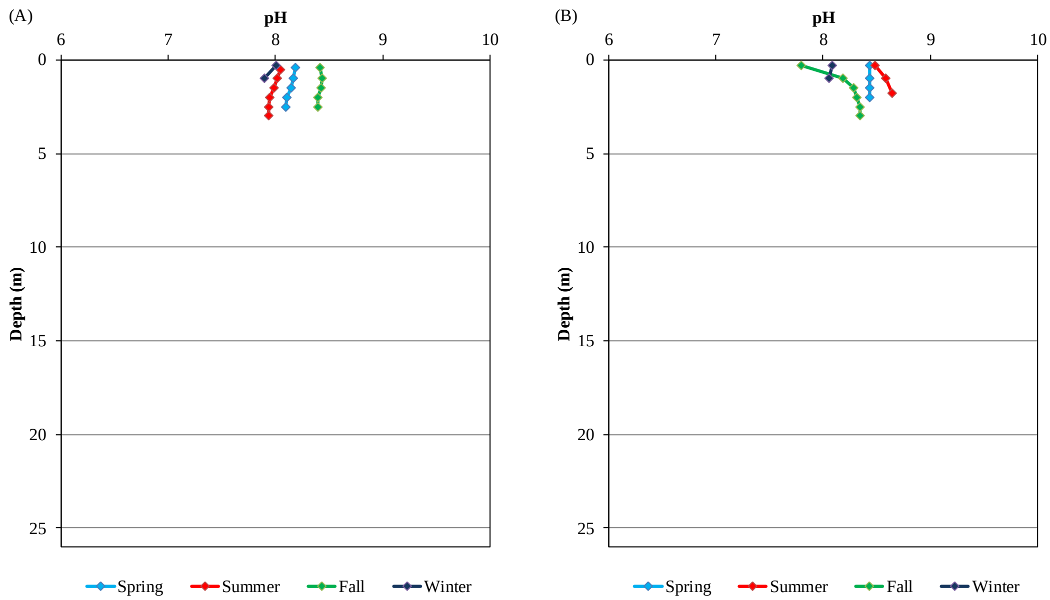


Figure 5.7.4-42. pH depth profiles measured at Assean Lake: (A) 2009/2010; and (B) 2010/2011.

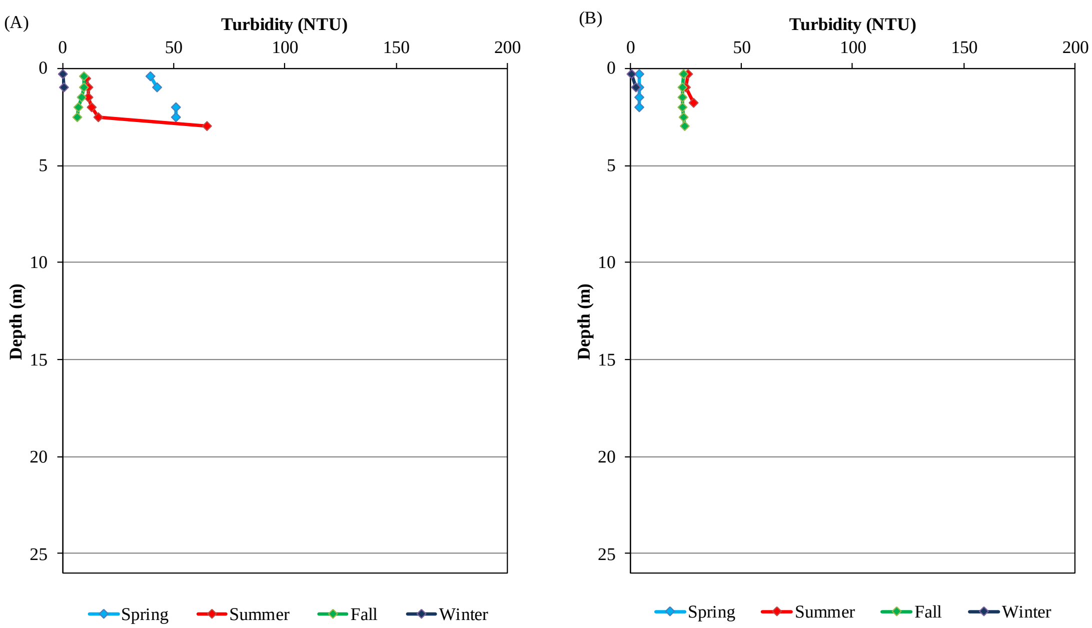


Figure 5.7.4-43. Turbidity depth profiles measured at Assean Lake: (A) 2009/2010; and (B) 2010/2011.

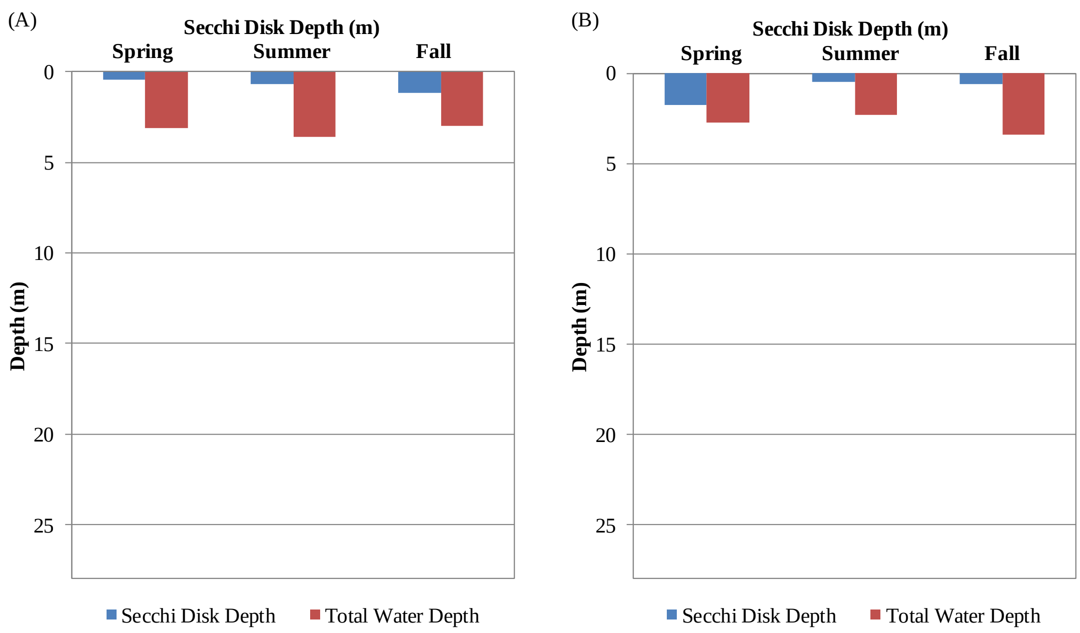


Figure 5.7.4-44. Secchi disk depths measured at Assean Lake: (A) 2009/2010; and (C) 2010/2011.

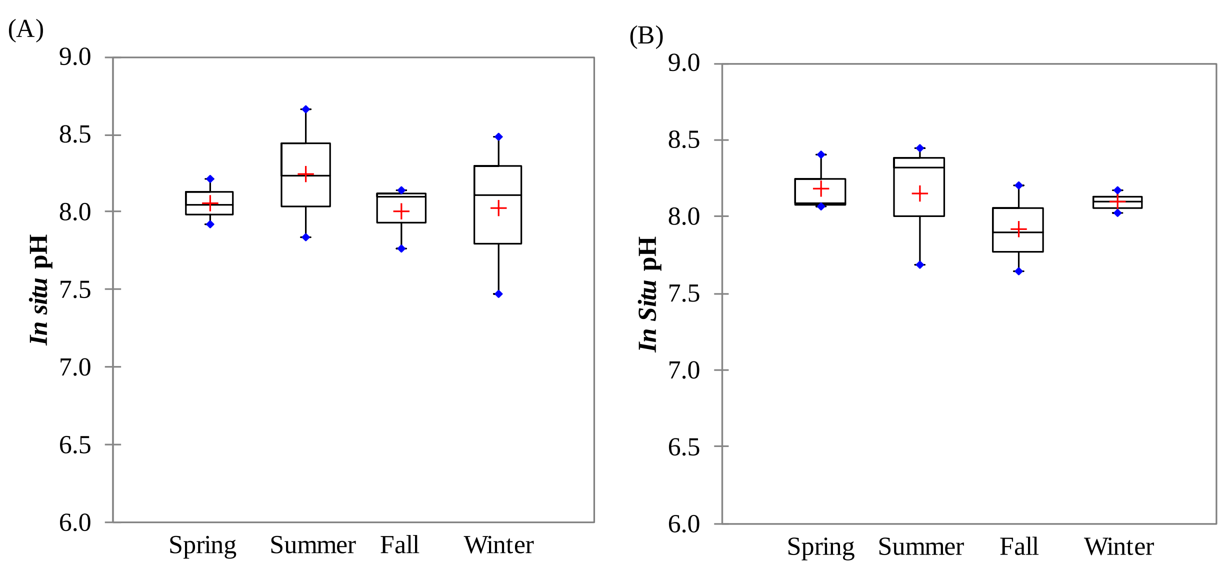


Figure 5.7.4-45. *In situ* pH in the Lower Nelson River Region by season: (A) lower Nelson River (sampled in Limestone Forebay during winter); and (B) Hayes River. There were no significant differences between seasons.

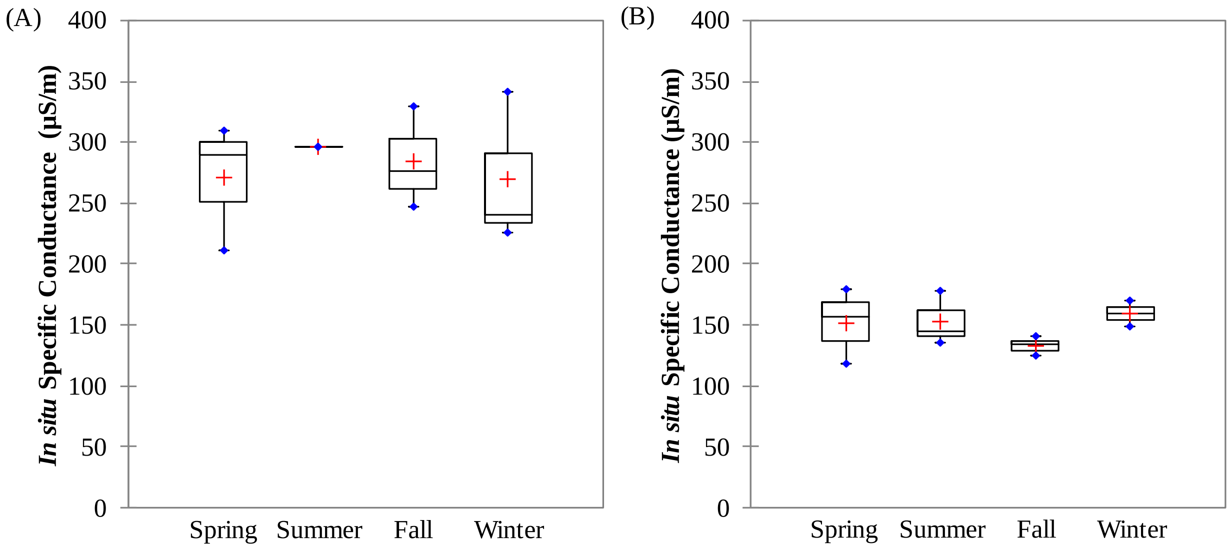


Figure 5.7.4-46. *In situ* specific conductance in the Lower Nelson River Region by season: (A) lower Nelson River (sampled in Limestone Forebay during winter); and (B) Hayes River. There were no significant differences between seasons.

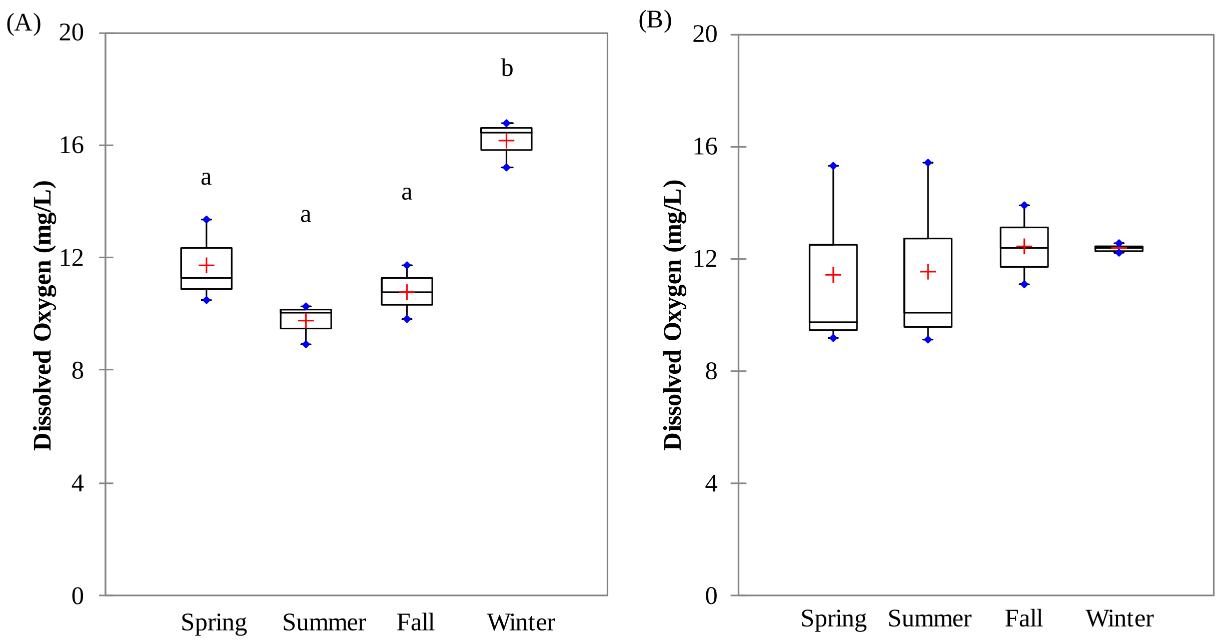


Figure 5.7.4-47. Dissolved oxygen in the Lower Nelson River Region by season: (A) lower Nelson River (sampled in Limestone Forebay during winter); and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

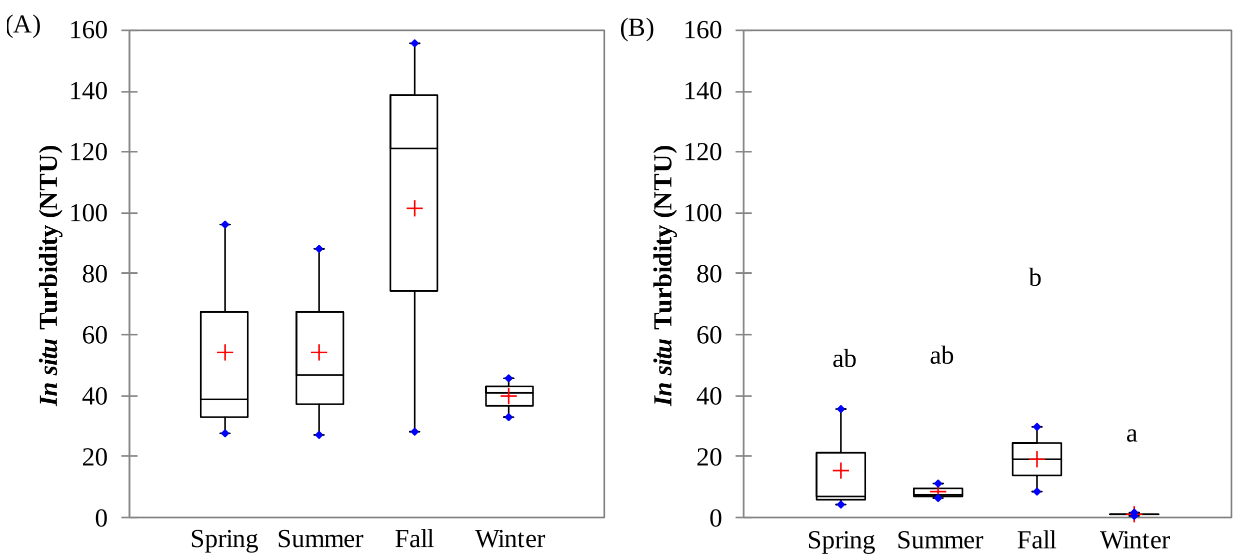


Figure 5.7.4-48 *In situ* turbidity in the Lower Nelson River Region by season: (A) lower Nelson River (sampled in Limestone Forebay during winter); and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

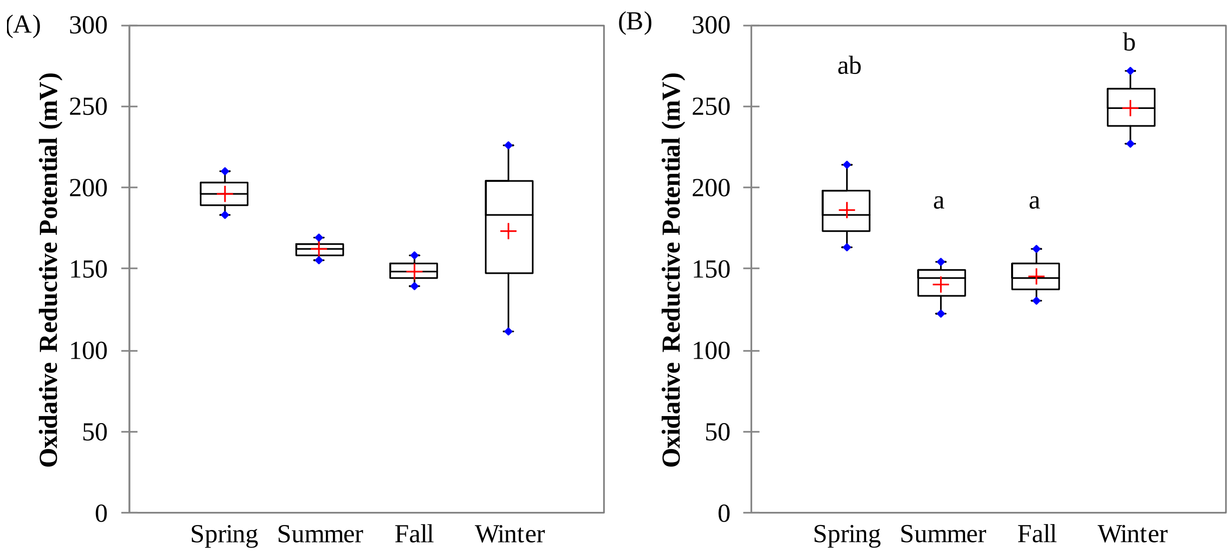


Figure 5.7.4-49. Oxidation-reduction potential in the Lower Nelson River Region by season: (A) lower Nelson River (sampled in Limestone Forebay during winter); and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

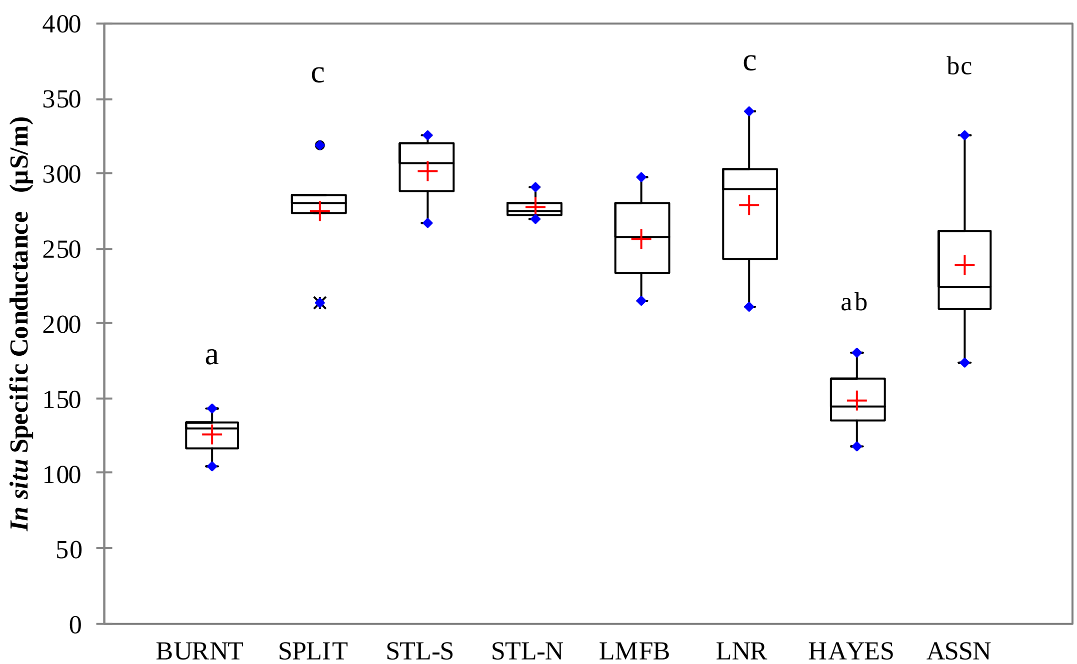


Figure 5.7.4-50. Specific conductance in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

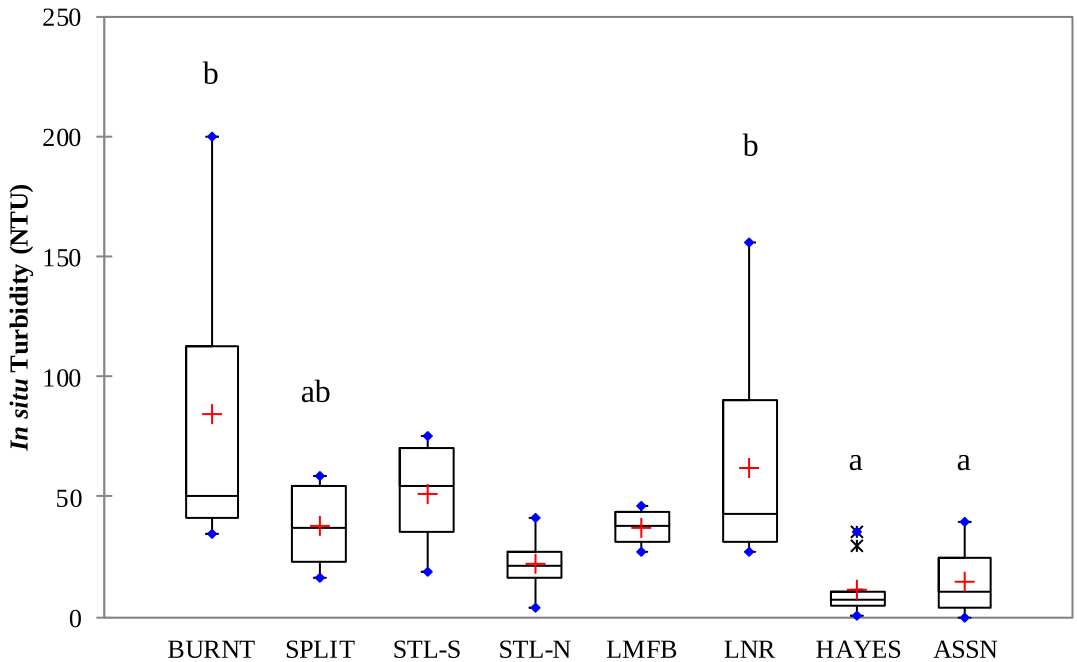


Figure 5.7.4-51. *In situ* turbidity in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

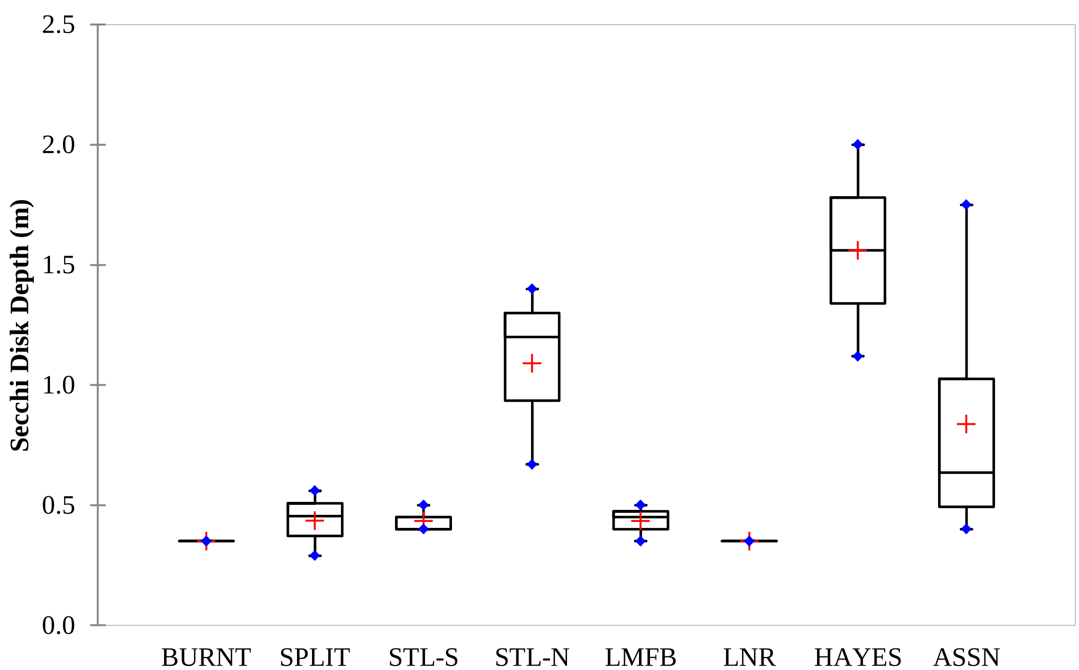


Figure 5.7.4-52. Secchi disk depth in the Lower Nelson River Region: 2008-2010.

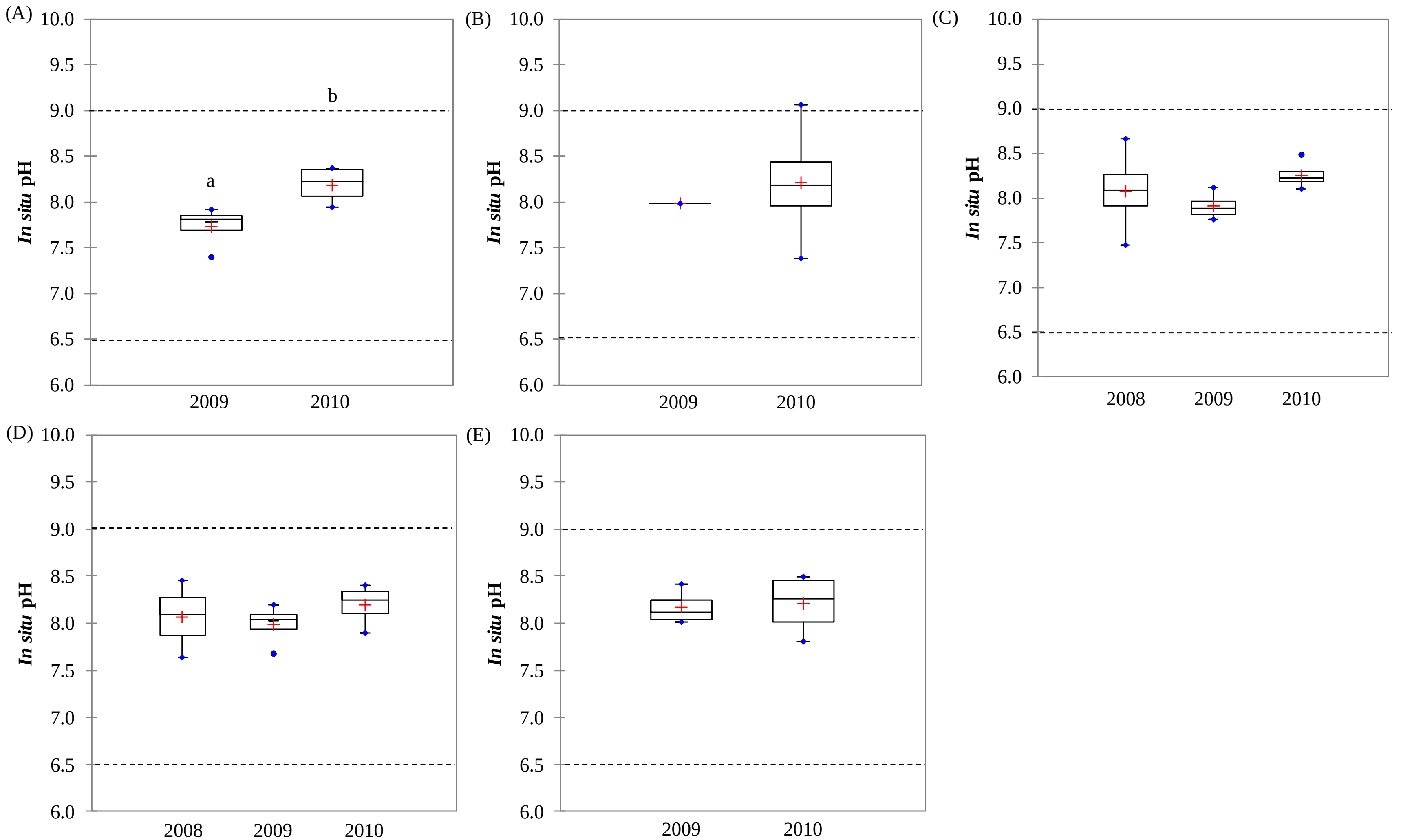


Figure 5.7.4-53. *In situ* pH measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts. Area between the dashed lines indicates the MWQSOG PAL guideline (6.5-9.0).

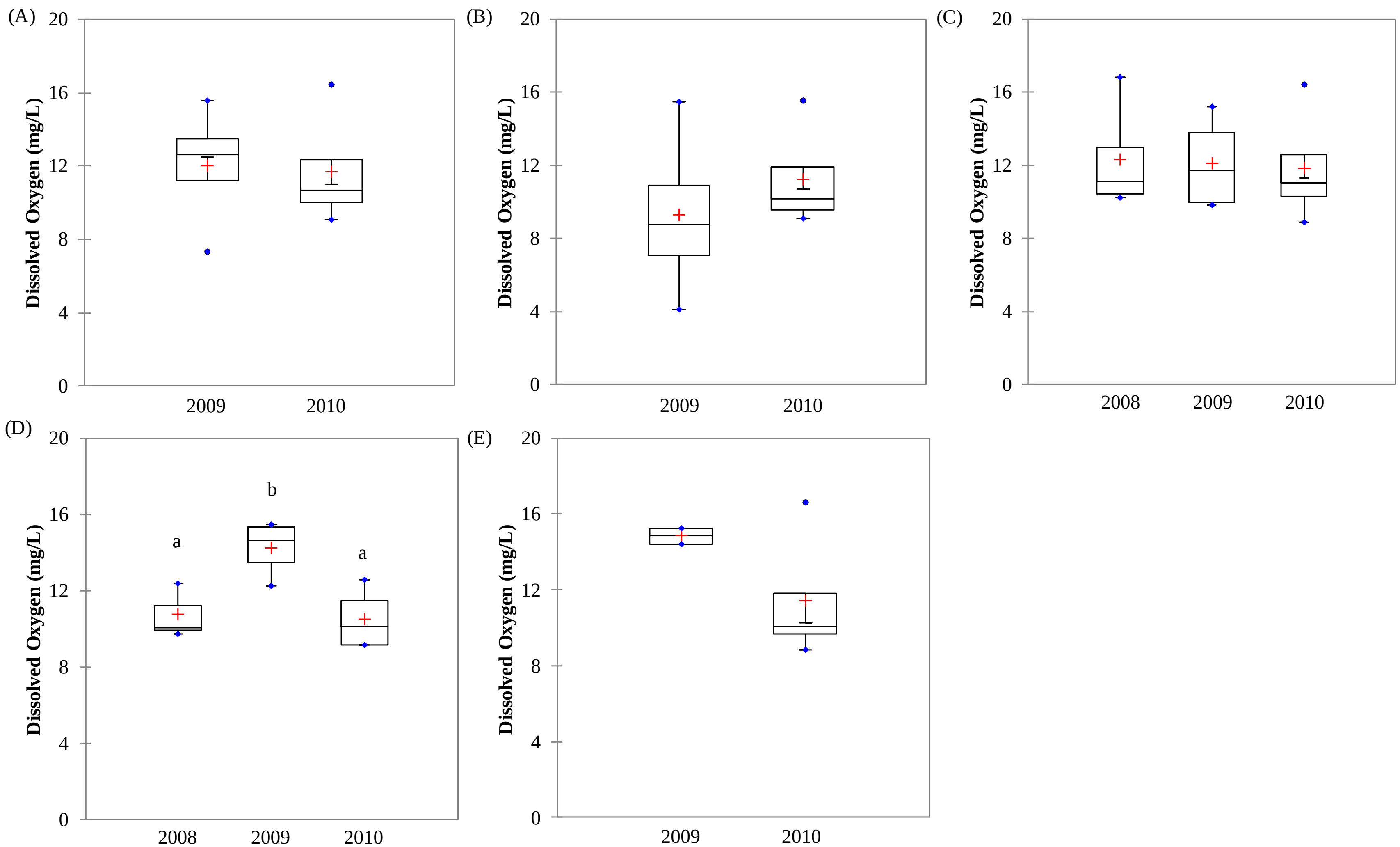


Figure 5.7.4-54. Dissolved oxygen measured in Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

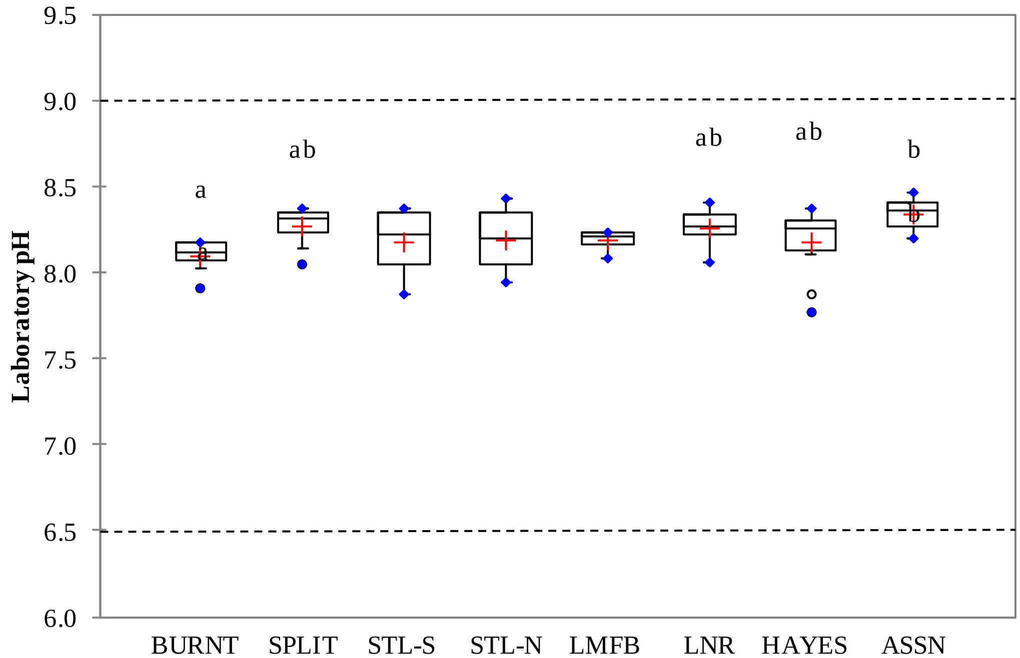


Figure 5.7.4-55. Laboratory pH in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. Area between the dashed lines indicates the MWQSOG PAL guideline (6.5-9).

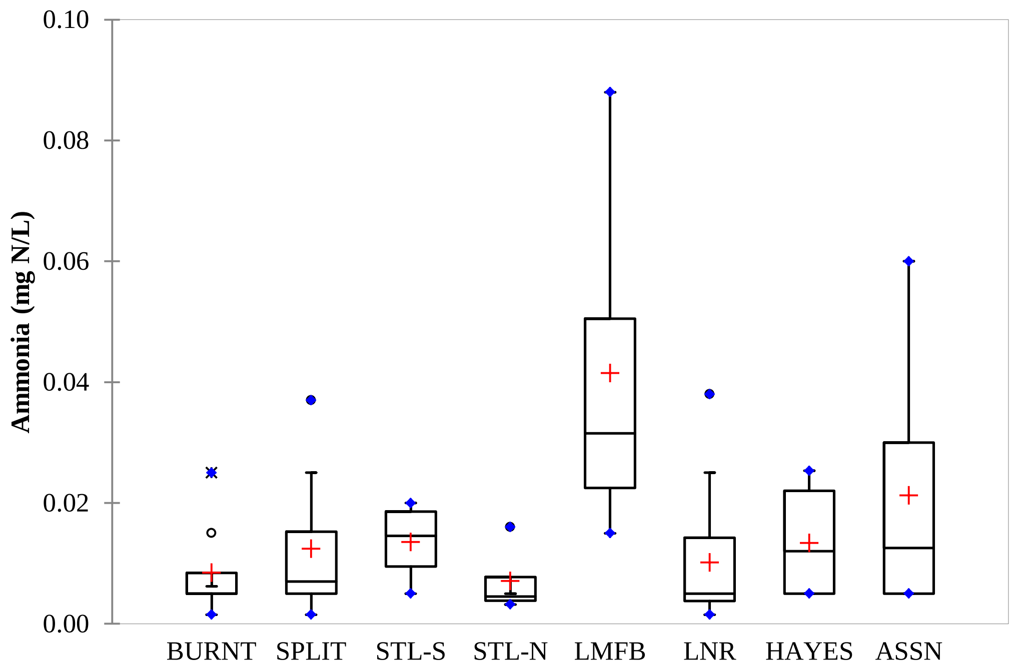


Figure 5.7.4-56. Ammonia in the Lower Nelson River Region: 2008-2010. There were no significant differences between annual waterbodies. The most stringent site-specific PAL objective is 0.76 mg N/L.

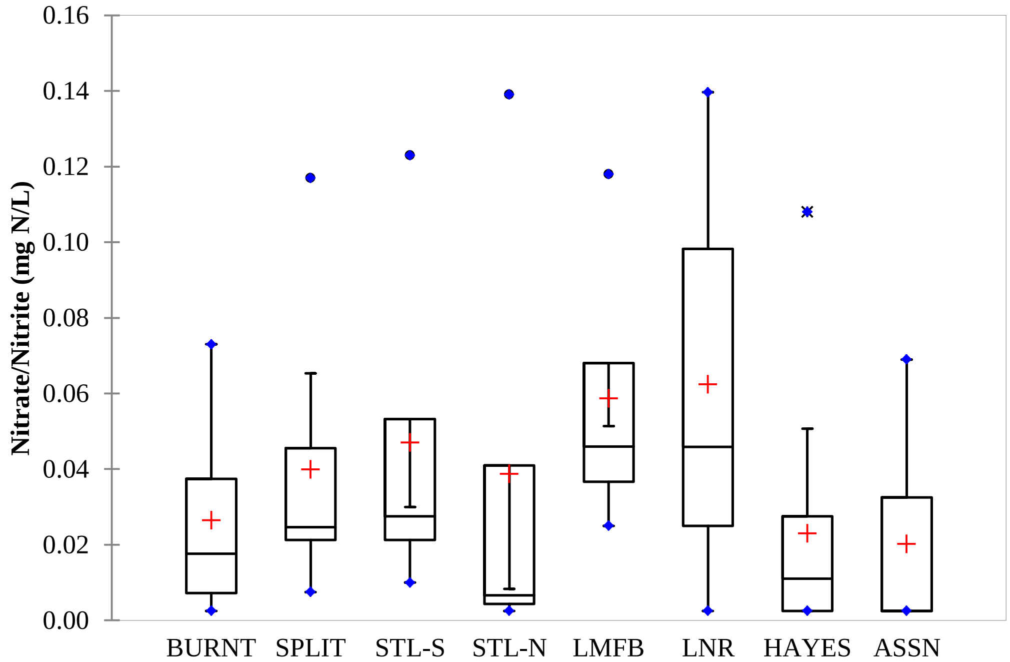


Figure 5.7.4-57. Nitrate/nitrite in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences were noted in ANOVA but not with the Tukey pairwise test. The MWQSOG PAL guideline is 2.93 mg N/L.

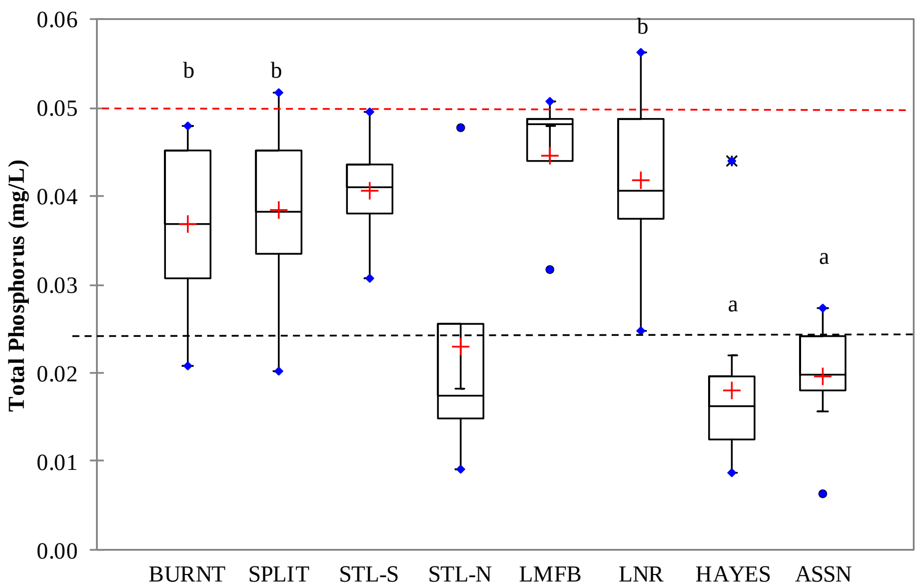


Figure 5.7.4-58. Total phosphorus in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The black dashed line represents the Manitoba narrative guideline for lakes, ponds, reservoirs, and tributaries at the point of entry to a lake; the red dashed line represents the guideline for rivers and streams.

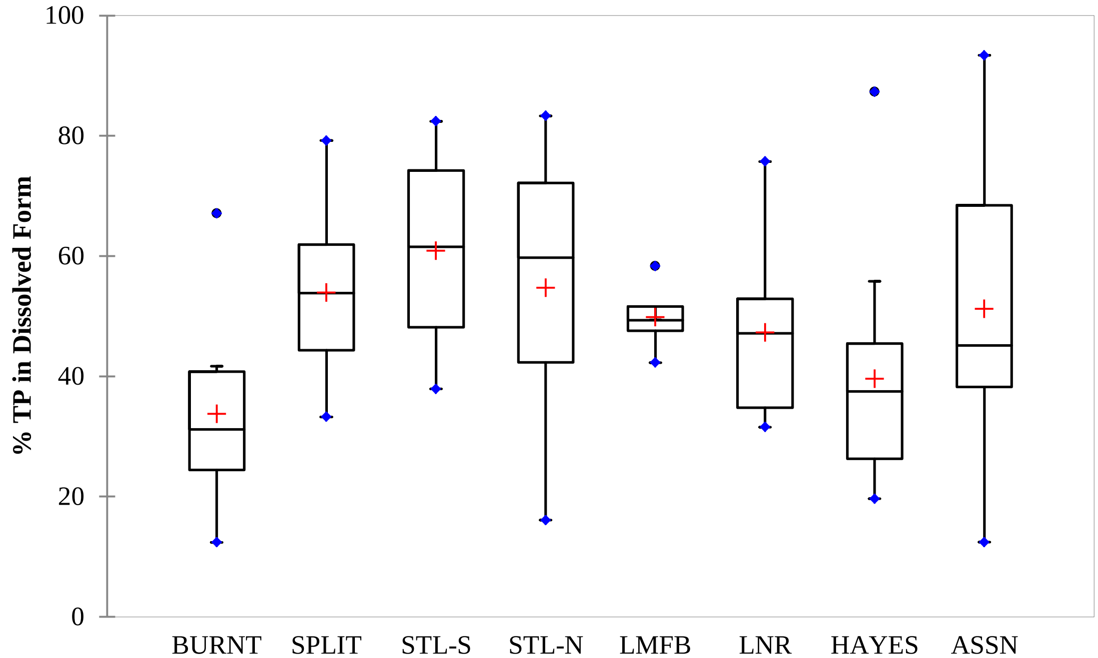


Figure 5.7.4-59. Fraction of total phosphorus in dissolved form in the Lower Nelson River Region.

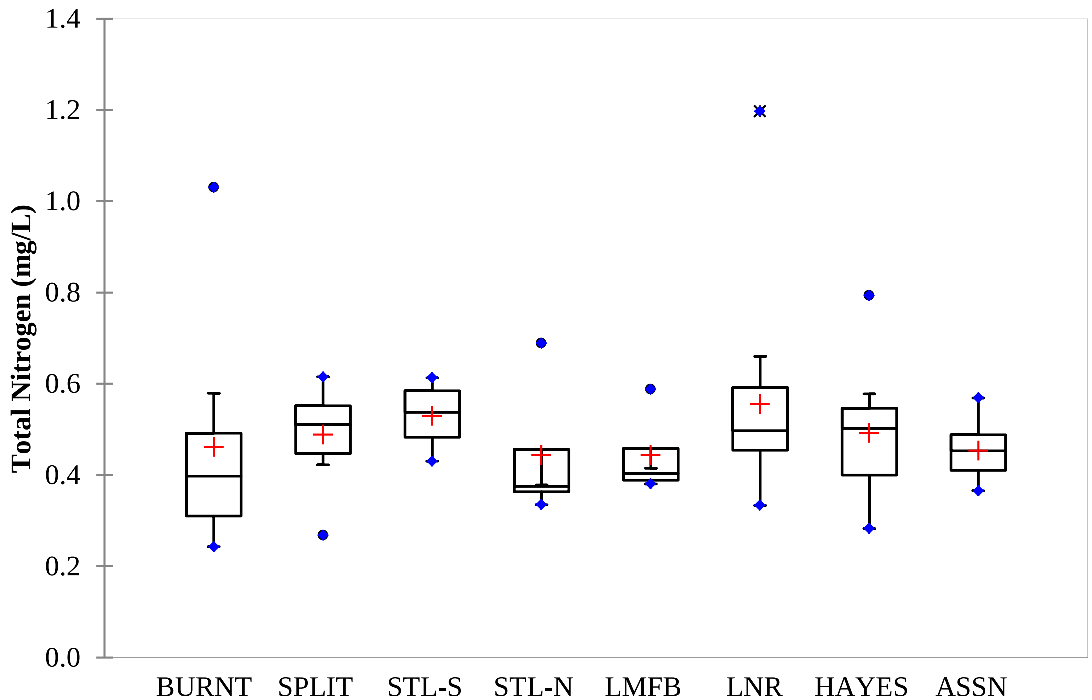


Figure 5.7.4-60. Total nitrogen in the Lower Nelson River Region: 2008-2010. There were no significant differences between annual waterbodies.

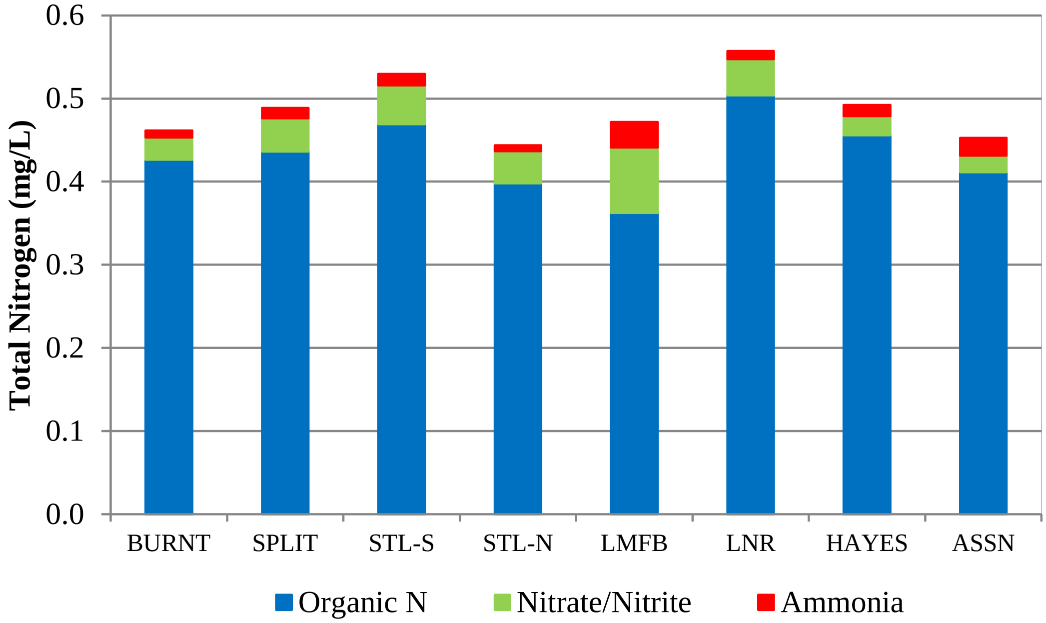


Figure 5.7.4-61. Composition of total nitrogen as organic nitrogen, nitrate/nitrite, and ammonia in the Lower Nelson River Region.

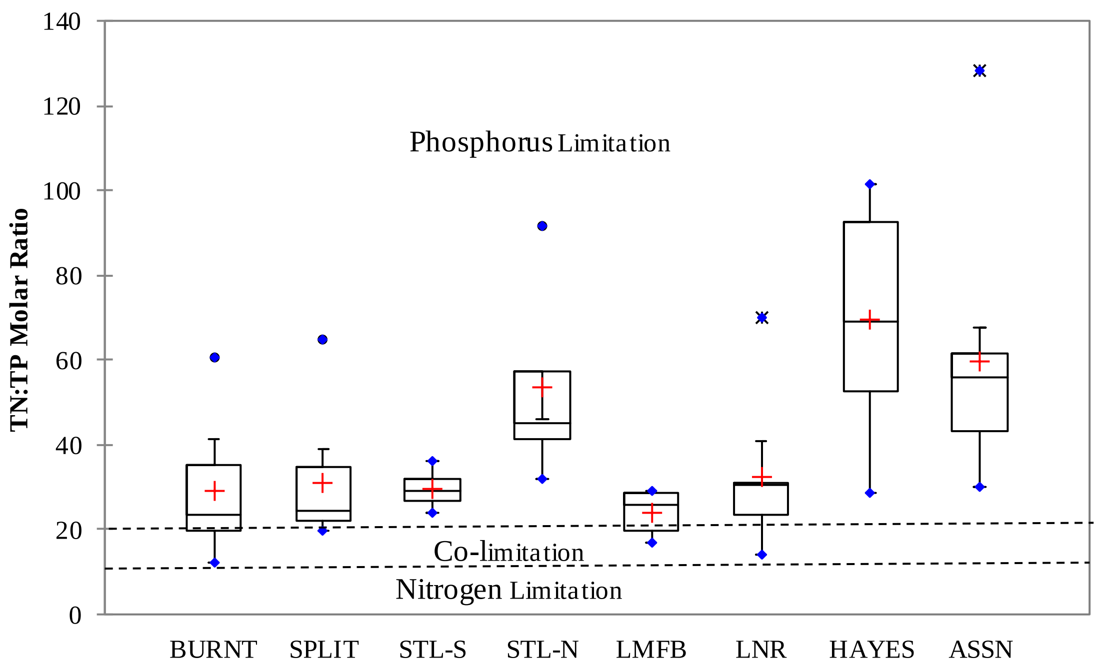


Figure 5.7.4-62. Total nitrogen to total phosphorus molar ratios in the Lower Nelson River Region.

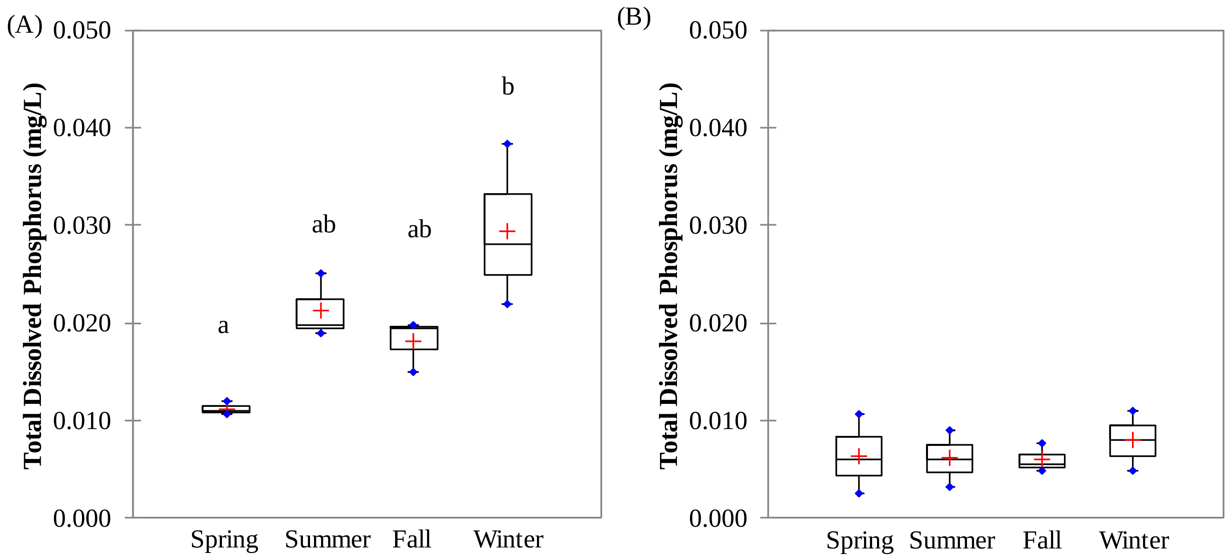


Figure 5.7.4-63. Total dissolved phosphorus measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

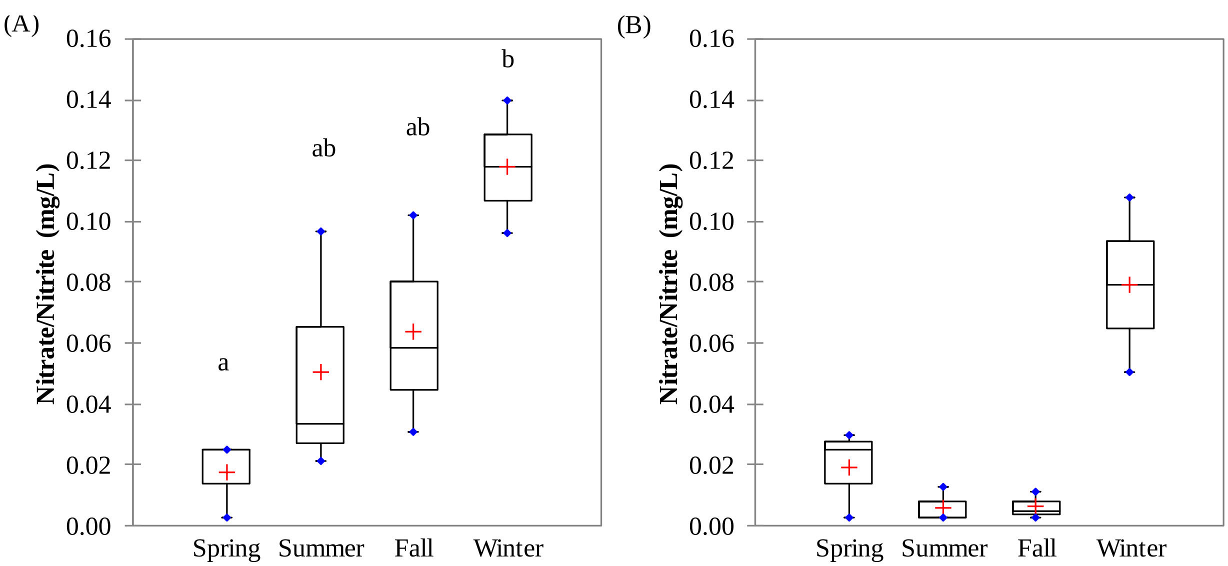


Figure 5.7.4-64. Nitrate/nitrite measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

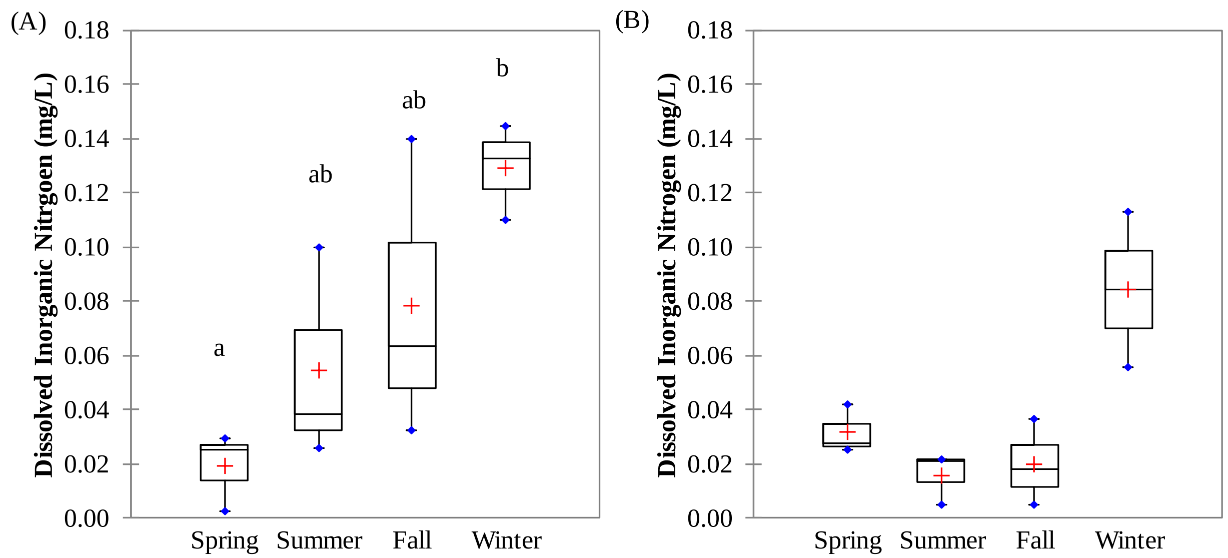


Figure 5.7.4-65. Dissolved inorganic nitrogen measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

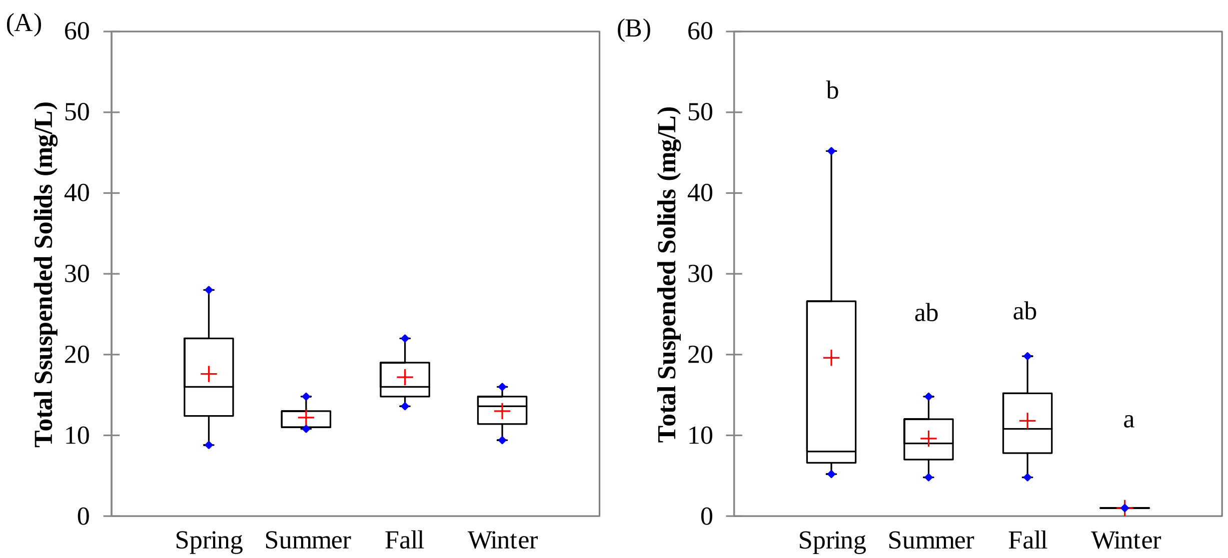


Figure 5.7.4-66. Total suspended solids (TSS) measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

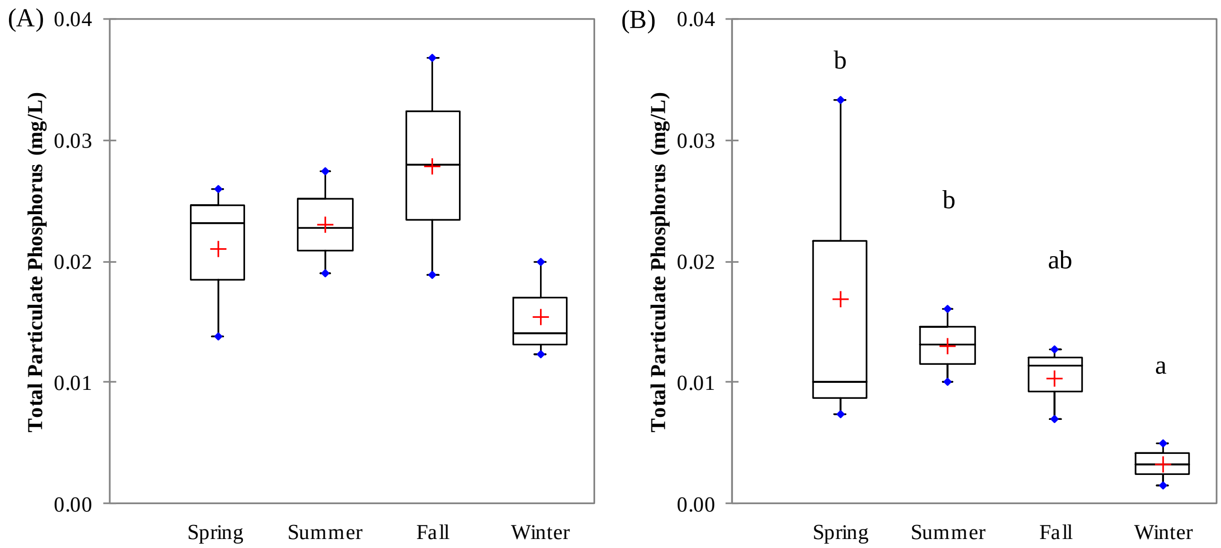


Figure 5.7.4-67. Total particulate phosphorus measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. There were no significant differences between seasons.

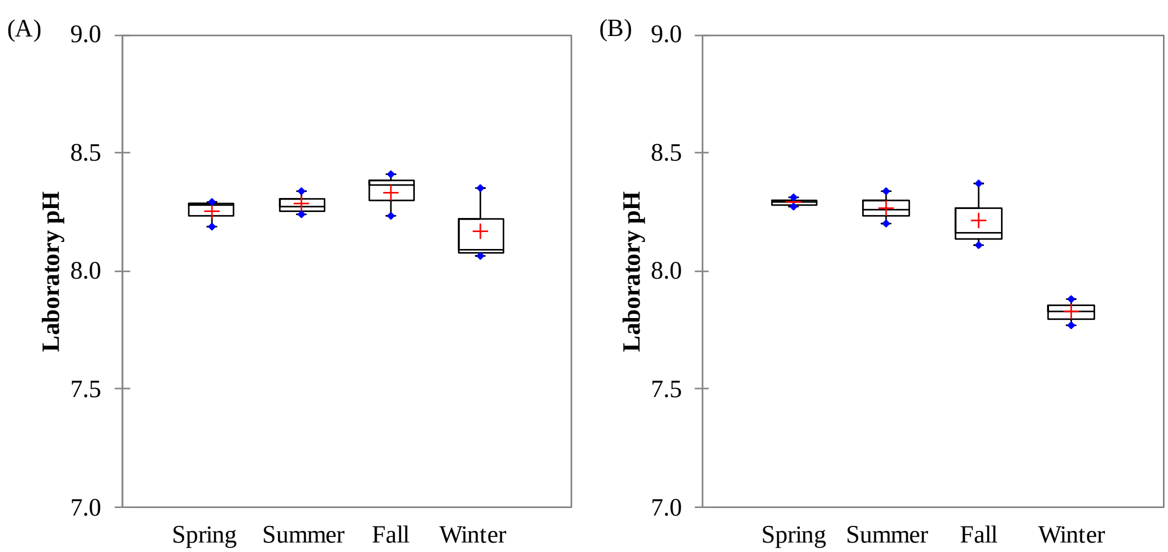


Figure 5.7.4-68. Laboratory pH measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. There were no significant differences between seasons.

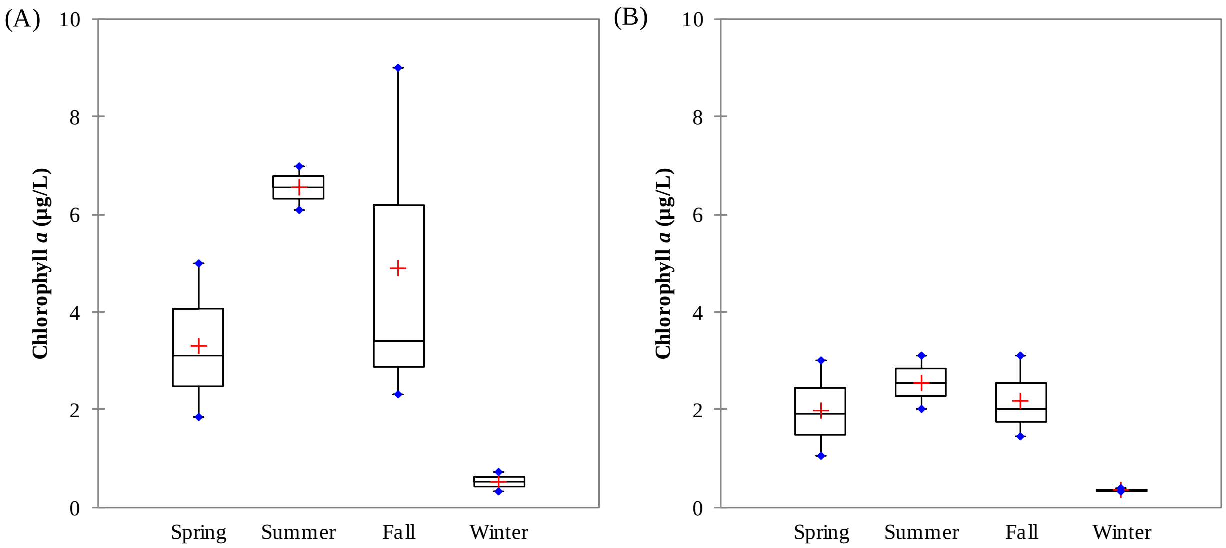


Figure 5.7.4-69. Chlorophyll *a* measured in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

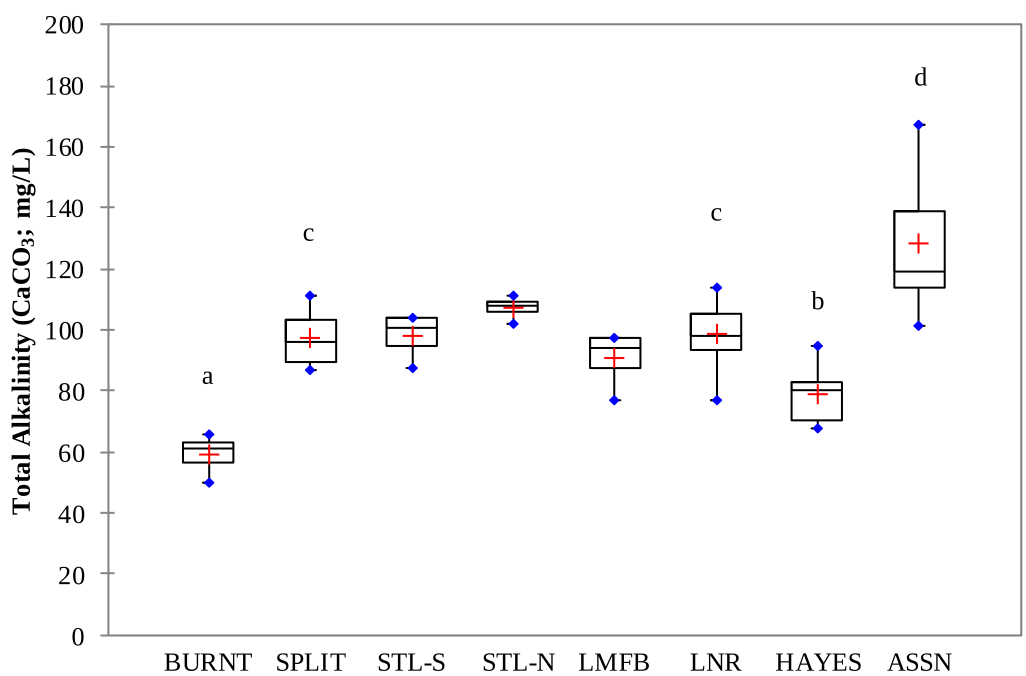


Figure 5.7.4-70. Total alkalinity in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

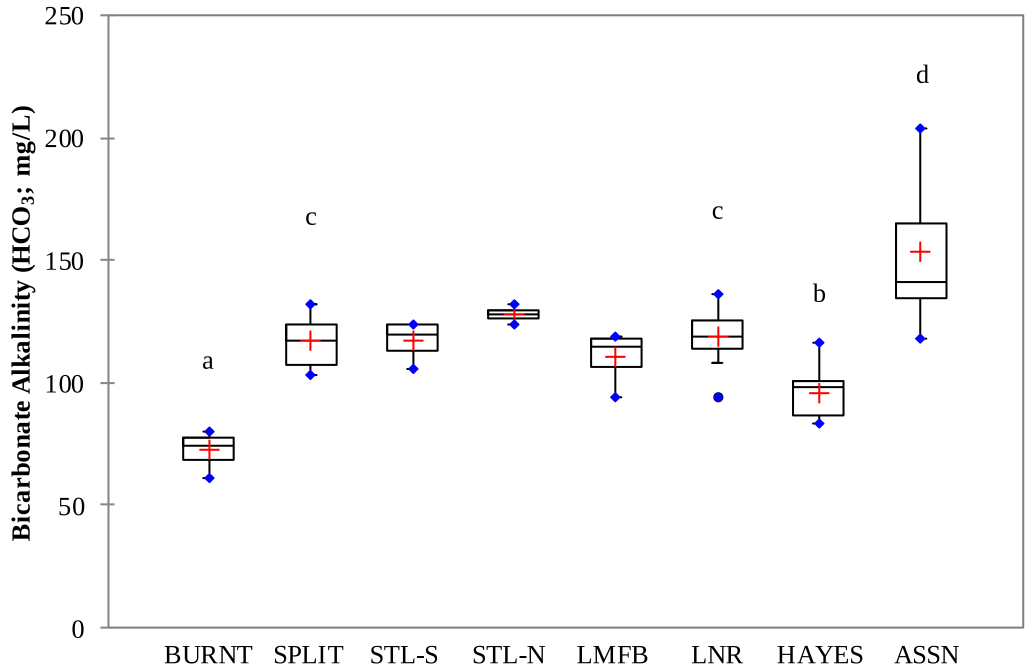


Figure 5.7.4-71. Bicarbonate alkalinity in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

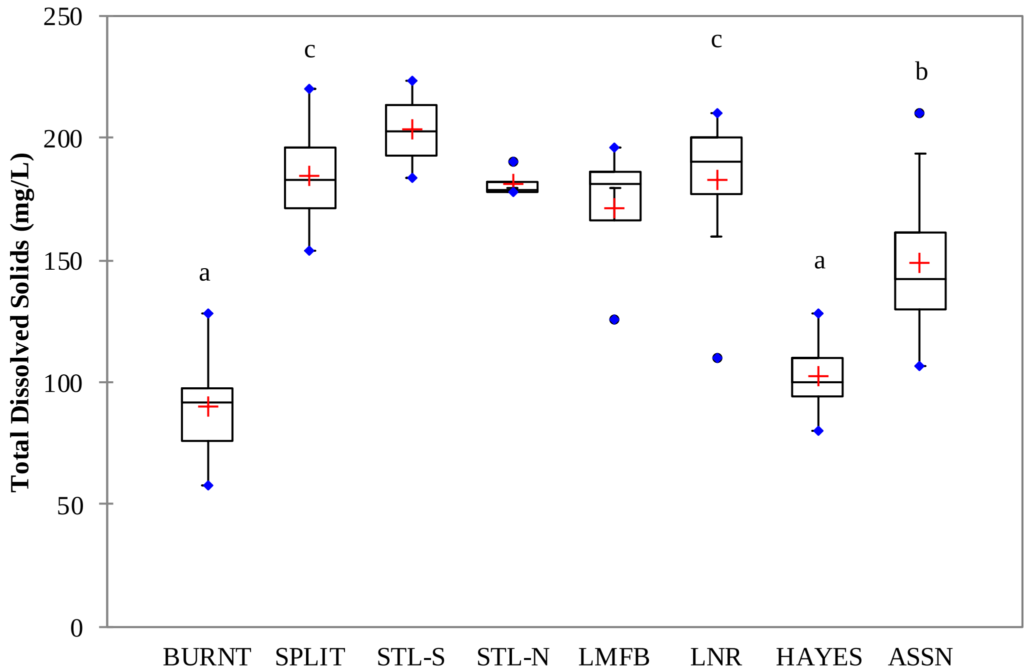


Figure 5.7.4-72. Total dissolved solids in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

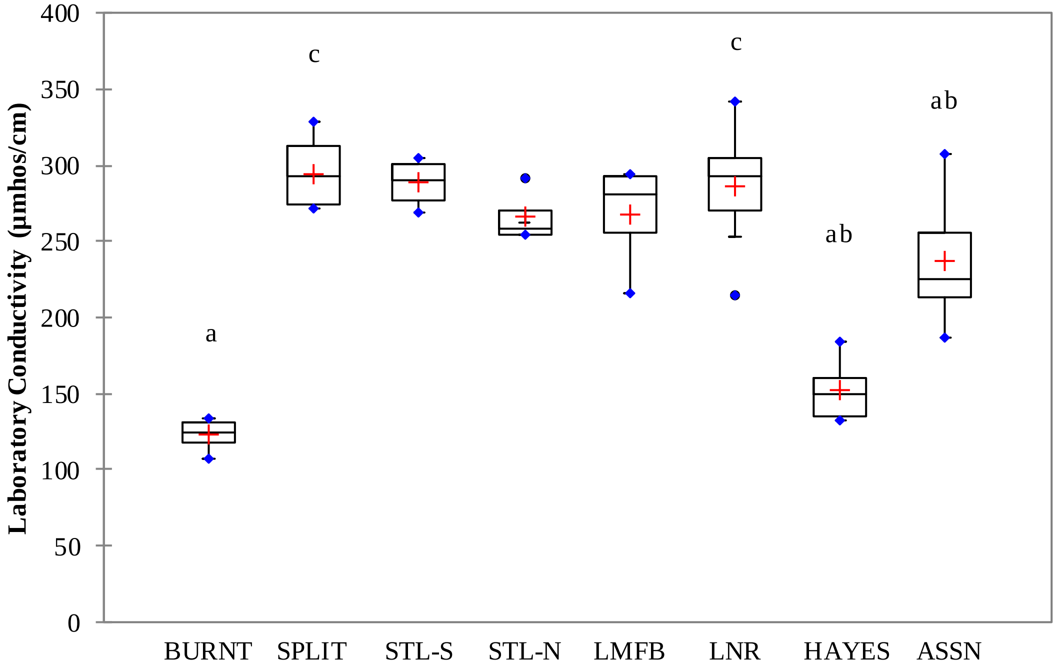


Figure 5.7.4-73. Laboratory conductivity in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

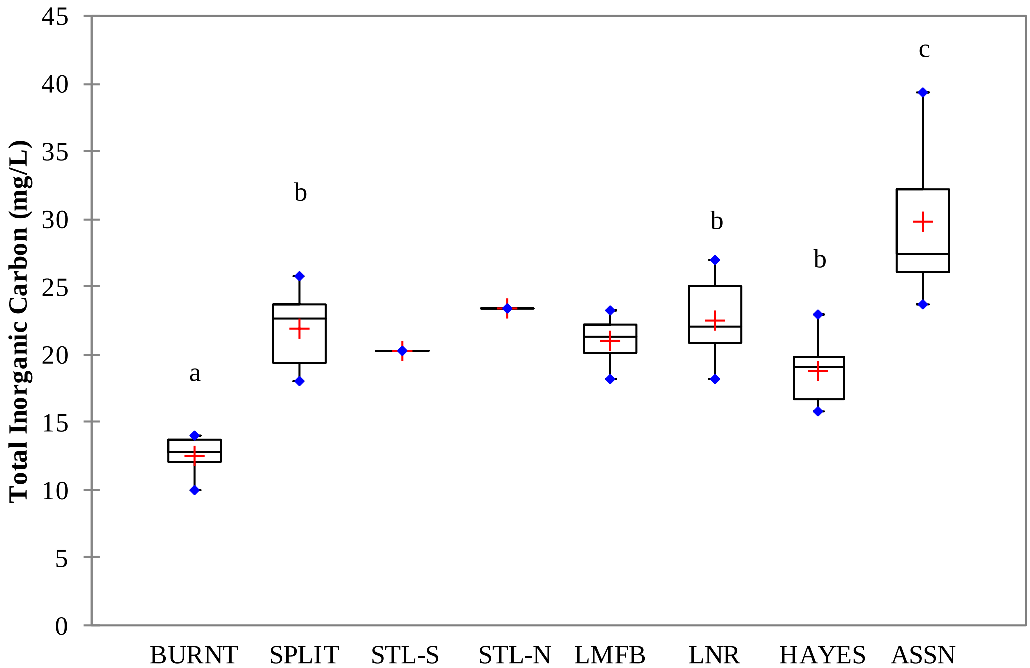


Figure 5.7.4-74. Total inorganic carbon in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

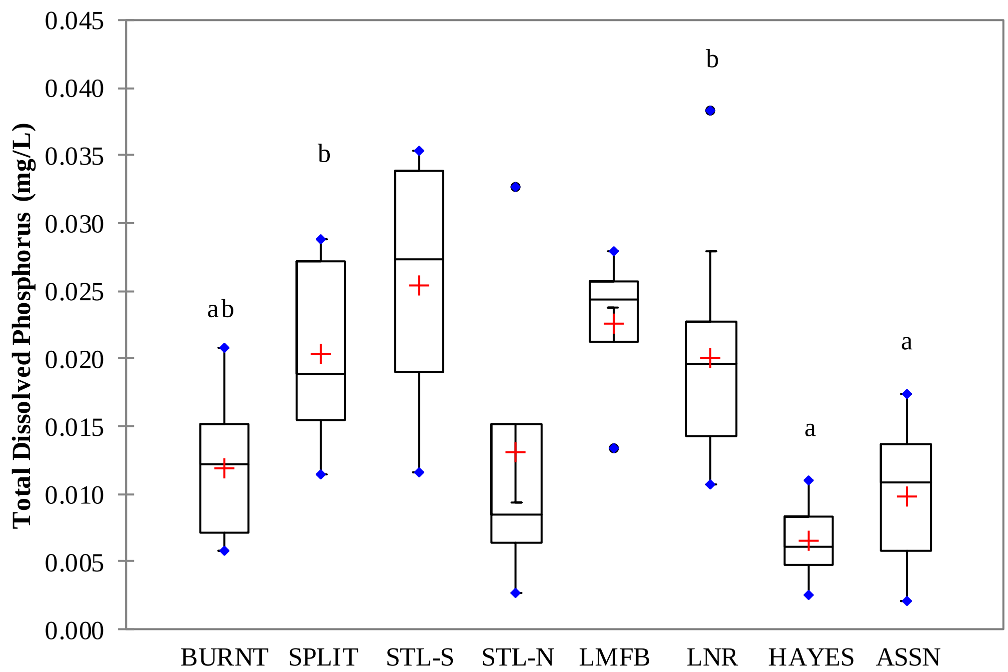


Figure 5.7.4-75. Total dissolved phosphorus in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

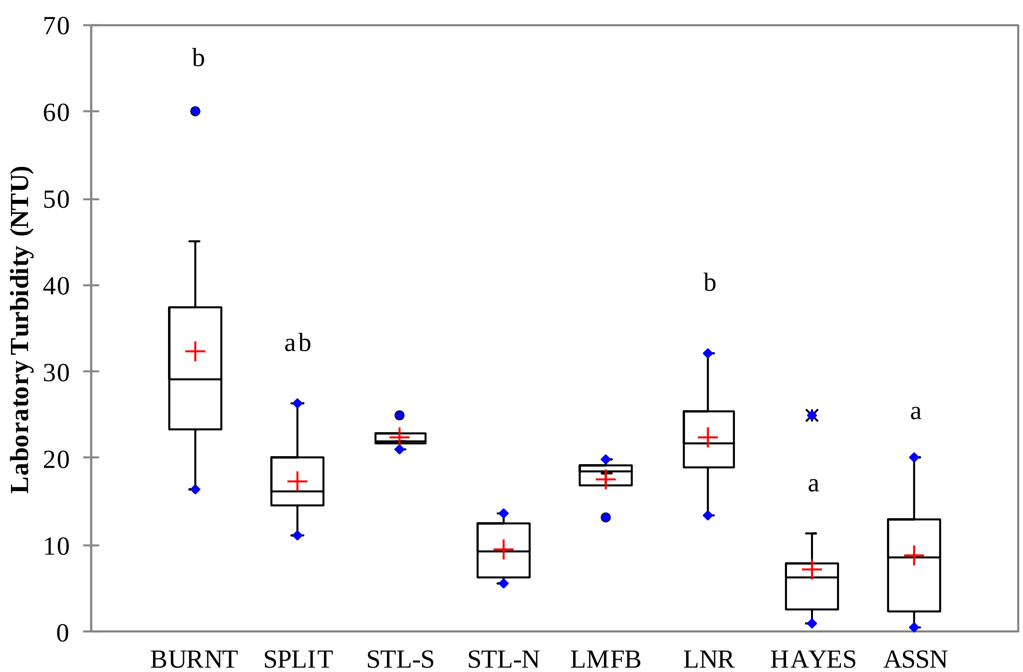


Figure 5.7.4-76. Laboratory turbidity in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

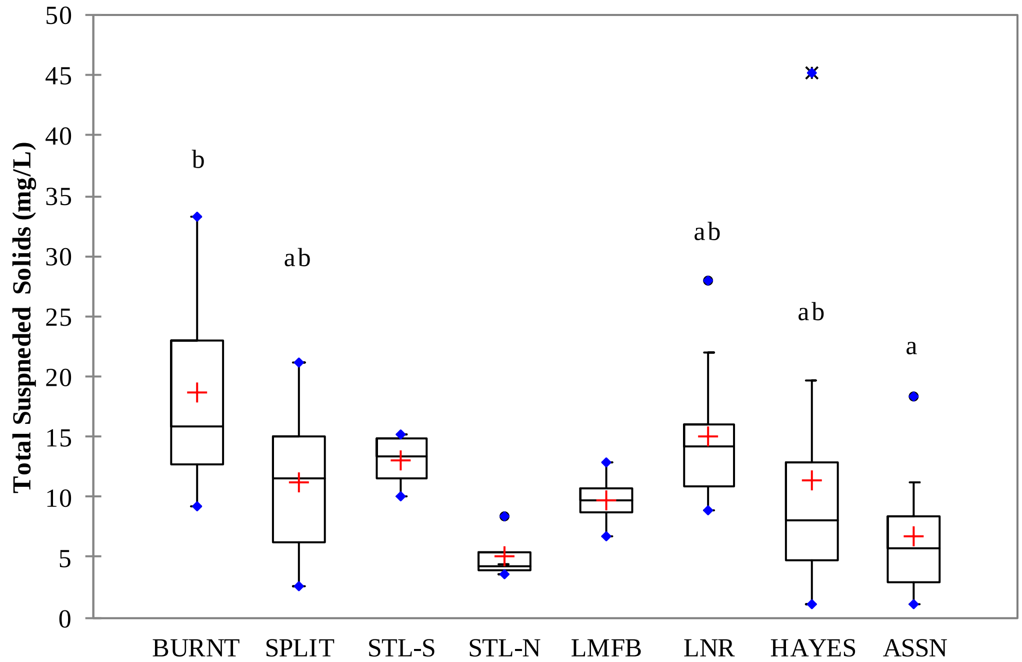


Figure 5.7.4-77. Total suspended solids in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

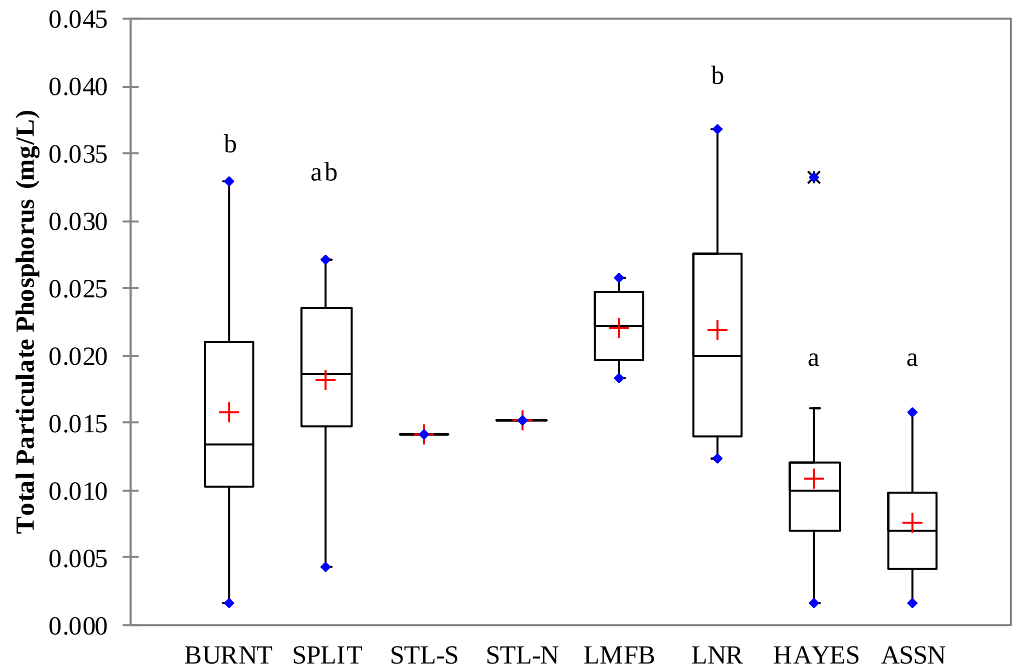


Figure 5.7.4-78. Total particulate phosphorus in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

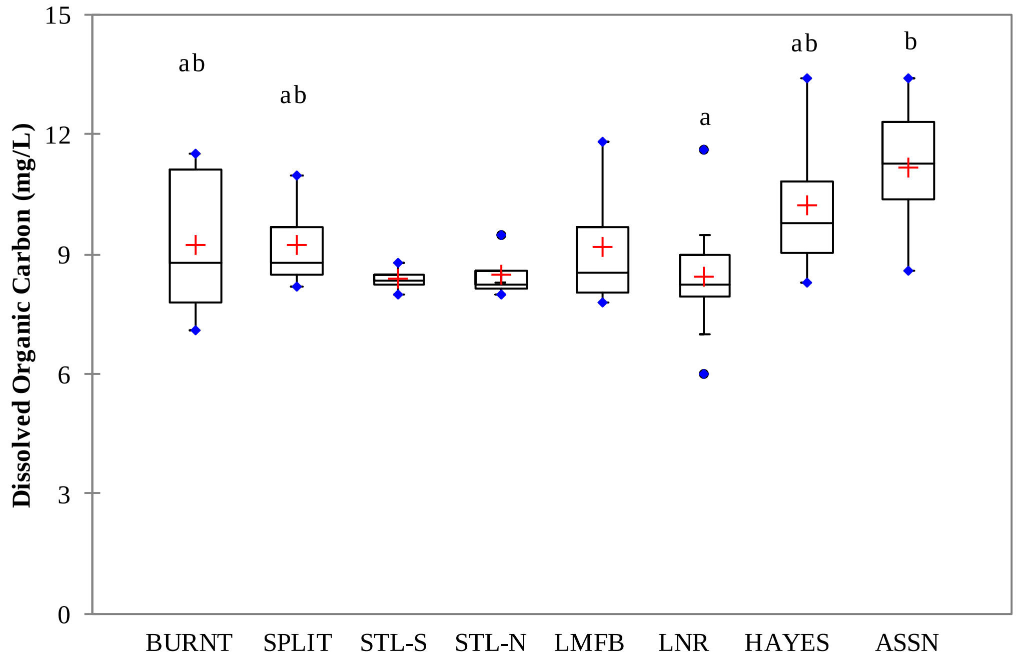


Figure 5.7.4-79. Dissolved organic carbon in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

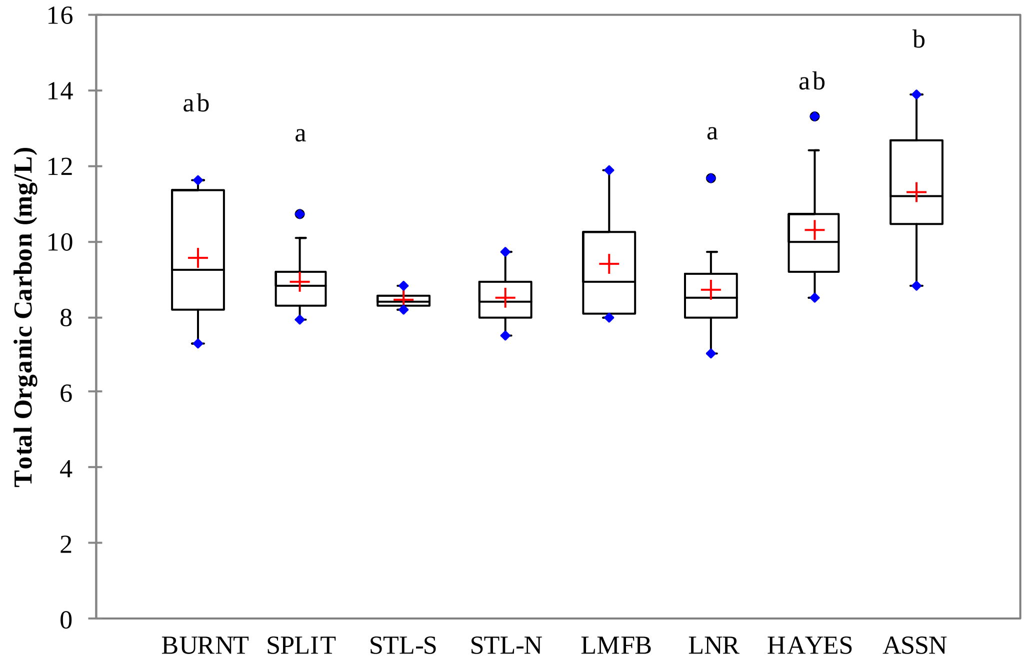


Figure 5.7.4-80. Total organic carbon in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

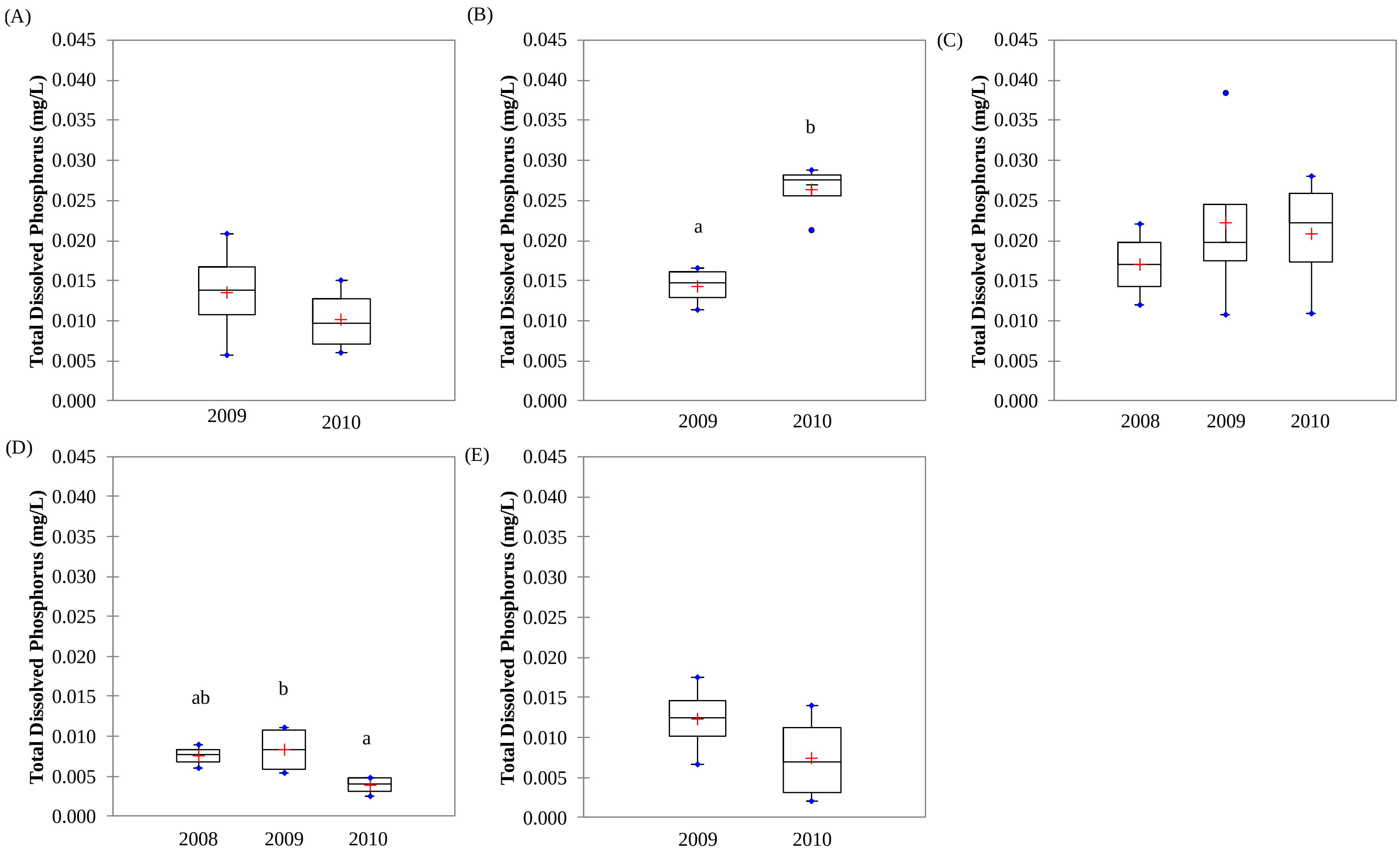


Figure 5.7.4-81. Total dissolved phosphorus measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

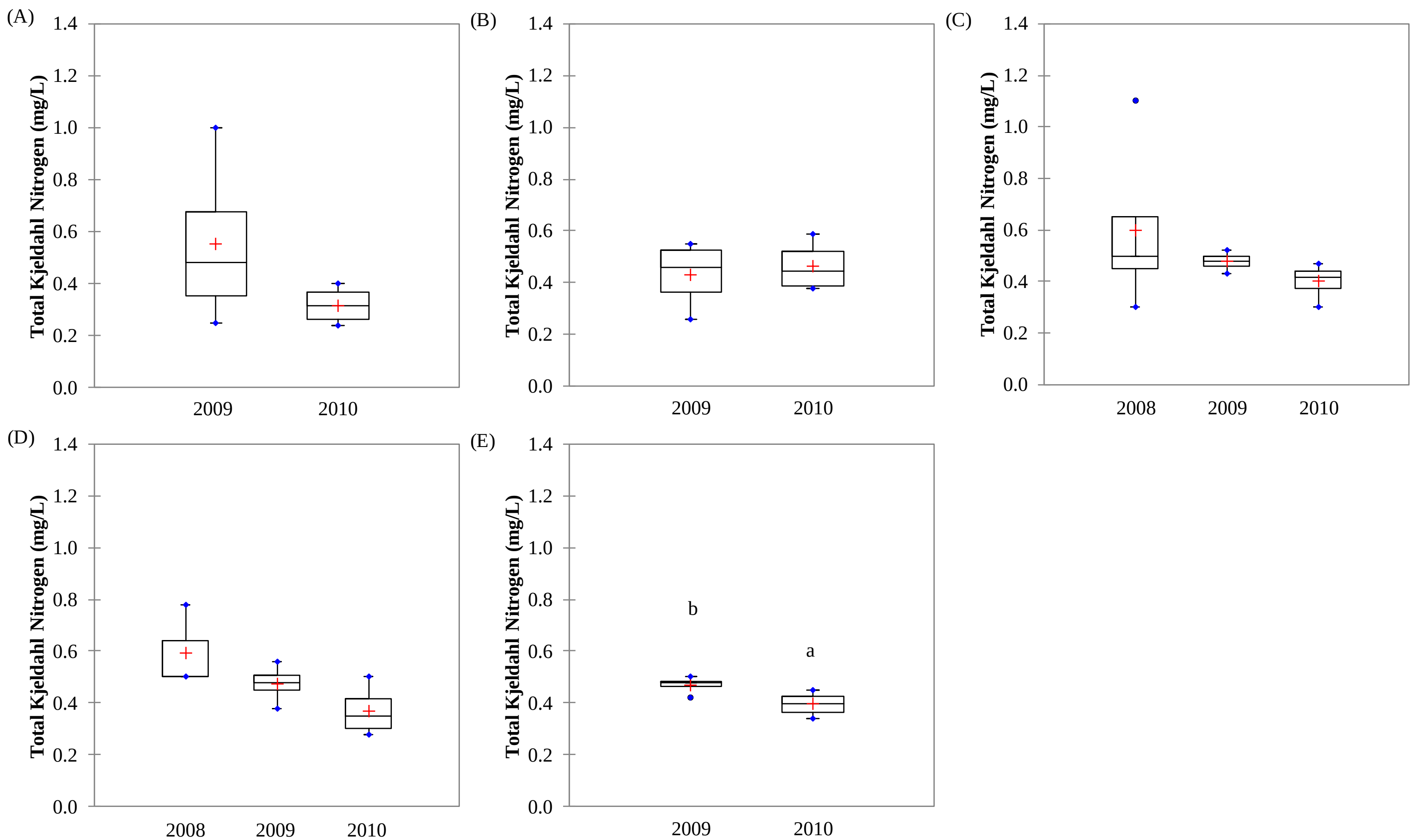
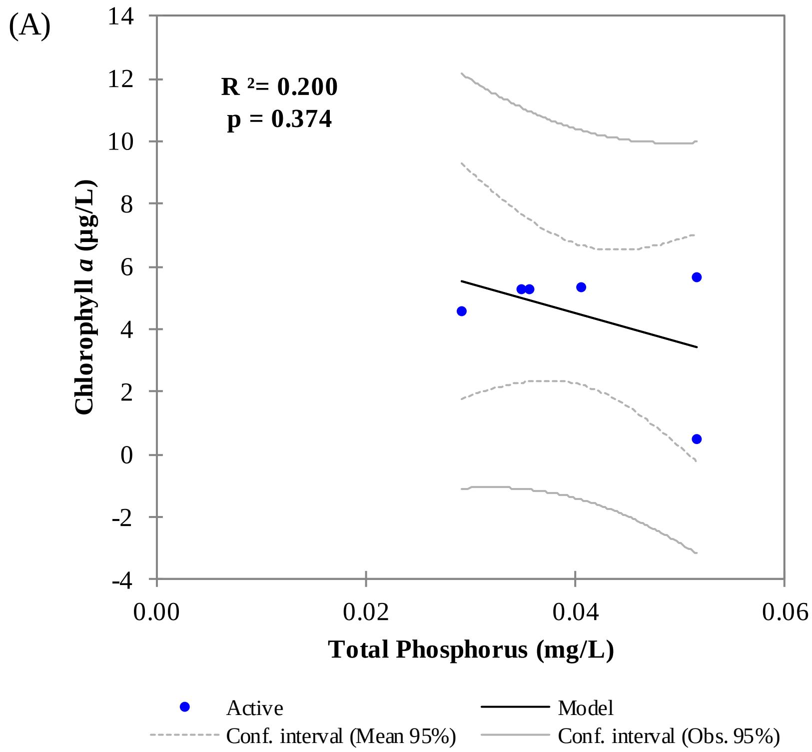


Figure 5.7.4-82. Total Kjeldahl nitrogen measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.



