Manitoba/Manitoba Hydro

Coordinated Aquatic Monitoring Pilot Program (CAMPP):

Three Year Summary Report (2008-2010) - Volume 5

Results of the Three Year Program

Section 5.4: Lower Churchill River Region

VOLUME 5

SECTION 5.4: LOWER CHURCHILL 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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5.4 LOWER CHURCHILL RIVER REGION

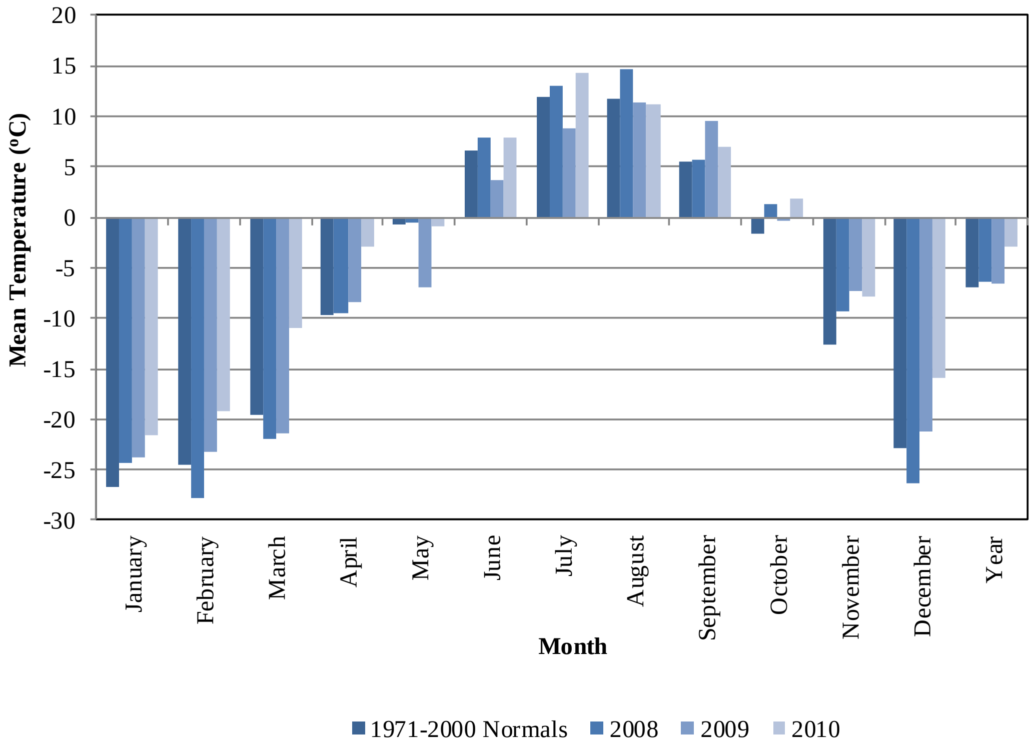
The following presents the results of the Coordinated Aquatic Monitoring Pilot Program (CAMPP) conducted over the period of 2008/2009 through 2010/2011 in the Lower Churchill River Region.

5.4.1 Climate

Annual mean temperatures at Churchill were slightly above normal in 2008, 2009, and 2010 (Figure 5.4.1-1). Considering the months of June-September (when biological and chemical monitoring was conducted), monthly mean temperatures in 2008 and 2010 were near or above normal whereas June and July 2009 were below normal.

Monthly precipitation data were not available for Churchill from December 2008 to June 2009 inclusive. Total monthly precipitation at Churchill varied from the monthly 1971-2000 precipitation normal (Figure 5.4.1-1). In June 2008, July 2009 and 2010, and August 2008 and 2010 total precipitation was noticeably greater than the precipitation normals. Precipitation peaked in August 2008 at 148 mm, July 2009 at 92 mm, and August 2010 at 181 mm. Overall, annual precipitation was very similar to the normal in 2010; comparisons between total precipitation for the years 2008 and 2009 and normal cannot be made due to incomplete data sets. However, 2008 was characterized by higher total precipitation for the period of January through November than the total annual normal indicating a relatively wet year.

(A)



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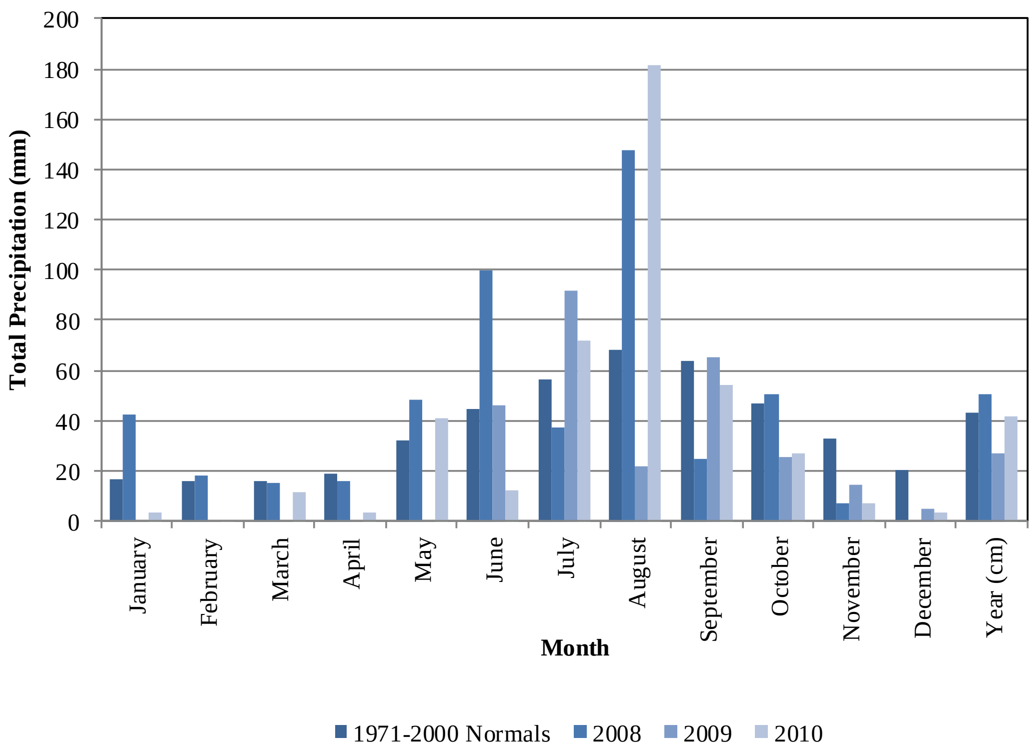


Figure 5.4.1-1. Monthly mean air temperature and monthly total precipitation for 2008-2010 compared to climate normals (1971-2000), Churchill, MB.

5.4.2 Hydrology

Flows along the lower Churchill River have been modified as a result of the Churchill River Diversion which diverts the majority of the upper Churchill River flow through the Rat-Burntwood River system to the Nelson River for power production. The Missi Falls Control Structure releases the remaining portion of the upper Churchill River flow from Southern Indian Lake into the lower Churchill River. The lower Churchill River flows through a number of lakes where discharge is augmented by local inflows and inflows from tributaries along the way to the Churchill River Estuary at Hudson Bay. Between 2008 and 2010, CAMPP monitoring occurred in Partridge Breast Lake, Northern Indian Lake, Billard Lake, and in the lower Churchill River at the confluence with the Little Churchill River. Flows for this region are monitored at the Missi Falls Control Structure and on the lower Churchill River above Red Head Rapids. Gauer Lake was also monitored as the off-system water body for this region. Gauer Lake levels can be inferred from Gauer River flows.

With the exception of a short peak in August 2008, Missi Falls Control Structure outflows were generally close to average from 2008 to mid-2009, and well above average from mid-2009 to the end of 2009. Flows are driven by snowpack and precipitation in the upper Churchill River Basin, storage in Southern Indian Lake and flows in the Nelson River. All three of these factors influenced the flow increase in 2008. In 2010, Missi Falls outflows remained close to average for most of the year except for a short peak above the upper quartile from late-August to mid-October. At this time, high Nelson River flow resulted in less than maximum diversion flows through Notigi and higher flows through Missi Falls (Figure 5.4.2-1). In early 2011, Missi Falls outflows remained close to average from January through March.

Between 2008 and 2010, flows on the lower Churchill River above Red Head Rapids and water levels on Partridge Breast Lake, Northern Indian Lake, Billard Lake, and on the Churchill River above Swallow Rapids, near the confluence with the Little Churchill River, generally followed a similar trend to Missi Falls outflows (Figures 5.4.2-2 to 5.4.2-6). In 2010, a very low snowpack resulted in flows being at record lows from June to mid-August of 2010. Flows and water levels at these locations were all close to average in early 2011.

Between 2008 and 2010, Gauer River flows varied but were generally lower in 2008, above average in 2009 and varied from average early in 2010, to near record lows in mid-2010, and near the upper quartile in the latter part of 2010 (Figure 5.4.2-7). In early 2011, flows were close to average from January through March. Flows on Gauer River are unregulated and respond to local precipitation and Gauer Lake levels.

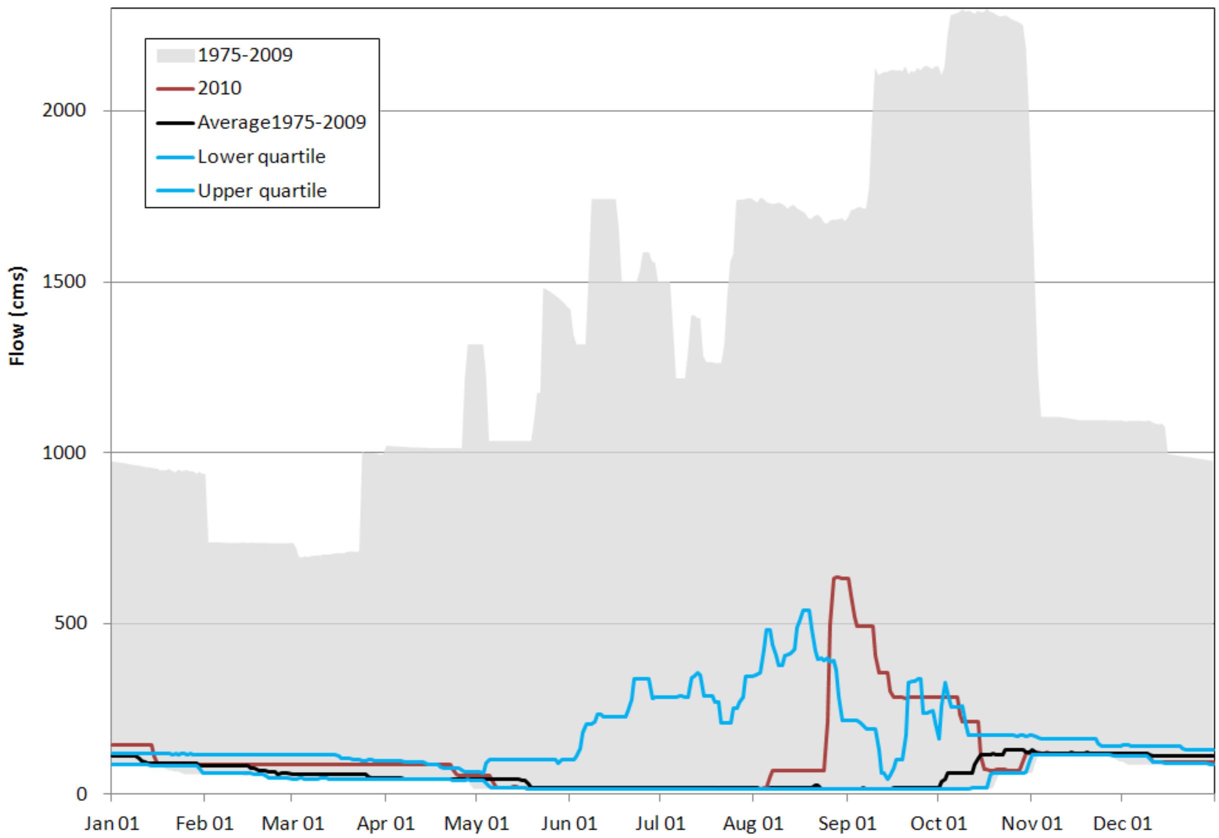


Figure 5.4.2-1. 2010 Missi Falls Control Structure (06EC702) flow.

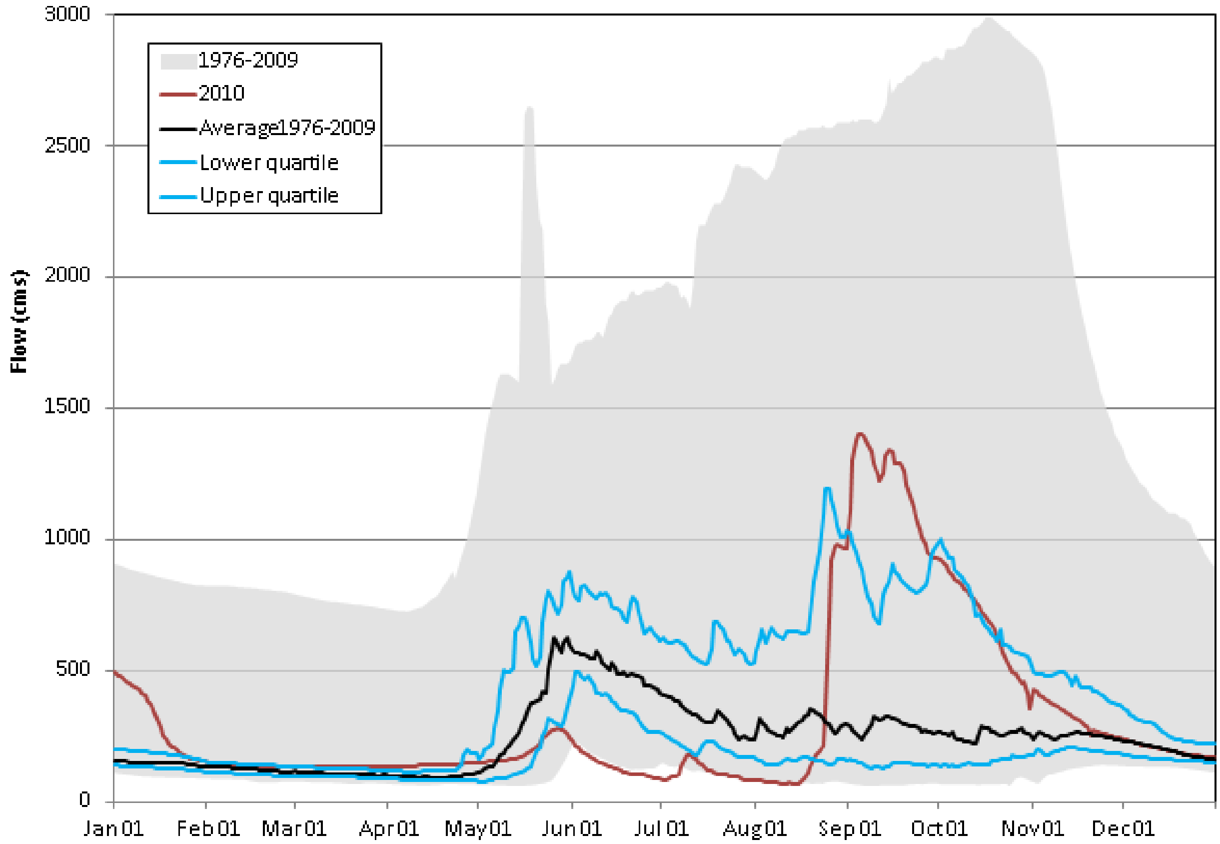


Figure 5.4.2-2. 2010 Churchill River above Red Head Rapids (06FD001) flow.

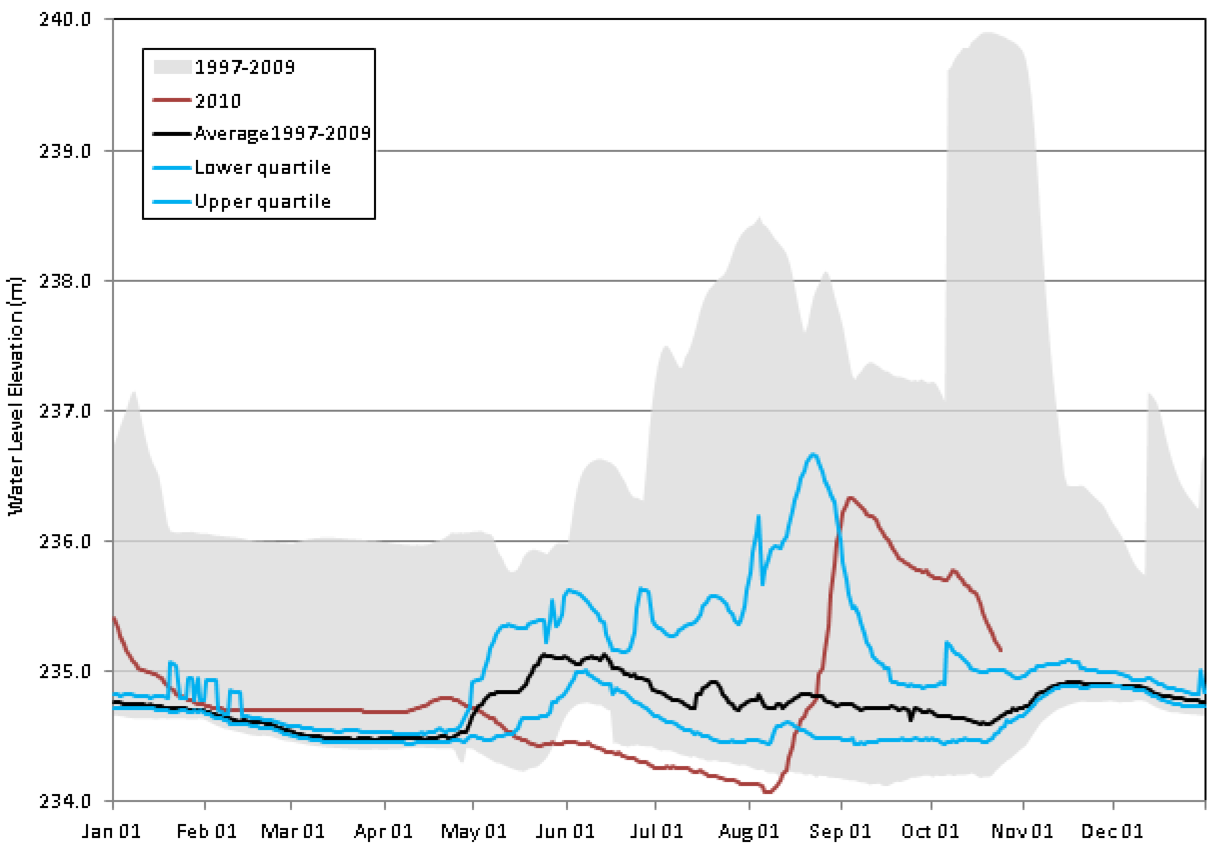


Figure 5.4.2-3. 2010 Northern Indian Lake (06FA701) water level elevation.

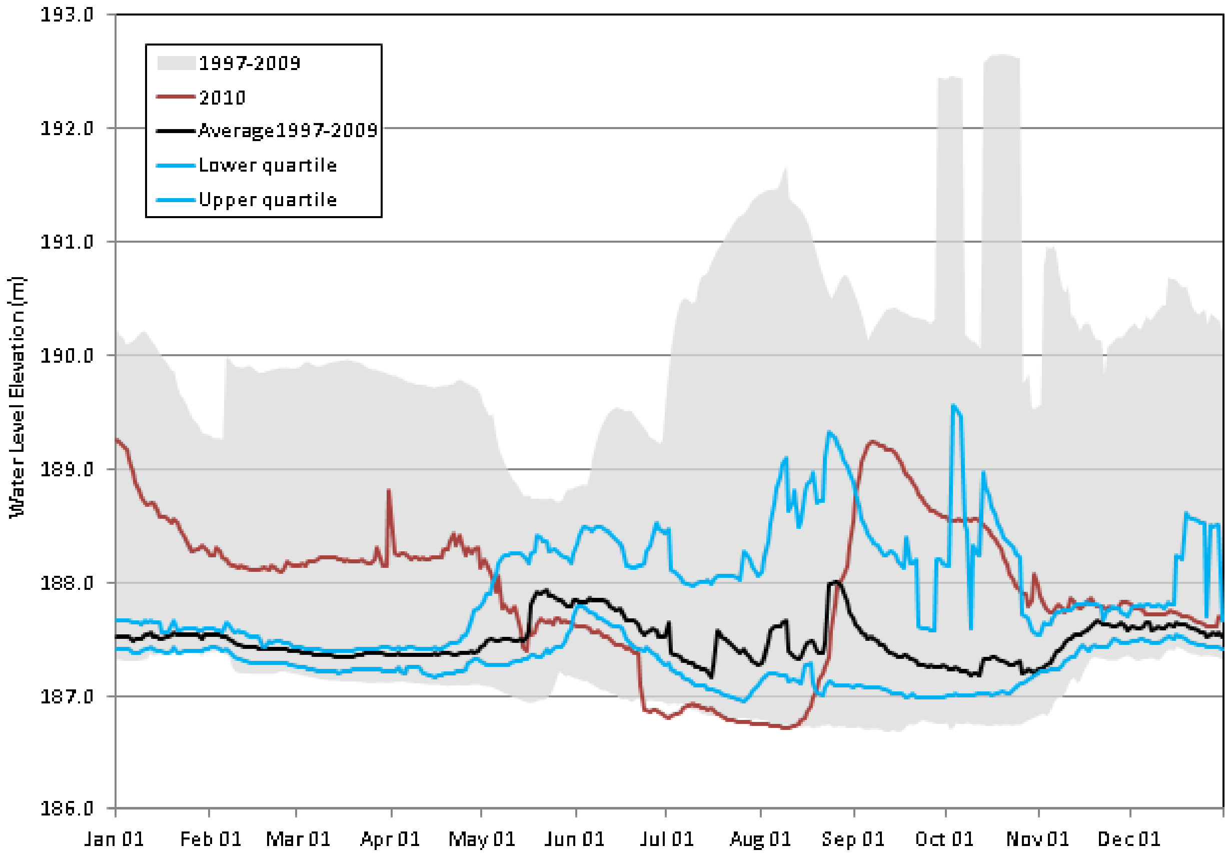


Figure 5.4.2-4. 2010 Billard Lake (06FB702) water level elevation.

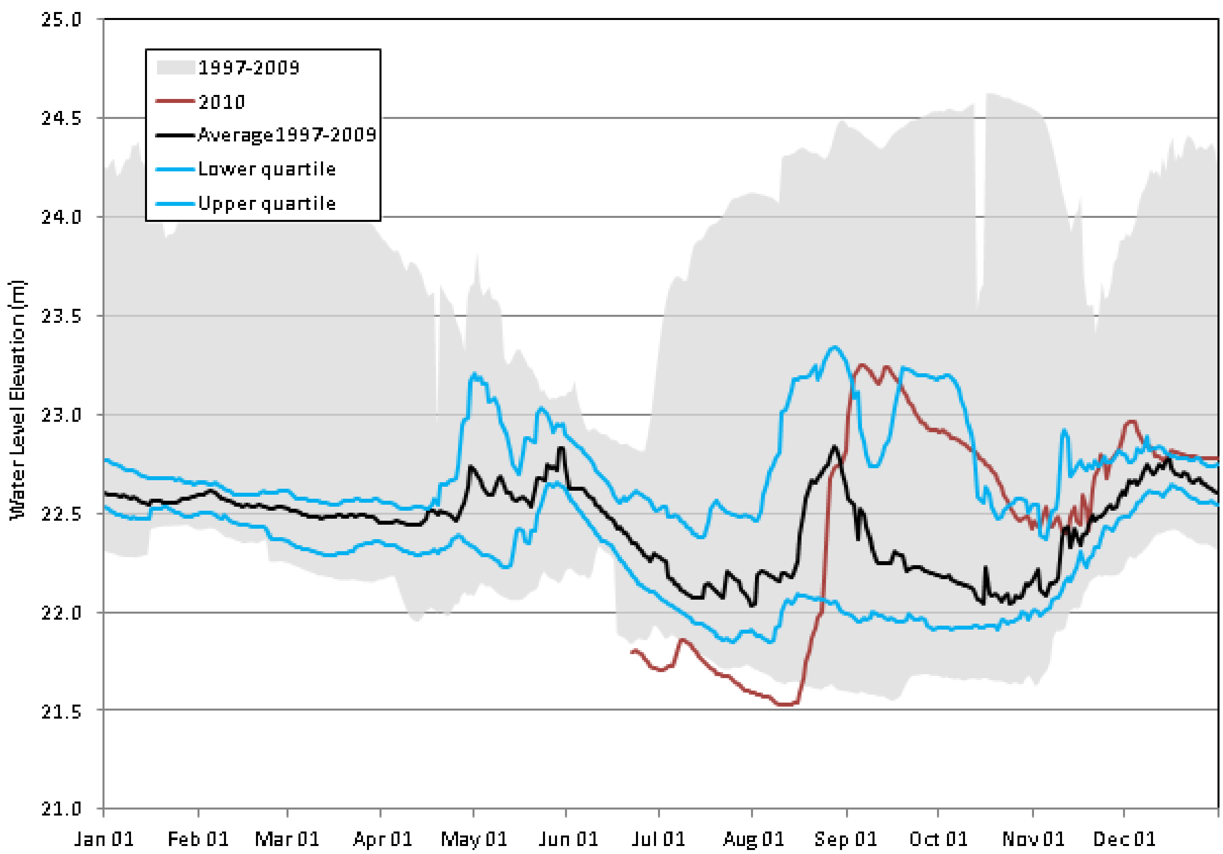


Figure 5.4.2-5. 2010 Churchill River above Swallow Rapids (06FD702) water level elevation.

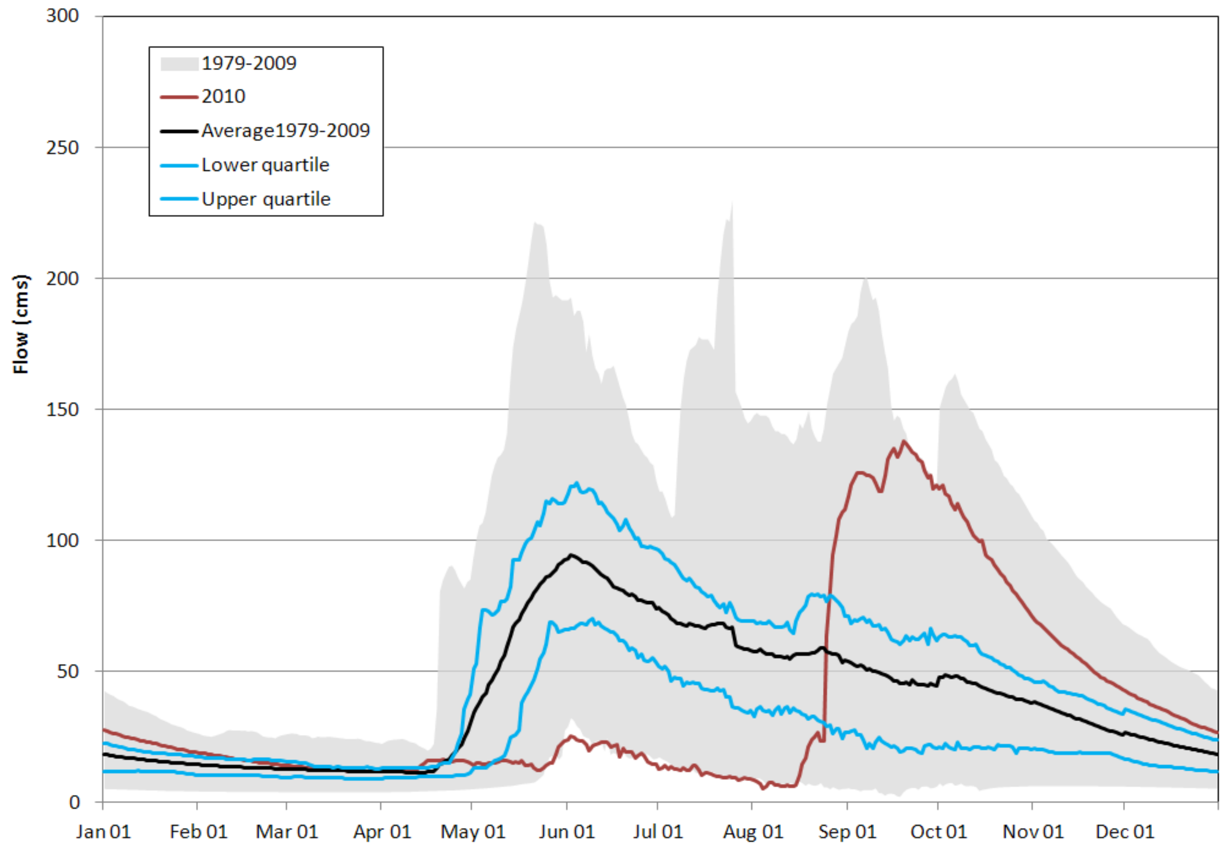


Figure 5.4.2-6. 2010 Gauer River (06FA001) flow.

5.4.3 Aquatic Habitat

Aquatic habitat surveys were conducted in Billard Lake and Northern Indian Lake in the Lower Churchill River Region in 2010.

5.4.3.1 Billard Lake

Overview

Billard Lake is one of the smallest CAMPP waterbodies. It is located on the lower Churchill River immediately downstream of a set of rapids, giving it the characteristics of a riverine lake (Figure 5.4.3-1). The following sections describe the depth, substrate, and overall aquatic habitat characteristics of Billard Lake relative to low water level conditions experienced during surveys conducted in June 2010 (Figure 5.4.2-5).

Bathymetry

Billard Lake is shallow with over 52% of the lake above 3 m in depth (Figure 5.4.3-2), its mean depth being 3.58 m, and its average bed slope -2.4 % (Figure 5.4.3-3; Table 5.4.3-1). The deepest point in Billard Lake at the time of survey was 12.80 m. The lake is generally deep throughout the central portion where two large connected basins comprise the most extensive moderately deep areas of the lake. Otherwise much of the lake bed has undulating hummocky shallow topography. There are a number of steep banks along the southern shore of the lake. The maximum slope is 72.3 %. The channelized area around the north side of Whillier Island and continuing on along the north shore is low-sloped and shallow. This area was dewatered during survey, but historically appears to have been wetted habitat. Billard Lake has a volume of 24,017,900 m^3 (under low water conditions) and likely has a low water residence time given its riverine character.

Substrate

Billard Lake is largely comprised of fine sandy substrates (Figure 5.4.3-4; Table 5.4.3-2). The shore zone is dominated by sand and sandy loam substrates interspersed with cobble and gravel sized materials, accounting for 464.04 ha (52.9%). The extensive low sloped south shore of Whillier Island is dominated by sand and sandy loam beach habitat. Offshore deep areas contain more loamy fine substrates with a higher percent composition of silt and clay sized material, contributing 77.64 ha (8.9%). A number of extensive cobble and boulder shoals occur intermittently throughout the waterbody, creating extensive areas of bottom structure, and accounting for 131.44 ha (14.9%).

Aquatic Habitat Summary

Due to its position on the lower Churchill River, Billard Lake has distinct riverine traits. It is also one of the smallest and has one of the least developed shorelines relative to the other CAMPP waterbodies. Although water movement was not measured for this report, it is expected that there are distinct areas of lentic and lotic habitat. Water level fluctuation was evident along the shorelines of the lake. Variable water levels, create a large range in the intermittently exposed zone (IEZ) of the lake, periodically wetting and drying these habitats, as evidenced by the dewatered wetland vegetation shown as a pink hue in the June 2010 Landsat 5 TM image (Figure 5.4.3-1). The upstream extent of Billard Lake is abundant with large barren shoal habitat, composed of cobble and boulder sized rock material, whereas there were also a number of relatively deep soft-bottomed areas in the middle of the lake. The presence of aquatic vegetation was not detected in any appreciable quantity during the surveys conducted in 2010, however habitat surveys did not target this habitat variable. In general, the habitats of Billard Lake can be considered heterogeneous ranging from lentic to lotic, deep to shallow, hard to soft, with variable water levels creating a large IEZ.

5.4.3.2 Northern Indian Lake

Overview

Northern Indian Lake is a medium sized waterbody located on the Churchill River (Figure 5.4.3-5). Its southern extent is riverine in nature, having deep channelized sections related to fluvial erosion. It consists of four large basins connected by narrow channels. The basin furthest east was not surveyed in 2010 due to its shallow nature, which was amplified by low water levels at the time of survey. The following sections describe the depth, substrate, and overall aquatic habitat characteristics of Northern Indian Lake. It should be noted that these results are relative to water level conditions experienced during surveys in June 2010 (see Appendix 1).

Bathymetry

Northern Indian Lake is generally a shallow lake, with only 50% of the lake deeper than 5 m (Figure 5.4.3-6). Its average depth was calculated to be 5.77 metres (Figures 5.4.3-7 to 5.4.3-10; Table 5.4.3-3), and the deepest point 39.78 metres (Figure 5.4.3-9). Many of the deeper areas occurred along the channelized southern portion of the lake. This is also where the steepest slopes are found, with the maximum slope being 61.16%. A number of shallow bays appear to be frequently wetted and dewatered, based on visual evidence of high and low water marks and riparian vegetation growth along the shore during surveys. Muheekan Bay has a shoreline that can range ~650 metres between high and low water level conditions, based on visual assessment of a Landsat 5 TM image, acquired at the time of surveys (Figure 5.4.3-5). Connectivity in the central portion of the lake between the southwest and northeast basins are also limited by water level, which appear to frequently water and dewater a flat wetland area in the central portion of the lake. The calculated volume of Northern Indian Lake based on the extent of bathymetric data collected in 2010 is 351,594,020 m^3.

Substrate

Northern Indian Lake has a heterogeneous mix of substrate types (Figures 5.4.3-11 to 5.4.3-14; Table 5.4.3-4). Hard substrates are found in limited quantity and only contribute about 284 ha (4.6%), and mostly in nearshore areas or shallow bedrock outcrops or shoals. Sand and/or mixed sand substrates dominate the lake at 2,591 ha (42.29%). Clay and silt/clay loam substrates are found throughout the lake and contribute 1753.13 ha (28.61%) and 1243.47 ha (20.29%) respectively. Silt/clay substrates are typically looser and more easily transported in higher flow portions of the lake contrary to compacted clay-based substrates.

Aquatic Habitat Summary

Northern Indian Lake has fairly complex shoreline development compared to the other CAMPP waterbodies, with many small inlets, bays, and narrow channels interconnecting larger basins. This would indicate that the littoral zone is more extensive than most CAMPP waterbodies. Northern Indian Lake has a large IEZ (Figure 5.4.3-5) that is visible in satellite imagery. How much of this zone is exposed varies widely, and is dependent on outflows from the Missi Falls Control Structure. For example both record high and low open water season water level elevations have been reached within the past 10 years (high water in 2005 and 2009, and low water in 2010; Figure 5.4.2-4).

The southern portion of Northern Indian Lake potentially has detectable flow along the course of the channelized area. The balance of the lake likely does not have any appreciable flow and would be classified as primarily lentic habitat. Further studies would be required to determine areas of flow, and better identify these habitats. Depths are variable and greatest in the southern portion of the lake, which appears to be more riverine than the rest of the lake. Depths of up to 40 m and relatively heterogeneous substrates throughout the lake provide refuge for different species of fish. Macrophytes were not identified during surveys as the survey period as the survey period was selected to avoid periods of heavy macrophyte growth. There are, however, large areas of shallow, lentic, soft substrate areas providing potential habitat for various aquatic plant species.

Table 5.4.3-1. Summary of depth, slope, and volume statistics of Billard Lake resulting from aquatic habitat surveys and mapping conducted in 2010.

Water Body Name	Area (m^2)	Area (ha)	Maximum Depth (m)	Mean Depth (m)	Maximum Slope (%)	Mean Slope (%)	Volume (m^3)
Billard Lake	6,697,660	669.77	12.80	3.58	72.26	2.43	24,017,900

Table 5.4.3-2. Summary of substrate distribution for Billard Lake resulting from aquatic habitat surveys and mapping conducted in 2010.

Substrate	Area (m^2)	Area (ha)	Total Area (%)
Cobble/Boulder	1,314,405	131.44	14.98
Sand/Gravel	4,640,432	464.04	52.90
Silt/Clay	776,439	77.64	8.85
unclassified	2,041,590	204.16	23.27
Total	8,772,866	877.28	100

Table 5.4.3-3. Summary of depth, slope, and volume statistics for areas of Northern Indian Lake resulting from aquatic habitat surveys and mapping conducted in 2010.

Water Body Name	Area (m^2)	Area (ha)	Maximum Depth (m)	Mean Depth (m)	Maximum Slope (%)	Mean Slope (%)	Volume (m^3)
Northern Indian Lake	6,1268,078	6,126.81	39.78	5.77	61.16	3.41	351,594,020

Table 5.4.3-4. Summary of substrate distribution for Northern Indian Lake resulting from aquatic habitat surveys and mapping conducted in 2010.

Substrate	Area (m^2)	Area (ha)	Total Area (%)
Bedrock	2,179,772	217.98	3.56
Cobble/Gravel	660,803	66.08	1.08
Sand	25,910,537	2,591.05	42.29
Silt/Clay	12,434,666	1,243.47	20.29
Clay	17,531,327	1753.13	28.61
Unclassified	2,555,419	255.54	4.17
Total	61272524	6127	100

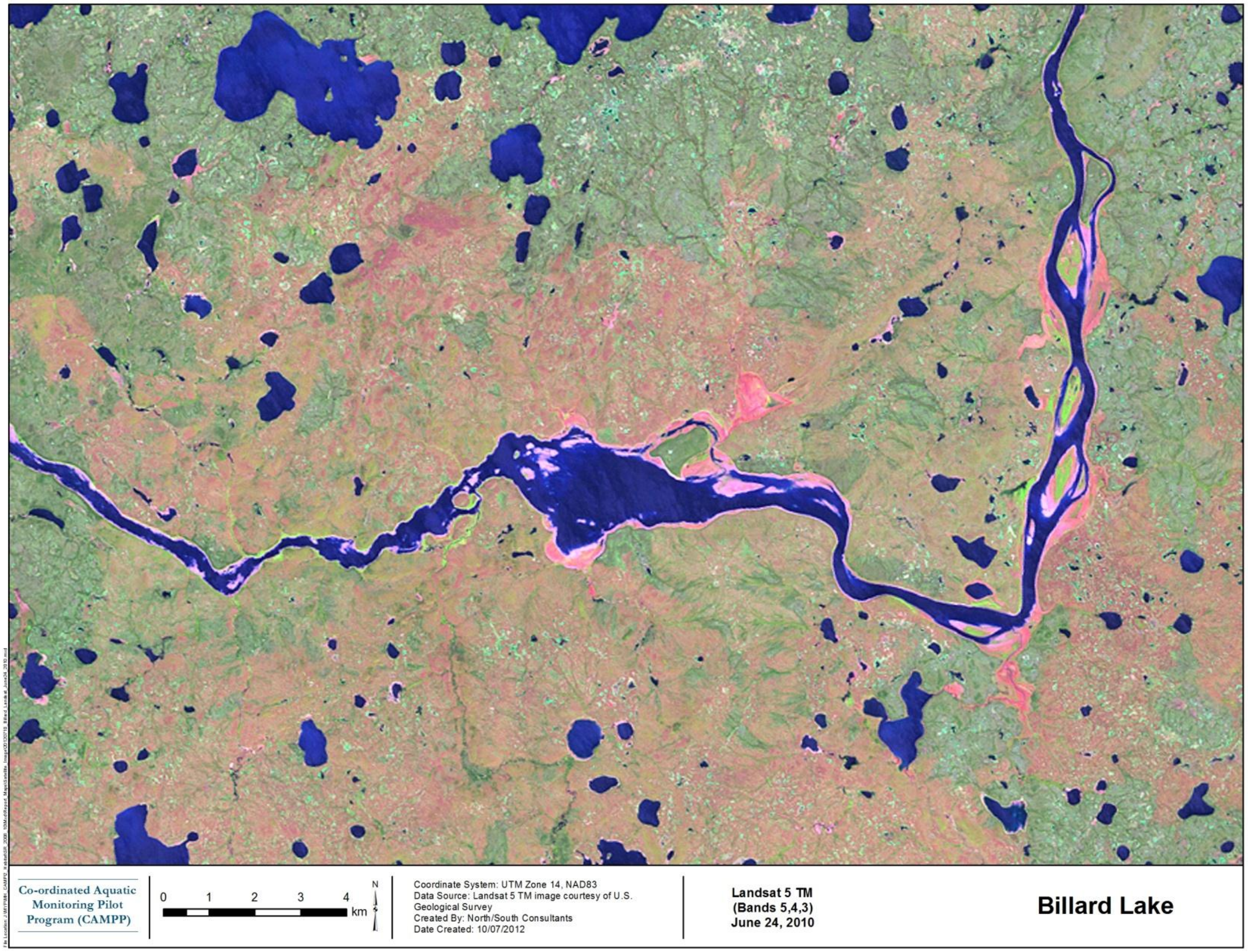


Figure 5.4.3-1. Landsat 5 TM false-colour composite image of Billard Lake acquired on June 24, 2010.

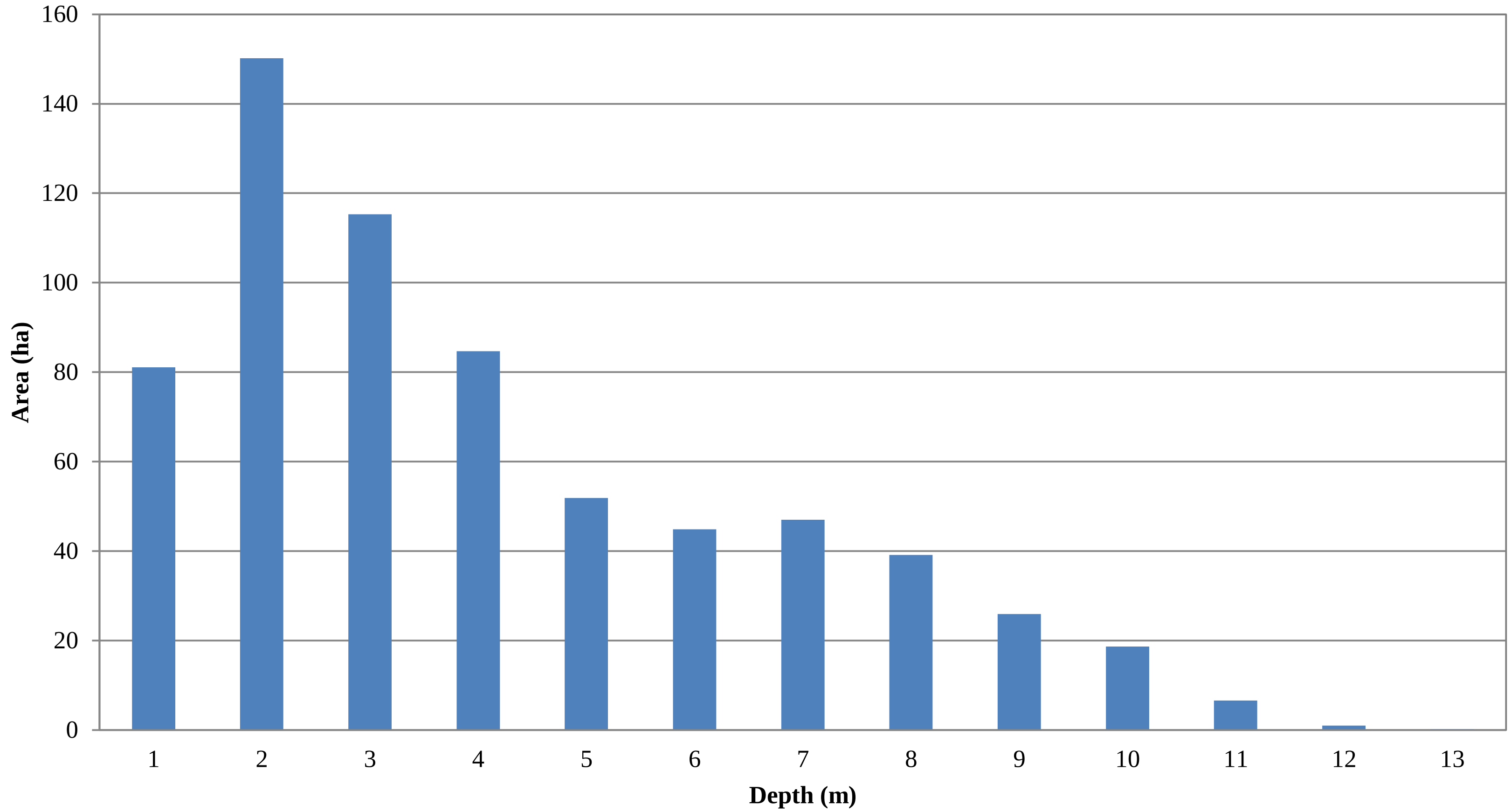


Figure 5.4.3-2. Histogram of depth distribution at 1 metre depth intervals on Billard Lake.

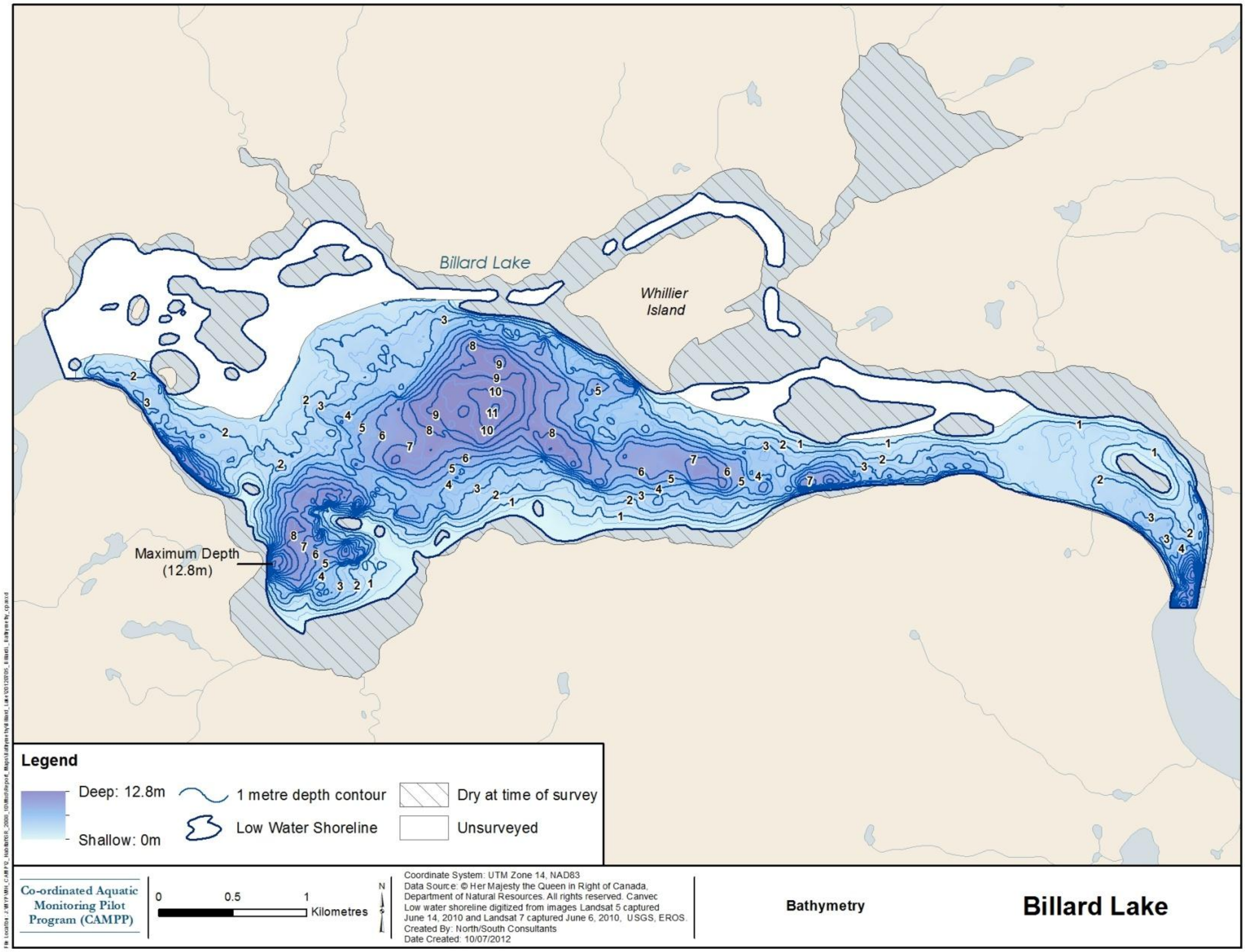


Figure 5.4.3-3. Bathymetric map of Billard Lake resulting from aquatic habitat studies conducted in 2010.

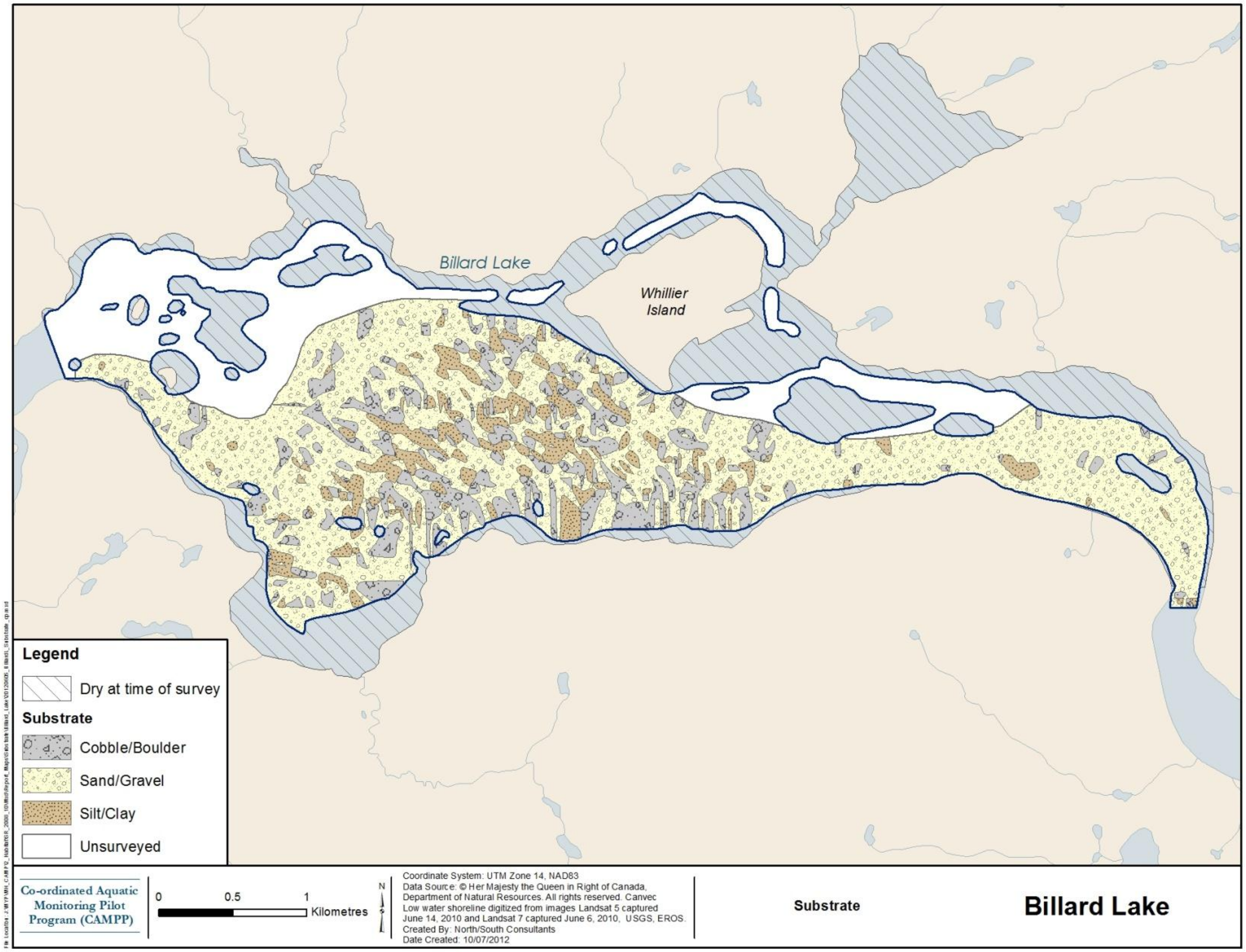


Figure 5.4.3-4. Substrate distribution map of Billard Lake resulting from aquatic habitat studies conducted in 2010.

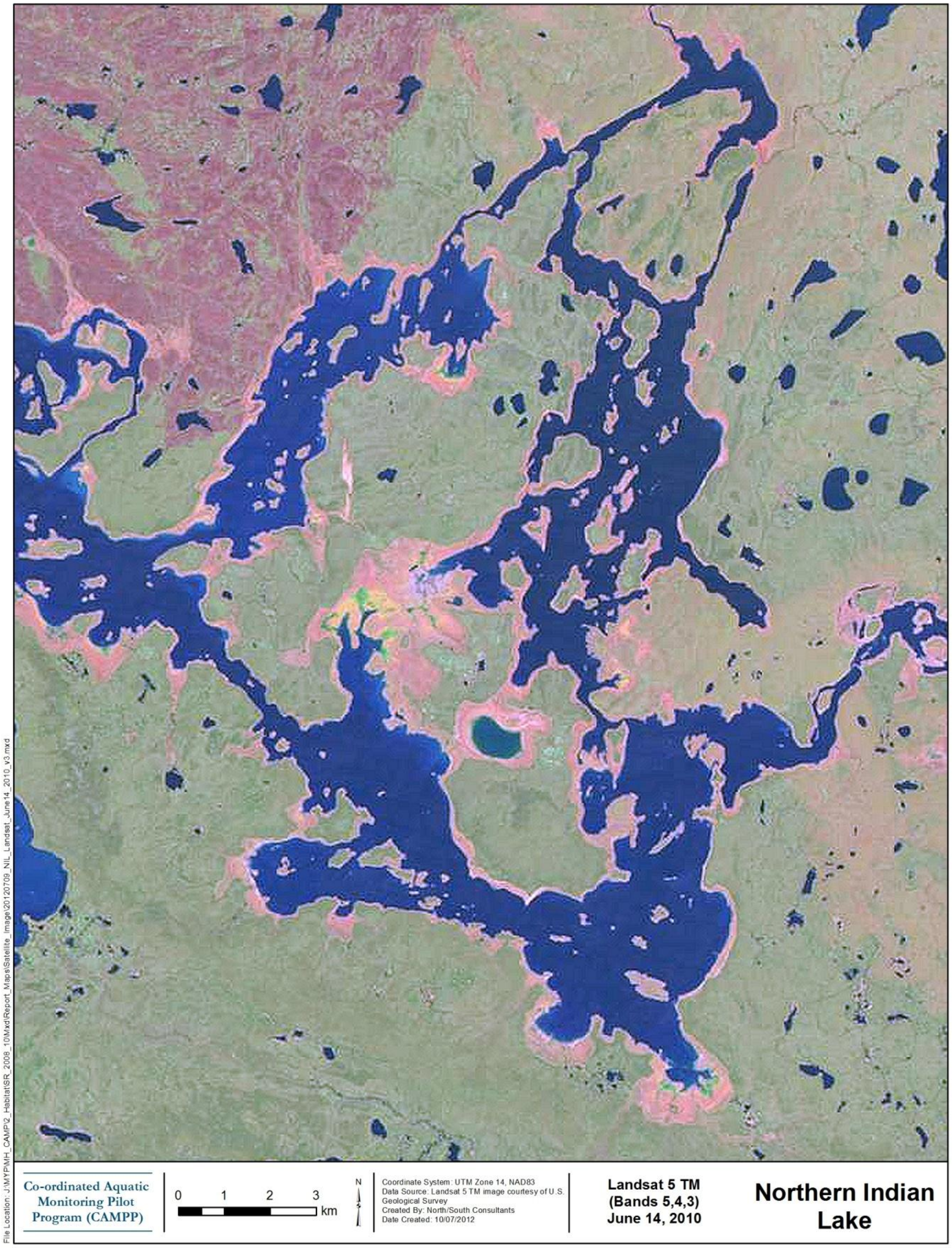


Figure 5.4.3-5. Landsat 5 TM false-colour composite image of Northern Indian Lake acquired on June 14, 2010.

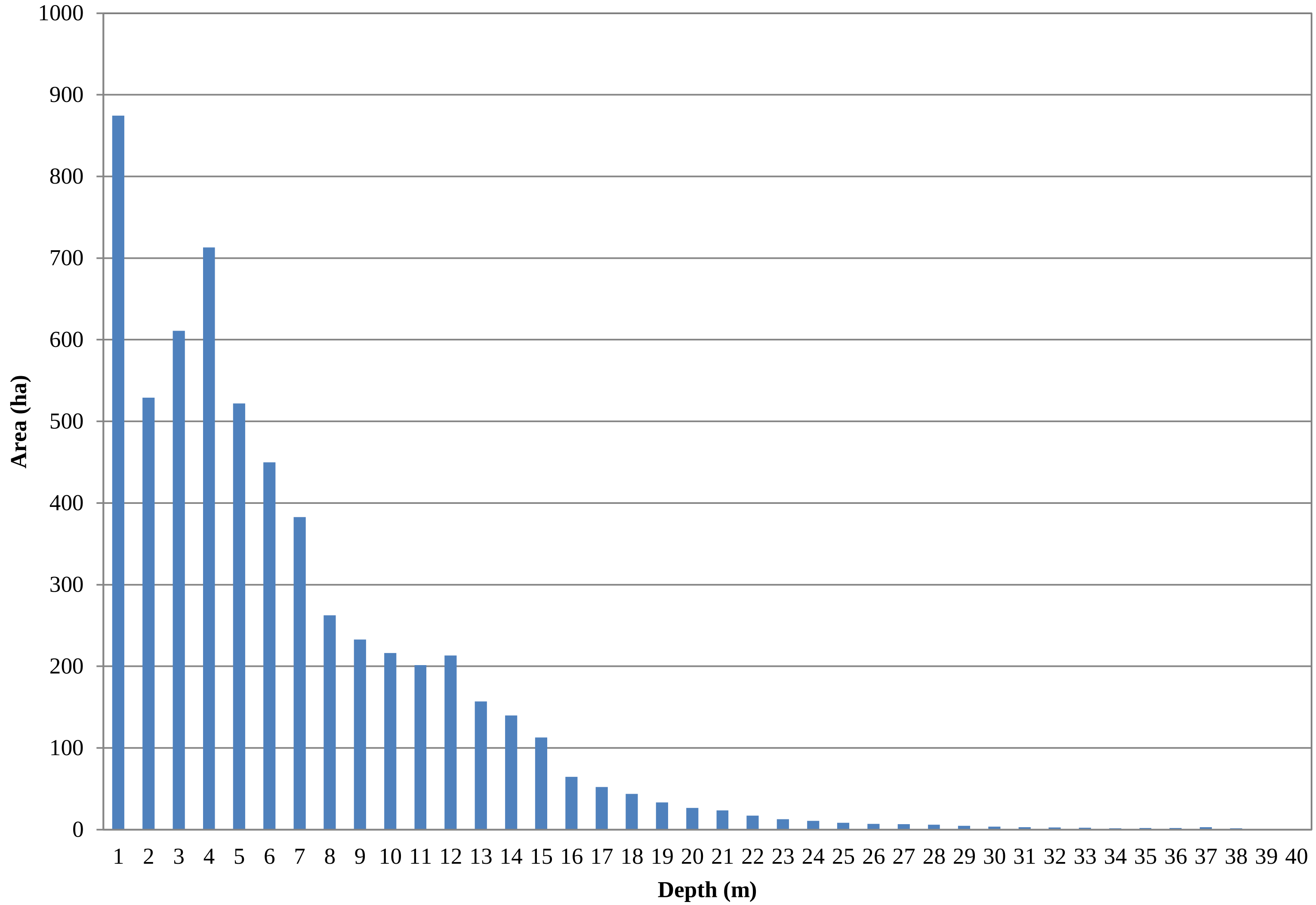


Figure 5.4.3-6. Histogram of depth distribution at 1 metre depth intervals on Northern Indian Lake.

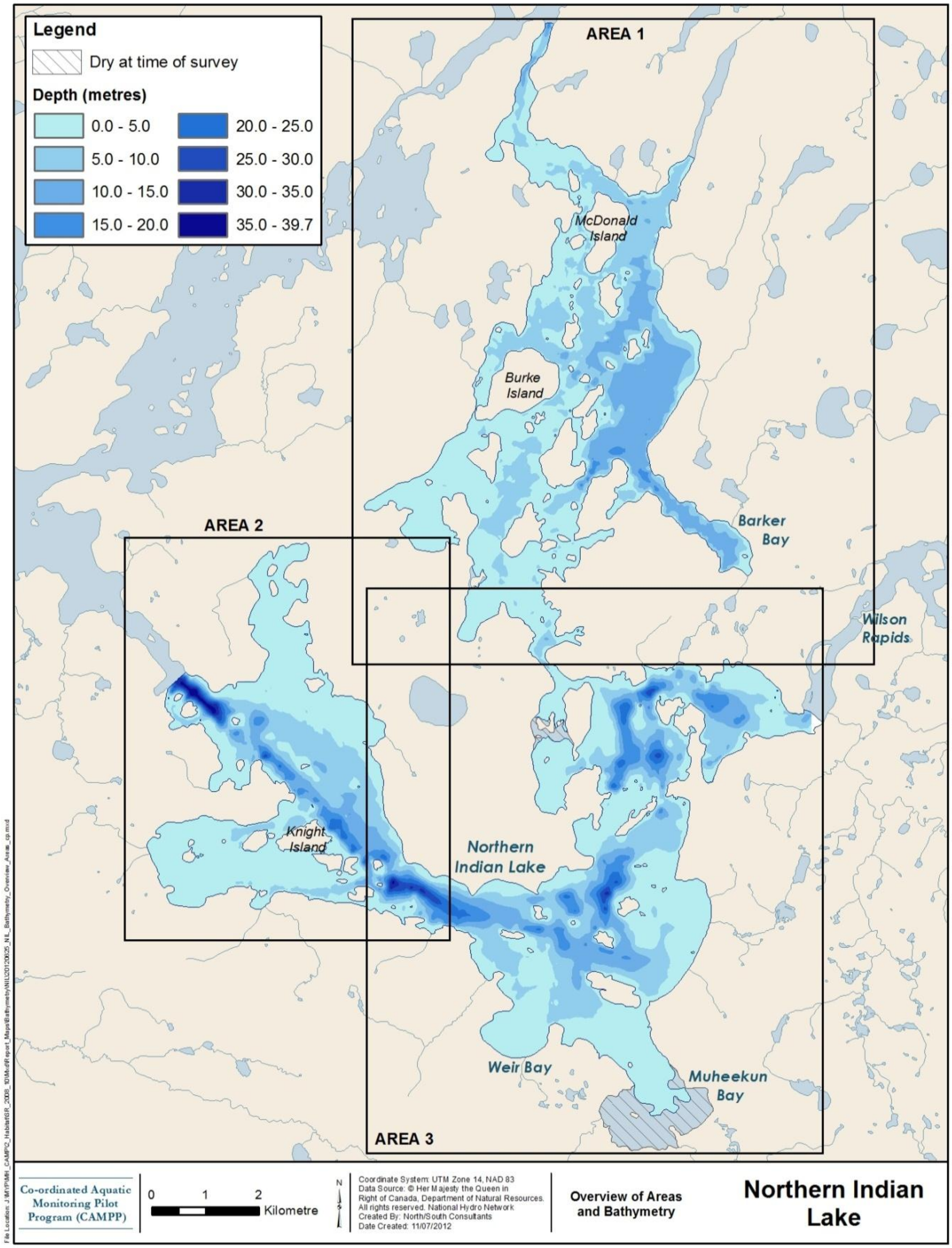


Figure 5.4.3-7. Overview bathymetric map of Northern Indian Lake resulting from surveys conducted in 2010 (detail area maps follow).

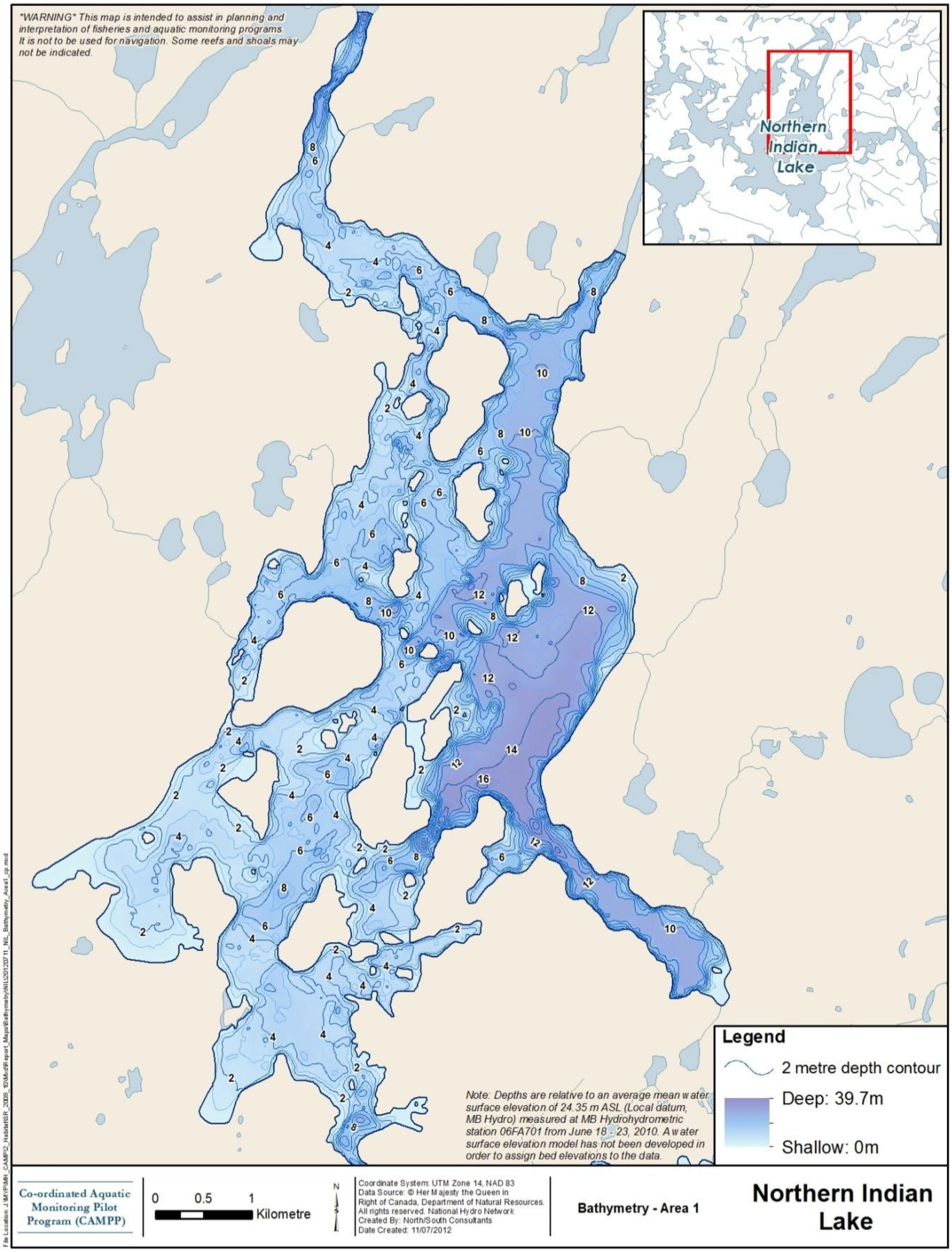


Figure 5.4.3-8. Bathymetric map of Northern Indian Lake showing detail for Area 1.

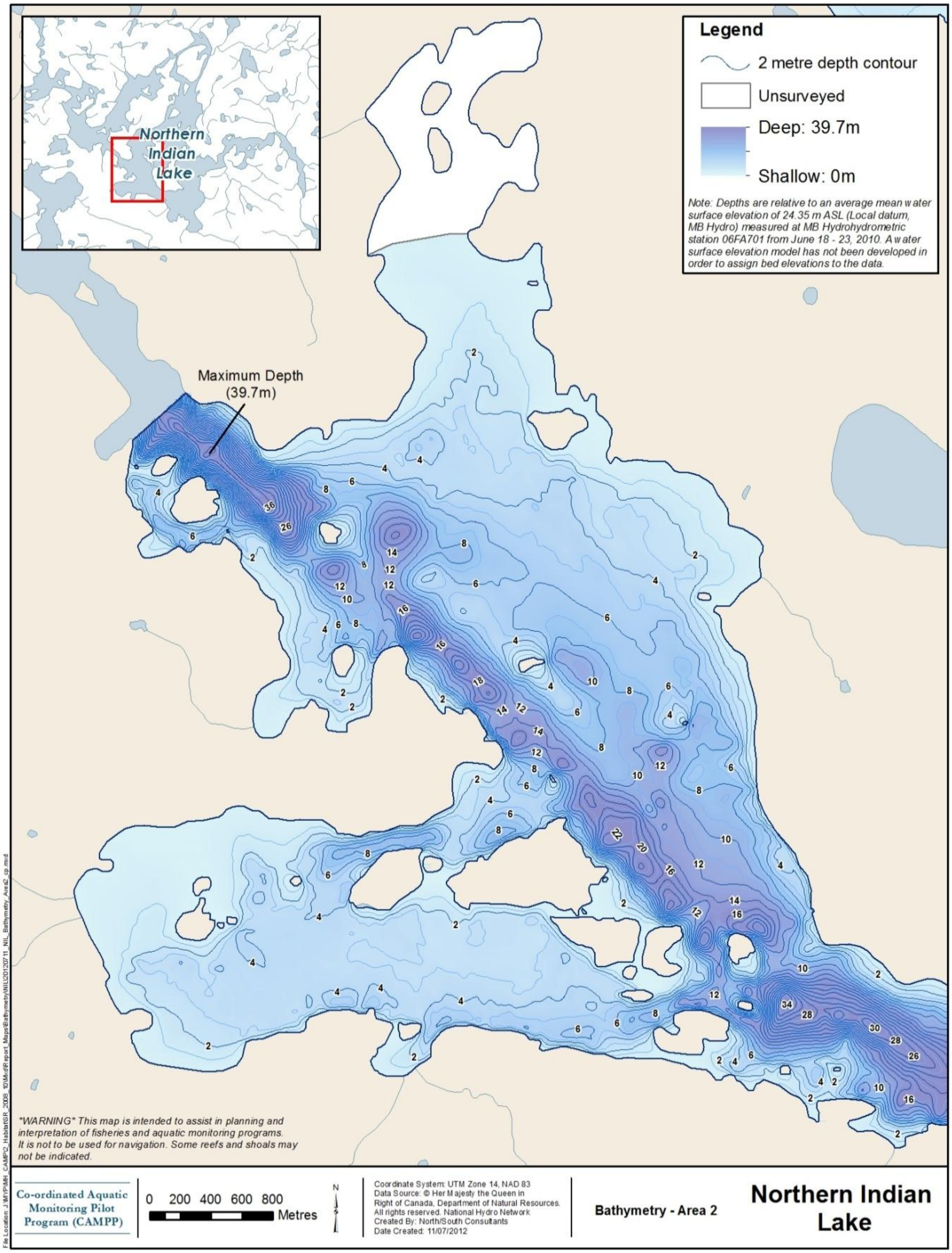


Figure 5.4.3-9. Bathymetric map of Northern Indian Lake showing detail for Area 2.

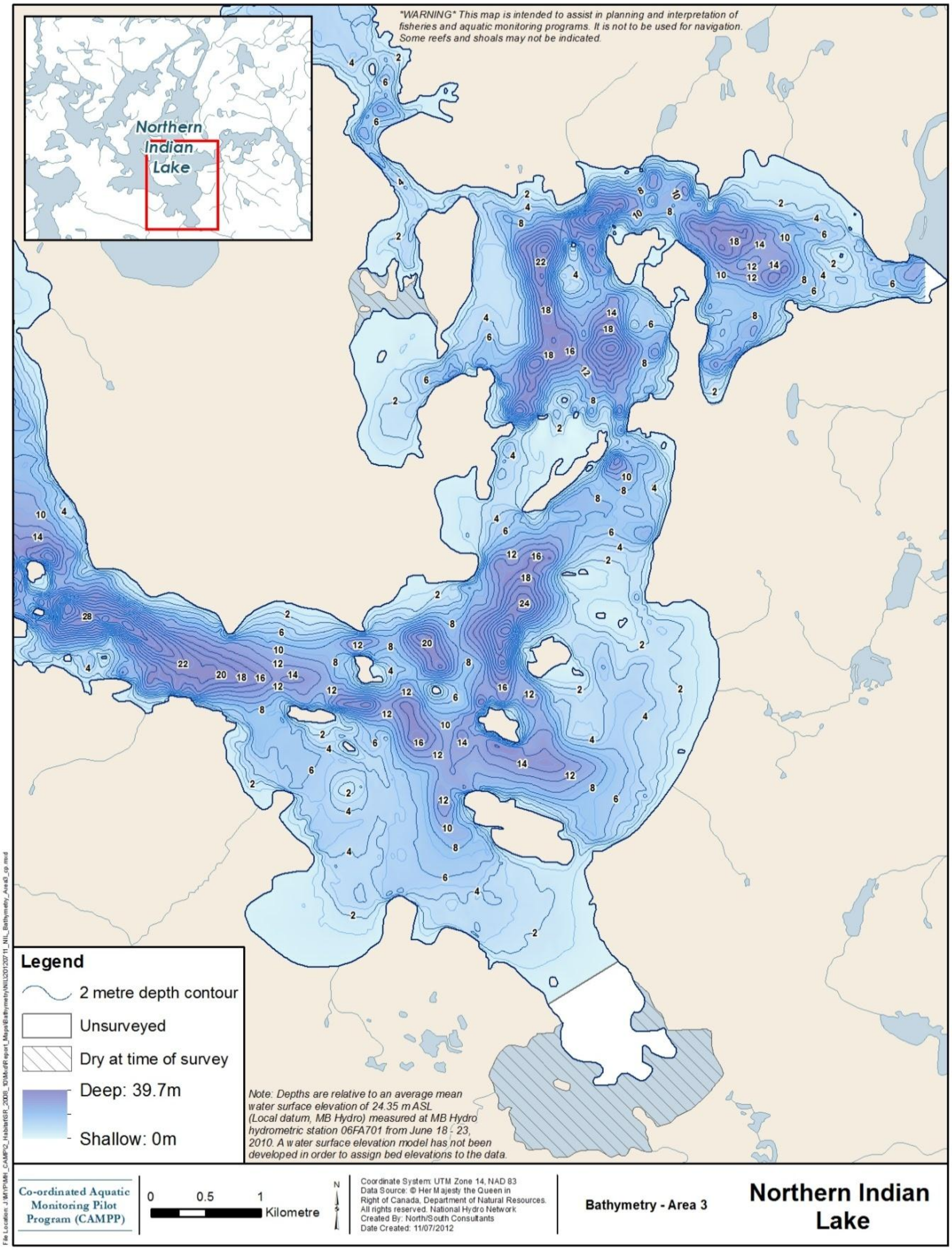


Figure 5.4.3-10. Bathymetric map of Northern Indian Lake showing detail for Area 3.

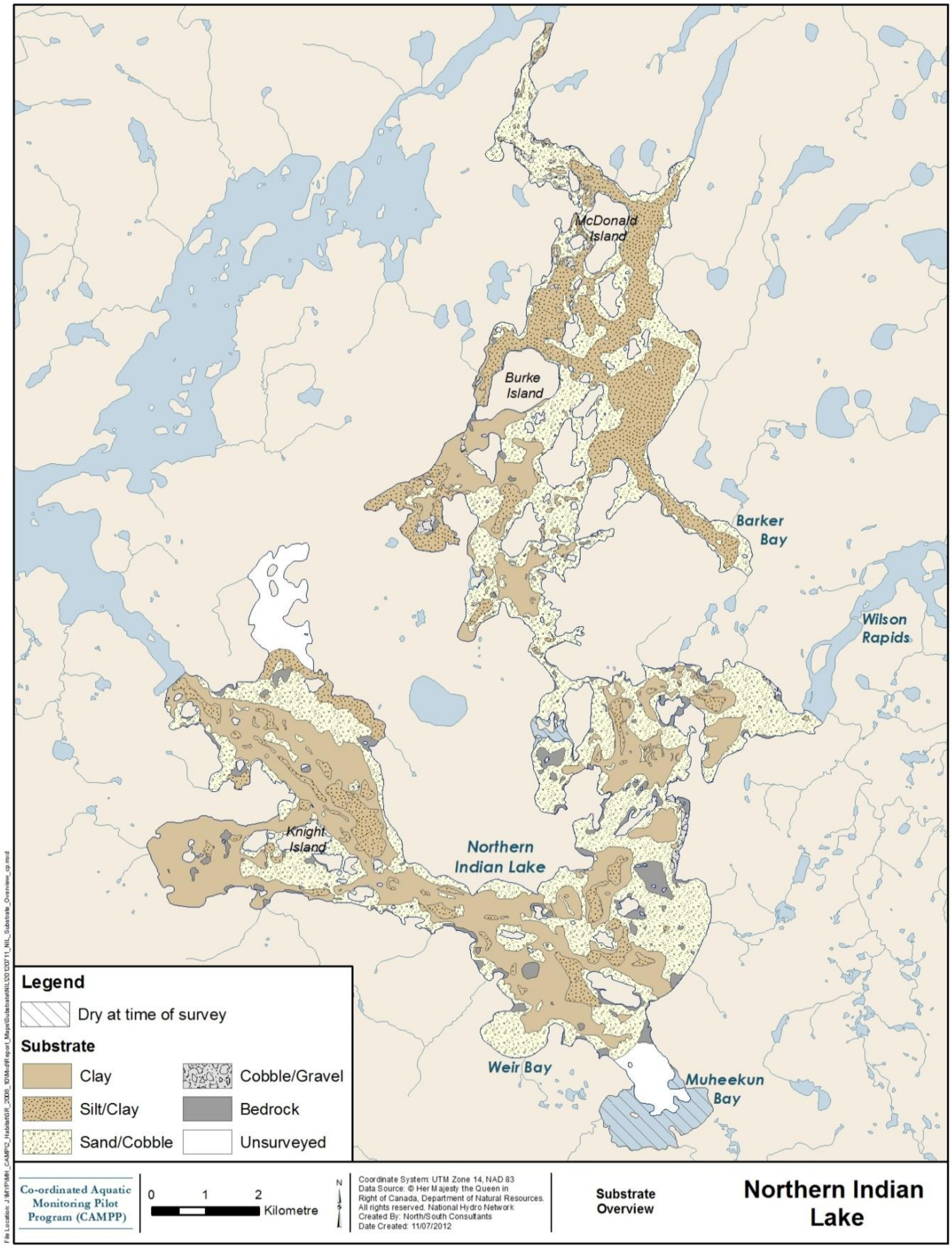


Figure 5.4.3-11. Overview substrate distribution map of Northern Indian Lake resulting from surveys conducted in 2010 (detail area maps follow).

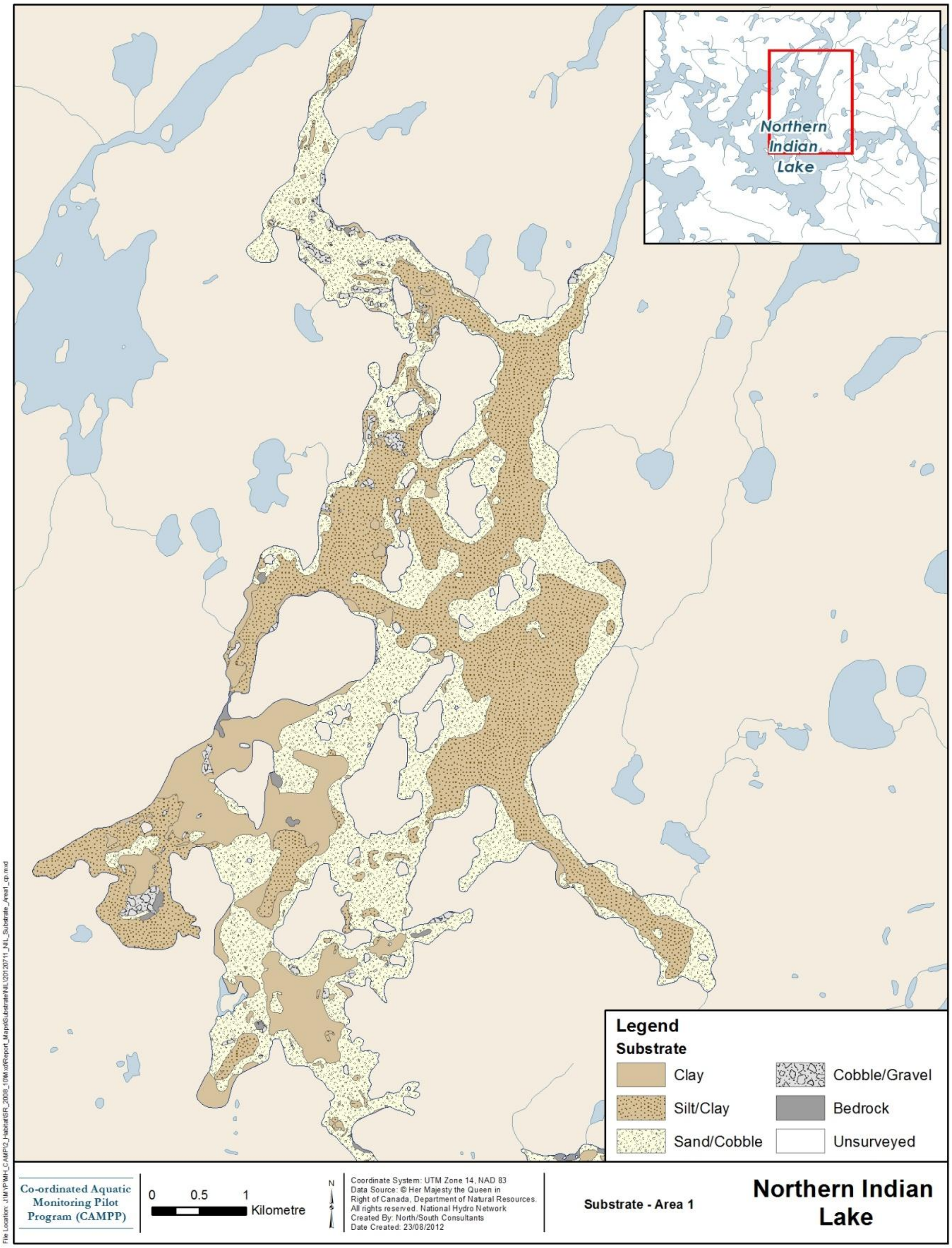


Figure 5.4.3-12. Substrate distribution map of Northern Indian Lake showing detail for Area 1.

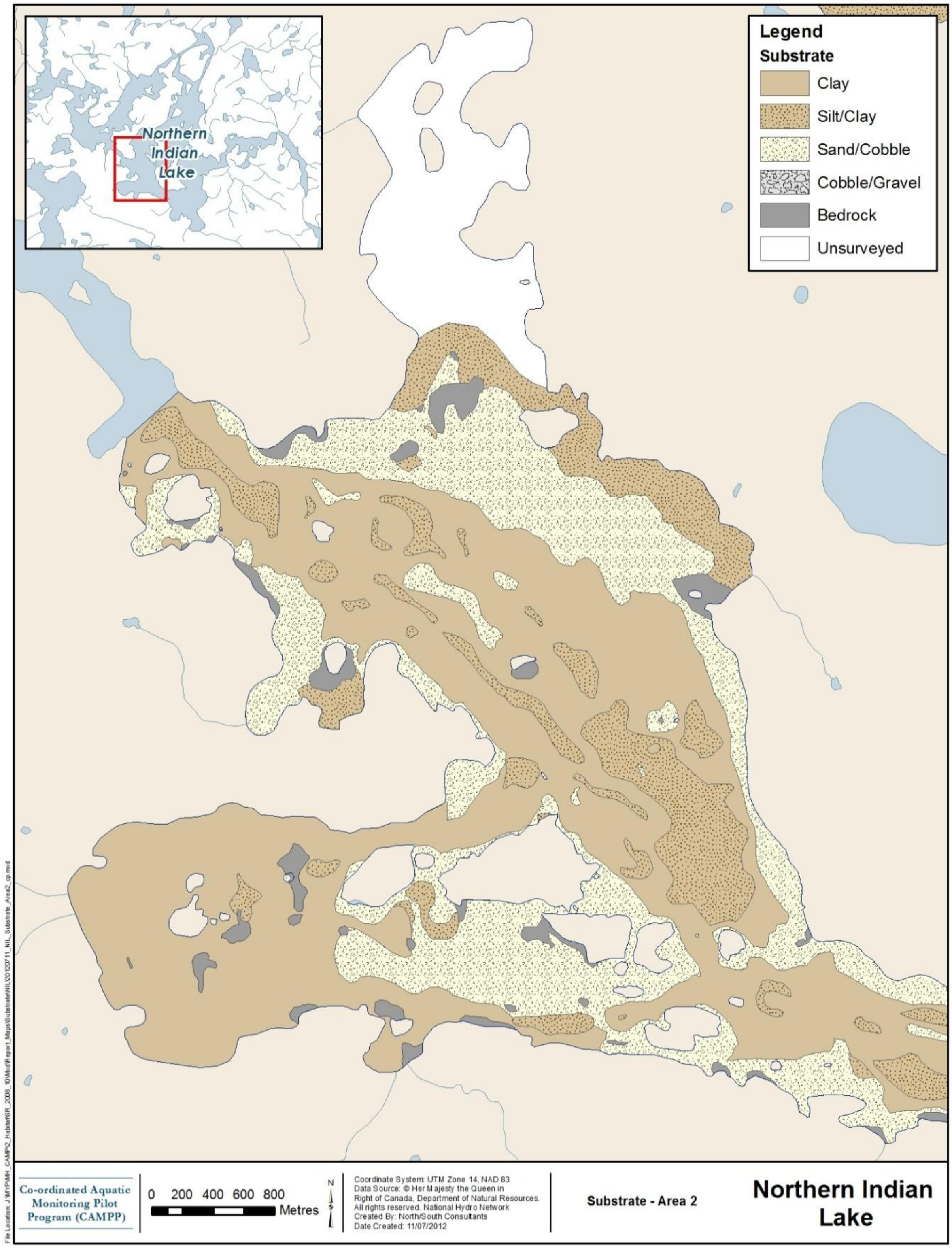


Figure 5.4.3-13. Substrate distribution map of Northern Indian Lake showing detail for Area 2.

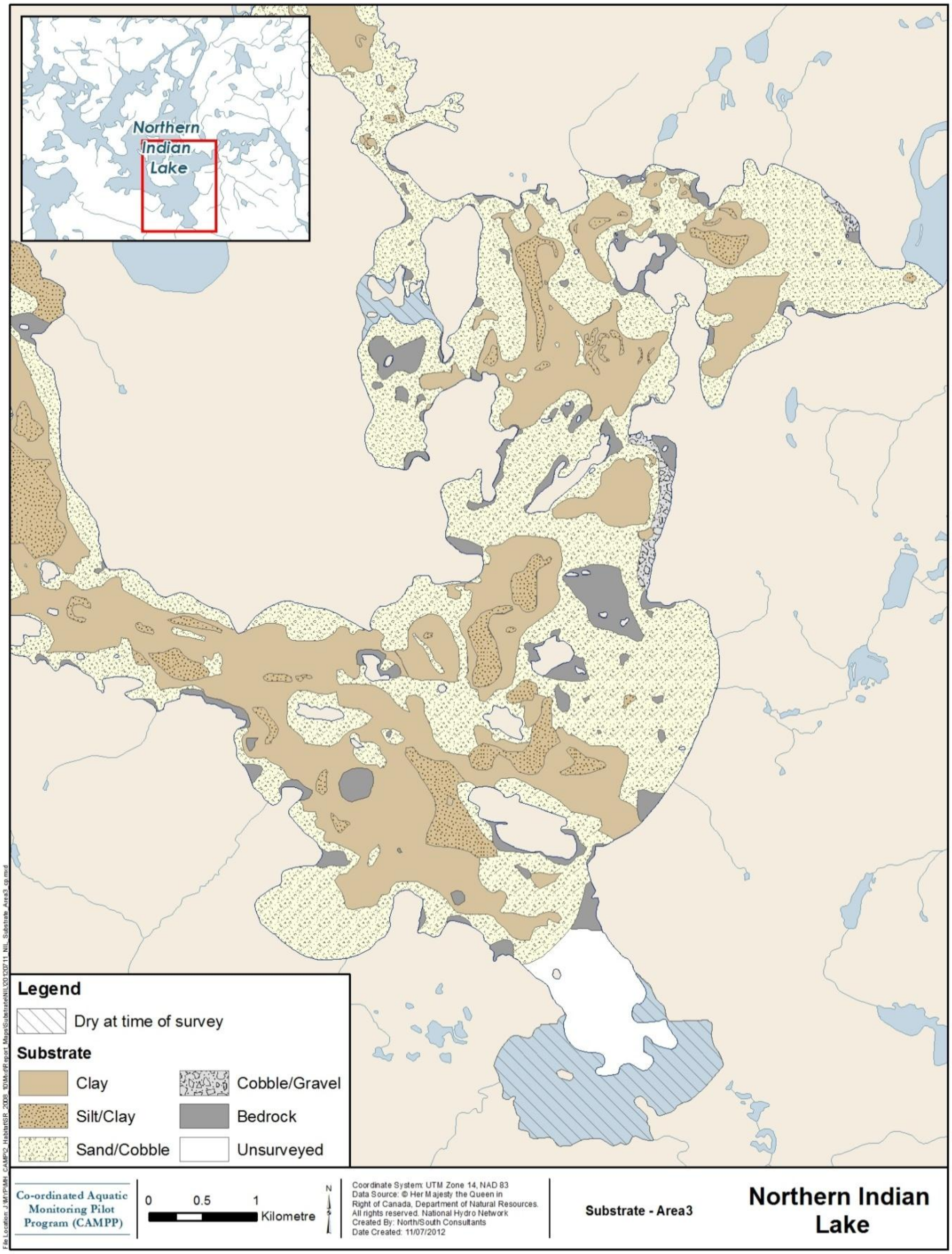


Figure 5.4.3-14. Substrate distribution map of Northern Indian Lake showing detail for Area 3.

5.4.4 Water Quality

The following provides an overview of water quality conditions measured in the Lower Churchill River Region over the three year CAMPP program. Waterbodies sampled annually included Northern Indian Lake, lower Churchill River at the confluence with the Little Churchill River (hereafter referred to as “lower Churchill River”), and an off-system reference lake (Gauer Lake; Figure 5.4.4-1). Water quality was also measured at Partridge Breast Lake (immediately downstream of Missi Falls) in 2009/2010 and Billard Lake (approximately 90 km downstream of Northern Indian Lake) in 2010/2011. While formally part of the Lower Nelson River Region, the off-system Hayes River was also considered in the interpretation of water quality data for the Lower Churchill River Region. Note that sampling locations at Northern Indian and Gauer lakes varied between sampling periods in 2008 and 2009. Sampling times relative to air temperature are presented in Figure 5.4.4-2.

Water quality is described below for waterbodies located on the lower Churchill River (on-system waterbodies), Hayes River (off-system river), and Gauer Lake (off-system lake), including results of statistical analyses conducted to evaluate seasonal variation, spatial differences, and temporal (i.e., inter-annual) 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 on-system sites along the lower Churchill River. Comparisons were also made between the on-system waterbodies and the off-system waterbodies (Hayes River and Gauer Lake). Water quality would be expected to differ between on- and off-system waterbodies, and between rivers and lakes, 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 Churchill 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.

5.4.4.1 Overview

Water quality of sites along the lower Churchill River from Partridge Breast Lake to the confluence with the Little Churchill River can be generally described as moderately nutrient-rich, slightly alkaline, moderately soft, and well-oxygenated with low water clarity. Northern Indian Lake stratified once (spring 2008) whereas Partridge Breast and Billard lakes did not stratify over the three year monitoring period. Partridge Breast Lake, and to a lesser extent Northern Indian Lake, exhibited DO depletion across depth, although concentrations were within the MWQSOGs for PAL. Waterbodies are classified as mesotrophic to meso-eutrophic on the basis of total phosphorus (TP) concentrations.

Most routine or conventional water quality parameters and metals were within the MWQSOGs for PAL at all sites along the lower Churchill River. Exceptions included TP, aluminum, iron, and selenium. TP concentrations exceeded the Manitoba narrative nutrient guideline in 17-25% of samples collected from Partridge Breast and Northern Indian lakes, while no samples from Billard Lake or the lower Churchill River site exceeded the guideline. Most (58-100%) of the samples collected from each site on the lower Churchill River were in excess of the Manitoba PAL guideline for aluminum (0.1 mg/L). At Partridge Breast Lake, Northern Indian Lake, and the lower Churchill River, iron exceeded the PAL guideline (0.3 mg/L) in 9-50% of samples and selenium was at or slightly above the PAL guideline (0.001 mg/L) in one sample from each of these sites. No significant differences in water quality were observed between annual sites (Northern Indian Lake and the lower Churchill River) on the lower Churchill River.

As expected, water quality of Gauer Lake (the off-system lake) and the Hayes River (the off-system river), while similar to the sites along the lower Churchill River in some respects, exhibited some notable differences. Like Northern Indian Lake, Gauer Lake was thermally stratified in spring 2008. Gauer Lake also experiences DO depletion across depth as observed in some on-system lakes, notably Partridge Breast Lake. However, unlike on-system sites, DO sometimes drops below MWQSOGs for PAL in Gauer Lake. Nutrients (nitrogen and phosphorus) and colour were similar in the on- and off-system sites. On average, the trophic status of Gauer Lake and the Hayes River was similar (mesotrophic to meso-eutrophic) to sites along the lower Churchill River.

Conversely, Gauer Lake is less turbid and the Hayes River contains more organic and inorganic carbon than on-system sites. Differences in concentrations of several metals were also observed between on- and off-system sites, though concentrations of some metals were lower and others higher in off-system waterbodies. Differences in water quality between the on- and off-system waterbodies are not unexpected due to inherent differences in the lakes' drainage basins, morphometries, and hydrological conditions.

Several water quality variables exhibited differences between one or more sampling seasons, most notably when comparing open-water sampling periods to the winter period. As is commonly observed in north temperate freshwater ecosystems that experience extensive ice-cover, nitrate/nitrite (a form of nitrogen readily taken up by algae) was higher and chlorophyll *a* (an indicator of algal abundance) was lower in winter. These seasonal differences reflect lower primary productivity under lower light and temperature conditions experienced under ice.

There were few and inconsistent differences in water quality conditions between the three sampling years for the annual waterbodies indicating that water quality conditions in the Lower Churchill River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. It is of note that water quality was relatively similar over the three year period when water levels and flows within the lower Churchill River ranged widely and included a record low period in 2010. A relatively wide range of flow conditions were also encountered in the Gauer and Hayes rivers over CAMPP but water quality in these off-system waterbodies remained relatively similar from year to year. Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.4.4.2 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 Churchill River

Region. The annual mean air temperatures at Churchill were similar to the 1971-2000 normal in 2008 and 2009 and above normal in 2010 (Figure 5.4.1-1).

Lower Churchill River

Northern Indian Lake was thermally stratified in spring 2008, but Partridge Breast and Billard lakes did not stratify during the period of study (Figures 5.4.4-3 to 5.4.4-5). Despite the absence of thermal stratification in the lakes during most seasons, all three lakes developed vertical differences in DO concentrations in some seasons (Figures 5.4.4-6 to 5.4.4-8). Specifically, DO decreased with depth in winter at Northern Indian and Billard lakes and in spring, summer, and fall 2009 at Partridge Breast Lake. Despite these decreases in DO with depth, no exceedances of the most stringent MWQSOGs for the protection of cool-water and cold-water aquatic life (5.5 and 9.5 mg/L, respectively) were found at any of the on-system sites during the 2008-2010 sampling period. It is of note that waterbodies remained well-oxygenated over this period when water levels and flows within the lower Churchill River ranged widely and included a record low period in 2010.

Other *in situ* variables including specific conductance (Figures 5.4.4-9 to 5.4.4-11) and turbidity (Figures 5.4.4-12 to 5.4.4-14) were generally similar across depth in each of the lakes, although pH increased or decreased with depth at some sites during some sampling periods (Figures 5.4.4-15 to 5.4.4-17).

Secchi disk depths of the lakes generally ranged between 1 and 2 m in the open-water season, although one reading at Northern Indian Lake was as high as 3.0 m (Figures 5.4.4-18 to 5.4.4-20). Based on average Secchi disk depths, water clarity of lakes on the lower Churchill River system is ranked as low according to the Swedish Environmental Protection Agency (Swedish EPA 2000).

Flow at the lower Churchill River was often too high to allow for measurement of *in situ* parameters at depth. However, profiles were collected on a few, rare instances and showed that, as expected, the site was isothermal (Figure 5.4.4-21) and well oxygenated (Figure 5.4.4-22) with relatively consistent specific conductance (Figure 5.4.4-23) and turbidity (Figure 5.4.4-24) across depth. The only *in situ* parameter that appeared to vary with depth at this site was pH, which increased through the water column (Figure 5.4.4-25). Similarly, high flows at the lower Churchill River normally preclude measurement of Secchi disk depth, but three measurements show that the clarity ranged from 1.0 to 2.6 m (Figure 5.4.4-26) and that water clarity of the river is low (Swedish EPA 2000).

Off-system Waterbodies: Gauer Lake and the Hayes River

Similar to Northern Indian Lake, Gauer Lake was thermally stratified in spring 2008 (Figure 5.4.4-27) and also developed vertical depletion of DO concentrations during summer 2008, and winter 2008 and 2009 (Figure 5.4.4-28). DO concentrations measured at depth in Gauer Lake in winter 2008 were below the most stringent MWQSOGs for the protection of cool-water and cold-water aquatic life (5.5 and 9.5 mg/L, respectively); however, no exceedances of the guidelines were found during any other period sampled between 2008/2009 and 2010/2011.

As with the on-system sites, specific conductance (Figure 5.4.4-29) and turbidity (Figure 5.4.4-30) were similar across depth in Gauer Lake whereas pH decreased with depth in some seasons but increased with depth during others (Figure 5.4.4-31). Two *in situ* measurements of pH near the water surface did not meet the MWQSOG for protection of aquatic life (6.5-9.0); the measurement in spring 2009 was below the lower limit whereas the reading from summer 2010 (10.21 mg/L; no profile was collected) exceeded the upper limit. However, as discussed in Section 5.4.4.3, laboratory pH was consistently within the PAL guideline range and varied little at this site and other sites in the region suggesting that these *in situ* measurements may reflect meter error.

Secchi disk depths ranged between 1 and 3.4 m in the open-water season (Figure 5.4.4-32); average Secchi disk depth (1.94 m), while higher than on-system waterbodies, also reflects low water clarity, as compared to the classification scheme developed by the Swedish EPA (2000).

As with the lower Churchill River, *in situ* parameters were rarely collected across depth in the Hayes River due to high water velocities. The two occasions (spring 2008 and winter 2010/2011) in which *in situ* profiles were measured indicated that this waterbody was isothermal (Figure 5.4.4-33), well-oxygenated (Figure 5.4.4-34), and had relatively consistent specific conductance (Figure 5.4.4-35), turbidity (Figure 5.4.4-36), and pH (Figure 5.4.4-37) across depth. High flows of the Hayes River normally precluded measurement of Secchi disk depth, although two measurements (1.1 and 2.0 m) indicate similar water clarity (low) as on-system sites on the lower Churchill River (Figure 5.4.4-38). All *in situ* measurements collected from the Hayes River were within MWQSOGs for PAL.

Seasonal Differences

Of the *in situ* water quality variables measured under CAMPP in the Lower Churchill River Region, significant seasonal differences were observed at one or more sites for turbidity, DO, and specific conductance. Turbidity differed significantly between seasons (lowest in the winter) in the Hayes River but was quite variable in the spring and fall periods at this site (Figure 5.4.4-

39). Seasonal trends for DO (Figure 5.4.4-40) and specific conductance (Figure 5.4.4-41) were relatively consistent across on- and off-system waterbodies in the region – both are highest in winter at all sites excepting the Hayes River, though significant seasonal differences were not observed at all sites. It is common for DO concentrations to be highest in winter due to the higher inherent capacity of water to hold more oxygen at lower water temperatures.

Spatial Comparisons

No statistically significant differences were observed between the two annual waterbodies (i.e., Northern Indian Lake and the lower Churchill River) for *in situ* limnological parameters. As such, these results indicate that, based on available data, water quality did not differ notably between two sites on the lower Churchill River that are separated by approximately 180 km.

The only significant difference found for *in situ* parameters between the on-system and off-system waterbodies was that specific conductance was higher in Gauer Lake than the lower Churchill River (Figure 5.4.4-42).

While statistical analyses did not incorporate Partridge Breast or Billard lakes due to limited data (i.e., only one year of data) DO was higher at Partridge Breast Lake than any other waterbody in the region (Figure 5.4.4-43). Statistical differences will be re-assessed in the future when additional data are acquired for this upstream waterbody.

Temporal Comparisons

None of the *in situ* water quality variables monitored in Northern Indian or Gauer lakes were statistically different between sampling years, indicating that these parameters remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. The lack of interannual differences for these lakes is notable in light of the relatively large range of hydrological conditions observed in the region over the period of 2008-2010 (see Section 5.4.2 for a discussion of hydrological conditions). Conversely, the Lower Churchill and Hayes rivers contained significantly higher concentrations of DO in 2009, when flows were above average, compared to 2010 when flows were low (Figure 5.4.4-44). Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.4.4.3 Routine Laboratory Variables

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

Lower Churchill River

All measurements of pH (PAL guideline 6.5-9.0), ammonia (objectives are site specific based on pH and temperature), and nitrate/nitrite (PAL guideline 2.93 mg N/L) were within MWQSOGs for PAL at all sites and sampling times along the lower Churchill River. With the exception of Billard Lake, 17-25% of samples collected at each lake exceeded the Manitoba narrative guideline for TP for lakes, reservoirs, and ponds (0.025 mg/L; MWS 2012); no samples from Billard Lake exceeded the guideline (Figure 5.4.4-45). Additionally, no samples from the site at the lower Churchill River were in excess of the Manitoba guideline for TP for streams and rivers (0.050 mg/L). Acid sensitivity of the Lower Churchill River Region is classified as least to low based on pH, calcium, and total alkalinity and moderate based on TDS (Table 5.4.4-1).

Total phosphorus was composed almost equally, on average, of dissolved phosphorus (DP) and total particulate phosphorus (TPP) in Northern Indian and Billard lakes and the lower Churchill River (Figure 5.4.4-46); DP comprised a greater fraction of TP in Partridge Breast Lake. Total nitrogen (TN) was dominated by organic nitrogen at all sites along the lower Churchill River and nitrate/nitrate, on average, represented a higher proportion of the dissolved inorganic nitrogen (DIN) pool than ammonia in Northern Indian and Billard lakes and the lower Churchill River (Figure 5.4.4-47). Partridge Breast Lake was again the exception, where ammonia dominated the DIN pool. Molar TN:TP ratios indicate that phosphorus limitation occurred at all sites along the river during most sampling events (Figure 5.4.4-48).

Off-system Waterbodies: Gauer Lake and the Hayes River

All measurements of ammonia (objectives are site specific based on pH and temperature) and nitrate/nitrite (PAL guideline 2.93 mg N/L) from Gauer Lake were within MWQSOGs for PAL. Similar to on-system waterbodies, 17% of samples collected over the three year sampling period in Gauer Lake had concentrations in excess of the Manitoba narrative guideline for TP for lakes, reservoirs and ponds (0.025 mg/L; Figure 5.4.4-45). Additionally, all laboratory measurements of pH were within the PAL guideline (6.5-9.0) though two exceedances were noted based on *in situ* pH measurements (Figure 5.4.4-31). Acid sensitivity of Gauer Lake is classified as least to low based on pH, calcium, and total alkalinity and moderate based on TDS (Table 5.4.4-1).

The composition of TN and TP in Gauer Lake was also relatively similar to that observed on the lower Churchill River system. Specifically, TP was composed approximately equally of dissolved and particulate forms on average (Figure 5.4.4-46) while TN was strongly dominated by organic nitrogen (Figure 5.4.4-47). Also like most of the sites on the lower Churchill River, on average, nitrate/nitrite was present in higher concentrations than ammonia and TN:TP ratios

(Figure 5.4.4-48) indicate that phosphorus limitation occurred in Gauer Lake over the monitoring period.

Like the lower Churchill River sites, pH (PAL guideline 6.5-9.0), ammonia (objectives are site specific based on pH and temperature), and nitrate/nitrite (PAL guideline 2.93 mg N/L) were within MWQSOGs for PAL in the Hayes River and acid sensitivity of the site ranged from least to moderate (Table 5.4.4-1). Additionally, none of the samples collected from the Hayes River exceeded the Manitoba guideline for TP for streams and rivers (0.050 mg/L; Figure 5.4.4-45).

Unlike sites on the lower Churchill River system, TP was on average dominated by the particulate fraction in the Hayes River (Figure 5.4.4-46). The composition of nitrogen in the Hayes River (TN dominated by organic nitrogen and nitrate/nitrate represented a greater proportion of the DIN pool than ammonia; Figure 5.4.4-47) was similar to on-system sites. Molar TN:TP ratios also indicate that phosphorus limitation occurred during most sampling events (Figure 5.4.4-48).

Seasonal Variability

Total and dissolved phosphorous; total and dissolved organic carbon (TOC and DOC), and true colour did not differ significantly across the sampling seasons in Northern Indian or Gauer lakes, or the Lower Churchill or Hayes rivers. Other routine variables exhibited seasonal differences in at least one of these waterbodies, with nearly all seasonal differences being related to the ice-cover season, as illustrated in Figures 5.4.4-49 to 5.4.4-56. Total and bicarbonate alkalinity (Figures 5.4.4-49 and 5.4.4-50), conductivity (Figure 5.4.4-56), and chlorophyll *a* (Figure 5.4.4-55) exhibited the most consistent seasonal differences for each of the waterbodies, where the former three parameters were higher and chlorophyll *a* was lower in winter, relative to one or more of the other sampling periods. Nitrate/nitrite (Figure 5.4.4-57.) was also highest in winter at all sites, although no statistical differences between seasons were observed.

The highest number of parameters exhibiting seasonal differences occurred for Gauer Lake and the lower Churchill River. Ammonia was the only parameter to exhibit significant differences in both Northern Indian and Gauer lakes (ammonia was highest in spring; Figure 5.4.4-51). Total and bicarbonate alkalinity (Figures 5.4.4-49 and 5.4.4-50), DIN (Figure 5.4.4-52), conductivity (Figure 5.4.4-56), and chlorophyll *a* (Figure 5.4.4-55) showed similar seasonality between the Lower Churchill and Hayes Rivers. Water quality commonly varies between the ice-cover and open-water seasons in aquatic ecosystems due to differences in hydrology, drainage basin influences, temperature, light, and productivity as well as the physical effects of ice cover (e.g., trapping of gases, lack of re-aeration, and absence of wind effects).

Spatial Comparisons

None of the routine water quality laboratory variables measured in Northern Indian Lake and the lower Churchill River were significantly different indicating water quality conditions were relatively similar between these two waterbodies. Statistical analyses did not incorporate Partridge Breast or Billard lakes due to limited data; however, qualitative analysis did not reveal any substantive differences in water quality conditions between these on-system waterbodies (e.g., Figures 5.4.4-58 and 5.4.4-59). Statistical differences will be re-assessed in the future when additional data are acquired for this region.

In contrast, statistical differences were observed for some routine laboratory water quality variables between the on-system (i.e., Northern Indian Lake and lower Churchill River) and off-system waterbodies (i.e., Gauer Lake and Hayes River). Water quality variables that were significantly higher in Gauer Lake and/or Hayes River compared to the lower Churchill River and Northern Indian Lake sites were: total alkalinity (Figure 5.4.4-60); bicarbonate alkalinity (Figure 5.4.4-61); DOC (Figure 5.4.4-62); TOC (Figure 5.4.4-63); total inorganic carbon (TIC; Figure 5.4.4-64), and conductivity (laboratory; Figure 5.4.4-65). 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. Significant differences were also noted between Hayes River and Gauer Lake, with turbidity (laboratory; Figure 5.4.4-66) and TSS (Figure 5.4.4-59) concentrations being lower in Gauer Lake than the off-system river.

Temporal Comparisons

Statistical comparisons between sampling years for annual waterbodies revealed few significant differences (Figure 5.4.4-67 to 5.4.4-68). None of the routine water quality variables monitored in Northern Indian Lake or the lower Churchill River were statistically different between sampling years. Differences observed for routine laboratory variables were restricted to the off-system waterbodies as follows: DOC was higher in 2010 than 2008 at Gauer Lake (Figure 5.4.4-67); and TDP measured at Hayes River was higher in 2009 compared to 2010 (Figure 5.4.4-68).

The lack of consistent year-to-year differences indicates that water quality conditions in the Lower Churchill River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. The absence of interannual differences at sites located on the lower Churchill River is notable in light of the relatively large range of flow conditions (including record low flows in 2010) observed in the region over the period of 2008-2010 (see Section 5.4.2 for a discussion of hydrological conditions). Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.4.4.4 Trophic Status

Lower Churchill River

Lakes located along the lower Churchill River are classified as mesotrophic on the basis of mean open-water TP concentrations (Table 5.4.4-2) and oligotrophic in terms of TN (Table 5.4.4-3). Application of trophic categorization schemes for lakes based on chlorophyll *a* also indicates mesotrophic status for Northern Indian and Billard lakes but Partridge Breast Lake ranked as oligotrophic (Table 5.4.4-4). Neither TP nor TN were significantly correlated to chlorophyll *a* in Northern Indian Lake (Figure 5.4.4-69).

The lower Churchill River ranked as mesotrophic based on mean open-water TP but ranked lower (oligotrophic) on the basis of TN and chlorophyll *a* concentrations (Tables 5.4.4-5 and 5.4.4-6); the lower trophic ranking reflects differences in categorization schemes for lakes and rivers, rather than lower concentrations of TN or chlorophyll *a*.

Unlike Northern Indian Lake, TN was significantly and strongly correlated to chlorophyll *a* and, while not significant at a p-value of 0.05, TP may also be correlated to chlorophyll *a* at this site as the p-value was only marginally above the significance level (Figure 5.4.4-70).

Off-system Waterbodies: Gauer Lake and the Hayes River

Gauer Lake has a slightly higher trophic status than lakes on the lower Churchill River. Gauer Lake ranked as mesotrophic/meso-eutrophic based on mean open-water TP, and mesotrophic based on TN and chlorophyll *a* (Tables 5.4.4-2 to 5.4.4-4). Trophic status of the Hayes River was similar to that of the lower Churchill River; the Hayes River was mesotrophic/meso-eutrophic on the basis of mean open-water TP (Table 5.4.4-2) but oligotrophic based on TN and chlorophyll *a* concentrations (Tables 5.4.4-5 and 5.4.4-6). TN and TP were not correlated to chlorophyll *a* in Gauer Lake (Figure 5.4.4-71) or the Hayes River (Figure 5.4.4-72).

5.4.4.5 Escherichia coli

Lower Churchill River

E. coli was detected at least once at all sites along the lower Churchill River over the period of 2008-2010, though the concentrations were low (maximum 5 colony forming units [CFU]/100 mL; Table 5.4.4-7). A low frequency of detection (25%) was found for the Partridge Breast, Northern Indian, and Billard lakes, whereas 64% of samples from the lower Churchill River had detectable *E. coli* concentrations. All measurements were well below the Manitoba water quality objective for primary recreation of 200 CFU/100 mL.

Off-system Waterbodies: Gauer Lake and the Hayes River

Like the lower Churchill River sites, *E. coli* was more frequently detected at the off-system river (Hayes River) than the off-system lake (Gauer Lake; Table 5.4.4-7). When detected, concentrations were low (maximum of 6 CFU/100 mL; Table 5.4.4-7) and all measurements were well below the Manitoba water quality objective for primary recreation of 200 CFU/100 mL.

5.4.4.6 Metals and Major Ions

Lower Churchill River

The dominant cation at the four CAMPP sites located along the lower Churchill River (Partridge Breast, Northern Indian, and Billard lakes; and the lower Churchill River) is calcium, followed by magnesium (Figure 5.4.4-73), and hardness measurements indicate that waters are, on average, moderately soft (Figure 5.4.4-74). Chloride concentrations were low in the lower Churchill River (i.e., < 2.1 mg/L; Figure 5.4.4-75), and well below the Canadian Council of Ministers of the Environment (CCME) PAL guideline of 120 mg/L for a long-term exposure (CCME 1999; updated to 2013). Sulphate concentrations were consistently less than 11 mg/L, averaged less than 3.4 mg/L across sites (Figure 5.4.4-76), and fell on the lower range of concentrations reported across Canada (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 Churchill River, only nine were never detected (beryllium, bismuth, cesium, mercury, silver, tellurium, thallium, tungsten, and zinc; Table 5.4.4-8). Metals that were consistently detected at all sites and times included: aluminum; barium; calcium; iron; magnesium; manganese; potassium; rubidium; silicon; sodium; strontium; and, uranium. The remaining metals were detected at varying frequencies, although antimony, boron, chromium, cobalt, nickel, selenium, and thorium 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 the lower Churchill River; the exceptions included aluminum, iron, and selenium (Table 5.4.4-9). The majority (≥58%) of samples collected on the lower Churchill River exceeded the PAL guideline of 0.1 mg/L for aluminum (Figure 5.4.4-77), and iron exceeded the PAL guideline (0.3 mg/L) at Partridge Breast Lake, Northern Indian Lake, and lower Churchill River in 9-50% of samples but not in any samples collected in Billard Lake (Figure 5.4.4-78). One sample collected in each of Partridge Breast Lake, Northern Indian Lake, and the lower Churchill River was at or slightly above the analytical detection limit (DL) for selenium (i.e., 0.001 mg/L), which is equivalent to the PAL guideline (Table 5.4.4-9). 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 DL.

The analytical DLs for mercury varied over the study period and were typically 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, all measurements from the lower Churchill River were below the current MWQSOG PAL.

Off-system Waterbodies: Gauer Lake and the Hayes River

Like the lower Churchill River, the dominant cation in Gauer Lake and the Hayes River is calcium, followed by magnesium (Figure 5.4.4-73); hardness measurements are slightly higher than the on-system sites but the sites are still considered to be moderately soft (Figure 5.4.4-74). Also like the lower Churchill River, chloride concentrations are low in Gauer Lake and the Hayes River (i.e., < 1.7 mg/L; Figure 5.4.4-75), 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 11 mg/L (Figure 5.4.4-76), fell on the lower range of concentrations reported across Canada (CCREM 1987), and consistently below the BCMOE PAL guideline (Meays and Nordin 2013).

Of the 38 metals/metalloids measured in Gauer Lake and the Hayes River, nine were never detected (beryllium, bismuth, boron, cesium, mercury, tellurium, thallium, thorium, and zinc; Table 5.4.4-8). 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, nickel, selenium, silver, tungsten, and zirconium were detected in less than 30% of samples collected in the off-system sites.

Metals were consistently below the MWQSOGs for PAL in Gauer Lake (Table 5.4.4-9). Conversely, aluminum, copper, iron, selenium, and silver, exceeded the MWQSOGs for PAL in some surface water samples collected from the Hayes River. Slightly more than one-half (55%) of samples from the Hayes River exceeded the PAL guideline for aluminum (0.1 mg/L; Figure

5.4.4-77) while 36% of samples were in excess of the PAL for iron (0.3 mg/L; Figure 5.4.4-78). One sample was above the site-specific PAL guideline for copper (0.007 mg/L), one other exceeded the guideline for silver (0.0001 mg/L) by more than four-fold, and one sample contained selenium at the analytical detection limit (0.001 mg/L), which is equivalent to the PAL guideline. 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 sample where mercury was analysed using a DL lower than the current PAL guideline.

Seasonal Variability

Several metals exhibited statistically significant seasonal differences in Gauer Lake and/or the lower Churchill River. Like routine water quality parameters, the majority of the seasonality was related to the ice-cover season. Specifically, at one or both of these sites, the following concentrations were higher in winter than the other seasons: hardness (Figure 5.4.4-79); barium (Figure 5.4.4-80); calcium (Figure 5.4.4-81); copper (Figure 5.4.4-82); magnesium (Figure 5.4.4-83); sodium (Figure 5.4.4-84); rubidium (Figure 5.4.4-85); and strontium (Figure 5.4.4-86). In contrast, manganese concentrations (Figure 5.4.4-87) at Gauer Lake were lower in winter than fall. There were no consistent trends in seasonal patterns between lakes and rivers, nor for the on-system and off-system sites.

Spatial Comparisons

Like routine water quality parameters, no statistically significant differences in concentrations of metals or major ions were observed between the two annual waterbodies on the lower Churchill River (i.e., Northern Indian Lake and the lower Churchill River) indicating that, based on available data, water quality did not differ notably across the 180 km separating these sites.

While statistical analyses did not incorporate Partridge Breast and Billard lakes due to limited data, some variables qualitatively indicated potential changes in water quality conditions from upstream to downstream, including aluminum (Figure 5.4.4-77), manganese (Figure 5.4.4-88), and sodium (Figure 5.4.4-89). Statistical differences will be re-assessed in the future when additional data are acquired for this upstream waterbody.

Similar to routine water quality variables discussed above, certain metals were significantly higher in Gauer Lake and/or the Hayes River than at sites on the lower Churchill River, including: hardness (Figure 5.4.4-74); calcium (Figure 5.4.4-90); and magnesium (Figure 5.4.4-91). Concentrations of barium were significantly lower in the Hayes River compared to the lower Churchill River site (Figure 5.4.4-92) and potassium was lower in both Gauer Lake and the

Hayes River compared to Northern Indian Lake (Figure 5.4.4-93). Aluminum (Figure 5.4.4-77), iron (Figure 5.4.4-78), rubidium (Figure 5.4.4-94), and titanium (Figure 5.4.4-95) concentrations were also lower in Gauer Lake than any other site in the region. Additionally, uranium measured in the Hayes River was the lowest for the region (Figure 5.4.4-96) but arsenic concentrations at this site were higher than at Gauer or Northern Indian lakes (Figure 5.4.4-97). 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 for metals and major ions (Figures 5.4.4-98 to 5.4.4-100). Sulphate concentrations measured in each of the annual waterbodies (on- and off-system) were significantly higher in 2009 when water levels/flows were high compared to 2008 and/or 2010 (Figure 5.4.4-98). The only other significant differences observed over the study period were restricted to Gauer Lake: chloride was higher in 2008 than 2010 (Figure 5.4.4-99), and vanadium was higher in 2008 and 2009 compared to 2010 (Figure 5.4.4-100), although these differences may be related to improvements in the analytical detection limit after 2009 and 2010, respectively.

The lack of consistent year-to-year differences indicates that water quality conditions in the Lower Churchill River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. This lack of interannual differences is notable in light of the relatively large range of flow conditions observed in the region over the period of 2008-2010 (see Section 5.4.2 for a discussion of hydrological conditions). Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

Table 5.4.4-1. Saffran and Trew (1996) categorization of acid sensitivity of aquatic ecosystems and sensitivity ranking for the Lower Churchill River Region.

Parameter	Units	Acid Sensitivity									
		High	Moderate	Low	Least	Partridge Breast Lake	Northern Indian Lake	Billard Lake	Lower Churchill River	Hayes River	Gauer Lake
pH	-	<6.5	6.6-7.0	7.1-7.5	>7.5	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
Calcium	mg/L	0-4	5-8	9-25	>25	Low	Low	Low	Low	Least	Low
Total Dissolved Solids	mg/L	0-50	51-200	201-500	>500	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

Table 5.4.4-2. Total phosphorus concentrations (open-water season and annual means) measured in the Lower Churchill River Region and the CCME (1999; updated to 2013) trophic categorization: 2008-2010.

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	
Partridge Breast Lake	Open-water season			0.015				2009
	Annual			0.018				2009/2010
Northern Indian Lake	Open-water season			0.015				2008
	Annual			0.015				2008/2009
	Open-water season				0.020			2009
	Annual				0.021			2009/2010
	Open-water season				0.020			2010
	Annual				0.020			2010/2011
	Open-water season			0.018				2008/2009-2010/2011
	Annual			0.018				2008/2009-2010/2011
Billard Lake	Open-water season			0.017				2010
	Annual			0.017				2010/2011
Lower Churchill River	Open-water season				0.020			2008
	Annual			0.017				2008/2009
	Open-water season				0.020			2009
	Annual				0.020a			2009/2010
	Open-water season			0.017				2010
	Annual			0.018				2010/2011
	Open-water season			0.019				2008/2009-2010/2011
	Annual			0.018a				2008/2009-2010/2011
Hayes River	Open-water season			0.018				2008
	Annual			0.018b				2008/2009
	Open-water season				0.026			2009
	Annual				0.023			2009/2010
	Open-water season			0.014c				2010
	Annual			0.013				2010/2011
	Open-water season				0.020[c]			2008/2009-2010/2011
	Annual			0.018b,c				2008/2009-2010/2011

Table 5.4.4-8. continued.

<table>
<tr><th rowspan="2">Waterbody</th><th rowspan="2">Period</th><th colspan="6">Trophic Status Based on Total Phosphorus (mg/L)</th><th rowspan="2">Years Sampled</th></tr>
<tr><th>Ultra-oligotrophic
<0.004</th><th>Oligotrophic
0.004 - 0.010</th><th>Mesotrophic
0.010 - 0.020</th><th>Meso-eutrophic
0.020 - 0.035</th><th>Eutrophic
0.035 - 0.100</th><th>Hyper-eutrophic
> 0.100</th></tr>
<tr><td>Gauer Lake</td><td>Open-water season</td><td></td><td></td><td colspan="2">0.020</td><td></td><td></td><td>2008</td></tr>
<tr><td></td><td>Annual</td><td></td><td></td><td>0.019</td><td></td><td></td><td></td><td>2008/2009</td></tr>
<tr><td></td><td>Open-water season</td><td></td><td></td><td>0.016</td><td></td><td></td><td></td><td>2009</td></tr>
<tr><td></td><td>Annual</td><td></td><td></td><td>0.016</td><td></td><td></td><td></td><td>2009/2010</td></tr>
<tr><td></td><td>Open-water season</td><td></td><td></td><td></td><td>0.024</td><td></td><td></td><td>2010</td></tr>
<tr><td></td><td>Annual</td><td></td><td></td><td></td><td>0.021</td><td></td><td></td><td>2010/2011</td></tr>
<tr><td></td><td>Open-water season</td><td></td><td></td><td colspan="2">0.020</td><td></td><td></td><td>2008/2009-2010/2011</td></tr>
<tr><td></td><td>Annual</td><td></td><td></td><td>0.019</td><td></td><td></td><td></td><td>2008/2009-2010/2011</td></tr>
</table>

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

Table 5.4.4-3. Total nitrogen concentrations (open-water season and annual means) measured in lakes and reservoirs in the Lower Churchill 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	
Partridge Breast Lake	Open-water season		0.29					2009
	Annual		0.33					2009/2010
Northern Indian Lake	Open-water season		0.34					2008
	Annual			0.35				2008/2009
	Open-water season		<0.20					2009
	Annual		0.27					2009/2010
	Open-water season			0.39				2010
	Annual			0.39				2010/2011
	Open-water season		0.31					2008/2009-2010/2011
	Annual		0.34					2008/2009-2010/2011
Billard Lake	Open-water season		0.30					2010
	Annual		0.33					2010/2011
Gauer Lake	Open-water season			0.46				2008
	Annual			0.44				2008/2009
	Open-water season		0.23					2009
	Annual		0.32					2009/2010
	Open-water season			0.49				2010
	Annual			0.49				2010/2011
	Open-water season			0.39				2008/2009-2010/2011
	Annual			0.41				2008/2009-2010/2011

Table 5.4.4-4. Chlorophyll *a* concentrations (open-water season and annual means) measured in the Lower Churchill 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	
Partridge Breast Lake	Open-water season		1.9					2009
	Annual		1.5					2009/2010
Northern Indian Lake	Open-water season			4.7				2008
	Annual			3.6				2008/2009
	Open-water season			2.9				2009
	Annual		2.4					2009/2010
	Open-water season		1.5					2010
	Annual		1.2					2010/2011
	Open-water season			3.0				2008/2009-2010/2011
	Annual		2.4					2008/2009-2010/2011
Billard Lake	Open-water season			3.7				2010
	Annual			2.9				2010/2011
Gauer Lake	Open-water season					9.3		2008
	Annual			7.1				2008/2009
	Open-water season			5.6				2009
	Annual			4.5				2009/2010
	Open-water season		1.7					2010
	Annual		1.6					2010/2011
	Open-water season			5.5				2008/2009-2010/2011
	Annual			4.4				2008/2009-2010/2011

Table 5.4.4-5. Mean (open-water season and annual) concentrations of TN in the Lower Churchill and Hayes rivers and comparison to a trophic categorization scheme for rivers/streams (Dodds et al. 1998): 2008/2009-2010/2011.

Waterbody	Period	River Trophic Status Based on Total Nitrogen (mg/L)						Years Sampled
		Ultra-oligotrophic -	Oligotrophic <0.7	Mesotrophic 0.7-1.5	Meso-eutrophic -	Eutrophic >1.5	Hyper-eutrophic -	
Lower Churchill River	Open-water season		0.55					2008
	Annual		0.51					2008/2009
	Open-water season		0.38					2009
	Annual		0.38					2009/2010
	Open-water season		0.33 [a]					2010
	Annual		0.35					2010/2011
	Open-water season		0.42					2008/2009-2010/2011
	Annual		0.42 [a]					2008/2009-2010/2011
Hayes River	Open-water season		0.61					2008
	Annual		0.61 [b]					2008/2009
	Open-water season		0.48					2009
	Annual		0.50					2009/2010
	Open-water season		0.40 [c]					2010
	Annual		0.39 [c]					2010/2011
	Open-water season		0.50 [c]					2008/2009-2010/2011
	Annual		0.49 [b,c]					2008/2009-2010/2011

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

Table 5.4.4-6. Mean (open-water season and annual) concentrations of chlorophyll *a* in the Lower Churchill and Hayes rivers and comparison to a trophic categorization scheme for rivers/streams (Dodds et al. 1998): 2008/2009-2010/2011.

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	-	
Lower Churchill River	Open-water season		5.7					2008
	Annual		4.4					2008/2009
	Open-water season		2.9					2009
	Annual		2.9[a]					2009/2010
	Open-water season		1.9					2010
	Annual		1.5					2010/2011
	Open-water season		3.5					2008/2009-2010/2011
	Annual		2.9[a]					2008/2009-2010/2011
Hayes River	Open-water season		2.3					2008
	Annual		2.3[b]					2008/2009
	Open-water season		2.7					2009
	Annual		2.1					2009/2010
	Open-water season		1.3[c]					2010
	Annual		0.9[c]					2010/2011
	Open-water season		2.2[c]					2008/2009-2010/2011
	Annual		1.8[bc]					2008/2009-2010/2011

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

Table 5.4.4-7. 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
Partridge Breast Lake	2009	1	4	25	<1	<1	2
Northern Indian Lake	2008-2010	3	12	25	<10	<1	<10
Billard Lake	2010	1	4	25	1	<1	4
Lower Churchill River	2008-2010	7	11	64	2	2	5
Hayes River	2008-2010	7	11	64	2	1	6
Gauer Lake	2008-2010	2	12	17	<1	<1	5

Table 5.4.4-8. Frequency of detection of metals and major ions measured in the Lower Churchill 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
Partridge Breast Lake	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	0	4	0	0	0	1	4	0	4	0	0	4	4	0	0	4	4	0	2
		% Detected	**100**	0	0	**100**	0	0	0	25	**100**	0	**100**	0	0	**100**	**100**	0	-	**100**	**100**	0	**50**
Northern Indian Lake	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	0	4	12	0	0	0	3	12	0	12	1	3	9	12	3	2	12	12	0	4
		% Detected	**100**	0	**33**	**100**	0	0	0	25	**100**	0	**100**	8	25	**75**	**100**	25	**50**	**100**	**100**	0	**33**
Billard Lake	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	0	4	4	0	0	0	1	4	0	4	0	0	4	4	3	3	4	4	0	0
		% Detected	**100**	0	**100**	**100**	0	0	0	25	**100**	0	**100**	0	0	**100**	**100**	**75**	**75**	**100**	**100**	0	0
Lower Churchill River	2008-2010	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	5	11	0	0	1	4	11	0	11	2	2	7	11	4	3	11	11	0	1
		% Detected	**100**	9	**45**	**100**	0	0	9	**36**	**100**	0	**100**	18	18	**64**	**100**	**36**	**75**	**100**	**100**	0	9
Hayes River	2008-2010	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
Gauer Lake	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	0	3	12	0	0	0	6	12	0	11	1	1	6	10	1	0	12	12	0	3
		% Detected	**100**	0	25	**100**	0	0	0	**50**	**100**	0	**92**	8	8	**50**	**83**	8	0	**100**	**100**	0	25

Table 5.4.4-8. continued.

Waterbody	Sample Years		Nickel	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphate-Dissolved	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
Partridge Breast Lake	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	1	0	0	4	4	4	0	0	0	0	4	0	4	1	0	2
		% Detected	0	**100**	**100**	25	-	0	**100**	**100**	**100**	0	0	-	0	**100**	0	**100**	25	0	**50**
Northern Indian Lake	2008-2010	n	12	12	12	12	4	12	12	12	12	12	12	4	12	12	12	12	12	12	12
		# Detected	2	12	12	1	4	0	12	12	10	0	0	0	5	11	0	12	4	0	1
		% Detected	17	**100**	**100**	8	**100**	0	**100**	**100**	**83**	0	0	0	**42**	**92**	0	**100**	**33**	0	8
Billard Lake	2010	n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		# Detected	0	4	4	0	4	0	4	4	4	0	0	1	1	4	0	4	4	0	1
		% Detected	0	**100**	**100**	0	**100**	0	**100**	**100**	**100**	0	0	25	25	**100**	0	**100**	**100**	0	25
Lower Churchill River	2008-2010	n	11	11	11	11	4	11	11	11	11	11	11	4	11	11	11	11	11	11	11
		# Detected	2	11	11	1	4	0	11	11	9	0	0	1	1	11	0	11	4	0	1
		% Detected	18	**100**	**100**	9	**100**	0	**100**	**100**	**82**	0	0	25	9	**100**	0	**100**	**36**	0	9
Hayes River	2008-2010	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
Gauer Lake	2008-2010	n	12	12	12	12	4	12	12	12	12	12	12	4	12	12	12	12	12	12	12
		# Detected	2	12	12	0	4	0	12	12	7	0	0	0	5	7	1	12	4	0	0
		% Detected	17	**100**	**100**	0	**100**	0	**100**	**100**	**58**	0	0	0	**42**	**58**	8	**100**	**33**	0	0

Table 5.4.4-9. Frequency of exceedances of MWQSOGs for PAL for total metals measured in the Lower Churchill 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	0.00017-0.00027	0.0531-0.0876	0.0056-0.0095	0.3	0.00150-0.00326	0.000026	0.073	0.0316-0.0530	0.001	0.0001	0.0008	0.015	0.0725-0.122
Partridge Breast Lake	2009	n	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4
		# Exceedence	3	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0
		% Exceedence	**75**	0	0	0	0	0	**50**	0	0	0	0	**25**	0	0	0	0
Northern Indian Lake	2008-2010	n	12	12	12	12	12	12	12	12	3	12	12	12	12	12	12	12
		# Exceedence	7	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0
		% Exceedence	**58**	0	0	0	0	0	**17**	0	0	0	0	**8**	0	0	0	0
Billard Lake	2010	n	4	4	4	4	4	4	4	4	0	4	4	4	4	4	4	4
		# Exceedence	4	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
		% Exceedence	**100**	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Lower Churchill River	2008-2010	n	11	11	11	11	11	11	11	11	3	11	11	11	11	11	11	11
		# Exceedence	7	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
		% Exceedence	**64**	0	0	0	0	0	**9**	0	0	0	0	**9**	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
		# Exceedence	6	0	0	0	0	1	4	0	0	0	0	1	1	0	0	0
		% Exceedence	**55**	0	0	0	0	**9**	**36**	0	0	0	0	**9**	**9**	0	0	0
Gauer Lake	2008-2010	n	12	12	12	12	12	12	12	12	3	12	12	12	12	12	12	12
		# Exceedence	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		% Exceedence	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

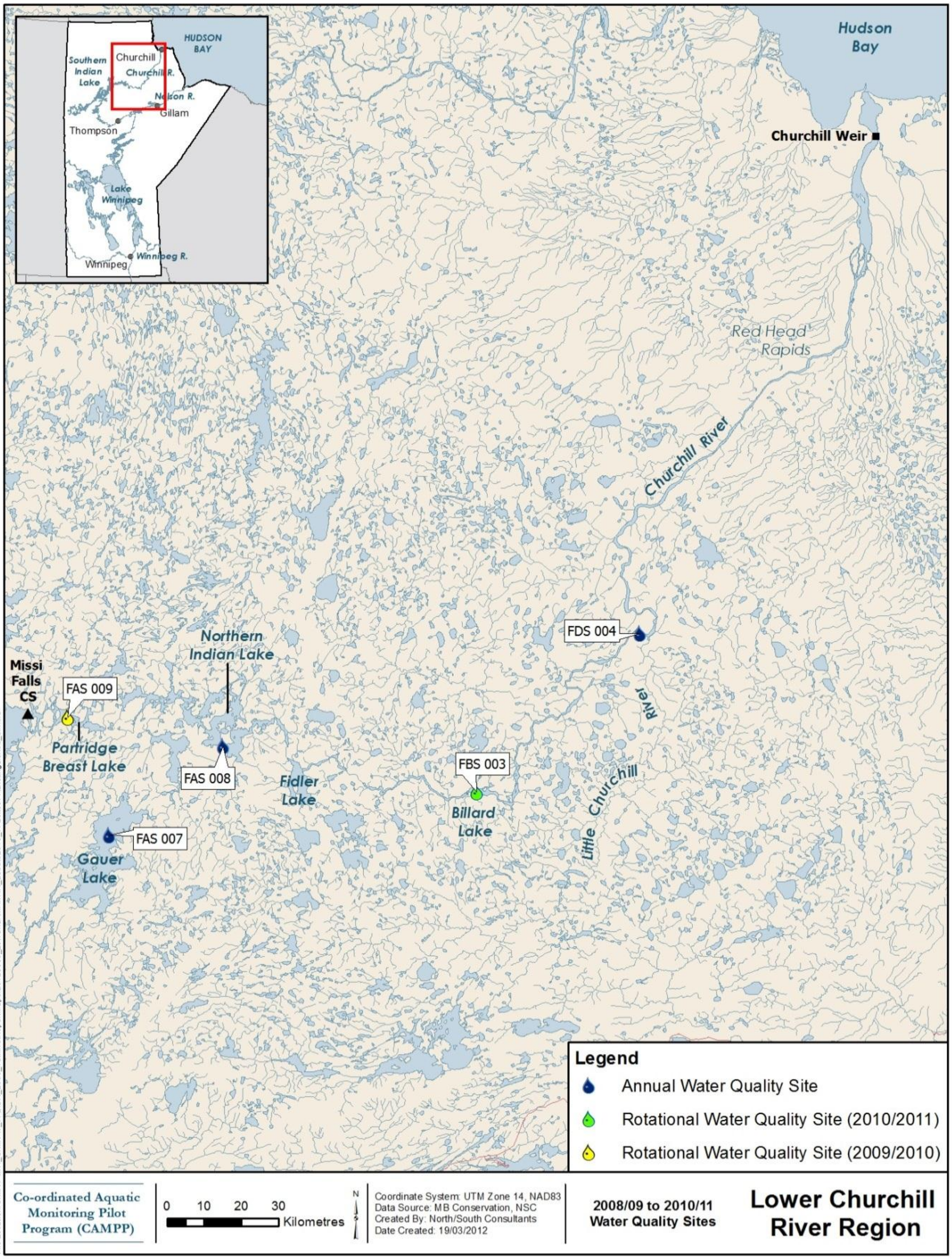


Figure 5.4.4-1. Water quality and phytoplankton monitoring sites in the Lower Churchill River Region.

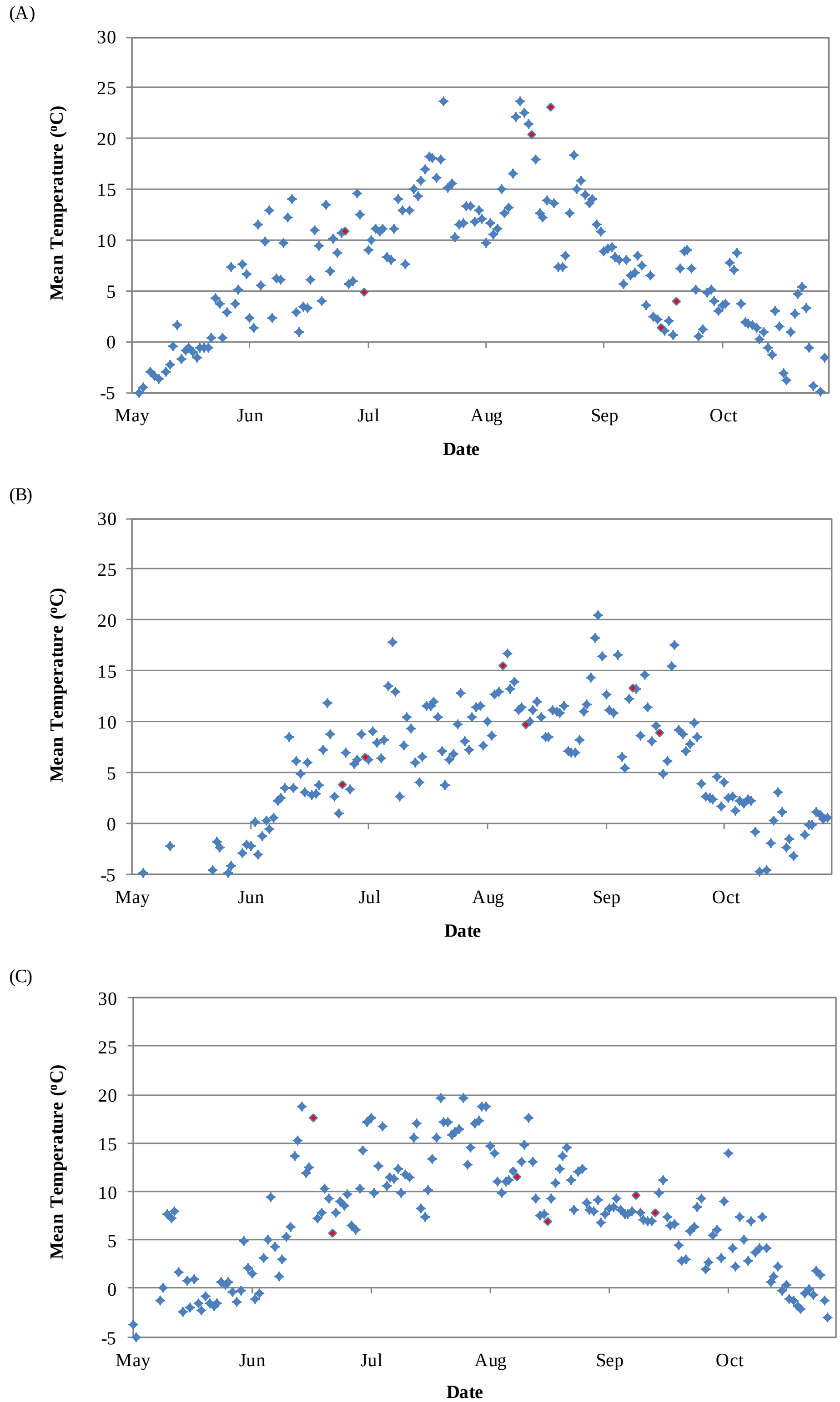


Figure 5.4.4-2. Mean daily air temperatures and water quality sampling dates (indicated in red) for the Lower Churchill River Region: (A) 2008; (B) 2009; and (C) 2010.

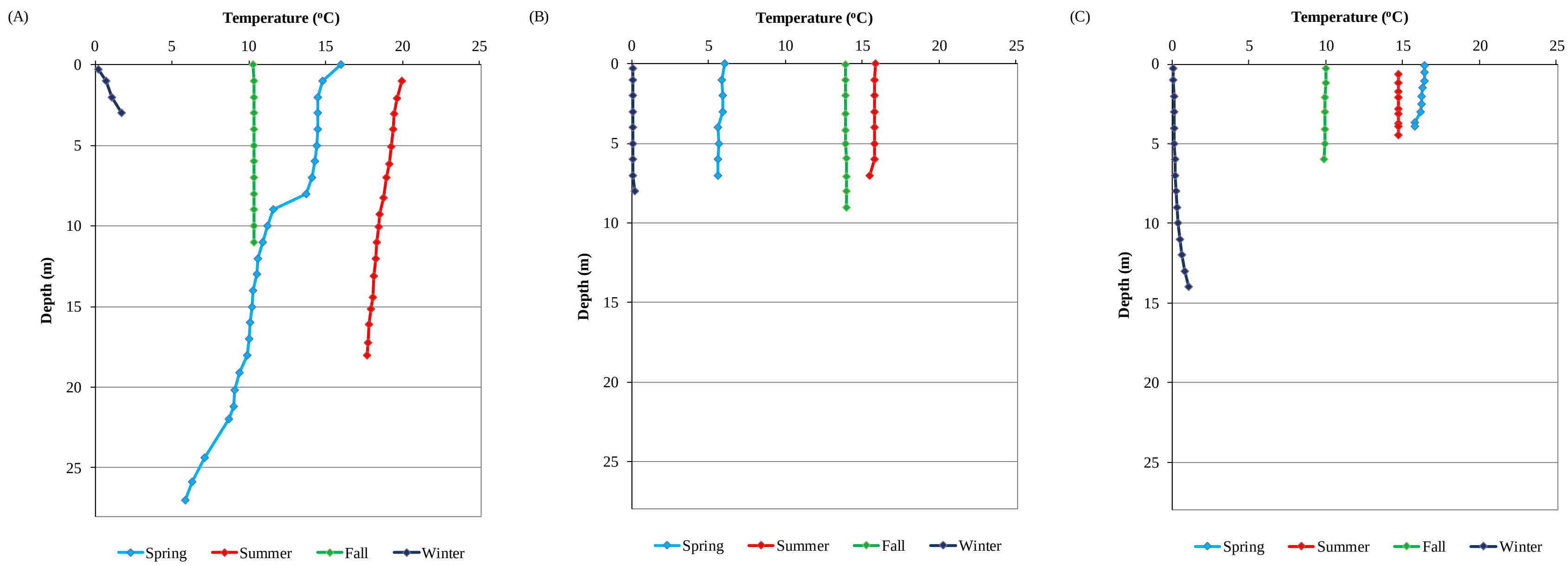


Figure 5.4.4-3. Water temperature profiles measured in Northern Indian Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

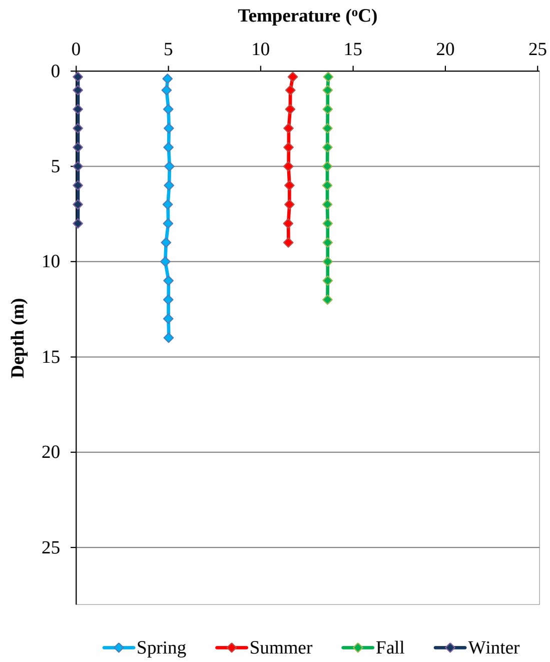


Figure 5.4.4-4. Water temperature profiles measured in Partridge Breast Lake 2009/2010.

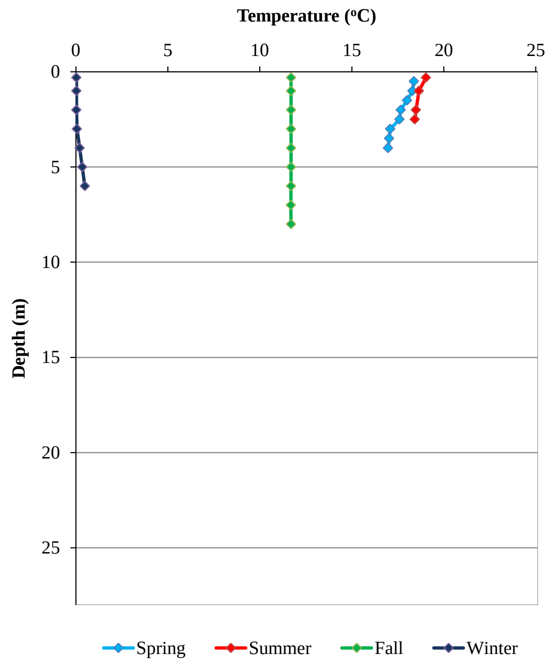


Figure 5.4.4-5. Water temperature profiles measured in Billard Lake 2010/2011.

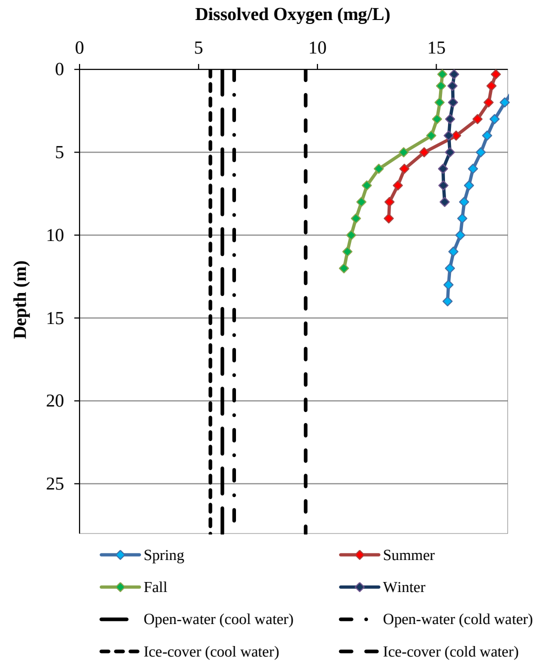


Figure 5.4.4-6. Dissolved oxygen depth profiles measured in Partridge Breast Lake 2009/2010.

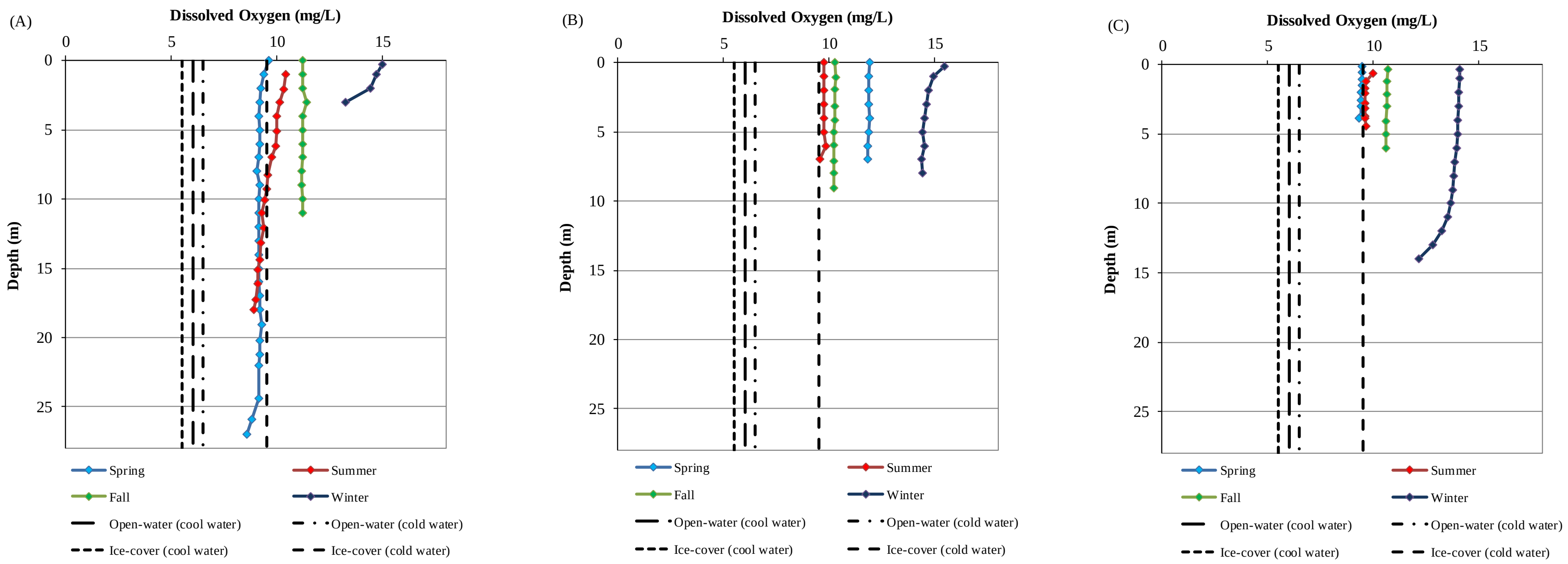


Figure 5.4.4-7. Dissolved oxygen profiles measured in Northern Indian Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

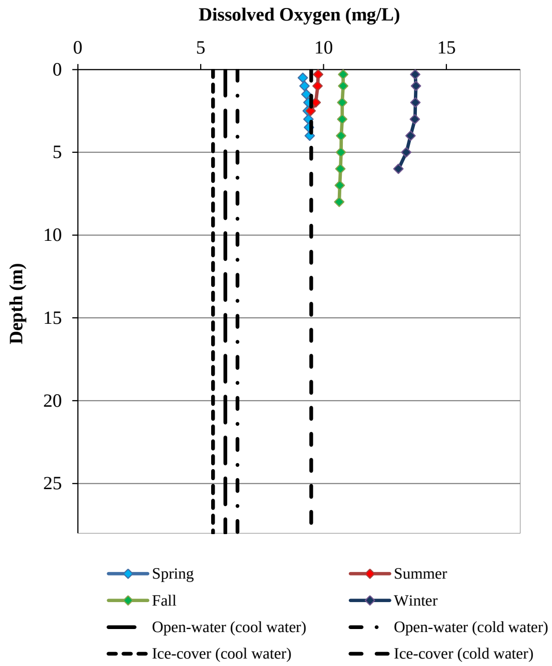


Figure 5.4.4-8. Dissolved oxygen profiles measured in Billard Lake 2010/2011.

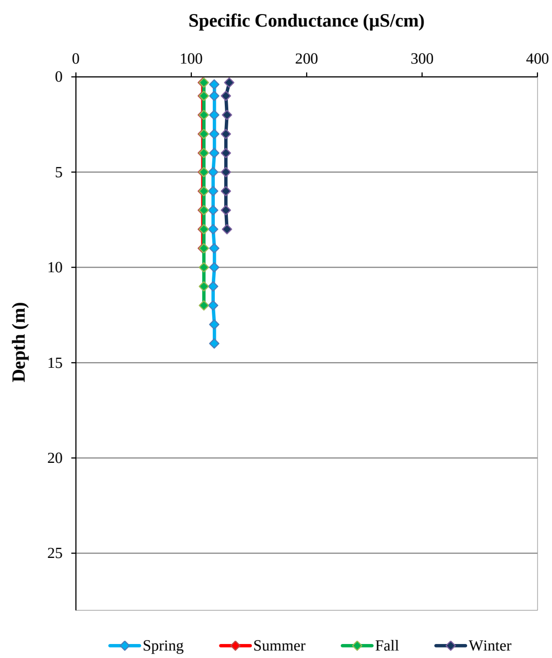


Figure 5.4.4-9. Specific conductance depth profiles measured at Partridge Breast Lake 2009/2010.

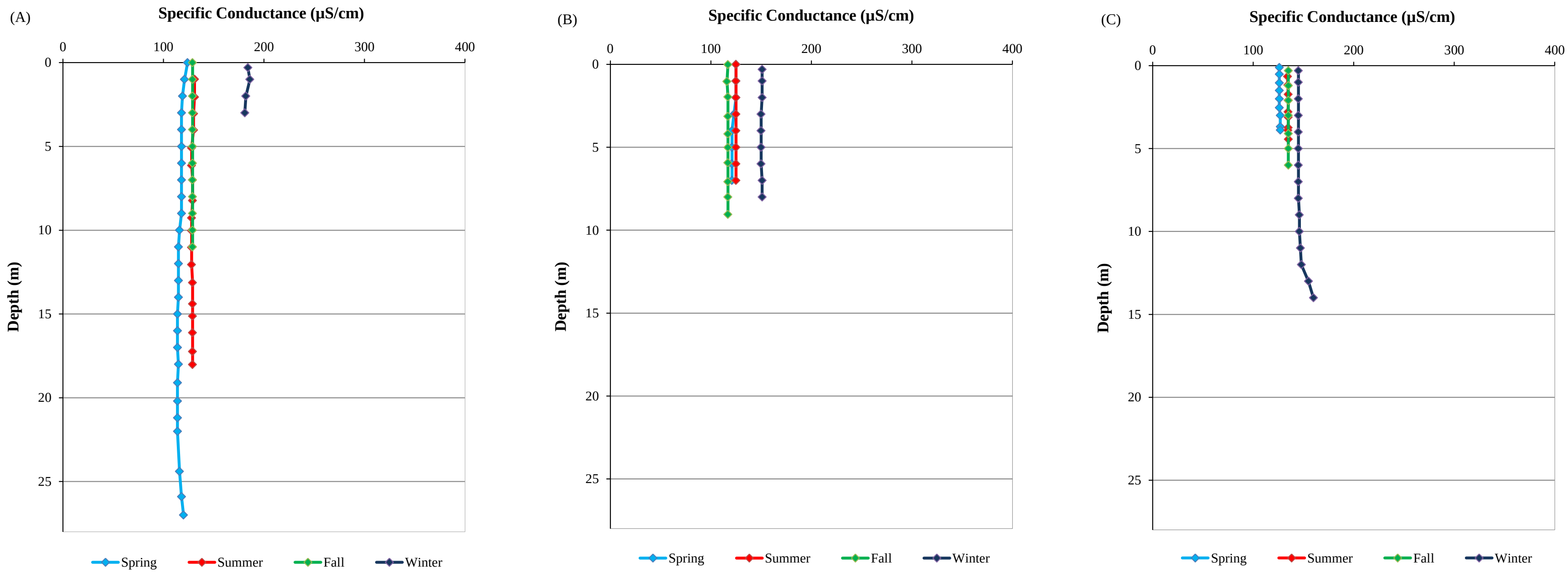


Figure 5.4.4-10. Specific conductance depth profiles measured at measured at Northern Indian Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

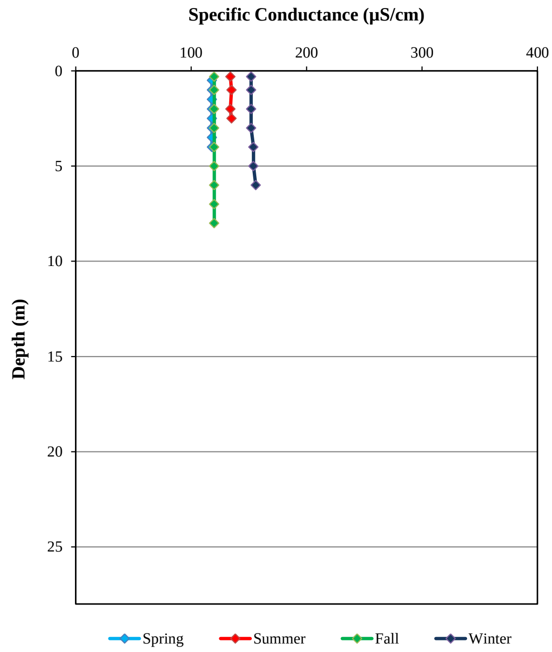


Figure 5.4.4-11. Specific conductance depth profiles measured at measured at Billard Lake 2010/2011.

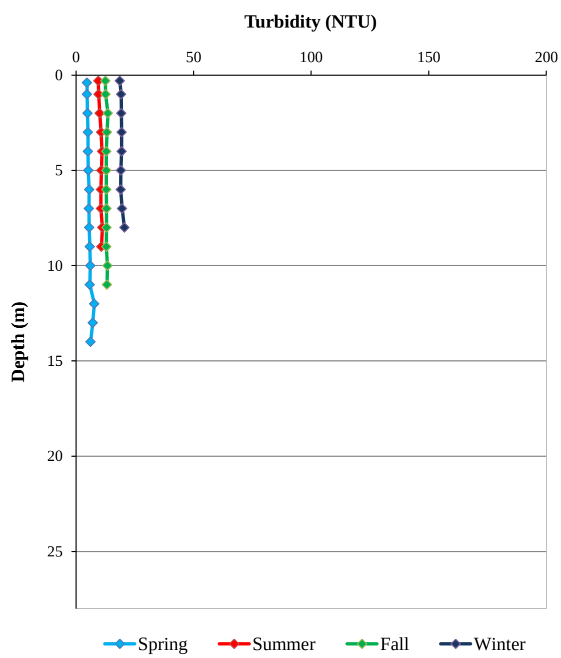


Figure 5.4.4-12. Turbidity depth profiles measured in Partridge Breast Lake 2009/2010.

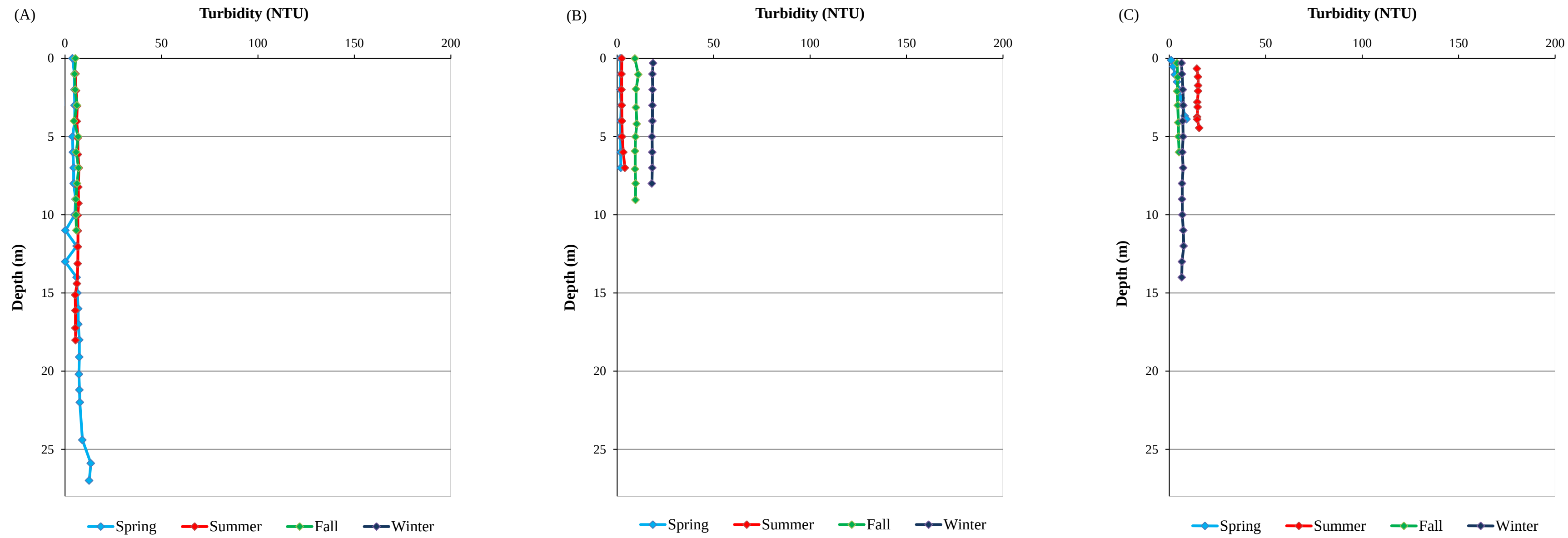


Figure 5.4.4-13. Turbidity depth profiles measured in Northern Indian Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

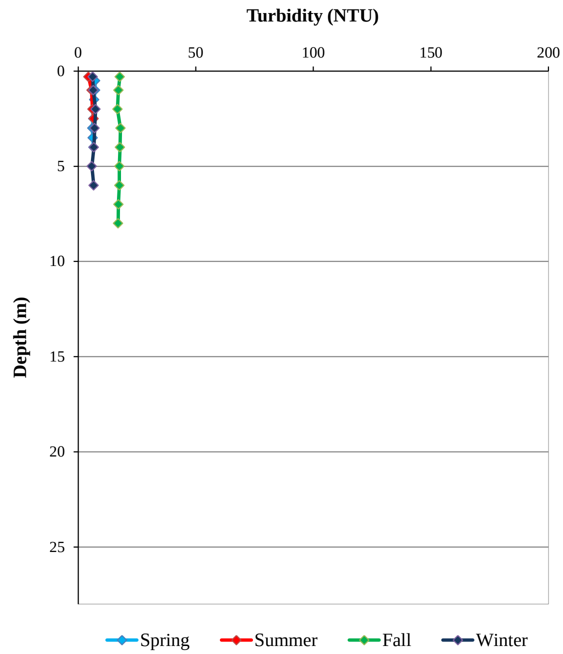


Figure 5.4.4-14. Turbidity depth profiles measured in Billard Lake 2010/2011.

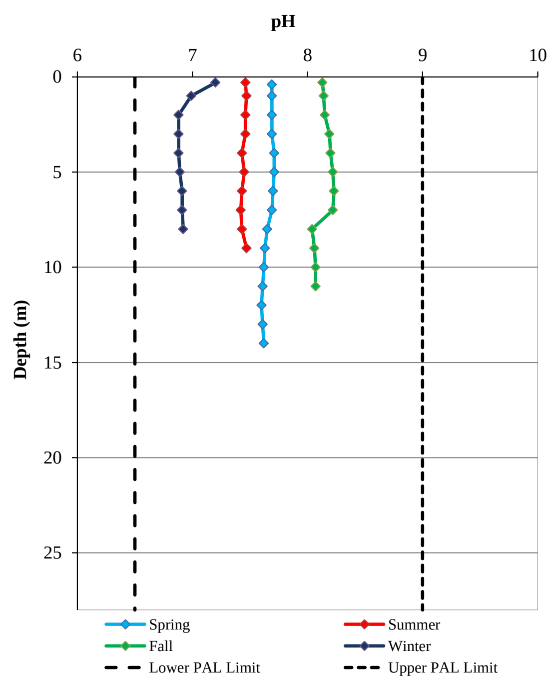


Figure 5.4.4-15. pH depth profiles measured in Partridge Breast Lake 2009/2010.

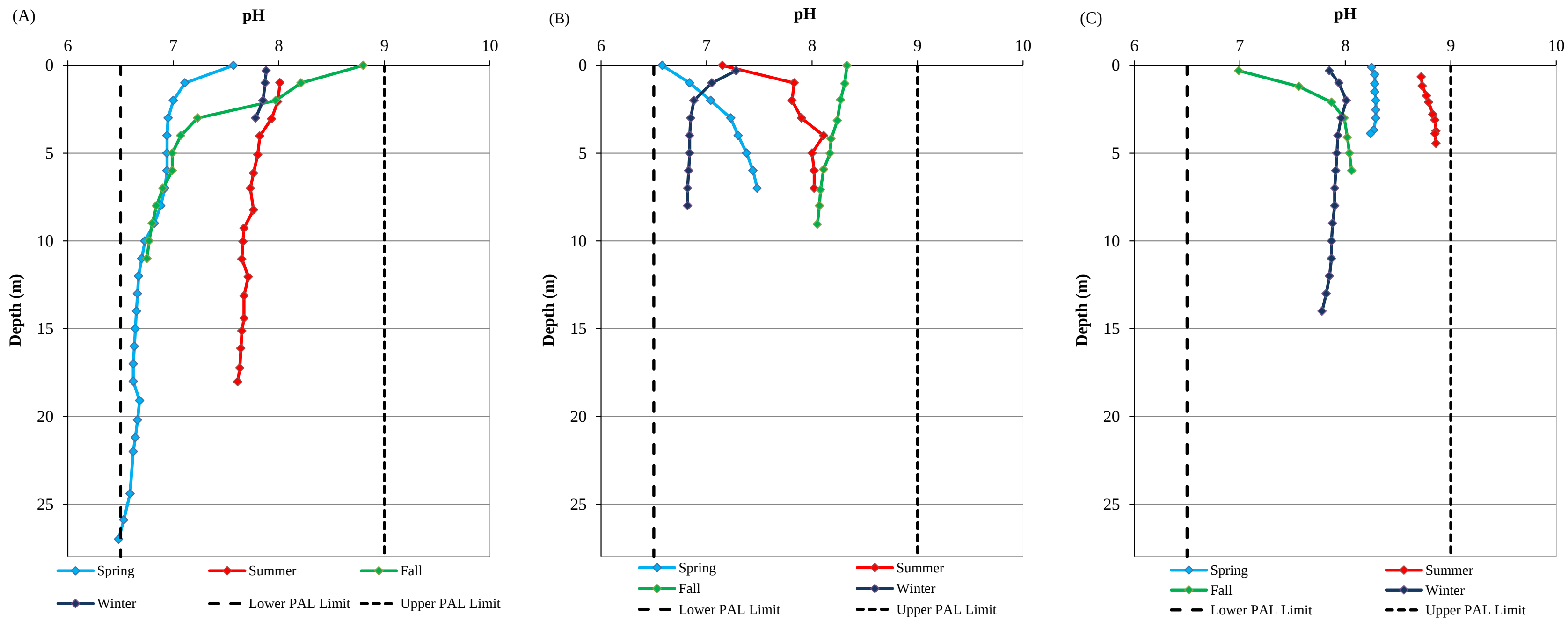


Figure 5.4.4-16. pH depth profiles measured in Northern Indian Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

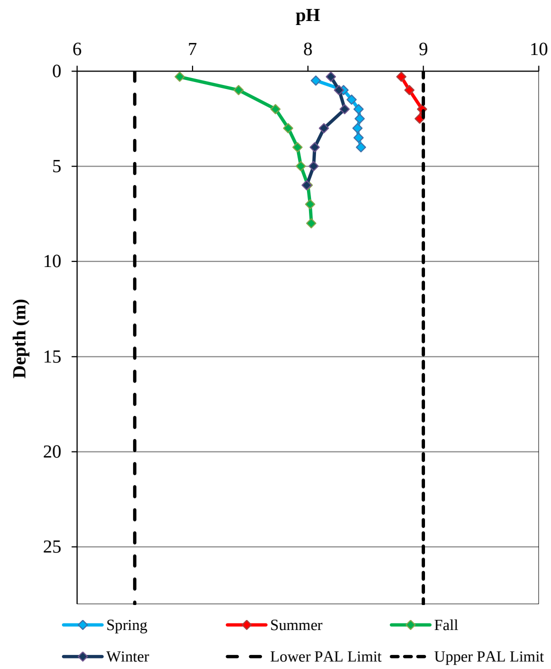


Figure 5.4.4-17. pH depth profiles measured in Billard Lake 2010/2011.

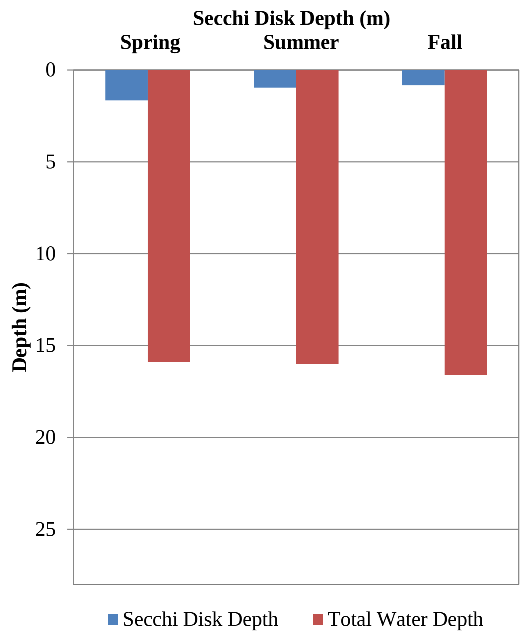


Figure 5.4.4-18. Secchi disk depths measured in Partridge Breast Lake 2009/2010.

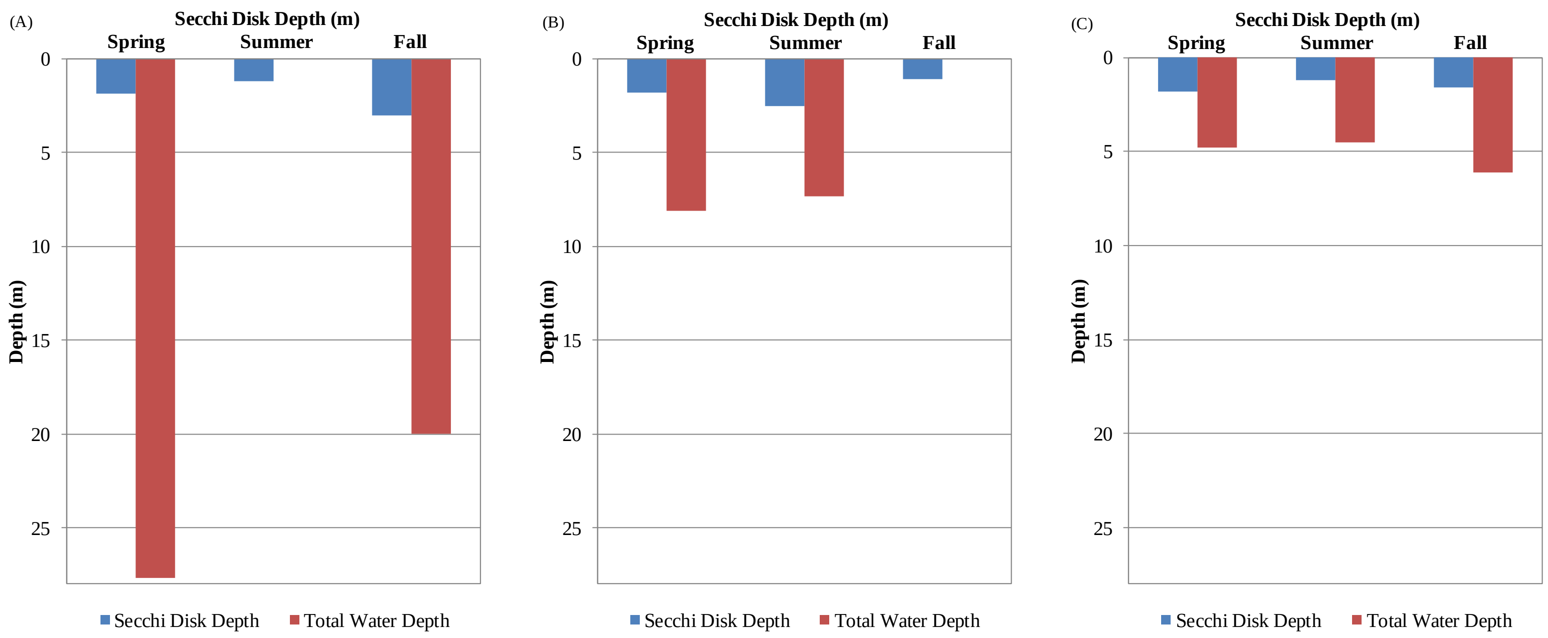


Figure 5.4.4-19. Secchi disk depths measured in Northern Indian Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

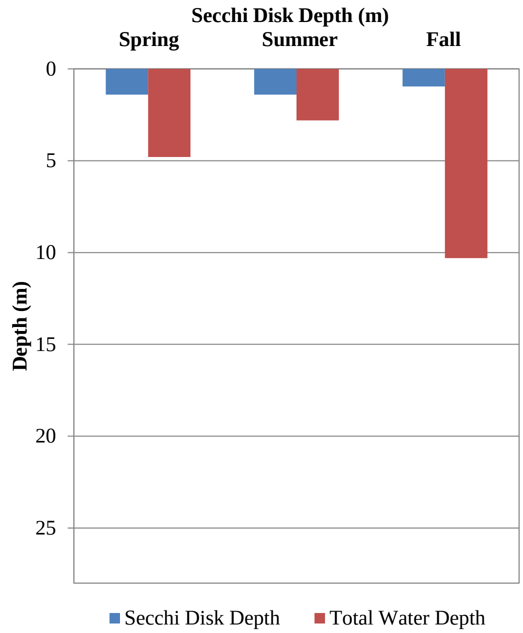


Figure 5.4.4-20. Secchi disk depths measured in Billard Lake 2010/2011.

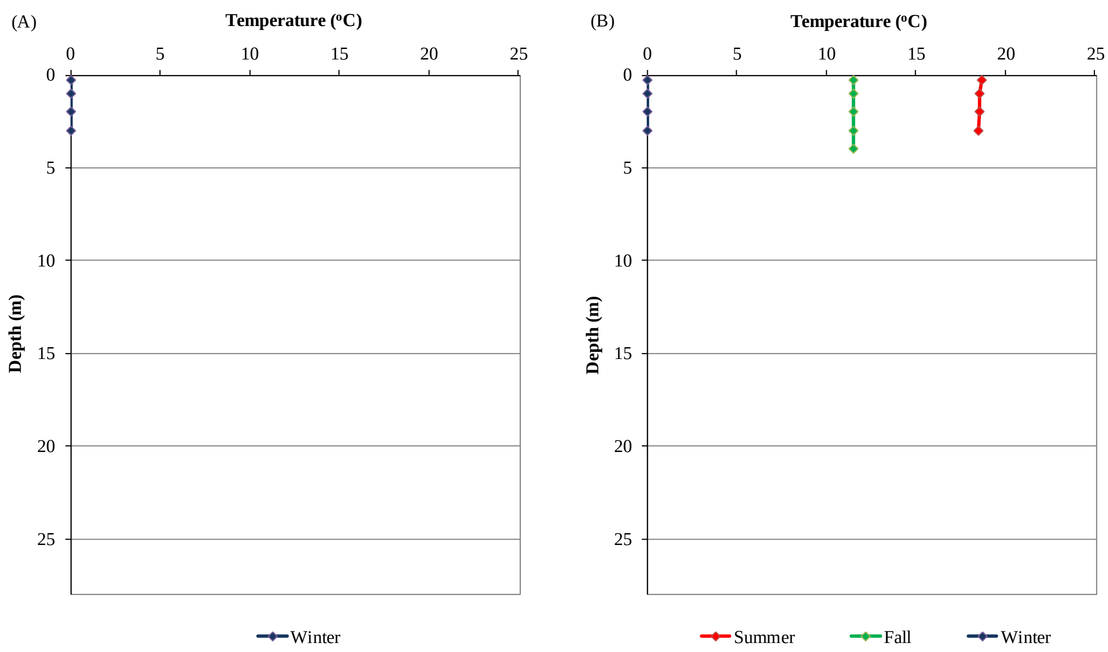


Figure 5.4.4-21. Water temperature profiles measured at the lower Churchill River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

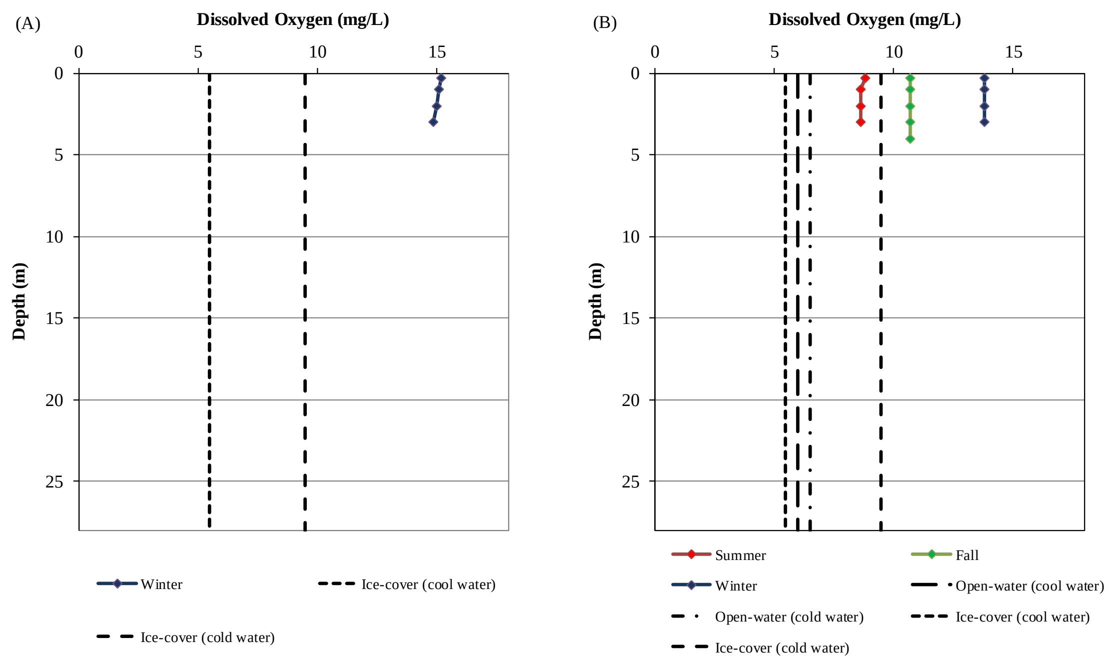


Figure 5.4.4-22. Dissolved oxygen profiles measured in the lower Churchill River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

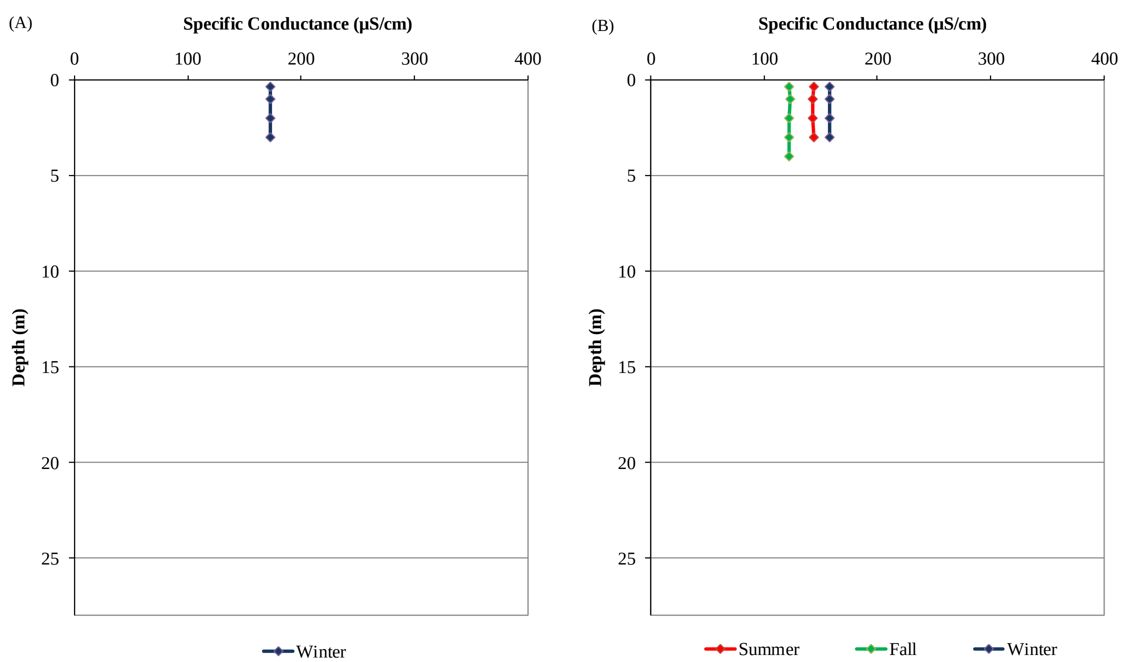


Figure 5.4.4-23. Specific conductance depth profiles measured at the lower Churchill River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

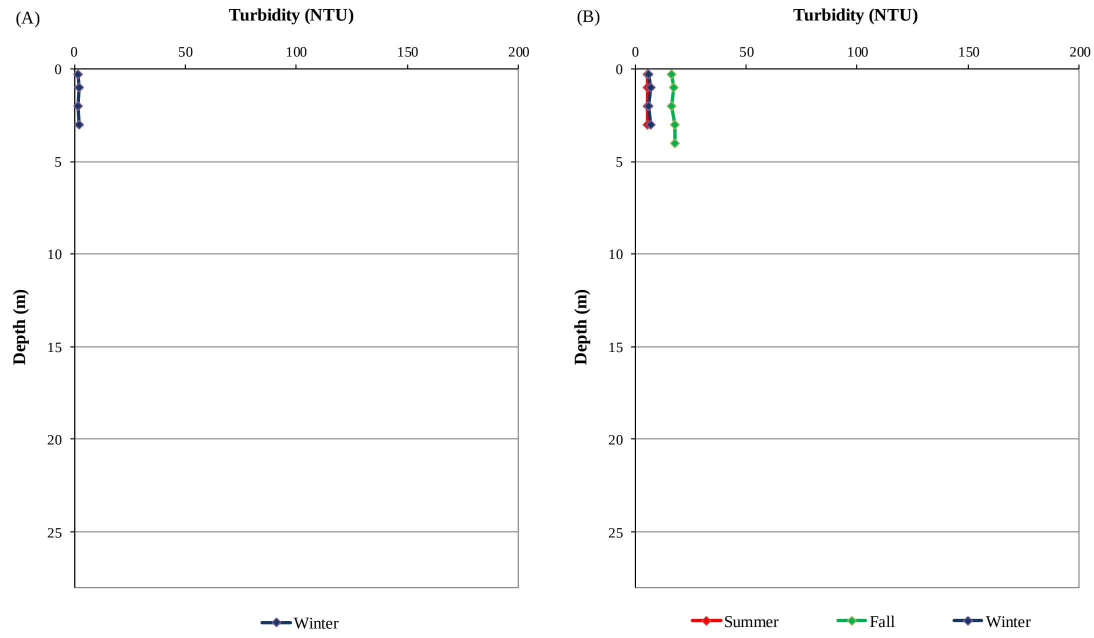


Figure 5.4.4-24. Turbidity depth profiles measured in lower Churchill River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

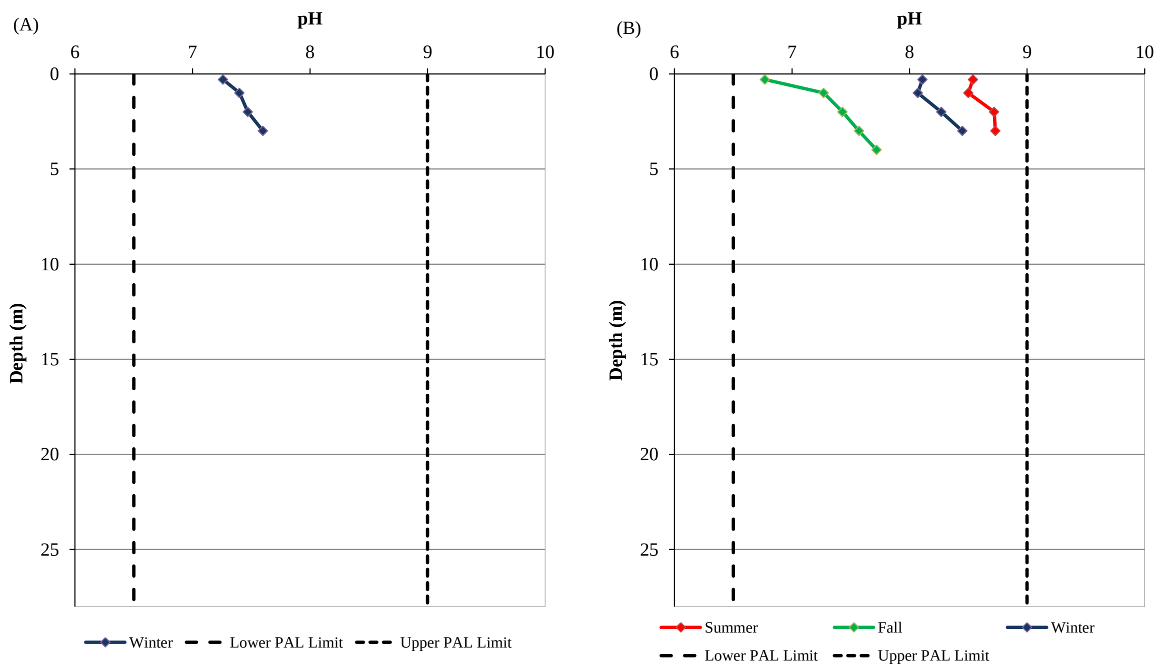


Figure 5.4.4-25. pH depth profiles measured in the lower Churchill River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

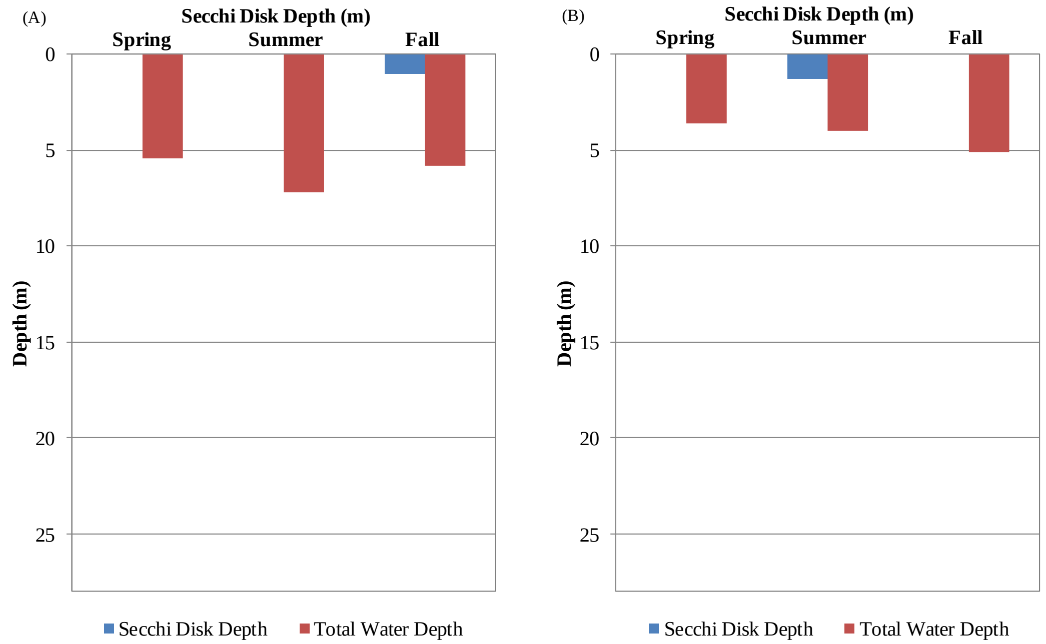


Figure 5.4.4-26. Secchi disk depths measured in the lower Churchill River: (A) 2008/2009 and (B) 2010/2011.Note: Secchi disk depths not collected during other sampling periods at this site.

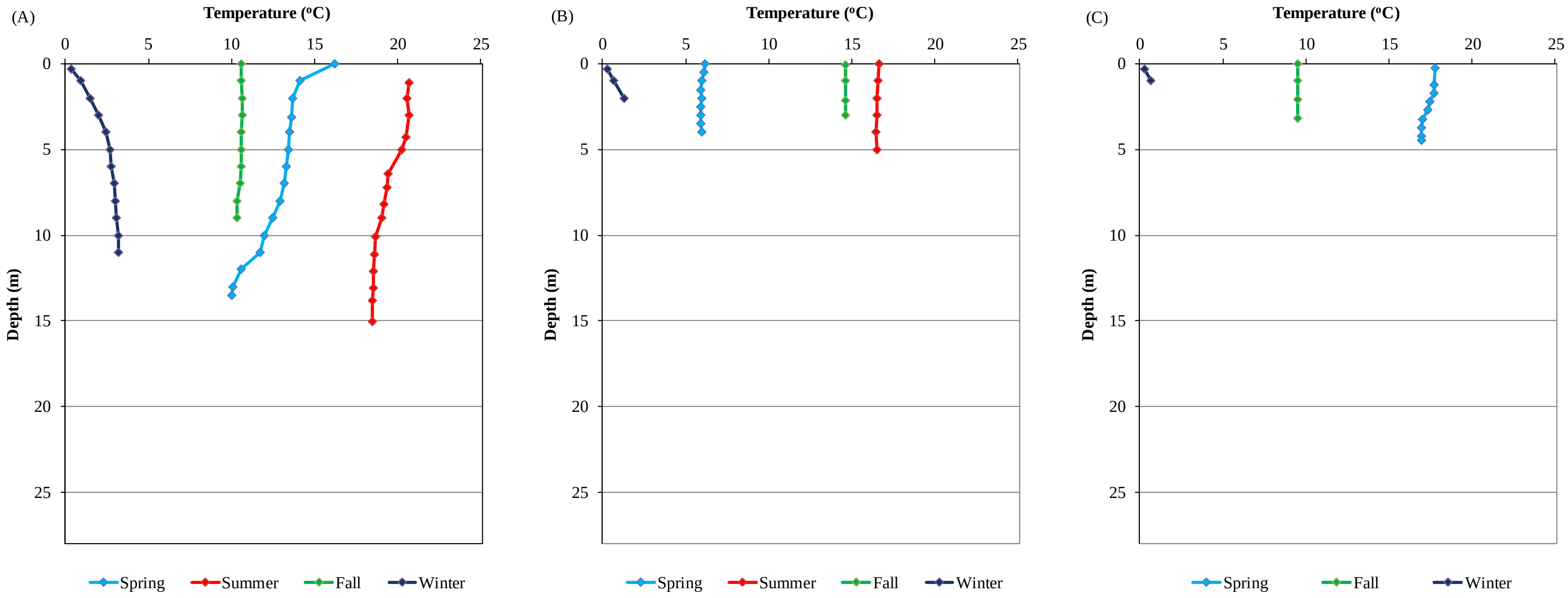


Figure 5.4.4-27. Water temperature profiles measured in Gauer Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

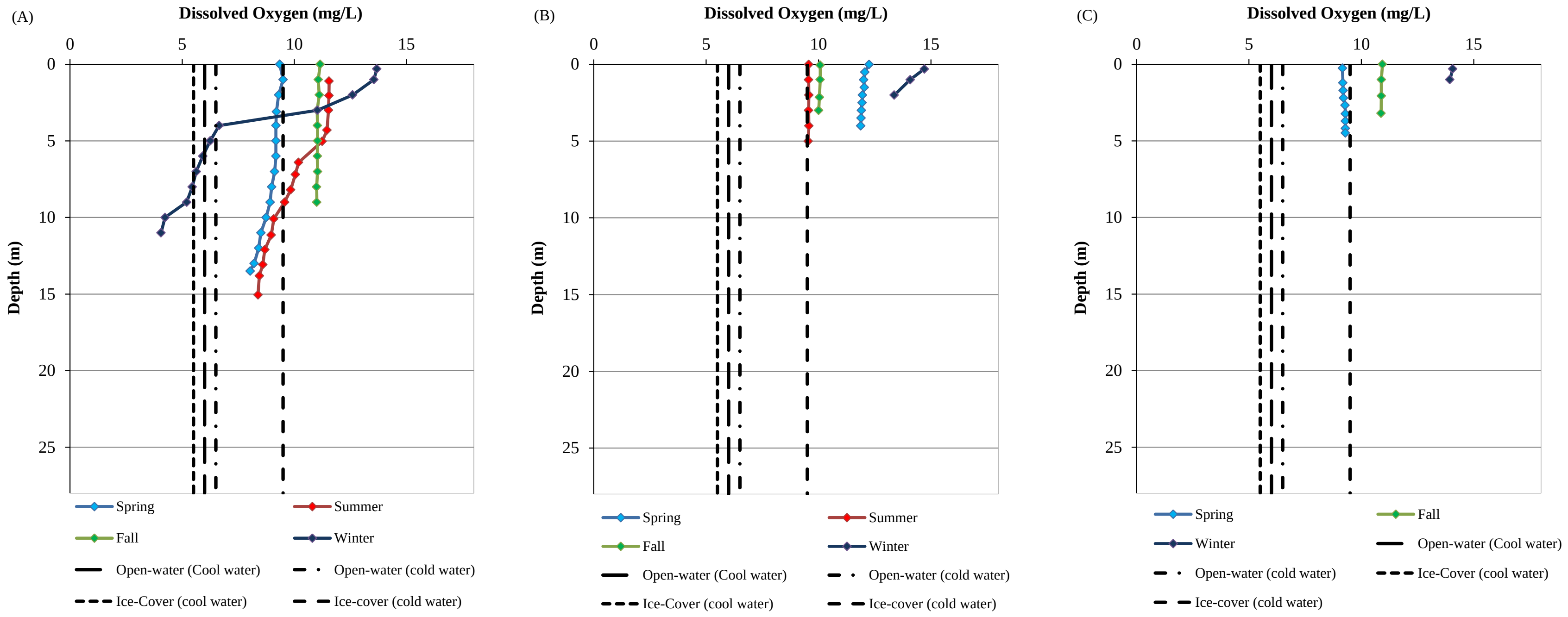


Figure 5.4.4-28. Dissolved oxygen profiles measured in Gauer Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

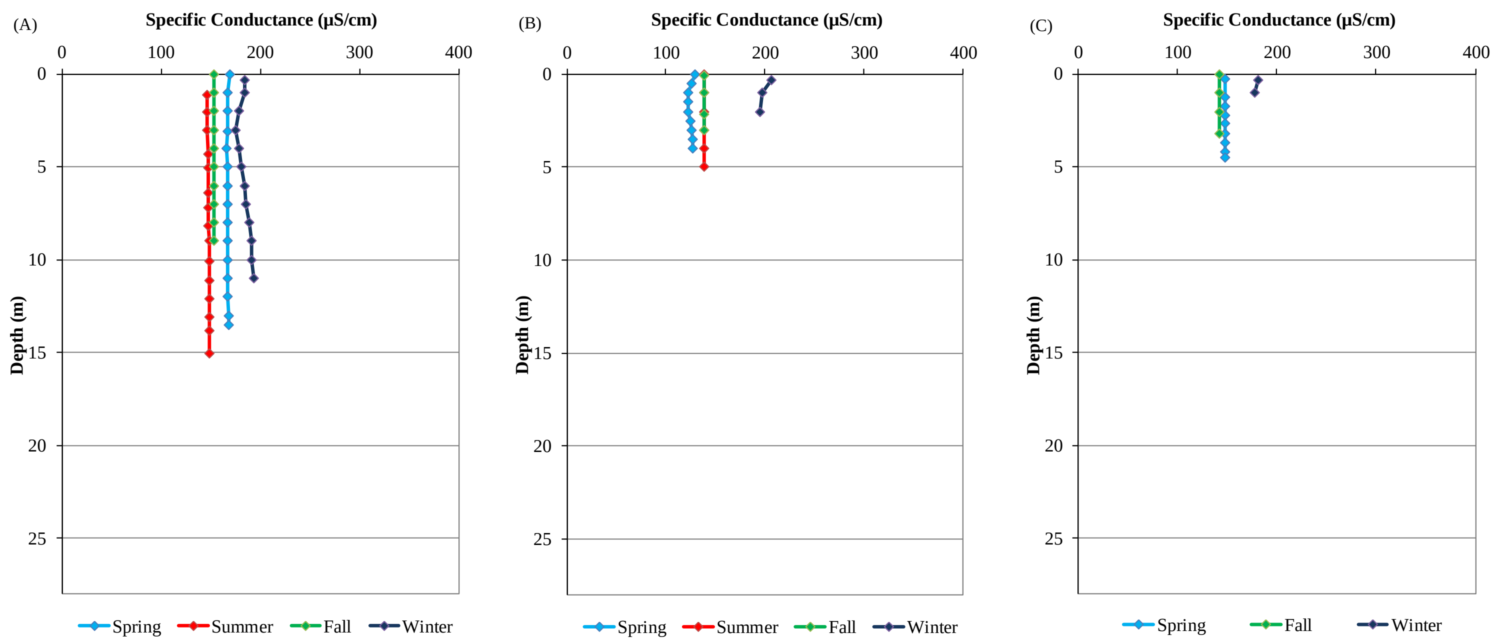


Figure 5.4.4-29. Specific conductance depth profiles measured at Gauer Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

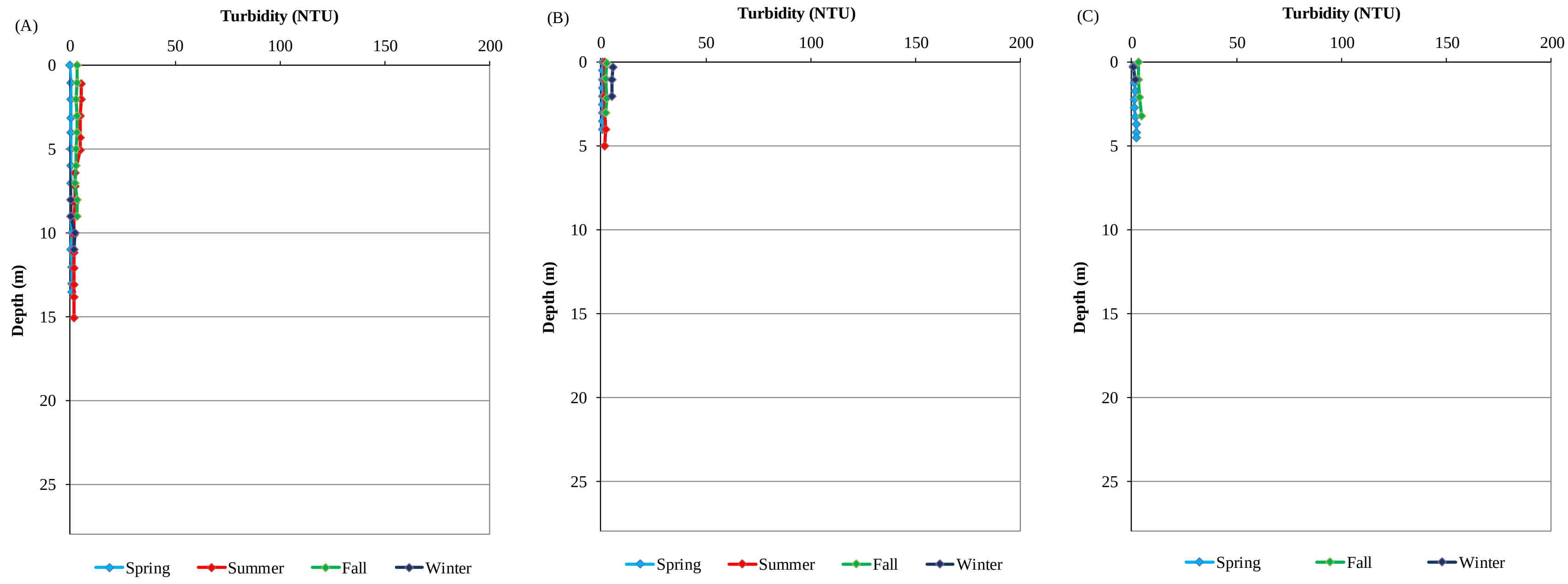


Figure 5.4.4-30. Turbidity depth profiles measured in Gauer Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

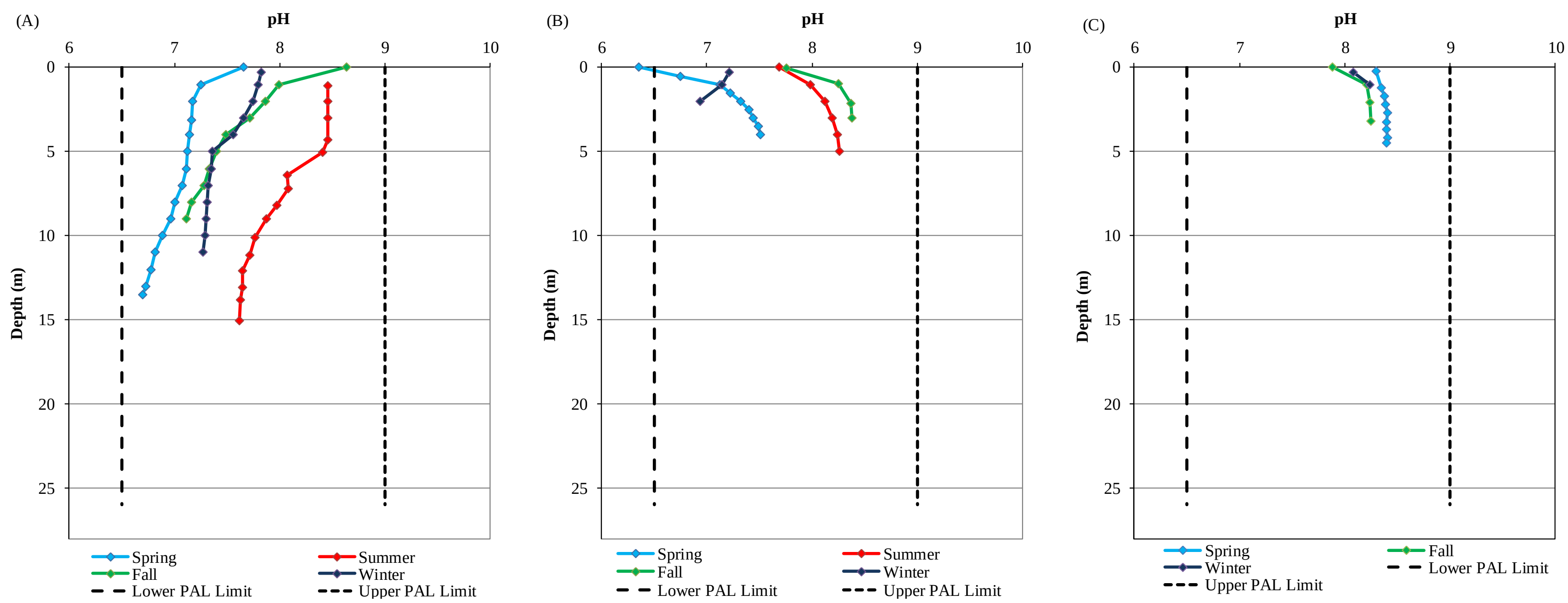


Figure 5.4.4-31. pH depth profiles measured in Gauer Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

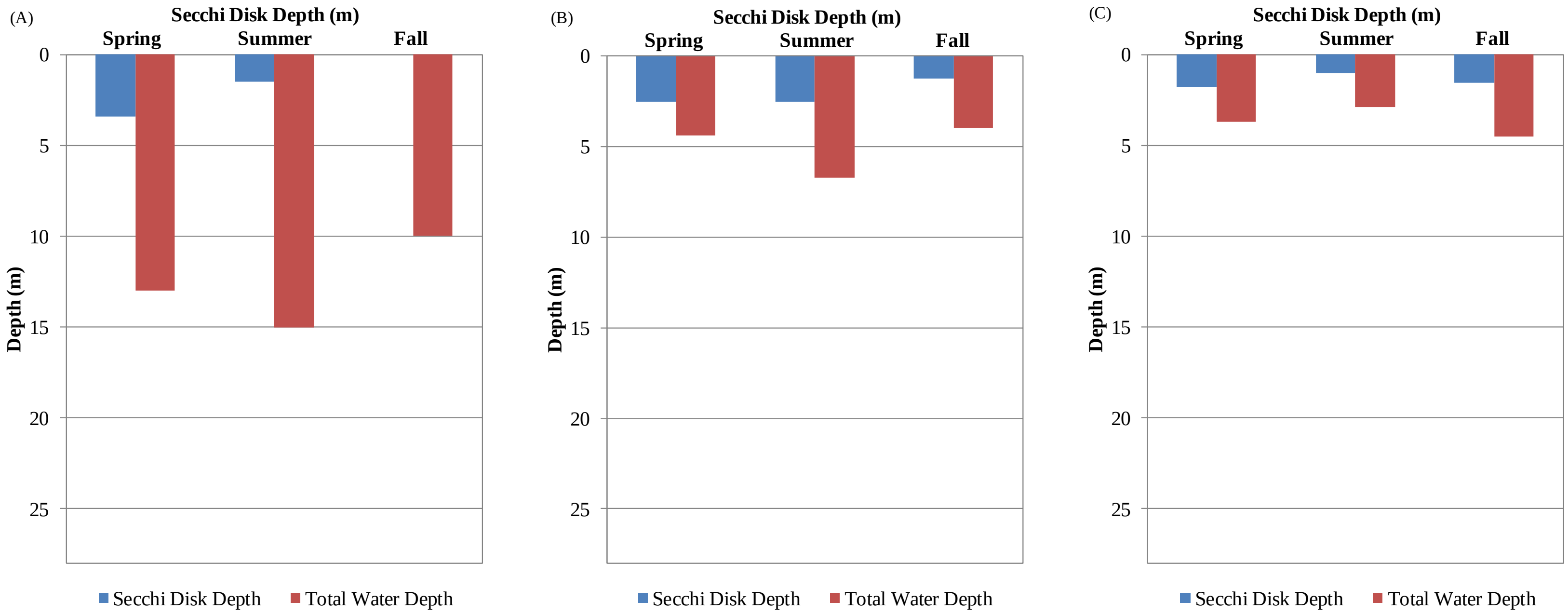


Figure 5.4.4-32. Secchi disk depths measured in Gauer Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

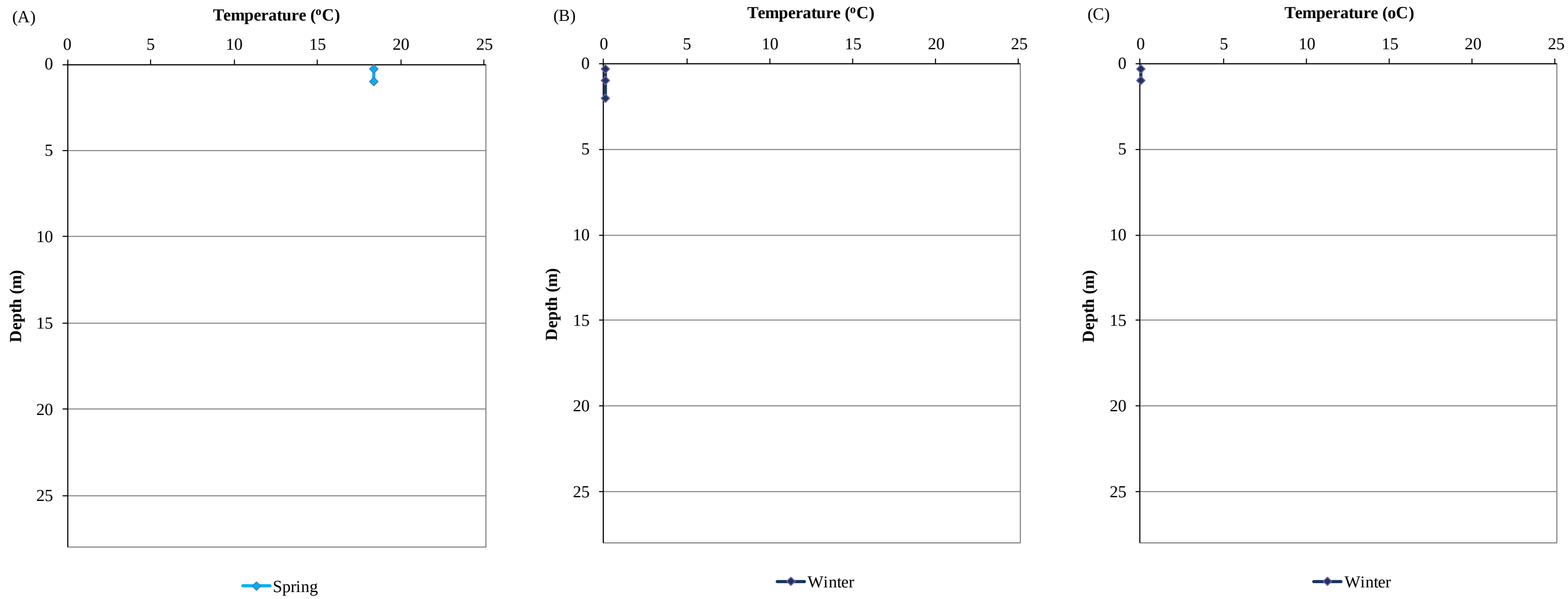


Figure 5.4.4-33. Water temperature profiles measured at Hayes River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

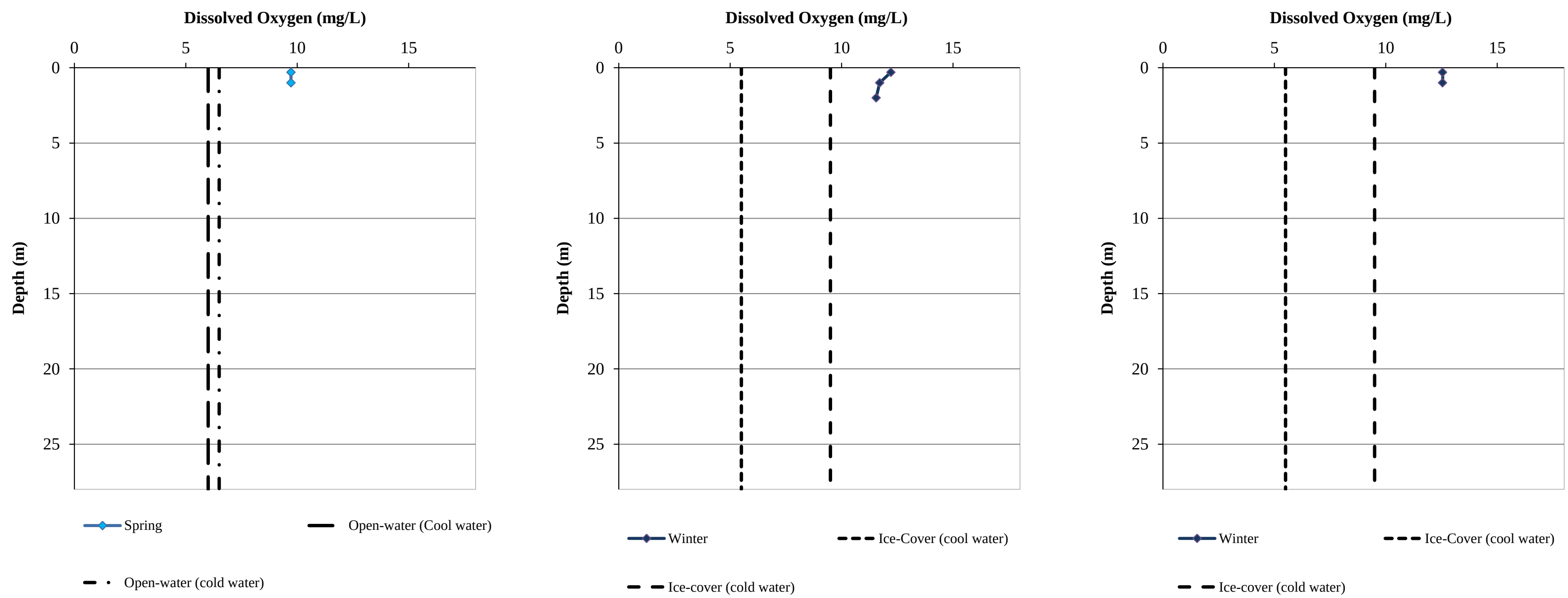


Figure 5.4.4-34. Dissolved oxygen profiles measured in Hayes River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

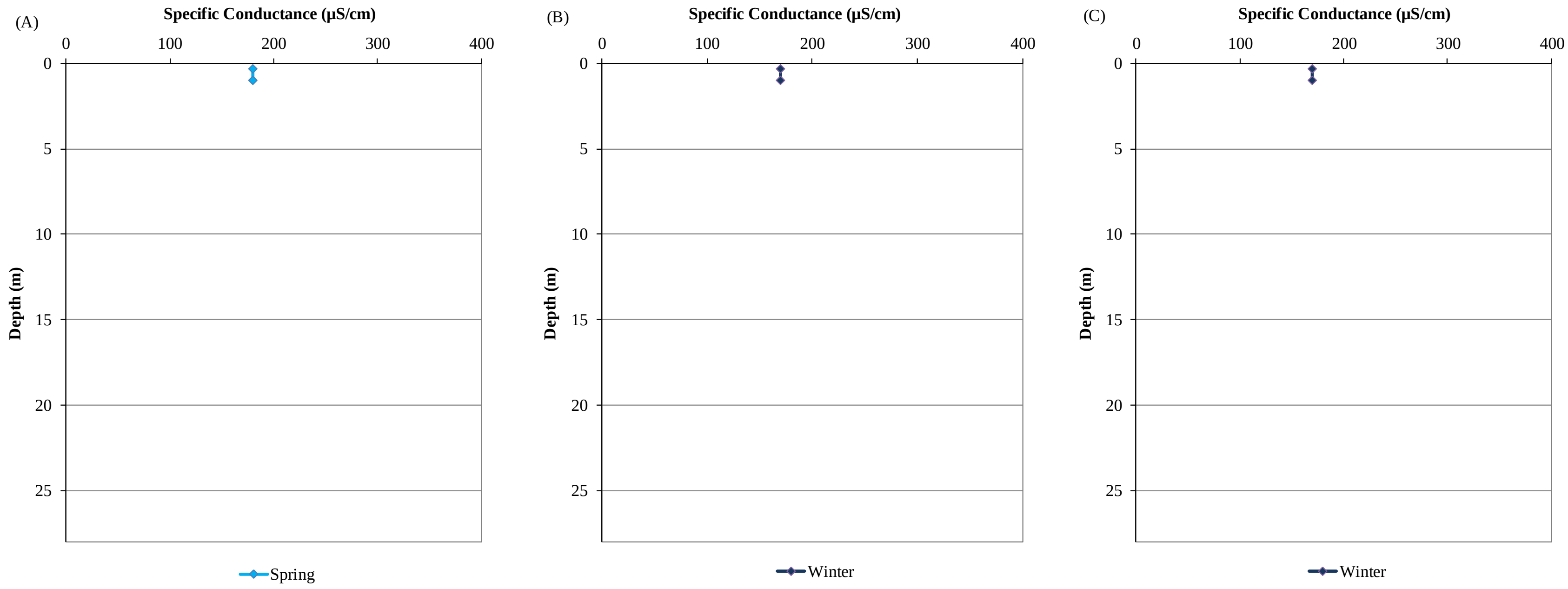


Figure 5.4.4-35. Specific conductance depth profiles measured at Hayes River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

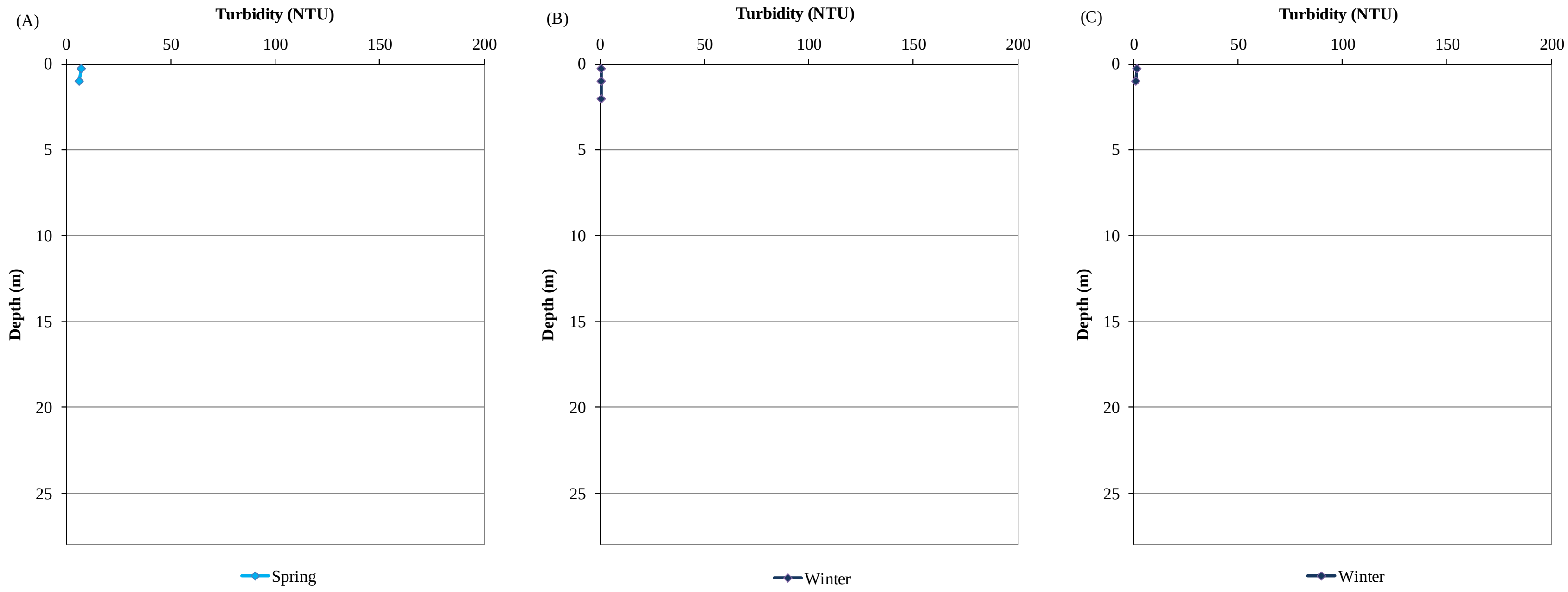


Figure 5.4.4-36. Turbidity depth profiles measured in Hayes River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

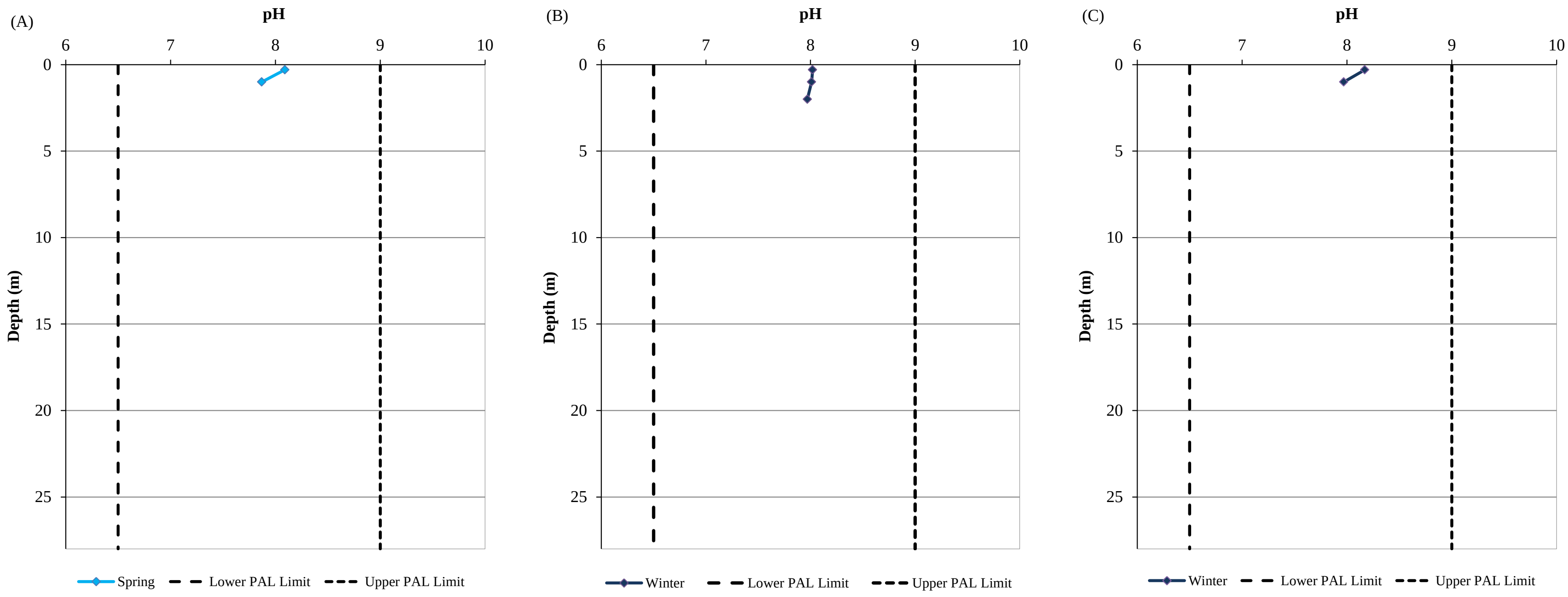


Figure 5.4.4-37. pH depth profiles measured in Hayes River: (A) 2008/2009 and (B) 2010/2011. Note: depth profiles not collected during other sampling periods at this site.