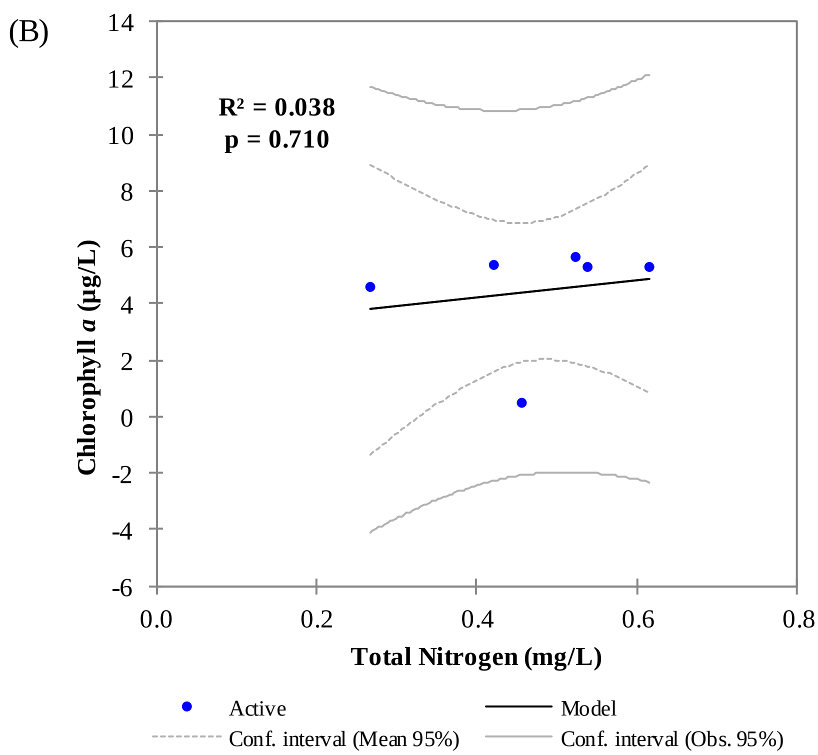


Figure 5.7.4-83. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in Split Lake: open-water seasons 2009-2010.

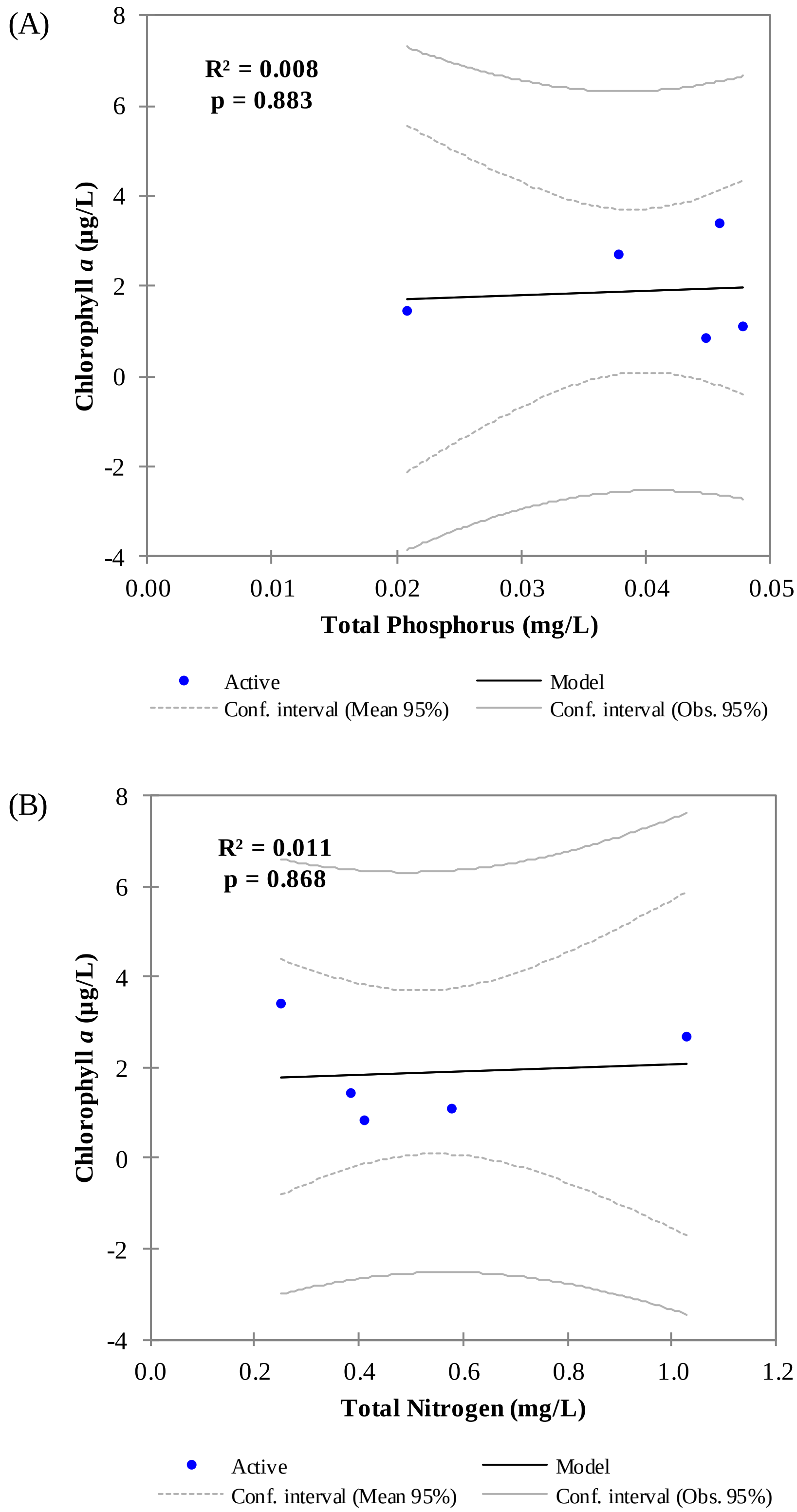
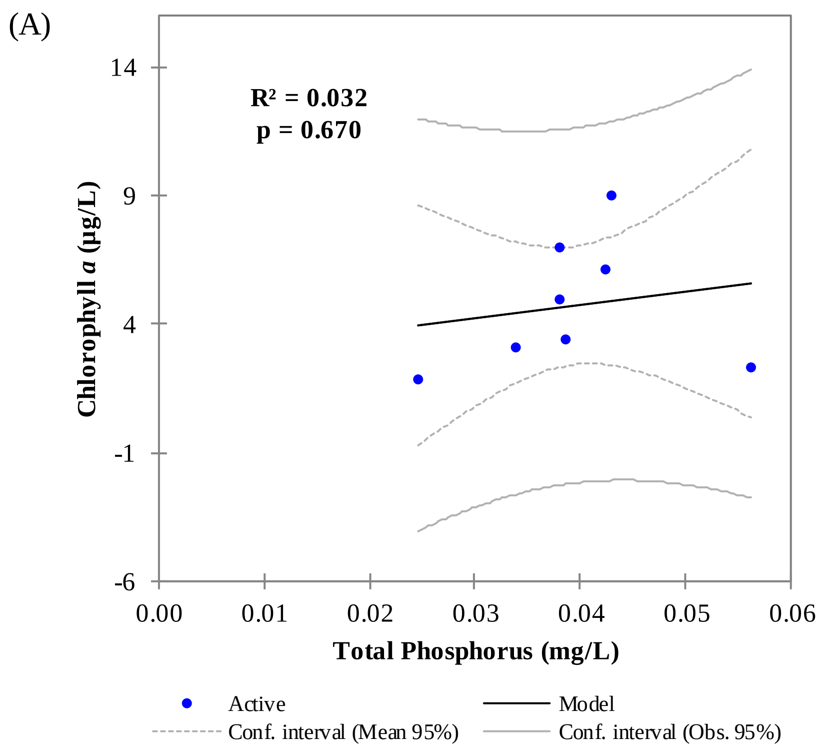


Figure 5.7.4-84. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in the Burntwood River: open-water seasons 2009-2010.



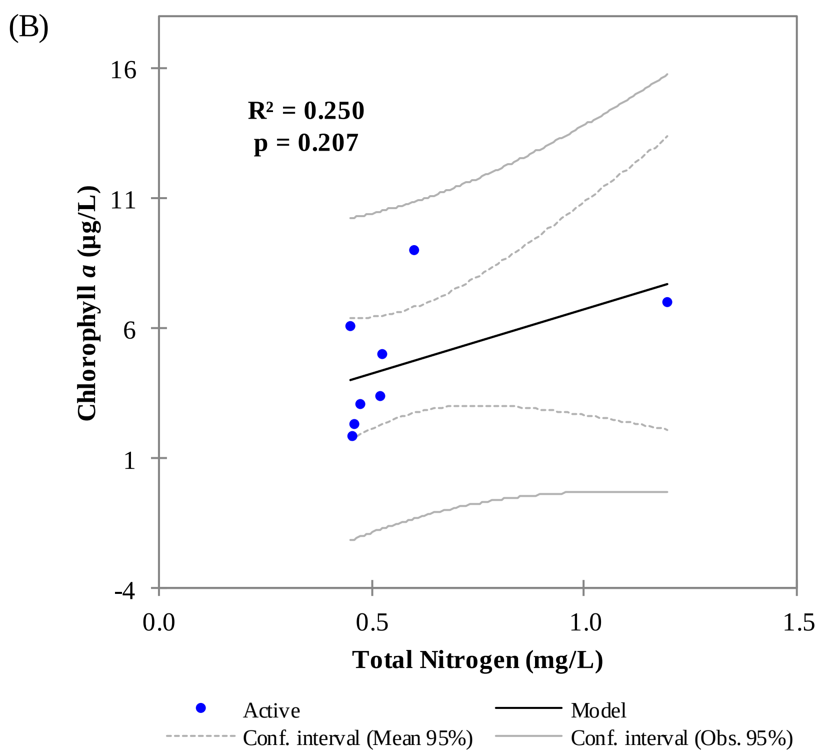


Figure 5.7.4-85. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in the Lower Nelson River: open-water seasons 2008-2010.

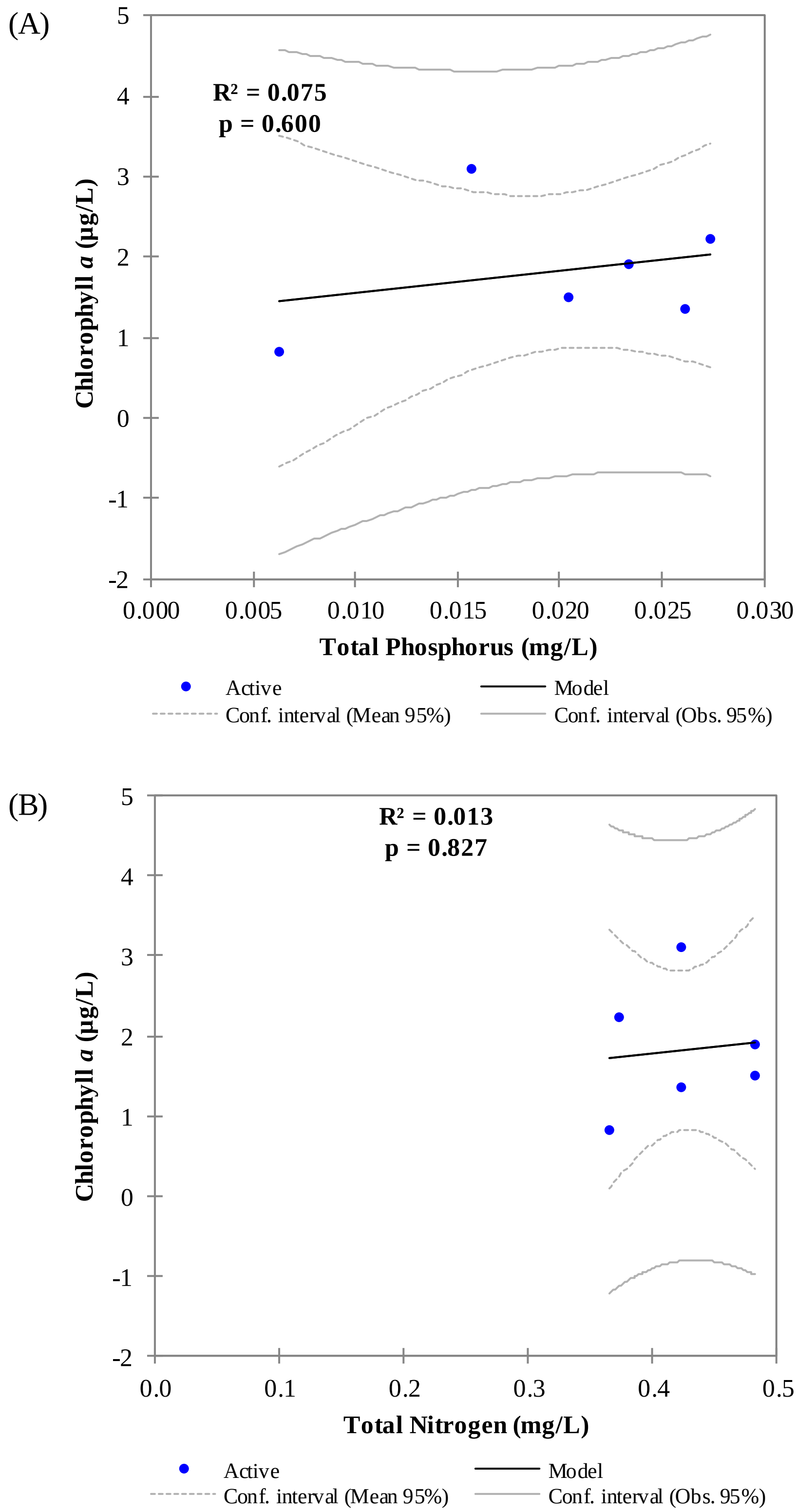


Figure 5.7.4-86. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in Assean Lake: open-water seasons 2009-2010.

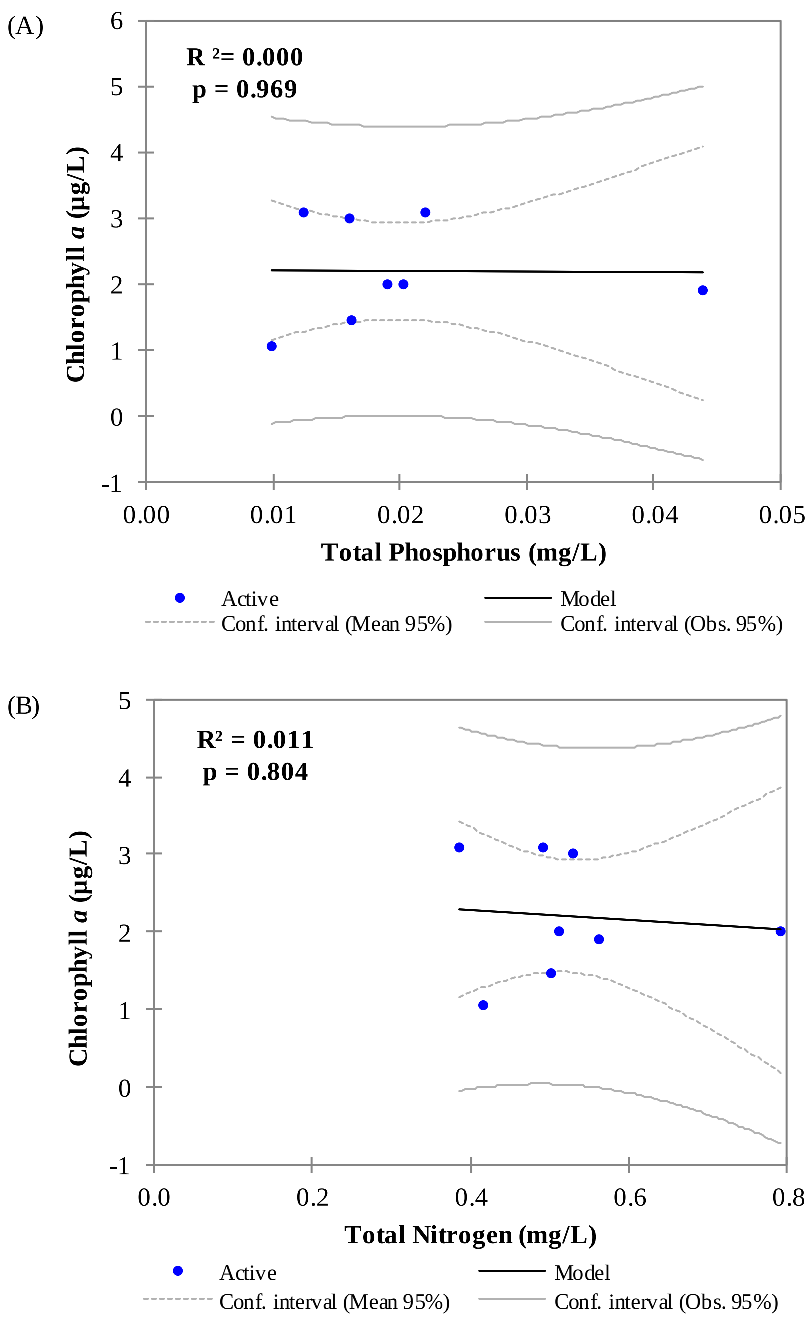


Figure 5.7.4-87. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in the Hayes River: open-water seasons 2008-2010.

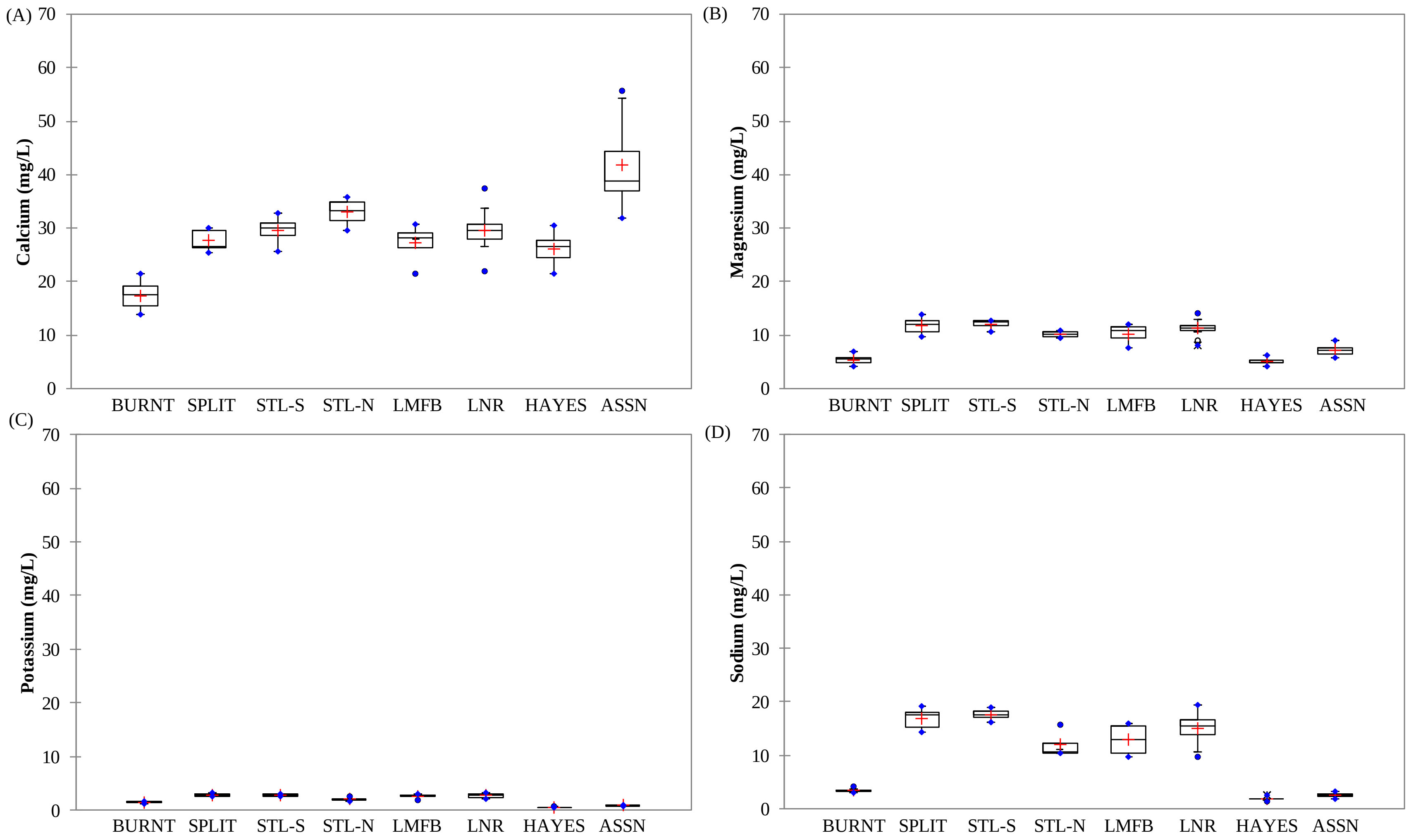


Figure 5.7.4-88. Concentrations of (A) calcium, (B) magnesium, (C) potassium, and (D) sodium measured in the Lower Nelson River Region by waterbody.

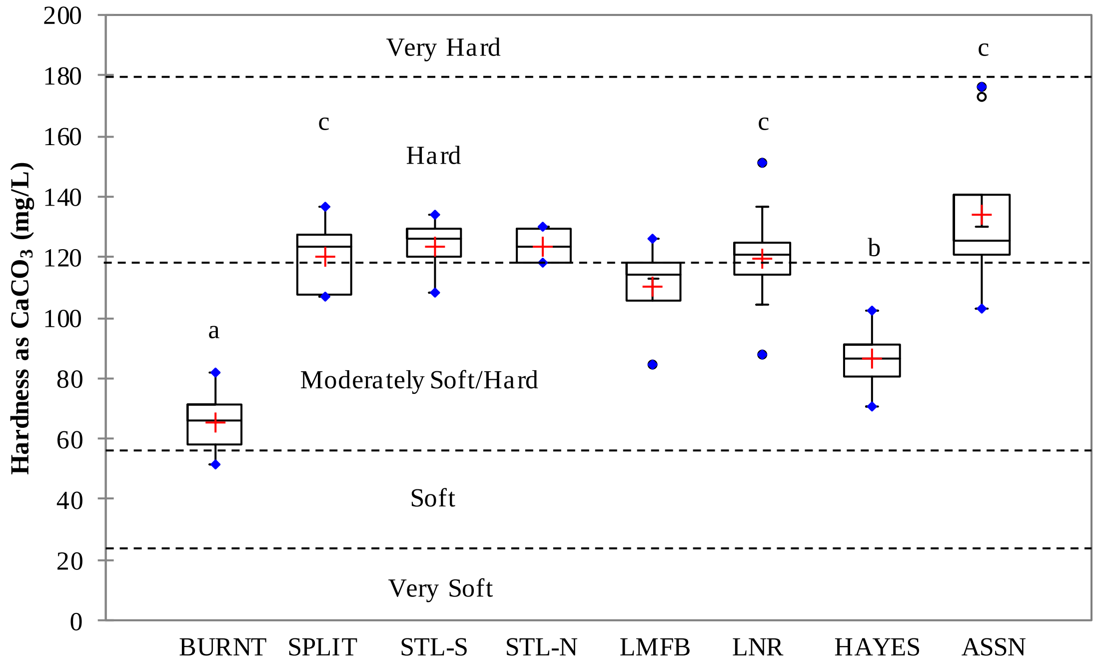


Figure 5.7.4-89. Water hardness measured in the Lower Nelson River Region by waterbody. Statistically significant spatial differences are denoted with different superscripts.

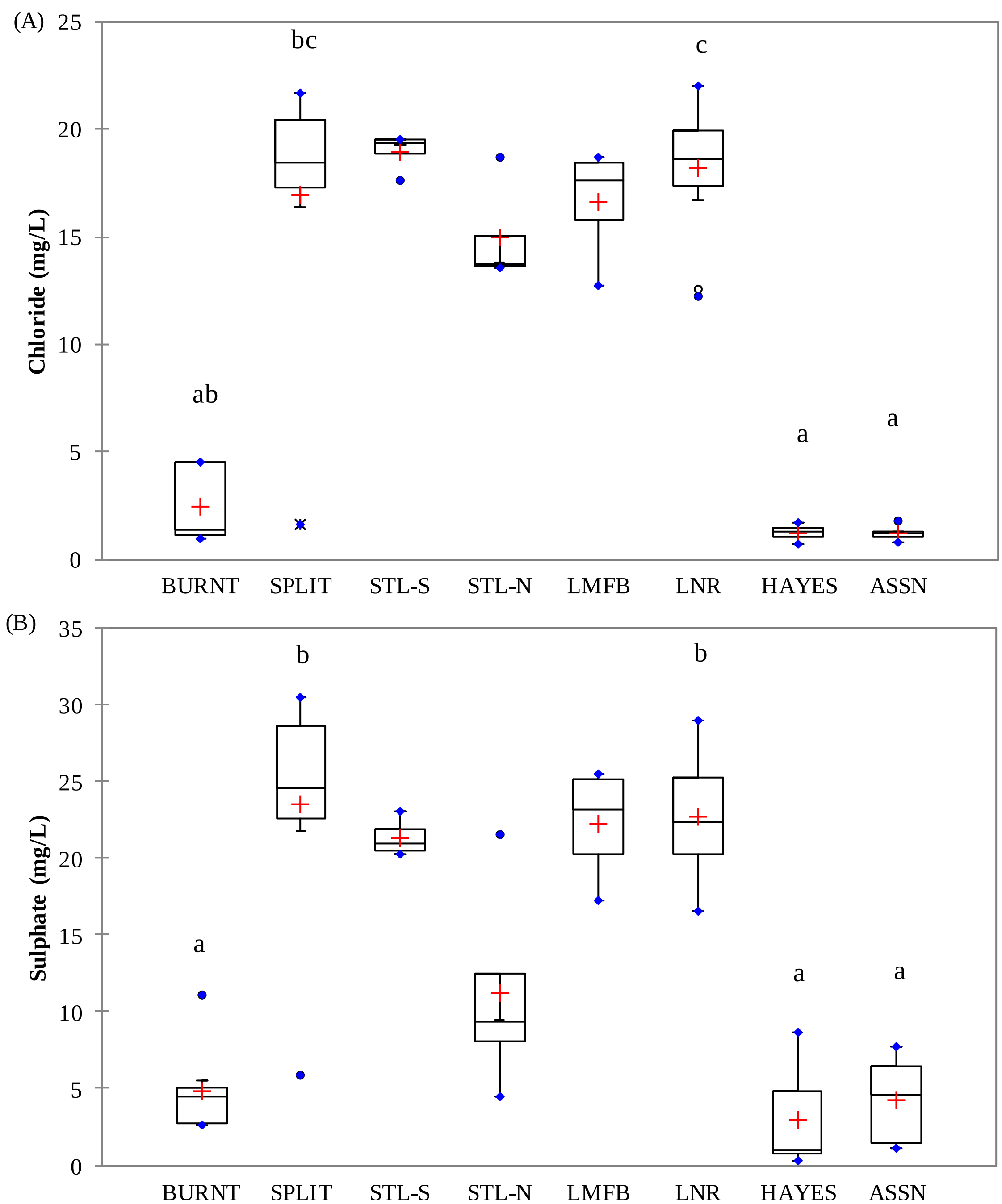


Figure 5.7.4-90. Concentrations of (A) chloride and (B) sulphate measured in the Lower Nelson River Region by waterbody. Statistically significant spatial differences are denoted with different superscripts.

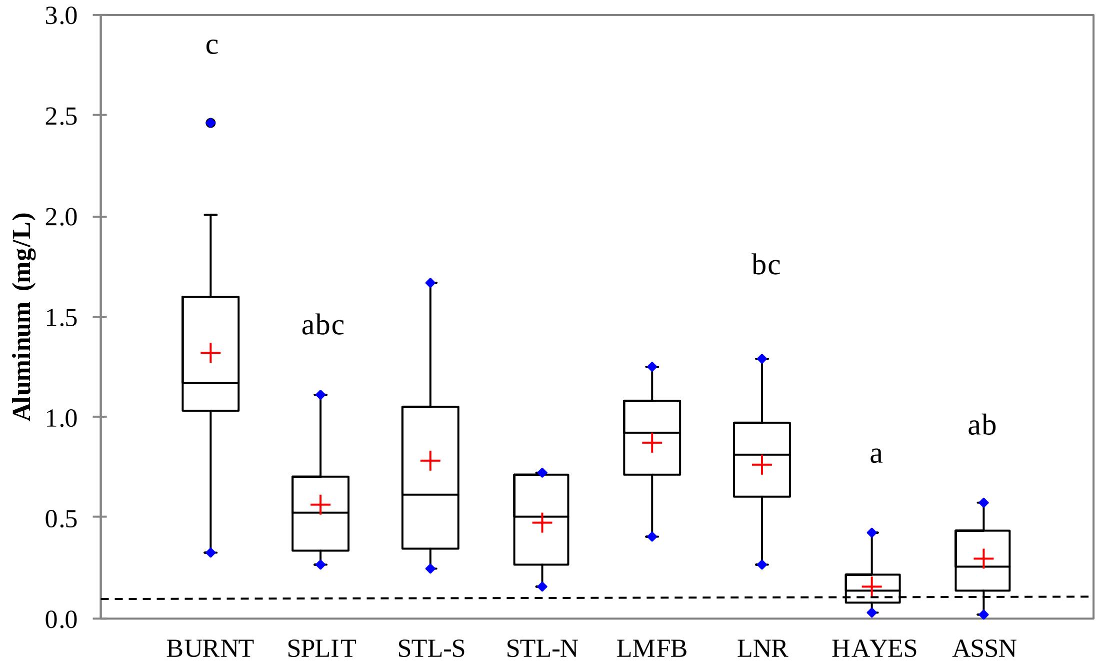


Figure 5.7.4-91. Aluminum in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The dashed line represents the Manitoba PAL guideline.

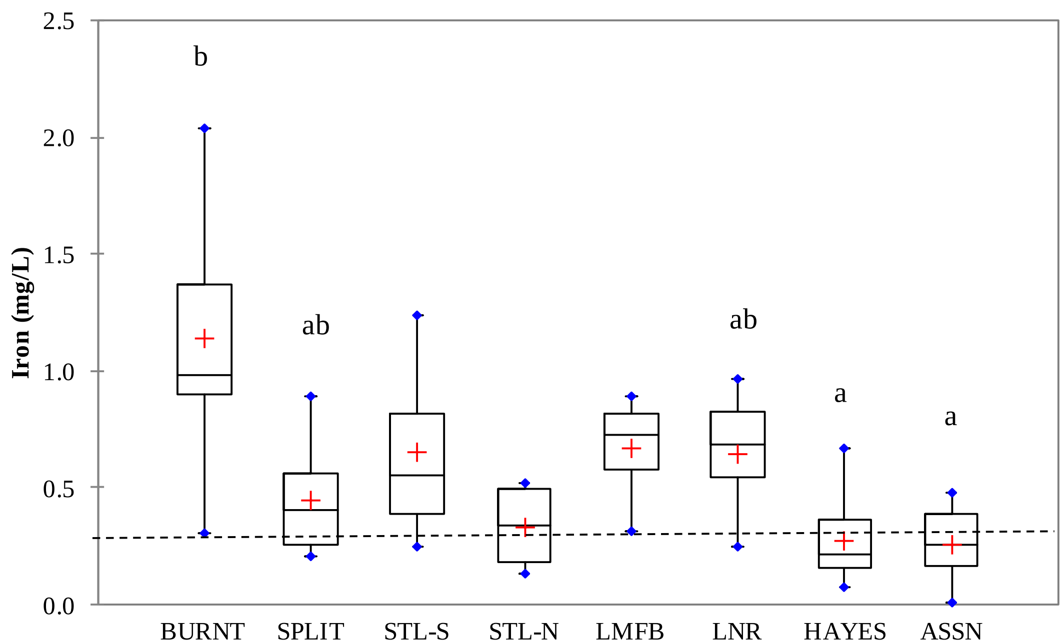


Figure 5.7.4-92. Iron in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The dashed line represents the Manitoba PAL guideline.

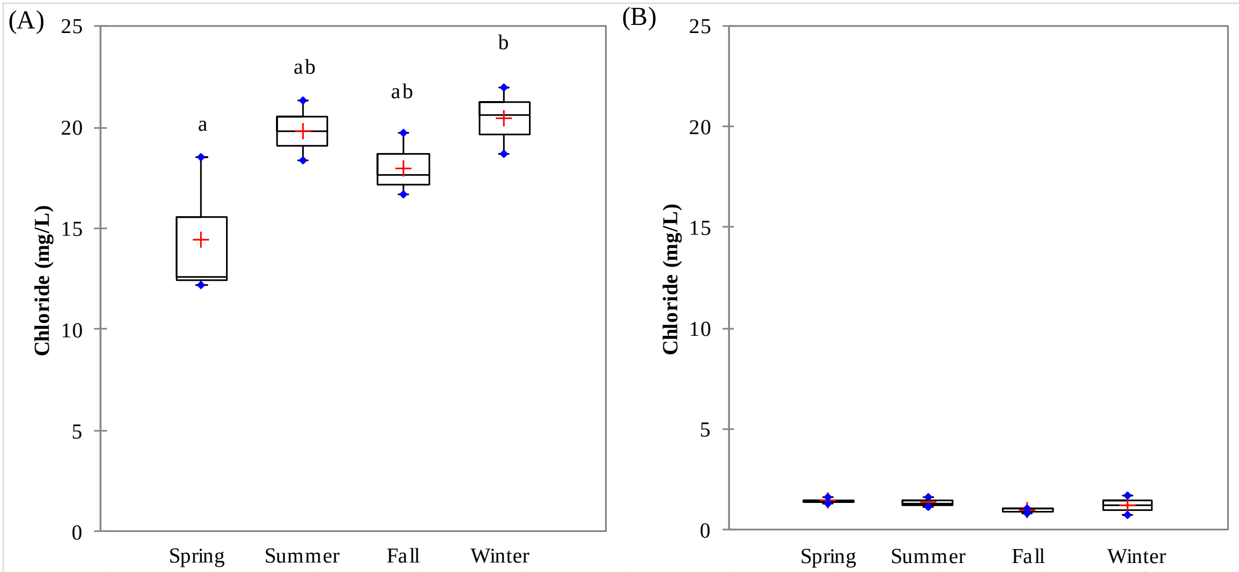


Figure 5.7.4-93. Chloride in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts.

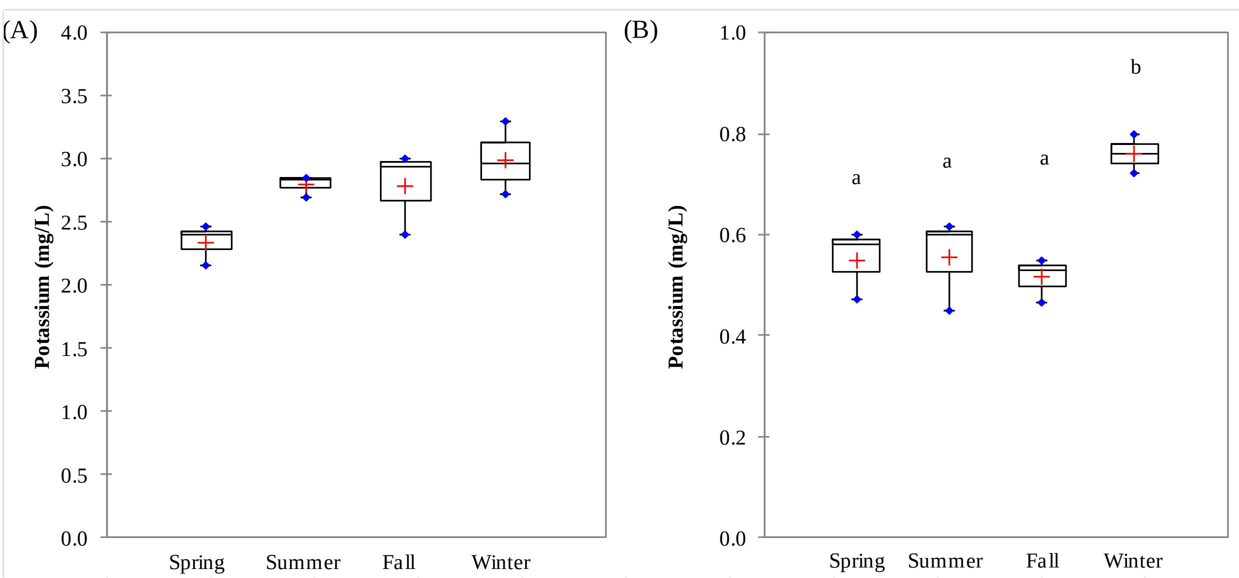


Figure 5.7.4-94. Potassium in the Lower Nelson River Region by season: (A) lower Nelson River; and (B) Hayes River. Statistically significant seasonal differences are denoted with different superscripts. Note the difference scales on the y-axes.

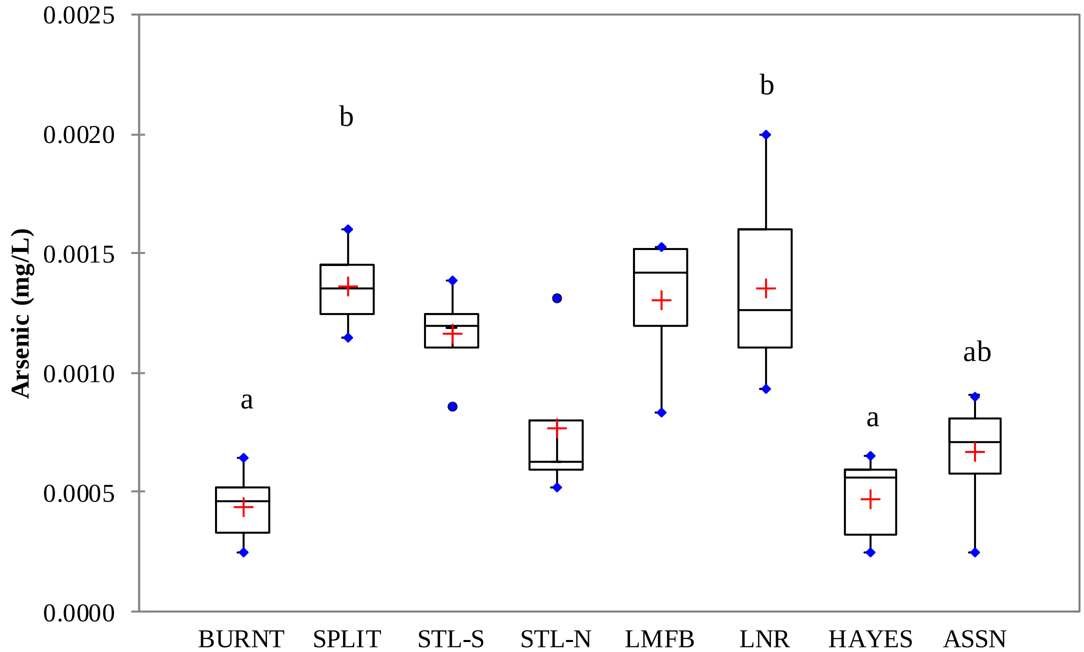


Figure 5.7.4-95. Arsenic in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

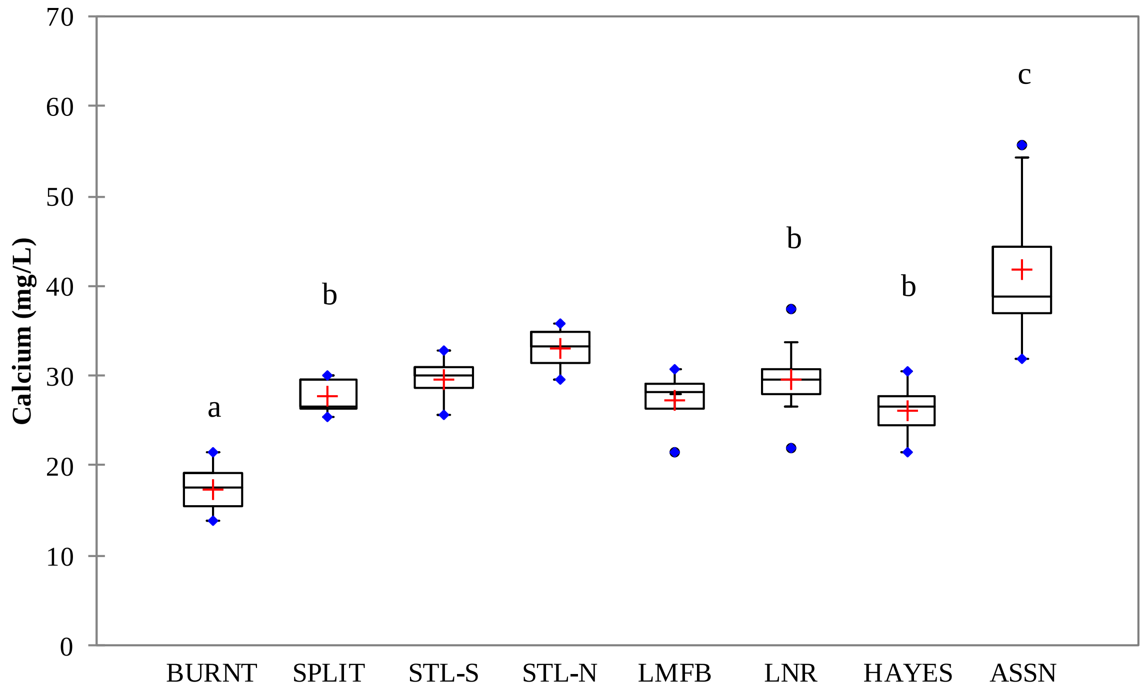


Figure 5.7.4-96. Calcium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

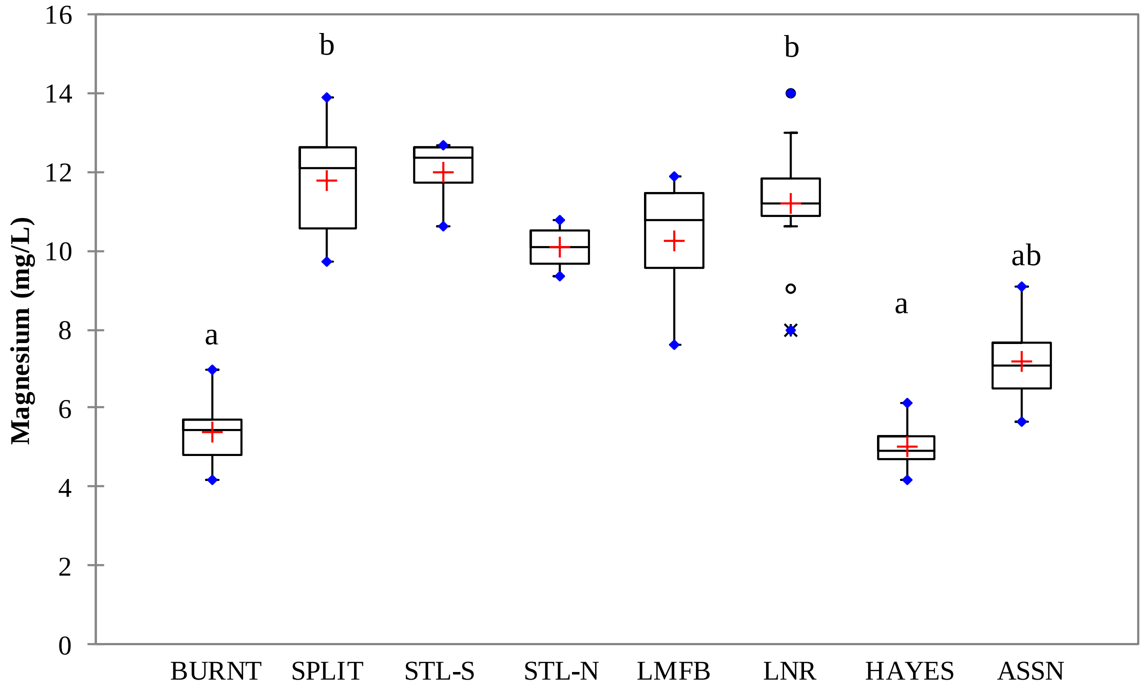


Figure 5.7.4-97. Magnesium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

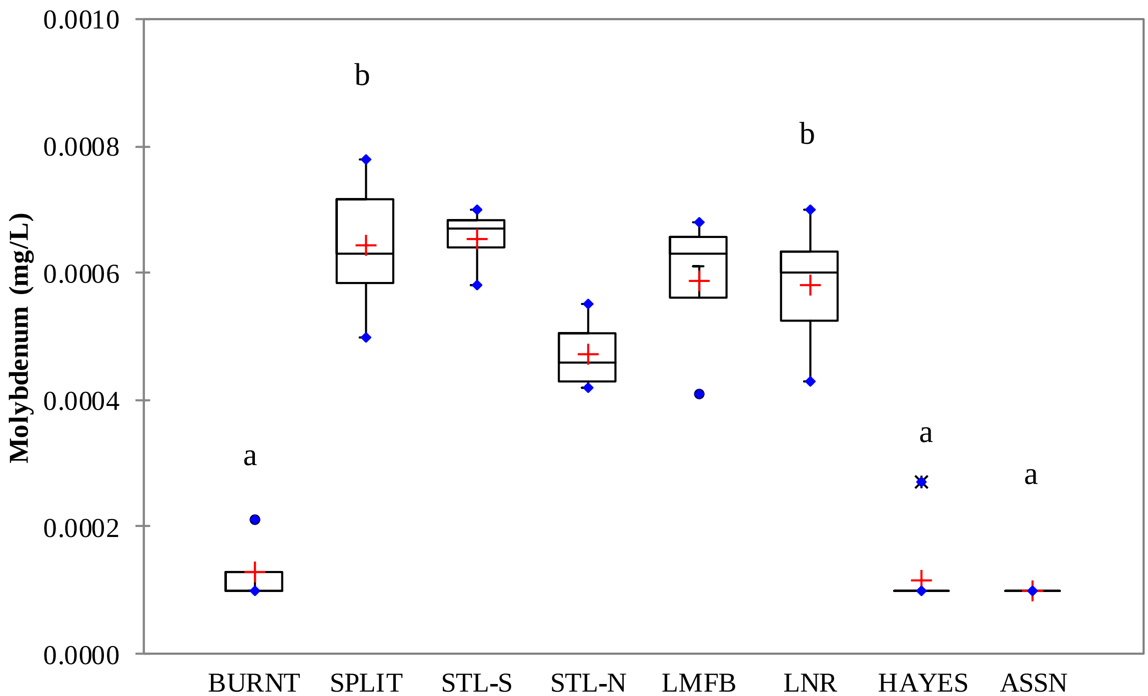


Figure 5.7.4-98. Molybdenum in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

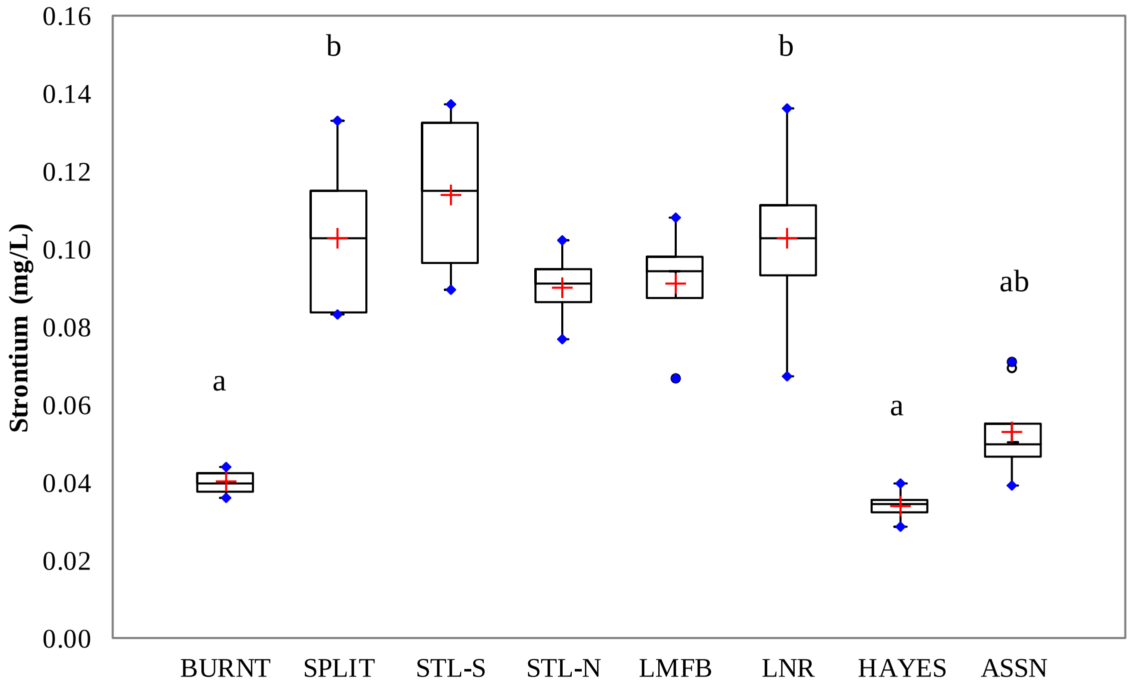


Figure 5.7.4-99. Strontium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

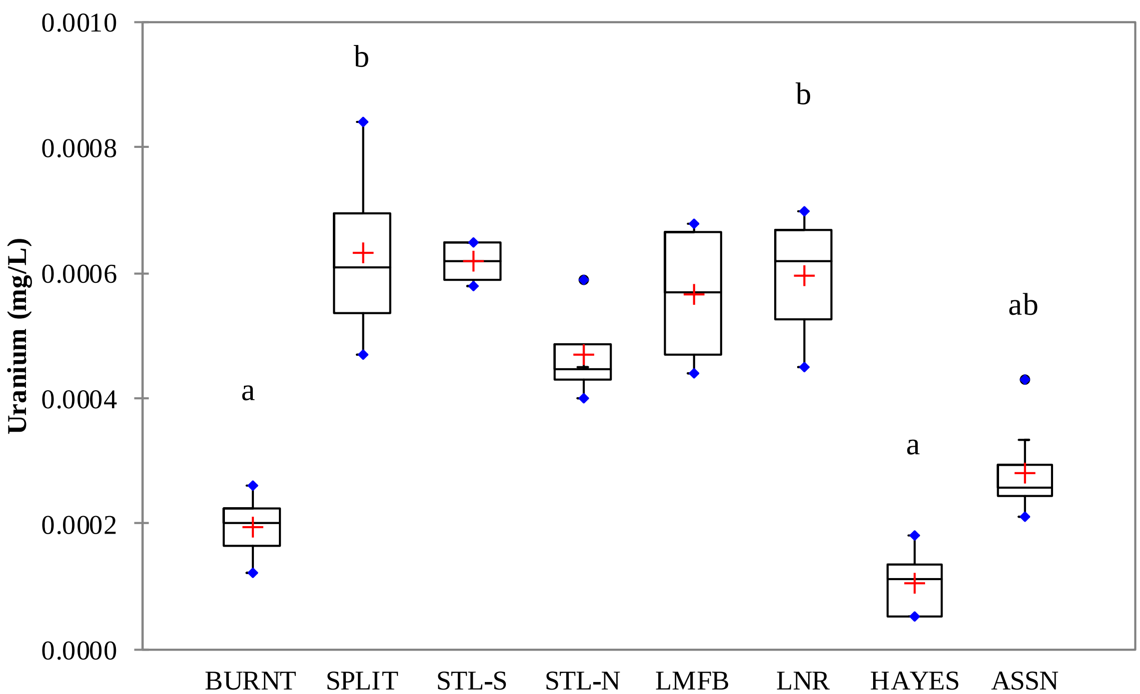


Figure 5.7.4-100. Uranium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

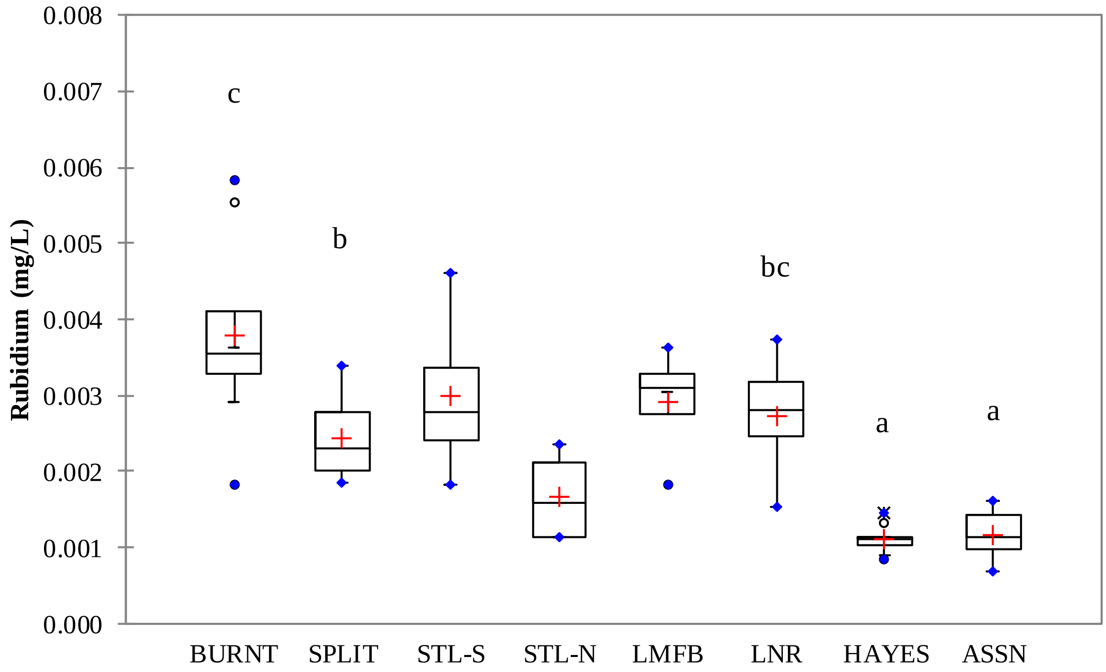


Figure 5.7.4-101. Rubidium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

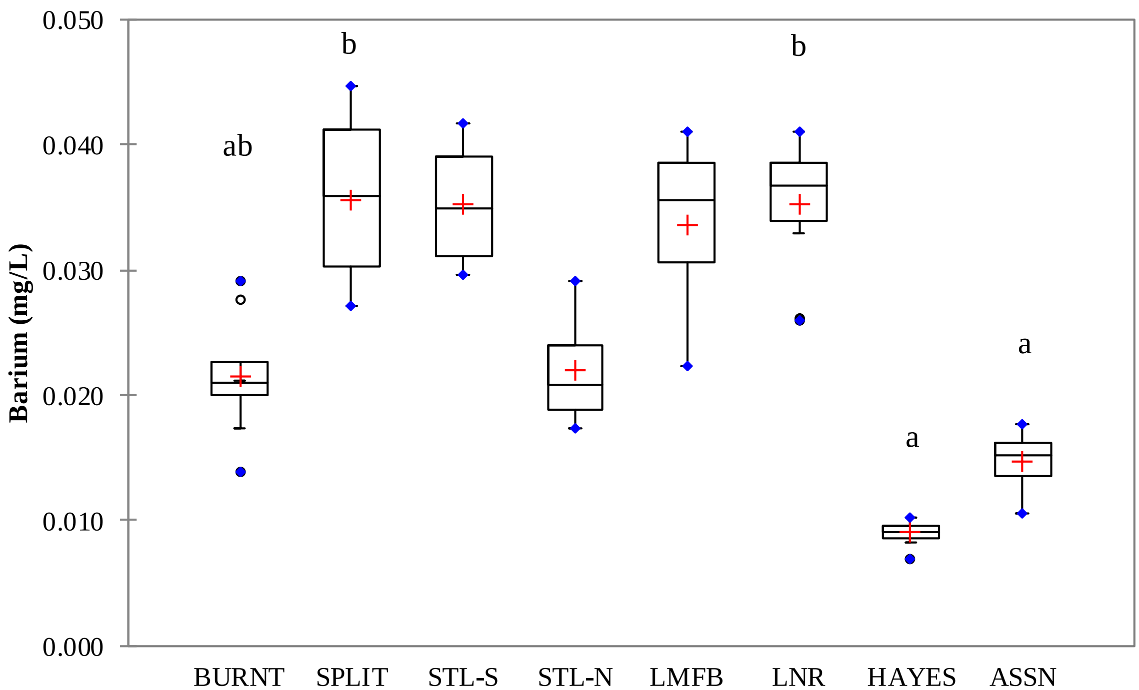


Figure 5.7.4-102. Barium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

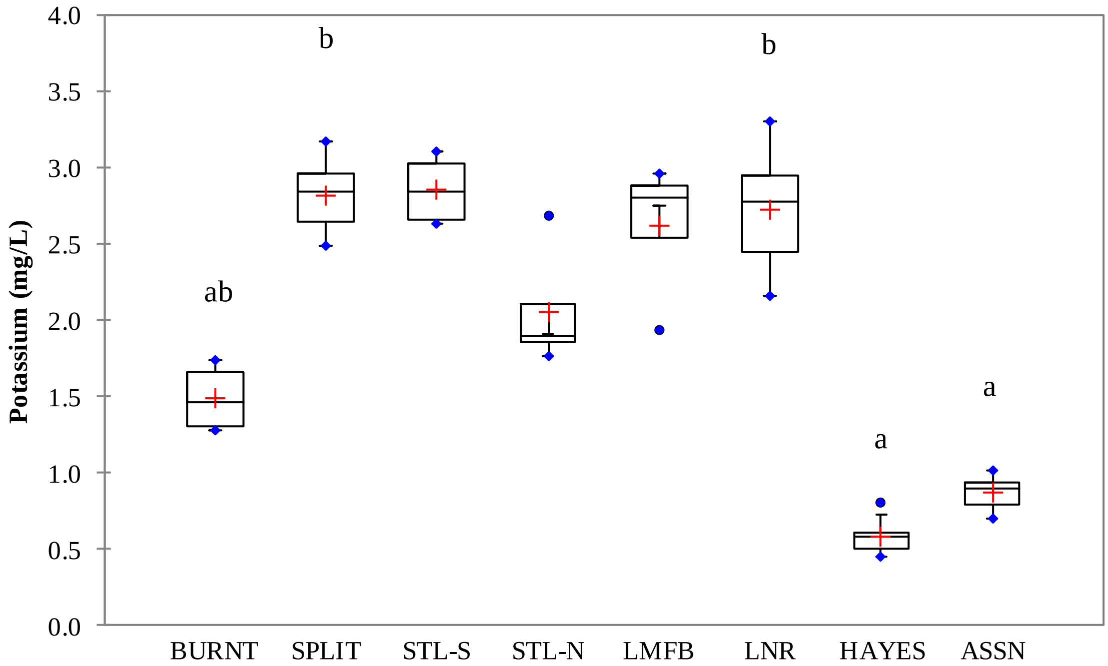


Figure 5.7.4-103. Potassium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

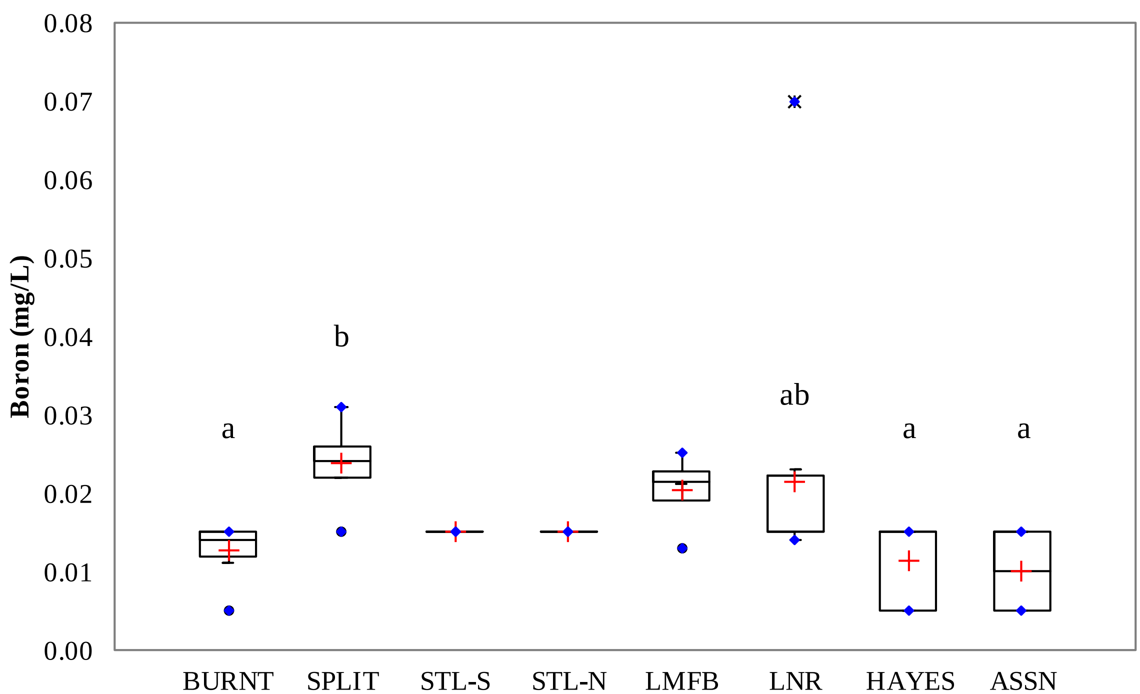


Figure 5.7.4-104. Boron in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

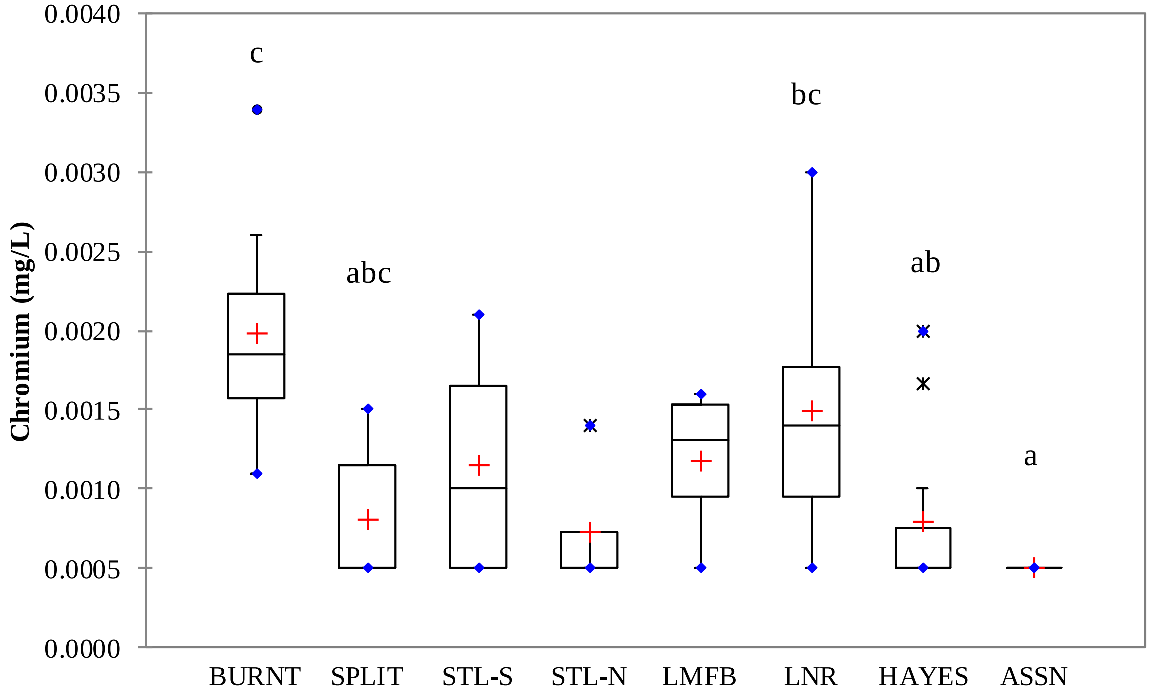


Figure 5.7.4-105. Chromium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

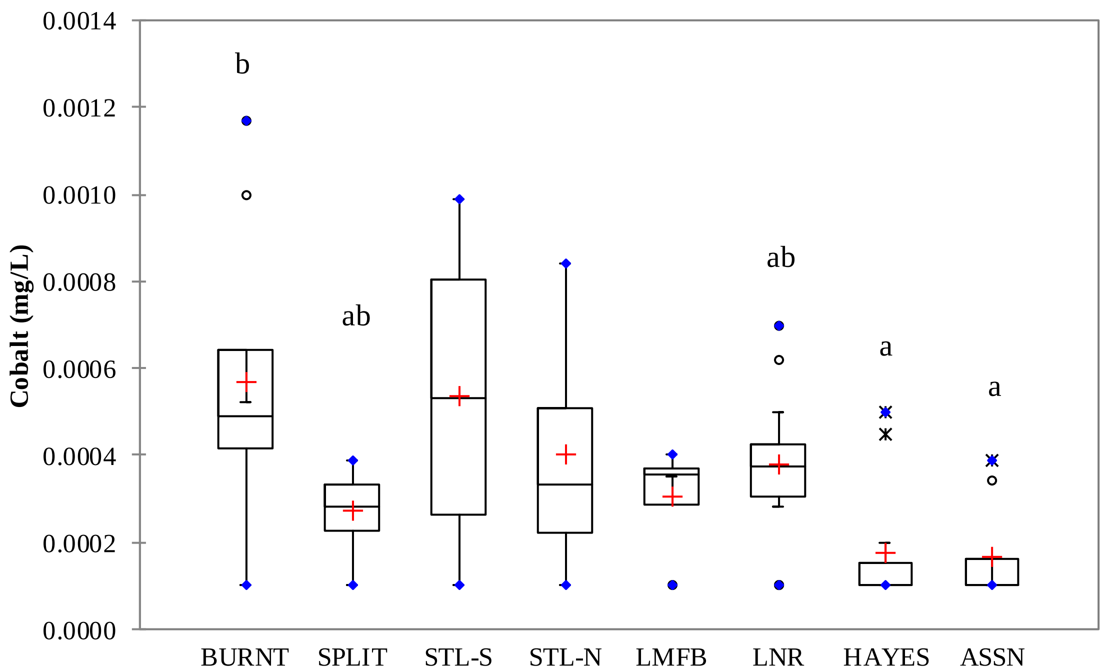


Figure 5.7.4-106. Cobalt in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

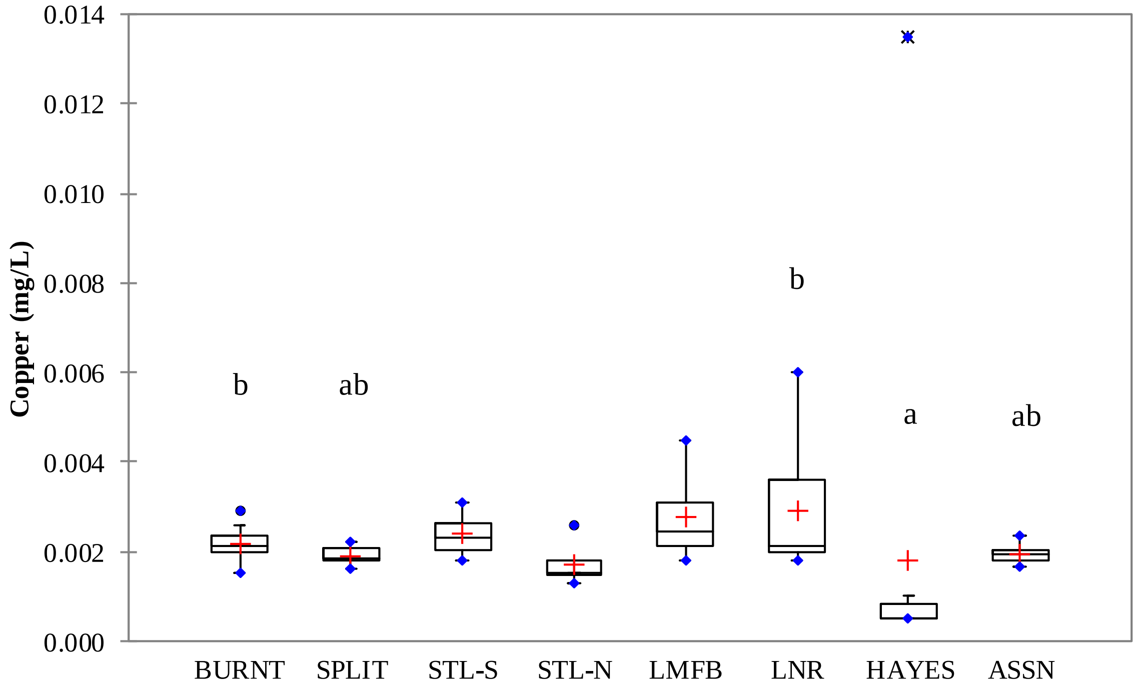


Figure 5.7.4-107. Copper in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

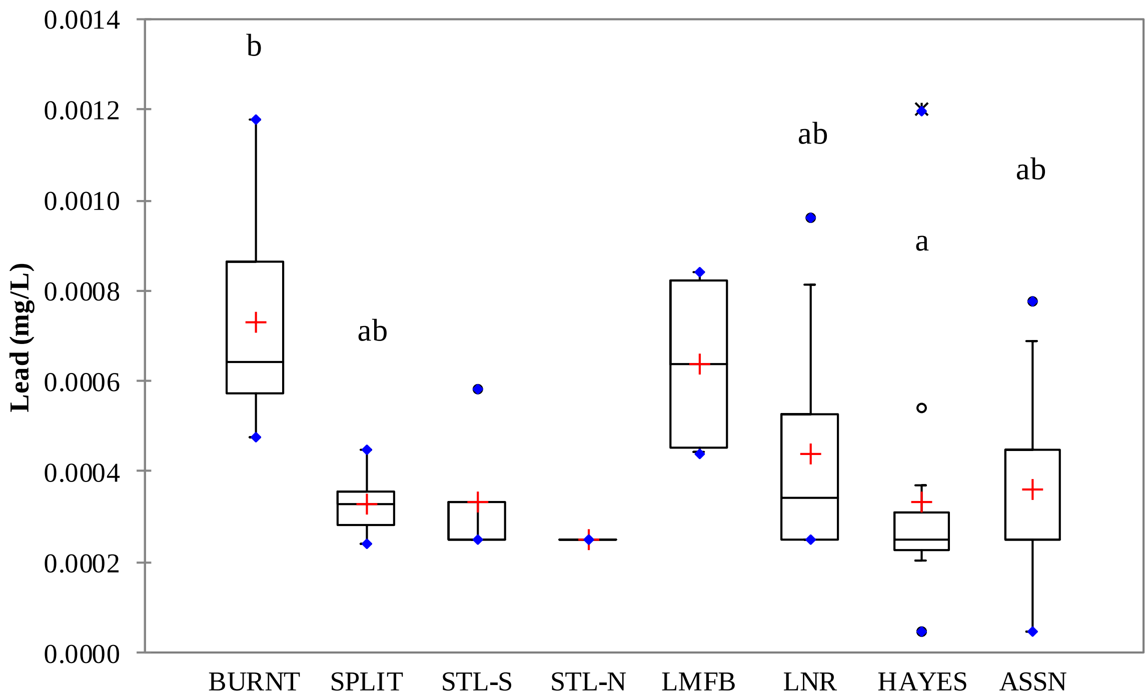


Figure 5.7.4-108. Lead in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

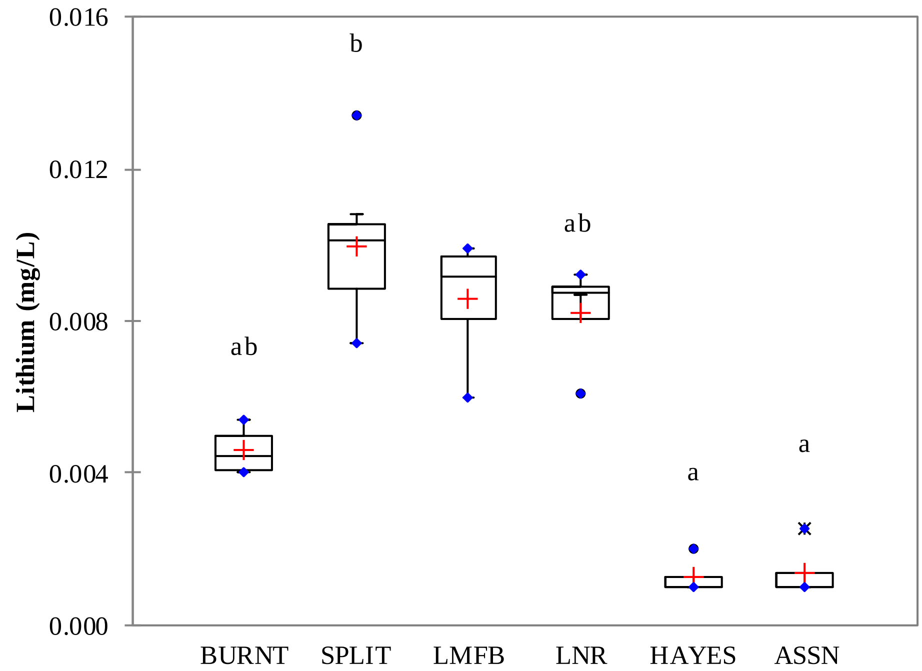


Figure 5.7.4-109. Lithium in the Lower Nelson River Region: 2008-2010 (this parameter was not analysed at Stephens Lake). Statistically significant spatial differences are denoted with different superscripts.

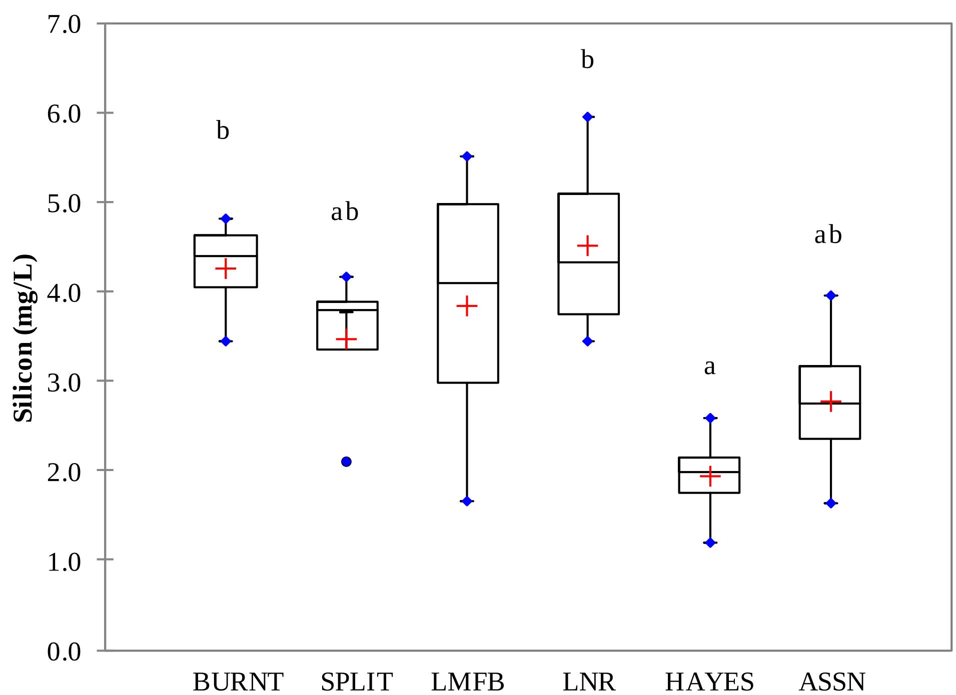


Figure 5.7.4-110. Silicon in the Lower Nelson River Region: 2008-2010 (this parameter was not analysed at Stephens Lake). Statistically significant spatial differences are denoted with different superscripts.

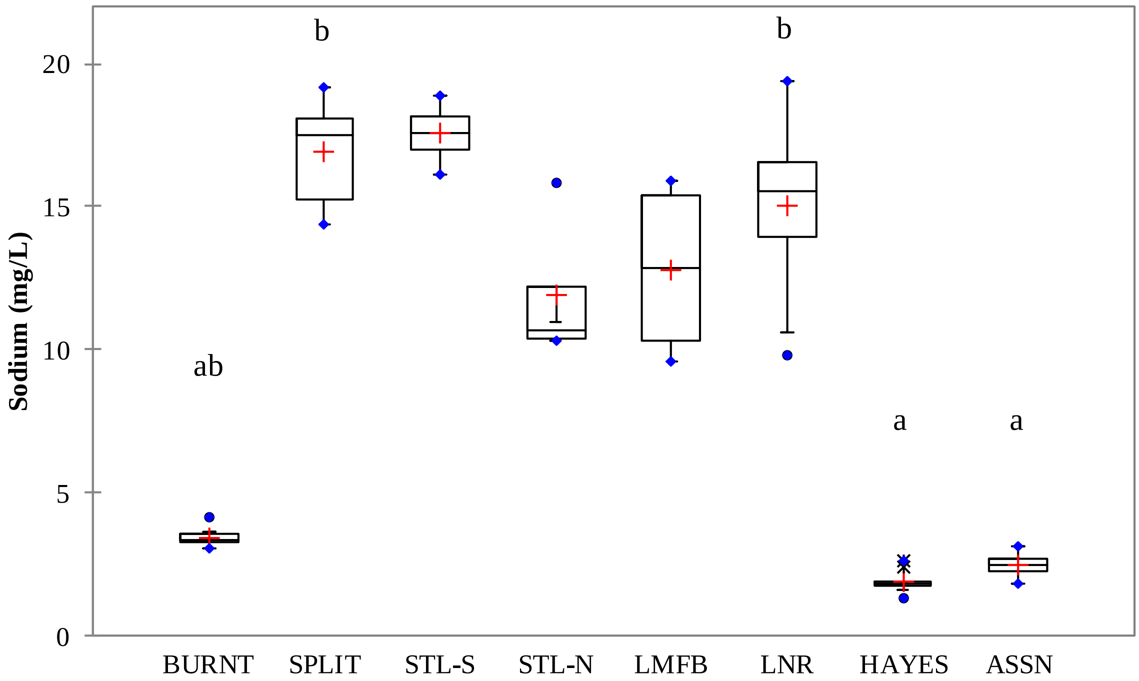


Figure 5.7.4-111. Sodium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

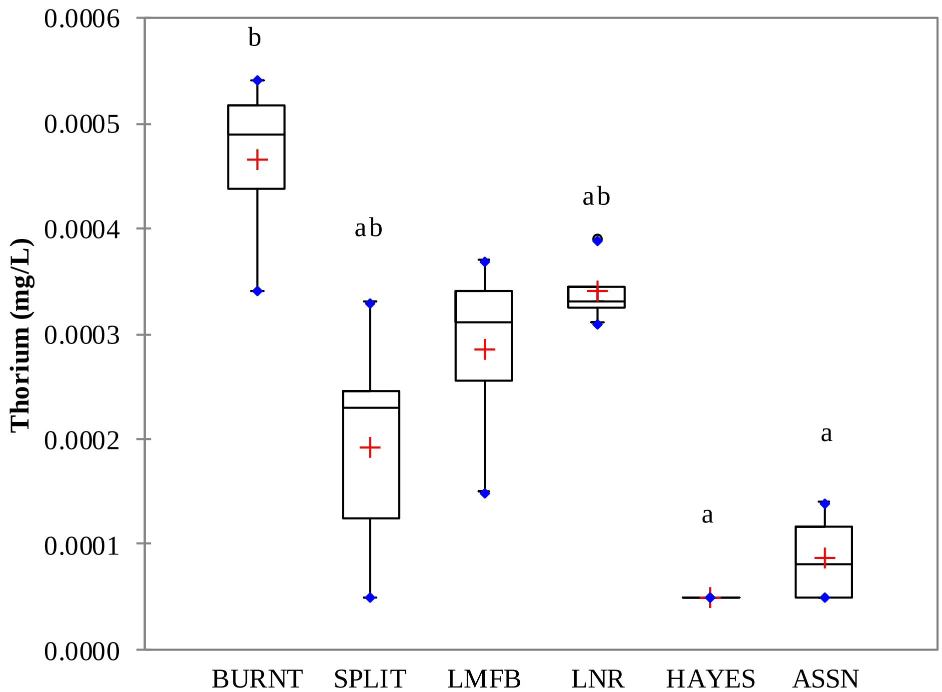


Figure 5.7.4-112. Thorium in the Lower Nelson River Region: 2008-2010 (this parameter was not analysed at Stephens Lake). Statistically significant spatial differences are denoted with different superscripts.

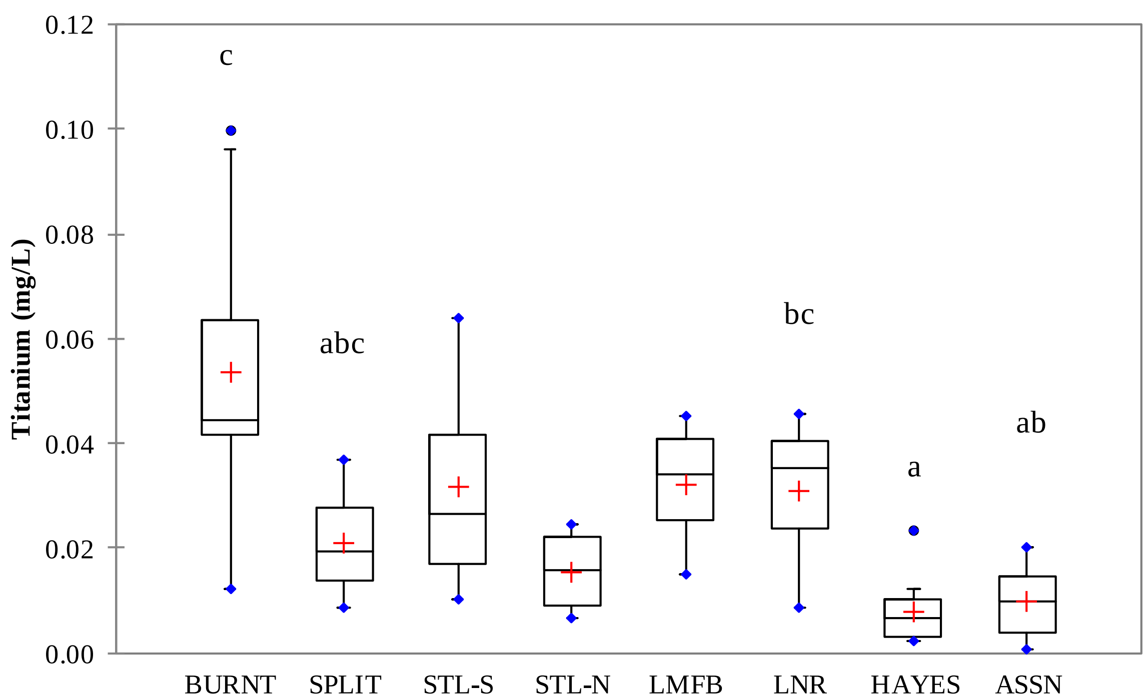


Figure 5.7.4-113. Titanium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

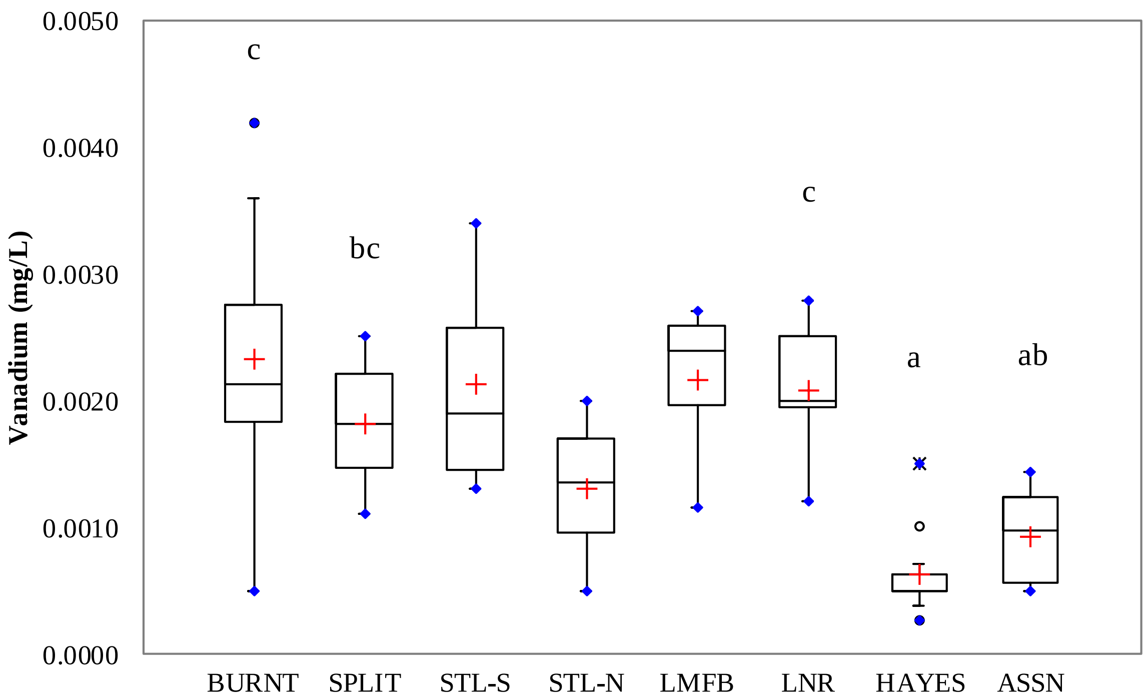


Figure 5.7.4-114. Vanadium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

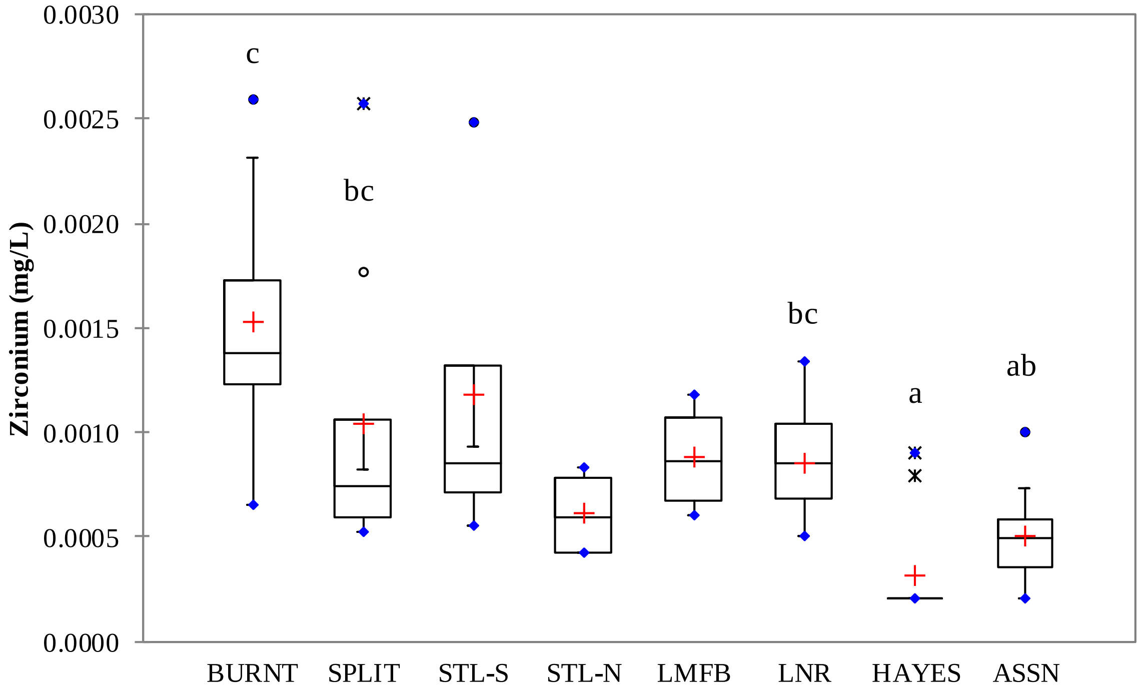


Figure 5.7.4-115. Zirconium in the Lower Nelson River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

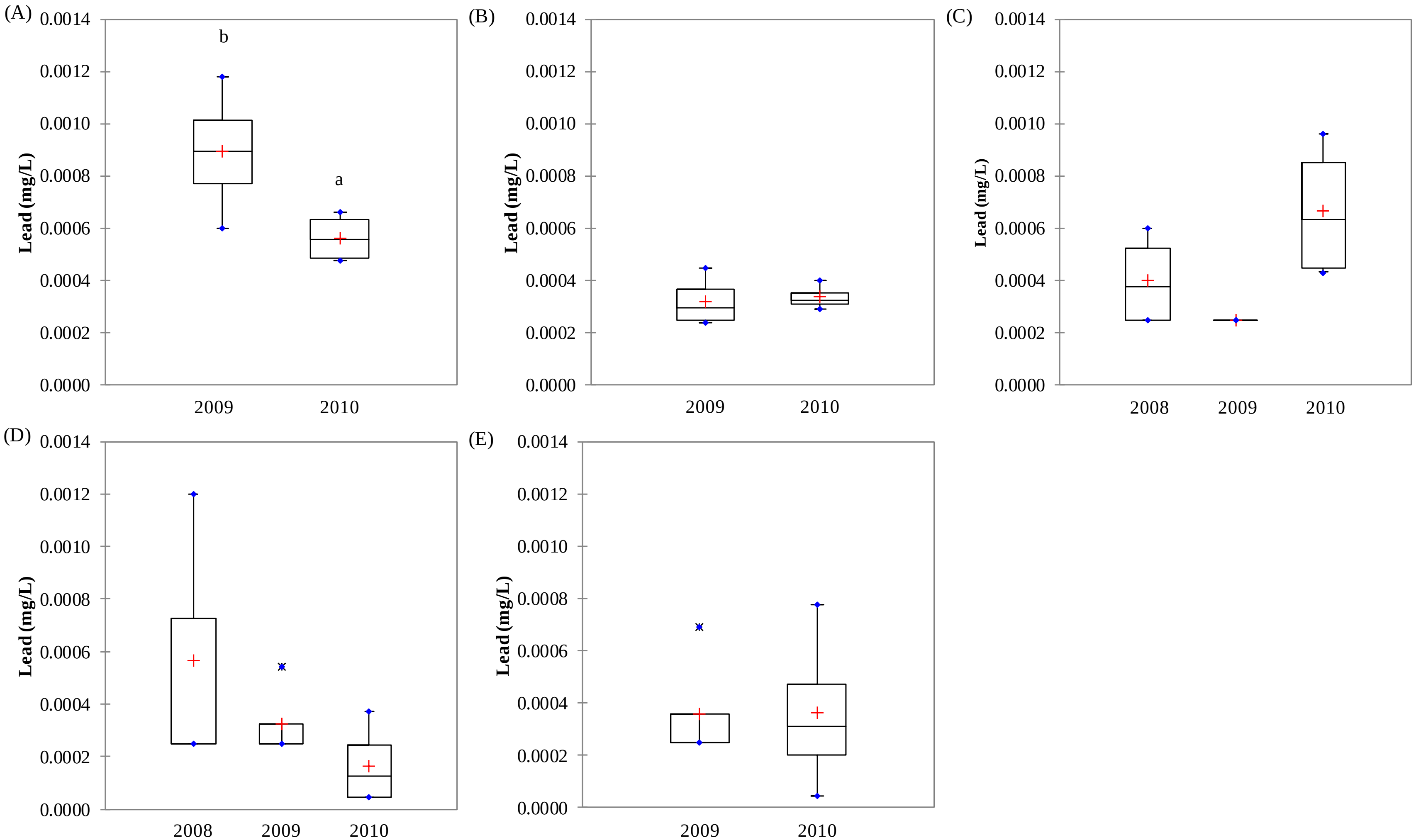


Figure 5.7.4-116. Lead measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

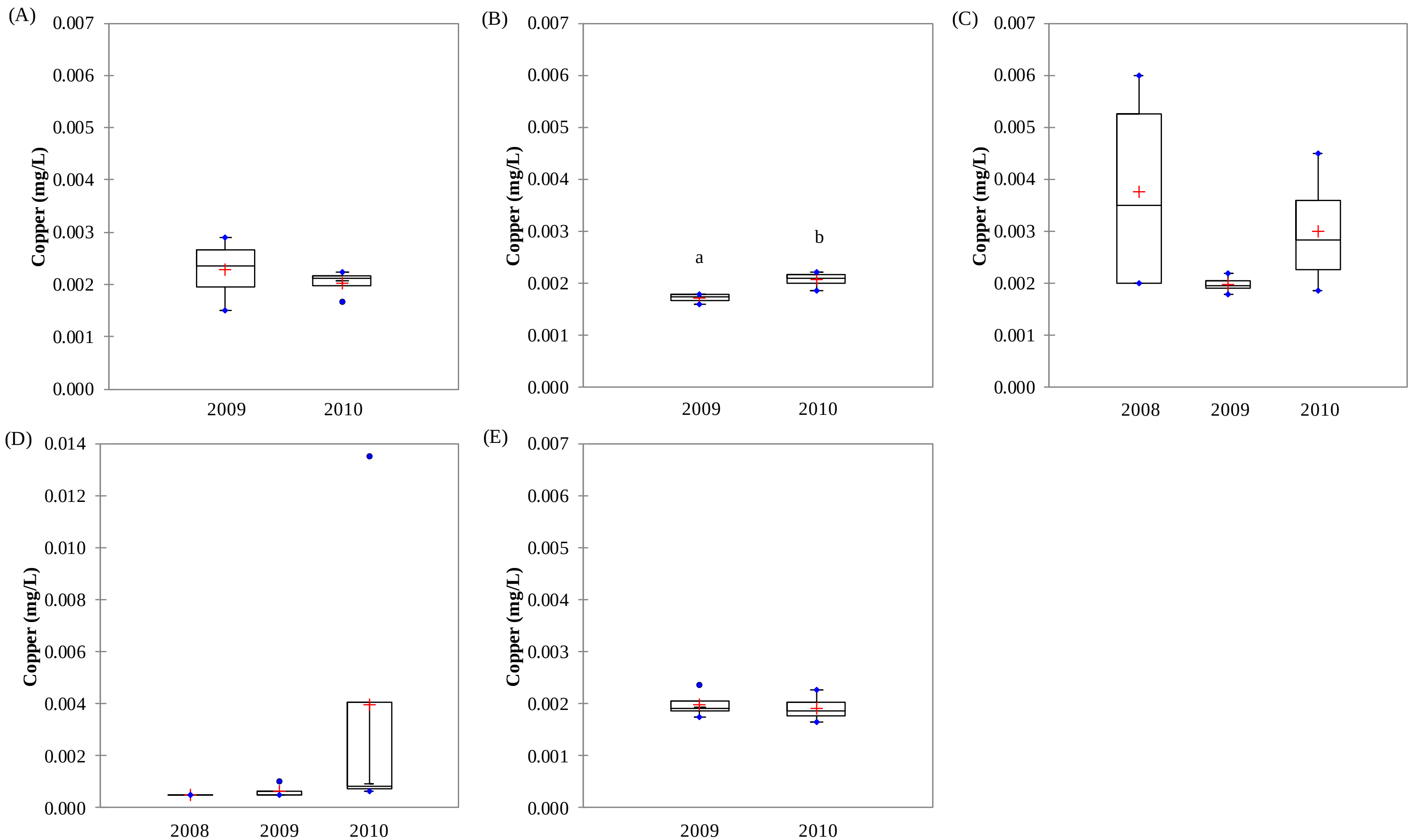


Figure 5.7.4-117. Copper measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Note the different scale on Hayes River. Statistically significant differences are denoted with different superscripts.