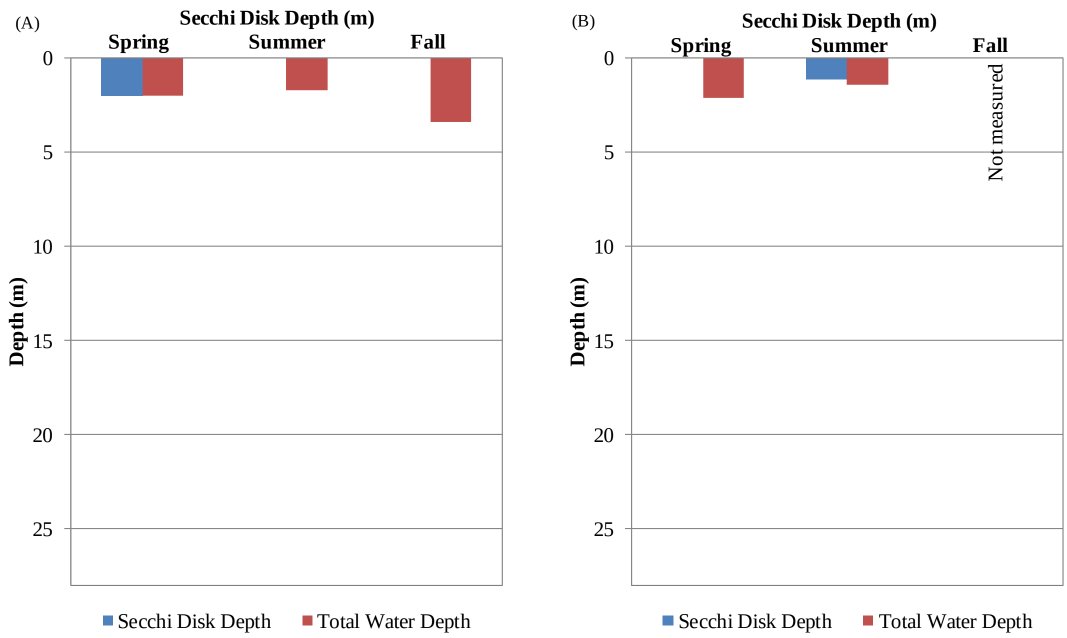


Figure 5.4.4-38. Secchi disk depths measured in the Hayes River: (A) 2008/2009 and (B) 2010/2011. Note: Secchi disk depths were not measured during other sampling periods at this site.

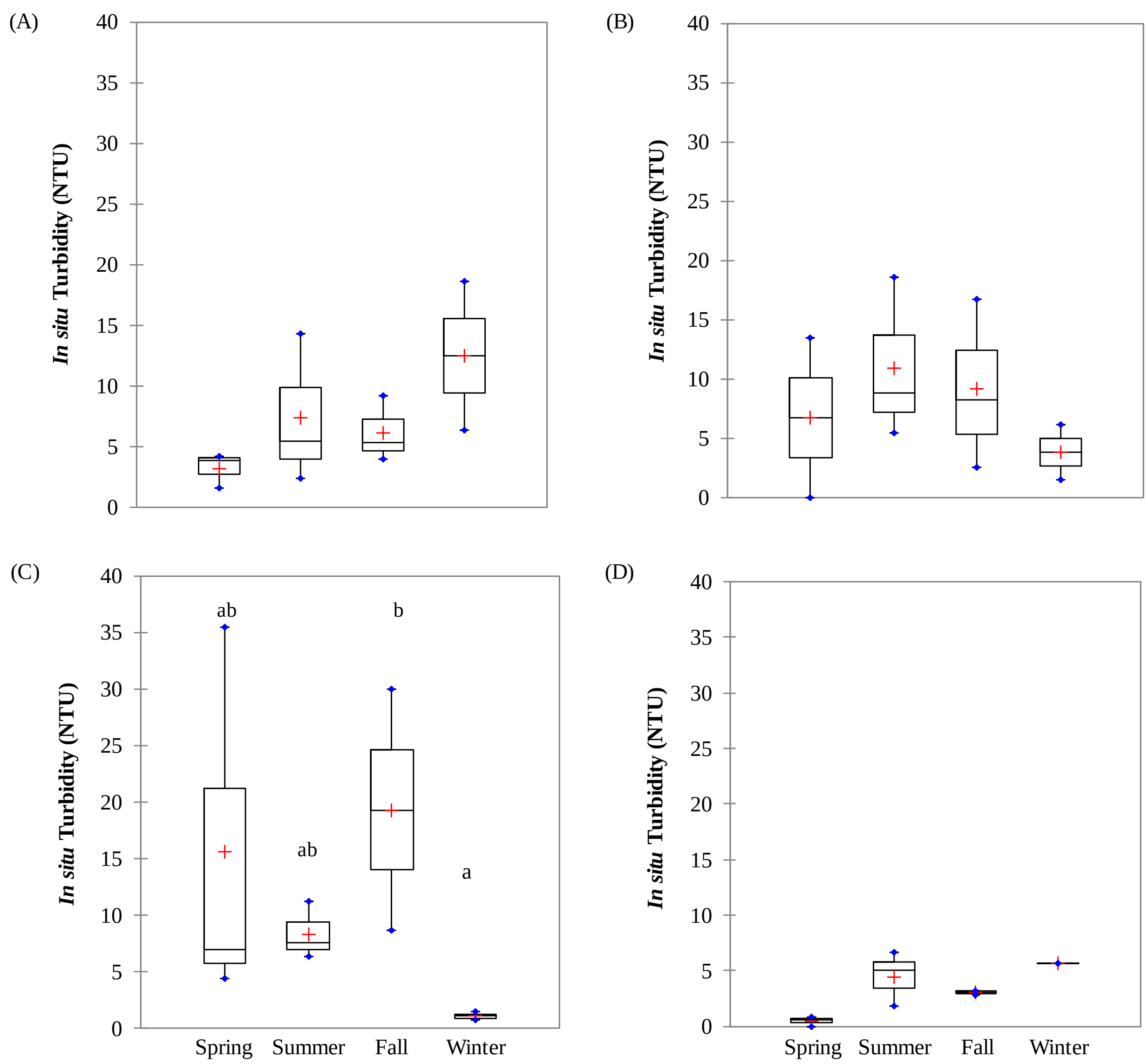


Figure 5.4.4-39. *In situ* turbidity in the Lower Churchill River Region by season: (A) Northern Indian Lake, (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

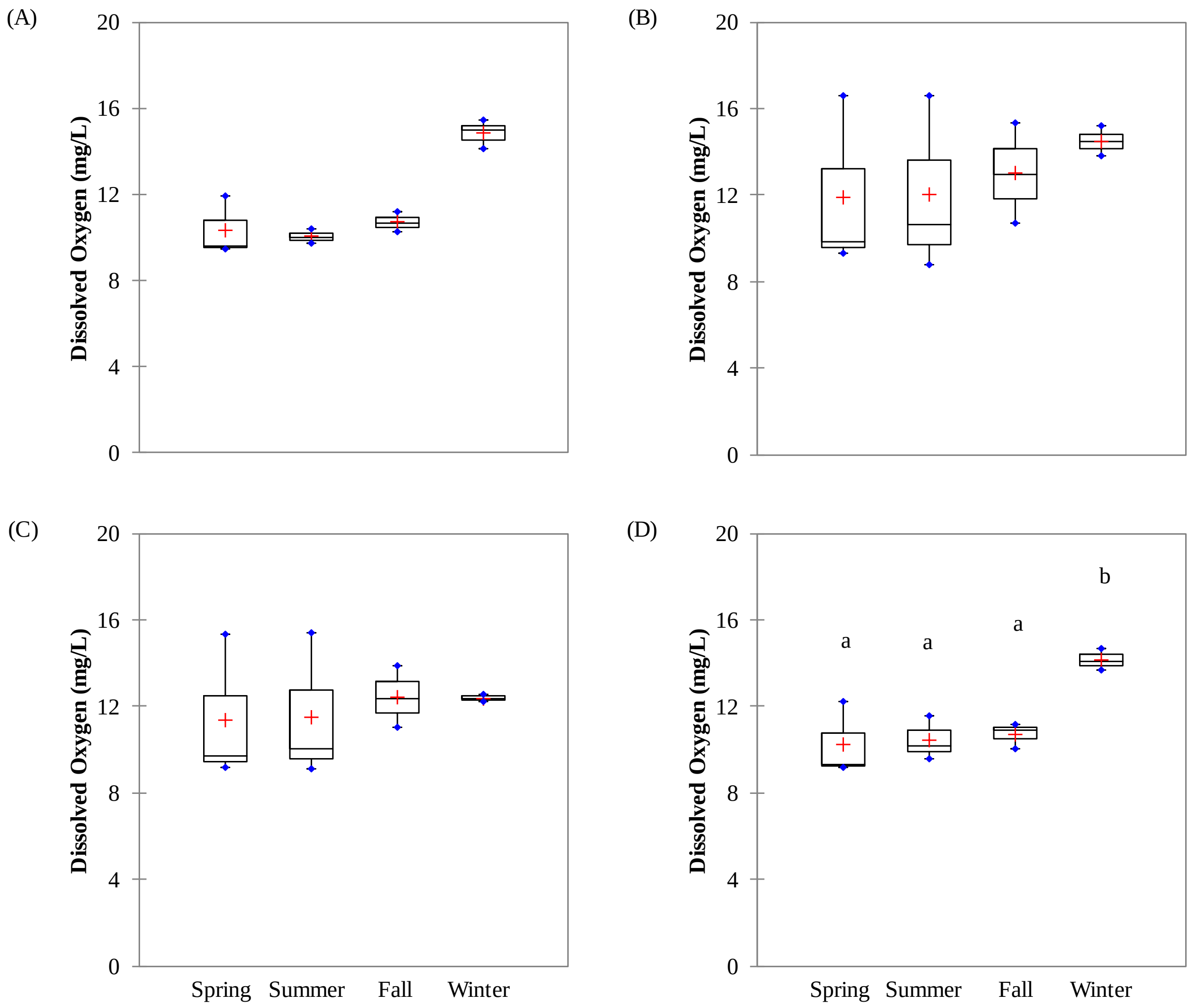


Figure 5.4.4-40. Dissolved oxygen in the Lower Churchill River Region by season: (A) Northern Indian Lake, (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

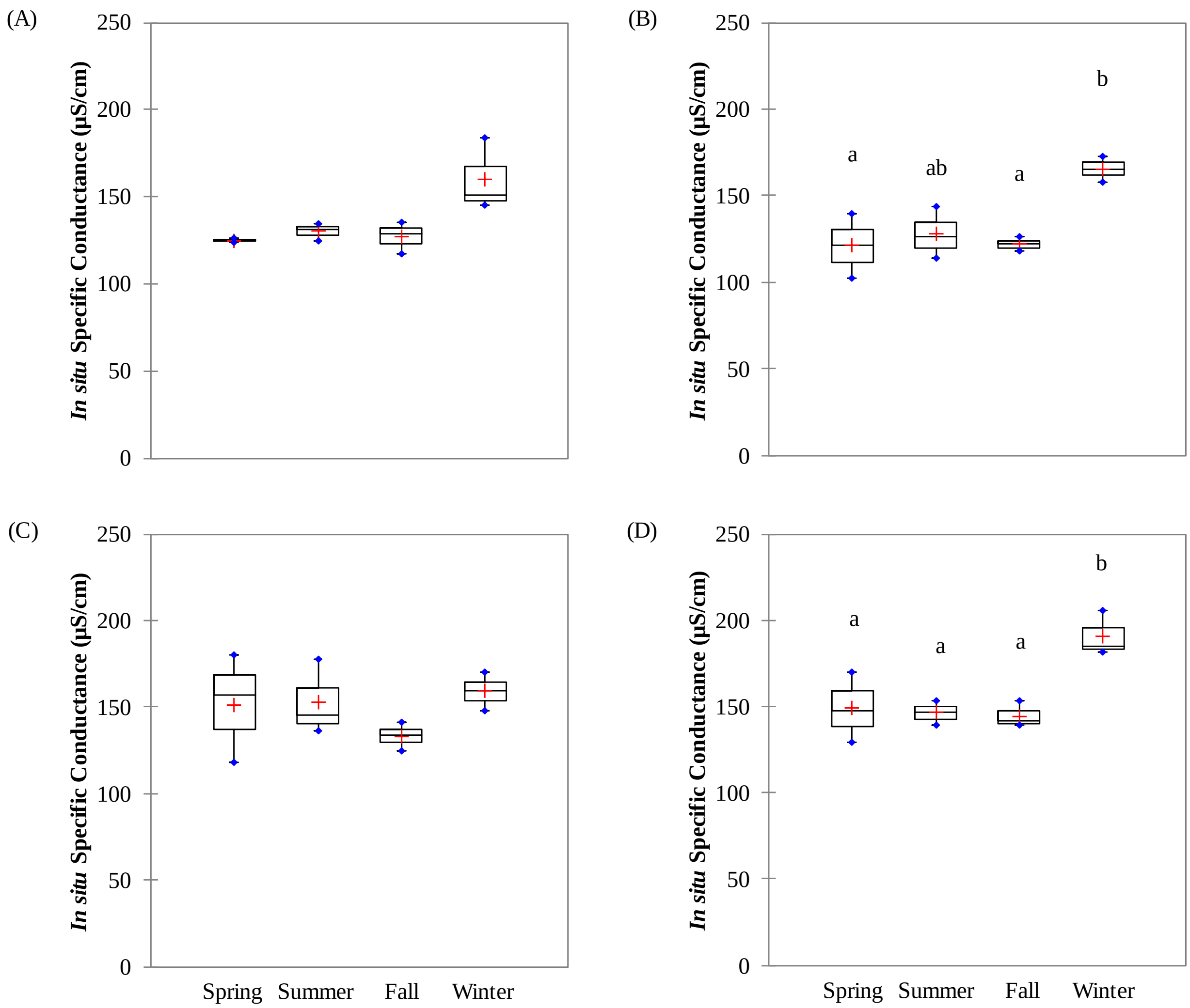


Figure 5.4.4-41. *In situ* specific conductance in the Lower Churchill River Region by season: (A) Northern Indian Lake, (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

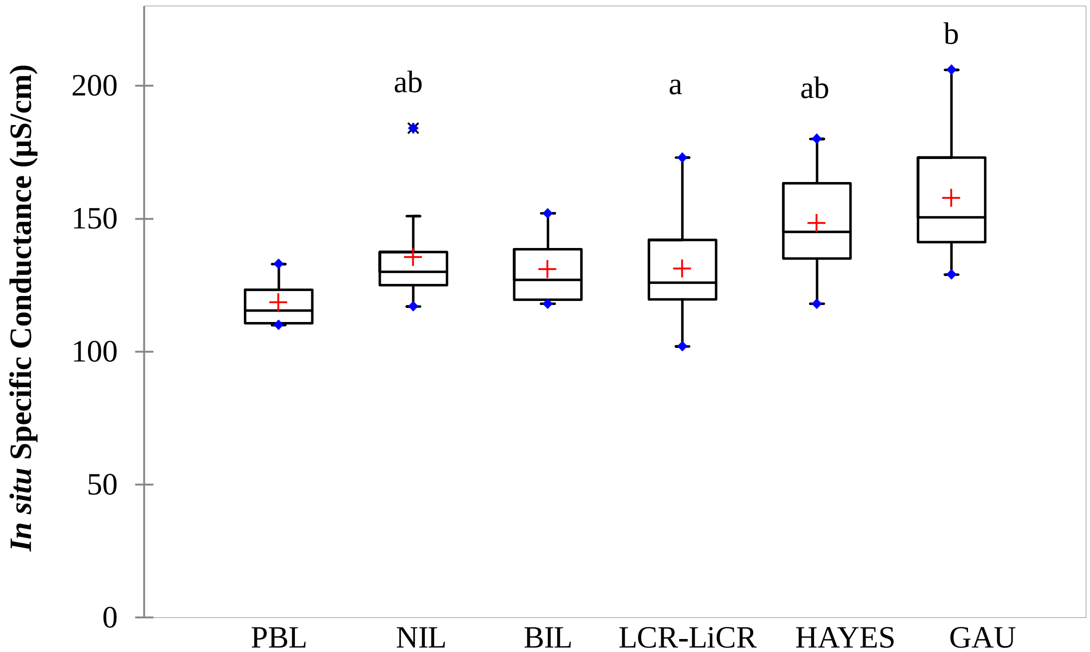


Figure 5.4.4-42. *In situ* specific conductance in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

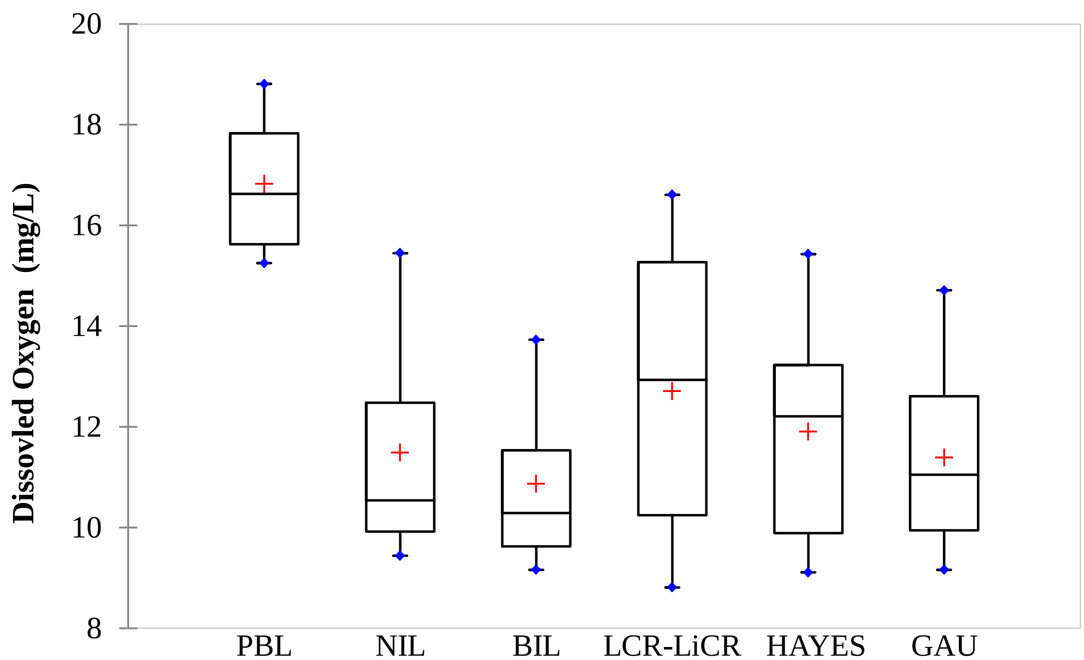


Figure 5.4.4-43. Dissolved oxygen in the Lower Churchill River Region: 2008-2010.

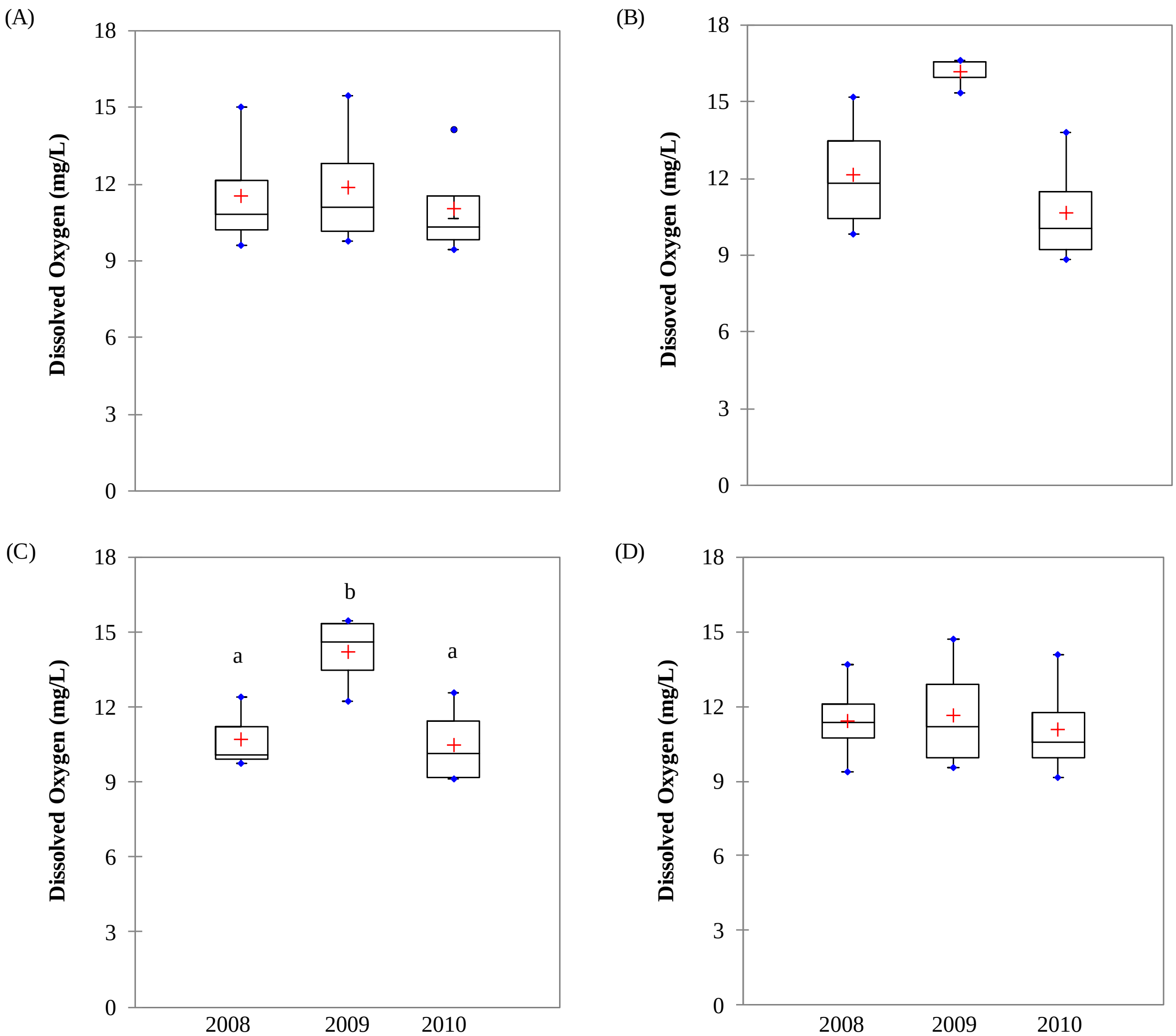


Figure 5.4.4-44. Dissolved oxygen in the Lower Churchill River Region by year: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant differences are denoted with different superscripts.

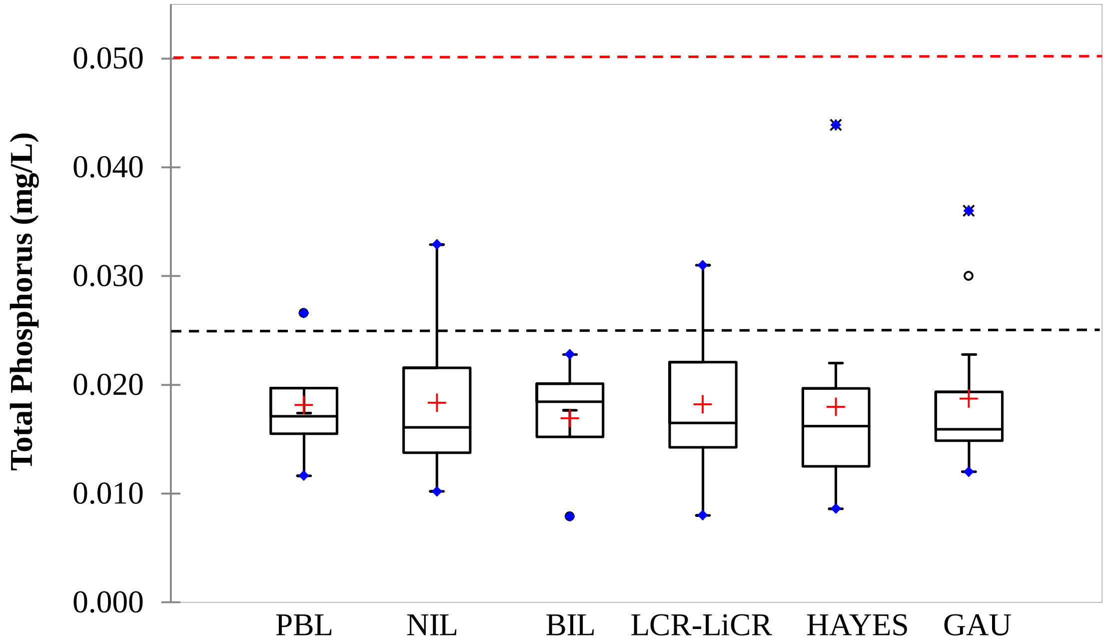


Figure 5.4.4-45. Total phosphorus in the Lower Churchill River Region: 2008-2010. The black dashed line represents the Manitoba narrative guideline for lakes, ponds, reservoirs, and tributaries to such waterbodies; the red dashed line is the guideline for streams and rivers.

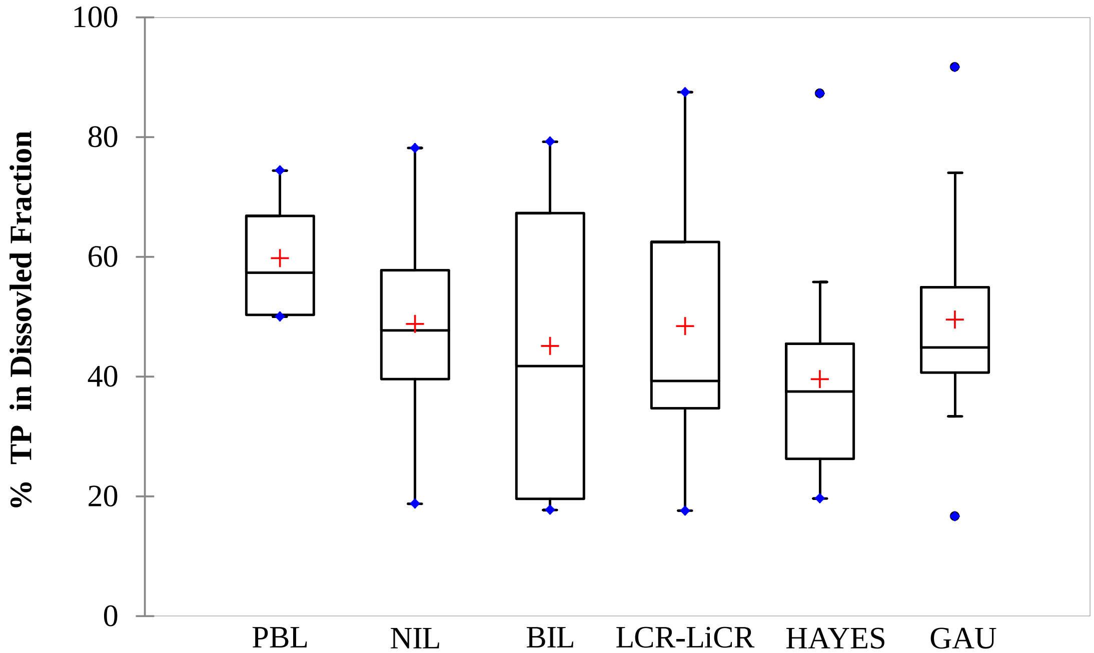


Figure 5.4.4-46. Fraction of total phosphorus in dissolved form in the Lower Churchill River Region: 2008-2010.

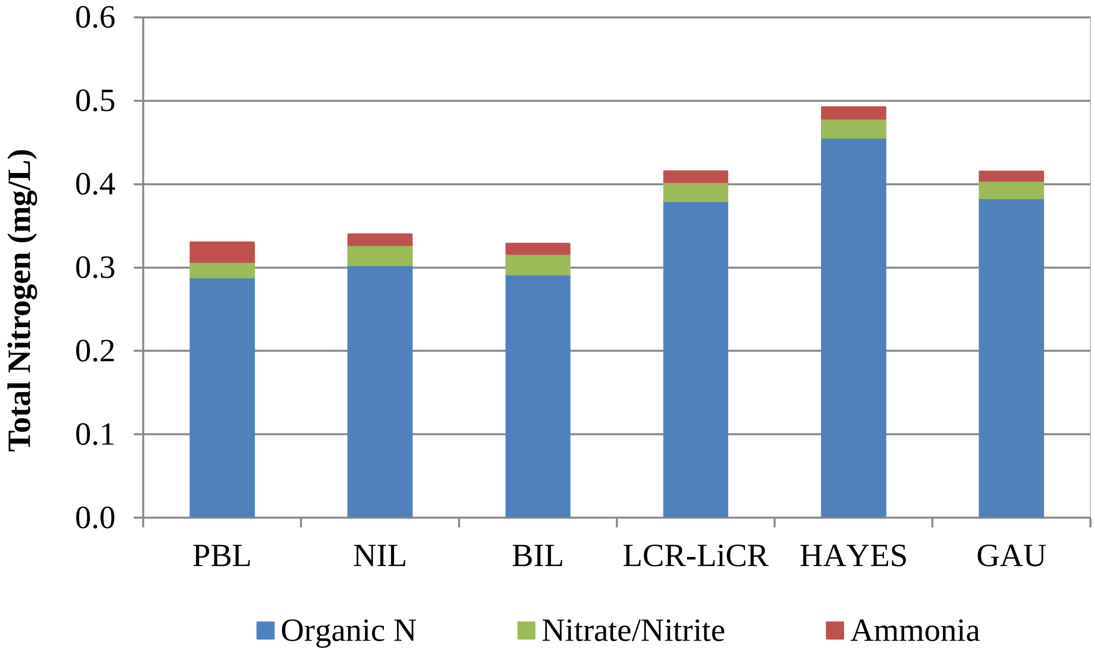


Figure 5.4.4-47. Composition of total nitrogen as organic nitrogen, nitrate/nitrite, and ammonia in the Lower Churchill River Region: 2008-2010.

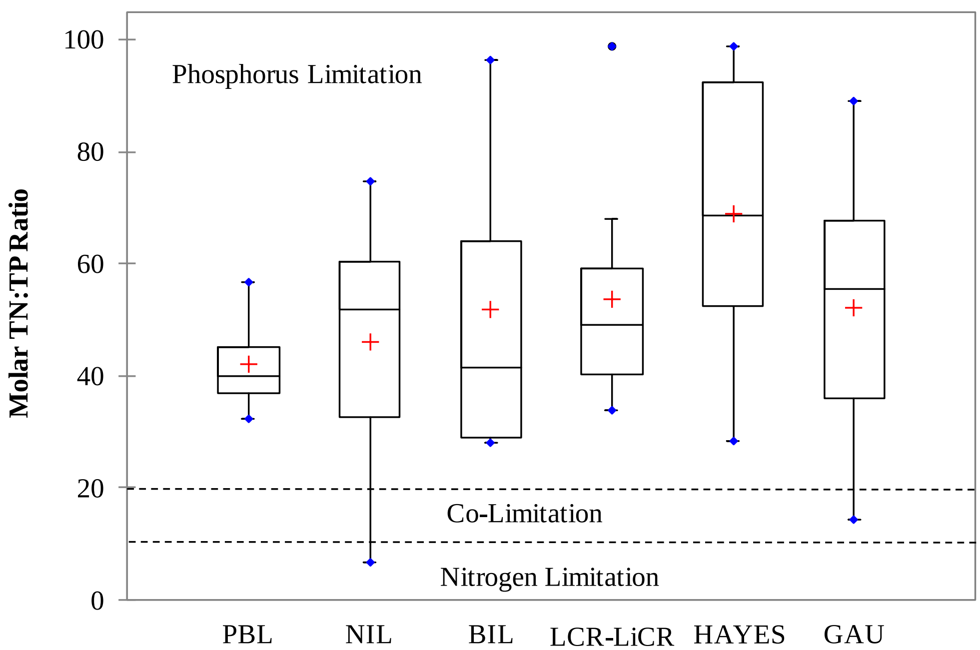


Figure 5.4.4-48. Total nitrogen to total phosphorus molar ratios in the Lower Churchill River Region: 2008-2010.

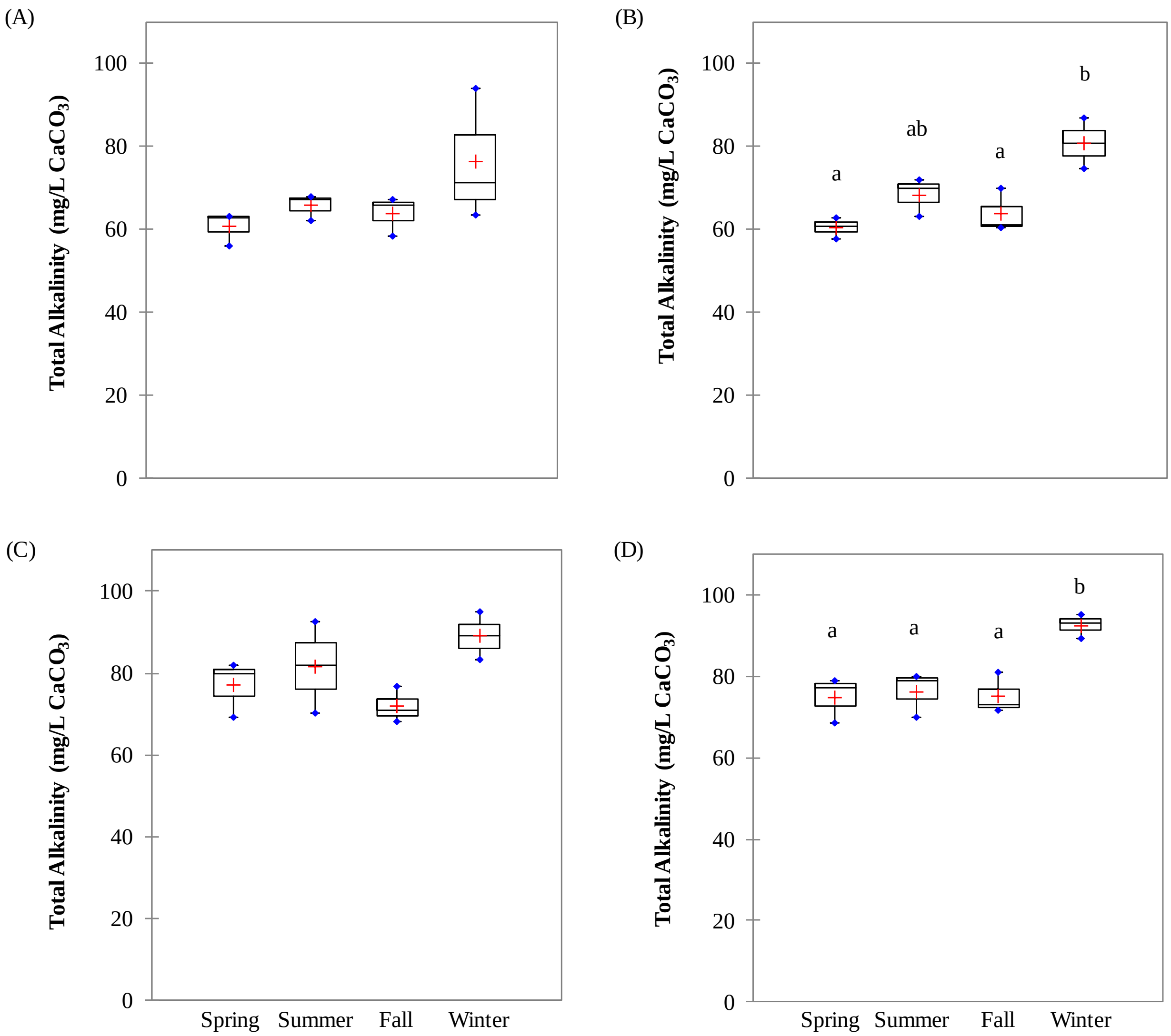


Figure 5.4.4-49. Total alkalinity in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

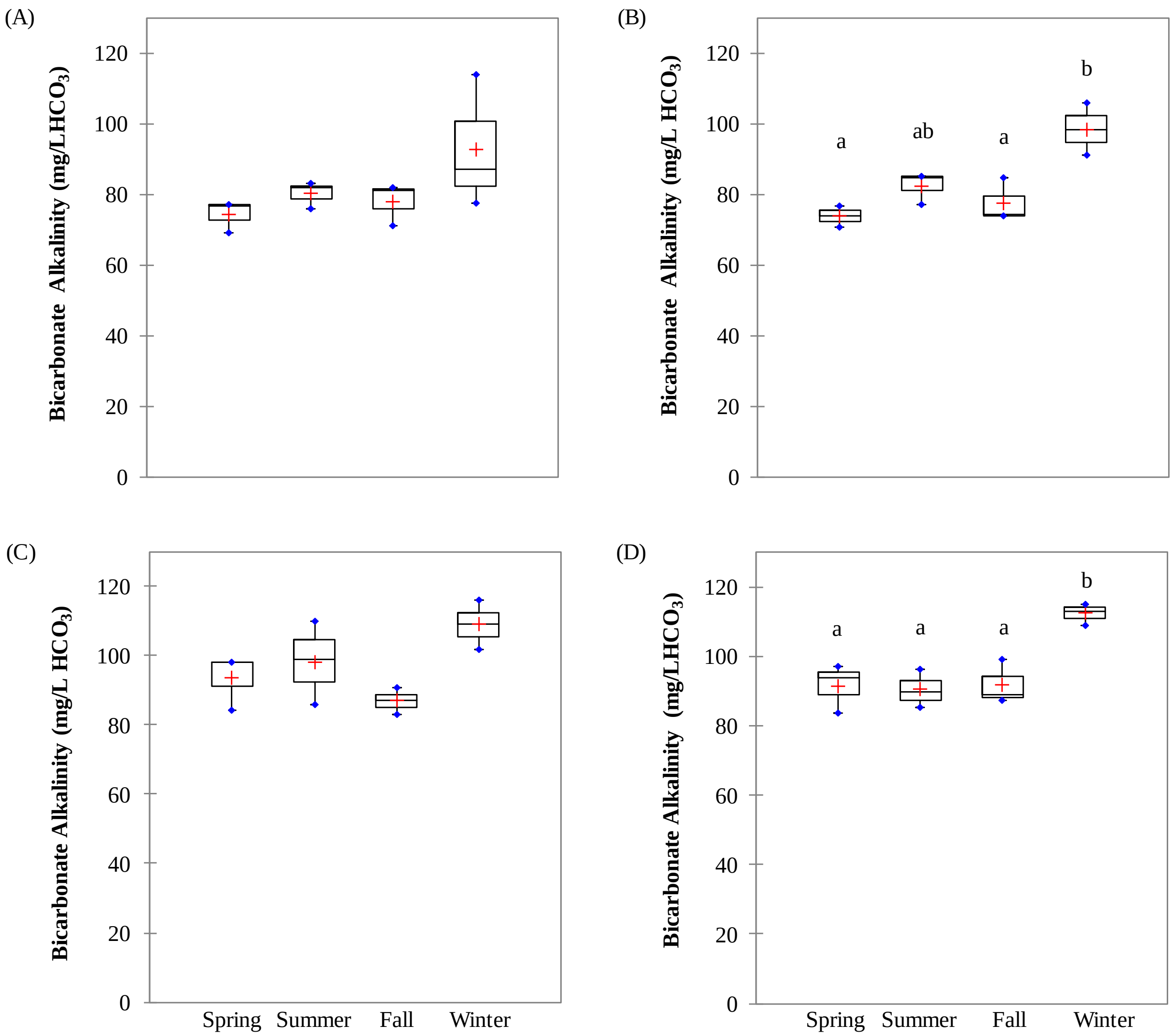


Figure 5.4.4-50. Bicarbonate alkalinity in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

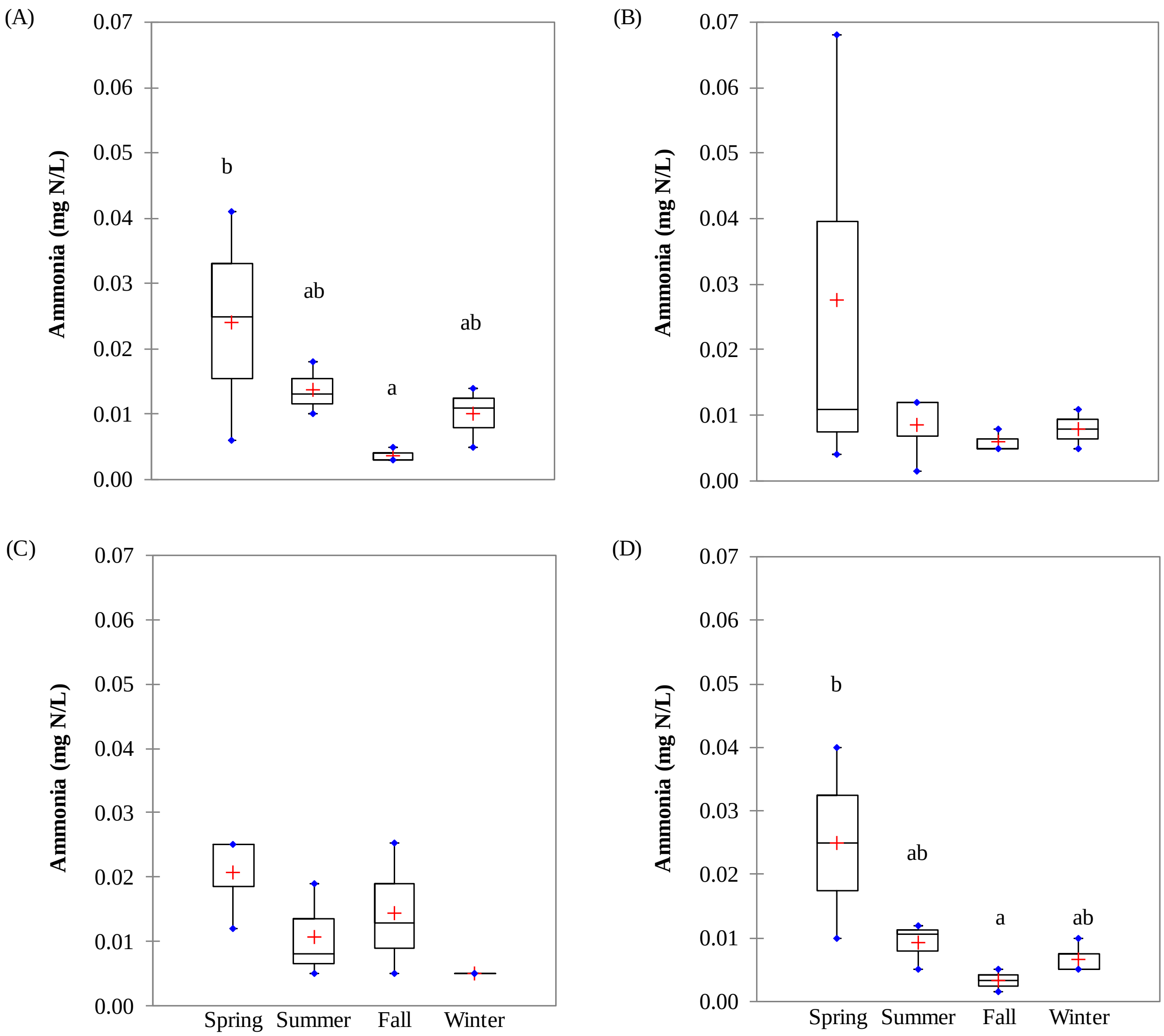


Figure 5.4.4-51. Ammonia in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

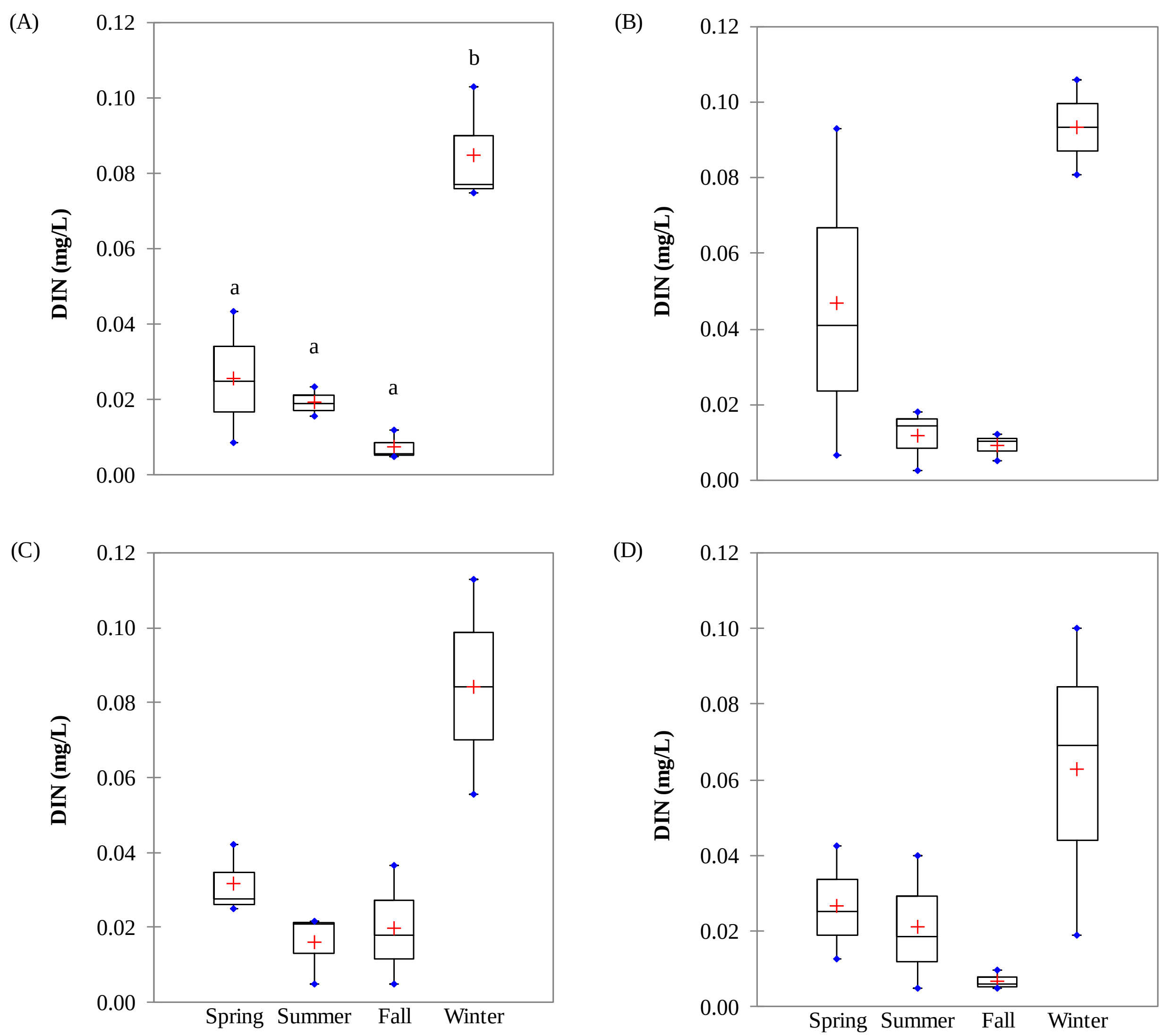


Figure 5.4.4-52. Dissolved inorganic nitrogen in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

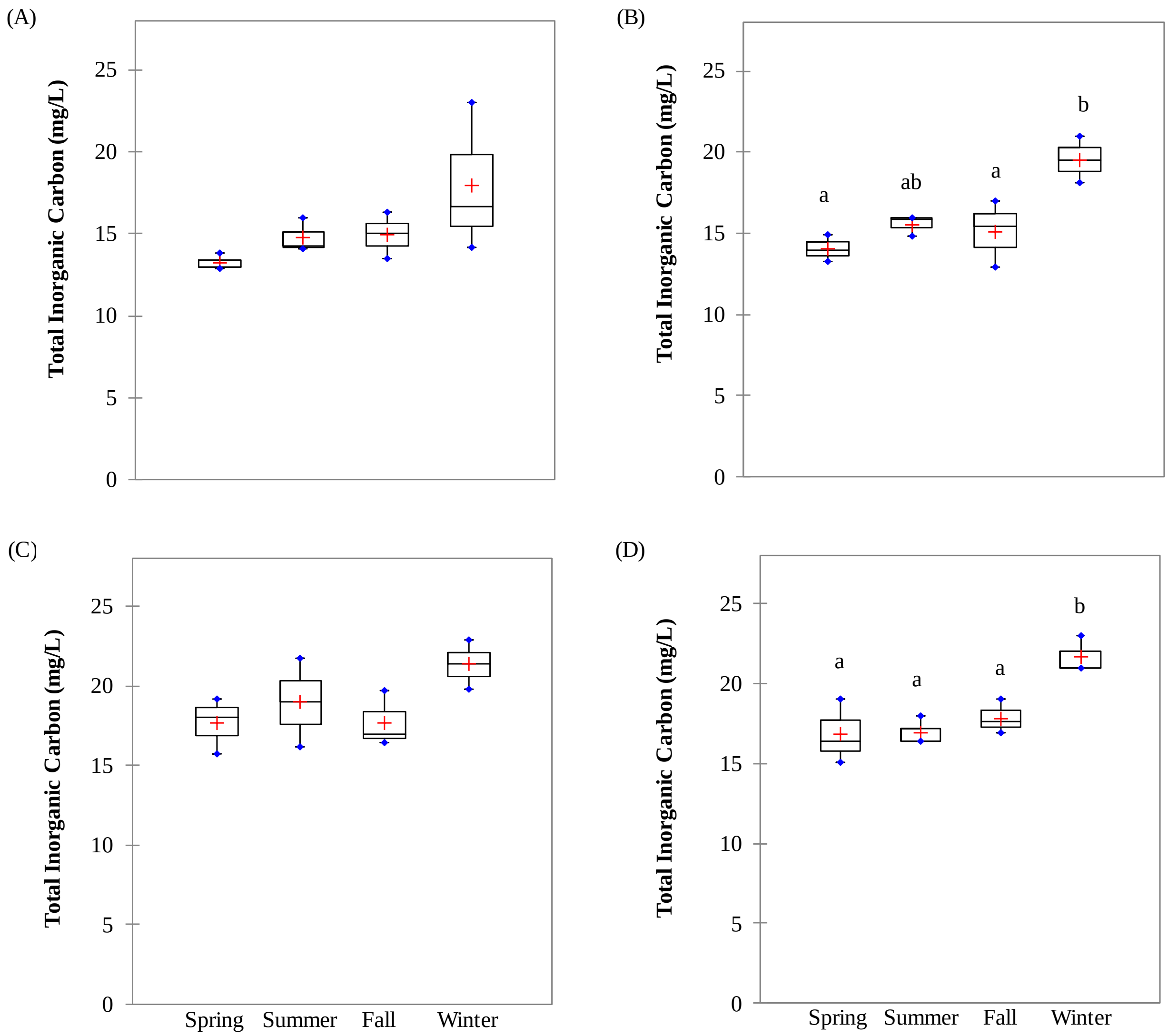


Figure 5.4.4-53. Total inorganic carbon in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

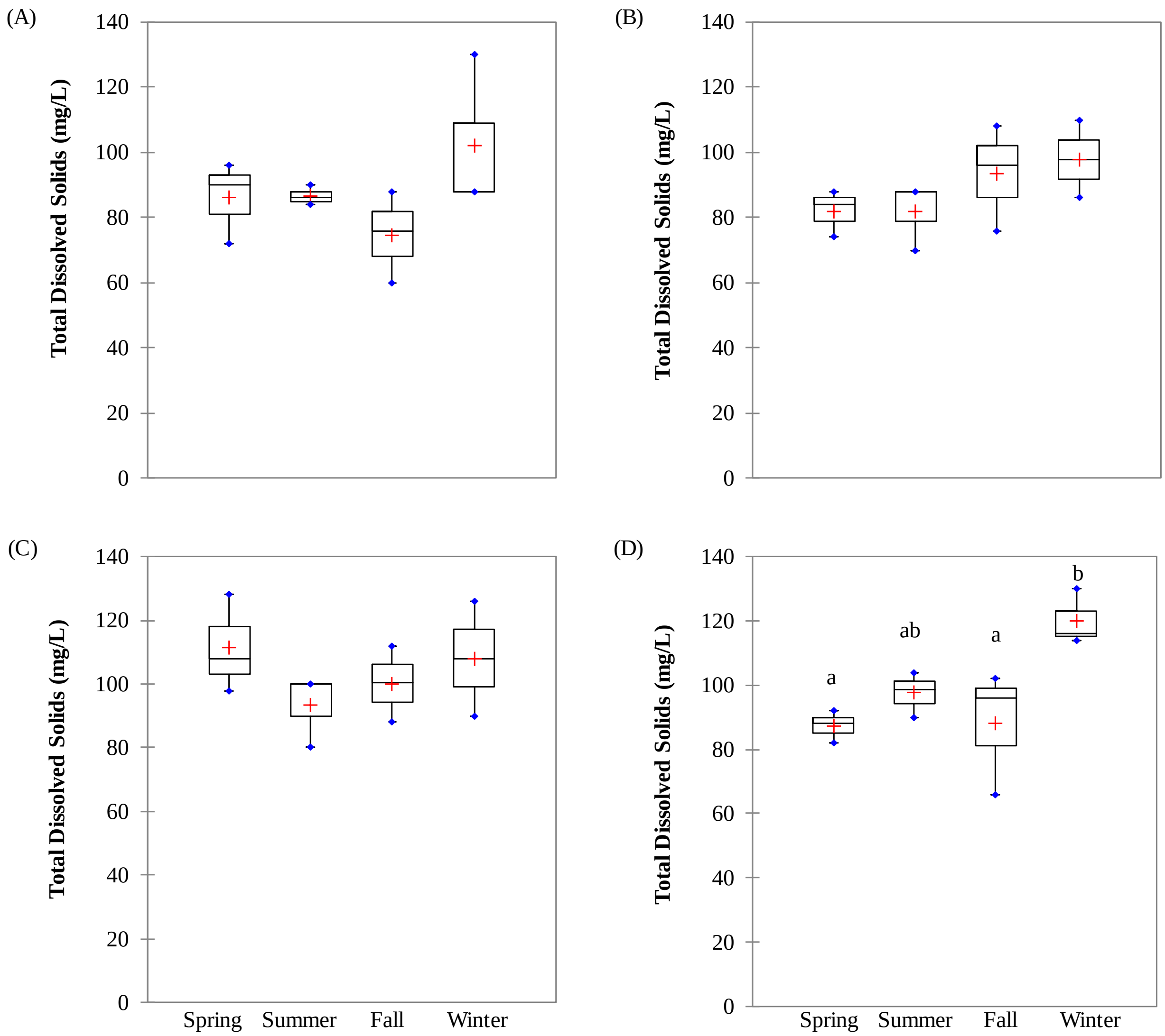


Figure 5.4.4-54. Total dissolved solids in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

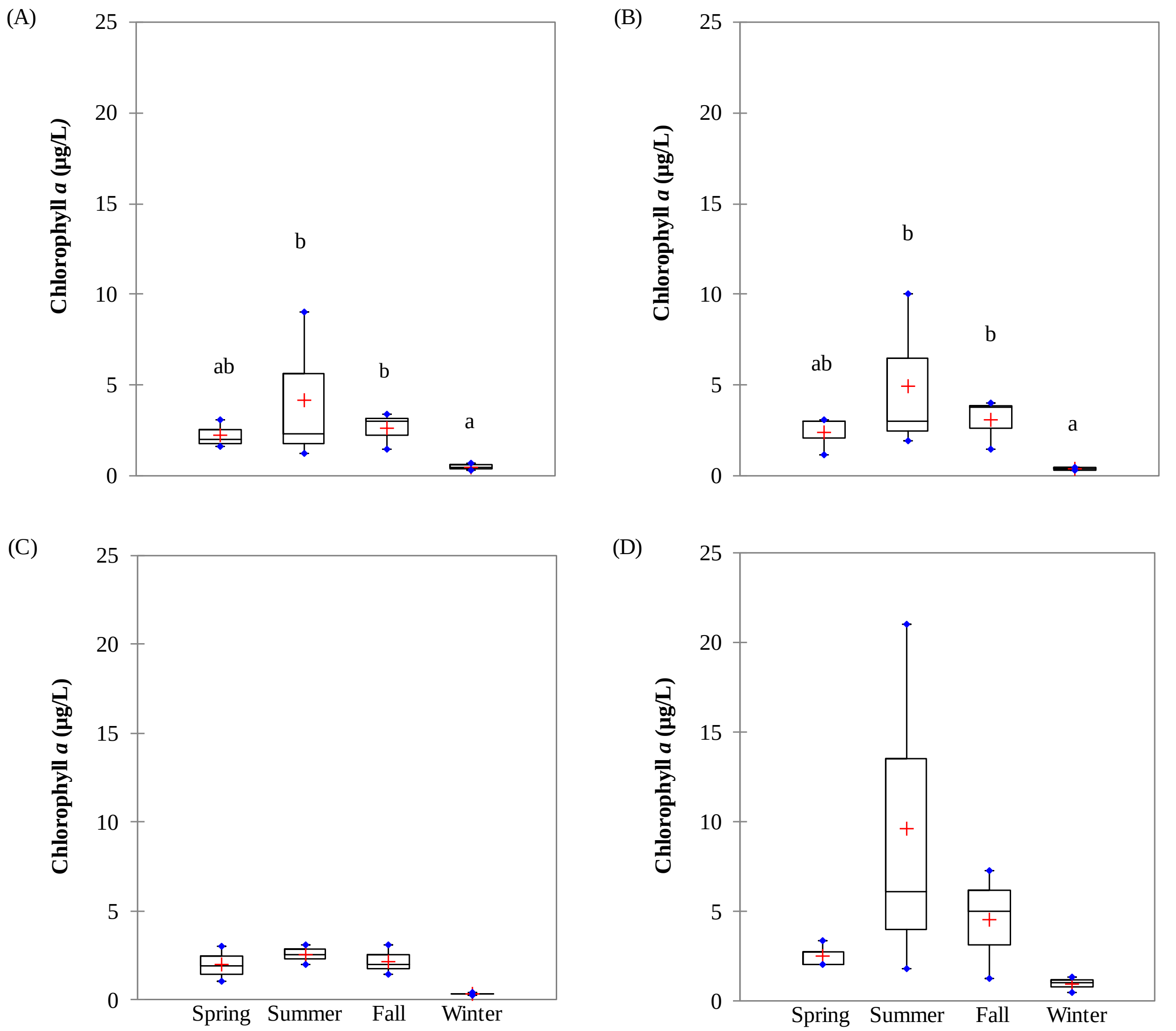


Figure 5.4.4-55. Chlorophyll *a* in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

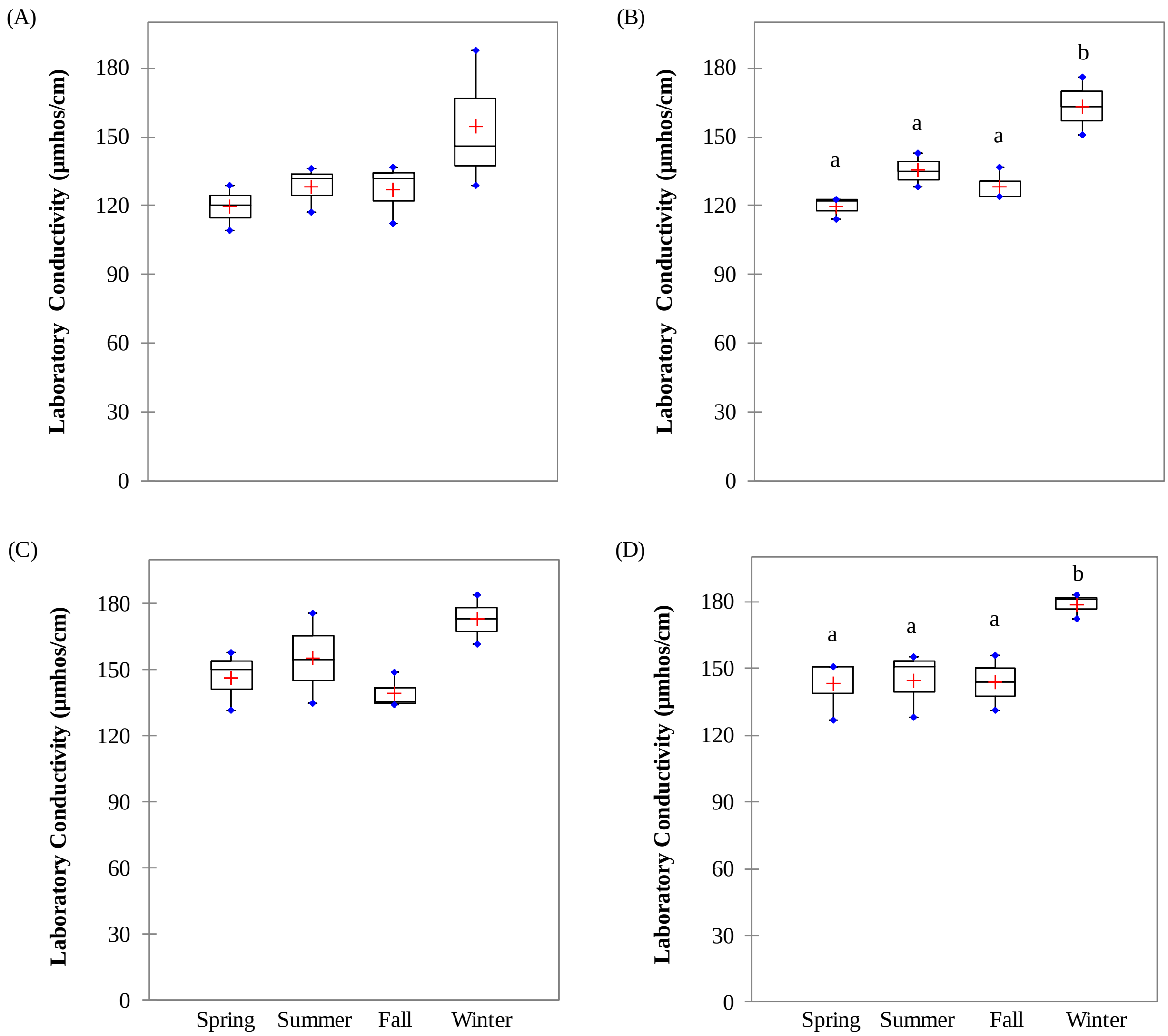


Figure 5.4.4-56. Laboratory conductivity in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

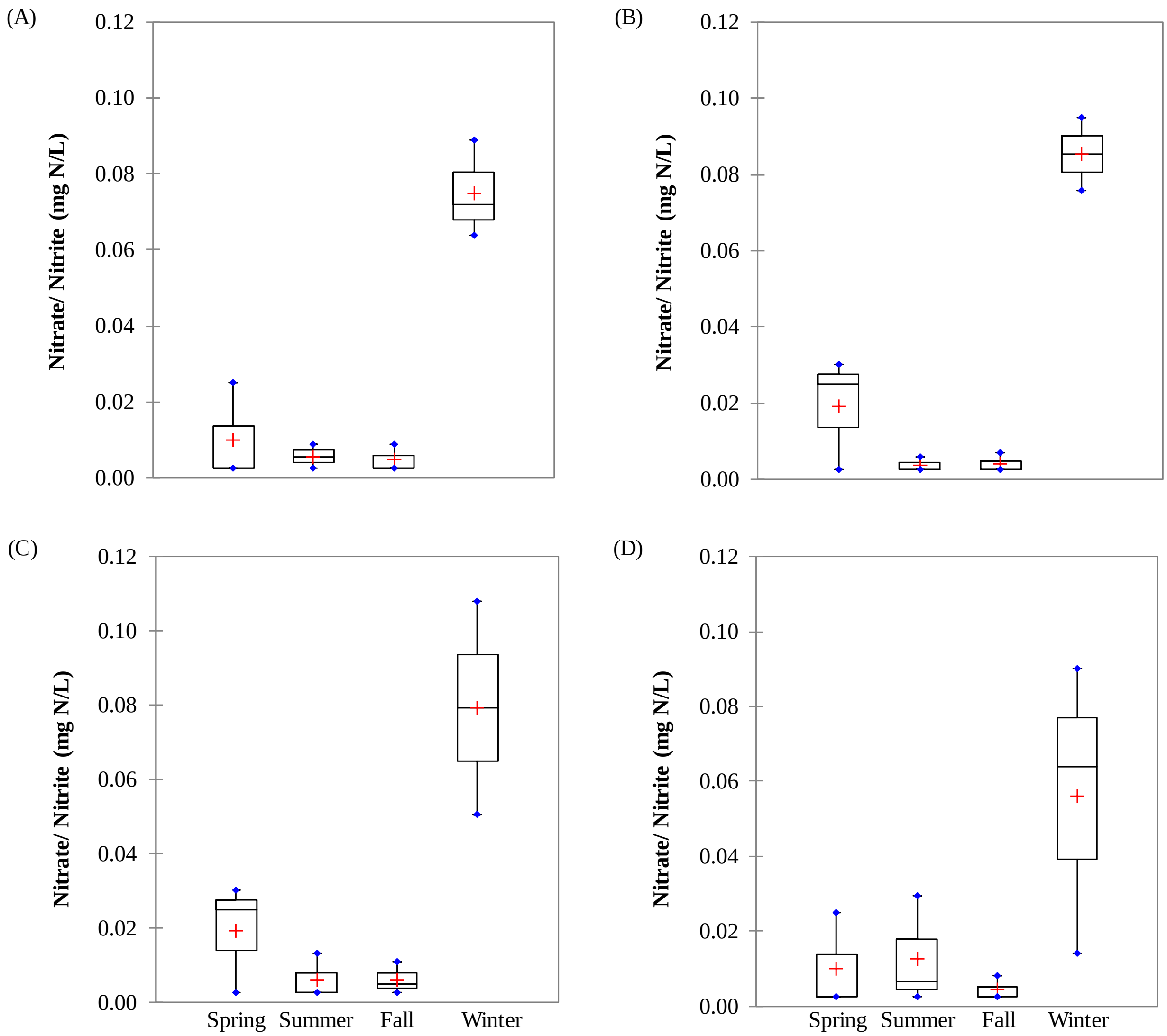


Figure 5.4.4-57. Nitrate/nitrite in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake.

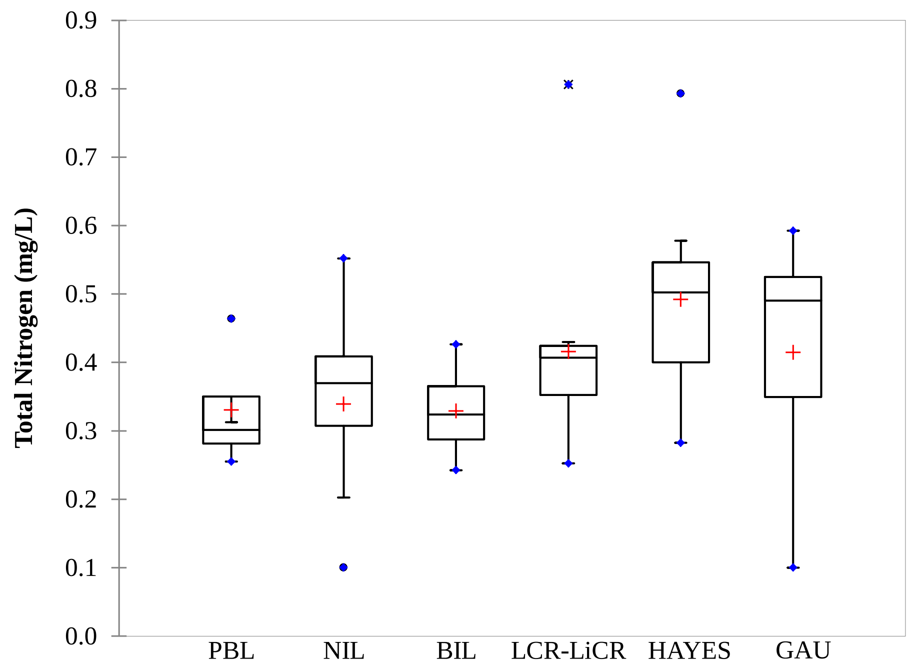


Figure 5.4.4-58. Total nitrogen in the Lower Churchill River Region: 2008-2010.

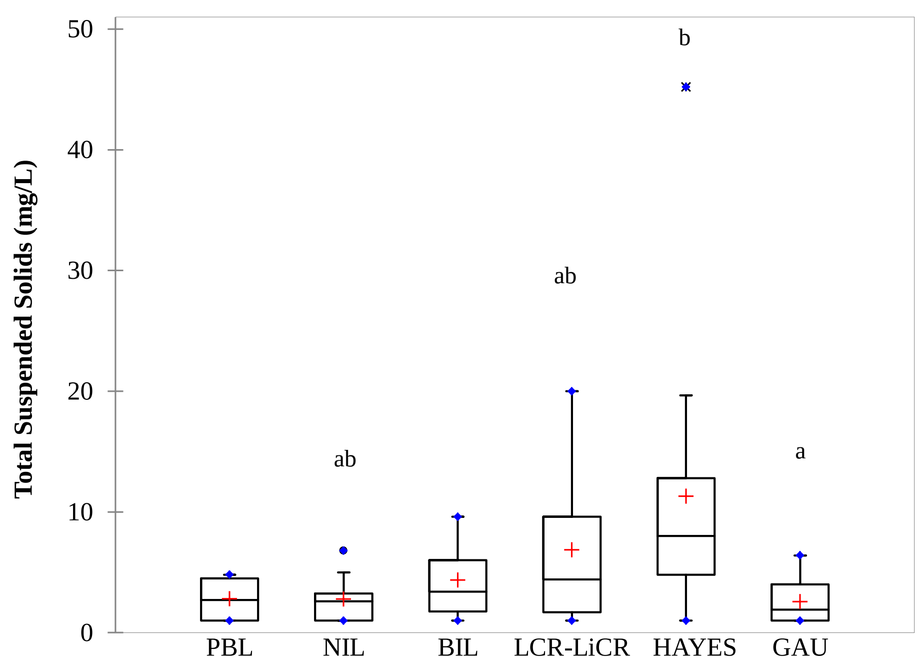


Figure 5.4.4-59. Total suspended solids in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

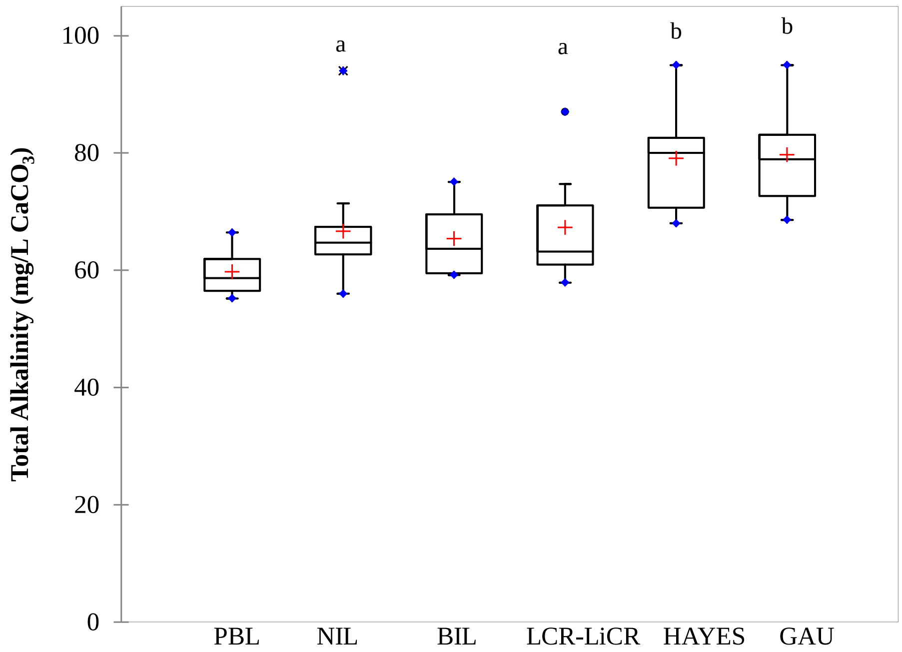


Figure 5.4.4-60. Total alkalinity in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

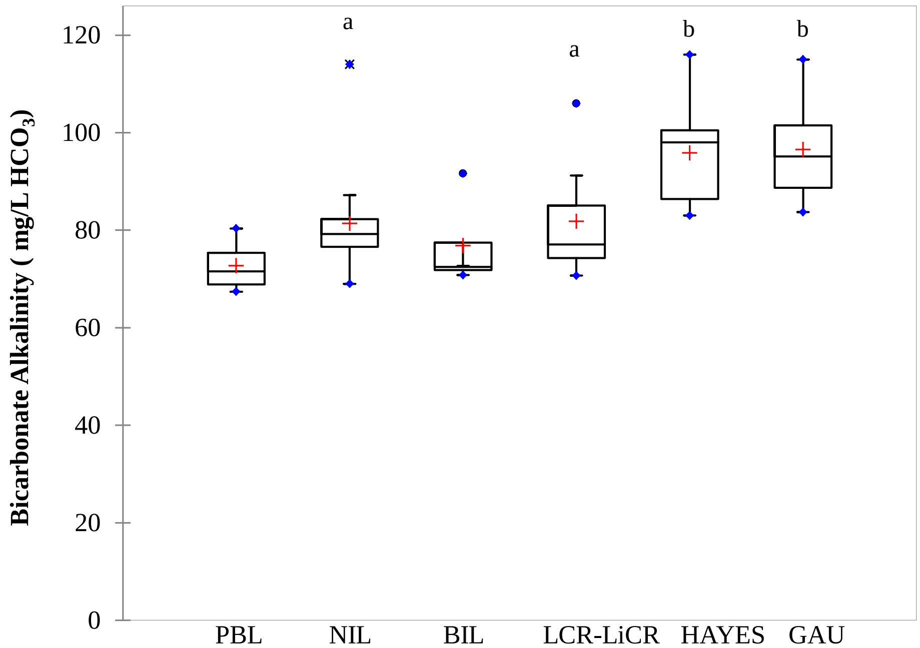


Figure 5.4.4-61. Bicarbonate alkalinity in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

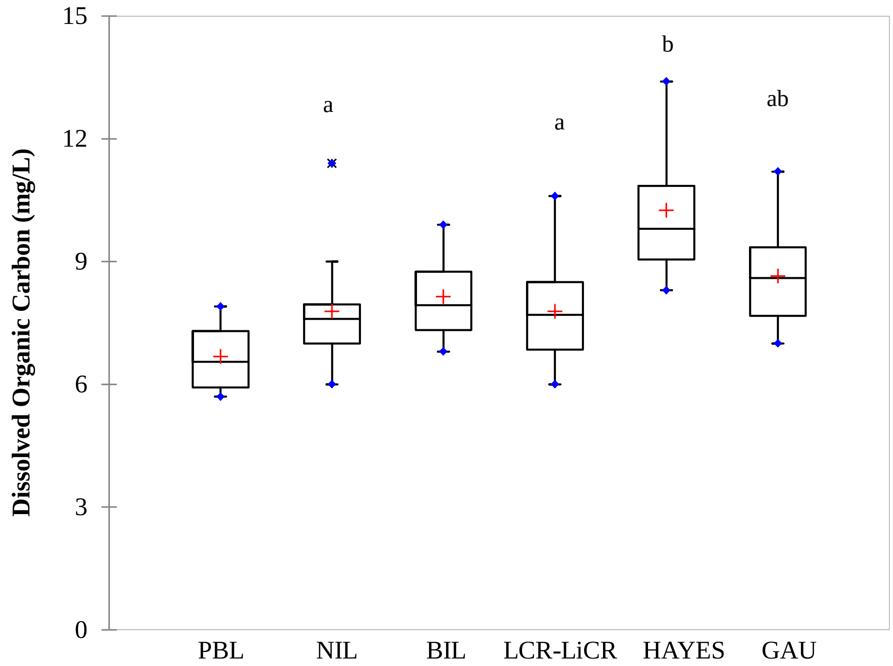


Figure 5.4.4-62. Dissolved organic carbon in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

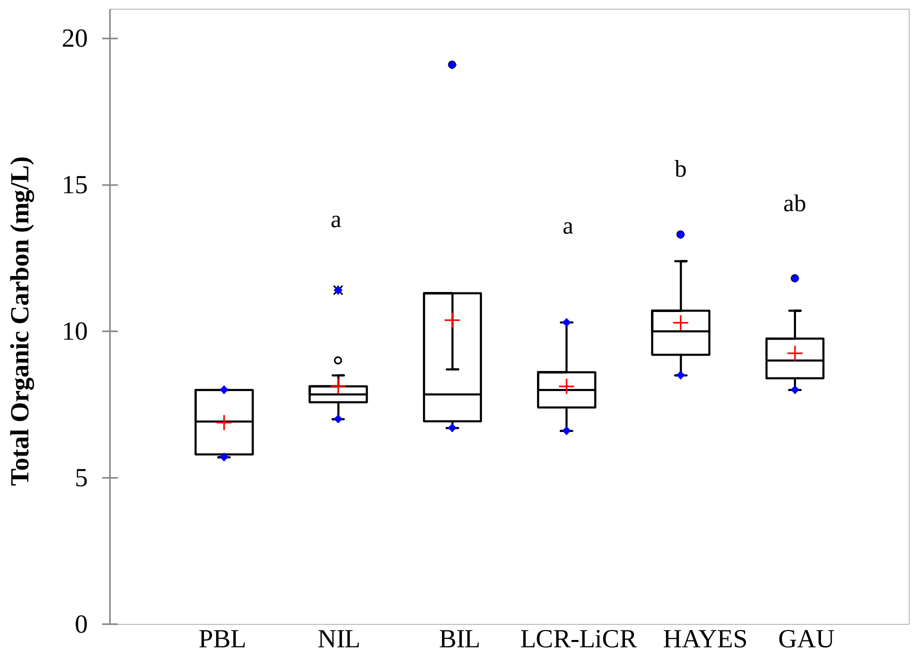


Figure 5.4.4-63. Total organic carbon in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

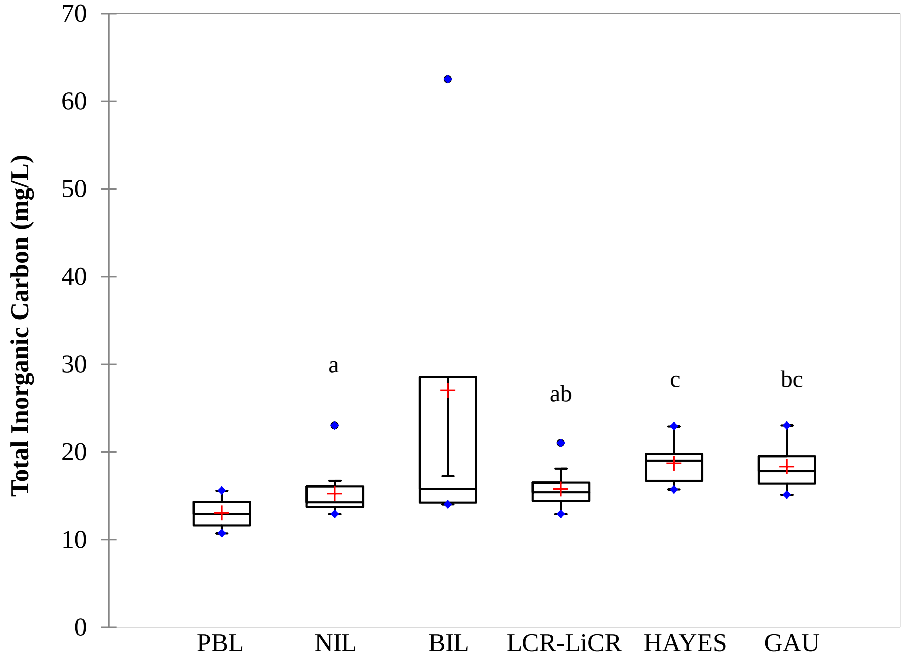


Figure 5.4.4-64. Total inorganic carbon in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

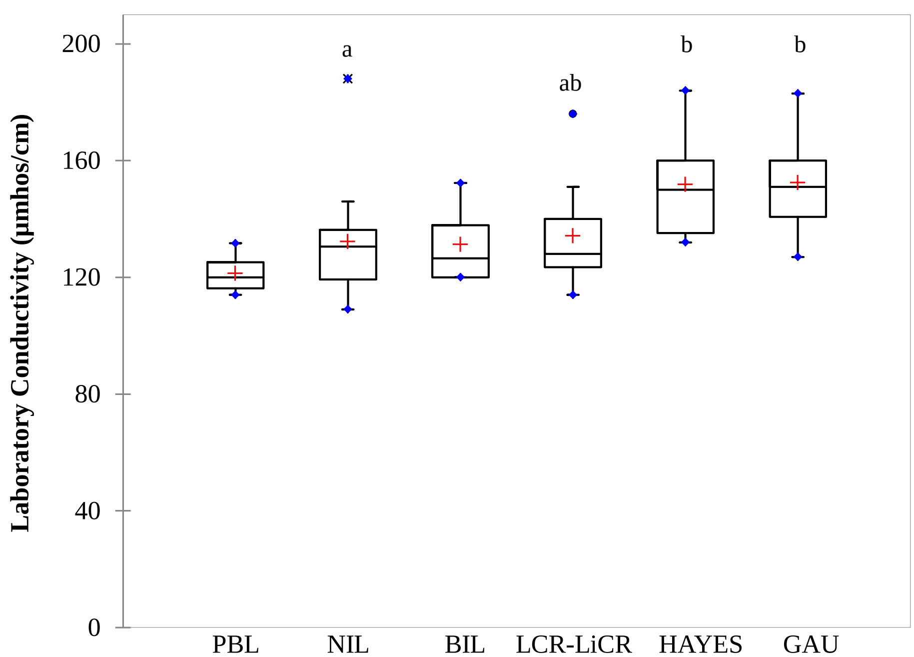


Figure 5.4.4-65. Laboratory conductivity in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

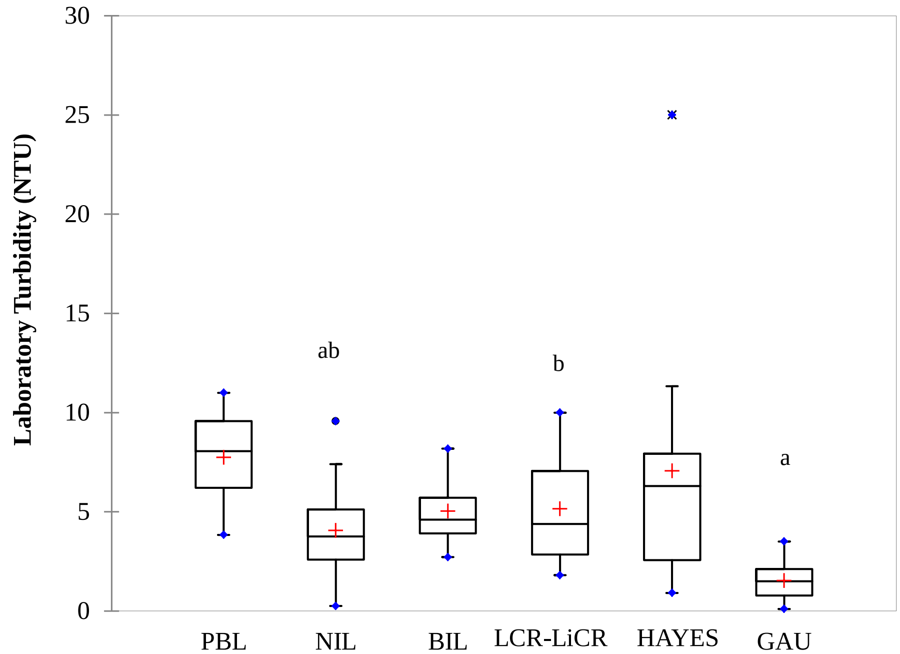


Figure 5.4.4-66. Laboratory turbidity measured in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

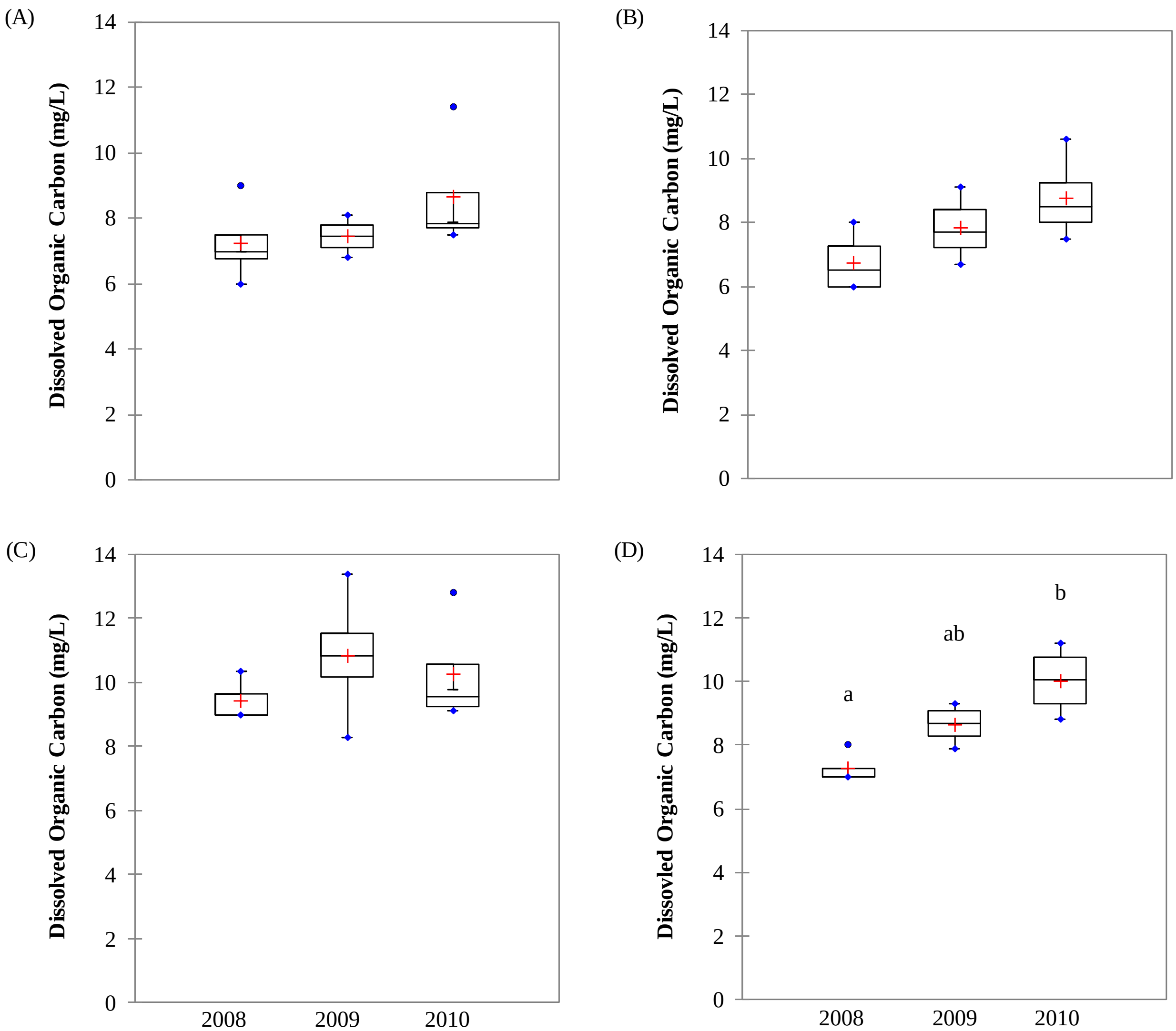


Figure 5.4.4-67. Dissolved organic carbon in the Lower Churchill River Region by year: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant differences are denoted with different superscripts.

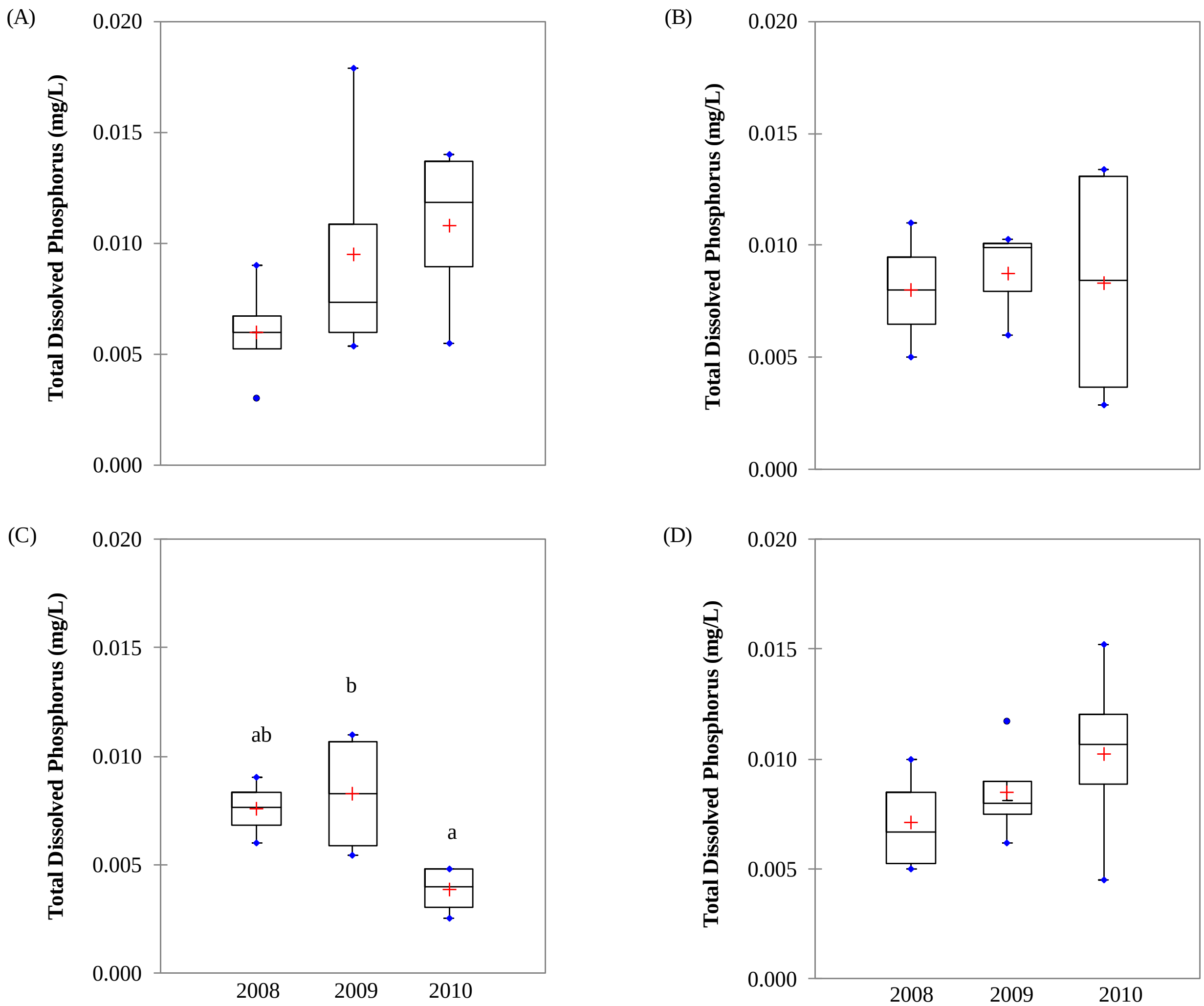


Figure 5.4.4-68. Total dissolved phosphorus in the Lower Churchill River Region by year: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant differences are denoted with different superscripts.

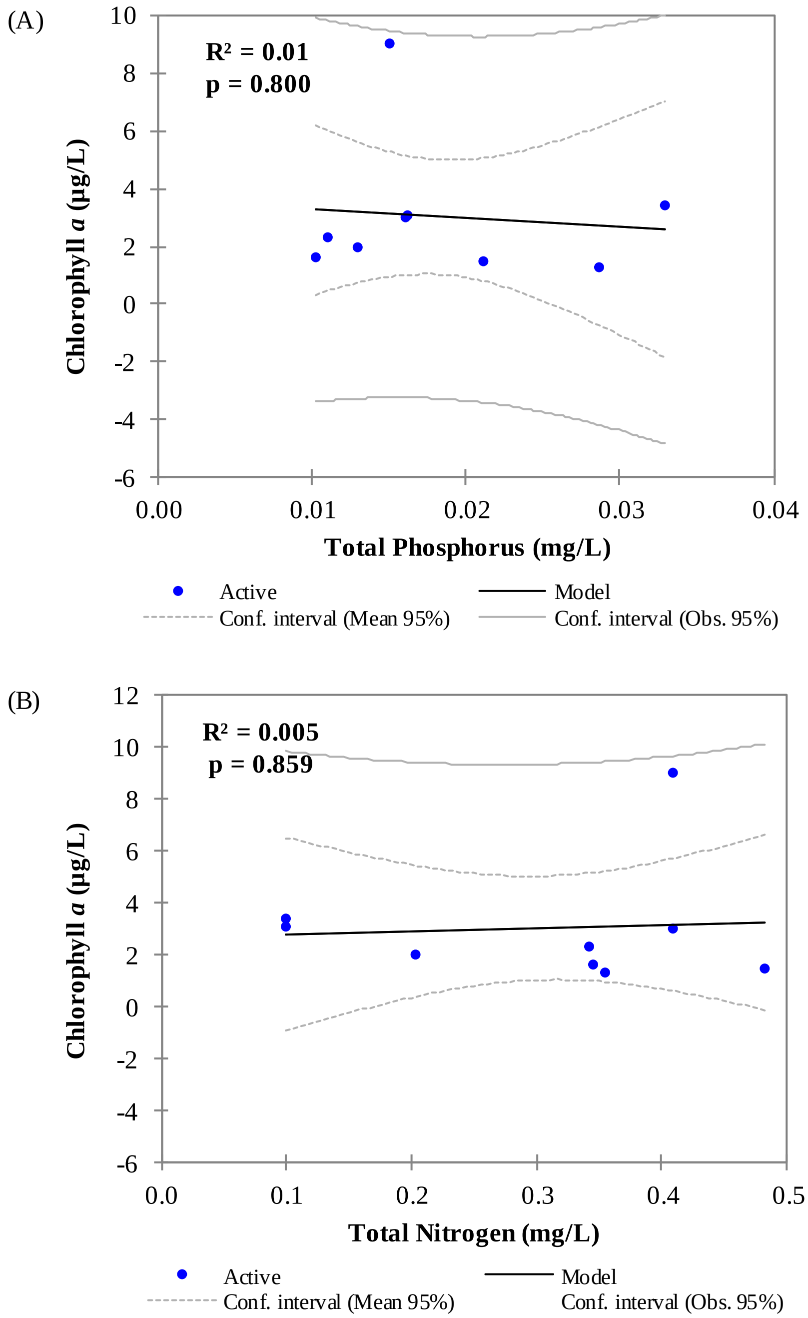
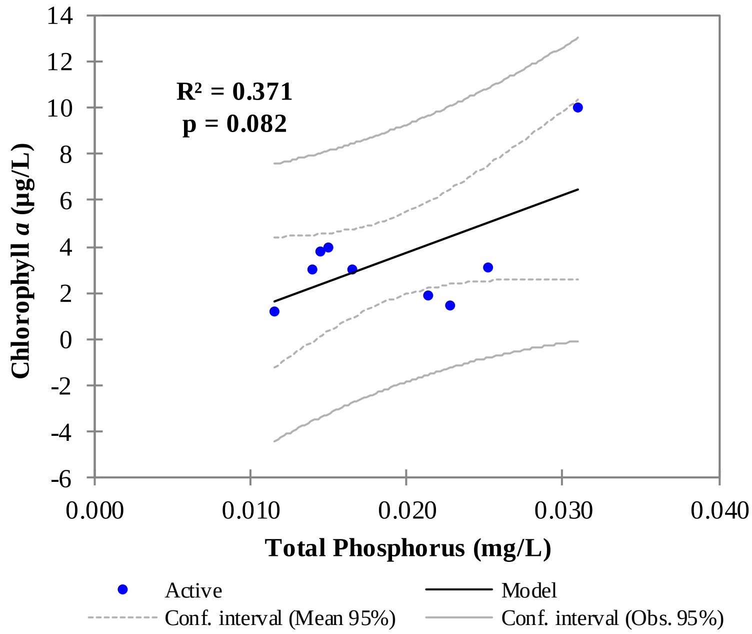


Figure 5.4.4-69. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in Northern Indian Lake: open-water seasons 2008-2010.

(A)



(B)

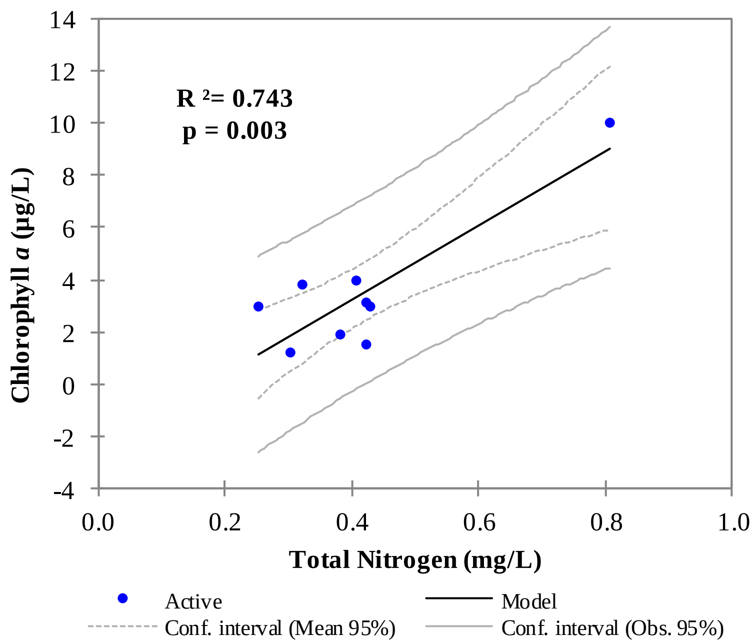


Figure 5.4.4-70. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in the lower Churchill River: open-water seasons 2008-2010.

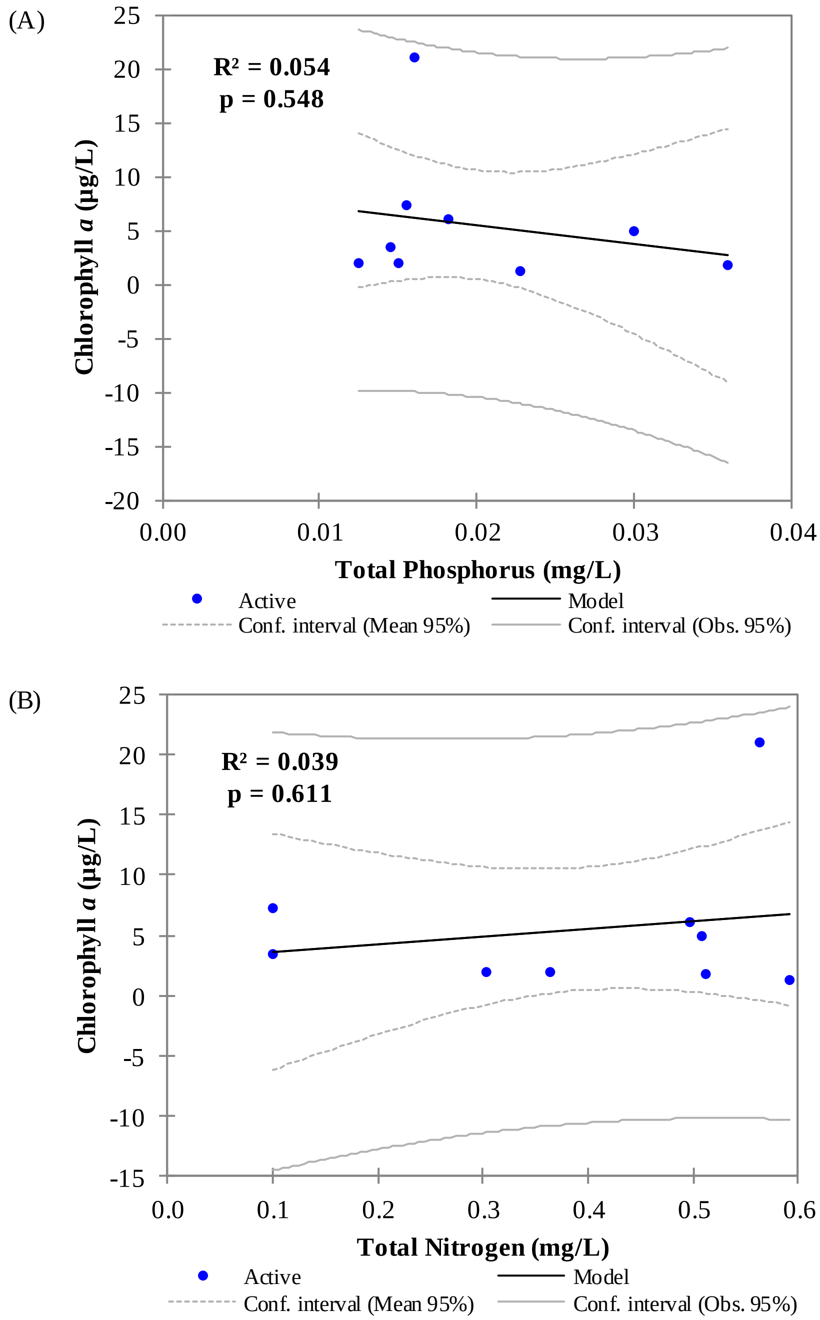
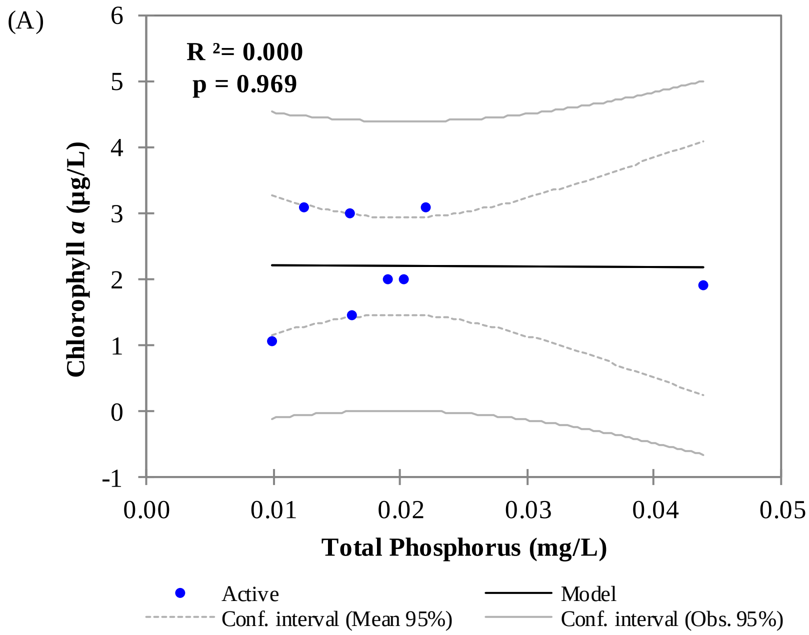


Figure 5.4.4-71. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in Gauer Lake: open-water seasons 2008-2010.



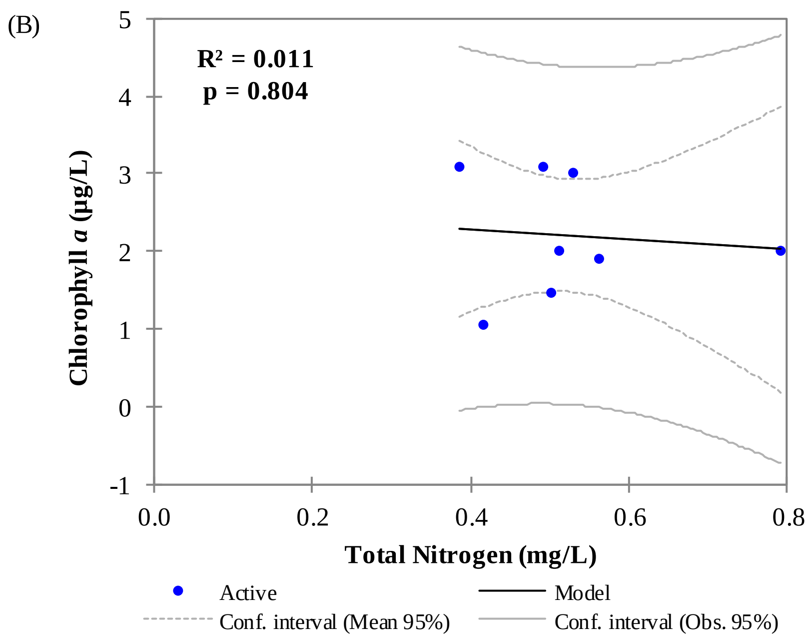


Figure 5.4.4-72. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in the Hayes River: open-water seasons 2008-2010.

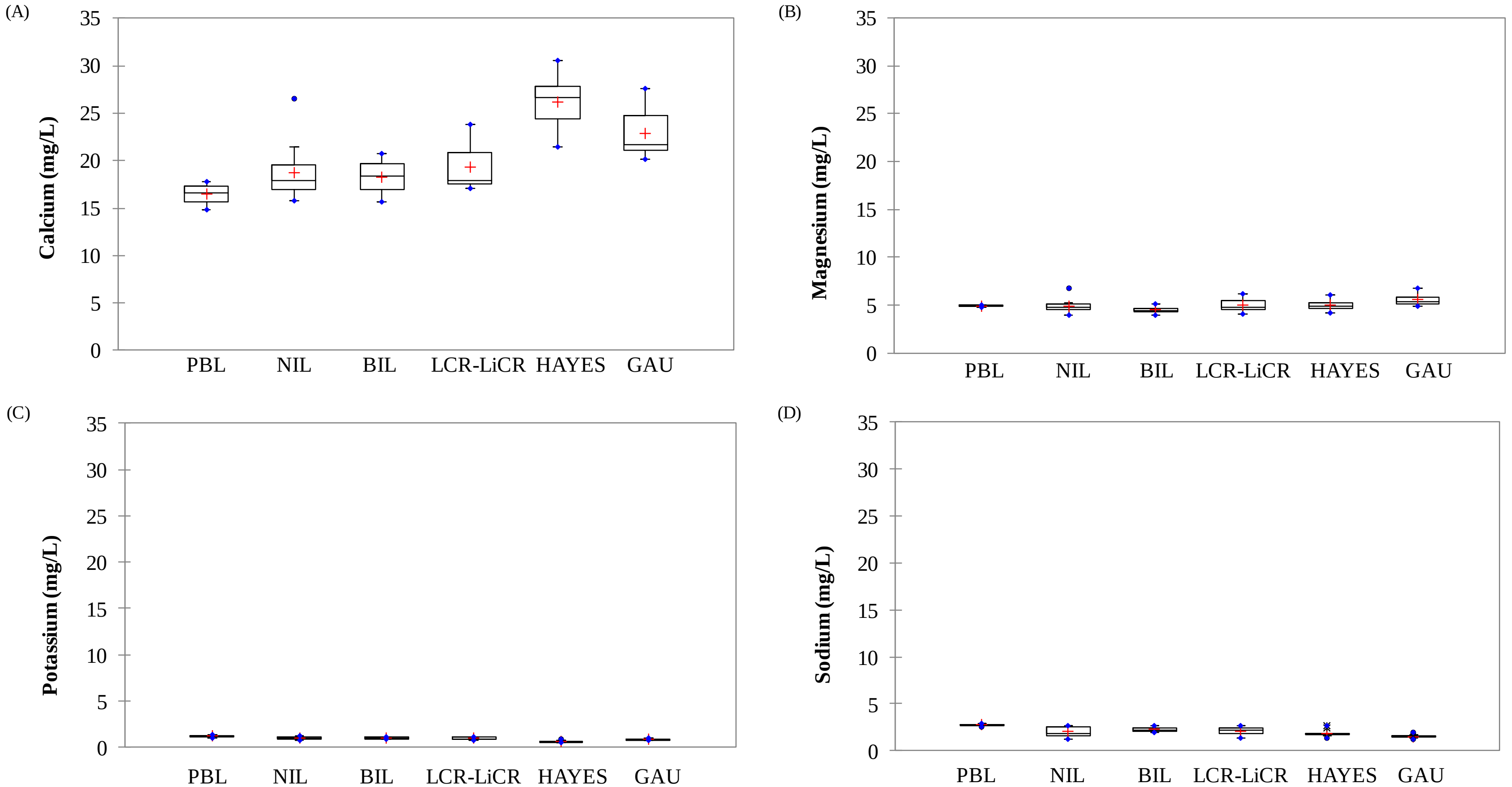


Figure 5.4.4-73. Concentrations of (A) calcium, (B) magnesium, (C) potassium, and (D) sodium measured in the Lower Churchill River Region by waterbody. Statistically significant spatial differences are denoted with different superscripts.

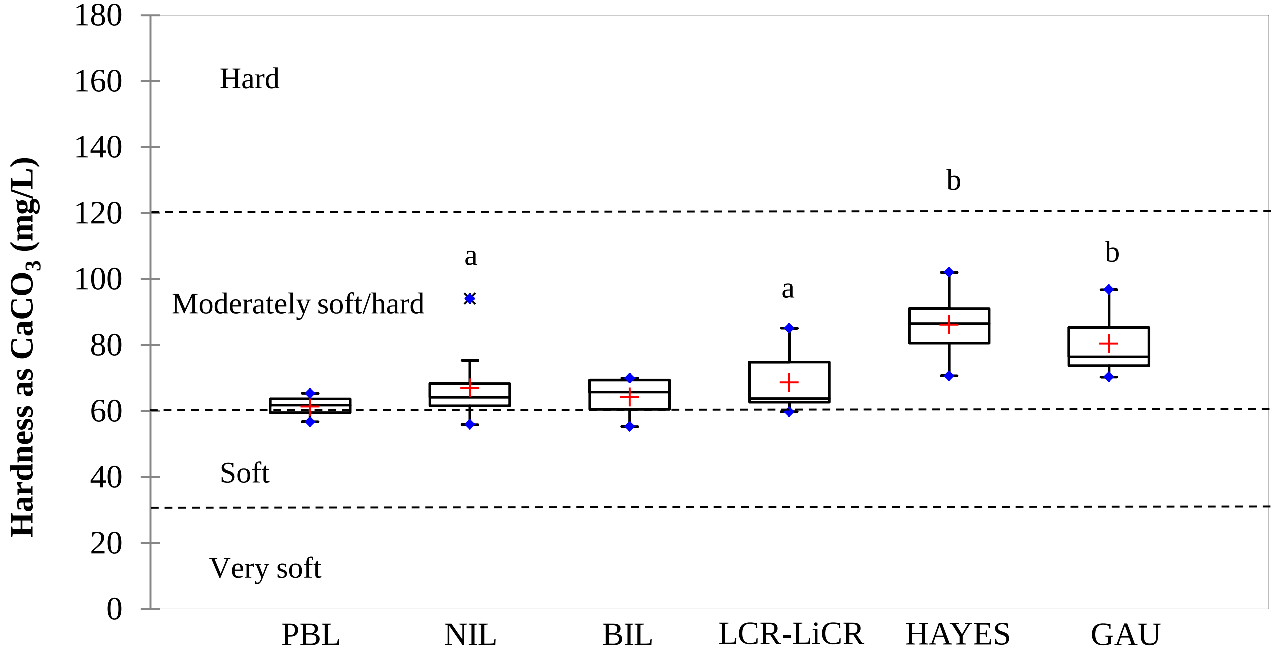


Figure 5.4.4-74. Water hardness measured in the Lower Churchill River Region by waterbody. Statistically significant spatial differences are denoted with different superscripts.

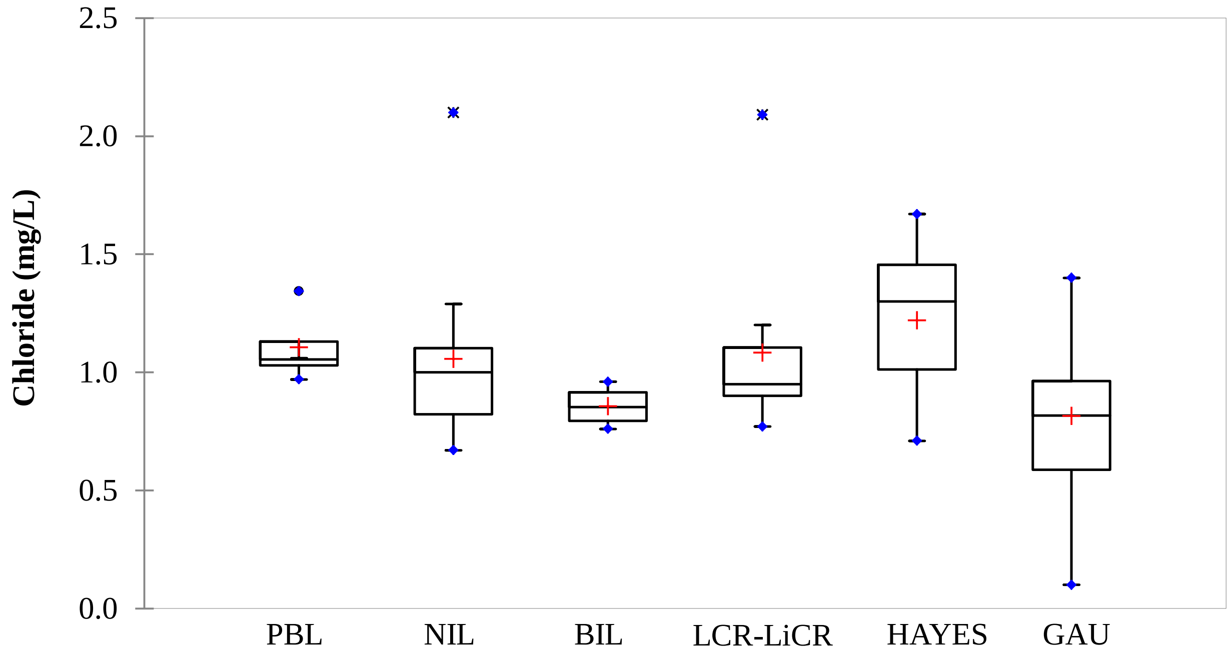


Figure 5.4.4-75. Chloride concentrations measured in the Lower Churchill River Region by waterbody.

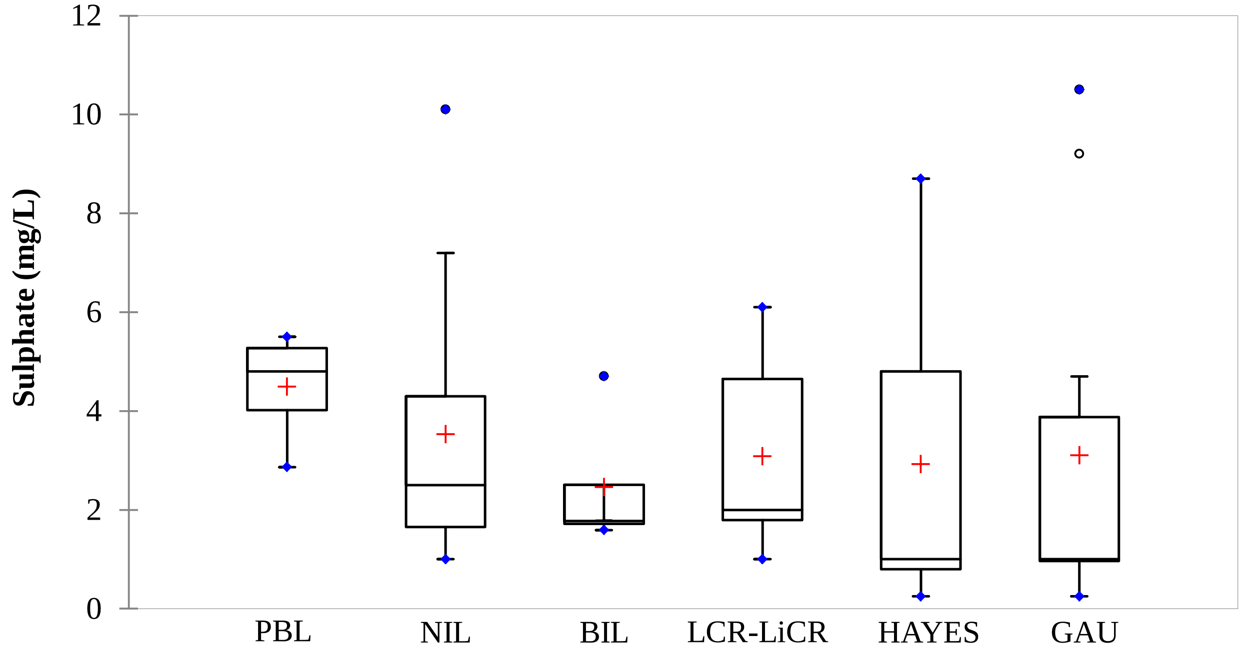


Figure 5.4.4-76. Sulphate concentrations measured in the Lower Churchill River Region by waterbody.

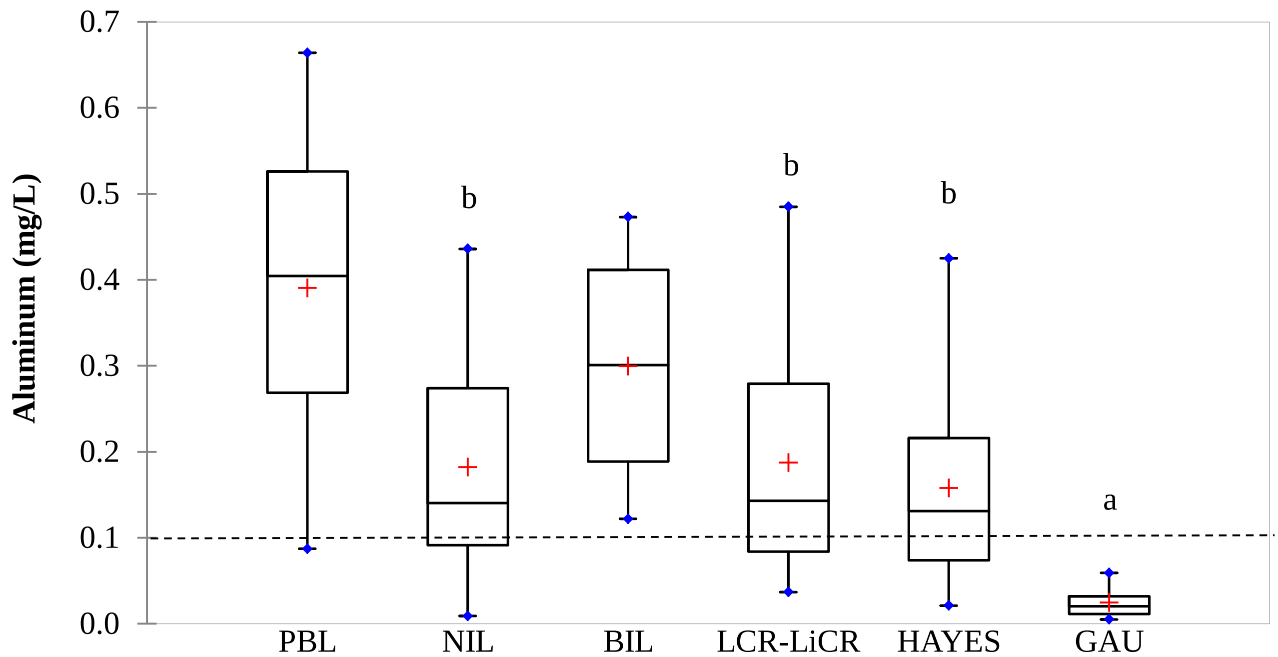


Figure 5.4.4-77. Aluminum in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The dashed line represents the Manitoba PAL guideline.

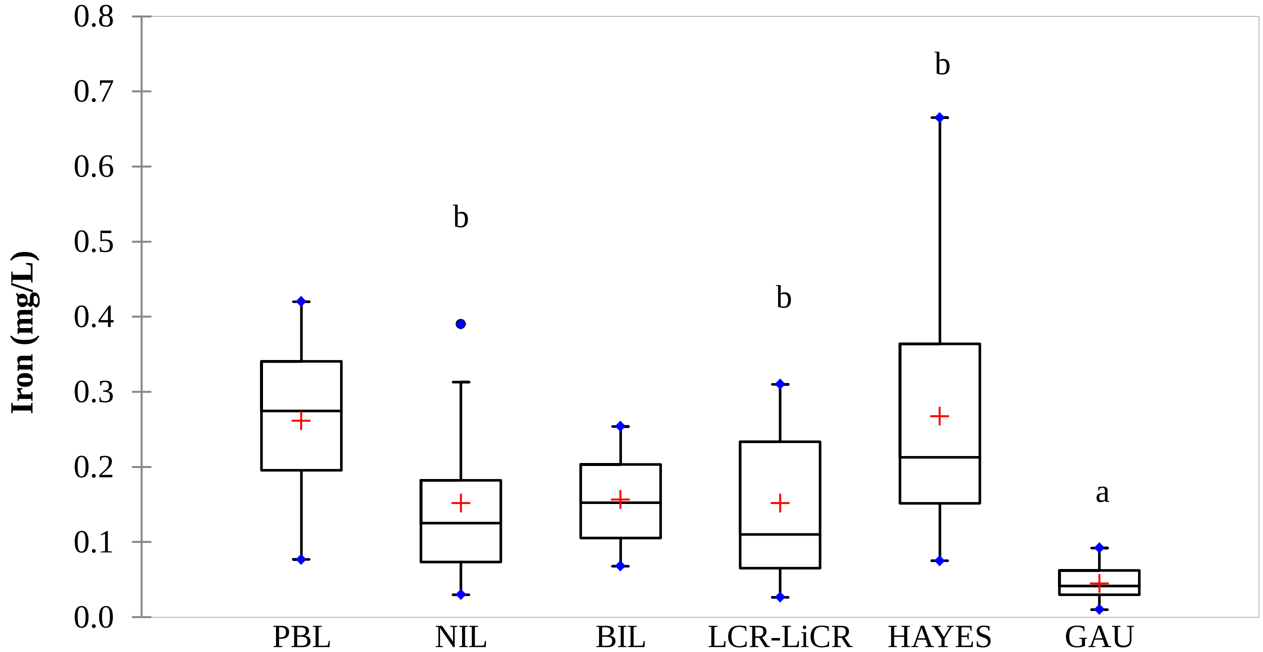


Figure 5.4.4-78. Iron in the: Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The dashed line represents the Manitoba PAL guideline.

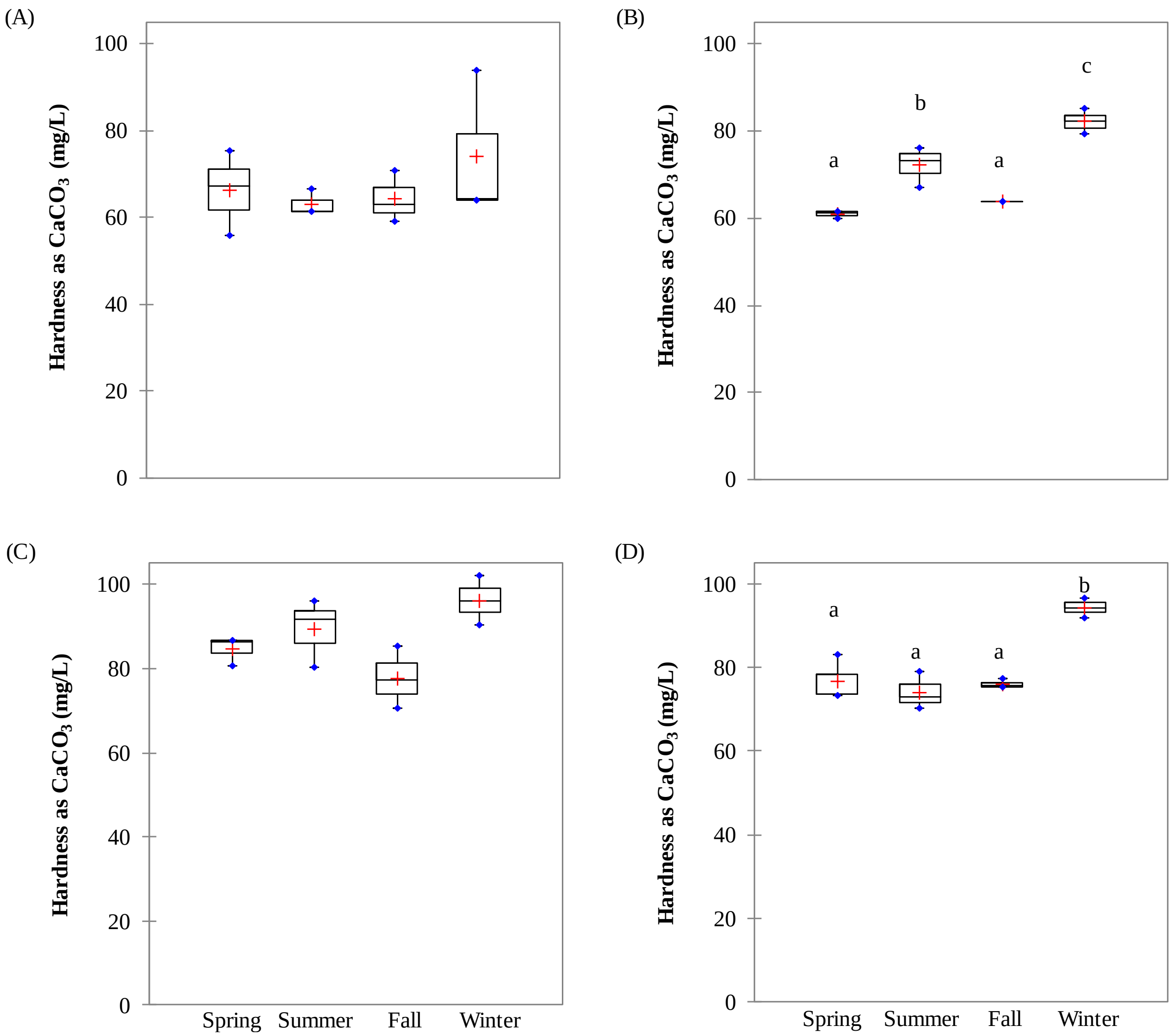


Figure 5.4.4-79. Hardness in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

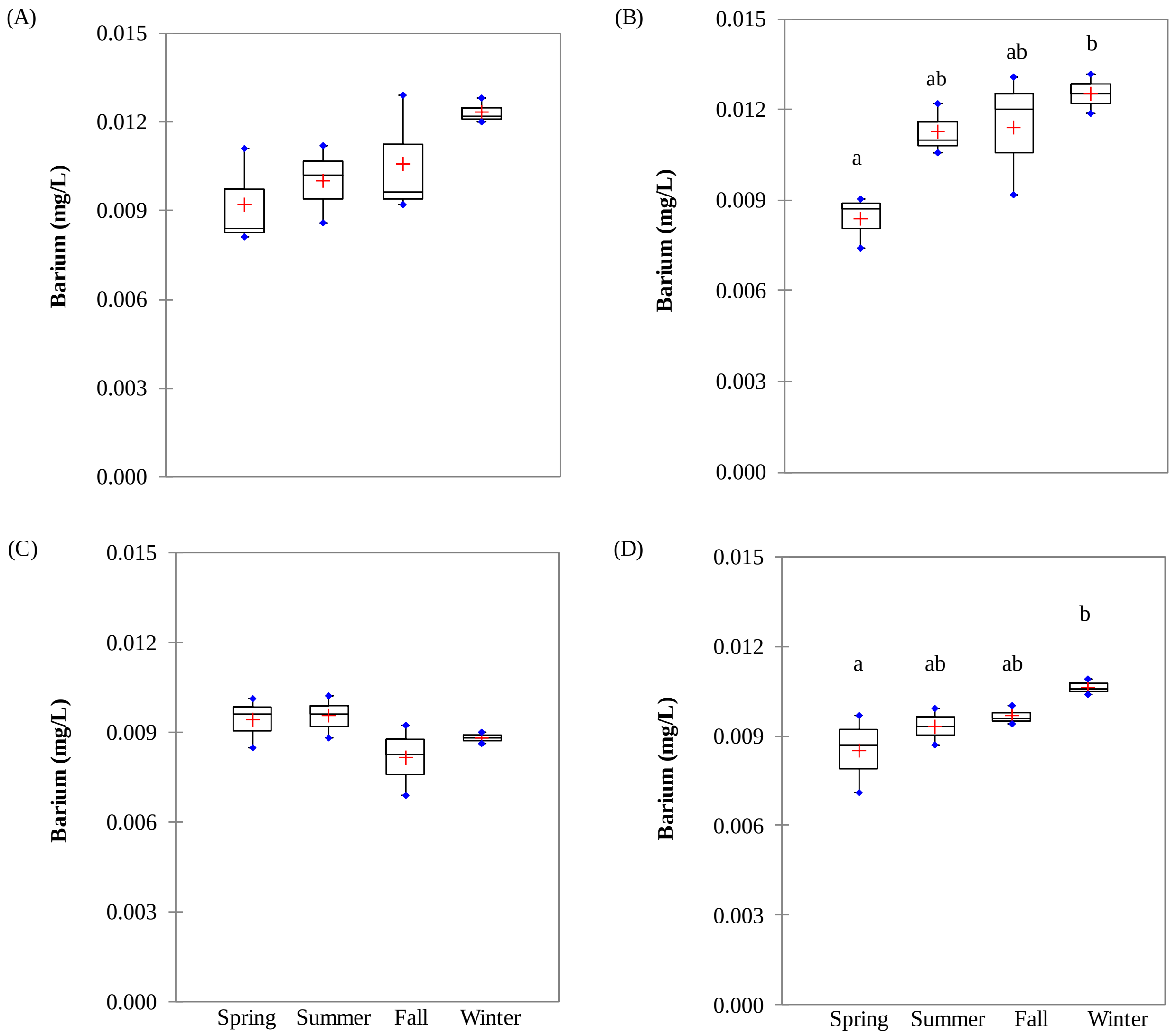


Figure 5.4.4-80. Barium in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

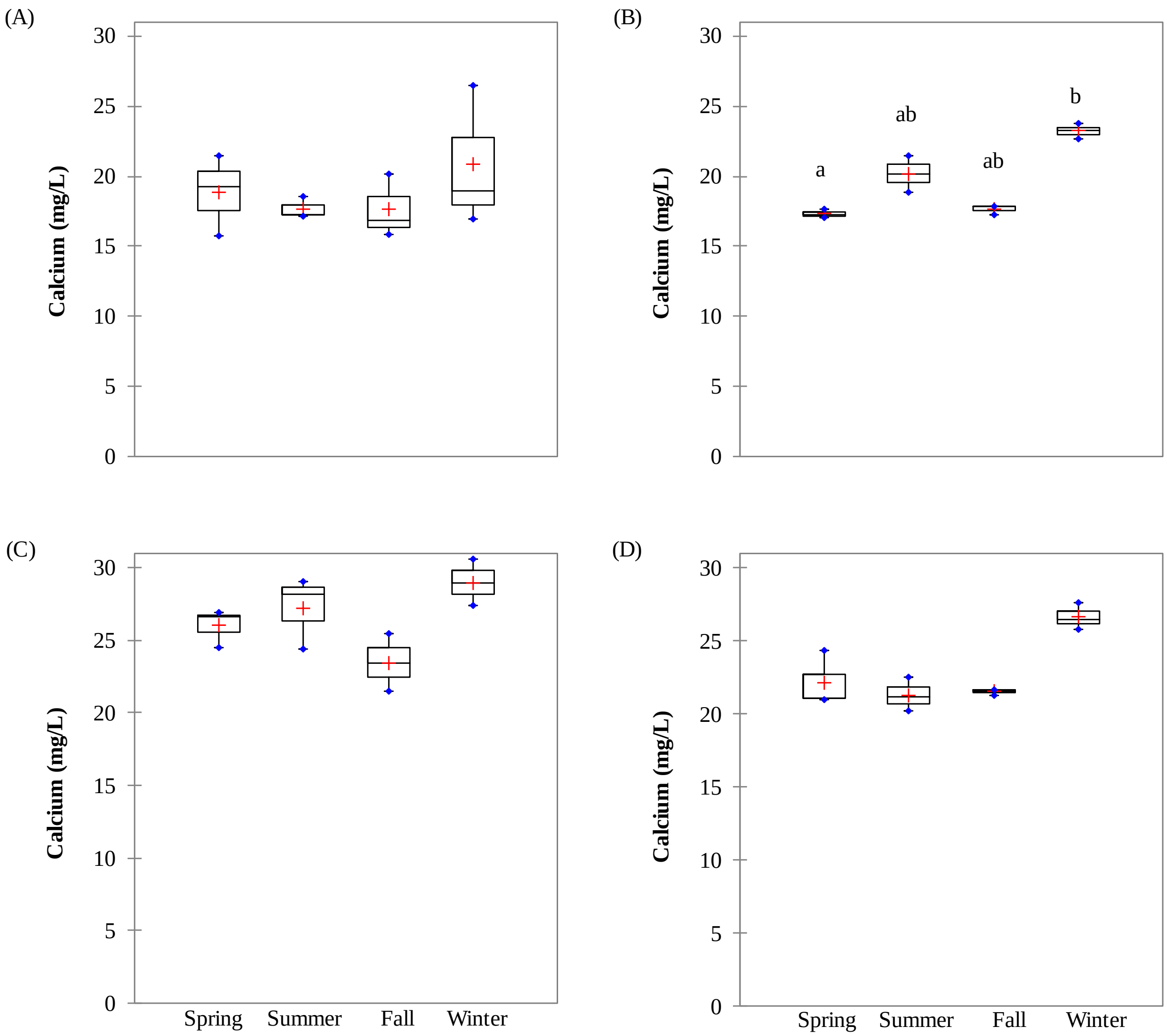


Figure 5.4.4-81. Calcium in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

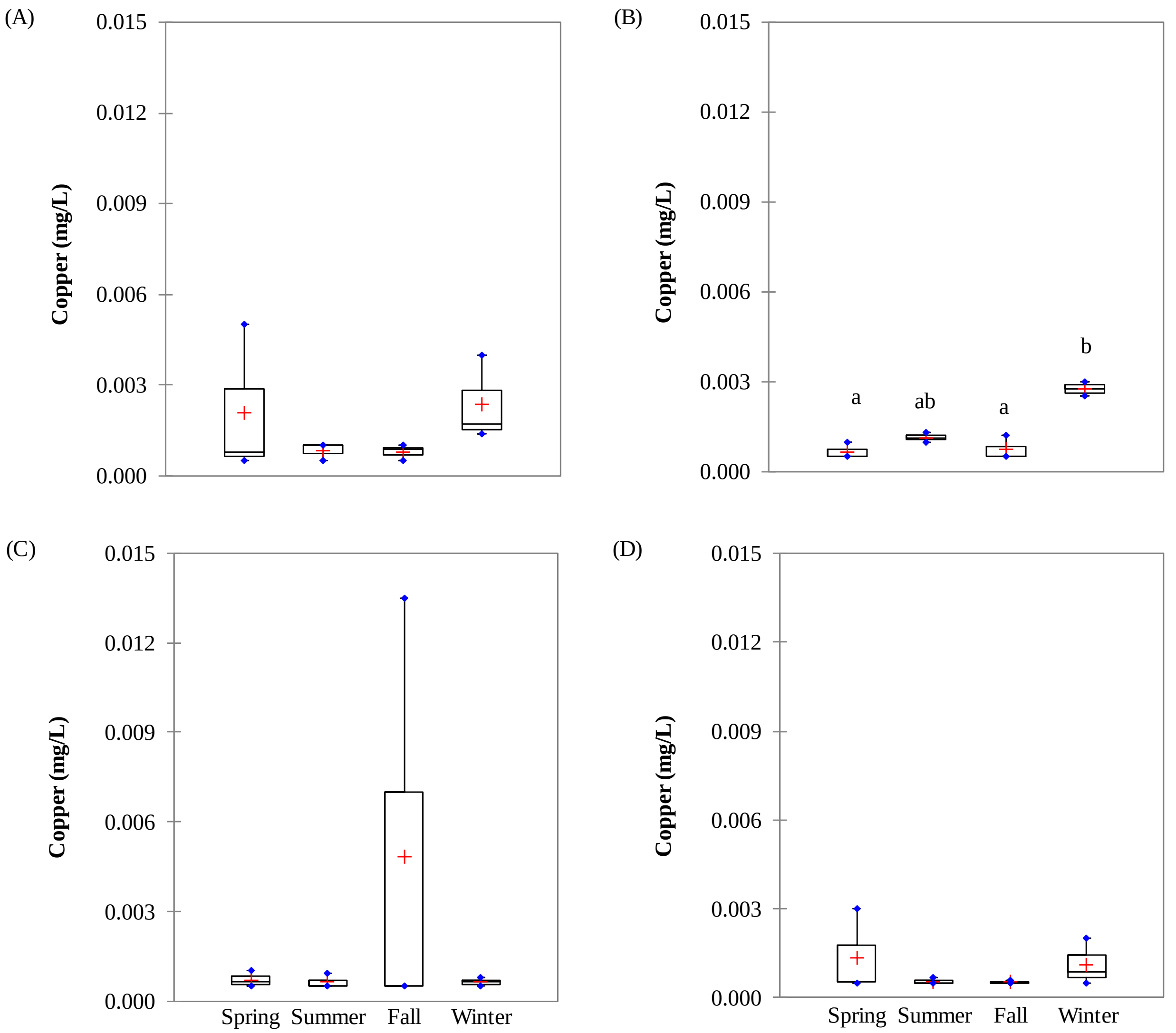


Figure 5.4.4-82. Copper in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

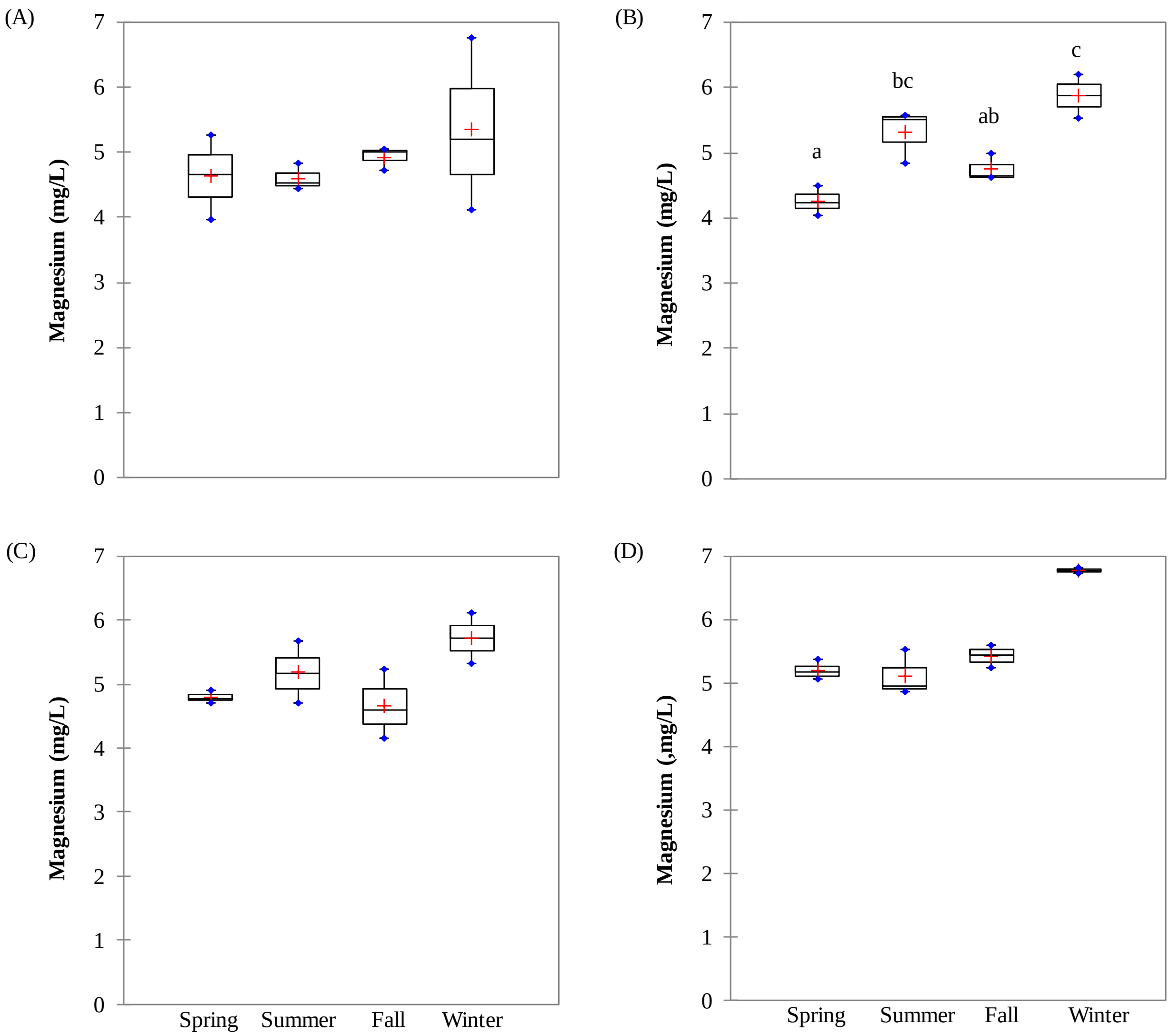


Figure 5.4.4-83. Magnesium in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

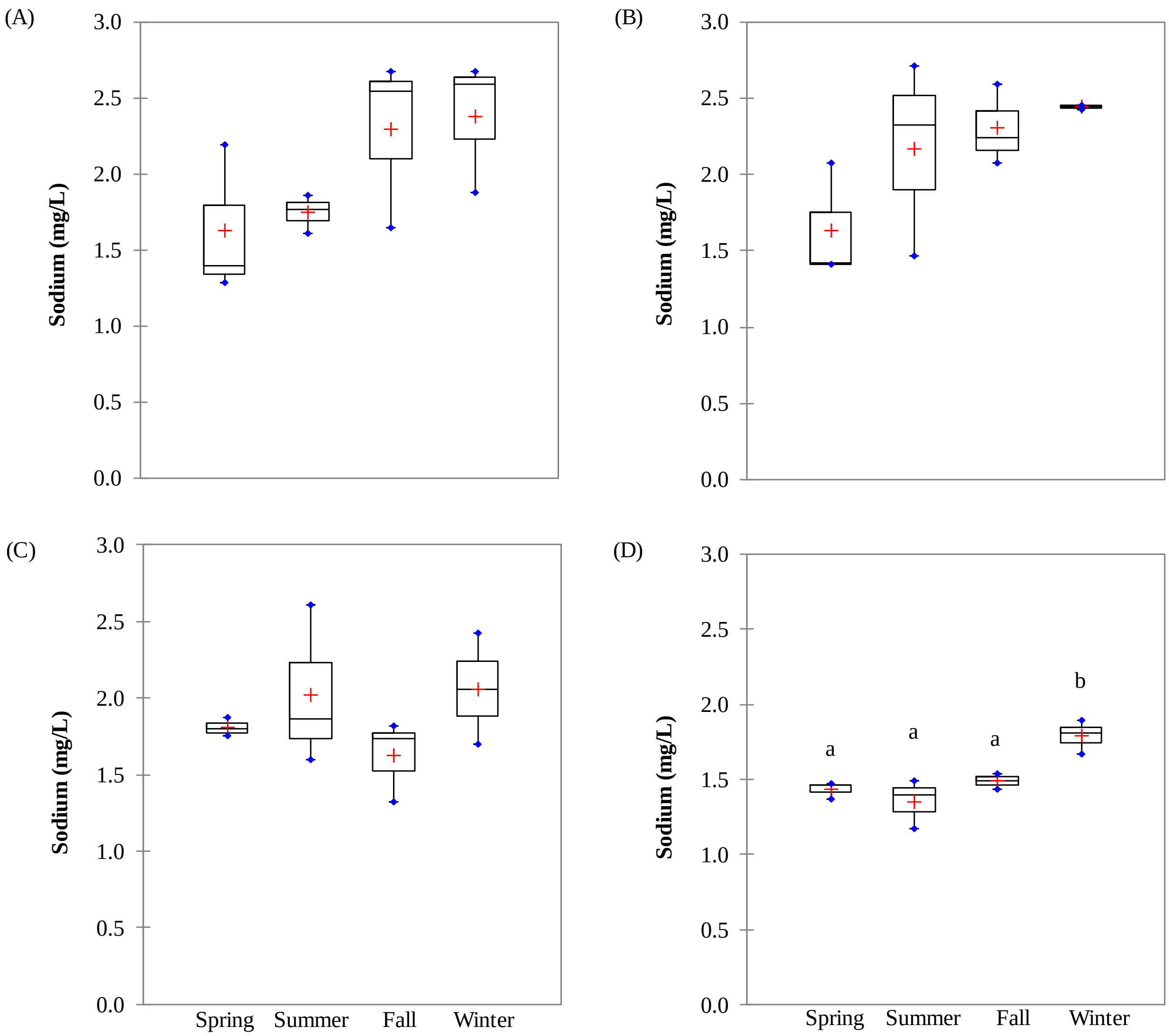


Figure 5.4.4-84. Sodium in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

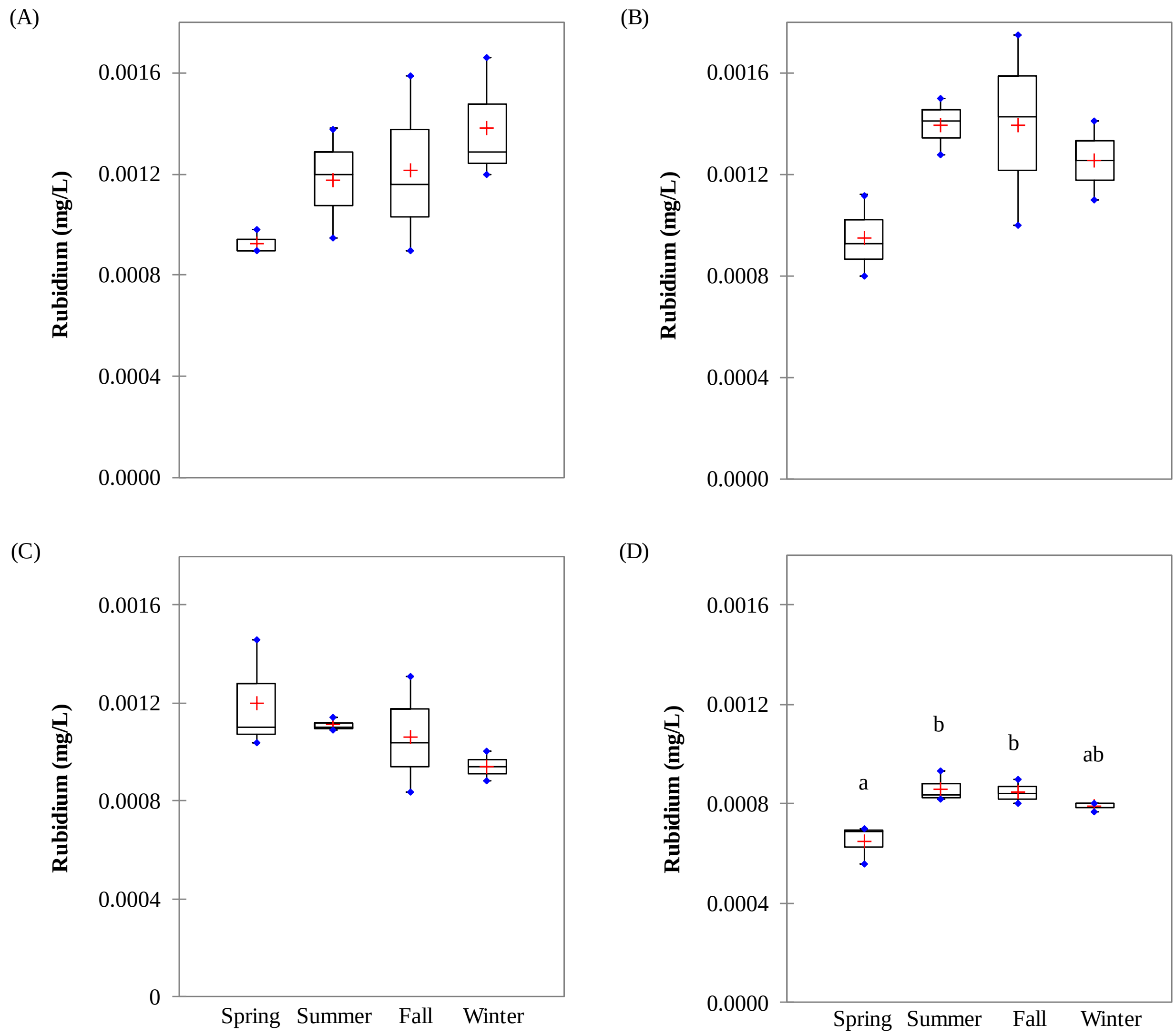


Figure 5.4.4-85. Rubidium in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

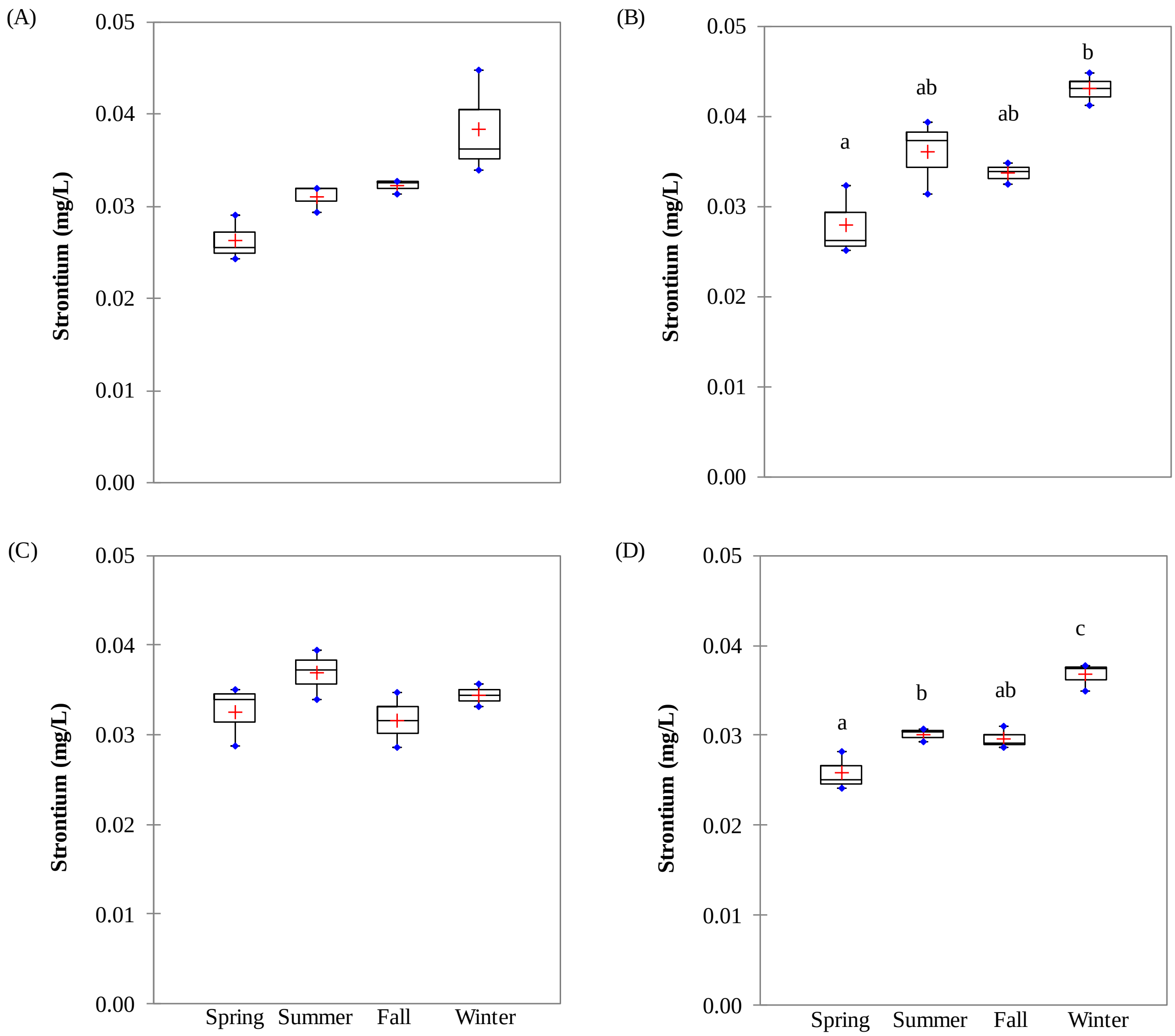


Figure 5.4.4-86. Strontium in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

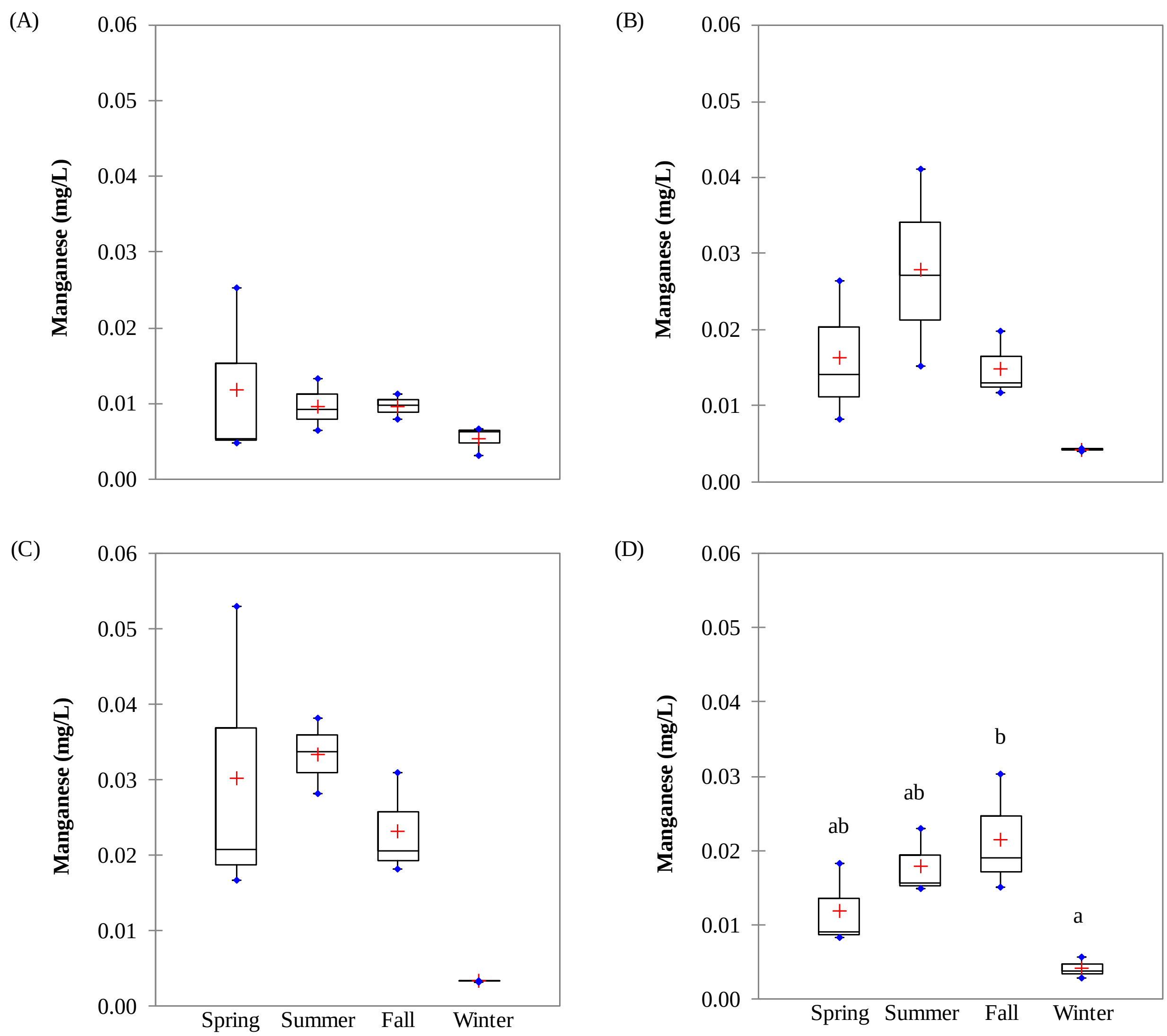


Figure 5.4.4-87. Manganese in the Lower Churchill River Region by season: (A) Northern Indian Lake; (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant seasonal differences are denoted with different superscripts.

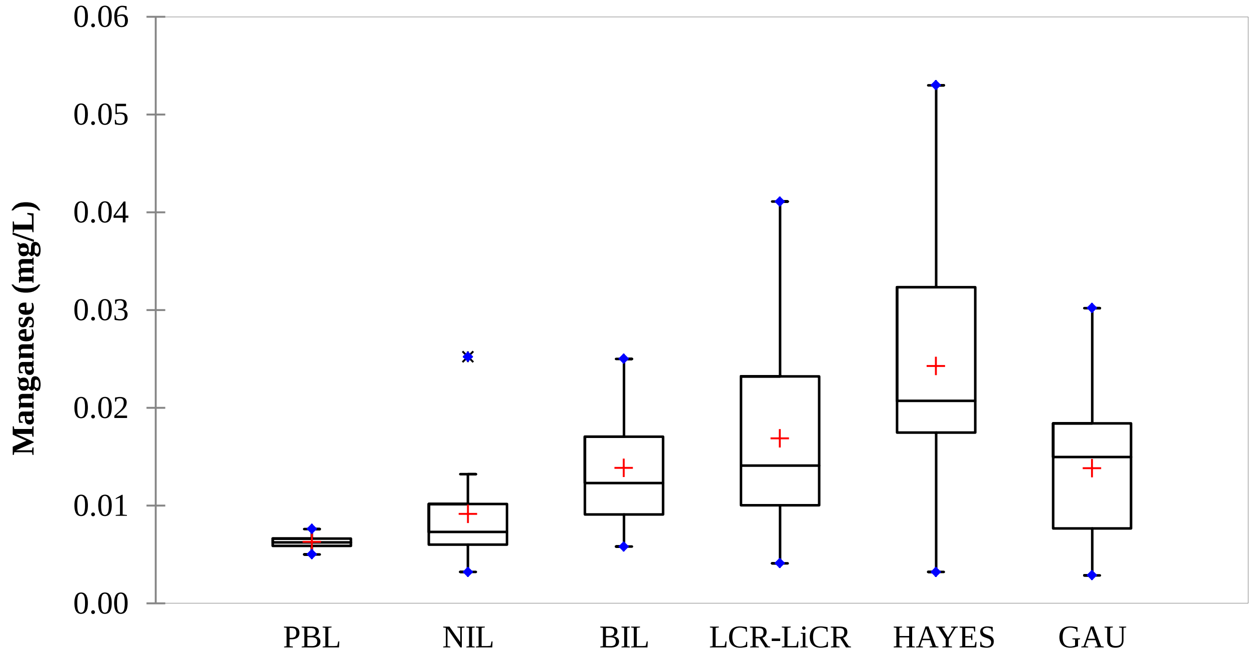


Figure 5.4.4-88. Manganese in the Lower Churchill River Region: 2008-2010.

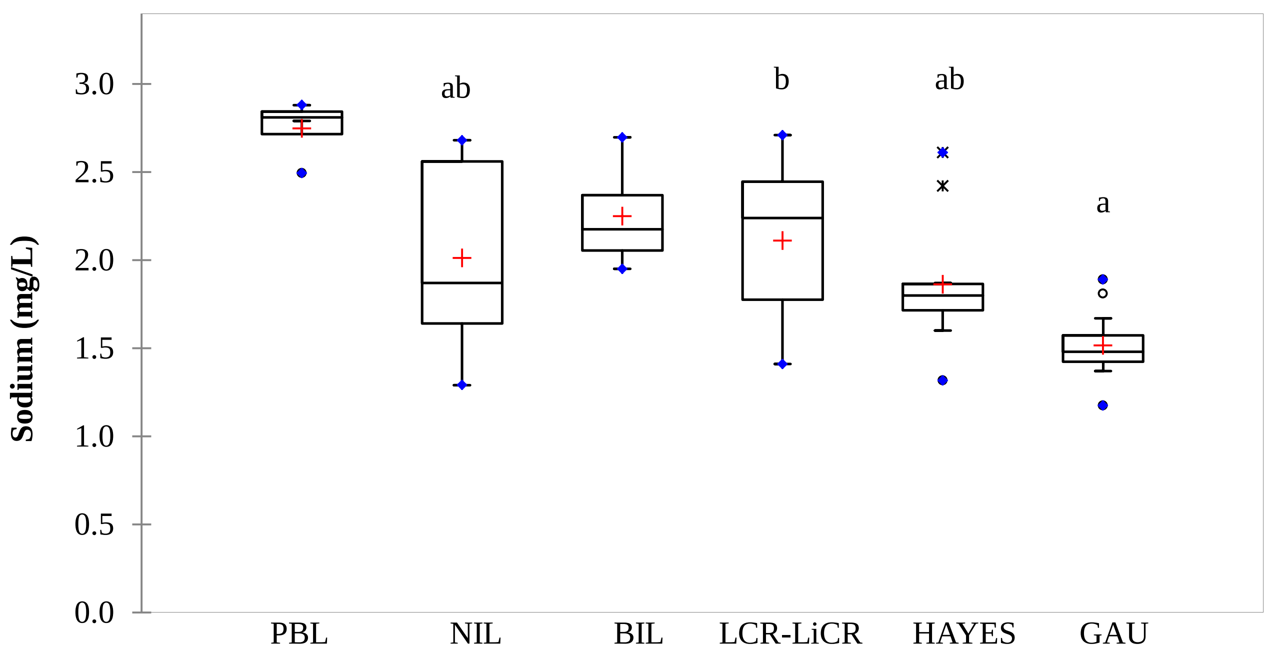


Figure 5.4.4-89. Sodium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

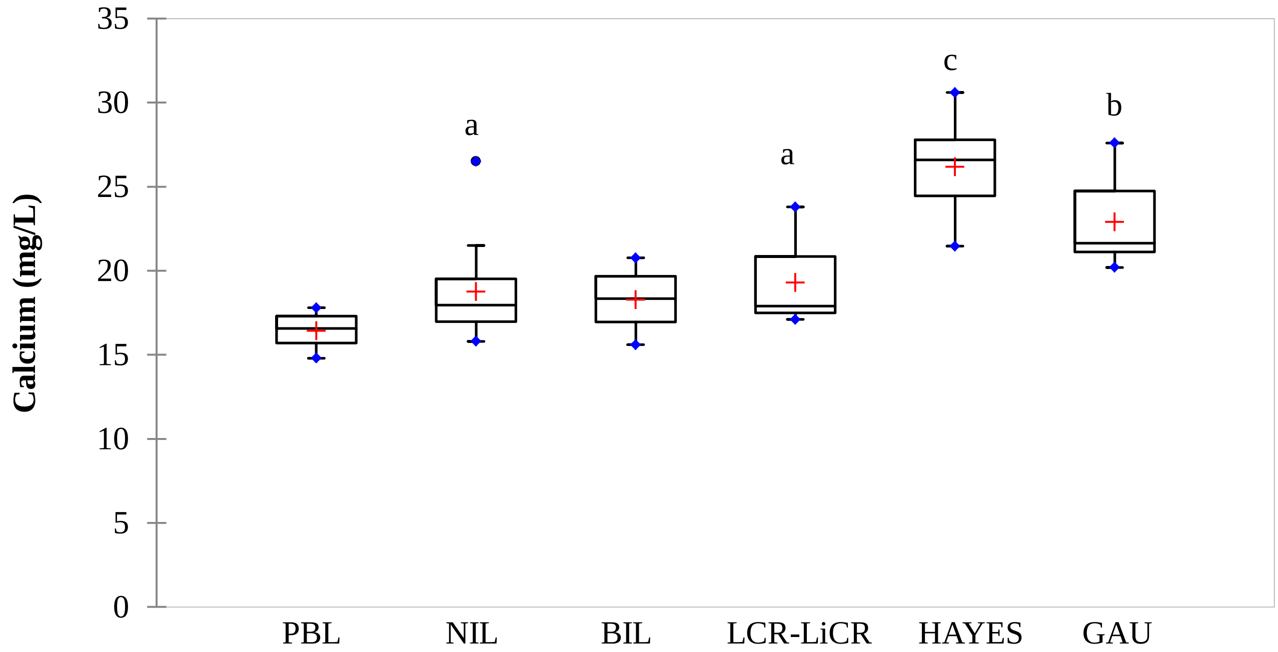


Figure 5.4.4-90. Calcium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

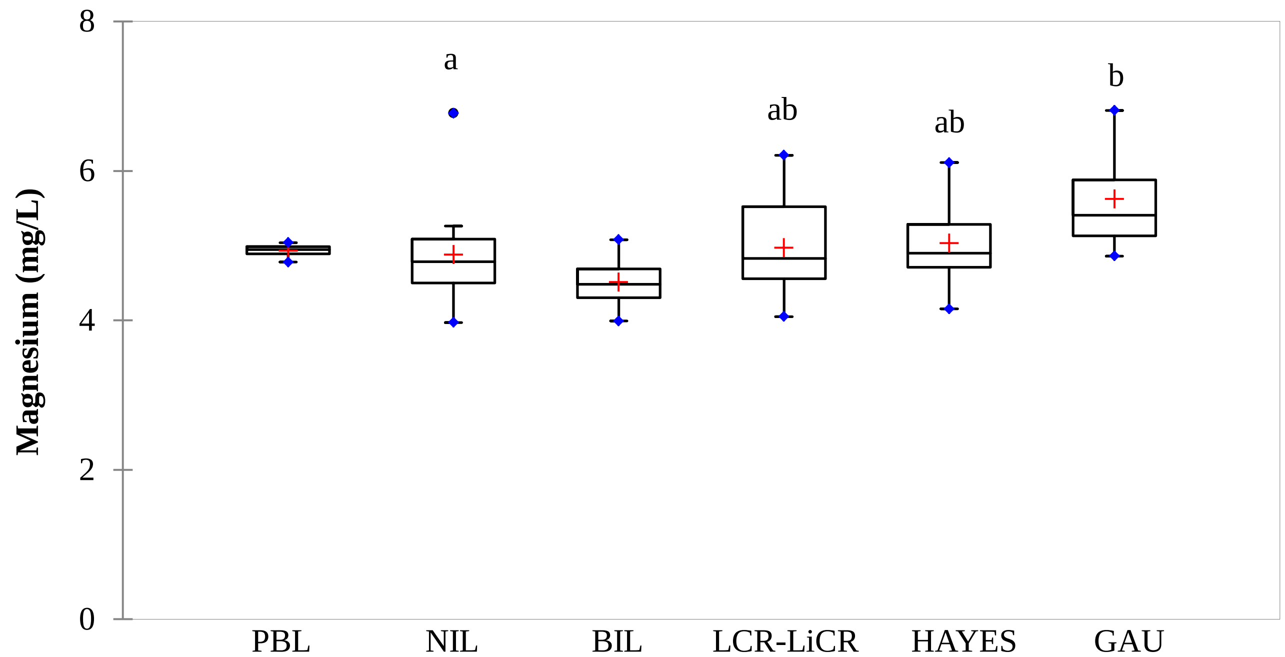


Figure 5.4.4-91. Magnesium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

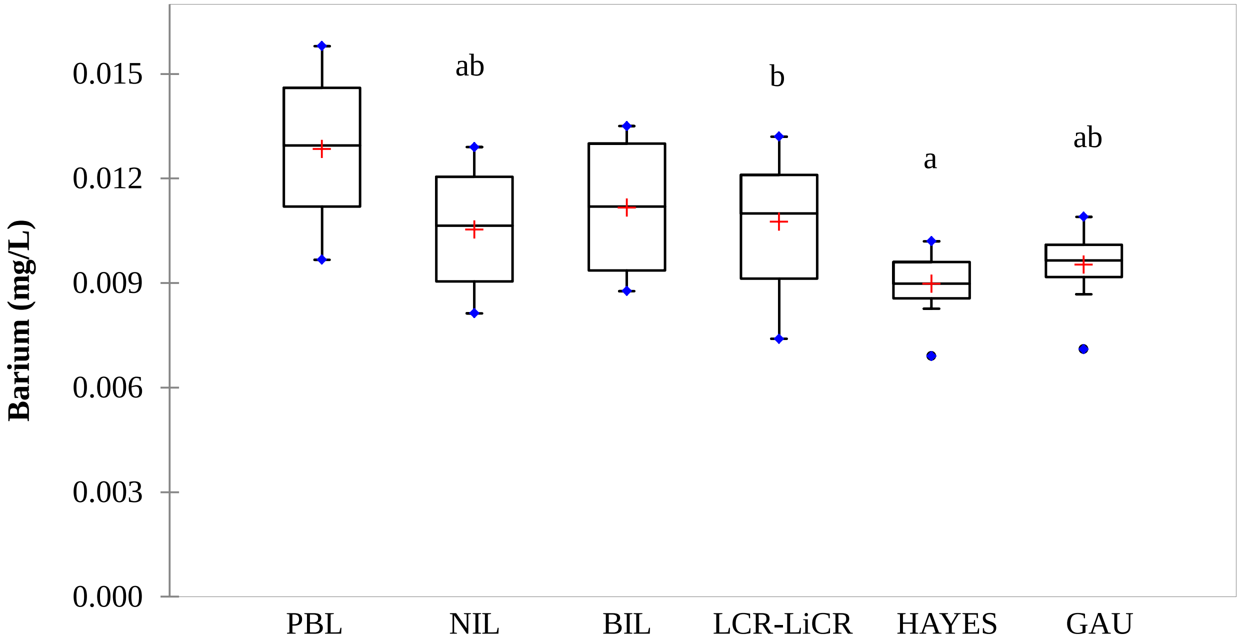


Figure 5.4.4-92. Barium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

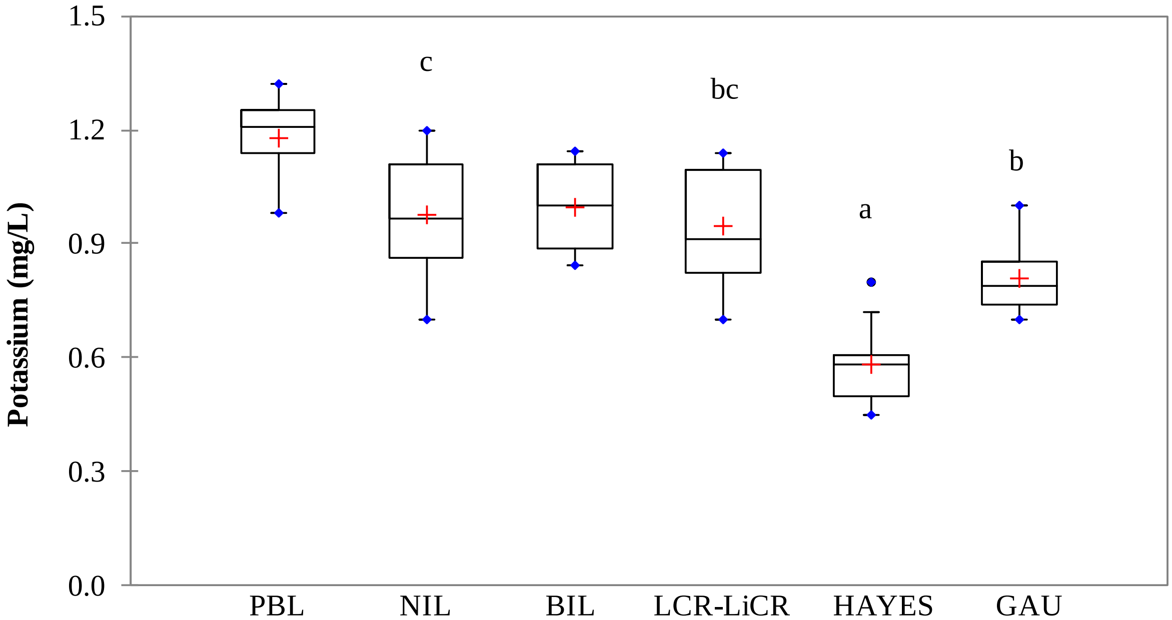


Figure 5.4.4-93. Potassium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

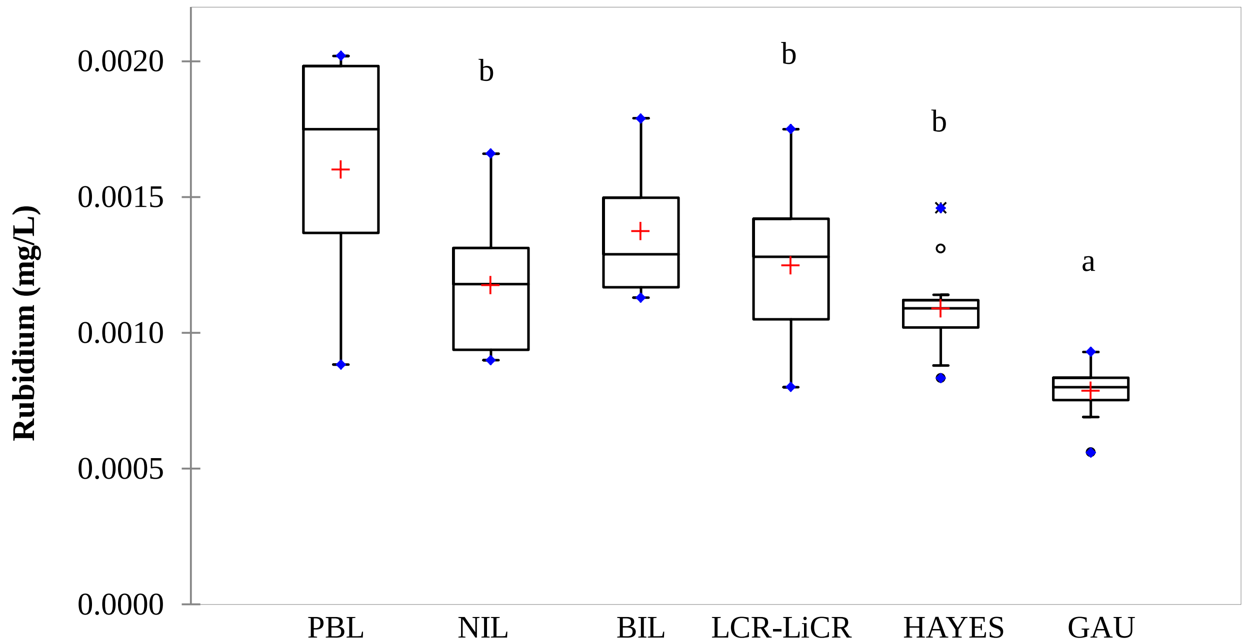


Figure 5.4.4-94. Rubidium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

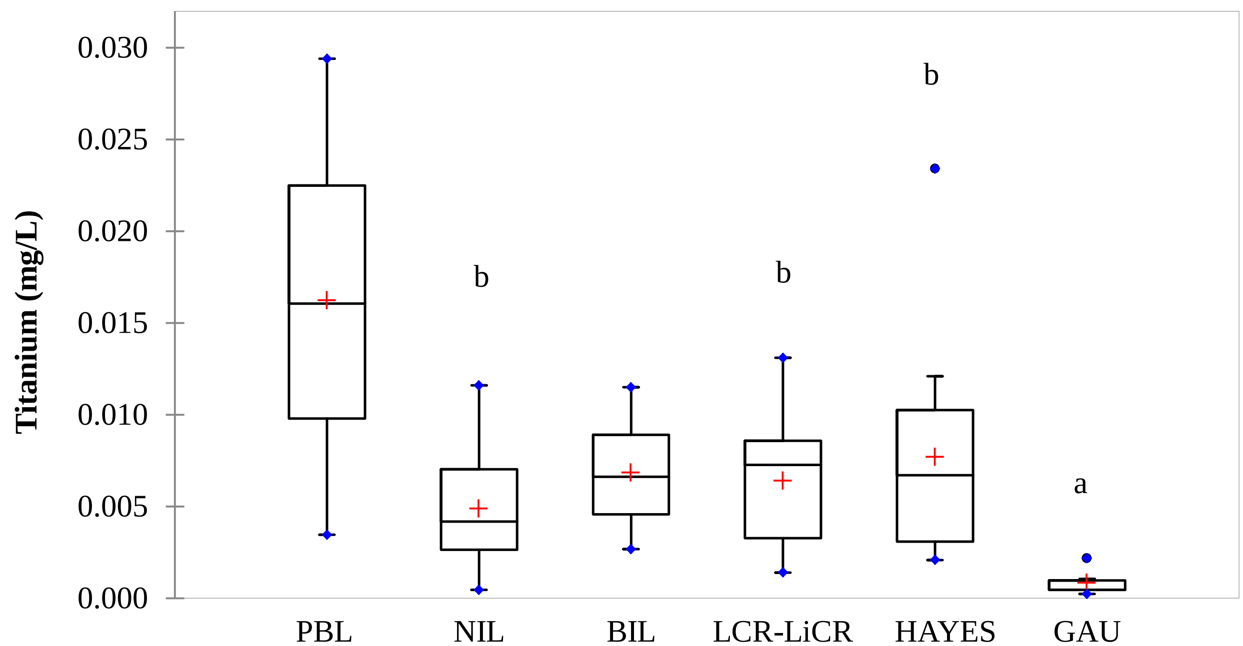


Figure 5.4.4-95. Titanium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

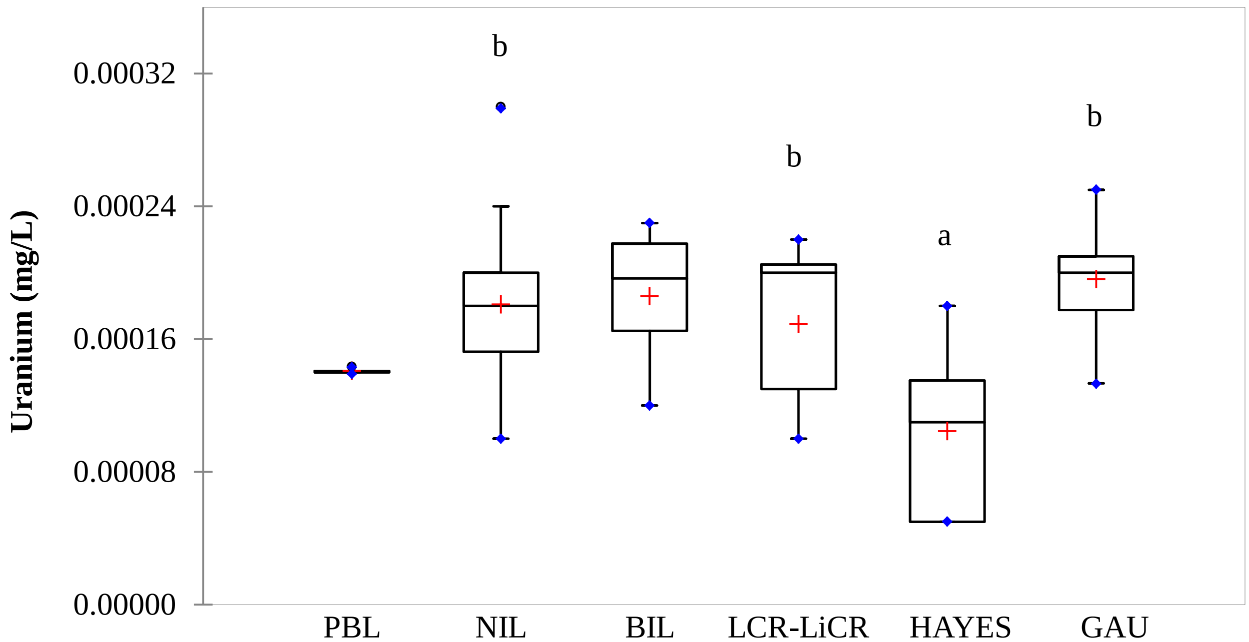


Figure 5.4.4-96. Uranium in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

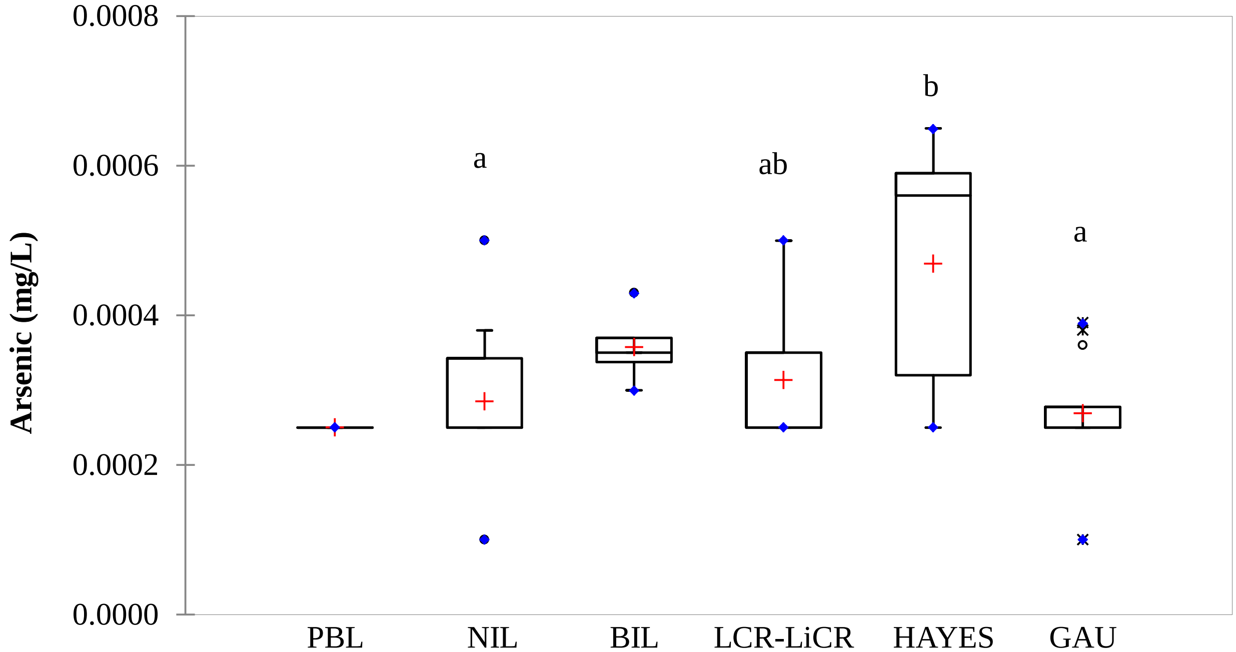


Figure 5.4.4-97. Arsenic in the Lower Churchill River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

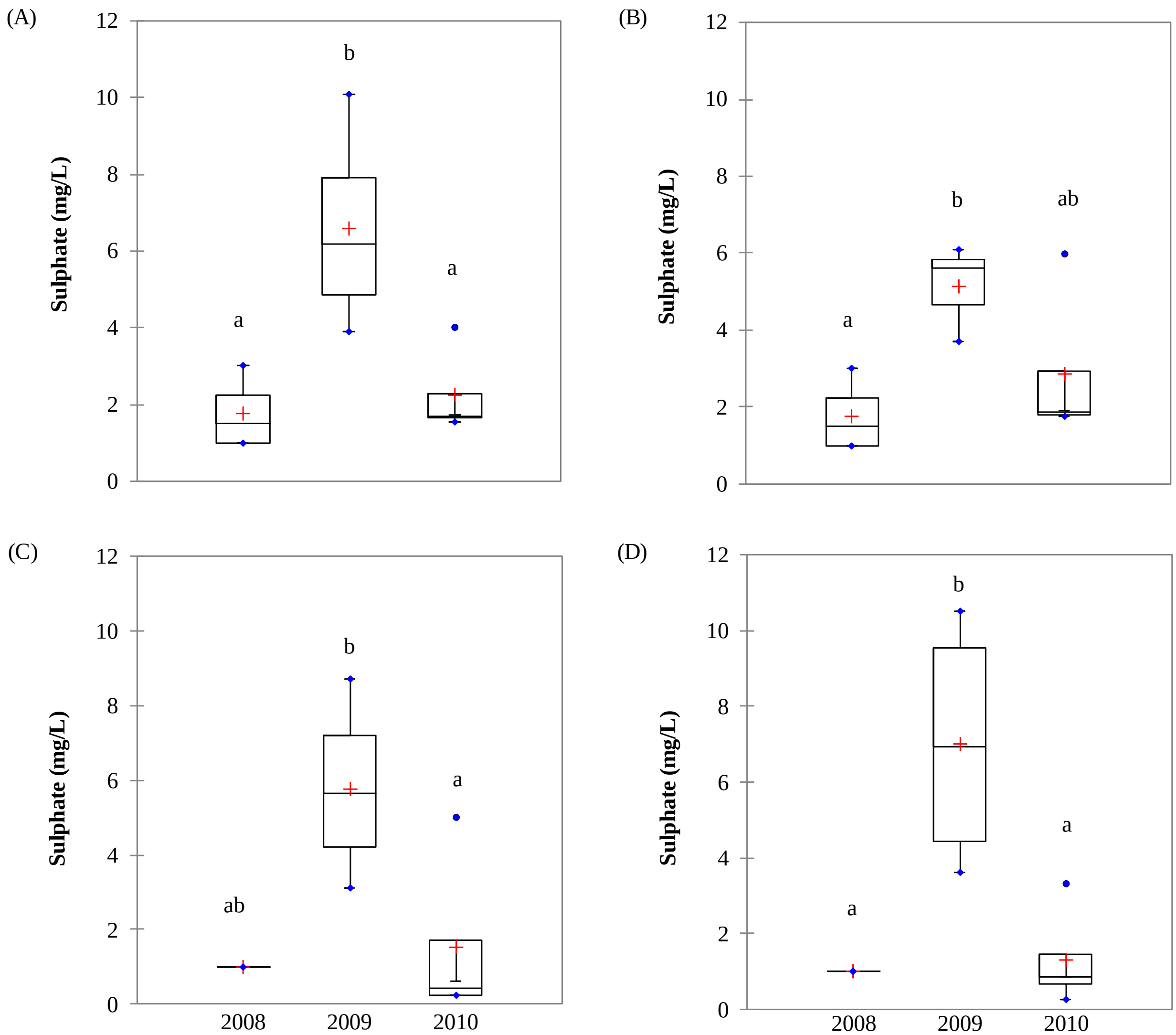


Figure 5.4.4-98. Sulphate measured in the Lower Churchill River Region by year: (A) Northern Indian Lake, (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant differences are denoted with different superscripts.

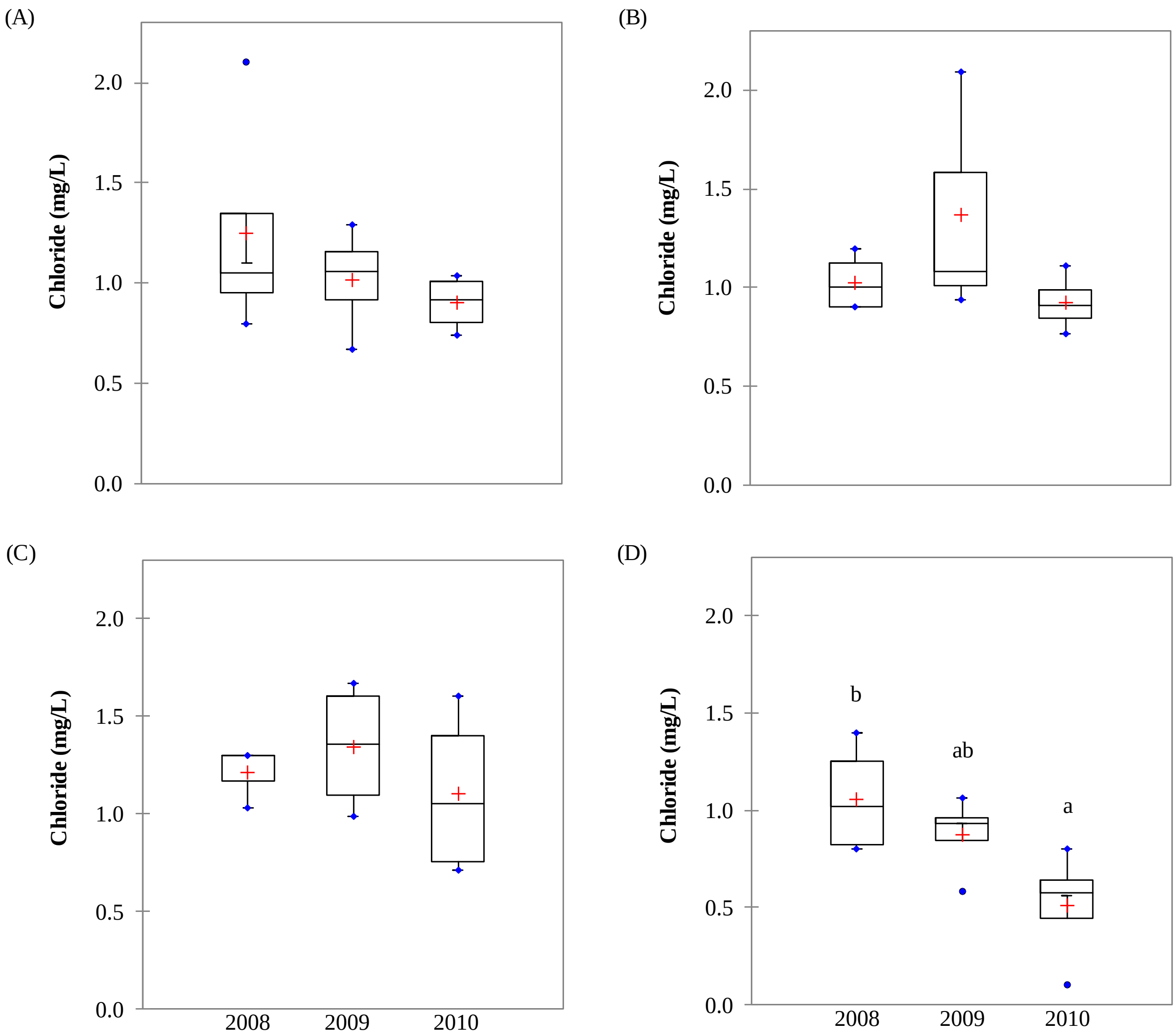


Figure 5.4.4-99. Chloride measured in the Lower Churchill River Region by year: (A) Northern Indian Lake, (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant differences are denoted with different superscripts.

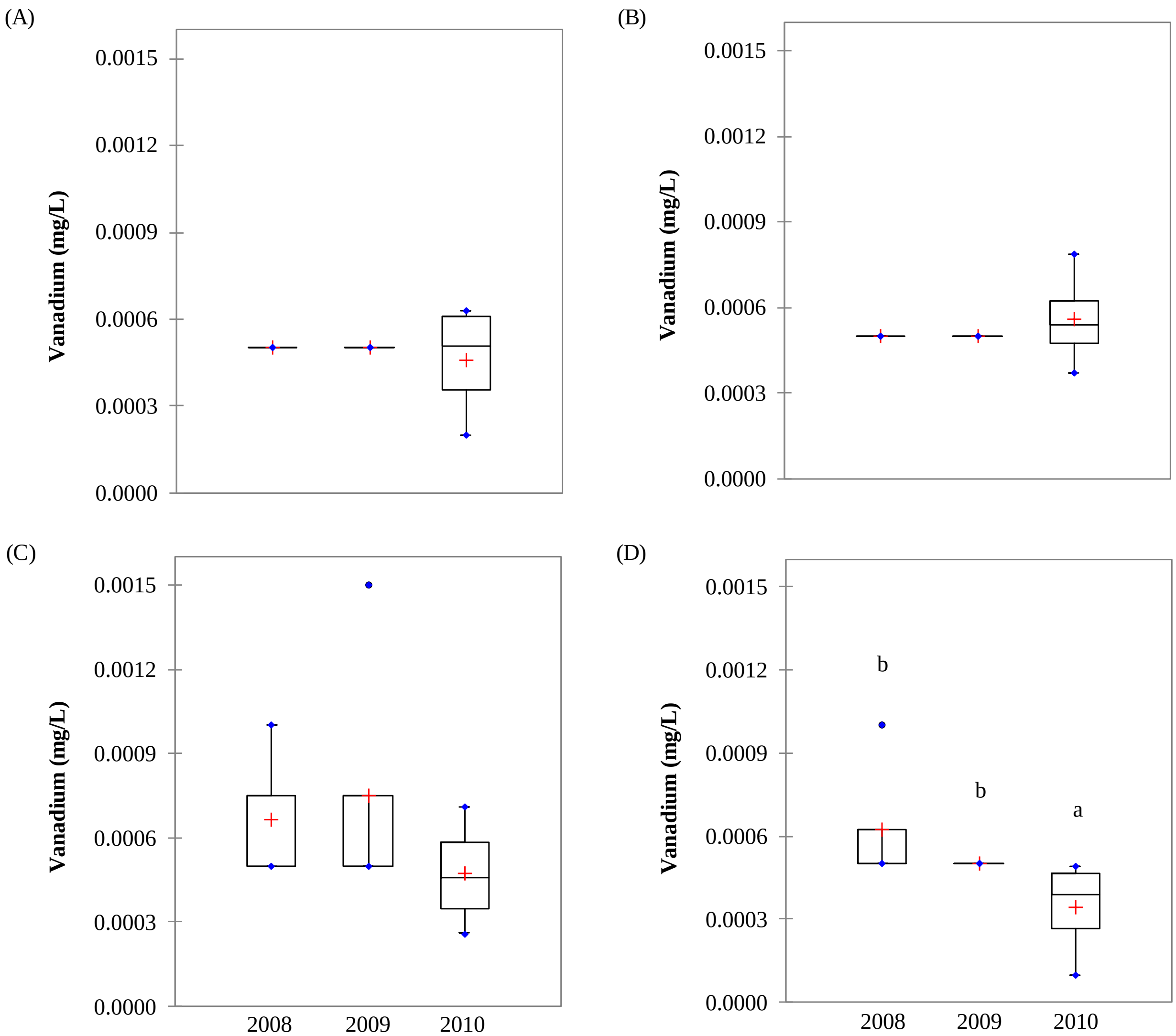


Figure 5.4.4-100. Vanadium measured in the Lower Churchill River Region by year: (A) Northern Indian Lake, (B) lower Churchill River; (C) Hayes River; and (D) Gauer Lake. Statistically significant differences are denoted with different superscripts.

5.4.5 Phytoplankton

The following provides an overview of phytoplankton monitoring results measured in the Lower Churchill River Region over the three years of CAMPP. Sampling sites and periods were consistent with water quality monitoring program and included annual monitoring at two on-system waterbodies (Northern Indian Lake and the lower Churchill River at the Little Churchill River [hereafter referred to as "lower Churchill River"]) and one off-system waterbody (Gauer Lake; Figure 5.4.4-1). Water quality and phytoplankton were also monitored at two rotational sites: Partridge Breast Lake (2009/2010) and Billard Lake (2010/2011). Although formally included in the Lower Nelson River Region, results collected from the off-system Hayes River were also incorporated into the discussion provided below. Sampling times relative to air temperature are presented in Figure 5.4.4-2.

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 seasonal, temporal, and spatial variability was assessed for this parameter.

Phytoplankton biomass and taxonomic composition were measured at all sites in 2009/2010, excepting Billard Lake where analyses were conducted in 2010/2011. Due to limited data, phytoplankton biomass, composition and community metrics were not assessed statistically; analyses will be conducted in the future when additional data are available.

Chlorophyll *a* exceeded the bloom monitoring trigger of 10 µg/L in the sample collected from Gauer Lake in summer 2008. Phytoplankton biomass and taxonomic composition and microcystin-LR (an algal toxin) were therefore also analysed in this sample.

5.4.5.1 Chlorophyll a

Over the three years of CAMPP sampling in the Lower Churchill River Region, chlorophyll *a* concentrations were relatively low. During the ice-cover season, chlorophyll *a* was less than 2 µg/L whereas concentrations generally ranged up to 10 µg/L during the open-water period. An anomalously high result of 21 µg/L was measured in Gauer Lake in summer 2008 (Figure 5.4.5-1). With the exception of this result, concentrations were generally similar between on-system and off-system.

5.4.5.2 Taxonomic Composition and Biomass

Phytoplankton biomass measured during the open-water season varied between the five waterbodies in the Lower Churchill River Region, as well as to the Hayes River. The most notable difference was the higher biomass measured in the off-system lake (Gauer Lake) relative to the other waterbodies in the region (Figure 5.4.5-2). Phytoplankton biomass was highest in fall and lowest in spring at most sites in the region; the exceptions were Partridge Breast Lake, where biomass was greatest in summer and lowest in fall, and Northern Indian Lake, were biomass was lowest in summer.

Phytoplankton communities also varied between the waterbodies in the region, with the off-system waterbodies exhibiting slightly different community structures than the on-system sites (Figure 5.4.5-3). Diatoms typically dominated the phytoplankton at on-system sites, with dinoflagellates, cryptophytes, or chrysophytes as the second-most dominant group. Exceptions occurred at Northern Indian Lake in spring when dinoflagellates dominated, and at Billard Lake in summer when blue-greens were dominant. However, because Billard Lake was sampled in a different year than the other waterbodies, the latter observation may reflect interannual variability rather than spatial differences. In contrast to the on-system sites, phytoplankton in the Hayes River was co-dominated by chrysophytes and diatoms in spring and blue-green and green algae in fall. At Gauer Lake, cryptophytes dominated in the spring and diatoms and blue-green algae dominated for the rest of the open-water period.

Metrics describing the phytoplankton community were calculated on a seasonal basis and are presented in Table 5.4.5-1. Overall the metrics varied between sites and seasons but community complexity tended to be lower at Partridge Breast and Northern Indian lakes compared to Gauer Lake and the lower Churchill and Hayes rivers.

5.4.5.3 Bloom Monitoring

Chlorophyll *a* exceeded the bloom monitoring trigger of 10 µg/L in Gauer Lake in summer 2008. Total biomass during this bloom was 8,310 mg/m^3 and the phytoplankton community was dominated by blue-green algae (Figure 5.4.5-4).

5.4.5.4 Microcystin

Some forms of blue-green algae are capable of producing microcystins (liver toxins), including species of *Anabaena*, *Aphanizomenon*, *Microcystis*¸ *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 every waterbody in the region and *Planktothrix*/*Oscillatoria* was found at all sites except Partridge Breast Lake and the Hayes River.

During the Pilot Program, microcystin-LR was analysed but was not detected (<0.2 µg/L) in one sample collected in Gauer Lake (summer 2008) when chlorophyll *a* results exceeded 10 µg/L (i.e., the threshold for microcystin-LR analysis).

5.4.5.5 Trophic Status

Based on trophic categorization schemes for lakes, Partridge Breast Lake would be classified as oligotrophic on the basis of mean open-water chlorophyll *a* concentrations, whereas Northern Indian, Billard, and Gauer lakes are categorized as mesotrophic (Table 5.4.4-4). Categorization schemes for rivers indicate that the lower Churchill and Hayes rivers are both oligotrophic (Table 5.4.4-6).

5.4.5.6 Seasonal Variability

Chlorophyll *a* concentrations measured during the ice-cover season were typically lower than those measured during the open-water season, regardless of the sampling location (Figure 5.4.5-1). Winter chlorophyll *a* concentrations measured at Northern Indian Lake and the lower Churchill River were significantly lower than those measured in summer and fall at these sites.

5.4.5.7 Spatial Comparisons

Mean annual chlorophyll *a* concentrations were not statistically different between the four annual waterbodies (Northern Indian Lake, lower Churchill River, Hayes River, and Gauer Lake; Figure 5.4.5-5).

5.4.5.8 Temporal Variability

Comparisons between sampling years for the annual waterbodies revealed that there were no significant differences in chlorophyll *a* concentrations over the monitoring period (Figure 5.4.5-6).

Table 5.4.5-1. Phytoplankton community metrics calculated for the five waterbodies in the Lower Churchill River Region and the Hayes River.

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 ($E^{H`}/S$)
Partridge Breast Lake	Spring	13	0.77	0.33	1.78	0.69	5.93	0.46
	Summer	11	0.60	0.23	1.36	0.57	3.91	0.36
	Fall	13	0.56	0.18	1.29	0.50	3.64	0.28
Northern Indian Lake	Spring	12	0.66	0.24	1.32	0.53	3.76	0.31
	Summer	12	0.76	0.35	1.71	0.69	5.53	0.46
	Fall	13	0.47	0.15	1.14	0.44	3.12	0.24
Billard Lake	Spring	23	0.88	0.37	2.44	0.78	11.44	0.50
	Summer	26	0.69	0.12	1.86	0.57	6.40	0.25
	Fall	23	0.84	0.27	2.28	0.73	9.75	0.42
Lower Churchill River at Little Churchill River	Spring	22	0.88	0.37	2.39	0.77	10.90	0.50
	Summer	-	-	-	-	-	-	-
	Fall	17	0.30	0.08	0.83	0.29	2.28	0.13
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
Gauer Lake	Summer 2008	35	0.85	0.19	2.29	0.65	9.91	0.28
	Spring 2009	20	0.73	0.19	1.83	0.61	6.22	0.31
	Summer 2009	34	0.89	0.27	2.52	0.71	12.42	0.37
	Fall 2009	37	0.83	0.16	2.25	0.62	9.46	0.26

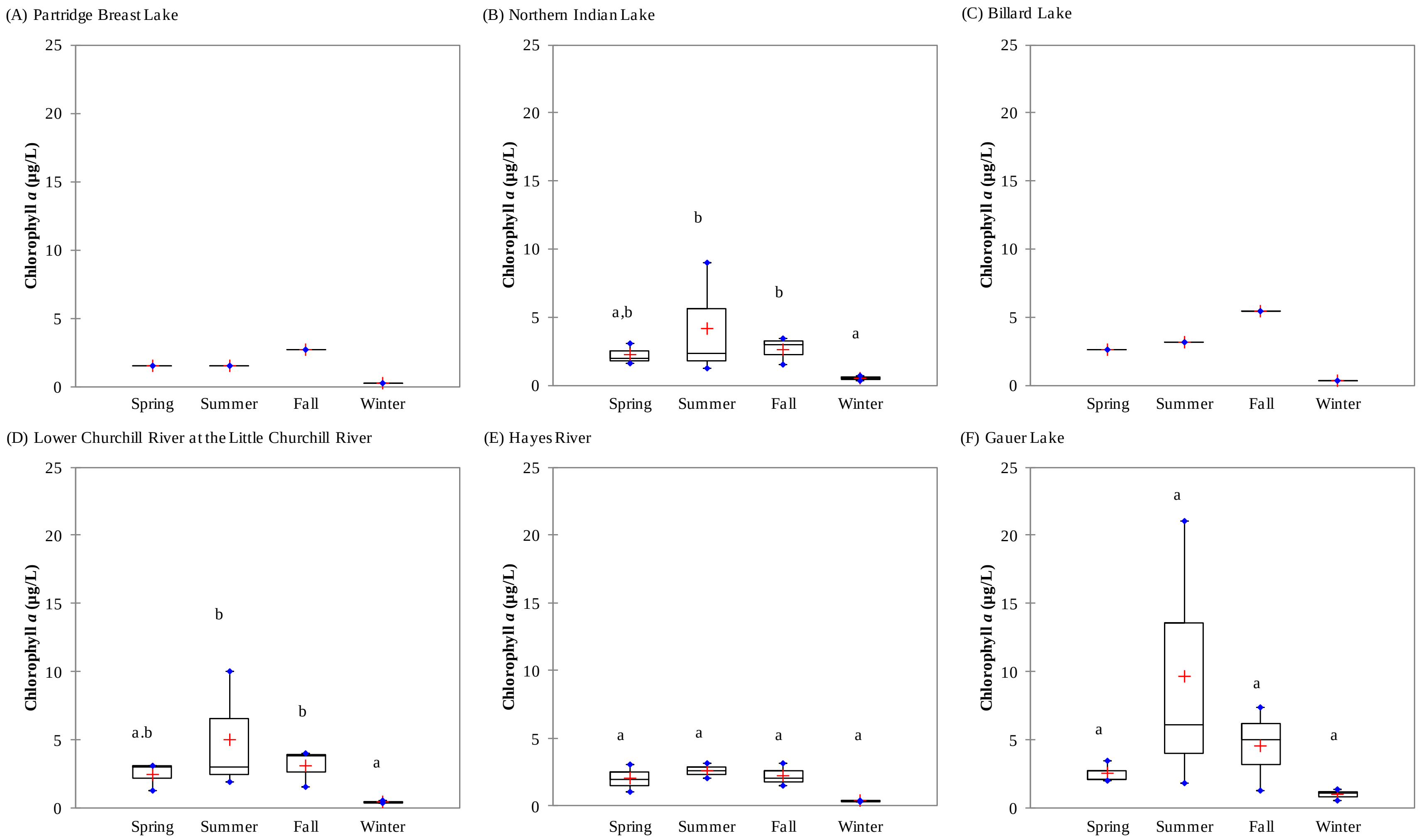


Figure 5.4.5-1. Chlorophyll *a* concentrations measured in the Lower Churchill River Region, 2008-2010 (Northern Indian Lake, lower Churchill River, Hayes River, and Gauer Lake), 2009 (Partridge Breast Lake), and 2010 (Billard Lake). Statistically significant differences within each lake are denoted with different superscripts.

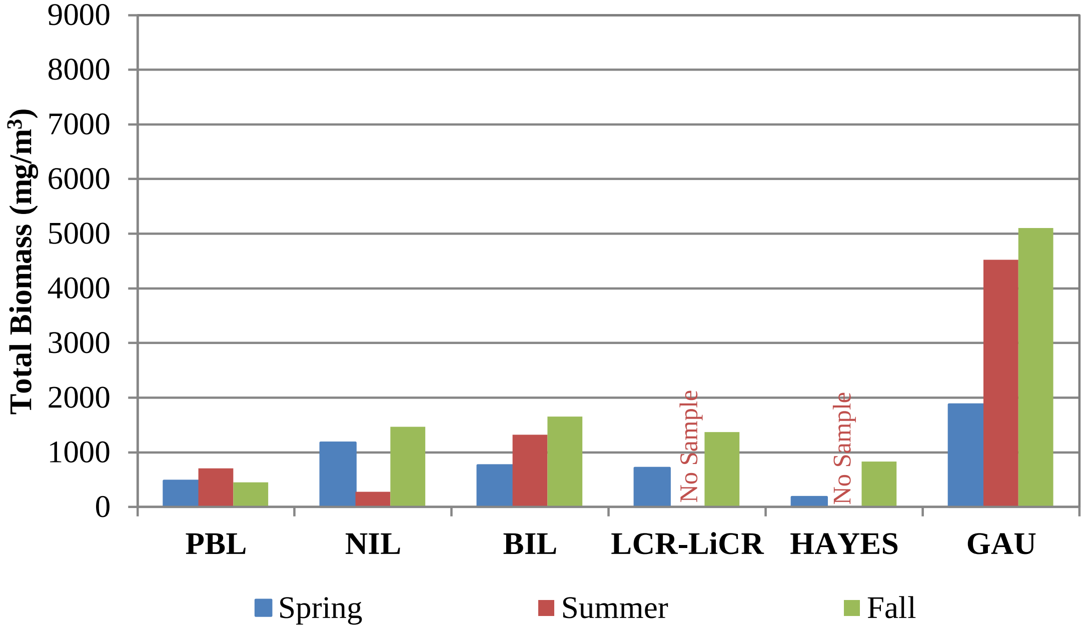


Figure 5.4.5-2. Phytoplankton biomass measured in the Lower Churchill River Region during the open-water seasons of 2009 (Partridge Breast Lake, Northern Indian Lake, lower Churchill River, Hayes River, and Gauer Lake) and 2010 (Billard Lake).

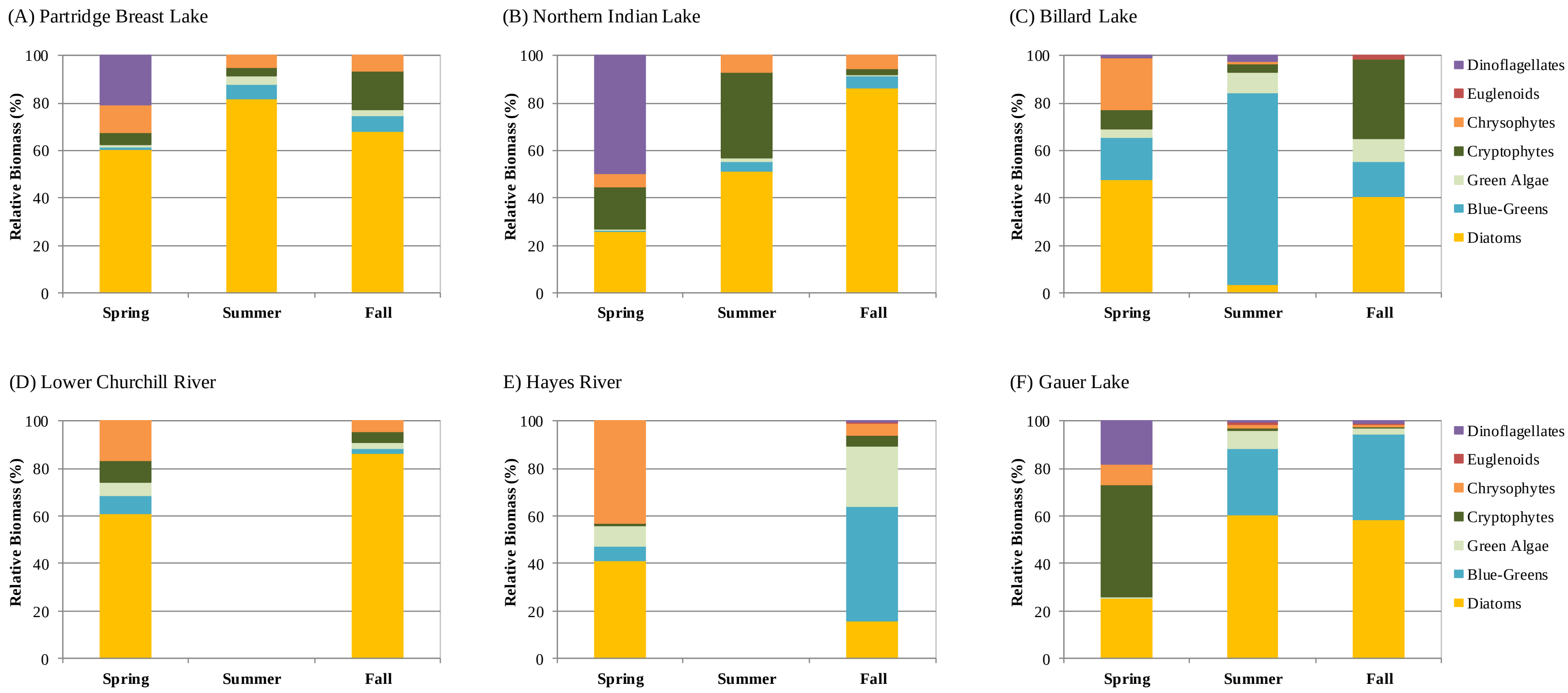


Figure 5.4.5-3. Phytoplankton community composition in the Lower Churchill River Region by season, as measured during the open-water seasons 2009 (Partridge Breast Lake, Northern Indian Lake, lower Churchill River, Hayes River, and Gauer Lake) and 2010 (Billard Lake).

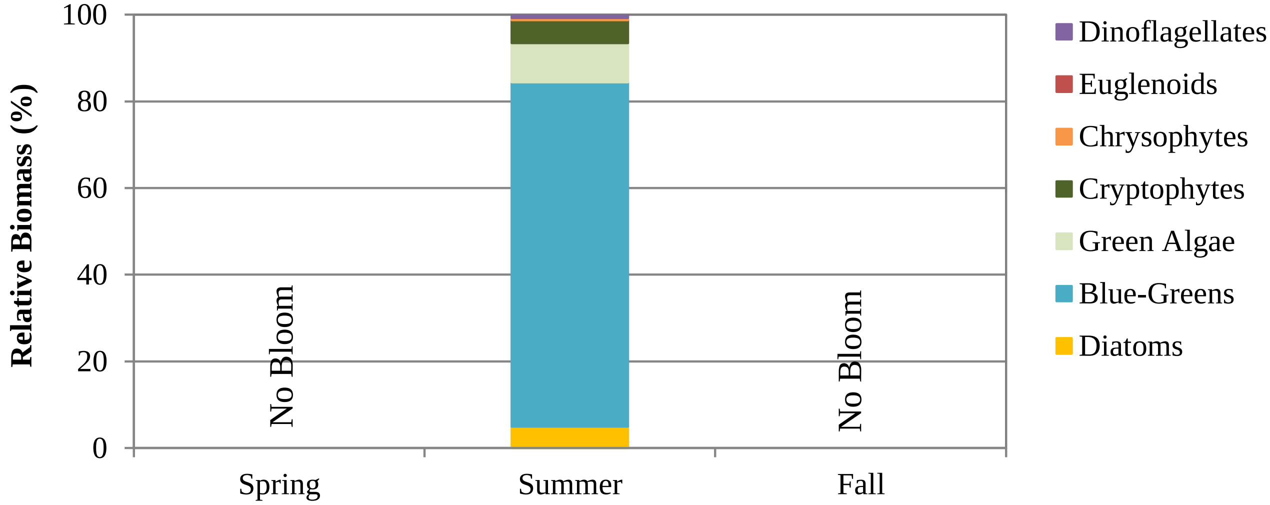


Figure 5.4.5-4. Phytoplankton community composition in Gauer Lake during summer 2008.

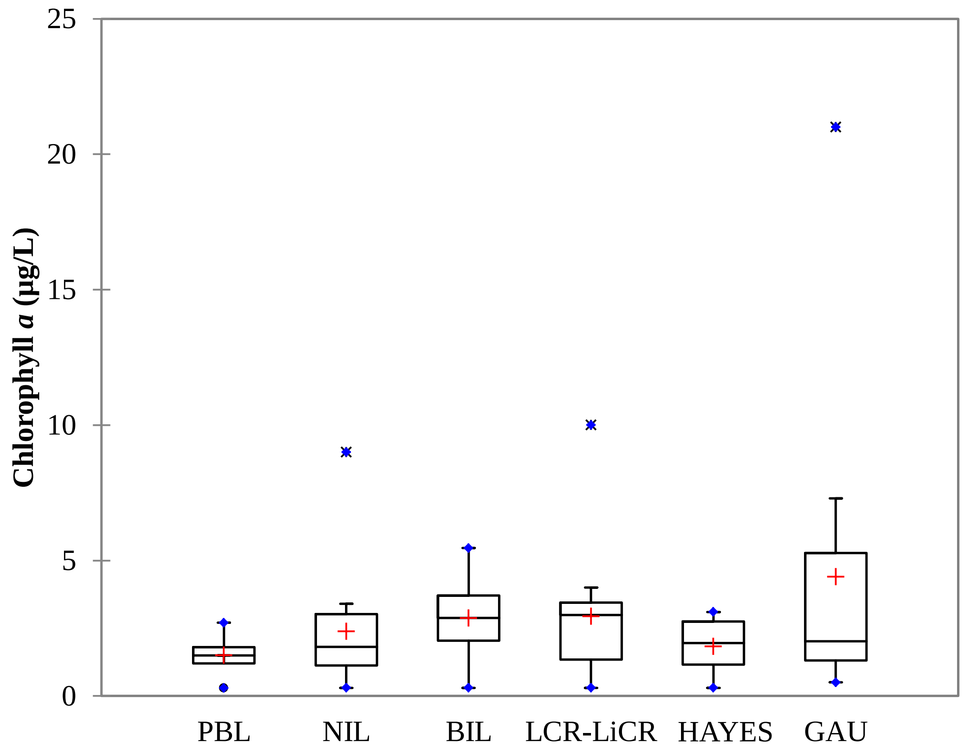


Figure 5.4.5-5. Chlorophyll *a* concentrations in the Lower Churchill River Region. There were no statistically significant spatial differences between the annual waterbodies.