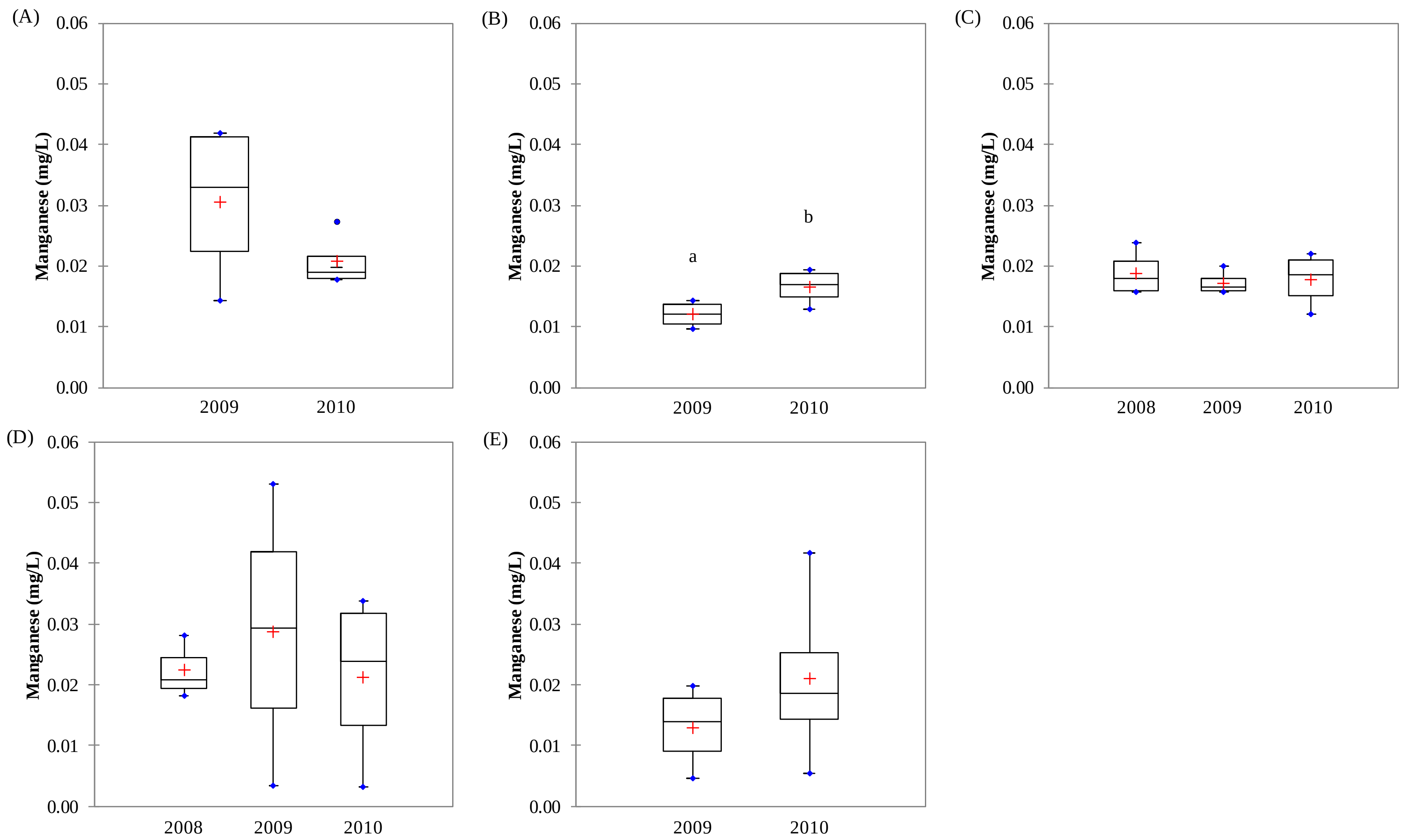


Figure 5.7.4-118. Manganese measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

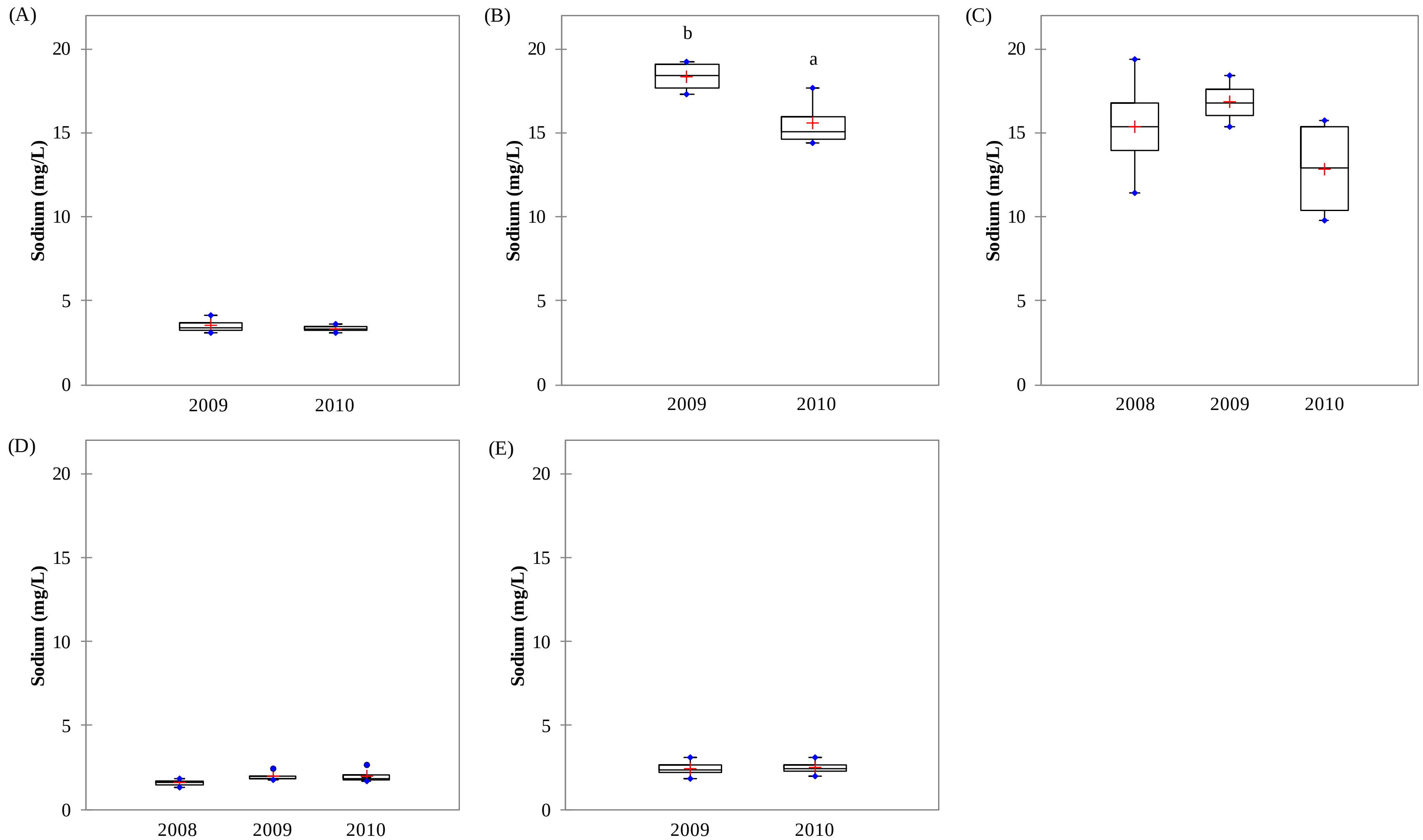


Figure 5.7.4-119. Sodium measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

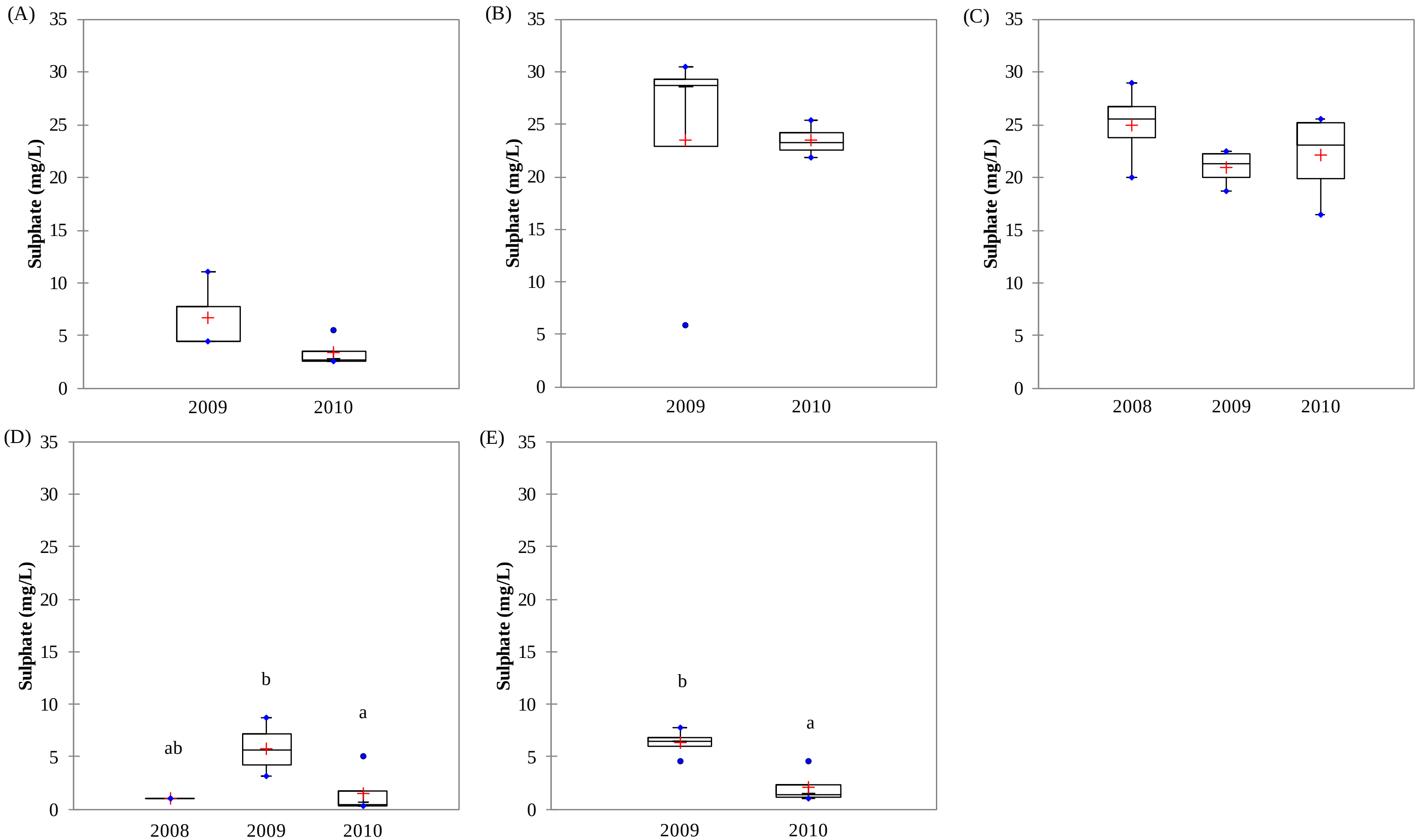


Figure 5.7.4-120. Sulphate measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

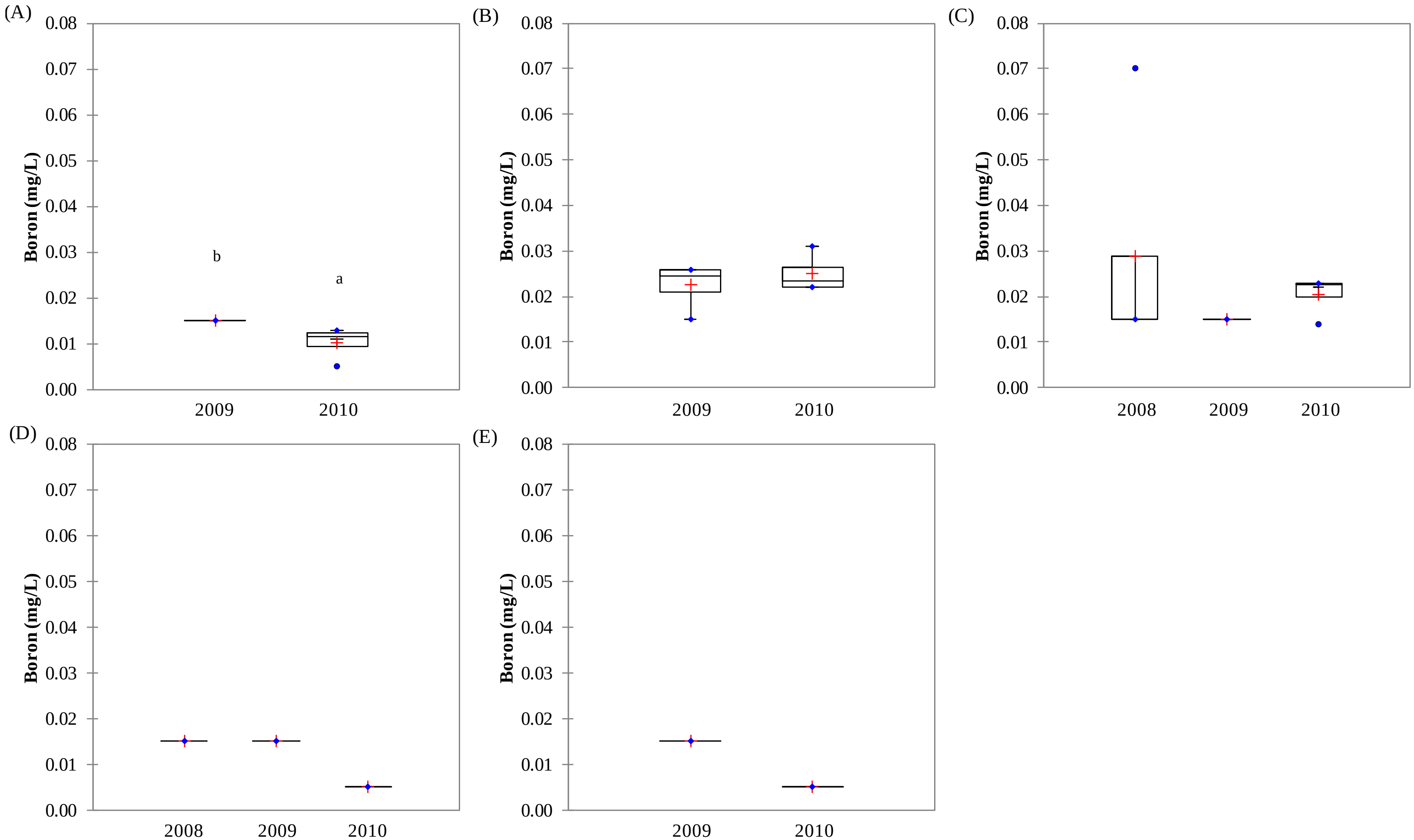


Figure 5.7.4-121. Boron measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

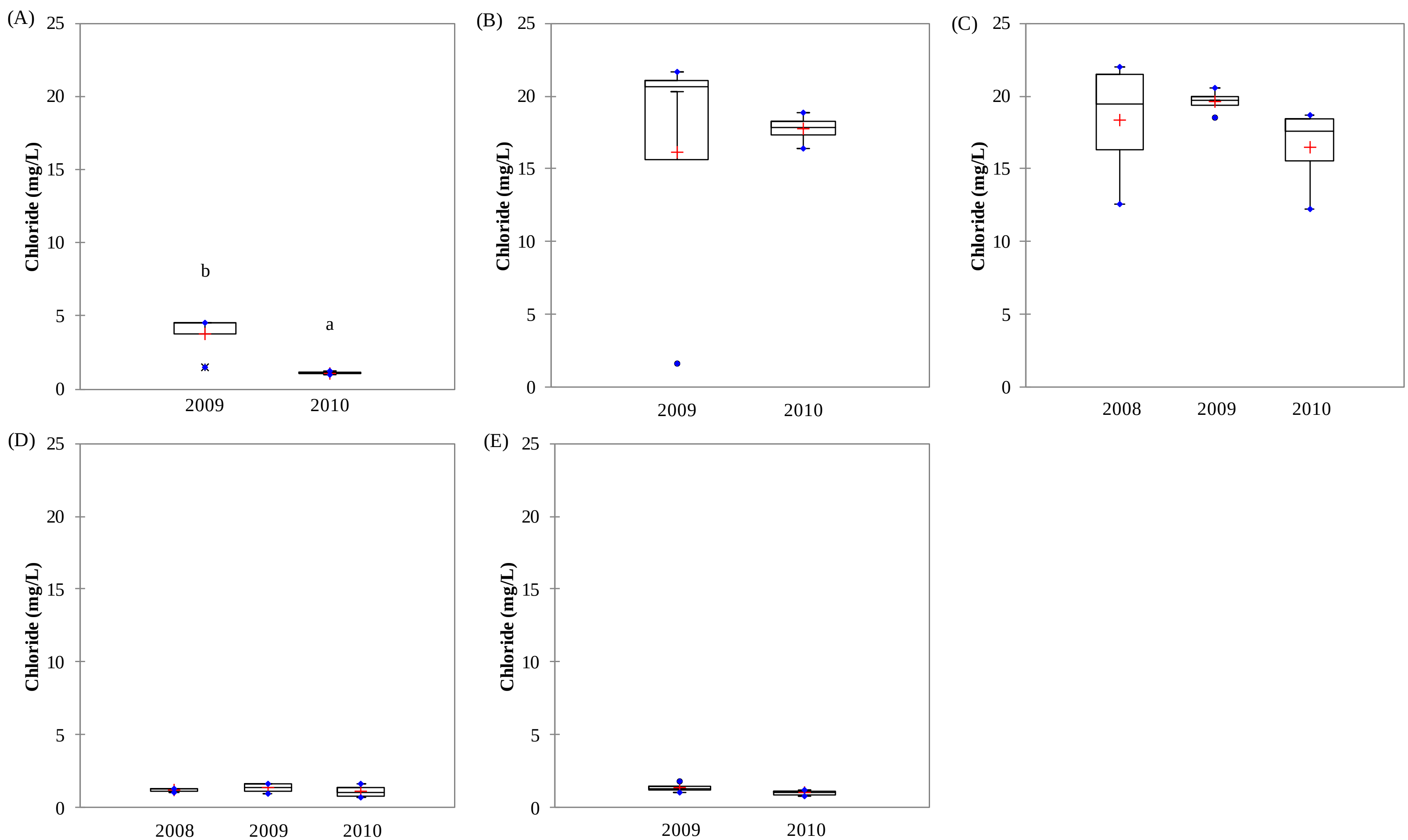


Figure 5.7.4-122. Chloride measured in the Lower Nelson River Region by year: (A) Burntwood River; (B) Split Lake; (C) lower Nelson River; (D) Hayes River; and (E) Assean Lake. Statistically significant differences are denoted with different superscripts.

5.7.5 Phytoplankton

The following provides an overview of phytoplankton monitoring results for the Lower Nelson River Region over the three years of CAMPP. Sampling sites and periods were consistent with the water quality monitoring program and included two annual waterbodies sampled all three years (lower Nelson River and an off-system river, Hayes River; Figure 5.7.4-1) and three annual waterbodies sampled starting in 2009 (Burntwood River, Split Lake, and an off-system lake, Assean Lake). Water quality and phytoplankton were also monitored at three rotational sites: Stephens Lake-South (2009/2010), Stephens Lake-North (2009/2010), and the Limestone Forebay (2010/2011). Sampling times relative to air temperature are presented in Figure 5.7.4-2.

Chlorophyll *a* was measured at all sites and sampling times in conjunction with the water quality sampling program. Data are therefore sufficient for statistical analysis and temporal and spatial variability was assessed for this parameter; seasonal variability was only assessed for annual sites that were sampled all three years.

Phytoplankton biomass and taxonomic composition were measured in the Hayes River in 2009/2010 and in the Burntwood River, Split Lake, the Limestone Forebay in 2010/2011, and in both 2009/2010 and 2010/2011 in Assean Lake. No data are available for Stephens Lake or the lower Nelson River. With the exception of Assean Lake, phytoplankton biomass, composition and community metrics were not assessed statistically due to limited data; analyses will be conducted in future when additional data are collected.

As all chlorophyll *a* samples were below the bloom monitoring trigger of 10 µg/L, no samples were analysed for microcystin-LR (an algal toxin) in the Lower Nelson River Region.

5.7.5.1 Chlorophyll a

Over the three years of CAMPP, chlorophyll *a* concentrations were relatively low: chlorophyll *a* was less than 1.2 µg/L during the ice-cover season and ranged up to 9.0 µg/L during the open-water period (Figure 5.7.5-1).

5.7.5.2 Taxonomic Composition and Biomass

During the open-water season, phytoplankton biomass varied between the five waterbodies in the Lower Nelson River Region where it was sampled. The most notable difference was the higher biomass measured at Split Lake in spring and summer relative to the other sites sampled for phytoplankton (i.e., Burntwood River, the Limestone Forebay, the Hayes River, and Assean Lake; Figure 5.7.5-2). Peak biomass occurred either in summer or fall in all waterbodies.

Phytoplankton communities within the region varied between waterbodies (Figure 5.7.5-3) and were composed of varying combinations of diatoms, blue-green algae, green algae, and, cryptophytes. Chrysophytes were more abundant at the off-system waterbodies. No one taxa group dominated consistently at any waterbody in the year(s) sampled and other algal groups typically made up a very small component of the phytoplankton. However, diatoms were generally more abundant in spring in waterbodies of the Lower Nelson River Region.

Metrics describing the phytoplankton community were calculated on a seasonal basis and are presented in Table 5.7.5-1. The community metrics exhibited considerable variability over the seasons at each site and no spatial trends in the diversity or evenness of the assemblages were readily apparent (Figure 5.7.5-4).

5.7.5.3 Bloom Monitoring

No chlorophyll *a* samples collected in the region exceeded the bloom monitoring trigger of 10 µg/L.

5.7.5.4 Microcystin

Some forms of blue-green algae are capable of producing microcystins (liver toxins), including species of *Anabaena*, *Aphanizomenon*, *Microsystis*¸ *Nostoc* and *Planktothrix* (a.k.a. *Oscillatoria*; Zurawell et al. 2005). Although not completely understood, several factors such as species, bacterial strain, and environmental conditions appear to affect production of microcystins. *Anabaena* and *Aphanizomenon* were identified in samples collected from the Burntwood River, Split Lake, the Limestone Forebay, the Hayes River and Assean Lake. Additionally, *Planktothrix* was found in all of these waterbodies excepting Split Lake.

During the three-year Pilot Program, chlorophyll *a* results for the waterbodies in the Lower Nelson River Region were consistently below 10 µg/L (i.e., the threshold for microcystin-LR analysis); therefore, microcystin-LR was not measured in this region.

5.7.5.5 Trophic Status

Based on mean open-water chlorophyll *a* concentrations, Split Lake and Stephens Lake-South are classified as mesotrophic whereas the remaining lakes in the region (Stephens Lake-North, the Limestone Forebay and Assean Lake) are classified as oligotrophic according to the classification scheme for lakes and reservoirs (Organization for Economic Development [OECD] 1982; Table 5.7.4-3). All three river sites (Burntwood, lower Nelson and Hayes rivers) monitored in the region are categorized as oligotrophic according to the trophic classification scheme for rivers (Dodds et al. 1998; Table 5.7.4-6).

5.7.5.6 Seasonal Variability

Chlorophyll *a* concentrations measured in the lower Nelson and Hayes rivers were not significantly different between seasons (Figure 5.7.5-1). However, concentrations at all sites in the region were qualitatively lower during the ice-cover season than those measured during the open-water season and the lack of significant differences may reflect the quantity of data available for analysis.

5.7.5.7 Spatial Comparisons

Mean annual chlorophyll *a* concentrations were not significantly different between the five annual waterbodies monitored in the Lower Nelson River Region (Figure 5.7.5-4).

5.7.5.8 Temporal Variability

Comparisons between sampling years for the five annual waterbodies revealed that there were no significant interannual differences in chlorophyll *a* concentrations over the monitoring period (Figure 5.7.5-5); water levels/flows were, with the exception of the Hayes River, also relatively similar across the years of study.

Statistical analysis of total phytoplankton biomass, major taxa (Figure 5.7.5-6), diversity, heterogeneity, evenness, and species effective richness (Figure 5.7.5-7) at Assean Lake showed that the phytoplankton community at this waterbody was generally similar in 2009 and 2010; however, the relative biomass of green algae was significantly higher in 2009 compared to 2010 (Figure 5.7.5-6).

Table 5.7.5-1. Diversity, evenness, heterogeneity, and effective richness of the phytoplankton communities in the five waterbodies in the Lower Nelson River Region.

Waterbody	Season	Species Richness	Simpson's Diversity Index (1-G)	Simpson's Evenness (E_D)	Shannon-Weaver Index (H)	Evenness (E_H)	Hill's Effective Richness ($e^{H`}$)	Evenness $E^{H`}/S$
Burntwood River	Spring	22	0.85	0.31	2.44	0.79	11.44	0.52
	Summer	11	0.41	0.15	1.06	0.44	2.88	0.26
	Fall	18	0.40	0.09	1.03	0.36	2.81	0.16
Split Lake	Spring	16	0.47	0.12	1.10	0.40	3.00	0.19
	Summer	26	0.68	0.12	1.21	0.37	3.37	0.13
	Fall	16	0.78	0.28	1.79	0.64	5.96	0.37
Limestone Forebay	Spring	20	0.70	0.17	2.33	0.78	10.24	0.51
	Summer	29	0.82	0.19	1.94	0.58	6.97	0.24
	Fall	25	0.73	0.15	1.66	0.52	5.25	0.21
Hayes River	Spring	14	0.79	0.34	1.96	0.74	7.07	0.50
	Summer	-	-	-	-	-	-	-
	Fall	29	0.90	0.36	2.69	0.80	14.66	0.51
Assean Lake	Spring[1]	16	0.84	0.43	2.11	0.78	8.28	0.56
	Summer[1]	19	0.79	0.26	1.96	0.67	7.11	0.38
	Fall[1]	23	0.90	0.47	2.51	0.82	12.35	0.58

[1]Data from Assean Lake are means of data collected in 2009 and 2010.

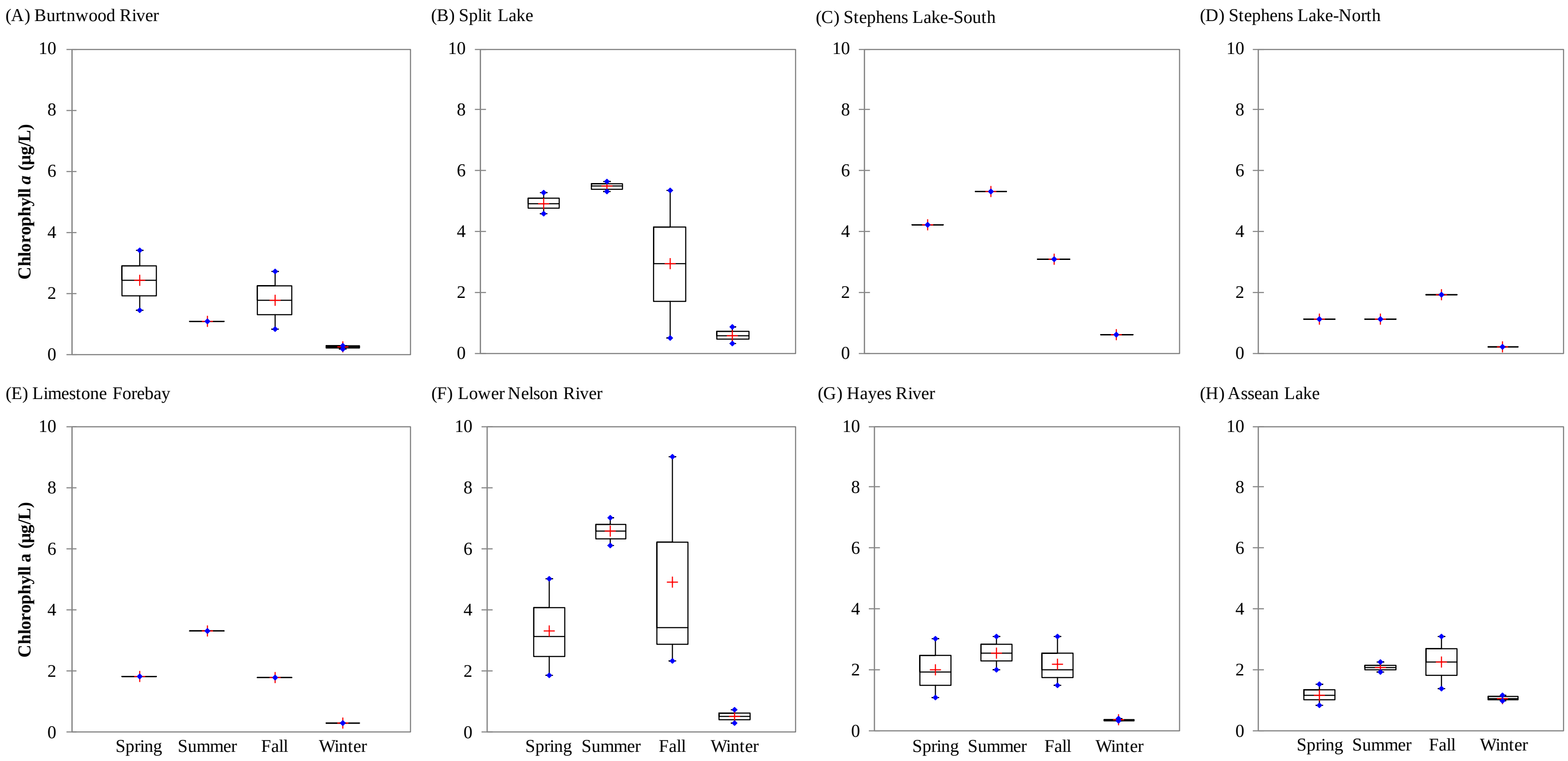


Figure 5.7.5-1. Chlorophyll *a* concentrations measured in the Lower Nelson River Region, 2008-2010 (lower Nelson River, Hayes River), 2009-2010 (Burntwood River, Split Lake, and Assean Lake), 2009 (Stephens Lake), and 2010 (Limestone Forebay). No statistically significant seasonal differences were found for the sites with three years of data.

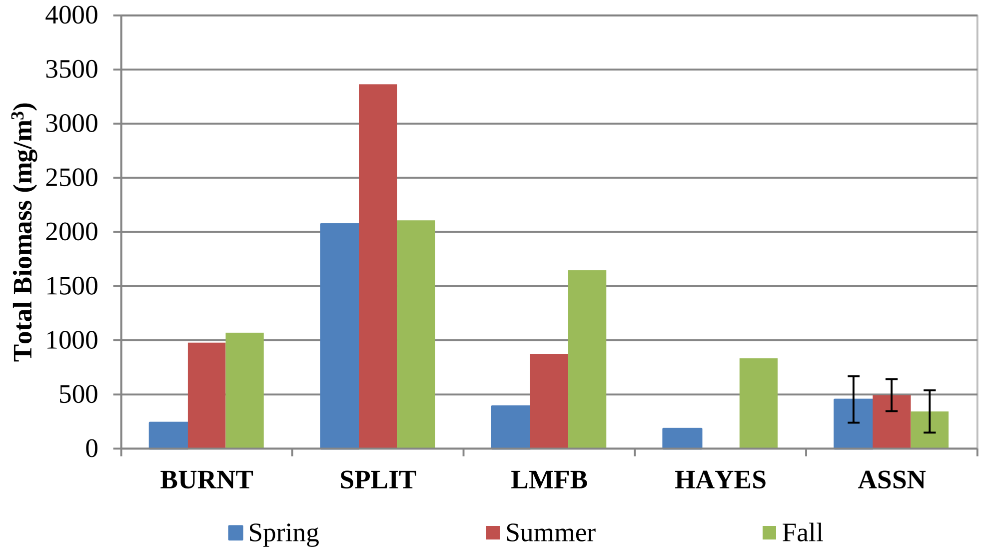


Figure 5.7.5-2. Phytoplankton biomass measured in the Lower Nelson River Region during the open-water seasons of 2009 (Hayes River) and 2010 (Burntwood River, Split Lake, and the Limestone Forebay). Data for Assean Lake represent the means for 2009 and 2010.

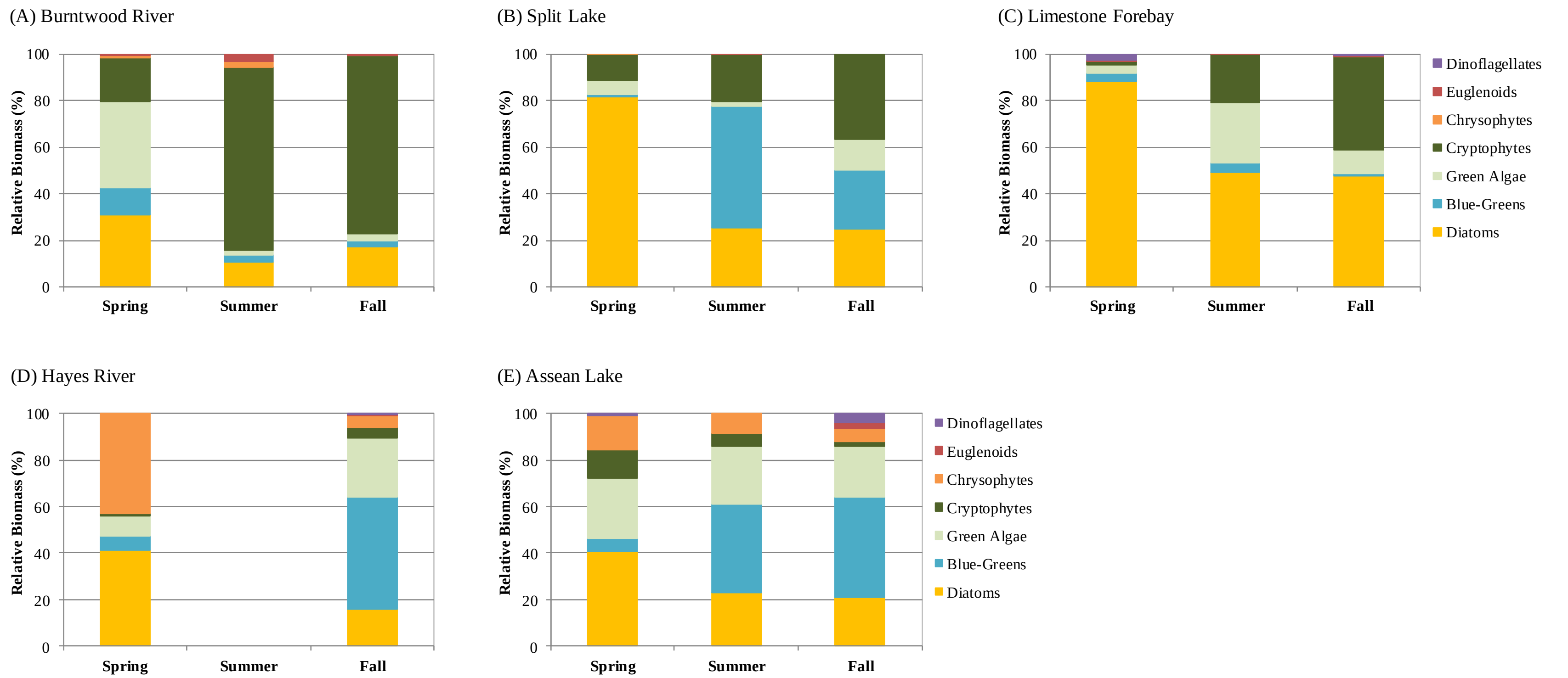


Figure 5.7.5-3. Phytoplankton community composition in the Lower Nelson River Region by season, as measured during the open-water seasons of 2009 (Hayes River) and 2010 (Burntwood River, Split Lake, and the Limestone Forebay). Data for Assean Lake represent the means for 2009 and 2010.

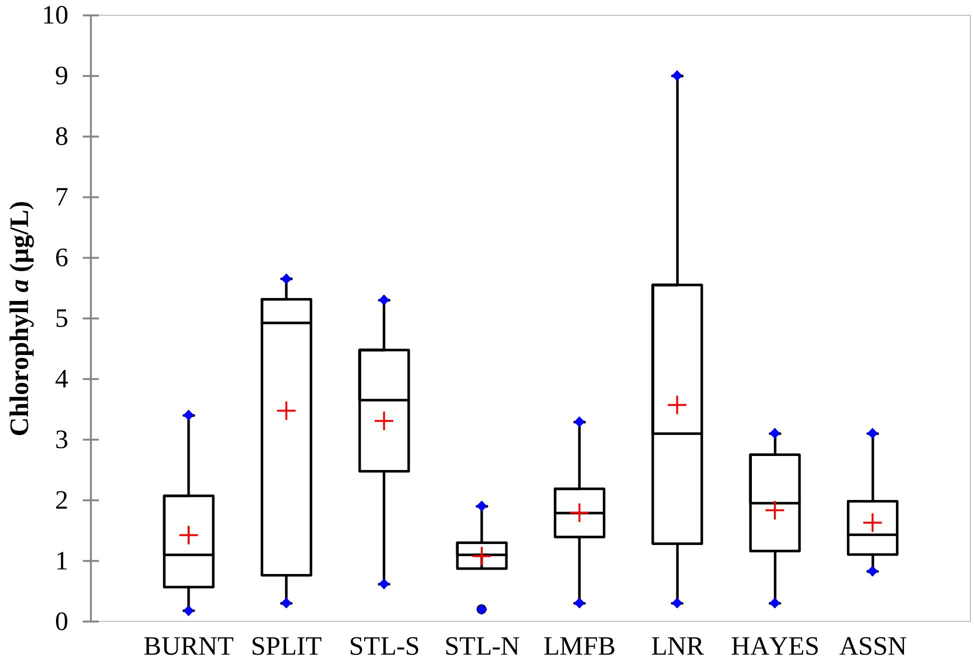


Figure 5.7.5-4. Chlorophyll *a* concentrations in the Lower Nelson River Region. No statistically significant spatial differences were found between the annual waterbodies (Split and Assean lakes, and the Burntwood, lower Nelson and Hayes rivers).

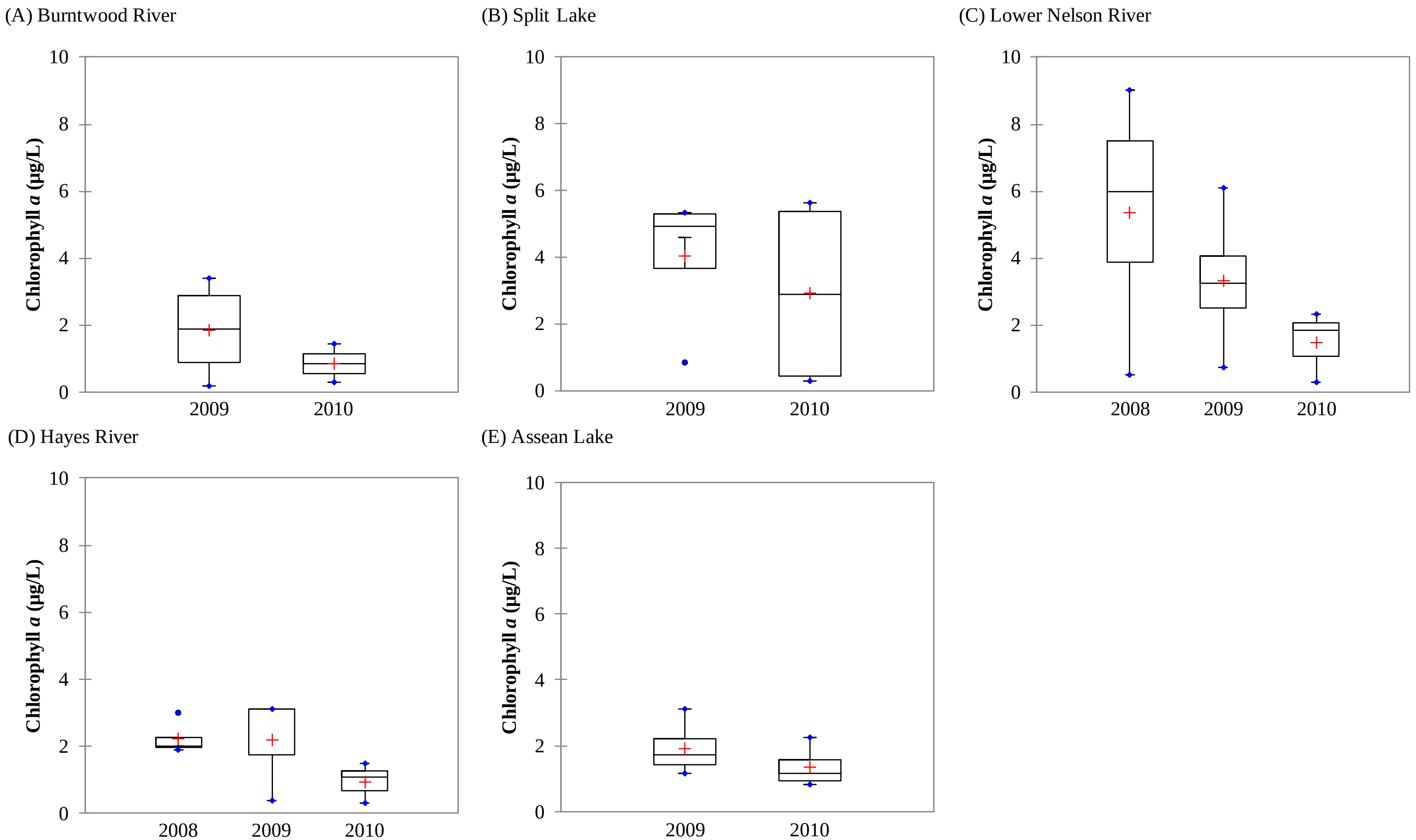


Figure 5.7.5-5. Chlorophyll *a* concentrations measured at the annual waterbodies in the Lower Nelson River Region by year: 2008-2010 (lower Nelson River, Hayes River), 2009-2010 (Burntwood River, Split Lake, and Assean Lake), 2009 (Stephens Lake), and 2010 (Limestone Forebay). No statistically significant interannual differences were noted within any of the annual waterbodies.

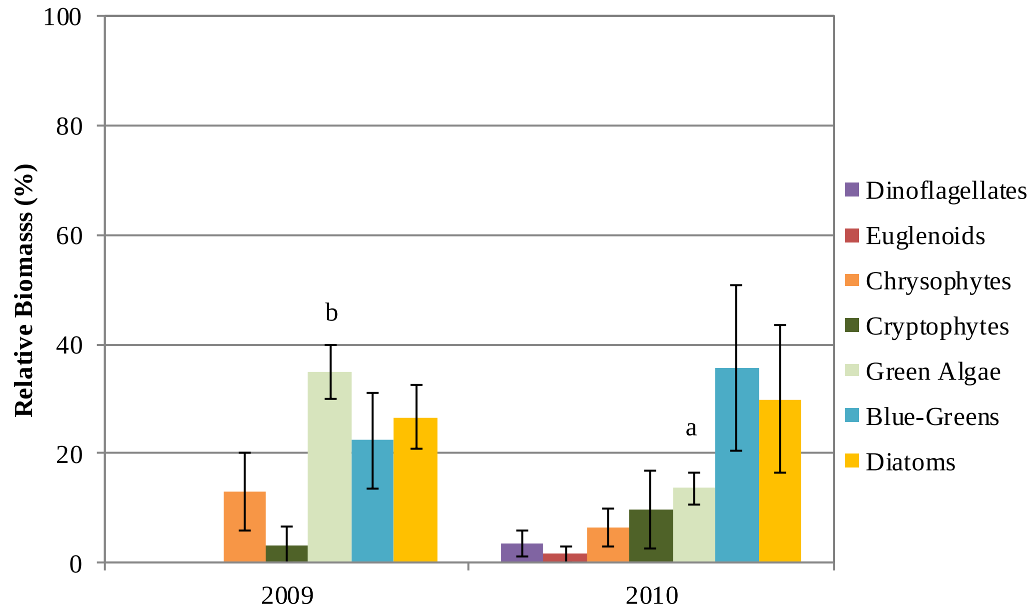


Figure 5.7.5-6. Mean open-water phytoplankton community composition in Assean Lake by year. Statistically significant temporal differences are denoted by different superscripts within each lake.

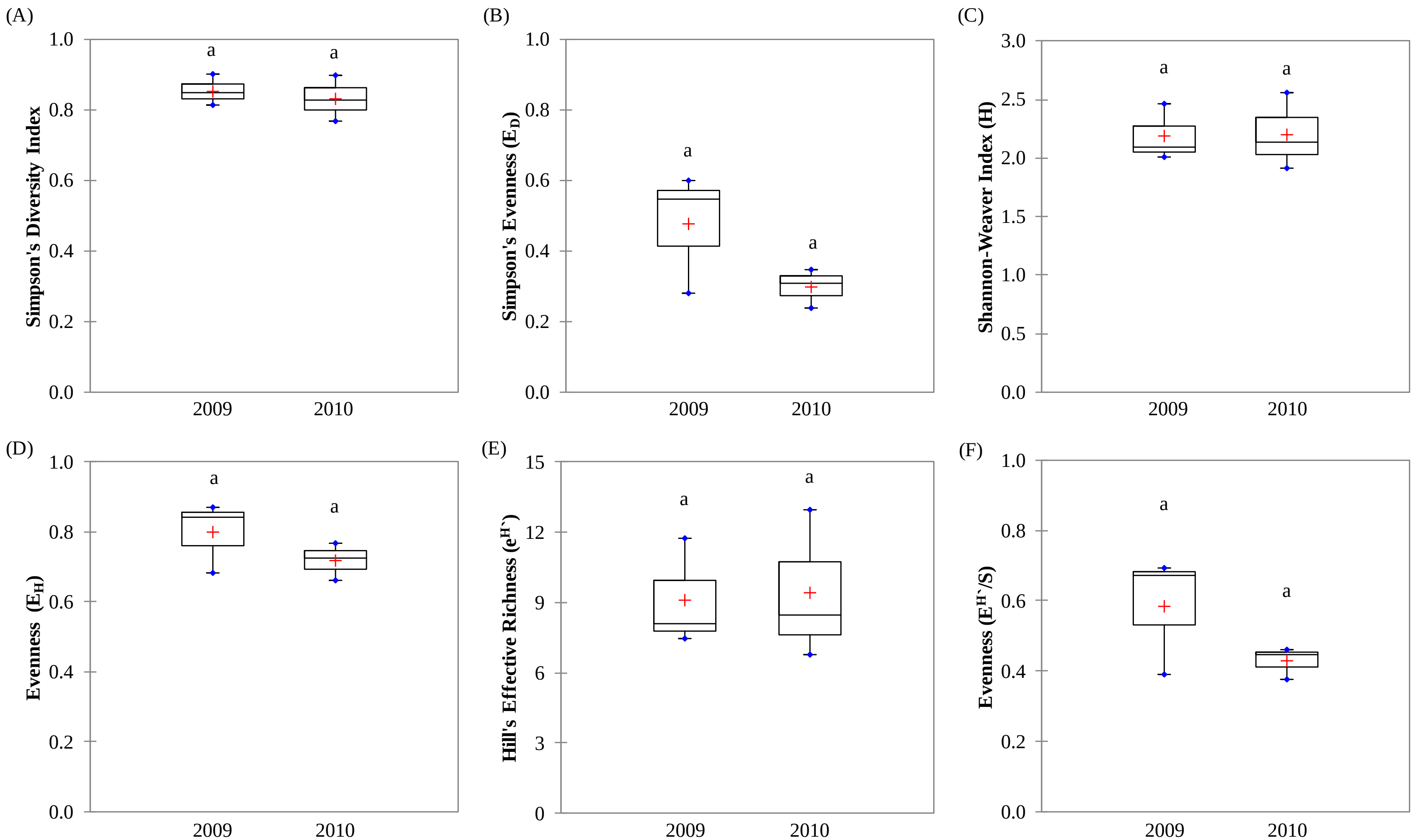


Figure 5.7.5-7. Diversity, evenness, heterogeneity, and effective richness of the phytoplankton community in Assean Lake by year. No statistically significant interannual differences occurred as denoted by superscripts.

5.7.6 Benthic Macroinvertebrates

The following provides an overview of the benthic macroinvertebrate (BMI) community sampled over the three year CAMPP program in the Lower Nelson River Region (Figure 5.7.6-1); no waterbodies were sampled in 2008 (as rockbasket data from the northern river sites are not included as part of the synthesis report). In 2009, BMI sampling was conducted in the on-system waterbodies Split Lake, Stephens Lake-South, Stephens Lake-North, and the off-system lake Assean Lake. Split and Assean lakes are sampled annually, and Stephens Lake-South and Stephens Lake-North are sampled on a rotational basis (i.e., once every three years). In 2010, sampling was conducted in the on-system waterbodies Split Lake, Limestone Forebay, and lower Nelson River (d/s of Limestone Forebay), and the off-system waterbodies Hayes River and Assean Lake. Lower Nelson River (d/s of Limestone Forebay) is sampled annually, and Limestone Forebay is sampled on a rotational basis. Nearshore and offshore habitat polygons were sampled in all waterbodies, except in 2010 where the offshore was not sampled in the Hayes River due to compact substrate. BMI sampling was conducted in mid- to late-August.

BMI are described for waterbodies in the Lower Nelson River Region, including results of statistical analyses to evaluate spatial and temporal differences. In 2010, the sampling design was modified to incorporate kicknet sampling at all nearshore sites (intermittently wetted aquatic habitat). For this reason, synthesis of data for the predominantly wetted nearshore habitat was not possible and the 2010 nearshore data were described separately. Further to this, the rockbasket data collected in 2008 and 2009 at the northern river sites (lower Nelson River and Hayes River) were not included in the synthesis section. The sampling design for the offshore habitat was comparable among years and, as such, data were summarized for 2009 and 2010 for all waterbodies.

The primary objective of spatial comparisons (i.e., comparison between waterbodies) was to evaluate whether the BMI community differ between on-system sites. Comparisons were also made between the on-system waterbodies and the off-system waterbody. The BMI community would be expected to differ between on- and off-system waterbodies due to fundamental, inherent differences associated with the watersheds and waterbodies. The objective of the comparisons between the on- and off-system waterbodies was to formally identify differences between these areas to assist with interpretation of results of CAMP as the program continues.

Temporal comparisons were undertaken for each waterbody sampled annually in order to provide a preliminary assessment of temporal variability. As additional data are acquired, more formal trend analyses will be undertaken to evaluate potential longer-term changes.

5.7.6.1 Supporting Environmental Variables

Supporting environmental variables (biophysical) were measured in the field within nearshore and offshore polygons at each waterbody, and included water depth, water temperature, water velocity, Secchi depth, substrate type, type of riparian vegetation, and algal presence (Table 5.7.6-1). Benthic sediment samples were collected from BMI sampling sites and analyzed for particle size analysis (PSA) and total organic carbon (TOC). In 2010, relative benchmarks were established along the shore at each waterbody to record the current water level and high water mark at the time of sampling.

In the intermittently wetted nearshore habitat (2010) water depths ranged from 0.9 (Split Lake and Limestone Forebay) m to 1.0 m (lower Nelson and Hayes rivers, and Assean Lake) (Table 5.7.6-1). In the predominantly wetted nearshore habitat (2009), mean water depths ranged from 1.9 m (Assean Lake) to 3.2 (Stephens Lake-North) (Table 5.7.6-1). Mean offshore water depths (2009 and 2010) varied considerably, ranging from 4.2 m (lower Nelson River) to 13.8 m (Assean Lake) (Table 5.7.6-1).

Intermittently wetted nearshore mean TOC values ranged from 0.2% (Limestone Forebay) to 0.9% (Split and Assean lakes) (Figure 5.7.6-2). Predominantly wetted nearshore benthic sediment had mean TOC values ranging between 1.9% (Assean Lake) and 7.7% (Stephens Lake-South) (Figure 5.7.6-3). In the offshore habitat, mean TOC ranged from 0.4% (lower Nelson River) to 1.7% (Assean Lake) (Figure 5.7.6-4).

Sediment composition (PSA) in the intermittently wetted nearshore habitat of Split Lake, Limestone Forebay, lower Nelson River, Hayes River and Assean Lake, largely consisted of sand (Figure 5.7.6-2). The predominantly wetted nearshore habitat of Assean Lake consisted mainly of silt; sediments from Split and Stephens lakes (North and South) were of similar proportions with respect to silt and clay (Figure 5.7.6-3). Sediment composition was quite variable in the offshore habitat (Figure 5.7.6-4). Silt dominated the sediment samples collected in Split, Stephens-South, Limestone Forebay, and Assean lakes; clay and silt were present in a similar amount in Stephens Lake-North. Sand was predominant in the offshore benthic sediment of lower Nelson River (Figure 5.7.6-4).

5.7.6.2 Species Composition, Distribution, and Relative Abundance

<u>Split Lake</u>

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of Split Lake was 95 individuals (Table 5.7.6-2; Figure 5.7.6-5). In general, non-insects and insects were equally represented in the samples (Figure 5.7.6-6). Of the non-insects, the main group was Amphipoda (scuds), followed by Oligochaeta (aquatic worms) and small numbers of Gastropoda (snails) (Figure 5.7.6-7). Insects mainly consisted of Ephemeroptera (mayflies) and Chironomidae (midges); Trichoptera (caddisflies) were also identified (Figure 5.7.6-7). Mean BMI density of benthic grab samples (n=15; 2009) collected in the predominantly wetted nearshore habitat was 375 individuals/m^2 (Table 5.7.6-3; Figure 5.7.6-8). Overall, insects dominated the BMI community and mainly consisted of Chironomidae and Ephemeroptera, and Trichoptera (Figures 5.7.6-9 and 5.7.6-10). Non-insects mainly consisted of Gastropoda, Bivalvia (clams), and Oligochaeta (Figure 5.7.6-10). Mean BMI density of offshore benthic grab samples (n=20; 2009 to 2010) was 4,952 individuals/m^2 (Table 5.7.6-4; Figure 5.7.6-11). Non-insects dominated the community, mainly consisting of Amphipoda and Bivalvia, and smaller numbers of Gastropoda, and Oligochaeta (Figures 5.7.6-12 and 5.7.6-13). Of the insects, the main group was Ephemeroptera; and smaller numbers of Chironomidae and Trichoptera were also present (Figure 5.7.6-13).

Total EPT (mean abundance of Ephemeroptera, Plecoptera, and Trichoptera) was generally similar between all habitat types sampled, comprising 23%, 35%, and 28% of the mean total BMI sampled in the intermittently wetted nearshore, predominantly wetted nearshore, and offshore habitats, respectively (Tables 5.7.6-2 to 5.7.6-4; Figures 5.7.6-14 to 5.7.6-16). Mayflies dominated the EPT in all habitat types; of which Caenidae (*Caenis*, small square-gilled mayflies) was dominant in the intermittently wetted nearshore and, Ephemeridae (*Hexagenia*, burrowing mayflies) dominant in predominantly wetted near and offshore grab samples (Tables 5.7.6-2 to 5.7.6-4). Mean EPT:C (ratio of EPT to Chironomidae) was 1.37 in the intermittently wetted nearshore habitat; and 0.36 and 10.52 in the predominantly wetted nearshore and offshore habitats, respectively (Tables 5.7.6-2 to 5.7.6-4). EPT:C indicated a relatively balanced community in the intermittently wetted nearshore habitat; a chironomid-dominated community in the predominantly wetted nearshore; and an EPT-dominated community within the offshore with respect to EPT and Chironomidae abundances.

Total taxonomic richness was greatest in the intermittently wetted nearshore and offshore habitats, and lowest in the predominantly wetted nearshore habitat (10) (Tables 5.7.6-2 to 5.7.6-4). Eight of the 18 families (Hill's effective and taxonomic richness) dominated the intermittently wetted nearshore habitat, notably Amphipoda (Hyalellidae), Chironomidae and Ephemeroptera (Caenidae) (Table 5.7.6-2). Three out of the ten families in the predominantly wetted nearshore habitat dominated the BMI community; most notable were Chironomidae and Ephemeridae (Table 5.7.6-3). Four of the 17 macroinvertebrate families dominated the community the offshore habitat, notably Amphipoda (Haustoriidae), Ephemeroptera (Ephemeridae), and Gastropoda (Pisidiidae) (Table 5.7.6-4). Mean taxonomic richness values were 13, 3, and 7 families in each of the intermittently wetted nearshore, predominantly wetted nearshore, and offshore habitats, respectively (Figures 5.7.6-17 to 5.7.6-19). Mean diversity (Simpson's) was 0.82 in the intermittently wetted nearshore, 0.51in the predominantly wetted nearshore, and 0.65 in the offshore (Figures 5.1.6-20 to 5.1.6-22). Mean evenness (Simpson's equitability) was 0.38 in the intermittently wetted nearshore, 0.85 in the predominantly wetted nearshore, and 0.44 in the offshore (Figures 5.1.6-20 to 5.1.6-22).

Stephens Lake-South

Mean BMI density of benthic grab samples (n=15; 2009) collected in the predominantly wetted nearshore habitat of Stephens Lake-South was 1,653 invertebrates/m^2 (Table 5.7.6-3; Figure 5.7.6-8). Insects dominated the BMI abundance and mainly consisted of Ephemeroptera; smaller numbers of Chironomidae and Trichoptera (Figures 5.7.6-9 and 5.7.6-10). Of the non-insects, the main macroinvertebrates included Amphipoda, Gastropoda, Oligochaeta; and Bivalvia (Figure 5.7.6-10). Mean BMI density in offshore benthic grab samples (n=15; 2009) was 7,794 individuals/m^2 (Table 5.7.6-4; Figure 5.7.6-11). Non-insects dominated the offshore BMI community, predominantly consisting of Amphipoda, Bivalvia, and Oligochaeata (Figures 5.7.6-12 and 5.7.6-13). Insects mainly consisted of Ephemeroptera, Chironomidae, and Trichoptera (Figure 5.7.6-13).

Mean EPT abundance comprised 83% and 23% of the mean total BMI density in the nearshore and offshore, respectively (Tables 5.7.6-3 and 5.7.6-4; Figures 5.7.6-15 and 5.7.6-16). In both habitat types, mayflies were the most abundant of the EPT, with Ephemeridae (*Hexagenia* sp.) as the most abundant mayfly genus (Tables 5.7.6-3 and 5.7.6-4). Plecoptera were not present in nearshore or offshore samples. Mean EPT:C was 9.32 and 2.08 in the nearshore and offshore polygon habitats, respectively, indicating an EPT-dominant community with respect to chironomid abundance within these insect groups (Tables 5.7.6-3 and 5.7.6-4).

Taxonomic richness was higher in the nearshore than in the offshore (Tables 5.7.6-3 and 5.7.6-4). Two of the 15 macroinvertebrate families identified in the predominantly wetted nearshore dominated the BMI community (most notably, Ephemeridae); and 3 of 9 families identified in the offshore were proportionally most abundant (most notably, Haustoriidae) (Tables 5.7.6-3 and 5.7.6-4). Mean taxa richness was 4 families in the nearshore and 5 families in the offshore (Figures 5.7.6-18 and 5.7.6-19). Simpson's diversity index was 0.36 and 0.55 in the near and off shore habitats, respectively (Figures 5.7.6-21 and 5.7.6-22). Simpson's evenness was 0.45 in the nearshore and 0.38 in the offshore (Figures 5.7.6-21 and 5.7.6-22).

Stephens Lake-North

Mean BMI density of benthic grab samples (n=15; 2009) collected in the predominantly wetted nearshore habitat of Stephens Lake-North was 765 invertebrates/m^2 (Table 5.7.6-3; Figure 5.7.6-8). Non-insects and insects were equally represented within the community (Figure 5.7.6-9). Non-insects mainly consisted of Oligochaeta and Bivalvia; although, Amphipoda and Gastropoda were also present (Figure 5.7.6-10). Insects mainly consisted of Chironomidae and Ephemeroptera; a smaller number of Trichoptera were also present (Figure 5.7.6-10). Mean BMI density for offshore benthic grab samples (n=15; 2009) in Stephens Lake-North was 1,570 individuals/m^2 (Table 5.7.6-4; Figure 5.7.6-11). Insects dominated the BMI community, consisting predominantly of Chironomidae (Figures 5.7.6-12 and 5.7.6-13). Other macroinvertebrate groups represented in the offshore habitat included Oligochaeta, Ephemeroptera, Bivalvia, and Amphipoda (Figure 5.7.6-13).

In nearshore and offshore habitats, mean EPT abundance comprised 20% and 1% of the total BMI community, respectively, with Ephemeroptera being the most abundant of the EPT (Tables 5.7.6-3 and 5.7.6-4; Figures 5.7.6-15 and 5.7.6-16). Ephemeridae (*Hexagenia*) was the most common mayfly genus in both habitats (Tables 5.7.6-3 and 5.7.6-4). Mean EPT:C was 0.96 in the nearshore, and 0.02 in the offshore (Tables 5.7.6-3 and 5.7.6-4). The EPT to chironomid abundances were nearly balanced in the nearshore and chironomids dominated the offshore with respect to EPT abundance.

Taxonomic richness was greater in the nearshore than in the offshore habitat (Tables 5.7.6-3 and 5.7.6-4). Five out of 14 macroinvertebrate families dominated the nearshore BMI community (notably, Chironomidae, Oligochaeta, Pisidiidae, and Ephemeridae); two of five families identified dominated the offshore community (most notably, Chironomidae) (Tables 5.7.6-3 and 5.7.6-4). Mean taxa richness in the predominantly wetted nearshore habitat was 5 families, and 3 families in the offshore (Figures 5.7.6-18 and 5.7.6-19). Mean diversity and evenness values were 0.73 and 0.70 in the nearshore habitat, and 0.40 and 0.47 in the offshore habitat (Figures 5.7.6-21 and 5.7.6-22).

Limestone Forebay

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of Limestone Forebay was 36 individuals (Table 5.7.6-2; Figure 5.7.6-5). Overall, insects dominated the BMI community, consisting predominantly of Chironomidae and Hemiptera (Figures 5.7.6-6 and 5.7.6-7). Non-insects mainly consisted of mainly Oligochaeta and small numbers of Amphipoda (Figure 5.7.6-7). Mean density of BMI collected in grab samples (n=5; 2010) in the offshore habitat of Limestone Forebay was 1,838 individuals/m^2

(Table 5.7.6-4; Figure 5.7.6-11). In general, non-insects and insects were equally represented within the offshore BMI community (Figure 5.7.6-12). Of the non-insects, Bivalvia was most abundant, followed by Oligochaeta, Amphipoda, and Gastropoda (Figure 5.7.6-13). Of the insects, Chironomidae was most abundant, followed by Ephemeroptera, and Trichoptera (Figure 5.7.6-13).

Mean EPT abundance comprised 2% and 19% of the mean BMI abundance in the nearshore and offshore habitats, respectively, with Ephemeroptera being the most abundant of the EPT (Tables 5.7.6-2 and 5.7.6-4; Figures 5.7.6-14 and 5.7.6-16). Three mayfly genera were identified in the intermittently wetted nearshore habitat (each being nearly equally represented): Caenidae (*Caenis* sp.), Baetidae (*Procloeon* sp., small minnow mayflies), and Heptageniidae (*Stenonema*, flat-headed mayflies) (Table 5.7.6-2). In the offshore habitat, Ephemeridae (*Hexagenia* sp.) was most abundant (Table 5.7.6-4). Mean EPT: C in the intermittently wetted nearshore habitat was 0.02, indicating a chironomid-based community with respect to EPT abundance (Table 5.7.6-2). Mean EPT: C in the offshore was 1.22, indicating a fairly balanced community with respect to EPT and Chironomidae abundances (Table 5.7.6-4).

Total taxonomic richness was similar in both nearshore and offshore habitats (Tables 5.7.6-2 and 5.7.6-4). Three of 13 macroinvertebrate families identified in the nearshore dominated the community (most notably, Chironomidae); and seven of the 16 families identified in the offshore were proportionately abundant (most notably, Pisidiidae) (Tables 5.7.6-2 and 5.7.6-4). Mean taxa richness was 6 families in the nearshore and 10 families in the offshore (Figures 5.7.6-17 and 5.7.6-19). Diversity and evenness values in the intermittently wetted nearshore habitat were 0.59 and 0.38, respectively (Figure 5.1.6-20). Diversity and evenness values in the offshore habitat were 0.82 and 0.54, respectively (Figure 5.1.6-22).

Lower Nelson River (d/s of Limestone Forebay)

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of lower Nelson River (d/s of Limestone Forebay) was 57 individuals (Table 5.7.6-2; Figure 5.7.6-5). Overall, insects dominated the BMI community in terms of total mean abundance, mainly consisting of Chironomidae and Ephemeroptera, with small numbers of Plecoptera (Figures 5.7.6-6 and 5.7.6-7). Non-insects consisted primarily of Oligochaeta (Figure 5.7.6-7). Mean BMI density in offshore grab samples (n=4; 2010) was 2,204 individuals/m^2 (Table 5.7.6-4; Figure 5.7.6-11). Similar to the nearshore, insects dominated the community in terms of abundance and Chironomidae and Trichoptera were the most abundant (Figures 5.7.6-12 and 5.7.6-13). Of the non-insects, Oligochaeta was proportionately most abundant; Gastropoda and Bivalvia also occurred (Figure 5.7.6-13).

Mean total EPT comprised 12% and 27% of the mean total BMI community in the intermittently wetted nearshore and offshore habitat polygons, respectively (Tables 5.7.6-2 and 5.7.6-4; Figures 5.7.6-14 and 5.7.6-16). Within EPT, Ephemeroptera was most abundant in the nearshore habitat; and Trichoptera predominated in the offshore habitat (Tables 5.7.6-2 and 5.7.6-4). Baetidae (*Procloeon* sp.) was the dominant mayfly genus of the four identified in the nearshore; Ephemeroptera were not found in offshore grab samples (Tables 5.7.6-2 and 5.7.6-4). Mean EPT:C in the intermittently wetted nearshore (0.60) and offshore (0.54) habitat polygons was fairly balanced with respect to EPT and Chironomidae abundances (Tables 5.7.6-2 and 5.7.6-4).

Five of 17 families identified from the intermittently wetted nearshore dominated the BMI community; notably, Chironomidae and Corixidae (Table 5.7.6-2). Mean taxa richness was 9 families (Figure 5.7.6-17). Three of the 9 macroinvertebrate families identified in the offshore were proportionately abundant; namely, Chironomidae, Trichoptera (Hydropsychidae), and Oligochaeta (Table 5.7.6-4). Mean taxa richness was 5 families (Figure 5.7.6-19). Mean Simpson’s diversity index was 0.69 in the nearshore and 0.60 in the offshore; evenness values were 0.37 in the nearshore and 0.46 in the offshore (Figures 5.7.6-20 and 5.7.6-22).

<u>Hayes River</u>

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 440 individuals (Table 5.7.6-2; Figure 5.7.6-5). Overall, insects dominated the total BMI abundance and predominantly consisted of Hemiptera, and smaller numbers of Ephemeroptera and Chironomidae (Figures 5.7.6-6 and 5.7.6-7). Non-insects mainly consisted of Oligochaeta and Amphipoda (Figure 5.7.6-7).

Mean EPT comprised 2% of the mean BMI abundance in the nearshore habitat, with ephemeropterans as proportionately most abundant (Table 5.7.6-2; Figure 5.7.6-14). Baetidae (*Baetisca*) was the dominant mayfly genus (Table 5.7.6-2). Mean EPT:C was 1.83, indicating a relatively balanced EPT:C community (Table 5.7.6-2).

Taxonomic richness indicated 18 families were identified in the nearshore samples, 2 of which dominated the BMI community (most notably, Corixidae) (Table 5.7.6-2). Mean taxa richness was 8 families (Figure 5.7.6-17). Simpson’s diversity index was 0.20 and evenness was 0.12 (Figure 5.7.6-20).

<u>Assean Lake</u>

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 708 individuals (Table 5.7.6-2; Figure 5.7.6-5). Insects and non-insects were nearly equally represented within the nearshore BMI community (Figure 5.7.6-6). Non-insects consisted predominantly of Amphipoda; though Bivalvia, Oligochaeta, and small numbers of Gastropoda were also present (Figure 5.7.6-7). Insects mainly consisted of Ephemeroptera; and Trichoptera and Chironomidae were also found to occur (Figure 5.7.6-7). Mean BMI density of benthic grab samples (n=15; 2009) collected in the predominantly wetted nearshore habitat of Assean Lake was 3,310 individuals/m^2 (Table 5.7.6-3; Figure 5.7.6-8). Overall, insects dominated total BMI abundance, mainly consisting of Chironomidae; and Ephemeroptera (Figures 5.7.6-9 and 5.7.6-10). Non-insects mainly consisted of Bivalvia, Oligochaeta, Amphipoda, and Gastropoda (Figure 5.7.6-10). Mean BMI density in offshore benthic grab samples (n=20, 2009 to 2010) in Assean Lake was 624 individuals/m^2 (Table 5.7.6-4; Figure 5.7.6-11). Insects marginally dominated the macroinvertebrate community, predominantly consisting of Chironomidae followed by Ephemeroptera and smaller numbers of Trichoptera (Figures 5.7.6-11 and 5.7.6-12). Of the non-insects, the main group was Bivalvia; and Oligochaeta and small numbers of Gastropoda were also present (Figure 5.7.6-12).

Mean EPT comprised 44%, 2%, and 22% of the mean total BMI in the intermittently wetted nearshore, predominantly wetted nearshore, and offshore habitats, respectively (Tables 5.7.6-2 to 5.7.6-4; Figures 5.7.6-14 to 5.7.6-16). Mayflies dominated the EPT in each habitat; of where Caenidae (*Caenis*) was dominant in the intermittently wetted nearshore; Ephemeridae (*Ephemera* and *Hexagenia*) were the dominant genus in the predominantly wetted nearshore; and Ephemeridae (*Hexagenia*) was dominant offshore (Tables 5.7.6-2 to 5.7.6-4). Mean EPT:C was 15.68, 0.06, and 0.80, in nearshore kicknet samples, nearshore grab samples, and offshore grab samples respectively (Tables 5.7.6-2 to 5.7.6-4). EPT:C indicated an EPT-dominated community in the intermittently wetted nearshore, a chironomid-dominated in the predominantly wetted nearshore, and a generally balanced community offshore with respect to EPT and Chironomidae abundances.

Five out of 30 BMI families identified in intermittently wetted nearshore samples dominated the community; notably, Ephemeroptera (Caenidae) and Amphipoda (Hyalellidae) (Table 5.7.6-2). Five out the 20 families identified in the predominantly wetted nearshore significantly contributed to the overall composition, most notably was Chironomidae (Table 5.7.6-3). Three out of 12 families identified in offshore BMI samples dominated, namely, Chironomidae, Gastropoda (Pisidiidae), and Ephemeroptera (Ephemeridae) (Table 5.7.6-4). Mean taxonomic richness values were 19, 8, and 4 families in each of the intermittently wetted nearshore, predominantly wetted nearshore, and offshore habitats, respectively (Figures 5.7.6-17 to 5.7.6-19). Mean diversity was 0.71 in the intermittently wetted nearshore, 0.62 in the predominantly wetted nearshore, and 0.64 in the offshore (Figures 5.1.6-20 to 5.1.6-22). Mean evenness was 0.17 in the intermittently wetted nearshore, 0.32 in the predominantly wetted nearshore, and 0.68 in the offshore (Figures 5.1.6-20 to 5.1.6-22).

5.7.6.3 Spatial Comparisons

Several spatial differences in the intermittently wetted nearshore habitat sampled in 2010 at Split and Assean lakes, and lower Nelson (on-system) and Hayes (off-system) rivers were detected. Trends were difficult to assess though it appeared that most abundance measures calculated from BMI samples collected in Assean Lake were significantly greater than Split Lake, Nelson River and Hayes River (Figures 5.7.6-5 to 5.7.6-7, 5.7.6-14, 5.7.6-17, and 5.7.6-20). No similarities between Split and Assean Lakes were detected. Lower Nelson and Hayes rivers were similar with respect to abundances of non-insects, oligochaetes and mayflies, EPT, and taxa richness (Figure 5.7.6-6, 5.7.6-7, 5.7.6-14, and 5.7.6-17). All waterbodies were similar in terms of abundance of chironomids (Figure 5.7.6-7).

Spatial differences in BMI abundance and richness metrics for the predominantly wetted nearshore habitat of Split (on-system) and Assean (off-system) lakes were detected. While statistical analysis only incorporated one year of data (2009), it appears that all measures were significantly different except for abundances of gastropods, mayflies, EPT, EPT:C, and Simpson's diversity (Figures 5.7.6-8 to 5.7.6-10, 5.7.6-15, 5.7.6-18, and 5.7.6-21). For most of these measures, Split Lake appears to be significantly lower than Assean Lake, except for Simpson's evenness index.

Spatial differences for the offshore habitat of Split Lake, Assean Lake, and lower Nelson River were also apparent. Statistical analysis only incorporated two years of data (2009 to 2010), though it appears that all sites differed except for Simpson's diversity (Figures 5.7.6-11 to 5.7.6-5.7.6-13, 5.7.6-16, 5.7.6-19, and 5.7.6-22). Trends were difficult to assess, though like the predominantly wetted nearshore habitat, Assean Lake was significantly different than the other two sites, though significantly lower with respect to abundances of the major BMI groups.

5.7.6.4 Temporal Variability

Preliminary power analysis of the initial CAMPP study design (implemented in 2008 and 2009) showed that the BMI community metrics differed considerably among samples within the same habitat type and the delineation between nearshore and offshore polygon locations was sometimes indistinct. The inherent variablilty of this data made it difficult to explain and relate "significant" results with confidence to other components of CAMPP (e.g., hydrology and water quality).

The initial BMI study design was refined and implemented in the 2010 field season. The study design was changed with respect to site selection within nearshore and offshore polygons, and nearshore sampling methods. The objective of the refined BMI program was to minimize the inherent variability and increase the power of the BMI data to detect statistically significant variabililty or trends over time. As additional data are acquired for the region under the refined program, analyses will be undertaken to evaluate potential long-term changes in BMI community metrics and to link significant trends to the other CAMP components.

Temporal differences in BMI abundance and richness metrics for the offshore habitat of Split Lake were detected. Statistical analysis incorporated only two years of data (2009 to 2010), though it appears that numbers of amphipods, bivalves, gastropods, and chironomids, taxa richness, and Simpson's diversity varied between years (Figures 5.7.6-23 to 5.7.6-28). Each of these measures was significantly lower in 2009, except for amphipod abundance.

Temporal differences in BMI abundance and richness metrics for the offshore habitat of Assean Lake were detected. Statistical analysis incorporated only two years of data (2009 to 2010) and all measures were significantly different except for abundances of non-insects, gastropods, chironomids, and Simpson's diversity (Figures 5.7.6-29 to 5.7.6-34). For each of the differences 2009 was significantly lower than 2010, except for oligochaete abundance and Simpson's evenness.

Table 5.7.6-1. Habitat and physical characteristics recorded at benthic macroinvertebrate sites in the Lower Nelson River Region for CAMPP, 2008 to 2010.

Waterbody	Habitat Type	No. of Samples	Water Depth			Mean Water Velocity	Mean Secchi Depth	Water Temperature	Predominant Substrate	Riparian Vegetation	Canopy Cover	Algae
			Mean	Min	Max							
		(n)	(m)	(m)	(m)	(m/sec)	(m)	(ºC)			(%)	
Lower Nelson River (2008)	Nearshore (rock baskets)	7	2.9	1.6	5.1	0.91	--	--	--	--	--	--
Hayes River (2008)	Nearshore (rock baskets)	2	2.7	2.6	2.7	0.83	--	--	--	--	--	--

Table 5.4.6-1. continued.

Waterbody	Habitat Type	No. of Samples (n)	Water Depth Mean (m)	Water Depth Min (m)	Water Depth Max (m)	Mean Water Velocity (m/sec)	Mean Secchi Depth (m)	Water Temperature (ºC)	Predominant Substrate	Riparian Vegetation	Canopy Cover (%)	Algae
Split Lake (2009)	Nearshore	15	2.6	2.0	2.9	0.02	0.32	15.0	--	coniferous, shrubs	0	--
	Offshore	15	8.6	6.6	10.5	0.12	0.32	17.0	--	--	0	--
Stephens Lake-South (2009)	Nearshore	15	2.9	1.6	4.0	0.01	0.45	16.0	--	coniferous	0	--
	Offshore	15	14.7	13.6	16.2	0.07	0.45	16.5	--	--	0	--
Stephens Lake-North (2009)	Nearshore	15	3.2	1.6	4.0	0.05	0.90	15.0	--	coniferous	0	--
	Offshore	15	10.6	10.1	11.6	0.05	1.00	16.0	--	--	0	--
Assean Lake (2009)	Nearshore	15	1.9	1.2	2.8	0.09	0.90	--	--	coniferous	0	--
	Offshore	15	15.8	8.7	18.9	0.32	1.50	16.5	--	--	0	--

Table 5.7.6-1. continued.

Waterbody	Habitat Type	No. of Samples	Water Depth			Mean Water Velocity	Mean Secchi Depth	Water Temperature	Predominant Substrate	Riparian Vegetation	Canopy Cover	Algae
			Mean	Min	Max							
		(n)	(m)	(m)	(m)	(m/sec)	(m)	(ºC)			(%)	
Split Lake (2010)	Nearshore	5	0.9	0.7	1.0	0.00	0.43	14.0	sand, organic matter	shrubs, coniferous	0-24	filamentous, algal balls
	Offshore	5	7.4	6.0	8.8	0.00	0.44	16.0	clay	--	--	--
Limestone Forebay (2010)	Nearshore	5	0.9	0.9	0.9	0.00	0.17	16.0	sand, woody debris	grass, coniferous	0	--
	Offshore	5	6.6	5.5	8.1	0.06	0.35	15.5	clay, sand	--	--	--
Lower Nelson River (d/s Limestone Forebay) (2010)	Nearshore	5	1.0	1.0	1.0	0.00	0.21	15.5	sand	shrubs, mixed forest	0	--
	Offshore	4	4.2	3.8	4.5	0.00	0.33	15.0	sand	--	--	--
Hayes River (2010)	Nearshore	5	1.0	1.0	1.0	0.49	0.17	--	sand, gravel, cobble	shrubs, mixed forest	0	--
Assean Lake (2010)	Nearshore	5	1.0	0.9	1.1	0.00	0.93	15.0	cobble, boulder	shrubs, coniferous	0-24	--
	Offshore	5	5.6	4.9	6.4	0.00	1.18	14.0	clay	--	--	--

Table 5.7.6-2. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate nearshore kicknet samples collected in the Lower Nelson River Region for CAMPP, 2010.

Waterbody and Habitat	Split Lake Nearshore (2010)							Limestone Forebay Nearshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--	5	--	--	--	--	--	--
Water Depth (m)	--	0.9	0.10	0.04	1.0	0.7	1.0	--	0.9	0.02	0.01	0.9	0.9	0.9
Abundance (no. per kicknet)														
Total Invertebrates	--	95	84.1	37.6	64	36	243	--	36	25.9	11.6	37	10	76
Non-Insecta	53	50	47.0	21.0	29	15	132	13	5	6.6	2.9	2	1	16
Oligochaeta	11	11	5.7	2.6	9	5	17	10	4	5.3	2.4	2	1	13
Amphipoda	40	38	43.8	19.6	18	7	113	2	1	1.3	0.6	0	0	3
Bivalvia	0	0	0.0	0.0	0	0	0	0	0	0.1	0.1	0	0	0
Gastropoda	0	0	0.1	0.1	0	0	1	0	0	0.2	0.1	0	0	0
Insecta	47	45	37.5	16.8	34	21	111	87	32	20.5	9.2	35	9	60
Chironomidae	17	16	15.7	7.0	10	7	44	65	24	18.8	8.4	24	6	53
Ephemeroptera	21	20	18.2	8.1	13	9	52	1	1	0.8	0.4	0	0	2
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	1	1	1.1	0.5	1	0	3	0	0	0.3	0.1	0	0	1
EPT	23	22	19.1	8.6	14	10	55	2	1	0.8	0.4	0	0	2
EPT to Chironomidae Ratio	--	1.37	0.155	0.069	1.38	1.19	1.58	--	0.02	0.020	0.009	0.01	0.00	0.04
Genus analysis of Ephemeroptera	Caenidae: *Caenis*	--	--	--	--	--	--	Caenidae: *Caenis* + Baetidae: *Procloeon* + Heptageniidae: *Stenonema*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	18	13	2.5	1.1	12	11	17	13	6	1.6	0.7	6	4	8
Simpson's Diversity Index	--	0.82	0.072	0.032	0.84	0.74	0.89	--	0.59	0.068	0.030	0.61	0.47	0.65
Evenness (Simpson's Equitability)	--	0.38	0.177	0.079	0.37	0.17	0.61	--	0.38	0.205	0.092	0.26	0.21	0.64
Shannon-Weaver Index	--	2.06	0.193	0.086	2.09	1.83	2.26	--	1.10	0.144	0.064	1.08	0.97	1.33
Evenness (Shannon's Equitability)	--	0.72	0.091	0.041	0.74	0.61	0.82	--	0.58	0.111	0.050	0.56	0.46	0.70
Hill's Effective Richness	--	8	1.5	0.7	8	6	10	--	3	0.5	0.2	3	3	4
Evenness (Hill's)	--	0.47	0.132	0.059	0.47	0.29	0.62	--	0.45	0.170	0.076	0.35	0.30	0.66

Table 5.7.6-2. continued.

Waterbody and Habitat	Lower Nelson River (d/s of Limestone Forebay) Nearshore (2010)							Hayes River Nearshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--	5	--	--	--	--	--	--
Water Depth (m)	--	1.0	0.00	0.00	1.0	1.0	1.0	--	1.0	0.00	0.00	1.0	1.0	1.0
Abundance (no. per kicknet)														
Total Invertebrates	--	57	52.8	23.6	44	15	146	--	440	313.8	140.3	419	62	902
Non-Insecta	8	4	2.3	1.0	4	2	8	1	6	2.7	1.2	5	4	11
Oligochaeta	6	3	1.9	0.9	3	1	6	1	5	3.8	1.7	4	0	11
Amphipoda	1	0	0.6	0.2	0	0	1	0	1	1.2	0.5	0	0	3
Bivalvia	0	0	0.0	0.0	0	0	0	0	0	0.1	0.1	0	0	0
Gastropoda	1	0	0.3	0.1	0	0	1	0	0	0.0	0.0	0	0	0
Insecta	92	53	52.5	23.5	42	10	142	99	434	312.9	139.9	413	58	897
Chironomidae	43	24	29.7	13.3	16	1	75	1	6	2.5	1.1	6	4	9
Ephemeroptera	12	7	6.6	2.9	7	0	15	2	9	3.8	1.7	9	5	15
Plecoptera	0	0	0.1	0.1	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	0	0	0.1	0.1	0	0	0	0	0	0.3	0.1	0	0	1
EPT	12	7	6.5	2.9	7	0	15	2	10	4.0	1.8	9	5	16
EPT to Chironomidae Ratio	--	0.60	0.589	0.263	0.57	0.07	1.50	--	1.83	1.421	0.636	1.21	1.08	4.36
Genus analysis of Ephemeroptera	Baetidae: *Procloeon*	--	--	--	--	--	--	Baetiscidae: *Baetisca*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	17	9	0.9	0.4	8	8	10	18	8	2.9	1.3	8	6	13
Simpson's Diversity Index	--	0.69	0.157	0.070	0.78	0.47	0.84	--	0.20	0.241	0.108	0.12	0.05	0.62
Evenness (Simpson's Equitability)	--	0.37	0.189	0.084	0.32	0.24	0.69	--	0.12	0.027	0.012	0.12	0.08	0.15
Shannon-Weaver Index	--	1.46	0.376	0.168	1.73	1.04	1.74	--	0.56	0.633	0.283	0.35	0.16	1.68
Evenness (Shannon's Equitability)	--	0.62	0.139	0.062	0.66	0.46	0.79	--	0.20	0.191	0.086	0.15	0.08	0.54
Hill's Effective Richness	--	5	1.5	0.7	6	3	6	--	2	1.8	0.8	1	1	5
Evenness (Hill's)	--	0.43	0.132	0.059	0.41	0.29	0.63	--	0.16	0.053	0.024	0.15	0.11	0.24

Table 5.7.6-2. continued.

Waterbody and Habitat	Assean Lake Nearshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--
Water Depth (m)	--	1.0	0.07	0.03	1.0	0.9	1.1
Abundance (no. per kicknet)							
Total Invertebrates	--	708	388.6	173.8	535	305	1193
Non-Insecta	48	339	244.9	109.5	203	124	632
Oligochaeta	6	43	25.2	11.3	49	7	75
Amphipoda	34	242	190.8	85.3	137	87	472
Bivalvia	6	45	33.5	15.0	27	15	88
Gastropoda	1	4	1.1	0.5	3	3	5
Insecta	52	370	166.7	74.6	378	182	616
Chironomidae	3	21	9.5	4.2	21	11	33
Ephemeroptera	40	287	134.7	60.3	312	127	479
Plecoptera	0	0	0.0	0.0	0	0	0
Trichoptera	3	22	19.5	8.7	15	8	55
EPT	44	309	149.5	66.8	320	135	534
EPT to Chironomidae Ratio	--	15.68	6.758	3.022	12.00	10.05	25.02
Genus analysis of Ephemeroptera	Caenidae: *Caenis*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	30	19	2.1	0.9	19	15	20
Simpson's Diversity Index	--	0.71	0.048	0.022	0.74	0.63	0.74
Evenness (Simpson's Equitability)	--	0.17	0.043	0.019	0.17	0.12	0.24
Shannon-Weaver Index	--	1.70	0.110	0.049	1.77	1.55	1.79
Evenness (Shannon’s Equitability)	--	0.56	0.050	0.023	0.56	0.50	0.64
Hill's Effective Richness	--	5	0.6	0.3	6	5	6
Evenness (Hill's)	--	0.27	0.058	0.026	0.25	0.21	0.37

Table 5.7.6-3. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate nearshore grab samples collected in the Lower Nelson River Region for CAMPP, 2008 to 2010.

Waterbody and Habitat	Split Lake Nearshore (2009)							Stephens Lake-South Nearshore (2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	15	--	--	--	--	--	--	15	--	--	--	--	--	--
Water Depth (m)	--	2.6	0.22	0.06	2.6	2.0	2.9	--	2.9	0.68	0.18	2.7	1.6	4.0
Abundance (no. per m^2)														
Total Invertebrates	--	375	445.5	115.0	260	43	1601	--	1653	868.9	224.4	1558	346	2900
Non-Insecta	20	75	62.2	16.1	87	0	173	7	115	266.6	68.8	43	0	1039
Oligochaeta	3	12	25.7	6.6	0	0	87	1	17	39.4	10.2	0	0	130
Amphipoda	0	0	0.0	0.0	0	0	0	4	61	187.8	48.5	0	0	736
Bivalvia	4	14	26.7	6.9	0	0	87	0	6	15.2	3.9	0	0	43
Gastropoda	11	40	55.4	14.3	0	0	130	2	26	56.2	14.5	0	0	173
Insecta	80	300	435.7	112.5	130	43	1558	93	1538	924.4	238.7	1515	303	2900
Chironomidae	37	139	327.7	84.6	0	0	1212	10	159	139.5	36.0	130	0	476
Ephemeroptera	35	130	141.7	36.6	87	0	519	81	1333	838.0	216.4	1255	130	2684
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	1	3	11.2	2.9	0	0	43	2	35	46.8	12.1	0	0	130
EPT	35	133	144.9	37.4	87	0	519	83	1368	842.7	217.6	1255	216	2684
EPT to Chironomidae Ratio	--	0.36	0.605	0.156	0.00	0.00	2.00	--	9.32	15.215	3.928	6.00	0.00	62.00
Genus analysis of Ephemeroptera	1 sp. (*Hexagenia*)	--	--	--	--	--	--	3 spp. (Dom: *Hexagenia*)	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	10	3	1.4	0.4	3	1	5	15	4	2.0	0.5	3	1	8
Simpson's Diversity Index	--	0.51	0.279	0.072	0.63	0.00	0.78	--	0.36	0.206	0.053	0.29	0.00	0.72
Evenness (Simpson's Equitability)	--	0.85	0.168	0.043	0.90	0.52	1.02	--	0.45	0.225	0.058	0.35	0.23	1.00
Shannon-Weaver Index	--	0.90	0.541	0.140	1.04	0.00	1.56	--	0.74	0.432	0.112	0.63	0.00	1.74
Evenness (Shannon's Equitability)	--	0.72	0.382	0.099	0.92	0.00	1.00	--	0.49	0.252	0.065	0.43	0.00	0.89
Hill's Effective Richness	--	3	1.2	0.3	3	1	5	--	2	1.1	0.3	2	1	6
Evenness (Hill's)	--	0.90	0.124	0.032	0.94	0.62	1.00	--	0.55	0.209	0.054	0.45	0.35	1.00

Table 5.7.6-3. continued.

Waterbody and Habitat	Stephens Lake-North Nearshore (2009)							Assean Lake Nearshore (2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	15	--	--	--	--	--	--	15	--	--	--	--	--	--
Water Depth (m)	--	3.2	0.60	0.16	3.3	1.6	4.0	--	1.9	0.37	0.10	2.0	1.2	2.8
Abundance (no. per m^2)														
Total Invertebrates	--	765	444.3	114.7	649	260	1731	--	3310	1415.5	365.5	2640	952	5930
Non-Insecta	50	381	430.1	111.1	130	43	1212	24	808	441.6	114.0	693	173	1558
Oligochaeta	23	179	259.6	67.0	87	0	1039	7	225	215.3	55.6	130	0	693
Amphipoda	6	49	104.6	27.0	0	0	303	6	190	214.4	55.4	87	0	649
Bivalvia	18	141	217.9	56.3	43	0	649	9	297	230.7	59.6	346	0	866
Gastropoda	1	6	15.2	3.9	0	0	43	3	84	106.6	27.5	43	0	390
Insecta	50	384	202.9	52.4	346	130	693	76	2502	1353.0	349.3	1904	779	5367
Chironomidae	25	193	123.4	31.9	173	43	519	67	2228	1381.6	356.7	1731	736	5194
Ephemeroptera	17	130	109.7	28.3	87	0	303	2	78	78.8	20.3	87	0	260
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	3	26	51.2	13.2	0	0	173	0	0	0.0	0.0	0	0	0
EPT	20	156	132.7	34.3	130	0	476	2	78	78.8	20.3	87	0	260
EPT to Chironomidae Ratio	--	0.96	0.894	0.231	1.00	0.00	3.00	--	0.06	0.078	0.020	0.02	0.00	0.21
Genus analysis of Ephemeroptera	3 spp. (Dom: *Hexagenia*)	--	--	--	--	--	--	4 spp. (DOM: *Ephemera + Hexagenia*)	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	14	5	1	0.4	5.0	3	8	20	8	2.1	0.5	8	5	11
Simpson's Diversity Index	--	0.73	0.081	0.021	0.72	0.59	0.85	--	0.62	0.154	0.040	0.58	0.41	0.83
Evenness (Simpson's Equitability)	--	0.70	0.185	0.048	0.71	0.41	1.04	--	0.32	0.126	0.033	0.30	0.17	0.51
Shannon-Weaver Index	--	1.49	0.276	0.071	1.55	0.96	1.99	--	1.47	0.383	0.099	1.40	0.92	2.06
Evenness (Shannon's Equitability)	--	0.86	0.091	0.023	0.88	0.67	1.00	--	0.64	0.136	0.035	0.65	0.43	0.82
Hill's Effective Richness	--	5	1.3	0.3	5	3	7	--	5	1.8	0.5	4	2	8
Evenness (Hill's)	--	0.80	0.134	0.035	0.82	0.55	1.00	--	0.46	0.139	0.036	0.48	0.27	0.64

Table 5.7.6-4. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate offshore grab samples collected in the Lower Nelson River Region for CAMPP, 2008 to 2010.

Waterbody and Habitat	Split Lake Offshore (2009 to 2010)							Stephens Lake-South Offshore (2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	20	--	--	--	--	--	--	15	--	--	--	--	--	--
Water Depth (m)	--	8.3	1.45	0.32	8.3	6.0	10.5	--	14.7	0.72	0.19	14.6	13.6	16.2
Abundance (no. per m^2)														
Total Invertebrates	--	4952	1765.7	394.8	4797	1212	8137	--	7794	3237.2	835.8	7098	2900	16015
Non-Insecta	68	3374	1327.1	296.8	3520	866	5497	63	4943	2428.9	627.1	4415	1558	11080
Oligochaeta	1	29	41.6	9.3	7	0	130	1	81	103.3	26.7	43	0	303
Amphipoda	40	1997	1249.4	279.4	2013	491	5194	61	4755	2462.3	635.8	4155	1298	11080
Bivalvia	24	1209	1016.8	227.4	974	130	3939	1	101	139.5	36.0	87	0	476
Gastropoda	5	266	378.1	84.6	22	0	1270	0	0	0.0	0.0	0	0	0
Insecta	32	1578	871.6	194.9	1515	260	2857	37	2851	1190.3	307.3	2770	909	4934
Chironomidae	3	142	171.7	38.4	43	0	462	13	1019	581.6	150.2	952	303	2078
Ephemeroptera	27	1327	835.5	186.8	1385	173	2684	23	1795	766.9	198.0	1731	606	3116
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	1	66	100.7	22.5	43	0	303	0	23	32.2	8.3	0	0	87
EPT	28	1392	872.8	195.2	1385	260	2813	23	1818	776.0	200.4	1731	606	3203
EPT to Chironomidae Ratio	--	10.52	14.984	3.350	4.08	0.00	56.00	--	2.08	0.865	0.223	2.00	0.86	4.20
Genus analysis of Ephemeroptera	Ephemeridae: *Hexagenia*	--	--	--	--	--	--	1 sp. (*Hexagenia*)	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	17	7	2.1	0.5	7	4	12	9	5	1.4	0.4	4	3	7
Simpson's Diversity Index	--	0.65	0.094	0.021	0.65	0.40	0.78	--	0.55	0.110	0.028	0.54	0.35	0.74
Evenness (Simpson's Equitability)	--	0.43	0.113	0.025	0.41	0.25	0.68	--	0.38	0.078	0.020	0.40	0.25	0.54
Shannon-Weaver Index	--	1.28	0.281	0.063	1.28	0.74	1.83	--	1.07	0.253	0.065	0.96	0.66	1.55
Evenness (Shannon’s Equitability)	--	0.66	0.084	0.019	0.69	0.46	0.79	--	0.58	0.086	0.022	0.58	0.46	0.72
Hill's Effective Richness	--	4	1.1	0.2	4	2	6	--	3	0.8	0.2	3	2	5
Evenness (Hill's)	--	0.53	0.110	0.025	0.50	0.36	0.75	--	0.47	0.080	0.021	0.48	0.35	0.64

Table 5.7.6-4. continued.

Waterbody and Habitat	Stephens Lake-North Offshore (2009)							Limestone Forebay Offshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	15	--	--	--	--	--	--	5	--	--	--	--	--	--
Water Depth (m)	--	10.6	0.35	0.09	10.5	10.1	11.6	--	6.6	0.99	0.44	6.4	5.5	8.1
Abundance (no. per m^2)														
Total Invertebrates	--	1570	667.0	172.2	1645	736	2857	--	1838	1567.5	701.0	1125	909	4588
Non-Insecta	19	294	297.7	76.9	216	43	1082	54	990	1295.6	579.4	462	188	3275
Oligochaeta	17	274	296.6	76.6	173	43	1082	11	208	232.1	103.8	101	72	620
Amphipoda	0	3	11.2	2.9	0	0	43	4	66	51.6	23.1	58	14	144
Bivalvia	1	17	21.9	5.7	0	0	43	35	646	981.5	438.9	289	14	2381
Gastropoda	0	0	0.0	0.0	0	0	0	4	66	52.6	23.5	43	14	130
Insecta	81	1275	506.0	130.7	1428	519	1991	46	848	280.8	125.6	721	635	1313
Chironomidae	80	1252	499.3	128.9	1428	476	1991	17	312	153.6	68.7	216	188	519
Ephemeroptera	1	23	27.7	7.2	0	0	87	11	196	79.4	35.5	159	115	317
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	0	0	0.0	0.0	0	0	0	8	147	99.1	44.3	115	58	317
EPT	1	23	27.7	7.2	0	0	87	19	343	92.6	41.4	346	231	476
EPT to Chironomidae Ratio	--	0.02	0.027	0.007	0.00	0.00	0.09	--	1.22	0.383	0.171	1.07	0.87	1.71
Genus analysis of Ephemeroptera	1 sp. (*Hexagenia*)	--	--	--	--	--	--	Ephemeridae: *Hexagenia*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	5	3	0.6	0.2	3	2	4	16	10	1.9	0.8	11	8	12
Simpson's Diversity Index	--	0.40	0.155	0.040	0.40	0.17	0.66	--	0.82	0.069	0.031	0.84	0.70	0.87
Evenness (Simpson's Equitability)	--	0.47	0.171	0.044	0.45	0.30	0.98	--	0.54	0.199	0.089	0.63	0.24	0.74
Shannon-Weaver Index	--	0.75	0.249	0.064	0.72	0.39	1.26	--	2.00	0.170	0.076	2.02	1.72	2.17
Evenness (Shannon’s Equitability)	--	0.56	0.186	0.048	0.56	0.28	0.99	--	0.82	0.104	0.047	0.86	0.65	0.92
Hill's Effective Richness	--	2	0.6	0.1	2	1	4	--	7	1.2	0.5	8	6	9
Evenness (Hill's)	--	0.57	0.158	0.041	0.55	0.37	0.99	--	0.66	0.170	0.076	0.73	0.40	0.84

Table 5.7.6-4. continued.

Waterbody and Habitat	Lower Nelson River (d/s of Limestone Forebay) Offshore (2010)							Assean Lake Offshore (2009 to 2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	4	--	--	--	--	--	--	20	--	--	--	--	--	--
Water Depth (m)	--	4.2	0.32	0.16	4.2	3.8	4.5	--	13.3	5.11	1.14	15.2	4.9	18.9
Abundance (no. per m^2)														
Total Invertebrates	--	2204	1257.1	628.6	2157	736	3766	--	624	533.5	119.3	418	0	1688
Non-Insecta	37	808	469.3	234.6	685	404	1457	41	256	256.0	57.3	173	0	952
Oligochaeta	26	570	415.1	207.5	563	72	1082	12	74	101.4	22.7	43	0	346
Amphipoda	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Bivalvia	3	58	58.9	29.5	58	0	115	27	171	238.5	53.3	58	0	822
Gastropoda	8	180	105.7	52.8	209	29	274	1	9	20.1	4.5	0	0	72
Insecta	63	1396	1365.2	682.6	1010	202	3362	59	368	364.4	81.5	238	0	1414
Chironomidae	36	790	451.7	225.9	858	188	1255	35	218	199.0	44.5	130	0	693
Ephemeroptera	0	0	0.0	0.0	0	0	0	21	133	236.7	52.9	0	0	750
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	27	602	1002.9	501.4	159	0	2092	0	2	5.3	1.2	0	0	14
EPT	27	602	1002.9	501.4	159	0	2092	22	136	240.2	53.7	0	0	765
EPT to Chironomidae Ratio	--	0.54	0.773	0.387	0.24	0.00	1.67	--	0.80	1.366	0.306	0.00	0.00	4.40
Genus analysis of Ephemeroptera	--	--	--	--	--	--	--	Ephemeridae: *Hexagenia*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	1	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	2	--	--	--	--	--	--
Taxonomic Richness (Family-level)	9	5	1.9	0.9	5	4	8	12	4	1.7	0.4	3	0	8
Simpson's Diversity Index	--	0.60	0.099	0.050	0.62	0.46	0.70	--	0.64	0.159	0.036	0.67	0.00	0.75
Evenness (Simpson's Equitability)	--	0.46	0.170	0.085	0.46	0.25	0.67	--	0.68	0.271	0.061	0.74	0.00	1.00
Shannon-Weaver Index	--	1.12	0.214	0.107	1.19	0.81	1.30	--	1.20	0.325	0.073	1.29	0.00	1.65
Evenness (Shannon’s Equitability)	--	0.64	0.126	0.063	0.62	0.52	0.81	--	0.81	0.223	0.050	0.88	0.00	1.00
Hill's Effective Richness	--	3	0.6	0.3	3	2	4	--	3	0.8	0.2	4	1	5
Evenness (Hill's)	--	0.54	0.167	0.083	0.55	0.33	0.74	--	0.76	0.248	0.055	0.84	0.00	1.00

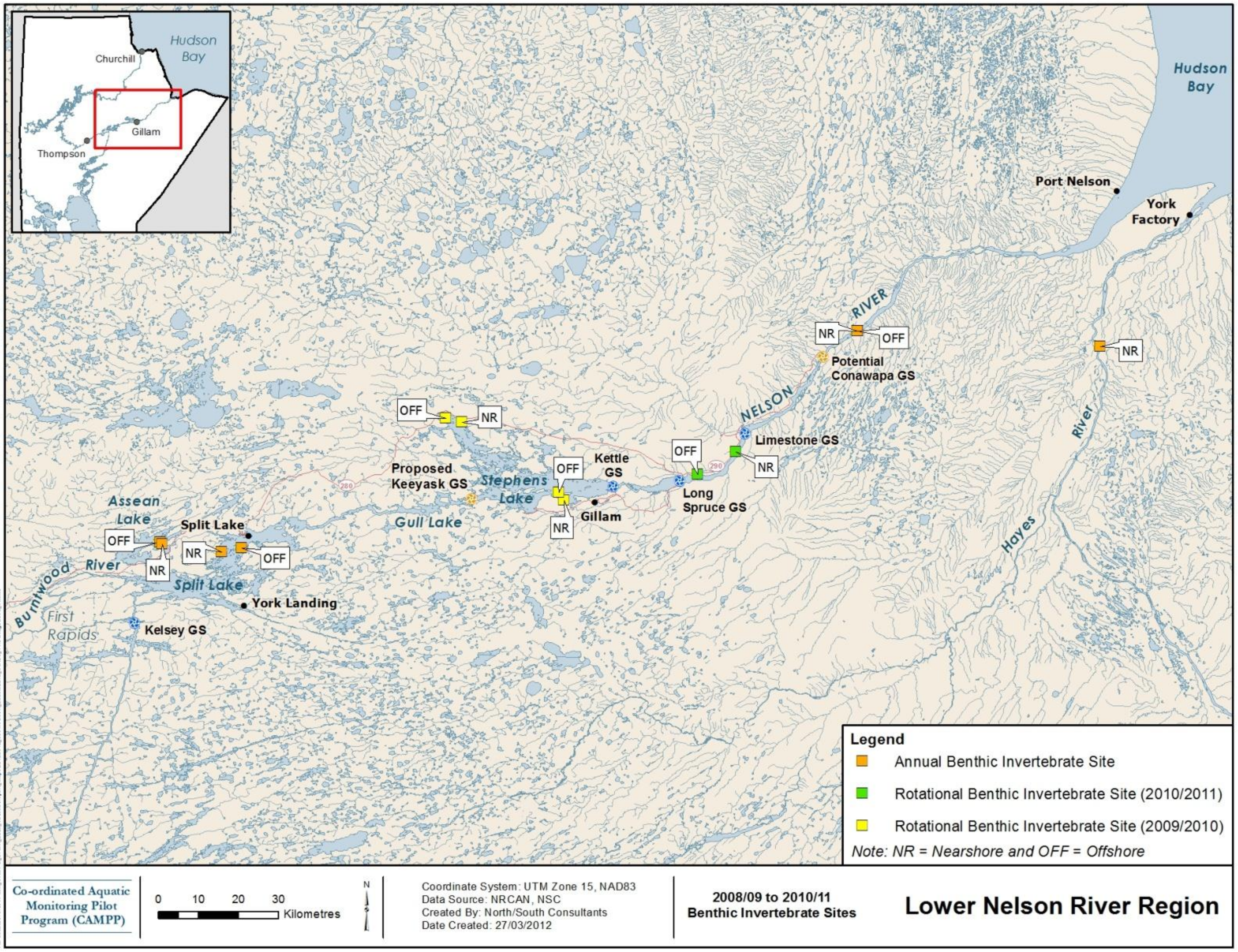


Figure 5.7.6-1. Benthic invertebrate sampling sites located in CAMPP waterbodies in the Lower Nelson River Region, 2008 to 2010.