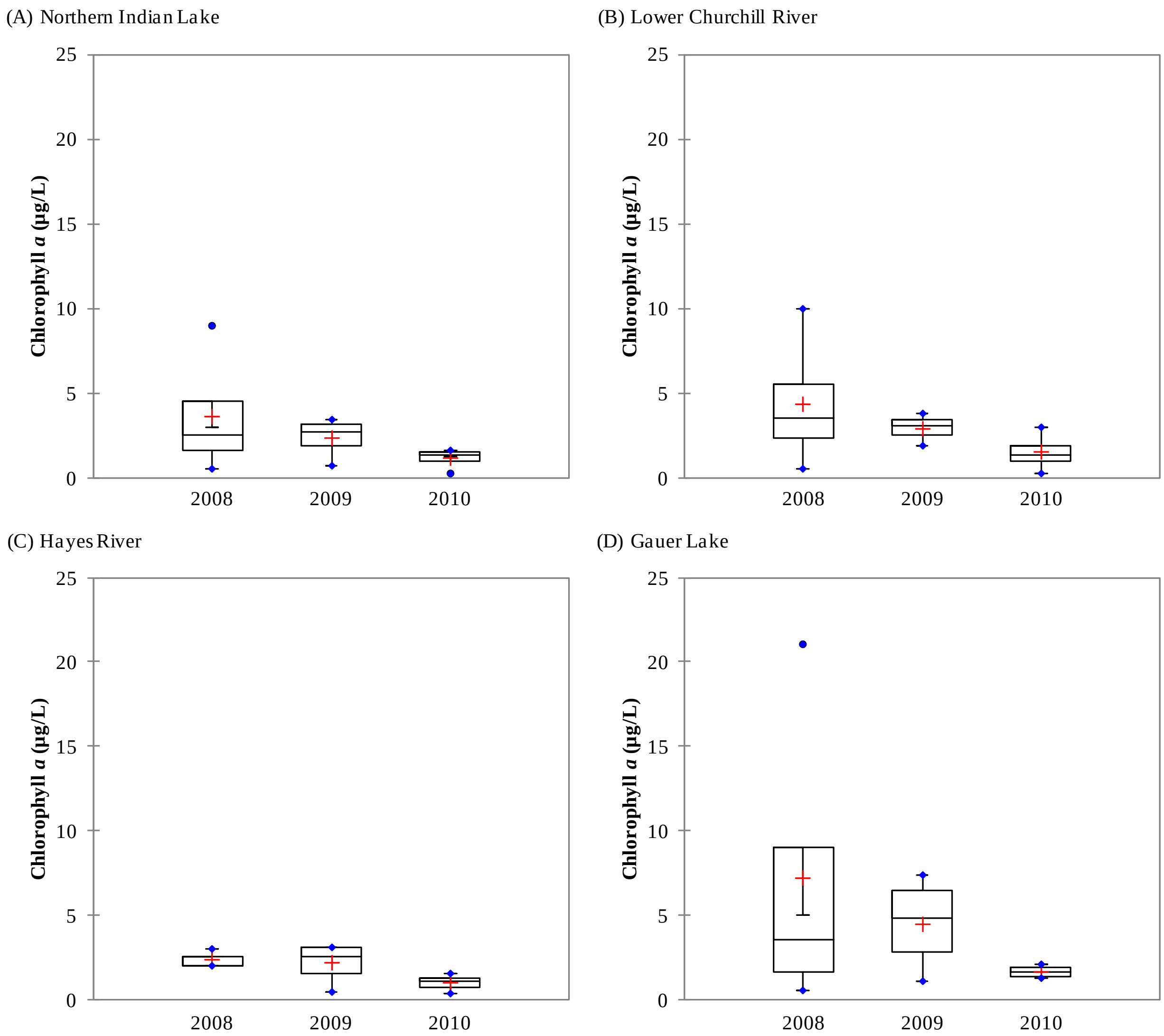


Figure 5.4.5-6. Chlorophyll *a* concentrations measured in the annual waterbodies in the Lower Churchill River Region by year.

5.4.6 Benthic Macroinvertebrates

The following provides an overview of the benthic macroinvertebrate (BMI) community sampled over the three year CAMPP program in the Lower Churchill River Region (Figure 5.4.6-1). In 2008, BMI sampling was conducted in the on-system waterbody Northern Indian Lake, and the off-system waterbody, Gauer Lake; both of these waterbodies are sampled annually. In 2009, sampling was conducted on the on-system lakes Partridge Breast, and Northern Indian, and at the off-system, Gauer Lake. Partridge Breast Lake is sampled on a rotational basis (i.e., once every three years). In 2010, sampling was conducted in the on-system waterbodies Northern Indian Lake, Billard Lake, lower Churchill River at Little Churchill River (hereafter referred to as “lower Churchill River”), Hayes River, and in the off-system Gauer Lake. Billard Lake is sampled on a rotational basis. Near 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 from mid- to late-August in all three years.

BMI are described for waterbodies in the Lower Churchill 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, a three year synthesis of the data for the predominantly wetted nearshore habitat was not possible and the 2010 nearshore data were described separately for lake sites. Further to this, the rockbasket data from the northern river sites (lower Churchill River and Hayes River) were also not included in the synthesis section. The sampling design for the offshore habitat was comparable among years and offshore data was summarized over the three year period.

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.

5.4.6.1 Supporting Environmental Variables

Supporting environmental variables (biophysical) were measured in the field at nearshore and offshore polygons in each waterbody, and included water depth, water temperature, water velocity, Secchi depth, substrate type, type of riparian vegetation, and algal presence (Table 5.4.6-1). Benthic sediment samples were collected from BMI sampling sites and analyzed for particle size analysis (PSA) and total organic carbon (TOC). The nearshore habitat of Gauer Lake (2010) consisted of mainly large, hard substrate, as such sediment samples were not collected for PSA and TOC analysis. 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.

Within the predominantly wetted nearshore habitat sampled in 2008 and 2009, mean water depths ranged from 2.8 m (Partridge Breast Lake) to 4.3 m (Gauer Lake) (Table 5.4.6-1). In 2010, intermittently wetted nearshore water depths ranged between 0.3 m at Northern Indian Lake and 1.0 m in the Churchill and Hayes rivers (Table 5.4.6-1). Mean water depths in the offshore habitat (2008 to 2010) varied considerably, with values ranging from 5.8 m (Northern Indian Lake) to 13.7 m (Gauer Lake) (Table 5.4.6-1).

Sediment composition (PSA) in the intermittently wetted nearshore habitat (2010) of Northern Indian Lake was primarily silt and clay; and Billard Lake and Hayes River largely consisted of sand (Figure 5.4.6-2). In the predominantly wetted nearshore habitat (2008 to 2009) of Partridge Breast Lake consisted of mainly clay and silt; sediment from Northern Indian Lake was of similar proportion of clay, silt, and sand; and Gauer sediment mainly consisted of sand (Figure 5.4.6-3). Sediment composition was quite variable in the offshore habitat (2008 to 2010; Figure 5.4.6-4). Sand dominated in Partridge Breast Lake, and clay and silt were prominent in comparable proportion. Silt was predominant in the offshore benthic sediment of Northern Indian, Billard, and Gauer lakes; and sand was the major component of the sediment at lower Churchill River (Figure 5.4.6-4).

In 2010, intermittently wetted nearshore TOC values ranged from 0.3% (Billard Lake and Hayes River) to 1.0% (Northern Indian Lake) (Figure 5.4.6-2). The predominantly wetted nearshore benthic sediment collected in 2008 and 2009 resulted in mean TOC values ranging between 1.0% (Northern Indian Lake) and 21.6% (Partridge Breast Lake) (Figure 5.4.6-3). In the offshore habitat (2008 to 2010), mean TOC ranged from 0.8% (lower Churchill River) to 7.7% (Gauer Lake) (Figure 5.4.6-4).

5.4.6.2 Species Composition, Distribution, and Relative Abundance

Partridge Breast Lake

Mean BMI density of benthic grab samples (n=15; 2009) collected in the predominantly wetted nearshore habitat of Partridge Breast Lake was 4,250 individuals/m^2 (Table 5.5.4.2; Figure 5.4.6-5). Non-insects dominated the BMI community in terms of abundance (Figure 5.4.6-6) and mainly consisted of Oligochaeta (aquatic worms); Gastropoda (snails) and Amphipoda (scuds) were also found (Figure 5.4.6-7). Of the insects, Chironomidae (midges) were the dominant taxa; Ephemeroptera (mayflies) were also present in small numbers (Figure 5.4.6-7). Mean BMI density collected in offshore grab samples (n=15; 2009) was 2,005 individuals/m^2 (Table 5.4.6-3; Figure 5.4.6-8). Similar to the nearshore samples, non-insects dominated the BMI community in terms of abundance. Amphipoda was the dominant taxa; though Bivalvia and Oligochaeta were also present (Figures 5.4.6-9 and 5.4.6-10). Of the insects, Chironomidae was dominant; though small abundances of Ephemeroptera and Trichoptera (caddisflies) were also present (Figures 5.4.6-7 and 5.4.6-10).

Total EPT (abundance of Ephemeroptera, Plecoptera, and Trichoptera) comprised < 1% and 1% of the mean total BMI community in the nearshore and offshore habitats, respectively (Tables 5.4.6-2 and 5.4.6-3; Figures 5.4.6-11 and 5.4.6-12). Of the EPT, Ephemeroptera were most abundant in both habitat types (Tables 5.4.6-2 and 5.4.6-3). In the nearshore, Caenidae (*Caenis* sp.; small square-gilled mayfly) was most abundant (Table 5.4.6-2). In the offshore, Ephemeridae (*Hexagenia* sp.; burrowing mayfly) was dominant (Table 5.4.6-3). A small number of Trichoptera were present in the offshore only; Plecoptera did not occur in either. Mean EPT: C (ratio of EPT to Chironomidae) was 0.03 in the nearshore and 0.11 offshore habitat; both indicating a chironomid-dominant benthic community with respect to EPT abundance (Tables 5.4.6-2 and 5.4.6-3).

One out of 11 families (Hill's effective and taxonomic richness) collected in the nearshore contributed to the overall BMI composition (namely Oligochaeta) (Table 5.4.6-2). Mean taxonomic richness in the nearshore was 3 families (Figure 5.4.6-13). In the offshore, 2 of the 6 families were dominant (most notably Amphipoda) (Table 5.4.6-3). Mean taxonomic richness for the offshore habitat was 3 families (Figure 5.4.6-14). Mean Simpson's diversity index was 0.13 in the nearshore and 0.26 in the offshore (Figures 5.4.6-15 to 5.4.6-16). Mean evenness values (Simpson's equitability) were 0.39 in the nearshore and 0.50 in the offshore (Figures 5.4.6-15 to 5.4.6-16).

Northern Indian Lake

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 120 individuals (Table 5.4.6-4; Figure 5.4.6-17). Abundance of insects was greater than the non-insects (Figure 5.4.6-18). Insects were comprised almost entirely of Tipulidae (crane flies) and Chironomidae; oligochaetes, bivalves and a small number of gastropods were most abundant among the non-insects (Table 5.4.6-4; Figure 5.4.6-19). Mean BMI density of benthic grab samples (n=30; 2008 to 2009) collected in the predominantly wetted nearshore habitat of Northern Indian Lake was 3,207 invertebrates/m^2 (Table 5.4.6-2; Figure 5.4.6-5). Insects dominated the BMI community, mainly consisting of Chironomidae and Ephemeroptera (Figures 5.4.6-6 and 5.4.6-7). Non-insects mainly consisted of oligochaetes and amphipods, and small numbers of gastropods and bivalves (Figures 5.4.6-6 and 5.4.6-7). Mean BMI density in offshore grab samples (n=35; 2008 to 2010) was 3,413 individuals/m^2 (Table 5.4.6-3; Figure 5.4.6-8). Insects dominated the offshore BMI community, and consisted mainly of Chironomidae and Ephemeroptera (Figures 5.4.6-9 and 5.4.6-10). Of the non-insects, amphipods and bivalves dominated; a small number of oligochaetes, and gastropods were also present (Figures 5.4.6-9 and 5.4.6-10).

In 2010, mean EPT was < 1% of the total BMI community and Ephemeroptera was solely comprised of small numbers of Caenidae (*Caenis* sp.) (Table 5.4.6-4; Figure 5.4.6-20). Mean EPT abundance comprised 13% and 15% of the mean total BMI density in the predominantly wetted nearshore and offshore, respectively (Tables 5.4.6-2 and 5.4.6-3; Figures 5.4.6-11 and 5.4.6-12). Ephemeroptera were most abundant and Ephemeridae (*Hexagenia* sp.) was the dominant taxon in both near and offshore samples (Tables 5.4.6-2 and 5.4.6-3). Small numbers of Trichoptera were also found in both habitat types; Plecoptera were not found to occur. Chironomid abundance predominated relative to EPT in the intermittently wetted nearshore habitat (0.10; Table 5.4.6-4). Mean EPT:C was 0.32 in the predominantly wetted nearshore, and 0.39 in the offshore, indicating a chironomid-dominated community compared to EPT in both habitats (Tables 5.4.6-2 and 5.4.6-3).

Six of the 23 families identified in the intermittently wetted nearshore habitat dominated (notably, Tipulidae, Oligochaeta, and Pisidiidae) (Table 5.5.4.4; Figure 5.4.6-21). Mean taxonomic richness was 13 families (Figure 5.4.6-21). Four of the 17 families (Hill's effective and taxonomic richness) identified in predominantly wetted nearshore habitat dominated the BMI community, namely Chironomidae, Ephemeroptera (Ephemeridae), Oligochaeta, and Amphipoda (Haustoriidae) (Table 5.4.6-2; Figure 5.4.6-13). Mean taxonomic richness of the nearshore habitat was 6 families (Figure 5.4.6-13). Four of 10 families identified in offshore samples dominated the community, specifically Chironomidae, Amphipoda (Haustoriidae), Ephemeroptera (Ephemeridae), and Bivalvia (Pisidiidae) (Table 5.4.6-3; Figure 5.4.6-14). In the offshore, mean number of taxa was 6 families (Figure 5.4.6-14). Diversity and evenness values in the intermittently wetted nearshore habitat were 0.71 and 0.27, respectively (Table 5.4.6-4; Figure 5.4.6-22). Mean diversity index (Simpson's) was 0.63 in the nearshore and 0.62 in the offshore habitats (Figures 5.4.6-15 and 5.4.6-16). Evenness values were also similar between grab samples in both habitats; 0.46 in the nearshore and 0.42 in the off-shore (Figures 5.4.6-15 and 5.4.6-16).

Billard Lake

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of Billard Lake was 241 invertebrates (Table 5.4.6-4; Figure 5.4.6-17). Overall, non-insects dominated the BMI community and mainly consisted of Oligochaeta and Bivalvia, (Figures 5.4.6-18 and 5.4.6-19). Insects mainly consisted of Ephemeroptera and Chironomidae (Figures 5.4.6-18 and 5.4.6-19). Mean BMI density in offshore grab samples (n=5; 2010) was 2,438 individuals/m^2 (Table 5.4.6-3; Figure 5.4.6-8). Non-insects dominated the BMI community and Bivalvia was the dominant (Figures 5.4.6-9 and 5.4.6-10). Insects mainly comprised of Chironomidae and a few Ephemeroptera and Trichoptera (Figures 5.4.6-9 and 5.4.6-10).

Mean EPT comprised 15% the total BMI community in the intermittently wetted nearshore habitat and < 1% in the offshore (Tables 5.4.6-3 and 5.4.6-4; Figures 5.4.6-20 and 5.4.6-12). Of the EPT, Ephemeroptera was proportionately the most abundant taxon in both habitats with small numbers of Trichoptera were also present (Tables 5.4.6-3 and 5.4.6-4). Ephemeridae (*Hexagenia* sp.) was the dominant mayfly identified in the offshore; Caenidae (*Caenis* sp.) was most abundant in the nearshore samples (Tables 5.4.6-3 and 5.4.6-4). EPT:C was 1.36, indicating an EPT-dominant community in the nearshore (Table 5.4.6-4). EPT:C was 0.02 indicating a chironomid-dominant community relative to EPT abundance in the offshore (Table 5.4.6-3).

Thirty different families (taxonomic richness) were identified in the intermittently wetted nearshore; and 11 families were identified in offshore samples (Figures 5.4.6-21 and 5.4.6-14). Seven families were most abundant in nearshore samples, though Oligochaeta was most numerous (Hill's effective richness; Table 5.4.6-4). Mean taxonomic richness in the nearshore was 18 families; and 6 families in the offshore (Figures 5.4.6-21 and 5.4.6-14). Three families dominated the offshore BMI community, namely, Bivalvia (Pisidiidae), Chironomidae and Oligochaeta (Table 5.4.6-3). Simpson's diversity index for the intermittently wetted nearshore habitat was 0.70, and 0.48 for the offshore (Figures 5.4.6-22 and 5.4.6-16). Evenness values (Simpson's) were 0.16 in the nearshore and 0.30 in the offshore (Figures 5.4.6-22 and 5.4.6-16).

Lower Churchill River at Little Churchill River

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of the lower Churchill River was 666 invertebrates (Table 5.4.6-4; Figure 5.4.6-17). Overall, insects dominated the total community and mainly consisted of Hemiptera (Corixidae), with small numbers of Ephemeroptera and Chironomidae (Table 5.4.6-4). Non-insects mainly consisted of Oligochaeta, Gastropoda, and Bivalvia (Figures 5.4.6-18 and 5.4.6-19). Mean BMI density in offshore grab samples (n=5; 2010) was 1,737 individuals/m^2 (Table 5.4.6-3; Figure 5.4.6-8). Insects dominated the BMI community of which Chironomidae was dominant with Ephemeroptera and Trichoptera also present (Figures 5.4.6-9 and 5.4.6-10). The majority of the non-insect community was comprised of Bivalvia (Pisidiidae), followed by oligochaetes, and a few gastropods and amphipods (Figures 5.4.6-9 and 5.4.6-10).

Total EPT comprised 4% of the nearshore BMI community, and 8% of the offshore community (Tables 5.4.6-4 and 5.4.6-3; Figures 5.4.6-20 and 5.4.6-12). Ephemeroptera were most abundant of the EPT in both habitats, where Siphlonuridae (*Parameletus* sp.; minnow mayfly) was predominant in the nearshore and Ephemeridae (*Hexagenia* sp.) most common in the offshore (Tables 5.4.6-4 and 5.4.6-3). Trichoptera were present in the offshore samples, and very small numbers of Plecoptera (stoneflies) were present in the nearshore. Mean EPT:C was 5.75 in the nearshore and 0.12 in the offshore (Tables 5.4.6-4 and 5.4.6-3). These ratios implied an EPT-dominated community in the nearshore, and a chironomid-dominated community in the offshore (Tables 5.4.6-4 and 5.4.6-3).

Twenty-two families (taxonomic richness) were identified in the nearshore samples; 11 families were identified in the offshore (Tables 5.4.6-4 and 5.4.6-3). Mean taxonomic richness for the nearshore habitat was 13 families; and offshore was 6 families (Figures 5.4.6-21 and 5.4.6-14). Three families were dominant in the nearshore but most abundant were Corixidae (water boatmen; Hemiptera) and Dytiscidae (predaceous diving beetles) (Hill’s effective richness; Table 5.4.6-4). Three families dominated the offshore BMI community namely, Chironomidae, Ephemeroptera (Ephemeridae), and Bivalvia (Pisidiidae) (Table 5.4.6-3). Nearshore Simpson’s diversity and evenness values were 0.52 and 0.15 (Figure 5.4.6-22). Offshore Simpson’s diversity and evenness values were 0.49 and 0.28 (Figure 5.4.6-16).

Hayes River

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of the Hayes River was 440 invertebrates (Table 5.4.6-4; Figure 5.4.6-17). Insects dominated the BMI community, predominantly Corixidae (Hemiptera); Ephemeroptera and Chironomidae were also present (Figures 5.4.6-18 and 5.4.6-19). Of the non-insects, Oligochaeta and Amphipoda were the two main taxa (Figures 5.4.6-18 and 5.4.6-19).

Mean EPT comprised 2% of the intermittently wetted nearshore BMI community (Table 5.4.6-4; Figure 5.4.6-20). Ephemeroptera was proportionately the most abundant taxon in the EPT with Baetiscidae (*Baetisca* sp.) as the dominant mayfly (Table 5.4.6-4). A very small number of Trichoptera were also present. Mean EPT:C was 1.83, indicating the BMI community was marginally dominated by EPT relative to chironomids (Table 5.4.6-4).

Taxonomic richness in the intermittently wetted nearshore habitat was 18 families, with an overall mean of 8 (Table 5.4.6-4; Figure 5.4.6-21). Only two were predominant in the BMI community (most notably: Corixidae) (Table 5.4.6-4). Simpson's diversity and evenness values were 0.20 and 0.12 (Figure 5.4.6-22).

<u>Gauer Lake</u>

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 180 individuals (Table 5.4.6-4; Figure 5.4.6-17). Insects dominated the BMI community and mainly comprised of Corixidae (water boatmen; Hemiptera) (Table 5.4.6-4). Non-insects mainly consisted of Amphipoda and Gastropoda (Figures 5.4.6-18 and 5.4.6-19). Mean BMI density of benthic grab samples (n=27; 2008 to 2009) collected in the predominantly wetted nearshore habitat of Gauer Lake was 5,375 individuals/m^2 (Table 5.4.6-2; Figure 5.4.6-5). Composition of the BMI community was nearly equal between insects and non-insects (51% and 49%, respectively) (Figure 5.4.6-6). Insects were comprised mainly of Chironomidae; and of the non-insects, Oligochaeta and Bivalvia were predominant (Figure 5.4.6-7). Mean BMI density collected in offshore grab samples (n=35; 2008 to 2010) was 3,758 individuals/m^2 (Table 5.4.6-3; Figure 5.4.6-8). Non-insects dominated the community and mainly consisted of Oligochaeta, followed in abundance by Bivalvia (Figures 5.4.6-9 and 5.4.6-10). Within Insecta, Chironomidae was the dominant taxa (Figure 5.4.6-10).

Total EPT for kicknet samples comprised 2% of the BMI community in the intermittently wetted nearshore (Figure 5.4.6-20). Mayflies were dominant EPT and Heptageniidae (*Stenomena* sp.) was most abundant (Table 5.4.6-4). A small number of Trichoptera was also present. In grab samples, mean EPT comprised 2% and 1% of the BMI community in the predominantly wetted nearshore and offshore habitats, respectively (Tables 5.4.6-2 and 5.4.6-3; Figures 5.4.6-11 and 5.4.6-12). Ephemeroptera were the most abundant EPT taxa the nearshore; numbers of Ephemeroptera and Trichoptera were similar the offshore habitat (Tables 5.4.6-2 and 5.4.6-3). Ephemeridae (*Hexagenia* sp.) was the dominant mayfly in both habitats; while singly represented in the offshore samples, *Ephemera* sp. (Ephemeridae) was also found in nearshore samples (Tables 5.4.6-2 and 5.4.6-3). Results from the nearshore kicknet samples indicated that the EPT were dominant (2.89) compared to chironomid abundance (Table 5.4.6-4). Mean EPT: C was 0.13 and 0.02 in the predominantly wetted nearshore and offshore habitats, respectively; indicating that both the nearshore and offshore communities were chironomid-dominated with respect to abundance of EPT (Tables 5.4.6-2 and 5.4.6-3).

Three out of the 25 families identified from kicknet samples dominated the intermittently wetted nearshore, most notably Corixidae (Table 5.4.6-4). Mean taxonomic richness was 13 families (Figure 5.4.6-21). Total taxonomic richness values were similar in the predominantly wetted nearshore (15 families) and offshore (12 families) habitats of Gauer Lake; as were the mean taxa richness values (Tables 5.4.6-2 and 5.4.6-3; Figures 5.4.6-13 and 5.4.6-14). Three families identified in the predominantly wetted nearshore contributed to the overall taxonomic composition; 4 families identified in offshore samples dominated (Tables 5.4.6-2 and 5.4.6-3). In both habitats, the dominant taxa were Chironomidae, Oligochaeta, and Bivalvia (Pisidiidae) (Tables 5.4.6-2 and 5.4.6-3). Diversity and evenness values of the intermittently wetted nearshore habitat were 0.29 and 0.11 respectively (Figure 5.4.6-22). Simpson’s diversity index and evenness values were similar in near and offshore grab samples (Figures 5.4.6-16 and 5.4.6-16).

5.4.6.3 Spatial Comparisons

Differences in BMI metrics for the intermittently wetted nearshore habitats of Northern Indian Lake (on-system), lower Churchill River (on-system), Hayes River (off-system), and Gauer Lake (off-system) lakes were detected. While the statistical analysis only incorporated one year of kicknet data (2010), it appears that all abundance metrics varied considerably between sites (i.e., total numbers of macroinvertebrates, non-insects, oligochaetes, amphipods, bivalves, gastropods, insects, chironomids, trichopterans, EPT, and EPT:C) (Figures 5.4.6-17 to 5.4.6-22). All sites were statistically similar with respect to taxonomic richness. For several of these measures trends were difficult to summarize, however in general Northern and Gauer lakes are more similar to one another; and the two river sites were more comparable. In many instances, the lower Churchill River site appears to be significantly greater than other sites with respect to abundance metrics. For all other diversity metrics, Northern Indian Lake was significantly different (greater) from Hayes River and different from Gauer Lake for Shannon’s and Hill’s evenness values. Statistical differences will be re-assessed in the future when additional data are acquired for these waterbodies.

Differences in BMI metrics for the predominantly wetted nearshore habitats of Northern Indian Lake (on-system) and Gauer Lake (off-system) lakes were detected. While the statistical analysis only incorporated two years of benthic grab data (2009 and 2010), it appears that abundance measures of non-insects, oligochaetes, amphipods, bivalves, ephemeropterans, trichopterans, EPT and EPT:C varied between sites (Figures 5.4.6-5 to 5.4.6-7, 5.4.6-11, 5.4.6-13, 5.4.6-15). Except for amphipods and the EPT-related abundance measures, these abundances were significantly lower in Northern Indian Lake compared to Gauer Lake. Statistical differences will be re-assessed in the future when additional data are acquired for these waterbodies.

Differences in the offshore BMI abundance and richness metrics of Northern Indian Lake (on-system), lower Churchill River (on-system), and Gauer Lake (off-system) were also detected. While the statistical analysis only incorporated two years of data for Northern Indian and Gauer lakes (2009 and 2010) and one year of data for lower Churchill River (2010), it appears that Gauer Lake was significantly different from one or both of the other sites with respect to the majority of the abundance and diversity metrics (i.e., non-insects, oligochaetes, bivalves, gastropods, ephemeropterans, EPT, EPT:C, taxa richness, Simpson's diversity index (Figures 5.4.6-8 to 5.4.6-10, 5.4.6-12, 5.4.6-14, 5.4.6-16). Gauer Lake had a significantly greater number of non-insect groups such as oligochaetes, gastropods, and bivalves than both other sites. Abundance of insects, EPT-related measures, and taxa richness were significantly lower in Gauer Lake compared to Northern Indian Lake, and lower Churchill River in some cases. Statistical differences will be re-assessed in the future when additional data are acquired for these waterbodies.

Future evaluations of spatial variability or trends will be undertaken when additional data are acquired for the region.

5.4.6.4 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 predominantly wetted nearshore habitat of Northern Indian Lake were detected. While the statistical analysis only incorporated two years of data (2009 and 2010), it appears that significant differences between years occurs for all measures except abundances of amphipods, bivalves, gastropods and Simpson's evenness index (Figures 5.4.6-23 to 5.4.6-28). For the majority of these measures, 2009 appears to be significantly lower than 2008. Temporal differences in BMI abundance and richness metrics for the offshore habitat of Northern Indian Lake were also detected. Statistical analysis incorporated three years of data (2008 to 2010) and it appears that differences between years occurs for all measures except abundances of oligochaetes, gastropods, EPT:C, and taxonomic richness (Figures 5.4.6-29 to 5.4.6-34). For most metrics, 2009 and/or 2010 were significantly less than 2008.

Temporal differences in BMI abundance and richness metrics for the predominantly wetted nearshore habitat of Gauer Lake were detected. While the statistical analysis only incorporated two years of data (2009 and 2010), it appears that differences between years occurs for all measures except abundances of trichoperans, EPT:C, Simpson's and Shannon's indices, and Hill's effective richness (Figures 5.4.6-35 to 5.4.6-40). For the majority of the measures, 2009 was significantly less than 2008. Temporal differences in BMI abundance and richness metrics for the offshore habitat of Gauer Lake were detected. Statistical analysis incorporated three years of data (2008 to 2010) and it appears that all of the measures were significantly different, except for abundances of amphipods, bivalves, insects, chironomids, and trichopterans (Figures 5.4.6-41 to 5.4.6-46). All sites were statistically different with respect to taxonomic richness. For several measures trends were difficult to summarize, however 2009 appeared to be significantly less than 2008 with respect to abundances of macroinvertebrates, non-insects, oligochaetes, gastropods, and Shannon's evenness value.

Table 5.4.6-1. Habitat and physical characteristics recorded at benthic macroinvertebrate sites in the Lower Churchill 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)			(%)	
Northern Indian Lake (2008)	Nearshore	15	2.6	2.1	3.0	--	--	--	--	--	--	--
	Offshore	15	5.4	5.0	5.7	--	--	--	--	--	--	--
Gauer Lake (2008)	Nearshore	15	4.7	4.0	5.2	--	--	--	--	--	--	--
	Offshore	15	14.8	9.4	20.6	--	--	--	--	--	--	--

Table 5.4.6-1. 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)			(%)	
Partridge Breast Lake (2009)	Nearshore	15	2.8	1.1	3.6	--	1.51	11.0	--	shrubs, mixed forest	0	--
	Offshore	15	12.7	9.6	15.2	--	1.23	13.0	--	--	0	--
Northern Indian Lake (2009)	Nearshore	15	4.2	3.3	4.6	--	1.54	14.5	--	coniferous, shrubs	0	--
	Offshore	15	6.9	6.6	7.4	--	1.33	14.5	--	--	0	--
Gauer Lake (2009)	Nearshore	12	3.7	1.3	4.8	--	2.42	16.0	--	mixed forest	0	--
	Offshore	15	15.2	9.9	20.1	--	2.21	16.0	--	--	0	--

Table 5.4.6-1. 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)			(%)	
Northern Indian Lake (2010)	Nearshore	5	0.3	0.3	0.4	0.00	0.34	14.0	silt, organic matter	grass, shrubs, deciduous	0-24	0
	Offshore	5	3.5	3.4	3.6	0.00	0.9	14.0	clay	--	--	0
Billard Lake (2010)	Nearshore	5	0.5	0.4	0.6	0.02	0.53	9.0	cobble, gravel, sand	mixed forest	0-24	0
	Offshore	5	8.2	7.6	9.1	0.07	1.23	13.0	clay, organic matter	--	--	0
Lower Churchill River (2010)	Nearshore	5	1.0	1.0	1.0	0.00	0.72	--	boulder	grass, shrubs, mixed forest	0	algal balls
	Offshore	5	6.4	5.2	7.4	0.49	0.65	12.0	sand	--	--	0
Gauer Lake (2010)	Nearshore	5	0.5	0.4	0.7	0.00	0.60	14.0	boulder	shrubs, coniferous	0-24	attached, floating at one site
	Offshore	5	6.2	6.0	6.6	0.01	2	13.5	clay, silt	--	--	0

Table 5.4.6-2. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate nearshore grab samples collected in the Lower Churchill River Region for CAMPP, 2008 to 2009.

Waterbody and Habitat	Partridge Breast Lake Nearshore (2009)							Northern Indian Lake Nearshore (2008 to 2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	15	--	--	--	--	--	--	30	--	--	--	--	--	--
Water Depth (m)	--	2.8	0.69	0.18	2.8	1.1	3.6	--	3.4	0.85	0.16	3.2	2.1	4.6
Abundance (no. per m^2)														
Total Invertebrates	--	4250	2388.5	616.7	4545	433	9089	--	3207	3113.9	568.5	1666	216	10604
Non-Insecta	96	4060	2316.1	598.0	4415	346	8873	12	398	305.9	55.9	303	43	1212
Oligochaeta	94	3976	2257.2	582.8	4328	346	8527	6	188	224.3	40.9	130	0	952
Amphipoda	0	6	15.2	3.9	0	0	43	4	133	134.5	24.5	108	0	519
Bivalvia	0	0	0.0	0.0	0	0	0	1	30	51.0	9.3	0	0	216
Gastropoda	1	23	42.9	11.1	0	0	130	1	32	48.1	8.8	0	0	173
Insecta	4	190	147.1	38.0	173	0	476	88	2809	2870.2	524.0	1363	87	9392
Chironomidae	4	170	146.7	37.9	130	0	476	72	2303	2525.8	461.2	801	43	8354
Ephemeroptera	0	3	11.2	2.9	0	0	43	11	342	299.3	54.6	216	43	1212
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	2	66	81.8	14.9	43	0	260
EPT	0	3	11.2	2.9	0	0	43	13	408	351.6	64.2	260	43	1428
EPT to Chironomidae Ratio	--	0.03	0.129	0.033	0.00	0.00	0.50	--	0.32	0.264	0.048	0.22	0.06	1.00
Genus analysis of Ephemeroptera	Caenide: *Caenis*	--	--	--	--	--	--	Ephemeridae: *Hexagenia*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	11	3	1.3	0.3	3	1	6	17	6	1.7	0.3	7	3	10
Simpson's Diversity Index	--	0.13	0.103	0.027	0.12	0.00	0.34		0.63	0.173	0.032	0.69	0.34	0.85
Evenness (Simpson's Equitability)	--	0.39	0.221	0.057	0.35	0.15	1.00		0.46	0.238	0.043	0.52	0.14	0.83
Shannon-Weaver Index	--	0.31	0.232	0.060	0.29	0.00	0.84		1.39	0.381	0.070	1.40	0.80	2.04
Evenness (Shannon’s Equitability)	--	0.23	0.136	0.035	0.20	0.00	0.58		0.70	0.202	0.037	0.78	0.35	0.95
Hill's Effective Richness	--	1	0.4	0.1	1	1	2		4	1.6	0.3	4	2	8
Evenness (Hill's)	--	0.44	0.210	0.054	0.39	0.21	1.00		0.58	0.236	0.043	0.67	0.22	0.91

Table 5.4.6-2. continued.

Waterbody and Habitat	Gauer Lake Nearshore (2008 to 2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	27	--	--	--	--	--	--
Water Depth (m)	--	4.3	0.88	0.17	4.5	1.3	5.2
Abundance (no. per m^2)							
Total Invertebrates	--	5375	4746.9	913.5	6839	43	12119
Non-Insecta	49	2624	2510.6	483.2	2251	0	7055
Oligochaeta	29	1550	1546.2	297.6	736	0	4155
Amphipoda	0	3	11.6	2.2	0	0	43
Bivalvia	18	994	1019.4	196.2	606	0	2986
Gastropoda	1	45	59.4	11.4	43	0	260
Insecta	51	2749	2476.8	476.7	3073	0	7488
Chironomidae	47	2547	2366.7	455.5	2900	0	7401
Ephemeroptera	2	99	98.9	19.0	87	0	433
Plecoptera	0	0	0.0	0.0	0	0	0
Trichoptera	0	14	31.8	6.1	0	0	130
EPT	2	114	106.8	20.6	87	0	433
EPT to Chironomidae Ratio	--	0.13	0.264	0.051	0.03	0.00	1.00
Genus analysis of Ephemeroptera	Ephemeridae: *Hexagenia*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	15	6	2.6	0.5	7	1	10
Simpson's Diversity Index	--	0.61	0.157	0.030	0.65	0.00	0.80
Evenness (Simpson's Equitability)	--	0.53	0.596	0.115	0.31	0.09	2.04
Shannon-Weaver Index	--	1.18	0.383	0.074	1.23	0.00	1.83
Evenness (Shannon’s Equitability)	--	0.49	0.289	0.056	0.53	0.00	1.46
Hill's Effective Richness	--	3	1.2	0.2	3	1	6
Evenness (Hill's)	--	0.58	0.573	0.110	0.38	0.09	2.00

Table 5.4.6-3. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate offshore grab samples collected in the Lower Churchill River Region for CAMPP, 2008 to 2010.

Waterbody and Habitat	Partridge Breast Lake Offshore (2009)							Northern Indian Lake Offshore (2008 to 2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	15	--	--	--	--	--	--	35	--	--	--	--	--	--
Water Depth (m)	--	12.7	1.80	0.46	12.9	9.6	15.2	--	5.8	1.20	0.20	5.6	3.4	7.4
Abundance (no. per m^2)														
Total Invertebrates	--	2005	1271.4	328.3	2164	87	4934	--	3413	1916.5	323.9	2496	130	6839
Non-Insecta	91	1829	1217.3	314.3	1991	87	4631	31	1058	529.7	89.5	1169	43	1904
Oligochaeta	1	23	42.9	11.1	0	0	130	1	51	65.4	11.1	43	0	303
Amphipoda	83	1665	1068.2	275.8	1775	87	3895	18	615	516.0	87.2	476	0	1515
Bivalvia	7	141	170.4	44.0	87	0	606	11	371	347.5	58.7	260	43	1515
Gastropoda	0	0	0.0	0.0	0	0	0	1	19	31.7	5.4	0	0	87
Insecta	9	176	242.9	62.7	87	0	866	69	2354	2013.4	340.3	1183	87	6103
Chironomidae	8	156	211.3	54.6	43	0	736	52	1781	1582.5	267.5	866	43	4891
Ephemeroptera	1	14	35.3	9.1	0	0	130	15	507	470.1	79.5	346	0	1861
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	0	6	15.2	3.9	0	0	43	1	21	38.2	6.5	0	0	130
EPT	1	20	36.1	9.3	0	0	130	15	528	494.6	83.6	346	0	1904
EPT to Chironomidae Ratio	--	0.11	0.258	0.067	0.00	0.00	1.00	--	0.39	0.288	0.049	0.30	0.00	1.17
Genus analysis of Ephemeroptera	Ephemeridae: *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)	6	3	1.1	0.3	3	1	5	10	6	1.2	0.2	6	3	8
Simpson's Diversity Index	--	0.26	0.190	0.049	0.19	0.00	0.62	--	0.62	0.106	0.018	0.67	0.41	0.78
Evenness (Simpson's Equitability)	--	0.50	0.227	0.058	0.41	0.26	1.00	--	0.42	0.148	0.025	0.37	0.25	1.01
Shannon-Weaver Index	--	0.53	0.377	0.097	0.40	0.00	1.20	--	1.30	0.257	0.043	1.34	0.83	1.70
Evenness (Shannon's Equitability)	--	0.39	0.219	0.057	0.43	0.00	0.74	--	0.68	0.121	0.020	0.68	0.46	1.00
Hill's Effective Richness	--	2	0.7	0.2	1	1	3	--	4	1.0	0.2	4	2	5
Evenness (Hill's)	--	0.58	0.198	0.051	0.53	0.36	1.00	--	0.55	0.137	0.023	0.49	0.35	1.00

Table 5.4.6-3. continued.

Waterbody and Habitat	Billard Lake Offshore (2010)							Lower Churchill River at Little Churchill River Offshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--	5	--	--	--	--	--	--
Water Depth (m)	--	8.2	0.65	0.29	7.9	7.6	9.1	--	6.4	0.79	0.35	6.4	5.2	7.4
Abundance (no. per m^2)														
Total Invertebrates	--	2438	1179.2	527.4	2337	678	3621	--	1737	884.8	395.7	1645	693	2770
Non-Insecta	76	1855	860.4	384.8	1760	606	2943	8	136	60.0	26.8	159	43	202
Oligochaeta	7	173	180.5	80.7	130	0	433	2	32	21.4	9.6	29	0	58
Amphipoda	1	17	31.3	14.0	0	0	72	0	3	6.5	2.9	0	0	14
Bivalvia	64	1573	742.3	332.0	1515	606	2655	5	95	41.6	18.6	87	43	159
Gastropoda	4	87	61.2	27.4	87	0	144	0	6	12.9	5.8	0	0	29
Insecta	24	583	396.1	177.1	649	72	1140	92	1601	869.5	388.9	1486	649	2611
Chironomidae	22	542	381.1	170.4	577	72	1111	83	1437	826.6	369.7	1327	519	2395
Ephemeroptera	0	9	7.9	3.5	14	0	14	7	121	39.0	17.4	130	58	159
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	0	3	6.5	2.9	0	0	14	1	12	18.8	8.4	0	0	43
EPT	0	12	12.1	5.4	14	0	29	8	133	35.9	16.1	144	72	159
EPT to Chironomidae Ratio	--	0.02	0.023	0.010	0.02	0.00	0.05	--	0.12	0.076	0.034	0.09	0.07	0.25
Genus analysis of Ephemeroptera	Ephemeridae: *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)	11	6	2.8	1.2	7	2	9	11	6	2.6	1.2	6	3	10
Simpson's Diversity Index	--	0.48	0.175	0.078	0.53	0.19	0.64	--	0.49	0.122	0.054	0.52	0.29	0.63
Evenness (Simpson's Equitability)	--	0.30	0.108	0.049	0.30	0.18	0.41	--	0.28	0.136	0.061	0.27	0.12	0.49
Shannon-Weaver Index	--	1.02	0.366	0.164	1.18	0.39	1.28	--	1.08	0.234	0.105	1.09	0.80	1.40
Evenness (Shannon's Equitability)	--	0.51	0.120	0.054	0.49	0.36	0.66	--	0.54	0.134	0.060	0.54	0.32	0.66
Hill's Effective Richness	--	3	0.9	0.4	3	1	4	--	3	0.7	0.3	3	2	4
Evenness (Hill's)	--	0.40	0.110	0.049	0.43	0.28	0.51	--	0.40	0.159	0.071	0.37	0.19	0.63

Table 5.4.6-3. continued.

Waterbody and Habitat	Gauer Lake Offshore (2008 to 2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	35	--	--	--	--	--	--
Water Depth (m)	--	13.7	4.14	0.70	14.0	6.0	20.6
Abundance (no. per m²)							
Total Invertebrates	--	3758	2367.8	400.2	3246	822	12292
Non-Insecta	62	2318	1982.5	335.1	1991	216	9998
Oligochaeta	42	1571	1837.8	310.6	1068	216	9436
Amphipoda	0	1	7.3	1.2	0	0	43
Bivalvia	17	657	409.3	69.2	693	0	1948
Gastropoda	2	67	65.2	11.0	43	0	173
Insecta	38	1440	644.8	109.0	1428	433	2857
Chironomidae	37	1390	639.1	108.0	1385	390	2770
Ephemeroptera	0	9	17.8	3.0	0	0	43
Plecoptera	0	0	0.0	0.0	0	0	0
Trichoptera	0	11	24.3	4.1	0	0	87
EPT	1	21	32.9	5.6	0	0	130
EPT to Chironomidae Ratio	--	0.02	0.026	0.004	0.00	0.00	0.09
Genus analysis of Ephemeroptera	Ephemeridae: *Hexagenia*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	12	5	1.7	0.3	5	2	10
Simpson's Diversity Index	--	0.65	0.111	0.019	0.70	0.33	0.77
Evenness (Simpson's Equitability)	--	0.52	0.127	0.021	0.49	0.26	0.83
Shannon-Weaver Index	--	1.29	0.260	0.044	1.35	0.51	1.65
Evenness (Shannon’s Equitability)	--	0.72	0.095	0.016	0.72	0.48	0.92
Hill's Effective Richness	--	4	0.8	0.1	4	2	5
Evenness (Hill's)	--	0.62	0.123	0.021	0.61	0.34	0.88

Table 5.4.6-4. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate nearshore kicknet samples collected in the Lower Churchill River Region for CAMPP, 2010.

Waterbody and Habitat	Northern Indian Lake Nearshore (2010)							Billard Lake 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)	--	0.3	0.07	0.03	0.3	0.3	0.4	--	0.5	0.09	0.04	0.5	0.4	0.6
Abundance (no. per kicknet)														
Total Invertebrates	--	120	92.1	41.2	81	28	249	--	241	93.1	41.6	198	142	359
Non-Insecta	44	53	60.8	27.2	33	8	160	61	147	72.9	32.6	130	79	266
Oligochaeta	29	35	61.5	27.5	10	2	145	50	120	75.4	33.7	96	65	249
Amphipoda	0	1	0.5	0.2	0	0	1	1	1	1.7	0.8	1	0	4
Bivalvia	12	15	9.0	4.0	14	3	27	9	23	21.5	9.6	14	6	57
Gastropoda	2	2	1.4	0.6	2	0	4	1	3	1.6	0.7	2	1	5
Insecta	56	67	53.5	23.9	52	20	150	39	94	39.4	17.6	87	63	161
Chironomidae	3	4	1.9	0.8	4	1	5	11	26	11.1	5.0	26	14	41
Ephemeroptera	0	0	0.1	0.1	0	0	0	14	34	28.5	12.7	24	12	83
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	0	1	0.9	0.4	1	0	2
EPT	0	0	0.1	0.1	0	0	0	15	35	28.9	12.9	24	14	85
EPT to Chironomidae Ratio	--	0.10	0.224	0.100	0.00	0.00	0.50	--	1.36	0.729	0.326	1.00	0.58	2.21
Genus analysis of Ephemeroptera	Caenidae: *Caenis*	--	--	--	--	--	--	Caenidae: *Caenis*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	23	13	0.9	0.4	14	12	14	30	18	1.5	0.7	18	17	21
Simpson's Diversity Index	--	0.71	0.141	0.063	0.76	0.52	0.84	--	0.70	0.140	0.063	0.71	0.50	0.83
Evenness (Simpson's Equitability)	--	0.27	0.135	0.060	0.30	0.12	0.39	--	0.16	0.063	0.028	0.16	0.08	0.25
Shannon-Weaver Index	--	1.68	0.366	0.164	1.74	1.27	2.06	--	1.84	0.396	0.177	1.79	1.27	2.26
Evenness (Shannon's Equitability)	--	0.61	0.150	0.067	0.66	0.44	0.74	--	0.58	0.113	0.051	0.58	0.40	0.68
Hill's Effective Richness	--	6	2.0	0.9	6	4	8	--	7	2.5	1.1	6	4	10
Evenness (Hill's)	--	0.36	0.148	0.066	0.41	0.20	0.49	--	0.28	0.082	0.037	0.27	0.15	0.36

Table 5.4.6-4. Conitinued.

Waterbody and Habitat	Lower Churchill River at Little Churchill River 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	0.0	0.0	1.0	1.0	1.0	--	1.0	0.00	0.00	1.0	1.0	1.0
Abundance (no. per kicknet)														
Total Invertebrates	--	666	253.0	113.1	571	351	987	--	440	313.8	140.3	419	62	902
Non-Insecta	3	18	8.3	3.7	16	11	32	1	6	2.7	1.2	5	4	11
Oligochaeta	2	13	2.4	1.1	13	9	15	1	5	3.8	1.7	4	0	11
Amphipoda	0	0	0.3	0.1	0	0	1	0	1	1.2	0.5	0	0	3
Bivalvia	0	2	4.7	2.1	0	0	11	0	0	0.1	0.1	0	0	0
Gastropoda	0	3	3.0	1.4	3	0	8	0	0	0.0	0.0	0	0	0
Insecta	97	648	248.8	111.3	557	332	955	99	434	312.9	139.9	413	58	897
Chironomidae	1	10	12.6	5.6	5	1	32	1	6	2.5	1.1	6	4	9
Ephemeroptera	4	29	22.0	9.9	19	11	61	2	9	3.8	1.7	9	5	15
Plecoptera	0	0	0.3	0.1	0	0	1	0	0	0.0	0.0	0	0	0
Trichoptera	0	0	0.0	0.0	0	0	0	0	0	0.3	0.1	0	0	1
EPT	4	29	21.9	9.8	19	11	61	2	10	4.0	1.8	9	5	16
EPT to Chironomidae Ratio	--	5.75	5.250	2.348	2.86	1.92	14.00	--	1.83	1.421	0.636	1.21	1.08	4.36
Genus analysis of Ephemeroptera	Siphlonuridae: *Parameletus*	--	--	--	--	--	--	Baetiscidae: *Baetisca*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	22	13	3.7	1.7	13	8	18	18	8	2.9	1.3	8	6	13
Simpson's Diversity Index	--	0.52	0.035	0.015	0.51	0.47	0.56	--	0.20	0.241	0.108	0.12	0.05	0.62
Evenness (Simpson's Equitability)	--	0.15	0.033	0.015	0.15	0.10	0.19	--	0.12	0.027	0.012	0.12	0.08	0.15
Shannon-Weaver Index	--	1.16	0.170	0.076	1.10	0.94	1.33	--	0.56	0.633	0.283	0.35	0.16	1.68
Evenness (Shannon's Equitability)	--	0.43	0.026	0.011	0.43	0.41	0.47	--	0.20	0.191	0.086	0.15	0.08	0.54
Hill's Effective Richness	--	3	0.5	0.2	3	3	4	--	2	1.8	0.8	1	1	5
Evenness (Hill's)	--	0.22	0.034	0.015	0.22	0.17	0.25	--	0.16	0.053	0.024	0.15	0.11	0.24

Table 5.4.6-4. Conitinued.

Waterbody and Habitat	Gauer Lake Nearshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--
Water Depth (m)	--	0.5	0.11	0.05	0.5	0.4	0.7
Abundance (no. per kicknet)							
Total Invertebrates	--	180	115	51.2	132.3	51	330
Non-Insecta	6	11	6	2.7	11.3	4	19
Oligochaeta	0	0	0	0.1	0.3	0	1
Amphipoda	3	5	5	2.1	2.7	1	10
Bivalvia	0	1	1	0.4	0.7	0	2
Gastropoda	2	4	3	1.3	2.7	2	9
Insecta	94	169	117	52.4	117.3	32	319
Chironomidae	1	1	1	0.5	1.7	0	3
Ephemeroptera	2	4	3	1.5	2.7	1	9
Plecoptera	0	0	0	0.0	0.0	0	0
Trichoptera	0	1	1	0.4	0.7	0	2
EPT	2	4	3	1.5	4.7	1	10
EPT to Chironomidae Ratio	--	2.89	2.917	1.304	2.33	0.00	7.50
Genus analysis of Ephemeroptera	Heptageniidae: *Stenomena*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	25	13	4.0	1.8	11	9	18
Simpson's Diversity Index	--	0.29	0.277	0.124	0.13	0.10	0.73
Evenness (Simpson's Equitability)	--	0.11	0.047	0.021	0.09	0.09	0.19
Shannon-Weaver Index	--	0.80	0.699	0.312	0.40	0.30	1.90
Evenness (Shannon’s Equitability)	--	0.28	0.226	0.101	0.16	0.12	0.65
Hill's Effective Richness	--	3	2.3	1.0	1	1	7
Evenness (Hill's)	--	0.17	0.103	0.046	0.13	0.11	0.35

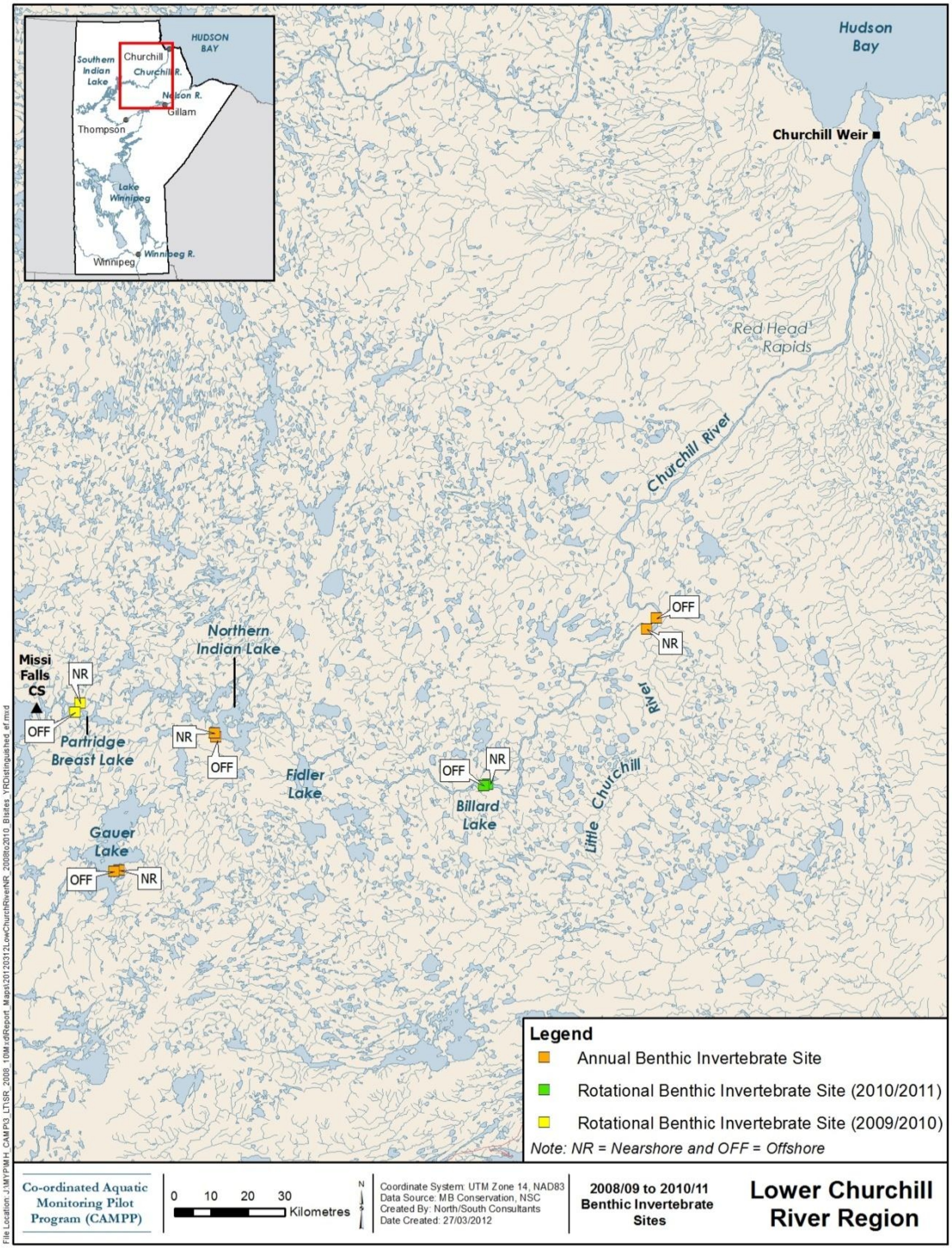
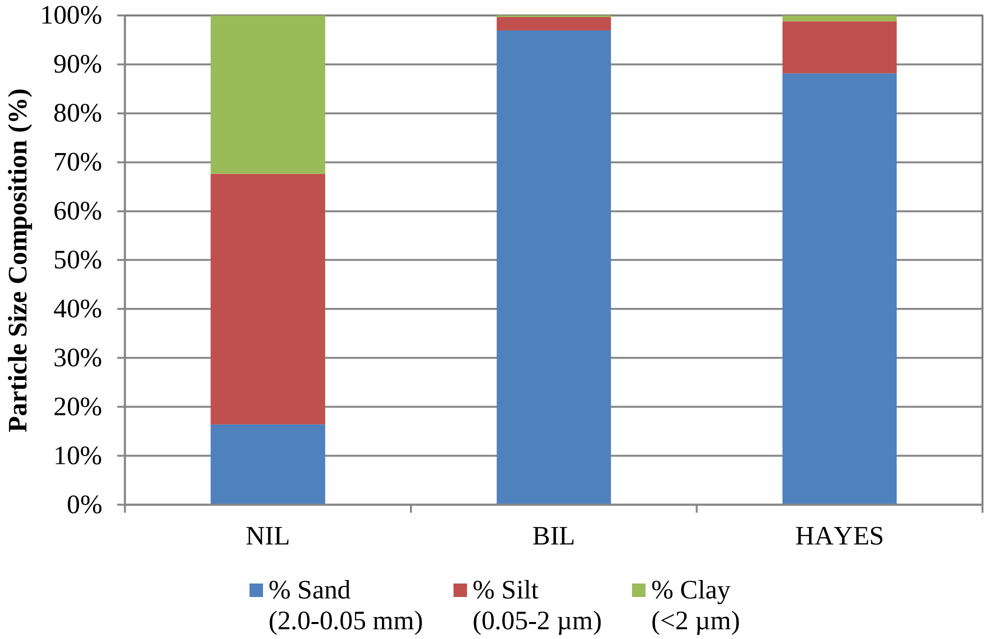


Figure 5.4.6-1. Benthic invertebrate sampling sites located in CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2010.



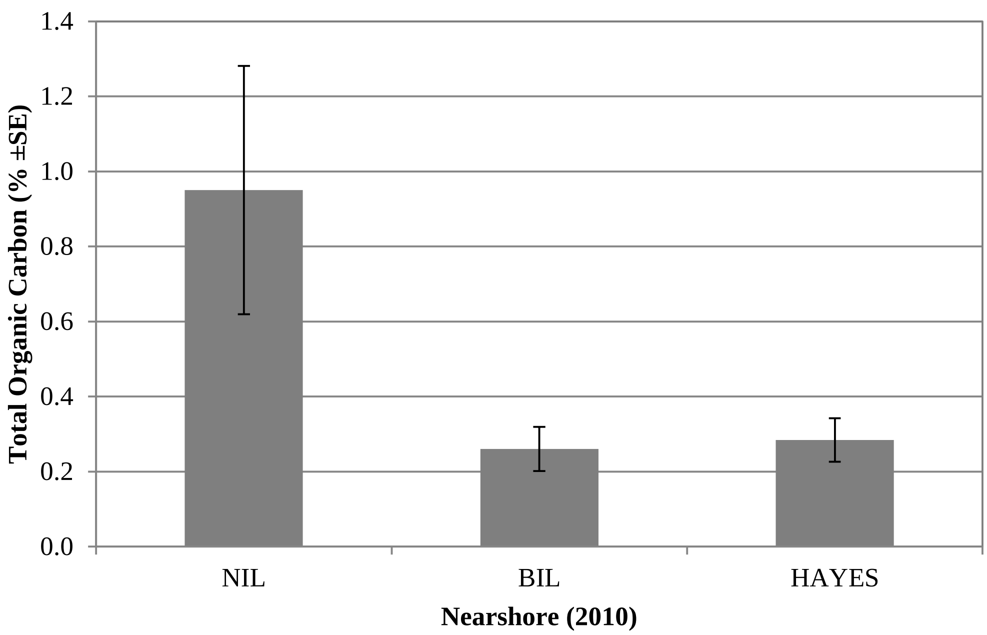


Figure 5.4.6-2. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with nearshore invertebrate kicknet sampling in the Lower Churchill River Region for CAMPP, 2010.

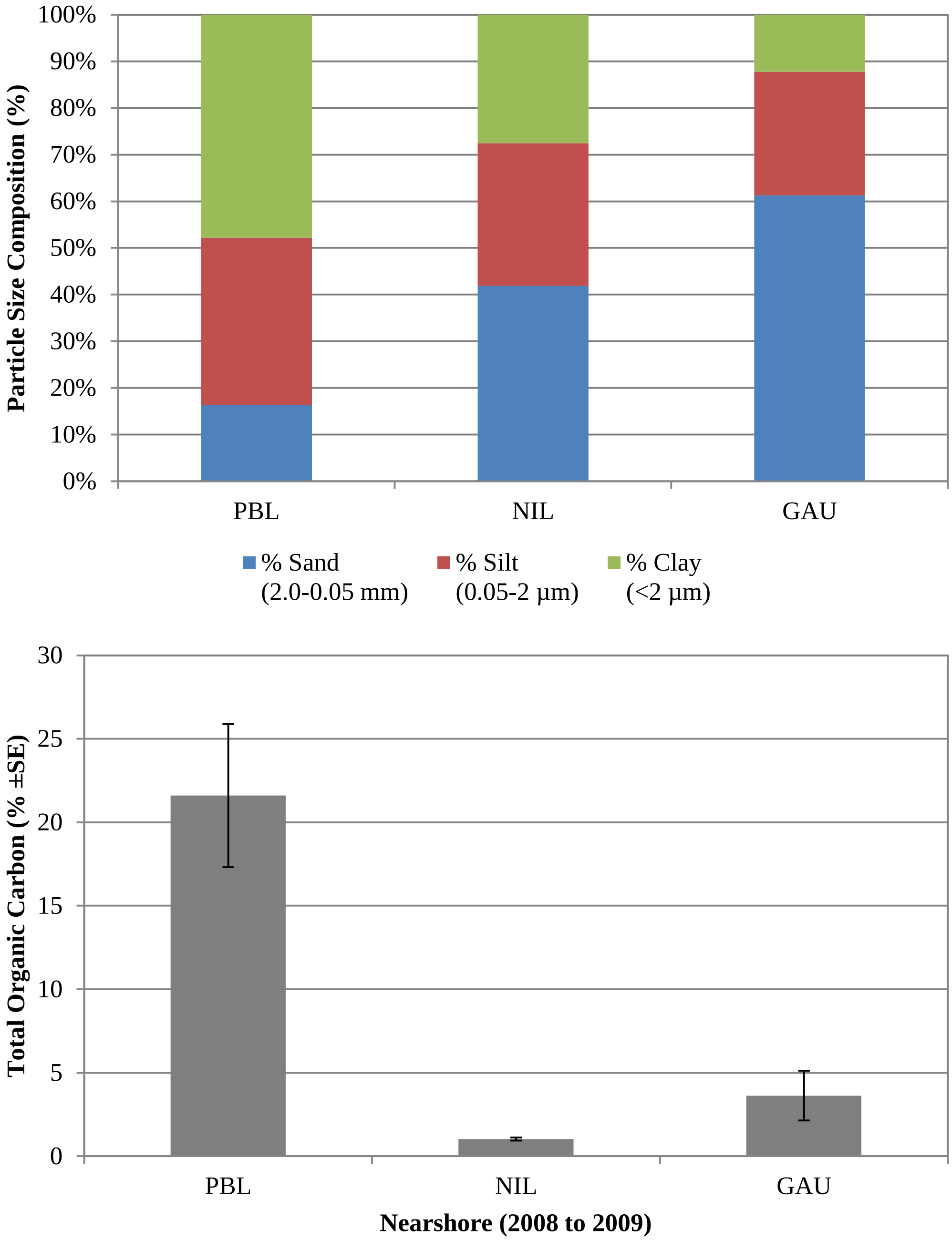


Figure 5.4.6-3. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with nearshore invertebrate grab sampling in the Lower Churchill River Region for CAMPP, 2008 to 2009.

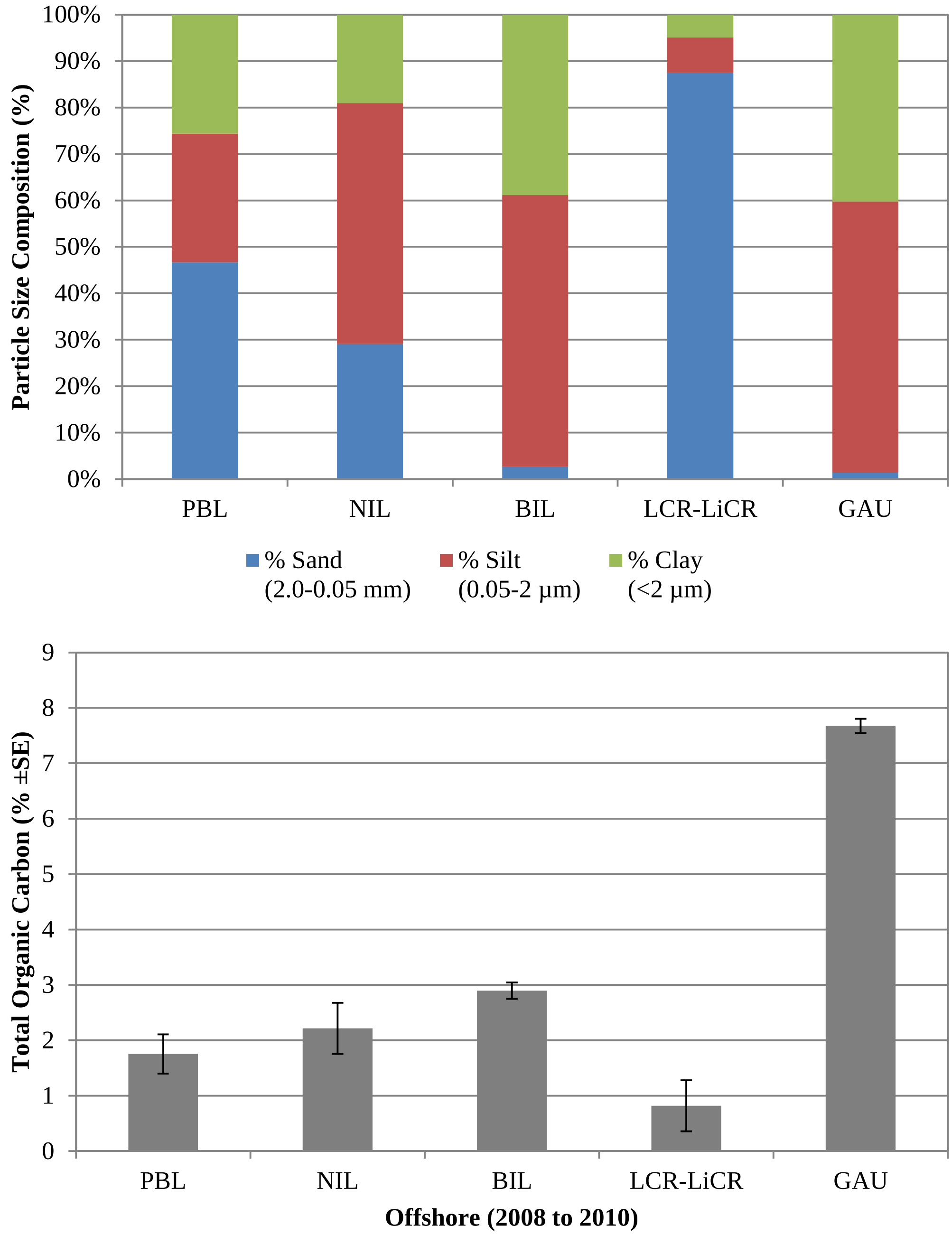


Figure 5.4.6-4. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with offshore invertebrate grab sampling in the Lower Churchill River Region for CAMPP, 2008 to 2010.

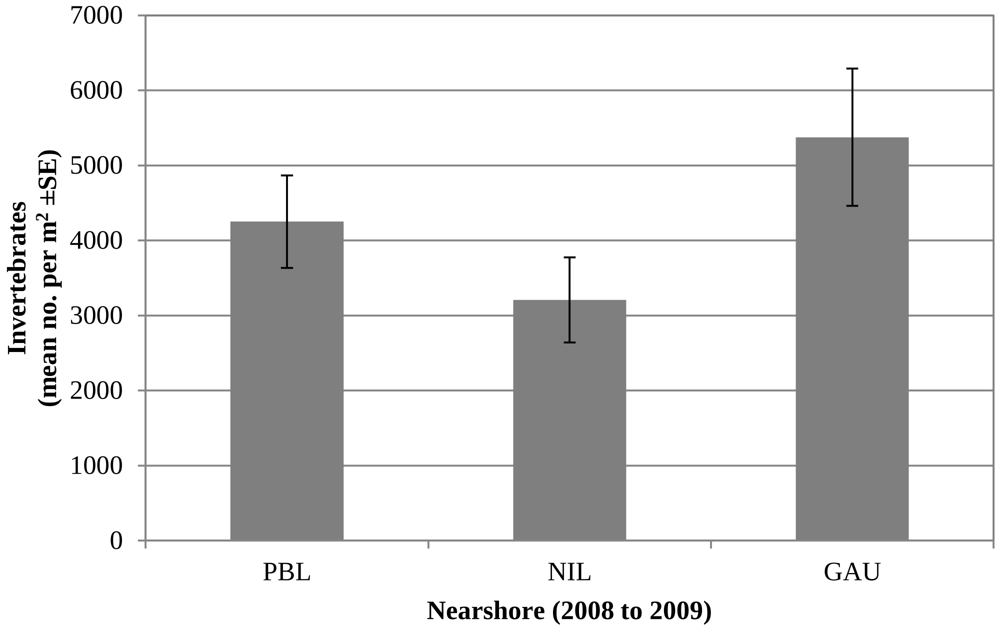


Figure 5.4.6-5. Abundances of benthic invertebrates (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2009.

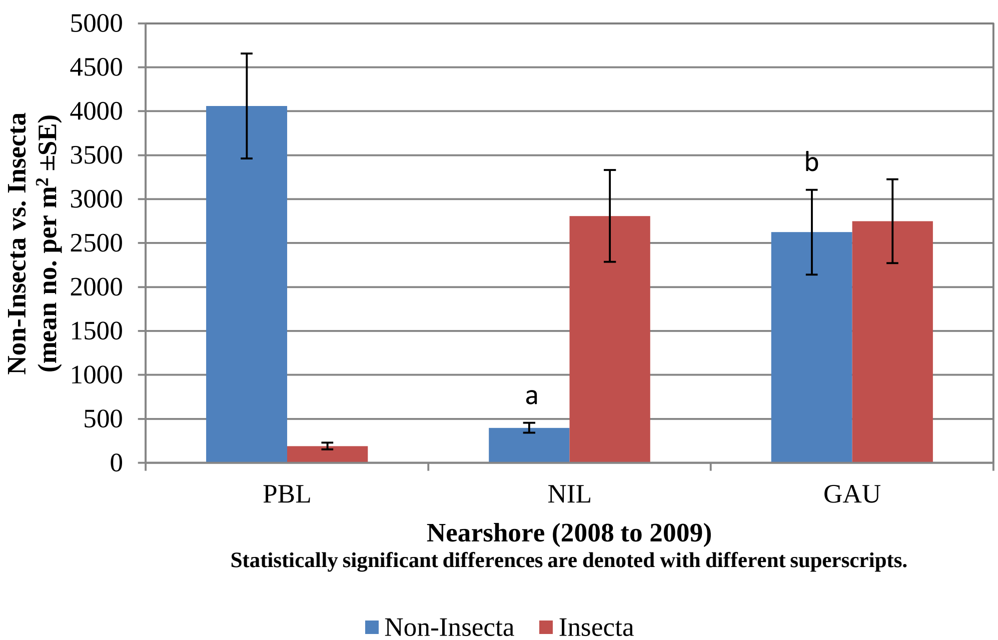


Figure 5.4.6-6. Abundances of non-insects and insects (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2009.

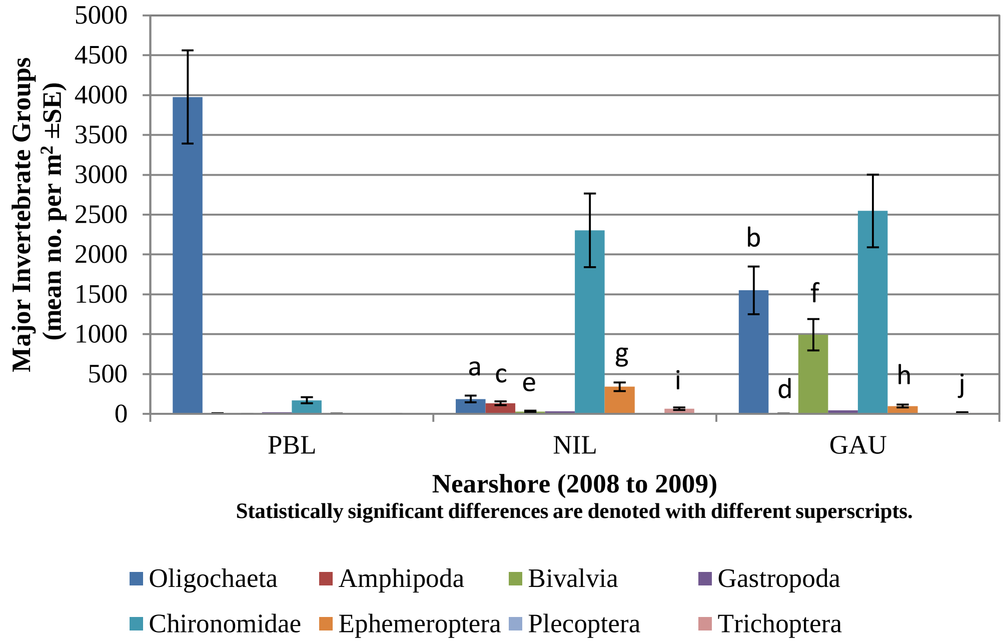


Figure 5.4.6-7. Abundances of the major invertebrate groups (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2009.

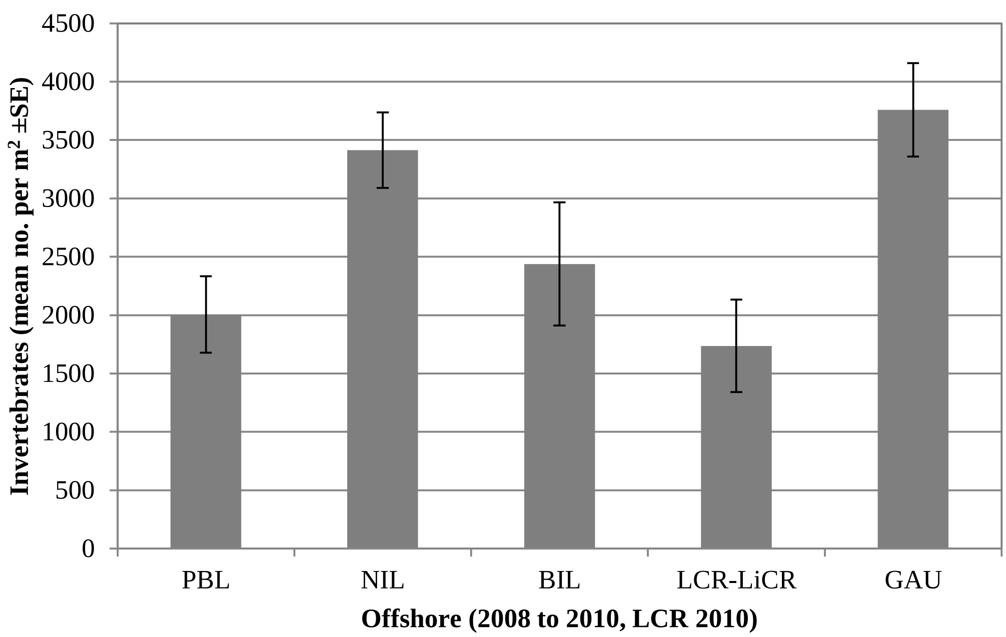


Figure 5.4.6-8. Abundances of benthic invertebrates (no. per m^2 ± SE) collected in the offshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2010.

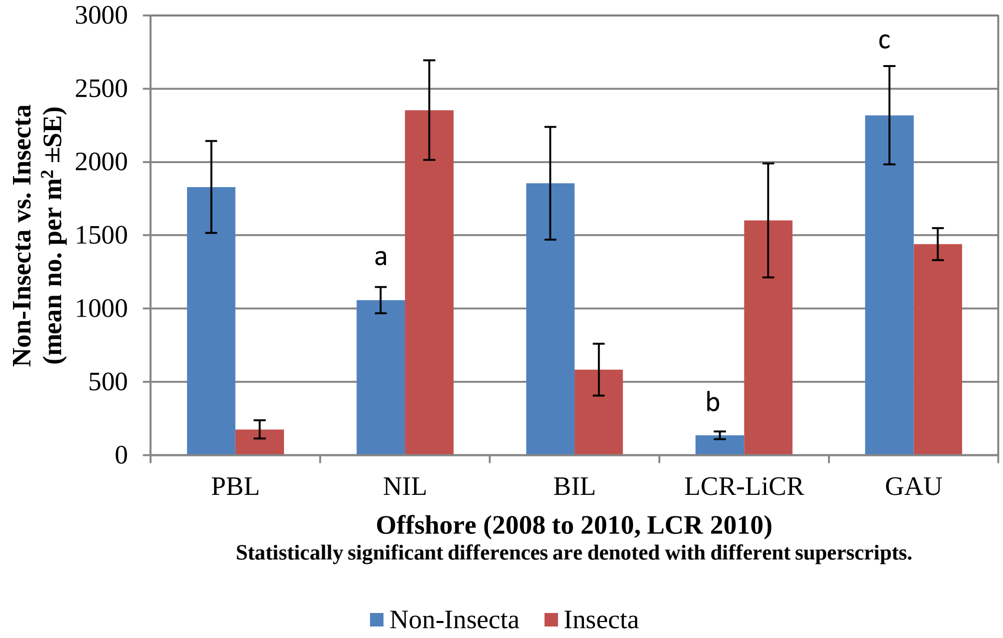


Figure 5.4.6-9. Abundances of non-insects and insects (no. per kicknet ± SE) collected in the offshore habitat of CAMPP waterbodies within the Winnipeg River Region, 2008 to 2010.

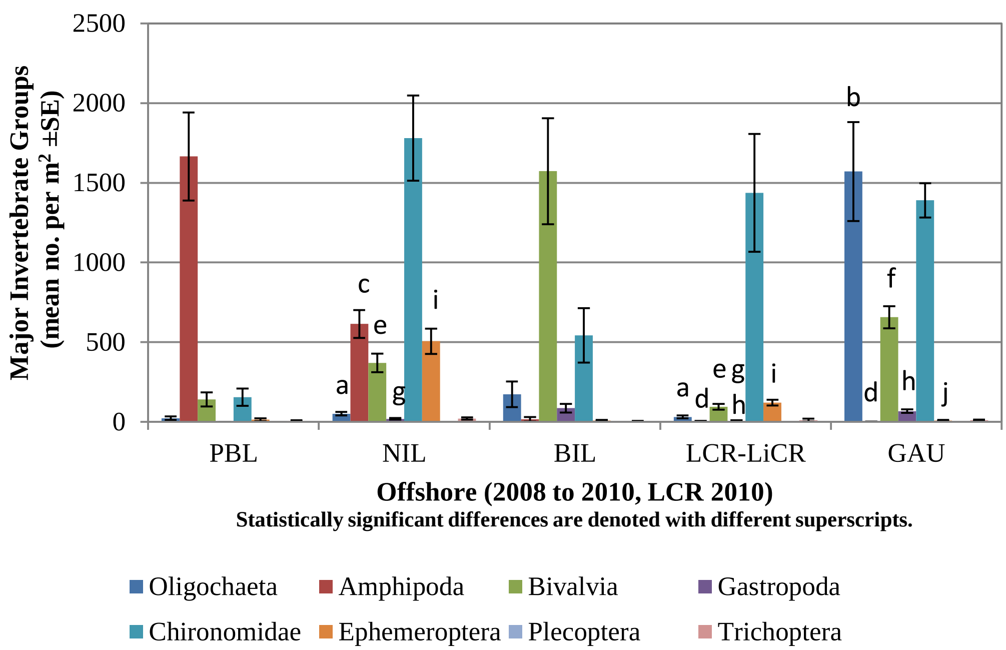


Figure 5.4.6-10. Abundances of the major invertebrate groups (no. per m^2 ± SE) collected in the offshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2010.

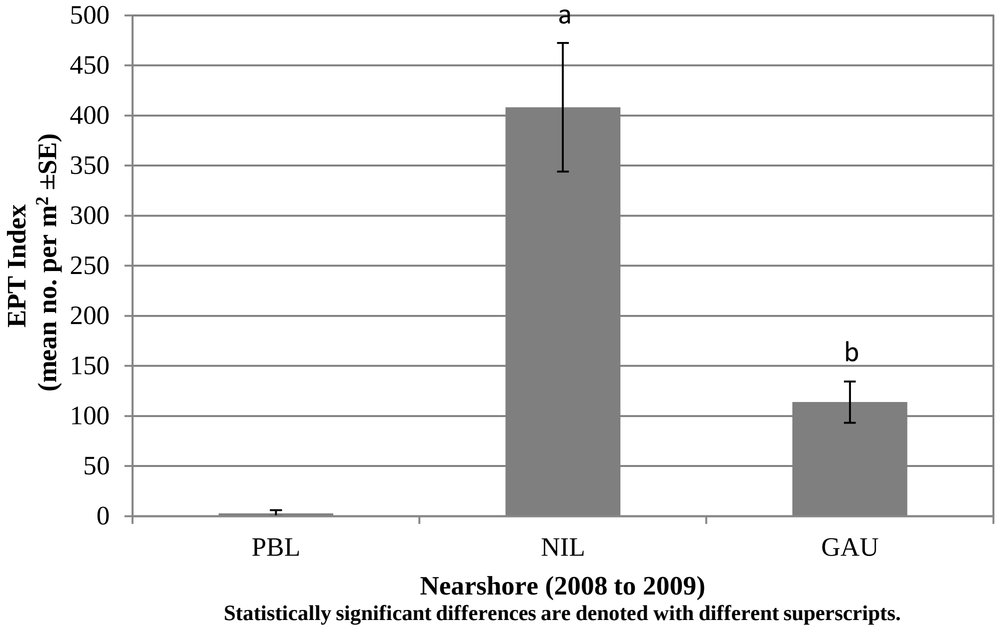


Figure 5.4.6-11. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from nearshore grab samples in CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2009.

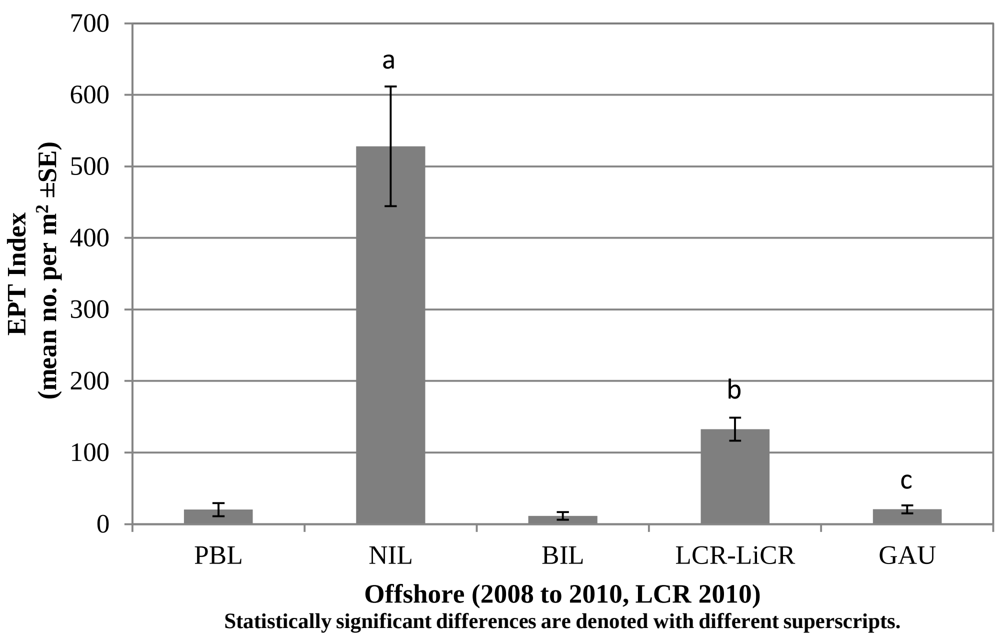


Figure 5.4.6-12. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from offshore grab samples in CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2010.

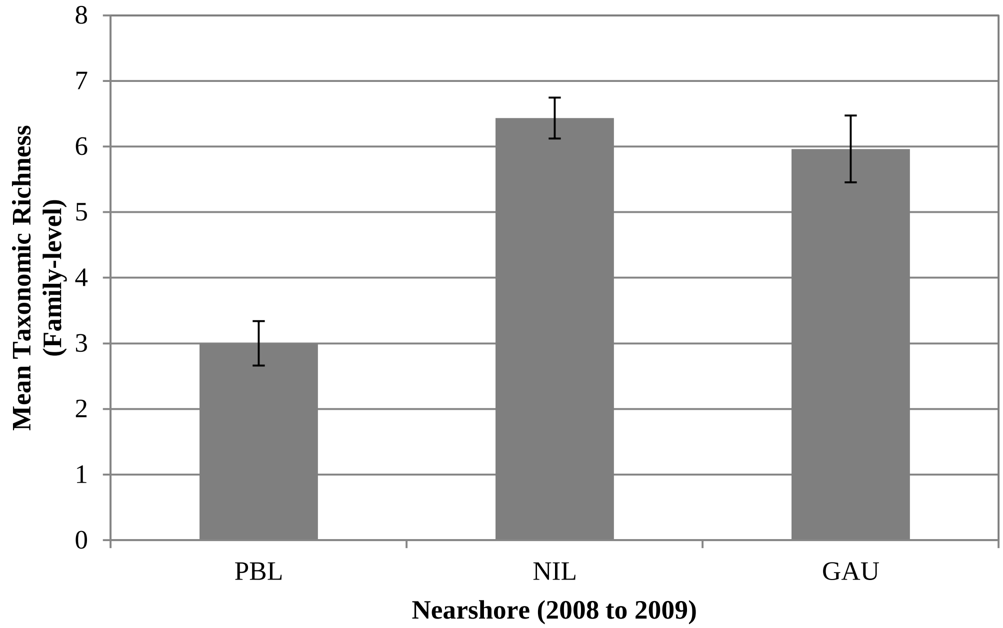


Figure 5.4.6-13. Taxa richness (mean no. of families) from benthic invertebrate grab samples collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2009.

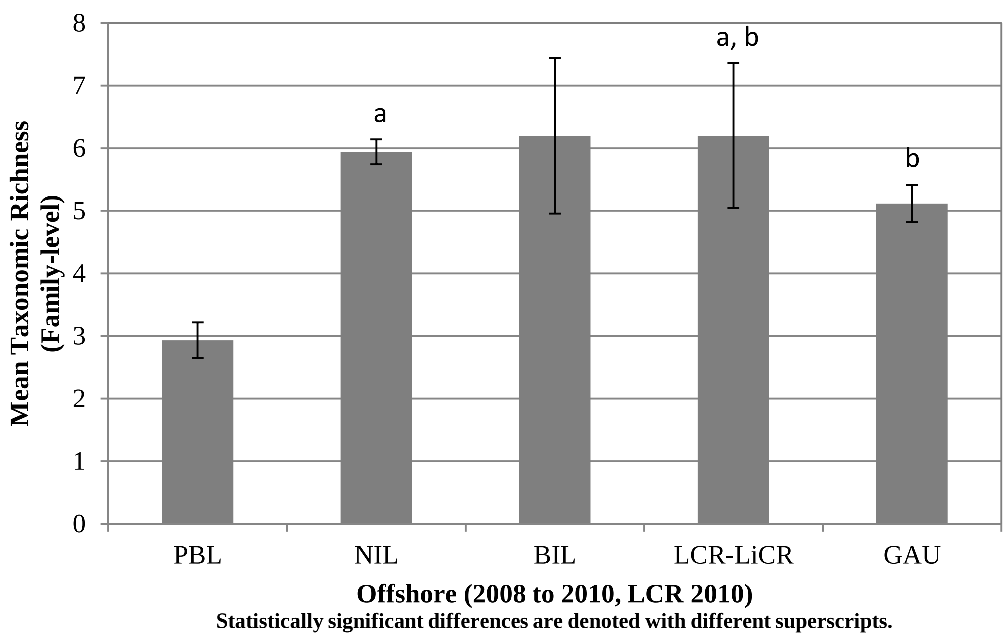


Figure 5.4.6-14. Taxa richness (mean no. of families) from benthic invertebrate grab samples collected in the offshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2010.

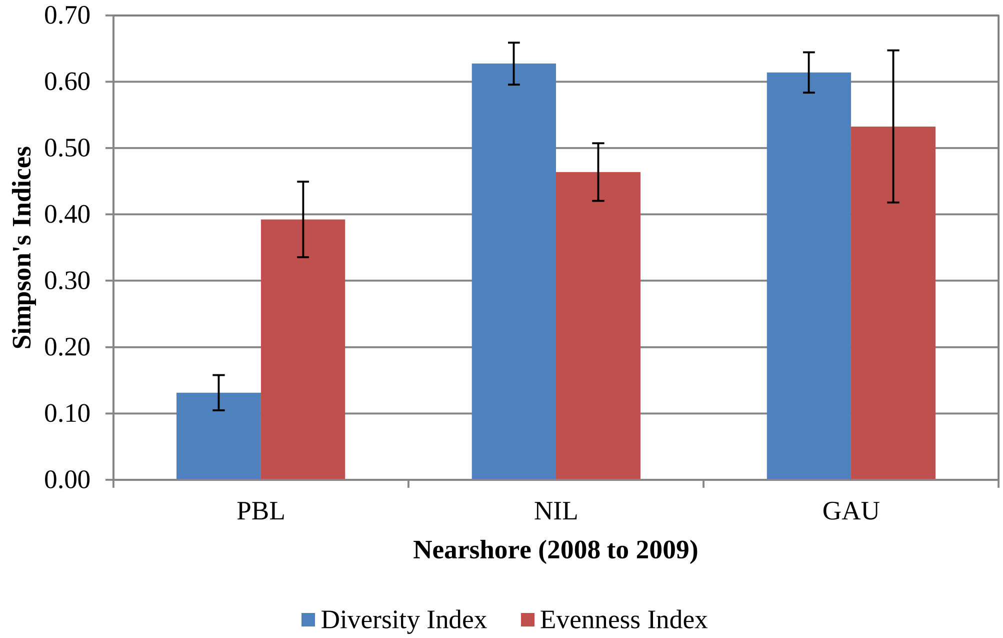


Figure 5.4.6-15. Diversity and evenness (Simpson's) indices calculated from nearshore grab samples of CAMPP waterbodies in the Lower Churchill River Region, 2008 to 2009.

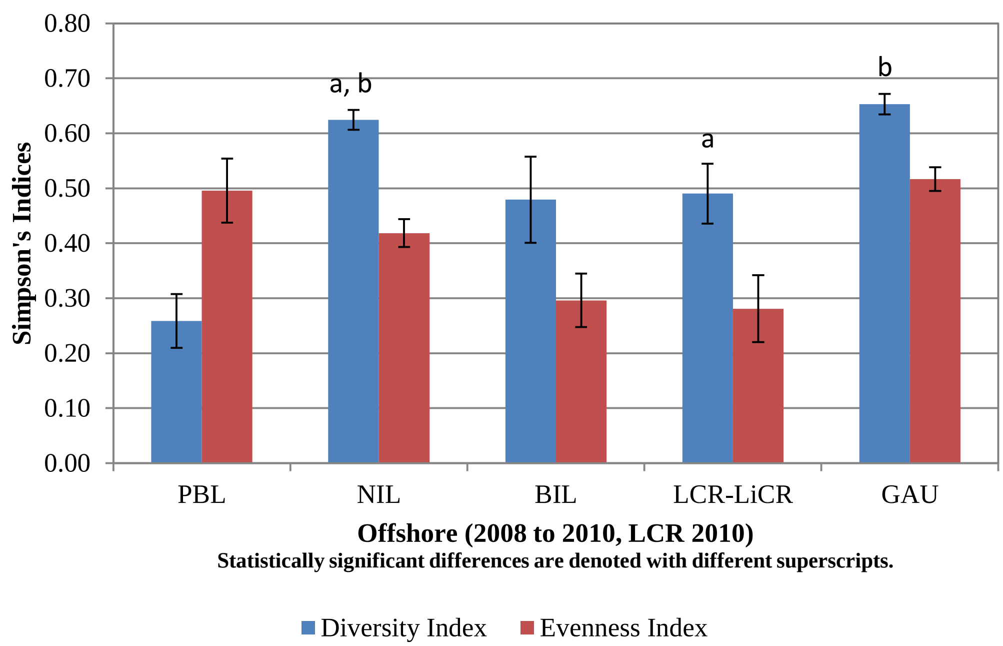


Figure 5.4.6-16. Diversity and evenness (Simpson's) indices calculated from offshore grab samples of CAMPP waterbodies within the Lower Churchill River Region, 2008 to 2010.

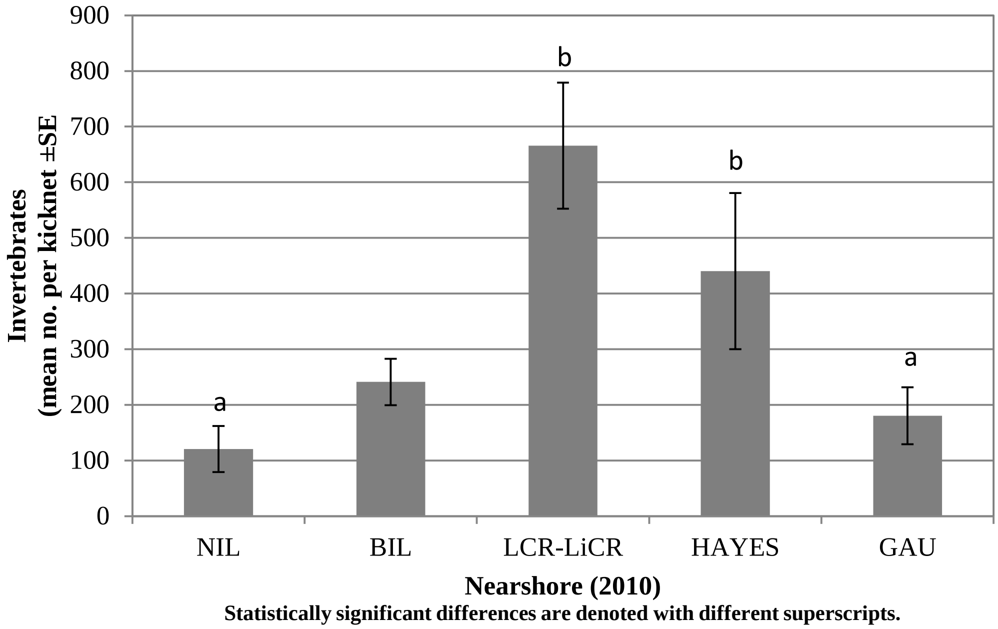


Figure 5.4.6-17. Abundances of benthic invertebrates (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2010.

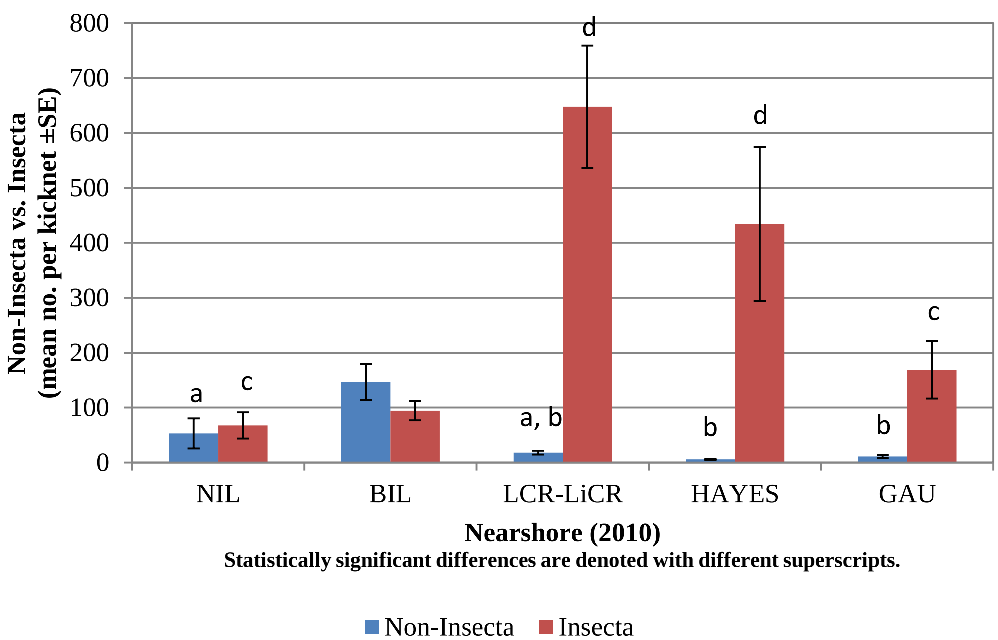


Figure 5.4.6-18. Abundances of non-insects and insects (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2010.

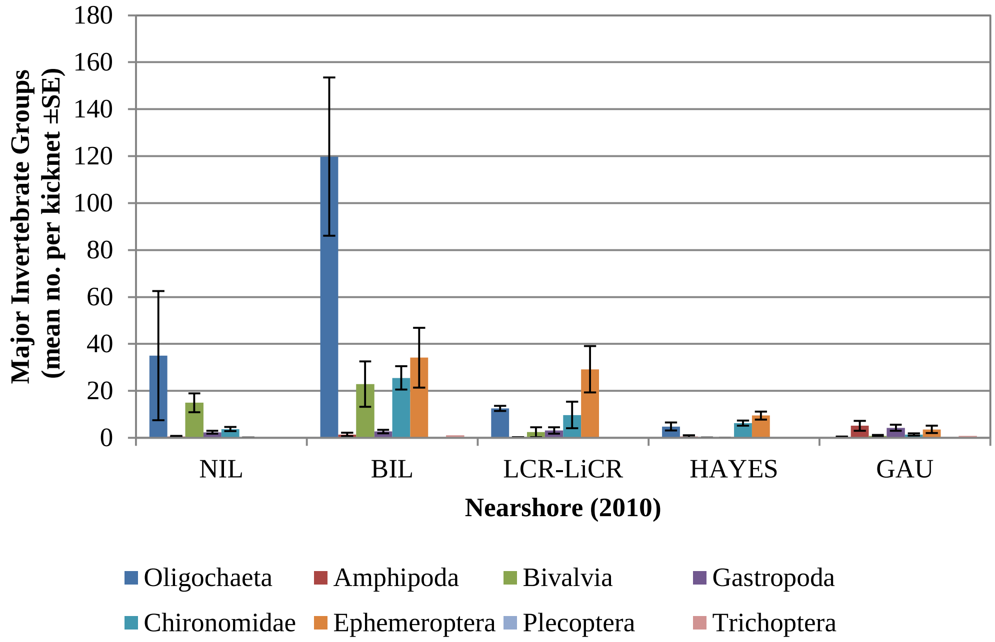


Figure 5.4.6-19. Abundances of the major invertebrate groups (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2010.

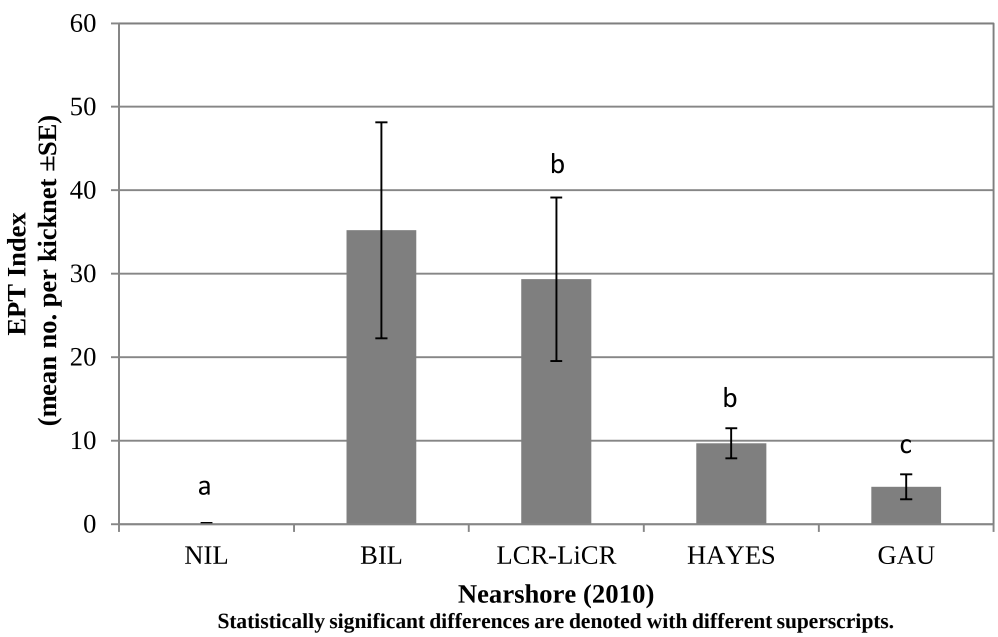


Figure 5.4.6-20. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from nearshore kicknet samples in CAMPP waterbodies in the Lower Churchill River Region, 2010.

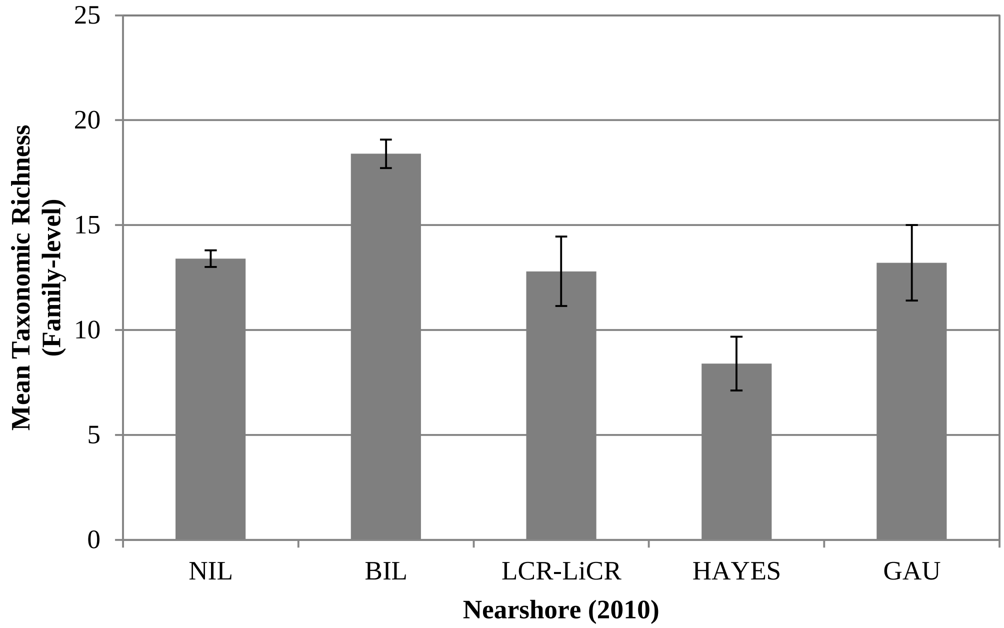


Figure 5.4.6-21. Taxa richness (mean no. of families) from benthic invertebrate kicknet samples collected in the nearshore habitat of CAMPP waterbodies in the Lower Churchill River Region, 2010.

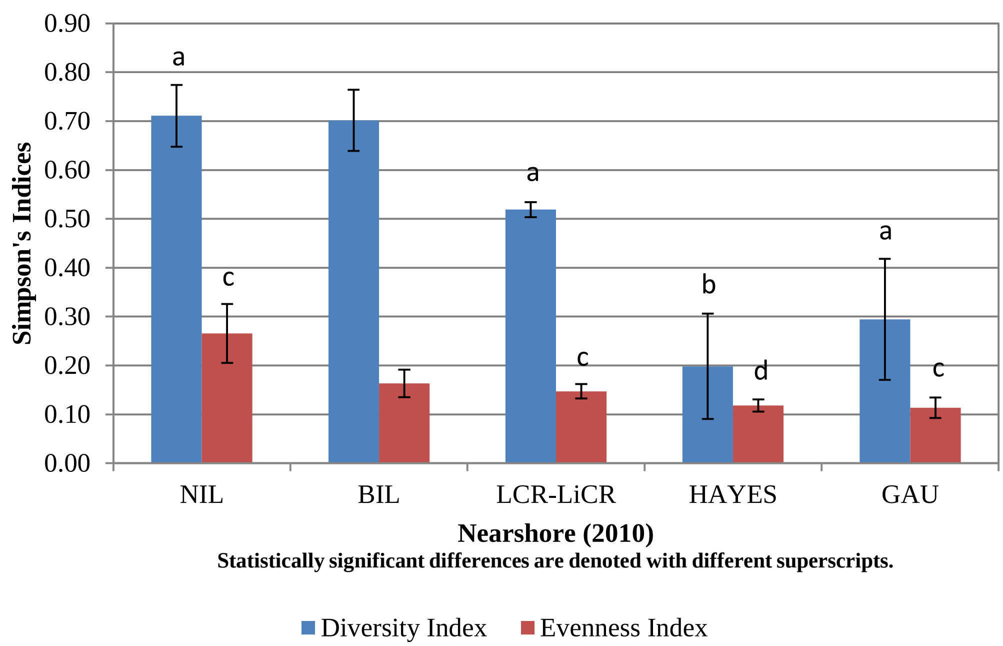


Figure 5.4.6-22. Diversity and evenness (Simpson's) indices calculated from nearshore kicknet samples of CAMPP waterbodies in the Lower Churchill River Region, 2010.

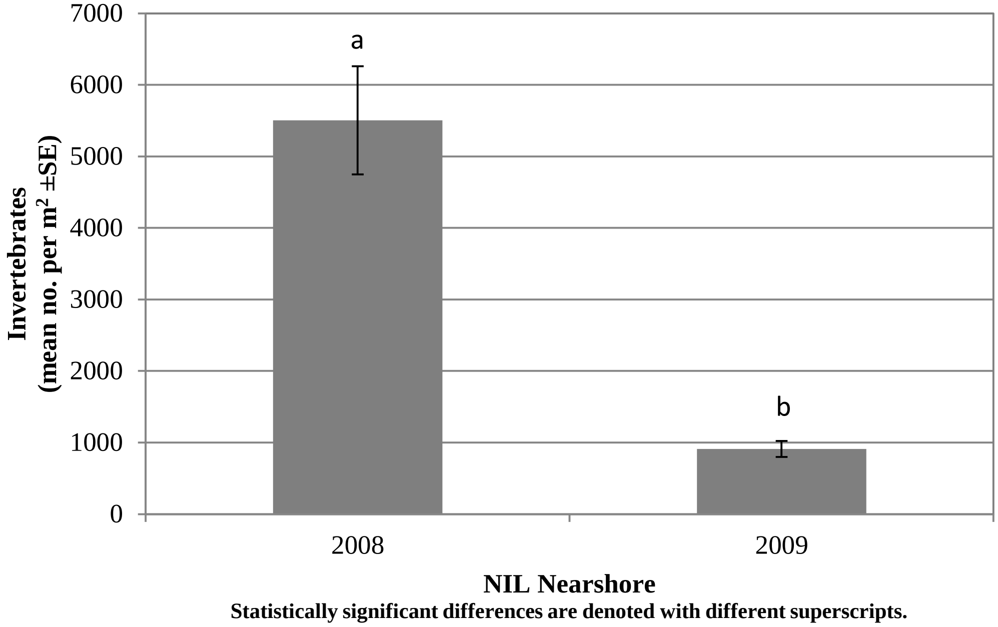


Figure 5.4.6-23. Temporal comparison of benthic invertebrate abundances (no. per $m^2 \pm$ SE) collected in the nearshore habitat of Northern Indian Lake, 2008 to 2009.

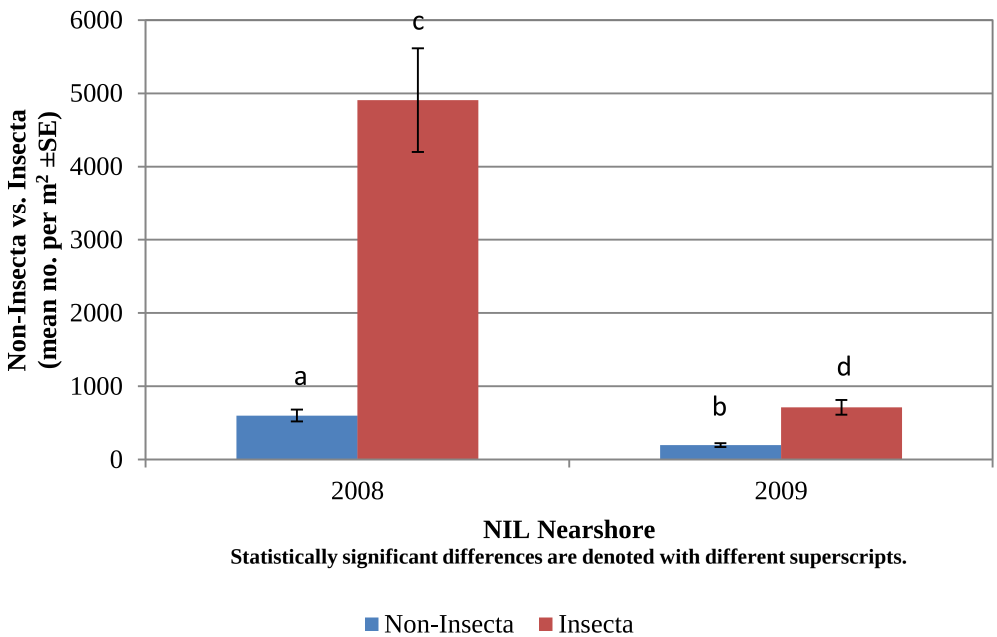


Figure 5.4.6-24. Temporal comparison of non-insect and insect abundances (no. per $m^2 \pm$ SE) collected in the nearshore habitat of Northern Indian Lake, 2008 to 2009.

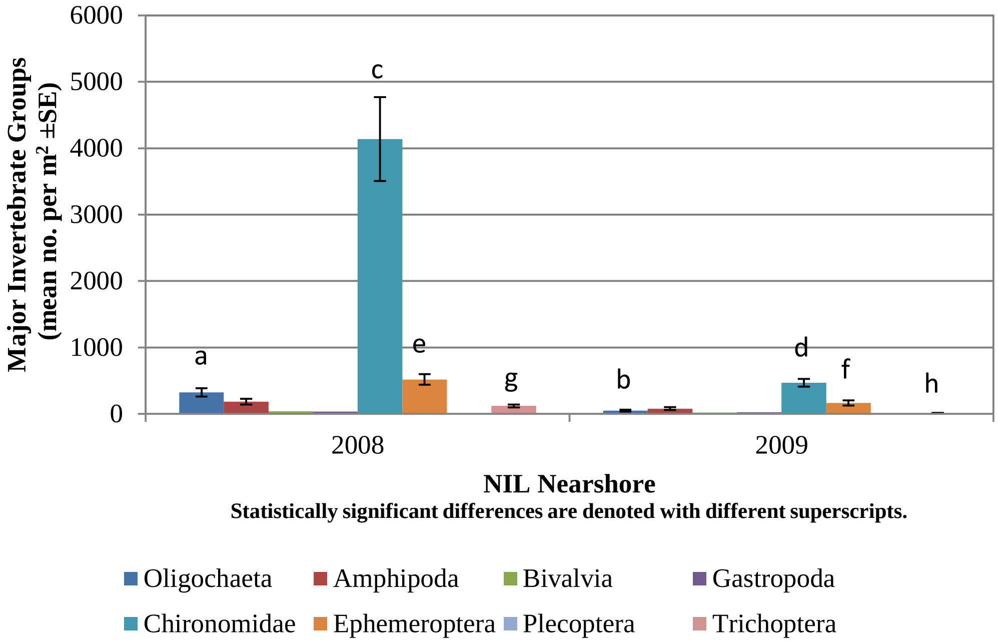


Figure 5.4.6-25. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the nearshore habitat of Northern Indian Lake, 2008 to 2009.

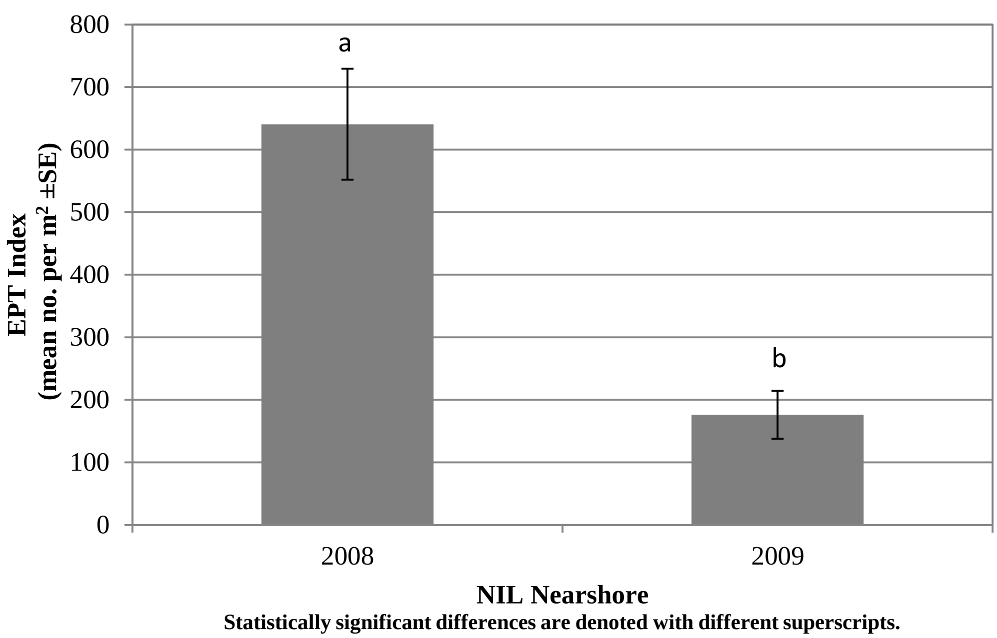


Figure 5.4.6-26. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of nearshore grab samples from Northern Indian Lake, 2008 to 2009.

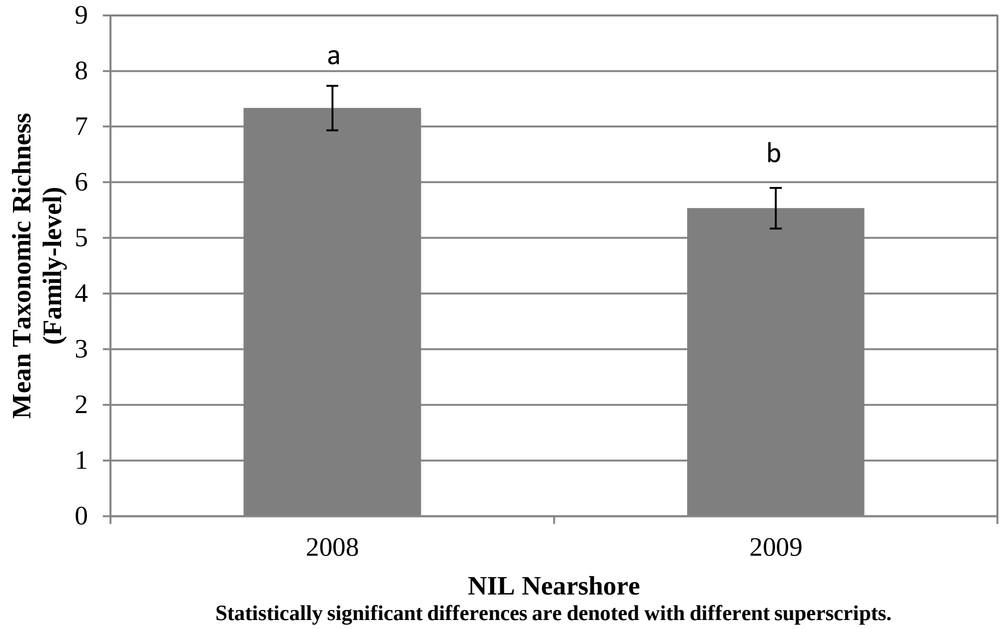


Figure 5.4.6-27. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of nearshore grab samples from Northern Indian Lake, 2008 to 2009.

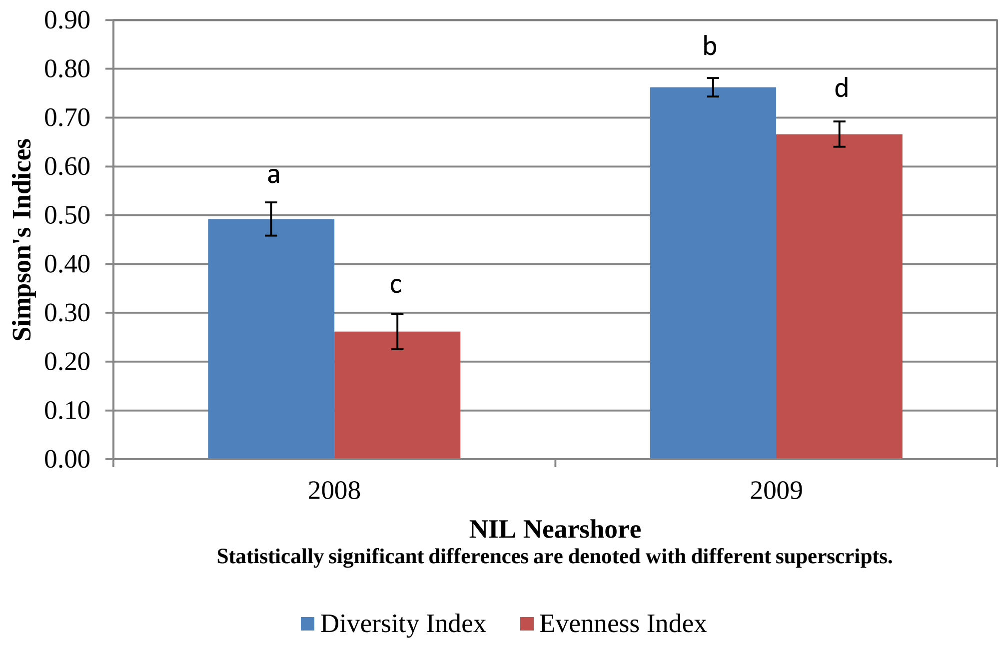


Figure 5.4.6-28. Temporal comparison of diversity and evenness (Simpson's) indices of nearshore grab samples from Northern Indian Lake, 2008 to 2009.

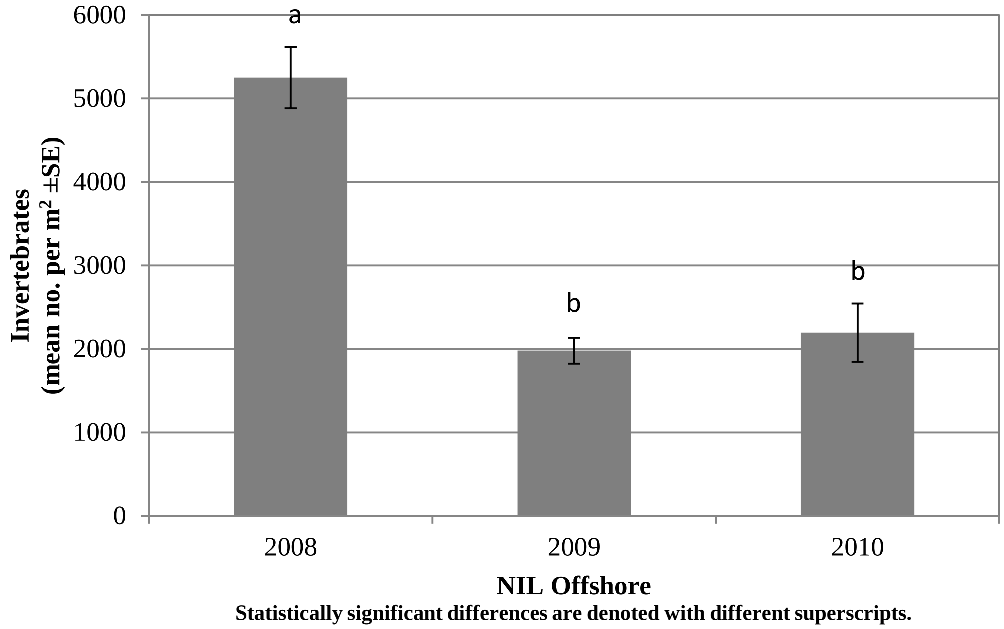


Figure 5.4.6-29. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the offshore habitat of Northern Indian Lake, 2008 to 2010.

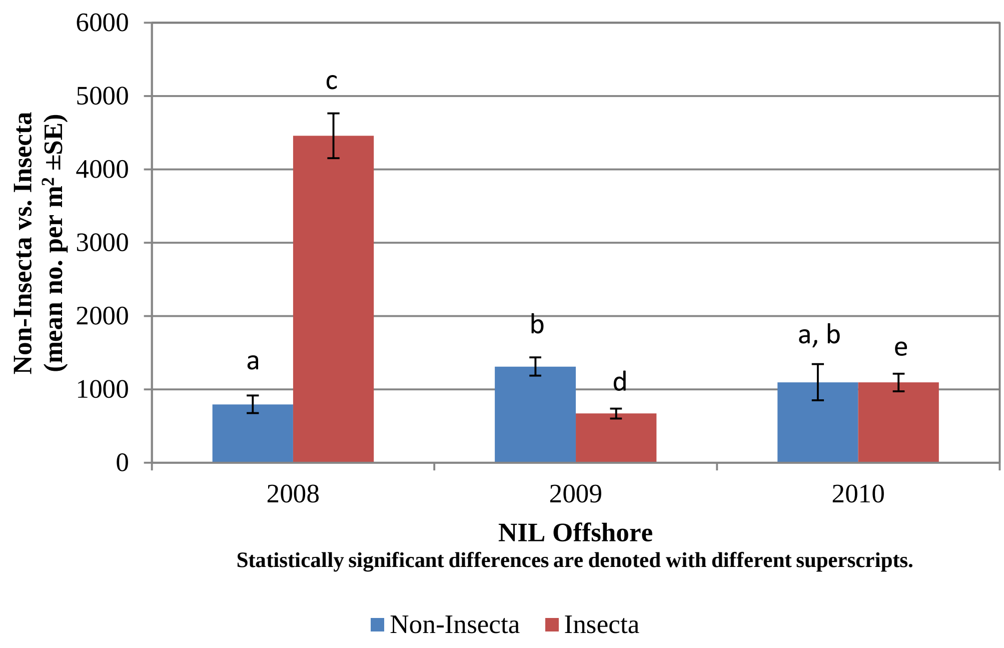


Figure 5.4.6-30. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the offshore habitat of Northern Indian Lake, 2008 to 2010.

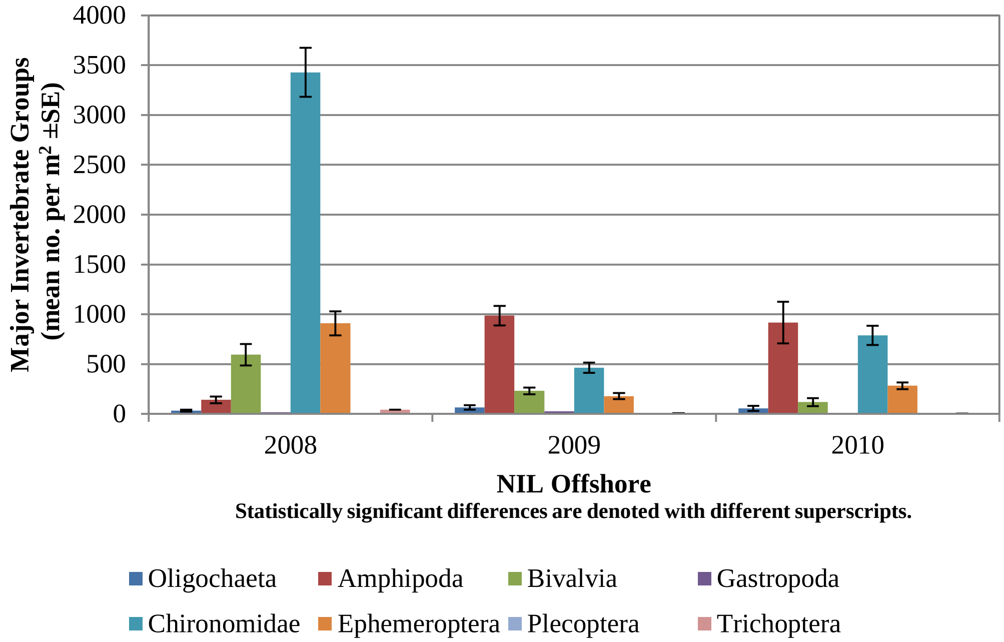


Figure 5.4.6-31. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the offshore habitat of Northern Indian Lake, 2008 to 2010.

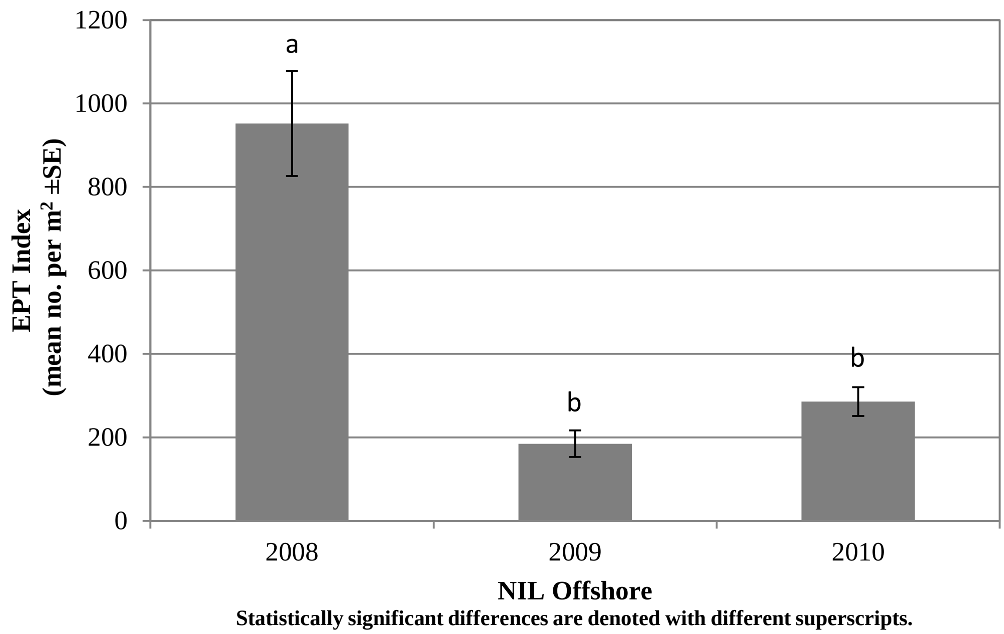


Figure 5.4.6-32. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore grab samples from Northern Indian Lake, 2008 to 2010.

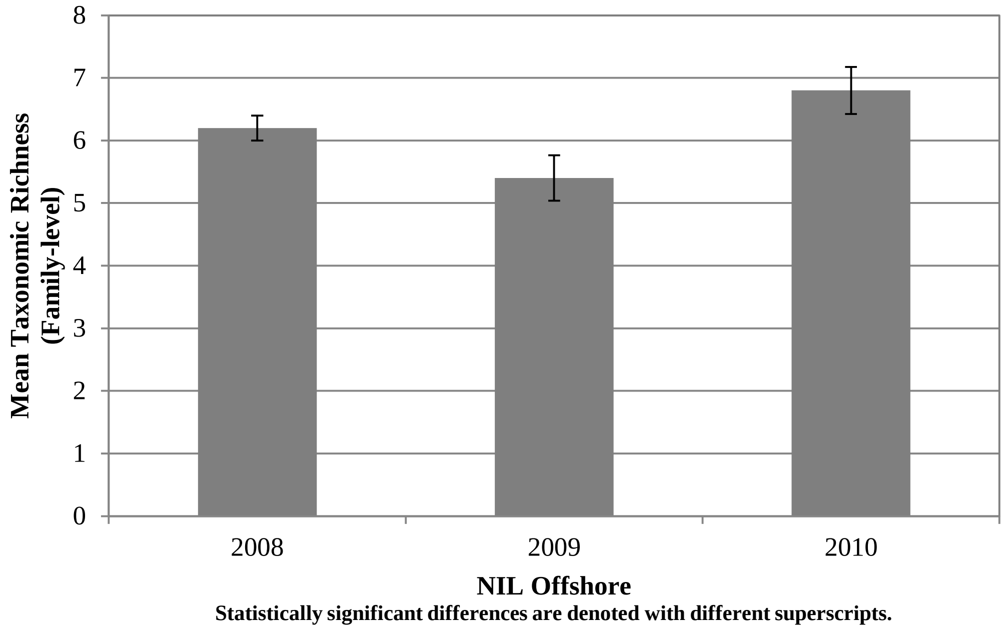


Figure 5.4.6-33. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of offshore grab samples from Northern Indian Lake, 2008 to 2010.

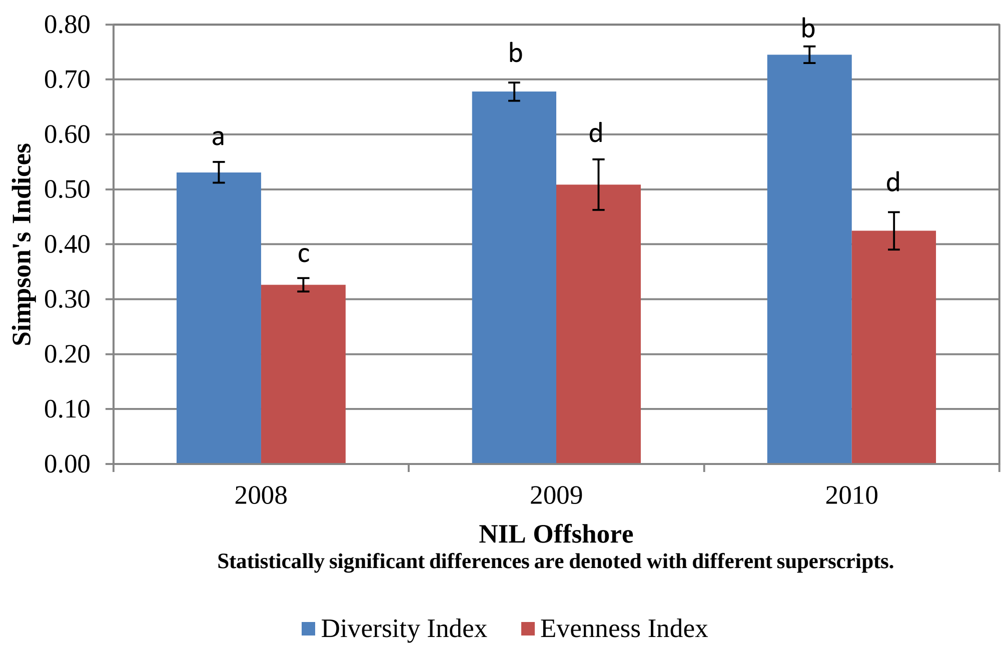


Figure 5.4.6-34. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Northern Indian Lake, 2008 to 2010.

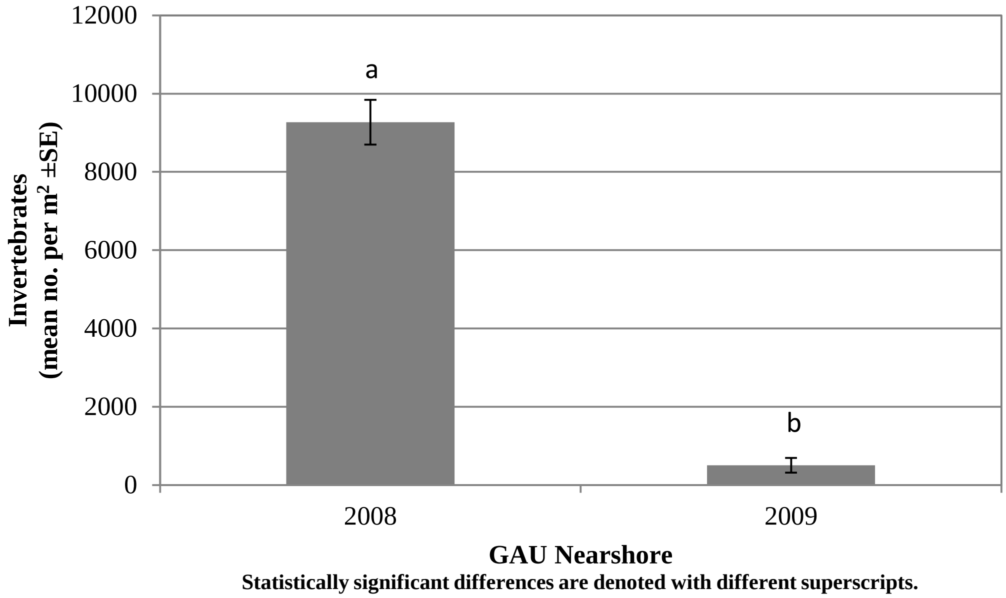


Figure 5.4.6-35. Temporal comparison of benthic invertebrate abundances (no. per $m^2 \pm$ SE) collected in the nearshore habitat of Gauer Lake, 2008 to 2009.

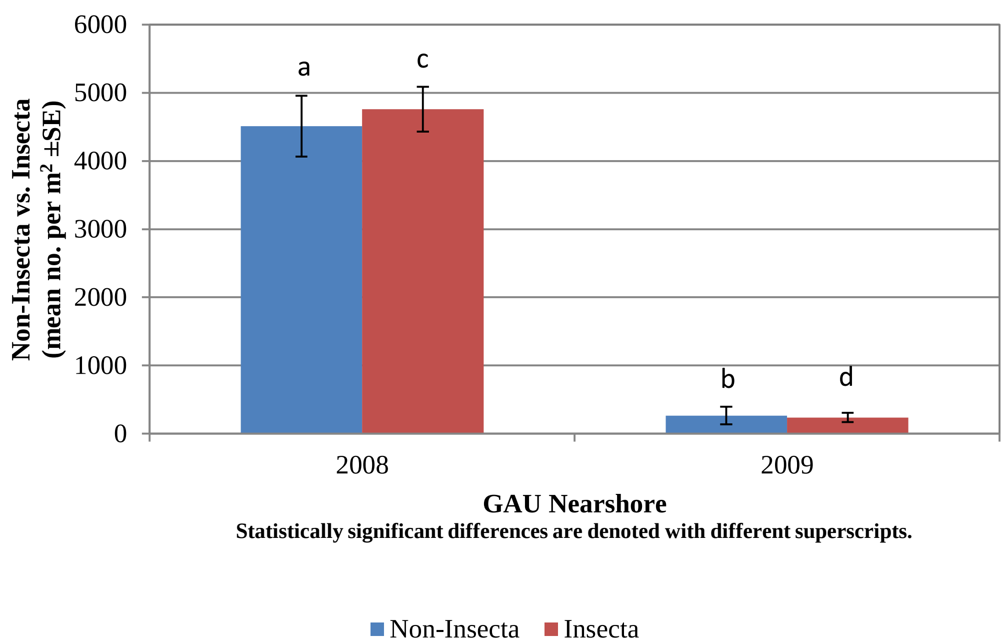


Figure 5.4.6-36. Temporal comparison of non-insect and insect abundances (no. per $m^2 \pm$ SE) collected in the nearshore habitat of Gauer Lake, 2008 to 2009.

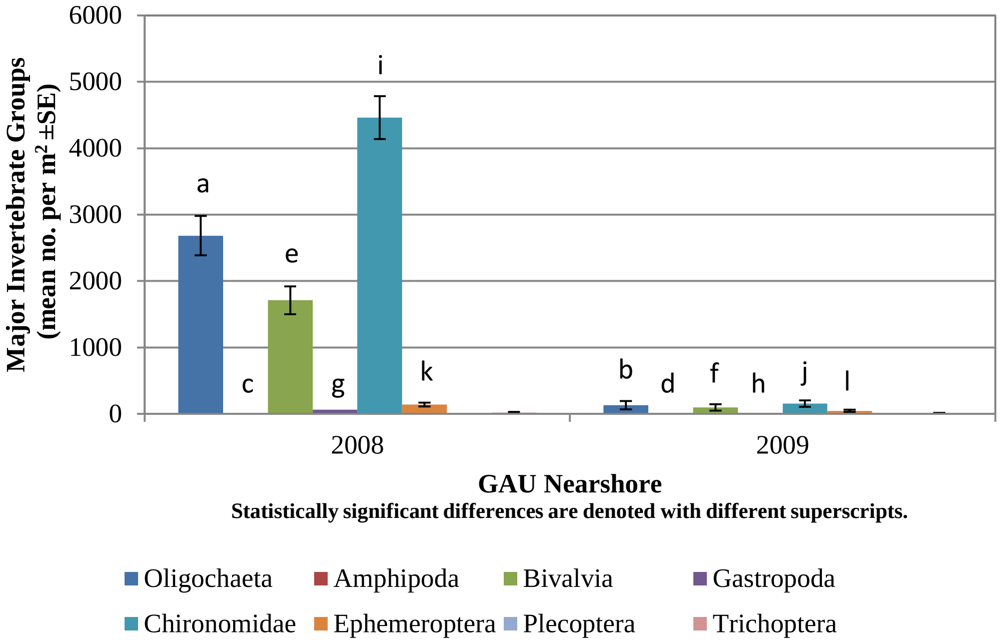


Figure 5.4.6-37. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the nearshore habitat of Gauer Lake, 2008 to 2009.

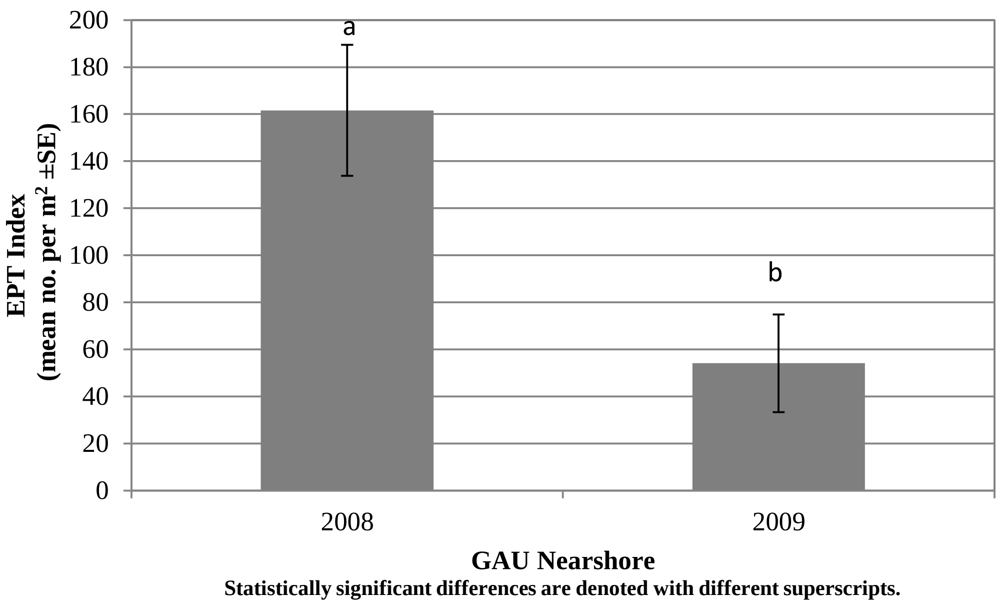


Figure 5.4.6-38. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of nearshore grab samples from Gauer Lake, 2008 to 2009.

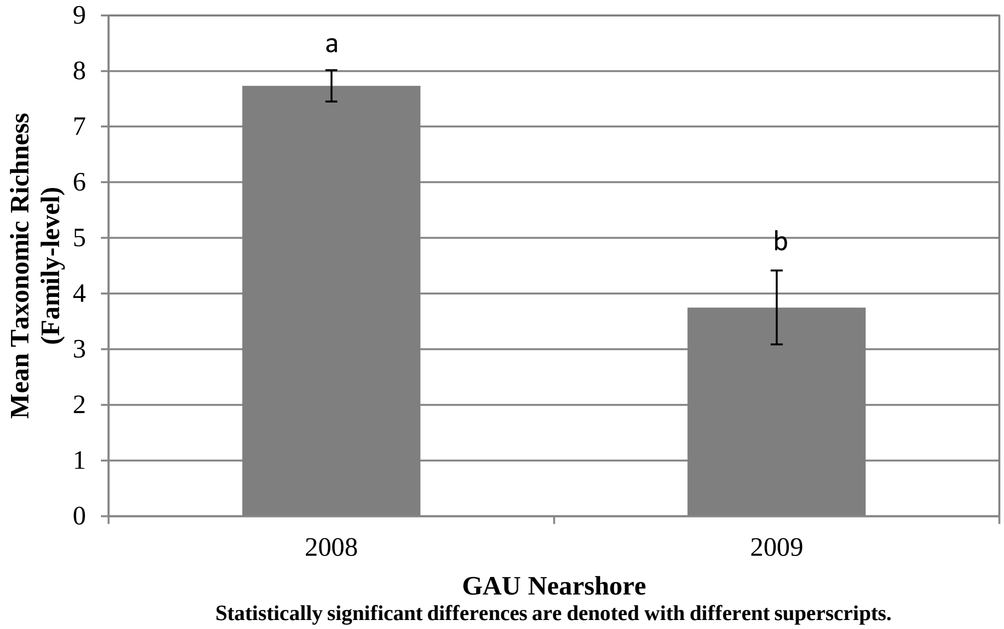


Figure 5.4.6-39. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of nearshore grab samples from Gauer Lake, 2008 to 2009.

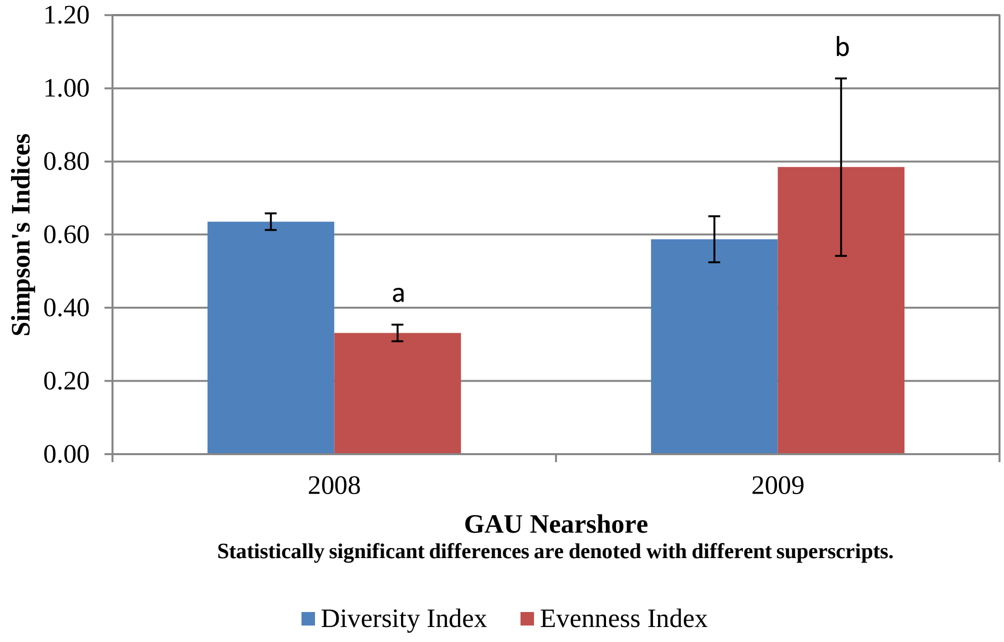


Figure 5.4.6-40. Temporal comparison of diversity and evenness (Simpson's) indices of nearshore grab samples from Gauer Lake, 2008 to 2009.

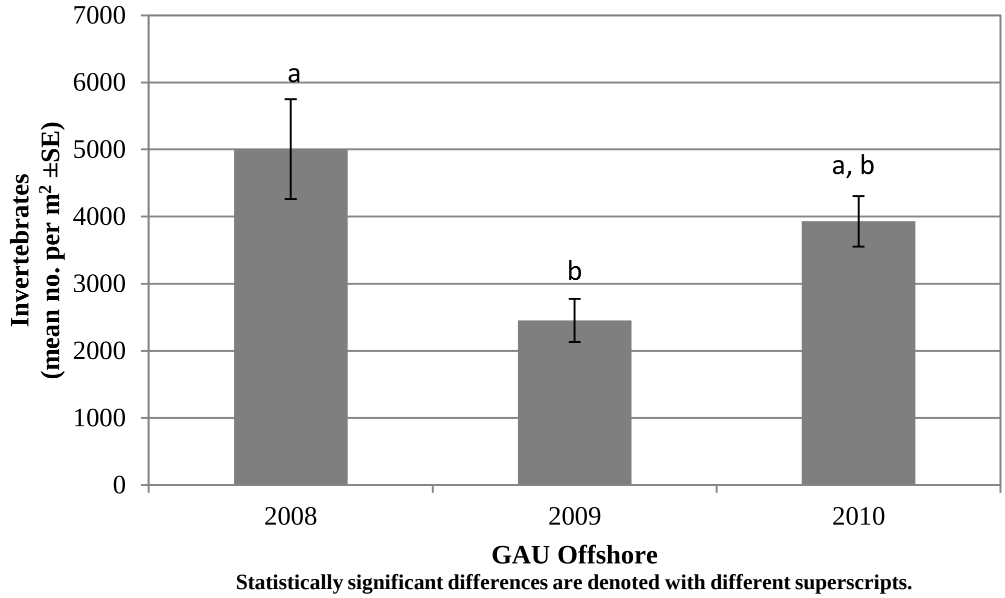


Figure 5.4.6-41. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the offshore habitat of Gauer Lake, 2008 to 2010.

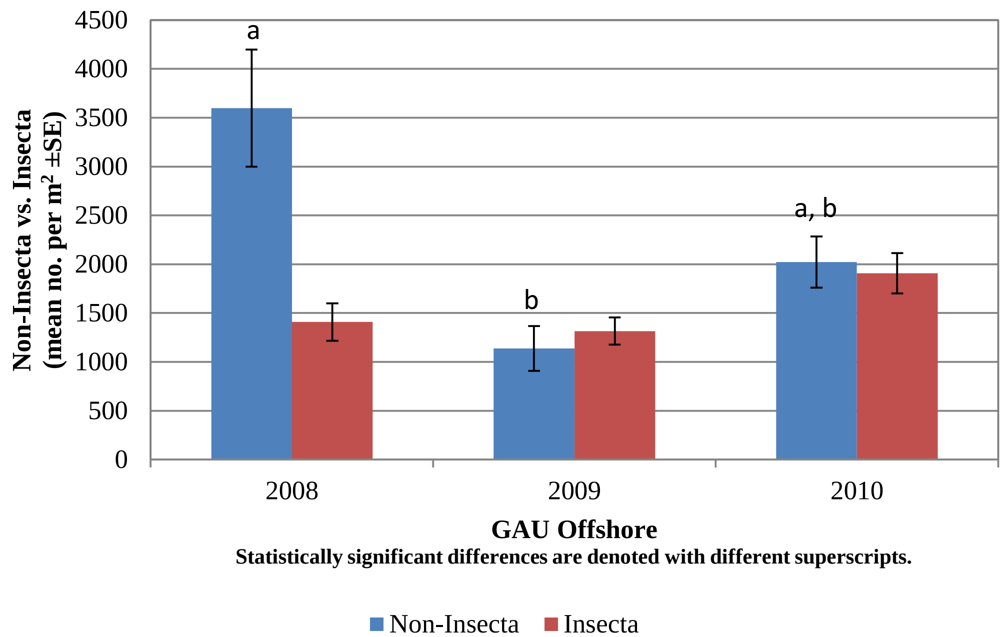


Figure 5.4.6-42. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the offshore habitat of Gauer Lake, 2008 to 2010.

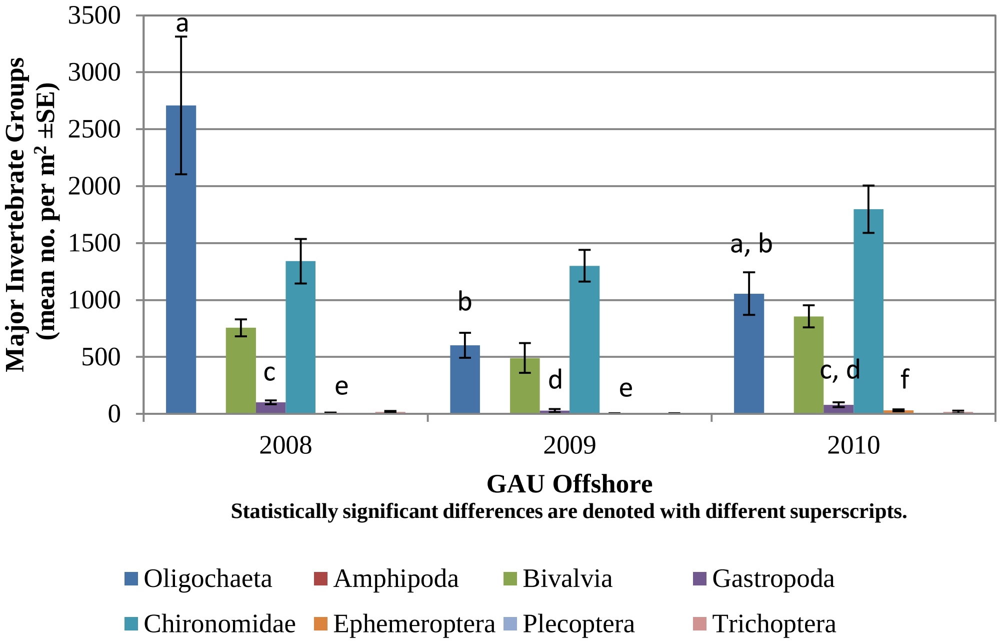


Figure 5.4.6-43. Temporal comparison of major invertebrate group abundances (no. per $m^2 \pm$ SE) collected in the offshore habitat of Gauer Lake, 2008 to 2010.

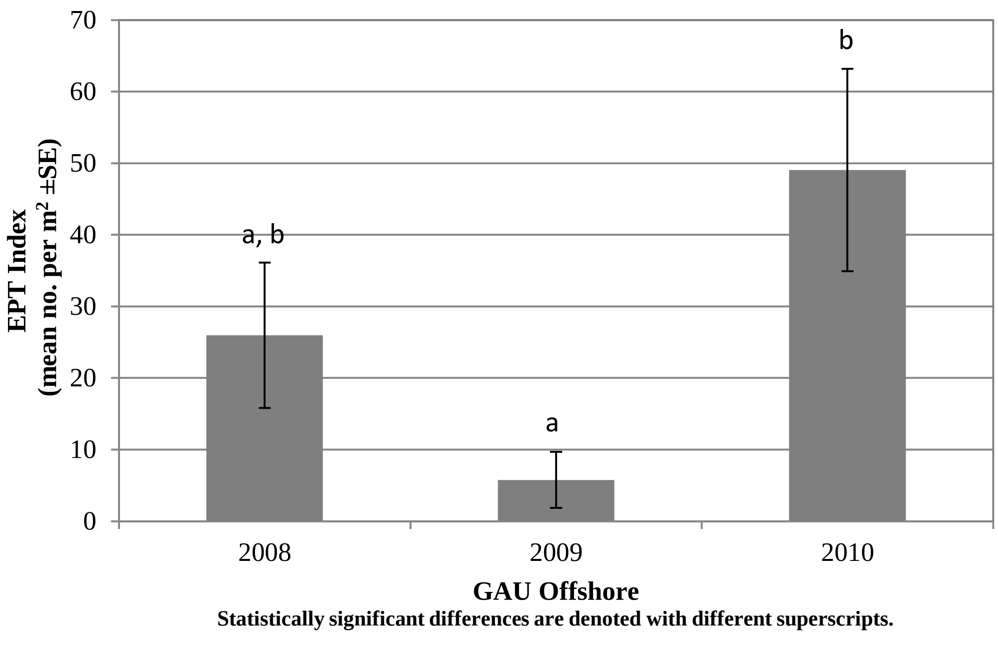


Figure 5.4.6-44. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore grab samples from Gauer Lake, 2008 to 2010.

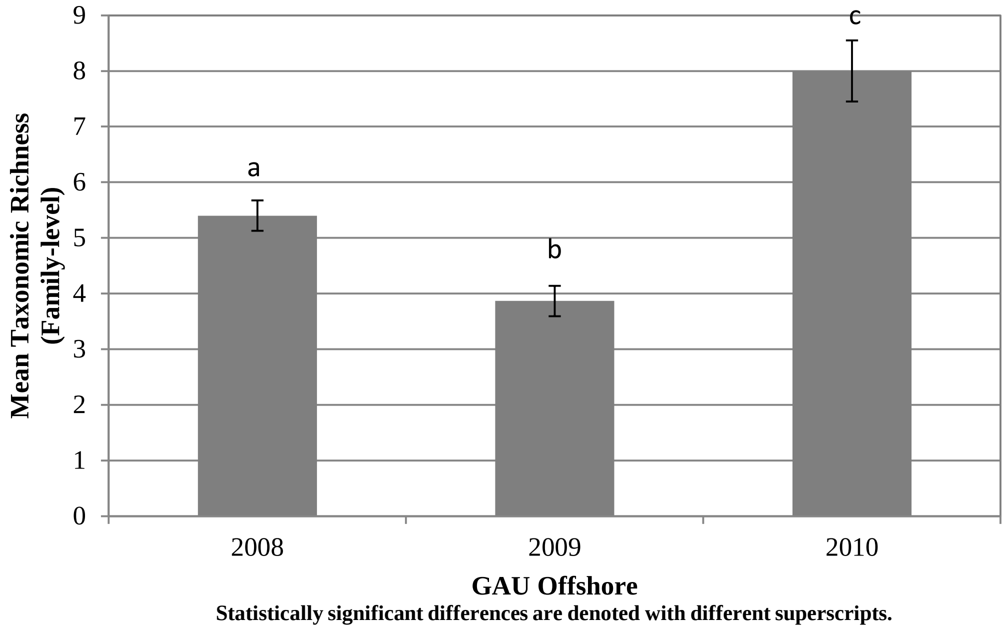


Figure 5.4.6-45. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of offshore grab samples from Gauer Lake, 2008 to 2010.

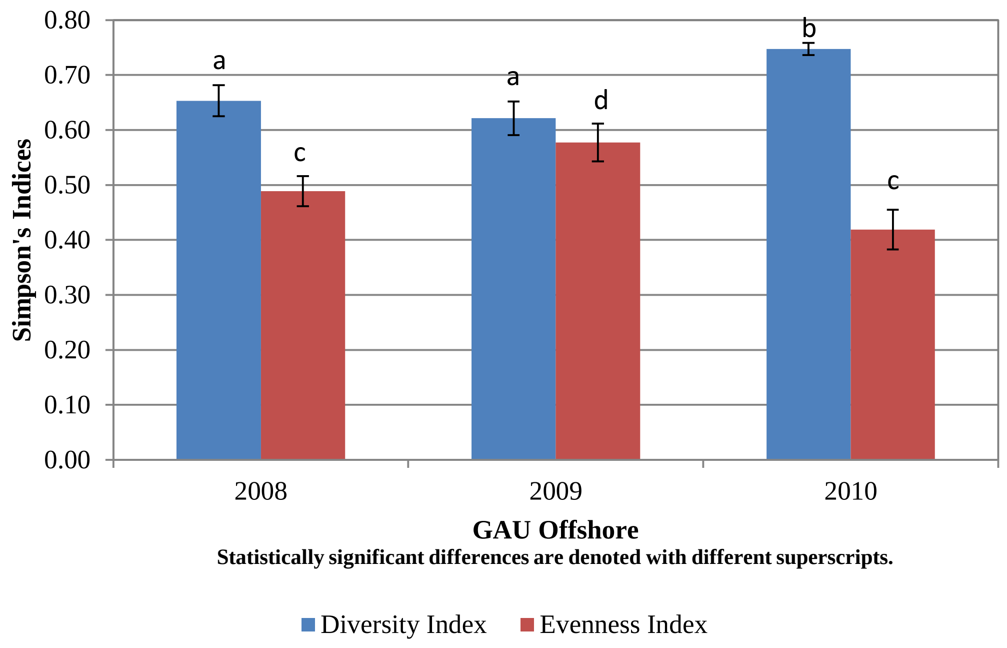


Figure 5.4.6-46. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Gauer Lake, 2008 to 2010.

5.4.7 Fish Communities

5.4.7.1 Overview

The following provides an overview of the fish communities present in six waterbodies within the Lower Churchill River Region surveyed as part of the CAMPP program conducted from 2008 to 2010. Waterbodies sampled annually included two on-system waterbodies, i.e., Northern Indian Lake and lower Churchill River at the Little Churchill River (hereafter referred to as "lower Churchill River") and two off-system waterbodies, i.e., Hayes River and Gauer Lake. Two rotational waterbodies (sampled once every three years) were also sampled, i.e., Partridge Breast Lake in 2009 and Billard Lake in 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 year of study. Individual fish from each site were separated by species, measured and weighed with the exception that in some cases (particularly with respect to small-bodied fish species), bulk weights were taken.

Overall, the fish assemblages as captured by standard gang index gill nets in the lower Churchill River on- and off-system waterbodies were similar and dominated by Walleye (*Sander vitreus*), Northern Pike (*Esox lucius*), Lake Whitefish (*Coregonus clupeaformis*) and White Sucker (*Catostomus commersoni*). In the lower Churchill River waterbody, these species were common, but Lake Sturgeon (*Acipenser fulvescens*) dominated the catch. Lake Sturgeon was not captured in Partridge Breast Lake, Northern Indian Lake or Gauer Lake and was uncommon in Billard Lake. The lower Churchill River fish assemblage resembled that in the Hayes River except that Lake Sturgeon and Longnose Sucker (*Catostomus catostomus*) were less common and Lake Whitefish and Northern Pike were more common in the lower Churchill River than in the Hayes River.

The Lower Churchill River Region on-system waterbodies, with the exception of the lower Churchill River, were found to have relatively similar overall CPUE values for total catch from the standard gang index gill nets. The CPUE values for White Sucker, Northern Pike, Lake Whitefish and all fish combined from Gauer Lake were generally similar to those in Partridge Breast Lake and Northern Indian Lake. CPUE values for the Hayes River were much lower for these same species and the CPUE for total catch was approximately one-quarter to one-sixth of those in the lower Churchill River. Notable differences in the small mesh index gill net CPUE values were evident, particularly with respect to Lake Chub (*Couesius plumbeus*), Emerald Shiner (*Notropis atherinoides*), Spottail Shiner (*Notropis hudsonius*), Yellow Perch (*Perca* *flavescens*) and Logperch (*Percina caprodes*). Yellow Perch showed a decreasing CPUE from Partridge Breast Lake to Northern Indian Lake, and was absent from more downstream waterbodies. In contrast, Logperch was absent from Partridge Breast Lake and Northern Indian Lake, but showed a slight increase in CPUE in the downstream direction.

For species of management interest, year-class strength for Northern Pike in 2002 and 2003 and Walleye in 2002 was consistent for all on-system waterbodies in the region. Lake Whitefish year-class strength was apparent for each year from 2001 to 2004 for most on-system waterbodies, but did not show the same year-class strength in Billard Lake.

The incidence rate for deformities, erosion, lesions and tumours in species of management interest was similar for all on-system waterbodies in the region (i.e., 1.1 – 2.0%). Off-system, the incidence rate was higher in the Hayes River (3.5%) and lower in Gauer Lake (0.9%).

Temporal CPUE comparisons were undertaken for the four waterbodies sampled annually from 2008 to 2010 to provide a preliminary assessment of temporal variability. In Northern Indian Lake and Gauer Lake, standard gang index gillnet CPUE showed little year-to-year variation. This was not the case for the lower Churchill River where CPUE more than doubled from 2009 to 2010, or the Hayes River where the CPUE value in 2010 was almost three times that in 2009. The small mesh index gillnet CPUE values showed much more variation for all waterbodies sampled and in the cases of Northern Indian Lake and the Hayes River varied by approximately five-fold from one year to another. In the former case, CPUE increased by this amount from 2008 to 2010 while in the latter case CPUE increased by this amount from 2008 to 2009 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, computed scores were similar for all waterbodies despite some wide variations in some of the metrics under consideration, with the lower Churchill River waterbody having slightly higher values on average. Similarly, off-system, the Hayes River and Gauer Lake had similar IBI values despite wide ranges in CPUE values and species assemblages.

5.4.7.2 Gill netting

Partridge Breast Lake was sampled with standard gang index gill nets at nine sites in late August, 2009 (Table 5.4.7-1, Figure 5.4.7-1). Northern Indian Lake was sampled at eight sites in late August of 2008 and at 12 sites in both mid-August of 2009 and early August of 2010 (Table 5.4.7-1, Figure 5.4.7-2). In Billard Lake, standard gang index gill nets were set in late July of 2010 at nine sites (Table 5.4.7-1, Figure 5.4.7-3). A total of nine sites were sampled in the lower

Churchill River in mid-August of 2008, 2009 and 2010 (Table 5.4.7-1, Figure 5.4.7-4). Similarly, the Hayes River was sampled at nine sites in early August of 2008 and late July of both 2009 and 2010 (Table 5.4.7-1, Figure 5.4.7-5). Gauer Lake was sampled at nine sites in late July of 2008 and 2009 and mid-July of 2010 (Table 5.4.7-1, Figure 5.4.7-6).

Small mesh index gill nets were attached to the smallest mesh end of the standard gang index gill net set in both Partridge Breast Lake and Billard Lake at three of nine sites to sample the small-bodied fish community (Table 5.4.7-1, Figures 5.4.7-1 and 5.4.7-3). In Northern Indian Lake, two of eight sites in 2008 and four of 12 sites in 2009 and 2010 had small mesh nets attached (Table 5.4.7-1, Figure 5.4.7-2). In each of the lower Churchill River, Hayes River and Gauer Lake, small mesh nets were set in three of the nine sites sampled in each of 2008, 2009 and 2010 (Table 5.4.7-1, Figures 5.4.7-4, 5.4.7-5 and 5.4.7-6).

5.4.7.3 Species Composition

A comprehensive list of all fish species captured, including common and scientific names, family, and identification code, for all Lower Churchill River Region waterbodies is provided in Table 5.4.7-2.

Partridge Breast Lake

In 2009, a total of 608 fish (621,412 g) representing eight species were captured in standard gang index gill nets set in Partridge Breast Lake (Tables 5.4.7-3 and 5.4.7-4). The most common species captured in standard gang index gill nets was Northern Pike (28.8%) followed by White Sucker (26.6%) and Walleye (25.4%) (Table 5.4.7-3 and Figure 5.4.7-7). The highest biomass values were similar to relative abundance; i.e., Northern Pike (proportion of total biomass = 38.9%), followed by Walleye (25.4%) and White Sucker (24.1%) (Table 5.4.7-4).

For the small mesh index gill nets, a total of 369 fish (25,623 g) representing ten species were captured (Tables 5.4.7-5 and 5.4.7-6). Spottail Shiner was the most common species (46.9%), followed by Yellow Perch (16.8%) and Emerald Shiner (14.4%) (Table 5.4.7-5 and Figure 5.4.7-7). For small-bodied fish from the small mesh gillnet catch, Spottail Shiner accounted for the highest proportion of total biomass (3.8%) (Table 5.4.7-6).

Northern Indian Lake

Over all years combined, a total of 1,991 fish (1,556,225 g) representing eight species were captured in standard gang index gill nets set in Northern Indian Lake (Tables 5.4.7-3 and 5.4.7-4). The number of species captured ranged from a low of seven in both 2008 and 2009 to a high of eight species in 2010. For all years combined, the most common species captured in standard gang index gill nets were Walleye (31.9%) and White Sucker (25.0%) (Table 5.4.7-3 and Figure 5.4.7-8). The highest biomass values were comprised of Walleye (28.5%) and White Sucker (26.4%) (Table 5.4.7-5).

For the small mesh index gill nets for all years of sampling, a total of 1,168 fish (111,622 g) representing 12 species were captured (Tables 5.4.7-4 and 5.4.7-6). Spottail Shiner was the most common species captured overall (35.5%), followed by Walleye (13.3%), Emerald Shiner (12.4%) and Troutperch (12.1%) (Table 5.4.7-4 and Figure 5.4.7-8). For small-bodied fish from the small mesh gillnet catch, Spottail Shiner accounted for the highest proportion of total biomass (1.9%), followed by Emerald Shiner (0.8%) (Table 5.4.7-6).

Billard Lake

In 2010, a total of 508 fish (574,189 g) representing five species were captured in standard gang index gill nets set in Billard Lake (Tables 5.4.7-3 and 5.4.7-4). The most common species captured in standard gang index gill nets were Lake Whitefish (47.4%), Walleye (22.1%) and Northern Pike (20.5%) (Table 5.4.7-3 and Figure 5.4.7-9). The highest biomass values for individual fish species were accounted for by Lake Whitefish (40.1%), followed by Northern Pike (28.5%) and Walleye (24.3%) (Table 5.4.7-4).

For the small mesh index gill nets, a total of 231 fish (23,739 g) representing eight species were captured (Tables 5.4.7-5 and 5.4.7-6). Troutperch (*Percopsis omiscomaycus*) was the most common species (38.1%) (Table 5.4.7-5, Figures 5.4.7-9) followed by Lake Whitefish (36.8%). For small-bodied fish from the small mesh gillnet catch, Troutperch accounted for the highest proportion of total biomass (2.0%) (Table 5.4.7-6).

Lower Churchill River

Over all years combined, a total of 1,122 fish (1,820,727 g) representing seven species were captured in standard gang index gill nets set in the lower Churchill River (Tables 5.4.7-3 and 5.4.7-4). For all years combined, the most common species captured in standard gang index gill nets were Lake Sturgeon (31.6%), Walleye (23.5%) and Lake Whitefish (20.3%) (Table 5.4.7-3 and Figure 5.4.7-10). Lake Sturgeon also accounted for the majority of the total biomass (44.3%), followed by Northern Pike (20.3%) and Walleye (17.7%) (Table 5.4.7-4).

For the small mesh index gill nets, a total of 958 fish (23,273 g) representing 15 species were captured in all years of sampling combined (Tables 5.4.7-5 and 5.4.7-6). The number of species captured ranged from a low of nine in 2009 to a high of 12 in both 2008 and 2010. Walleye was the most common species captured overall (46.4%), followed by Spottail Shiner (16.4%) and Troutperch (13.2%) (Table 5.4.7-5 and Figure 5.4.7-10). For small-bodied fish from the small mesh gillnet catch, Lake Chub accounted for the highest proportion of total biomass (3.5%), followed by Spottail Shiner (3.4%) and Troutperch (3.3%) (Table 5.4.7-6).

Hayes River

Over all years combined, a total of 295 fish (301,119 g) representing nine species were captured in standard gang index gill nets set in the Hayes River (Tables 5.4.7-3 and 5.4.7-4). For all years combined, the most common species captured in standard gang index gill nets was Walleye (30.2%) followed by Lake Sturgeon (29.2%) (Table 5.4.7-3 and Figure 5.4.7-11). The highest proportions of total biomass values for the two most common fish species mirrored that of the catch in numbers with Walleye comprising the highest proportion of total biomass (38.0%), followed by Lake Sturgeon (29.8%) (Table 5.4.7-4).

For the small mesh index gill nets for all years of sampling, a total of 30 fish (9,502 g) representing seven species were captured (Tables 5.4.7-5 and 5.4.7-6). The number of species captured ranged from three in 2009 to a high of five in both 2008 and 2010. Lake Sturgeon was the most common species captured overall (33.3%) (Table 5.4.7-5; Figure 5.4.7-11). For small-bodied fish captured in the small mesh gillnet catch, Lake Chub accounted for the highest proportion of total biomass (0.7%) (Table 5.4.7-6).

Gauer Lake

Over all years combined, a total of 2,168 fish (2,022,871 g) representing eight species were captured in standard gang index gill nets set in Gauer Lake (Tables 5.4.7-3 and 5.4.7-4). For all years combined, the most common species captured in standard gang index gill nets was White Sucker (27.9%) (Table 5.4.7-3 and Figure 5.4.7-1). The highest proportion of total biomass was accounted for by White Sucker (38.0%) (Table 5.4.7-4).

For the small mesh index gill nets for all years of sampling, a total of 1091 fish (66,886 g) representing 13 species were captured (Tables 5.4.7-5 and 5.4.7-6). The number of species captured ranged from a low of nine in 2009 and 2010 to a high of 12 in 2008. Spottail Shiner was the most common species captured overall (48.6%) (Table 5.4.7-5, Figure 5.4.7-11). Troutperch (16.3%) and Emerald Shiner (12.9%) were also abundant in catches for all years combined. For small-bodied fish from the small mesh gillnet catch, Spottail Shiner accounted for the highest proportion of total biomass (3.2%) (Table 5.4.7-6).

5.4.7.4 Catch Per Unit of Effort (CPUE)/Biomass Per Unit Effort (BPUE)

Partridge Breast Lake

Total CPUE and BPUE for the standard gang index gillnet catch from Partridge Breast Lake in 2009 was 58.1 fish/100m of net/24 h and 59,268 g/100m of net/24 h respectively (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-13 and 5.4.7-14). The highest individual species' CPUE and BPUE values were recorded for Northern Pike (16.7 and 23,097), followed by Walleye (16.3 and 15,051) and White Sucker (15.3 and 14,168) (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-15 and 5.4.7-16).

For the small mesh index gill nets, total CPUE and BPUE was 120.8 fish/30m of net/24 h and 8,410 g/30m of net/24 h respectively (Tables 5.4.7-8 and 5.4.7-10, Figures 5.4.7-13 and 5.4.7-14). The highest individual species' CPUE values were recorded for Spottail Shiner (56.5) followed by Yellow Perch (20.0) and Emerald Shiner (17.9) (Table 5.4.7-8, Figure 5.4.7-15). Similarly the highest BPUE values (small-bodied fish only) in the small mesh index gill nets were recorded for Spottail Shiner (320) and Emerald Shiner (103) (Table 5.4.7-10, Figure 5.4.7-16).

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 5.4.7-17 and 5.4.7-18 respectively. Northern Pike, Lake Whitefish and Walleye were captured at all sites in Partridge Breast Lake. CPUE values for Northern Pike, Lake Whitefish and Walleye were similar between sites while BPUE was more variable particularly for Northern Pike and Walleye. For all species combined CPUE and BPUE values were found to be fairly consistent among sites.

Northern Indian Lake

Total overall CPUE (BPUE) for the standard gang index gillnet catch in Northern Indian Lake was 61.8 fish (47,268 g) (Tables 5.4.7-7 and 5.4.7-9). Total CPUE and BPUE values increased yearly between 2008 and 2010 (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-13 and 5.4.7-14). The overall CPUE (BPUE) values for the standard gang index gill net catch were 50.9 fish (36,447) in 2008 rising to 75.9 (56,342 g) in 2010. The highest individual species' CPUE values for the standard gang index gillnet catch (all years combined) in Northern Indian Lake were recorded for Walleye (19.2), White Sucker (15.3) and Lake Whitefish (11.7) (Table 5.4.7-7, Figure 5.4.7-15). The highest BPUE values were for Walleye (13,209 g), White Sucker (12,633) and Northern Pike (11,050) (Table 5.4.7-9, Figure 5.4.7-16).

Total overall CPUE (BPUE) for the small mesh index gillnet catch in Northern Indian Lake (all years combined) was 124.8 fish (11,399 g) (Tables 5.4.7-8 and 5.4.7-10). The total CPUE value for 2008 (97.0) was approximately double the value for 2009 (53.8) and one-half the 2010 value (190.1) (Table 5.4.7-8, Figure 5.4.7-13). In the case of BPUE, the value for 2008 (6,549) was approximately one-half that in both 2009 (14,103) and 2010 (13,545) (Table 5.4.7-10, Figure 5.4.7-14). The highest overall individual species' CPUE values were recorded for Spottail Shiner (47.3) followed by Emerald Shiner (16.4) (Table 5.4.7-8, Figure 5.4.7-15). With respect to small-bodied fish captured in small mesh index gill nets the highest BPUE values were recorded for Spottail Shiner (236), Emerald Shiner (98) and Yellow Perch (92) (Table 5.4.7-7, Figure 5.4.7-16).

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 5.4.7-19 and 5.4.7-20, respectively. Northern Pike, Lake Whitefish and Walleye were captured at all sites sampled in Northern Indian Lake. The CPUE and BPUE values for Northern Pike, Lake Whitefish, Walleye and all fish combined were very similar within individual sites and also between years for the same sites with the exception of GN-02 for Lake Whitefish which had higher CPUE and BPUE values and varied from year to year.

Billard Lake

Total CPUE and BPUE for the standard gang index gillnet catch from Billard Lake in 2010 was 56.2 fish and 63,390 g, respectively (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-13 and 5.4.7-14). The highest individual CPUE values were recorded for Lake Whitefish (26.4), Walleye (12.7) and Northern Pike (11.5) (Table 5.4.7-7, Figure 5.4.7-15). The highest BPUE values were recorded for Lake Whitefish (25,098), Northern Pike (17,968) and Walleye (15,820) (Table 5.4.7-9, Figure 5.4.7-16).

For the small mesh index gill nets, total CPUE and BPUE values were 88.5 fish and 8,731 g, respectively (Tables 5.4.7-8 and 5.4.7-10, Figures 5.4.7-13 and 5.4.7-14). The highest individual species' CPUE values were recorded for Lake Whitefish (33.4) followed by Troutperch (33.2) (Table 5.4.7-8, Figure 5.4.7-15). For BPUE the highest values (small-bodied fish only) were recorded for Troutperch (177), followed by Spottail Shiner (53) (Table 5.4.7-10, Figure 5.4.7-16).

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 5.4.7-21 and 5.4.7-22, respectively. Northern Pike, Lake Whitefish and Walleye were captured at all sites sampled in Billard Lake. The CPUE/BPUE values for Northern Pike, Lake Whitefish, Walleye and all fish combined were similar for most sites with GN-04 having higher CPUE and BPUE values for Lake Whitefish and GN-05 having higher values for Walleye and all fish combined.

Lower Churchill River

Total overall CPUE (BPUE) for the standard gang index gillnet catch in the lower Churchill River (all years combined) was 39.4 fish (63,403 g) (Tables 5.4.7-7 and 5.4.7-9). Total CPUE (BPUE) values between all years of study for the standard gang index gillnet catches in the lower Churchill River were lowest in 2009 at 21.2 (35,765) and highest in 2010 at almost three times that value (59.3 [93,949]) (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-13 and 5.4.7-14). The highest individual species' CPUE values for the standard gang index gillnet catch (all years combined) in the lower Churchill River were recorded for Lake Sturgeon (12.0), Walleye (9.4) and Lake Whitefish (8.4) (Table 5.4.7-7, Figure 5.4.7-15). The highest BPUE values were for Lake Sturgeon (27,260), Northern Pike (13,049) and Walleye (11,427) (Table 5.4.7-9, Figure 5.4.7-16).

Total overall CPUE (BPUE) for the small mesh index gillnet catch in the lower Churchill River (all years combined) was 113.6 fish (2,883 g) (Tables 5.4.7-8 and 5.4.7-10). Total CPUE (BPUE) values followed a similar pattern to those for the standard gang index gill nets (Tables 5.4.7-8 and 5.4.7-10, Figures 5.4.7-13 and 5.4.7-14). CPUE (BPUE) was lowest in 2009 at 53.8 (1,963), intermediate in 2008 at 97.0 (3,086) and highest in 2010 at 190.1 (3,600 g). The highest overall CPUE values were recorded for Walleye (51.0) followed by Spottail Shiner (19.2) (Table 5.4.7-8, Figure 5.4.7-15). With respect to small-bodied fish species captured in small mesh index gill nets the highest BPUE values were recorded for Lake Chub (104), Spottail Shiner (96) and Troutperch (92) (Table 5.4.7-10, Figure 5.4.7-16).

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 5.4.7-23 and 5.4.7-24, respectively. Northern Pike, Lake Whitefish and Walleye were captured at all sites sampled in the lower Churchill River and had relatively consistent CPUE values both between sites and years with the exception of GN-05 for Lake Whitefish which was higher than all other sites and varied the most between years. BPUE values followed a similar pattern to the CPUE values, however, Northern Pike showed more variation between years for the same sites than the other species. The CPUE/BPUE values for all fish combined followed a similar pattern to Walleye due to its high contribution to the overall catch.

Hayes River

Total overall CPUE (BPUE) for the standard gang index gillnet catch in Hayes River (all years combined) was 10.5 fish (10,632 g) (Tables 5.4.7-7 and 5.4.7-9). Total CPUE and BPUE values were relatively dissimilar between each of the three years of study (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-13 and 5.4.7-14). The overall CPUE (BPUE) values for the standard gang index gill net were highest in 2010 at 15.4 (17,336) and lowest in 2009 at 5.8 (4,790). The highest individual species' CPUE values for the standard gang index gillnet catch (all years combined) in the Hayes River were recorded for Walleye (3.2) and Lake Sturgeon (3.1) (Table 5.4.7-7, Figure 5.4.7-15). The highest BPUE values were recorded for Walleye (4,105) and Lake Sturgeon (3,162) (Table 5.4.7-9, Figure 5.4.7-16).

Total overall CPUE (BPUE) for the small mesh index gillnet catch in the Hayes River (all years combined) was 4.1 fish (1,266 g) (Tables 5.4.7-8 and 5.4.7-10). Total CPUE (BPUE) values for 2008 (6.0 fish [1,430 g]) and 2010 (5.1 fish [2,159 g]) were relatively similar but the values for 2009 were considerably lower at 1.2 fish (209 g) (Tables 5.4.7-8 and 5.4.7-10, Figures 5.4.7-13 and 5.4.7-14. The highest overall individual species' CPUE values were recorded for Lake Sturgeon (1.3) followed by Walleye (0.9) (Table 5.4.7-8, Figure 5.4.7-15). With respect to small-bodied fish only as captured in small mesh index gill nets the highest BPUE values were recorded for Lake Chub (10) and Longnose Dace (*Rhinichthys cataractae*) (4) (Table 5.4.7-10, Figure 5.4.7-16).

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 5.4.7-25 and 5.4.7-26, respectively. Lake Whitefish and Walleye were captured at all sites sampled in the Hayes River. Northern Pike were captured at nearly all sites. The CPUE values for Northern Pike, Lake Whitefish and Walleye were consistent between sites and years with the exception of one site, GN-01, that was high and variable for Lake Whitefish. BPUE values showed a similar pattern to CPUE, however, Walleye at several sites were found to vary in value from year to year. The CPUE and BPUE values for all fish combined reflected those for Walleye more so than Northern Pike or Lake Whitefish.

Gauer Lake

Total overall CPUE (BPUE) for the standard gang index gillnet catch in Gauer Lake (all years combined) was 66.9 fish (61,588 g) (Tables 5.4.7-7 and 5.4.7-9). Overall CPUE (BPUE) values were similar between 2009 (59.9 [55,082]) and 2010 (61.1 [54,715]) and somewhat higher in 2008 (79.9 [74,967]) (Tables 5.4.7-7 and 5.4.7-9, Figures 5.4.7-13 and 5.4.7-14). The highest individual species' CPUE values for the standard gang index gillnet catch (all years combined) in Gauer Lake were recorded for White Sucker (18.7), Lake Whitefish (15.6) and Walleye (13.5) (Table 5.4.7-7, Figure 5.4.7-15). The highest BPUE values were for White Sucker (23,439), Northern Pike (12,961) and Lake Whitefish (11,596) (Table 5.4.7-9, Figure 5.4.7-16).

Total overall CPUE (BPUE) for the small mesh index gillnet catch in the lower Churchill River (all years combined) was 122.9 fish (7,753 g) (Tables 5.4.7-8 and 5.4.7-10). Total CPUE values for 2009 (92.4) and 2010 (112.8) were relatively similar but the value for 2008 was higher at 160.4 (Tables 5.4.7-8 and 5.4.7-10, Figure 5.4.7-13). Conversely, in the case of BPUE, the value for 2008 (4,969) was much lower than that for either 2009 (9,314) or 2010 (8,717) (Figure 5.4.7-14). The highest overall individual CPUE values were recorded for Spottail Shiner (57.8) followed by Troutperch (19.6) and Emerald Shiner (17.4) (Table 5.4.7-8, Figure 5.4.7-15). With respect to small-bodied fish species captured in small mesh index gill nets the highest BPUE values were recorded for Spottail Shiner (238), Yellow Perch (182) and Troutperch (89) (Table 5.4.7-10, Figure 5.4.7-16).

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 5.4.7-27 and 5.4.7-28, respectively. Northern Pike, Lake Whitefish and Walleye were captured at all sites sampled in Gauer Lake. All three species had consistent CPUE and BPUE values both among sites and between years. The mean overall CPUE and BPUE values for all species combined were fairly consistent in value; however, there was some variation between years for some sites.

5.4.7.5 Size and Condition

Partridge Breast Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 185 Northern Pike, 83 Lake Whitefish and 176 Walleye captured in standard gang and small mesh index gill nets from Partridge Breast Lake in 2009 (Tables 5.4.7-11, 5.4.7-12 and 5.4.7-13). In addition, bulk weights were collected from 15 Lake Whitefish and nine Walleye. Mean (±SD) fork lengths were as follows: Northern Pike = 585 (±89) mm; Lake Whitefish = 354 (±82); and Walleye = 429 (±60) mm.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.4.7-29, 5.4.7-30 and 5.4.7-31 respectively. Similarly, fork length frequency distributions for the same species are provided in Figures 5.4.7-32, 5.4.7-33 and 5.4.7-34.

Mean weights for Northern Pike, Lake Whitefish and Walleye were 1,377 g, 659 g and 883 g, respectively. Mean condition factors for these three species were as follows: Northern Pike = 0.64; Lake Whitefish = 1.44; Walleye = 1.10.

Northern Indian Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 300 Northern Pike, 391 Lake Whitefish and 749 Walleye captured in standard gang and small mesh index gill nets from Northern Indian Lake during 2008, 2009 and 2010 (Tables 5.4.7-11, 5.4.7-12 and 5.4.7-13). Bulk weights were collected from an additional 10 Lake Whitefish and 42 Walleye. Mean (±SD) fork lengths for all three species were similar from 2008 to 2010. Mean (±SD) fork lengths for Northern Pike were 580 (±124) mm, 579 (±116) mm and 568 (±127) mm for these three years respectively. Mean (±SD) fork lengths for Lake Whitefish and Walleye were also similar from 2008 to 2010 with 333 (±81) mm, 353 (±94) mm and 337 (±78) mm and 393 (±78) mm, 370 (±77) mm and 365 (±75) mm, respectively.

The mean fork length calculated for Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.4.7-29, 5.4.7-30 and 5.4.7-31, respectively. Similarly, fork length frequency distributions for the same species are provided in Figures 5.4.7-32, 5.4.7-33 and 5.4.7-34.

As was the case for fork length, mean weights for Northern Pike and Walleye from Northern Indian Lake were similar in 2008, 2009 and 2010 except that Lake Whitefish mean weight was relatively high in 2009 and Walleye mean weight was relatively high in 2008. Mean (±SD) weights for Northern Pike were 1,423 (±1,179) g, 1,384 (±871) g and 1,379 (±1,131) g for 2008, 2009 and 2010. Mean weights for Lake Whitefish were 585g, 749 g and 593 g for 2008, 2009 and 2010, and for Walleye they were 754 g, 579 g and 584 g, respectively. Condition factors for Northern Pike, Lake Whitefish and Walleye showed little variance from year to year. These values were 0.63 (2008), 0.63 (2009) and 0.64 (2010) for Northern Pike; 1.33, 1.41 and 1.34 for Lake Whitefish and 1.10, 1.10 and 1.06 for Walleye.

Billard Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) from 109 Northern Pike, 255 Lake Whitefish and 124 Walleye captured in standard gang and small mesh index gill nets from Billard Lake in 2010 (Tables 5.4.7-11, 5.4.7-12 and 5.4.7-13). Bulk weights were collected from an additional 71 Lake Whitefish. Mean (±SD) fork lengths were as follows: Northern Pike = 604 (±102) mm; Lake Whitefish = 395 (±75) mm; Walleye = 468 (±89) mm.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.4.7-29, 5.4.7-30 and 5.4.7-31. Similarly, fork length frequency distributions for the same species are provided in Figures 5.4.7-32, 5.4.7-33 and 5.4.7-34.

Mean (±SD, where calculated) weights for Northern Pike, Lake Whitefish and Walleye were 1,552 (±1,050) g, 735 g and 1,187 (±583)g respectively. Mean (±SD) condition factors for these three species were as follows: Northern Pike = 0.65 (±0.08); Lake Whitefish = 1.36 (±0.12); Walleye = 1.05 (±0.09).

Lower Churchill River

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 145 Northern Pike, 230 Lake Whitefish and 270 Walleye captured in standard gang and small mesh index gill nets from the lower Churchill River during 2008, 2009 and 2010 (Tables 5.4.7-11, 5.4.7-12 and 5.4.7-13). In addition, bulk weights were collected from one Northern Pike, 25 Lake Whitefish and 438 Walleye. Mean fork lengths for Lake Whitefish and Walleye were similar from year to year while those for Northern Pike rose slightly each year from 2008 to 2010. Mean (±SD) fork lengths for Northern Pike were 615 (±189) mm, 655 (±160) mm and 704 (±164) mm for these three years respectively. Mean (±SD) fork lengths for Lake Whitefish were 399 (±77) mm, 403 (±58) mm and 403 (±48) mm for 2008, 2009 and 2010 while those for Walleye were 474 (±85) mm, 464 (±88) mm and 443 (±88) mm.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.4.7-29, 5.4.7-30 and 5.4.7-31. Similarly, fork length frequency distributions for the same species are provided in Figures 5.4.7-32, 5.4.7-33 and 5.4.7-34.

Mean (±SD) weights for Northern Pike were relatively similar from year to year at 2,166 (±2,106) g, 2,558 (±2,174) g and 2,452 (±1,556)g for 2008, 2009 and 2010. Lake Whitefish weights were somewhat more variable at 929 g, 1,028 g and 786 g for the same years. Mean weights for Walleye were highly variable at 602 g, 1,199 g and 346 g respectively. Mean (±SD) condition factors were 0.70 (±0.09), 0.72 (±0.12) and 0.74 (±0.08) for 2008, 2009 and 2010 for Northern Pike, 1.35 (±0.19), 1.60 (±0.15) and 1.42 (±0.13) for Lake Whitefish and 1.11 (±0.12), 1.09 (±0.10) and 1.18 (±0.10) 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 5.4.7-11, 5.4.7-12 and 5.4.7-13). Weights only were collected from an additional seven Walleye. Mean (±SD) fork length was higher in 2008 (775±93 mm) for four individual Northern Pike than was the case for two individuals in 2009 (642±30 mm) or 10 individuals in 2010 (620±138 mm). The mean fork lengths for both Lake Whitefish and Walleye were similar from year to year. Mean (±SD, where calculated) fork lengths for Lake Whitefish were 366 (±25) mm, 364 mm and 319

(±58) mm for these three years respectively. Mean fork lengths for Walleye were also similar for these three years at 467 (±90) mm, 439 (±99) mm and 482 (±102) mm.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.4.7-29, 5.4.7-30 and 5.4.7-31. Fork length frequency distributions for the same species are provided in Figures 5.4.7-32, 5.4.7-33 and 5.4.7-34 respectively.

As was the case for fork length, mean weights for Northern Pike were higher in 2008 than 2009 and 2010 while those for Lake Whitefish and Walleye were similar for all years of study. Mean (±SD) weights for Northern Pike were 3,313 (±1,061) g, 1,920 (±311) g and 1,916 (±1,013) g for the three years. Mean (±SD, where calculated) weights for the same three years for Lake Whitefish were 691 (±245) g, 730 g and 515 (±199) g, and for Walleye were 467 (±90) g, 439 (±99) g and 482 (±102) g. Mean (±SD) condition factors for 2008, 2009 and 2010 were 0.70 (0.10), 0.72 (0.01) and 0.72 (0.06) for Northern Pike;1.37 (0.17), 1.51 and 1.46 (0.10) for Lake Whitefish; and 1.09 (0.10), 1.11 (0.12) and 1.13 (0.13) for Walleye.

Gauer Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 346 Northern Pike, 489 Lake Whitefish and 450 Walleye captured in standard gang and small mesh index gill nets from Gauer Lake during 2008, 2009 and 2010 (Tables 5.4.7-11, 5.4.7-12 and 5.4.7-13). In addition, bulk weights were collected from 26 Northern Pike, 24 Lake Whitefish and 77 Walleye. Mean fork lengths for all three species were similar from year to year. Mean (±SD) fork lengths for Northern Pike were 566 (±117) mm, 571 (±117) mm and 557 (±107) mm for the three years. Mean (±SD) fork lengths for Lake Whitefish were 352 (±78) mm, 363 (±77) mm and 348 (±68) mm and for Walleye were 388 (±57) mm, 390 (±63) mm and 387 (±58) mm for the same three years.

The mean fork length of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes is presented in Figures 5.4.7-29, 5.4.7-30 and 5.4.7-31. Fork length frequency distributions for the same species are provided in Figures 5.4.7-32, 5.4.7-33 and 5.4.7-34.

As was the case for fork length, mean weights for Northern Pike and Walleye from Gauer Lake were relatively similar in 2008, 2009 and 2010. Mean weights for Lake Whitefish were somewhat more dissimilar, showing a modest increase from 2008 to 2009 and a decrease from 2009 to 2010. Mean (±SD, where calculated) weights for Northern Pike were 1,372 g, 1,229 g and 1,293 (±936) g for these three years respectively. Mean weights for Lake Whitefish were 729 g, 816 g and 646 g and for Walleye they were 629g, 613g and 630g. Mean (±SD) condition factors for 2008, 2009 and 2010 were 0.69 (0.08), 0.67 (0.07) and 0.66 (0.08) for Northern Pike;

1.45 (0.19), 1.49 (0.14) and 1.39 (0.13) for Lake Whitefish; and 1.10 (0.10), 1.09 (0.09) and 1.11 (0.09) for Walleye.

5.4.7.6 Age Composition

Partridge Breast Lake

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in Partridge Breast Lake during 2009. Age frequency distributions are presented by year-class cohort (Tables 5.4.7-14, 5.4.7-15 and 8.7.3-16) and by age (Tables 5.4.7-17, 5.4.7-18 and 8.7.3-19, Figures 5.4.7-35, and 5.4.7-36 and 5.4.7-37). Year-classes represented ranged from 1995 to 2006 for Northern Pike, from 1992 to 2006 for Lake Whitefish and from 1989 to 2006 for Walleye.

These data suggest that for Northern Pike year-classes, 2002 and 2003 were the strongest, while for Walleye the 2000 and 2001 year-classes were the strongest. Lake Whitefish year-classes were fairly evenly distributed between 2002 and 2005, but few or no Lake Whitefish older than 8 years of age were present in the data.

Northern Pike, Lake Whitefish and Walleye length-, weight- and condition factor-by-age and year-class are provided in Tables 8.7.7-20, 8.7.7-21 and 8.7.7-22, respectively. Fitted typical von Bertalanffy growth curves for the same three species are provided in Figures 5.4.7-38, 5.4.7-39 and 5.4.7-40.

Northern Indian Lake

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in Northern Indian Lake during 2008, 2009 and 2010. Age frequency distributions are presented by year-class cohort (Tables 5.4.7-14, 5.4.7-15 and 8.7.3-16) and by age (Tables 5.4.7-17, 5.4.7-18 and 8.7.3-19; Figures 5.4.7-35, 5.4.7-36 and 5.4.7-37). Year-classes represented ranged from 1991 to 2008 for Northern Pike, from 1984 to 2008 for Lake Whitefish and from 1982 to 2007 for Walleye.

For each year of sampling, the modal age of Northern Pike was approximately 5 or 6 years of age. The 2008 and 2009 data for Lake Whitefish suggested that a particularly strong cohort was produced in 2001, while based on the 2010 data, 2003 was the strongest year-class even though very low numbers of fish from this cohort (n = 2) were caught in 2009. For Walleye, modes were generally around 9 or 10 years of age (Figure 5.4.7-16). Based on the 2008 data, the strongest year-class was produced in 1998, whereas based on 2009 and 2010 sampling the 2000 year-class was the strongest cohort. Very low numbers of Walleye under the age of five were caught in 2008 (n = 16), 2009 (n = 2) or 2010 (n = 9).

Northern Pike, Lake Whitefish and Walleye length-, weight- and condition factor-by-age and year-class are provided in Tables 8.7.7-20, 8.7.7-21 and 8.7.7-22, respectively. Fitted typical von Bertalanffy growth models for the same three species are provided in Figures 5.4.7-38, 5.4.7-39 and 5.4.7-40.

Billard Lake

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in Billard Lake during 2010. Age frequency distributions are presented by year-class cohort (Tables 5.4.7-14, 5.4.7-15 and 8.7.3-16) and by age (Tables 5.4.7-17, 5.4.7-18 and 8.7.3-19; Figures 5.4.7-35, and 5.4.7-36 and 5.4.7-37). Year-classes represented ranged from 1993 to 2007 for Northern Pike, from 1987 to 2008 for Lake Whitefish and from 1986 to 2006 for Walleye.

These data suggest that relatively strong Northern Pike year-classes were produced in 2003 and 2004. Strong year-classes for Lake Whitefish are apparent for each year from 2001 to 2006, with 2003 being a particularly strong cohort. All years from 1988 to 2006 are represented in the Walleye catch from Billard Lake with most years showing relatively good representation. Particularly strong year-classes are suggested in 1998, 2000 and 2003.

Northern Pike, Lake Whitefish and Walleye length-, weight- and condition factor-by-age and year-class are provided in Tables 8.7.7-20, 8.7.7-21 and 8.7.7-22 respectively. Fitted typical von Bertalanffy growth models for the same three species are provided in Figures 5.4.7-38, 5.4.7-39 and 5.4.7-40.

Lower Churchill River

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in the lower Churchill River during 2008, 2009 and 2010. Age frequency distributions are presented by year-class cohort (Tables 5.4.7-14, 5.4.7-15 and 8.7.3-16) and by age (Tables 5.4.7-17, 5.4.7-18 and 8.7.3-19, Figures 5.4.7-35, and 5.4.7-36 and 5.4.7-37). Year-classes represented ranged from 1990 to 2006 for Northern Pike, from 1987 to 2007 for Lake Whitefish and from 1981 to 2007 for Walleye.

These data suggest a relatively strong Northern Pike cohort was produced in 2002. With the exception of the 2001 year-class sampled in 2008, no one Lake Whitefish year-class was overly abundant. The majority of the Lake Whitefish belonged to year-classes produced between 2000 and 2005. There appeared to be a decline in young fish over the three year sampling period, and as a result the average age for Lake Whitefish increased by almost two years between 2008 and 2010 (from 6.8 in 2008, to 7.5 in 2009, to 8.6 in 2010). The data for Walleye suggested that strong cohorts were produced each year from 1995 to 1999.

Northern Pike, Lake Whitefish and Walleye length-, weight- and condition factor-by-age and year-class are provided in Tables 8.7.7-20, 8.7.7-21 and 8.7.7-22 respectively. Fitted typical von Bertalanffy growth models for the same three species are provided in Figures 5.4.7-38, 5.4.7-39 and 5.4.7-40.

Hayes River

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in the Hayes River during 2008, 2009 and 2010. Age frequency distributions are presented by year-class cohort (Tables 5.4.7-14, 5.4.7-15 and 8.7.3-16) and by age (Tables 5.4.7-17, 5.4.7-18 and 8.7.3-19, Figures 5.4.7-35, and 5.4.7-36 and 5.4.7-37). Year-classes represented 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, Lake Whitefish, or Walleye in the Hayes River.

Northern Pike, Lake Whitefish and Walleye length-, weight- and condition factor-by-age and year-class are provided in Tables 8.7.7-20, 8.7.7-21 and 8.7.7-22 respectively. Fitted typical von Bertalanffy growth models for the same three species are provided in Figures 5.4.7-38, 5.4.7-39 and 5.4.7-40.

Gauer Lake

Age frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in Gauer Lake during 2008, 2009 and 2010. Age frequency distributions are presented by year-class (Tables 5.4.7-14, 5.4.7-15 and 5.4.7-16) and by age (Tables 5.4.7-17, 5.4.7-18 and 5.4.7-19; Figures 5.4.7-35, 5.4.7-36 and 5.4.7-37). Year-classes represented ranged from 1993 to 2008 for Northern Pike, from 1980 to 2007 for Lake Whitefish and from 1990 to 2006 for Walleye.

These data suggest that strong Northern Pike cohorts were produced in all years from 2001 to 2005, with a particularly strong year-class in 2003. For Lake Whitefish, the modal year-class was produced in 2001 based on the 2008 sample, and 2006 based on the 2009 and 2010 samples. A majority of the Lake Whitefish caught and aged from Gauer Lake were produced between 2000 and 2002, while two additional cohorts (2005 and 2006) gained strength over time. The data suggested that the strongest Walleye year-classes were 1998 and 2000 based on 2008 sampling, 1999 based on 2009 sampling and 2000 based on 2010 sampling.

Northern Pike, Lake Whitefish and Walleye length-, weight- and condition factor-by-age and year-class are provided in Tables 8.7.7-20, 8.7.7-21 and 8.7.7-22 respectively. Fitted typical von Bertalanffy growth models for the same three species are provided in Figures 9.7.9-38, 5.4.7-39 and 5.4.7-40.

5.4.7.7 Deformities, Erosion, Lesions and Tumours (DELTs)

Partridge Breast Lake

A total of eight DELTs were recorded from 633 fish (1.3%) examined from Partridge Breast Lake in 2009 (Table 5.4.7-23). The highest incidence rate was observed for Northern Pike (4.1%, n = 98), followed by Lake Whitefish (1.1%, n = 185) and Walleye (1.1%, n = 185). In total, one erosion and three lesions were found on Northern Pike, one deformity and one lesion on Lake Whitefish and one deformity and one tumour on Walleye. No DELTs were observed on 165 White Sucker examined.

Northern Indian Lake

A total of 41 DELTs were recorded from 2,021 fish (2.0%) examined from Northern Indian Lake in 2008, 2009 and 2010 (Table 5.4.7-23). The highest incidence rate was observed for Lake Whitefish (2.7%, n = 401), followed by Walleye (2.0%, n = 791), White Sucker (1.9%, n = 529) and Northern Pike (1.3%, n = 300). In total, three deformities and eight lesions were found on Lake Whitefish; two deformities, two erosion, seven lesions and five tumours were found on Walleye; four deformities and six lesions on White Sucker, and two deformities and two erosion were found on Northern Pike.

Billard Lake

A total of seven DELTs were recorded from 623 fish (1.1%) examined from Billard Lake in 2010 (Table 5.4.7-23). The highest incidence rate was observed for Walleye (1.6%, n = 124), followed by White Sucker (1.6%, n = 63), Northern Pike (0.9%, n = 109) and Lake Whitefish (0.9%, n = 326). In total, one lesion and one tumour were found on Walleye, one lesion on White Sucker, one deformity on Northern Pike, and three lesions on Lake Whitefish. One Lake Sturgeon was also was examined for DELTs but none were observed.

Lower Churchill River

A total of 30 DELTs were recorded from 1,587 fish (1.9%) examined from the lower Churchill River in 2008, 2009 and 2010 (Table 5.4.7-23). The highest incidence rate was observed for Lake Whitefish (4.3 %, n = 55), followed by Lake Sturgeon (2.0%, n = 7), Northern Pike (1.4%, n = 146), Walleye (1.3%, n = 708) and White Sucker (0.8%, n = 119). In total, three deformities, three erosion and five lesions were found on Lake Whitefish, five deformities, one erosion and one lesion on Lake Sturgeon, one deformity and one erosion on Northern Pike, four deformities, two lesions and three tumours on Walleye and one erosion on White Sucker.

Hayes River

A total of nine DELTs were recorded from 254 fish (3.5%) examined from the Hayes River in 2008, 2009 and 2010 (Table 5.4.7-23). The highest incidence rate was observed for 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 erosion and two lesions were found on White Sucker; one lesion for each of Northern Pike and Lake Whitefish and one deformity, one lesion and one tumour on Walleye. No DELTs were observed on 96 Lake Sturgeon examined.

Gauer Lake

A total of 18 instances of DELTs were recorded from 1,868 (1.0%) individuals of four species of fish examined from Gauer Lake in 2008, 2009, and 2010 (Table 5.3.7-23). The highest incidence rate was observed to occur in White Sucker (2.2%, n = 604), followed by Northern Pike (0.6%, n = 328), Lake Whitefish (0.4%, n = 489) and Walleye (0.2%, n = 447). In total, seven deformities, three lesions and three tumours were found on White Sucker; one lesion and one tumour were found on Northern Pike; two lesions were found on Lake Whitefish; and one lesion was found on Walleye.

5.4.7.8 Index of Biological Integrity (IBI)

Index of Biotic Integrity scores based on 11 metrics were calculated for all Lower Churchill River Region waterbodies, both on- and off-system. On-system IBI scores varied from 57.5 (Northern Indian Lake 2009) to 74.6 (lower Churchill River 2010) (Table 5.4.7-24 and Figure 5.4.7-41). Off-system IBI scores ranged from 54.1 (Gauer Lake 2009) to 59.2 (Gauer Lake 2008 and Hayes River 2010). On-system species assemblages ranged from 11 to 12, with the exception of Billard Lake in 2010 that had a fish assemblage of nine species and the lower Churchill River in 2010 that had an assemblage of 14 species. Species assemblages for off-system waterbodies ranged from 11 to 13 in Gauer Lake and from eight to 11 in the Hayes River.

All waterbodies had two or three sensitive species present with the exception of Billard Lake (n=1). The lower Churchill River in 2008 had the lowest proportion of tolerant species (5.3%) while Northern Indian Lake (2009) had considerably higher proportions over all three years (16.5 to 21.2%). Gauer Lake had similar proportions across all three years (19.2 – 22.6%) whereas the Hayes River had a larger range from 13.2 to 28.8%.

The number of insectivore species in the lower Churchill River ranged from seven to 12 whereas other on-system areas ranged from five to eight. In Gauer Lake, this value ranged from seven to 10 and in the Hayes River ranged from four to six. Evenness values were lowest in Billard Lake (4.73) and highest in Northern Indian Lake in 2010 (8.66). In off-system areas, this value ranged from a low of 5.43 (Hayes River 2010) to a high of 8.29 (Gauer Lake 2008). Piscivorous species were dominant in the Partridge Breast Lake and Northern Indian Lake catches, followed by omnivorous species. However, in Billard Lake and the lower Churchill River, piscivores and insectivores dominated with low catches of omnivorous species present. In general, Gauer Lake had similar proportions of piscivores and omnivores with a lower proportion of insectivores. Hayes River had low proportions of omnivores in comparison to piscivores and insectivores.

The proportion of simple lithophilic spawners ranged from 0.48 in Partridge Breast Lake to 0.80 in Northern Indian Lake in 2010 and the lower Churchill River in 2010. In off-system areas, this proportion was lower in Gauer Lake (0.54 to 0.60) compared to the Hayes River (0.88 to 0.92). In general, CPUE values were similar in Partridge Breast, Northern Indian, and Billard lakes, all of which were higher than those in the lower Churchill River. Gauer Lake had high CPUE values ranging from 61.1 to 79.9 whereas the Hayes River had the lowest CPUE values ranging from 5.8 to 15.4. Percentage of deformities, erosion, lesions, and tumours were less than 3% for all waterbodies with the exception of the lower Churchill River in 2008 (6.25%) and the Hayes River in 2008 (3.45%) and 2009 (5.00%).

5.4.7.9 Spatial Comparisons

Overall, the fish assemblage as captured by standard gang index gillnet sets in the lower Churchill River mainstem waterbodies was found to be dominated by Walleye, Northern Pike, Lake Whitefish and White Sucker in the uppermost lakes (i.e., Partridge Breast Lake, Northern Indian Lake, and Billard Lake) as well as the off-system lacustrine waterbody (Gauer Lake) (Table 5.4.7-3). In the lower Churchill River, these species were also common; however, Lake Sturgeon dominated the catch. Lake Sturgeon was not captured in Partridge Breast Lake, Northern Indian Lake or Gauer Lake and was uncommon in Billard Lake. The lower Churchill River fish assemblage resembled that in the Hayes River except that Longnose Sucker was less common and Lake Whitefish and Northern Pike were more common in the lower Churchill River than in the Hayes River.

With respect to small-bodied fish species captured in the small mesh gillnet catches, Spottail Shiner, Yellow Perch, Emerald Shiner and Troutperch dominated the catch in the two uppermost on-system lakes (Partridge Breast Lake and Northern Indian Lake) as well as the off-system lacustrine waterbody (Gauer Lake) (Table 5.4.7-4). Moving downstream on the Churchill River mainstem, Yellow Perch were not captured in either Billard Lake or the lower Churchill River. Emerald Shiner was less common than farther upstream and Lake Chub was more common. Longnose Dace was captured in the lower Churchill River but not elsewhere in the lower Churchill River watershed. Logperch was captured only in the lower Churchill River and in Gauer Lake but was not found in any of the other waterbodies sampled in the Lower Churchill River Region. In the Hayes River, Lake Chub and Longnose Dace were the only small-bodied fish species captured.

Moving downstream on the lower Churchill River the catch in Partridge Breast Lake was comprised of 12 species, all of which were found in other Lower Churchill River Region waterbodies sampled. Notable absences from the catch in Partridge Breast Lake (species captured in other on-system Lower Churchill River Region waterbodies farther downstream) included Northern Pearl Dace (*Margariscus margarita*), Lake Sturgeon, Longnose Dace, and Logperch. The fish assemblage captured in Northern Indian Lake was comprised of 13 species, all of which were also found in other Lower Churchill River Region waterbodies. Absences from the catch included Lake Sturgeon, Arctic Grayling (*Thymallus articus*) and Logperch. Nine species were captured in Billard Lake, all of which were found in other on-system lakes in the region. Notable absences from the catch were Emerald Shiner, Cisco (*Coregonus artedi*), Yellow Perch and Burbot (*Lota lota*). Fifteen species were captured in the lower Churchill River (the highest species count in all Lower Churchill River Region waterbodies sampled), all of which were captured in other on-system and/or reference waterbodies in the region except Arctic Grayling. Logperch was captured only in the lower Churchill River and Gauer Lake while Arctic Grayling were captured only in the lower Churchill River and Longnose Dace were captured only in the lower Churchill and Hayes rivers.

With respect to the off-system waterbodies, the catch in the Hayes River was comprised of 11 species of which Silver Lamprey (*Ichthyomyzon unicuspis*), Shorthead Redhorse (*Moxostoma macrolepidotum*) and Brook Trout (*Salvelinus fontinalis*) were not found elsewhere in the region. Notable absences from the Hayes River catch (that were common in the lower Churchill River) included Spottail Shiner, Emerald Shiner, Troutperch, Yellow Perch and Cisco. In Gauer Lake the catch was made up of 13 species, all of which were found elsewhere in the region. Lake Sturgeon was not captured in Gauer Lake.

A comparison of mean CPUE values for the two annual on-system Lower Churchill River Region waterbodies (Northern Indian Lake and lower Churchill River) and the rotational waterbodies (Partridge Breast Lake and Billard Lake) are presented in Tables 5.4.7-7 and 5.4.7-8 (all fish) and Figures 8.7.5-13 and 8.7.5-15. The Lower Churchill River Region on-system waterbodies, with the exception of the lower Churchill River, were found to have relatively similar overall CPUE values for total catch from the standard gang index gill nets. The lower Churchill River had a lower overall CPUE for total catch, primarily as result of low CPUE in 2009. Of the most abundant species in on-system waterbodies, the CPUE for White Sucker was similar between the two upstream on-system waterbodies (i.e., Partridge Breast Lake and Northern Indian Lake) and also similar between the downstream waterbodies (i.e., Billard Lake and lower Churchill River); however, the CPUE of the latter was approximately one-third that of the former. For Lake Whitefish, no particular pattern was evident in CPUE with Billard Lake having the highest CPUE value followed by Northern Indian Lake, the lower Churchill River and Partridge Breast Lake. Northern Pike had the highest CPUE in Partridge Breast Lake, followed by Billard Lake then Northern Indian Lake and the lower Churchill River. The CPUE values for Walleye were similar for all on-system waterbodies with a decreasing trend downstream from Northern Indian Lake.

Notable differences in the CPUE values for the small mesh index gill nets set in the Lower Churchill River Region were evident particularly with respect to Lake Chub, Emerald Shiner and Spottail Shiner. The CPUE for Lake Chub in the lower Churchill River was much higher than more upstream waterbodies while the CPUE for Emerald Shiner was much lower in both Billard Lake and the lower Churchill River than in Partridge Breast Lake or Northern Indian Lake. Spottail Shiner had a higher CPUE in the two most upstream waterbodies than in the downstream waterbodies. Yellow Perch showed a decreasing CPUE from Partridge Breast Lake to Northern Indian Lake then was absent from the catch from more downstream waterbodies. Conversely, Logperch was absent from the Partridge Breast Lake and Northern Indian Lake catches, then showed a slight increase in CPUE in a downstream direction.

The CPUE values for White Sucker, Northern Pike, Lake Whitefish and all fish combined from both standard gang and small mesh index gill nets for Gauer Lake were generally similar to those in Partridge Breast Lake and Northern Indian Lake. CPUE values for the Hayes River were much lower for these same species and CPUE for total catch was approximately one quarter to one sixth of those in the lower Churchill River watershed.

A comparison of BPUE values for standard gang and small mesh index gillnet catches from all sampled waterbodies in the region is provided in Tables 5.4.7-9 and 5.4.7-10 and Figures 5.4.7-14 and 5.4.7-16. Generally BPUE values for all fish from both standard gang and small mesh index gill nets were comparable between all on-system waterbodies and Gauer Lake. The exception was the BPUE for small mesh index gill nets from the lower Churchill River which was lower than other on-system waterbodies and Gauer Lake. The overall BPUE value for Hayes River was much lower at approximately one fifth the value for other waterbodies in the region. As was the case with CPUE, the BPUE values for White Sucker and Lake Whitefish were highest in Partridge Breast Lake, Billard Lake and Partridge Breast Lake respectively. Walleye showed a decreasing trend in BPUE from Partridge Breast Lake to Northern Indian Lake and from Billard Lake to the lower Churchill River. BPUE values for small-bodied fish species from the small mesh index gill nets generally mirrored CPUE values for all waterbodies in the region.

Within each waterbody, site variability was examined by comparing mean CPUE values from the standard gang index gill nets for individual sites. With the exception of Partridge Breast Lake and Billard Lake, each of which only had one year of data, the three years of collected data (Northern Indian Lake, lower Churchill River, Hayes River and Gauer Lake) were pooled for individual sites. Total CPUE values are presented along with values for Northern Pike, Lake Whitefish and Walleye. In Partridge Breast Lake, total CPUE values ranging from approximately 35 (Site GN-09) to nearly 90 (Site GN-06) (Figure 5.4.7-17). In Northern Indian Lake these values were from approximately 25 (Site GN-13) to nearly 90 (Site GN-02) (Figure 5.4.7-19). In Billard Lake, total CPUE values ranged from below 40 for Site GN-01 to nearly 100 at Site GN-05 (Figure 5.4.7-21). In the lower Churchill River, total CPUE values ranged from approximately 15 (Site GN-06) to over 60 (Site GN-03) (Figure 5.4.7-23). For the off-system waterbodies, the Hayes River showed a small range of total CPUE between sites from approximately 5 (Site GN-09) to 18 (Site GN-01) (Figure 5.4.7-25). The range in total CPUE values for Gauer Lake was from approximately 40 at Site GN-07 to 90 at Site GN-08 (Figure 5.4.7-27).

With respect to IBI, scores were similar for all waterbodies in the Lower Churchill River Region despite some wide variations in some of the metrics under consideration, with the lower Churchill River waterbody having slightly higher values on average. Similarly, in off-system areas, Gauer Lake and the Hayes River had similar IBI values despite wide ranges in CPUE values and species assemblages.

5.4.7.10 Temporal Variability

CPUE values were used to examine temporal variability within the four waterbodies for which multi-year sampling occurred, i.e., Northern Indian Lake, lower Churchill River, Hayes River and Gauer Lake. Within Northern Indian Lake, overall standard gang index gillnet CPUE varied from a low of 50.9 in 2008 when water levels were around the upper quartile to a high of 75.9 in 2010 when water levels were at or near record lows for the period of record (see Section 5.4.2 for discussion) (Table 5.4.7-7). In the lower Churchill River annual total CPUE varied from a low in 2009 of 21.2 when flows slightly below record highs to a high in 2010 at 59.3 when flows were at or near record lows (see Section 5.4.2 for discussion). In the Hayes River the annual total CPUE also was lowest in 2009 (5.9) and highest in 2010 (15.4). The CPUE in Gauer Lake was highest in 2008 at 79.9 and lowest in 2009 at 59.9, the latter almost identical to the 2010 CPUE value of 61.1. Hydrologic information from the Gauer River suggests that there was considerable variation in the water level of Gauer Lake in the three study periods, with Gauer River flows near the lower quartile in 2008, somewhere between the upper quartile and record highs in 2009, and at or near record lows in 2010 (see Section 5.4.2).

With respect to the catch from the small mesh index gill nets, the CPUE in Northern Indian Lake increased yearly and displayed a large range between 2008 (42.1) and 2010 (211.2) (Table 5.4.7-8). The lower Churchill River displayed somewhat less variation but still ranged from a low of 53.8 in 2009 to a high of 190.1 in 2010. The Hayes River had a low overall CPUE in 2009 of 1.2 compared to relatively similar values in 2008 and 2010 of 6.0 and 5.1 respectively. Gauer Lake displayed declining overall CPUE from 2008 (163.5) to 2009 (92.4), then increased again in 2010 to less than the 2008 value.

The IBI values for Northern Indian Lake were similar across all three years, ranging from 57.5 to 61.1. IBI values for the lower Churchill River were higher than those in Northern Indian Lake, with the highest value (74.6) occurring in 2010. Off-system waterbodies had comparable values across all three years (Table 5.4.7-24 and Figure 5.4.7-41).