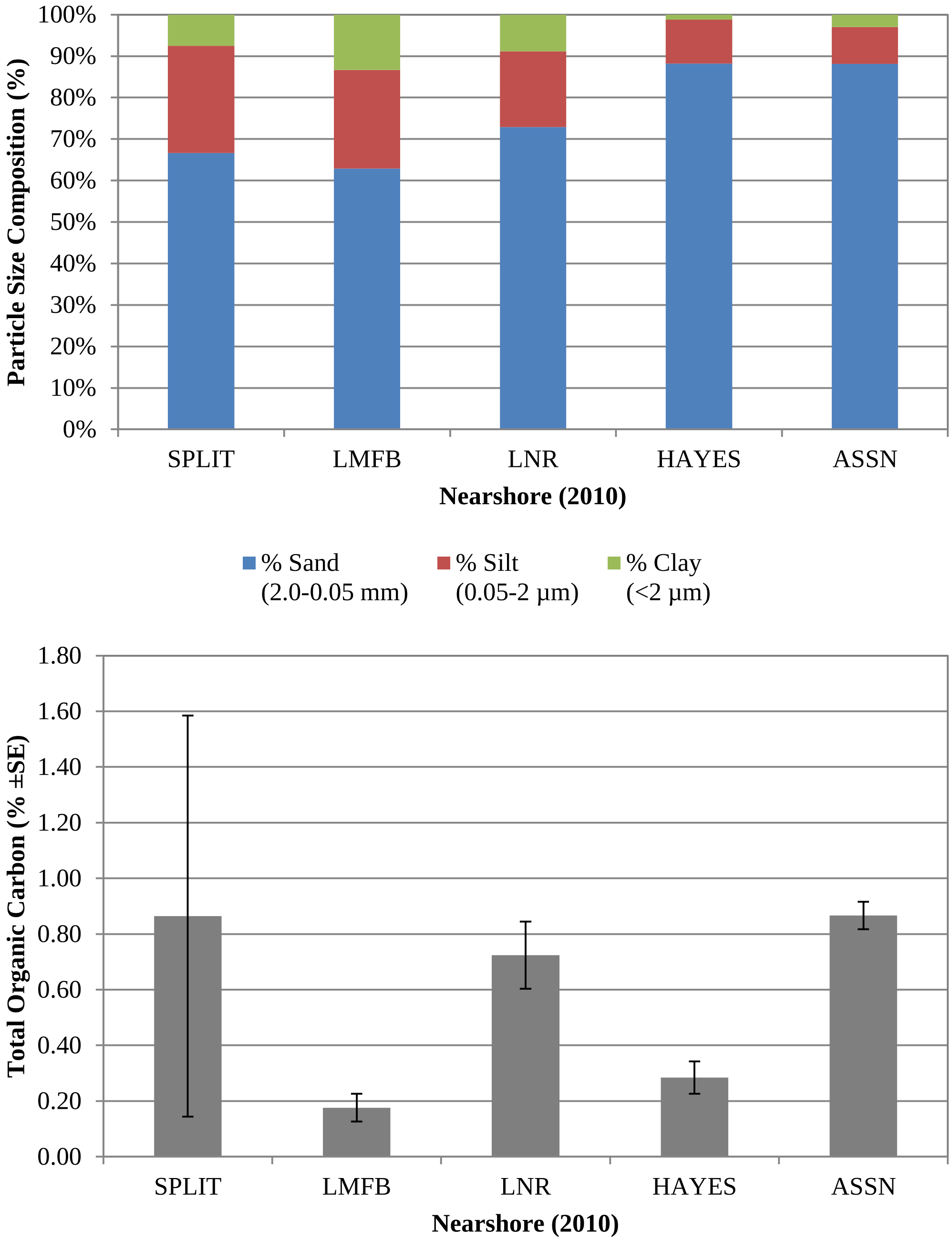


Figure 5.7.6-2. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with nearshore invertebrate sampling in the Lower Nelson River Region for CAMPP, 2010.

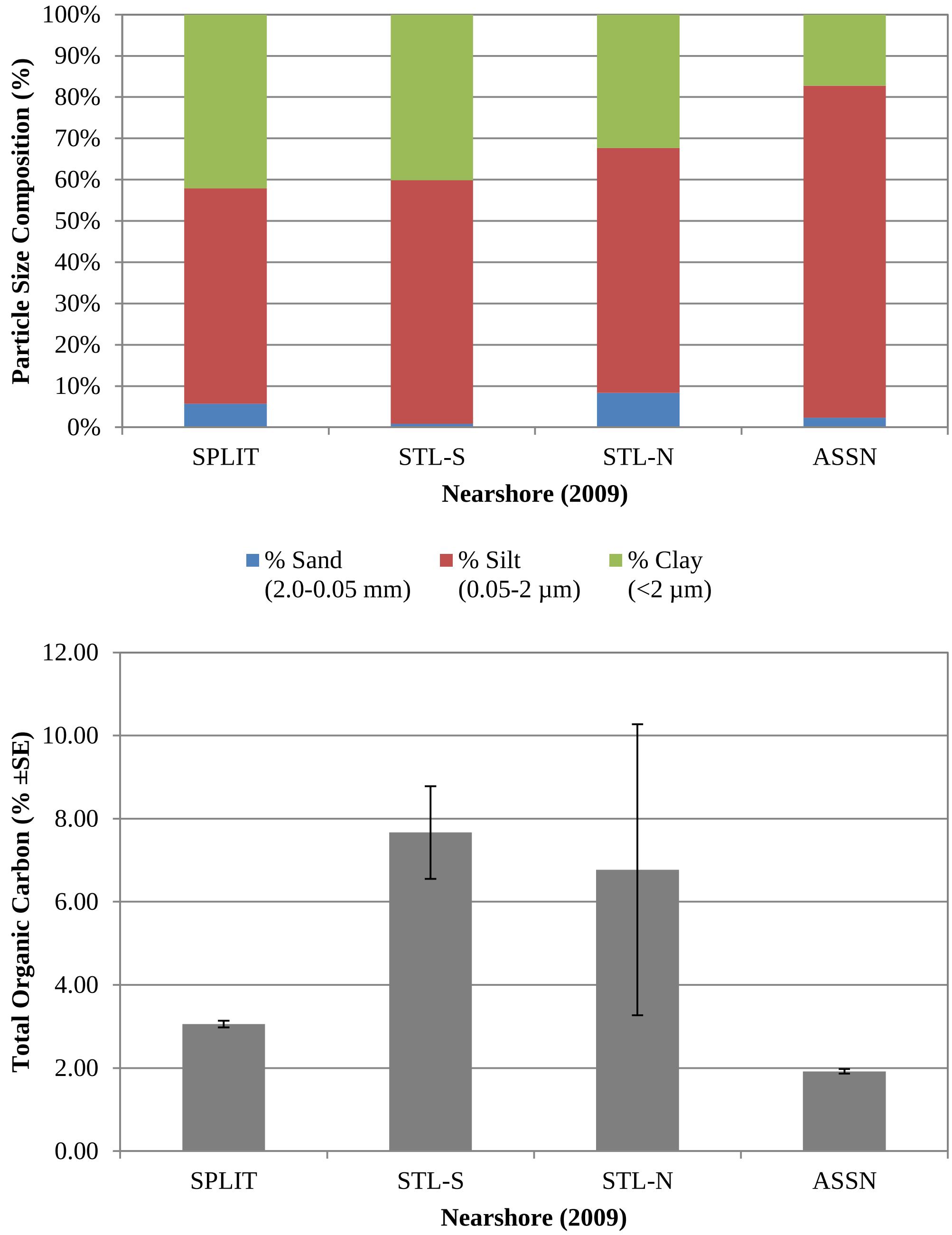


Figure 5.7.6-3. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with nearshore invertebrate sampling in the Lower Nelson River Region for CAMPP, 2009.

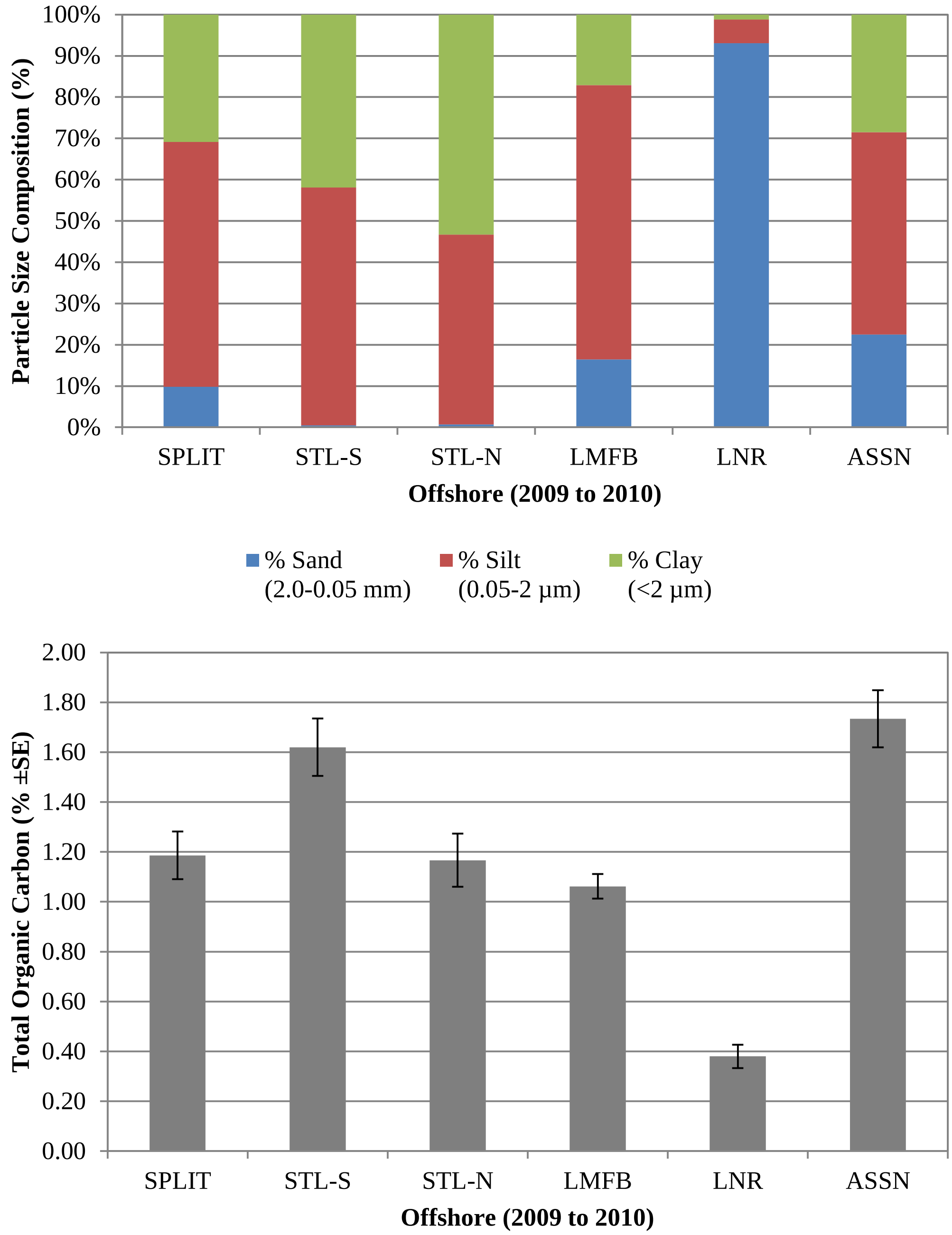


Figure 5.7.6-4. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with offshore invertebrate sampling in the Lower Nelson River Region for CAMPP, 2009 to 2010.

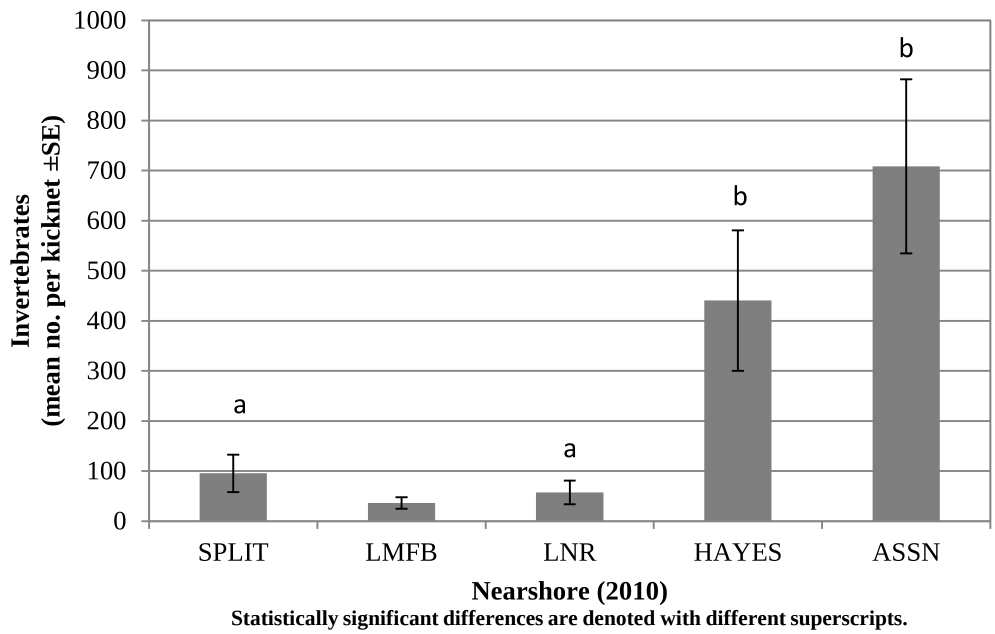


Figure 5.7.6-5. Abundances of benthic invertebrates (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2010.

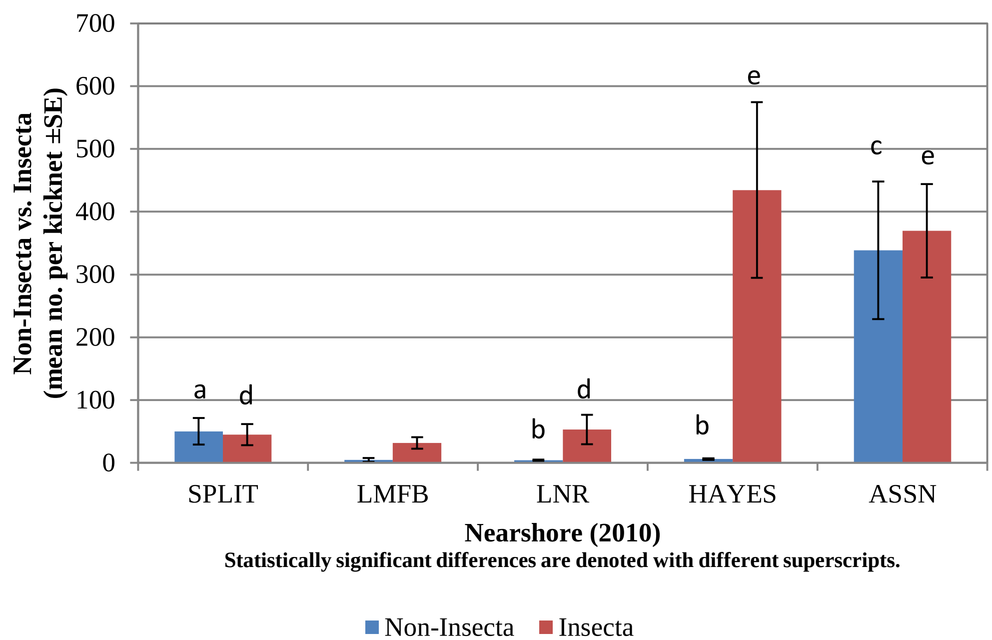


Figure 5.7.6-6. Abundances of non-insects and insects (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2010.

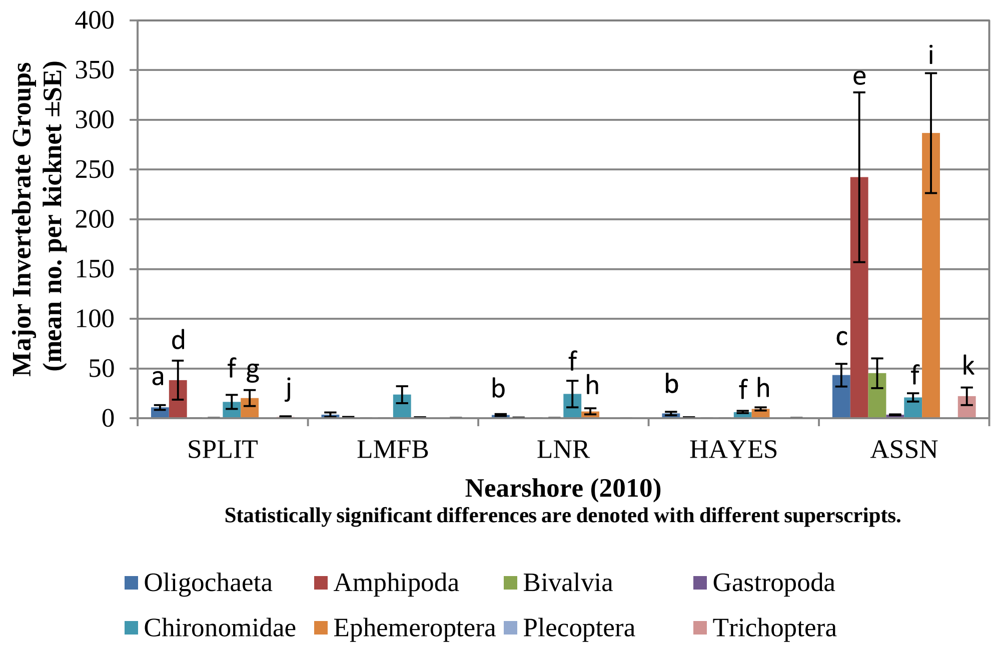


Figure 5.7.6-7. Abundances of the major invertebrate groups (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2010.

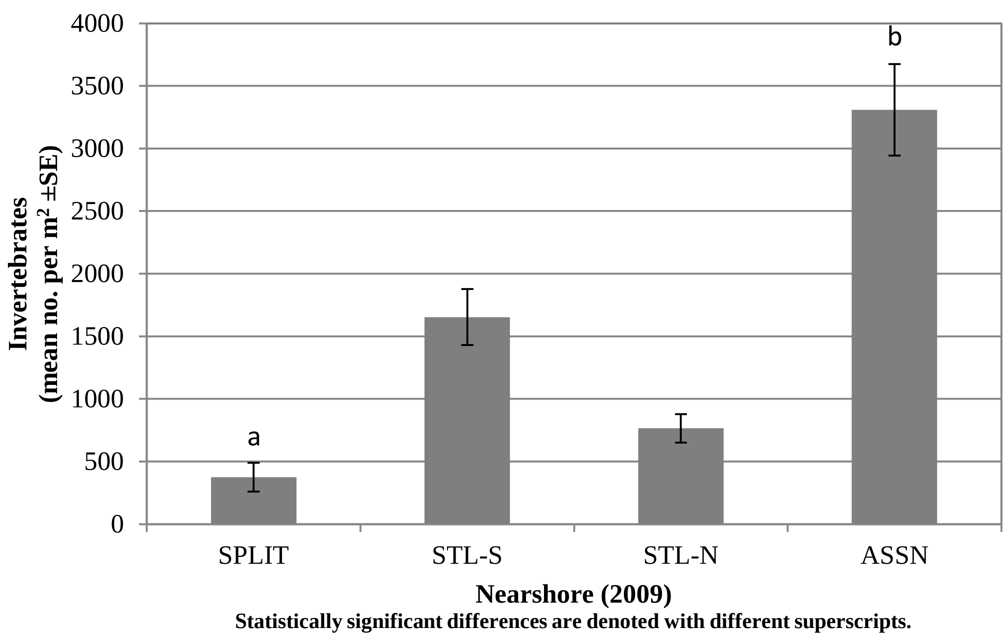


Figure 5.7.6-8. Abundances of benthic invertebrates (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009.

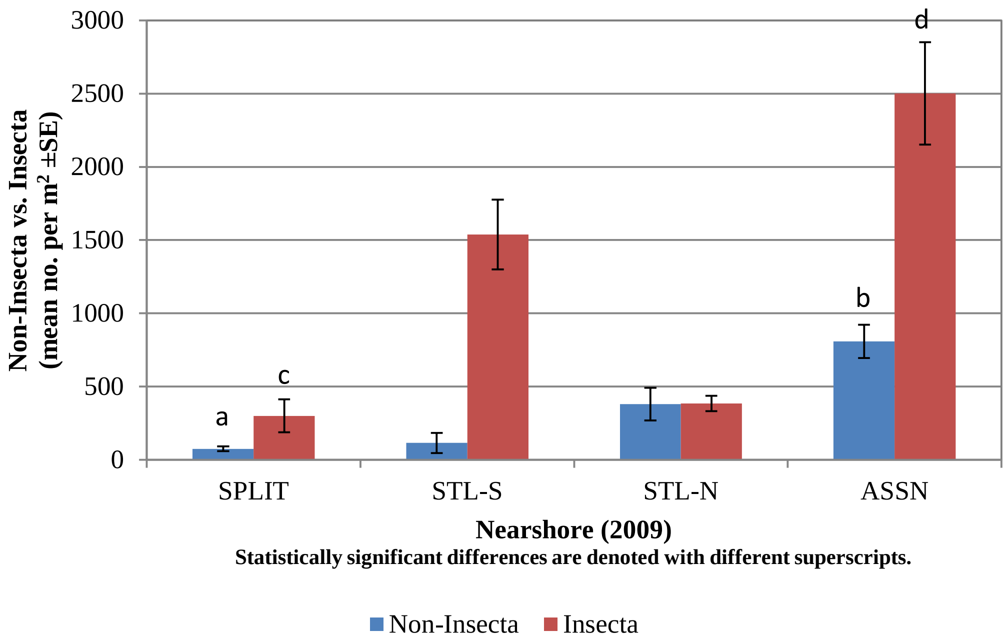


Figure 5.7.6-9. Abundances of non-insects and insects (no. per $m^2 \pm$ SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009.

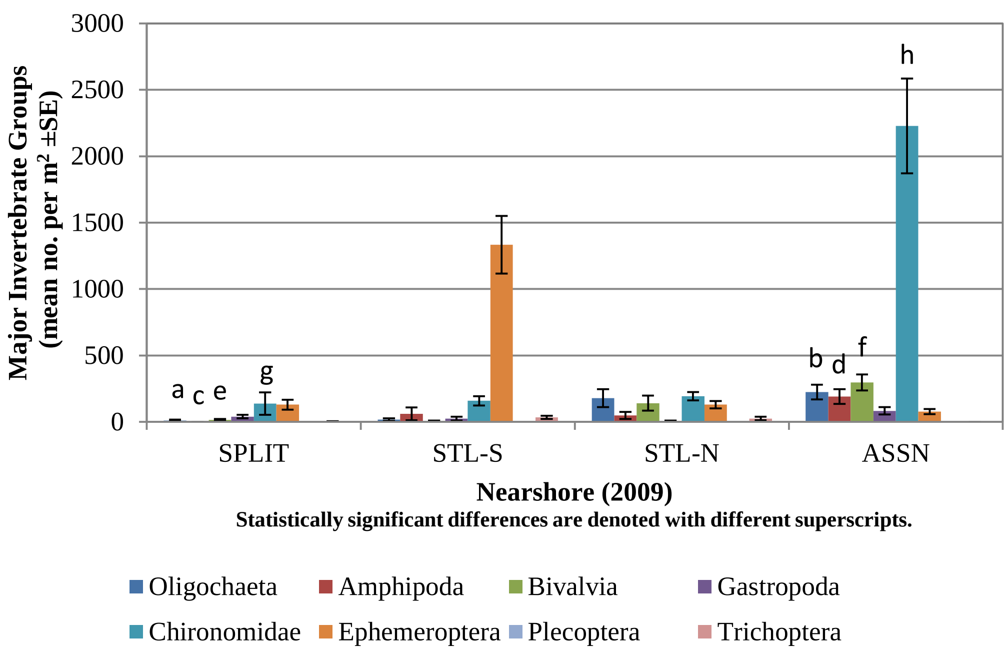


Figure 5.7.6-10. Abundances of the major invertebrate groups (no. per $m^2 \pm$ SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009.

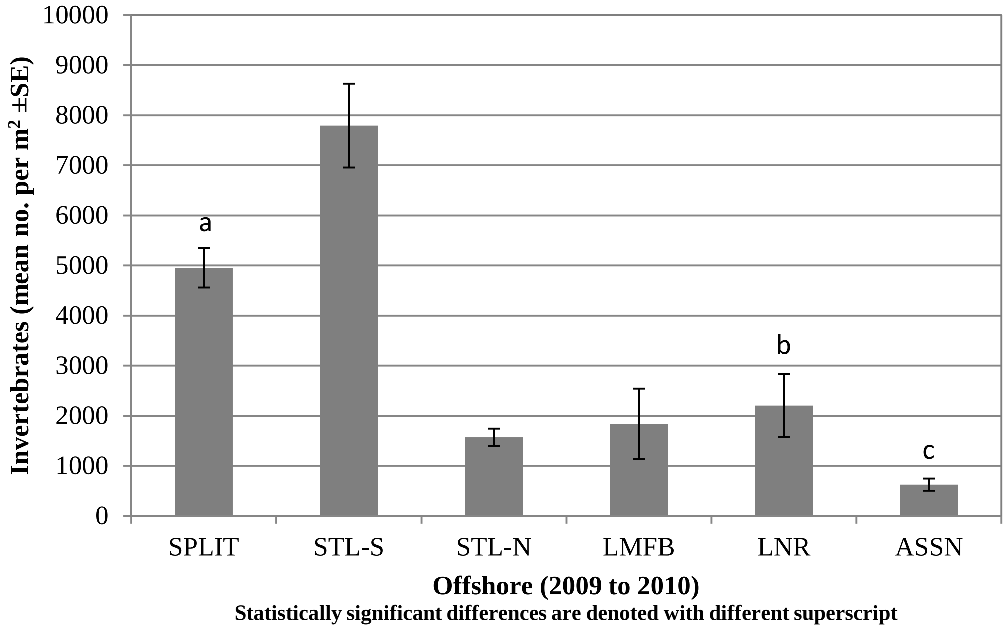


Figure 5.7.6-11. Abundances of benthic invertebrates (no. per $m^2 \pm$ SE) collected in the offshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009 to 2010.

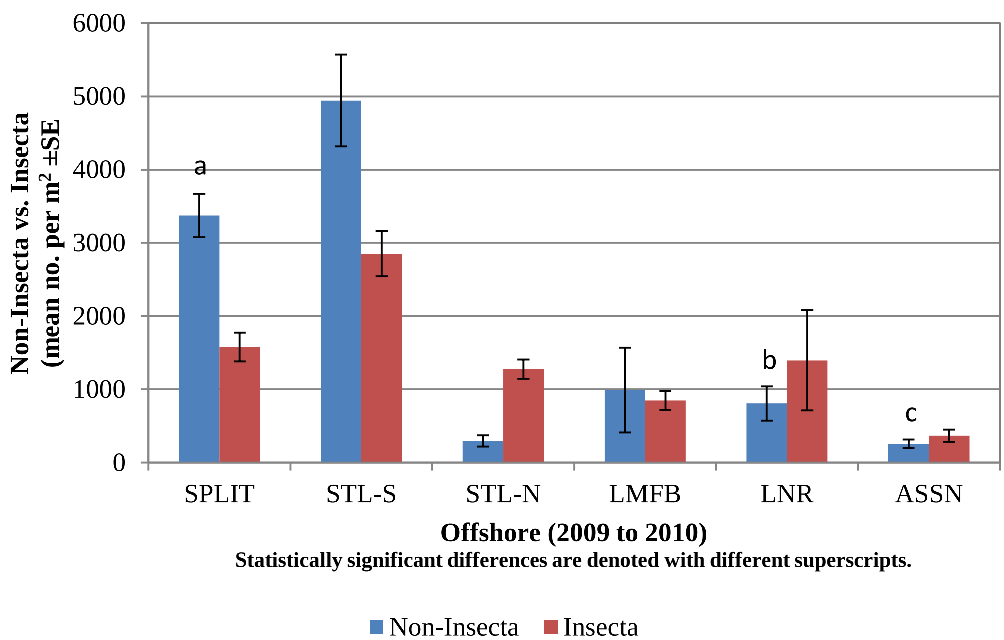


Figure 5.7.6-12. Abundances of non-insects and insects (no. per $m^2 \pm$ SE) collected in the offshore habitat of CAMPP waterbodies within the Lower Nelson River Region, 2009 to 2010.

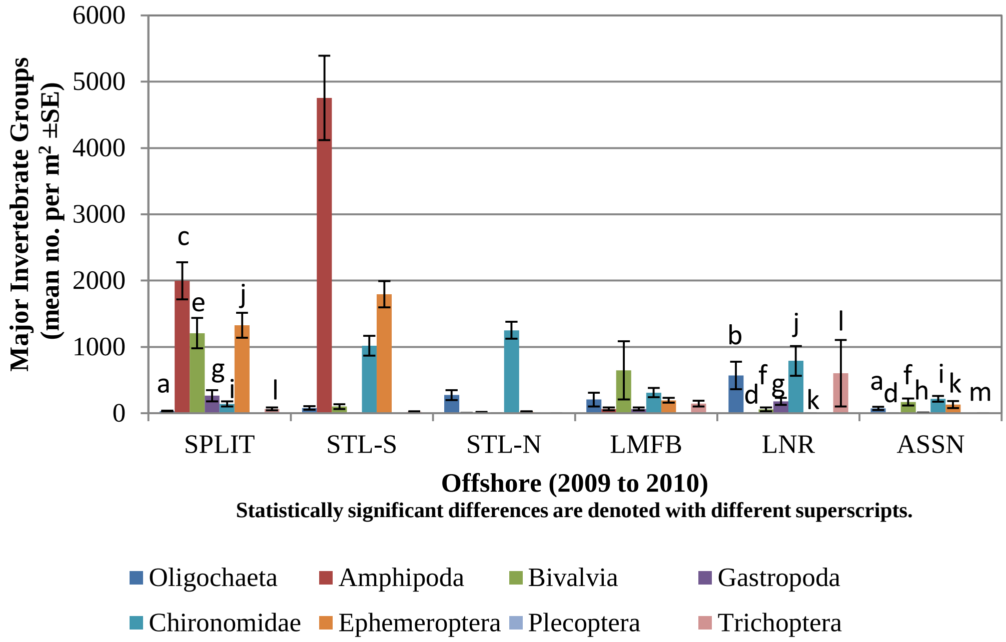


Figure 5.7.6-13. Abundances of the major invertebrate groups (no. per m^2 ± SE) collected in the offshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009 to 2010.

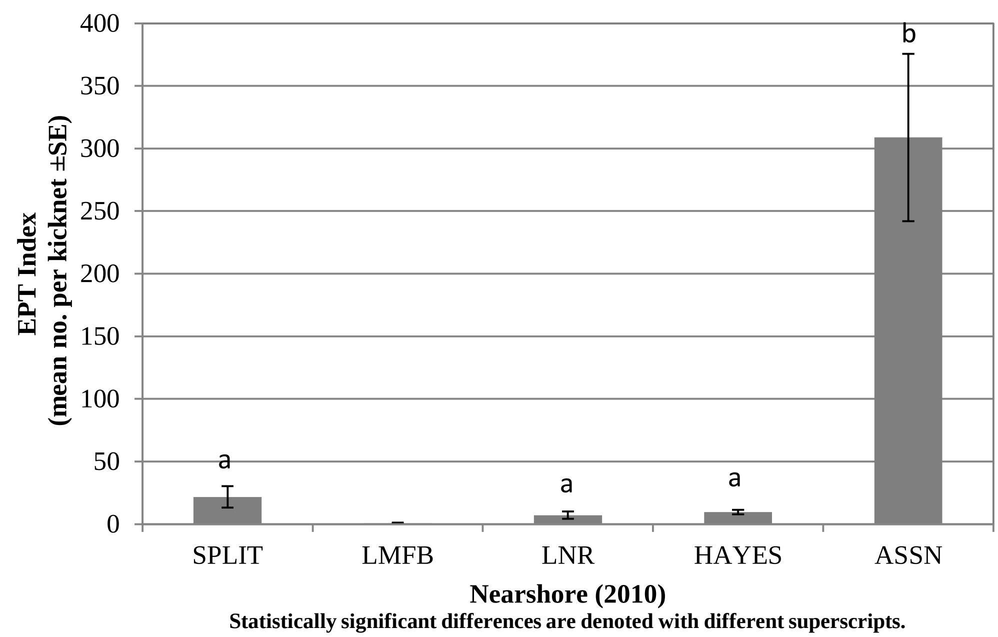


Figure 5.7.6-14. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from nearshore kicknet samples in CAMPP waterbodies in the Lower Nelson River Region, 2010.

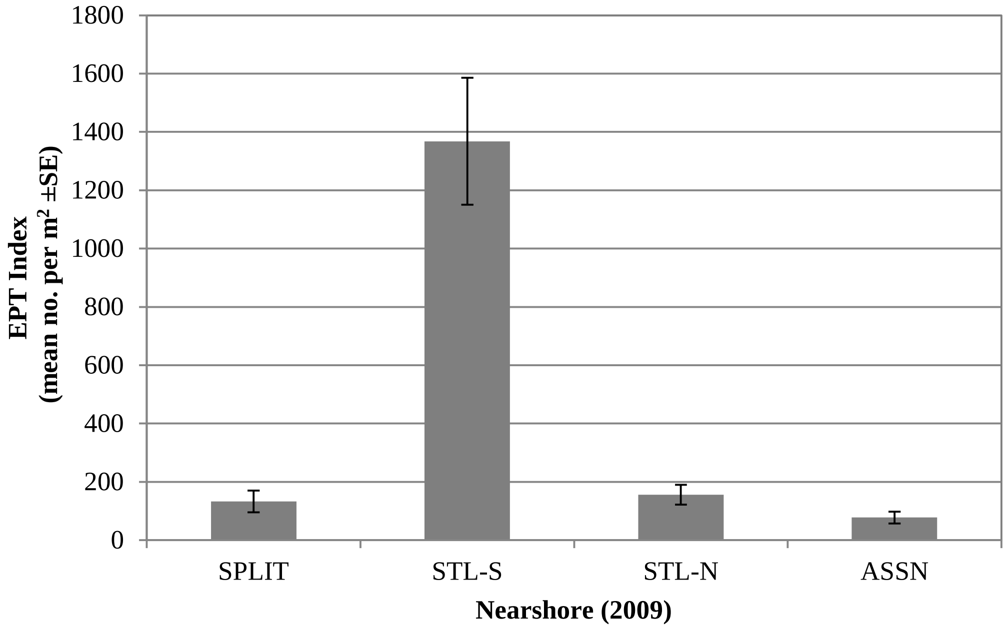


Figure 5.7.6-15. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from nearshore grab samples in CAMPP waterbodies in the Lower Nelson River Region, 2009.

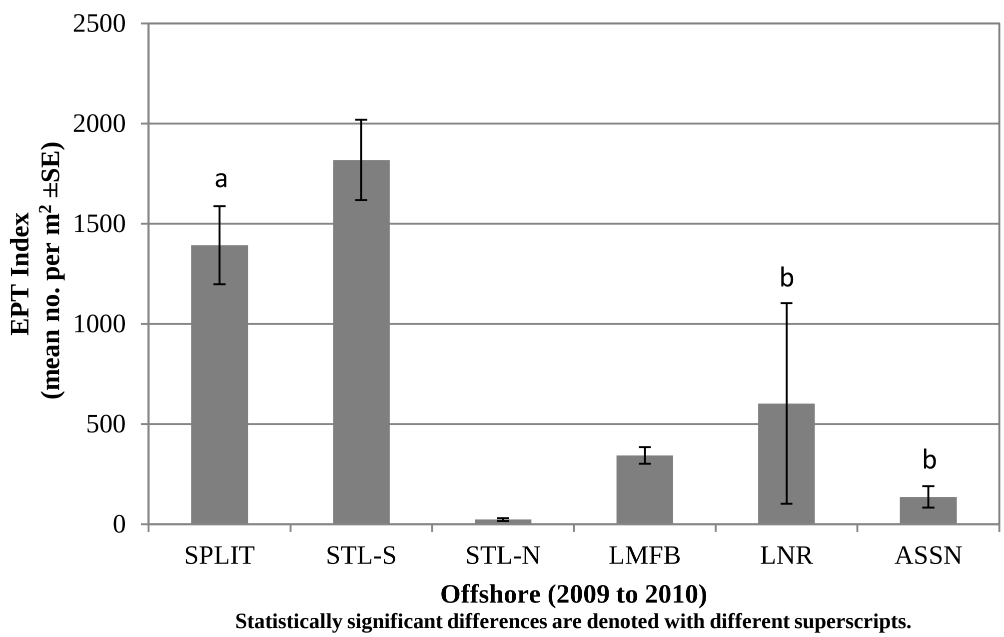


Figure 5.7.6-16. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from offshore grab samples in CAMPP waterbodies in the Lower Nelson River Region, 2009 to 2010.

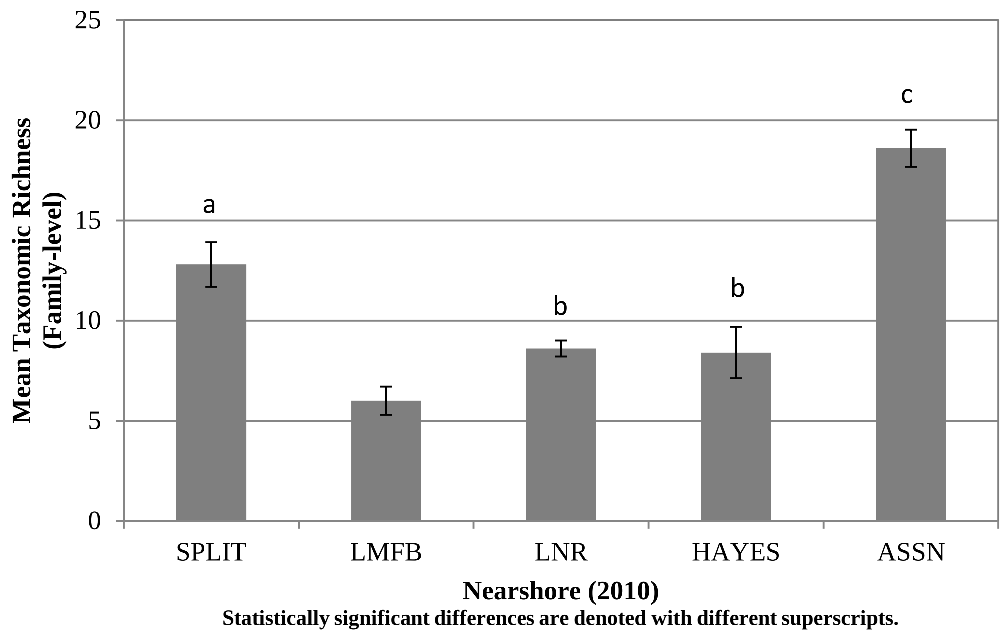


Figure 5.7.6-17. Taxa richness (mean no. of families) from benthic invertebrate kicknet samples collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2010.

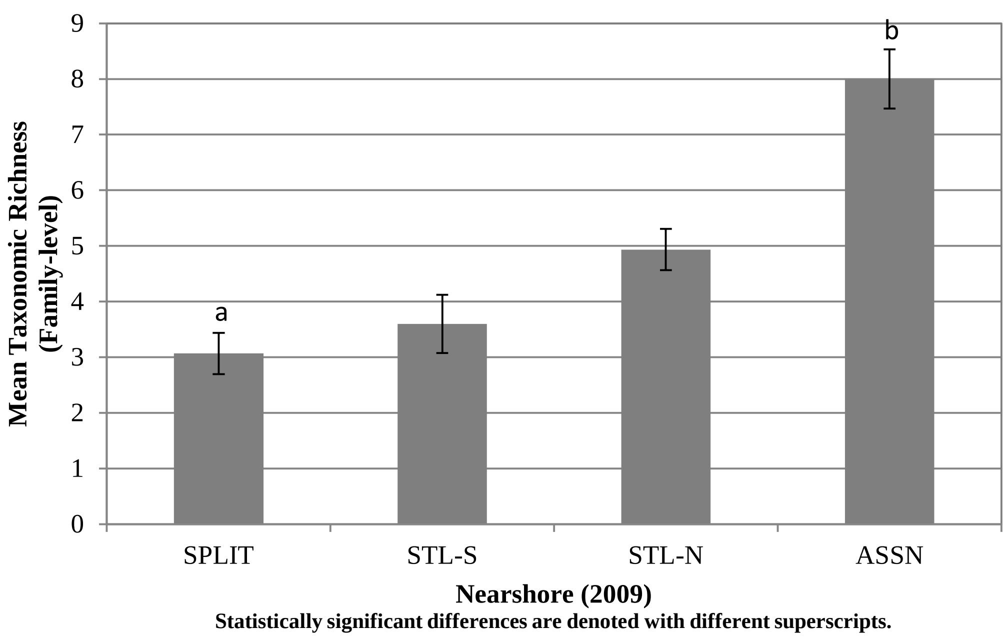


Figure 5.7.6-18. Taxa richness (mean no. of families) from benthic invertebrate grab samples collected in the nearshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009.

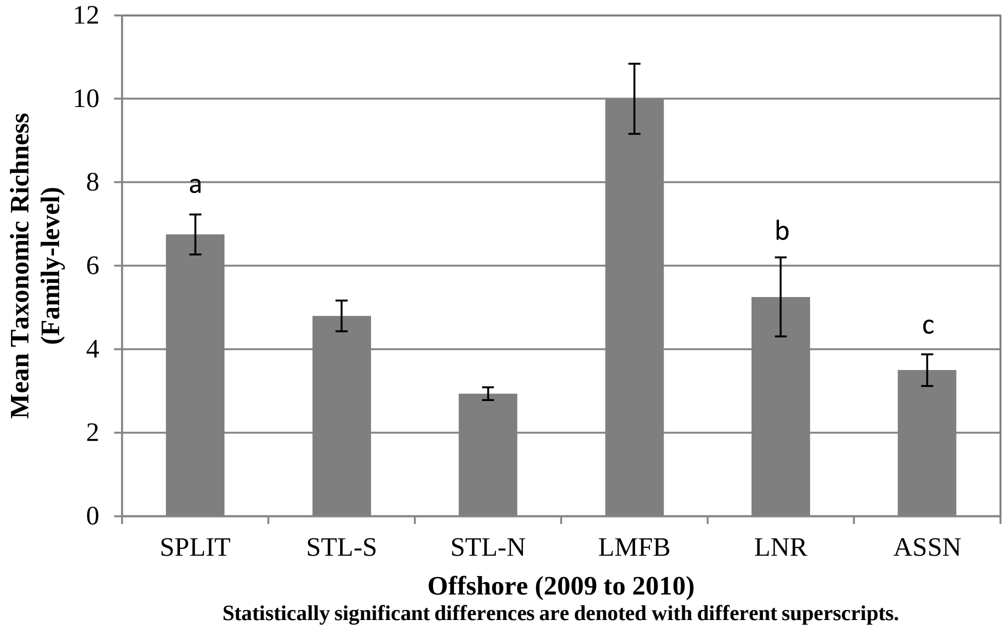


Figure 5.7.6-19. Taxa richness (mean no. of families) from benthic invertebrate grab samples collected in the offshore habitat of CAMPP waterbodies in the Lower Nelson River Region, 2009 to 2010.

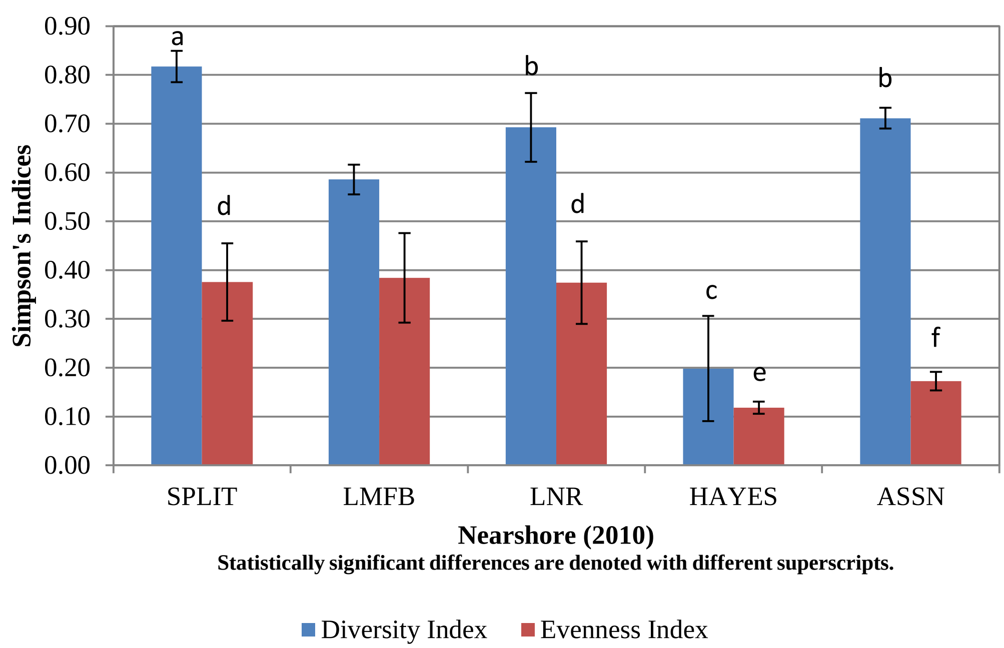


Figure 5.7.6-20. Diversity and evenness (Simpson’s) indices calculated from nearshore kicknet samples of CAMPP waterbodies in the Lower Nelson River Region, 2010.

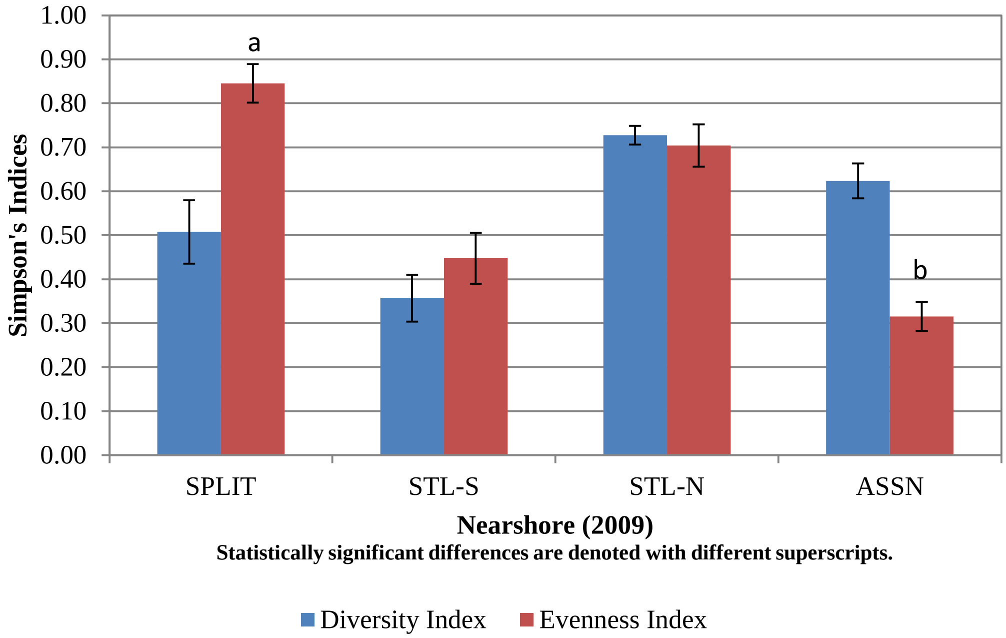


Figure 5.7.6-21. Diversity and evenness (Simpson's) indices calculated from nearshore grab samples of CAMPP waterbodies in the Lower Nelson River Region, 2009.

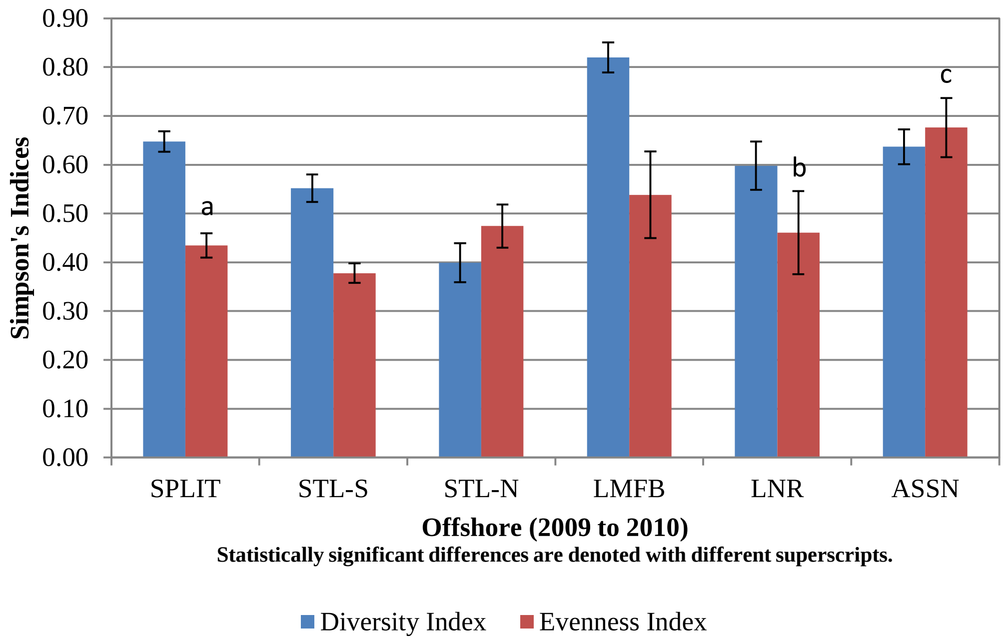


Figure 5.7.6-22. Diversity and evenness (Simpson's) indices calculated from offshore grab samples of CAMPP waterbodies within the Lower Nelson River Region, 2009 to 2010.

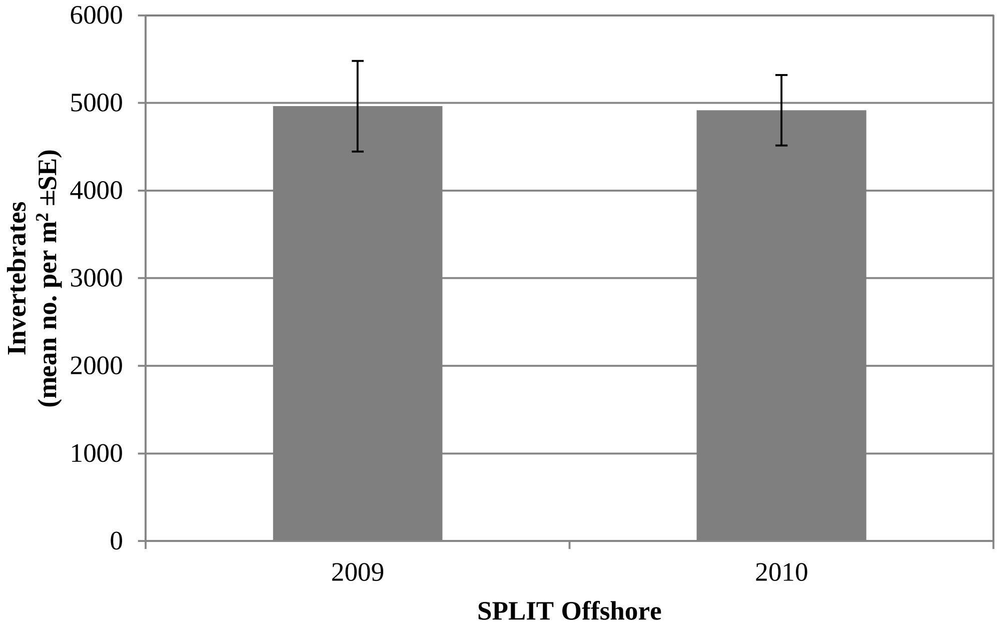


Figure 5.7.6-23. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the offshore habitat of Split Lake, 2009 to 2010.

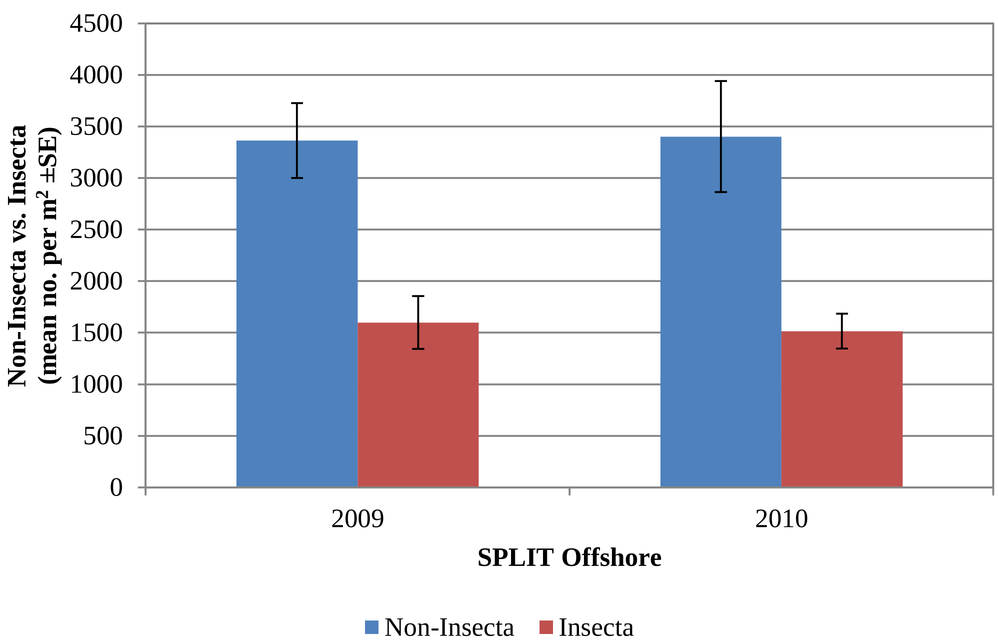


Figure 5.7.6-24. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the offshore habitat of Split Lake, 2009 to 2010.

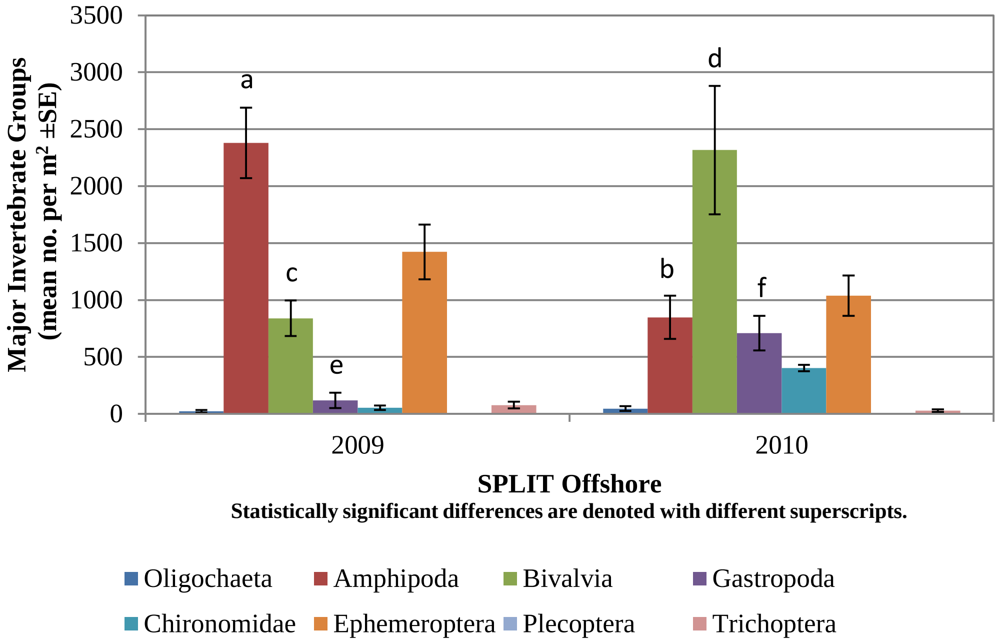


Figure 5.7.6-25. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the offshore habitat of Split Lake, 2009 to 2010.

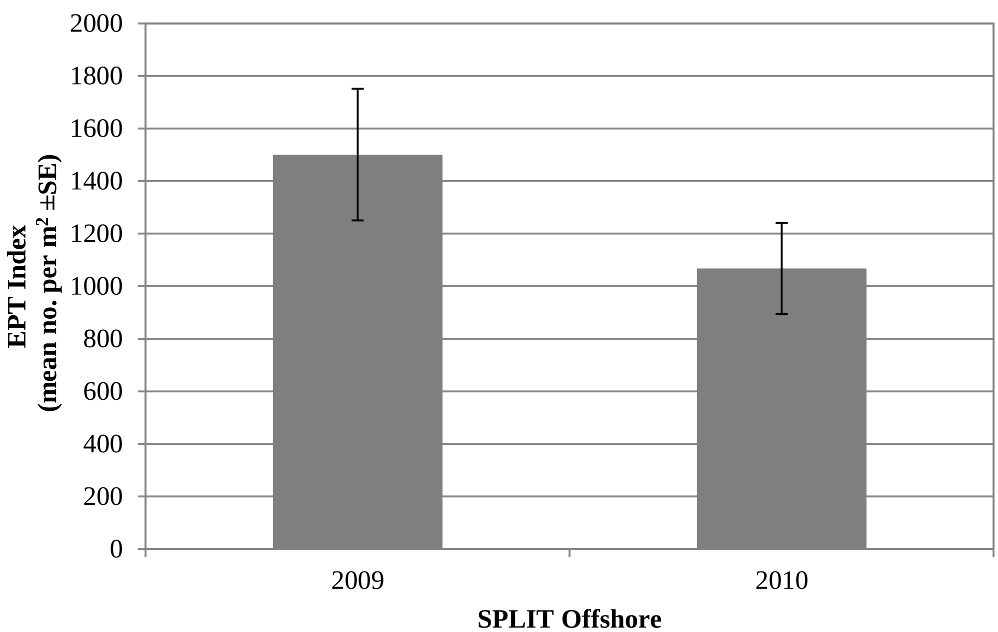


Figure 5.7.6-26. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore habitat of Split Lake, 2009 to 2010.

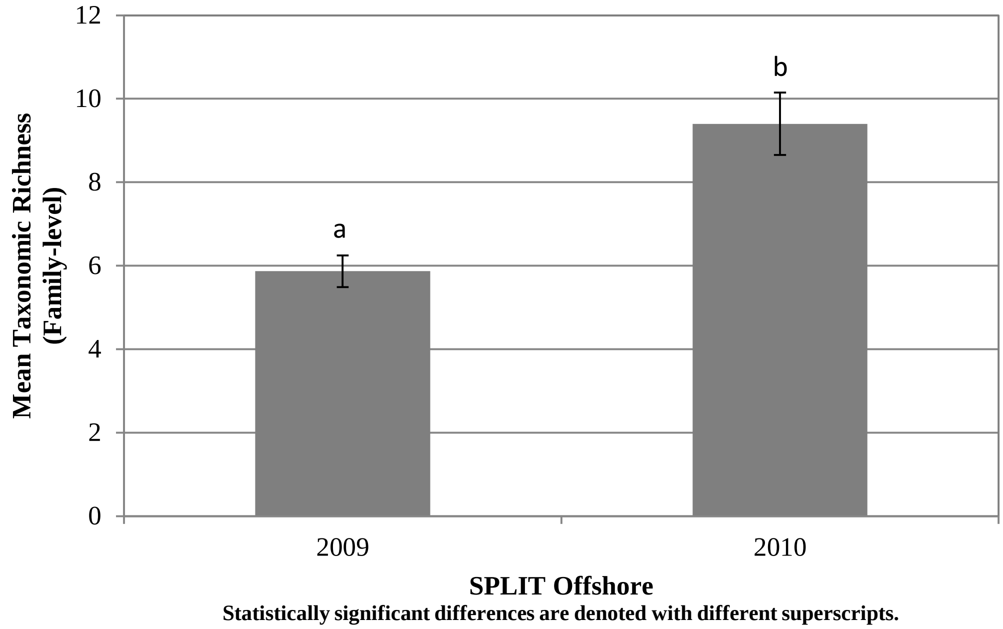


Figure 5.7.6-27. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of offshore habitat of Split Lake, 2009 to 2010.

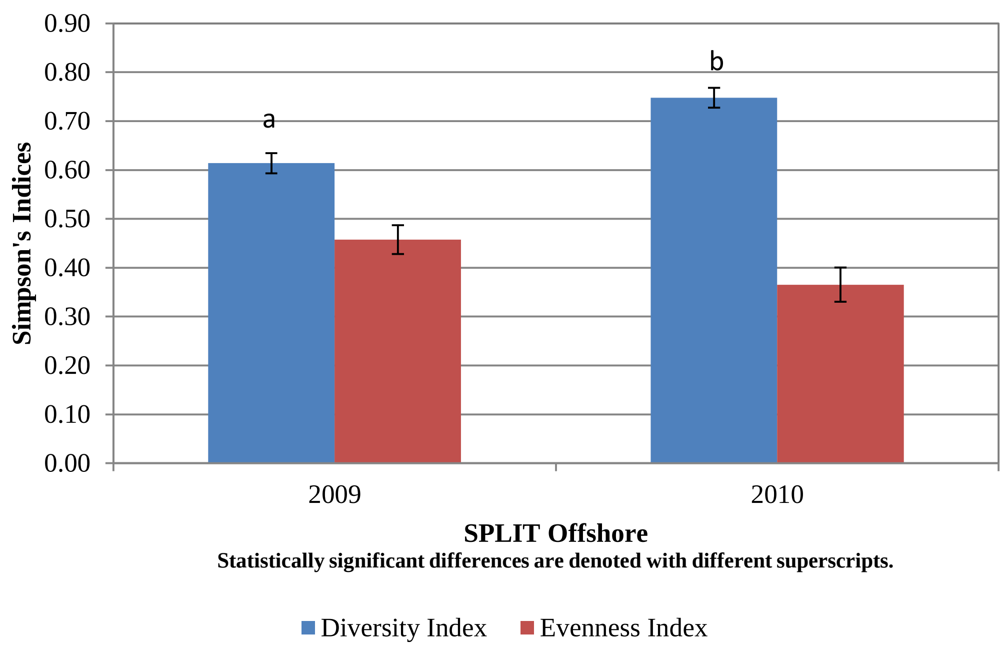


Figure 5.7.6-28. Temporal comparison of diversity and evenness (Simpson's) indices of offshore habitat of Split Lake, 2009 to 2010.

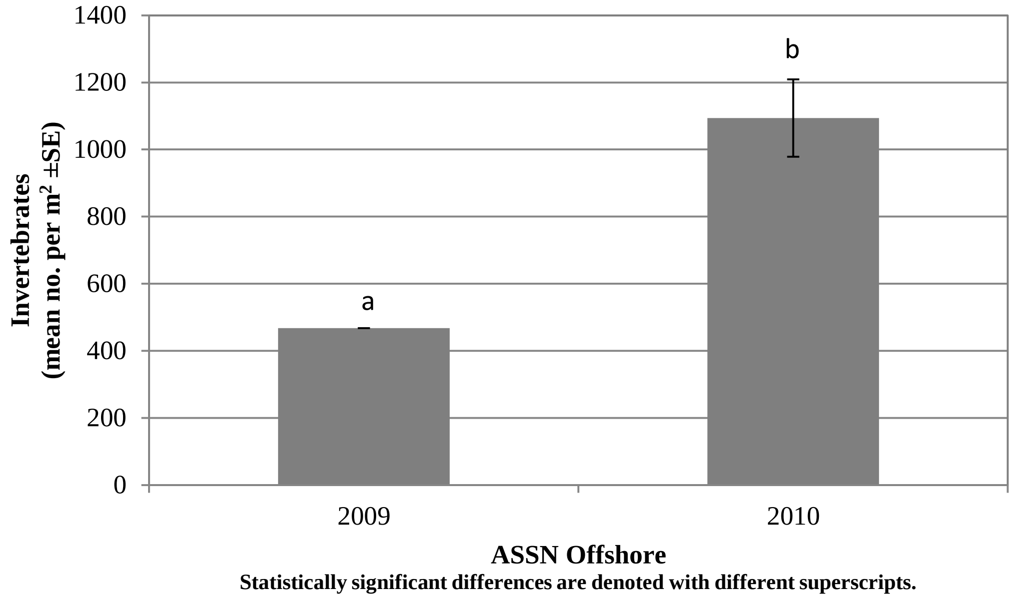


Figure 5.7.6-29. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the offshore habitat of Assean Lake, 2009 to 2010.

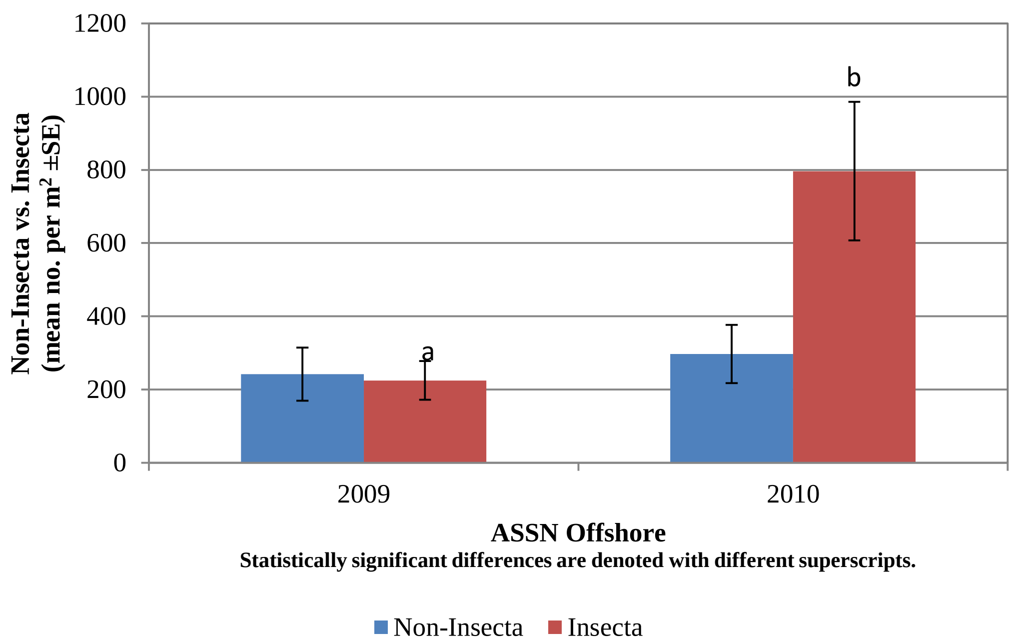


Figure 5.7.6-30. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the offshore habitat of Assean Lake, 2009 to 2010.

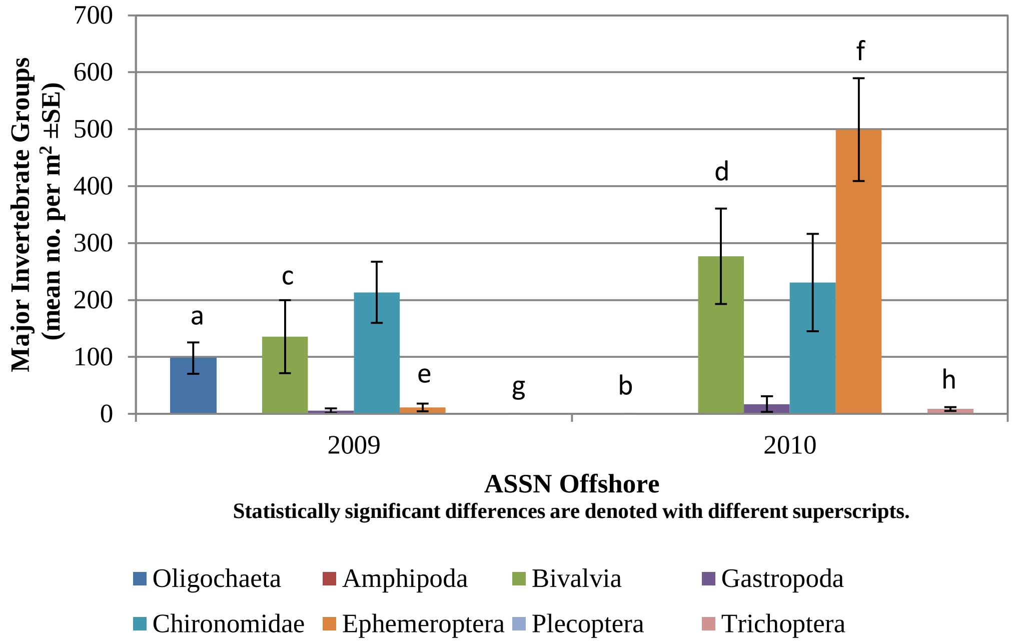


Figure 5.7.6-31. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the offshore habitat of Assean Lake, 2009 to 2010.

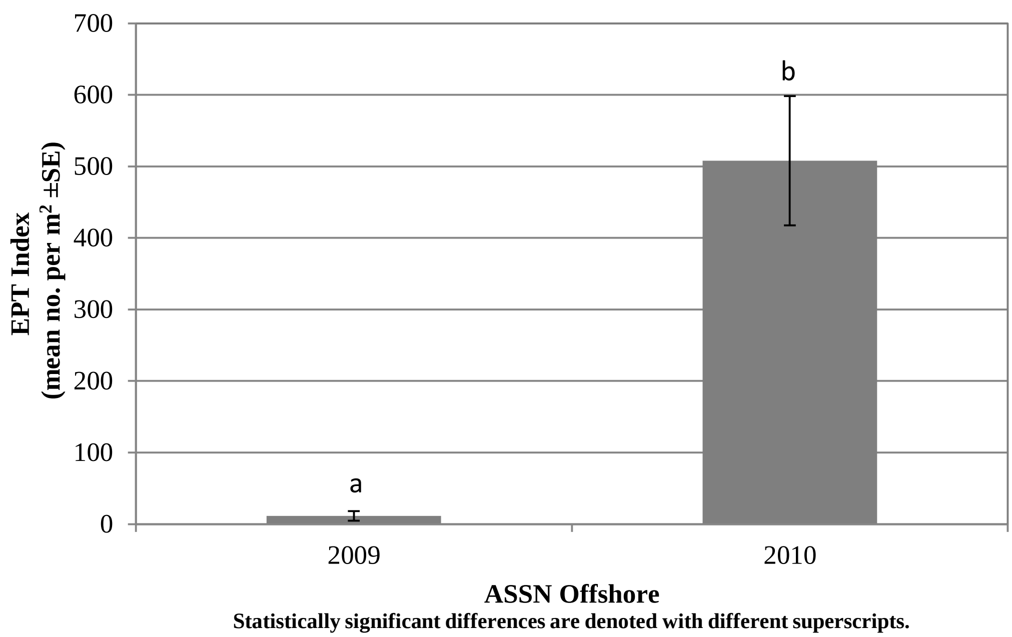


Figure 5.7.6-32. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore grab samples from Assean Lake, 2009 to 2010.

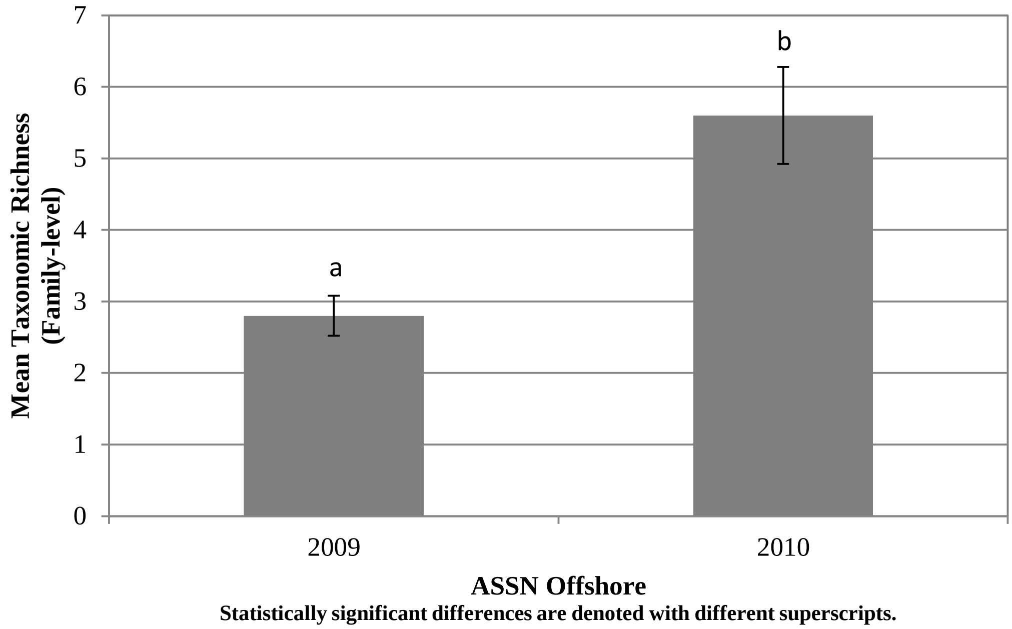


Figure 5.7.6-33. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of offshore grab samples from Assean Lake, 2009 to 2010.

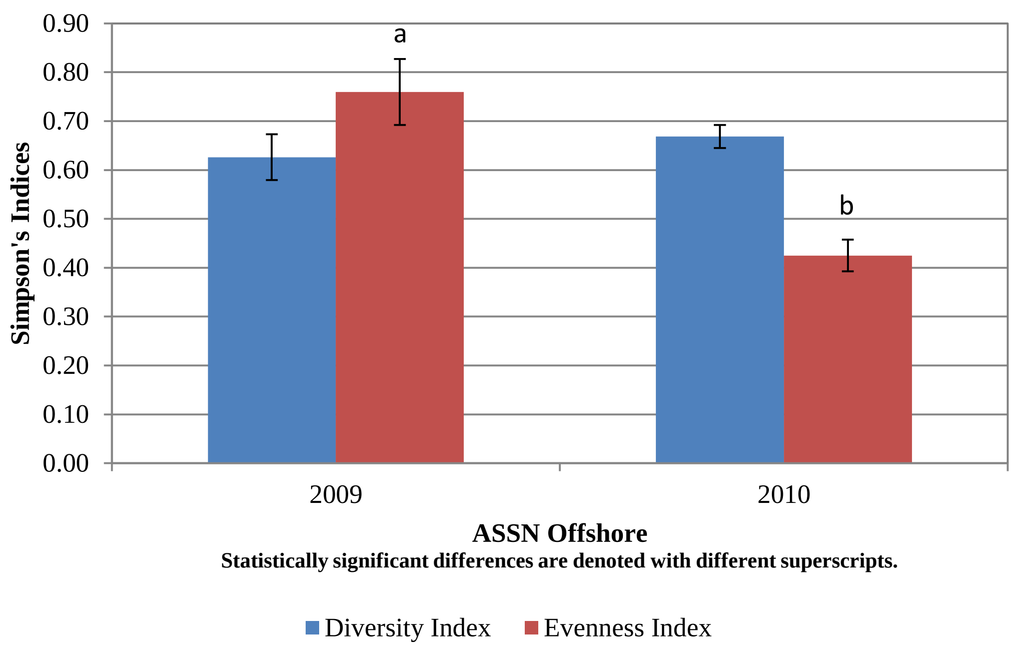


Figure 5.7.6-34. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Assean Lake, 2009 to 2010.

5.7.7 Fish Communities

5.7.7.1 Overview

The following provides an overview of fish communities present in seven waterbodies within the Lower Nelson River Region as part of CAMPP conducted from 2008 to 2010. Waterbodies sampled annually included two on-system waterbodies, i.e., Split Lake and lower Nelson River and two off-system waterbodies (i.e., Hayes River and Assean Lake). Three rotational on-system waterbodies i.e., Stephens Lake – South, Stephens Lake – North and Limestone Forebay were each sampled once in either 2009 or 2010.

Gill netting, utilizing both standard gang and small mesh index gill nets, was conducted at pre-established sites in each waterbody and these were generally consistently sampled in each of the years of study. Individual fish from each site were separated by species and mesh size. For selected species (i.e., Northern Pike [*Esox lucius*], Lake Whitefish [*Coregonus clupeaformis*], and Walleye [*Sander vitreus*]), individual metrics were collected from all fish captured in the standard gang index gill nets. Selected metrics were also collected from Lake Sturgeon (*Acipenser fulvescens*) and White Sucker (*Catostomus commersoni*). No individual metrics were collected from fish captured in the small mesh index gill net gangs. Metrics collected included length, weight, occurrence of deformities, erosion, lesions and tumours (DELTs), and ageing structures. The remaining species from the standard gang index gillnet catch were counted and bulk weighed to the nearest 25 g by species and mesh size. Fish from the small mesh index gill nets were not separated by mesh size, but were separated on the basis of species, counted and bulk weighed to the nearest 25 g (large bodied species) or 1 g (small bodied species).

Overall, the fish assemblage as captured by standard gang index gill nets in all lower Nelson River waterbodies was similar. Walleye dominated the catch in the uppermost lakes in the region as well as in the off-system waterbodies. Northern Pike was common in all waterbodies in the region except the Hayes River. White Sucker was common in Split Lake and Assean Lake but less common in the downstream on-system waterbodies and the Hayes River. In the downstream on-system waterbodies and the Hayes River, Longnose Sucker (*Catostomus catostomus*) was more common. Sauger (*Sander canadensis*) was absent from the catch in the Hayes River and Assean Lake.

CPUE values from standard gang index gill nets set in Split Lake and Stephens Lake – South were relatively similar as were values for Stephens Lake – North and the lower Nelson River, but each pair varied considerably from the other with Split Lake and Stephens Lake - South having the higher CPUE values. The overall CPUE value for Limestone Forebay was the lowest of all on-system waterbodies while the Hayes River had the lowest of all waterbodies sampled in the region and Assean Lake the highest. The CPUE values for most common species were relatively similar among the on-system waterbodies and Assean Lake with the exception of Walleye which had moderately high CPUEs in the upstream on-system waterbodies, very low to low CPUEs in the more downstream on-system waterbodies and a high CPUE in Assean Lake. The Hayes River had a low CPUE for most species.

A particularly strong 2005 Northern Pike cohort was evident in all on-system waterbodies. Strong 2002 and 2003 Walleye cohorts also were evident in all waterbodies except the lower Nelson River, in the latter case of these only the 2003 cohort showed particular strength. In addition, both Stephens Lake north and south had bimodal distributions with a peak at 1997 followed by a drop in year class success until another peak around 2002/2003.

The overall incidence rate for deformities, erosion, lesions and tumours in species of management interest was low in most waterbodies in the region with Assean Lake having the lowest rate at 0.9%. The highest incidence rate was recorded in Limestone Forebay at 6.6%.

Temporal comparisons were undertaken for the four waterbodies sampled in multiple years (i.e., Split Lake and Assean Lake in 2009 and 2010, lower Nelson River and Hayes River in 2008, 2009 and 2010) in order to provide a preliminary assessment of temporal variability. Both on-system and off-system generally showed little temporal variability in the standard gang index gillnet CPUE values, with the exception of the Hayes River in 2009. The small mesh index gillnet CPUE showed more annual variability than the standard gang index gill nets, again with the Hayes River showing the most variation. The standard gang and small mesh gillnet CPUEs for the Hayes River declined by approximately one-half and one-quarter respectively from those obtained for 2008 and 2010. As additional data are acquired, more formal trend analysis will be undertaken to evaluate potential long-term changes.

With respect to the Index of Biological Integrity, the majority of annual scores for all waterbodies and years were similar with the Limestone Forebay having the lowest annual IBI score in 2010 and Split Lake the highest in 2009.

5.7.7.2 Gill netting

Split Lake was sampled with standard gang index gill nets at 12 sites in late August of both 2009 and 2010 (Table 5.7.7-1, Figure 5.7.7-1). In each of Stephens Lake - South and Stephens Lake - North, standard gang index gill nets were set in early to mid-September, 2009 at nine sites (Table 5.7.7-1, Figure 5.7.7-2). A total of nine sites were sampled in Limestone Forebay in mid-July, 2010 (Table 5.7.7-1, Figure 5.7.7-3). The lower Nelson River was sampled at 16 sites in mid-

August of 2008, at 12 sites in early August of 2009 and at nine sites in early August of 2010. (Table 5.7.7-1; Figure 5.7.7-4). Similarly, the Hayes River was sampled at nine sites in early August of 2008 and late July of both 2009 and 2010 (Table 5.7.7-1, Figure 5.7.7-5). Assean Lake was sampled at nine sites in late August, 2009 and mid-August, 2010 (Table 5.7.7-1, Figures 5.7.7-6). In Split Lake and Hayes River, all sites were sampled in each year of study. In the lower Nelson River, four sites were sampled only in 2008, three sites were sampled only in 2008 and 2009 and nine sites were sampled in all of 2008, 2009 and 2010. In Assean Lake one site was sampled only in 2009 and one site was sampled only in 2010. Eight sites were sampled in both 2009 and 2010.

Small mesh index gill nets were attached to the smallest mesh end of the standard gang index gill nets set at four of 12 sites in Split Lake in both 2009 and 2010 in order to sample the small-bodied fish community (Table 5.7.7-1, Figure 5.7.7-1). In each of Stephens Lake - South, Stephens Lake - North and Limestone Forebay, small mesh index gill nets were set at three of the nine sites sampled (Table 5.7.7-1, Figures 5.7.7-2 and 5.7.7-3). In the lower Nelson River, five of 16 sites, four of 12 sites and three of nine sites had small mesh index gill nets set in 2008, 2009 and 2010, respectively (Table 5.7.7-1, Figure 5.7.7-4). In both the Hayes River and Assean Lake, three of nine sites had small mesh index gill nets set in each of the three years (Hayes River) and two years (Assean Lake) of sampling (Table 5.7.7-1, Figures 5.7.7-5 and 5.7.7-6). In Split Lake, the same set of small mesh index gillnet sampling sites were sampled in 2009 and 2010, and in the Hayes River, the same set of small mesh index gillnet sampling sites were sampled in 2008, 2009 and 2010. In the lower Nelson River, small mesh sampling site locations varied considerably from year to year, with only two sites being consistently sampled in all three years of study. In Assean Lake, one site was sampled in 2009, but not 2010; one site was sampled in 2010, but not 2009; two sites were sampled in both 2009 and 2010.

5.7.7.3 Species Composition

A comprehensive list of all fish species captured, including common and scientific names, family, and identification code, for all Lower Nelson River Region waterbodies is provided in Table 5.7.7-2.

<u>Split Lake</u>

A total of 1,025 fish representing 14 species were captured in standard gang index gill nets set in Split Lake in 2009 and 2010 (Table 5.7.7-3). Walleye was the most common species captured in standard gang index gill nets (mean relative abundance = 37.4%) followed by White Sucker (24.5%) (Table 5.7.7-3; Figure 5.7.7-7). A total of 1,020 fish were weighed for a total biomass of 971,169 g (Table 5.7.7-4). The fish species with the highest overall biomass captured in standard gang index gill nets were Walleye (34.4%), followed by White Sucker (29.8%) and Northern Pike (18.6%) (Table 5.7.7-4).

For the small mesh index gill nets, a total of 544 fish representing 11 species were captured (Tables 5.7.7-5 and 5.7.7-6). Spottail Shiner (*Notropis hudsonius*) was the most common species captured overall (mean relative abundance = 34.4%), however, Rainbow Smelt (*Osmerus mordax*) (32.0%) and Troutperch (*Percopsis omiscomaycus*) (19.9%) were also abundant (Table 5.7.7-5, Figure 5.7.7-7). The biomass of the catch (n=544) was 12,304 g (Table 5.7.7-6). Of the small-bodied fish species from the small mesh index gillnet catch, Rainbow Smelt accounted for the highest proportion of total biomass (10.5%), followed by Spottail Shiner (6.5%) and Troutperch (5.5%) (Table 5.7.7-6).

Stephens Lake - South

In 2009, a total of 328 fish representing eight species were captured in standard gang index gill nets set in Stephens Lake - South (Table 5.7.7-3). The most common species captured in standard gang index gill nets was Walleye (54.0%) followed by Northern Pike (22.6%) (Table 5.7.7-3; Figure 5.7.7-8). A total of 327 fish were weighed giving a total biomass of 415,602 g (Table 5.7.7-4). The highest biomass value for fish captured in standard gang index gill nets was Walleye (58.4%) followed by Northern Pike (28.0%) (Table 5.7.7-4).

For the small mesh index gill nets, a total of 130 fish representing seven species were captured (Tables 5.7.7-5 and 5.7.7-6). Rainbow Smelt was the most common species (34.6%), followed by Troutperch (31.5%) and Spottail Shiner (23.9%) (Table 5.7.7-5; Figure 5.7.7-8). The biomass of the small mesh index gillnet catch (n=130) was 4,372 g (Table 5.7.7-6). For small-bodied fish species from the small mesh catch, Rainbow Smelt accounted for the highest proportion of total biomass (8.3%), followed by Troutperch (3.8%) and Spottail Shiner (3.3%) (Table 5.7.7-6).

Stephens Lake - North

In 2009, a total of 198 fish representing six species were captured in standard gang index gill nets set in the Stephens Lake - North (Table 5.7.7-3). The most common species captured in standard gang index gill nets were Walleye (49.0%) and Northern Pike (39.0%) (Table 5.7.7-3; Figure 5.7.7-9). The total biomass for the 198 fish was 279,466 g (Table 5.7.7-4). Walleye accounted for the highest proportion of total biomass (47.7%) followed by Northern Pike (40.9%) (Table 5.7.7-4).

For the small mesh index gill nets, a total of 206 fish representing eight species were captured (Tables 5.7.7-5 and 5.7.7-6). Spottail Shiner was the most common species (42.2%), followed by Rainbow Smelt (32.0%) and Emerald Shiner (*Notropis atherinoides*) (16.5%) (Table 5.7.7-5;

Figure 5.7.7-9). The biomass of the catch (n=206) was 15,439 g (Table 5.7.7-6). For small-bodied fish species from the small mesh index gillnet catch, Rainbow Smelt accounted for the highest proportion of total biomass (4.1%), followed by Spottail Shiner (2.7%) (Table 5.7.7-6).

Limestone Forebay

In 2010, a total of 148 fish representing seven species were captured in standard gang index gill nets set in the Limestone Forebay (Table 5.7.7-3). The most common species captured in standard gang index gill nets was Longnose Sucker (51.4%), followed by Northern Pike (29.1%) (Table 5.7.7-3; Figure 5.7.7-10). A total of 146 fish were weighed giving a total biomass of 158,369 g (Table 5.7.7-4). Northern Pike accounted for the highest proportion of total biomass (47.1%), followed by Longnose Sucker (34.7%) (Table 5.7.7-4).

For the small mesh index gill nets, a total of 56 fish representing four species were captured (Tables 5.7.7-5 and 5.7.7-6). Troutperch was the most common species (80.4%), followed by Spottail Shiner (14.3%) (Table 5.7.7-5; Figure 5.7.7-10). A total of 56 fish were weighed giving a total biomass of 426 g (Table 5.7.7-6). Of the small-bodied fish species from the small mesh index gillnet catch, Troutperch accounted for the highest proportion of total biomass (46.2%), followed by Spottail Shiner (10.6%) (Table 5.7.7-6).

Lower Nelson River

Over all years combined, a total of 956 fish representing 13 species were captured in standard gang index gill nets set in the lower Nelson River (Table 5.7.7-3). The most common species captured in standard gang index gill nets was Longnose Sucker (28.9%) followed by Northern Pike (24.9%), Walleye (14.1%) and Lake Sturgeon (13.1%) (Table 5.7.7-3; Figure 5.7.7-11). A total of 954 fish were weighed giving a total biomass of 1,136,037 g (Table 5.7.7-4). Among individual species, Northern Pike accounted for the highest proportion of the total biomass (42.0%), followed by Lake Sturgeon (22.6%), Longnose Sucker (12.7%) and Walleye (11.5%) (Table 5.7.7-4).

Overall, for the small mesh index gill nets, a total of 314 fish representing 11 species were captured (Table 5.7.7.5). Rainbow Smelt was the most common species captured overall (29.3%) followed by Troutperch (18.8%) and Emerald Shiner (17.5%) (Table 5.7.7-5; Figure 5.7.7-11). A total of 313 fish (one lake sturgeon excluded) were weighed for a total biomass of 7,095 g (Table 5.7.7-6). For small-bodied fish species captured in the small mesh index gill nets, Rainbow Smelt accounted for the highest proportion of total biomass (7.3%), followed by Lake Chub (*Couesius plumbeus*) (5.9%) (Table 5.7.7-6).

Hayes River

Over all years combined, a total of 295 fish representing nine species were captured in standard gang index gill nets set in the Hayes River (Tables 5.7.7-3). The most common species captured in standard gang index gill nets was Walleye (30.2%) followed by Lake Sturgeon (29.2%) (Table 5.7.7-3; Figure 5.7.7-12). The biomass value of the overall catch (n=295) was 301,119 g (Table 5.7.7-4). Walleye made up the highest proportion of total biomass (38.0%), followed by Lake Sturgeon (29.8%) (Table 5.7.7-4).

For the small mesh index gill nets for all years of sampling, a total of 30 fish representing seven species were captured (Tables 5.7.7-5). Lake Sturgeon was the most common species captured overall (33.3%) followed by Walleye (26.7%) (Table 5.7.7-5; Figure 5.7.7-12). The biomass of the total catch (n=30) was 9,502 g (Table 5.7.7-6). For small-bodied fish species captured in the small mesh index gillnet catch, Lake Chub accounted for the highest proportion of total biomass (0.7%,) (Table 5.7.7-6).

Assean Lake

A total of 1,191 fish representing seven species were captured in standard gang index gill nets set in Assean Lake in 2009 and 2010 (Table 5.7.7-3). Overall, the most common species captured in standard gang index gill nets was Walleye (46.4%) (Table 5.7.7-3; Figure 5.7.7-13). The biomass value of the overall catch (n=1191) was 923,851 g (Table 5.7.7.-4). Walleye accounted for the highest proportion of total overall biomass (45.5%), followed by Northern Pike (23.1%) (Table 5.7.7-4).

For the small mesh index gill nets, a total of 697 fish representing nine species were captured (Table 5.7.7-5). Yellow Perch (*Perca flavescens*) was the most common species captured (45.2%), followed by Spottail Shiner (29.6%) (Table 5.7.7-5; Figure 5.7.7-13). The biomass of the total catch (n=697) was 36,854 g (Table 5.7.7-6). Of the small-bodied fish species from the small mesh index gillnet catch, Spottail Shiner accounted for the highest proportion of total biomass (3.3%), followed by Yellow Perch (2.5%) (Table 5.7.7-6).

5.7.7.4 Catch Per Unit of Effort (CPUE) and Biomass Per Unit Effort (BPUE)

Split Lake

Mean CPUE (n=1,025) and BPUE (n=1,020) for the standard gang index gillnet catch in Split Lake was 31.9 fish/100 m of net/24 h and 29,917 g/100 m of net/24 h, respectively (Tables 5.7.7-7 and 5.7.7-8). CPUE and BPUE values were both marginally lower in 2009 (31.7, 28,634) than in 2010 (32.0, 31,201) (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). The highest individual species' CPUE values for the standard gang index gillnet catch (both years combined) in Split Lake were recorded for Walleye (11.8) followed by White Sucker (7.9) (Table 5.7.7-7 and Figure 5.7.7-18). The highest BPUE values for the standard gang index gillnet catch (both years combined) in Split Lake were recorded for Walleye (10,190) followed by White Sucker (8,853) (Table 5.7.7-8 and Figure 5.7.7-19).

Total overall (both years combined) CPUE and BPUE for the small mesh index gillnet catch in Split Lake was 50.9 fish and 1,193 g/30 m of net/24 h (Tables 5.7.7-9 and 5.7.7-10). The lower total CPUE and BPUE values for all fish were recorded in 2010 at 33.3 fish and 586 g while for 2009 the CPUE and BPUE values were 68.4 fish and 1,799 g (Tables 5.7.7-9 and 5.7.7-10, Figures 5.7.7-16 and 5.7.7-17). The highest overall CPUE values were recorded for Rainbow Smelt (17.0) followed by Spottail Shiner (16.2) (Table 5.7.7-9 and Figure 5.7.7-18). The highest overall BPUE values were recorded for Rainbow Smelt (127 g) followed by Spottail Shiner (72 g) (Table 5.7.7-10 and Figure 5.7.7-19).

CPUE and BPUE by standard gang index gill net site for Northern Pike, Lake Whitefish, Walleye and all species combined are provided in Figures 5.7.7-20 and 5.7.7-21. Northern Pike were captured at all but one site while Lake Whitefish were captured at all but two sites. Walleye were captured at the majority of sites. The CPUE and BPUE values for Northern Pike and Lake Whitefish were consistently low. CPUE and BPUE values for Walleye were similar for most sites; however, GN-15 had considerably higher and more variable values. For all species combined both CPUE and BPUE values varied between sites but not between sampling years.

Stephens Lake - South

Total CPUE for 328 fish comprised of eight species captured in standard gang index gill nets set in Stephens Lake - South in 2009 was 31.7 fish and BPUE for the 327 fish that had weights was 40,027 g (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). The highest CPUE and BPUE values for the 2009 standard gang index gillnet catch in Stephens Lake - South were recorded for Walleye (17.0 fish and 23,327 g), followed by Northern Pike (7.1 fish and 11,130 g) (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-18 and 5.7.7-19).

For the small mesh index gill nets, total CPUE and BPUE for 130 fish representing seven species was 43.6 fish and 1,477 g (Tables 5.7.7-9 and 5.7.7-10, Figures 5.7.7-18 and 5.7.7-19). The highest CPUE values were recorded for Rainbow Smelt (15.4), followed by Troutperch (13.6) (Table 5.7.7-9, Figure 5.7.7-18). The highest BPUE values (small-bodied fish only) from the small mesh index gill nets were recorded for Rainbow Smelt (123 g), Troutperch (55 g) and Spottail Shiner (49 g) (Table 5.7.7-10, Figure 5.7.7-19).

CPUE and BPUE by standard gang index gill net site for Northern Pike, Lake Whitefish, Walleye and all species combined are provided in Figures 5.7.7-22 and 5.7.7-23. Northern Pike were captured at all but one site, Lake Whitefish were only captured at four sites while Walleye were captured at all but two sites. Northern Pike and Lake Whitefish had the most consistent CPUE and BPUE values between sites, while values for both Walleye and all species combined were variable.

Stephens Lake - North

Total CPUE and BPUE for 198 fish representing six species captured in standard index gill nets set in Stephens Lake - North in 2009 was 19.2 fish and 27,199 g (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). The highest CPUE and BPUE values for the 2010 standard gang index gillnet catch in Stephens Lake - North were recorded for Walleye (9.6 fish and 13,241 g), and Northern Pike (7.3 fish and 10,830 g) (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-18 and 5.7.7-19).

For the small mesh index gill nets, total CPUE and BPUE for 206 fish representing seven species was 66.7 fish and 5,022 g (Tables 5.7.7-9 and 5.7.7-10, Figures 5.7.7-16 and 5.7.7-17). The highest CPUE values were recorded for Spottail Shiner (27.6 fish), followed by Rainbow Smelt (21.3 fish) (Table 5.7.7-9, Figure 5.7.7-18). For BPUE, the highest values (small-bodied fish only) were recorded for Rainbow Smelt (205 g), followed by Spottail Shiner (131 g) (Table 5.7.7-10, Figure 5.7.7-19).

CPUE and BPUE by standard gang index gill net site for Northern Pike, Lake Whitefish, Walleye and all species combined are provided in Figures 5.7.7-24 and 5.7.7-25. Northern Pike and Walleye were captured at all sites in Stephens Lake – North whereas Lake Whitefish were captured at four of nine sites. The CPUE and BPUE values for Northern Pike and Lake Whitefish were consistent between sites while the values for both Walleye and all species combined varied.

Limestone Forebay

Total CPUE for 148 fish comprised of seven species captured in standard gang index gill nets set in Limestone Forebay in 2010 was 14.1 fish while the total BPUE for the 146 fish that were weighed was 13,944 g (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). The highest CPUE values for the 2010 standard gang index gillnet catch in Limestone Forebay were recorded for Longnose Sucker (7.2 fish) and Northern Pike (4.1 fish) (Table 5.7.7-7, Figure 5.7.7-18). The highest BPUE values were for Northern Pike (5,901 g) and Longnose Sucker (5,223 g) (Table 5.7.7-8, Figure 5.7.7-19).

Total CPUE and BPUE for 56 fish comprising seven species captured in small mesh index gill nets set in the Limestone Forebay was 17.6 fish and 137 g (Tables 5.7.7-8 and 5.7.7-10, Figures 5.7.7-16 and 5.7.7-17). The highest CPUE values were recorded for Troutperch (14.2 fish), followed by Spottail Shiner (2.4 fish) (Table 5.7.7-8, Figure 5.7.7-18). For BPUE, the highest values (small-bodied fish only) were recorded for Troutperch (62 g) and Spottail Shiner (14 g) (Table 5.7.7-10, Figure 5.7.7-19).

CPUE and BPUE by standard gang index gill net site for Northern Pike, Lake Whitefish, Walleye and all species combined are provided in Figures 5.7.7-26 and 5.7.7-27. Northern Pike were captured at only four out of nine sites, Lake Whitefish were captured at only one site, and Walleye were captured at only two sites. For all species combined, CPUE and BPUE values were variable.

Lower Nelson River

Total overall CPUE and BPUE for the standard gang index gillnet catch in the lower Nelson River (all years combined) was 22.9 fish and 29,372 g (Tables 5.7.7-7 and 5.7.7-8). Total CPUE values were relatively similar in each year of study, whereas BPUE values varied considerably between years (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). Standard gang index gill net total CPUE and BPUE was highest in 2009 at 32.0 fish and 36,027 g and lowest in 2008 at 19.5 fish and 22,065 g. The highest CPUE values for the standard gang index gillnet catch (all years combined) in the lower Nelson River were recorded for Longnose Sucker (7.6 fish) and Northern Pike (6.2 fish) (Table 5.7.7-7, Figure 5.7.7-18). The highest BPUE values were recorded for Northern Pike (11,857 g) and Lake Sturgeon (6,714 g) (Table 5.7.7-8, Figure 5.7.7-19).

Total overall CPUE for 314 fish captured in the small mesh index gill nets set in the lower Nelson River (all years combined) was 31.5 fish (Table 5.7.7-9) whereas total overall BPUE for 313 of these fish was 625 g (Table 5.7.7-10). Total CPUE was relatively similar in 2009 (39.1 fish) and 2010 (32.4 fish), but was considerably lower in 2008 (23.1 fish) (Table 5.7.7-9, Figure 5.7.7-16). Total BPUE for 2010 (1,538 g) was much higher than in either 2008 (245 g) or 2009 (415 g) (Table 5.7.7-10, Figure 5.7.7-17). The highest individual species' CPUE values were recorded for Rainbow Smelt (8.7 fish), followed by Emerald Shiner (5.8 fish) and Troutperch (5.6 fish) (Table 5.7.7-9, Figure 5.7.7-18). Considering only small-bodied fish species captured in small mesh index gill nets, the highest BPUE values were recorded for Lake Chub (55 g), Rainbow Smelt (45 g) and Troutperch (35 g) (Table 5.7.7-10, Figure 5.7.7-19).