Table 5.4.7-1. Summary of site-specific physical measurements collected during CAMPP index gillnetting conducted in Lower Churchill River Region waterbodies, 2008 to 2010.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Partridge Breast Lake	GN-01	14	567957	6354808	26-Aug-09	24.33	7.8	5.9	12.0
Partridge Breast Lake	GN-02	14	567227	6356363	26-Aug-09	24.60	5.7	7.2	12.0
Partridge Breast Lake	GN-03	14	564465	6355790	26-Aug-09	24.58	6.3	9.5	12.0
Partridge Breast Lake	GN-04	14	560608	6357661	27-Aug-09	25.20	7.3	8.2	11.0
Partridge Breast Lake	GN-05	14	560996	6358412	27-Aug-09	26.90	7.1	5.1	11.5
Partridge Breast Lake	GN-06	14	561944	6357266	27-Aug-09	24.32	4.9	10.9	11.0
Partridge Breast Lake	GN-07	14	562352	6359394	28-Aug-09	23.32	6.5	6.3	12.0
Partridge Breast Lake	GN-08	14	560438	6359033	28-Aug-09	23.00	11.0	10.8	12.0
Partridge Breast Lake	GN-09	14	559841	6359379	28-Aug-09	22.78	7.5	10.0	12.0
Partridge Breast Lake	SN-01	14	567847	6354855	26-Aug-09	24.33	8.0	7.8	12.0
Partridge Breast Lake	SN-04	14	560586	6357650	27-Aug-09	25.20	5.4	7.3	11.0
Partridge Breast Lake	SN-07	14	562382	6359375	28-Aug-09	23.32	7.4	6.5	12.0
Northern Indian Lake	GN-08	14	606399	6360026	26-Aug-08	44.42	5.5	5.9	17.0
Northern Indian Lake	GN-09	14	605915	6366619	25-Aug-08	25.33	6.8	18.3	15.0
Northern Indian Lake	GN-10	14	606419	6363940	24-Aug-08	15.08	8.0	0.9	16.0
Northern Indian Lake	GN-11	14	607490	6361881	25-Aug-08	20.50	11.9	0.8	16.0
Northern Indian Lake	GN-12	14	607463	6363269	24-Aug-08	16.67	11.9	1.1	16.0
Northern Indian Lake	GN-13	14	607568	6360660	26-Aug-08	49.58	12.5	0.9	16.0
Northern Indian Lake	GN-14	14	607325	6360996	26-Aug-08	47.50	11.7	1.1	17.0
Northern Indian Lake	GN-15	14	608116	6362758	25-Aug-08	22.75	0.9	10.8	16.0
Northern Indian Lake	SN-03	14	605890	6366588	25-Aug-08	25.33	0.8	6.8	15.0
Northern Indian Lake	SN-08	14	606413	6360060	26-Aug-08	44.42	0.9	5.5	17.0

Table 5.4.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Northern Indian Lake	GN-01	14	598933	6350622	11-Aug-09	23.67	7.1	5.1	14.0
Northern Indian Lake	GN-02	14	603566	6349855	11-Aug-09	23.77	12.4	12.7	14.0
Northern Indian Lake	GN-03	14	606601	6350708	12-Aug-09	23.80	5.5	2.6	14.0
Northern Indian Lake	GN-04	14	600409	6350971	12-Aug-09	24.43	7.2	2.3	14.0
Northern Indian Lake	GN-05	14	605422	6356585	13-Aug-09	25.25	7.9	8.0	15.0
Northern Indian Lake	GN-06	14	608465	6353026	13-Aug-09	24.28	9.5	8.7	15.0
Northern Indian Lake	GN-07	14	606166	6359022	14-Aug-09	24.52	9.7	10.0	15.0
Northern Indian Lake	GN-08	14	606364	6360040	14-Aug-09	24.53	8.0	8.0	15.0
Northern Indian Lake	GN-09	14	605373	6366523	15-Aug-09	24.77	7.7	7.8	14.0
Northern Indian Lake	GN-10	14	606314	6363941	15-Aug-09	24.77	8.8	9.0	14.0
Northern Indian Lake	GN-12	14	607605	6363273	16-Aug-09	24.82	10.4	12.5	15.0
Northern Indian Lake	GN-14	14	607330	6361062	16-Aug-09	24.07	13.5	14.0	15.0
Northern Indian Lake	SN-03	14	606566	6350700	12-Aug-09	23.80	6.0	5.5	14.0
Northern Indian Lake	SN-05	14	605376	6356614	13-Aug-09	25.25	3.5	7.9	15.0
Northern Indian Lake	SN-09	14	605398	6366554	15-Aug-09	24.77	6.5	7.7	14.0
Northern Indian Lake	SN-12	14	607572	6363292	16-Aug-09	24.82	8.0	10.4	15.0
Northern Indian Lake	GN-01	14	599033	6350500	7-Aug-10	15.83	2.5	3.0	19.0
Northern Indian Lake	GN-02	14	604258	6349713	7-Aug-10	14.58	15.2	21.0	19.0
Northern Indian Lake	GN-03	14	606790	6350687	8-Aug-10	17.25	7.0	10.0	20.0
Northern Indian Lake	GN-04	14	600354	6350843	7-Aug-10	15.92	2.5	2.5	19.0
Northern Indian Lake	GN-05	14	605333	6356405	8-Aug-10	17.50	3.8	4.1	20.0
Northern Indian Lake	GN-06	14	608420	6352936	8-Aug-10	17.33	9.1	8.2	20.0
Northern Indian Lake	GN-07	14	606154	6359037	9-Aug-10	14.75	5.9	6.0	21.0
Northern Indian Lake	GN-08	14	606325	6359927	9-Aug-10	15.00	4.0	4.0	19.0
Northern Indian Lake	GN-09	14	605405	6366506	9-Aug-10	14.83	3.0	6.0	19.0
Northern Indian Lake	GN-10	14	606417	6363839	6-Aug-10	14.25	5.5	4.0	19.0
Northern Indian Lake	GN-11	14	607544	6361982	6-Aug-10	14.83	9.7	9.0	19.0
Northern Indian Lake	GN-12	14	607611	6363297	6-Aug-10	15.67	2.5	9.0	19.0
Northern Indian Lake	SN-03	14	606769	6350705	8-Aug-10	17.25	7.0	-	20.0
Northern Indian Lake	SN-05	14	605353	6356379	8-Aug-10	17.50	3.8	-	20.0
Northern Indian Lake	SN-09	14	605412	6366555	9-Aug-10	14.83	3.0	-	19.0
Northern Indian Lake	SN-12	14	607597	6363321	6-Aug-10	15.67	2.5	-	19.0

Table 5.4.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Billard Lake	GN-01	14	671175	6336533	23-Jul-10	20.00	9.0	7.8	18.5
Billard Lake	GN-02	14	671650	6336560	23-Jul-10	20.00	2.2	3.3	18.5
Billard Lake	GN-03	14	673959	6337121	24-Jul-10	18.50	5.0	3.0	20.0
Billard Lake	GN-04	14	672390	6337817	24-Jul-10	20.83	8.5	7.8	20.0
Billard Lake	GN-05	14	671572	6337385	25-Jul-10	19.33	2.5	5.2	22.0
Billard Lake	GN-06	14	673130	6337293	25-Jul-10	24.50	6.7	8.0	20.0
Billard Lake	GN-07	14	670542	6337415	26-Jul-10	23.75	3.2	3.0	23.0
Billard Lake	GN-08	14	675310	6337324	26-Jul-10	23.25	3.0	3.8	23.0
Billard Lake	GN-09	14	676095	6337262	26-Jul-10	21.00	1.0	3.4	22.0
Billard Lake	SN-03	14	673905	6337135	24-Jul-10	18.50	5.0	3.0	20.0
Billard Lake	SN-06	14	673159	6337269	25-Jul-10	24.50	6.7	8.0	20.0
Billard Lake	SN-09	14	676134	6337261	26-Jul-10	21.00	1.0	3.4	22.0
Lower Churchill River	GN-01	15	357186	6376811	12-Aug-08	26.87	0.5	3.0	21.0
Lower Churchill River	GN-02	15	360480	6379199	12-Aug-08	21.25	0.5	5.8	21.0
Lower Churchill River	GN-03	15	358509	6376564	13-Aug-08	20.15	3.3	0.5	22.0
Lower Churchill River	GN-04	15	360650	6382061	13-Aug-08	23.50	0.5	3.2	22.0
Lower Churchill River	GN-05	15	359665	6382897	14-Aug-08	16.28	4.5	0.5	21.0
Lower Churchill River	GN-06	15	360873	6380606	15-Aug-08	17.35	4.0	2.4	22.0
Lower Churchill River	GN-07	15	359599	6377858	15-Aug-08	15.90	0.5	2.2	22.0
Lower Churchill River	GN-08	15	355845	6382569	16-Aug-08	17.83	4.5	5.8	20.0
Lower Churchill River	GN-09	15	361161	6381301	16-Aug-08	19.00	3.9	0.5	20.0
Lower Churchill River	SN-03	15	358509	6376564	13-Aug-08	20.15	3.3	3.3	22.0
Lower Churchill River	SN-06	15	360873	6380606	15-Aug-08	17.35	4.7	4.0	22.0
Lower Churchill River	SN-08	15	355845	6382569	16-Aug-08	17.83	0.5	4.5	20.0
Lower Churchill River	GN-01	15	357320	6376786	12-Aug-09	19.75	3.3	2.7	14.1
Lower Churchill River	GN-02	15	360494	6379373	12-Aug-09	20.88	9.0	6.4	15.0
Lower Churchill River	GN-03	15	358501	6376515	13-Aug-09	22.57	1.8	1.9	14.7
Lower Churchill River	GN-04	15	360667	6382230	13-Aug-09	24.82	4.1	5.0	14.7
Lower Churchill River	GN-05	15	359708	6382934	15-Aug-09	21.83	9.5	1.5	14.4
Lower Churchill River	GN-06	15	361087	6380670	15-Aug-09	21.80	4.4	5.5	14.4
Lower Churchill River	GN-07	15	359640	6377733	16-Aug-09	19.17	4.0	2.9	14.4
Lower Churchill River	GN-08	15	355645	6383872	14-Aug-09	21.13	2.5	2.3	14.4
Lower Churchill River	GN-09	15	360637	6381661	14-Aug-09	25.17	2.1	8.7	14.4
Lower Churchill River	SN-03	15	358501	6376515	13-Aug-09	22.57	1.7	1.8	14.7
Lower Churchill River	SN-05	15	359708	6382934	15-Aug-09	21.83	9.5	1.5	14.4
Lower Churchill River	SN-08	15	355645	6383872	14-Aug-09	21.13	2.5	2.3	14.4

Table 5.4.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Lower Churchill River	GN-01	15	357387	6376685	11-Aug-10	22:13	3.1	0.2	19.0
Lower Churchill River	GN-02	15	360445	6379491	12-Aug-10	26:00	0.8	3.0	19.0
Lower Churchill River	GN-03	15	358464	6376582	11-Aug-10	22:47	2.9	3.3	19.0
Lower Churchill River	GN-04	15	360673	6381916	12-Aug-10	23:36	3.5	1.0	19.0
Lower Churchill River	GN-05	15	359608	6383044	13-Aug-10	24:11	3.7	4.0	20.0
Lower Churchill River	GN-06	15	360876	6380553	13-Aug-10	26:28	1.9	1.5	20.0
Lower Churchill River	GN-07	15	360947	6381612	15-Aug-10	20:55	2.3	2.6	15.0
Lower Churchill River	GN-08	15	355372	6383711	14-Aug-10	24:36	4.3	0.5	19.0
Lower Churchill River	GN-09	15	359343	6377258	15-Aug-10	25:11	3.6	3.0	15.0
Lower Churchill River	SN-05	15	359564	6383007	13-Aug-10	24:14	2.3	3.7	20.0
Lower Churchill River	SN-06	15	360876	6380553	11-Aug-10	22:57	0.9	2.9	19.0
Lower Churchill River	SN-08	15	355407	6383707	14-Aug-10	24:36	3.0	4.3	19.0
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	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	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	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

Table 5.4.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Hayes River	GN-01	15	519953	6286088	18-Jul-10	21.73	2.8	2.7	18.0
Hayes River	GN-02	15	518647	6286273	18-Jul-10	21.45	1.0	1.2	18.0
Hayes River	GN-03	15	518425	6287149	18-Jul-10	21.42	2.3	2.1	19.0
Hayes River	GN-04	15	519034	6289061	19-Jul-10	27.47	3.2	2.4	20.0
Hayes River	GN-05	15	518940	6291417	19-Jul-10	27.67	2.1	3.1	20.0
Hayes River	GN-06	15	520146	6292583	19-Jul-10	26.97	1.6	2.6	20.0
Hayes River	GN-07	15	520295	6285118	20-Jul-10	24.38	1.7	1.3	22.0
Hayes River	GN-08	15	520355	6284067	20-Jul-10	24.28	2.1	1.8	22.0
Hayes River	GN-09	15	520503	6280550	20-Jul-10	24.17	2.8	2.5	22.0
Hayes River	SN-01	15	519853	6286142	18-Jul-10	21.57	2.8	3.3	18.0
Hayes River	SN-06	15	519854	6292207	19-Jul-10	27.25	0.9	1.6	20.0
Hayes River	SN-09	15	520221	6281452	20-Jul-10	23.98	2.9	2.8	22.0
Gauer Lake	GN-01	14	570993	6307763	25-Jul-08	21.85	1.8	5.6	17.0
Gauer Lake	GN-02	14	567110	6308585	25-Jul-08	44.73	6.4	7.2	17.0
Gauer Lake	GN-03	14	564457	6312455	25-Jul-08	25.32	1.6	1.5	17.0
Gauer Lake	GN-04	14	568015	6310555	26-Jul-08	26.50	1.0	4.7	17.5
Gauer Lake	GN-05	14	571365	6314613	27-Jul-08	23.92	21.5	22.8	22.0
Gauer Lake	GN-06	14	568168	6314278	27-Jul-08	17.80	5.1	3.8	22.0
Gauer Lake	GN-07	14	568602	6311778	28-Jul-08	47.33	9.1	5.1	18.5
Gauer Lake	GN-08	14	566588	6317104	28-Jul-08	25.00	2.6	2.3	19.0
Gauer Lake	GN-09	14	562503	6310057	29-Jul-08	24.70	3.2	2.8	19.0
Gauer Lake	SN-03	14	564476	6312494	25-Jul-08	25.40	1.3	1.6	17.0
Gauer Lake	SN-05	14	571365	6314613	27-Jul-08	23.83	18.0	21.5	22.0
Gauer Lake	SN-09	14	562544	6310065	29-Jul-08	26.17	3.2	3.2	19.0
Gauer Lake	GN-01	14	570865	6307811	24-Jul-09	23.25	6.6	2.3	16.0
Gauer Lake	GN-02	14	567193	6308674	24-Jul-09	24.00	3.0	8.9	16.0
Gauer Lake	GN-03	14	564412	6312314	25-Jul-09	22.00	1.4	2.7	17.0
Gauer Lake	GN-04	14	567909	6310496	23-Jul-09	16.92	5.9	1.7	14.0
Gauer Lake	GN-05	14	571301	6314698	27-Jul-09	18.58	23.6	24.4	16.0
Gauer Lake	GN-06	14	568145	6314312	26-Jul-09	28.50	3.3	5.9	17.0
Gauer Lake	GN-07	14	568509	6311651	25-Jul-09	23.00	15.1	8.4	15.0
Gauer Lake	GN-08	14	566554	6316951	27-Jul-09	19.83	3.5	2.4	16.0
Gauer Lake	GN-09	14	562528	6309951	26-Jul-09	26.08	1.7	2.1	19.0
Gauer Lake	SN-03	14	564412	6312314	25-Jul-09	22.00	1.4	2.7	17.0
Gauer Lake	SN-05	14	571301	6314698	27-Jul-09	18.58	23.6	24.4	16.0
Gauer Lake	SN-09	14	562528	6309951	26-Jul-09	26.08	1.7	2.1	19.0

Table 5.4.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Gauer Lake	GN-01	14	570828	6307756	14-Jul-10	45.07	1.0	6.5	18.5
Gauer Lake	GN-02	14	567206	6308669	14-Jul-10	24.20	6.0	7.0	18.0
Gauer Lake	GN-03	14	564469	6312317	17-Jul-10	22.25	2.0	1.0	18.0
Gauer Lake	GN-04	14	567874	6310483	14-Jul-10	46.23	2.0	6.0	17.5
Gauer Lake	GN-05	14	571226	6314682	16-Jul-10	20.27	25.0	24.0	18.0
Gauer Lake	GN-06	14	568189	6314213	16-Jul-10	22.88	5.5	4.5	18.0
Gauer Lake	GN-07	14	568537	6311638	14-Jul-10	45.47	3.5	13.5	18.0
Gauer Lake	GN-08	14	566594	6317087	16-Jul-10	20.33	3.0	1.0	18.0
Gauer Lake	GN-09	14	562378	6309862	17-Jul-10	21.02	1.0	3.5	18.0
Gauer Lake	SN-03	14	564469	6312317	17-Jul-10	22.25	2.0	1.0	18.0
Gauer Lake	SN-05	14	571226	6314682	16-Jul-10	20.27	25.0	24.0	18.0
Gauer Lake	SN-09	14	562378	6309862	17-Jul-10	21.02	1.0	1.0	18.0

Table 5.4.7-2. Fish species list compiled from standard gang and small mesh index gillnetting conducted in Lower Churchill River Region waterbodies, 2008-2010.

Family	Common Name	Scientific Name	ID Code	Captured in Study Area		
				2008	2009	2010
Petromyzontidae	Silver Lamprey	*Ichthyomyzon unicuspis*	SLLM		+	
Acipenseridae	Lake Sturgeon	*Acipenser fulvescens*	LKST	+	+	+
Cyprinidae	Lake Chub	*Couesius plumbeus*	LKCH	+	+	+
	Northern Pearl Dace	*Margariscus nachtriebi*	NPDC	+	+	
	Emerald Shiner	*Notropis atherinoides*	EMSH	+	+	+
	Spottail Shiner	*Notropis hudsonius*	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	+	+	+
Salmonidae	Cisco	*Coregonus artedi*	CISC	+	+	+
	Lake Whitefish	*Coregonus clupeaformis*	LKWH	+	+	+
	Arctic Grayling	*Thymallus arcticus*	ARGR			+
	Brook Trout	*Salvelinus fontinalis*	BRTR		+	+
Percopsidae	Troutperch	*Percopsis omiscomaycus*	TRPR	+	+	+
Gadidae	Burbot	*Lota lota*	BURB	+	+	+
Percidae	Yellow Perch	*Perca flavescens*	YLPR	+	+	+
	Logperch	*Percina caprodes*	LGPR	+		+
	Walleye	*Sander vitreus*	WALL	+	+	+

Table 5.4.7-3 Standard gang index gillnet relative abundance summaries from Lower Churchill River Region waterbodies, 2008-2010 (and overall).

Species	Partridge Breast Lake		Northern Indian Lake								Billard Lake	
	2009		2008		2009		2010		Overall		2010	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	1	0.20
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	3	0.49	-	-	5	0.61	9	1.34	14	0.70	-	-
White Sucker	162	26.64	108	21.47	219	26.81	171	25.48	498	25.01	50	9.84
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	175	28.78	41	8.15	135	16.52	87	12.97	263	13.21	104	20.47
Cisco	15	2.47	67	13.32	45	5.51	86	12.82	198	9.94	-	-
Lake Whitefish	79	12.99	79	15.71	117	14.32	170	25.34	366	18.38	241	47.44
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	2	0.33	1	0.20	3	0.37	3	0.45	7	0.35	-	-
Yellow Perch	2	0.33	4	0.80	-	-	5	0.75	9	0.45	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	170	27.96	203	40.36	293	35.86	140	20.86	636	31.94	112	22.05
Total	608	100	503	100	817	100	671	100	1991	100	508	100

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

Table 5.4.7-3. continued.

Species	Lower Churchill River								Hayes River							
	2008		2009		2010		Overall		2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	1	1.79	-	-	1	0.34
Lake Sturgeon	66	21.02	35	17.07	254	42.12	355	31.64	12	15.00	14	25.00	60	37.74	86	29.15
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	5	1.59	2	0.98	7	1.16	14	1.25	11	13.75	10	17.86	8	5.03	29	9.83
White Sucker	17	5.41	17	8.29	68	11.28	102	9.09	3	3.75	7	12.50	13	8.18	23	7.80
Shorthead Redhorse	-	-	-	-	-	-	-	-	11	13.75	3	5.36	6	3.77	20	6.78
Northern Pike	57	18.15	36	17.56	51	8.46	144	12.83	4	5.00	2	3.57	10	6.29	16	5.42
Cisco	5	1.59	2	0.98	8	1.33	15	1.34	-	-	-	-	-	-	-	-
Lake Whitefish	88	28.03	62	30.24	78	12.94	228	20.32	10	12.50	1	1.79	10	6.29	21	7.12
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	2	3.57	8	5.03	10	3.39
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	76	24.20	51	24.88	137	22.72	264	23.53	29	36.25	16	28.57	44	27.67	89	30.17
Total	314	100	205	100	603	100	1122	100	80	100	56	100	159	100	295	100

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

Table 5.4.7-3. continued.

Species	Gauer Lake							
	2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-
Longnose Sucker	19	2.14	16	2.83	16	2.23	51	2.35
White Sucker	255	28.75	171	30.27	178	24.86	604	27.86
Shorthead Redhorse	-	-	-	-	-	-	-	-
Northern Pike	126	14.21	80	14.16	122	17.04	328	15.13
Cisco	64	7.22	14	2.48	12	1.68	90	4.15
Lake Whitefish	212	23.90	105	18.58	172	24.02	489	22.56
Arctic Grayling	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-
Burbot	34	3.83	6	1.06	3	0.42	43	1.98
Yellow Perch	48	5.41	42	7.43	26	3.63	116	5.35
Logperch	-	-	-	-	-	-	-	-
Walleye	129	14.54	131	23.19	187	26.12	447	20.62
Total	887	100	565	100	716	100	2168	100

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

Table 5.4.7-4. Standard gang index gillnet biomass summaries from Lower Churchill River Region waterbodies, 2008 - 2010 (and overall).

Species	Partridge Breast Lake			Northern Indian Lake											
	2009			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	3	3950	0.64	-	-	-	5	10130	1.48	9	4620	0.93	14	14750	0.95
White Sucker	162	149844	24.11	108	86400	23.12	219	172518	25.25	171	151231	30.29	498	410149	26.36
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	175	241740	38.90	41	61060	16.34	135	192328	28.15	87	123377	24.71	263	376765	24.21
Cisco	15	6523	1.05	67	17710	4.74	45	15762	2.31	86	20668	4.14	198	54140	3.48
Lake Whitefish	79	60074	9.67	79	48410	12.95	117	92949	13.60	170	105716	21.17	366	247075	15.88
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	2	1440	0.23	1	840	0.22	3	4310	0.63	3	4190	0.84	7	9340	0.60
Yellow Perch	2	161	0.03	4	400	0.11	-	-	-	5	592	0.12	9	992	0.06
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	170	157680	25.37	203	158870	42.51	293	195227	28.57	140	88917	17.81	636	443014	28.47
Total	608	621412	100	503	373690	100	817	683224	100	671	499311	100	1991	1556225	100

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

Table 5.4.7-4. continued.

Species	Billard Lake			Lower Churchill River											
	2010			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	1	9074	1.58	66	193519	37.18	35	102725	29.51	254	509747	53.54	355	805991	44.27
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	5	3010	0.58	2	2690	0.77	7	3080	0.32	14	8780	0.48
White Sucker	50	31750	5.53	17	13080	2.51	17	13890	3.99	68	51520	5.41	102	78490	4.31
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	104	163670	28.50	57	125550	24.12	36	94489	27.15	51	150343	15.79	144	370382	20.34
Cisco	-	-	-	5	1760	0.34	2	560	0.16	8	4160	0.44	15	6480	0.36
Lake Whitefish	241	230085	40.07	88	82850	15.92	62	70400	20.23	78	75380	7.92	228	228630	12.56
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	112	139610	24.31	76	100780	19.36	51	63290	18.18	137	157904	16.58	264	321974	17.68
Total	508	574189	100	314	520549	100	205	348044	100	603	952134	100	1122	1820727	100

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

Table 5.4.7-4. continued.

Species	Hayes River											
	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
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	11	4365	5.70	10	2590	5.63	8	2335	1.31	29	9290	3.09
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
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	10	6905	9.02	1	730	1.59	10	5610	3.14	21	13245	4.40
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	2	2360	5.13	8	8071	4.52	10	10431	3.46
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	35950	46.96	16	17340	37.69	44	61200	34.28	89	114490	38.02
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 5.4.7-4. continued.

Species	Gauer Lake											
	2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	19	19310	2.29	16	14010	2.70	16	14345	2.17	51	47665	2.36
White Sucker	255	331670	39.34	171	200280	38.66	178	236237	35.70	604	768187	37.98
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	126	178910	21.22	80	105540	20.37	122	156893	23.71	328	441343	21.82
Cisco	64	17290	2.05	14	4520	0.87	12	2526	0.38	90	24336	1.20
Lake Whitefish	212	157580	18.69	105	87206	16.83	172	114795	17.35	489	359581	17.78
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	34	41040	4.87	6	6650	1.28	3	4797	0.72	43	52487	2.59
Yellow Perch	48	8100	0.96	42	8010	1.55	26	4578	0.69	116	20688	1.02
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	129	89090	10.57	131	91852	17.73	187	127642	19.29	447	308584	15.25
Total	887	842990	100	565	518068	100	716	661813	100	2168	2022871	100

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

Table 5.4.7-5. Small mesh index gillnet relative abundance summaries from Lower Churchill River Region waterbodies, 2008-2010 (and overall).

Species	Partridge Breast Lake		Northern Indian Lake								Billard Lake	
	2009		2008		2009		2010		Overall		2010	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	5	1.36	-	-	4	0.80	6	1.08	10	0.86	1	0.43
Northern Pearl Dace	-	-	1	0.88	-	-	-	-	1	0.09	-	-
Emerald Shiner	53	14.36	20	17.70	57	11.47	68	12.19	145	12.41	-	-
Spottail Shiner	173	46.88	34	30.09	195	39.24	186	33.33	415	35.53	25	10.82
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	1	0.18	1	0.09	2	0.87
White Sucker	3	0.81	1	0.88	8	1.61	22	3.94	31	2.65	13	5.63
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	10	2.71	6	5.31	24	4.83	7	1.25	37	3.17	5	2.16
Cisco	1	0.27	7	6.19	2	0.40	88	15.77	97	8.30	-	-
Lake Whitefish	19	5.15	10	8.85	9	1.81	16	2.87	35	3.00	85	36.80
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	28	7.59	2	1.77	77	15.49	62	11.11	141	12.07	88	38.10
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	62	16.80	16	14.16	31	6.24	53	9.50	100	8.56	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	15	4.07	16	14.16	90	18.11	49	8.78	155	13.27	12	5.19
Total	369	100	113	100	497	100	558	100	1168	100	231	100

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

Table 5.4.7-5. continued.

Species	Lower Churchill River								Hayes River							
	2008		2009		2010		Overall		2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	4	1.72	-	-	-	-	4	0.42	3	25.00	1	33.33	6	40.00	10	33.33
Lake Chub	63	27.16	-	-	32	5.52	95	9.92	3	25.00	1	33.33	-	-	4	13.33
Northern Pearl Dace	-	-	3	2.05	-	-	3	0.31	-	-	-	-	-	-	-	-
Emerald Shiner	1	0.43	1	0.68	6	1.03	8	0.84	-	-	-	-	-	-	-	-
Spottail Shiner	50	21.55	21	14.38	86	14.83	157	16.39	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	47	8.10	47	4.91	-	-	1	33.33	-	-	1	3.33
Longnose Sucker	3	1.29	1	0.68	2	0.34	6	0.63	2	16.67	-	-	2	13.33	4	13.33
White Sucker	4	1.72	5	3.42	8	1.38	17	1.77	-	-	-	-	-	-	-	-
Shorthead Redhorse									1	8.33	-	-	1	6.67	2	6.67
Northern Pike	1	0.43	1	0.68	-	-	2	0.21	-	-	-	-	-	-	-	-
Cisco	1	0.43	-	-	16	2.76	17	1.77	-	-	-	-	-	-	-	-
Lake Whitefish	2	0.86	7	4.79	18	3.10	27	2.82	-	-	-	-	1	6.67	1	3.33
Arctic Grayling	-	-	-	-	1	0.17	1	0.10	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	9	3.88	102	69.86	15	2.59	126	13.15	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	1	0.43	-	-	3	0.52	4	0.42	-	-	-	-	-	-	-	-
Walleye	93	40.09	5	3.42	346	59.66	444	46.35	3	25.00	-	-	5	33.33	8	26.67
Total	232	100	146	100	580	100	958	100	12	100	3	100	15	100	30	100

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

Table 5.4.7-5. continued.

Species	Gauer Lake							
	2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-
Lake Chub	9	1.72	1	0.37	7	2.36	17	1.56
Northern Pearl Dace	-	-	-	-	-	-	-	-
Emerald Shiner	15	2.87	-	-	126	42.42	141	12.92
Spottail Shiner	335	64.18	143	52.57	52	17.51	530	48.58
Longnose Dace	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	1	0.37	1	0.34	2	0.18
White Sucker	8	1.53	1	0.37	-	-	9	0.82
Shorthead Redhorse								
Northern Pike	8	1.53	18	6.62	8	2.69	34	3.12
Cisco	3	0.57	-	-	-	-	3	0.27
Lake Whitefish	9	1.72	4	1.47	11	3.70	24	2.20
Arctic Grayling	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-
Troutperch	70	13.41	49	18.01	59	19.87	178	16.32
Burbot	5	0.96	-	-	-	-	5	0.46
Yellow Perch	38	7.28	23	8.46	6	2.02	67	6.14
Logperch	1	0.19	-	-	-	-	1	0.09
Walleye	21	4.02	32	11.76	27	9.09	80	7.33
Total	522	100	272	100	297	100	1091	100

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

Table 5.4.7-6. Small mesh index gillnet biomass summaries from Lower Churchill River Region waterbodies, 2008 - 2010 (and overall).

Species	Partridge Breast Lake			Northern Indian Lake											
	2009			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	5	34	0.13	-	-	-	4	32	0.06	6	61	0.17	10	93	0.08
Northern Pearl Dace	-	-	-	1	20	0.12	-	-	-	-	-	-	1	20	0.02
Emerald Shiner	53	304	1.19	20	120	0.69	57	284	0.49	68	440	1.21	145	844	0.76
Spottail Shiner	173	979	3.82	34	200	1.15	195	803	1.38	186	1137	3.14	415	2140	1.92
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	1	100	0.28	-	100	0.09
White Sucker	3	655	2.56	1	910	5.25	8	388	0.67	22	796	2.19	31	2094	1.88
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	10	13010	50.77	6	5830	33.66	24	27790	47.89	7	6280	17.32	37	39900	35.75
Cisco	1	20	0.08	7	170	0.98	2	81	0.14	88	1164	3.21	97	1415	1.27
Lake Whitefish	19	4555	17.78	10	3670	21.19	9	1468	2.53	16	4526	12.48	35	9664	8.66
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	28	136	0.53	2	12	0.07	77	345	0.59	62	300	0.83	141	657	0.59
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	62	249	0.97	16	110	0.64	31	144	0.25	53	570	1.57	100	824	0.74
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	15	5681	22.17	16	6280	36.25	90	26698	46.00	49	20893	57.61	155	53871	48.26
Total	369	25623	100	113	17322	100	497	58033	100	558	36267	100	1168	111622	100

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

Table 5.4.7-6. continued.

Species	Billard Lake			Lower Churchill River											
	2010			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	4	4380	62.59	-	-	-	-	-	-	4	4380	18.82
Lake Chub	1	14	0.06	63	460	6.57	-	-	-	32	348	3.18	95	808	3.47
Northern Pearl Dace	-	-	-	-	-	-	3	20	0.37	-	-	-	3	20	0.09
Emerald Shiner	-	-	-	1	10	0.14	1	4	0.07	6	47	0.43	8	61	0.26
Spottail Shiner	25	140	0.59	50	220	3.14	21	126	2.36	86	446	4.08	157	792	3.40
Longnose Dace	-	-	-	-	-	-	-	-	-	47	228	2.09	47	228	0.98
Longnose Sucker	2	35	0.15	3	20	0.29	1	15	0.28	2	18	0.16	6	53	0.23
White Sucker	13	370	1.56	4	50	0.71	5	80	1.50	8	62	0.57	17	192	0.82
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	5	5480	23.08	1	100	1.43	1	140	2.62	-	-	-	2	240	1.03
Cisco	-	-	-	1	10	0.14	-	-	-	16	89	0.81	17	99	0.43
Lake Whitefish	85	9650	40.65	2	750	10.72	7	534	10.00	18	88	0.80	27	1372	5.90
Arctic Grayling	-	-	-	-	-	-	-	-	-	1	450	4.12	1	450	1.93
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	88	470	1.98	9	58	0.83	102	586	10.97	15	113	1.03	126	757	3.25
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	1	10	0.14	-	-	-	3	17	0.16	4	27	0.12
Walleye	12	7580	31.93	93	930	13.29	5	3835	71.82	346	9029	82.57	444	13794	59.27
Total	231	23739	100	232	6998	100	146	5340	100	580	10935	100	958	23273	100

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

Table 5.4.7-6. continued.

Species	Hayes River											
	2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
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
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	1	56	0.90	1	56	0.59
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
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 5.4.7-6. continued.

Species	Gauer Lake											
	2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	9	55	0.33	1	10	0.04	7	44	0.19	17	109	0.16
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	15	77	0.47	-	-	-	126	388	1.68	141	465	0.70
Spottail Shiner	335	1360	8.21	143	600	2.20	52	196	0.85	530	2156	3.22
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	1	520	1.91	1	205	0.89	2	725	1.08
White Sucker	8	110	0.66	1	15	0.06	-	-	-	9	125	0.19
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	8	4950	29.90	18	14920	54.79	8	11207	48.52	34	31077	46.46
Cisco	3	390	2.36	-	-	-	-	-	-	3	390	0.58
Lake Whitefish	9	3580	21.62	4	1750	6.43	11	3497	15.14	24	8827	13.20
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	70	340	2.05	49	235	0.86	59	245	1.06	178	820	1.23
Burbot	5	25	0.15	-	-	-	-	-	-	5	25	0.04
Yellow Perch	38	380	2.30	23	1100	4.04	6	216	0.94	67	1696	2.54
Logperch	1	10	0.06	-	-	-	-	-	-	1	10	0.01
Walleye	21	5280	31.89	32	8080	29.67	27	7101	30.74	80	20461	30.59
Total	522	16557	100	272	27230	100	297	23099	100	1091	66886	100

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

Table 5.4.7-7. 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 Churchill River Region waterbodies, 2008-2010 (and overall).

Species	Partridge Breast Lake			Northern Indian Lake											
	2009 (#sites=9)			2008 (#sites=8)			2009 (#sites=12)			2010 (#sites=12)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	3	0.3	0.60	-	-	-	5	0.4	0.76	9	0.9	2.15	14	0.4	0.27
White Sucker	162	15.3	11.13	108	11.1	7.04	219	15.6	9.21	171	19.1	12.78	498	15.3	2.31
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	175	16.7	5.49	41	3.8	1.98	135	9.7	7.10	87	9.6	6.44	263	7.7	1.97
Cisco	15	1.5	1.59	67	7.4	5.29	45	3.3	4.09	86	10.0	7.55	198	6.9	1.97
Lake Whitefish	79	7.6	5.64	79	7.1	5.57	117	8.5	8.31	170	19.5	23.87	366	11.7	3.92
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	2	0.2	0.39	1	0.1	0.37	3	0.2	0.38	3	0.4	1.25	7	0.2	0.07
Yellow Perch	2	0.2	0.39	4	0.4	0.59	-	-	-	5	0.6	0.69	9	0.3	0.17
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	170	16.3	8.55	203	21.0	9.98	293	20.9	9.21	140	15.8	11.92	636	19.2	1.70
Total	608	58.1	14.91	503	50.9	18.84	817	58.6	13.41	671	75.9	24.60	1991	61.8	7.39

#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 5.4.7-7. continued.

Species	Billard Lake			Lower Churchill River											
	2010 (#sites=9)			2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	1	0.1	0.33	66	7.1	6.06	35	3.4	4.77	254	25.3	20.43	355	12.0	6.77
Lake Chub	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-		5	0.6	0.78	2	0.2	0.39	7	0.7	1.11	14	0.5	0.15
White Sucker	50	5.6	4.23	17	2.1	1.68	17	1.8	1.32	68	6.7	4.95	102	3.5	1.59
Shorthead Redhorse	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	104	11.5	4.11	57	6.6	5.64	36	3.8	3.72	51	4.9	2.79	144	5.1	0.83
Cisco	-	-		5	0.7	2.16	2	0.2	0.63	8	0.8	0.99	15	0.6	0.18
Lake Whitefish	241	26.4	11.64	88	11.3	14.64	62	6.5	5.43	78	7.5	8.10	228	8.4	1.48
Arctic Grayling	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Walleye	112	12.7	10.98	76	9.2	8.64	51	5.4	4.80	137	13.5	6.99	264	9.4	2.34
Total	508	56.2	16.74	314	37.7	20.52	205	21.2	14.49	603	59.3	26.25	1122	39.4	11.04

#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 5.4.7-7. continued.

Species	Hayes River 2008 (#sites=9) n	2008 CPUE	2008 SD	2009 (#sites=9) n	2009 CPUE	2009 SD	2010 (#sites=9) n	2010 CPUE	2010 SD	Overall (#years=3) n	Overall CPUE	Overall SE
Silver Lamprey	-	-	-	1	0.1	0.10	-	-	-	1	0.03	0.03
Lake Sturgeon	12	1.7	2.70	14	1.6	3.60	60	6.0	4.14	86	3.1	1.47
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	11	1.2	2.49	10	1.0	1.05	8	0.8	1.26	29	1.0	0.13
White Sucker	3	0.4	0.60	7	0.7	0.75	13	1.2	1.35	23	0.8	0.23
Shorthead Redhorse	11	1.5	1.56	3	0.3	0.69	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
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	10	1.4	2.67	1	0.1	0.30	10	1.0	0.84	21	0.8	0.38
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	2	0.2	0.60	8	0.8	0.54	10	0.3	0.23
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	3.7	3.30	16	1.6	1.65	44	4.2	2.37	89	3.2	0.79
Total	80	10.2	9.18	56	5.9	6.33	159	15.4	4.71	295	10.5	1.64

#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 5.4.7-7. continued.

Species	Gauer Lake											
	2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	19	1.4	2.94	16	1.7	2.50	16	1.4	3.05	51	1.5	0.10
White Sucker	255	23.2	15.00	171	18.1	11.03	178	14.9	9.33	604	18.7	2.40
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	126	10.8	7.27	80	8.3	3.48	122	10.2	7.67	328	9.8	0.76
Cisco	64	5.6	5.33	14	1.6	2.95	12	1.0	1.03	90	2.7	1.43
Lake Whitefish	212	20.1	11.35	105	11.5	5.80	172	15.1	8.85	489	15.6	2.52
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	34	3.3	9.95	6	0.7	1.87	3	0.3	0.69	43	1.4	0.95
Yellow Perch	48	4.3	6.54	42	4.1	7.54	26	2.8	4.42	116	3.7	0.49
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	129	11.2	8.48	131	14.0	11.84	187	15.3	4.16	447	13.5	1.23
Total	887	79.9	25.72	565	59.9	26.13	716	61.1	16.51	2168	66.9	6.47

#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 5.4.7-8. Mean biomass-per-unit-effort (BPUE) calculated for fish species captured in standard gang index (g/100 m/24 h) gill nets set in Lower Churchill River Region water bodies, 2008-20010 (and over).

Species	Partridge Breast Lake			Northern Indian Lake											
	2009 (#sites=9)			2008 (#sites=8)			2009 (#sites=12)			2010 (#sites=12)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	3	378	857	-	-	-	5	731	1843	9	472	1099	14	401	214
White Sucker	162	14168	11590	108	8703	5044	219	12324	8269	171	16871	13289	498	12633	2363
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	175	23097	8600	41	5497	3712	135	13854	11375	87	13800	10756	263	11050	2777
Cisco	15	641	746	67	1912	1837	45	1145	1667	86	2407	2677	198	1821	367
Lake Whitefish	79	5782	5823	79	4540	3960	117	6755	7436	170	12136	16011	366	7810	2255
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	2	135	355	1	108	304	3	311	602	3	503	1742	7	307	114
Yellow Perch	2	16	31	4	43	62	-	-	-	5	65	85	9	36	19
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	170	15051	8276	203	15644	6648	293	13894	8315	140	10087	7316	636	13208	1640
Total	608	59268	16139	503	36447	11594	817	49014	18858	671	56342	19754	1991	47268	5809

#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 5.4.7-8. continued.

Species	Billard Lake 2010 (#sites=9)			Lower Churchill River 2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	1	1008	3024	66	21036	15367	35	10043	13259	254	50703	44432	355	27260	12143
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	5	380	473	2	263	522	7	293	560	14	312	35
White Sucker	50	3496	3306	17	1596	1342	17	1477	950	68	5108	4154	102	2727	1191
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	104	17968	7175	57	14483	16040	36	10005	13431	51	14659	9343	144	13049	1523
Cisco	-	-	-	5	252	757	2	58	174	8	390	544	15	233	96
Lake Whitefish	241	25098	13221	88	10628	15287	62	7284	6006	78	7271	7529	228	8394	1117
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	112	15820	12683	76	12120	10526	51	6636	6358	137	15526	7058	264	11427	2590
Total	508	63390	19773	314	60495	29589	205	35765	25357	603	93949	46257	1122	63403	16859

#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 5.4.7-8. continued.

Species	Hayes River											
	2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)		
	n	BPUE	SD	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
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
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
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
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	10	945	1630	1	77	230	10	539	441	21	520	251
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	2	238	713	8	801	583	10	346	238
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	29	4672	5048	16	1749	1686	44	5895	4287	89	4105	1230
Total	80	9768	9262	56	4790	5006	159	17336	6117	295	10632	3647

#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 5.4.7-8. continued.

Species	Gauer Lake											
	2008 (#sites=9)			2009 (#sites=9)			2010 (#sites=9)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	19	1191	2215	16	1443	1828	16	1104	2055	51	1246	102
White Sucker	255	29769	19332	171	21199	12364	178	19350	12708	604	23439	3209
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	126	15104	8983	80	11109	5665	122	12671	9724	328	12961	1162
Cisco	64	1527	1864	14	493	766	12	189	247	90	737	405
Lake Whitefish	212	14983	9393	105	9503	4884	172	10301	6954	489	11596	1709
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	34	4003	12009	6	824	2404	3	414	980	43	1747	1134
Yellow Perch	48	705	1010	42	779	1437	26	475	740	116	653	91
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	129	7685	6449	131	9731	8624	187	10209	3743	447	9208	774
Total	887	74967	21910	565	55082	24063	716	54715	17670	2168	61588	6690

#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 5.4.7-9. Mean catch-per-unit-effort (CPUE) calculated for fish species captured in small mesh index gill nets (fish/30 m/24 h) set in the Lower Churchill River Region waterbodies, 2008-2010 (and overall).

Species	Partridge Breast Lake			Northern Indian Lake											
	2009 (#sites=3)			2008 (#sites=2)			2009 (#sites=4)			2010 (#sites=4)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	5	1.6	1.97	-	-	-	4	1.0	1.12	6	2.3	3.06	10	1.1	0.67
Northern Pearl Dace	-	-	-	1	0.3	0.38	-	-	-	-	-	-	1	0.1	0.09
Emerald Shiner	53	17.9	21.82	20	9.3	12.35	57	13.8	19.52	68	26.1	18.46	145	16.4	5.01
Spottail Shiner	173	56.5	48.50	34	12.9	5.95	195	47.2	52.24	186	71.1	66.26	415	43.7	16.91
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	1	0.4	0.70	1	0.1	0.12
White Sucker	3	1.0	1.02	1	0.3	0.38	8	1.9	3.26	22	8.2	6.32	31	3.5	2.40
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	10	3.3	0.69	6	2.4	1.91	24	5.9	2.28	7	2.6	1.82	37	3.6	1.12
Cisco	1	0.3	0.55	7	2.7	1.53	2	0.5	0.56	88	33.1	23.54	97	12.1	10.53
Lake Whitefish	19	6.2	3.22	10	3.5	0.38	9	2.2	2.22	16	6.1	3.56	35	3.9	1.13
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	28	9.2	8.09	2	0.7	0.28	77	19.1	21.14	62	23.9	27.66	141	14.6	7.06
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	62	20.0	21.93	16	4.9	2.96	31	7.5	13.12	53	19.3	20.42	100	10.6	4.41
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	15	4.8	6.65	16	5.1	1.91	90	21.8	13.34	49	18.3	5.96	155	15.1	5.07
Total	369	120.8	93.41	113	42.1	16.80	497	121.0	91.36	558	211.2	128.80	1168	124.8	48.85

#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 5.4.7-9. continued.

Species	Billard Lake 2010 (#sites=3)			Lower Churchill River 2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	4	1.7	1.51	-	-	-	-	-	-	4	0.6	0.57
Lake Chub	1	0.4	0.74	63	27.0	20.26	-	-	-	32	10.6	18.31	95	12.5	7.86
Northern Pearl Dace	-	-	-	-	-	-	3	1.1	1.84	-	-	-	3	0.4	0.35
Emerald Shiner	-	-	-	1	0.4	0.69	1	0.4	0.66	6	2.0	3.43	8	0.9	0.53
Spottail Shiner	25	9.5	16.49	50	21.2	18.64	21	7.9	11.88	86	28.2	25.48	157	19.1	5.95
Longnose Dace	-	-	-	-	-	-	-	-	-	47	15.3	26.47	47	5.1	5.09
Longnose Sucker	2	0.7	1.13	3	1.2	2.06	1	0.4	0.64	2	0.7	1.13	6	0.7	0.24
White Sucker	13	5.0	5.63	4	1.8	3.19	5	1.9	1.68	8	2.6	4.57	17	2.1	0.26
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	5	1.7	2.01	1	0.5	0.80	1	0.4	0.66	-	-	-	2	0.3	0.14
Cisco	-	-	-	1	0.5	0.78	-	-	-	16	5.3	8.31	17	1.9	1.69
Lake Whitefish	85	33.4	32.68	2	0.8	1.37	7	2.6	2.86	18	5.9	10.29	27	3.1	1.51
Arctic Grayling	-	-	-	-	-	-	-	-	-	1	0.3	0.57	1	0.1	0.11
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	88	33.2	15.80	9	3.6	5.14	102	37.4	57.12	15	5.0	7.74	126	15.3	11.03
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	1	0.4	0.69	-	-	-	3	1.0	0.99	4	0.5	0.29
Walleye	12	4.6	4.97	93	37.9	48.10	5	1.8	0.68	346	113.3	99.02	444	51.0	32.84
Total	231	88.5	23.42	232	97.0	69.78	146	53.8	54.52	580	190.1	164.03	958	113.6	40.22

#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 5.4.7-9. continued.

Species	Hayes River											
	2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
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
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	1	0.5	0.90	-	-	-	1	0.3	0.58	2	0.3	0.15
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	1	0.3	0.58	1	0.1	0.11
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	3	1.6	2.68	-	-	-	5	1.7	2.89	8	1.1	0.54
Total	12	6.0	8.22	3	1.2	2.01	15	5.1	6.20	30	4.1	1.49

#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 5.4.7-9. continued.

Species	Gauer Lake											
	2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#sites=3)		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	9	2.8	2.48	1	0.3	0.53	7	2.6	2.35	17	1.9	0.80
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	15	4.6	7.16	-	-	-	126	47.7	69.89	141	17.4	15.18
Spottail Shiner	335	104.1	90.93	143	49.6	55.90	52	19.6	26.87	530	57.8	24.71
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	1	0.4	0.75	1	0.4	0.68	2	0.3	0.14
White Sucker	8	2.5	2.15	1	0.4	0.63	-	-	-	9	1.0	0.77
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	8	2.5	1.36	18	6.3	7.24	8	3.0	3.50	34	3.9	1.18
Cisco	3	1.0	1.01	-	-	-	-	-	-	3	0.3	0.33
Lake Whitefish	9	2.9	0.90	4	1.3	1.17	11	4.2	1.84	24	2.8	0.83
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	70	22.9	18.81	49	15.7	17.17	59	22.7	20.74	178	20.4	2.36
Burbot	5	1.7	2.11	-	-	-	-	-	-	5	0.6	0.55
Yellow Perch	38	11.9	15.40	23	7.6	6.73	6	2.3	3.96	67	7.3	2.78
Logperch	1	0.3	0.55	-	-	-	-	-	-	1	0.1	0.10
Walleye	21	6.5	5.86	32	10.8	9.63	27	10.3	7.19	80	9.2	1.34
Total	522	163.5	96.82	272	92.4	84.82	297	112.8	86.54	1091	122.9	21.16

#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 5.4.7-10. Mean biomass-per-unit-effort (BPUE) calculated for fish species captured in small mesh index (g/30 m/24 h) gill nets set in Lower Churchill River Region water bodies, 2008-20010 (and over).

Species	Partridge Breast Lake			Northern Indian Lake											
	2009 (#sites=3)			2008 (#sites=2)			2009 (#sites=4)			2010 (#sites=4)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	5	11	16	-	-	-	4	8	9	6	24	34	10	10	7
Northern Pearl Dace	-	-	-	1	5	8	-	-	-	-	-	-	1	2	2
Emerald Shiner	53	103	124	20	55	70	57	69	93	68	169	131	145	98	36
Spottail Shiner	173	320	283	34	78	50	195	195	204	186	436	445	415	236	105
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	1	35	70	1	12	12
White Sucker	3	225	387	1	246	348	8	94	178	22	286	357	31	209	59
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	10	4302	1463	6	2365	1855	24	6776	2082	7	2379	2456	37	3840	1468
Cisco	1	6	11	7	60	9	2	20	23	88	433	275	97	171	132
Lake Whitefish	19	1497	2421	10	1507	1260	9	352	472	16	1741	1378	35	1200	429
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	28	45	39	2	4	2	77	85	90	62	115	127	141	68	33
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	62	80	89	16	34	21	31	35	60	53	208	226	100	92	58
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	15	1822	1938	16	2195	178	90	6470	2973	49	7719	3851	155	5462	1672
Total	369	8410	3088	113	6549	3042	497	14103	4611	558	13545	6410	1168	11399	2430

#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 5.4.7-10. continued.

Species	Billard Lake 2010 (#sites=3)			Lower Churchill River 2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	4	1989	2963	-	-	-	-	-	-	4	663	663
Lake Chub	1	6	10	63	196	110	-	-	-	32	115	199	95	104	57
Northern Pearl Dace	-	-	-	-	-	-	3	7	12	-	-	-	3	2	2
Emerald Shiner	-	-	-	1	4	7	1	2	3	6	16	27	8	7	4
Spottail Shiner	25	53	92	50	93	81	21	48	71	86	147	171	157	96	29
Longnose Dace	-	-	-	-	-	-	-	-	-	47	74	128	47	25	25
Longnose Sucker	2	11	20	3	8	14	1	6	10	2	6	10	6	6	1
White Sucker	13	147	117	4	23	40	5	30	28	8	20	35	17	24	3
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	5	1827	2513	1	46	80	1	53	92	-	-	-	2	33	17
Cisco	-	-	-	1	4	8	-	-	-	16	29	48	17	11	9
Lake Whitefish	85	3501	2964	2	298	516	7	202	342	18	29	50	27	176	79
Arctic Grayling	-	-	-	-	-	-	-	-	-	1	146	253	1	49	49
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	88	177	84	9	24	24	102	215	342	15	37	55	126	92	61
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	1	4	7	-	-	-	3	6	5	4	3	2
Walleye	12	3009	1911	93	397	320	5	1402	416	346	2975	1838	444	1591	750
Total	231	8731	2994	232	3086	2942	146	1963	600	580	3600	2318	958	2883	483

#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 5.4.7-10. continued.

Species	Hayes River 2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#years=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
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
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Dace	-	-	-	1	12	21	-	-	-	1	4	4
Longnose Sucker	2	7	8	-	-	-	2	19	33	4	9	6
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	1	98	170	-	-	-	1	19	33	2	39	30
Northern Pike	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	1	19	32	1	6	6
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-
Burbot	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	3	160	278	-	-	-	5	407	706	8	189	118
Total	12	1430	2443	3	209	362	15	2159	1920	30	1266	569

#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 5.4.7-10. continued.

Species	Gauer Lake											
	2008 (#sites=3)			2009 (#sites=3)			2010 (#sites=3)			Overall (#sites=3)		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-
Lake Chub	9	17	15	1	3	5	7	16	17	17	12	5
Northern Pearl Dace	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	15	24	35	-	-	-	126	146	205	141	57	45
Spottail Shiner	335	422	366	143	209	239	52	74	86	530	235	101
Longnose Dace	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	1	224	388	1	81	140	2	102	65
White Sucker	8	34	30	1	5	9	-	-	-	9	13	11
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	8	1573	200	18	5155	5589	8	4187	4261	34	3638	1070
Cisco	3	130	210	-	-	-	-	-	-	3	43	43
Lake Whitefish	9	1164	1048	4	596	569	11	1352	973	24	1037	227
Arctic Grayling	-	-	-	-	-	-	-	-	-	-	-	-
Brook Trout	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	70	112	130	49	75	84	59	94	78	178	94	11
Burbot	5	8	11	-	-	-	-	-	-	5	3	3
Yellow Perch	38	119	147	23	346	465	6	82	142	67	182	82
Logperch	1	3	5	-	-	-	-	-	-	1	1	1
Walleye	21	1622	2180	32	2701	2349	27	2685	101	80	2336	357
Total	522	5228	2387	272	9314	8292	297	8717	4227	1091	7753	1274

#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 5.4.7-11. 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 Churchill River Region waterbodies, 2008-2010.

Mesh (in)	Partridge Breast Lake			Northern Indian Lake									Billard Lake		
	2009			2008			2009			2010			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)															
SM	10	566	75	6	531	109	24	550	87	7	485	121	5	550	81
2	52	567	95	12	503	104	47	535	119	31	517	141	19	527	90
3	74	567	78	15	574	50	45	572	74	38	566	74	45	610	108
3.75	30	619	76	6	621	60	25	636	82	11	666	116	28	627	81
4.25	16	661	93	5	762	166	14	671	177	5	690	49	8	679	71
5	3	660	67	3	629	213	4	659	234	2	841	122	4	651	113
Total	185	585	89	47	580	124	159	579	116	94	568	127	109	604	102
Weight (g)															
SM	10	1301	517	6	972	440	24	1158	618	7	897	835	5	1096	408
2	52	1287	678	12	883	443	47	1095	774	31	1132	1193	19	1012	433
3	74	1222	571	15	1193	305	45	1232	532	38	1184	470	45	1608	1291
3.75	30	1568	690	6	1518	350	25	1731	934	11	2073	1585	28	1685	869
4.25	16	1991	677	5	3322	2598	14	2264	1087	5	2276	598	8	2134	1107
5	3	1817	950	3	2287	1746	4	2609	1715	2	4565	1690	4	1955	843
Total	185	1377	668	47	1423	1179	159	1384	871	94	1379	1131	109	1552	1050
Condition Factor (K)															
SM	10	0.69	0.05	6	0.61	0.06	24	0.65	0.05	7	0.65	0.06	5	0.64	0.08
2	52	0.65	0.06	12	0.62	0.06	47	0.63	0.06	31	0.63	0.08	19	0.66	0.08
3	74	0.63	0.06	15	0.62	0.07	45	0.62	0.06	38	0.62	0.07	45	0.64	0.08
3.75	30	0.63	0.06	6	0.63	0.06	25	0.63	0.07	11	0.64	0.07	28	0.64	0.08
4.25	16	0.67	0.07	5	0.65	0.05	14	0.64	0.07	5	0.68	0.06	8	0.65	0.10
5	3	0.60	0.16	3	0.74	0.08	4	0.70	0.06	2	0.76	0.05	4	0.68	0.05
Total	185	0.64	0.06	47	0.63	0.07	159	0.63	0.06	94	0.64	0.07	109	0.65	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 5.4.7-11. continued.

Mesh (in)	Lower Churchill River									Hayes River								
	2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																		
SM	-	-	-	1	276	-	-	-	-	-	-	-	-	-	-	-	-	-
2	19	558	268	5	539	107	14	665	208	1	654	-	-	-	-	2	391	20
3	27	608	109	17	621	110	16	628	129	-	-	-	1	621	-	4	675	91
3.75	6	701	134	8	684	121	13	758	128	1	875	-	-	-	-	3	654	59
4.25	4	728	160	2	976	37	6	823	75	2	785	37	1	663	-	1	756	-
5	1	884	-	4	823	79	2	893	66	-	-	-	-	-	-	-	-	-
Total	57	615	189	37	655	160	51	704	164	4	775	93	2	642	30	10	620	138
Weight (g)																		
SM	1	100	-	1	140	-	-	-	-	-	-	-	-	-	-	-	-	-
2	19	2243	2741	5	1168	656	10	1528	1226	1	1750	-	-	-	-	2	440	113
3	27	1788	1500	17	1932	1450	14	1696	950	-	-	-	1	1700	-	4	2330	875
3.75	6	2768	2068	8	2593	1459	13	3551	1592	1	3990	-	-	-	-	3	2020	664
4.25	4	3258	2189	2	8394	1283	4	3835	673	2	3755	290	1	2140	-	1	2900	-
5	1	5020	-	4	4569	1984	-	-	-	-	-	-	-	-	-	-	-	-
Total	58	2166	2106	37	2558	2174	41	2452	1556	4	3313	1061	2	1920	311	10	1916	1013
Condition Factor (K)																		
SM	-	-	-	1	0.67	-	-	-	-	-	-	-	-	-	-	-	-	-
2	19	0.69	0.07	5	0.69	0.06	10	0.72	0.10	1	0.63	-	-	-	-	2	0.73	0.08
3	27	0.69	0.11	17	0.69	0.13	14	0.73	0.08	-	-	-	1	0.71	-	4	0.73	0.05
3.75	6	0.71	0.08	8	0.73	0.09	13	0.75	0.08	1	0.60	-	-	-	-	3	0.71	0.08
4.25	4	0.77	0.07	2	0.92	0.25	4	0.80	0.09	2	0.78	0.06	1	0.73	-	1	0.67	-
5	1	0.73	-	4	0.79	0.10	-	-	-	-	-	-	-	-	-	-	-	-
Total	57	0.70	0.09	37	0.72	0.12	41	0.74	0.08	4	0.70	0.10	2	0.72	0.01	10	0.72	0.06

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 5.4.7-11. continued.

Mesh (in)	Gauer Lake								
	2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)									
SM	3	629	31	7	662	133	8	567	86
2	48	516	132	29	514	138	47	499	114
3	41	544	63	30	570	61	46	559	58
3.75	22	632	84	13	599	49	21	622	71
4.25	10	682	66	5	728	101	5	682	72
5	5	651	206	3	537	170	3	754	234
Total	129	566	117	87	571	117	130	557	107
Weight (g)									
SM	8	619	-	18	829	-	8	1401	635
2	48	1157	1108	29	1105	728	47	958	699
3	41	1145	371	30	1219	377	46	1142	381
3.75	22	1820	953	13	1481	298	21	1702	675
4.25	10	2305	825	5	2868	1368	5	2323	608
5	5	2664	2523	3	1110	757	3	3994	4093
Total	134	1372	-	98	1229	-	130	1293	936
Condition Factor (K)									
SM	-	-	-	-	-	-	8	0.72	0.09
2	48	0.69	0.06	29	0.69	0.06	47	0.67	0.07
3	41	0.69	0.07	30	0.64	0.06	46	0.64	0.08
3.75	22	0.68	0.10	13	0.69	0.05	21	0.68	0.05
4.25	10	0.71	0.10	5	0.70	0.09	5	0.73	0.09
5	5	0.75	0.04	3	0.62	0.08	3	0.72	0.12
Total	126	0.69	0.08	80	0.67	0.07	130	0.66	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 5.4.7-12. Summary of mean fork length (mm), weight (g), and condition factor (K) calculated for Lake Whitefish captured in standard gang and small mesh index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Mesh (in)	Partridge Breast Lake			Northern Indian Lake									Billard Lake		
	2009			2008			2009			2010			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)															
SM	6	351	66	9	286	87	4	273	91	12	282	64	14	350	62
2	24	283	83	26	244	46	43	265	74	55	268	71	53	334	97
3	16	339	60	15	350	53	15	365	65	33	355	51	57	386	57
3.75	9	388	65	10	388	31	16	399	49	38	361	50	56	409	55
4.25	17	416	49	11	391	15	19	430	51	30	394	47	34	431	43
5	11	412	30	17	410	27	24	425	36	14	428	36	41	457	32
Total	83	354	82	88	333	81	121	353	94	182	337	78	255	395	75
Weight (g)															
SM	19	240	-	10	367	325	9	163	-	16	283	-	85	114	-
2	26	382	402	26	207	164	43	332	420	55	309	292	53	645	521
3	16	626	386	15	609	259	15	743	440	33	648	287	57	846	378
3.75	9	932	457	10	842	228	16	1006	359	38	670	282	56	1011	430
4.25	17	1155	380	11	813	90	19	1253	532	30	893	323	34	1109	327
5	11	1100	246	17	972	177	24	1151	285	14	1078	185	41	1302	257
Total	98	659	-	89	585	363	126	749	-	186	593	-	326	735	-
Condition Factor (K)															
SM	6	1.50	0.10	9	1.32	0.22	4	1.28	0.10	12	1.35	0.12	14	1.29	0.19
2	24	1.29	0.15	26	1.24	0.16	43	1.32	0.12	55	1.27	0.11	53	1.35	0.15
3	16	1.42	0.14	15	1.34	0.11	15	1.38	0.09	33	1.35	0.09	57	1.39	0.09
3.75	9	1.47	0.08	10	1.41	0.09	16	1.51	0.20	38	1.35	0.10	56	1.39	0.11
4.25	17	1.55	0.11	11	1.35	0.09	19	1.51	0.14	30	1.41	0.10	34	1.35	0.09
5	11	1.55	0.08	17	1.40	0.11	24	1.48	0.12	14	1.38	0.15	41	1.35	0.10
Total	83	1.44	0.16	88	1.33	0.15	121	1.41	0.16	182	1.34	0.12	255	1.36	0.12

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 5.4.7-12. continued.

Mesh (in)	Lower Churchill River									Hayes River								
	2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																		
SM	-	-	-	2	254	25	-	-	-	-	-	-	-	-	-	1	165	-
2	15	301	86	8	393	40	11	389	72	-	-	-	-	-	-	1	305	-
3	18	390	75	18	394	53	24	397	43	7	354	12	-	-	-	6	326	26
3.75	25	424	52	21	408	55	26	405	47	3	392	30	1	364	-	2	360	21
4.25	22	427	44	11	425	47	12	412	43	-	-	-	-	-	-	1	367	-
5	8	450	45	4	443	68	5	429	21	-	-	-	-	-	-	-	-	-
Total	88	399	77	64	403	58	78	403	48	10	366	25	1	364	-	11	319	58
Weight (g)																		
SM	2	375	-	7	76	-	18	5	-	-	-	-	-	-	-	1	56	-
2	15	475	405	8	1025	346	11	915	426	-	-	-	-	-	-	1	420	-
3	18	841	435	18	1021	375	24	898	296	7	598	87	-	-	-	6	510	108
3.75	25	1038	364	21	1141	451	26	972	328	3	907	385	1	730	-	2	705	64
4.25	22	1096	340	11	1265	467	12	1071	394	-	-	-	-	-	-	1	720	-
5	8	1313	393	4	1490	811	5	1132	163	-	-	-	-	-	-	-	-	-
Total	90	929	-	69	1028	-	96	786	-	10	691	245	1	730	-	11	515	199
Condition Factor (K)																		
SM	-	-	-	2	1.53	0.01	-	-	-	-	-	-	-	-	-	1	1.25	-
2	15	1.38	0.21	8	1.64	0.10	11	1.42	0.08	-	-	-	-	-	-	1	1.48	-
3	18	1.33	0.23	18	1.61	0.14	24	1.40	0.15	7	1.34	0.14	-	-	-	6	1.47	0.08
3.75	25	1.32	0.19	21	1.60	0.17	26	1.42	0.13	3	1.44	0.26	1	1.51	-	2	1.52	0.12
4.25	22	1.37	0.16	11	1.58	0.17	12	1.49	0.08	-	-	-	-	-	-	1	1.46	-
5	8	1.41	0.12	4	1.60	0.09	5	1.43	0.15	-	-	-	-	-	-	-	-	-
Total	88	1.35	0.19	64	1.60	0.15	78	1.42	0.13	10	1.37	0.17	1	1.51	-	11	1.46	0.10

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 5.4.7-12. continued.

Mesh (in)	Gauer Lake								
	2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)									
SM	-	-	-	-	-	-	-	-	-
2	73	295	90	29	302	84	68	304	55
3	53	364	52	21	339	63	36	329	52
3.75	44	381	45	14	379	57	25	390	48
4.25	22	397	41	29	405	43	34	405	46
5	20	419	29	12	433	32	9	423	54
Total	212	352	78	105	363	77	172	348	68
Weight (g)									
SM	9	398	-	4	438	-	11	318	-
2	73	490	485	29	517	478	68	415	244
3	53	767	372	21	638	396	36	536	285
3.75	44	840	339	14	896	467	25	886	338
4.25	22	966	326	29	1040	341	34	1022	363
5	20	1147	274	12	1344	311	9	1158	419
Total	221	729	-	109	816	-	183	646	-
Condition Factor (K)									
SM	-	-	-	-	-	-	-	-	-
2	73	1.39	0.20	29	1.43	0.17	68	1.33	0.10
3	53	1.48	0.17	21	1.45	0.13	36	1.38	0.10
3.75	44	1.45	0.18	14	1.52	0.14	25	1.43	0.15
4.25	22	1.50	0.18	29	1.51	0.09	34	1.48	0.14
5	20	1.54	0.15	12	1.63	0.08	9	1.46	0.17
Total	212	1.45	0.19	105	1.49	0.14	172	1.39	0.13

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 5.4.7-13. Summary of mean fork length (mm), weight (g), and condition factor (K) calculated for Walleye captured in standard gang and small mesh index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Mesh (in)	Partridge Breast Lake			Northern Indian Lake									Billard Lake		
	2009			2008			2009			2010			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)															
SM	6	425	59	11	353	75	55	338	70	47	331	69	12	377	87
2	62	421	59	90	348	77	142	342	70	62	336	69	25	421	99
3	46	403	52	47	407	50	79	373	56	42	388	69	35	457	74
3.75	31	439	49	40	435	38	40	437	58	23	423	49	22	496	62
4.25	19	476	38	17	463	49	24	443	58	12	441	33	21	527	47
5	12	474	86	9	507	53	8	496	51	1	486	-	9	561	38
Total	176	429	60	214	393	78	348	370	77	187	365	75	124	468	89
Weight (g)															
SM	15	379	-	16	393	-	90	297	-	49	435	-	12	632	488
2	62	873	378	90	526	376	142	499	329	62	451	289	25	922	582
3	46	759	355	47	776	308	79	613	309	42	673	393	35	1085	493
3.75	31	938	438	40	993	304	40	984	388	23	847	325	22	1340	512
4.25	19	1272	319	17	1225	343	24	1040	360	12	1011	242	21	1538	408
5	12	1287	625	9	1612	522	8	1456	501	1	1050	-	9	1869	329
Total	185	883	-	219	754	-	383	579	-	189	584	-	124	1187	583
Condition Factor (K)															
SM	6	1.15	0.05	11	1.01	0.08	55	1.08	0.10	47	1.06	0.10	12	1.01	0.07
2	62	1.10	0.07	90	1.06	0.14	142	1.09	0.09	62	1.03	0.10	25	1.05	0.08
3	46	1.10	0.08	47	1.10	0.11	79	1.10	0.07	42	1.05	0.10	35	1.06	0.09
3.75	31	1.06	0.09	40	1.17	0.10	40	1.13	0.07	23	1.07	0.09	22	1.05	0.10
4.25	19	1.16	0.07	17	1.20	0.09	24	1.14	0.08	12	1.16	0.05	21	1.03	0.09
5	12	1.12	0.06	9	1.21	0.10	8	1.16	0.10	1	0.91	-	9	1.05	0.08
Total	176	1.10	0.08	214	1.10	0.13	348	1.10	0.09	187	1.06	0.10	124	1.05	0.09

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 5.4.7-13. continued.

Mesh (in)	Lower Churchill River									Hayes River								
	2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																		
SM	-	-	-	5	355	174	1	436	-	-	-	-	-	-	-	1	510	-
2	8	337	82	4	388	137	19	349	76	2	365	27	3	369	95	3	472	156
3	18	453	66	11	469	66	52	425	87	14	435	88	5	387	44	16	420	92
3.75	15	505	70	12	466	53	30	467	63	9	488	63	4	473	113	9	456	64
4.25	19	481	42	16	476	36	24	496	68	2	571	16	3	492	68	8	513	69
5	16	530	79	8	538	56	12	509	50	2	591	16	1	617	-	8	603	54
Total	76	474	85	56	464	88	138	443	88	29	467	90	16	439	99	45	482	102
Weight (g)																		
SM	93	10	-	5	767	714	346	26	-	3	103	-	-	-	-	5	244	-
2	8	456	454	4	800	680	19	584	398	2	545	177	3	593	413	3	1243	1019
3	18	1039	497	11	1208	493	52	1007	575	14	995	746	5	646	187	16	933	701
3.75	15	1561	697	12	1117	341	30	1307	542	9	1306	623	4	1370	994	9	1088	386
4.25	19	1343	406	16	1199	213	24	1468	487	2	2225	35	3	1317	516	8	1634	659
5	16	1844	762	8	1778	409	12	1668	468	2	2365	21	1	2800	-	8	2461	528
Total	169	602	-	56	1199	492	483	346	-	32	1133	-	16	1078	779	49	1274	-
Condition Factor (K)																		
SM	-	-	-	5	1.03	0.14	1	1.15	-	-	-	-	-	-	-	1	0.91	-
2	8	0.97	0.10	4	1.04	0.08	19	1.17	0.10	2	1.10	0.12	3	1.05	0.08	3	1.08	0.19
3	18	1.03	0.11	11	1.10	0.10	52	1.16	0.10	14	1.08	0.09	5	1.10	0.09	16	1.13	0.10
3.75	15	1.14	0.07	12	1.08	0.08	30	1.22	0.09	9	1.06	0.12	4	1.16	0.21	9	1.12	0.12
4.25	19	1.18	0.06	16	1.11	0.09	24	1.16	0.13	2	1.20	0.12	3	1.07	0.05	8	1.15	0.06
5	16	1.16	0.11	8	1.14	0.12	12	1.23	0.10	2	1.15	0.08	1	1.19	-	8	1.13	0.20
Total	76	1.11	0.12	56	1.09	0.10	138	1.18	0.10	29	1.09	0.10	16	1.11	0.12	45	1.13	0.13

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 5.4.7-13. continued.

Mesh (in)	Gauer Lake								
	2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)									
SM	-	-	-	-	-	-	3	398	121
2	50	355	57	40	364	74	55	349	71
3	34	397	45	42	374	42	69	394	34
3.75	29	414	45	33	411	51	46	407	31
4.25	13	420	54	12	465	44	12	426	72
5	3	450	24	4	422	39	5	439	71
Total	129	388	57	131	390	63	190	387	58
Weight (g)									
SM	21	251	-	32	253	-	27	263	-
2	50	526	258	40	585	311	55	523	280
3	34	708	254	42	589	220	69	690	191
3.75	29	824	268	33	785	247	46	764	180
4.25	13	896	281	12	1163	278	12	935	353
5	3	1053	211	4	955	221	5	974	438
Total	150	629	-	163	613	-	214	630	-
Condition Factor (K)									
SM	-	-	-	-	-	-	3	1.01	0.07
2	50	1.08	0.10	40	1.07	0.07	55	1.10	0.10
3	34	1.09	0.08	42	1.08	0.10	69	1.11	0.09
3.75	29	1.13	0.10	33	1.10	0.08	46	1.12	0.08
4.25	13	1.17	0.11	12	1.15	0.12	12	1.13	0.06
5	3	1.15	0.08	4	1.26	0.08	5	1.09	0.03
Total	129	1.10	0.10	131	1.09	0.09	190	1.11	0.09

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 5.4.7-14. Year-class frequency distributions (%) for Northern Pike captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Year-Class	Partridge Breast L.		Northern Indian L.						Billard L.	
	2009		2008		2009		2010		2010	
	n	%	n	%	n	%	n	%	n	%
2010	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	1	1.15	-	-
2007	-	-	-	-	-	-	2	2.30	1	0.98
2006	2	1.14	1	2.56	5	3.79	4	4.60	8	7.84
2005	9	5.14	3	7.69	16	12.12	19	21.84	13	12.75
2004	8	4.57	2	5.13	21	15.91	13	14.94	27	26.47
2003	43	24.57	3	7.69	23	17.42	14	16.09	27	26.47
2002	45	25.71	10	25.64	18	13.64	12	13.79	10	9.80
2001	26	14.86	7	17.95	18	13.64	11	12.64	5	4.90
2000	20	11.43	7	17.95	10	7.58	4	4.60	7	6.86
1999	12	6.86	3	7.69	8	6.06	2	2.30	1	0.98
1998	6	3.43	1	2.56	3	2.27	1	1.15	1	0.98
1997	2	1.14	-	-	2	1.52	-	-	1	0.98
1996	-	-	1	2.56	4	3.03	1	1.15	-	-
1995	2	1.14	-	-	2	1.52	1	1.15	-	-
1994	-	-	-	-	-	-	-	-	-	-
1993	-	-	-	-	1	0.76	2	2.30	1	0.98
1992	-	-	-	-	-	-	-	-	-	-
1991	-	-	1	2.56	1	0.76	-	-	-	-
1990	-	-	-	-	-	-	-	-	-	-

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

Table 5.4.7-14. continued.

Year-Class	lower Churchill R.						Hayes R.					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
2010	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	1	10.00
2006	4	7.41	-	-	1	2.04	-	-	-	-	1	10.00
2005	5	9.26	-	-	4	8.16	-	-	-	-	1	10.00
2004	8	14.81	2	5.71	5	10.20	-	-	-	-	2	20.00
2003	8	14.81	4	11.43	7	14.29	1	25.00	-	-	1	10.00
2002	14	25.93	5	14.29	8	16.33	-	-	1	50.00	3	30.00
2001	3	5.56	6	17.14	6	12.24	-	-	-	-	-	-
2000	-	-	6	17.14	6	12.24	1	25.00	1	50.00	1	10.00
1999	3	5.56	1	2.86	4	8.16	2	50.00	-	-	-	-
1998	1	1.85	6	17.14	1	2.04	-	-	-	-	-	-
1997	1	1.85	-	-	2	4.08	-	-	-	-	-	-
1996	3	5.56	1	2.86	4	8.16	-	-	-	-	-	-
1995	2	3.70	-	-	1	2.04	-	-	-	-	-	-
1994	-	-	2	5.71	-	-	-	-	-	-	-	-
1993	2	3.70	-	-	-	-	-	-	-	-	-	-
1992	-	-	-	-	-	-	-	-	-	-	-	-
1991	-	-	1	2.86	-	-	-	-	-	-	-	-
1990	-	-	1	2.86	-	-	-	-	-	-	-	-

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

Table 5.4.7-14. continued.

Year-Class	Gauer L.					
	2008		2009		2010	
	n	%	n	%	n	%
2010	-	-	-	-	-	-
2009	-	-	-	-	-	-
2008	-	-	-	-	1	1.27
2007	-	-	3	3.80	6	7.59
2006	4	3.17	3	3.80	9	11.39
2005	14	11.11	6	7.59	13	16.46
2004	15	11.90	5	6.33	24	30.38
2003	36	28.57	11	13.92	14	17.72
2002	30	23.81	15	18.99	4	5.06
2001	13	10.32	20	25.32	5	6.33
2000	6	4.76	7	8.86	2	2.53
1999	3	2.38	5	6.33	-	-
1998	2	1.59	2	2.53	-	-
1997	1	0.79	-	-	-	-
1996	-	-	-	-	-	-
1995	-	-	2	2.53	-	-
1994	1	0.79	-	-	1	1.27
1993	1	0.79	-	-	-	-
1992	-	-	-	-	-	-
1991	-	-	-	-	-	-
1990	-	-	-	-	-	-

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

Table 5.4.7-15. Year-class frequency distributions (%) for Lake Whitefish captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Year-Class	Partridge Breast L.		Northern Indian L.						Billard L.	
	2009		2008		2009		2010		2010	
	n	%	n	%	n	%	n	%	n	%
2010	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	3	1.83	6	2.67
2007	-	-	-	-	1	0.90	6	3.66	2	0.89
2006	6	8.00	2	2.56	9	8.11	11	6.71	24	10.67
2005	11	14.67	6	7.69	14	12.61	13	7.93	29	12.89
2004	11	14.67	10	12.82	7	6.31	27	16.46	31	13.78
2003	14	18.67	9	11.54	3	2.70	29	17.68	41	18.22
2002	8	10.67	5	6.41	15	13.51	26	15.85	32	14.22
2001	12	16.00	19	24.36	20	18.02	16	9.76	23	10.22
2000	2	2.67	5	6.41	10	9.01	10	6.10	11	4.89
1999	1	1.33	10	12.82	6	5.41	2	1.22	3	1.33
1998	3	4.00	3	3.85	3	2.70	7	4.27	6	2.67
1997	1	1.33	3	3.85	4	3.60	2	1.22	3	1.33
1996	1	1.33	2	2.56	2	1.80	3	1.83	2	0.89
1995	1	1.33	-	-	3	2.70	1	0.61	3	1.33
1994	3	4.00	1	1.28	3	2.70	4	2.44	1	0.44
1993	-	-	3	3.85	1	0.90	2	1.22	3	1.33
1992	1	1.33	-	-	1	0.90	-	-	2	0.89
1991	-	-	-	-	3	2.70	-	-	-	-
1990	-	-	-	-	2	1.80	-	-	2	0.89
1989	-	-	-	-	1	0.90	-	-	-	-
1988	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	1	0.90	-	-	1	0.44
1986	-	-	-	-	-	-	2	1.22	-	-
1985	-	-	-	-	1	0.90	-	-	-	-
1984	-	-	-	-	1	0.90	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-

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

Table 5.4.7-15. continued.

Year-Class	lower Churchill R.						Hayes R.					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
2010	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2007	2	2.30	-	-	-	-	-	-	-	-	-	-
2006	3	3.45	1	1.67	2	2.60	-	-	-	-	1	10.00
2005	11	12.64	5	8.33	1	1.30	-	-	-	-	2	20.00
2004	6	6.90	6	10.00	10	12.99	-	-	-	-	5	50.00
2003	5	5.75	10	16.67	16	20.78	1	10.00	-	-	2	20.00
2002	11	12.64	9	15.00	15	19.48	4	40.00	-	-	-	-
2001	21	24.14	8	13.33	11	14.29	2	20.00	-	-	-	-
2000	10	11.49	12	20.00	10	12.99	2	20.00	-	-	-	-
1999	8	9.20	1	1.67	3	3.90	-	-	1	100.00	-	-
1998	2	2.30	4	6.67	7	9.09	-	-	-	-	-	-
1997	-	-	1	1.67	-	-	1	10.00	-	-	-	-
1996	-	-	-	-	-	-	-	-	-	-	-	-
1995	2	2.30	1	1.67	-	-	-	-	-	-	-	-
1994	2	2.30	1	1.67	-	-	-	-	-	-	-	-
1993	1	1.15	1	1.67	-	-	-	-	-	-	-	-
1992	-	-	-	-	1	1.30	-	-	-	-	-	-
1991	3	3.45	-	-	-	-	-	-	-	-	-	-
1990	-	-	-	-	-	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	-	-
1988	-	-	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	1	1.30	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 5.4.7-15. continued.

Year-Class	Gauer L.					
	2008		2009		2010	
	n	%	n	%	n	%
2010	-	-	-	-	-	-
2009	-	-	-	-	-	-
2008	-	-	-	-	-	-
2007	-	-	4	3.88	1	0.95
2006	11	5.26	12	11.65	15	14.29
2005	12	5.74	6	5.83	12	11.43
2004	21	10.05	7	6.80	4	3.81
2003	13	6.22	4	3.88	10	9.52
2002	26	12.44	10	9.71	16	15.24
2001	38	18.18	11	10.68	6	5.71
2000	24	11.48	11	10.68	11	10.48
1999	18	8.61	10	9.71	9	8.57
1998	13	6.22	4	3.88	3	2.86
1997	9	4.31	3	2.91	2	1.90
1996	3	1.44	1	0.97	1	0.95
1995	4	1.91	4	3.88	1	0.95
1994	6	2.87	4	3.88	1	0.95
1993	5	2.39	3	2.91	5	4.76
1992	1	0.48	4	3.88	2	1.90
1991	1	0.48	1	0.97	4	3.81
1990	2	0.96	-	-	-	-
1989	-	-	1	0.97	-	-
1988	2	0.96	-	-	-	-
1987	-	-	2	1.94	-	-
1986	-	-	1	0.97	-	-
1985	-	-	-	-	-	-
1984	-	-	-	-	-	-
1983	-	-	-	-	1	0.95
1982	-	-	-	-	-	-
1981	-	-	-	-	-	-
1980	-	-	-	-	1	0.95

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

Table 5.4.7-16. Year-class frequency distributions (%) for Walleye captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Year-Class	Partridge Breast L.		Northern Indian L.						Billard L.	
	2009		2008		2009		2010		2010	
	n	%	n	%	n	%	n	%	n	%
2010	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	1	0.72	-	-
2006	1	0.59	-	-	-	-	2	1.44	3	2.75
2005	-	-	1	0.50	1	0.34	6	4.32	2	1.83
2004	1	0.59	5	2.48	1	0.34	3	2.16	1	0.92
2003	17	10.06	10	4.95	6	2.07	9	6.47	11	10.09
2002	25	14.79	22	10.89	38	13.10	11	7.91	4	3.67
2001	37	21.89	32	15.84	20	6.90	26	18.71	9	8.26
2000	40	23.67	18	8.91	69	23.79	28	20.14	13	11.93
1999	13	7.69	25	12.38	29	10.00	13	9.35	4	3.67
1998	2	1.18	43	21.29	25	8.62	8	5.76	11	10.09
1997	9	5.33	26	12.87	21	7.24	10	7.19	8	7.34
1996	14	8.28	9	4.46	17	5.86	13	9.35	8	7.34
1995	7	4.14	4	1.98	41	14.14	2	1.44	3	2.75
1994	-	-	-	-	3	1.03	1	0.72	1	0.92
1993	-	-	1	0.50	3	1.03	-	-	4	3.67
1992	-	-	-	-	-	-	-	-	2	1.83
1991	1	0.59	2	0.99	-	-	1	0.72	8	7.34
1990	-	-	1	0.50	2	0.69	2	1.44	9	8.26
1989	2	1.18	3	1.49	2	0.69	-	-	6	5.50
1988	-	-	-	-	2	0.69	1	0.72	1	0.92
1987	-	-	-	-	3	1.03	-	-	-	-
1986	-	-	-	-	2	0.69	-	-	1	0.92
1985	-	-	-	-	-	-	1	0.72	-	-
1984	-	-	-	-	2	0.69	1	0.72	-	-
1983	-	-	-	-	2	0.69	-	-	-	-
1982	-	-	-	-	1	0.34	-	-	-	-
1981	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-

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

Table 5.4.7-16. continued.

Year-Class	lower Churchill R.						Hayes R.					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
2010	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	1	0.74	-	-	-	-	-	-
2006	-	-	-	-	3	2.21	-	-	-	-	1	2.27
2005	-	-	1	2.00	2	1.47	-	-	-	-	-	-
2004	1	1.33	-	-	3	2.21	-	-	-	-	2	4.55
2003	2	2.67	-	-	14	10.29	-	-	3	20.00	6	13.64
2002	3	4.00	2	4.00	16	11.76	2	7.14	1	6.67	3	6.82
2001	4	5.33	-	-	3	2.21	4	14.29	1	6.67	1	2.27
2000	4	5.33	1	2.00	10	7.35	-	-	-	-	4	9.09
1999	6	8.00	2	4.00	10	7.35	4	14.29	-	-	2	4.55
1998	12	16.00	7	14.00	14	10.29	4	14.29	3	20.00	3	6.82
1997	12	16.00	9	18.00	10	7.35	-	-	4	26.67	3	6.82
1996	7	9.33	9	18.00	21	15.44	5	17.86	1	6.67	4	9.09
1995	8	10.67	6	12.00	7	5.15	1	3.57	-	-	1	2.27
1994	3	4.00	2	4.00	6	4.41	2	7.14	-	-	1	2.27
1993	1	1.33	1	2.00	-	-	-	-	-	-	1	2.27
1992	1	1.33	-	-	-	-	-	-	-	-	1	2.27
1991	5	6.67	1	2.00	2	1.47	2	7.14	-	-	-	-
1990	1	1.33	1	2.00	1	0.74	3	10.71	-	-	5	11.36
1989	-	-	-	-	3	2.21	-	-	-	-	3	6.82
1988	-	-	2	4.00	-	-	-	-	1	6.67	1	2.27
1987	-	-	-	-	3	2.21	-	-	-	-	-	-
1986	3	4.00	1	2.00	3	2.21	-	-	-	-	-	-
1985	1	1.33	2	4.00	1	0.74	-	-	-	-	-	-
1984	1	1.33	1	2.00	1	0.74	1	3.57	1	6.67	2	4.55
1983	-	-	1	2.00	1	0.74	-	-	-	-	-	-
1982	-	-	-	-	1	0.74	-	-	-	-	-	-
1981	-	-	1	2.00	-	-	-	-	-	-	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 5.4.7-16. continued.

Year-Class	Gauer L.					
	2008		2009		2010	
	n	%	n	%	n	%
2010	-	-	-	-	-	-
2009	-	-	-	-	-	-
2008	-	-	-	-	-	-
2007	-	-	-	-	-	-
2006	-	-	2	1.59	1	0.93
2005	1	0.81	2	1.59	4	3.74
2004	2	1.63	4	3.17	2	1.87
2003	8	6.50	1	0.79	11	10.28
2002	14	11.38	7	5.56	13	12.15
2001	15	12.20	12	9.52	11	10.28
2000	22	17.89	16	12.70	20	18.69
1999	12	9.76	32	25.40	11	10.28
1998	22	17.89	8	6.35	11	10.28
1997	19	15.45	6	4.76	8	7.48
1996	7	5.69	12	9.52	9	8.41
1995	-	-	15	11.90	5	4.67
1994	-	-	7	5.56	1	0.93
1993	-	-	1	0.79	-	-
1992	1	0.81	-	-	-	-
1991	-	-	-	-	-	-
1990	-	-	1	0.79	-	-
1989	-	-	-	-	-	-
1988	-	-	-	-	-	-
1987	-	-	-	-	-	-
1986	-	-	-	-	-	-
1985	-	-	-	-	-	-
1984	-	-	-	-	-	-
1983	-	-	-	-	-	-
1982	-	-	-	-	-	-
1981	-	-	-	-	-	-
1980	-	-	-	-	-	-

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

Table 5.4.7-17. Age frequency distributions (%) for Northern Pike captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Age	Partridge Breast L.		Northern Indian L.						Billard L.	
	2009		2008		2009		2010		2010	
	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-
2	-	-	1	2.56	-	-	1	1.15	-	-
3	2	1.14	3	7.69	5	3.79	2	2.30	1	0.98
4	9	5.14	2	5.13	16	12.12	4	4.60	8	7.84
5	8	4.57	3	7.69	21	15.91	19	21.84	13	12.75
6	43	24.57	10	25.64	23	17.42	13	14.94	27	26.47
7	45	25.71	7	17.95	18	13.64	14	16.09	27	26.47
8	26	14.86	7	17.95	18	13.64	12	13.79	10	9.80
9	20	11.43	3	7.69	10	7.58	11	12.64	5	4.90
10	12	6.86	1	2.56	8	6.06	4	4.60	7	6.86
11	6	3.43	-	-	3	2.27	2	2.30	1	0.98
12	2	1.14	1	2.56	2	1.52	1	1.15	1	0.98
13	-	-	-	-	4	3.03	-	-	1	0.98
14	2	1.14	-	-	2	1.52	1	1.15	-	-
15	-	-	-	-	-	-	1	1.15	-	-
16	-	-	-	-	1	0.76	-	-	-	-
17	-	-	1	2.56	-	-	2	2.30	1	0.98
18	-	-	-	-	1	0.76	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-
Total	175	100	39	100	132	100	87	100	102	100

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

Table 5.4.7-17. continued.

Age	lower Churchill R.						Hayes R.					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-	-	-
2	4	7.41	-	-	-	-	-	-	-	-	-	-
3	5	9.26	-	-	-	-	-	-	-	-	1	10.00
4	8	14.81	-	-	1	2.04	-	-	-	-	1	10.00
5	8	14.81	2	5.71	4	8.16	1	25.00	-	-	1	10.00
6	14	25.93	4	11.43	5	10.20	-	-	-	-	2	20.00
7	3	5.56	5	14.29	7	14.29	-	-	1	50.00	1	10.00
8	-	-	6	17.14	8	16.33	1	25.00	-	-	3	30.00
9	3	5.56	6	17.14	6	12.24	2	50.00	1	50.00	-	-
10	1	1.85	1	2.86	6	12.24	-	-	-	-	1	10.00
11	1	1.85	6	17.14	4	8.16	-	-	-	-	-	-
12	3	5.56	-	-	1	2.04	-	-	-	-	-	-
13	2	3.70	1	2.86	2	4.08	-	-	-	-	-	-
14	-	-	-	-	4	8.16	-	-	-	-	-	-
15	2	3.70	2	5.71	1	2.04	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-	-
18	-	-	1	2.86	-	-	-	-	-	-	-	-
19	-	-	1	2.86	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-
Total	54	100	35	100	49	100	4	100	2	100	10	100

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

Table 5.4.7-17. continued.

Age	Gauer L.					
	2008		2009		2010	
	n	%	n	%	n	%
1	-	-	-	-	-	-
2	4	3.17	3	3.80	1	1.27
3	14	11.11	3	3.80	6	7.59
4	15	11.90	6	7.59	9	11.39
5	36	28.57	5	6.33	13	16.46
6	30	23.81	11	13.92	24	30.38
7	13	10.32	15	18.99	14	17.72
8	6	4.76	20	25.32	4	5.06
9	3	2.38	7	8.86	5	6.33
10	2	1.59	5	6.33	2	2.53
11	1	0.79	2	2.53	-	-
12	-	-	-	-	-	-
13	-	-	-	-	-	-
14	1	0.79	2	2.53	-	-
15	1	0.79	-	-	-	-
16	-	-	-	-	1	1.27
17	-	-	-	-	-	-
18	-	-	-	-	-	-
19	-	-	-	-	-	-
20	-	-	-	-	-	-
Total	126	100	79	100	79	100

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

Table 5.4.7-18. Age frequency distributions (%) for Lake Whitefish captured in standard gang index gill nets set in Lower Churchill River Region water bodies, 2008-2010.

Age	Partridge Breast L.		Northern Indian L.						Billard L.	
	2009		2008		2009		2010		2010	
	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-
2	-	-	2	2.56	1	0.90	3	1.83	6	2.67
3	6	8.00	6	7.69	9	8.11	6	3.66	2	0.89
4	11	14.67	10	12.82	14	12.61	11	6.71	24	10.67
5	11	14.67	9	11.54	7	6.31	13	7.93	29	12.89
6	14	18.67	5	6.41	3	2.70	27	16.46	31	13.78
7	8	10.67	19	24.36	15	13.51	29	17.68	41	18.22
8	12	16.00	5	6.41	20	18.02	26	15.85	32	14.22
9	2	2.67	10	12.82	10	9.01	16	9.76	23	10.22
10	1	1.33	3	3.85	6	5.41	10	6.10	11	4.89
11	3	4.00	3	3.85	3	2.70	2	1.22	3	1.33
12	1	1.33	2	2.56	4	3.60	7	4.27	6	2.67
13	1	1.33	-	-	2	1.80	2	1.22	3	1.33
14	1	1.33	1	1.28	3	2.70	3	1.83	2	0.89
15	3	4.00	3	3.85	3	2.70	1	0.61	3	1.33
16	-	-	-	-	1	0.90	4	2.44	1	0.44
17	1	1.33	-	-	1	0.90	2	1.22	3	1.33
18	-	-	-	-	3	2.70	-	-	2	0.89
19	-	-	-	-	2	1.80	-	-	-	-
20	-	-	-	-	1	0.90	-	-	2	0.89
21	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	1	0.90	-	-	-	-
23	-	-	-	-	-	-	-	-	1	0.44
24	-	-	-	-	1	0.90	2	1.22	-	-
25	-	-	-	-	1	0.90	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-
Total	75	100	78	100	111	100	164	100	225	100

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

Table 5.4.7-18. continued.

Age	lower Churchill R.						Hayes R.					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
1	2	2.30	-	-	-	-	-	-	-	-	-	-
2	3	3.45	-	-	-	-	-	-	-	-	-	-
3	11	12.64	1	1.67	-	-	-	-	-	-	-	-
4	6	6.90	5	8.33	2	2.60	-	-	-	-	1	10.00
5	5	5.75	6	10.00	1	1.30	1	10.00	-	-	2	20.00
6	11	12.64	10	16.67	10	12.99	4	40.00	-	-	5	50.00
7	21	24.14	9	15.00	16	20.78	2	20.00	-	-	2	20.00
8	10	11.49	8	13.33	15	19.48	2	20.00	-	-	-	-
9	8	9.20	12	20.00	11	14.29	-	-	-	-	-	-
10	2	2.30	1	1.67	10	12.99	-	-	1	100.00	-	-
11	-	-	4	6.67	3	3.90	1	10.00	-	-	-	-
12	-	-	1	1.67	7	9.09	-	-	-	-	-	-
13	2	2.30	-	-	-	-	-	-	-	-	-	-
14	2	2.30	1	1.67	-	-	-	-	-	-	-	-
15	1	1.15	1	1.67	-	-	-	-	-	-	-	-
16	-	-	1	1.67	-	-	-	-	-	-	-	-
17	3	3.45	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	1	1.30	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	1	1.30	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
Total	87	100	60	100	77	100	10	100	1	100	10	100

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

Table 5.4.7-18. continued.

Age	Gauer L.					
	2008		2009		2010	
	n	%	n	%	n	%
1	-	-	-	-	-	-
2	11	5.26	4	3.88	-	-
3	12	5.74	12	11.65	1	0.95
4	21	10.05	6	5.83	15	14.29
5	13	6.22	7	6.80	12	11.43
6	26	12.44	4	3.88	4	3.81
7	38	18.18	10	9.71	10	9.52
8	24	11.48	11	10.68	16	15.24
9	18	8.61	11	10.68	6	5.71
10	13	6.22	10	9.71	11	10.48
11	9	4.31	4	3.88	9	8.57
12	3	1.44	3	2.91	3	2.86
13	4	1.91	1	0.97	2	1.90
14	6	2.87	4	3.88	1	0.95
15	5	2.39	4	3.88	1	0.95
16	1	0.48	3	2.91	1	0.95
17	1	0.48	4	3.88	5	4.76
18	2	0.96	1	0.97	2	1.90
19	-	-	-	-	4	3.81
20	2	0.96	1	0.97	-	-
21	-	-	-	-	-	-
22	-	-	2	1.94	-	-
23	-	-	1	0.97	-	-
24	-	-	-	-	-	-
25	-	-	-	-	-	-
26	-	-	-	-	-	-
27	-	-	-	-	1	0.95
28	-	-	-	-	-	-
29	-	-	-	-	-	-
30	-	-	-	-	1	0.95
Total	209	100	103	100	105	100

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

Table 5.4.7-19. Age frequency distributions (%) for Walleye captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Age	Partridge Breast L.		Northern Indian L.						Billard L.	
	2009		2008		2009		2010		2010	
	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-
3	1	0.59	1	0.50	-	-	1	0.72	-	-
4	-	-	5	2.48	1	0.34	2	1.44	3	2.75
5	1	0.59	10	4.95	1	0.34	6	4.32	2	1.83
6	17	10.06	22	10.89	6	2.07	3	2.16	1	0.92
7	25	14.79	32	15.84	38	13.10	9	6.47	11	10.09
8	37	21.89	18	8.91	20	6.90	11	7.91	4	3.67
9	40	23.67	25	12.38	69	23.79	26	18.71	9	8.26
10	13	7.69	43	21.29	29	10.00	28	20.14	13	11.93
11	2	1.18	26	12.87	25	8.62	13	9.35	4	3.67
12	9	5.33	9	4.46	21	7.24	8	5.76	11	10.09
13	14	8.28	4	1.98	17	5.86	10	7.19	8	7.34
14	7	4.14	-	-	41	14.14	13	9.35	8	7.34
15	-	-	1	0.50	3	1.03	2	1.44	3	2.75
16	-	-	-	-	3	1.03	1	0.72	1	0.92
17	-	-	2	0.99	-	-	-	-	4	3.67
18	1	0.59	1	0.50	-	-	-	-	2	1.83
19	-	-	3	1.49	2	0.69	1	0.72	8	7.34
20	2	1.18	-	-	2	0.69	2	1.44	9	8.26
21	-	-	-	-	2	0.69	-	-	6	5.50
22	-	-	-	-	3	1.03	1	0.72	1	0.92
23	-	-	-	-	2	0.69	-	-	-	-
24	-	-	-	-	-	-	-	-	1	0.92
25	-	-	-	-	2	0.69	1	0.72	-	-
26	-	-	-	-	2	0.69	1	0.72	-	-
27	-	-	-	-	1	0.34	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-
Total	169	100	202	100	290	100	139	100	109	100

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

Table 5.4.7-19. continued.

Age	lower Churchill R.						Hayes R.					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	1	0.74	-	-	-	-	-	-
4	1	1.33	1	2.00	3	2.21	-	-	-	-	1	2.27
5	2	2.67	-	-	2	1.47	-	-	-	-	-	-
6	3	4.00	-	-	3	2.21	2	7.14	3	20.00	2	4.55
7	4	5.33	2	4.00	14	10.29	4	14.29	1	6.67	6	13.64
8	4	5.33	-	-	16	11.76	-	-	1	6.67	3	6.82
9	6	8.00	1	2.00	3	2.21	4	14.29	-	-	1	2.27
10	12	16.00	2	4.00	10	7.35	4	14.29	-	-	4	9.09
11	12	16.00	7	14.00	10	7.35	-	-	3	20.00	2	4.55
12	7	9.33	9	18.00	14	10.29	5	17.86	4	26.67	3	6.82
13	8	10.67	9	18.00	10	7.35	1	3.57	1	6.67	3	6.82
14	3	4.00	6	12.00	21	15.44	2	7.14	-	-	4	9.09
15	1	1.33	2	4.00	7	5.15	-	-	-	-	1	2.27
16	1	1.33	1	2.00	6	4.41	-	-	-	-	1	2.27
17	5	6.67	-	-	-	-	2	7.14	-	-	1	2.27
18	1	1.33	1	2.00	-	-	3	10.71	-	-	1	2.27
19	-	-	1	2.00	2	1.47	-	-	-	-	-	-
20	-	-	-	-	1	0.74	-	-	-	-	5	11.36
21	-	-	2	4.00	3	2.21	-	-	1	6.67	3	6.82
22	3	4.00	-	-	-	-	-	-	-	-	1	2.27
23	1	1.33	1	2.00	3	2.21	-	-	-	-	-	-
24	1	1.33	2	4.00	3	2.21	1	3.57	-	-	-	-
25	-	-	1	2.00	1	0.74	-	-	1	6.67	-	-
26	-	-	1	2.00	1	0.74	-	-	-	-	2	4.55
27	-	-	-	-	1	0.74	-	-	-	-	-	-
28	-	-	1	2.00	1	0.74	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-
Total	75	100	50	100	136	100	28	100	15	100	44	100

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

Table 5.4.7-19. continued.

Age	Gauer L.					
	2008		2009		2010	
	n	%	n	%	n	%
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	1	0.81	2	1.59	-	-
4	2	1.63	2	1.59	1	0.93
5	8	6.50	4	3.17	4	3.74
6	14	11.38	1	0.79	2	1.87
7	15	12.20	7	5.56	11	10.28
8	22	17.89	12	9.52	13	12.15
9	12	9.76	16	12.70	11	10.28
10	22	17.89	32	25.40	20	18.69
11	19	15.45	8	6.35	11	10.28
12	7	5.69	6	4.76	11	10.28
13	-	-	12	9.52	8	7.48
14	-	-	15	11.90	9	8.41
15	-	-	7	5.56	5	4.67
16	1	0.81	1	0.79	1	0.93
17	-	-	-	-	-	-
18	-	-	-	-	-	-
19	-	-	1	0.79	-	-
20	-	-	-	-	-	-
21	-	-	-	-	-	-
22	-	-	-	-	-	-
23	-	-	-	-	-	-
24	-	-	-	-	-	-
25	-	-	-	-	-	-
26	-	-	-	-	-	-
27	-	-	-	-	-	-
28	-	-	-	-	-	-
29	-	-	-	-	-	-
30	-	-	-	-	-	-
Total	123	100	126	100	107	100

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

Table 5.4.7-20. 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 Churchill River Region waterbodies, 2008-2010.

Age	Year-Class	Partridge Breast Lake 2009 FL (mm)			W (g)			K			Year-Class	Northern Indian Lake 2008 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	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-		-	-	-	2006	1	351	-	1	260	-	1	0.60	-
3	2006	2	340	26	2	245	49	2	0.62	0.02	2005	3	353	29	3	285	93	3	0.63	0.06
4	2005	9	442	65	9	576	217	9	0.65	0.06	2004	2	468	9	2	713	81	2	0.70	0.09
5	2004	8	500	57	8	833	271	8	0.65	0.05	2003	3	558	11	3	1080	139	3	0.62	0.04
6	2003	43	539	41	43	1020	271	43	0.64	0.06	2002	10	560	14	10	1082	135	10	0.62	0.06
7	2002	45	583	57	45	1302	407	45	0.64	0.06	2001	7	572	36	7	1191	213	7	0.63	0.06
8	2001	26	624	41	26	1538	293	26	0.63	0.06	2000	7	644	31	7	1606	316	7	0.60	0.06
9	2000	20	621	56	20	1576	517	20	0.64	0.07	1999	3	673	28	3	2097	529	3	0.68	0.14
10	1999	12	699	69	12	2345	788	12	0.67	0.06	1998	1	815	-	1	3880	-	1	0.72	-
11	1998	6	725	71	6	2587	756	6	0.67	0.08	1997	-	-	-	-	-	-	-	-	-
12	1997	2	733	127	2	2370	1344	2	0.57	0.04	1996	1	635	-	1	1740	-	1	0.68	-
13	1996	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
14	1995	2	796	47	2	3545	573	2	0.70	0.01	1994	-	-	-	-	-	-	-	-	-
15	1994	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
16	1993	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1991	1	1035	-	1	7830	-	1	0.71	-
18	1991	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
19	1990	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
20	1989	-	-	-	-	-	-	-	-	-	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 5.4.7-20. continued.

Age	Year-Class	2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
		Northern Indian Lake																		
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2008	1	288	-	1	167	-	1	0.70	-
3	2006	5	353	29	5	295	72	5	0.66	0.06	2007	2	383	68	2	370	212	2	0.62	0.05
4	2005	16	448	54	16	604	212	16	0.64	0.03	2006	4	406	36	4	423	133	4	0.62	0.06
5	2004	21	528	45	21	954	221	21	0.64	0.04	2005	19	459	58	19	643	258	19	0.63	0.05
6	2003	23	554	43	23	1056	275	23	0.61	0.07	2004	13	544	44	13	1018	255	13	0.62	0.07
7	2002	18	605	38	18	1397	301	18	0.63	0.08	2003	14	586	26	14	1226	233	14	0.61	0.08
8	2001	18	640	65	18	1676	532	18	0.63	0.06	2002	12	637	33	12	1643	243	12	0.63	0.07
9	2000	10	682	35	10	1952	347	10	0.61	0.07	2001	11	671	72	11	2035	734	11	0.65	0.09
10	1999	8	706	67	8	2416	901	8	0.66	0.07	2000	4	678	54	4	2050	887	4	0.63	0.11
11	1998	3	694	37	3	2103	342	3	0.63	0.05	1999	2	679	16	2	2055	318	2	0.66	0.15
12	1997	2	756	74	2	2780	1216	2	0.62	0.10	1998	1	705	-	1	2380	-	1	0.68	-
13	1996	4	776	58	4	3065	538	4	0.66	0.08	1997	-	-	-	-	-	-	-	-	-
14	1995	2	819	129	2	3670	1541	2	0.65	0.03	1996	1	705	-	1	2640	-	1	0.75	-
15	1994	-	-	-	-	-	-	-	-	-	1995	1	927	-	1	5760	-	1	0.72	-
16	1993	1	828	-	1	4170	-	1	0.73	-	1994	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1993	2	949	30	2	6490	368	2	0.76	0.03
18	1991	1	871	-	1	5360	-	1	0.81	-	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 5.4.7-20. continued.

Age	Year-Class	Billard Lake 2010									Year-Class	Lower Churchill River 2008								
		FL (mm)			W (g)			K				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	4	325	15	4	225	34	4	0.65	0.04
3	2007	1	401	-	1	450	-	1	0.70	-	2005	5	374	35	5	360	116	5	0.67	0.03
4	2006	8	470	58	8	733	226	8	0.69	0.06	2004	8	527	41	8	976	294	8	0.65	0.08
5	2005	13	529	42	13	999	245	13	0.67	0.04	2003	8	577	25	8	1331	327	8	0.69	0.11
6	2004	27	570	47	27	1190	259	27	0.64	0.07	2002	14	635	55	14	1847	618	14	0.70	0.11
7	2003	27	611	44	27	1464	344	27	0.64	0.09	2001	3	679	62	3	2070	596	3	0.65	0.01
8	2002	10	672	36	10	1905	353	10	0.62	0.07	2000	-	-	-	-	-	-	-	-	-
9	2001	5	682	47	5	1920	595	5	0.59	0.08	1999	3	888	16	3	5733	1270	3	0.81	0.13
10	2000	7	738	52	7	2644	807	7	0.64	0.10	1998	1	819	-	1	4220	-	1	0.77	-
11	1999	1	830	-	1	4800	-	1	0.84	-	1997	1	914	-	1	6340	-	1	0.83	-
12	1998	1	875	-	1	4400	-	1	0.66	-	1996	3	904	37	3	5520	35	3	0.75	0.10
13	1997	1	835	-	1	4260	-	1	0.73	-	1995	2	931	37	2	5940	707	2	0.73	0.00
14	1996	-	-	-	-	-	-			-	1994	-	-	-	-	-	-	-	-	-
15	1995	-	-	-	-	-	-			-	1993	2	973	39	2	7450	919	2	0.81	0.00
16	1994	-	-	-	-	-	-			-	1992	-	-	-	-	-	-	-	-	-
17	1993	1	1084	-	1	8920	-	1	0.70	-	1991	-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
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 5.4.7-20. continued.

		Lower Churchill River																		
		2009										2010								
Age	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	1	276	-	1	140	-	1	0.67	-	2007	-	-	-	-	-	-	-	-	-
4	2005	-	-	-	-	-	-	-	-	-	2006	1	465	-	1	700	-	1	0.70	-
5	2004	2	434	16	2	560	-	2	0.69	0.08	2005	4	499	87	4	1028	710	4	0.74	0.07
6	2003	4	568	89	4	1265	726	4	0.64	0.04	2004	5	490	52	5	842	330	5	0.69	0.05
7	2002	5	549	80	5	1154	438	5	0.67	0.06	2003	7	627	138	7	2093	1571	7	0.72	0.07
8	2001	6	675	64	6	2248	646	6	0.71	0.06	2002	8	691	93	7	2244	1132	7	0.70	0.11
9	2000	6	630	67	6	1605	558	6	0.62	0.04	2001	6	749	65	5	3118	771	5	0.77	0.05
10	1999	1	742	-	1	3060	-	1	0.75	-	2000	6	782	44	5	3686	254	5	0.81	0.08
11	1998	6	761	77	6	3607	1336	6	0.78	0.10	1999	4	863	73	2	4860	1867	2	0.86	0.09
12	1997	-	-	-	-	-	-	-	-	-	1998	1	774	-	1	3170	-	1	0.68	-
13	1996	1	797	-	1	3730	-	1	0.74	-	1997	2	925	156	1	4240	-	1	0.79	-
14	1995	-	-	-	-	-	-	-	-	-	1996	4	890	51	2	4690	1570	2	0.69	0.11
15	1994	2	883	69	2	6806	962	2	0.99	0.09	1995	1	949	-	-	-	-	-	-	-
16	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	1	1002	-	1	7486	-	1	0.74	-	1992	-	-	-	-	-	-	-	-	-
19	1990	1	949	-	1	9301	-	1	1.09	-	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 5.4.7-20. continued.

		Hayes River																		
		2008										2009								
Age	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	-	-	-	-	-	-	-	-	-
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 5.4.7-20. continued.

Age	Year-Class	Hayes River 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	Gauer Lake 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-		4	329	15	4	245	37	4	0.69	0.03
3	2007	1	377	-	1	360	-	1	0.67	-		14	416	36	14	539	151	14	0.73	0.05
4	2006	1	405	-	1	520	-	1	0.78	-		15	484	59	15	791	254	15	0.68	0.09
5	2005	1	550	-	1	1130	-	1	0.68	-		36	537	40	36	1069	228	36	0.68	0.07
6	2004	2	660	40	2	2140	283	2	0.75	0.04		30	604	56	30	1497	380	30	0.67	0.07
7	2003	1	610	-	1	1400	-	1	0.62	-		13	651	59	13	1925	512	13	0.69	0.05
8	2002	3	727	38	3	2857	299	3	0.75	0.05		6	701	38	6	2342	387	6	0.68	0.06
9	2001	-	-	-	-	-	-	-	-	-		3	775	19	3	3360	459	3	0.72	0.06
10	2000	1	756	-	1	2900	-	1	0.67	-		2	742	3	2	3780	42	2	0.93	0.02
11	1999	-	-	-	-	-	-	-	-	-		1	865	-	1	4650	-	1	0.72	-
12	1998	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
13	1997	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
14	1996	-	-	-	-	-	-	-	-	-		1	953	-	1	6900	-	1	0.80	-
15	1995	-	-	-	-	-	-	-	-	-		1	925	-	1	6860	-	1	0.87	-
16	1994	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
17	1993	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
18	1992	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-
20	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 5.4.7-20. continued.

Age	Year-Class	Gauer Lake 2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	3	285	17	3	173	23	3	0.75	0.06	2008	1	353	-	1	284	-	1	0.65	-
3	2006	3	327	18	3	253	42	3	0.72	0.02	2007	6	383	42	6	398	113	6	0.69	0.05
4	2005	6	419	59	6	515	198	6	0.67	0.05	2006	9	456	35	9	647	147	9	0.68	0.06
5	2004	5	485	21	5	794	119	5	0.69	0.03	2005	13	516	41	13	893	194	13	0.64	0.05
6	2003	11	545	37	11	1076	171	11	0.67	0.08	2004	24	573	40	24	1239	305	24	0.65	0.07
7	2002	15	577	48	15	1296	371	15	0.66	0.06	2003	14	609	32	14	1483	416	14	0.64	0.11
8	2001	20	605	35	20	1447	221	20	0.65	0.07	2002	4	668	32	4	1835	358	4	0.61	0.06
9	2000	7	648	18	7	1780	257	7	0.65	0.05	2001	5	694	46	5	2568	447	5	0.77	0.06
10	1999	5	702	36	5	2250	437	5	0.65	0.08	2000	2	739	54	2	2525	601	2	0.62	0.01
11	1998	2	634	80	2	1730	523	2	0.67	0.05	1999	-	-	-	-	-	-	-	-	-
12	1997	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
13	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
14	1995	2	831	36	2	4325	247	2	0.76	0.14	1996	-	-	-	-	-	-	-	-	-
15	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
16	1993	-	-	-	-	-	-	-	-	-	1994	1	1024	-	1	8700	-	1	0.81	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	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 5.4.7-21. Mean fork length- (mm), weight- (g), and condition factor- (K) at-age for Lake Whitefish captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Age	Year-Class	Partridge Breast Lake 2009 FL (mm)			W (g)			K			Year-Class	Northern Indian Lake 2008 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	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2006	2	190	4	2	75	7	2	1.11	0.17
3	2006	5	224	24	6	151	54	5	1.27	0.09	2005	7	218	47	7	143	86	7	1.19	0.18
4	2005	10	275	53	11	316	210	10	1.36	0.21	2004	11	237	25	11	172	60	11	1.25	0.11
5	2004	11	295	42	11	365	170	11	1.32	0.11	2003	11	286	49	11	321	179	11	1.24	0.18
6	2003	14	354	58	14	711	311	14	1.46	0.14	2002	6	288	33	6	335	102	6	1.38	0.11
7	2002	8	393	40	8	990	306	8	1.58	0.13	2001	20	382	17	20	776	107	20	1.39	0.11
8	2001	12	419	50	12	1166	397	12	1.51	0.10	2000	7	376	21	7	734	129	7	1.37	0.08
9	2000	2	457	6	2	1495	64	2	1.57	0.12	1999	10	406	24	10	945	203	10	1.40	0.10
10	1999	1	395	-	1	1000	-	1	1.62	-	1998	4	399	16	4	908	46	4	1.44	0.20
11	1998	3	428	23	3	1173	184	3	1.49	0.04	1997	3	417	9	3	1057	101	3	1.45	0.06
12	1997	1	450	-	1	1350	-	1	1.48	-	1996	2	416	6	2	985	21	2	1.37	0.03
13	1996	1	435	-	1	1340	-	1	1.63	-	1995	-	-	-	-	-	-	-	-	-
14	1995	1	462	-	1	1560	-	1	1.58	-	1994	1	425	-	1	950	-	1	1.24	-
15	1994	3	456	35	3	1337	345	3	1.38	0.04	1993	3	451	26	3	1193	236	3	1.29	0.06
16	1993	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
17	1992	1	480	-	1	1730	-	1	1.56	-	1991	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
19	1990	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
20	1989	-	-	-	-	-	-	-	-	-	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 5.4.7-21. continued.

Age	Year-Class	2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
		Northern Indian Lake																		
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	1	191	-	1	80	-	1	1.15	-	2008	3	251	86	3	270	303	3	1.26	0.18
3	2006	9	219	15	9	132	26	9	1.24	0.03	2007	6	251	79	6	258	272	6	1.22	0.10
4	2005	14	245	20	14	195	56	14	1.30	0.11	2006	11	246	58	11	227	187	11	1.28	0.08
5	2004	7	277	46	7	308	167	7	1.32	0.12	2005	13	261	35	13	244	96	13	1.31	0.12
6	2003	3	285	41	3	328	126	3	1.37	0.10	2004	27	306	47	27	408	187	27	1.31	0.11
7	2002	15	353	37	15	637	206	15	1.40	0.08	2003	29	356	55	29	647	275	29	1.33	0.11
8	2001	20	396	24	20	959	181	20	1.53	0.12	2002	26	358	44	26	668	251	26	1.38	0.10
9	2000	10	401	24	10	986	205	10	1.52	0.20	2001	16	400	37	16	912	212	16	1.40	0.10
10	1999	6	433	19	6	1165	147	6	1.43	0.05	2000	10	399	38	10	931	291	10	1.41	0.12
11	1998	3	434	14	3	1177	68	3	1.45	0.18	1999	2	377	4	2	815	49	2	1.52	0.04
12	1997	4	443	39	4	1373	286	4	1.57	0.11	1998	7	419	61	7	1059	339	7	1.38	0.12
13	1996	2	452	31	2	1515	276	2	1.63	0.04	1997	2	453	32	2	1240	198	2	1.34	0.07
14	1995	3	459	27	3	1417	282	3	1.45	0.09	1996	3	454	39	3	1147	218	3	1.22	0.12
15	1994	3	448	6	3	1303	50	3	1.45	0.07	1995	1	470	-	1	1340	-	1	1.29	-
16	1993	1	458	-	1	1610	-	1	1.68	-	1994	4	413	83	4	1055	641	4	1.34	0.09
17	1992	1	475	-	1	1760	-	1	1.64	-	1993	2	389	118	2	860	594	2	1.38	0.24
18	1991	3	460	18	3	1350	207	3	1.38	0.15	1992	-	-	-	-	-	-	-	-	-
19	1990	2	489	65	2	1885	799	2	1.56	0.06	1991	-	-	-	-	-	-	-	-	-
20	1989	1	508	-	1	1930	-	1	1.47	-	1990	-	-	-	-	-	-	-	-	-
21	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 5.4.7-21. continued.