CPUE and BPUE by standard gang index gill net site for Northern Pike, Lake Whitefish, Walleye and all species combined are provided in Figures 5.7.7-28 and 5.7.7-29. Northern Pike were captured at 13 of 16 sites in the lower Nelson River. Lake Whitefish were captured at 14 of 16 sites, while Walleye were captured at 12 of 16 sites. Northern Pike CPUE and BPUE values were similar for most sites, however, GN-01, GN-03, and to a lesser extent GN-02 had higher and more variable values between years than the other sites. For Lake Whitefish the CPUE and BPUE values were very consistent both between sites and between years for the same sites. Walleye CPUE and BPUE values were similar for most sites. For all species combined the CPUE and BPUE values varied considerably.

Hayes River

Total overall standard gang index gillnet CPUE and BPUE in the Hayes River was 9.1 fish and 10,632 g (Tables 5.7.7-7 and 5.7.7-8). Standard gang index gillnet total CPUE and BPUE values varied considerably from year to year for the Hayes River (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). Total CPUE and BPUE for standard gang index gill nets was highest in 2010 at 11.2 fish and 17,336 g and lowest in 2009 at 5.8 fish and 4,790 g. The highest overall CPUE values for the standard gang index gillnet catch were recorded for Walleye (3.2 fish) and Lake Sturgeon (3.1 fish) (Table 5.7.7-7, Figure 5.7.7-18). The highest BPUE values were recorded for Walleye (4,105 g) followed by Lake Sturgeon (3,162 g) (Table 5.7.7-8, Figure 5.7.7-19).

Total overall CPUE and BPUE for the small mesh index gillnet catch in the Hayes River was 4.1 fish and 1,266 g (Tables 5.7.7-9 and 5.7.7-10). The CPUE and BPUE values for 2008 (6.0 fish and 1,430 g) and 2010 (5.1 fish and 2,159 g) were relatively similar, but the values for 2009 were considerably lower at 1.2 fish and 209 g (Tables 5.7.7-9 and 5.7.7-10, Figures 5.7.7-14 and 5.7.7-15). The highest CPUE values for individual species were recorded for Lake Sturgeon (1.3 fish), followed by Walleye (1.1 fish) (Table 5.7.7-9, Figure 5.7.7-18). Of the small-bodied fish captured in small mesh index gill nets, the highest BPUE values were recorded for Lake Chub (10 g) and Longnose Dace (*Rhinichthys cataractae*) (4 g) (Table 5.7.7-10, Figure 5.7.7-19).

CPUE and BPUE by standard gang index gill net site for Northern Pike, Lake Whitefish, Walleye and all species combined are provided in Figures 5.7.7-30 and 5.7.7-31. Lake Whitefish and Walleye were captured at all sites sampled while Northern Pike were captured at seven of nine sites. Northern Pike, Lake Whitefish, and Walleye CPUE and BPUE values were very consistent between sites and between years. For all fish combined the CPUE and BPUE values were similar between sites but varied somewhat between sampling years.

Assean Lake

Total overall CPUE and BPUE for the standard gang index gillnet catch in Assean Lake was 53.0 fish and 33,091 g (Tables 5.7.7-7 and 5.7.7-8). The CPUE and BPUE values for the standard gang index gillnet catch in Assean Lake were both marginally lower in 2009 (42.7 fish and 29,836 g) than in 2010 (63.4 fish and 36,346 g) (Tables 5.7.7-7 and 5.7.7-8, Figures 5.7.7-14 and 5.7.7-15). The highest CPUE values for the standard gang index gillnet catch (both years combined) in Assean Lake were recorded for Walleye (25.5 fish) (Table 5.7.7-7, Figure 5.7.7-18). The highest BPUE values were recorded for Walleye (14,199 g) and Northern Pike (7,802 g) (Table 5.7.7-8, Figure 5.7.7-19).

Total overall CPUE and BPUE values for the small mesh index gillnet catch in Assean Lake (both years combined) were 105.5 fish and 5,978 g (Tables 5.7.7-9 and 5.7.7-10). The lowest total CPUE value was recorded in 2009 at 69.6 fish while the value for 2010 was 141.3 fish (Tables 5.7.7-9, Figure 5.7.7-16). The BPUE value for 2009 was 7,849 g while for 2010 it was 4,108 g (Tables 5.7.7-10, Figure 5.7.7-17). The highest overall species' CPUE values were recorded for Yellow Perch (47.4 fish), followed by Spottail Shiner (31.6 fish) (Table 5.7.7-9, Figure 5.7.7-18). With respect to small-bodied fish captured in small mesh index gill nets, the highest BPUE values were recorded for Spottail Shiner (198 g) followed by Yellow Perch (144 g) (Table 5.7.7-10, Figure 5.7.7-19).

CPUE and BPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined captured in standard gang index gill nets are provided in Figures 5.7.7-32 and 5.7.7-33. Northern Pike and Walleye were captured at all sites sampled while Lake Whitefish were captured at all but one site. The CPUE and BPUE values for Northern Pike and Lake Whitefish were similar between sites and between years for the same sites. The CPUE and BPUE values for Walleye and for all fish combined varied both between sites and between sampling years for the same sites.

5.7.7.5 Size and Condition

Fish length, weight and condition factor data for Northern Pike, Lake Whitefish, and Walleye captured in Lower Nelson River Region waterbodies are presented in Tables 5.6.7-11, 5.6.7-12 and 5.6.7-13, respectively. Mean and median fork lengths of Northern Pike, Lake Whitefish, and Walleye, by waterbody, year, and mesh size, captured in Lower Nelson River Region waterbodies are presented in Figures 5.6.7-34, 5.6.7-35 and 5.6.7-36, respectively. Fork length frequency distributions for Northern Pike, Lake Whitefish, and Walleye, by waterbody and year, captured in Lower Nelson River Region waterbodies are presented in Figures 5.6.7-37, 5.6.7-38 and 5.6.7-39, respectively.

Split Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 134 Northern Pike, 38 Lake Whitefish and 388 Walleye caught in standard gang and small mesh index gill nets set in Split Lake during 2009 and 2010 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Weights only were taken from an additional six Northern Pike and three Walleye. Mean (±SD) fork length for Northern Pike was similar in 2009 (532 [±134] mm) and 2010 (523 [±134] mm), mean (±SD) fork length for Lake Whitefish was higher in 2009 (498 [±40] mm) than 2010 (381 [±83] mm), and mean (±SD) fork length for Walleye was relatively similar in 2009 and 2010 at 384 (±68) mm and 396 (±86) mm, respectively.

Northern Pike, Lake Whitefish and Walleye mean fork length captured by various mesh sizes is presented in Figures 5.7.7-34, 5.7.7-35 and 5.7.7-36. Similarly, fork length frequency distributions for these species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39.

Similar to fork length, mean (±SD, where calculated) weights for both Northern Pike and Walleye from Split Lake were relatively similar in 2009 and 2010. For Northern Pike these values were 1,306 g and 1,347 g in 2009 and 2010, respectively; for Walleye these values were 808 g and 914 (±527) g respectively for the same years. Mean (±SD) weight for Lake Whitefish was higher in 2009 (2,435 [±585] g) than 2010 (1,047 [±628] g).

Condition factor for both Northern Pike and Walleye also differed little from 2009 to 2010. Mean (±SD) condition factor in 2009 and 2010 was 0.76 (±0.07) and 0.76 (±0.07) respectively for Northern Pike and 1.32 (±0.12) and 1.27 (±0.12) respectively for Walleye. For Lake Whitefish, mean (±SD) condition factor was higher in 2009 (1.93 [±0.14]) than in 2010 (1.61 [±0.22]).

Stephens Lake - South

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 74 Northern Pike, six Lake Whitefish and 178 Walleye caught in standard gang and small mesh index gill nets set in Stephens Lake - South in 2009 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Mean (±SD) fork lengths were as follows: Northern Pike = 558 (±148) mm; Lake Whitefish = 486 (±82) mm; Walleye = 446 (±80) mm.

Mean fork length for Northern Pike, Lake Whitefish and Walleye per mesh size is presented in Figures 5.7.7-34, 5.7.7-35 and 5.7.7-36, respectively. Similarly, length frequency distributions for these species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39, respectively.

Mean (±SD) weight for Northern Pike, Lake Whitefish and Walleye was 1,573 (±1,186) g, 2,528 (±1,193) g and 1,372 (±680) g respectively. Mean (±SD) condition factor for each of these three species was as follows: Northern Pike = 0.76 (±0.08), Lake Whitefish = 2.04 (±0.17); Walleye = 1.40 (±0.10).

Stephens Lake - North

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 80 Northern Pike, 11 Lake Whitefish and 109 Walleye caught in standard gang and small mesh index gill nets set in Stephens Lake - North in 2009 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Mean (±SD) fork length was as follows: Northern Pike = 558 (±129) mm; Lake Whitefish = 443 (±120) mm; Walleye = 435 (±94) mm.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.7.7-34, 5.7.7-35 and 5.7.7-36. Similarly, fork length frequency distributions for these species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39.

Mean (±SD) weight for Northern Pike, Lake Whitefish and Walleye was 1,474 (±1,194) g, 1,975 (±968) g and 1,322 (±749) g, respectively. Mean (±SD) condition factor for these three species was as follows: Northern Pike = 0.74 (±0.10), Lake Whitefish = 1.89 (±0.24); Walleye = 1.40 (±0.11).

Limestone Forebay

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 41 Northern Pike, one Lake Whitefish and five Walleye caught in standard gang and small mesh index gill nets set in Limestone Forebay in 2010 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Mean (±SD) fork length was as follows: Northern Pike = 613 (±81) mm; Walleye = 498 (±55) mm. The lone Lake Whitefish measured had a fork length of 512 mm.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.7.7-34, 5.7.7-35 and 5.7.7-36. Similarly, length frequency distributions for these species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39.

Mean (±SD) weight for Northern Pike and Walleye was 1,820 (±673) g and 1,660 (±423) g respectively. Mean (±SD) condition factor was as follows: Northern Pike = 0.76 (±0.08), Walleye = 1.33 (±0.14). One Lake Whitefish had a weight of 2,320 g and a condition factor of 1.73.

Lower Nelson River

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 238 Northern Pike, 62 Lake Whitefish and 141 Walleye captured in standard gang and small mesh index gill nets from the lower Nelson River during 2008, 2009 and 2010 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Weights only were taken from an additional two Northern Pike and 19 Walleye. Mean fork length for all three species was similar in 2008 and 2009; however, mean length was somewhat lower for both Northern Pike and Lake Whitefish and somewhat higher for Walleye in 2010 than in previous years. Mean (±SD) fork length for Northern Pike was 641 (±108) mm in 2008 compared to 631 (±119) mm in 2009 and 608 (±120) mm in 2010. For Lake Whitefish these values were 425 (±55) mm, 423 (±34) and 397 (±56) mm for 2008, 2009 and 2010 respectively, while for Walleye they were 394 (±90) mm, 392 (±105) mm and 407 (±93) mm.

Northern Pike, Lake Whitefish and Walleye mean fork length per mesh size is presented in Figures 5.7.7-34, 5.7.7-35 and 5.7.7-36. Similarly, length frequency distributions for these species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39.

Mean weight for Northern Pike, Lake Whitefish and Walleye from the lower Nelson River followed the same yearly pattern as fork length. Mean (±SD, where calculated) weight for Northern Pike was 2,056 (±1,081) g, 2,048 (±1,144) g and 1,925 g in 2008, 2009 and 2010, respectively. Corresponding values for Lake Whitefish were 1,117 (±42) g, 1,221 (±347) g and 942 (±453) g and for Walleye were 496 g, 914 (±469) g and 953 g, respectively.

Mean (±SD) condition factors for 2008, 2009 and 2010 were 0.71 (±0.08), 0.74 (±0.09) and 0.76 (±0.09), respectively, for Northern Pike, 1.37 (±0.14), 1.57 (±0.15) and 1.40 (±0.11), respectively, for Lake Whitefish and 1.11 (±0.11), 1.26 (±0.13) and 1.29 (±0.14), respectively, for Walleye.

Hayes River

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 16 Northern Pike, 22 Lake Whitefish and 90 Walleye captured in standard gang and small mesh index gill nets from the Hayes River during 2008, 2009 and 2010 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Weights only were taken from an additional seven Walleye. Mean (±SD) fork length for Northern Pike was highest in 2008 (775 [±93]) and declined in both 2009 (642 [±30] mm) and 2010 (620 [±138] mm). Mean (±SD, where calculated) fork length for Lake Whitefish was similar between 2008 (366 [±25] mm) and 2009 (364 mm), but declined in 2010

(319 [±58] mm). Mean (±SD) fork length for Walleye was similar in all three years, at: 467 (±90) mm, 439 (±99) mm and 482 (±102) mm.

Mean fork lengths for Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes are presented in 5.7.7-34, 5.7.7-35 and 5.7.7-36; fork length frequency distributions for these same three species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39.

Mean weight for Northern Pike, Lake Whitefish and Walleye from the Hayes River in 2008, 2009 and 2010 all followed a similar pattern to fork length. Mean (±SD, where calculated) weight for Northern Pike was 3,313 (±1,061) g in 2008, 1,920 (±311) g in 2009 and 1,916 (±1,013) g in 2010, while those for Lake Whitefish were 691 (±245) g, 730 g and 51 (±199) g. Mean (±SD, where calculated) weight for Walleye was calculated as 1,133 g, 1,078 (±779) g and 1,274 g in 2008, 2009 and 2010, respectively.

Condition factors for Northern Pike and Walleye showed little variation from year to year while those for Lake Whitefish increased from 2008 to 2009 and was intermediate in value in 2010. Mean (±SD) condition factor in 2008, 2009 and 2010 was 0.70 (±0.10), 0.72 (±0.01) and 0.72 (±0.06) respectively for Northern Pike; 1.37 (±0.17), 1.51 and 1.46 (±0.10) for Lake Whitefish; 1.09 (±0.10), 1.11 (±0.12) and 1.12 (±0.13) for Walleye.

Assean Lake

Fork length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 151 Northern Pike, 121 Lake Whitefish and 569 Walleye collected from standard gang and small mesh index gill nets in Assean Lake during 2009 and 2010 (Tables 5.7.7-11, 5.7.7-12 and 5.7.7-13). Weights only were taken from an additional six Northern Pike, five Lake Whitefish and 55 Walleye. Mean fork length for all three species was similar between years. Mean (±SD) fork length for Northern Pike was 544 (±156) mm in 2009 compared to 524 (±124) mm in 2010, while those for Lake Whitefish were 323 (±74) mm and 340 (±92) mm for the same years. Mean fork length for Walleye in 2009 and 2010 was 353 (±68) mm and 364 (±55) mm, respectively.

Mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.7.7-34, 5.7.7-35 and 5.7.7-36. Similarly, length frequency distributions for these species are provided in Figures 5.7.7-37, 5.7.7-38, and 5.7.7-39.

As was the case for fork length, mean (±SD, where calculated) weights for all Northern Pike and Walleye from Assean Lake were relatively similar in 2009 and 2010, while those for Lake Whitefish noticeably increased during the same time period. For Northern Pike these values were 1,288 and 1,083 (±717) g in 2009 and 2010, respectively, for Lake Whitefish 615 and 762 g, and for Walleye 498 and 560 (±225) g. Mean (±SD) condition factor in 2009 and 2010 were as follows: for Northern Pike (0.65 [±0.08]) and (0.65 [±0.07]), Lake Whitefish (1.58 [±0.17]) and (1.57 [±0.18]) and Walleye (1.12 [±0.10]) and (1.09 [±0.07]).

5.7.7.6 Age Composition

Year-class and age-frequency distributions for Northern Pike, Lake Whitefish, and Walleye captured in standard gang index gill nets in Lower Nelson River Region waterbodies are presented in Tables 5.6.7-14 – 5.6.7-16 and Tables 5.6.7-17 – 5.6.7-19, respectively. Age-frequency distributions for Northern Pike, Lake Whitefish and Walleye are also illustrated in Figures 5.6.7-40 – 5.6.7-42, respectively. Where sufficient data existed, mean fork length, weight, and condition factor, by age and year-class, for Northern Pike, Lake Whitefish, and Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies are presented in Tables 5.6.7-20 – 5.6.7-22. Where sufficient data existed, von Bertalanffy growth curves were produced and are presented for Northern Pike, Lake Whitefish, and Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies in Figures 5.6.7-43 – 5.6.7-45, respectively.

Split Lake

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in Split Lake during 2009 and 2010. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes ranged from 1995 to 2008 for Northern Pike, from 1989 to 2008 for Lake Whitefish and from 1987 to 2008 for Walleye.

Relatively strong Northern Pike cohorts were evident each year from 2003 to 2007. Few ageing data were available to determine year-class strength for Lake Whitefish, but some evidence suggests a relatively strong year-class in 2003. The data for Walleye suggests particularly strong cohorts in each of 2001, 2002 and 2003.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

Stephens Lake - South

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in Stephens Lake - South during 2009. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes ranged from 1992 to 2007 for Northern Pike, 1990 to 2004 for Lake Whitefish and 1979 to 2007 for Walleye.

The data suggest that a strong Northern Pike year-class was produced in 2004. Too few data were available to determine year-class strength for Lake Whitefish. Strong year-classes for Walleye appear to have been produced in 2001 and 2002.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22, respectively. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

Stephens Lake - North

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in Stephens Lake - North during 2009. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes ranged from 1992 to 2008 for Northern Pike, 1984 to 2003 for Lake Whitefish and 1981 to 2007 for Walleye.

The data suggest that relatively strong Northern Pike year-classes were produced in 2005 and 2006. Too few data were available to determine year-class strength for Lake Whitefish. For Walleye, however, strong year-classes were apparent in 2000, 2001 and 2002.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

Limestone Forebay

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in the Limestone Forebay during 2010. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes ranged from 2001 to 2007 for Northern Pike, 1993 to 2003 for Walleye, and for Lake Whitefish only one fish was aged (1996 year-class).

The data suggest that a relatively strong Northern Pike year-class was produced in 2004. Too few data were available to determine year-class strength for either Lake Whitefish or Walleye.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

Lower Nelson River

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in the lower Nelson River during 2008, 2009 and 2010. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes ranged from 1995 to 2007 for Northern Pike, 1988 to 2005 for Lake Whitefish and 1987 to 2008 for Walleye.

The data suggest that strong Northern Pike cohorts were produced each year from 2001 to 2005. For Walleye, strong cohorts were evident in 2002 and 2003 while no one year was particularly strong for Lake Whitefish.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

Hayes River

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in the Hayes River during 2008, 2009 and 2010. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes ranged from 1999 to 2007 for Northern Pike, from 1997 to 2006 for Lake Whitefish and from 1984 to 2006 for Walleye.

Too few ageing data were available to suggest year-class strength for Northern Pike or Lake Whitefish in the Hayes River. The data for Walleye suggest strong cohorts in 1997, 1999 and 2004.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

Assean Lake

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets set in Assean Lake during 2009 and 2010. Age frequency distributions are presented by year-class (Tables 5.7.7-14, 5.7.7-15 and 5.7.7-16) and age (Tables 5.7.7-17, 5.7.7-18 and 5.7.7-19; Figures 5.7.7-40, 5.7.7-41 and 5.7.7-42). Year-classes represented ranged from 1991 to 2008 for Northern Pike, from 1990 to 2009 for Lake Whitefish and from 1990 to 2008 for Walleye.

The data suggest that relatively strong Northern Pike cohorts were produced each year from 2002 to 2006 while strong Lake Whitefish cohorts were produced each year from 2004 to 2006. The Walleye ageing data suggests strong cohorts were produced each year from 1996 to 2003.

Length, weight and condition factor by age and year class data for Northern Pike, Lake Whitefish and Walleye are provided in Tables 5.7.7-20, 5.7.7-21 and 5.7.7-22. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.7.7-43, 5.7.7-44 and 5.7.7-45.

5.7.7.7 Deformities, Erosion, Lesions and Tumours (DELTs)

Split Lake

A total of eight DELTs were recorded from 806 (1.0%) fish examined from Split Lake in 2009 and 2010 (Table 5.7.7-23). The highest incidence rate occurred in Lake Whitefish (2.6%, n = 38), followed by Walleye (1.3%, n = 383), Northern Pike (0.8%, n = 132) and White Sucker (0.4%, n = 251). In total, one erosion was found on one Lake Whitefish, two deformities and two tumours on Walleye, one deformity on Northern Pike and one erosion on White Sucker. Two Lake Sturgeon were examined for DELTs but none were observed.

Stephens Lake - South

A total of seven DELTs were recorded from 272 (2.6%) fish examined from Stephens Lake - South in 2009 (Table 5.7.7-23). The highest incidence rate occurred in White Sucker (13.3%, n = 15), followed by Northern Pike (2.7%, n = 74) and Walleye (1.7%, n = 177). In total, two erosion were found on White Sucker and two on Northern Pike and one deformity and two tumours were found on Walleye. Six Lake Whitefish were examined for DELTs but none were observed.

Stephens Lake - North

A total of four DELTs were recorded from 189 (2.1%) fish examined from Stephens Lake - North in 2009 (Table 5.7.7-23). The highest incidence rate occurred in Northern Pike (2.6%, n = 77), followed by Sauger (2.1%, n = 97). In total, one erosion and one tumour were found on Northern Pike and one deformity and one tumour were found on Sauger. No DELTs were observed in a total of five White Sucker and 10 Lake Whitefish examined.

Limestone Forebay

A total of four DELTs were recorded from 61 (6.6%) fish examined from the Limestone Forebay in 2010 (Table 5.7.7-23). DELTs were observed only on Northern Pike (9.3%, n = 43). In total, one deformity, two erosion and one lesion were found. No DELTs were observed in White Sucker (n = 12), Lake Whitefish (n = 1) or Walleye (n = 5).

Lower Nelson River

A total of 13 DELTs were recorded from 507 (2.6%) fish examined from the lower Nelson River in 2008, 2009 and 2010 (Table 5.7.7-23). The highest incidence rate occurred in Walleye (3.0%, n = 135), followed by Northern Pike (2.9%, n = 238) and White Sucker (2.8%, n = 72). In total, three lesions and one tumour were found on Walleye, three deformities, one erosion and three lesions on Northern Pike and one deformity and one tumour on White Sucker. No DELTs were observed in 62 Lake Whitefish examined.

Hayes River

A total of nine DELTs were recorded from 244 (3.7%) fish examined from the Hayes River in 2008, 2009 and 2010 (Table 5.7.7-23). The highest incidence rate occurred in White Sucker (17.4%, n =23), followed by Northern Pike (6.3%, n = 16), Lake Whitefish (4.6%, n = 22) and Walleye (3.1%, n = 97). In total, one deformity, one case of an erosion, two lesions and one tumour were found on White Sucker; one lesion was found on each of Northern Pike and Lake Whitefish and one deformity and one lesion was found on Walleye.

Assean Lake

A total of nine DELTs were recorded from 977 (0.9%) fish examined from Assean Lake in 2009 and 2010 (Table 5.7.7-23). The highest incidence rate occurred in White Sucker (1.8%, n = 163), followed by Walleye (1.1%, n = 552). In total, one deformity and two lesions were found on White Sucker and four deformities, one lesion and one tumour were found on Walleye. No DELTs were observed in 143 Northern Pike and 119 Lake Whitefish examined.

5.7.7.8 Index of Biological Integrity (IBI)

Index of Biotic Integrity scores based on 11 metrics were calculated for all Lower Nelson River Region sampled waterbodies. The Lower Nelson River Region IBI scores varied from 36.9 (Limestone Forebay 2010) to 61.0 (Split Lake 2009) with the majority of annual scores for all waterbodies and years falling between 55 and 60 (Table 5.7.7-24, Figure 5.7.7-46). The total number of species ranged from eight to 16 with the Hayes River having eight to 11 and Split Lake having 16 to 17. Stephens Lake, the Limestone Forebay, and Assean Lake all had 10 species present while the lower Nelson River had 14 to 15. The number of sensitive species present ranged from one (Stephens Lake-North) to four (Split Lake) with all other waterbodies having two to three. The proportion of tolerant species was lowest in the off-system waterbody, Assean Lake, at approximately 10% and was highest in the Limestone Forebay (44 %). The total number of insectivore species ranged from four to 11 with the Hayes River having four to six and Split Lake having 11. The evenness metric values ranged from 5.26 for the Limestone Forebay to 9.27 for Split Lake. The remaining waterbodies all had values of approximately six with the exception of the lower Nelson River for which evenness values approximated that of the Limestone Forebay.

Piscivore species were found to dominate the catch in terms of biomass for all waterbodies, which was especially true for Stephens Lake where in both the north and south areas, piscivores accounted for 90% of the biomass. Omnivores contributed the second highest amount of biomass for Split Lake, the Limestone Forebay and Assean Lake (2009) while insectivores were the second highest contributor for the lower Nelson River, the Hayes River and Assean Lake (2010). The proportion of simple lithophilic spawners varied among waterbodies, ranging from 0.31 (Stephens Lake - North) to 0.92 (Hayes River). Total CPUE ranged from 5.8 fish (Hayes River 2009) to 63.4 fish (Assean Lake 2010).

5.7.7.9 Spatial Comparisons

Overall, the fish assemblage as captured by standard gang index gill net sets in all lower Nelson River waterbodies was found to be dominated by Walleye in the uppermost on-system lakes (i.e., Split Lake and Stephens Lake) as well as the off-system waterbodies (i.e., Hayes River and Assean Lake) (Table 5.7.7-3). Northern Pike was common in all waterbodies in the region except the Hayes River. White Sucker was common in Split Lake and Assean Lake but was less common in the downstream on-system waterbodies in the region (i.e., Limestone Forebay, lower Nelson River) and the Hayes River. In the downstream on-system waterbodies and the Hayes River, Longnose Sucker was more common. Sauger was common in Split Lake but less common to scarce in on-system waterbodies further downstream and was absent from the catch in the Hayes River and Assean Lake. Cisco (*Coregonus artedi*) was common only in Assean Lake.

Of the small-bodied fish species captured in the small mesh index gill nets, Rainbow Smelt was common in all on-system waterbodies with the exception of the Limestone Forebay, Hayes River and Assean Lake, where the species was absent (Table 5.7.7-3). Spottail Shiner was common in the uppermost on-system waterbodies, as far downstream as the Limestone Forebay and in Assean Lake, but was uncommon in the lower Nelson River and absent from the Hayes River. Troutperch was common in most on-system waterbodies (including Split Lake, Stephens Lake - South, the Limestone Forebay and the lower Nelson River) as well as Assean Lake, but was absent from Stephens Lake - North and the Hayes River.

The catch in Split Lake was comprised of 19 species, of which only Freshwater Drum (*Aplodinotus grunniens*) and Slimy Sculpin (*Cottus cognatus*) were not found in any of the other sampled Lower Nelson River Region waterbodies. Shorthead Redhorse (*Moxostoma macrolepidotum*) was captured in Split Lake, but not in other on-system waterbodies in the region. Shorthead Redhorse was captured off-system in the Hayes River and Yellow Perch was captured in Assean Lake. Notable absences from the catch in Split Lake (species captured in other on-system waterbodies further downstream) included Silver Lamprey (*Ichthyomyzon unicuspis*), Goldeye (*Hiodon alosoides*) and Troutperch. The fish assemblage captured in Stephens Lake - South was comprised of 10 species, all of which were also found in other Lower Nelson River Region waterbodies. Ten species were also captured in Stephens Lake – North, including Common Carp (*Cyprinus carpio*) (not captured elsewhere in the region) and Emerald Shiner (not captured in Stephens Lake – South). Both Mooneye (*Hiodon tergisus*) and Sauger were not detected in Stephens Lake – North, but were detected in Stephens Lake - South. Ten species were captured in the Limestone Forebay, all of which were captured in other on-system and/or off-system waterbodies in the region. Eighteen species were captured in the lower Nelson River of which Silver Lamprey was not captured elsewhere on-system (captured in the Hayes River) and Goldeye was not captured elsewhere either on-system or off-system.

With respect to the off-system waterbodies, the catch in the Hayes River was comprised of 11 species of which Brook Trout (*Salvelinus fontinalis*) and Longnose Dace were not found elsewhere in the region. Notable absences from the Hayes River catch (common in the Nelson River) included Rainbow Smelt, Spottail Shiner, Emerald Shiner, Troutperch and Yellow Perch. In Assean Lake the catch was made up of 10 species, all of which were found elsewhere in the region. One notable absence from the Assean Lake catch was Lake Sturgeon.

A comparison of mean CPUE values for the two annual on-system Lower Nelson River Region waterbodies (Split Lake and lower Nelson River), three on-system rotational waterbodies (Stephens Lake - South and Stephens Lake - North and Limestone Forebay) and annual off-system waterbodies (Hayes River and Assean Lake) is presented in Tables 5.7.7-7 and 5.7.7-9 and Figures 5.7.7-14, 5.7.7-16 and 5.7.7-18. CPUE values from standard gang index gill nets set in Split Lake and Stephens Lake – South were relatively similar as were values for Stephens Lake – North and the lower Nelson River, but each pair varied considerably from the other with the former having the higher CPUE values. The total overall CPUE value for Limestone Forebay was the lowest of all on-system waterbodies while the Hayes River CPUE was lowest overall and Assean Lake highest overall. The CPUEs of most common species captured in the standard gang index gill nets were relatively similar both on-system and off-system with the exception of Walleye which had moderately high CPUEs in the upstream on-system waterbodies of the region (i.e., Split Lake, Stephens Lake - South and Stephens Lake - North), very low to low CPUEs in the more downstream on-system waterbodies (Limestone Forebay and lower Nelson River) and a high CPUE in Assean Lake (off-system waterbody). The Hayes River (off-system waterbody) had a low CPUE for Walleye, consistent with low CPUEs for other species and all fish combined. Assean Lake was noteworthy in having higher CPUE values for White Sucker, Northern Pike and Lake Whitefish than other waterbodies in the region and Split Lake was noteworthy in having a CPUE for White Sucker that was similar to that in Assean Lake and higher than other waterbodies in the region.

Notable differences in the CPUE values for the small mesh index gill nets set in the Lower Nelson River Region were evident, particularly for Spottail Shiner and Troutperch. For on-system waterbodies, CPUE for Spottail Shiner was highest in Stephens Lake - North and lowest in the lower Nelson River. Troutperch CPUE values were highest in Stephens Lake – South and Limestone Forebay, but almost absent from the catch in Stephens Lake - North. CPUEs for Troutperch from Split Lake and the lower Nelson River were intermediate in value. Emerald Shiner CPUE was higher in Stephens Lake - North than other on-system waterbodies, was particularly low in Limestone Forebay and completely absent from Stephens Lake - South. Yellow Perch had a low CPUE value in all on-system waterbodies, but was abundant in Assean Lake and absent from the Hayes River.

Standard gang and small mesh index gillnet BPUE from all sampled waterbodies in the region are provided in Tables 5.7.7-8 and 5.7.7-10 and Figures 5.7.7-15, 5.7.7-17 and 5.7.7-19. Generally total BPUE from standard gang index gill nets was similar between on-system waterbodies, with the exception of Limestone Forebay, where overall BPUE was low. Total overall BPUE for Assean Lake was similar to that found in most on-system waterbodies while that for the Hayes River was the lowest of all waterbodies sampled in the region. Small mesh index gill net BPUE was more complex as the upstream on-system waterbodies (Split Lake, Stephens Lake - North and Stephens Lake - South) had considerably higher total overall BPUE values than the more downstream waterbodies (i.e., Limestone Forebay and lower Nelson River). Off-system, the Hayes River had a higher overall small mesh BPUE, approximately twice that of the lower Nelson River, but similar to values from Split Lake and Stephens Lake - South. Assean Lake had the highest total overall BPUE in the region, similar to that in Stephens Lake - North.

In the standard gang index gill nets, White Sucker, Northern Pike and Walleye showed considerable variation in BPUE between waterbodies. White Sucker BPUE was comparatively high in Split Lake and low in Stephens Lake – North, when compared to other on-system waterbodies. White Sucker BPUE was lower in the Hayes River than any other waterbody, while Assean Lake BPUE was similar to that calculated for Split Lake. Northern Pike BPUE was similar between Split Lake and the Limestone Forebay, and between Stephens Lake - South, Stephens Lake - North and the lower Nelson River, with the former waterbodies having BPUE values approximately one-half of those the latter waterbodies. Northern Pike BPUE in the Hayes River was the lowest of all waterbodies sampled in the region while that for Assean Lake was similar to Split Lake and the Limestone Forebay. As was the case with CPUE, Walleye BPUE values from both the standard gang and small mesh index gill nets showed considerable variation between waterbodies and decreased in a downstream direction from Stephens Lake - South to the Limestone Forebay.

Within each waterbody, site variability was examined by comparing variability in mean annual CPUE between the standard gang index gill net sites. With the exception of Stephens Lake - South, Stephens Lake - North and the Limestone Forebay, each of which only had one year of data, the two years (Split Lake) and three years (lower Nelson River, Hayes River, Assean Lake) of collected data were averaged for each individual site. Total CPUE values are presented along with values for Northern Pike, Lake Whitefish and Walleye. In Split Lake, total CPUE values ranged from approximately 15 (Site GN-05 and GN-18) to over 80 (Site GN-15) (Figure 5.7.7-20). In Stephens Lake - South and Stephens Lake - North total CPUE values ranged from approximately 5 (Site GN-15) to approximately 75 (Site GN-30) and from less than 10 (Site GN-02) to approximately 45 (Site GN-26), respectively (Figures 5.7.7-22 and 5.7.7-24). In the Limestone Forebay total CPUE values ranged from below 10 for Site GN-07 to nearly 30 at Site

GN-05 (Figure 5.7.7-26). In the lower Nelson River total CPUE values ranged from approximately 10 (Site GN-16) to approximately 40 (Site GN-04 (Figure 5.7.7-28). In the Hayes River, total CPUE showed a small range between sites from approximately 5 calculated for Site GN-09 to approximately 18 calculated for Site GN-01 (Figure 5.7.7-30). Total CPUE values for Assean Lake ranged from less than 20 at Site GN-06 to approximately 100 at Site GN-11 (Figure 5.7.7-32).

5.7.7.10 Temporal Variability

Total CPUE was used to examine temporal variability within the four waterbodies sampled in multiple years. Split Lake showed little temporal variability in standard gang index gillnet CPUE between 2009 (31.7) and 2010 (32.0) (Table 5.7.7-7). In the lower Nelson River, CPUE increased from 2008 (19.5) to 2009 (32.0) then decreased somewhat in 2010 (26.5). In the Hayes River the CPUE values for 2008 and 2010 were similar: CPUE = 10.2 and 11.2 respectively, but the value for 2009 was approximately one-half of that (5.8). Assean Lake total CPUE showed an increase from 2009 (42.7) to 2010 (63.4).

Total small mesh index gillnet CPUE values showed slightly more annual variability the standard gang index gill nets (Table 5.7.7-9). In Split Lake, 2009 small mesh CPUE (68.4) was approximately double that of 2010 (33.3). For the lower Nelson River, CPUE values were more consistent, but increased from 2008 (23.1) to 2009 (39.1), and declined slightly in 2010 (32.4), The Hayes River CPUE values for 2008 (6.0) and 2010 (5.1) were similar, but the value for 2009 was considerably less (1.2). In Assean Lake, CPUE increased considerably from 2009 (69.6) to 2010 (141.3), a result of a large catch of Yellow Perch in 2010.

Split Lake’s IBI scores decreased from 61 in 2009 to 57.2 in 2010, primarily due to one fewer fish species being captured and two fewer insectivore species being captured in 2010. The lower Nelson River IBI scores remained very close from 2008 to 2010, near 57-58. The total number of insectivore species captured dropped from 10 in 2009 to only seven in 2010, however, both the proportion of omnivore biomass and percentage of individuals with DELTs were lower in 2010 offsetting the decrease in insectivore species present. The Hayes River IBI scores ranged from 54.9 to 59.2, with the highest score occurring in 2010 due primarily to an increase in the proportion of insectivore biomass. The other off-system waterbody, Assean Lake, had relatively consistent IBI scores ranging from 58.5 in 2009 to 60.5 in 2010.

Water levels and flows did not appear to have any noticeable relationship to the CPUE or IBI value differences noted for any of the Lower Nelson River Region waterbodies. Additional data will be collected over time and determine if any relationships are apparent in the future.

Table 5.7.7-1. Summary of site-specific physical measurements collected during CAMPP index gillnetting conducted in Lower Nelson River Region waterbodies, 2008-2010.

Location	Site	UTM Coordinates			Set Date	Set Duration (hr)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Split Lake	GN-03	15	316492	6237800	27-Aug-09	26.00	3.2	4.5	14.0
Split Lake	GN-05	14	673559	6236207	22-Aug-09	27.00	2.8	3.7	16.0
Split Lake	GN-06	14	673487	6233791	21-Aug-09	27.17	2.4	3.9	16.0
Split Lake	GN-13	14	669910	6221792	20-Aug-09	25.50	4.6	5.8	16.0
Split Lake	GN-15	14	657459	6221683	18-Aug-09	25.33	4.5	3.0	12.0
Split Lake	GN-18	14	669466	6225217	19-Aug-09	22.50	3.4	3.9	16.0
Split Lake	GN-20	14	682951	6236532	27-Aug-09	24.63	10.2	8.3	14.0
Split Lake	GN-21	14	675199	6233925	21-Aug-09	26.17	7.1	9.7	16.0
Split Lake	GN-22	14	677869	6232988	22-Aug-09	27.50	12.8	13.9	16.0
Split Lake	GN-26	14	670725	6225619	19-Aug-09	21.83	12.3	8.8	16.0
Split Lake	GN-28	14	657810	6221887	18-Aug-09	26.17	8.0	14.4	12.0
Split Lake	GN-29	14	670742	6221973	20-Aug-09	26.08	9.4	9.0	16.0
Split Lake	SN-03	15	316404	6237958	27-Aug-09	26.00	3.2	4.5	14.0
Split Lake	SN-06	14	673641	6233840	21-Aug-09	27.17	2.4	3.9	16.0
Split Lake	SN-20	14	683125	6236598	27-Aug-09	24.63	10.2	8.3	14.0
Split Lake	SN-26	14	670854	6225508	19-Aug-09	21.83	12.3	8.8	16.0
Split Lake	GN-03	15	316477	6237843	23-Aug-10	48.58	4.8	5.2	16.0
Split Lake	GN-05	14	673580	6236345	23-Aug-10	45.08	3.5	3.5	15.0
Split Lake	GN-06	14	673465	6233853	23-Aug-10	45.50	3.5	3.7	15.0
Split Lake	GN-13	14	669781	6221741	22-Aug-10	28.58	5.5	4.7	16.0
Split Lake	GN-15	14	657349	6221655	21-Aug-10	25.92	2.7	3.8	16.0
Split Lake	GN-18	14	669558	6225261	22-Aug-10	28.67	3.9	3.6	15.5
Split Lake	GN-20	14	683018	6236587	20-Aug-10	25.58	10.8	9.5	16.0
Split Lake	GN-21	14	675244	6233962	20-Aug-10	25.33	8.9	7.0	16.0
Split Lake	GN-22	14	677978	6233132	20-Aug-10	24.75	10.2	11.8	16.0
Split Lake	GN-26	14	670883	6225531	21-Aug-10	27.17	11.4	11.3	16.0
Split Lake	GN-28	14	657720	6221822	21-Aug-10	27.08	15.9	14.7	16.0
Split Lake	GN-29	14	670875	6222070	22-Aug-10	28.58	8.2	9.2	16.0
Split Lake	SN-03	15	316518	6237827	23-Aug-10	48.58	4.6	4.8	15.0
Split Lake	SN-06	14	673465	6233853	23-Aug-10	45.50	3.5	2.6	15.0
Split Lake	SN-20	14	683018	6236587	20-Aug-10	25.58	10.8	10.7	16.0
Split Lake	SN-26	14	670883	6225531	21-Aug-10	27.17	11.4	12.0	16.0

Table 5.7.6-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Stephens Lake-South	GN-13	15	397669	6249302	13-Sep-09	24.17	23.3	4.2	16.0
Stephens Lake-South	GN-14	15	397005	6248157	13-Sep-09	25.57	3.4	3.7	16.0
Stephens Lake-South	GN-15	15	397389	6251227	14-Sep-09	23.65	7.8	5.1	16.0
Stephens Lake-South	GN-16	15	395049	6252194	15-Sep-09	25.57	2.0	2.8	14.0
Stephens Lake-South	GN-17	15	392830	6246993	13-Sep-09	25.87	1.9	2.7	16.0
Stephens Lake-South	GN-22	15	387318	6246252	16-Sep-09	21.83	2.7	2.1	15.5
Stephens Lake-South	GN-30	15	368047	6246983	3-Sep-09	23.17	2.4	1.8	16.0
Stephens Lake-South	GN-32	15	369421	6247610	3-Sep-09	22.92	14.1	13.6	16.0
Stephens Lake-South	GN-33	15	370979	6246147	4-Sep-09	25.02	1.6	1.8	15.0
Stephens Lake-South	SN-14	15	396959	6248155	13-Sep-09	25.17	3.2	3.4	16.0
Stephens Lake-South	SN-22	15	387342	6246217	16-Sep-09	21.83	2.7	2.9	15.5
Stephens Lake-South	SN-32	15	369342	6247374	3-Sep-09	22.92	14.1	14.7	16.0
Stephens Lake-North	GN-01	15	359072	6265735	9-Sep-09	24.50	8.4	3.6	15.0
Stephens Lake-North	GN-02	15	358236	6264487	9-Sep-09	24.92	5.9	7.1	15.0
Stephens Lake-North	GN-04	15	362483	6264772	8-Sep-09	25.33	2.2	2.3	15.0
Stephens Lake-North	GN-05	15	359695	6262150	8-Sep-09	24.22	1.9	2.4	15.0
Stephens Lake-North	GN-09	15	364630	6259308	10-Sep-09	25.40	6.7	3.6	14.0
Stephens Lake-North	GN-26	15	369332	6252009	11-Sep-09	22.17	3.0	5.6	16.0
Stephens Lake-North	GN-31	15	367225	6248992	7-Sep-09	25.08	2.0	3.4	15.0
Stephens Lake-North	GN-34	15	368355	6249515	11-Sep-09	23.50	1.5	2.9	16.0
Stephens Lake-North	GN-35	15	370445	6249859	7-Sep-09	25.75	2.4	2.0	15.0
Stephens Lake-North	SN-04	15	362435	6264757	8-Sep-09	25.95	2.2	2.3	15.0
Stephens Lake-North	SN-09	15	364646	6259347	10-Sep-09	26.17	4.0	6.7	14.0
Stephens Lake-North	SN-34	15	368309	6249519	11-Sep-09	23.50	1.4	1.2	16.0
Limestone Forebay	GN-01	15	432376	6262734	12-Jul-10	24.85	4.0	2.7	19.0
Limestone Forebay	GN-02	15	430571	6261417	12-Jul-10	23.85	23.8	12.2	19.0
Limestone Forebay	GN-03	15	427953	6256825	13-Jul-10	26.45	1.9	1.2	20.0
Limestone Forebay	GN-04	15	430019	6257845	13-Jul-10	26.43	18.5	18.6	20.0
Limestone Forebay	GN-05	15	427310	6255991	14-Jul-10	24.50	16.7	16.5	19.0
Limestone Forebay	GN-06	15	423756	6252134	14-Jul-10	24.25	16.0	14.8	19.0
Limestone Forebay	GN-07	15	420755	6252963	15-Jul-10	23.75	1.6	4.8	18.0
Limestone Forebay	GN-08	15	418465	6251618	15-Jul-10	22.83	1.7	1.2	18.0
Limestone Forebay	GN-09	15	421951	6252789	15-Jul-10	22.37	12.8	11.5	18.0
Limestone Forebay	SN-01	15	432399	6262782	12-Jul-10	25.15	4.2	4.0	19.0
Limestone Forebay	SN-04	15	430034	6257872	13-Jul-10	26.25	17.8	18.5	20.0
Limestone Forebay	SN-06	15	423756	6252134	14-Jul-10	24.05	16.0	15.2	19.0

Table 5.7.6-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
lower Nelson R	GN-01	15	443329	6271561	12-Aug-08	27.25	2.3	3.4	20.0
lower Nelson R	GN-02	15	445800	6273839	12-Aug-08	22.63	0.9	1.8	20.5
lower Nelson R	GN-03	15	445152	6273017	12-Aug-08	24.83	1.5	2.3	21.0
lower Nelson R	GN-04	15	448032	6276646	13-Aug-08	14.50	1.5	2.4	21.0
lower Nelson R	GN-05	15	448088	6278129	13-Aug-08	15.03	1.9	1.5	21.0
lower Nelson R	GN-06	15	469692	6300756	16-Aug-08	28.67	3.3	0.5	20.0
lower Nelson R	GN-07	15	469436	6300083	16-Aug-08	28.83	0.8	3.4	20.0
lower Nelson R	GN-08	15	468666	6298720	17-Aug-08	21.50	1.6	3.3	20.0
lower Nelson R	GN-09	15	462183	6290251	17-Aug-08	23.00	2.3	1.6	20.0
lower Nelson R	GN-10	15	462291	6290286	18-Aug-08	17.58	2.8	3.0	21.0
lower Nelson R	GN-11	15	459931	6288704	14-Aug-08	19.50	6.1	1.1	21.0
lower Nelson R	GN-12	15	458535	6288328	14-Aug-08	21.00	0.9	0.9	21.0
lower Nelson R	GN-13	15	468191	6297013	15-Aug-08	25.17	2.4	0.5	21.0
lower Nelson R	GN-14	15	460161	6289162	15-Aug-08	18.17	0.5	2.3	21.0
lower Nelson R	GN-15	15	464654	6294014	15-Aug-08	23.67	5.0	5.9	21.0
lower Nelson R	GN-16	15	461917	6290919	14-Aug-08	17.98	7.0	0.8	21.0
lower Nelson R	SN-03	15	445132	6272991	12-Aug-08	24.83	1.5	1.5	21.0
lower Nelson R	SN-07	15	468654	6298676	17-Aug-08	21.50	1.6	1.6	20.0
lower Nelson R	SN-14	15	462265	6290259	18-Aug-08	17.58	2.0	2.8	21.0
lower Nelson R	SN-12	15	458574	6288333	14-Aug-08	21.00	1.9	1.9	21.0
lower Nelson R	SN-15	15	464625	6294036	15-Aug-08	23.67	0.8	5.0	21.0
lower Nelson R	GN-01	15	443342	6271647	4-Aug-09	17.67	1.6	1.4	18.0
lower Nelson R	GN-02	15	446438	6274299	4-Aug-09	18.25	3.5	1.3	18.0
lower Nelson R	GN-03	15	445236	6273113	5-Aug-09	21.58	1.4	1.9	16.0
lower Nelson R	GN-04	15	448025	6276627	5-Aug-09	22.67	1.5	3.0	16.0
lower Nelson R	GN-05	15	447986	6277985	6-Aug-09	20.48	1.2	1.5	16.0
lower Nelson R	GN-06	15	469755	6300802	6-Aug-09	18.62	4.1	1.8	17.0
lower Nelson R	GN-07	15	468658	6298711	6-Aug-09	18.92	2.9	3.8	17.0
lower Nelson R	GN-08	15	468165	6297143	7-Aug-09	22.70	1.0	3.0	17.0
lower Nelson R	GN-09	15	462380	6290315	7-Aug-09	19.25	2.5	0.8	17.0
lower Nelson R	GN-10	15	459744	6288723	7-Aug-09	23.93	6.9	2.6	17.0
lower Nelson R	GN-11	15	461720	6290695	8-Aug-09	18.55	3.7	1.3	17.0
lower Nelson R	GN-12	15	458077	6288020	8-Aug-09	14.68	2.8	4.0	17.0
lower Nelson R	SN-03	15	445142	6272972	5-Aug-09	22.67	1.5	1.9	16.0
lower Nelson R	SN-07	15	468643	6298696	6-Aug-09	19.00	1.4	2.9	17.0
lower Nelson R	SN-09	15	462447	6290403	7-Aug-09	19.25	4.2	2.5	17.0
lower Nelson R	SN-12	15	458048	6288003	8-Aug-09	14.83	1.8	2.8	17.0

Table 5.7.6-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
lower Nelson R	GN-01	15	443364	6271568	5-Aug-10	23.53	1.6	1.2	20.0
lower Nelson R	GN-02	15	446436	6274306	5-Aug-10	24.20	2.3	1.4	20.0
lower Nelson R	GN-03	15	445153	6273019	5-Aug-10	25.22	2.0	1.7	20.0
lower Nelson R	GN-04	15	447959	6276542	6-Aug-10	26.40	1.0	2.5	20.0
lower Nelson R	GN-05	15	448044	6278002	6-Aug-10	26.83	1.0	1.5	20.0
lower Nelson R	GN-06	15	469929	6300885	7-Aug-10	28.10	2.1	4.8	20.0
lower Nelson R	GN-07	15	468798	6298797	7-Aug-10	26.22	2.1	2.1	20.0
lower Nelson R	GN-08	15	468274	6297213	8-Aug-10	23.20	5.7	5.9	20.0
lower Nelson R	GN-09	15	462474	6290371	8-Aug-10	23.33	1.7	5.3	20.0
lower Nelson R	SN-03	15	445134	6272999	5-Aug-10	25.22	0.5	2.0	20.0
lower Nelson R	SN-07	15	468748	6298798	7-Aug-10	27.60	2.1	2.1	20.0
lower Nelson R	SN-09	15	462485	6290392	8-Aug-10	23.20	5.6	5.7	20.0
Hayes River	GN-01	15	520203	6285732	6-Aug-08	15.37	1.4	3.5	20.0
Hayes River	GN-02	15	518655	6286319	6-Aug-08	17.33	2.8	1.4	20.0
Hayes River	GN-03	15	518265	6287086	6-Aug-08	18.50	3.6	2.5	20.0
Hayes River	GN-04	15	518930	6289492	7-Aug-08	21.82	4.8	2.0	18.5
Hayes River	GN-05	15	518571	6290811	7-Aug-08	20.25	2.7	0.9	19.0
Hayes River	GN-06	15	519822	6292272	7-Aug-08	18.53	1.4	2.7	19.0
Hayes River	GN-07	15	520351	6284900	8-Aug-08	21.67	3.4	0.9	19.0
Hayes River	GN-08	15	519904	6283756	8-Aug-08	20.17	3.4	1.0	19.0
Hayes River	GN-09	15	520817	6280710	8-Aug-08	18.83	1.2	2.4	20.0
Hayes River	SN-01	15	520192	6285701	6-Aug-08	15.47	1.4	1.6	20.0
Hayes River	SN-06	15	519780	6292288	7-Aug-08	18.92	1.1	1.4	19.0
Hayes River	SN-09	15	520836	6280676	8-Aug-08	18.83	1.0	1.2	20.0
Hayes River	GN-01	15	520063	6285866	23-Jul-09	18.97	1.4	2.5	20.0
Hayes River	GN-02	15	518546	6286221	23-Jul-09	20.80	3.3	1.1	20.0
Hayes River	GN-03	15	518457	6287073	24-Jul-09	24.90	1.6	3.0	20.0
Hayes River	GN-04	15	518670	6289393	24-Jul-09	23.82	1.4	1.5	20.0
Hayes River	GN-05	15	518657	6290826	25-Jul-09	23.17	1.0	1.3	19.5
Hayes River	GN-06	15	519938	6292346	25-Jul-09	22.25	1.9	2.0	19.5
Hayes River	GN-07	15	520309	6285048	26-Jul-09	25.25	3.5	3.6	19.0
Hayes River	GN-08	15	520066	6283803	26-Jul-09	24.58	3.3	3.1	19.0
Hayes River	GN-09	15	520848	6280210	27-Jul-09	22.52	2.8	2.2	19.0
Hayes River	SN-01	15	520179	6285734	23-Jul-09	20.68	1.5	1.2	20.0
Hayes River	SN-06	15	520053	6292440	25-Jul-09	21.65	2.6	3.0	19.5
Hayes River	SN-09	15	520719	6280464	27-Jul-09	22.18	2.7	2.4	19.0
Hayes River	GN-01	15	519853	6286142	18-Jul-10	21.73	2.8	2.7	18.0
Hayes River	GN-02	15	518539	6286310	18-Jul-10	21.45	1.0	1.2	18.0
Hayes River	GN-03	15	518400	6287034	18-Jul-10	21.42	2.3	2.1	19.0
Hayes River	GN-04	15	519082	6288952	19-Jul-10	27.47	3.2	2.4	20.0

Table 5.7.6-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (hr)	WaterDepth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Hayes River	GN-05	15	519009	6291514	19-Jul-10	27.67	2.1	3.1	20.0
Hayes River	GN-06	15	520132	6292558	19-Jul-10	26.97	1.6	2.6	20.0
Hayes River	GN-07	15	520292	6285057	20-Jul-10	24.38	1.7	1.3	22.0
Hayes River	GN-08	15	520123	6283913	20-Jul-10	24.28	2.1	1.8	22.0
Hayes River	GN-09	15	520942	6280508	20-Jul-10	24.17	2.8	2.5	22.0
Hayes River	SN-01	15	519823	6286164	18-Jul-10	21.57	2.8	3.3	18.0
Hayes River	SN-06	15	519832	6292226	19-Jul-10	27.25	0.9	1.6	20.0
Hayes River	SN-09	15	520214	6281475	20-Jul-10	23.98	2.9	2.8	22.0
Assean Lake	GN-01	14	659325	6234906	25-Aug-09	22.87	11.0	11.0	12.0
Assean Lake	GN-03	14	656723	6231966	25-Aug-09	23.58	2.7	3.0	12.0
Assean Lake	GN-04	14	659763	6231527	25-Aug-09	20.63	4.4	4.8	12.0
Assean Lake	GN-05	14	654404	6232902	26-Aug-09	24.98	5.8	6.5	12.0
Assean Lake	GN-06	14	654376	6228594	26-Aug-09	23.73	1.7	2.3	12.0
Assean Lake	GN-07	14	654215	6232630	26-Aug-09	26.38	5.4	2.9	12.0
Assean Lake	GN-08	14	664661	6238272	24-Aug-09	24.38	6.7	7.1	14.0
Assean Lake	GN-09	14	671128	6242106	24-Aug-09	27.47	2.2	4.4	14.0
Assean Lake	GN-10	14	673918	6245012	24-Aug-09	27.25	6.6	6.7	14.0
Assean Lake	SN-04	14	659937	6231583	25-Aug-09	20.63	4.4	4.8	12.0
Assean Lake	SN-06	14	654517	6228495	26-Aug-09	23.73	1.7	2.3	12.0
Assean Lake	SN-08	14	664782	6238387	24-Aug-09	24.38	6.7	7.1	14.0
Assean Lake	GN-01	14	659411	6234940	17-Aug-10	25.92	10.2	9.7	11.0
Assean Lake	GN-03	14	656701	6231968	18-Aug-10	25.25	1.7	2.3	9.0
Assean Lake	GN-04	14	659412	6231645	14-Aug-10	72.83	3.8	3.7	15.0
Assean Lake	GN-05	14	654543	6232827	12-Aug-10	23.08	5.0	4.4	20.0
Assean Lake	GN-07	14	654015	6232579	12-Aug-10	24.00	5.7	5.7	20.0
Assean Lake	GN-08	14	664620	6238238	17-Aug-10	25.33	5.6	5.6	11.0
Assean Lake	GN-09	14	671137	6242179	13-Aug-10	25.58	3.4	3.4	23.0
Assean Lake	GN-10	14	673873	6244968	13-Aug-10	25.58	5.5	5.5	23.0
Assean Lake	GN-11	14	657043	6235845	18-Aug-10	25.75	4.1	3.5	11.0
Assean Lake	SN-04	14	659436	6231680	14-Aug-10	72.83	4.1	3.8	15.0
Assean Lake	SN-08	14	664600	6238215	17-Aug-10	25.33	5.8	5.6	11.0
Assean Lake	SN-11	14	656851	6235879	18-Aug-10	25.75	2.8	3.5	11.0

Table 5.7.7-2. Fish species list compiled from standard gang and small mesh index gillnetting conducted in Lower Nelson River Region waterbodies, 2008-2010.

Family	Species	Scientific Name	ID Code	Captured in Study Area		
				2008	2009	2010
Petromyzontidae	Silver Lamprey	*Ichthyomyzon unicuspis*	SLLM		+	+
Acipenseridae	Lake Sturgeon	*Acipenser fulvescens*	LKST	+	+	+
Hiodontidae	Goldeye	*Hiodon alosoides*	GOLD	+		
	Mooneye	*Hiodon tergisus*	MOON		+	+
Cyprinidae	Lake Chub	*Couesius plumbeus*	LKCH	+	+	+
	Common Carp	*Cyprinus carpio*	CARP		+	
	Emerald Shiner	*Notropis atherinoides*	EMSH	+	+	+
	Spottail Shiner	*Notropis heterolepis*	SPSH	+	+	+
	Longnose Dace	*Rhinichthys cataractae*	LNDC		+	
Catostomidae	Longnose Sucker	*Catostomus catostomus*	LNSC	+	+	+
	White Sucker	*Catostomus commersoni*	WHSC	+	+	+
	Shorthead Redhorse	*Moxostoma macrolepidotum*	SHRD	+	+	+
Esocidae	Northern Pike	*Esox lucius*	NRPK	+	+	+
Osmeridae	Rainbow Smelt	*Osmerus mordax*	RNSM	+	+	+
Salmonidae	Cisco	*Coregonus artedi*	CISC	+	+	+
	Lake Whitefish	*Coregonus clupeaformis*	LKWH	+	+	+
	Brook Trout	*Salvelinus fontinalis*	BRTR		+	+
Percopsidae	Troutperch	*Percopsis omiscomaycus*	TRPR	+	+	+
Gadidae	Burbot	*Lota lota*	BURB	+	+	+
Cottidae	Slimy Sculpin	*Cottus cognatus*	SLSC		+	
Percidae	Yellow Perch	*Perca flavescens*	YLPR	+	+	+
	Sauger	*Sander canadensis*	SAUG		+	+
	Walleye	*Sander vitreus*	WALL	+	+	+
Sciaenidae	Freshwater Drum	*Aplodinotus grunniens*	FRDR			+

Table 5.7.6-3. Standard gang index gillnet relative abundance summaries from Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L						Stephens Lake - South		Stephens Lake - North	
	2009		2010		Overall		2009		2009	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	2	0.36	2	0.20	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-	-
Mooneye	8	1.72	12	2.14	20	1.95	12	3.66	-	-
Common Carp	-	-	-	-	-	-	-	-	1	0.5
Longnose Sucker	10	2.15	23	4.11	33	3.22	-	-	-	-
White Sucker	97	20.86	154	27.50	251	24.49	15	4.57	5	2.5
Shorthead Redhorse	3	0.65	3	0.54	6	0.59	-	-	-	-
Northern Pike	58	12.47	74	13.21	132	12.88	74	22.56	77	38.9
Rainbow Smelt	9	1.94	10	1.79	19	1.85	12	3.66	8	4.0
Cisco	2	0.43	2	0.36	4	0.39	-	-	-	-
Lake Whitefish	10	2.15	28	5.00	38	3.71	6	1.83	10	5.1
Brook Trout	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	1	0.30	-	-
Burbot	9	1.94	10	1.79	19	1.85	-	-	-	-
Yellow Perch	2	0.43	-	-	2	0.20	-	-	-	-
Sauger	68	14.62	47	8.39	115	11.22	31	9.45	-	-
Walleye	189	40.65	194	34.64	383	37.37	177	53.96	97	49.0
Freshwater Drum	-	-	1	0.18	1	0.10	-	-	-	-
Total	465	100	560	100	1025	100	328	100	198	100

n = number of fish caught and RA = percent relative abundance.

Table 5.7.7-3. continued.

Species	Limestone Forebay		lower Nelson R							
	2010		2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	1	0.35	1	0.10
Lake Sturgeon	-	-	60	19.48	22	6.08	43	15.03	125	13.08
Goldeye	-	-	7	2.27	-	-	-	-	7	0.73
Mooneye	6	4.05	-	-	12	3.31	1	0.35	13	1.36
Common Carp	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	76	51.35	94	30.52	125	34.53	57	19.93	276	28.87
White Sucker	12	8.11	22	7.14	31	8.56	19	6.64	72	7.53
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-
Northern Pike	43	29.05	76	24.68	82	22.65	80	27.97	238	24.90
Rainbow Smelt	-	-	1	0.32	8	2.21	9	3.15	18	1.88
Cisco	-	-	-	-	1	0.28	-	-	1	0.10
Lake Whitefish	1	0.68	16	5.19	21	5.80	25	8.74	62	6.49
Brook Trout	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	1	0.32	2	0.55	4	1.40	7	0.73
Yellow Perch	-	-	-	-	-	-	-	-	-	-
Sauger	5	3.38	-	-	-	-	1	0.35	1	0.10
Walleye	5	3.38	31	10.06	58	16.02	46	16.08	135	14.12
Freshwater Drum	-	-	-	-	-	-	-	-	-	-
Total	148	100	308	100	362	100	286	100	956	100

n = number of fish caught and RA = perecnt relative abundance.

Table 5.7.7-3. continued.

Species	Hayes R								Assean L					
	2008		2009		2010		Overall		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	1	1.79	-	-	1	0.34	-	-	-	-	-	-
Lake Sturgeon	12	15.00	14	25.00	60	37.74	86	29.15	-	-	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	11	13.75	10	17.86	8	5.03	29	9.83	-	-	-	-	-	-
White Sucker	3	3.75	7	12.50	13	8.18	23	7.80	70	15.59	93	12.53	163	13.69
Shorthead Redhorse	11	13.75	3	5.36	6	3.77	20	6.78	-	-	-	-	-	-
Northern Pike	4	5.00	2	3.57	10	6.29	16	5.42	66	14.70	77	10.38	143	12.01
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	31	6.90	163	21.97	194	16.29
Lake Whitefish	10	12.50	1	1.79	10	6.29	21	7.12	40	8.91	79	10.65	119	9.99
Brook Trout	-	-	2	3.57	8	5.03	10	3.39	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	1	0.13	1	0.08
Yellow Perch	-	-	-	-	-	-	-	-	5	1.11	14	1.89	19	1.60
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	36.25	16	28.57	44	27.67	89	30.17	237	52.78	315	42.45	552	46.35
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	80	100	56	100	159	100	295	100	449	100	742	100	1191	100

n = number of fish caught and RA = percent relative abundance.

Table 5.7.7-4. Standard gang index gillnet biomass summaries from Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L									Stephens L-South			Stephens L-North		
	2009			2010			Overall			2009			2009		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	2	2660	0.48	2	2660	0.27	-	-	-	-	-	-
Goldeye	-	-	-		-	-		-	-	-	-	-	-	-	-
Mooneye	8	2050	0.49	12	3560	0.64	20	5610	0.58	12	4600	1.11	-	-	-
Common Carp	-	-	-		-	-		-	-		-	-	1	3310	1.18
Longnose Sucker	10	11475	2.75	23	19530	3.53	33	31005	3.19		-	-	-	-	-
White Sucker	97	104845	25.10	154	184140	33.27	251	288985	29.76	15	17590	4.23	5	6593	2.36
Shorthead Redhorse	3	975	0.23	3	1440	0.26	6	2415	0.25		-	-	-	-	-
Northern Pike	58	78625	18.83	74	101671	18.37	132	180296	18.56	74	116385	28.00	77	114400	40.94
Rainbow Smelt	9	63	0.02	6	46	0.01	15	109	0.01	11	75	0.02	8	71	0.03
Cisco	2	1200	0.29	2	540	0.10	4	1740	0.18		-	-	-	-	-
Lake Whitefish	10	24350	5.83	28	29308	5.29	38	53658	5.53	6	15170	3.65	10	21690	7.76
Brook Trout	-	-	-		-	-		-	-		-	-	-	-	-
Troutperch	-	-	-		-	-		-	-	1	8	0.00	-	-	-
Burbot	9	2650	0.63	9	4100	0.74	18	6750	0.70		-	-	-	-	-
Yellow Perch	2	375	0.09		-	-	2	375	0.04		-	-	-	-	-
Sauger	68	36170	8.66	47	25630	4.63	115	61800	6.36	31	19090	4.59	-	-	-
Walleye	189	154880	37.08	194	179606	32.45	383	334486	34.44	177	242684	58.39	97	133402	47.73
Freshwater Drum	-	-	-	1	1280	0.23	1	1280	0.13	-	-	-	-	-	-
Total	465	417658	100	555	553511	100	1020	971169	100	327	415602	100	198	279466	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-4. continued.

Species	Limestone Forebay			lower Nelson R											
	2010			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	1	15	0.004	1	15	0.001
Lake Sturgeon	-	-	-	60	108810	29.47	22	61485	14.90	43	86980	24.56	125	257275	22.65
Goldeye	-	-	-	7	2610	0.71	-	-	-		-	-	7	2610	0.23
Mooneye	6	2050	1.29	-	-	-	12	3910	0.95	1	290	0.08	13	4200	0.37
Common Carp		-	-	-	-	-	-	-	-		-	-		-	-
Longnose Sucker	76	55020	34.74	94	46700	12.65	125	67660	16.40	57	30580	8.64	276	144940	12.76
White Sucker	12	12429	7.85	22	11810	3.20	31	25350	6.14	19	11316	3.20	72	48476	4.27
Shorthead Redhorse		-	-	-	-	-	-	-	-		-	-		-	-
Northern Pike	41	74620	47.12	76	156260	42.32	82	167957	40.70	80	153810	43.43	238	478027	42.08
Rainbow Smelt		-	-	1	10	0.003	8	66	0.02	9	52	0.01	18	128	0.01
Cisco		-	-	-	-	-	1	190	0.05		-	-	1	190	0.02
Lake Whitefish	1	2320	1.46	16	17870	4.84	21	25638	6.21	25	23550	6.65	62	67058	5.90
Brook Trout		-	-	-	-	-	-	-	-		-	-		-	-
Troutperch		-	-	-	-	-	-	-	-		-	-		-	-
Burbot		-	-	1	560	0.15	2	1180	0.29	4	2150	0.61	7	3890	0.34
Yellow Perch		-	-	-	-	-	-	-	-		-	-		-	-
Sauger	5	3630	2.29	-	-	-	-	-	-	1	580	0.16	1	580	0.05
Walleye	5	8300	5.24	31	24630	6.67	58	59218	14.35	44	44800	12.65	133	128648	11.32
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	146	158369	100	308	369260	100	362	412654	100	284	354123	100	954	1136037	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-4. continued.

Species	Hayes R											
	2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	1	20	0.04	-	-	-	1	20	0.01
Lake Sturgeon	12	9765	12.76	14	12340	26.82	60	67688	37.91	86	89793	29.82
Goldeye	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	-	-	-	-	-	-	-	-	-	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	11	4365	5.70	10	2690	5.85	8	2335	1.31	29	9390	3.12
White Sucker	3	2375	3.10	7	5180	11.26	13	9030	5.06	23	16585	5.51
Shorthead Redhorse	11	3945	5.15	3	1610	3.50	6	5460	3.06	20	11015	3.66
Northern Pike	4	13250	17.31	2	3840	8.35	10	19160	10.73	16	36250	12.04
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	10	6905	9.02	1	730	1.59	10	5610	3.14	21	13245	4.40
Brook Trout	-	-	-	2	2360	5.13	8	8071	4.52	10	10431	3.46
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	35950	46.96	16	17240	37.47	44	61200	34.28	89	114390	37.99
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	-
Total	80	76555	100	56	46010	100	159	178554	100	295	301119	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-4. continued.

Species	Assean L								
	2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-
Mooneye	-	-	-	-	-	-	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-
White Sucker	70	66296	21.18	93	81680	18.98	163	147976	19.91
Shorthead Redhorse	-	-	-	-	-	-	-	-	-
Northern Pike	66	88055	28.13	77	88833	20.64	143	176888	23.80
Rainbow Smelt	-	-	-	-	-	-	-	-	-
Cisco	31	2990	0.96	163	17855	4.15	194	20845	2.80
Lake Whitefish	40	25653	8.20	79	63274.9	14.70	119	88927.9	11.96
Brook Trout	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	1	190	0.04	1	190	0.03
Yellow Perch	5	635	0.20	14	1615	0.38	19	2250	0.30
Sauger	-	-	-	-	-	-	-	-	-
Walleye	237	129396	41.34	315	176908	41.11	552	306304	41.20
Freshwater Drum	-	-	-	-	-	-	-	-	-
Total	449	313025	100	742	430356	100	1191	743381	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-5. Small mesh index gillnet relative abundance summaries from Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L						Stephens L-South		Stephens L-North	
	2009		2010		Overall		2009		2009	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-
Lake Chub	14	4.73	2	0.81	16	2.94	-	-	-	-
Emerald Shiner	29	9.80	-	-	29	5.33	-	-	34	16.5
Spottail Shiner	86	29.05	101	40.73	187	34.38	31	23.85	87	42.2
Longnose Dace	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-
White Sucker	2	0.68	1	0.40	3	0.55	4	3.08	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	2.03	2	0.81	8	1.47	-	-	3	1.5
Rainbow Smelt	104	35.14	70	28.23	174	31.99	45	34.62	66	32.0
Cisco	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	1	0.5
Troutperch	42	14.19	66	26.61	108	19.85	41	31.54	1	0.5
Slimy Sculpin	7	2.36	-	-	7	1.29	-	-	-	-
Yellow Perch	2	0.68	-	-	2	0.37	3	2.31	2	1.0
Sauger	1	0.34	1	0.40	2	0.37	5	3.85	-	-
Walleye	3	1.01	5	2.02	8	1.47	1	0.77	12	5.8
Total	296	100	248	100	544	100	130	100	206	100

n = number of fish caught and RA = percent relative abundance.

Table 5.7.7-5. continued.

Species	Limestone Forebay		lower Nelson R							
	2010		2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Lake Sturgeon	-	-	-	-	-	-	1	0.93	1	0.32
Lake Chub	-	-	4	4.17	22	20.00	-	-	26	8.28
Emerald Shiner	1	1.79	12	12.50	8	7.27	35	32.41	55	17.52
Spottail Shiner	8	14.29	1	1.04	8	7.27	1	0.93	10	3.18
Longnose Dace	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	2	3.57	3	3.13	3	2.73	5	4.63	11	3.50
White Sucker	-	-	8	8.33	14	12.73	-	-	22	7.01
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-
Northern Pike	-	-	-	-	-	-	2	1.85	2	0.64
Rainbow Smelt	-	-	17	17.71	16	14.55	59	54.63	92	29.30
Cisco	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-
Troutperch	45	80.36	30	31.25	25	22.73	4	3.70	59	18.79
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	2	2.08	7	6.36	-	-	9	2.87
Sauger	-	-	-	-	-	-	-	-	-	-
Walleye	-	-	19	19.79	7	6.36	1	0.93	27	8.60
Total	56	100	96	100	110	100	108	100	314	100

n = number of fish caught and RA = percent relative abundance.

Table 5.7.7-5. continued.

Species	Hayes R								Assean L					
	2008		2009		2010		Overall		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Lake Sturgeon	3	25.00	1	33.33	6	40.00	10	33.33	-	-	-	-	-	-
Lake Chub	3	25.00	1	33.33	-	-	4	13.33	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	7	3.54	2	0.40	9	1.29
Spottail Shiner	-	-	-	-	-	-	-	-	96	48.48	110	22.04	206	29.56
Longnose Dace	-	-	1	33.33	-	-	1	3.33	-	-	-	-	-	-
Longnose Sucker	2	16.67	-	-	2	13.33	4	13.33	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	10	5.05	1	0.20	11	1.58
Shorthead Redhorse	1	8.33	-	-	1	6.67	2	6.67	-	-	-	-	-	-
Northern Pike	-	-	-	-	-	-	-	-	6	3.03	8	1.60	14	2.01
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	1	0.51	6	1.20	7	1.00
Lake Whitefish	-	-	-	-	1	6.67	1	3.33	2	1.01	5	1.00	7	1.00
Troutperch	-	-	-	-	-	-	-	-	7	3.54	49	9.82	56	8.03
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	14	7.07	301	60.32	315	45.19
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	3	25.00	-	-	5	33.33	8	26.67	55	27.78	17	3.41	72	10.33
Total	12	100	3	100	15	100	30	100	198	100	499	100	697	100

n = number of fish caught and RA = percent relative abundance

Table 5.7.7-6. Small mesh index gillnet biomass summaries from Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L									Stephens L-South			Stephens L-North		
	2009			2010			Overall			2009			2009		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	14	154	1.95	2	15	0.34	16	169	1.37	-	-	-	-	-	-
Emerald Shiner	29	126	1.59	-	-	-	29	126	1.02	-	-	-	34	155	1.004
Spottail Shiner	86	411	5.20	101	390	8.87	187	801	6.51	31	146	3.34	87	418	2.707
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	2	23	0.29	1	10	0.23	3	33	0.27	4	33	0.75	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	4960	62.74	2	710	16.14	8	5670	46.08	-	-	-	3	3490	22.61
Rainbow Smelt	104	817	10.33	70	475	10.80	174	1292	10.50	45	363	8.30	66	638	4.132
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	1	36	0.233
Troutperch	42	273	3.45	66	398	9.05	108	671	5.45	41	164	3.75	1	3	0.019
Slimy Sculpin	7	22	0.28	-	-	-	7	22	0.18	-	-	-	-	-	-
Yellow Perch	2	43	0.54	-	-	-	2	43	0.35	3	36	0.82	2	10	0.065
Sauger	1	900	11.38	1	200	4.55	2	1100	8.94	5	2130	48.72	-	-	-
Walleye	3	177	2.24	5	2200	50.02	8	2377	19.32	1	1500	34.31	12	10689	69.23
Total	296	7906	100	248	4398	100	544	12304	100	130	4372	100	206	15439	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-6. continued.

Species	Limestone Forebay			lower Nelson R											
	2010			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-		
Lake Chub	-	-	-	4	60	5.77	22	361	31.64	-	-	-	26	421	5.93
Emerald Shiner	1	5	1.17	12	60	5.77	8	41	3.593	35	131	2.67	55	232	3.27
Spottail Shiner	8	45	10.56	1	5	0.48	8	17	1.49	1	3	0.06	10	25	0.35
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-			
Longnose Sucker	2	179	42.02	3	348	33.5	3	57	4.996	5	441	8.97	11	846	11.92
White Sucker	-	-	-	8	75	7.22	14	162	14.2	-	-	-	22	237	3.34
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-			
Northern Pike	-	-	-	-	-	-	-	-	-	2	4030	82	2	4030	56.80
Rainbow Smelt	-	-	-	17	135	13	16	107	9.378	59	278	5.66	92	520	7.33
Cisco	-	-	-	-	-	-	-	-	-	-	-	-			
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-			
Troutperch	45	197	46.24	30	160	15.4	25	148	12.97	4	25	0.51	59	333	4.69
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-			
Yellow Perch	-	-	-	2	45	4.33	7	60	5.259	-	-	-	9	105	1.48
Sauger	-	-	-	-	-	-	-	-	-	-	-	-			
Walleye	-	-	-	19	151	14.5	7	188	16.48	1	7	0.14	27	346	4.88
Total	56	426	100	96	1039	100	110	1141	100	107	4915	100	313	7095	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-6. continued.

Species	Hayes R											
	2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Lake Sturgeon	3	2225	80.32	1	470	86.88	6	4800	77.53	10	7495	78.88
Lake Chub	3	30	1.08	1	39	7.21	-	-	-	4	69	0.73
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	1	32	5.91	-	-	-	1	32	0.34
Longnose Sucker	2	15	0.54	-	-	-	2	57	0.92	4	72	0.76
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	1	190	6.86	-	-	-	1	57	0.92	2	247	2.60
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	1	56	0.90	1	56	0.59
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	3	310	11.19	-	-	-	5	1221	19.72	8	1531	16.11
Total	12	2770	100	3	541	100	15	6191	100	30	9502	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-6. continued.

Species	Assean L								
	2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%
Lake Sturgeon	-	-	-	-	-	-			
Lake Chub	-	-	-	-	-	-			
Emerald Shiner	7	20	0.09	2	8	0.0531	9	28	0.076
Spottail Shiner	96	542	2.49	110	741	4.919	206	1283	3.481
Longnose Dace	-	-	-	-	-	-			
Longnose Sucker	-	-	-	-	-	-			
White Sucker	10	69	0.32	1	7	0.0465	11	76	0.206
Shorthead Redhorse	-	-	-	-	-	-			
Northern Pike	6	4710	21.62	8	3244	21.535	14	7954	21.58
Rainbow Smelt	-	-	-	-	-	-			
Cisco	1	29	0.13	6	264	1.7525	7	293	0.795
Lake Whitefish	2	160	0.73	5	771	5.1182	7	931	2.526
Troutperch	7	37	0.17	49	295	1.9583	56	332	0.901
Slimy Sculpin	-	-	-	-	-	-			
Yellow Perch	14	123	0.56	301	844	5.6028	315	967	2.624
Sauger	-	-	-	-	-	-			
Walleye	55	16100	73.89	17	8890	59.015	72	24990	67.81
Total	198	21790	100	499	15064	100	697	36854	100

n = number of fish measured (may not equal number of fish caught); B = biomass (g); and % = percent of total biomass

Table 5.7.7-7. Mean catch-per-unit-effort (CPUE) calculated for fish species captured in standard gang index gill nets (fish/100 m/24 h) set in Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L									Stephens L-South			Stephens L-North		
	2009 (#sites=12)			2010 (#sites=12)			Overall (#years=2)			2009 (#sites=9)			2009 (#sites = 9)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE	n	CPUE	SD	n	CPUE	SD
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	2	0.1	0.45	2	0.06	0.06	-	-	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	8	0.6	1.34	12	0.8	1.76	20	0.65	0.10	12	1.2	3.62	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1	0.30
Longnose Sucker	10	0.7	1.35	23	1.5	4.19	33	1.11	0.39	-	-	-	-	-	-
White Sucker	97	6.6	4.70	154	9.1	9.17	251	7.87	1.27	15	1.5	2.04	5	0.5	0.62
Shorthead Redhorse	3	0.2	0.51	3	0.2	0.64	6	0.19	0.01	-	-	-	-	-	-
Northern Pike	58	4.0	3.67	74	3.6	4.18	132	3.77	0.19	74	7.1	6.43	77	7.3	3.61
Rainbow Smelt	9	0.6	0.95	10	0.6	1.18	19	0.57	0.02	12	1.2	1.49	8	0.8	0.90
Cisco	2	0.1	0.31	2	0.1	0.25	4	0.10	0.03	-	-	-	-	-	-
Lake Whitefish	10	0.7	0.90	28	1.7	1.75	38	1.20	0.52	6	0.6	0.83	10	1.0	1.56
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	1	0.1	0.32	-	-	-
Burbot	9	0.6	1.29	10	0.7	1.23	19	0.63	0.02	-	-	-	-	-	-
Yellow Perch	2	0.1	0.33	-	-	-	2	0.07	0.07	-	-	-	-	-	-
Sauger	68	4.5	6.11	47	3.0	2.94	115	3.76	0.74	31	3.1	8.14	-	-	-
Walleye	189	13.0	20.42	194	10.7	14.30	383	11.82	1.17	177	17.0	23.16	97	9.6	11.05
Freshwater Drum	-	-	-	1	0.1	0.23	1	0.03	0.03	-	-	-	-	-	-
Total	465	31.7	20.15	560	32.0	19.69	1025	31.85	0.16	328	31.7	25.36	198	19.2	12.17

#sites = number of sites sampled; #years = number of years sampled; n = number of fish caught

CPUE = mean catch per unit effort (fish/100 m/24 h) per site (2008, 2009 and 2010) and per year (overall)

SD = standard deviation; SE = standard error

Table 5.7.7-7. continued.

Species	Limestone Forebay			lower Nelson R											
	2010 (#sites=9)			2008 (#sites=16)			2009 (#sites=12)			2010 (#sites=9)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	1	0.1	0.30	1	0.0	0.03
Lake Sturgeon	-	-	-	60	3.6	5.50	22	2.0	1.78	43	4.1	5.27	125	3.2	0.65
Goldeye	-	-	-	7	0.5	1.44	-	-	-	-	-	0.00	7	0.2	0.15
Mooneye	6	0.6	0.97	-	-	-	12	1.3	2.55	1	0.1	0.28	13	0.4	0.40
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	76	7.2	9.73	94	6.6	8.83	125	11.2	10.49	57	5.1	5.73	276	7.6	1.85
White Sucker	12	1.2	1.47	22	1.4	2.01	31	2.6	3.29	19	1.7	1.66	72	1.9	0.36
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	-
Northern Pike	43	4.1	5.09	76	4.2	5.89	82	6.9	9.56	80	7.6	9.04	238	6.2	1.02
Rainbow Smelt	-	-	-	1	0.1	0.29	8	0.7	2.52	9	0.8	2.40	18	0.5	0.23
Cisco	-	-	-	-	-	-	1	0.1	0.27	-	-	0.00	1	0.0	0.03
Lake Whitefish	1	0.1	0.28	16	1.0	1.53	21	1.8	2.08	25	2.3	3.95	62	1.7	0.39
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	1	0.1	0.23	2	0.2	0.39	4	0.4	1.20	7	0.2	0.10
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	5	0.5	1.56	-	-	-	-	-	-	1	0.1	0.30	1	0.0	0.03
Walleye	5	0.5	1.22	31	2.1	3.46	58	5.2	6.79	46	4.1	7.87	135	3.8	0.92
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	0.00	-	-	-
Total	148	14.1	5.92	308	19.5	10.93	362	32.0	12.13	286	26.5	15.99	956	22.9	2.27

#sites = number of sites sampled; #years = number of years sampled; n = number of fish caught
CPUE = mean catch per unit effort (fish/100 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-7. continued.

Species	Hayes R												Assean L								
	2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=2)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	1	0.1	0.30	-	-	-	1	-	0.03	-	-	-	-	-	-	-	-	-
Lake Sturgeon	12	1.7	2.71	14	1.6	3.61	60	6.0	4.15	86	3.1	1.47	-	-	-	-	-	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	11	1.2	2.49	10	1.0	1.04	8	0.8	1.26	29	1.0	0.13	-	-	-	-	-	-	-	-	-
White Sucker	3	0.4	0.59	7	0.7	0.76	13	1.2	1.36	23	0.8	0.23	70	6.5	5.10	93	7.2	3.55	163	6.9	0.35
Shorthead Redhorse	11	1.4	1.55	3	0.3	0.68	6	0.5	0.87	20	0.8	0.35	-	-	-	-	-	-	-	-	-
Northern Pike	4	0.5	0.57	2	0.2	0.42	10	0.9	0.87	16	0.5	0.22	66	6.2	3.65	77	6.5	3.51	143	6.4	0.17
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	31	2.8	4.23	163	14.0	19.01	194	8.4	5.61
Lake Whitefish	10	1.4	2.66	1	0.1	0.31	10	1.0	0.85	21	0.8	0.38	40	3.8	5.12	79	6.3	6.94	119	5.0	1.22
Brook Trout	-	-	-	2	0.2	0.60	8	0.8	0.53	10	0.3	0.23	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.1	0.28	1	0.0	0.05
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	5	0.5	0.60	14	1.2	1.73	19	0.9	0.37
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	3.7	3.29	16	1.6	1.64	44	4.2	2.36	89	3.2	0.79	237	22.9	23.08	315	28.0	23.74	552	25.5	2.55
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	80	10.2	9.18	56	5.8	6.33	159	11.2	4.58	295	9.1	1.64	449	42.7	19.36	742	63.4	22.95	1191	53.0	10.32

#sites = number of sites sampled; #years = number of years sampled; n = number of fish caught
CPUE = mean catch per unit effort (fish/100 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-8. Mean biomass-per-unit-effort (BPUE) calculated for fish species captured in standard gang index gill nets (g/100 m/24 h) set in Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L									Stephens L-South			Stephens L-North		
	2009 (#sites=12)			2010 (#sites=12)			Overall (#years=2)			2009 (#sites=9)			2009 (#sites=9)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE	n	BPUE	SD	n	BPUE	SD
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	2	172	595	2	86	86	-	-	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	8	141	338	12	226	526	20	183	42	12	463	1390	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	1	329	986
Longnose Sucker	10	812	1636	23	1270	3334	33	1041	229	-	-	-	-	-	-
White Sucker	97	7115	4296	154	10591	9524	251	8853	1738	15	1707	2126	5	651	935
Shorthead Redhorse	3	66	166	3	88	305	6	77	11	-	-	-	-	-	-
Northern Pike	58	5513	4033	74	5320	5356	132	5416	97	74	11130	9223	77	10830	7974
Rainbow Smelt	9	4	7	6	3	8	15	4	1	11	5	7	8	7	9
Cisco	2	79	225	2	19	67	4	49	30	-	-	-	-	-	-
Lake Whitefish	10	1646	2246	28	1807	1783	38	1726	81	6	1473	2082	10	2142	3371
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	1	1	3	-	-	-
Burbot	9	185	353	9	267	543	18	226	41	-	-	-	-	-	-
Yellow Perch	2	27	67	-	-	-	2	14	14	-	-	-	-	-	-
Sauger	68	2388	3137	47	1629	1695	115	2008	379	31	1920	4865	-	-	-
Walleye	189	10658	18372	194	9723	16074	383	10190	468	177	23327	30477	97	13241	15298
Freshwater Drum	-	-	-	1	86	299	1	43	43	-	-	-	-	-	-
Total	465	28634	17118	555	31201	19707	1020	29917	1283	327	40027	33628	198	27199	19241

#sites = number of sites sampled; #years = number of years sampled; n = number of fish measured (may not equal number of fish caught)
BPUE = mean biomass per unit effort (g/100 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-8. continued.

Species	Limestone Forebay 2010 (#sites=9)			lower Nelson R 2008 (#sites=16)			2009 (# sites= 12)			2010 (#sites=9)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	1	2	5	1	-	-
Lake Sturgeon	-	-	-	60	6701	8935	22	5542	6694	43	8301	10258	125	6714	800
Goldeye	-	-	-	7	173	545	-	-	-	-	-	-	7	75	25
Mooneye	6	196	329	-	-	-	12	408	834	1	27	80	13	139	113
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	76	5223	7750	94	3252	4213	125	6000	5942	57	2731	3376	276	4016	951
White Sucker	12	1193	1523	22	753	1092	31	2125	2870	19	1043	1122	72	1269	330
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	41	5901	9093	76	8442	14610	82	14274	22096	80	14703	21716	238	11857	886
Rainbow Smelt	-	-	-	1	1	3	8	6	21	9	5	14	18	3	1
Cisco	-	-	-	-	-	-	1	15	51	-	-	-	1	5	4
Lake Whitefish	1	218	653	16	1071	1804	21	2229	2717	25	2239	4112	62	1731	168
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	1	32	130	2	99	237	4	215	645	7	99	39
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	5	379	1136	-	-	-	-	-	-	1	58	174	1	14	17
Walleye	5	834	2018	31	1640	2385	58	5328	7200	46	4167	9274	135	3451	547
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	146	13944	8585	308	22065	16630	362	36027	22834	286	33490	34481	956	29372	1939

#sites = number of sites sampled; #years = number of years sampled; n = number of fish measured (may not equal number of fish caught)
BPUE = mean biomass per unit effort (g/100 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-8. continued.

Species	Hayes R												Assean L								
	2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=2)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	1	2	6	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-
Lake Sturgeon	12	1316	2390	14	1362	2728	60	6807	5165	86	3162	1823	-	-	-	-	-	-	-	-	-
Goldeye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common Carp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	11	482	1081	10	269	282	8	229	431	29	326	79	-	-	-	-	-	-	-	-	-
White Sucker	3	294	450	7	523	595	13	815	1005	23	544	151	70	6146	5452	93	6459	4684	163	6303	157
Shorthead Redhorse	11	495	606	3	171	409	6	472	872	20	379	104	-	-	-	-	-	-	-	-	-
Northern Pike	4	1563	1991	2	400	795	10	1779	1710	16	1248	428	66	8365	3832	77	7240	4103	143	7802	562
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	31	273	410	163	1541	2009	194	907	634
Lake Whitefish	10	945	1630	1	77	230	10	539	441	21	520	251	40	2448	3766	79	5088	6822	119	3768	1320
Brook Trout	-	-	-	2	238	713	8	801	583	10	346	238	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	18	53	1	9	9
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	5	61	77	14	145	185	19	103	42
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	4672	5048	16	1749	1686	44	5895	4287	89	4105	1230	237	12543	13323	315	15855	13065	552	14199	1656
Freshwater Drum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	80	9768	9262	56	4790	5006	159	17336	6117	295	10632	3647	449	29836	11568	742	36346	9833	1191	33091	3255

#sites = number of sites sampled; #years = number of years sampled; n = number of fish measured (may not equal number of fish caught)
BPUE = mean biomass per unit effort (g/100 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-9. Mean catch-per-unit-effort (CPUE) calculated for fish species captured in small mesh index gill nets (fish/30 m/24 h) set in Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L									Stephens L-South			Stephens L-North		
	2009 (#sites=4)			2010 (#sites=4)			Overall (#years=2)			2009 (#sites=3)			2009 (#sites=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE	n	CPUE	SD	n	CPUE	SD
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	14	3.2	6.46	2	0.3	0.53	16	1.7	1.48	-	-	-	-	-	-
Emerald Shiner	29	6.8	12.14	-	-	-	29	3.4	3.39	-	-	-	34	11.6	20.05
Spottail Shiner	86	19.7	32.24	101	12.7	17.48	187	16.2	3.51	31	10.3	10.03	87	27.6	19.71
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	2	0.5	0.92	1	0.1	0.26	3	0.3	0.16	4	1.3	2.20	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	1.3	1.70	2	0.3	0.30	8	0.8	0.54	-	-	-	3	1.0	0.06
Rainbow Smelt	104	24.1	14.91	70	10.0	7.48	174	17.0	7.09	45	15.4	13.36	66	21.3	14.39
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3	0.53
Troutperch	42	9.7	8.92	66	9.1	7.36	108	9.4	0.26	41	13.6	12.66	1	0.3	0.59
Slimy Sculpin	7	1.7	2.80	-	-	-	7	0.8	0.85	-	-	-	-	-	-
Yellow Perch	2	0.5	0.92	-	-	-	2	0.2	0.23	3	1.1	1.10	2	0.6	1.07
Sauger	1	0.2	0.44	1	0.2	0.47	2	0.2	0.01	5	1.6	2.75	-	-	-
Walleye	3	0.7	0.89	5	0.6	1.24	8	0.7	0.04	1	0.4	0.63	12	4.0	3.77
Total	296	68.4	56.66	248	33.3	32.26	544	50.9	17.56	130	43.6	38.23	206	66.7	44.29

#sites = number of sites sampled; #years = number of years sampled; n = number of fish caught

CPUE = mean catch per unit effort (fish/30 m/24 h) per site (2008, 2009 and 2010) and per year (overall)

SD = standard deviation; SE = standard error

Table 5.7.7-9. continued.

Species	Limestone Forebay			lower Nelson R											
	2010 (#sites=3)			2008 (#sites=4)			2009 (#sites=4)			2010 (#sites=3)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Lake Sturgeon	-	-	-	-	-	-	-	-	-	1	0.3	0.6	1	0.1	0.11
Lake Chub	-	-	-	4	1.1	2	22	8.8	16.79	-	-	-	26	3.3	2.77
Emerald Shiner	1	0.3	0.55	12	3	4	8	3.2	6.47	35	11.1	18.43	55	5.8	2.66
Spottail Shiner	8	2.4	4.22	1	0.2	1	8	2.5	3.53	1	0.3	0.55	10	1	0.74
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	2	0.7	1.15	3	0.7	1	3	1.2	2.43	5	1.4	2.51	11	1.1	0.22
White Sucker	-	-	-	8	1.8	3	14	4.9	4.09	-	-	-	22	2.2	1.44
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	-	-	-	-	-	-	-	-	-	2	0.6	1.1	2	0.2	0.21
Rainbow Smelt	-	-	-	17	3.7	4	16	5.5	6.7	59	17.1	29.62	92	8.7	4.21
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	45	14.2	16.09	30	7.2	7	25	8.6	7.38	4	1.2	2.01	59	5.6	2.27
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	2	0.5	1	7	2.2	4.36	-	-	-	9	0.9	0.66
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	-	-	-	19	4.9	8	7	2.2	4.36	1	0.3	0.5	27	2.5	1.34
Total	56	17.6	14.82	96	23.1	20	110	39.1	39.16	108	32.4	30.02	314	31.5	4.64

#sites = number of sites sampled; #years = number of years sampled; n = number of fish caught
CPUE = mean catch per unit effort (fish/30 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-9. continued.

Species	Hayes R												Assean L								
	2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=2)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Lake Sturgeon	3	1.5	1.56	1	0.4	0.67	6	2.1	1.84	10	1.3	0.50	-	-	-	-	-	-	-	-	-
Lake Chub	3	1.6	2.69	1	0.4	0.67	-	-	-	4	0.6	0.47	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	7	2.3	3.98	2	0.6	1.09	9	1.5	0.83
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	96	34.3	14.12	110	28.9	18.61	206	31.6	2.70
Longnose Dace	-	-	-	1	0.4	0.67	-	-	-	1	0.1	0.13	-	-	-	-	-	-	-	-	-
Longnose Sucker	2	0.9	0.83	-	-	-	2	0.7	1.16	4	0.5	0.28	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-	10	3.5	3.45	1	0.1	0.19	11	1.8	1.68
Shorthead Redhorse	1	0.5	0.90	-	-	-	1	0.3	0.58	2	0.3	0.15	-	-	-	-	-	-	-	-	-
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-	6	2.1	1.04	8	2.1	1.54	14	2.1	0.01
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	1	0.3	0.57	6	1.3	1.42	7	0.8	0.47
Lake Whitefish	-	-	-	-	-	-	1	0.3	0.58	1	0.1	0.11	2	0.7	1.17	5	1.6	1.94	7	1.1	0.44
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	7	2.3	2.06	49	12.4	11.86	56	7.4	5.06
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	14	4.9	0.95	301	90.0	77.21	315	47.4	42.55
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	3	1.6	2.69	-	-	-	5	1.7	2.89	8	1.1	0.54	55	19.2	17.58	17	4.3	3.69	72	11.8	7.46
Total	12	6.0	8.22	3	1.2	2.01	15	5.1	6.20	30	4.1	1.49	198	69.6	23.53	499	141.3	102.03	697	105.5	35.84

#sites = number of sites sampled; #years = number of years sampled; n = number of fish caught

CPUE = mean catch per unit effort (fish/30 m/24 h) per site (2008, 2009 and 2010) and per year (overall)

SD = standard deviation; SE = standard error

Table 5.7.7-10. Mean biomass-per-unit-effort (BPUE) calculated for fish species captured in small mesh index gill nets (fish/30 m/24 h) set in Lower Nelson River Region waterbodies, 2008-2010 (and overall).

Species	Split L									Stephens L-South			Stephens L-North		
	2009 (#sites=4)			2010 (#sites=4)			Overall (#years=2)			2009 (#sites=3)			2009 (#sites=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE	n	BPUE	SD	n	BPUE	SD
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	14	36	71	2	2	4	16	19	17	-	-	-	-	-	-
Emerald Shiner	29	29	53	-	-	-	29	15	15	-	-	-	34	53	91
Spottail Shiner	86	94	156	101	49	68	187	72	23	31	49	48	87	131	121
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	2	5	11	1	1	3	3	3	2	4	10	18	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	1127	1409	2	93	145	8	610	517	-	-	-	3	1093	768
Rainbow Smelt	104	189	123	70	66	53	174	127	61	45	123	107	66	205	122
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	1	11	19
Troutperch	42	63	54	66	57	43	108	60	3	41	55	46	1	1	2
Slimy Sculpin	7	5	9	-	-	-	7	3	3	-	-	-	-	-	-
Yellow Perch	2	10	20	-	-	-	2	5	5	3	13	15	2	3	5
Sauger	1	199	397	1	47	94	2	123	76	5	677	1173	-	-	-
Walleye	3	42	50	5	272	543	8	157	115	1	550	952	12	3524	3371
Total	296	1799	1869	248	586	660	544	1193	606	130	1477	1291	206	5022	3169

#sites = number of sites sampled; #years = number of years sampled; n = number of fish measured (may not equal number of fish caught)
BPUE = mean biomass per unit effort (g/30 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-10. continued.

Species	Limestone Forebay 2010 (#sites=3)			lower Nelson R 2008 (#sites=4)			2009 (#sites=4)			2010 (#sites=3)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	4	16	37	22	145	281	-	-	-	26	55	46
Emerald Shiner	1	2	3	12	15	16	8	17	33	35	41	68	55	22	9
Spottail Shiner	8	14	24	1	1	3	8	5	6	1	1	2	10	2	1
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	2	60	103	3	78	169	3	23	46	5	128	221	11	72	30
White Sucker	-	-	-	8	17	34	14	59	59	-	-	-	22	26	17
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	-	-	-	-	-	-	-	-	-	2	1278	2214	2	320	426
Rainbow Smelt	-	-	-	17	30	29	16	38	44	59	81	140	92	45	16
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	45	62	76	30	38	26	25	51	40	4	7	13	59	35	13
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	2	10	19	7	19	37	-	-	-	9	11	5
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	-	-	-	19	40	77	7	59	117	1	2	4	27	37	17
Total	56	137	56.0	96	245	264	110	415	469	107	1538	2121	313	625	406

#sites = number of sites sampled; #years = number of years sampled; n = number of fish measured (may not equal number of fish caught)
BPUE = mean biomass per unit effort (g/30 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-10. continued.

Species	Hayes R												Assean L								
	2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=2)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Lake Sturgeon	3	1148	1961	1	182	315	6	1695	1491	10	1008	442	-	-	-	-	-	-	-	-	-
Lake Chub	3	16	27	1	15	26	-	-	-	4	10	5	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	7	7	11	2	3	4	9	5	1
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	96	194	90	110	202	156	206	198	3
Longnose Dace	-	-	-	1	12	21	-	-	-	1	4	4	-	-	-	-	-	-	-	-	-
Longnose Sucker	2	7	8	-	-	-	2	19	33	4	9	6	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-	10	25	21	1	1	1	11	13	8
Shorthead Redhorse	1	98	170	-	-	-	1	19	33	2	39	30	-	-	-	-	-	-	-	-	-
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-	6	1700	1336	8	839	556	14	1270	305
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	1	10	16	6	51	51	7	30	15
Lake Whitefish	-	-	-	-	-	-	1	19	32	1	6	6	2	54	93	5	240	367	7	147	66
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	7	12	16	49	79	89	56	46	23
Slimy Sculpin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	14	42	20	301	246	192	315	144	72
Sauger	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	3	160	278	-	-	-	5	407	706	8	189	118	55	5805	5238	17	2449	2418	72	4127	1187
Total	12	1430	2443	3	209	362	15	2159	1920	30	1266	569	198	7849	5218	499	4108	3134	697	5978	1323

#sites = number of sites sampled; #years = number of years sampled; n = number of fish measured (may not equal number of fish caught)
BPUE = mean biomass per unit effort (g/30 m/24 h) per site (2008, 2009 and 2010) and per year (overall)
SD = standard deviation; SE = standard error

Table 5.7.7-11. Summary of mean fork length (mm), weight (g), and condition factor (K) calculated for Northern Pike captured in standard gang and small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Mesh (in)	Split L						Stephens L-South			Stephens L-North			Limestone Forebay		
	2009			2010			2009			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)															
SM	-	-	-	2	357	129	-	-	-	3	530	143	-	-	-
2	16	402	72	19	418	93	15	434	156	12	466	93	3	476	135
3	23	509	73	39	524	83	38	539	106	36	497	71	9	581	81
3.75	10	609	99	8	611	160	10	644	93	19	643	94	14	604	47
4.25	7	732	56	6	720	124	9	706	146	8	726	118	13	662	47
5	2	758	33	2	741	10	2	743	66	2	790	191	2	708	25
Total	58	532	134	76	523	134	74	558	148	80	558	129	41	613	81
Weight (g)															
SM	6	827	-	2	355	318	-	-	-	3	1163	849	-	-	-
2	16	541	241	19	630	419	15	942	1040	12	858	505	3	900	594
3	23	1035	498	39	1187	733	38	1306	867	36	962	443	9	1567	668
3.75	10	1800	925	8	2149	1717	10	1991	1025	19	2014	1287	14	1678	399
4.25	7	3014	800	6	3258	1624	9	2947	1497	8	2988	1704	13	2188	529
5	2	3540	57	2	3335	64	2	3100	566	2	3660	1923	2	2945	856
Total	64	1306	-	76	1347	1184	74	1573	1186	80	1474	1194	41	1820	673
Condition Factor															
SM	-	-	-	2	0.67	0.03	-	-	-	3	0.71	0.07	-	-	-
2	16	0.78	0.07	19	0.76	0.04	15	0.78	0.09	12	0.79	0.15	3	0.74	0.04
3	23	0.74	0.08	39	0.75	0.07	38	0.76	0.07	36	0.75	0.06	9	0.77	0.09
3.75	10	0.74	0.04	8	0.76	0.08	10	0.70	0.05	19	0.70	0.10	14	0.75	0.08
4.25	7	0.75	0.07	6	0.81	0.09	9	0.77	0.10	8	0.73	0.10	13	0.74	0.08
5	2	0.82	0.09	2	0.82	0.04	2	0.76	0.06	2	0.73	0.13	2	0.82	0.16
Total	58	0.76	0.07	76	0.76	0.07	74	0.76	0.08	80	0.74	0.10	41	0.76	0.08

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-11. continued.

Mesh (in)	lower Nelson R									Hayes R									Assean L					
	2008			2009			2010			2008			2009			2010			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																								
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	336	156
2	15	598	121	14	521	119	20	608	139	1	654	-	-	-	-	2	391	20	21	450	174	26	486	123
3	29	620	107	25	585	107	32	578	108	-	-	-	1	621	-	4	675	91	30	554	110	33	545	70
3.75	19	639	80	15	648	79	17	593	111	1	875	-	-	-	-	3	654	59	8	650	163	11	595	61
4.25	10	748	84	18	679	57	6	723	79	2	785	37	1	663	-	1	756	-	7	662	103	6	682	37
5	3	719	53	10	785	54	5	704	64	-	-	-	-	-	-	-	-	-	-	-	-	1	600	-
Total	76	641	108	82	631	119	80	608	120	4	775	93	2	642	30	10	620	138	66	544	156	85	524	124
Weight (g)																								
SM	-	-	-	-	-	-	2	2015	-	-	-	-	-	-	-	-	-	-	6	785	-	8	406	357
2	15	1779	1035	14	1255	803	20	2039	1531	1	1750	-	-	-	-	2	440	113	21	875	1615	26	895	837
3	29	1802	1045	25	1597	988	32	1614	1130	-	-	-	1	1700	-	4	2330	875	30	1192	916	33	1089	489
3.75	19	1977	903	15	2051	809	17	1772	1319	1	3990	-	-	-	-	3	2020	664	8	2320	1624	11	1398	452
4.25	10	3177	1053	18	2317	658	6	2838	823	2	3755	290	1	2140	-	1	2900	-	7	2196	1022	6	2182	658
5	3	2660	588	10	3798	1146	5	2844	748	-	-	-	-	-	-	-	-	-	-	-	-	1	1150	-
Total	76	2056	1081	82	2048	1144	82	1925	-	4	3313	1061	2	1920	311	10	1916	1013	72	1288	-	85	1083	717
Condition Factor																								
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	0.72	0.08
2	15	0.72	0.08	14	0.80	0.12	20	0.77	0.09	1	0.63	-	-	-	-	2	0.73	0.08	21	0.65	0.07	26	0.64	0.05
3	29	0.68	0.08	25	0.73	0.08	32	0.74	0.11	-	-	-	1	0.71	-	4	0.73	0.05	30	0.63	0.07	33	0.64	0.06
3.75	19	0.71	0.09	15	0.72	0.06	17	0.76	0.07	1	0.60	-	-	-	-	3	0.71	0.08	8	0.70	0.10	11	0.65	0.06
4.25	10	0.74	0.10	18	0.72	0.08	6	0.74	0.06	2	0.78	0.06	1	0.73	-	1	0.67	-	7	0.69	0.06	6	0.67	0.13
5	3	0.71	0.02	10	0.77	0.12	5	0.80	0.04	-	-	-	-	-	-	-	-	-	-	-	-	1	0.53	-
Total	76	0.71	0.08	82	0.74	0.09	80	0.76	0.09	4	0.70	0.10	2	0.72	0.01	10	0.72	0.06	66	0.65	0.08	85	0.65	0.07

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-12. Summary of mean fork length (mm), weight (g), and condition factor (K) calculated for Lake Whitefish captured in standard gang index and small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Mesh (in)	Split L						Stephens L-South			Stephens L-North			Limestone Forebay		
	2009			2010			2009			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)															
SM	-	-	-	-	-	-	-	-	-	1	133	-	-	-	-
2	-	-	-	5	274	98	1	435	-	2	503	18	-	-	-
3	-	-	-	5	332	70	2	422	88	-	-	-	-	-	-
3.75	3	476	22	3	415	13	1	494	-	2	399	69	-	-	-
4.25	4	486	41	11	422	46	-	-	-	2	440	85	-	-	-
5	3	537	29	4	437	40	2	571	16	4	516	31	1	512	-
Total	10	498	40	28	381	83	6	486	82	11	443	120	1	512	-
Weight (g)															
SM	-	-	-	-	-	-	-	-	-	1	36	-	-	-	-
2	-	-	-	5	488	637	1	1790	-	2	2500	141	-	-	-
3	-	-	-	5	655	525	2	1565	1039	-	-	-	-	-	-
3.75	3	2117	236	3	1218	101	1	2500	-	2	1355	926	-	-	-
4.25	4	2325	719	11	1308	598	-	-	-	2	1655	1054	-	-	-
5	3	2900	458	4	1387	480	2	3875	106	4	2668	245	1	2320	-
Total	10	2435	585	28	1047	628	6	2528	1193	11	1975	968	1	2320	-
Condition Factor															
SM	-	-	-	-	-	-	-	-	-	1	1.53	-	-	-	-
2	-	-	-	5	1.54	0.34	1	2.17	-	2	1.97	0.10	-	-	-
3	-	-	-	5	1.52	0.16	2	1.90	0.18	-	-	-	-	-	-
3.75	3	1.96	0.08	3	1.71	0.05	1	2.07	-	2	1.94	0.43	-	-	-
4.25	4	1.97	0.21	11	1.65	0.23	-	-	-	2	1.79	0.18	-	-	-
5	3	1.86	0.07	4	1.62	0.21	2	2.09	0.23	4	1.96	0.22	1	1.73	-
Total	10	1.93	0.14	28	1.61	0.22	6	2.04	0.17	11	1.89	0.24	1	1.73	-

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-12. continued.

Mesh (in)	lower Nelson R									Hayes R									Assean L					
	2008			2009			2010			2008			2009			2010			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																								
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	165	-	-	-	-	2	239	98
2	1	303	-	1	372	-	3	434	84	-	-	-	-	-	-	1	305	-	11	306	99	26	274	98
3	3	375	52	3	408	11	5	380	56	7	354	12	-	-	-	6	326	26	20	303	37	17	334	49
3.75	4	448	38	8	415	40	11	380	51	3	392	30	1	364	-	2	360	21	7	388	77	9	344	43
4.25	2	420	21	7	438	28	5	426	48	-	-	-	-	-	-	1	367	-	1	357	-	16	405	62
5	6	458	30	2	452	3	1	415	-	-	-	-	-	-	-	-	-	-	1	428	-	11	427	48
Total	16	425	55	21	423	34	25	397	56	10	366	25	1	364	-	11	319	58	40	323	74	81	340	92
Weight (g)																								
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	56	-	2	80	-	5	154	-
2	1	360	-	1	780	-	3	1300	711	-	-	-	-	-	-	1	420	-	11	620	679	26	462	510
3	3	737	351	3	1100	131	5	762	362	7	598	87	-	-	-	6	510	108	20	448	198	17	606	371
3.75	4	1403	431	8	1150	457	11	800	372	3	907	385	1	730	-	2	705	64	7	1101	755	9	673	281
4.25	2	960	212	7	1330	238	5	1196	472	-	-	-	-	-	-	1	720	-	1	788	-	16	1221	616
5	6	1295	221	2	1525	163	1	1060	-	-	-	-	-	-	-	-	-	-	1	1375	-	11	1397	555
Total	16	1117	421	21	1221	347	25	942	453	10	691	245	1	730	-	11	515	199	42	615	-	84	762	-
Condition Factor																								
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.25	-	-	-	-	2	1.35	0.18
2	1	1.29	-	1	1.52	-	3	1.46	0.09	-	-	-	-	-	-	1	1.48	-	11	1.61	0.23	26	1.50	0.16
3	3	1.32	0.12	3	1.62	0.06	5	1.32	0.09	7	1.34	0.14	-	-	-	6	1.47	0.08	20	1.53	0.14	17	1.50	0.14
3.75	4	1.51	0.13	8	1.53	0.23	11	1.37	0.09	3	1.44	0.26	1	1.51	-	2	1.52	0.13	7	1.64	0.14	9	1.59	0.16
4.25	2	1.29	0.10	7	1.57	0.04	5	1.49	0.11	-	-	-	-	-	-	1	1.46	-	1	1.73	-	16	1.69	0.14
5	6	1.35	0.13	2	1.65	0.14	1	1.48	-	-	-	-	-	-	-	-	-	-	1	1.75	-	11	1.71	0.15
Total	16	1.37	0.14	21	1.57	0.15	25	1.40	0.11	10	1.37	0.17	1	1.51	-	11	1.46	0.10	40	1.58	0.17	81	1.57	0.18

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-13. Summary of mean fork length (mm), weight (g), and condition factor (K) calculated for Walleye captured in standard gang index and small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Mesh (in)	Split L						Stephens L-South			Stephens L-North			Limestone Forebay		
	2009			2010			2009			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)															
SM	-	-	-	5	317	71	1	483	-	12	366	124	-	-	-
2	46	318	68	53	309	81	17	341	129	8	355	146	-	-	-
3	64	382	49	46	397	70	36	431	73	26	419	80	1	535	-
3.75	44	413	38	45	433	45	56	448	59	24	422	63	3	516	22
4.25	23	434	55	31	446	28	41	456	50	19	470	63	1	405	-
5	12	439	61	19	484	47	27	514	45	20	513	53	-	-	-
Total	189	384	68	199	396	86	178	446	80	109	435	94	5	498	55
Weight (g)															
SM	3	59	-	5	440	371	1	1500	-	12	891	542	-	-	-
2	46	477	312	53	444	416	17	771	825	8	974	925	-	-	-
3	64	783	313	46	864	486	36	1250	690	26	1144	706	1	2050	-
3.75	44	959	255	45	1092	360	56	1328	609	24	1124	540	3	1770	66
4.25	23	1149	581	31	1220	226	41	1386	517	19	1523	783	1	940	-
5	12	1186	487	19	1544	396	27	1977	501	20	1998	577	-	-	-
Total	192	808	-	199	914	527	178	1372	680	109	1322	749	5	1660	423
Condition Factor															
SM	-	-	-	5	1.19	0.12	1	1.33	-	12	1.39	0.12	-	-	-
2	46	1.29	0.13	53	1.18	0.11	17	1.32	0.13	8	1.42	0.17	-	-	-
3	64	1.33	0.12	46	1.25	0.11	36	1.42	0.09	26	1.38	0.14	1	1.34	-
3.75	44	1.32	0.11	45	1.30	0.08	56	1.40	0.09	24	1.39	0.09	3	1.30	0.19
4.25	23	1.34	0.13	31	1.37	0.11	41	1.41	0.10	19	1.38	0.08	1	1.42	-
5	12	1.32	0.13	19	1.34	0.09	27	1.43	0.11	20	1.45	0.10	-	-	-
Total	189	1.32	0.12	199	1.27	0.12	178	1.40	0.10	109	1.40	0.11	5	1.33	0.14

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-13. continued.

Mesh (in)	lower Nelson R									Hayes R									Assean L					
	2008			2009			2010			2008			2009			2010			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																								
SM	-	-	-	7	132	32	1	82	-	-	-	-	-	-	-	1	510	-	-	-	-	17	357	46
2	7	319	102	4	376	95	7	306	112	2	365	27	3	369	95	3	472	156	89	310	73	116	340	63
3	11	393	21	12	393	62	9	406	57	14	435	88	5	387	44	16	420	92	96	357	43	124	373	38
3.75	8	421	122	23	421	44	18	437	46	9	488	63	4	473	113	9	456	64	39	411	27	58	391	32
4.25	2	445	1	12	439	28	8	454	20	2	571	16	3	492	68	8	513	69	13	441	33	12	426	27
5	3	468	56	7	483	30	2	476	135	2	591	16	1	617	-	8	603	54	-	-	-	5	273	104
Total	31	394	90	65	392	105	45	407	93	29	467	90	16	439	99	45	482	102	237	353	68	332	364	55
Weight (g)																								
SM	19	8	-	7	27	23	1	7	-	3	103	-	-	-	-	5	244	-	55	-	-	17	523	174
2	7	469	534	4	725	525	7	511	604	2	545	177	3	593	413	3	1243	1019	89	293	254	116	465	232
3	11	680	134	12	852	406	9	936	414	14	995	746	5	646	187	16	933	701	96	391	171	124	579	190
3.75	8	1014	564	23	971	277	18	1116	405	9	1306	623	4	1370	994	9	1088	386	39	526	150	58	670	131
4.25	2	1070	28	12	1089	176	8	1274	209	2	2225	35	3	1317	516	8	1634	659	13	795	233	12	892	206
5	3	1207	492	7	1529	322	2	1265	615	2	2365	21	1	2800	-	8	2461	528	-	1004	-	5	322	426
Total	50	496	-	65	914	469	45	953	-	32	1133	-	16	1078	779	49	1274	-	292	498	-	332	560	225
Condition Factor																								
SM	-	-	-	7	1.01	0.07	1	1.27	-	-	-	-	-	-	-	1	0.91	-	-	-	-	17	1.10	0.06
2	7	1.08	0.14	4	1.20	0.11	7	1.20	0.13	2	1.10	0.12	3	1.05	0.08	3	1.07	0.19	89	1.12	0.11	116	1.08	0.06
3	11	1.11	0.10	12	1.30	0.06	9	1.31	0.14	14	1.08	0.09	5	1.10	0.10	16	1.13	0.10	96	1.12	0.10	124	1.08	0.08
3.75	8	1.11	0.11	23	1.28	0.10	18	1.29	0.12	9	1.06	0.12	4	1.16	0.20	9	1.12	0.12	39	1.13	0.07	58	1.10	0.07
4.25	2	1.22	0.03	12	1.28	0.11	8	1.35	0.07	2	1.20	0.11	3	1.07	0.05	8	1.15	0.06	13	1.16	0.12	12	1.13	0.08
5	3	1.12	0.12	7	1.34	0.10	2	1.21	0.42	2	1.15	0.08	1	1.19	-	8	1.13	0.20	-	-	-	5	1.09	0.08
Total	31	1.11	0.11	65	1.26	0.13	45	1.29	0.14	29	1.09	0.10	16	1.11	0.12	45	1.12	0.13	237	1.12	0.10	332	1.09	0.07

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-14. Year-class frequency distributions (%) for Northern Pike captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Year-Class	Split L				Stephens L-South		Stephens L-North		Limestone Forebay	
	2009		2010		2009		2009		2010	
	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-
2008	-	-	2	2.70	-	-	-	-	-	-
2007	1	1.85	12	16.22	4	5.56	1	1.30	1	2.50
2006	4	7.41	12	16.22	3	4.17	5	6.49	2	5.00
2005	6	11.11	15	20.27	7	9.72	15	19.48	4	10.00
2004	9	16.67	16	21.62	18	25.00	17	22.08	12	30.00
2003	11	20.37	5	6.76	8	11.11	7	9.09	6	15.00
2002	5	9.26	3	4.05	8	11.11	9	11.69	9	22.50
2001	4	7.41	2	2.70	9	12.50	8	10.39	6	15.00
2000	6	11.11	2	2.70	3	4.17	6	7.79	-	-
1999	3	5.56	1	1.35	4	5.56	2	2.60	-	-
1998	2	3.70	-	-	1	1.39	2	2.60	-	-
1997	2	3.70	2	2.70	4	5.56	2	2.60	-	-
1996	-	-	1	1.35	-	-	-	-	-	-
1995	1	1.85	1	1.35	1	1.39	1	1.30	-	-
1994	-	-	-	-	1	1.39	1	1.30	-	-
1993	-	-	-	-	-	-	-	-	-	-
1992	-	-	-	-	1	1.39	-	-	-	-
1991	-	-	-	-	-	-	1	1.30	-	-
Total	54	100	74	100	72	100	77	100	40	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-14. continued.

Year Class	lower Nelson R						Hayes R						Assean L			
	2008		2009		2010		2008		2009		2010		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.37
2007	1	1.32	2	2.44	-	-	-	-	-	-	1	10.00	3	4.55	2	2.74
2006	1	1.32	1	1.22	6	7.79	-	-	-	-	1	10.00	7	10.61	11	15.07
2005	7	9.21	11	13.41	23	29.87	-	-	-	-	1	10.00	3	4.55	21	28.77
2004	12	15.79	9	10.98	11	14.29	-	-	-	-	2	20.00	12	18.18	14	19.18
2003	15	19.74	17	20.73	15	19.48	1	25.00	-	-	1	10.00	11	16.67	13	17.81
2002	17	22.37	13	15.85	8	10.39	-	-	1	50.00	3	30.00	13	19.70	3	4.11
2001	10	13.16	14	17.07	4	5.19	-	-	-	-	-	-	2	3.03	4	5.48
2000	7	9.21	7	8.54	4	5.19	1	25.00	1	50.00	1	10.00	3	4.55	4	5.48
1999	2	2.63	3	3.66	2	2.60	2	50.00	-	-	-	-	5	7.58	-	-
1998	2	2.63	2	2.44	3	3.90	-	-	-	-	-	-	2	3.03	-	-
1997	2	2.63	2	2.44	-	-	-	-	-	-	-	-	2	3.03	-	-
1996	-	-	-	-	1	1.30	-	-	-	-	-	-	1	1.52	-	-
1995	-	-	1	1.22	-	-	-	-	-	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-	-	-	-	-	-	1	1.52	-	-
1992	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	-	-	-	-	-	-	1	1.52	-	-
Total	76	100	82	100	77	100	4	100	2	100	10	100	66	100	73	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-15. Year-class frequency distributions (%) for Lake Whitefish captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Year-Class	Split L				Stephens L-South		Stephens L-North		Limestone Forebay	
	2009		2010		2009		2009		2010	
	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-
2008	-	-	1	5.00	-	-	-	-	-	-
2007	-	-	1	5.00	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-
2005	-	-	2	10.00	-	-	-	-	-	-
2004	-	-	3	15.00	1	16.67	-	-	-	-
2003	-	-	6	30.00	-	-	-	-	-	-
2002	1	10.00	3	15.00	-	-	1	11.11	-	-
2001	-	-	1	5.00	-	-	1	11.11	-	-
2000	-	-	1	5.00	1	16.67	-	-	-	-
1999	-	-	1	5.00	-	-	1	11.11	-	-
1998	-	-	-	-	-	-	-	-	-	-
1997	2	20.00	-	-	1	16.67	1	11.11	-	-
1996	1	10.00	-	-	-	-	-	-	1	100
1995	1	10.00	-	-	1	16.67	-	-	-	-
1994	-	-	-	-	-	-	1	11.11	-	-
1993	-	-	1	5.00	-	-	-	-	-	-
1992	1	10.00	-	-	1	16.67	1	11.11	-	-
1991	-	-	-	-	-	-	-	-	-	-
1990	-	-	-	-	1	16.67	1	11.11	-	-
1989	4	40.00	-	-	-	-	-	-	-	-
1988	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	1	11.11	-	-
1983	-	-	-	-	-	-	1	11.11	-	-
Total	10	100	20	100	6	100	9	100	1	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-15. continued.

Year-Class	lower Nelson R						Hayes R						Assean L			
	2008		2009		2010		2008		2009		2010		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3.85
2008	-	-	-	-	-	-			-	-	-	-	-	-	10	12.82
2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	11.54
2006	-	-	-	-	-	-	-	-	-	-	1	10.00	4	10.26	12	15.38
2005	-	-	-	-	1	4.35	-	-	-	-	2	20.00	14	35.90	24	30.77
2004	1	6.25	-	-	2	8.70	-	-	-	-	5	50.00	9	23.08	9	11.54
2003	-	-	1	4.76	1	4.35	1	10.00	-	-	2	20.00	6	15.38	-	-
2002	1	6.25	-	-	5	21.74	4	40.00	-	-	-	-	3	7.69	2	2.56
2001	1	6.25	2	9.52	3	13.04	2	20.00	-	-	-	-	-	-	1	1.28
2000	1	6.25	1	4.76	1	4.35	2	20.00	-	-	-	-	-	-	-	-
1999	2	12.50	5	23.81	-	-	-	-	1	100	-	-	-	-	1	1.28
1998	3	18.75	-	-	2	8.70	-	-	-	-	-	-	-	-	2	2.56
1997	2	12.50	4	19.05	1	4.35	1	10.00	-	-	-	-	-	-	-	-
1996	1	6.25	3	14.29	1	4.35	-	-	-	-	-	-	-	-	2	2.56
1995	1	6.25	2	9.52	-	-	-	-	-	-	-	-	-	-	-	-
1994	2	12.50	-	-	1	4.35	-	-	-	-	-	-	-	-	1	1.28
1993	-	-	-	-	1	4.35	-	-	-	-	-	-	3	7.69	1	1.28
1992	1	6.25	2	9.52	2	8.70	-	-	-	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1990	-	-	-	-	1	4.35	-	-	-	-	-	-	-	-	1	1.28
1989	-	-	1	4.76	-	-	-	-	-	-	-	-	-	-	-	-
1988	-	-	-	-	1	4.35	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	16	100	21	100	23	100	10	100	1	100	10	100	39	100	78	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-16. Year-class frequency distributions (%) for Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Year-Class	Split L				Stephens L-South		Stephens L-North		Limestone Forebay	
	2009		2010		2009		2009		2010	
	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-
2008	-	-	13	7.69	-	-	-	-	-	-
2007	1	0.54	19	11.24	1	0.56	-	-	-	-
2006	8	4.35	8	4.73	5	2.82	2	2.08	-	-
2005	10	5.43	18	10.65	3	1.69	1	1.04	-	-
2004	17	9.24	6	3.55	2	1.13	3	3.13	-	-
2003	19	10.33	57	33.73	9	5.08	2	2.08	1	25.00
2002	57	30.98	34	20.12	41	23.16	11	11.46	-	-
2001	36	19.57	8	4.73	30	16.95	18	18.75	-	-
2000	14	7.61	4	2.37	5	2.82	10	10.42	-	-
1999	3	1.63	-	-	4	2.26	2	2.08	1	25.00
1998	-	-	1	0.59	3	1.69	3	3.13	-	-
1997	4	2.17	-	-	4	2.26	8	8.33	1	25.00
1996	3	1.63	-	-	24	13.56	14	14.58	-	-
1995	2	1.09	1	0.59	7	3.95	6	6.25	-	-
1994	4	2.17	-	-	8	4.52	3	3.13	-	-
1993	1	0.54	-	-	3	1.69	1	1.04	1	25.00
1992	2	1.09	-	-	1	0.56	-	-	-	-
1991	1	0.54	-	-	1	0.56	1	1.04	-	-
1990	-	-	-	-	1	0.56	1	1.04	-	-
1989	-	-	-	-	4	2.26	-	-	-	-
1988	1	0.54	-	-	2	1.13	1	1.04	-	-
1987	1	0.54	-	-	4	2.26	1	1.04	-	-
1986	-	-	-	-	4	2.26	1	1.04	-	-
1985	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	1	0.56	1	1.04	-	-
1983	-	-	-	-	5	2.82	3	3.13	-	-
1982	-	-	-	-	2	1.13	2	2.08	-	-
1981	-	-	-	-	2	1.13	-	-	-	-
1980	-	-	-	-	-	-	1	1.04	-	-
1979	-	-	-	-	1	0.56	-	-	-	-
Total	184	100	169	100	177	100	96	100	4	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-16. continued.

Year-Class	lower Nelson R						Hayes R						Assean L			
	2008		2009		2010		2008		2009		2010		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	1	2.17	-	-	-	-	-	-	1	0.44	3	1.15
2007	-	-	-	-	4	8.70	-	-	-	-	-	-	1	0.44	3	1.15
2006	-	-	-	-	1	2.17	-	-	-	-	1	2.27	4	1.76	17	6.51
2005	-	-	-	-	4	8.70	-	-	-	-	-	-	20	8.81	13	4.98
2004	3	10.71	3	5.56	4	8.70	-	-	-	-	2	4.55	5	2.20	6	2.30
2003	7	25.00	4	7.41	12	26.09	-	-	3	20.00	6	13.64	5	2.20	38	14.56
2002	4	14.29	26	48.15	11	23.91	2	7.14	1	6.67	3	6.82	24	10.57	46	17.62
2001	1	3.57	5	9.26	2	4.35	4	14.29	1	6.67	1	2.27	36	15.86	57	21.84
2000	3	10.71	8	14.81	1	2.17	-	-	-	-	4	9.09	43	18.94	40	15.33
1999	3	10.71	2	3.70	2	4.35	4	14.29	-	-	2	4.55	27	11.89	11	4.21
1998	2	7.14	-	-	3	6.52	4	14.29	3	20.00	3	6.82	21	9.25	13	4.98
1997	2	7.14	2	3.70	-	-	-	-	4	26.67	3	6.82	25	11.01	3	1.15
1996	-	-	-	-	-	-	5	17.86	1	6.67	4	9.09	5	2.20	7	2.68
1995	-	-	3	5.56	1	2.17	1	3.57	-	-	1	2.27	6	2.64	1	0.38
1994	1	3.57	-	-	-	-	2	7.14	-	-	1	2.27	3	1.32	1	0.38
1993	-	-	-	-	-	-	-	-	-	-	1	2.27	-	-	-	-
1992	-	-	-	-	-	-	-	-	-	-	1	2.27	-	-	-	-
1991	-	-	1	1.85	-	-	2	7.14	-	-	-	-	-	-	1	0.38
1990	1	3.57	-	-	-	-	3	10.71	-	-	5	11.36	1	0.44	1	0.38
1989	-	-	-	-	-	-	-	-	-	-	3	6.82	-	-	-	-
1988	-	-	-	-	-	-	-	-	1	6.67	1	2.27	-	-	-	-
1987	1	3.57	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	1	3.57	1	6.67	2	4.55	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1979	-	-	-	-			-	-	-	-			-	-		
Total	28	100	54	100	46	100	28	100	15	100	44	100	227	100	261	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-17. Age frequency distributions (%) for Northern Pike captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Age	Split L				Stephens L-South		Stephens L-North		Limestone Forebay	
	2009		2010		2009		2008		2010	
	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-
2	1	1.85	2	2.70	4	5.56	1	1.30	-	-
3	4	7.41	12	16.22	3	4.17	5	6.49	1	2.50
4	6	11.11	12	16.22	7	9.72	15	19.48	2	5.00
5	9	16.67	15	20.27	18	25.00	17	22.08	4	10.00
6	11	20.37	16	21.62	8	11.11	7	9.09	12	30.00
7	5	9.26	5	6.76	8	11.11	9	11.69	6	15.00
8	4	7.41	3	4.05	9	12.50	8	10.39	9	22.50
9	6	11.11	2	2.70	3	4.17	6	7.79	6	15.00
10	3	5.56	2	2.70	4	5.56	2	2.60	-	-
11	2	3.70	1	1.35	1	1.39	2	2.60	-	-
12	2	3.70	-	-	4	5.56	2	2.60	-	-
13	-	-	2	2.70	-	-	-	-	-	-
14	1	1.85	1	1.35	1	1.39	1	1.30	-	-
15	-	-	1	1.35	1	1.39	1	1.30	-	-
16	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	1	1.39	-	-	-	-
18	-	-	-	-	-	-	1	1.30	-	-
Total	54	100	74	100	72	100	77	100	40	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-17. continued.

Age	lower Nelson R						Hayes R						Assean L			
	2008		2009		2010		2008		2009		2010		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	1	1.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	1	1.32	2	2.44	-	-	-	-	-	-	-	-	3	4.55	1	1.37
3	7	9.21	1	1.22	-	-	-	-	-	-	1	10.00	7	10.61	2	2.74
4	12	15.79	11	13.41	6	7.79	-	-	-	-	1	10.00	3	4.55	11	15.07
5	15	19.74	9	10.98	23	29.87	1	25.00	-	-	1	10.00	12	18.18	21	28.77
6	17	22.37	17	20.73	11	14.29	-	-	-	-	2	20.00	11	16.67	14	19.18
7	10	13.16	13	15.85	15	19.48	-	-	1	50.00	1	10.00	13	19.70	13	17.81
8	7	9.21	14	17.07	8	10.39	1	25.00	-	-	3	30.00	2	3.03	3	4.11
9	2	2.63	7	8.54	4	5.19	2	50.00	1	50.00	-	-	3	4.55	4	5.48
10	2	2.63	3	3.66	4	5.19	-	-	-	-	1	10.00	5	7.58	4	5.48
11	2	2.63	2	2.44	2	2.60	-	-	-	-	-	-	2	3.03	-	-
12	-	-	2	2.44	3	3.90	-	-	-	-	-	-	2	3.03	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-	1	1.52	-	-
14	-	-	1	1.22	1	1.30	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-	1	1.52	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-	-	1	1.52	-	-
Total	76	100	82	100	77	100	4	100	2	100	10	100	66	100	73	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-18. Age frequency distributions (%) for Lake Whitefish captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Age	Split L				Stephens L-South		Stephens L-North		Limestone Forebay	
	2009		2010		2009		2008		2010	
	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-
2	-	-	1	5.00	-	-	-	-	-	-
3	-	-	1	5.00	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	2	10.00	1	16.67	-	-	-	-
6	-	-	3	15.00	-	-	-	-	-	-
7	1	10.00	6	30.00	-	-	1	11.11	-	-
8	-	-	3	15.00	-	-	1	11.11	-	-
9	-	-	1	5.00	1	16.67	-	-	-	-
10	-	-	1	5.00	-	-	1	11.11	-	-
11	-	-	1	5.00	-	-	-	-	-	-
12	2	20.00	-	-	1	16.67	1	11.11	-	-
13	1	10.00	-	-	-	-	-	-	-	-
14	1	10.00	-	-	1	16.67	-	-	1	100
15	-	-	-	-	-	-	1	11.11	-	-
16	-	-	-	-	-	-	-	-	-	-
17	1	10.00	1	5.00	1	16.67	1	11.11	-	-
18	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	1	16.67	1	11.11	-	-
20	4	40.00	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	1	11.11	-	-
26	-	-	-	-	-	-	1	11.11	-	-
Total	10	100	20	100	6	100	9	100	1	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-18. continued.

Age	lower Nelson R						Hayes R						Assean L			
	2008		2009		2010		2008		2009		2010		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3.85
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	12.82
3	-	-	-	-	-	-	-	-	-	-	-	-	4	10.26	9	11.54
4	1	6.25	-	-	-	-	-	-	-	-	1	10.00	14	35.90	12	15.38
5	-	-	-	-	1	4.35	1	10.00	-	-	2	20.00	9	23.08	24	30.77
6	1	6.25	1	4.76	2	8.70	4	40.00	-	-	5	50.00	6	15.38	9	11.54
7	1	6.25	-	-	1	4.35	2	20.00	-	-	2	20.00	3	7.69	-	-
8	1	6.25	2	9.52	5	21.74	2	20.00	-	-	-	-	-	-	2	2.56
9	2	12.50	1	4.76	3	13.04	-	-	-	-	-	-	-	-	1	1.28
10	3	18.75	5	23.81	1	4.35	-	-	1	100	-	-	-	-	-	-
11	2	12.50	-	-	-	-	1	10.00	-	-	-	-	-	-	1	1.28
12	1	6.25	4	19.05	2	8.70	-	-	-	-	-	-	-	-	2	2.56
13	1	6.25	3	14.29	1	4.35	-	-	-	-	-	-	-	-	-	-
14	2	12.50	2	9.52	1	4.35	-	-	-	-	-	-	-	-	2	2.56
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	1	6.25	-	-	1	4.35	-	-	-	-	-	-	3	7.69	1	1.28
17	-	-	2	9.52	1	4.35	-	-	-	-	-	-	-	-	1	1.28
18	-	-	-	-	2	8.70	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	1	4.76	1	4.35	-	-	-	-	-	-	-	-	1	1.28
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	1	4.35	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	16	100	21	100	23	100	10	100	1	100	10	100	39	100	78	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-19. Age frequency distributions (%) for Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Age	Split L				Stephens L-South		Stephens L-North		Limestone Forebay	
	2009		2010		2009		2008		2010	
	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-
2	1	0.54	13	7.69	1	0.56	-	-	-	-
3	8	4.35	19	11.24	5	2.82	2	2.08	-	-
4	10	5.43	8	4.73	3	1.69	1	1.04	-	-
5	17	9.24	18	10.65	2	1.13	3	3.13	-	-
6	19	10.33	6	3.55	9	5.08	2	2.08	-	-
7	57	30.98	57	33.73	41	23.16	11	11.46	1	25.00
8	36	19.57	34	20.12	30	16.95	18	18.75	-	-
9	14	7.61	8	4.73	5	2.82	10	10.42	-	-
10	3	1.63	4	2.37	4	2.26	2	2.08	-	-
11	-	-	-	-	3	1.69	3	3.13	1	25.00
12	4	2.17	1	0.59	4	2.26	8	8.33	-	-
13	3	1.63	-	-	24	13.56	14	14.58	1	25.00
14	2	1.09	-	-	7	3.95	6	6.25	-	-
15	4	2.17	1	0.59	8	4.52	3	3.13	-	-
16	1	0.54	-	-	3	1.69	1	1.04	-	-
17	2	1.09	-	-	1	0.56	-	-	1	25.00
18	1	0.54	-	-	1	0.56	1	1.04	-	-
19	-	-	-	-	1	0.56	1	1.04	-	-
20	-	-	-	-	4	2.26	-	-	-	-
21	1	0.54	-	-	2	1.13	1	1.04	-	-
22	1	0.54	-	-	4	2.26	1	1.04	-	-
23	-	-	-	-	4	2.26	1	1.04	-	-
24	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	1	0.56	1	1.04	-	-
26	-	-	-	-	5	2.82	3	3.13	-	-
27	-	-	-	-	2	1.13	2	2.08	-	-
28	-	-	-	-	2	1.13	-	-	-	-
29	-	-	-	-	-	-	1	1.04	-	-
30	-	-	-	-	1	0.56	-	-	-	-
Total	184	100	169	100	177	100	96	100	4	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-19. continued.

Age	lower Nelson R						Hayes R						Assean L			
	2008		2009		2010		2008		2009		2010		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-	-	-	1	0.44	-	-
2	-	-	-	-	1	2.17	-	-	-	-	-	-	1	0.44	3	1.15
3	-	-	-	-	4	8.70	-	-	-	-	-	-	4	1.76	3	1.15
4	3	10.71	-	-	1	2.17	-	-	-	-	1	2.27	20	8.81	17	6.51
5	7	25.00	3	5.56	4	8.70	-	-	-	-	-	-	5	2.20	13	4.98
6	4	14.29	4	7.41	4	8.70	2	7.14	3	20.00	2	4.55	5	2.20	6	2.30
7	1	3.57	26	48.15	12	26.09	4	14.29	1	6.67	6	13.64	24	10.57	38	14.56
8	3	10.71	5	9.26	11	23.91	-	-	1	6.67	3	6.82	36	15.86	46	17.62
9	3	10.71	8	14.81	2	4.35	4	14.29	-	-	1	2.27	43	18.94	57	21.84
10	2	7.14	2	3.70	1	2.17	4	14.29	-	-	4	9.09	27	11.89	40	15.33
11	2	7.14	-	-	2	4.35	-	-	3	20.00	2	4.55	21	9.25	11	4.21
12	-	-	2	3.70	3	6.52	5	17.86	4	26.67	3	6.82	25	11.01	13	4.98
13	-	-	-	-	-	-	1	3.57	1	6.67	3	6.82	5	2.20	3	1.15
14	1	3.57	3	5.56	-	-	2	7.14	-	-	4	9.09	6	2.64	7	2.68
15	-	-	-	-	1	2.17	-	-	-	-	1	2.27	3	1.32	1	0.38
16	-	-	-	-	-	-	-	-	-	-	1	2.27	-	-	1	0.38
17	-	-	-	-	-	-	2	7.14	-	-	1	2.27	-	-	-	-
18	1	3.57	1	1.85	-	-	3	10.71	-	-	1	2.27	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	1	0.44	1	0.38
20	-	-	-	-	-	-	-	-	-	-	5	11.36	-	-	1	0.38
21	1	3.57	-	-	-	-	-	-	1	6.67	3	6.82	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	1	2.27	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	1	3.57	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	1	6.67	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	2	4.55	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	28	100	54	100	46	100	28	100	15	100	44	100	227	100	261	100

n = number of fish aged (may not equal number of fish caught); % = percent of total number of fish aged

Table 5.7.7-20. Mean fork length- (mm), weight- (g) and condition factor- (k) at-age for Northern Pike captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Age	Split L 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Split L 2010 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	1	262	-	1	150	-	1	0.83	-	2008	2	298	19	2	200	14	2	0.77	0.09
3	2006	4	370	15	4	400	41	4	0.79	0.05	2007	12	390	54	12	471	187	12	0.76	0.04
4	2005	6	432	11	6	592	38	6	0.74	0.04	2006	12	450	57	12	699	252	12	0.74	0.04
5	2004	9	460	40	9	761	145	9	0.78	0.10	2005	15	522	50	15	1079	369	15	0.74	0.06
6	2003	11	494	35	11	932	243	11	0.76	0.06	2004	16	554	77	16	1343	547	16	0.74	0.08
7	2002	5	560	56	5	1380	497	5	0.76	0.03	2003	5	555	28	5	1282	221	5	0.75	0.07
8	2001	4	637	43	4	1925	457	4	0.74	0.04	2002	3	698	142	3	3060	1816	3	0.84	0.11
9	2000	6	692	61	6	2388	872	6	0.69	0.12	2001	2	775	58	2	3950	806	2	0.84	0.01
10	1999	3	729	56	3	2835	688	3	0.72	0.04	2000	2	690	71	2	2735	1068	2	0.81	0.07
11	1998	2	781	71	2	3700	1131	2	0.77	0.02	1999	1	680	-	1	2900	-	1	0.92	-
12	1997	2	691	129	2	2895	1351	2	0.86	0.06	1998	-	-	-	-	-	-	-	-	-
13	1996	-	-	-	-	-	-	-	-	-	1997	2	851	15	2	5160	198	2	0.84	0.07
14	1995	1	735	-	1	3500	-	1	0.88	-	1996	1	777	-	1	4100	-	1	0.87	-
15	1994	-	-	-	-	-	-	-	-	-	1995	1	748	-	1	3290	-	1	0.79	-
16	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-20. continued.

Age	Stephens L-South										Stephens L-North									
	2009										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2007	4	275	13	4	160	27	4	0.76	0.05	2007	1	277	-	1	250	-	1	1.18	-
3	2006	3	318	23	3	233	61	3	0.72	0.11	2006	5	388	23	5	464	66	5	0.79	0.10
4	2005	7	460	17	7	737	88	7	0.75	0.03	2005	15	472	48	15	843	272	15	0.78	0.06
5	2004	18	469	31	18	809	144	18	0.78	0.08	2004	17	493	35	17	886	183	17	0.73	0.05
6	2003	8	572	26	8	1348	193	8	0.72	0.04	2003	7	560	57	7	1340	449	7	0.74	0.05
7	2002	8	582	29	8	1504	262	8	0.76	0.08	2002	9	586	40	9	1454	404	9	0.71	0.06
8	2001	9	652	62	9	2059	491	9	0.74	0.10	2001	8	623	74	8	1715	507	8	0.70	0.11
9	2000	3	638	45	3	1953	737	3	0.73	0.11	2000	6	674	30	6	2170	319	6	0.71	0.10
10	1999	4	748	54	4	3358	653	4	0.80	0.15	1999	2	691	30	2	1915	870	2	0.57	0.19
11	1998	1	785	-	1	3820	-	1	0.79	-	1998	2	749	18	2	3125	35	2	0.75	0.05
12	1997	4	803	36	4	4070	161	4	0.79	0.09	1997	2	828	138	2	3810	1711	2	0.65	0.03
13	1996	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
14	1995	1	825	-	1	3640	-	1	0.65	-	1995	1	921	-	1	6920	-	1	0.89	-
15	1994	1	795	-	1	4520	-	1	0.90	-	1994	1	745	-	1	3500	-	1	0.85	-
16	1993	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
17	1992	1	919	-	1	4540	-	1	0.58	-	1992	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1991	1	975	-	1	6800	-	1	0.73	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-20. continued.

Age	Limestone Forebay										lower Nelson R									
	2010										2008									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-	2007	1	334	-	1	230	-	1	0.62	-
2	2008	-	-	-	-	-	-	-	-	-	2006	1	525	-	1	1000	-	1	0.69	-
3	2007	1	329	-	1	270	-	1	0.76	-	2005	7	518	43	7	926	200	7	0.66	0.07
4	2006	2	511	7	2	1025	64	2	0.77	0.01	2004	12	550	48	12	1163	364	12	0.68	0.07
5	2005	4	574	36	4	1368	223	4	0.73	0.13	2003	15	612	49	15	1535	386	15	0.66	0.06
6	2004	12	578	43	12	1483	272	12	0.77	0.09	2002	17	649	69	17	2129	799	17	0.74	0.08
7	2003	6	641	50	6	1863	400	6	0.70	0.07	2001	10	714	47	10	2791	585	10	0.76	0.06
8	2002	9	667	28	9	2379	502	9	0.79	0.09	2000	7	761	25	7	3383	564	7	0.77	0.11
9	2001	6	693	66	6	2517	711	6	0.74	0.05	1999	2	860	41	2	4465	672	2	0.70	0.00
10	2000	-	-	-	-	-	-	-	-	-	1998	2	790	107	2	3455	714	2	0.71	0.14
11	1999	-	-	-	-	-	-	-	-	-	1997	2	839	16	2	3975	21.2	2	0.68	0.05
12	1998	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
13	1997	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
14	1996	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
15	1995	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
16	1994	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
17	1993	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-20. continued.

Age	lower Nelson R																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	2	346	52	2	395	191	2	0.91	0.04	2008	-	-	-	-	-	-	-	-	-
3	2006	1	497	-	1	800	-	1	0.65	-	2007	-	-	-	-	-	-	-	-	-
4	2005	11	481	51	11	907	252	11	0.80	0.10	2006	6	476	70	6	880	373	6	0.78	0.05
5	2004	9	559	80	9	1372	555	9	0.75	0.05	2005	23	505	31	23	988	174	23	0.77	0.11
6	2003	17	604	44	17	1561	444	17	0.70	0.09	2004	11	579	58	11	1496	473	11	0.75	0.07
7	2002	13	662	61	13	2174	637	13	0.73	0.07	2003	15	612	46	15	1647	488	15	0.70	0.06
8	2001	14	706	64	14	2649	729	14	0.73	0.07	2002	8	726	51	8	2914	794	8	0.74	0.09
9	2000	7	742	81	7	3041	930	7	0.72	0.06	2001	4	716	64	4	2820	877	4	0.75	0.06
10	1999	3	703	64	3	2597	1079	3	0.72	0.14	2000	4	837	45	4	4788	1085	4	0.81	0.06
11	1998	2	810	14	2	4050	113	2	0.77	0.06	1999	2	800	35	2	3640	57	2	0.72	0.08
12	1997	2	843	16	2	4205	7	2	0.71	0.04	1998	3	805	27	3	4573	869	3	0.87	0.10
13	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
14	1995	1	845	-	1	6577	-	1	1.09	-	1996	1	830	-	1	5040	-	1	0.88	-
15	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
16	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-20. continued.

Age	Hayes R																			
	2008										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2006	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
3	2005	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
4	2004	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
5	2003	1	654	-	1	1750	-	1	0.63	-	2004	-	-	-	-	-	-	-	-	-
6	2002	-	-	-	-	-	-	-	-	-	2003	-	-	-	-	-	-	-	-	-
7	2001	-	-	-	-	-	-	-	-	-	2002	1	621	-	1	1700	-	1	0.71	-
8	2000	1	875	-	1	3990	-	1	0.60	-	2001	-	-	-	-	-	-	-	-	-
9	1999	2	785	37	2	3755	290	2	0.78	0.06	2000	1	663	-	1	2140	-	1	0.73	-
10	1998	-	-	-	-	-	-	-	-	-	1999	-	-	-	-	-	-	-	-	-
11	1997	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
12	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
13	1995	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
14	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
15	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
16	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
17	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
18	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-20. continued.

Age	Hayes R 2010 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Assean L 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
1	2009	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2007	3	310	7	3	207	12	3	0.70	0.08
3	2007	1	377	-	1	360	-	1	0.67	-	2006	7	362	24	7	309	46	7	0.65	0.05
4	2006	1	405	-	1	520	-	1	0.78	-	2005	3	397	89	3	430	252	3	0.65	0.15
5	2005	1	550	-	1	1130	-	1	0.68	-	2004	12	456	51	12	636	190	12	0.66	0.08
6	2004	2	660	40	2	2140	283	2	0.75	0.04	2003	11	523	50	11	890	262	11	0.61	0.06
7	2003	1	610	-	1	1400	-	1	0.62	-	2002	13	572	48	13	1205	330	13	0.63	0.05
8	2002	3	727	38	3	2857	299	3	0.75	0.05	2001	2	663	119	2	2255	1549	2	0.70	0.14
9	2001	-	-	-	-	-	-	-	-	-	2000	3	655	100	3	2083	1121	3	0.69	0.06
10	2000	1	756	-	1	2900	-	1	0.67	-	1999	5	713	72	5	2422	923	5	0.65	0.14
11	1999	-	-	-	-	-	-	-	-	-	1998	2	706	37	2	2485	375	2	0.71	0.01
12	1998	-	-	-	-	-	-	-	-	-	1997	2	722	1	2	2375	35	2	0.63	0.01
13	1997	-	-	-	-	-	-	-	-	-	1996	1	900	-	1	5400	-	1	0.74	-
14	1996	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
15	1995	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
16	1994	-	-	-	-	-	-	-	-	-	1993	1	882	-	1	5150	-	1	0.75	-
17	1993	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-	1991	1	1080	-	1	7750	-	1	0.62	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-20. continued.

Age	Year-Class	Assean L 2010 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K SD
1	2009	-	-	-	-	-	-	-	-	-
2	2008	1	320	-	1	218	-	1	0.67	-
3	2007	2	428	103	2	585	389	2	0.69	-
4	2006	11	439	63	11	576	230	11	0.65	0.03
5	2005	21	490	55	21	764	263	21	0.63	0.06
6	2004	14	551	59	14	1087	298	14	0.64	0.06
7	2003	13	597	52	13	1363	404	13	0.63	0.06
8	2002	3	699	15	3	2350	416	3	0.69	0.12
9	2001	4	685	109	4	2473	1054	4	0.74	0.11
10	2000	4	711	58	4	2413	746	4	0.66	0.07
11	1999	-	-	-	-	-	-	-	-	-
12	1998	-	-	-	-	-	-	-	-	-
13	1997	-	-	-	-	-	-	-	-	-
14	1996	-	-	-	-	-	-	-	-	-
15	1995	-	-	-	-	-	-	-	-	-
16	1994	-	-	-	-	-	-	-	-	-
17	1993	-	-	-	-	-	-	-	-	-
18	1992	1	320	-	1	218	-	1	0.67	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. Mean fork FL- (mm), weight- (g) and condition factor- (k)-at-age for Lake Whitefish captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Age	Split L																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2008	1	190	-	1	80.0	-	1	1.17	-
3	2006	-	-	-	-	-	-	-	-	-	2007	1	300	-	1	397	-	1	1.47	-
4	2005	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
5	2004	-	-	-	-	-	-	-	-	-	2005	2	417	21	2	1194	9	2	1.66	0.27
6	2003	-	-	-	-	-	-	-	-	-	2004	3	390	10	3	986	146	3	1.65	0.13
7	2002	1	433	-	1	1350	-	1	1.66	-	2003	6	415	19	6	1251	254	6	1.74	0.22
8	2001	-	-	-	-	-	-	-	-	-	2002	3	434	25	3	1382	430	3	1.66	0.24
9	2000	-	-	-	-	-	-	-	-	-	2001	1	426	-	1	1321	-	1	1.71	-
10	1999	-	-	-	-	-	-	-	-	-	2000	1	443	-	1	1540	-	1	1.77	-
11	1998	-	-	-	-	-	-	-	-	-	1999	1	459	-	1	1174	-	1	1.21	-
12	1997	2	471	28	2	2025	247	2	1.95	0.11	1998	-	-	-	-	-	-	-	-	-
13	1996	1	474	-	1	2250	-	1	2.11	-	1997	-	-	-	-	-	-	-	-	-
14	1995	1	540	-	1	2800	-	1	1.78	-	1996	-	-	-	-	-	-	-	-	-
15	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
16	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
17	1992	1	525	-	1	3000	-	1	2.07	-	1993	1	523	-	1	2850	-	1	1.99	-
18	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
19	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
20	1989	4	517	33	4	2725	479	4	1.96	0.07	1990	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Split L																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1988	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
22	1987	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
23	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
26	1984	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Stephens L-South										Stephens L-North									
	2009										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
3	2006	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
4	2005	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
5	2004	1	360	-	1	830	-	1	1.78	-	2004	-	-	-	-	-	-	-	-	-
6	2003	-	-	-	-	-	-	-	-	-	2003	-	-	-	-	-	-	-	-	-
7	2002	-	-	-	-	-	-	-	-	-	2002	1	380	-	1	910	-	1	1.66	-
8	2001	-	-	-	-	-	-	-	-	-	2001	1	350	-	1	700	-	1	1.63	-
9	2000	1	484	-	1	2300	-	1	2.03	-	2000	-	-	-	-	-	-	-	-	-
10	1999	-	-	-	-	-	-	-	-	-	1999	1	520	-	1	2760	-	1	1.96	-
11	1998	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
12	1997	1	494	-	1	2500	-	1	2.07	-	1997	1	490	-	1	2400	-	1	2.04	-
13	1996	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
14	1995	1	560	-	1	3950	-	1	2.25	-	1995	-	-	-	-	-	-	-	-	-
15	1994	-	-	-	-	-	-	-	-	-	1994	1	500	-	1	2400	-	1	1.92	-
16	1993	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
17	1992	1	435	-	1	1790	-	1	2.17	-	1992	1	532	-	1	2630	-	1	1.75	-
18	1991	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
19	1990	1	582	-	1	3800	-	1	1.93	-	1990	1	540	-	1	2930	-	1	1.86	-
20	1989	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Stephens L-South 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Stephens L-North 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
21	1988	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
22	1987	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
23	1986	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1984	1	515	-	1	2600	-	1	1.90	-
26	1983	-	-	-	-	-	-	-	-	-	1983	1	448	-	1	2010	-	1	2.24	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Limestone Forebay										lower Nelson R									
	2010										2008									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
3	2007	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
4	2006	-	-	-	-	-	-	-	-	-	2004	1	303	-	1	360	-	1	1.29	-
5	2005	-	-	-	-	-	-	-	-	-	2003	-	-	-	-	-	-	-	-	-
6	2004	-	-	-	-	-	-	-	-	-	2002	1	323	-	1	400	-	1	1.19	-
7	2003	-	-	-	-	-	-	-	-	-	2001	1	394	-	1	830	-	1	1.36	-
8	2002	-	-	-	-	-	-	-	-	-	2000	1	375	-	1	710	-	1	1.35	-
9	2001	-	-	-	-	-	-	-	-	-	1999	2	416	15	2	955	205	2	1.32	0.14
10	2000	-	-	-	-	-	-	-	-	-	1998	3	441	13	3	1263	85	3	1.47	0.06
11	1999	-	-	-	-	-	-	-	-	-	1997	2	458	37	2	1295	431	2	1.32	0.13
12	1998	-	-	-	-	-	-	-	-	-	1996	1	501	-	1	1500	-	1	1.19	-
13	1997	-	-	-	-	-	-	-	-	-	1995	1	482	-	1	1850	-	1	1.65	-
14	1996	1	512	-	1	2320	-	1	1.73	-	1994	2	461	3	2	1410	226	2	1.44	0.21
15	1995	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
16	1994	-	-	-	-	-	-	-	-	-	1992	1	434	-	1	1110	-	1	1.36	-
17	1993	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Limestone Forebay										lower Nelson R									
	2010										2008									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
20	1990	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
21	1989	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
22	1988	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
23	1987	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
26	1984	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	lower Nelson R																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
3	2006	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
4	2005	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
5	2004	-	-	-	-	-	-	-	-	-	2005	1	350	-	1	510	-	1	1.19	-
6	2003	1	350	-	1	550	-	1	1.28	-	2004	2	346	8	2	565	35	2	1.37	0.01
7	2002	-	-	-	-	-	-	-	-	-	2003	1	354	-	1	570	-	1	1.28	-
8	2001	2	393	29	2	930	212	2	1.53	0.01	2002	5	350	13	5	600	86	5	1.39	0.09
9	2000	1	395	-	1	960	-	1	1.56	-	2001	3	348	12	3	587	106	3	1.38	0.12
10	1999	5	403	15	5	996	170	5	1.51	0.17	2000	1	356	-	1	600	-	1	1.33	-
11	1998	-	-	-	-	-	-	-	-	-	1999	-	-	-	-	-	-	-	-	-
12	1997	4	432	32	4	1392	355	4	1.70	0.17	1998	2	426	48	2	1170	438	2	1.48	0.06
13	1996	3	455	1	3	1490	60.0	3	1.58	0.05	1997	1	415	-	1	1060	-	1	1.48	-
14	1995	2	448	8	2	1495	205	2	1.66	0.13	1996	1	411	-	1	990	-	1	1.43	-
15	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
16	1993	-	-	-	-	-	-	-	-	-	1994	1	470	-	1	1620	-	1	1.56	-
17	1992	2	451	41	2	1425	530	2	1.52	0.16	1993	1	459	-	1	1410	-	1	1.46	-
18	1991	-	-	-	-	-	-	-	-	-	1992	2	469	16	2	1550	325	2	1.49	0.17
19	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
20	1989	1	450	-	1	1410	-	1	1.55	-	1990	1	481	-	1	1400	-	1	1.26	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	lower Nelson R																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1988	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
22	1987	-	-	-	-	-	-	-	-	-	1988	1	450	-	1	1260	-	1	1.38	-
23	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
26	1983	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Hayes R																			
	2008										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2006	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
3	2005	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
4	2004	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
5	2003	1	373	-	1	710	-	1	1.37	-	2004	-	-	-	-	-	-	-	-	-
6	2002	4	358	15	4	640	87	4	1.39	0.14	2003	-	-	-	-	-	-	-	-	-
7	2001	2	349	13	2	530	99	2	1.24	0.10	2002	-	-	-	-	-	-	-	-	-
8	2000	2	362	17	2	613	18	2	1.30	0.15	2001	-	-	-	-	-	-	-	-	-
9	1999	-	-	-	-	-	-	-	-	-	2000	-	-	-	-	-	-	-	-	-
10	1998	-	-	-	-	-	-	-	-	-	1999	1	364	-	1	730	-	1	1.51	-
11	1997	1	427	-	1	1350	-	1	1.73	-	1998	-	-	-	-	-	-	-	-	-
12	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
13	1995	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
14	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
15	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
16	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
17	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
18	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
19	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Hayes R																			
	2008										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
20	1988	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
21	1987	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
22	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
23	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
24	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
25	1983	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
26	1982	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Hayes R 2010 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Assean L 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
1	2009	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
3	2007	-	-	-	-	-	-	-	-	-	2006	4	237	31	4	223	71	4	1.66	0.30
4	2006	1	310	-	1	440	-	1	1.48	-	2005	14	276	29	14	325	99	14	1.50	0.11
5	2005	2	308	25	2	450	85	2	1.55	0.08	2004	9	320	26	9	515	125	9	1.55	0.17
6	2004	5	346	27	5	620	125	5	1.48	0.09	2003	6	367	38	6	846	310	6	1.65	0.12
7	2003	2	344	33	2	585	191	2	1.42	0.06	2002	3	400	29	3	1075	261	3	1.66	0.18
8	2002	-	-	-	-	-	-	-	-	-	2001	-	-	-	-	-	-	-	-	-
9	2001	-	-	-	-	-	-	-	-	-	2000	-	-	-	-	-	-	-	-	-
10	2000	-	-	-	-	-	-	-	-	-	1999	-	-	-	-	-	-	-	-	-
11	1999	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
12	1998	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
13	1997	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
14	1996	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
15	1995	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
16	1994	-	-	-	-	-	-	-	-	-	1993	3	501	14	3	2233	104	3	1.78	0.10
17	1993	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
20	1990	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Hayes R 2010 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Assean L 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
21	1989	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
22	1988	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
23	1987	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
26	1984	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
		Assean L 2010								
1	2009	3	186	8	3	94.0	17	3	1.44	0.07
2	2008	10	199	25	10	117	56	10	1.39	0.13
3	2007	9	302	20	9	446	100	9	1.60	0.13
4	2006	12	327	31	12	539	188	12	1.49	0.15
5	2005	24	368	41	24	820	294	24	1.58	0.11
6	2004	9	400	22	9	1075	203	9	1.66	0.10
7	2003	-	-	-	-	-	-	-	-	-
8	2002	2	448	1	2	1469	45	2	1.64	0.04
9	2001	1	464	-	1	1830	-	1	1.83	-
10	2000	-	-	-	-	-	-	-	-	-
11	1999	1	501	-	1	2090	-	1	1.66	-
12	1998	2	484	9	2	2225	233	2	1.97	0.09
13	1997	-	-	-	-	-	-	-	-	-
14	1996	2	496	1	2	2125	49	2	1.75	0.04
15	1995	-	-	-	-	-	-	-	-	-
16	1994	1	470	-	1	1970	-	1	1.90	-
17	1993	1	486	-	1	2230	-	1	1.94	-
18	1992	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-
20	1990	1	488	-	1	2150	-	1	1.85	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-21. continued.

Age	Year-Class	Assean L 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
21	1989	-	-	-	-	-	-	-	-	-
22	1988	-	-	-	-	-	-	-	-	-
23	1987	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-
26	1984	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor
n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. Mean fork length- (mm), weight- (g) and condition factor- (k)-at-age for Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Age	Split L																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	1	269	-	1	225	-	1	1.16	-	2008	13	246	18	13	167	46	13	1.10	0.12
3	2006	8	236	17	8	181	29	8	1.38	0.13	2007	19	307	18	19	338	69	19	1.15	0.07
4	2005	10	286	52	10	329	173	10	1.28	0.08	2006	8	349	50	8	543	243	8	1.20	0.10
5	2004	17	324	27	17	439	111	17	1.27	0.07	2005	18	383	27	18	715	167	18	1.26	0.09
6	2003	19	386	38	19	772	235	19	1.31	0.09	2004	6	427	34	6	1018	278	6	1.27	0.09
7	2002	57	402	46	57	923	298	57	1.35	0.12	2003	57	452	31	57	1246	268	57	1.33	0.09
8	2001	36	421	39	36	1024	279	36	1.34	0.10	2002	34	452	35	34	1246	294	34	1.32	0.10
9	2000	14	410	29	14	990	199	14	1.42	0.08	2001	8	453	47	8	1284	413	8	1.34	0.05
10	1999	3	432	28	3	1058	253	3	1.29	0.11	2000	4	489	74	4	1635	731	4	1.32	0.07
11	1998	-	-	-	-	-	-	-	-	-	1999	-	-	-	-	-	-	-	-	-
12	1997	4	433	63	4	1053	539	4	1.23	0.19	1998	1	490	-	1	1570	-	1	1.33	-
13	1996	3	462	167	3	1633	1715	3	1.27	0.12	1997	-	-	-	-	-	-	-	-	-
14	1995	2	380	14	2	638	88	2	1.16	0.03	1996	-	-	-	-	-	-	-	-	-
15	1994	4	426	81	4	1013	763	4	1.16	0.15	1995	1	576	-	1	2230	-	1	1.17	-
16	1993	1	402	-	1	750	-	1	1.15	-	1994	-	-	-	-	-	-	-	-	-
17	1992	2	382	12	2	575	106	2	1.03	0.10	1993	-	-	-	-	-	-	-	-	-
18	1991	1	382	-	1	650	-	1	1.17	-	1992	-	-	-	-	-	-	-	-	-
19	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
20	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Split L 2009 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Split L 2010 Year-Class	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
21	1988	1	405	-	1	850	-	1	1.28	-	1989	-	-	-	-	-	-	-	-	-
22	1987	1	464	-	1	1450	-	1	1.45	-	1988	-	-	-	-	-	-	-	-	-
23	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
26	1983	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
27	1982	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
28	1981	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
29	1980	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
30	1979	-	-	-	-	-	-	-	-	-	1980	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Stephens L-South										Stephens L-North									
	2009										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2007	1	205	-	1	96.0	-	1	1.11	-	2007	-	-	-	-	-	-	-	-	-
3	2006	5	230	15	5	158	31	5	1.30	0.13	2006	2	265	64	2	221	141	2	1.11	0.05
4	2005	3	247	31	3	207	89	3	1.33	0.14	2005	1	127	-	1	31.0	-	1	1.51	-
5	2004	2	345	71	2	600	339	2	1.38	0.03	2004	3	297	22	3	353	95	3	1.33	0.11
6	2003	9	388	29	9	830	217	9	1.39	0.06	2003	2	315	7	2	415	92	2	1.32	0.21
7	2002	41	406	26	41	931	177	41	1.38	0.08	2002	11	390	27	11	815	150	11	1.36	0.07
8	2001	30	421	27	30	1059	201	30	1.41	0.09	2001	18	405	39	18	932	301	18	1.37	0.11
9	2000	5	432	14	5	1138	188	5	1.40	0.14	2000	10	403	44	10	953	364	10	1.39	0.11
10	1999	4	484	24	4	1588	194	4	1.40	0.09	1999	2	474	16	2	1490	14	2	1.41	0.16
11	1998	3	451	49	3	1270	405	3	1.35	0.07	1998	3	463	17	3	1370	157	3	1.37	0.03
12	1997	4	508	48	4	1788	433	4	1.35	0.07	1997	8	486	52	8	1753	589	8	1.49	0.13
13	1996	24	505	43	24	1899	482	24	1.45	0.09	1996	14	506	40	14	1903	460	14	1.44	0.06
14	1995	7	511	45	7	1856	531	7	1.35	0.13	1995	6	505	43	6	1997	493	6	1.53	0.11
15	1994	8	483	25	8	1679	271	8	1.48	0.09	1994	3	478	57	3	1587	529	3	1.42	0.03
16	1993	3	514	47	3	1963	490	3	1.43	0.04	1993	1	543	-	1	2160	-	1	1.35	-
17	1992	1	631	-	1	3580	-	1	1.42	-	1992	-	-	-	-	-	-	-	-	-
18	1991	1	485	-	1	1710	-	1	1.50	-	1991	1	470	-	1	1500	-	1	1.44	-
19	1990	1	503	-	1	2050	-	1	1.61	-	1990	1	475	-	1	1550	-	1	1.45	-
20	1989	4	553	43	4	2568	675	4	1.49	0.06	1989	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Stephens L-South										Stephens L-North									
	2009										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1988	2	503	53	2	1925	530	2	1.50	0.06	1988	1	520	-	1	1930	-	1	1.37	-
22	1987	4	533	67	4	2218	656	4	1.44	0.11	1987	1	575	-	1	2320	-	1	1.22	-
23	1986	4	519	56	4	1905	608	4	1.34	0.20	1986	1	492	-	1	1710	-	1	1.44	-
24	1985	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
25	1984	1	415	-	1	1100	-	1	1.54	-	1984	1	465	-	1	1400	-	1	1.39	-
26	1983	5	549	50	5	2376	529	5	1.42	0.14	1983	3	554	107	3	2587	1480	3	1.42	0.05
27	1982	2	548	11	2	2470	42	2	1.51	0.11	1982	2	618	11	2	3140	156	2	1.33	-
28	1981	2	543	10	2	2370	184	2	1.48	0.04	1981	-	-	-	-	-	-	-	-	-
29	1980	-	-	-	-	-	-	-	-	-	1980	1	510	-	1	2000	-	1	1.51	-
30	1979	1	440	-	1	1050	-	1	1.23	-	1979	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Limestone Forebay										lower Nelson R									
	2010										2008									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
3	2007	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
4	2006	-	-	-	-	-	-	-	-	-	2004	3	269	28	3	217	96	3	1.07	0.20
5	2005	-	-	-	-	-	-	-	-	-	2003	7	382	41	7	629	225	7	1.07	0.12
6	2004	-	-	-	-	-	-	-	-	-	2002	4	401	15	4	745	66	4	1.15	0.03
7	2003	1	405	-	1	940	-	1.00	1.42	-	2001	1	482	-	1	1250	-	1	1.12	-
8	2002	-	-	-	-	-	-	-	-	-	2000	3	430	14	3	923	194	3	1.15	0.16
9	2001	-	-	-	-	-	-	-	-	-	1999	3	428	65	3	983	422	3	1.21	0.04
10	2000	-	-	-	-	-	-	-	-	-	1998	2	452	139	2	1185	983	2	1.12	0.01
11	1999	1	535	-	1	2050	-	1	1.34	-	1997	2	464	87	2	1135	615	2	1.08	-
12	1998	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
13	1997	1	492	-	1	1760	-	1	1.48	-	1995	-	-	-	-	-	-	-	-	-
14	1996	-	-	-	-	-	-	-	-	-	1994	1	444	-	1	1050	-	1	1.20	-
15	1995	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
16	1994	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
17	1993	1	536	-	1	1710	-	1	1.11	-	1991	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-	1990	1	502	-	1	1530	-	1	1.21	-
19	1991	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
20	1990	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Limestone Forebay										lower Nelson R									
	2010										2008									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1989	-	-	-	-	-	-	-	-	-	1987	1	520	-	1	1610	-	1	1.15	-
22	1988	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
23	1987	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
26	1984	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
27	1983	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
28	1982	-	-	-	-	-	-	-	-	-	1980	-	-	-	-	-	-	-	-	-
29	1981	-	-	-	-	-	-	-	-	-	1979	-	-	-	-	-	-	-	-	-
30	1980	-	-	-	-	-	-	-	-	-	1978	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	lower Nelson R																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2008	1	241	-	1	158	-	1	1.13	-
3	2006	-	-	-	-	-	-	-	-	-	2007	4	241	19	4	161	44	4	1.14	0.11
4	2005	2	328	32	2	435	92	2	1.24	0.09	2006	1	295	-	1	360	-	1	1.40	-
5	2004	3	371	50	3	713	345	3	1.32	0.17	2005	4	425	50	4	1100	467	4	1.37	0.10
6	2003	4	378	57	4	723	314	4	1.29	0.13	2004	4	407	36	4	805	263	4	1.16	0.16
7	2002	26	422	36	26	1005	256	26	1.31	0.07	2003	12	437	41	11	1134	332	11	1.35	0.12
8	2001	5	434	103	5	1160	680	5	1.26	0.11	2002	11	424	31	10	1052	179	10	1.31	0.06
9	2000	8	441	46	8	1160	402	8	1.29	0.13	2001	2	458	8	2	1205	35	2	1.26	0.04
10	1999	2	459	12	2	1230	14	2	1.28	0.08	2000	1	571	-	1	1700	-	1	0.91	-
11	1998	-	-	-	-	-	-	-	-	-	1999	2	426	13	2	1030	156	2	1.33	0.07
12	1997	2	501	28	2	1480	184	2	1.18	0.05	1998	3	513	29	3	1813	420	3	1.33	0.20
13	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
14	1995	3	479	35	3	1317	312	3	1.18	0.04	1996	-	-	-	-	-	-	-	-	-
15	1994	-	-	-	-	-	-	-	-	-	1995	1	468	-	1	1420	-	1	1.39	-
16	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	1	386	-	1	650	-	1	1.13	-	1992	-	-	-	-	-	-	-	-	-
19	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
20	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	lower Nelson R																			
	2009										2010									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1988	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
22	1987	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
23	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
26	1983	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
27	1982	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
28	1981	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
29	1980	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
30	1979	-	-	-	-	-	-	-	-	-	1980	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Hayes R																			
	2008										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
2	2006	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
3	2005	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
4	2004	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
5	2003	-	-	-	-	-	-	-	-	-	2004	-	-	-	-	-	-	-	-	-
6	2002	2	381	5	2	635	49	2	1.15	0.04	2003	3	360	21	3	510	26	3	1.10	0.14
7	2001	4	356	15	4	498	66	4	1.10	0.07	2002	1	267	-	1	210	-	1	1.10	-
8	2000	-	-	-	-	-	-	-	-	-	2001	1	390	-	1	680	-	1	1.15	-
9	1999	4	447	46	4	970	318	4	1.06	0.06	2000	-	-	-	-	-	-	-	-	-
10	1998	4	421	35	4	765	216	4	1.01	0.09	1999	-	-	-	-	-	-	-	-	-
11	1997	-	-	-	-	-	-	-	-	-	1998	3	466	29	3	1023	200	3	1.00	0.01
12	1996	5	482	67	5	1268	634	5	1.07	0.12	1997	4	439	36	4	923	225	4	1.07	0.05
13	1995	1	458	-	1	880	-	1	0.92	-	1996	1	567	-	1	1900	-	1	1.04	-
14	1994	2	512	3	2	1595	64	2	1.19	0.07	1995	-	-	-	-	-	-	-	-	-
15	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
16	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
17	1991	2	593	16	2	2430	325	2	1.17	0.06	1992	-	-	-	-	-	-	-	-	-
18	1990	3	613	64	3	2477	829	3	1.05	0.05	1991	-	-	-	-	-	-	-	-	-
19	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
20	1988	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Hayes R																			
	2008										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1987	-	-	-	-	-	-	-	-	-	1988	1	610	-	1	2800	-	1	1.23	-
22	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
23	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
24	1984	1	560	-	1	2250	-	1	1.28	-	1985	-	-	-	-	-	-	-	-	-
25	1983	-	-	-	-	-	-	-	-	-	1984	1	617	-	1	2800	-	1	1.19	-
26	1982	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
27	1981	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
28	1980	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
29	1979	-	-	-	-	-	-	-	-	-	1980	-	-	-	-	-	-	-	-	-
30	1978	-	-	-	-	-	-	-	-	-	1979	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Hayes R										Assean L									
	2010										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-	2008	1	127	-	1	30.0	-	1	1.46	-
2	2008	-	-	-	-	-	-	-	-	-	2007	1	206	-	1	120	-	1	1.37	-
3	2007	-	-	-	-	-	-	-	-	-	2006	4	224	10	4	115	30	4	1.00	0.11
4	2006	1	312	-	1	360	-	1	1.19	-	2005	20	223	10	20	122	26	20	1.10	0.15
5	2005	-	-	-	-	-	-	-	-	-	2004	5	226	17	5	131	38	5	1.12	0.17
6	2004	2	307	13	2	360	42	2	1.25	0.01	2003	5	309	42	5	334	117	5	1.10	0.14
7	2003	6	395	26	6	760	194	6	1.21	0.08	2002	24	333	26	24	413	92	24	1.10	0.09
8	2002	3	413	20	3	777	150	3	1.09	0.07	2001	36	346	32	36	475	139	36	1.12	0.09
9	2001	1	381	-	1	650	-	1	1.18	-	2000	43	367	34	43	581	164	43	1.14	0.09
10	2000	4	453	54	4	1135	500	4	1.16	0.12	1999	27	378	33	27	628	172	27	1.14	0.07
11	1999	2	406	21	2	785	106	2	1.17	0.02	1998	21	401	28	21	734	145	21	1.13	0.12
12	1998	3	490	59	3	1353	391	3	1.14	0.09	1997	25	417	33	25	817	212	25	1.11	0.07
13	1997	3	480	28	3	1263	215	3	1.14	0.07	1996	5	407	47	5	789	245	5	1.15	0.06
14	1996	4	520	120	4	1433	659	4	1.01	0.22	1995	6	445	32	6	979	175	6	1.10	0.04
15	1995	1	523	-	1	1360	-	1	0.95	-	1994	3	425	30	3	965	278	3	1.23	0.10
16	1994	1	605	-	1	2650	-	1	1.20	-	1993	-	-	-	-	-	-	-	-	-
17	1993	1	610	-	1	2680	-	1	1.18	-	1992	-	-	-	-	-	-	-	-	-
18	1992	1	515	-	1	1710	-	1	1.25	-	1991	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-	1990	1	482	-	1	1300	-	1	1.16	-
20	1990	5	586	81	5	2256	872	5	1.08	0.11	1989	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Hayes R										Assean L									
	2010										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1989	4	524	88	4	1424	672	4	0.95	0.08	1988	-	-	-	-	-	-	-	-	-
22	1988	1	620	-	1	2800	-	1	1.17	-	1987	-	-	-	-	-	-	-	-	-
23	1987	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
26	1984	2	626	49	2	2963	357	2	1.22	0.13	1983	-	-	-	-	-	-	-	-	-
27	1983	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
28	1982	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
29	1981	-	-	-	-	-	-	-	-	-	1980	-	-	-	-	-	-	-	-	-
30	1980	-	-	-	-	-	-	-	-	-	1979	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Assean L									
	2010									
	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-
2	2008	3	190	5	3	65.0	5	3	0.95	0.01
3	2007	3	240	9	3	150	20	3	1.08	0.06
4	2006	17	257	18	17	186	32	17	1.08	0.08
5	2005	13	295	20	13	282	59	13	1.08	0.05
6	2004	6	336	31	6	413	132	6	1.07	0.04
7	2003	38	352	21	38	477	94	38	1.08	0.05
8	2002	46	362	24	46	529	104	46	1.10	0.07
9	2001	57	390	26	57	656	139	57	1.09	0.08
10	2000	40	411	28	40	779	164	40	1.11	0.08
11	1999	11	412	27	11	792	171	11	1.11	0.08
12	1998	13	411	29	13	782	179	13	1.12	0.09
13	1997	3	426	31	3	896	253	3	1.14	0.06
14	1996	7	404	26	7	713	158	7	1.07	0.05
15	1995	1	411	-	1	810	-	1	1.17	-
16	1994	1	412	-	1	740	-	1	1.06	-
17	1993	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-
19	1991	1	446	-	1	1000	-	1	1.13	-
20	1990	1	453	-	1	1080	-	1	1.16	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-22. continued.

Age	Assean L									
	2010									
	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
21	1989	-	-	-	-	-	-	-	-	-
22	1988	-	-	-	-	-	-	-	-	-
23	1987	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-
26	1984	-	-	-	-	-	-	-	-	-
27	1983	-	-	-	-	-	-	-	-	-
28	1982	-	-	-	-	-	-	-	-	-
29	1981	-	-	-	-	-	-	-	-	-
30	1980	-	-	-	-	-	-	-	-	-

FL = fork length; W = weight; K = condition factor

n = number of fish measured (may not equal number of fish caught); SD = standard deviation (unable to calculate for species and/or mesh sizes where only bulk weights were recorded)

Table 5.7.7-23. Deformities, erosions, lesions, and tumours (DELTs) for select fish species captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

Species	Deformities		Erosions		Lesions		Tumours		Total		
	n	%	n	%	n	%	n	%	$n_{Inspect}$	n_{DELTS}	$\%_{DELTS}$
Split L											
Lake Sturgeon	-	-	-	-	-	-	-	-	2	-	-
White Sucker	-	-	1	0.40	-	-	-	-	251	1	0.40
Northern Pike	1	0.76	-	-	-	-	-	-	132	1	0.76
Lake Whitefish	-	-	1	-	-	-	-	-	38	1	2.63
Walleye	2	0.52	1	-	-	-	2	0.52	383	5	1.31
Total	3	0.37	3	0.37	-	-	2	0.25	806	8	0.99
Stephens L-South											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	2	13.33	-	-	-	-	15	2	13.33
Northern Pike	-	-	2	2.70	-	-	-	-	74	2	2.70
Lake Whitefish	-	-	-	-	-	-	-	-	6	-	-
Walleye	1	0.56	-	-	-	-	2	1.13	177	3	1.69
Total	1	0.37	4	1.47	-	-	2	0.74	272	7	2.57
Stephens L-North											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	5	-	-
Northern Pike	-	-	1	1.30	-	-	1	1.30	77	2	2.60
Lake Whitefish	-	-	-	-	-	-	-	-	10	-	-
Walleye	1	1.03	-	-	-	-	1	1.03	97	2	2.06
Total	1	0.53	1	0.53	-	-	2	1.06	189	4	2.12
Limestone Forebay											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	12	-	-
Northern Pike	1	2.33	2	4.65	1	2.33	-	-	43	4	9.30
Lake Whitefish	-	-	-	-	-	-	-	-	1	-	-
Walleye	-	-	-	-	-	-	-	-	5	-	-
Total	1	1.64	2	3.28	1	1.64	0	0.00	61	4	6.56

Table 5.7.7-23. continued.

Species	Deformities		Erosions		Lesions		Tumours		Total		
	n	%	n	%	n	%	n	%	$n_{Inspect}$	n_{DELTS}	$\%_{DELTS}$
lower Nelson R											
Lake Sturgeon	-	-	-	-	2	1.60	-	-	125	2	1.6
White Sucker	1	1.39	-	-	-	-	1	1.39	72	2	2.78
Northern Pike	3	1.26	1	0.42	3	1.26	-	-	238	7	2.94
Lake Whitefish	-	-	-	-	-	-	-	-	62	-	-
Walleye	-	-	-	-	3	2.22	1	0.74	135	4	2.96
Total	4	0.63	1	0.16	8	1.27	2	0.32	632	15	2.37
Hayes R											
Lake Sturgeon	-	-	-	-	-	-	-	-	86	-	-
White Sucker	1	4.35	1	4.35	2	8.70	-	-	23	4	17.39
Northern Pike	-	-	-	-	1	6.25	-	-	16	1	6.25
Lake Whitefish	-	-	-	-	1	4.55	-	-	22	1	4.55
Walleye	1	1.12	-	-	1	1.12	1	1.12	89	3	3.37
Total	2	0.85	1	0.42	5	2.12	1	0.42	236	9	3.81
Assean L											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	0.61	-	-	2	1.23	-	-	163	3	1.84
Northern Pike	-	-	-	-	-	-	-	-	143	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	119	-	-
Walleye	4	0.72	-	-	1	0.18	1	0.18	552	6	1.09
Total	5	0.51	0	0.00	3	0.31	1	0.10	977	9	0.92

n = number of inspected fish with DELTs;
$n_{Inspect}$ = total number of fish inspected for DELTs;
n_{DELTs} = total number of fish with DELTs;
% = percentage of inspected fish with DELTs ($n/n_{Inspect}\times100$);
$\%_{DELTs}$ = total percentage of inspected fish with DELTs ($n_{DELTs}/n_{Inspect}\times100$)

Table 5.7.7-24. Lower Nelson River Region Index of Biotic Integrity (IBI) values, 2008-2010.

Metric	SPLIT		STL-S	STL-N	LMFB	LNR			HAYES			ASSN	
	2009	2010	2009	2009	2010	2008	2009	2010	2008	2009	2010	2009	2010
Non standardized values													
Number of species	17	16	10	10	10	14	15	14	8	11	8	10	10
Number of sensitive species	4	4	2	1	2	2	3	2	2	3	3	2	2
Proportion of tolerant individuals	29.2	32.1	16.6	19.8	44.1	35.9	41.7	37.8	17.4	28.8	13.2	10.5	8.2
Number of Insectivore species	11	9	5	5	6	9	10	7	5	6	4	7	6
Hill's Evenness Index	9.27	8.64	6.29	5.65	5.26	8.40	9.18	8.24	6.09	6.77	5.43	5.54	6.55
Insectivore biomass	6.8	7.3	4.8	7.6	2.9	35.0	22.1	30.9	29.0	32.5	45.3	10.0	19.7
Omnivore biomass	26.3	35.1	4.2	3.4	42.6	15.9	22.5	11.8	8.5	16.9	6.2	18.4	16.9
Piscivore biomass	66.7	57.6	91.0	89.1	54.5	49.1	55.3	57.3	62.4	50.4	48.5	71.6	63.4
Proportion lithophilic spawners	0.52	0.60	0.52	0.31	0.50	0.63	0.60	0.51	0.92	0.88	0.90	0.73	0.62
CPUE	31.7	32.0	31.7	19.2	14.1	19.5	32.0	26.5	10.2	5.8	15.4	42.7	63.4
% individuals with DELTS	1.92	0.87	2.97	2.12	6.06	2.93	2.80	0.93	3.45	5.00	2.92	0.00	1.23
IBI Scores													
Number of species	8.5	8.0	5.0	5.0	5.0	7.0	7.5	7.0	4.0	5.5	4.0	5.0	5.0
Number of sensitive species	4.8	4.8	2.4	1.2	2.4	2.4	3.6	2.4	2.4	3.6	3.6	2.4	2.4
Proportion of tolerant individuals	5.0	4.5	7.2	6.6	2.5	3.9	2.9	3.6	7.0	5.1	7.8	8.2	8.6
Number of Insectivore species	8.3	6.8	3.8	3.8	4.5	6.8	7.5	5.3	3.8	4.5	3.0	5.3	4.5
Hill's Evenness Index	8.1	7.5	5.5	4.9	4.6	7.3	8.0	7.2	5.3	5.9	4.7	4.8	5.7
Insectivore biomass	1.2	1.3	0.9	1.4	0.5	6.3	4.0	5.6	5.2	5.9	8.2	1.8	3.5
Omnivore biomass	6.0	4.7	9.4	9.5	3.6	7.6	6.6	8.2	8.7	7.5	9.1	7.2	7.5
Piscivore biomass	6.7	5.8	9.1	8.9	5.5	4.9	5.5	5.7	6.2	5.0	4.9	7.2	6.3
Proportion lithophilic spawners	5.2	6.0	5.2	3.1	5.0	6.3	6.0	5.1	9.2	8.8	9.0	7.3	6.2
CPUE	3.2	3.2	3.2	1.9	1.4	2.0	3.2	2.6	1.0	0.6	1.5	4.3	6.3
% individuals with DELTS	4.0	4.6	3.5	3.9	2.0	3.5	3.6	4.5	3.3	2.5	3.5	5.0	4.4
Total IBI	61.0	57.2	55.0	50.2	36.9	57.9	58.4	57.2	56.2	54.9	59.2	58.5	60.5

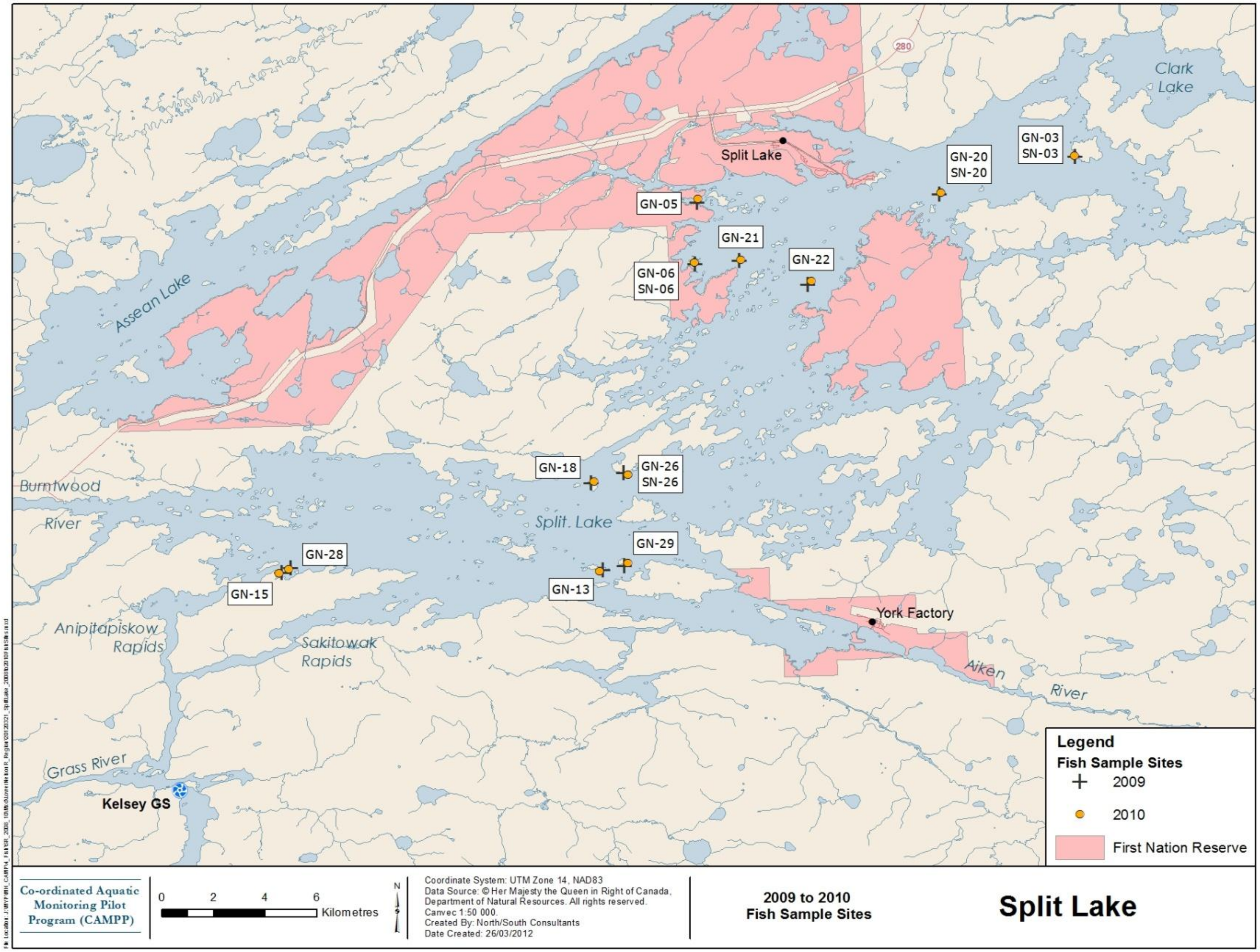


Figure 5.7.7-1. Map depicting standard gang and small mesh index gillnet sites sampled in Split Lake, 2009 and 2010.

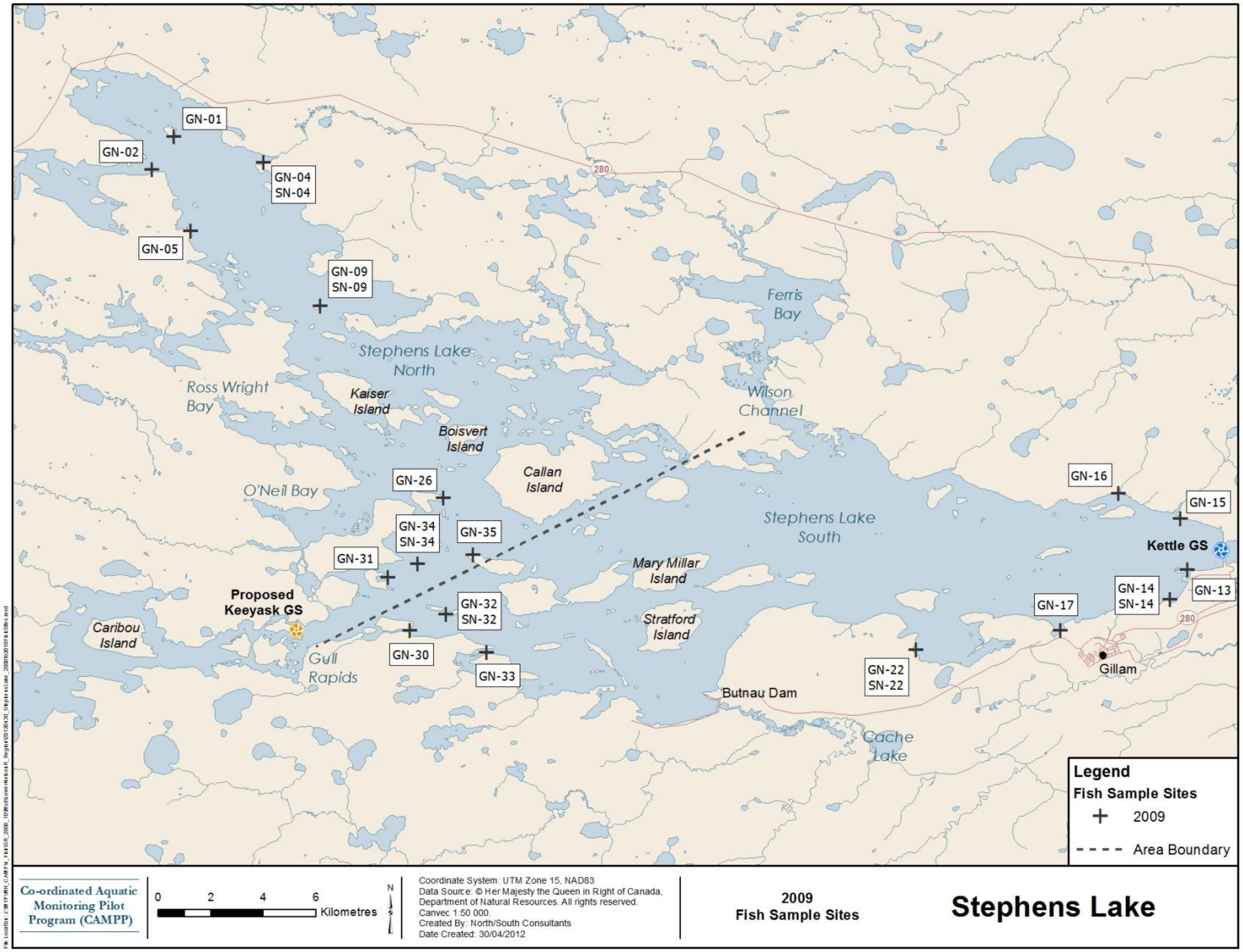


Figure 5.7.7-2. Map depicting standard gang and small mesh index gillnet sites sampled in Stephens Lake, 2009.

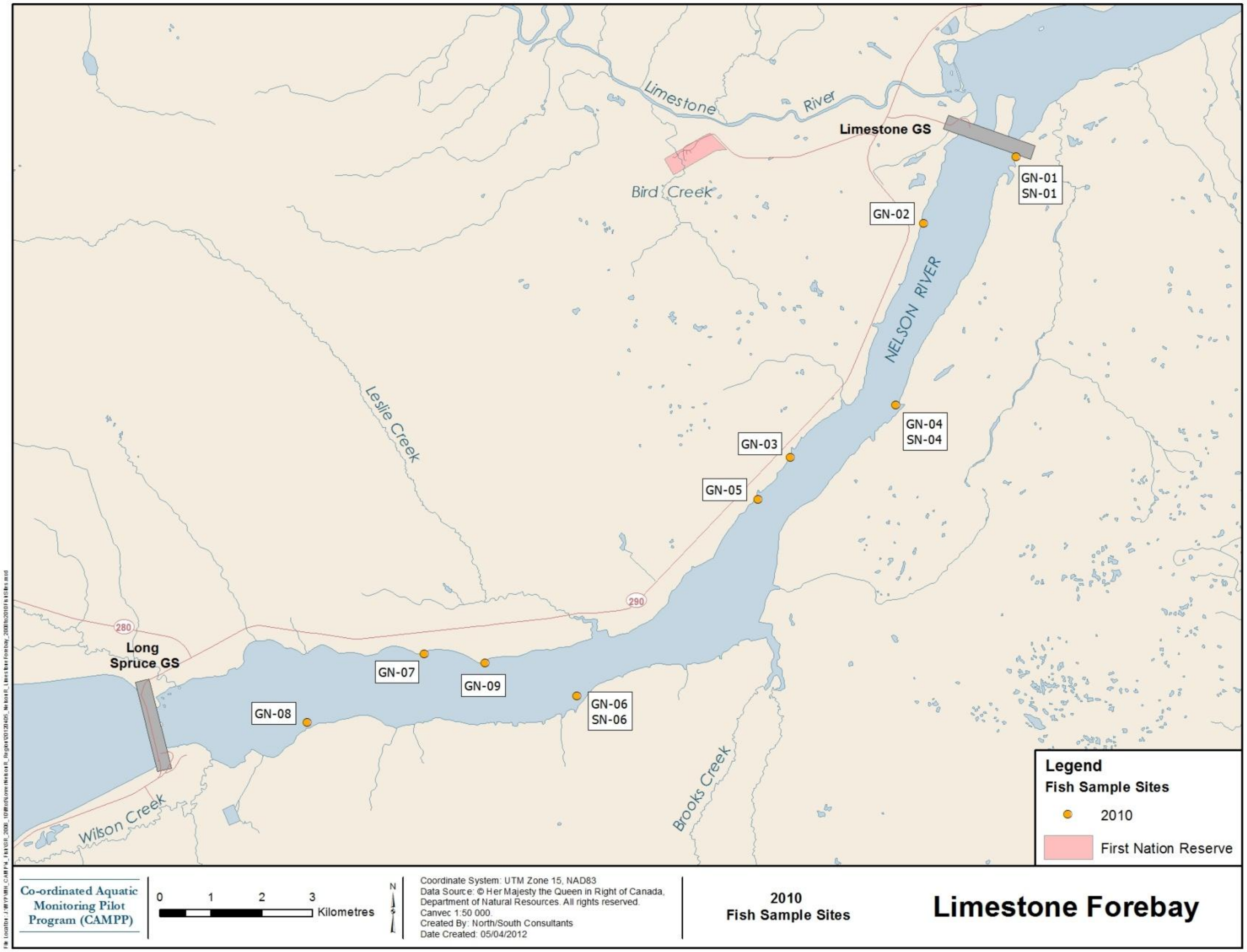


Figure 5.7.7-3. Map depicting standard gang and small mesh index gillnet sites sampled in Limestone Forebay, 2010.

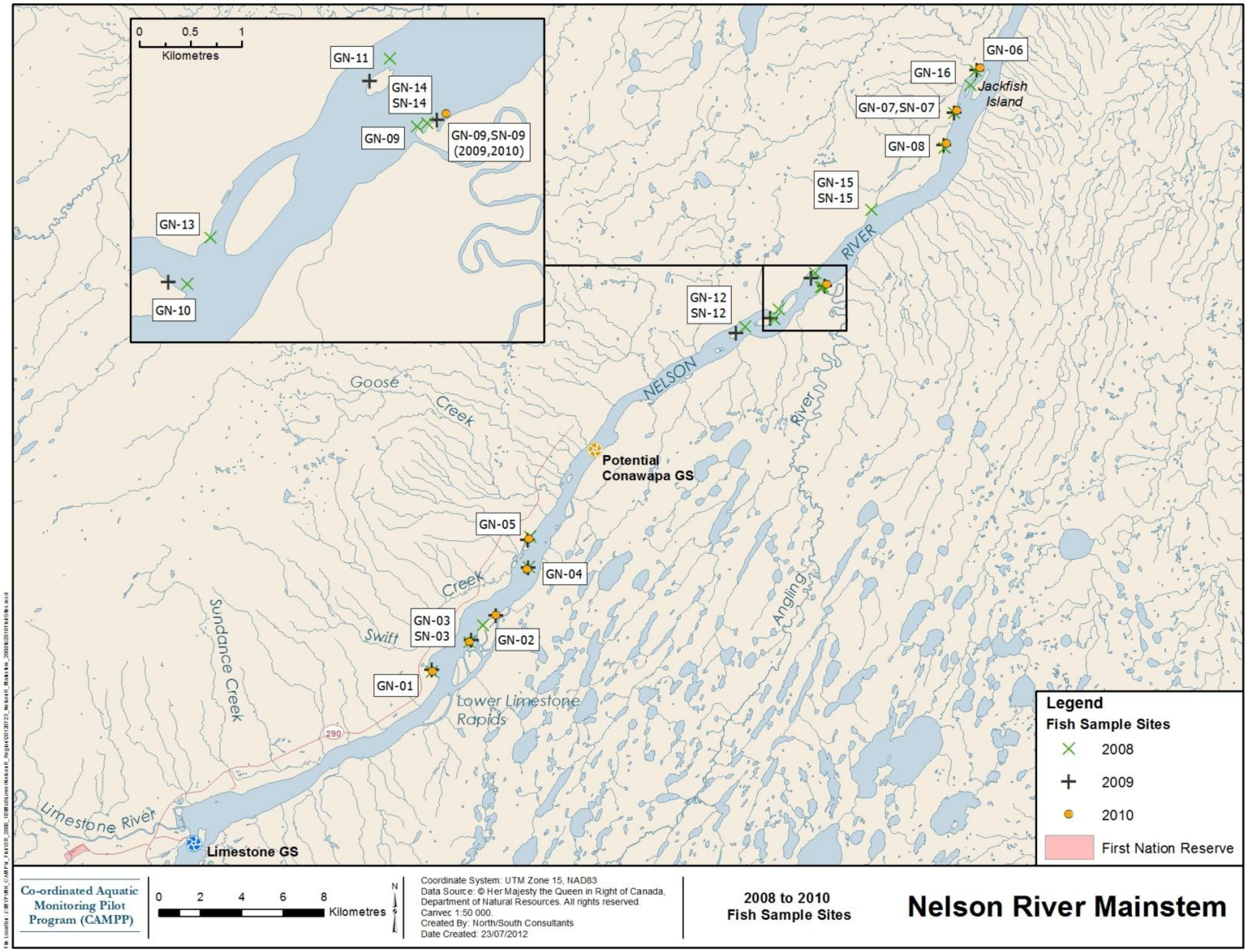


Figure 5.7.7-4. Map depicting standard gang and small mesh index gillnet sites sampled in the lower Nelson River, 2008-2010.

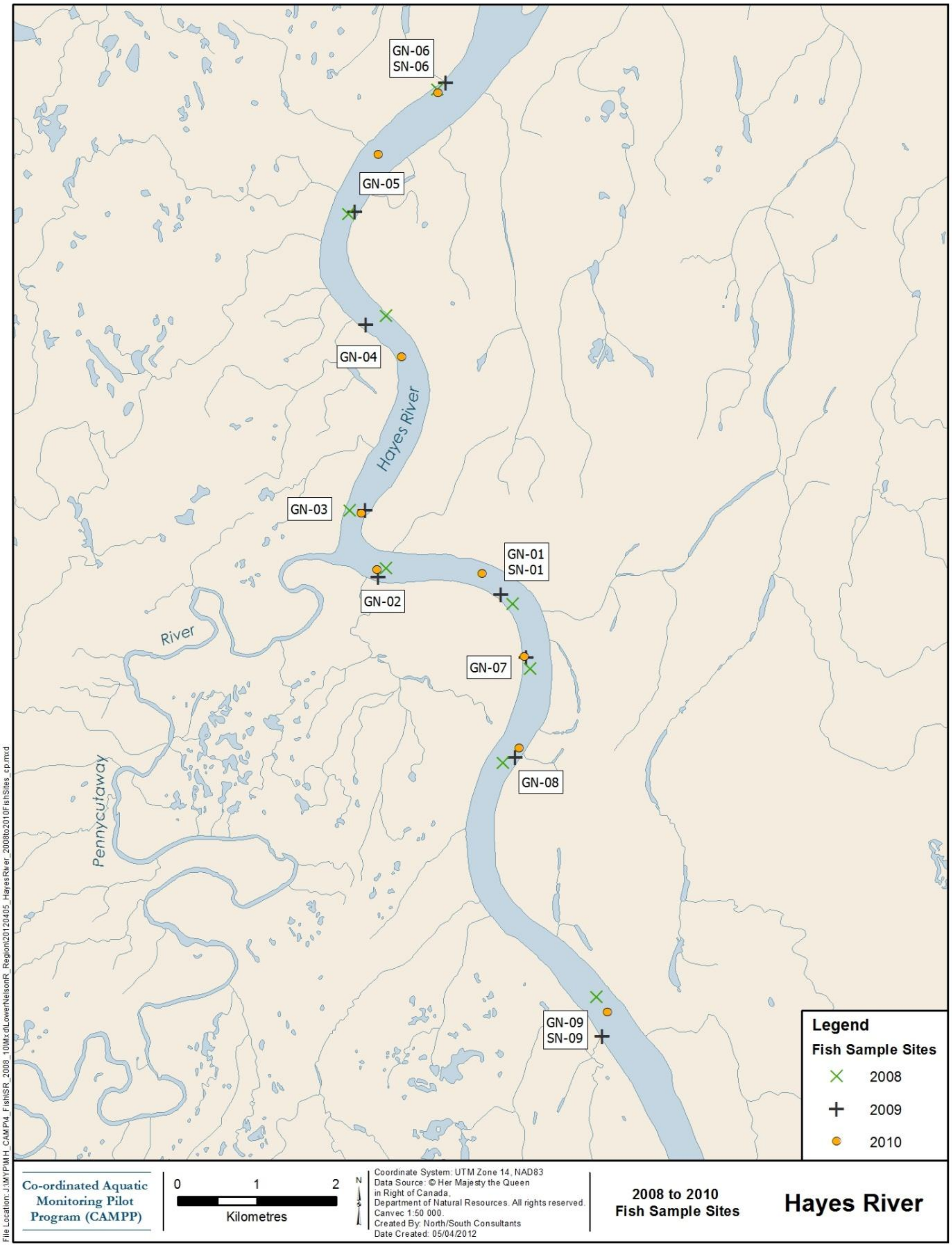


Figure 5.7.7-5. Map depicting standard gang and small mesh index gillnet sites sampled in Hayes River, 2008-2010.

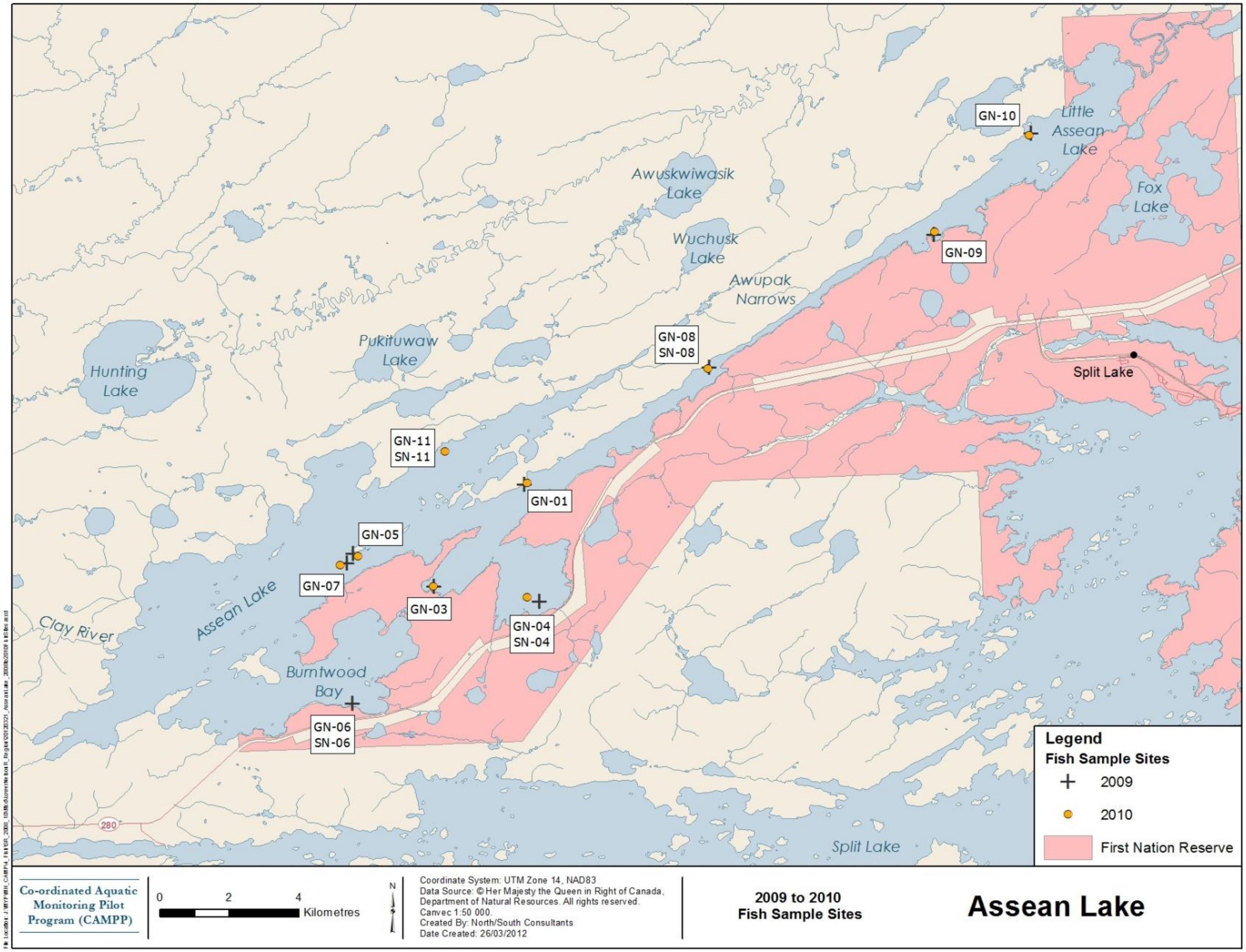


Figure 5.7.7-6. Map depicting standard gang and small mesh index gillnet sites sampled in Assean Lake, 2009 and 2010.

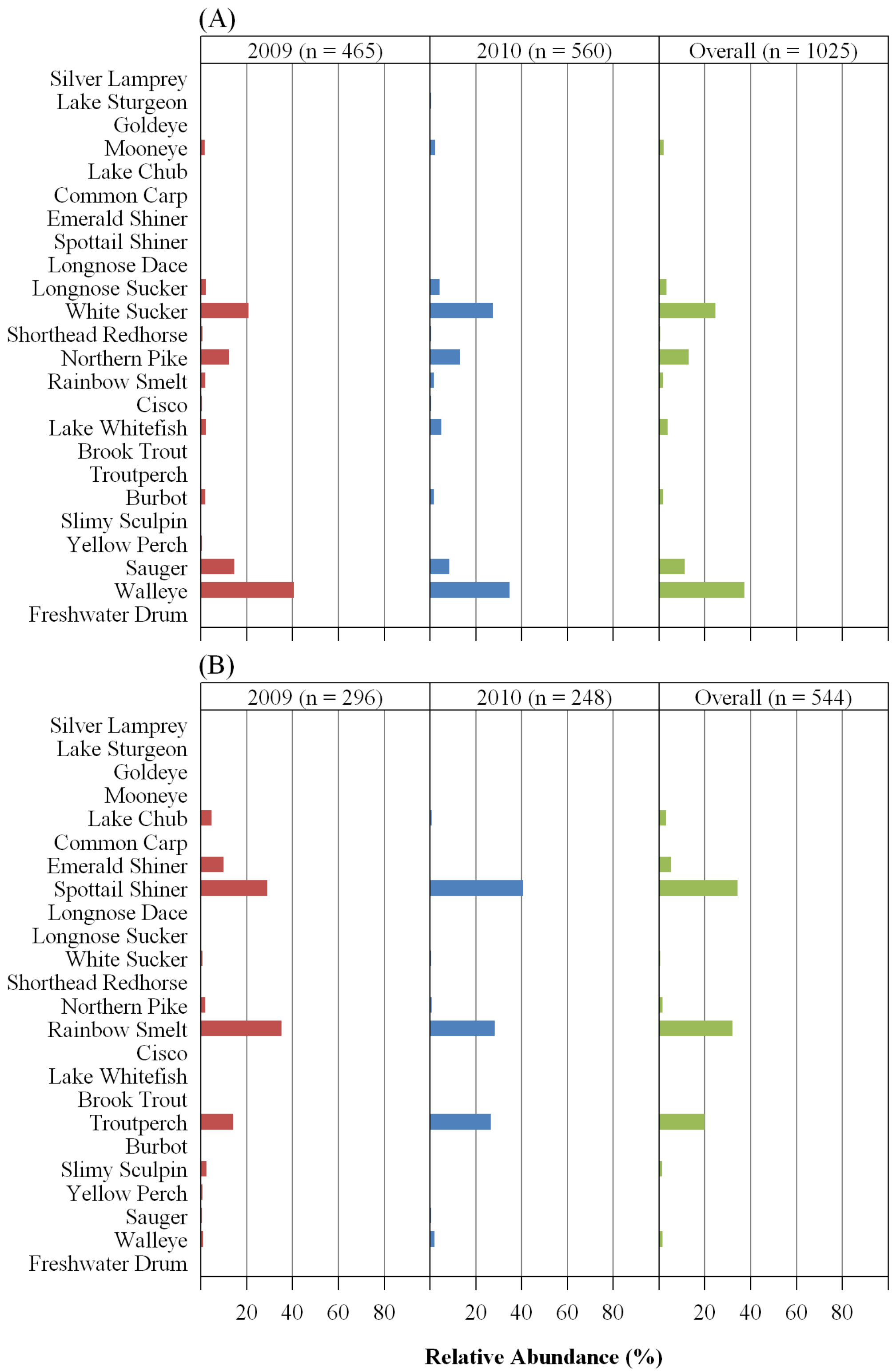


Figure 5.7.7-7. Relative abundance (%) distribution for fish captured (A) standard gang and (B) small mesh index gill nets set in Split Lake, 2009 and 2010 (and overall).

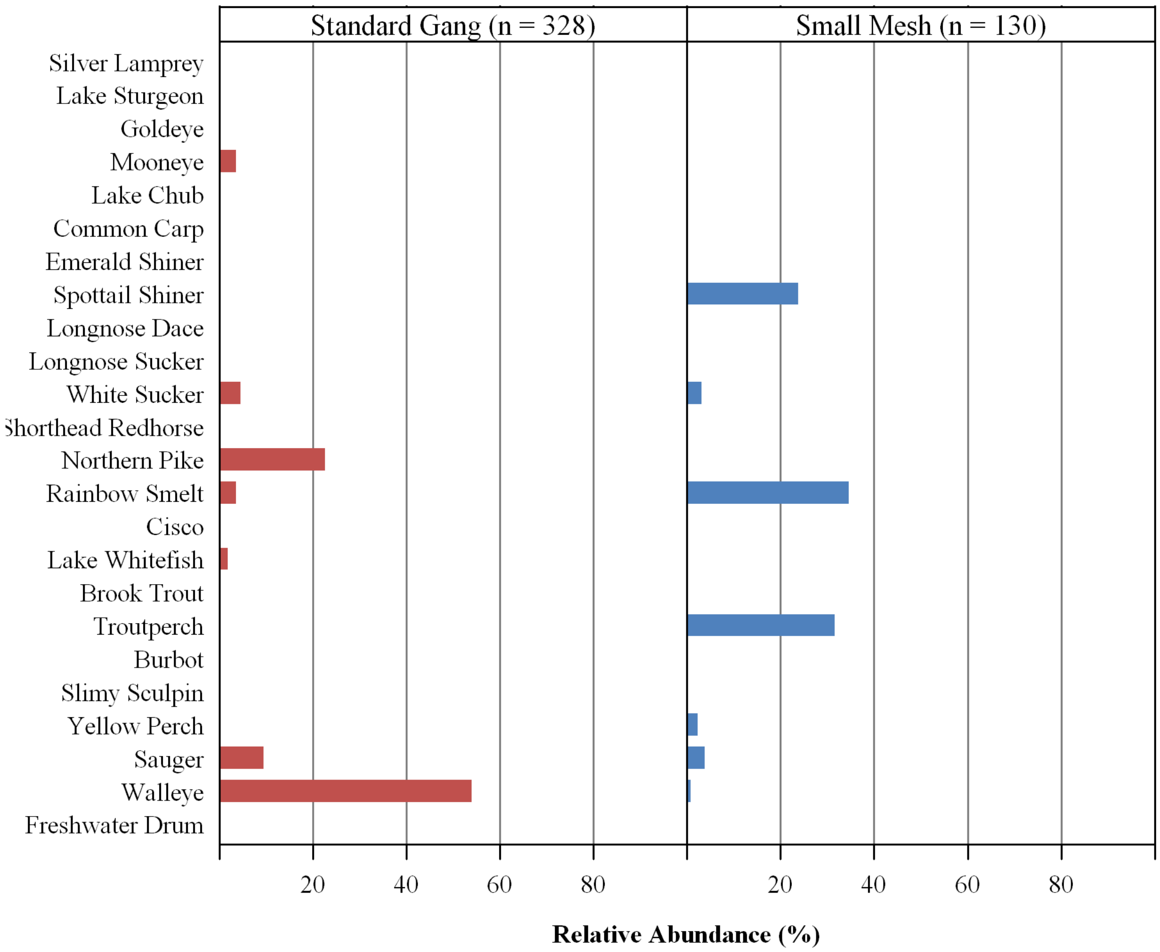


Figure 5.7.7-8. Relative abundance (%) distribution for fish captured in standard gang and small mesh index gill nets set in Stephens Lake – South, 2009.

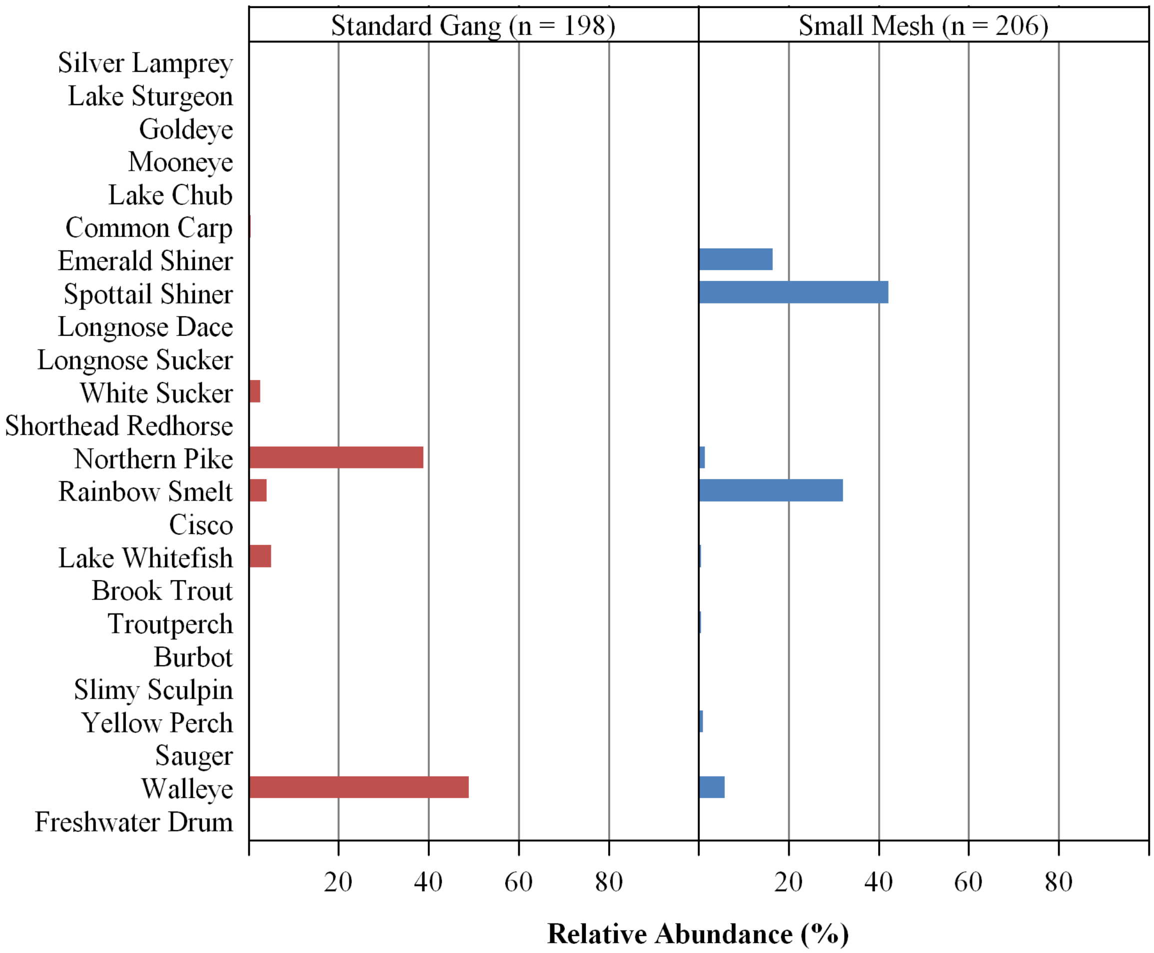


Figure 5.7.7-9. Relative abundance (%) distribution for fish captured in standard gang and small mesh index gill nets set in Stephens Lake – North, 2009.

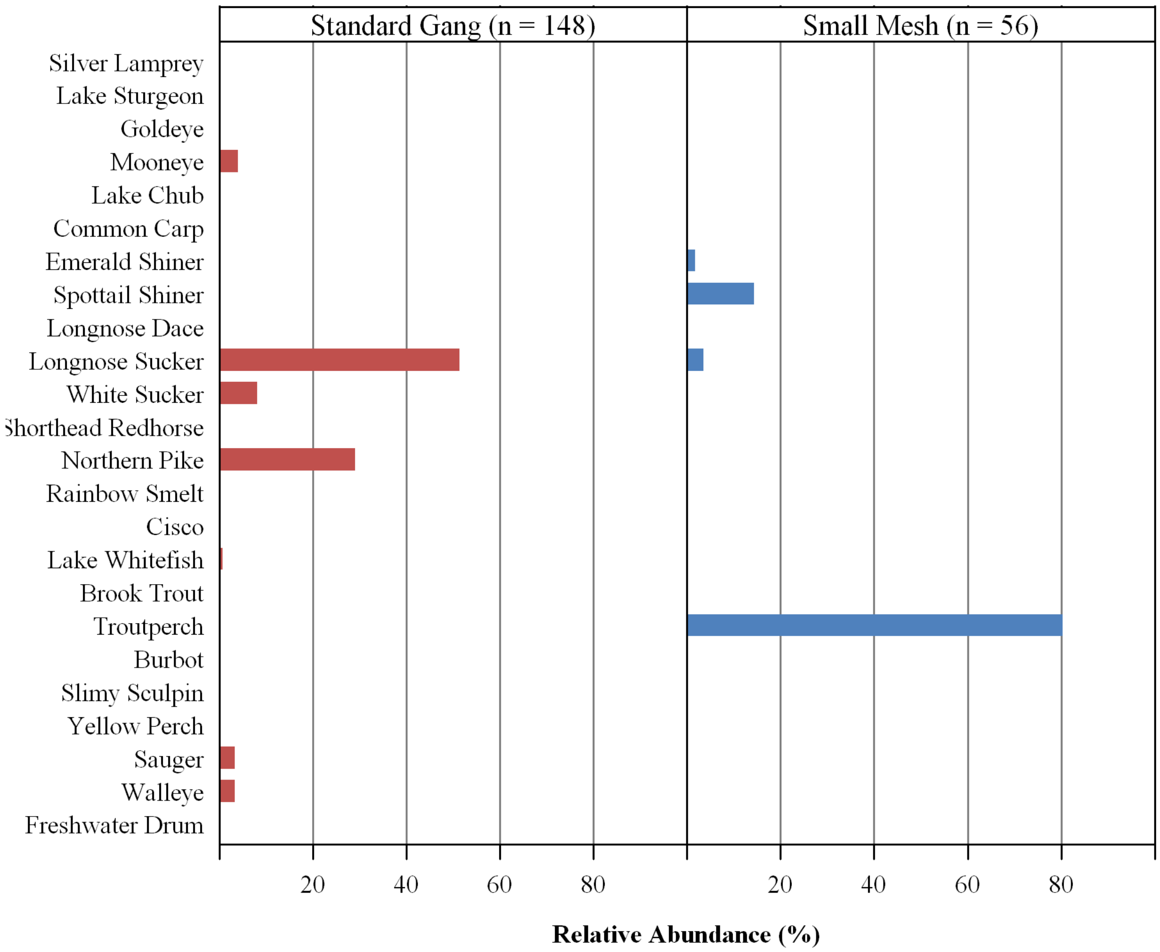


Figure 5.7.7-10. Relative abundance (%) distribution for fish captured in standard gang and small mesh index gill nets set in Limestone Forebay, 2010.

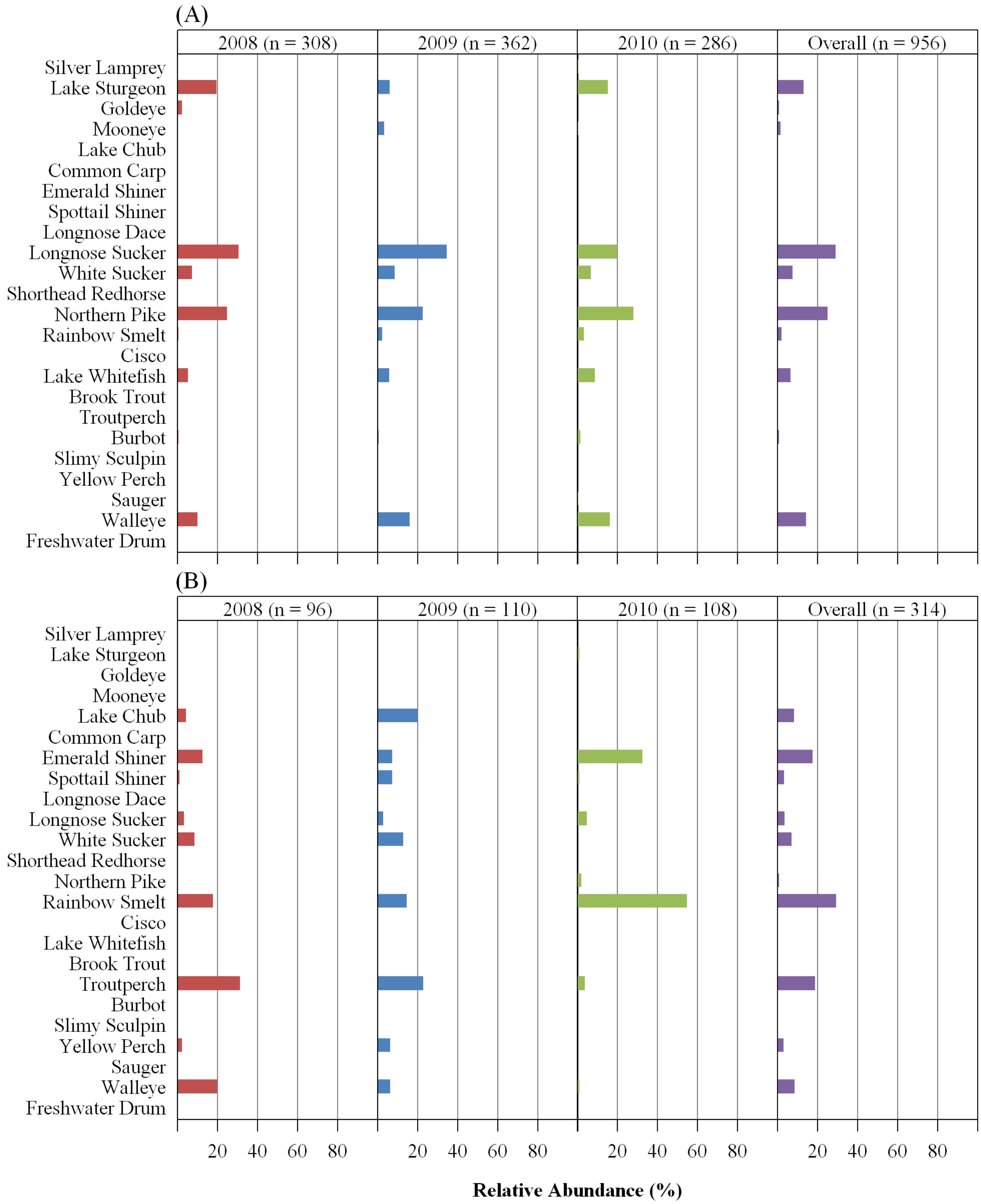


Figure 5.7.7-11. Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in the lower Nelson River, 2008-2010.

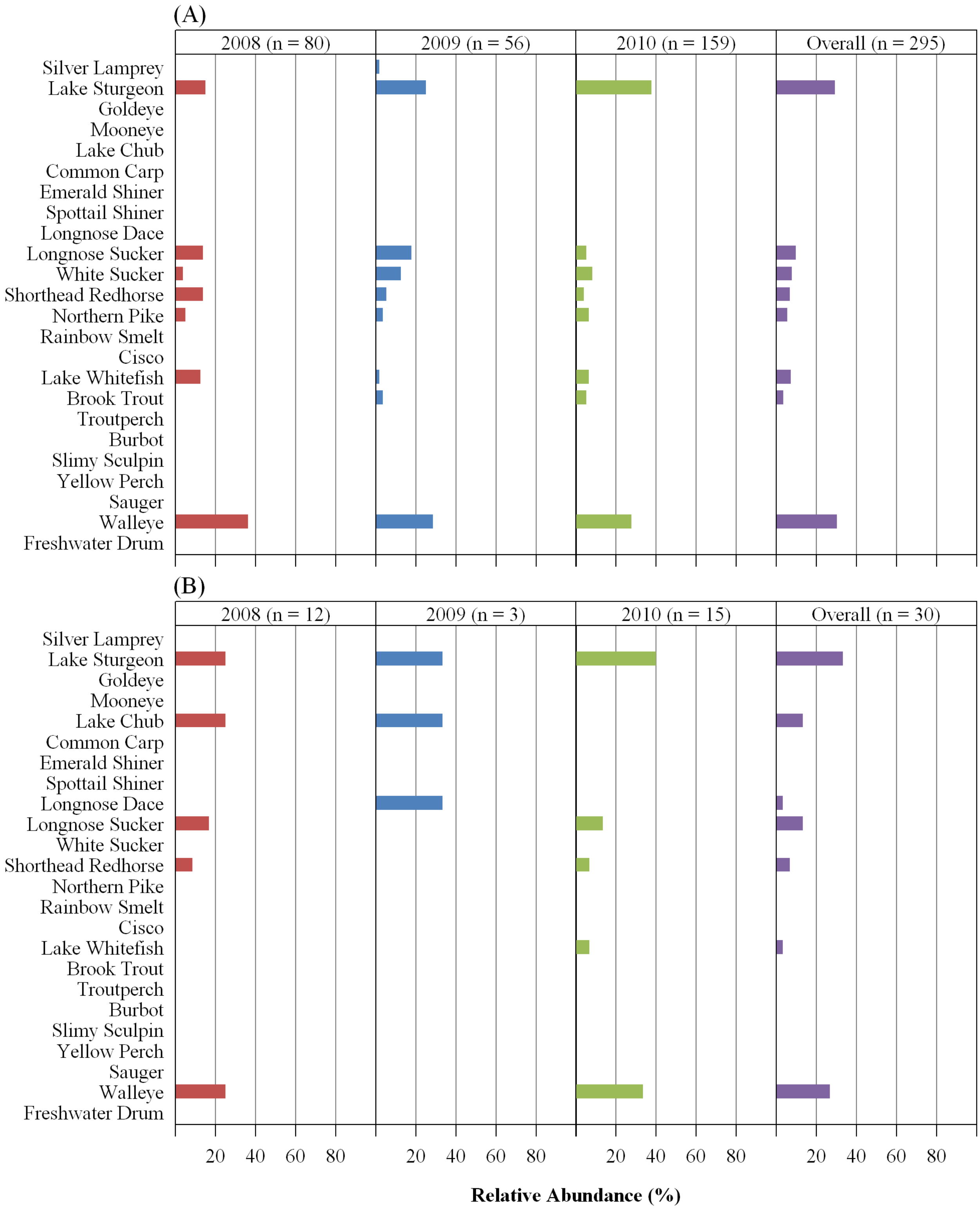


Figure 5.7.7-12. Relative abundance (%) distribution for fish captured in (A) standard gang and (B) small mesh index gill nets set in the Hayes River, 2008-2010.

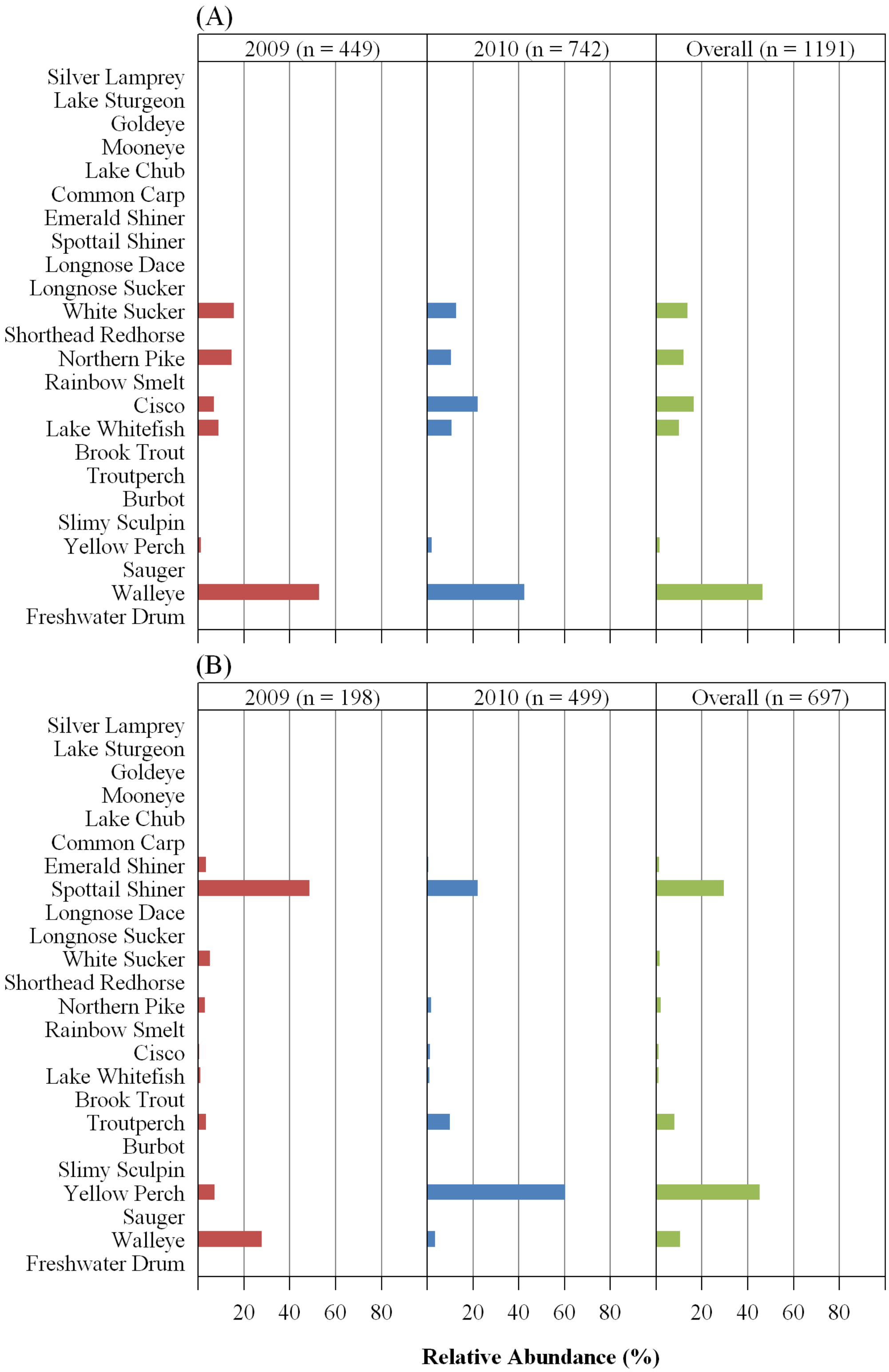


Figure 5.7.7-13. Relative abundance (%) distribution for fish captured in (A) standard gang and (B) small mesh index gill nets set in Assean Lake, 2009 and 2010.

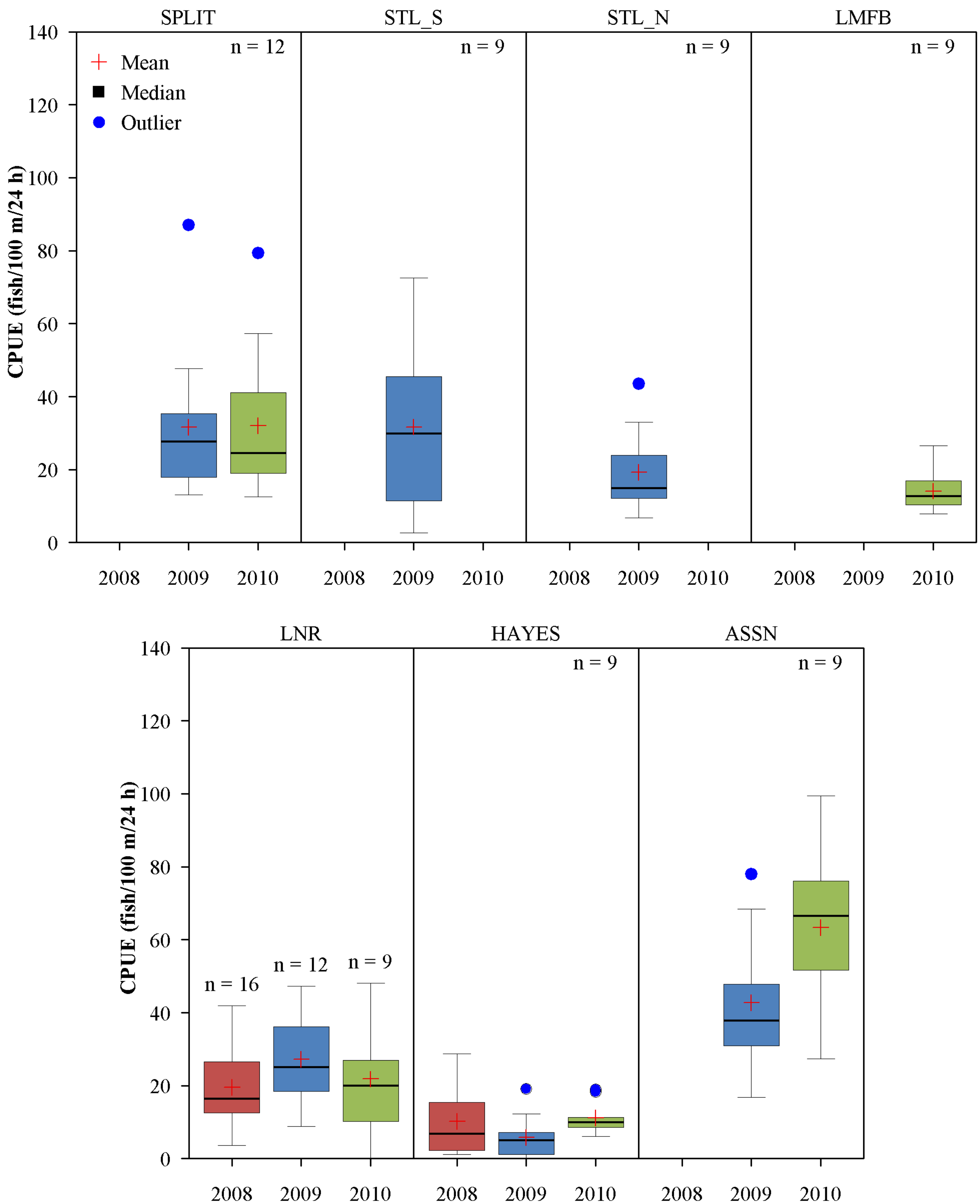


Figure 5.7.7-14. Mean and median (range) total CPUE per site calculated for fish captured in (A) standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

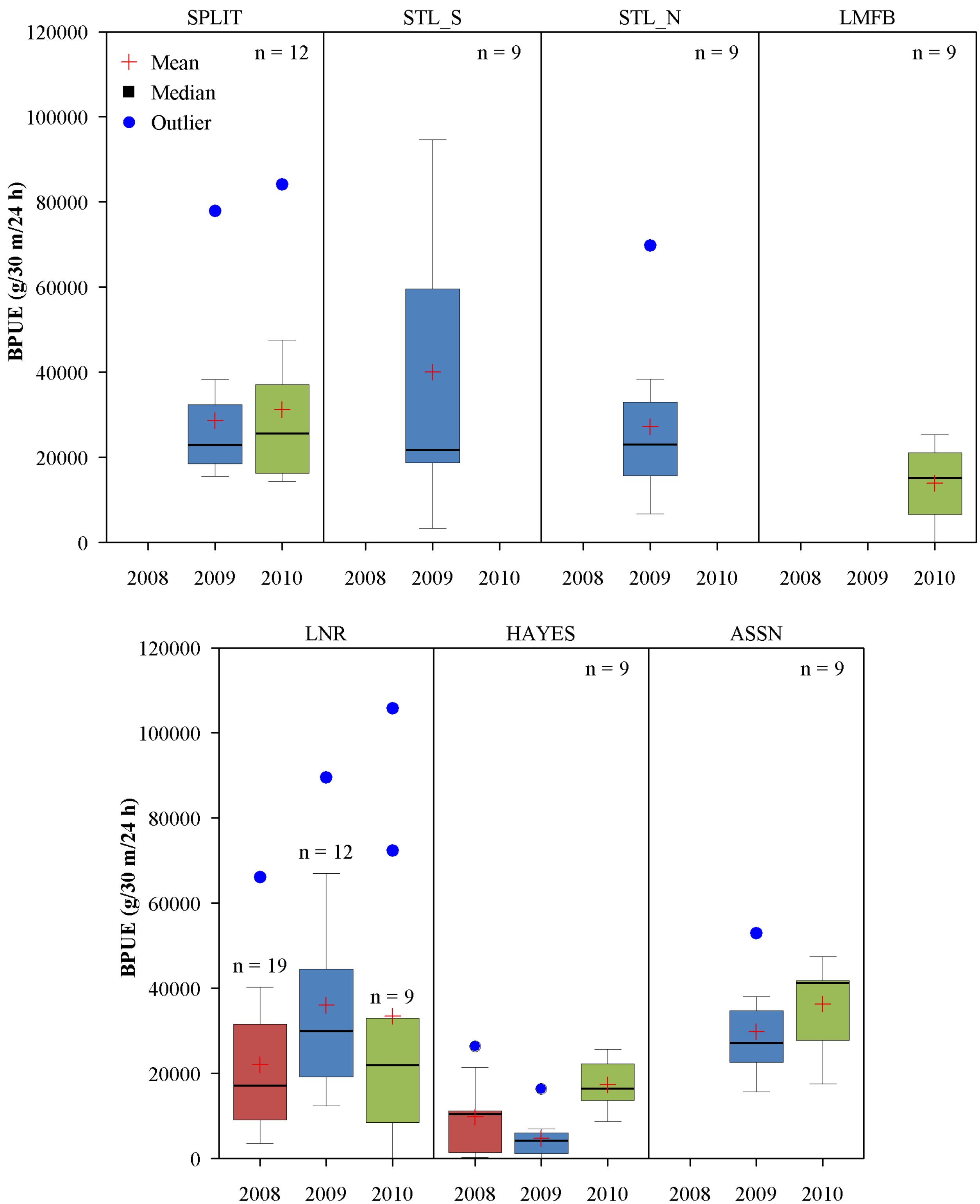


Figure 5.7.7-15. Mean and median (range) total BPUE per site calculated for fish captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

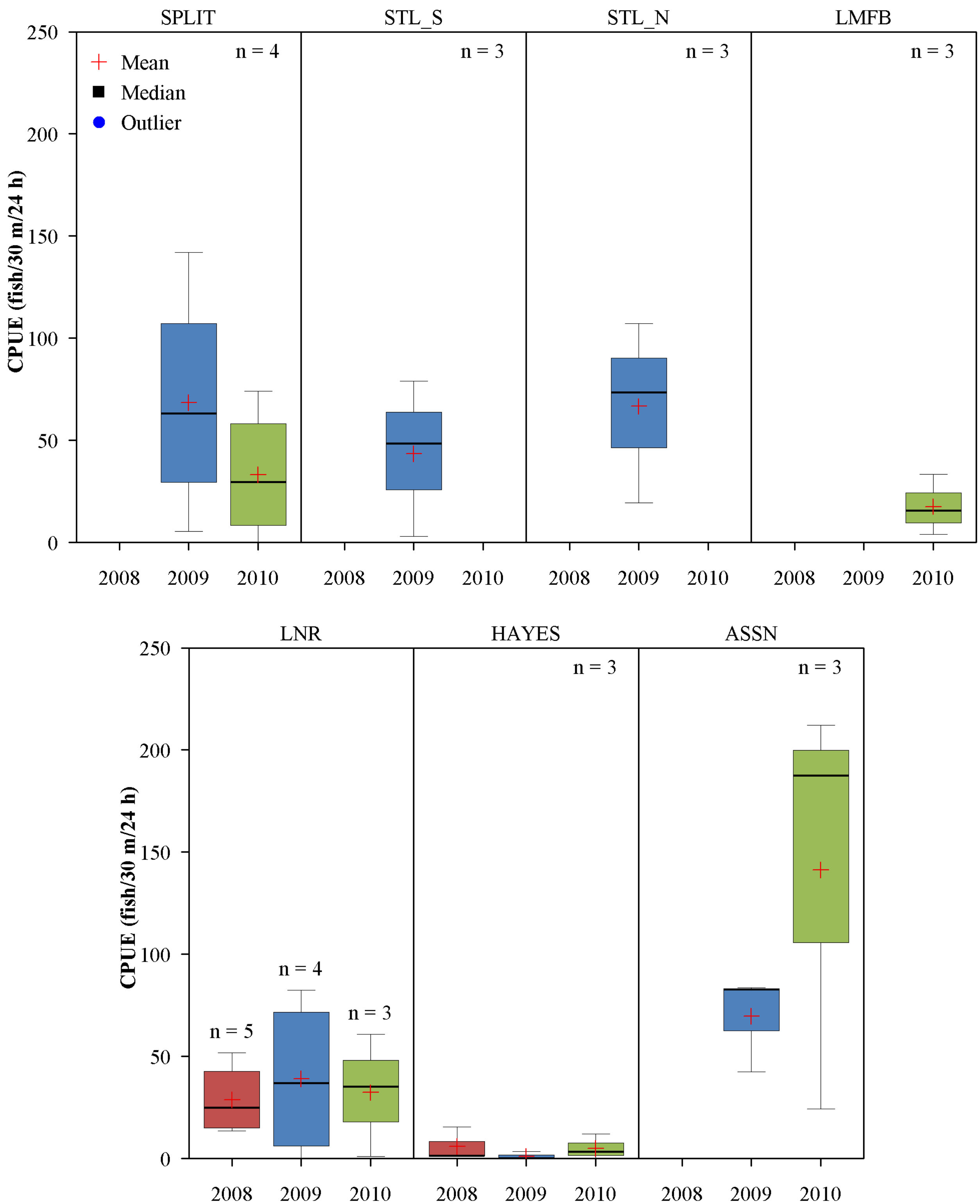


Figure 5.7.7-16. Mean and median (range) total CPUE per site calculated for fish captured in small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

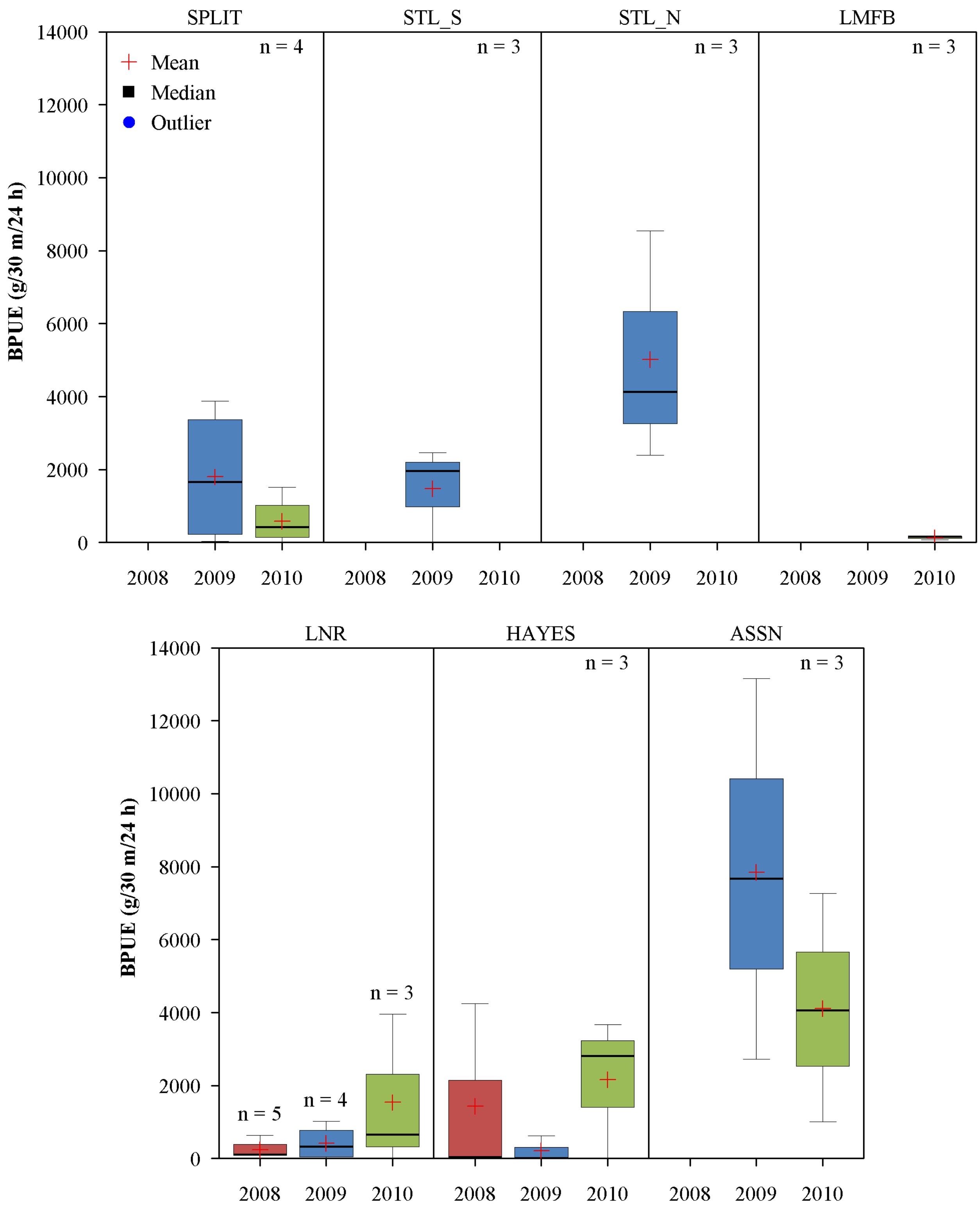


Figure 5.7.7-17. Mean and median (range) total BPUE per site calculated for fish captured in small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

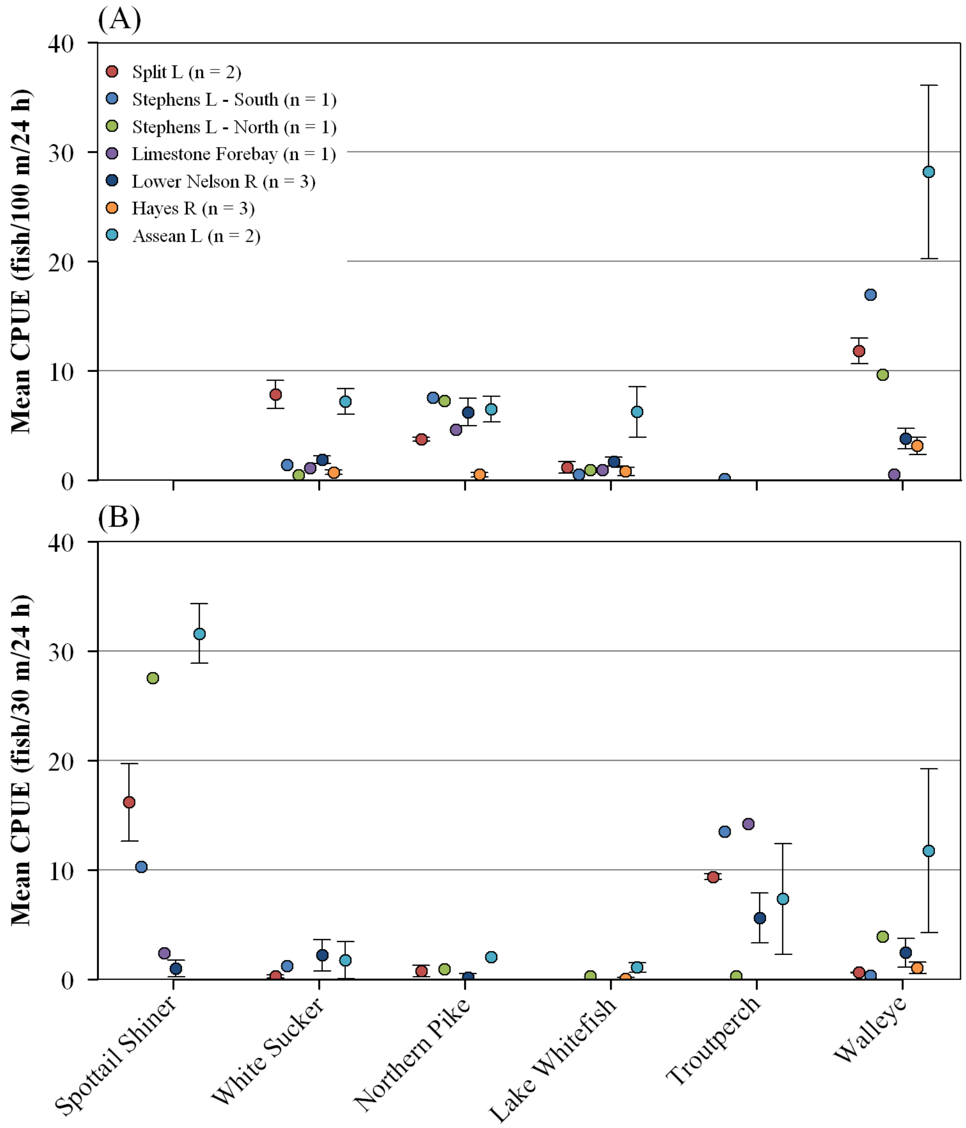


Figure 5.7.7-18. Mean (SE) CPUE for select species captured in (A) standard gang and (B) small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

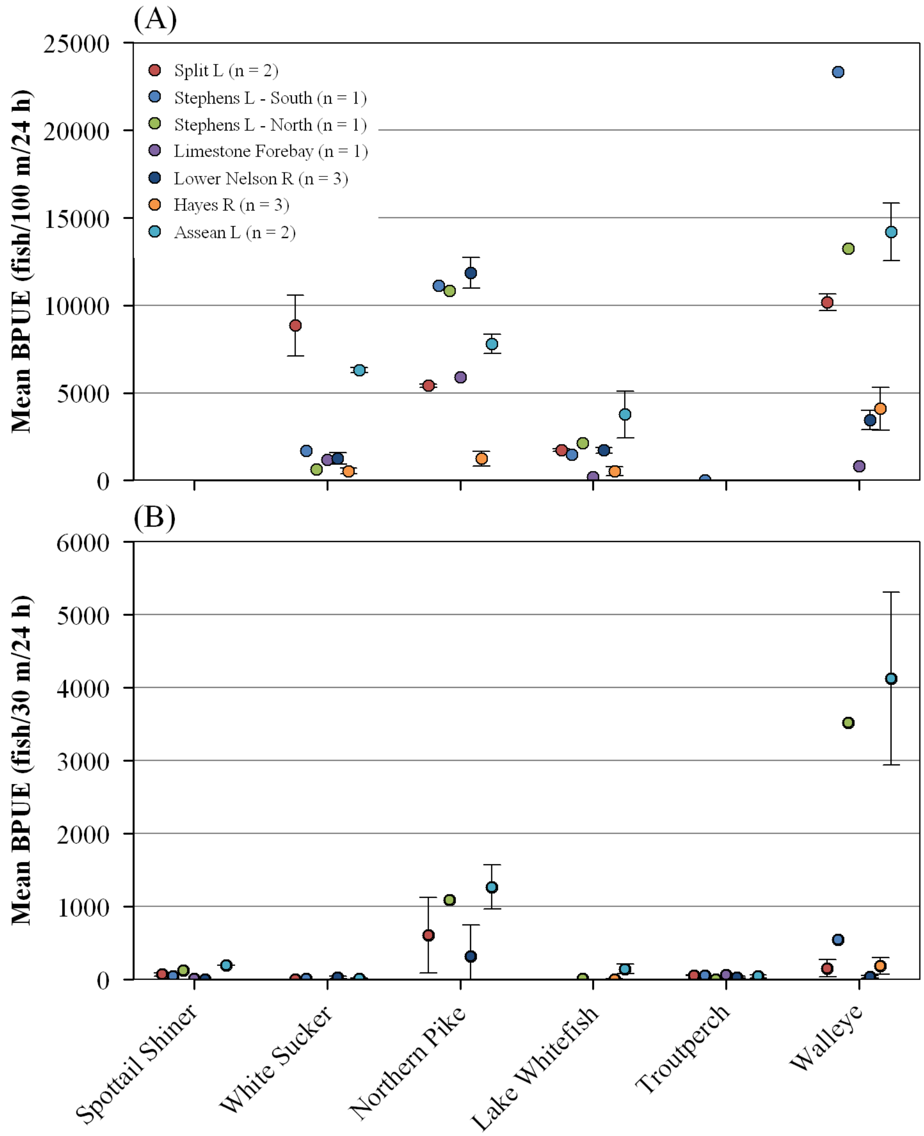


Figure 5.7.7-19. Mean (SE) BPUE for select species captured in (A) standard gang and (B) small mesh index gill nets set in Lower Nelson River Region waterbodies from 2008-2010.

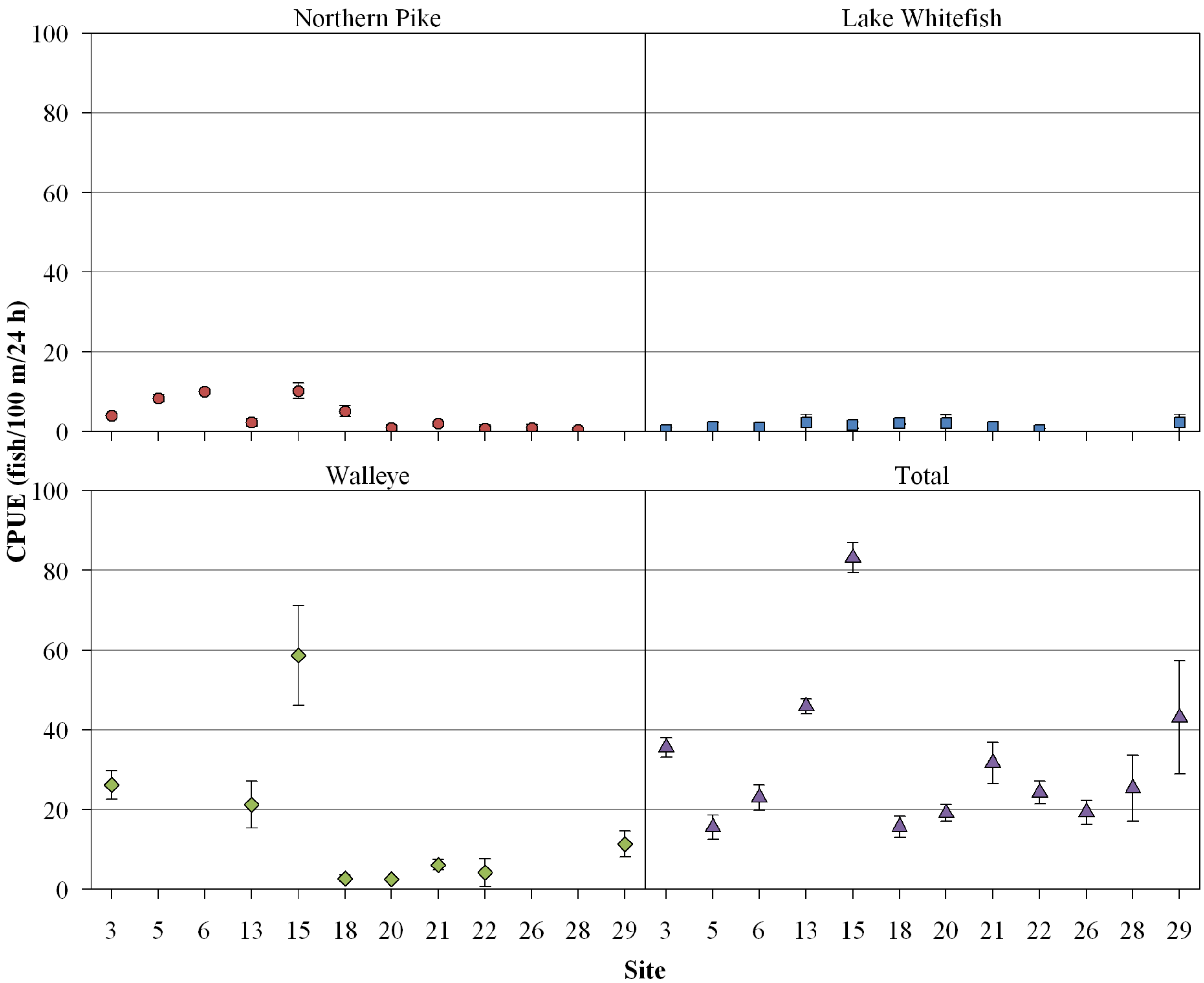


Figure 5.7.7-20. Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Split Lake, 2009 and 2010.

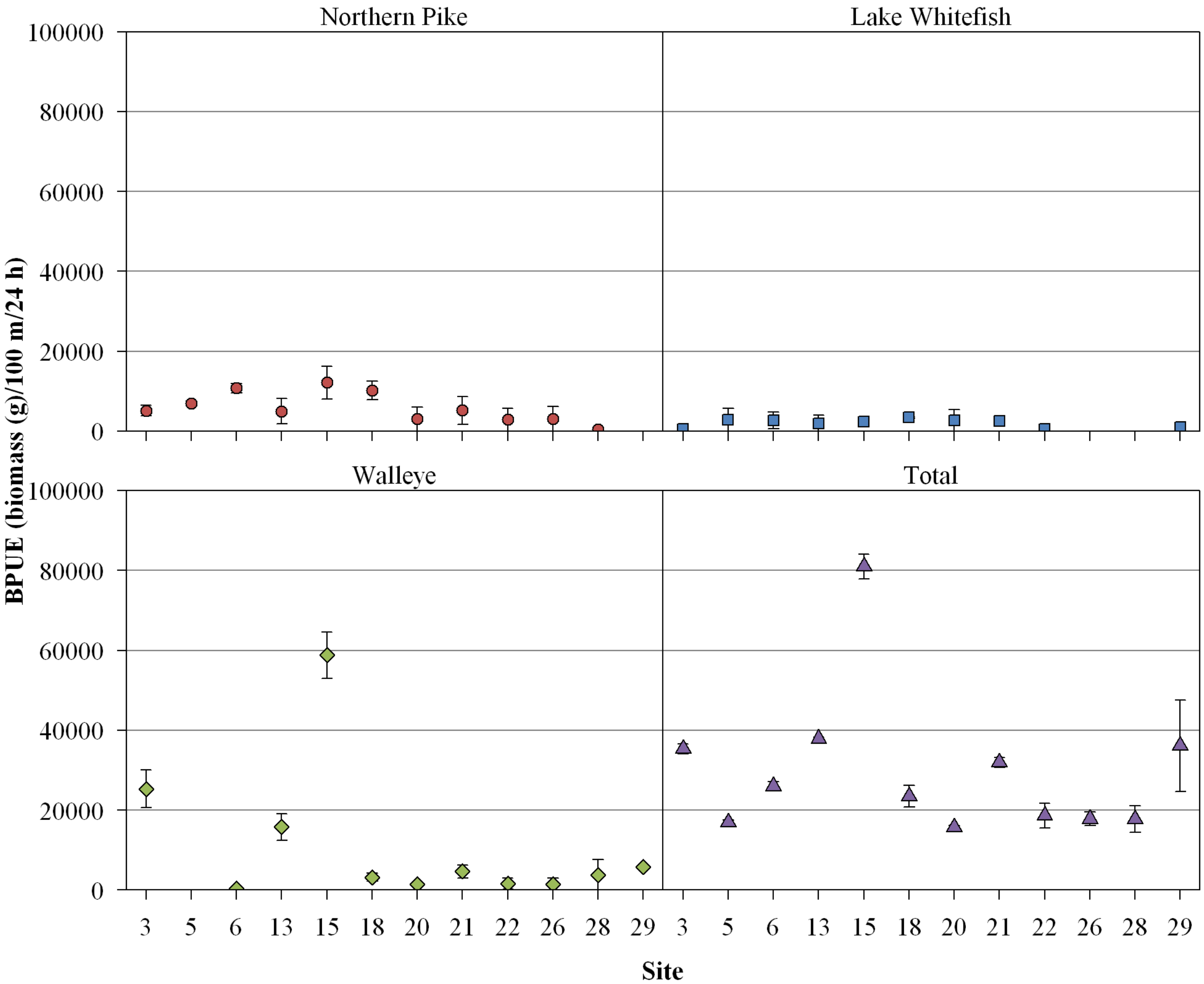


Figure 5.7.7-21. Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Split Lake, 2009 and 2010.

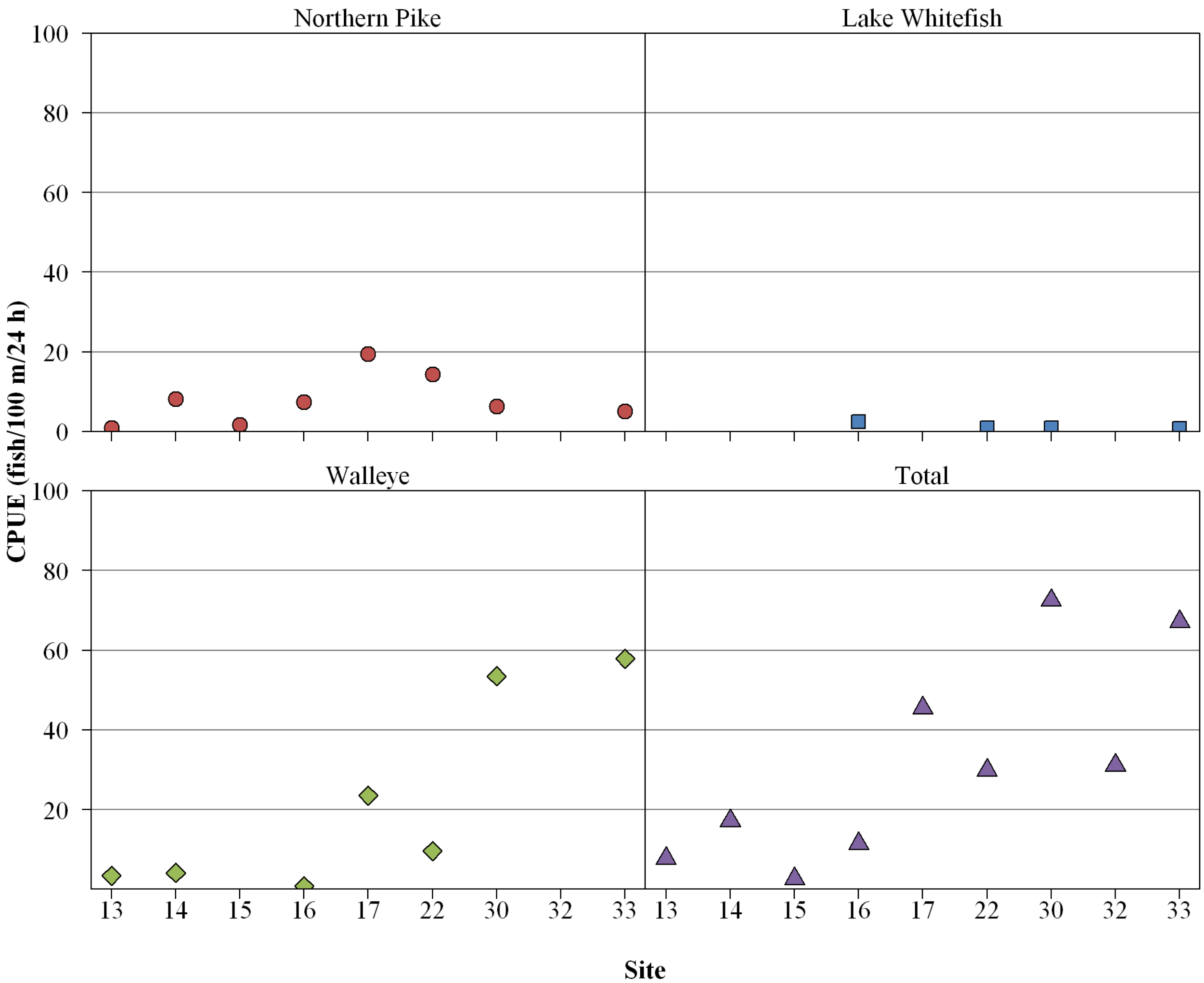


Figure 5.7.7-22. CPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Stephens Lake – South, 2009.

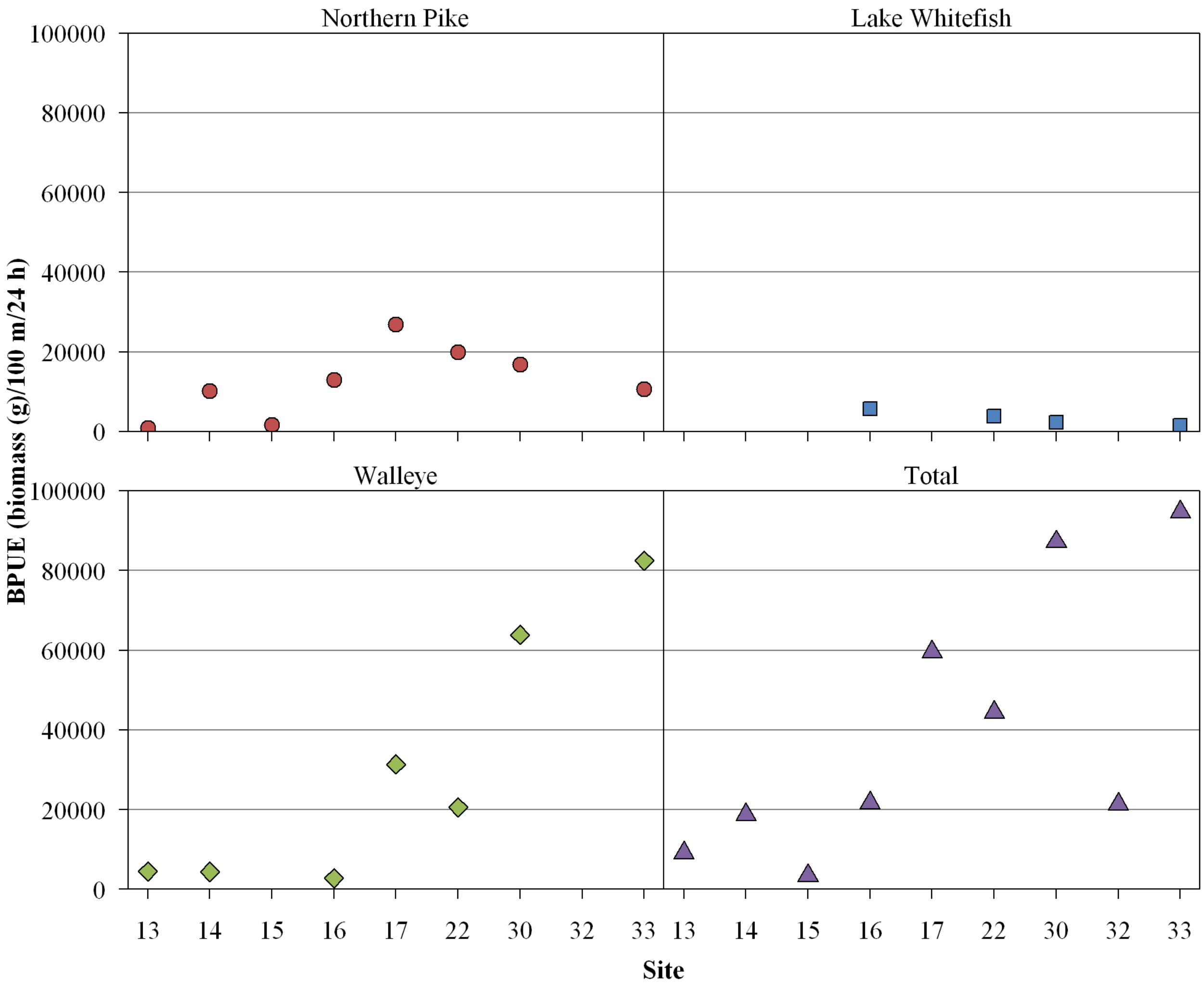


Figure 5.7.7-23. BPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Stephens Lake – South, 2009.

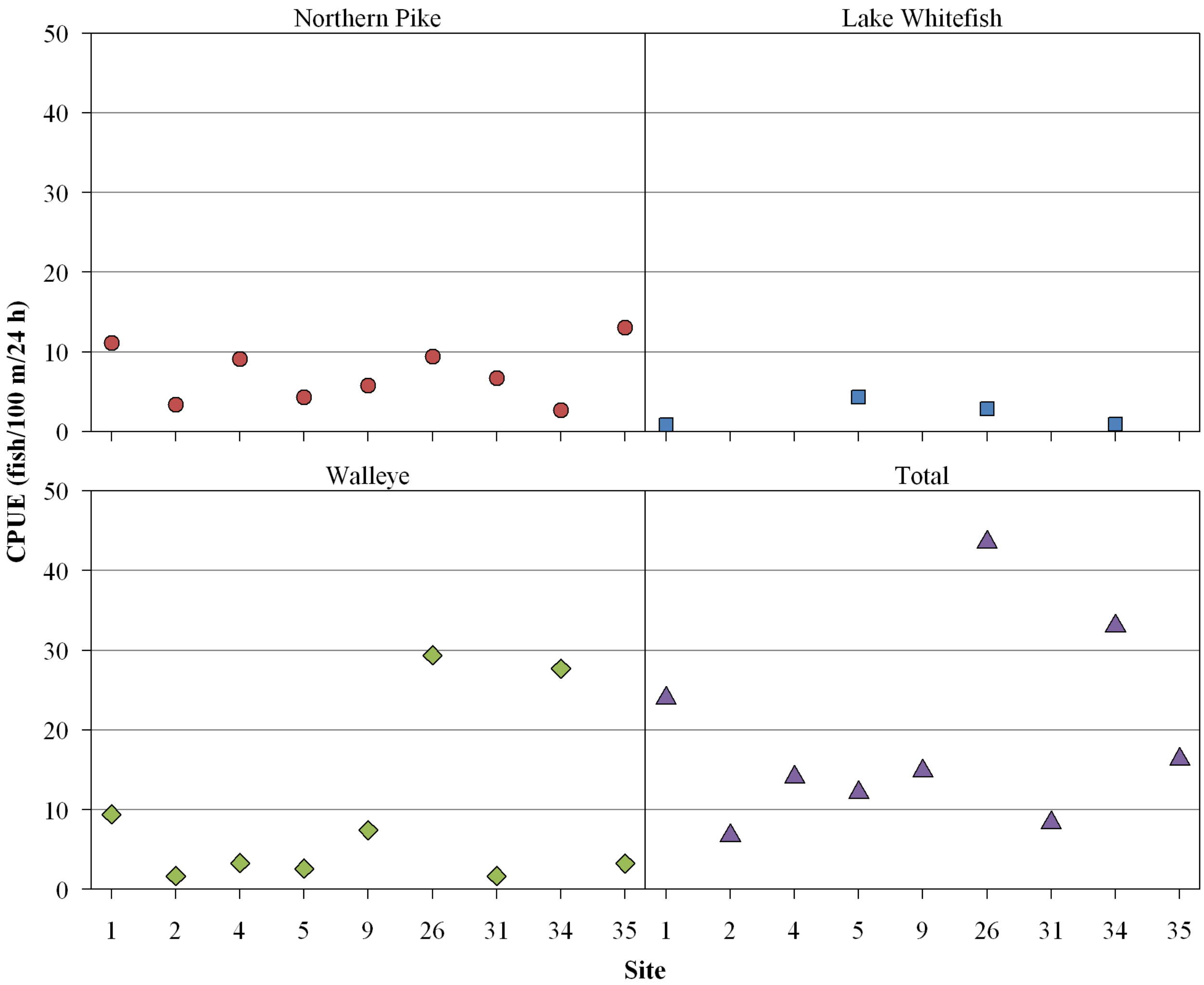


Figure 5.7.7-24 CPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Stephens Lake – North, 2009.

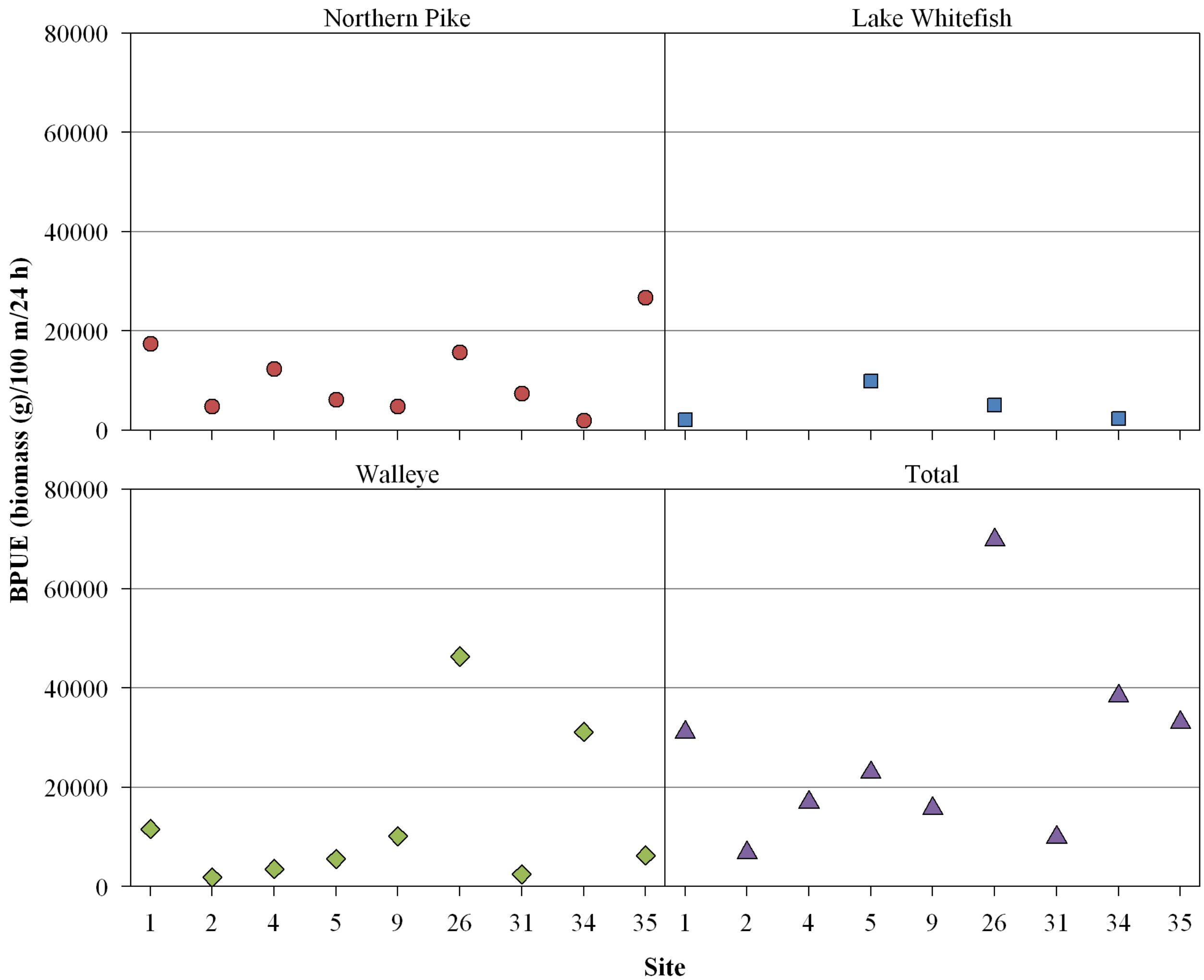


Figure 5.7.7-25. BPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Stephens Lake – North, 2009.

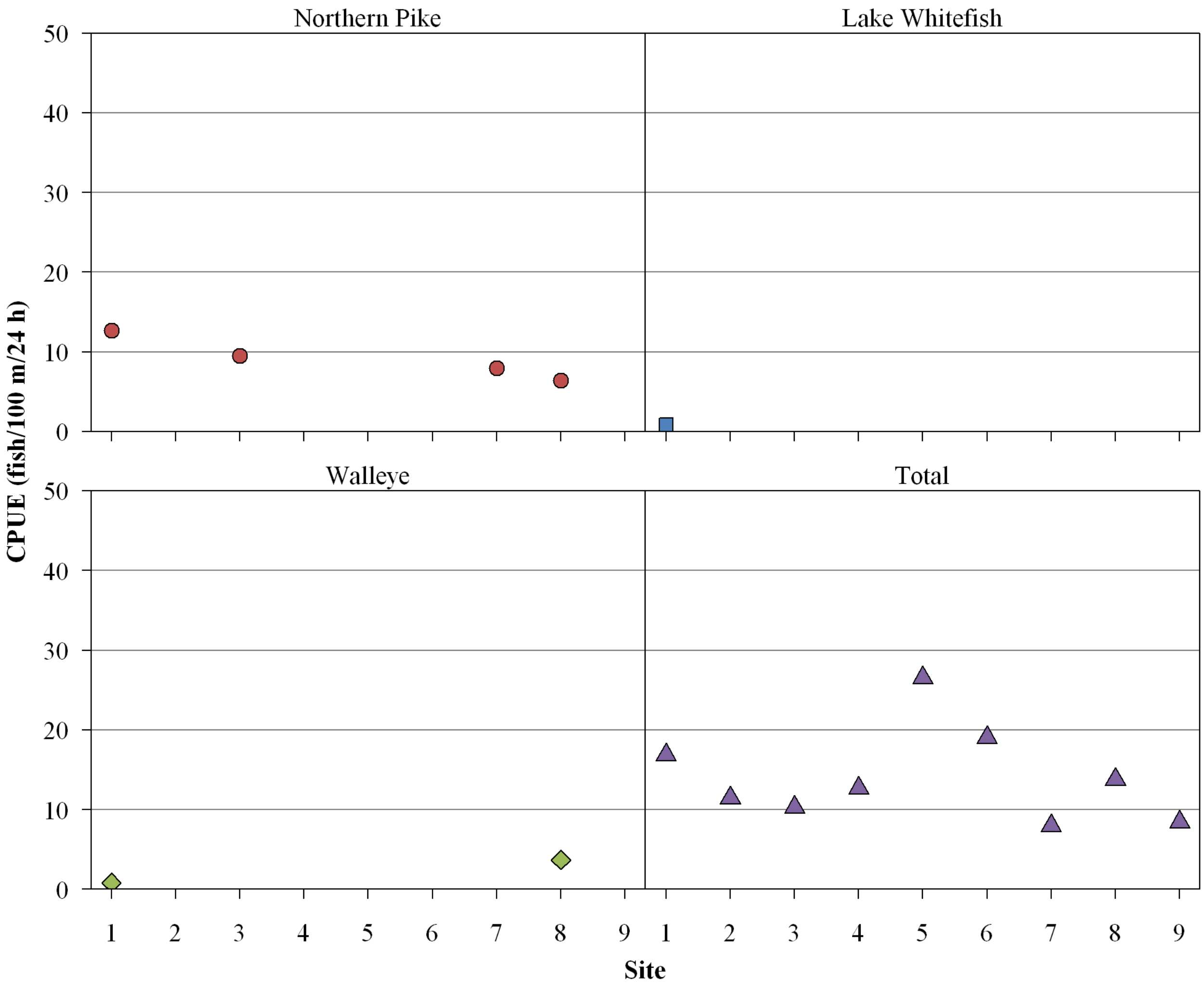


Figure 5.7.7-26. CPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Limestone Forebay, 2010.

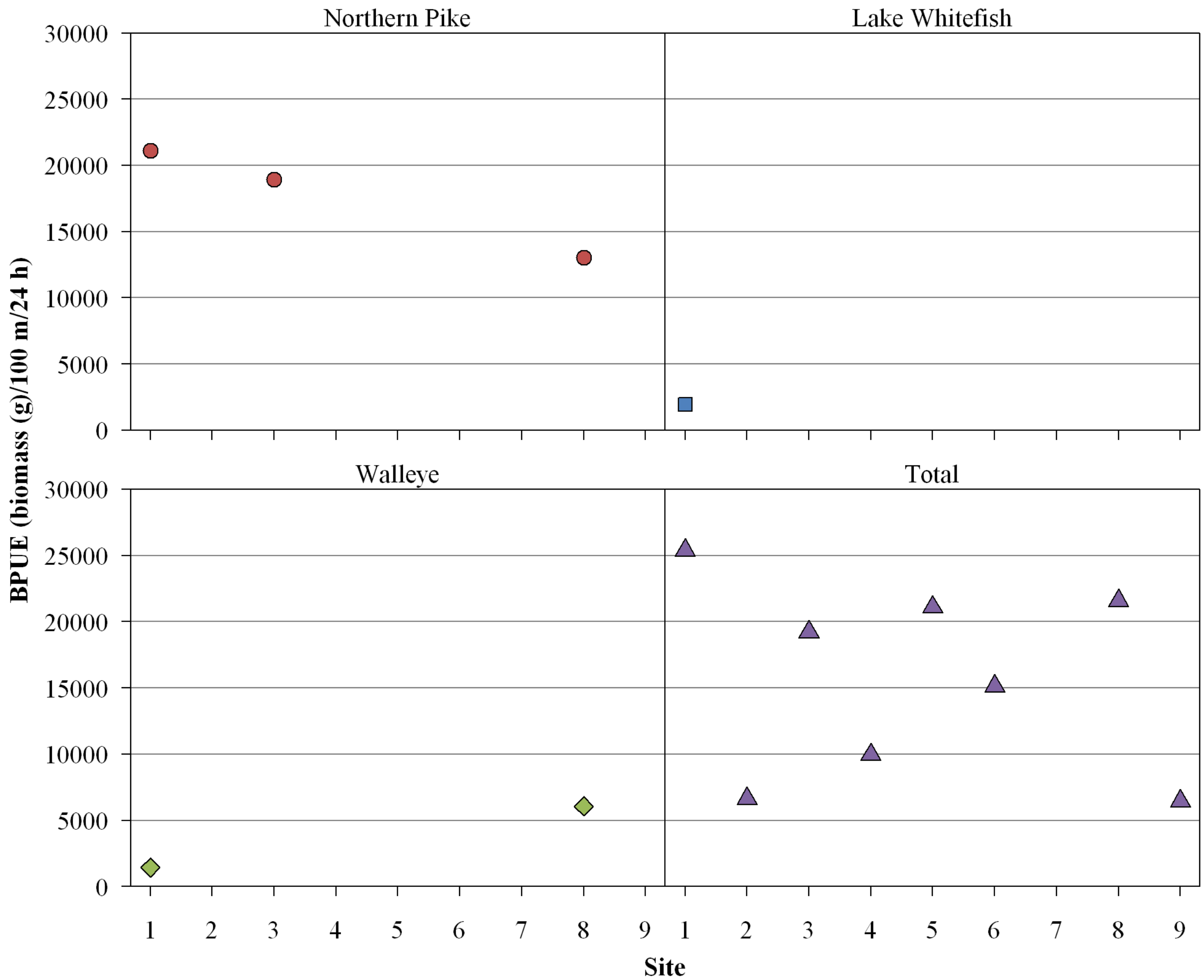


Figure 5.7.7-27. BPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in CAMPP standard gang index gill nets set in Limestone Forebay, 2010.

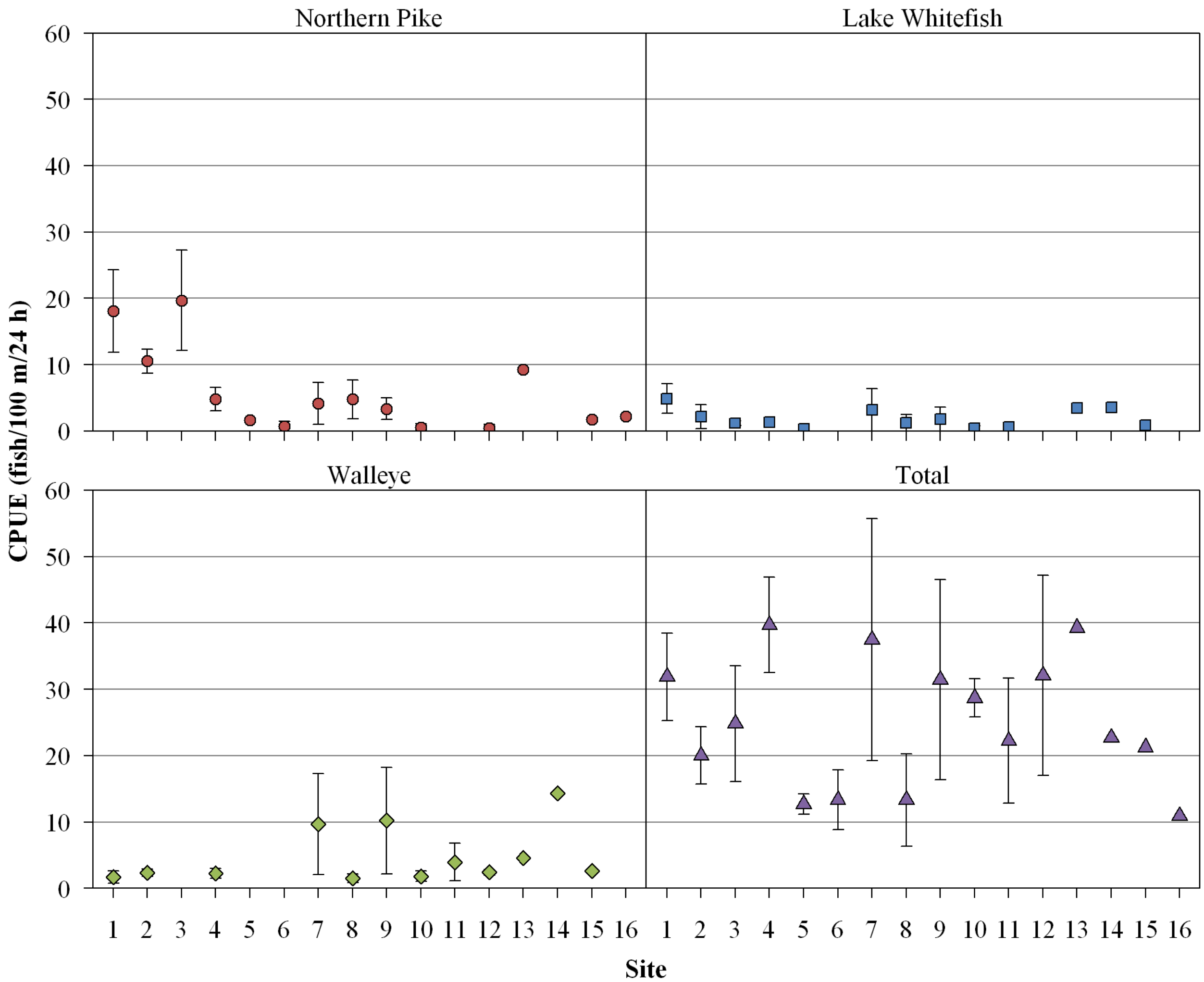


Figure 5.7.7-28. Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the lower Nelson River, 2008-2010.

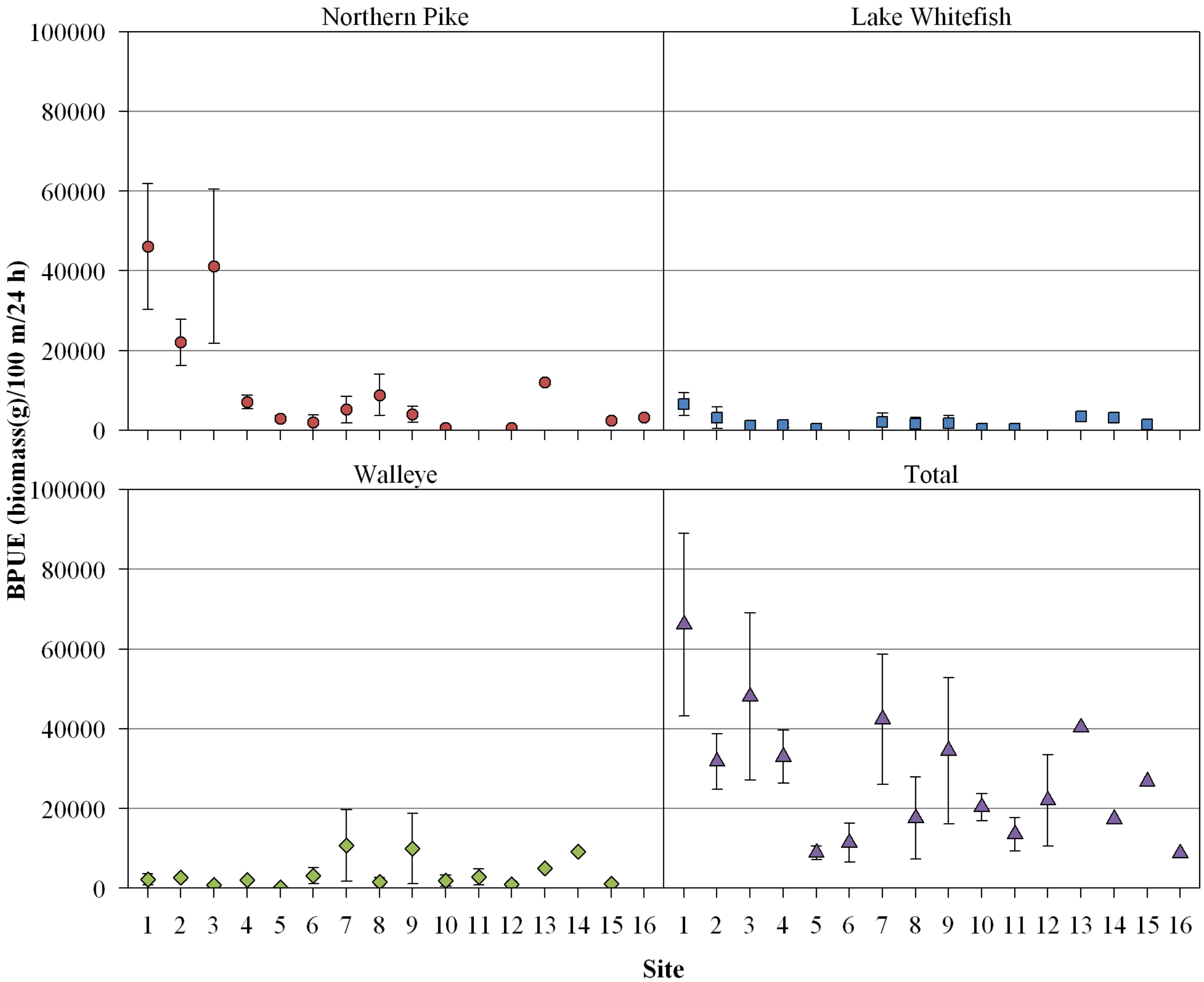


Figure 5.7.7-29. Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the lower Nelson River, 2008-2010.

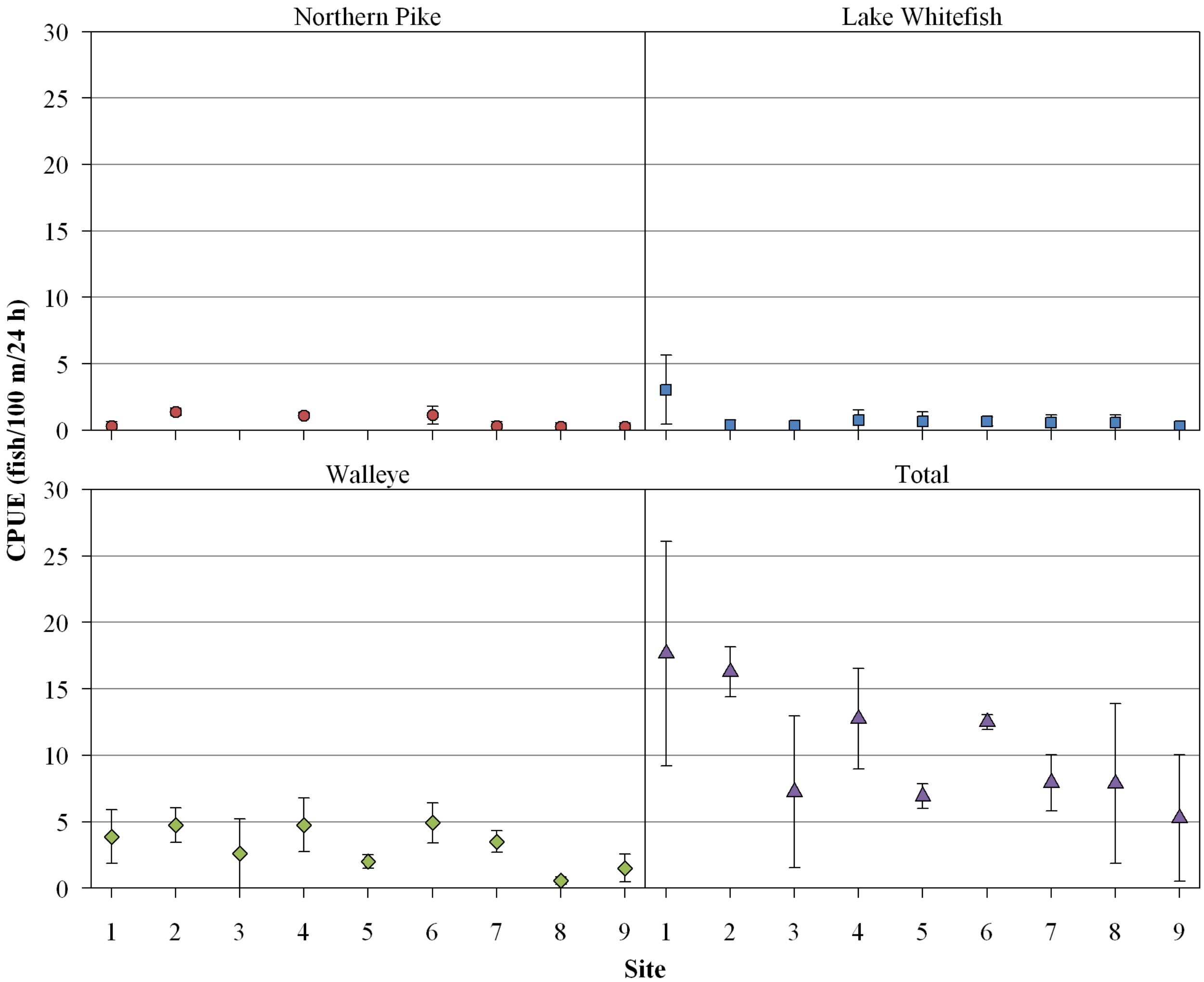


Figure 5.7.7-30. Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the Hayes River, 2008-2010.

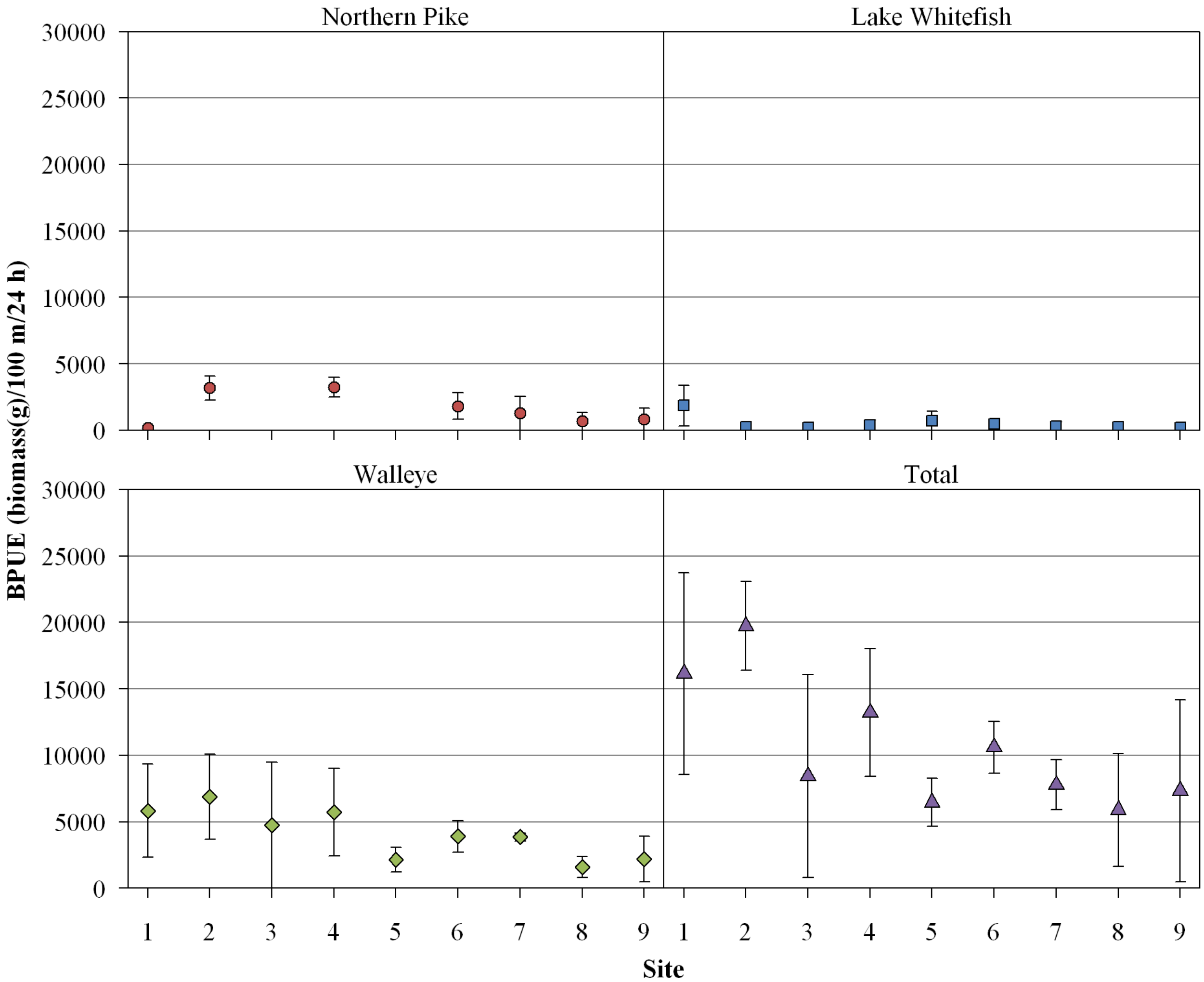


Figure 5.7.7-31. Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the Hayes River, 2008-2010.

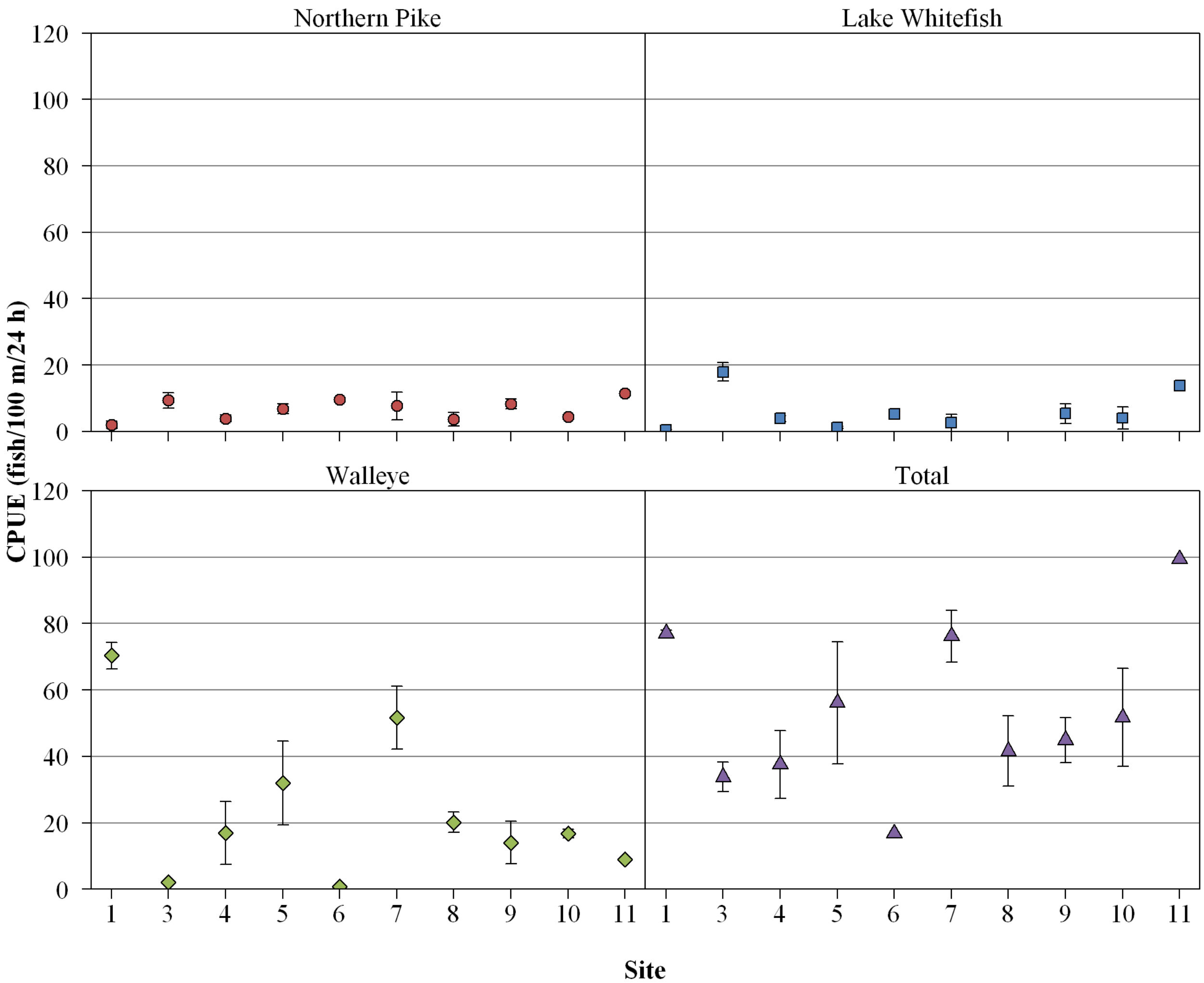


Figure 5.7.7-32. Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Assean Lake, 2009 and 2010.

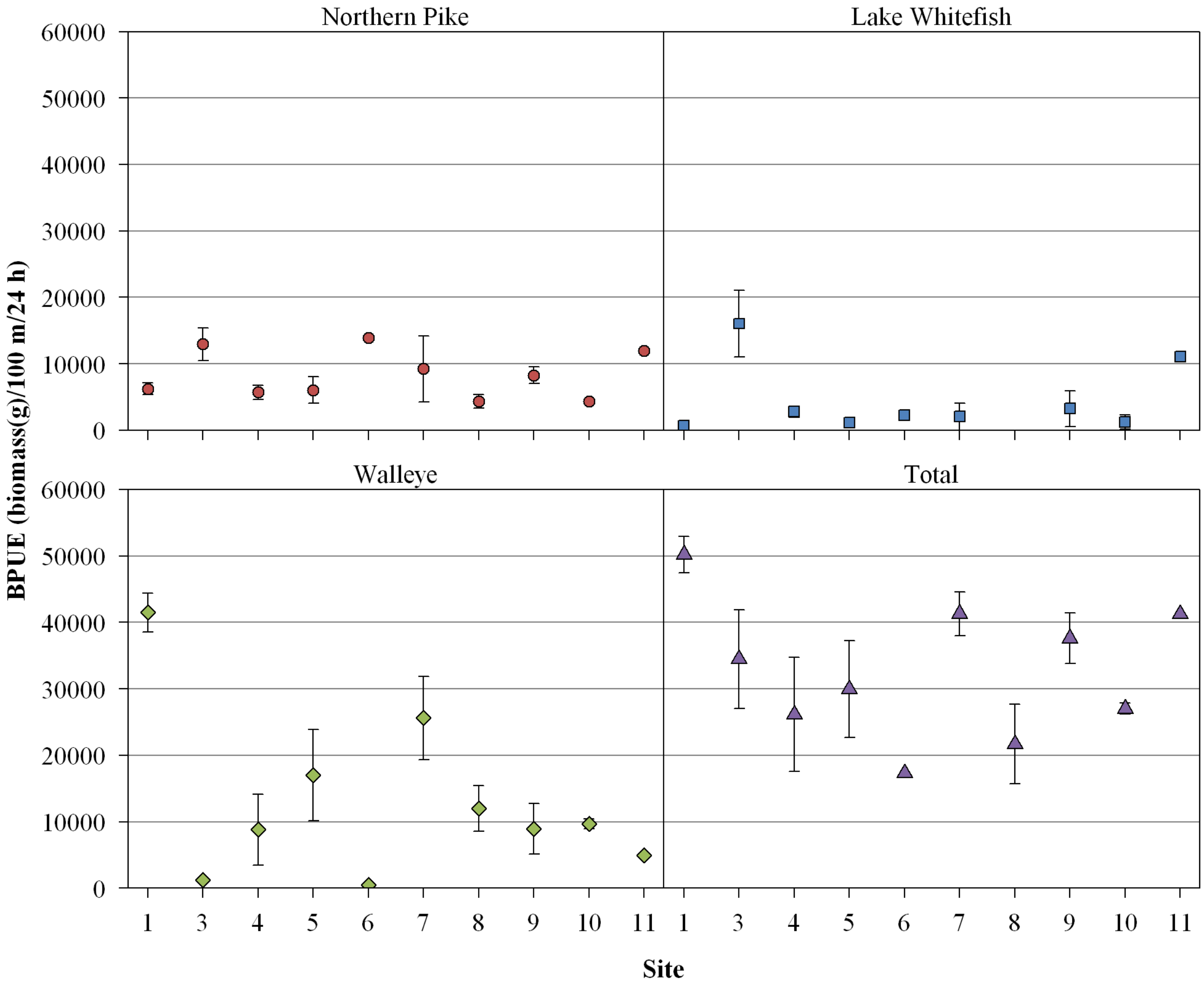


Figure 5.7.7-33. Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Assean Lake, 2009 and 2010.

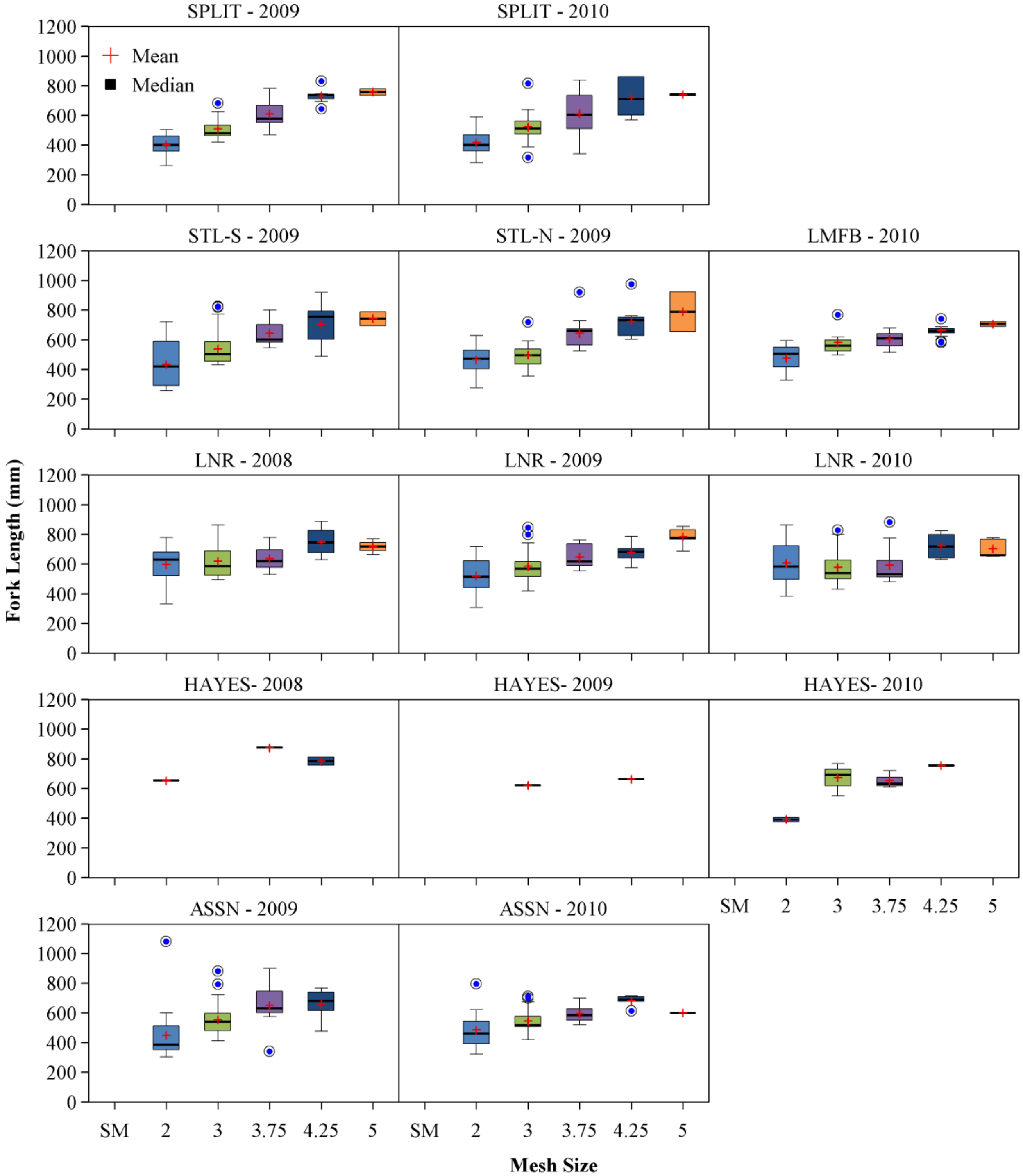


Figure 5.7.7-34. Mean and median (range) fork length (mm) per mesh size calculated for Northern Pike captured in standard gang and small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

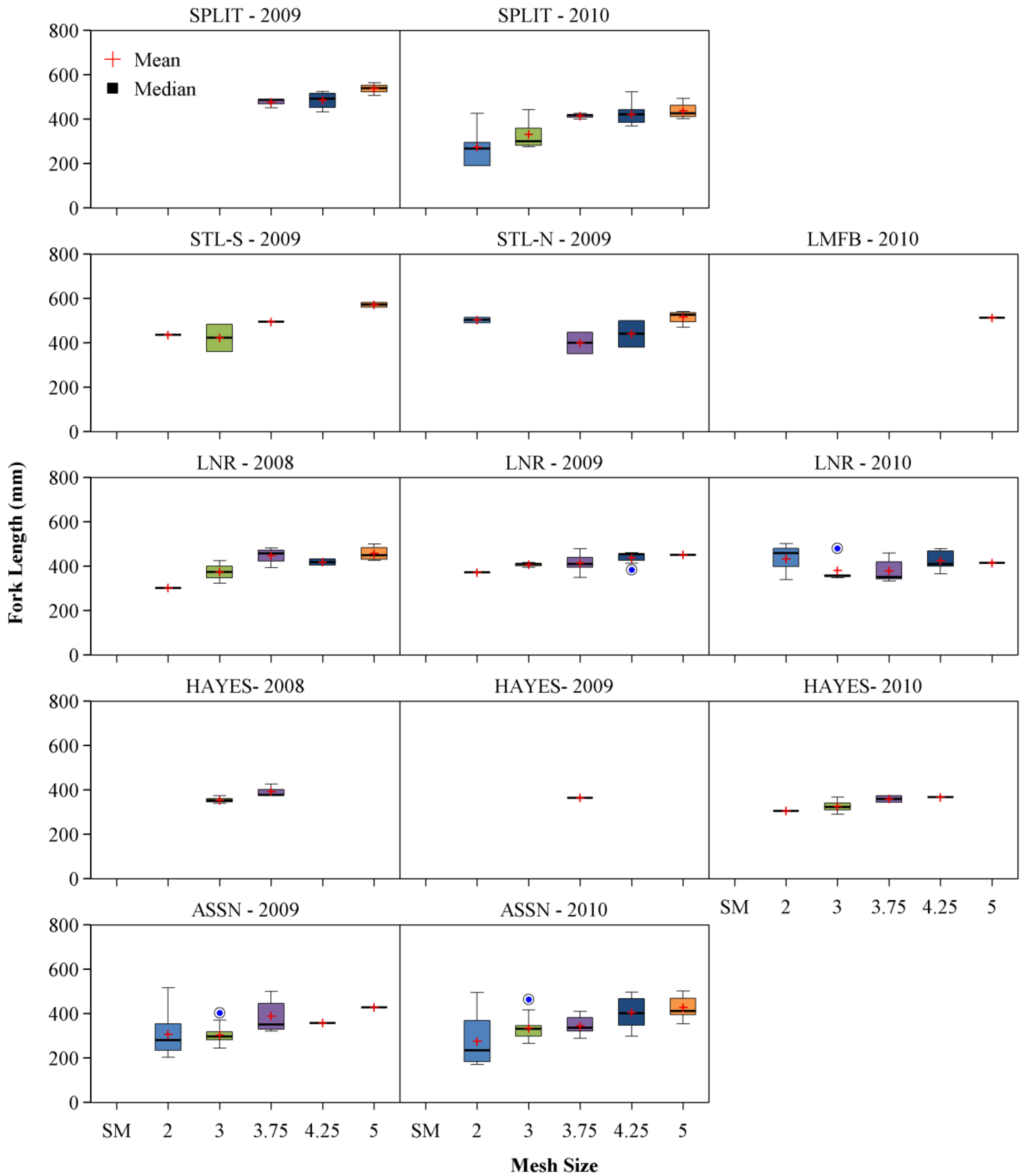


Figure 5.7.7-35. Mean and median (range) fork length (mm) per mesh size calculated for Lake Whitefish captured in standard gang and small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

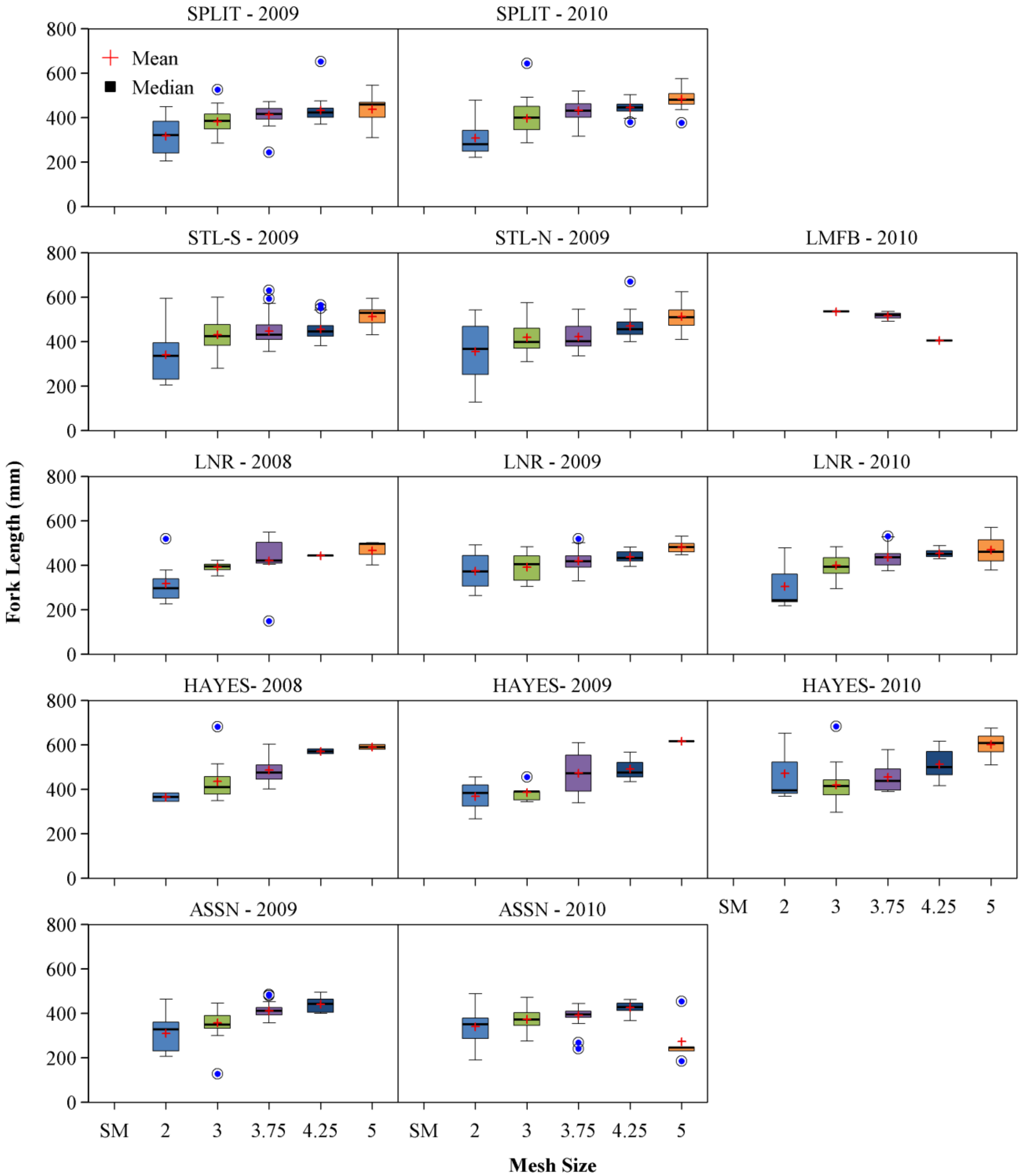


Figure 5.7.7-36. Mean and median (range) fork length (mm) per mesh size calculated for Walleye captured in standard gang and small mesh index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

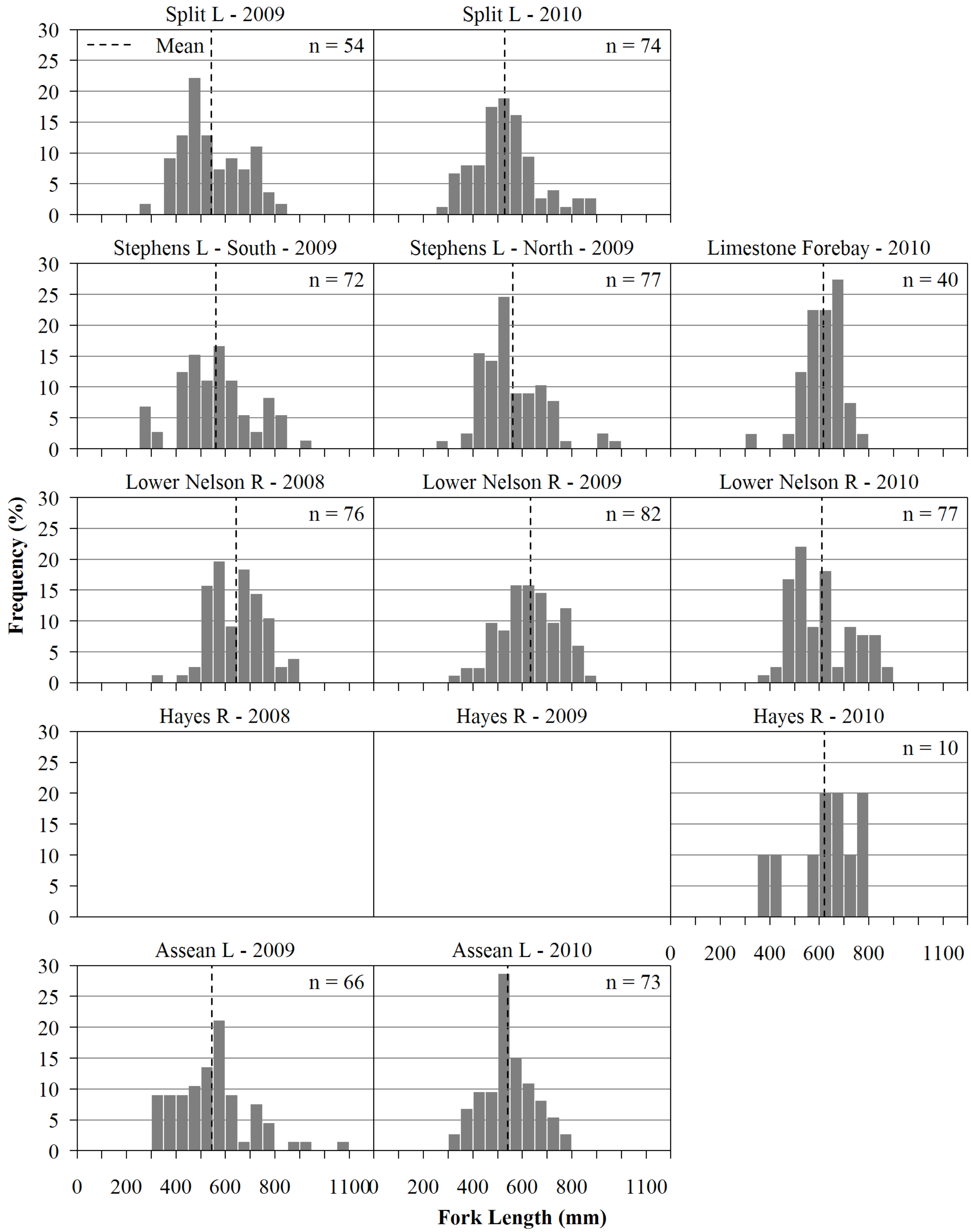


Figure 5.7.7-37. Fork length frequency histograms for Northern Pike captured in Lower Nelson River Region waterbodies, 2008-2010.

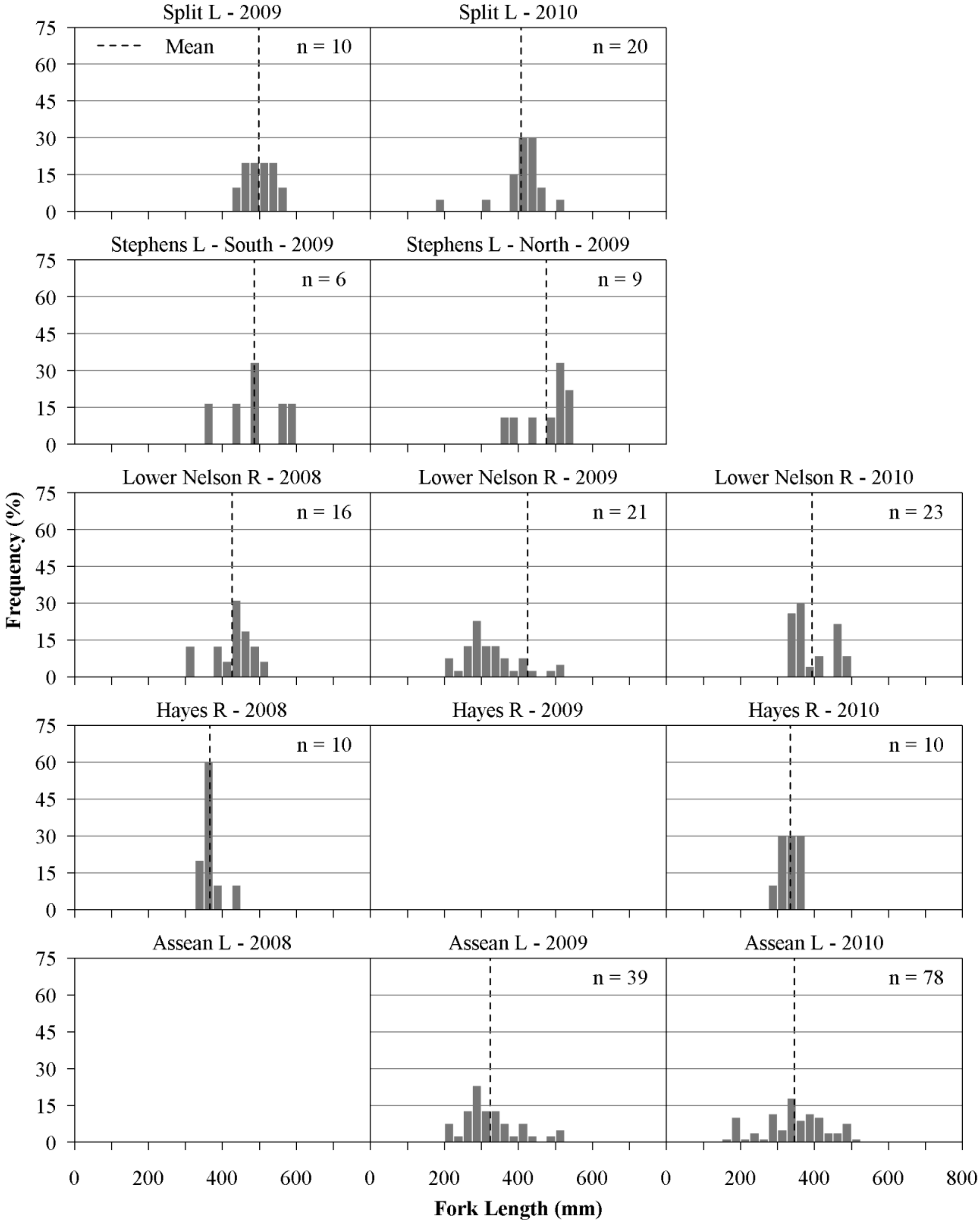


Figure 5.7.7-38. Fork length frequency histograms for Lake Whitefish captured in Lower Nelson River Region waterbodies, 2008-2010.

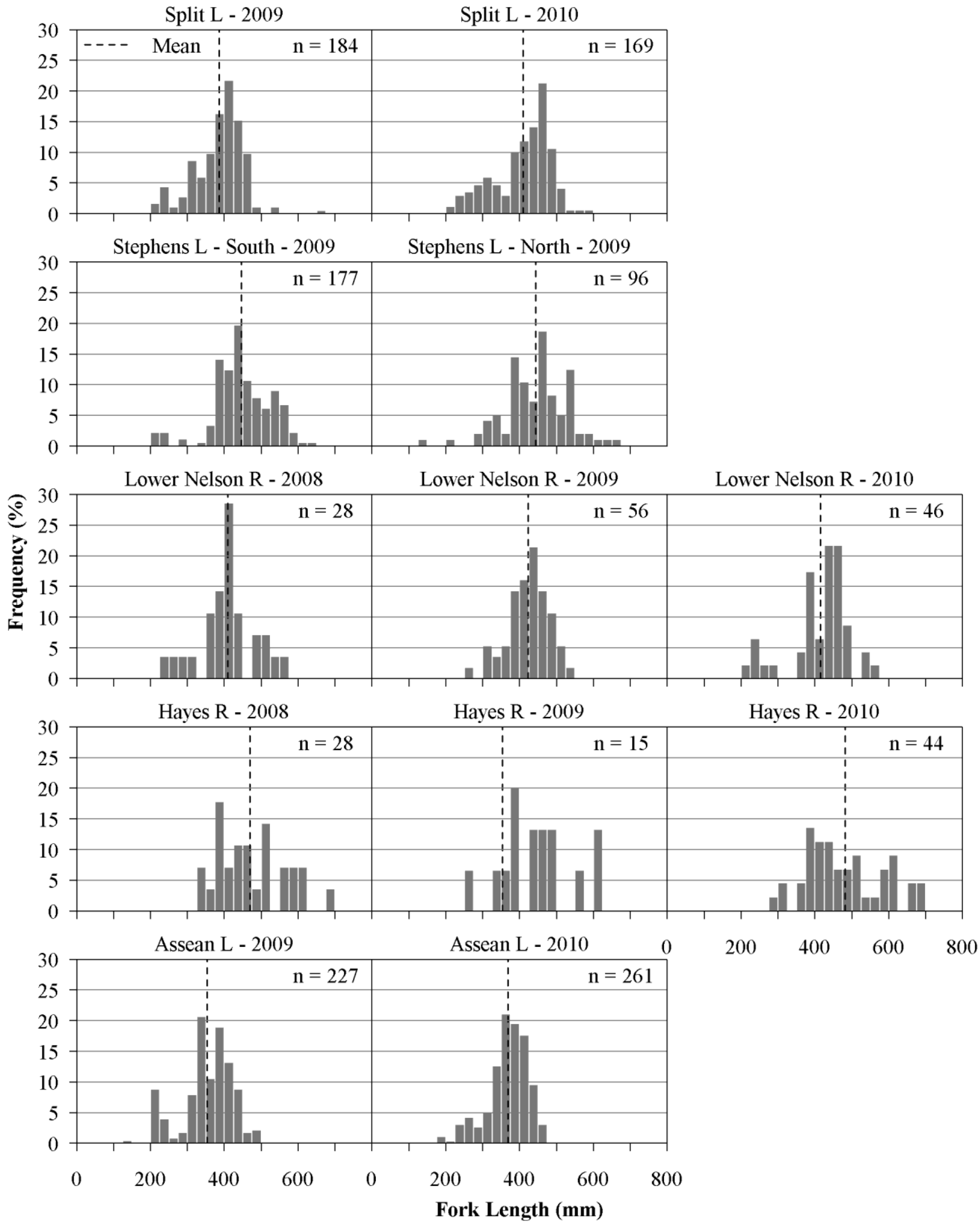


Figure 5.7.7-39. Fork length frequency histograms for Walleye captured in Lower Nelson River Region waterbodies, 2009 and 2010.

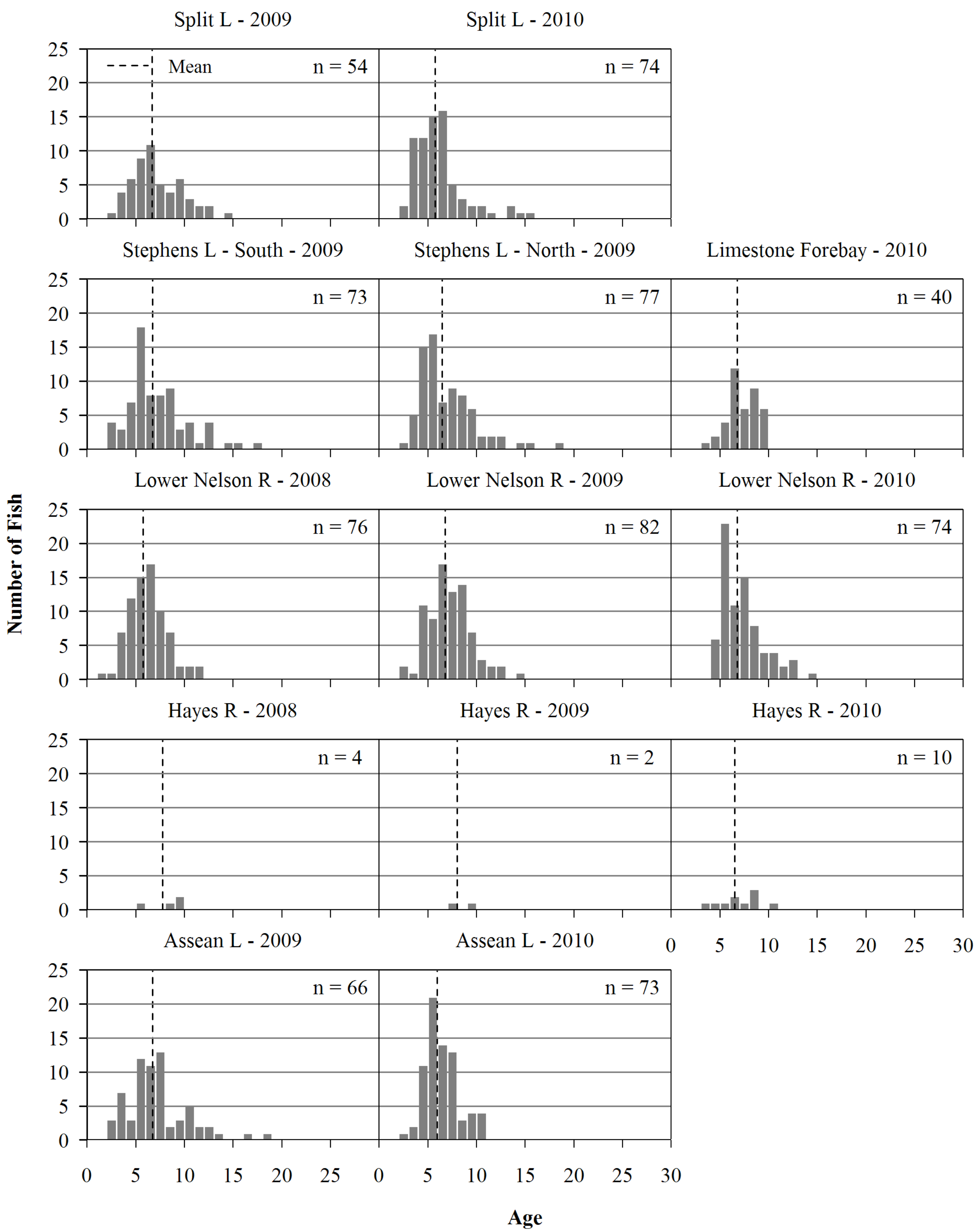


Figure 5.7.7-40. Catch-at-age plots for Northern Pike captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

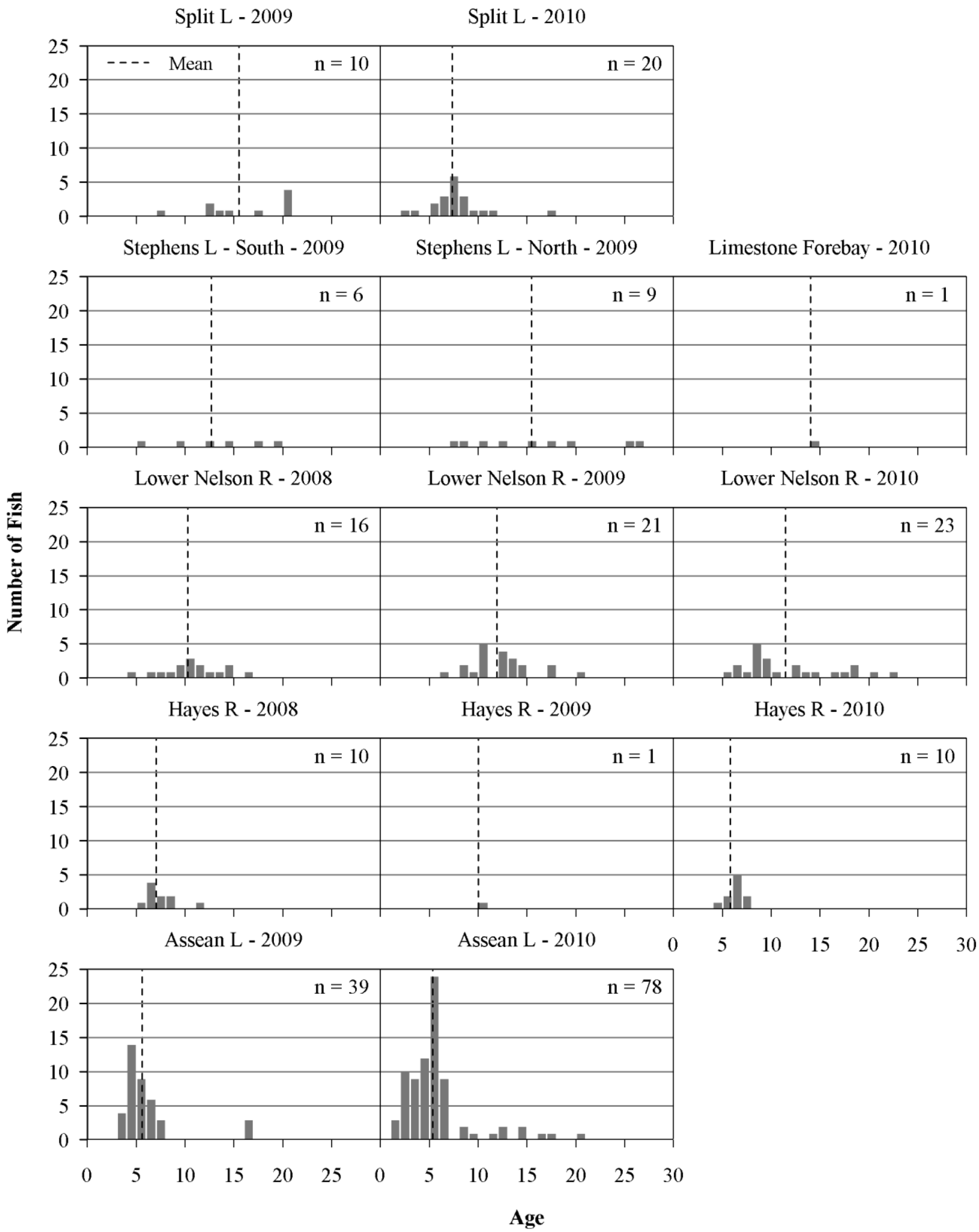


Figure 5.7.7-41. Catch-at-age plots for Lake Whitefish captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

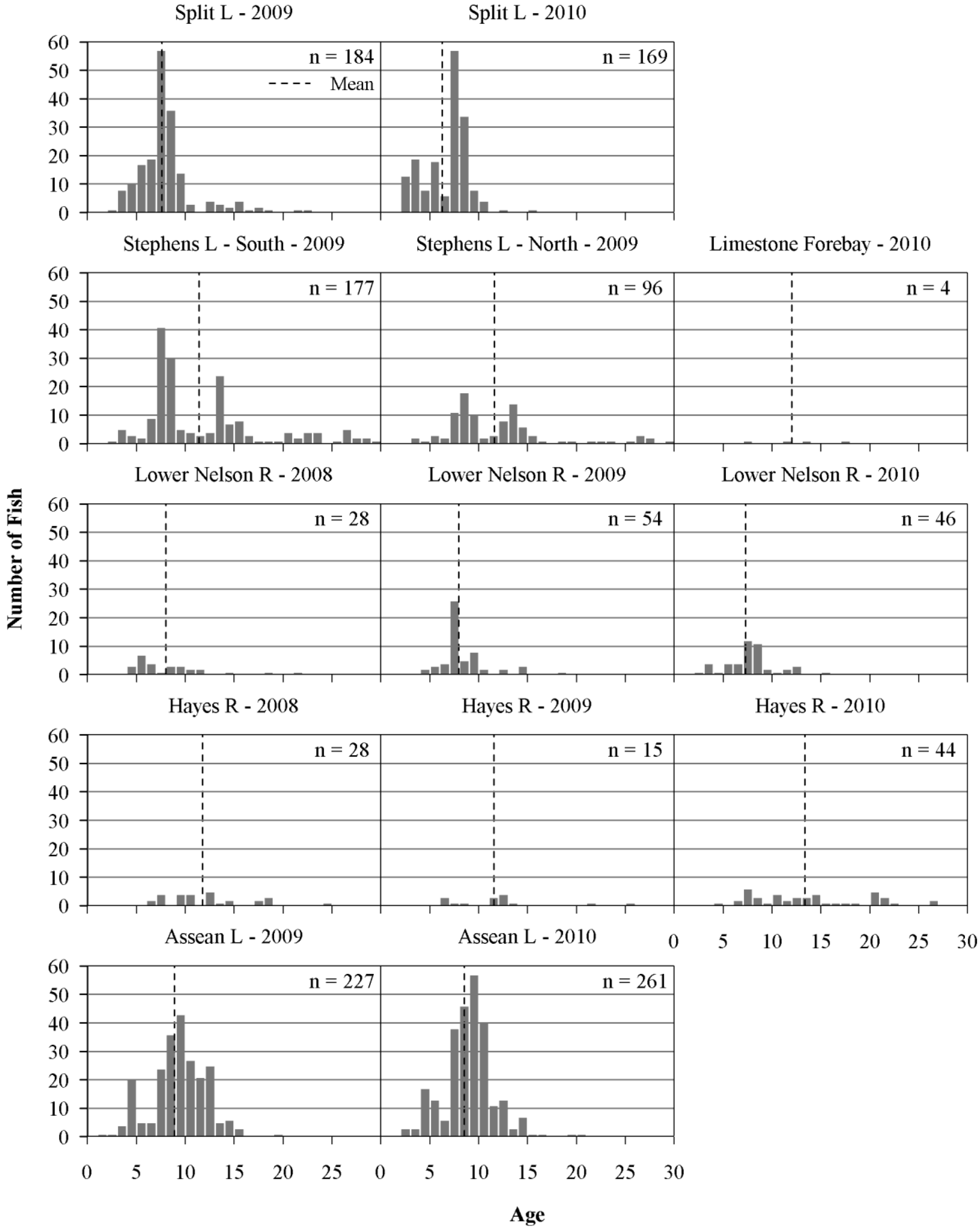


Figure 5.7.7-42. Catch-at-age plots for Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

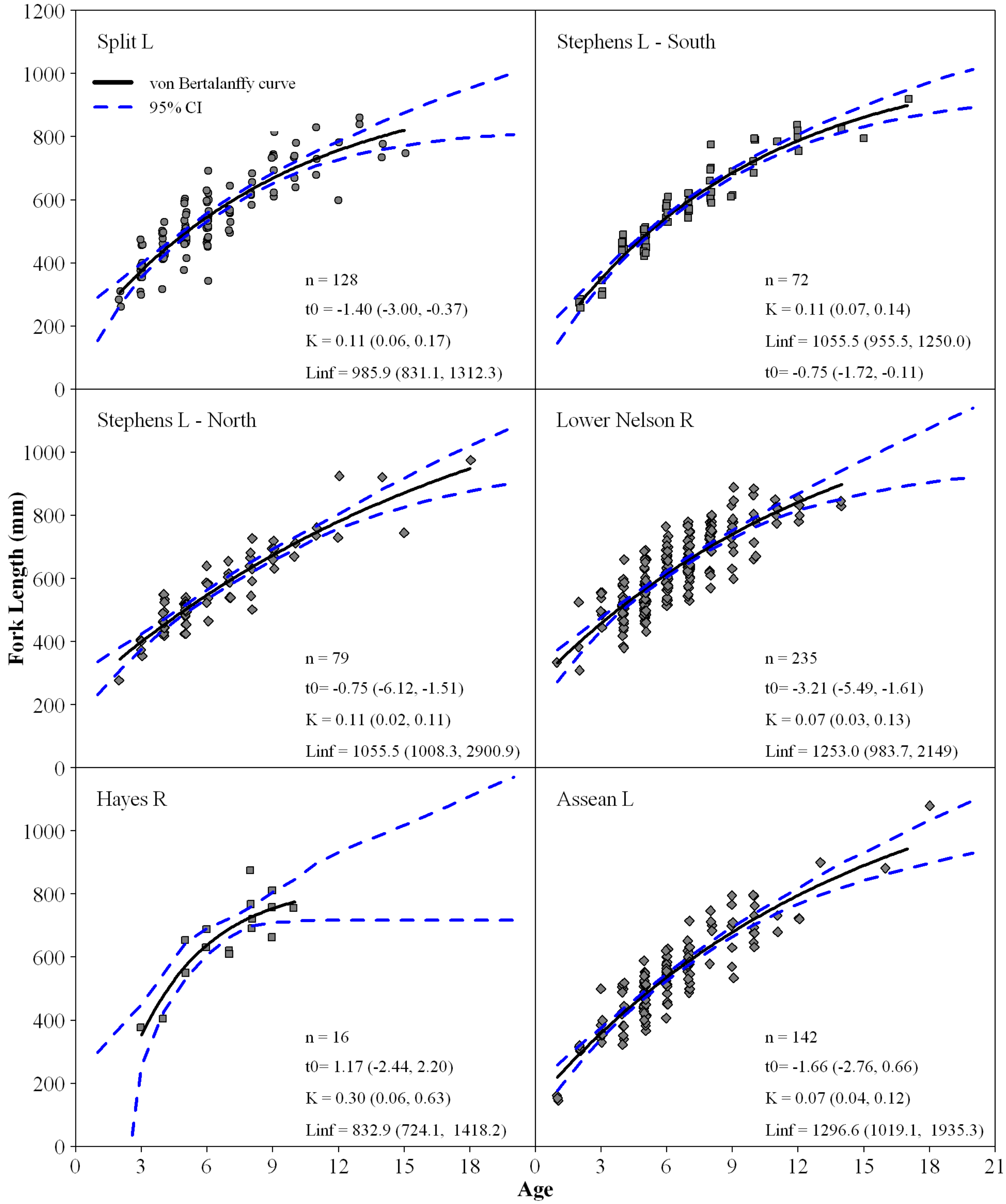


Figure 5.7.7-43. Fitted typical von Bertalanffy growth models for Northern Pike captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

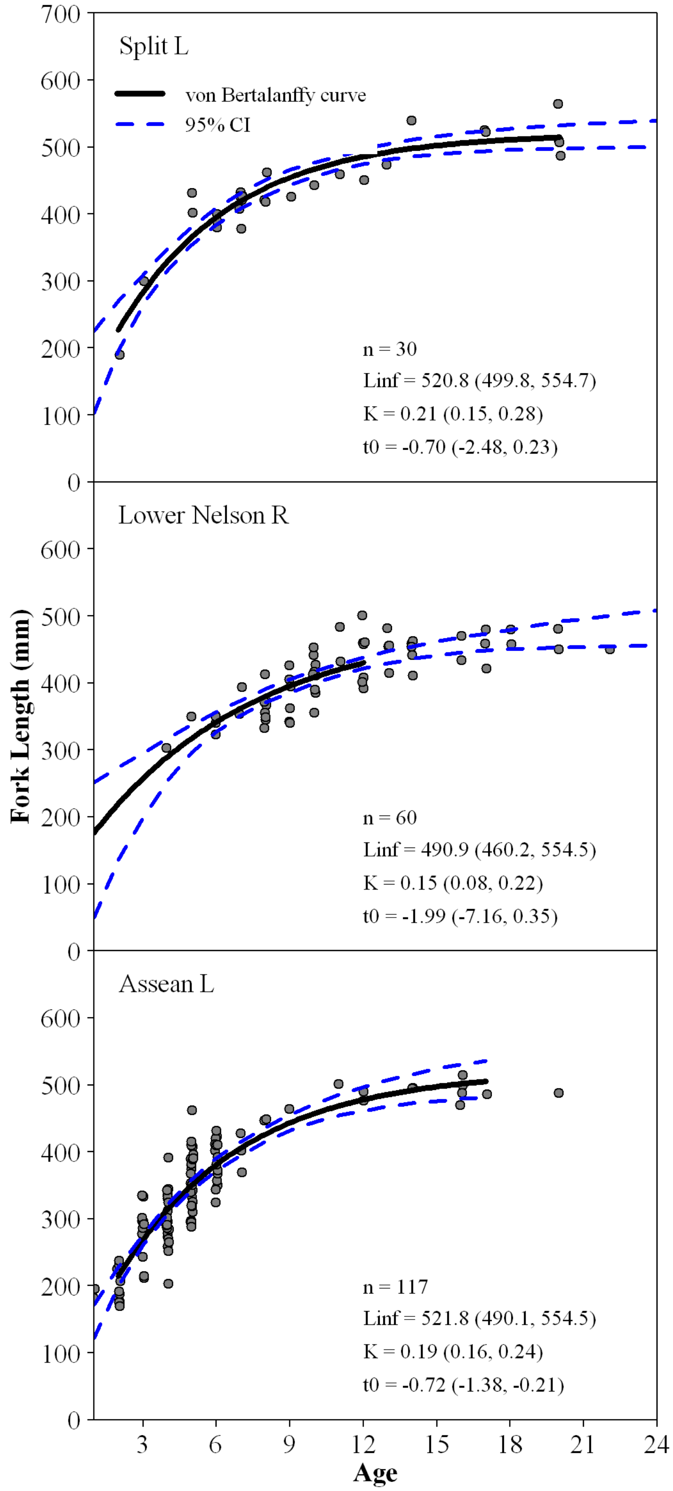


Figure 5.7.7-44. Fitted typical von Bertalanffy growth models for Lake Whitefish captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

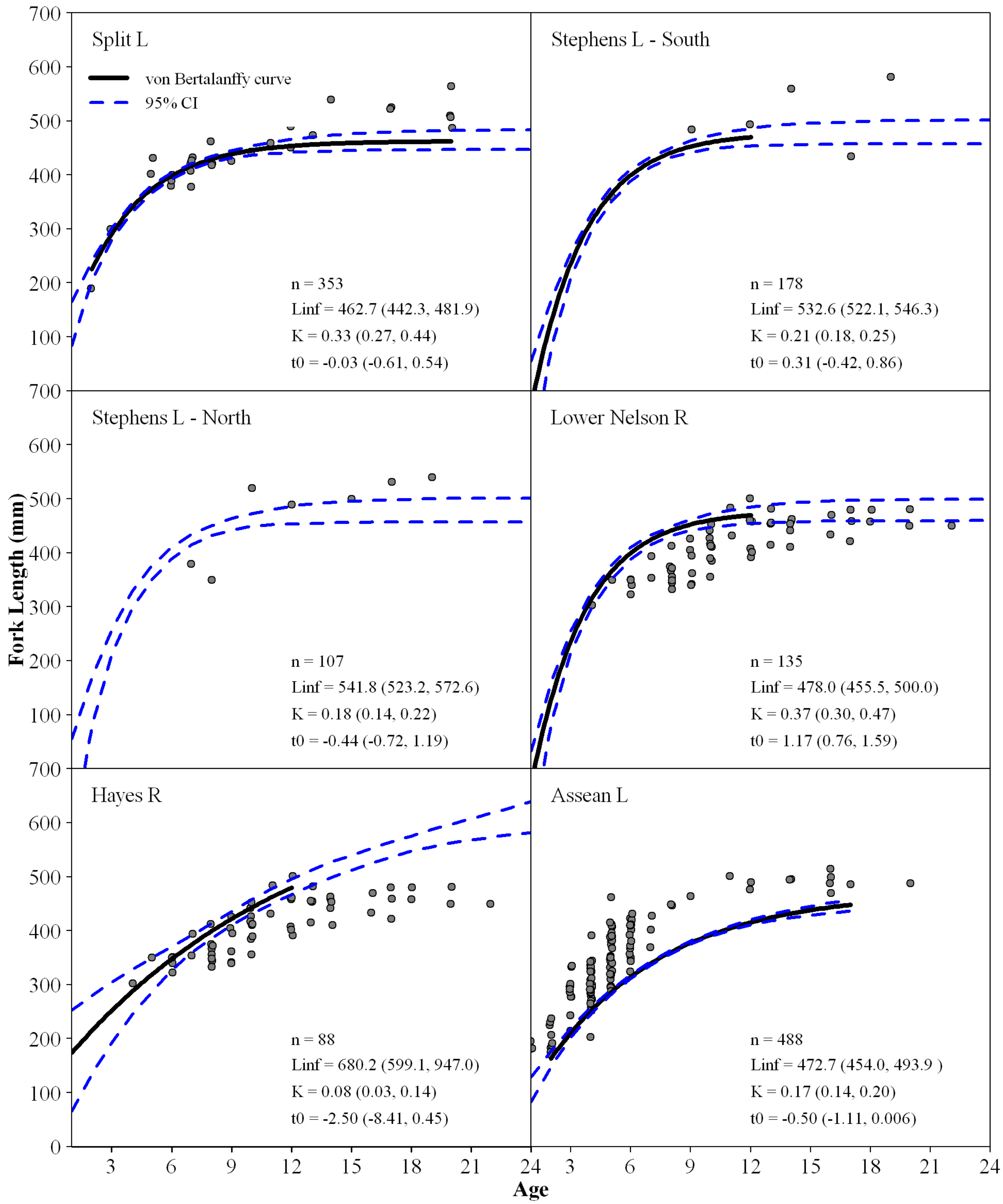


Figure 5.7.7-45. Fitted typical von Bertalanffy growth models for Walleye captured in standard gang index gill nets set in Lower Nelson River Region waterbodies, 2008-2010.

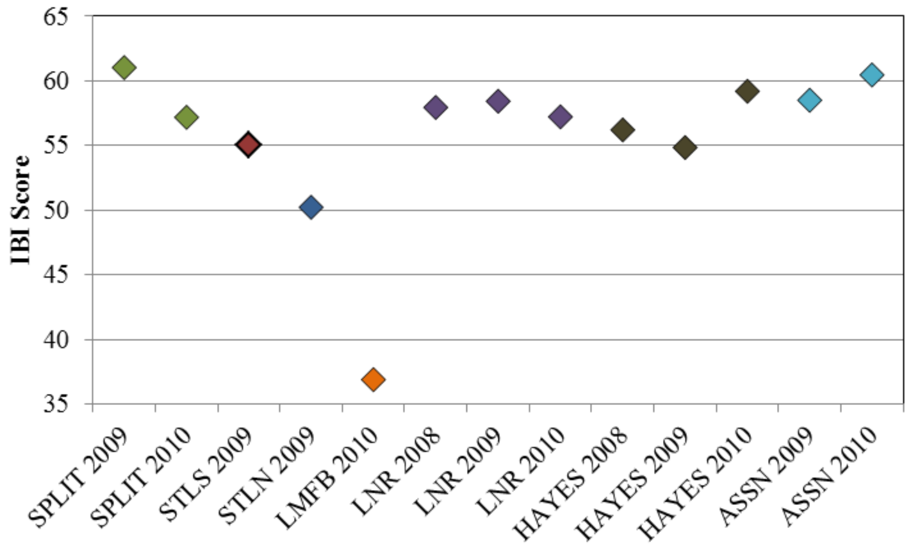


Figure 5.7.7-46. Scatter plot of yearly IBI scores for Lower Nelson River Region waterbodies, 2008-2010.

5.7.8 Fish Mercury

The following provides an overview of the results of fish mercury monitoring conducted in the Lower Nelson River Region under CAMPP. Waterbodies sampled include Split Lake, Stephens Lake South, the Limestone Forebay, the lower Nelson River downstream of the Limestone GS, and two off-system waterbodies, the Hayes River and Assean Lake (Figures 5.7.8-1 to 5.8.7-6). Stephens Lake was sampled in 2009, while fish from all other waterbodies were collected in 2010. Details of sampling locations, times, and methodology are provided in Appendix 1.

5.7.8.1 Species comparisons

A total of 452 fish collected from the Lower Nelson River Region in 2009 and 2010 were analyzed for mercury. In addition to analysis of target fish species, mercury was analysed in two incidental Lake Sturgeon mortalities (one each from the lower Nelson and Hayes rivers; Table 5.7.8-1). No Yellow Perch of suitable size were captured from any waterbody in the region and the target sample size of 36 fish each for Northern Pike, Walleye, and Lake Whitefish was not captured from several waterbodies (Figure 5.7.8-1).

Mercury concentration and fish length were significantly positively correlated for all species with a sample size of five or more fish (Figures 5.7.8-7 and 5.7.8-8). The significant relationships between fish mercury concentration and fork length indicated that length-standardization of mercury concentrations was necessary for comparative purposes. Not including Lake Whitefish, Northern Pike, and Walleye from Assean Lake, length-standardized concentrations were often substantially lower than the corresponding arithmetic concentrations (Table 5.7.8-1), reflecting the fact that mean lengths of individuals captured for mercury analysis for these three species were generally larger than their respective standard lengths (Table 5.7.8-2). This pattern was particularly pronounced for Lake Whitefish from Stephens Lake and the lower Nelson River, and Walleye from the Hayes River.

Arithmetic mean mercury concentrations in Walleye were significantly lower than those of Northern Pike in Split Lake whereas the reverse pattern occurred for the Hayes River where mercury concentrations in Walleye were almost triple that of Northern Pike (Table 5.7.8-1). Mercury bioaccumulates over time in fish, and age is often a better predictor of mercury concentrations than length in CAMPP target species (Jansen and Strange 2007b). Therefore, the large age differences between Northern Pike and Walleye (Table 5.7.8-2) likely contributed to the observed differences in mercury concentrations of the two species in the Hayes River.

Arithmetic mean mercury concentrations in the two piscivorous species (i.e., Northern Pike and Walleye) were significantly higher than in the benthivorous Lake Whitefish for all waterbodies sampled where 10 or more Lake Whitefish were collected (i.e., Split and Assean lakes and the lower Nelson River). However, even when significant differences existed, the percentage difference in mercury concentrations between the two piscivores and Lake Whitefish were relatively low, particularly for Split Lake and the lower Nelson River. For these two waterbodies, arithmetic mean mercury concentrations in Lake Whitefish were approximately half the concentration measured in at least one of the piscivores (Table 5.7.8-1). This was also the case for Stephens Lake, where arithmetic mercury concentration did not significantly differ between all three species. These relatively small differences in mercury concentrations between Lake Whitefish and the two predatory species is uncommon for Manitoba waters (Jansen 2010a,b; Jansen and Strange 2009, 2007a,b; Jansen 2009; Bodaly et al. 2007). In all three cases, particularly for Stephens Lake, the Lake Whitefish analyzed for mercury were relatively large (and old) and/or their sample size was relatively small (Table 5.7.8-2), indicating that the relatively high mercury concentrations may not adequately represent the population mean in each of the lakes.

5.7.8.2 Comparison to consumption guidelines

Length-standardized mercury concentrations of all species from the Lower Nelson River Region waterbodies were generally substantially below 0.5 parts per million (ppm; Table 5.7.8-1; Figure 5.7.8-8), the Health Canada standard for commercial marketing of freshwater fish in Canada (Health Canada 2007a,b) and the Manitoba aquatic life tissue residue guideline for human consumers (Manitoba Water Stewardship [MWS] 2011). With 0.46 ppm mercury, only Walleye from the Hayes River was close to the Health Canada standard and the MWS guideline. Concentrations in the remaining populations of the two piscivorous species ranged between 0.20 and 0.29 ppm, at or only slightly exceeding the 0.2 ppm guideline commonly accepted as a safe consumption limit for people eating large quantities of fish domestically (see section 4.8.2.3). With length-standardized concentrations of 0.04-0.07 ppm, Lake Whitefish remained substantially below the safe consumption limit.

Based on individual concentrations, almost 20% of Northern Pike and Walleye analyzed from the region contained concentrations of mercury in excess of 0.5 ppm (Figures 5.7.8-7 and 5.7.8-8). Approximately 70% of walleye collected in the region were captured in the Hayes River, for which 64% and 100% of individuals had concentrations above 0.5 ppm and 0.2 ppm, respectively. Northern Pike with mercury concentrations exceeding 0.5 ppm were captured from all on-system waterbodies and Assean Lake (the off-system lake) in approximately equal proportions. Conversely, no Northern Pike from the Hayes River contained mercury at a concentration above the Health Canada standard and Manitoba guideline for human consumers (i.e., 0.5 ppm). Considered collectively, more than 70% of the Walleye and 78% of the Northern

Pike analyzed for mercury in the region had concentrations above 0.2 ppm. Conversely, just over 10% of all the Lake Whitefish sampled for mercury exceeded the 0.2 ppm guideline and almost all of these fish were captured from the lower Nelson River (Figure 5.7.8-8). This location also yielded the only Lake Whitefish with a concentration above 0.5 ppm mercury. Aside from 20 Lake Whitefish and three Northern Pike (all 1-year-olds), predominantly from Assean Lake, all fish analyzed from the Lower Nelson River Region exceeded a total mercury concentration of 0.033 ppm, the Canadian Council of Ministers of the Environment (CCME) and Manitoba tissue residue guideline for methylmercury for the protection of wildlife consumers of aquatic biota (CCME 1999; updated to 2013; MWS 2011). While CAMPP monitors for total mercury rather than methylmercury in fish muscle, the vast majority of mercury in fish muscle is in the form of methylmercury (see section 4.8.2.3) and comparison to these guidelines is conservative.

5.7.8.3 Spatial Comparisons

Length-standardized mercury concentrations in Lake Whitefish from Split Lake, the lower Nelson River, and the Hayes River were similar and were significantly higher than in Lake Whitefish from Assean Lake (Figure 5.7.8-9). For Northern Pike, mercury concentrations in fish from Split Lake, Stephens Lake, the Limestone Forebay, the Nelson River, and Assean Lake were all similar, but fish from the Hayes River had significantly lower concentrations than their conspecifics from Split Lake, Stephens Lake, and the Limestone Forebay (Figure 5.7.8-9). Conversely, length-standardized concentrations in Walleye from the Hayes River, the off-system riverine site, were significantly higher compared to their conspecifics from all other waterbodies sampled in the region (Figure 5.7.8-9). Walleye from Stephens Lake and the Nelson River had significantly higher mercury concentrations than those from Split Lake, however, fish from the lower Nelson River site had similar concentrations as the upstream riverine lakes and reservoirs and Assean Lake.

Table 5.7.8-1. Arithmetic mean (± standard error, SE) and length-standardized (± 95% confidence limit, CL) mercury concentrations (ppm) in Lake Whitefish, Northern Pike, and Walleye captured from the Lower Nelson River Region in 2009 and 2010.

Waterbody	Species	n	Arithmetic	SE	Standard	95% CL
SPLIT	Northern Pike	24	0.363[c]	0.043	0.289	0.249 - 0.335
	Walleye	33	0.197[b]	0.023	0.196	0.173 - 0.222
	Lake Whitefish	16	0.092[a]	0.013	0.062	0.049 - 0.078
STL-S	Northern Pike	36	0.293	0.042	0.260	0.229 - 0.296
	Walleye	36	0.315	0.030	0.262	0.236 - 0.291
	Lake Whitefish	7	0.159	0.029	0.046	0.026 - 0.084
LMFB	Northern Pike	36	0.399	0.027	0.292	0.264 - 0.324
	Walleye	5	0.526	0.074	0.250	0.179 - 0.347
	Lake Whitefish	1	0.304	-	-	-
LNR	Northern Pike	36	0.368[b]	0.032	0.242	0.206 - 0.285
	Walleye	36	0.322[b]	0.025	0.277	0.255 - 0.302
	Lake Whitefish	21	0.178[a]	0.029	0.070	0.056 - 0.088
	Lake Sturgeon	1	0.178	-	-	-
HAYES	Northern Pike	10	0.259[a]	0.029	0.202	0.179 - 0.228
	Walleye	36	0.722[b]	0.060	0.463	0.403 - 0.532
	Lake Whitefish	9	0.063[a]	0.006	0.070	0.064 - 0.077
	Lake Sturgeon	1	0.194	-	-	-
ASSN	Northern Pike	36	0.251[b]	0.028	0.248	0.220 - 0.280
	Walleye	36	0.195[b]	0.012	0.235	0.215 - 0.257
	Lake Whitefish	36	0.039[a]	0.003	0.039	0.035 - 0.043

Note: Different superscripts indicate significant differences between species within a waterbody: forsignificant differences between standardized means (i.e., within species between waterbodies) see Figure 5.7.8-9.

Table 5.7.8-2. Mean (± standard error, SE) fork length, round weight, condition (K), and age of Lake Whitefish, Northern Pike, and Walleye sampled for mercury from the Lower Nelson River Region in 2009-2010.

Waterbody	Species	n	Length (mm)	Weight (g)	K	Age (years)
SPLIT	Northern Pike	24	583.8 ± 33.0	1936.1 ± 320.0	0.78 ± 0.01	6.0 ± 0.6
	Walleye	33	376.4 ± 19.3	853.9 ± 121.9	1.22 ± 0.02	5.2 ± 0.5
	Lake Whitefish [a]	16	411.8 ± 19.3	1323.6 ± 159.1	1.69 ± 0.06	7.5 ± 0.9
STL-S	Northern Pike	36	526.4 ± 32.5	1500.9 ± 227.0	0.75 ± 0.02	6.8 ± 0.7
	Walleye	36	419.2 ± 18.5	1241.5 ± 142.7	1.37 ± 0.02	11.5 ± 1.2
	Lake Whitefish	7	483.0 ± 28.3	2410.0 ± 428.4	1.99 ± 0.08	12.0 ± 1.9
LMFB	Northern Pike	36	611.8 ± 14.1	1815.6 ± 118.3	0.76 ± 0.01	6.7 ± 0.3
	Walleye	5	497.6 ± 24.5	1660.0 ± 189.1	1.33 ± 0.06	12.0 ± 2.1
	Lake Whitefish	1	512	2320	1.73	14
LNR	Northern Pike [b]	36	624.6 ± 22.9	2151.9 ± 252.2	0.76 ± 0.01	6.9 ± 0.4
	Walleye [c]	36	410.2 ± 14.1	979.4 ± 83.1	1.27 ± 0.02	7.2 ± 0.5
	Lake Whitefish [d]	21	400.2 ± 12.0	959.0 ± 94.2	1.40 ± 0.02	11.7 ± 1.1
	Lake Sturgeon	1	690	-	-	-
HAYES	Northern Pike	10	619.8 ± 43.6	1916.0 ± 320.4	0.71 ± 0.02	6.5 ± 0.7
	Walleye	36	470.7 ± 16.6	1350.3 ± 140.5	1.15 ± 0.02	12.9 ± 0.9
	Lake Whitefish [e]	9	318.1 ± 21.4	517.3 ± 72.8	1.45 ± 0.04	5.8 ± 0.4
	Lake Sturgeon	1	664	-	-	-
ASSN	Northern Pike	36	509.9 ± 29.0	1131.0 ± 156.7	0.65 ± 0.01	5.7 ± 0.5
	Walleye [f]	36	348.4 ± 13.3	531.0 ± 54.4	1.07 ± 0.01	7.7 ± 0.5
	Lake Whitefish [f]	36	332.6 ± 17.4	784.9 ± 112.1	1.56 ± 0.03	5.4 ± 0.7

[a]n = 15 for age; [b]n = 35 for age; [c]n = 35 for weight and K; [d]n = 19 for age; [e]n = 8 for age; [f]n = 32 for age

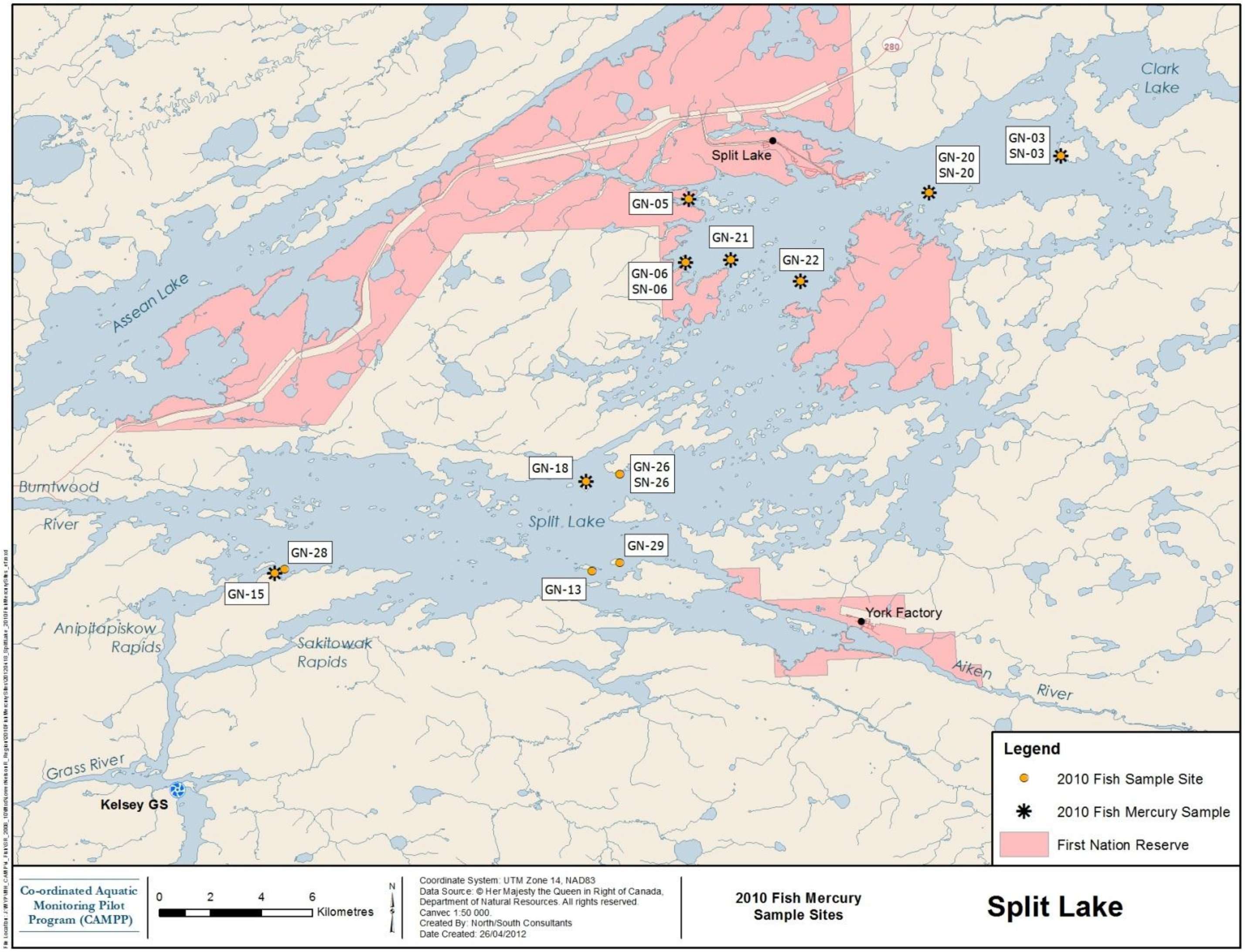


Figure 5.7.8-1. Fish sampling sites for Split Lake in 2010, indicating those sites where fish were collected for mercury analysis.

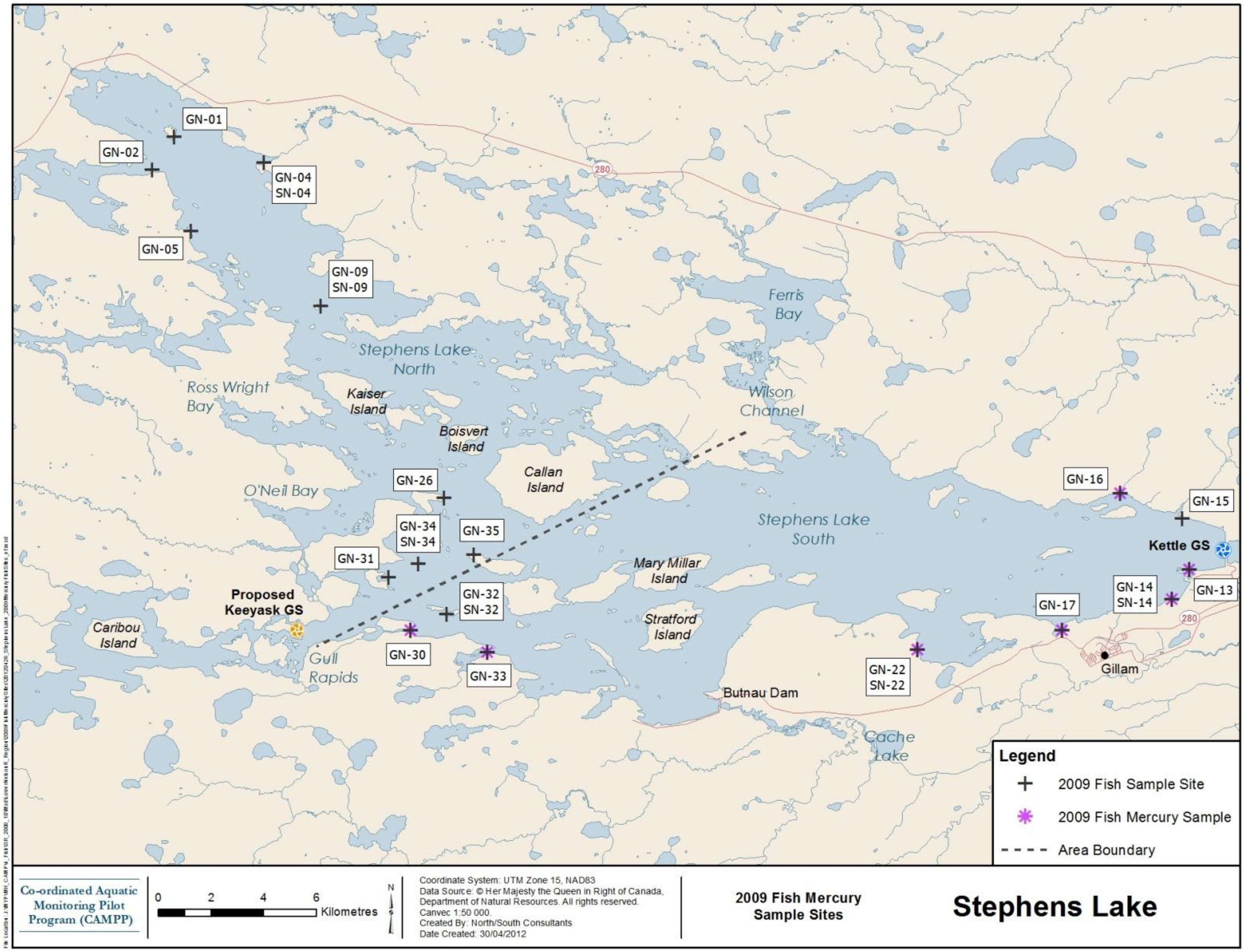


Figure 5.7.8-2. Fish sampling sites for Stephens Lake South in 2009, indicating those sites where fish were collected for mercury analysis.

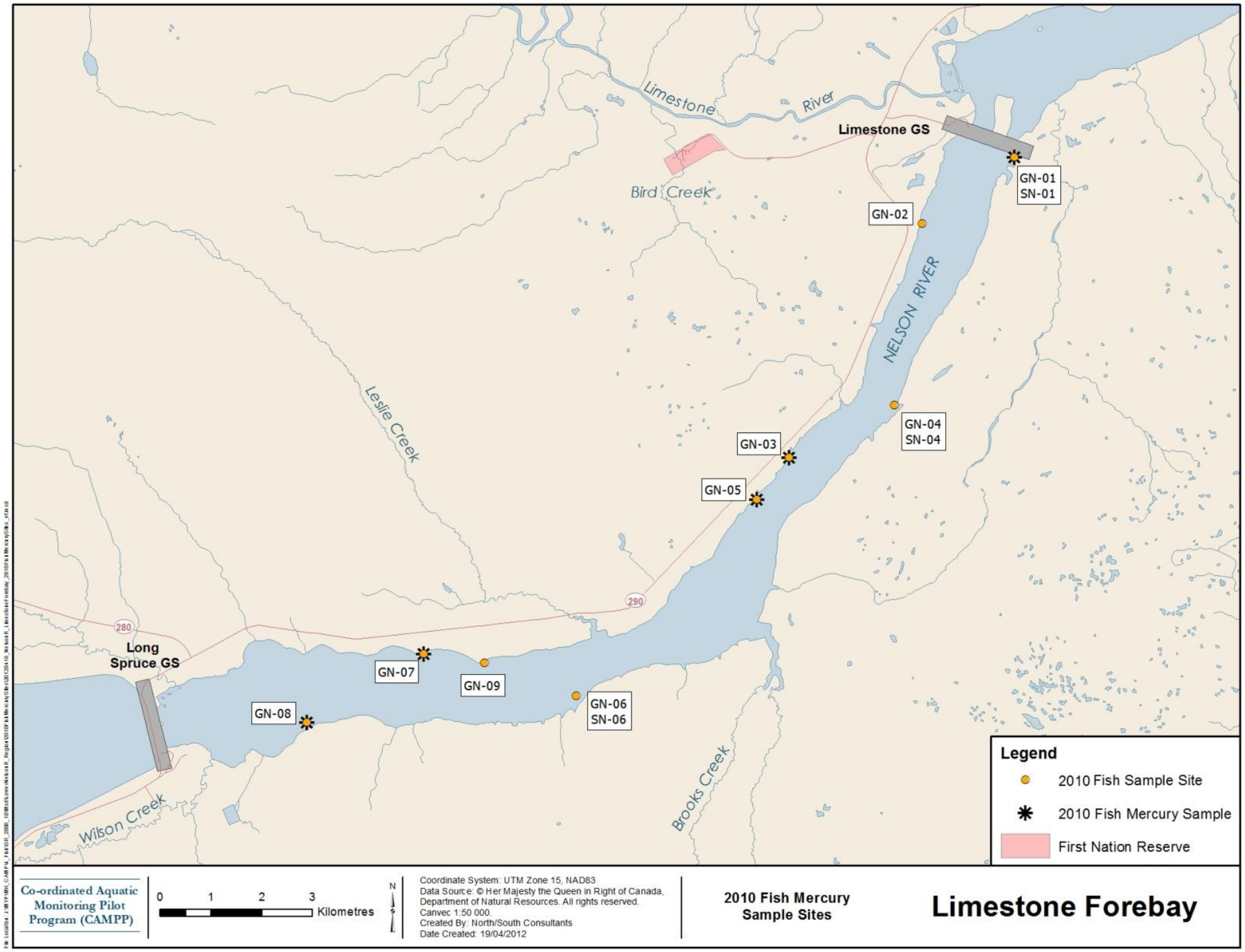


Figure 5.7.8-3. Fish sampling sites for the Limestone Forebay in 2010, indicating those sites where fish were collected for mercury analysis.

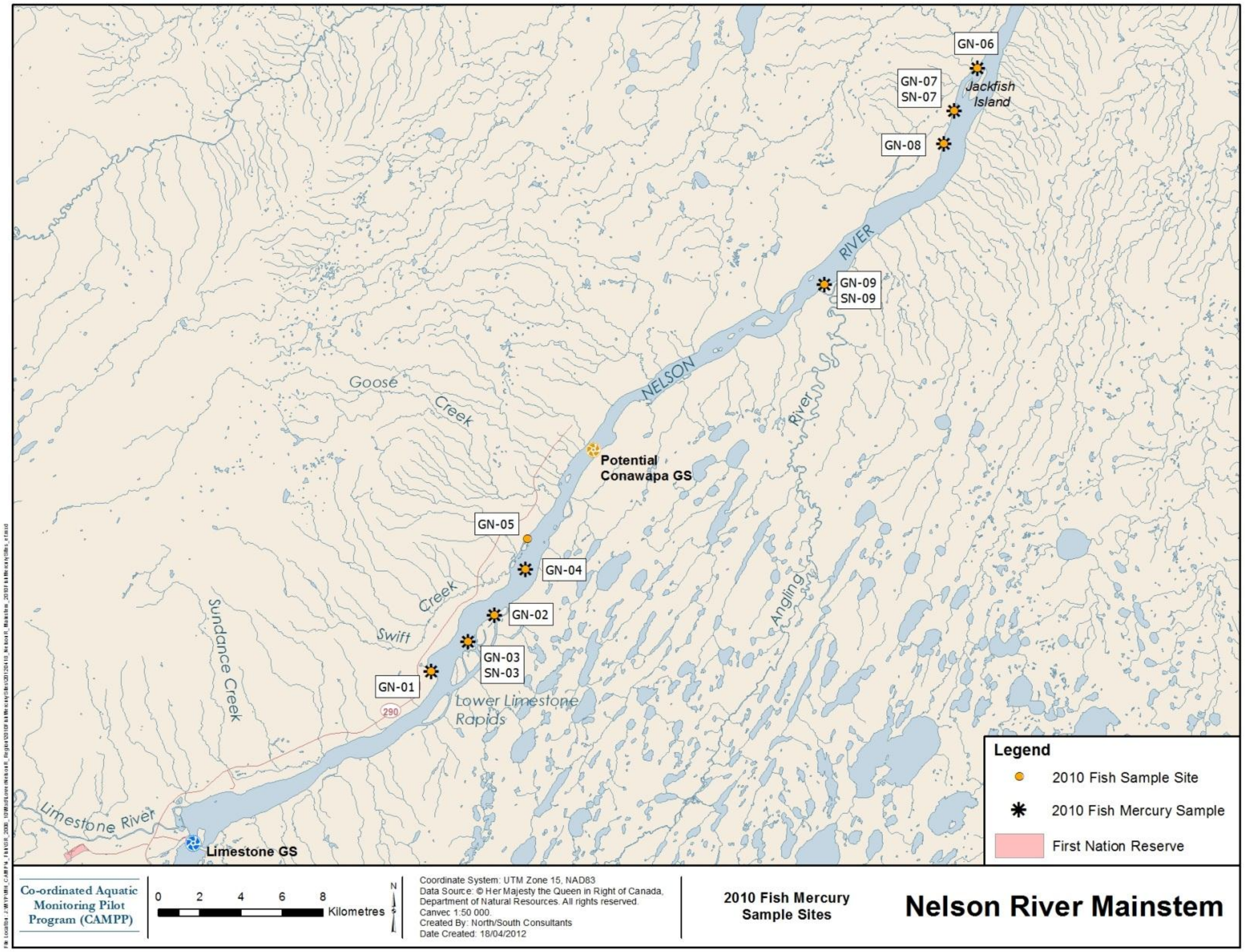


Figure 5.7.8-4. Fish sampling sites for the lower Nelson River in 2010, indicating those sites where fish were collected for mercury analysis.

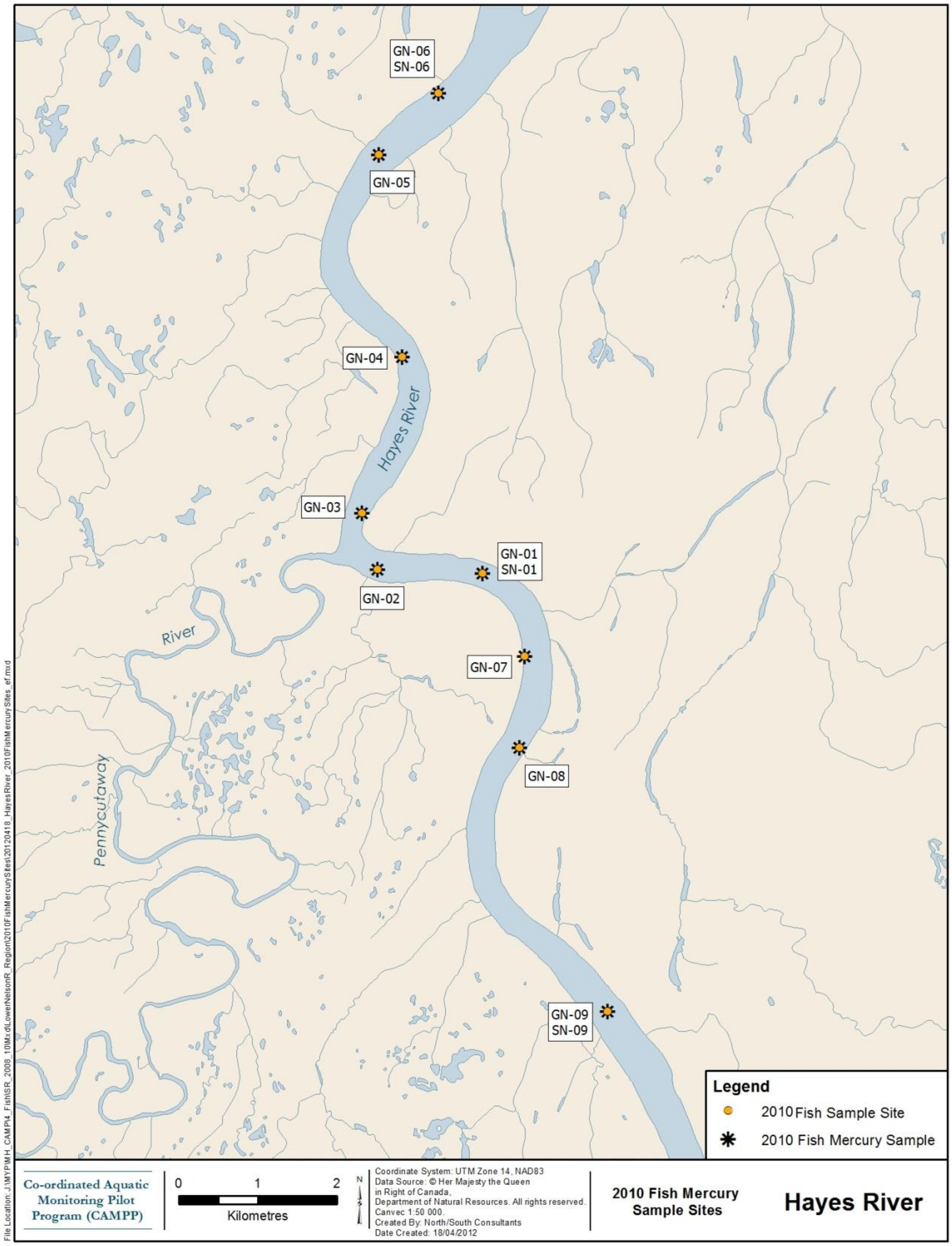


Figure 5.7.8-5. Fish sampling sites for the Hayes River in 2010, indicating those sites where fish were collected for mercury analysis.

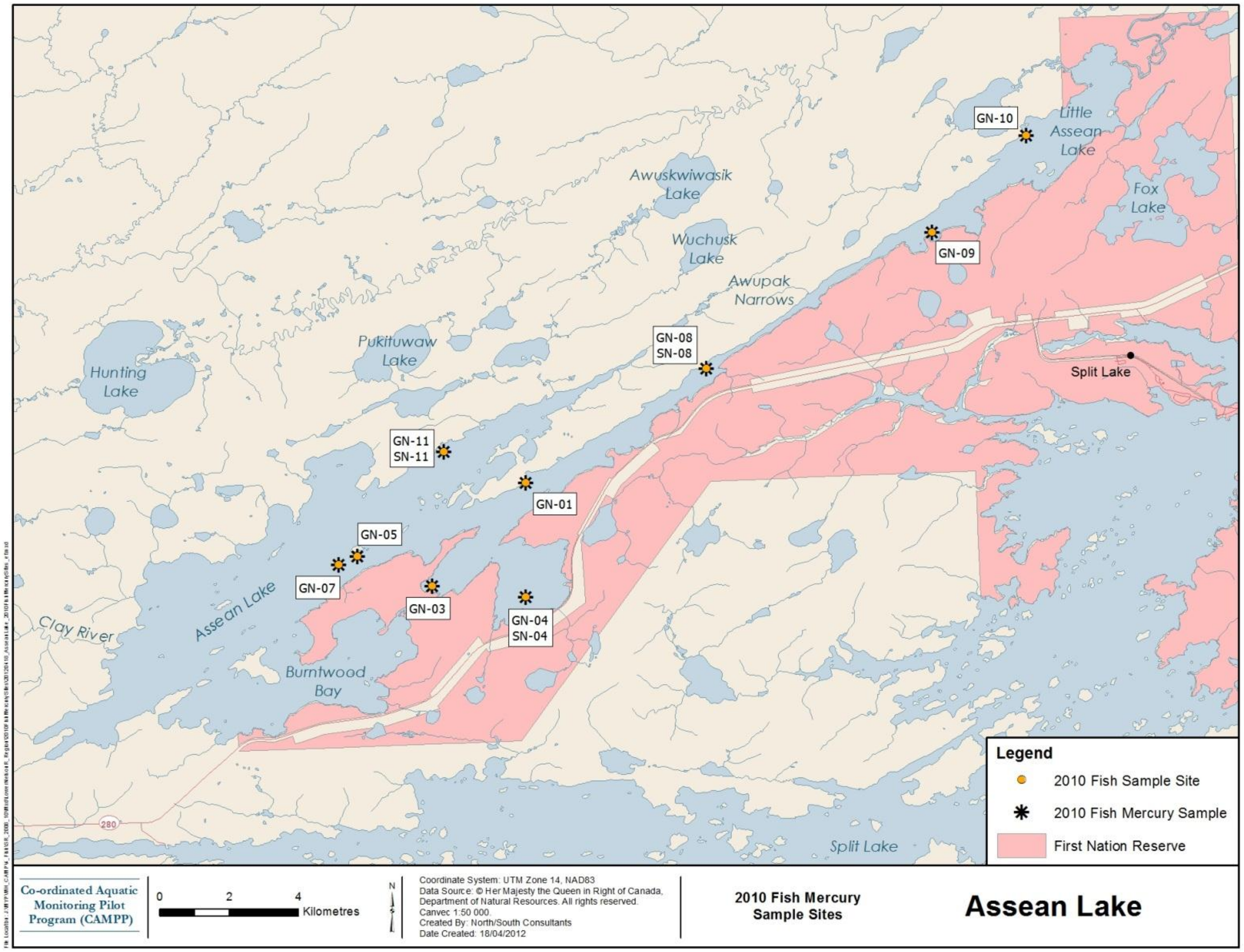


Figure 5.7.8-6. Fish sampling sites for Assean Lake in 2010, indicating those sites where fish were collected for mercury analysis.

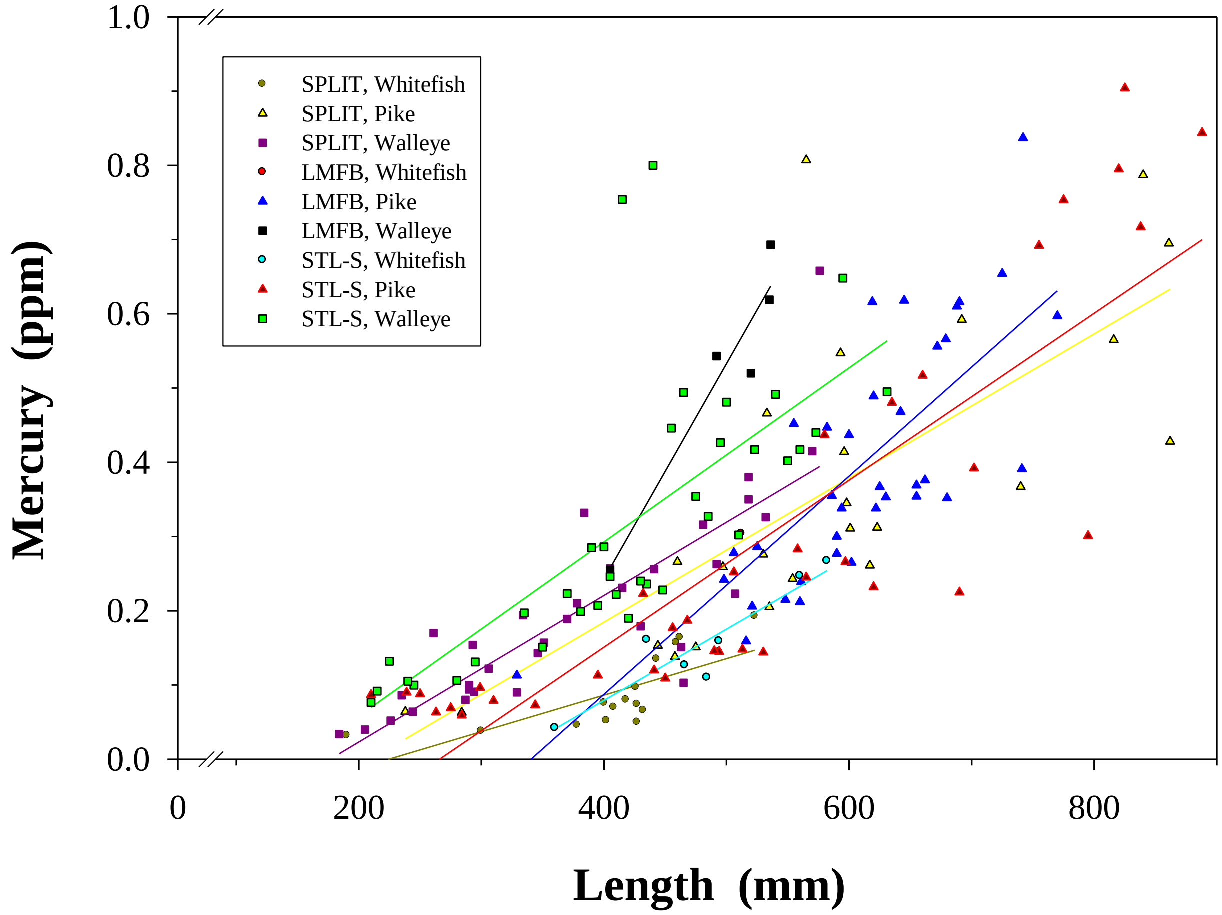


Figure 5.7.8-7. Relationship between mercury concentration and fork length for Lake Whitefish, Northern Pike, and Walleye from Stephens Lake South in 2009 and Split Lake and the Limestone Forebay in 2010. Significant linear regression lines are shown.

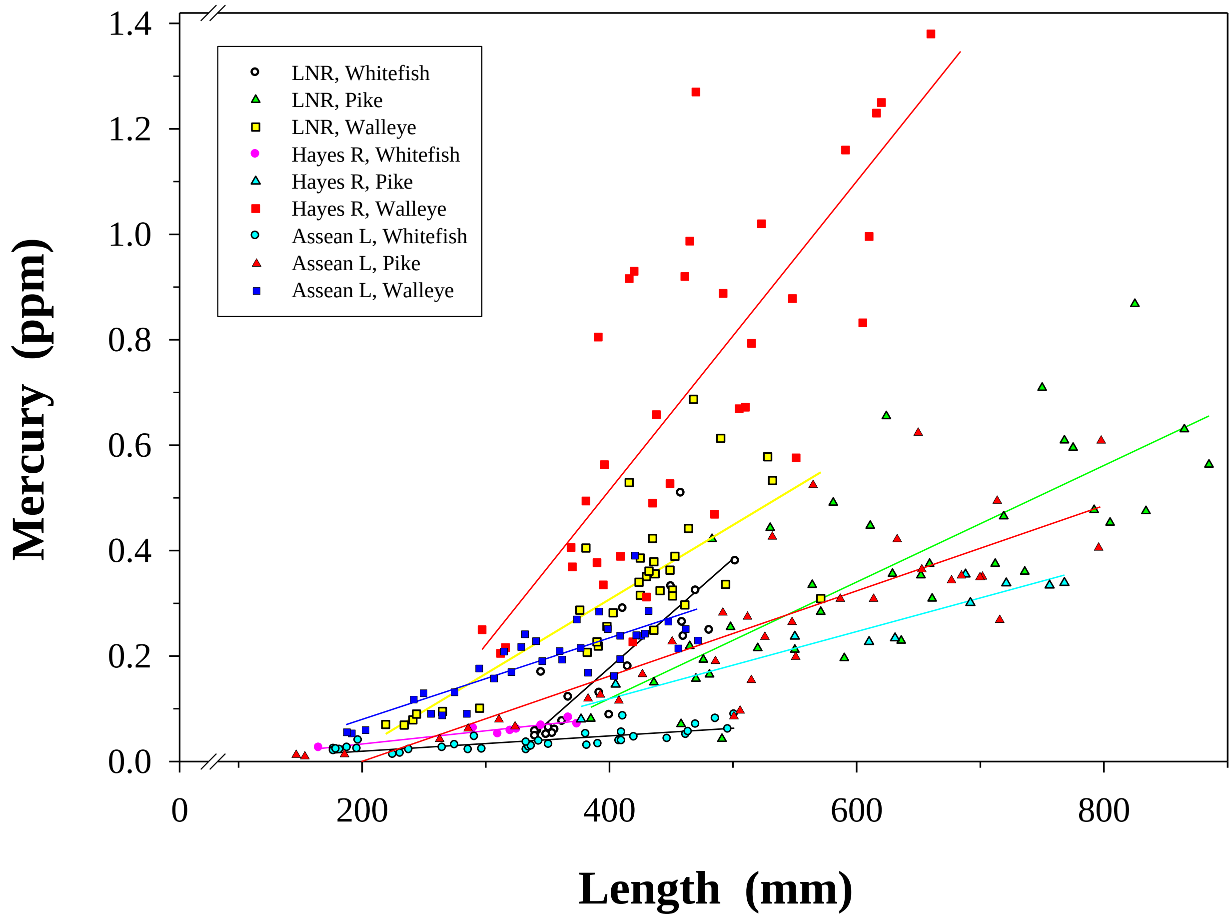


Figure 5.7.8-8. Relationship between mercury concentration and fork length for Lake Whitefish, Northern Pike, and Walleye from the lower Nelson River, the Hayes River, and Assean Lake in 2010. Significant linear regression lines are shown.

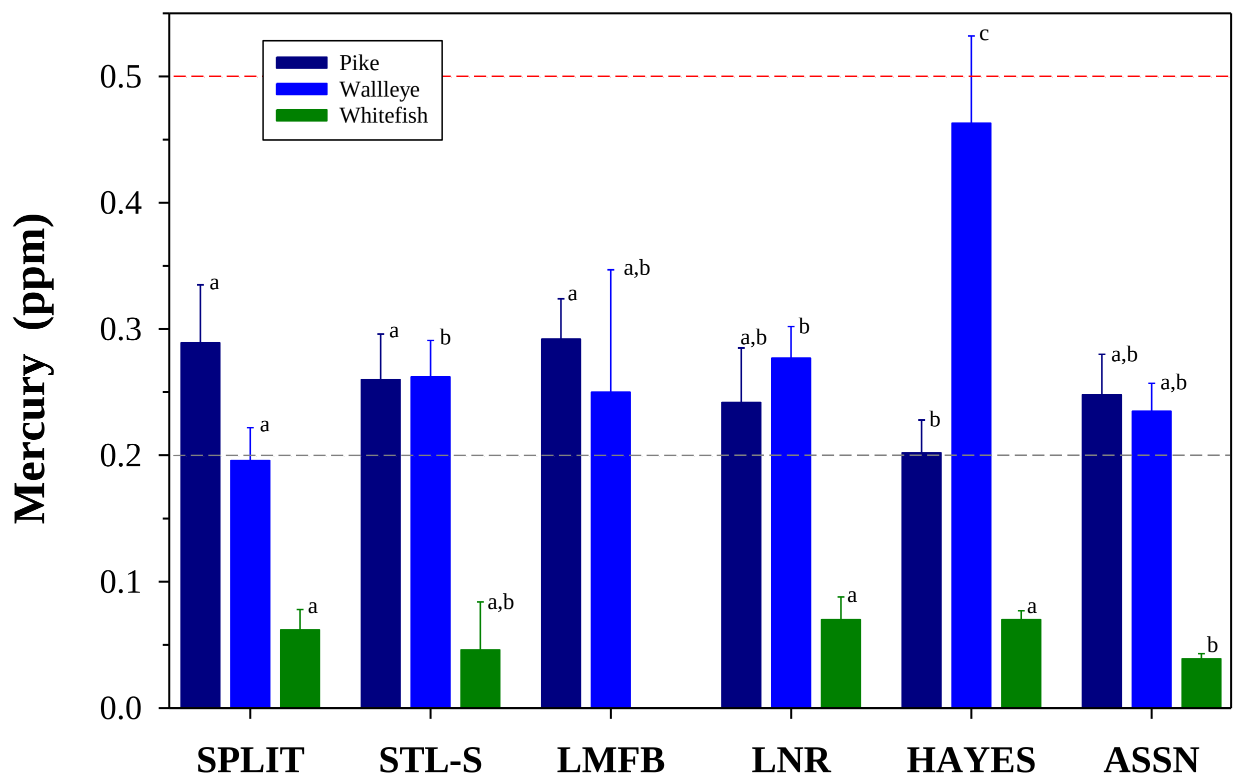


Figure 5.7.8-9. Length-standardized mean (+95% CL) muscle mercury concentrations of Northern Pike, Walleye, and Lake Whitefish from the Lower Nelson River Region in 2009 and 2010. Means with different superscripts indicate a significant difference between waterbodies within species. Stippled lines indicate the 0.5 ppm standard and the 0.2 ppm guideline for human consumption.