Age	Year-Class	Northern Indian Lake 2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
22	1987	1	480	-	1	1350	-	1	1.22	-	1988	-	-	-	-	-	-	-	-	-
23	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
24	1985	1	470	-	1	1300	-	1	1.25	-	1986	2	458	20	2	1255	219	2	1.30	0.06
25	1984	1	573	-	1	3070	-	1	1.63	-	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 5.4.7-21. continued.

Age	Billard Lake 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	Lower Churchill River 2008 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	-	-	-	-	-	-	-	-	-	2007	2	227	12	2	140	57	2	1.18	0.30
2	2008	6	211	19	6	118	31	6	1.23	0.13	2006	3	228	37	3	150	75	3	1.20	0.12
3	2007	2	268	2	2	240	28	2	1.25	0.12	2005	11	284	29	11	336	81	11	1.45	0.12
4	2006	24	320	38	24	463	155	24	1.35	0.11	2004	6	351	38	6	625	206	6	1.41	0.17
5	2005	29	341	29	29	569	165	29	1.40	0.11	2003	5	397	32	5	934	280	5	1.45	0.14
6	2004	31	398	42	31	897	279	31	1.37	0.07	2002	11	411	41	11	970	304	11	1.37	0.17
7	2003	41	413	36	41	1015	313	41	1.40	0.12	2001	21	429	25	21	1069	238	21	1.35	0.25
8	2002	32	434	25	32	1131	198	32	1.37	0.09	2000	10	437	18	10	1082	225	10	1.29	0.18
9	2001	23	457	21	23	1343	214	23	1.39	0.10	1999	8	439	28	8	1164	372	8	1.34	0.17
10	2000	11	465	29	11	1397	308	11	1.37	0.08	1998	2	464	30	2	1330	170	2	1.34	0.09
11	1999	3	475	12	3	1303	176	3	1.22	0.13	1997	-	-	-	-	-	-	-	-	-
12	1998	6	494	31	6	1713	505	6	1.39	0.12	1996	-	-	-	-	-	-	-	-	-
13	1997	3	467	11	3	1347	163	3	1.32	0.09	1995	2	497	40	2	1535	21	2	1.27	0.28
14	1996	2	477	12	2	1365	21	2	1.26	0.08	1994	2	493	18	2	1560	198	2	1.30	0.03
15	1995	3	486	6	3	1570	40	3	1.37	0.07	1993	1	488	-	1	1680	-	1	1.45	-
16	1994	1	485	-	1	1680	-	1	1.47	-	1992	-	-	-	-	-	-	-	-	-
17	1993	3	510	22	3	1703	315	3	1.27	0.09	1991	3	521	21	3	1807	74	3	1.28	0.11
18	1992	2	471	7	2	1270	156	2	1.21	0.09	1990	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
20	1990	2	487	35	2	1400	354	2	1.20	0.04	1988	-	-	-	-	-	-	-	-	-
21	1989	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-

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 5.4.7-21. continued.

Age	Year-Class	Billard Lake 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	Lower Churchill River 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
22	1988	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
23	1987	1	542	-	1	2120	-	1	1.33	-	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 5.4.7-21. continued.

Age	Lower Churchill River																			
	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	2	293	80	2	475	389	2	1.64	0.17	2007	-	-	-	-	-	-	-	-	-
4	2005	6	330	37	6	563	165	6	1.53	0.10	2006	2	265	57	2	275	177	2	1.36	0.07
5	2004	6	350	20	6	732	145	6	1.70	0.15	2005	1	346	-	1	460	-	1	1.11	-
6	2003	10	391	39	10	978	269	10	1.60	0.09	2004	10	377	23	10	798	132	10	1.49	0.10
7	2002	9	396	38	9	1021	288	9	1.62	0.12	2003	16	382	27	16	824	199	16	1.46	0.13
8	2001	8	417	28	8	1179	258	8	1.61	0.11	2002	15	404	42	15	999	290	15	1.47	0.09
9	2000	12	438	39	12	1362	443	12	1.57	0.24	2001	11	404	31	11	925	219	11	1.38	0.14
10	1999	1	453	-	1	1380	-	1	1.48	-	2000	10	432	40	10	1124	332	10	1.36	0.16
11	1998	4	470	23	4	1635	336	4	1.56	0.09	1999	3	423	2	3	1073	38	3	1.42	0.04
12	1997	1	452	-	1	1630	-	1	1.77	-	1998	7	452	24	7	1281	259	7	1.37	0.12
13	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
14	1995	1	541	-	1	2690	-	1	1.70	-	1996	-	-	-	-	-	-	-	-	-
15	1994	1	476	-	1	1720	-	1	1.59	-	1995	-	-	-	-	-	-	-	-	-
16	1993	1	481	-	1	1650	-	1	1.48	-	1994	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1992	1	519	-	1	2150	-	1	1.54	-
19	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
20	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
21	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 5.4.7-21. continued.

Age	Year-Class	2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
22	1987	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
23	1986	-	-	-	-	-	-	-	-	-	1987	1	515	-	1	1740	-	1	1.27	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
26	1983	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
27	1982	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
28	1981	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
29	1980	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
30	1979	-	-	-	-	-	-	-	-	-	1980	-	-	-	-	-	-	-	-	-

Lower Churchill River

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 5.4.7-21. continued.

Age	Hayes River 2008 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	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	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	0.14	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	-	-	-	-	-	-	-	-	-
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 5.4.7-21. continued.

Age	Hayes River Year-Class	Hayes River 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Gauer Lake Year-Class	Gauer Lake 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2006	11	207	15	11	116	30	11	1.30	0.14
3	2007	-	-	-	-	-	-	-	-	-	2005	12	224	23	12	151	56	12	1.30	0.20
4	2006	1	310	-	1	440	-	1	1.48	-	2004	21	266	46	21	295	174	21	1.40	0.21
5	2005	2	308	25	2	450	85	2	1.55	0.08	2003	13	316	43	13	489	231	13	1.44	0.20
6	2004	5	346	27	5	620	125	5	1.48	0.09	2002	26	343	33	26	592	191	26	1.43	0.20
7	2003	2	344	33	2	585	191	2	1.42	0.06	2001	38	370	38	38	775	285	38	1.47	0.15
8	2002	-	-	-	-	-	-	-	-	-	2000	24	386	44	24	913	364	24	1.51	0.18
9	2001	-	-	-	-	-	-	-	-	-	1999	18	395	28	18	939	247	18	1.49	0.18
10	2000	-	-	-	-	-	-	-	-	-	1998	13	415	24	13	1107	215	13	1.54	0.16
11	1999	-	-	-	-	-	-	-	-	-	1997	9	425	39	9	1211	311	9	1.55	0.09
12	1998	-	-	-	-	-	-	-	-	-	1996	3	416	31	3	1060	272	3	1.45	0.13
13	1997	-	-	-	-	-	-	-	-	-	1995	4	461	22	4	1585	381	4	1.59	0.17
14	1996	-	-	-	-	-	-	-	-	-	1994	6	429	12	6	1017	170	6	1.28	0.19
15	1995	-	-	-	-	-	-	-	-	-	1993	5	454	12	5	1392	273	5	1.48	0.21
16	1994	-	-	-	-	-	-	-	-	-	1992	1	440	-	1	1430	-	1	1.68	-
17	1993	-	-	-	-	-	-	-	-	-	1991	1	451	-	1	1530	-	1	1.67	-
18	1992	-	-	-	-	-	-	-	-	-	1990	2	468	25	2	1565	304	2	1.52	0.06
19	1991	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
20	1990	-	-	-	-	-	-	-	-	-	1988	2	491	27	2	1750	424	2	1.46	0.12

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 5.4.7-21. continued.

		Gauer Lake																		
		2009										2010								
Age	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	4	208	31	4	130	61	4	1.38	0.06	2008	-	-	-	-	-	-	-	-	-
3	2006	12	246	24	12	204	58	12	1.34	0.13	2007	1	283	-	1	284	-	1	1.25	-
4	2005	6	287	30	6	320	106	6	1.32	0.13	2006	15	278	28	15	291	89	15	1.31	0.05
5	2004	7	302	27	7	424	127	7	1.50	0.09	2005	12	299	29	12	385	142	12	1.39	0.11
6	2003	4	354	18	4	640	110	4	1.44	0.04	2004	4	304	16	4	395	85	4	1.39	0.16
7	2002	10	354	37	10	678	277	10	1.46	0.09	2003	10	368	35	10	739	242	10	1.43	0.11
8	2001	11	368	41	11	797	296	11	1.52	0.14	2002	16	363	30	16	692	193	16	1.41	0.13
9	2000	11	385	33	11	880	300	11	1.49	0.13	2001	6	401	38	6	965	292	6	1.46	0.11
10	1999	10	398	26	10	1003	194	10	1.57	0.08	2000	11	416	28	11	1115	255	11	1.52	0.11
11	1998	4	411	33	4	1080	280	4	1.53	0.11	1999	9	417	37	9	1129	399	9	1.49	0.17
12	1997	3	452	19	3	1463	212	3	1.58	0.07	1998	3	400	10	3	915	88	3	1.43	0.09
13	1996	1	445	-	1	1450	-	1	1.65	-	1997	2	453	40	2	1408	522	2	1.48	0.17
14	1995	4	431	36	4	1220	307	4	1.50	0.11	1996	1	430	-	1	1128	-	1	1.42	-
15	1994	4	451	11	4	1623	217	4	1.76	0.12	1995	1	435	-	1	1016	-	1	1.23	-
16	1993	3	452	24	3	1550	275	3	1.66	0.06	1994	1	434	-	1	1193	-	1	1.46	-
17	1992	4	433	20	4	1220	214	4	1.50	0.05	1993	5	456	27	5	1342	331	5	1.40	0.10
18	1991	1	495	-	1	1920	-	1	1.58	-	1992	2	399	11	2	896	35	2	1.42	0.06
19	1990	-	-	-	-	-	-	-	-	-	1991	4	460	17	4	1418	143	4	1.47	0.20
20	1989	1	473	-	1	1710	-	1	1.62	-	1990	-	-	-	-	-	-	-	-	-
21	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 5.4.7-21. continued.

Age	Year-Class (2009)	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD	Year-Class (2010)	FL (mm) n	FL (mm) Mean	FL (mm) SD	W (g) n	W (g) Mean	W (g) SD	K n	K Mean	K SD
		Gauer Lake																		
22	1987	2	461	11	2	1455	290	2	1.48	0.19	1988	-	-	-	-	-	-	-	-	-
23	1986	1	458	-	1	1410	-	1	1.47	-	1987	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
26	1983	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
27	1982	-	-	-	-	-	-	-	-	-	1983	1	461	-	1	1327	-	1	1.35	-
28	1981	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-
29	1980	-	-	-	-	-	-	-	-	-	1981	-	-	-	-	-	-	-	-	-
30	1979	-	-	-	-	-	-	-	-	-	1980	1	480	-	1	1498	-	1	1.35	-

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 5.4.7-22. Mean fork length- (mm), weight- (g), and condition factor- (K) at-age for Walleye captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Age	Year-Class	Partridge Breast Lake 2009 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K SD	Year-Class	Northern Indian Lake 2008 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K SD
1	2008	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
3	2006	1	358	-	1	530	-	1	1.16	-	2005	1	234	-	1	120	-	1	0.94	-
4	2005	-	-	-	-	-	-	-	-	-	2004	5	239	21	5	138	48	5	0.98	0.12
5	2004	1	288	-	1	260	-	1	1.09	-	2003	11	292	56	11	282	187	11	1.06	0.16
6	2003	17	363	22	17	527	98	17	1.09	0.05	2002	25	319	58	25	359	223	25	1.00	0.16
7	2002	25	376	20	25	575	95	25	1.07	0.07	2001	34	343	46	34	457	223	34	1.06	0.10
8	2001	37	409	44	37	777	265	37	1.09	0.08	2000	21	377	46	21	595	222	21	1.06	0.06
9	2000	40	443	31	40	979	227	40	1.11	0.08	1999	25	430	38	25	944	284	25	1.16	0.12
10	1999	13	454	29	13	1061	242	13	1.12	0.11	1998	43	437	51	43	993	369	43	1.13	0.10
11	1998	2	503	1	2	1560	28	2	1.23	0.03	1997	27	453	48	27	1105	383	27	1.14	0.12
12	1997	9	469	38	9	1181	259	9	1.13	0.05	1996	9	429	29	9	969	189	9	1.22	0.10
13	1996	14	501	49	14	1424	456	14	1.10	0.07	1995	4	463	49	4	1185	400	4	1.15	0.10
14	1995	7	524	50	7	1697	419	7	1.16	0.08	1994	-	-	-	-	-	-	-	-	-
15	1994	-	-	-	-	-	-	-	-	-	1993	1	493	-	1	1560	-	1	1.30	-
16	1993	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-	1991	2	503	23	2	1515	7	2	1.20	0.17
18	1991	1	525	-	1	1520	-	1	1.05	-	1990	2	490	8	2	1490	198	2	1.27	0.11
19	1990	-	-	-	-	-	-	-	-	-	1989	3	525	79	3	1840	838	3	1.21	0.05
20	1989	2	565	128	2	1980	1584	2	0.96	0.21	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 5.4.7-22. continued.

		Northern Indian Lake																		
		2009										2010								
Age	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	1	227	-	1	112	-	1	0.96	-
4	2005	1	221	-	1	108	-	1	1.00	-	2006	2	221	9	2	105	7	2	0.98	0.06
5	2004	1	238	-	1	115	-	1	0.85	-	2005	6	239	12	6	127	11	6	0.94	0.12
6	2003	6	274	27	6	225	77	6	1.06	0.10	2004	3	276	37	3	242	138	3	1.06	0.15
7	2002	38	285	30	38	256	90	38	1.06	0.08	2003	10	316	33	10	341	127	10	1.04	0.08
8	2001	20	317	39	20	370	139	20	1.12	0.06	2002	12	311	34	12	321	109	12	1.03	0.08
9	2000	69	345	33	69	463	146	69	1.09	0.06	2001	27	371	56	27	597	296	27	1.07	0.08
10	1999	29	361	32	29	531	155	29	1.10	0.08	2000	28	378	37	28	605	209	28	1.08	0.08
11	1998	25	384	51	25	656	261	25	1.10	0.07	1999	14	396	44	14	671	229	14	1.05	0.07
12	1997	21	416	51	21	867	303	21	1.16	0.07	1998	8	416	38	8	814	249	8	1.10	0.11
13	1996	17	440	51	17	1021	318	17	1.16	0.05	1997	10	415	46	10	797	234	10	1.10	0.08
14	1995	41	451	40	41	1071	279	41	1.14	0.07	1996	13	441	26	13	922	237	13	1.06	0.15
15	1994	3	475	52	3	1223	333	3	1.13	0.14	1995	2	463	33	2	960	127	2	0.97	0.08
16	1993	3	485	35	3	1267	291	3	1.09	0.03	1994	1	452	-	1	900	-	1	0.97	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
19	1990	2	518	110	2	1535	870	2	1.05	0.04	1991	1	410	-	1	620	-	1	0.90	-
20	1989	2	467	15	2	1265	205	2	1.24	0.08	1990	2	559	62	2	1780	382	2	1.03	0.12
21	1988	2	463	4	2	1075	35	2	1.09	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 5.4.7-22. continued.

Age	Northern Indian Lake 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	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
22	1987	3	527	56	3	1853	542	3	1.25	0.06	1988	1	568	-	1	2080	-	1	1.14	-
23	1986	2	527	21	2	1630	396	2	1.10	0.14	1987	-	-	-	-	-	-	-	-	-
24	1985	-	-	-	-	-	-	-	-	-	1986	-	-	-	-	-	-	-	-	-
25	1984	2	541	13	2	1475	7	2	0.93	0.07	1985	1	520	-	1	1500	-	1	1.07	-
26	1983	2	512	30	2	1385	205	2	1.03	0.03	1984	1	524	-	1	1670	-	1	1.16	-
27	1982	1	534	-	1	1460	-	1	0.96	-	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 5.4.7-22. continued.

Age	Billard Lake 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	Lower Churchill River 2008 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	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
3	2007	-	-	-	-	-	-	-	-	-	2005	-	-	-	-	-	-	-	-	-
4	2006	3	278	21	3	220	61	3	1.01	0.14	2004	1	264	-	1	200	-	1	1.09	-
5	2005	2	312	13	2	330	71	2	1.08	0.10	2003	2	283	60	2	220	141	2	0.90	0.05
6	2004	1	401	-	1	610	-	1	0.95	-	2002	3	361	32	3	460	145	3	0.95	0.07
7	2003	11	373	14	11	528	62	11	1.01	0.07	2001	4	361	65	4	483	306	4	0.94	0.07
8	2002	4	379	13	4	575	85	4	1.05	0.07	2000	4	413	72	4	833	506	4	1.07	0.10
9	2001	9	432	33	9	870	225	9	1.06	0.08	1999	6	447	43	6	973	334	6	1.05	0.08
10	2000	13	465	26	13	1075	203	13	1.06	0.08	1998	12	460	59	12	1141	423	12	1.12	0.11
11	1999	4	488	27	4	1295	157	4	1.11	0.05	1997	12	489	36	12	1417	337	12	1.19	0.06
12	1998	11	497	19	11	1381	126	11	1.13	0.06	1996	7	496	30	7	1464	349	7	1.18	0.06
13	1997	8	502	39	8	1344	385	8	1.03	0.10	1995	8	513	28	8	1516	381	8	1.10	0.14
14	1996	8	516	30	8	1411	269	8	1.02	0.10	1994	3	507	81	3	1503	846	3	1.09	0.17
15	1995	3	534	19	3	1633	184	3	1.07	0.04	1993	1	516	-	1	1500	-	1	1.09	-
16	1994	1	496	-	1	1360	-	1	1.11	-	1992	1	440	-	1	1020	-	1	1.20	-
17	1993	4	558	31	4	1845	371	4	1.05	0.08	1991	5	573	57	5	2328	639	5	1.21	0.06
18	1992	2	507	19	2	1480	71	2	1.14	0.07	1990	1	504	-	1	1560	-	1	1.22	-
19	1991	8	548	42	8	1753	364	8	1.06	0.11	1989	-	-	-	-	-	-	-	-	-
20	1990	9	565	34	9	1904	365	9	1.05	0.07	1988	-	-	-	-	-	-	-	-	-
21	1989	6	588	25	6	1928	217	6	0.95	0.05	1987	-	-	-	-	-	-	-	-	-

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 5.4.7-22. continued.

Age	Year-Class	Billard Lake 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	Lower Churchill River 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
22	1988	1	572	-	1	2100	-	1	1.12	-	1986	3	553	58	3	1970	508	3	1.15	0.09
23	1987	-	-	-	-	-	-	-	-	-	1985	1	675	-	1	3690	-	1	1.20	-
24	1986	1	624	-	1	2380	-	1	0.98	-	1984	1	645	-	1	3000	-	1	1.12	-
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 5.4.7-22. continued.

Age	Year-Class	Lower Churchill River 2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	1	120	-	1	15	-	1	0.87	-	2008	-	-	-	-	-	-	-	-	-
3	2006	1	229	-	1	110	-	1	0.92	-	2007	1	209	-	1	100	-	1	1.10	-
4	2005	1	235	-	1	120	-	1	0.92	-	2006	3	267	51	3	227	151	3	1.07	0.10
5	2004	-	-	-	-	-	-	-	-	-	2005	2	285	28	2	265	120	2	1.11	0.20
6	2003	-	-	-	-	-	-	-	-	-	2004	3	305	24	3	320	66	3	1.12	0.04
7	2002	2	321	16	2	340	42	2	1.03	0.03	2003	14	400	60	14	771	378	14	1.14	0.07
8	2001	-	-	-	-	-	-	-	-	-	2002	16	375	27	16	621	155	16	1.16	0.07
9	2000	1	402	-	1	640	-	1	0.99	-	2001	3	371	12	3	600	46	3	1.18	0.07
10	1999	2	426	57	2	860	368	2	1.08	0.04	2000	10	411	38	10	847	203	10	1.21	0.11
11	1998	7	442	32	7	961	177	7	1.11	0.08	1999	10	424	58	10	967	387	10	1.21	0.07
12	1997	10	476	17	10	1201	107	10	1.11	0.08	1998	14	461	53	14	1204	373	14	1.20	0.13
13	1996	10	478	30	10	1267	289	10	1.14	0.08	1997	11	467	38	11	1231	285	11	1.19	0.08
14	1995	6	498	40	6	1475	313	6	1.18	0.04	1996	21	498	46	21	1548	439	21	1.22	0.09
15	1994	2	465	27	2	1255	332	2	1.23	0.12	1995	7	499	34	7	1484	198	7	1.20	0.12
16	1993	1	475	-	1	1110	-	1	1.04	-	1994	6	525	52	6	1888	562	6	1.27	0.06
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	2	505	43	2	1355	445	2	1.03	0.08	1992	-	-	-	-	-	-	-	-	-
19	1990	1	577	-	1	2100	-	1	1.09	-	1991	2	533	50	2	1875	318	2	1.25	0.14
20	1989	-	-	-	-	-	-	-	-	-	1990	1	561	-	1	2140	-	1	1.21	-
21	1988	2	495	44	2	1300	297	2	1.06	0.04	1989	3	548	56	3	1800	303	3	1.10	0.15

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 5.4.7-22. continued.

		Lower Churchill River																		
		2009										2010								
Age	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
22	1987	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-
23	1986	1	585	-	1	2250	-	1	1.12	-	1987	3	554	51	3	1990	567	3	1.15	0.08
24	1985	2	530	120	2	1610	834	2	1.05	0.15	1986	3	533	28	3	1627	122	3	1.08	0.18
25	1984	1	567	-	1	1600	-	1	0.88	-	1985	1	601	-	1	2150	-	1	0.99	-
26	1983	1	543	-	1	1570	-	1	0.98	-	1984	1	596	-	1	2780	-	1	1.31	-
27	1982	-	-	-	-	-	-	-	-	-	1983	1	570	-	1	2360	-	1	1.27	-
28	1981	1	564	-	1	1730	-	1	0.96	-	1982	1	520	-	1	1850	-	1	1.32	-
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 5.4.7-22. continued.

Age	Year-Class	Hayes River 2008 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K SD	Year-Class	2009 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K 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	0.13
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	-	-	-	-	-	-	-	-	-
21	1987	-	-	-	-	-	-	-	-	-	1988	1	610	-	1	2800	-	1	1.23	-

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 5.4.7-22. continued.

Age	Year-Class	Hayes River 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	2009 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
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 5.4.7-22. continued.

Age	Year-Class	Hayes River 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Year-Class	Gauer Lake 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
1	2009	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-
2	2008	-	-	-	-	-	-	-	-	-	2006	-	-	-	-	-	-	-	-	-
3	2007	-	-	-	-	-	-	-	-	-	2005	1	215	-	1	110	-	1	1.11	-
4	2006	1	312	-	1	360	-	1	1.19	-	2004	2	314	8	2	300	28	2	0.97	0.02
5	2005	-	-	-	-	-	-	-	-	-	2003	8	302	23	8	294	83	8	1.05	0.15
6	2004	2	307	13	2	360	42	2	1.25	0.01	2002	14	327	30	14	381	109	14	1.06	0.08
7	2003	6	395	26	6	760	194	6	1.21	0.08	2001	15	363	36	15	547	166	15	1.11	0.10
8	2002	3	413	20	3	777	150	3	1.09	0.07	2000	22	383	22	22	628	127	22	1.10	0.08
9	2001	1	381	-	1	650	-	1	1.18	-	1999	12	395	28	12	731	146	12	1.17	0.08
10	2000	4	453	54	4	1135	500	4	1.16	0.12	1998	22	431	29	22	892	188	22	1.10	0.08
11	1999	2	406	21	2	785	106	2	1.17	0.02	1997	19	444	34	19	979	211	19	1.11	0.11
12	1998	3	490	59	3	1353	391	3	1.14	0.09	1996	7	453	36	7	1093	309	7	1.14	0.08
13	1997	3	480	28	3	1263	215	3	1.14	0.07	1995	-	-	-	-	-	-	-	-	-
14	1996	4	520	120	4	1433	659	4	1.01	0.22	1994	-	-	-	-	-	-	-	-	-
15	1995	1	523	-	1	1360	-	1	0.95	-	1993	-	-	-	-	-	-	-	-	-
16	1994	1	605	-	1	2650	-	1	1.20	-	1992	1	452	-	1	1090	-	1	1.18	-
17	1993	1	610	-	1	2680	-	1	1.18	-	1991	-	-	-	-	-	-	-	-	-
18	1992	1	515	-	1	1710	-	1	1.25	-	1990	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-	1989	-	-	-	-	-	-	-	-	-
20	1990	5	586	81	5	2256	872	5	1.08	0.11	1988	-	-	-	-	-	-	-	-	-
21	1989	4	524	88	4	1424	672	4	0.95	0.08	1987	-	-	-	-	-	-	-	-	-
22	1988	1	620	-	1	2800	-	1	1.17	-	1986	-	-	-	-	-	-	-	-	-

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 5.4.7-22. continued.

Age	Hayes River Year-Class	Hayes River 2010 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD	Gauer Lake Year-Class	Gauer Lake 2008 FL (mm) n	Mean	SD	W (g) n	Mean	SD	K n	Mean	SD
23	1987	-	-	-	-	-	-	-	-	-	1985	-	-	-	-	-	-	-	-	-
24	1986	-	-	-	-	-	-	-	-	-	1984	-	-	-	-	-	-	-	-	-
25	1985	-	-	-	-	-	-	-	-	-	1983	-	-	-	-	-	-	-	-	-
26	1984	2	626	49	2	2963	357	2	1.22	0.14	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 5.4.7-22. continued.

Age	Year-Class (2009)	2009 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K SD	Year-Class (2010)	2010 FL (mm) n	FL Mean	FL SD	W (g) n	W Mean	W SD	K n	K Mean	K SD
1	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
3	2006	2	228	11	2	115	7	2	0.98	0.08	2007	-	-	-	-	-	-	-	-	-
4	2005	2	231	10	2	125	21	2	1.01	0.04	2006	1	224	-	1	123	-	1	1.09	-
5	2004	4	247	18	4	152	37	4	1.00	0.12	2005	4	276	29	4	227	69	4	1.06	0.12
6	2003	1	240	-	1	130	-	1	0.94	-	2004	2	329	69	2	406	267	2	1.04	0.08
7	2002	7	327	17	7	394	55	7	1.12	0.06	2003	11	347	16	11	453	57	11	1.08	0.08
8	2001	12	349	30	12	457	126	12	1.05	0.04	2002	13	372	24	13	553	107	13	1.06	0.05
9	2000	16	365	28	16	540	128	16	1.09	0.06	2001	11	382	22	11	622	108	11	1.10	0.07
10	1999	32	392	28	32	682	154	32	1.11	0.07	2000	20	399	31	20	702	172	20	1.08	0.07
11	1998	8	404	14	8	725	167	8	1.09	0.21	1999	11	411	26	11	793	156	11	1.13	0.07
12	1997	6	425	12	6	853	94	6	1.11	0.07	1998	11	422	30	11	827	184	11	1.09	0.09
13	1996	12	445	26	12	1018	180	12	1.14	0.06	1997	8	444	39	8	1000	267	8	1.12	0.09
14	1995	15	454	51	15	1047	322	15	1.10	0.12	1996	9	438	52	9	967	303	9	1.14	0.17
15	1994	7	438	33	7	927	252	7	1.08	0.05	1995	5	434	28	5	952	273	5	1.14	0.11
16	1993	1	417	-	1	750	-	1	1.03	-	1994	1	452	-	1	961	-	1	1.04	-
17	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-
19	1990	1	532	-	1	1400	-	1	0.93	-	1991	-	-	-	-	-	-	-	-	-
20	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-

Gauer Lake

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 5.4.7-23. Deformities, erosion, lesions, and tumours (DELTs) summary for select fish species captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

Species	Deformities		Erosion		Lesions		Tumours		Total		
	n[1]	%[2]	n	%	n	%	n	%	$n_{Inspect}$	n_{DELTs}	$\%_{DELTs}$
Partridge Breast L.											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	162	-	-
Northern Pike	1	0.57	-	-	1	0.57	-	-	175	2	1.14
Lake Whitefish	-	-	1	1.27	3	3.80	-	-	79	4	5.06
Walleye	1	0.59	-	-	-	-	1	0.59	170	2	1.18
Total	2	0. 34	1	0.17	4	0.68	1	0.17	586	8	1.37
Northern Indian L.											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	4	0.80	-	-	6	1.20	-	-	498	10	2.01
Northern Pike	2	0.76	2	0.76	-	-	-	-	263	4	1.52
Lake Whitefish	3	0.82	-	-	7	1.91	-	-	366	10	2.73
Walleye	2	0.31	1	0.16	6	0.94	4	0.63	636	13	2.04
Total	11	0.62	3	0.17	19	1.08	4	0.23	1763	37	2.10
Billard L.											
Lake Sturgeon	-	-	-	-	-	-	-	-	1	-	-
White Sucker	-	-	-	-	1	2.00	-	-	50	1	2.00
Northern Pike	1	0.96	-	-	-	-	-	-	104	1	0.96
Lake Whitefish	-	-	-	-	3	1.24	-	-	241	3	1.24
Walleye	-	-	-	-	1	0.89	1	0.89	112	2	1.79
Total	1	0.20	-	-	5	0.98	1	0.20	508	7	1.38
lower Churchill R.											
Lake Sturgeon	5	1.41	1	0.28	1	0.28	-	-	355	7	1.97
White Sucker	-	-	1	0.98	-	-	-	-	102	1	0.98
Northern Pike	1	0.69	1	0.69	-	-	-	-	144	2	1.39
Lake Whitefish	3	1.32	3	1.32	5	2.19	-	-	228	11	4.82
Walleye	4	1.52	-	-	2	0.76	3	1.14	264	9	3.41
Total	13	1.19	6	0.55	8	0.73	3	0.27	1093	30	2.74

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 ($n/n_{Inspect} \times 100$);
$\%_{DELTs}$ = total percentage of inspected fish with DELTs ($n_{DELTs}/n_{Inspect} \times 100$)
*Deformity and tumour from same fish.

Table 5.4.7-23. continued.

Species	Deformities		Erosion		Lesions		Tumours		Total		
	n[1]	%[2]	n	%	n	%	n	%	$n_{Inspect}$	n_{DELTs}	$\%_{DELTs}$
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
Gauer L.											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	7	1.16	-	-	3	0.50	3	0.50	604	13	2.15
Northern Pike	-	-	-	-	1	0.30	1	0.30	328	2	0.61
Lake Whitefish	-	-	-	-	2	0.41	-	-	489	2	0.41
Walleye	-	-	-	-	1	0.22	-	-	447	1	0.22
Total	7	0.37	0	0	7	0.37	4	0.21	1868	18	0.96

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 ($n/n_{Inspect} \times 100$);
$\%_{DELTs}$ = total percentage of inspected fish with DELTs ($n_{DELTs}/n_{Inspect} \times 100$)
*Deformity and tumour from same fish.

Table 5.4.7-24. Lower Churchill River Region Index of Biotic Integrity (IBI) values, 2008-2010.

Metric	Partridge Breast L	Northern Indian L			Billard L	LChurchill R- LiChurchill R			Gauer L			Hayes R		
	2009	2008	2009	2010	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
Non standardized values														
Number of species	12	11	12	12	9	12	11	14	13	11	12	8	11	8
Number of sensitive species	2	2	2	2	1	2	2	3	2	2	2	2	3	3
Proportion of tolerant individuals	17.2	17.7	21.2	16.5	8.8	5.3	7.1	7.2	20	22.6	19.2	17.4	28.8	13.2
Number of Insectivore species	8	6	7	8	5	10	7	12	10	7	8	5	6	4
Hill's Evenness Index	7.62	6.21	7.31	8.66	4.73	7.08	6.74	6.34	8.29	7.52	7.89	6.09	6.77	5.43
Insectivore biomass	11.3	18.1	13	25.2	41.7	53.6	49.3	54.4	22	19	18.5	29	32.5	45.3
Omnivore biomass	23.9	22.3	24.7	29.3	5.4	3.1	4.7	7.7	40.8	39.4	36.6	8.5	16.9	6.2
Piscivore biomass	64.8	59.6	62.4	45.5	52.9	43.3	46	37.7	37.1	41.6	44.9	62.4	50.4	48.5
Proportion lithophilic spawners	0.48	0.8	0.61	0.61	0.7	0.67	0.53	0.8	0.54	0.57	0.6	0.92	0.88	0.9
CPUE	58.1	50.9	58.6	75.9	56.2	37.7	21.2	59.3	79.9	59.9	61.1	10.2	5.8	15.4
% individuals with DELTS	1.37	1.39	1.44	2.99	1.38	6.25	1.99	1.19	1.94	0.41	0.76	3.45	5	2.92
IBI Scores														
Number of species	6	5.5	6	6	4.5	6	5.5	7	6.5	5.5	6	4	5.5	4
Number of sensitive species	2.4	2.4	2.4	2.4	1.2	2.4	2.4	3.6	2.4	2.4	2.4	2.4	3.6	3.6
Proportion of tolerant species	7.1	7	6.4	7.2	8.5	9.1	8.8	8.8	6.6	6.2	6.7	7	5.1	7.8
Number of Insectivore species	6	4.5	5.3	6	3.8	7.5	5.3	9	7.5	5.3	6	3.8	4.5	3
Hill's Evenness Index	6.6	5.4	6.4	7.5	4.1	6.2	5.9	5.5	7.2	6.5	6.9	5.3	5.9	4.7
Insectivore biomass	2	3.3	2.3	4.5	7.5	9.6	8.9	9.8	4	3.4	3.3	5.2	5.9	8.2
Omnivore biomass	6.4	6.7	6.3	5.6	9.2	9.5	9.3	8.8	3.9	4.1	4.5	8.7	7.5	9.1
Piscivore biomass	6.5	6	6.2	4.5	5.3	4.3	4.6	3.8	3.7	4.2	4.5	6.2	5	4.9
Proportion lithophilic spawners	4.8	8	6.1	6.1	7	6.7	5.3	8	5.4	5.7	6	9.2	8.8	9
CPUE	5.8	5.1	5.9	7.6	5.6	3.8	2.1	5.9	8	6	6.1	1	0.6	1.5
% individuals with DELTS	4.3	4.3	4.3	3.5	4.3	1.9	4	4.4	4	4.8	4.6	3.3	2.5	3.5
Total IBI	58	58	57.5	61.1	61	67	62	74.6	59.2	54.1	57	56.2	54.9	59.2

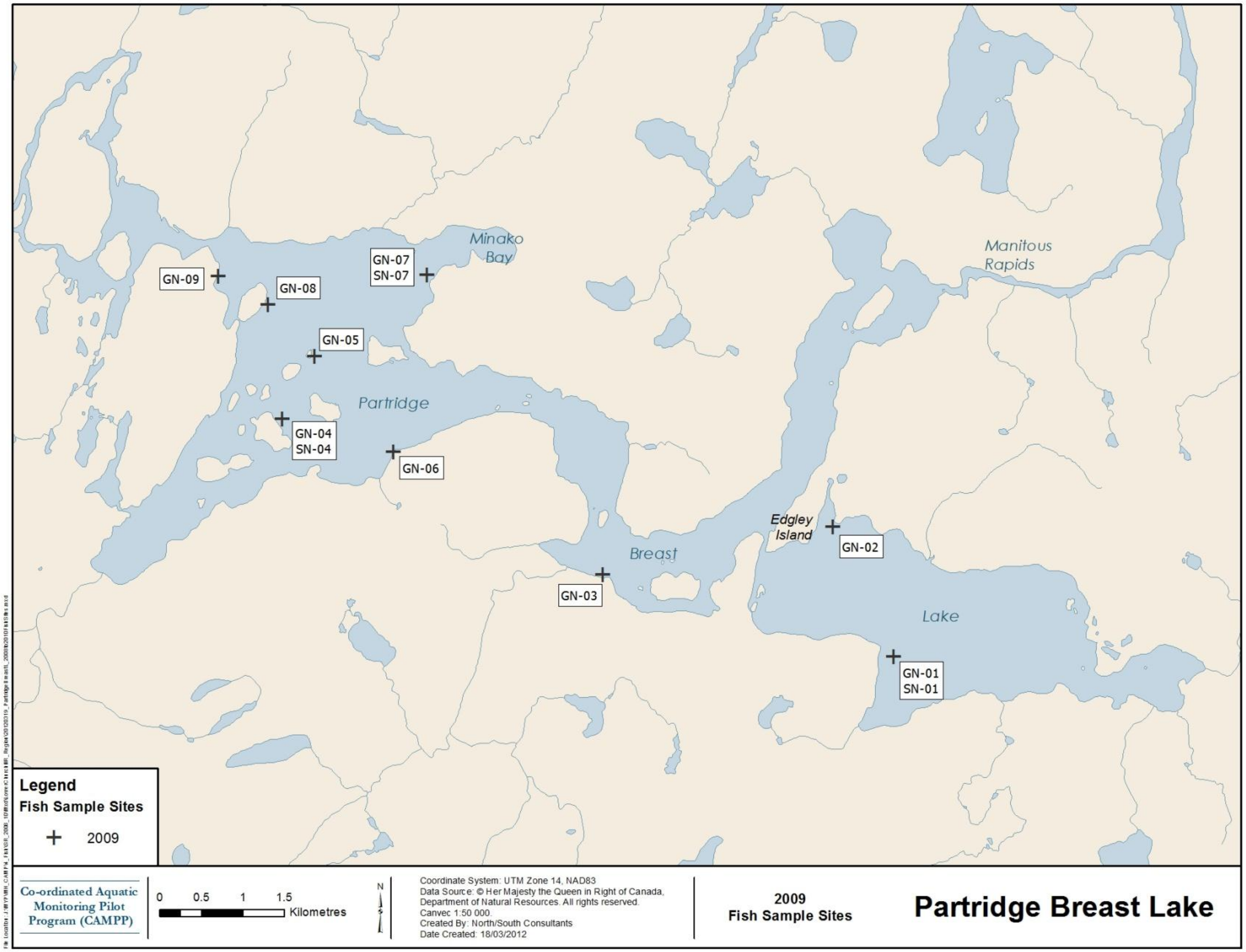


Figure 5.4.7-1 Map depicting standard gang and small mesh index gillnet sites sampled in Partridge Breast Lake, 2009.

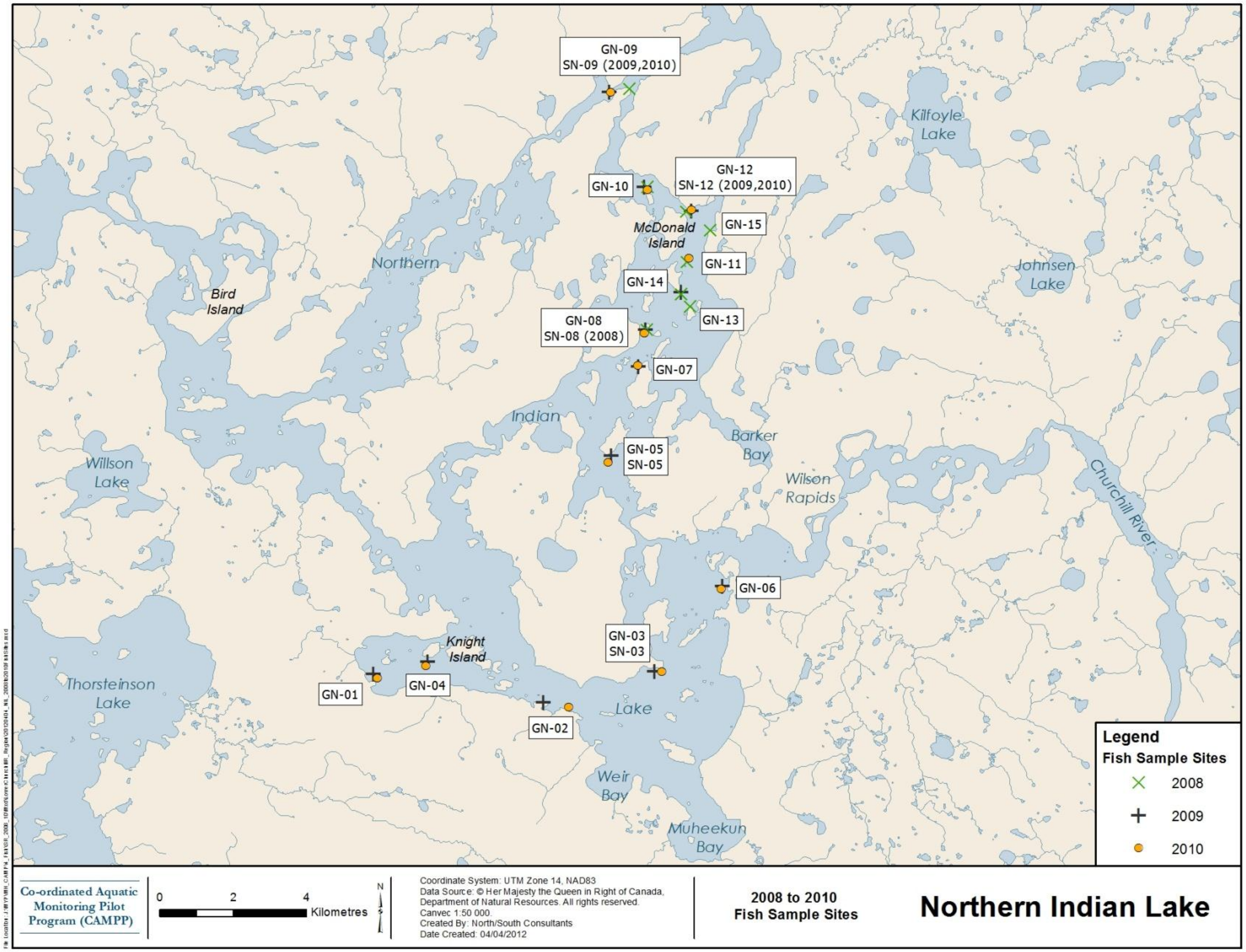


Figure 5.4.7-2 Map depicting standard gang and small mesh index gillnet sites sampled in Northern Indian Lake, 2008-2010.

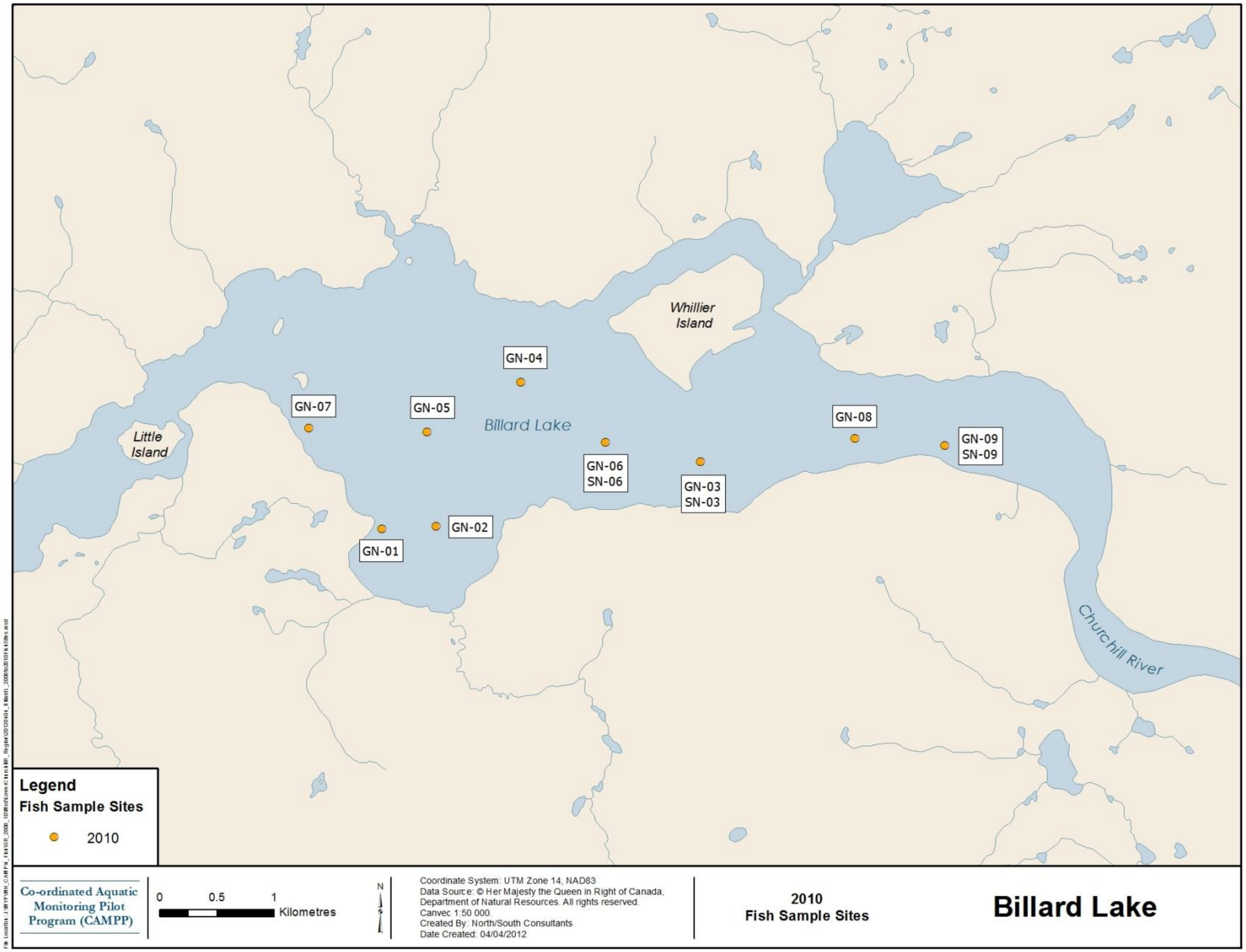


Figure 5.4.7-3 Map depicting standard gang and small mesh index gillnet sites sampled in Billard Lake, 2010.

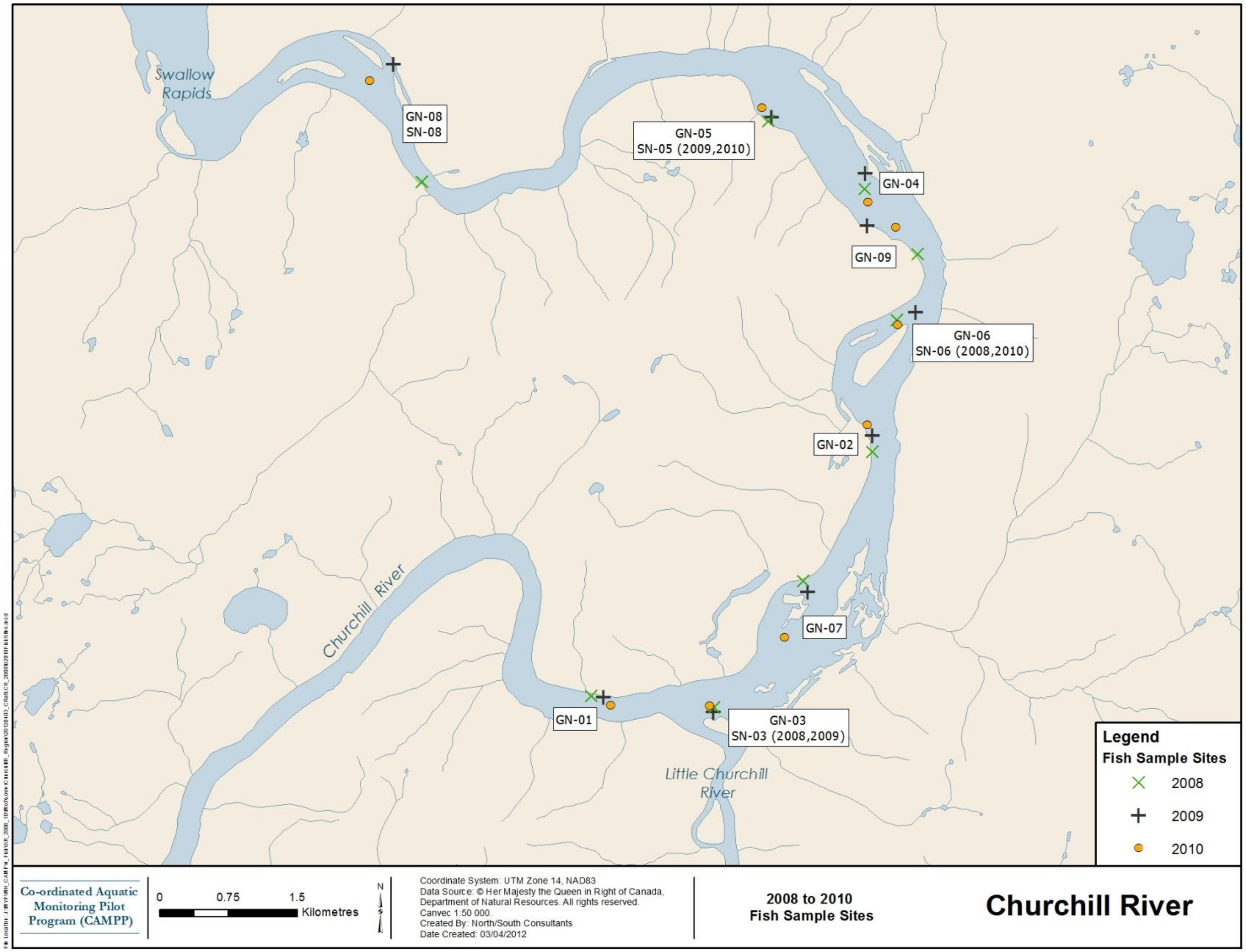


Figure 5.4.7-4 Map depicting standard gang and small mesh index gillnet sites sampled in the lower Churchill River, 2008-2010.

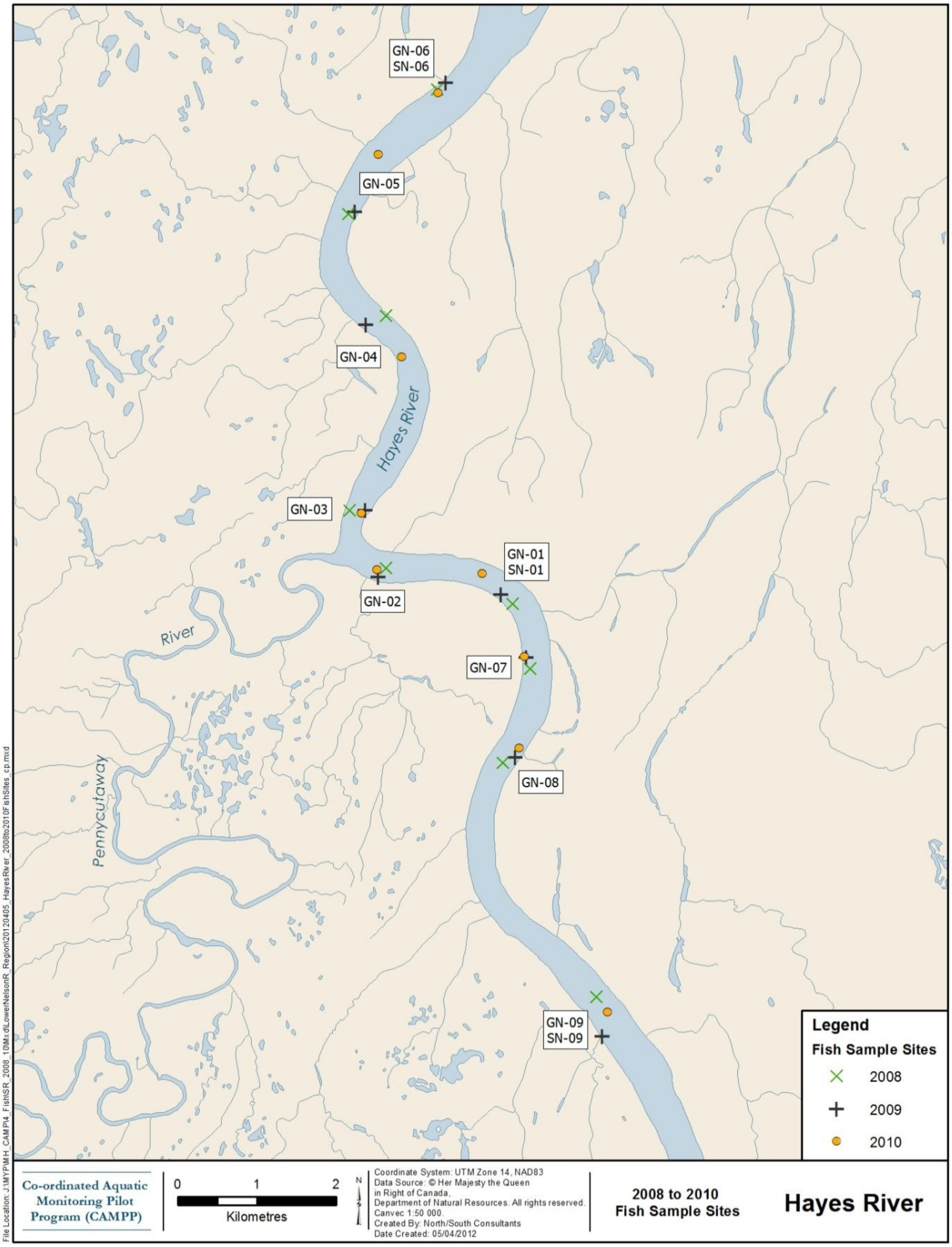


Figure 5.4.7-5 Map depicting standard gang and small mesh index gillnet sites sampled in the Hayes River, 2008-2010.

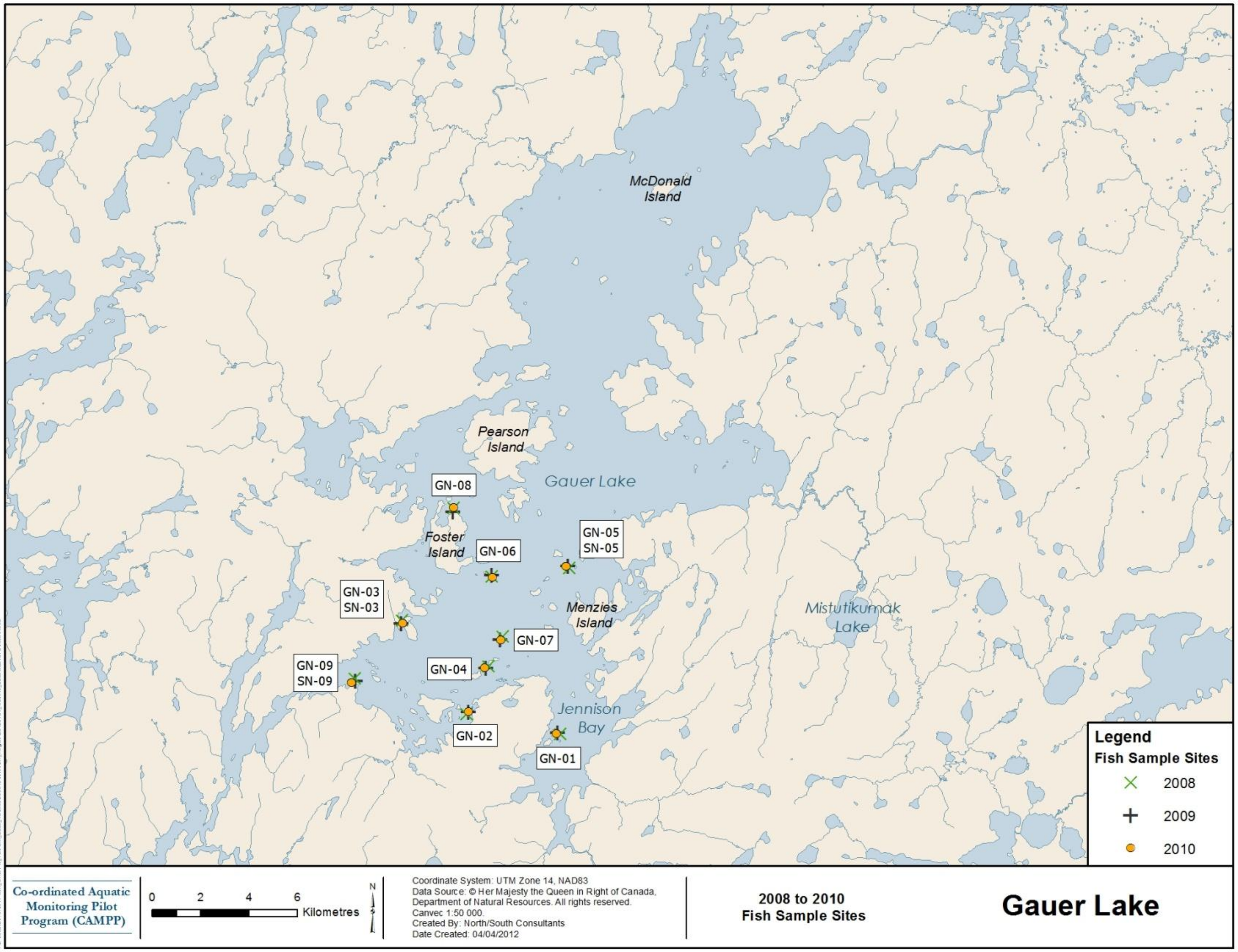


Figure 5.4.7-6 Map depicting standard gang and small mesh index gillnet sites sampled in Gauer Lake, 2008-2010.

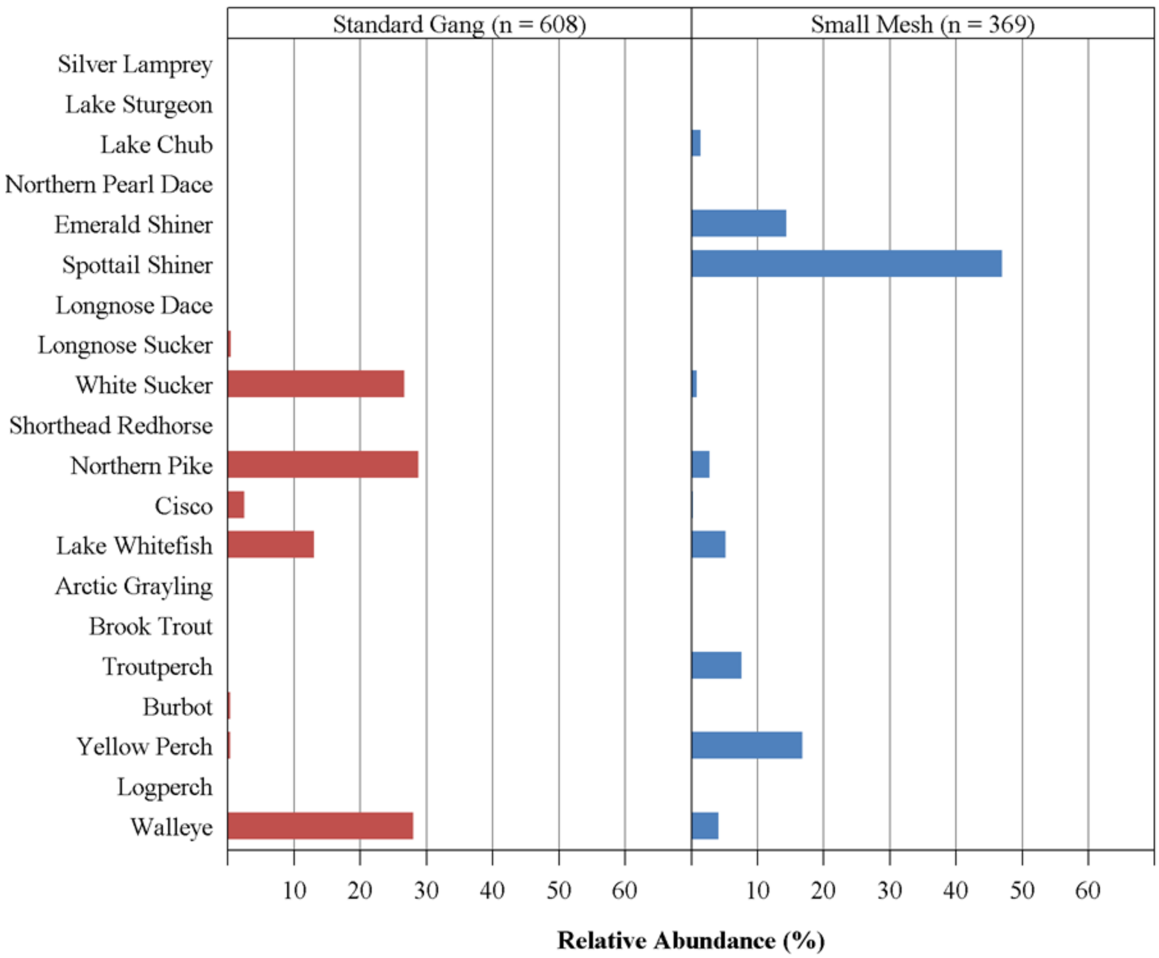


Figure 5.4.7-7 Relative abundance (%) distribution for fish species captured in standard gang and small mesh index gill nets set in Partridge Breast Lake in 2009.

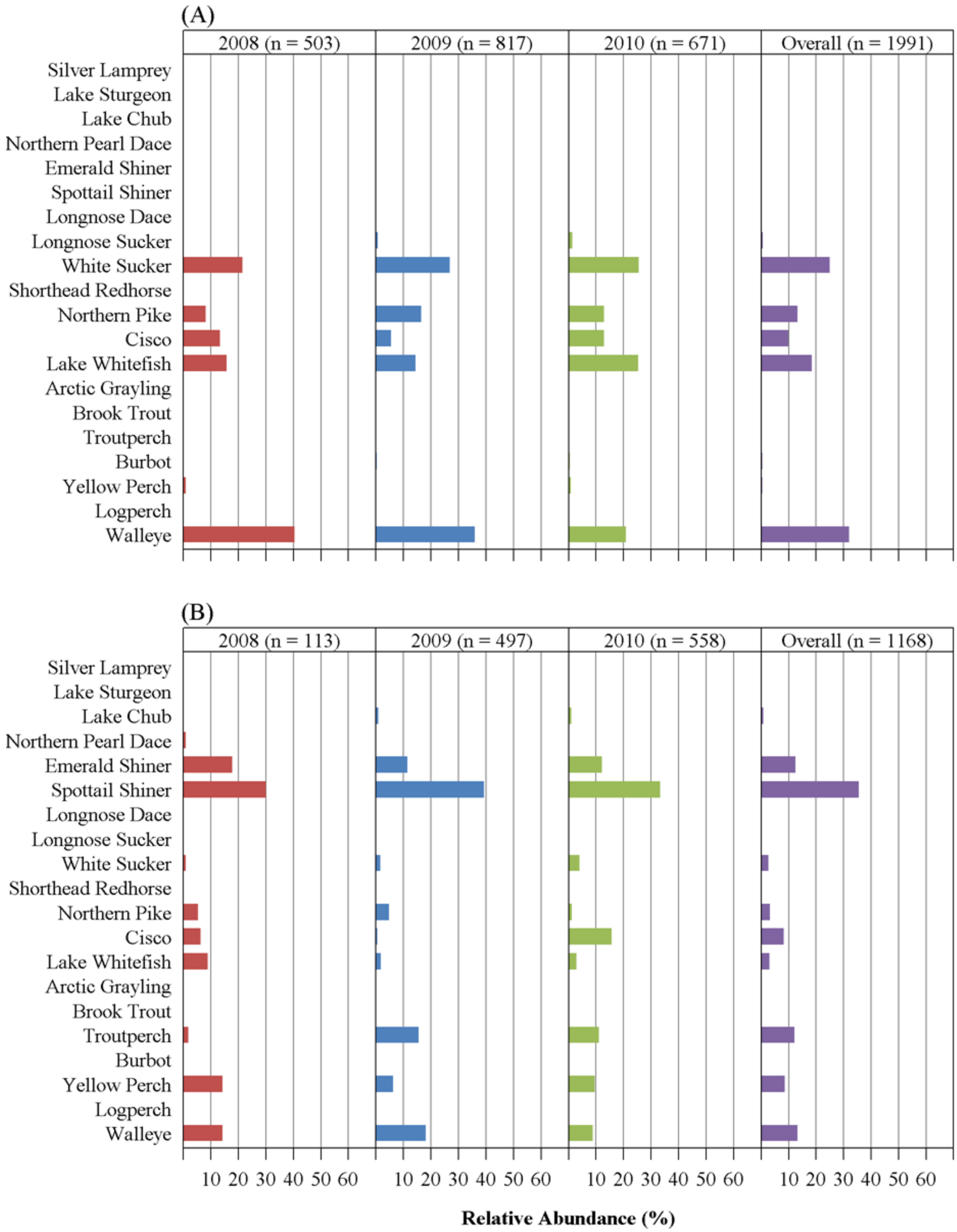


Figure 5.4.7-8 Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in Northern Indian Lake, 2008-2010.

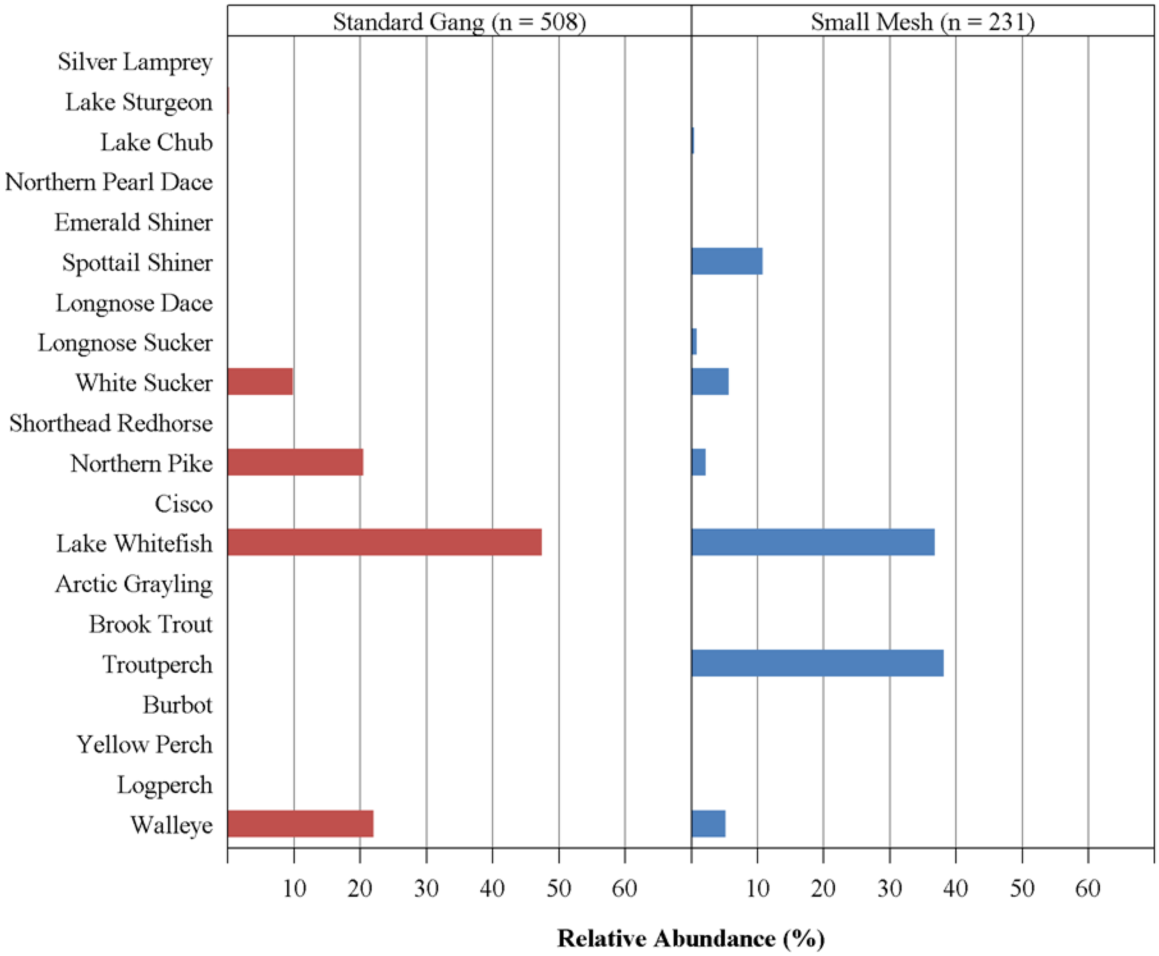


Figure 5.4.7-9 Relative abundance (%) distribution for fish species captured in standard gang and small mesh index gill nets set in Billard Lake, 2010.

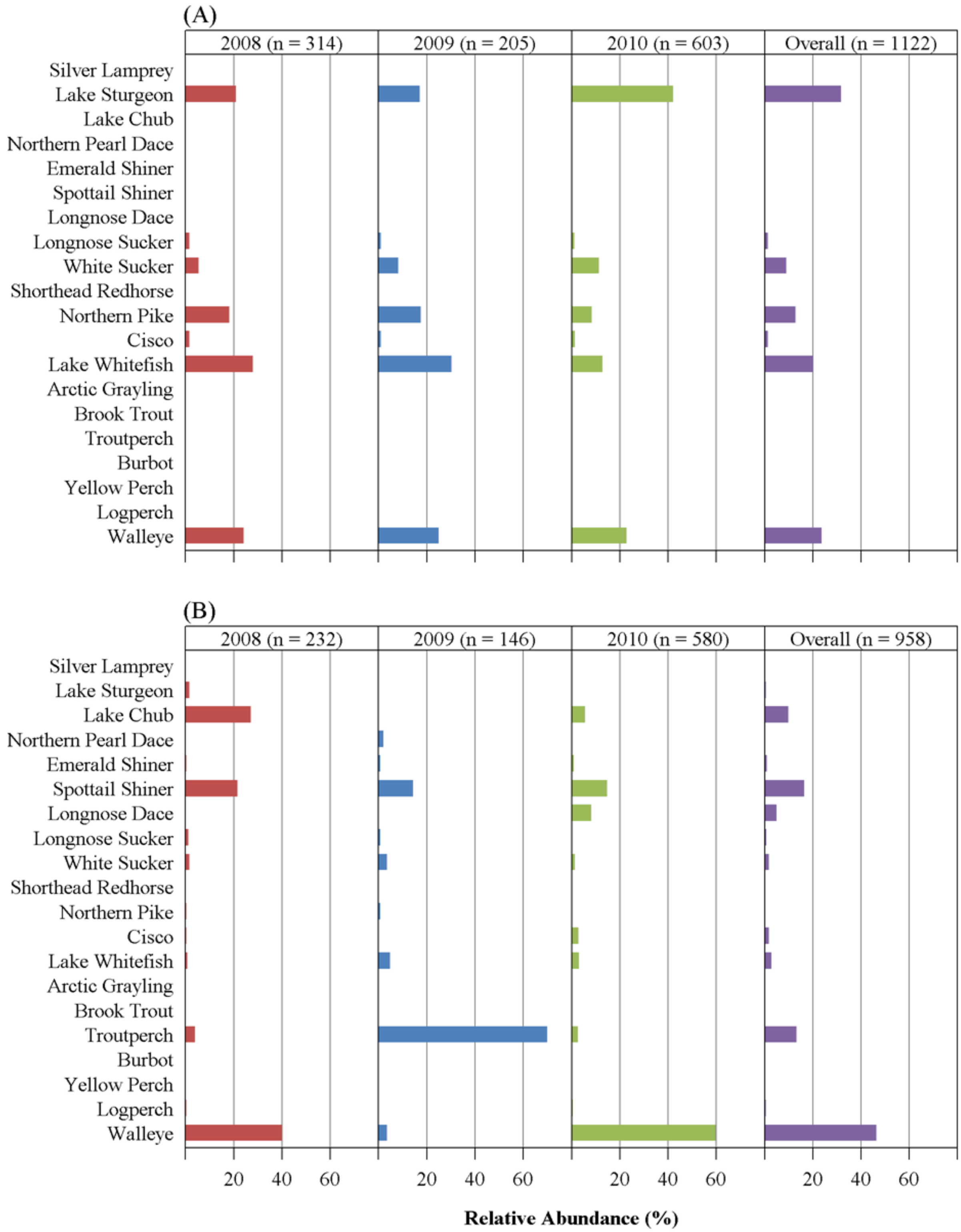


Figure 5.4.7-10 Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in the lower Churchill River, 2008-2010.

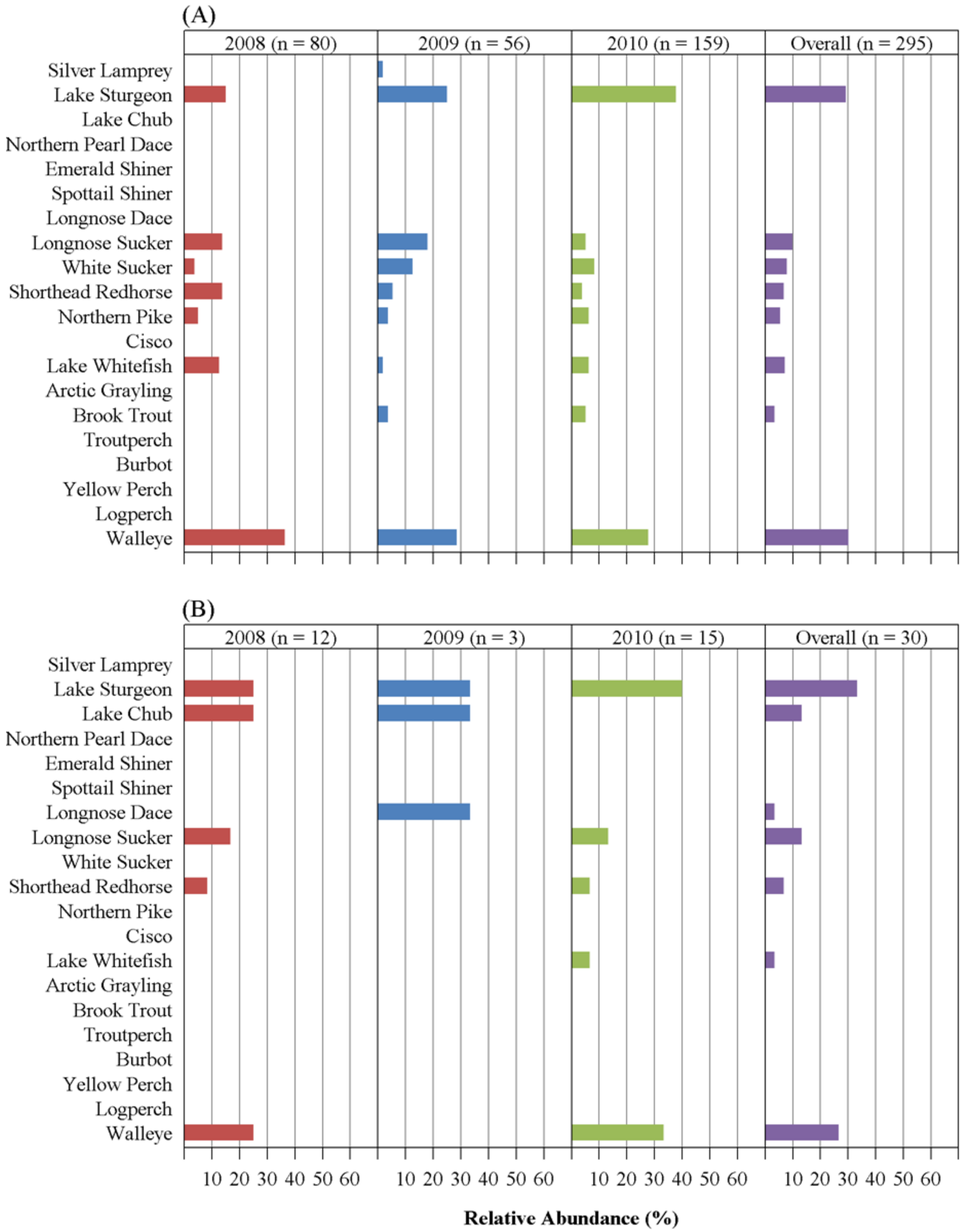


Figure 5.4.7-11 Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in the Hayes River, 2008-2010.

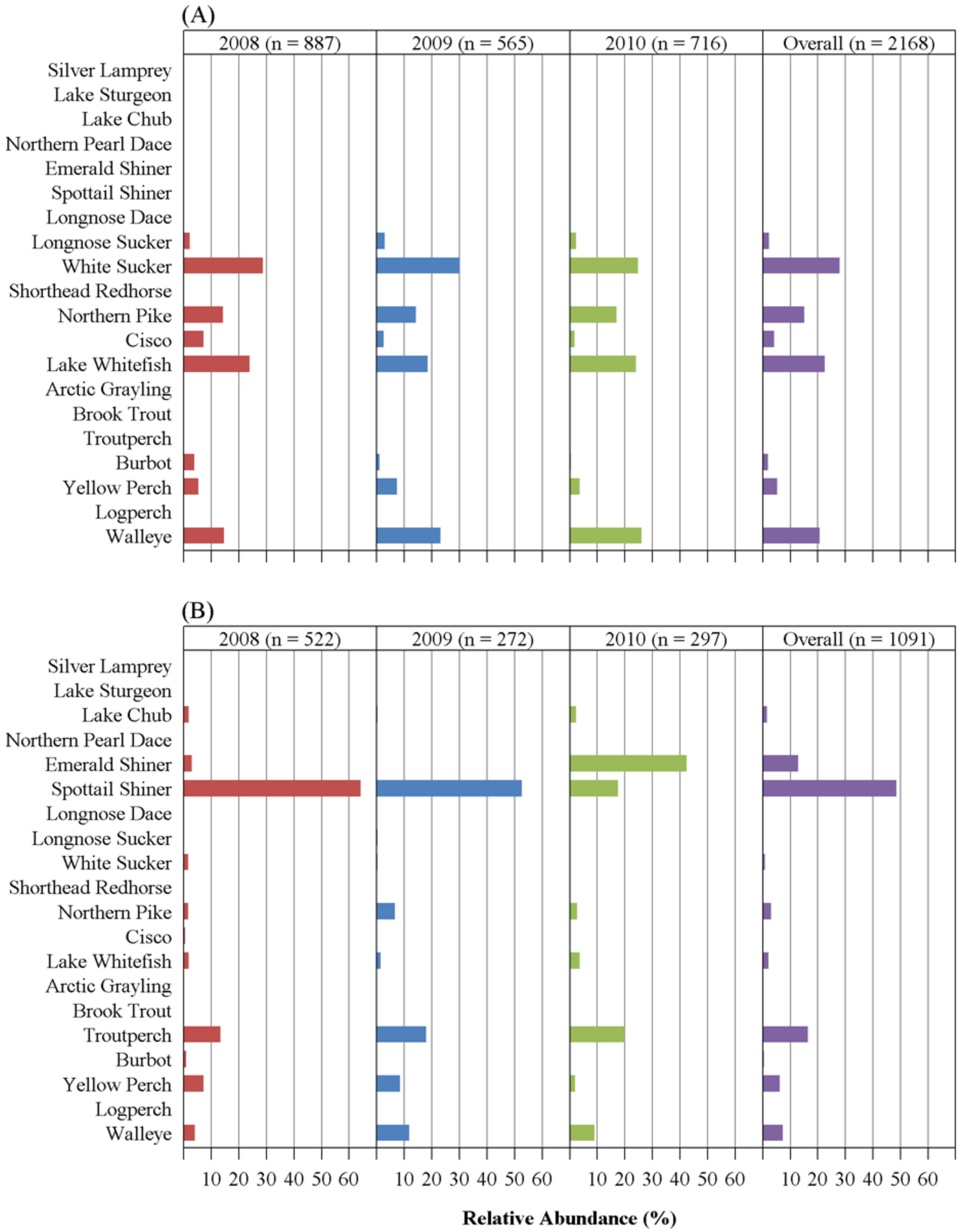


Figure 5.4.7-12 Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in Gauer Lake, 2008-2010.

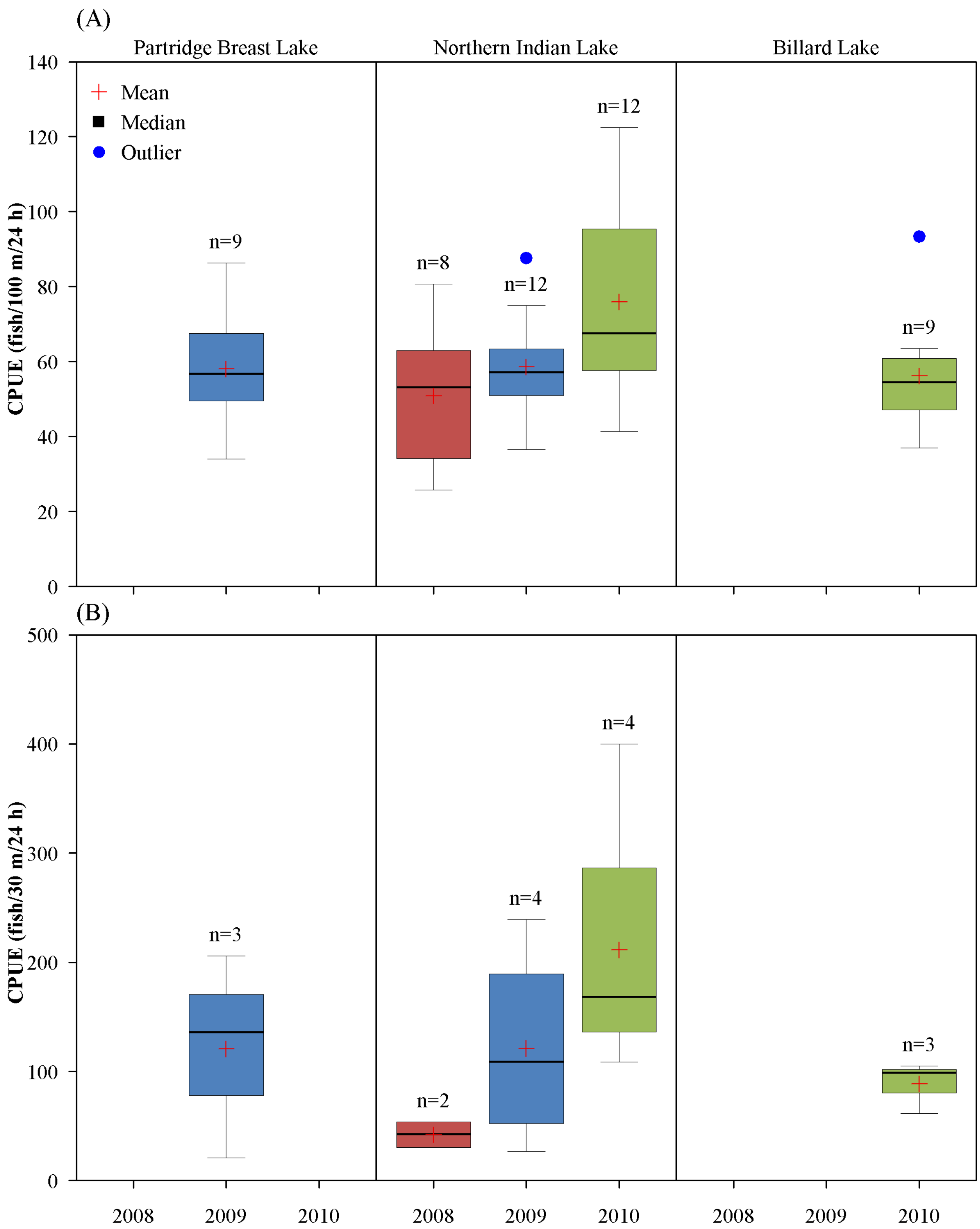


Figure 5.4.7-13 Mean and median (range) total CPUE per site calculated for fish captured in (A) standard gang and (B) small mesh index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

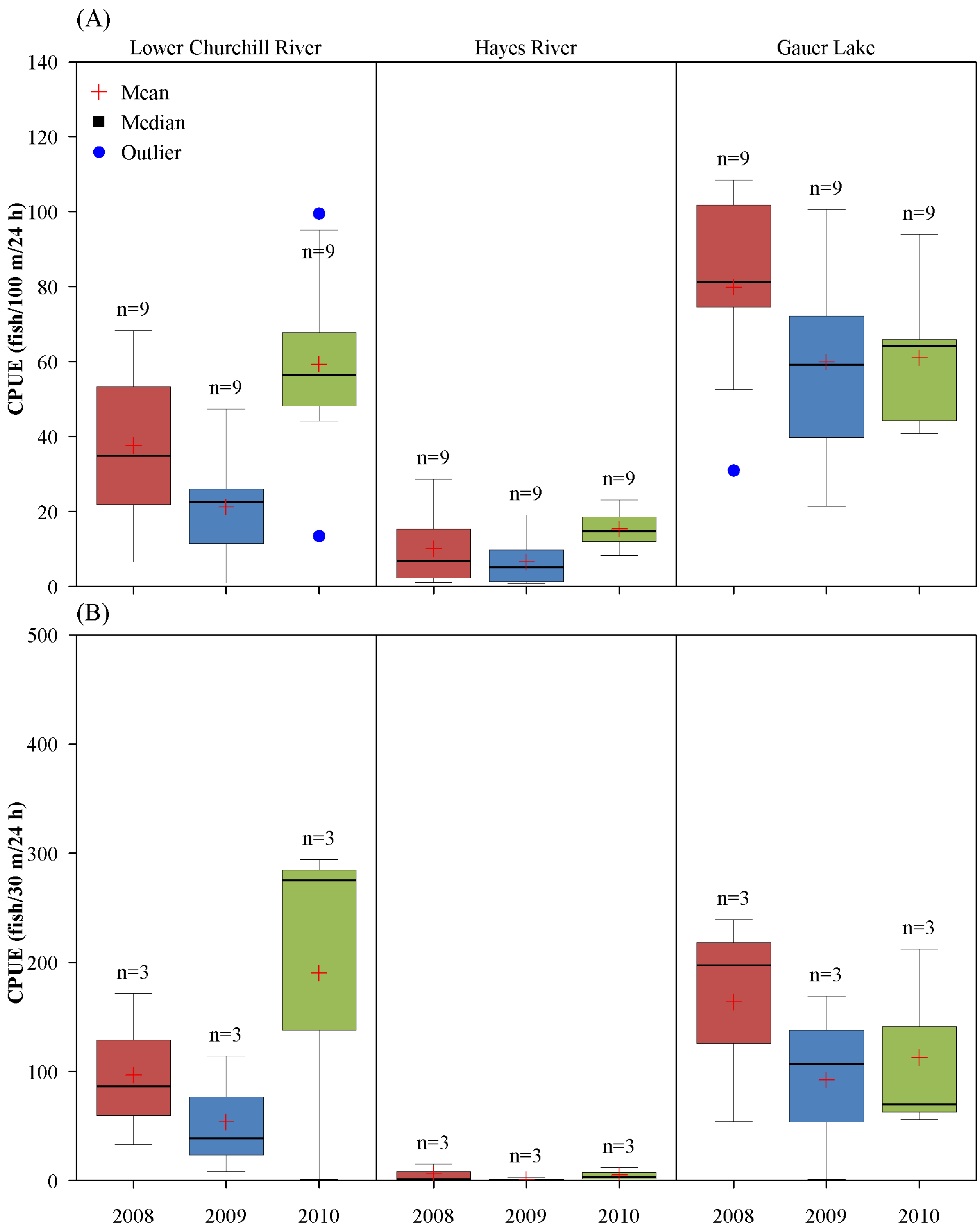


Figure 5.4.7-13. continued.

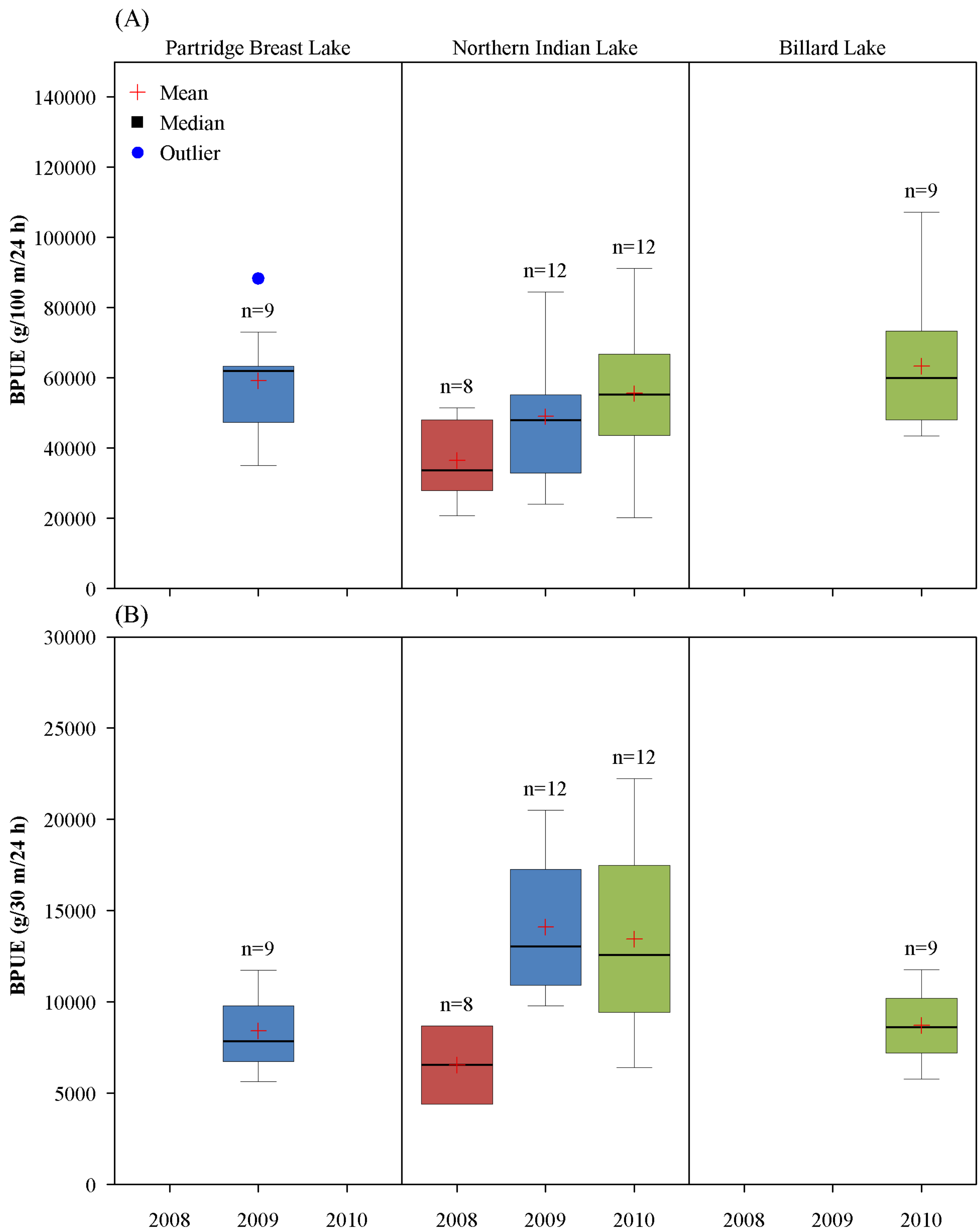


Figure 5.4.7-14 Mean and median (range) total BPUE per site calculated for fish captured in (A) standard gang and (B) small mesh index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

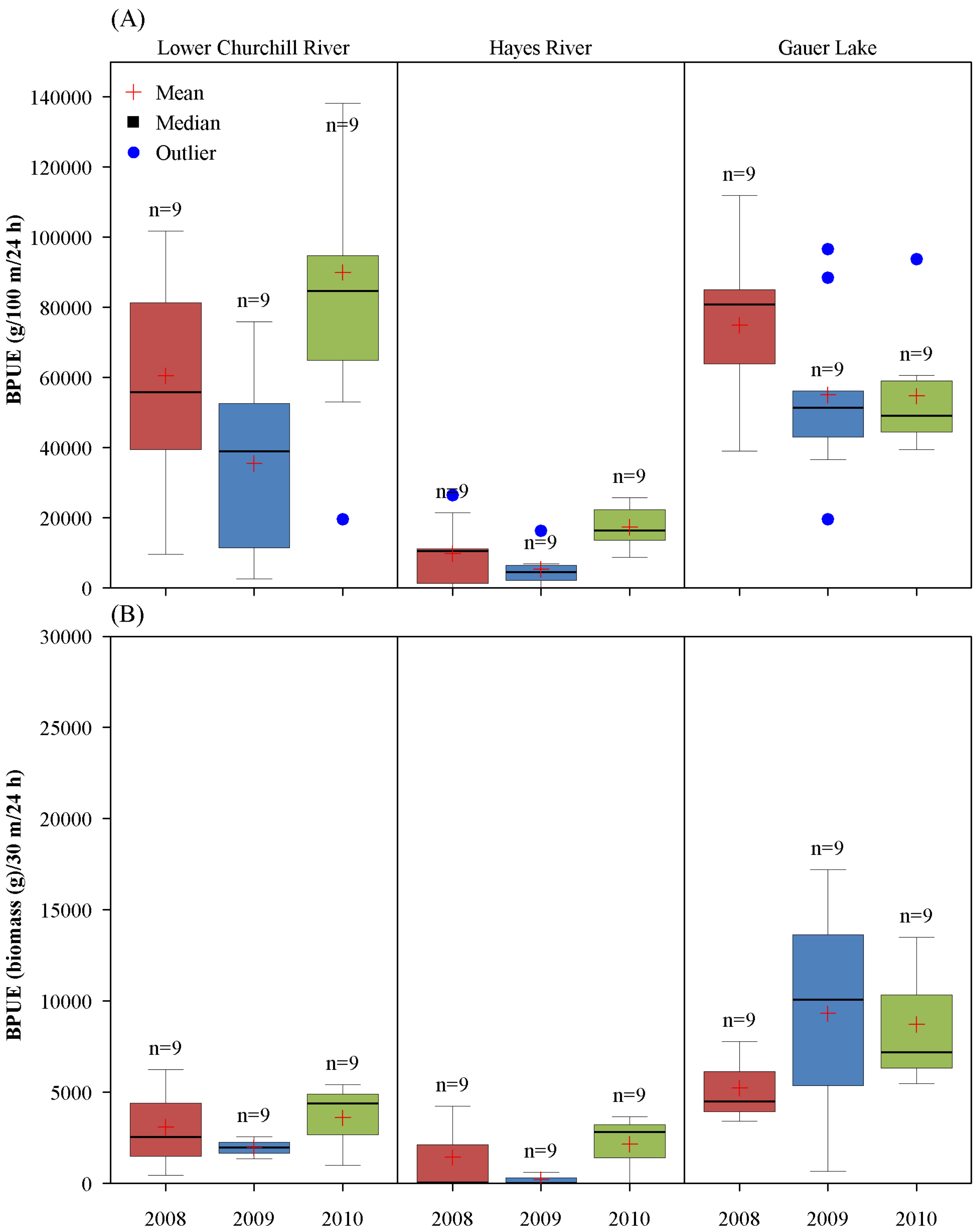


Figure 5.4.7-14 continued.

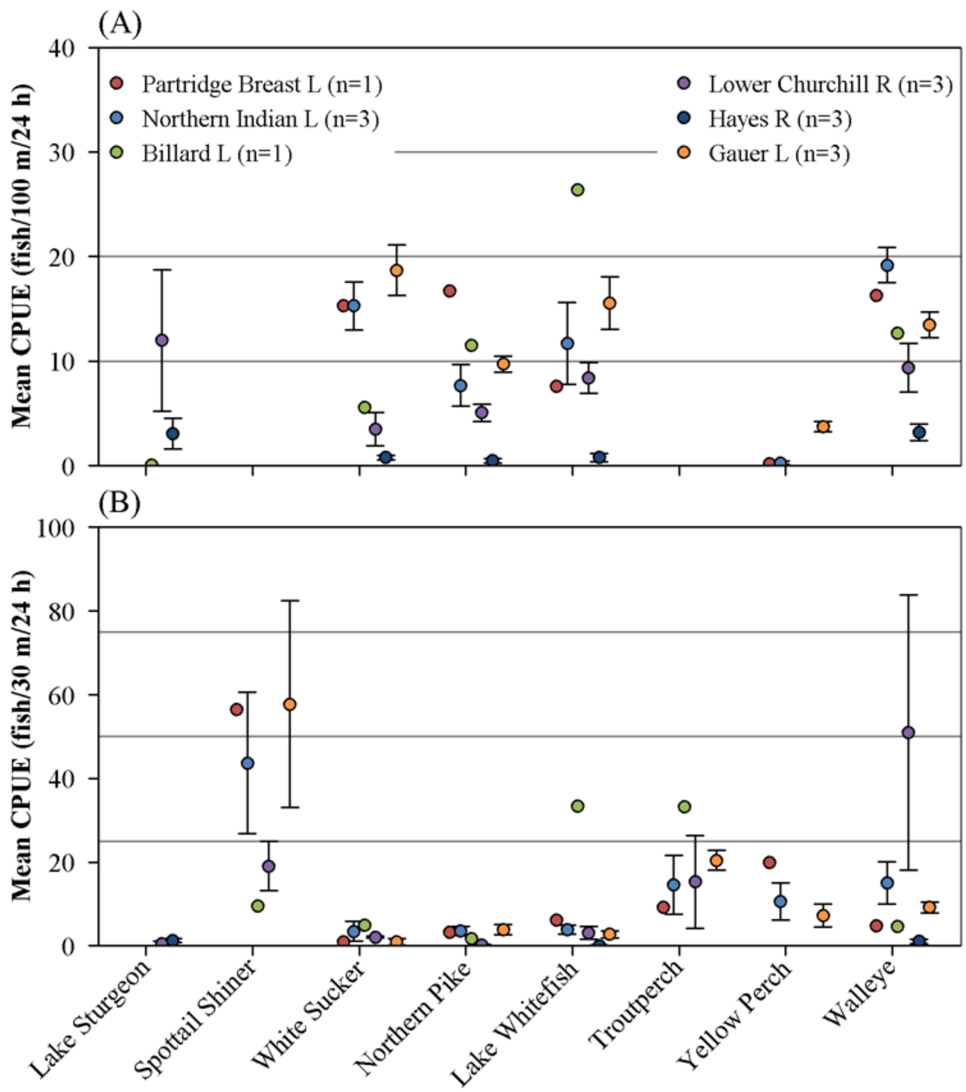


Figure 5.4.7-15 Mean (SE) CPUE for select species captured in (A) standard gang and (B) small mesh index gill nets set in Lower Churchill River Region waterbodies, 2008-2010.

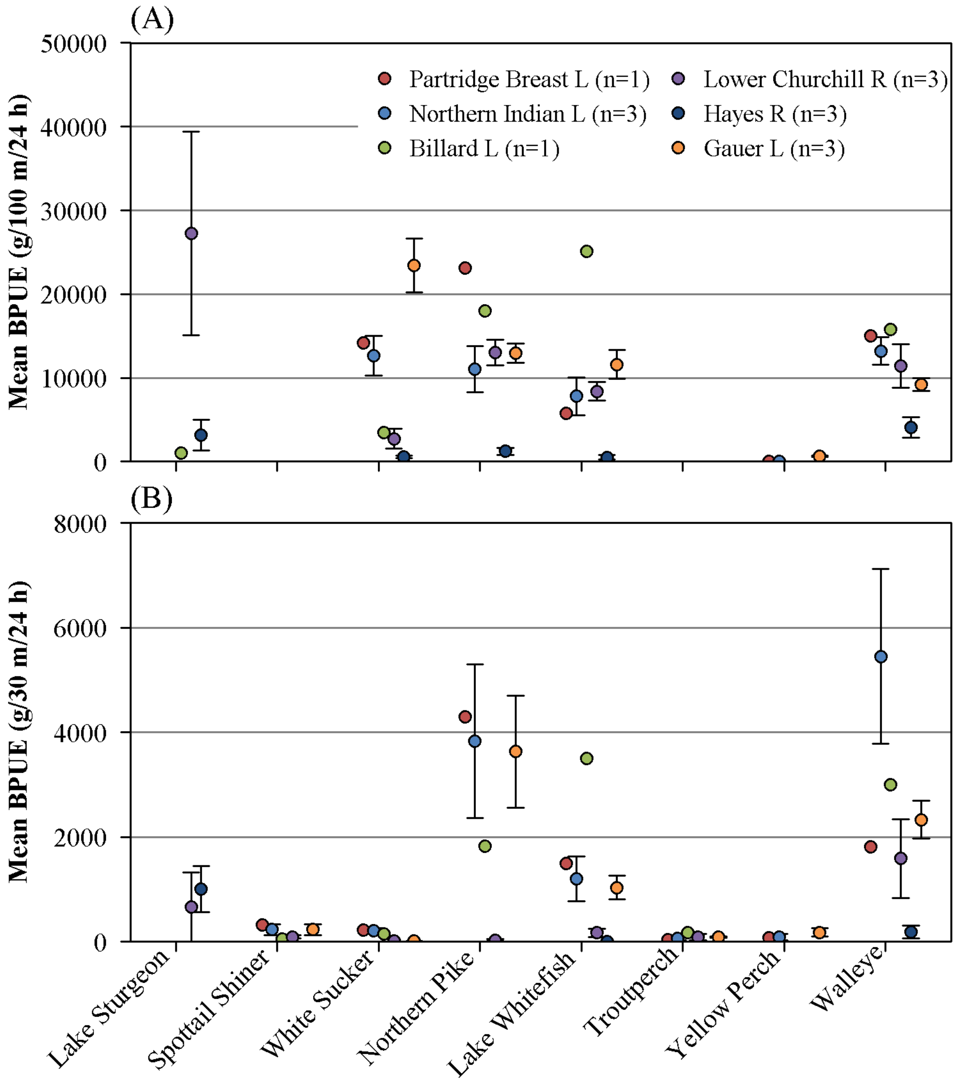


Figure 5.4.7-16 Mean (SE) BPUE for select species captured in (A) standard gang and (B) small mesh index gill nets set in Lower Churchill River Region waterbodies from 2008-2010.

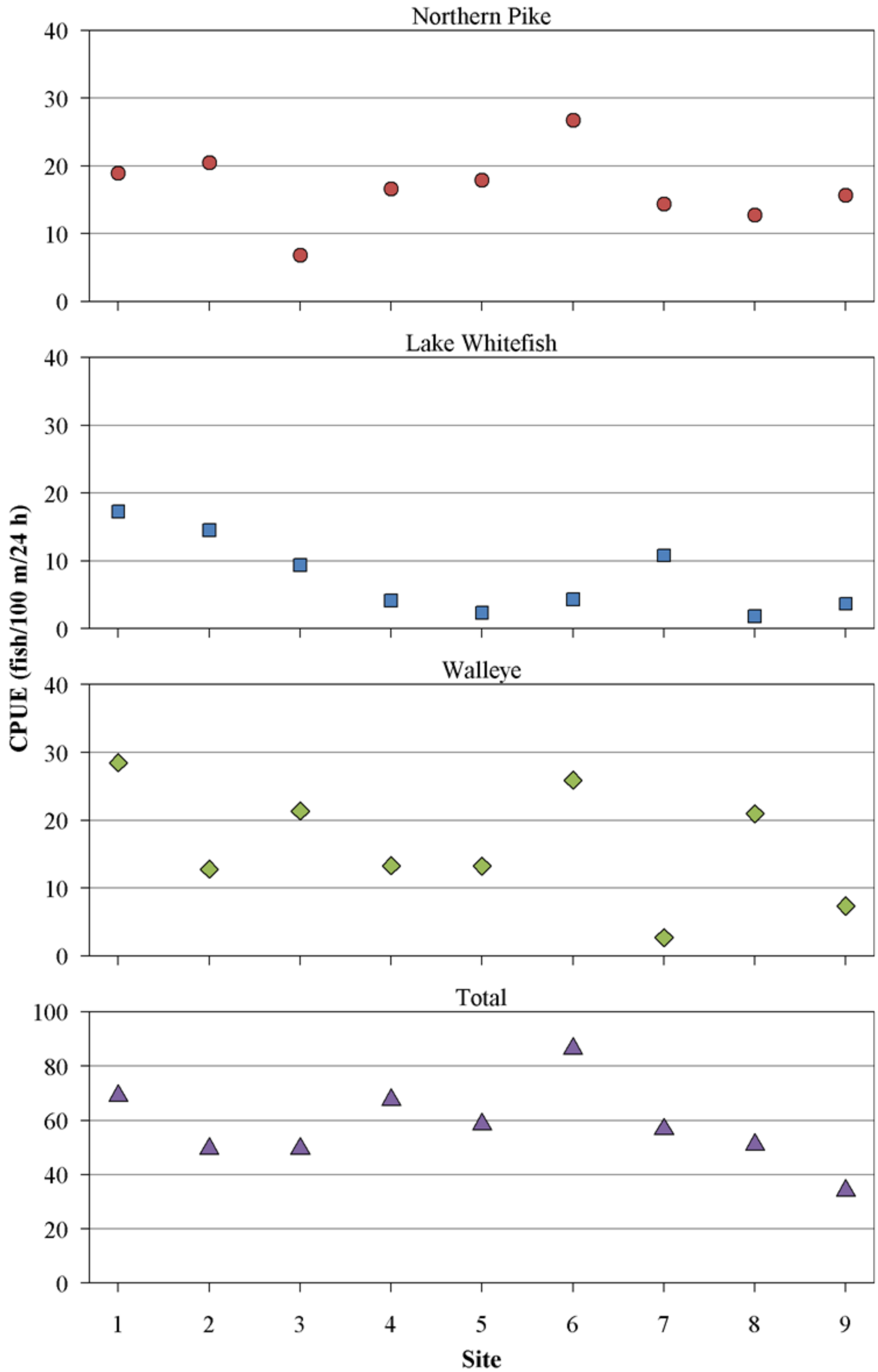


Figure 5.4.7-17 CPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Partridge Breast Lake, 2009.

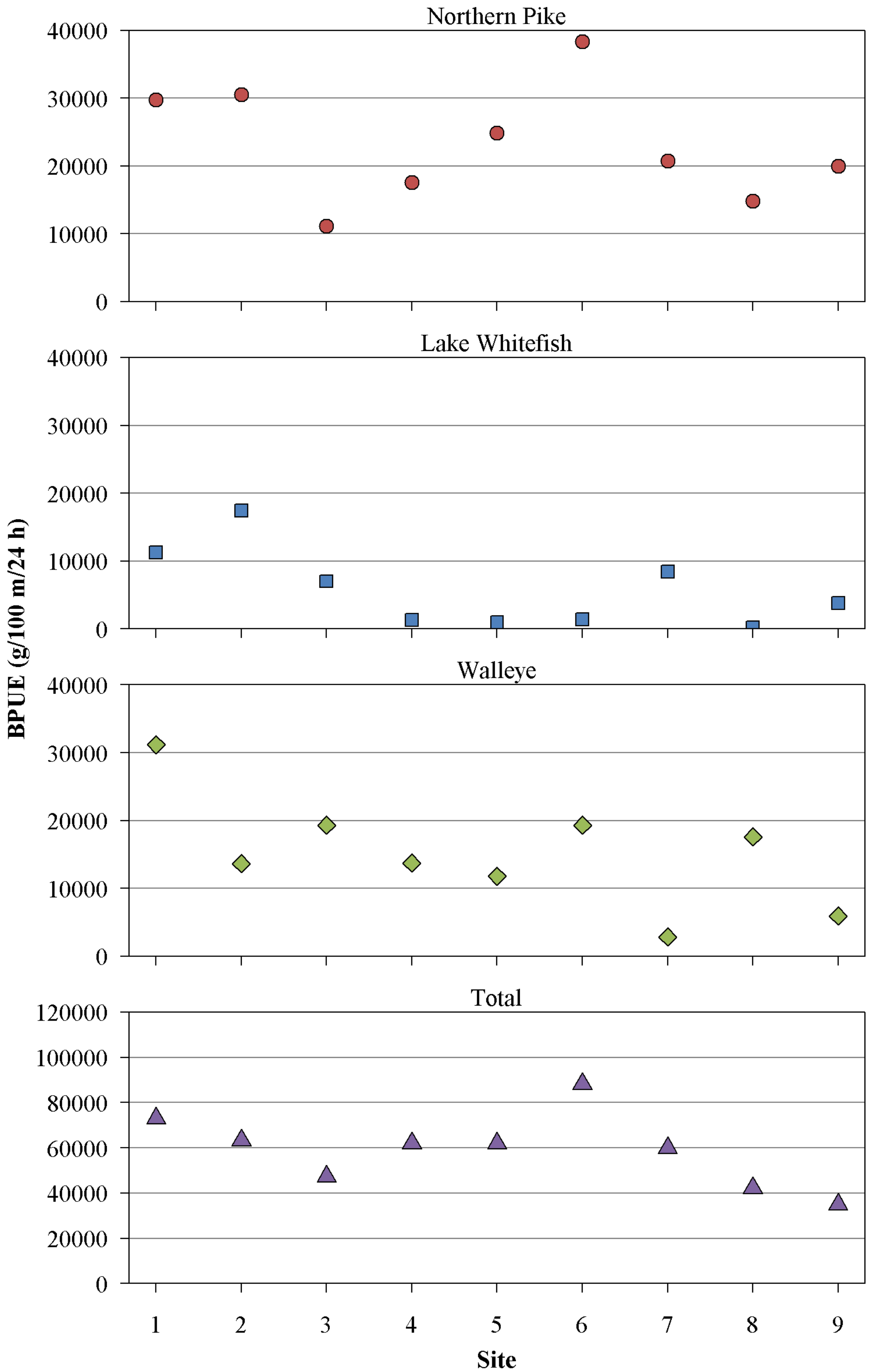


Figure 5.4.7-18 BPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Partridge Breast Lake, 2009.

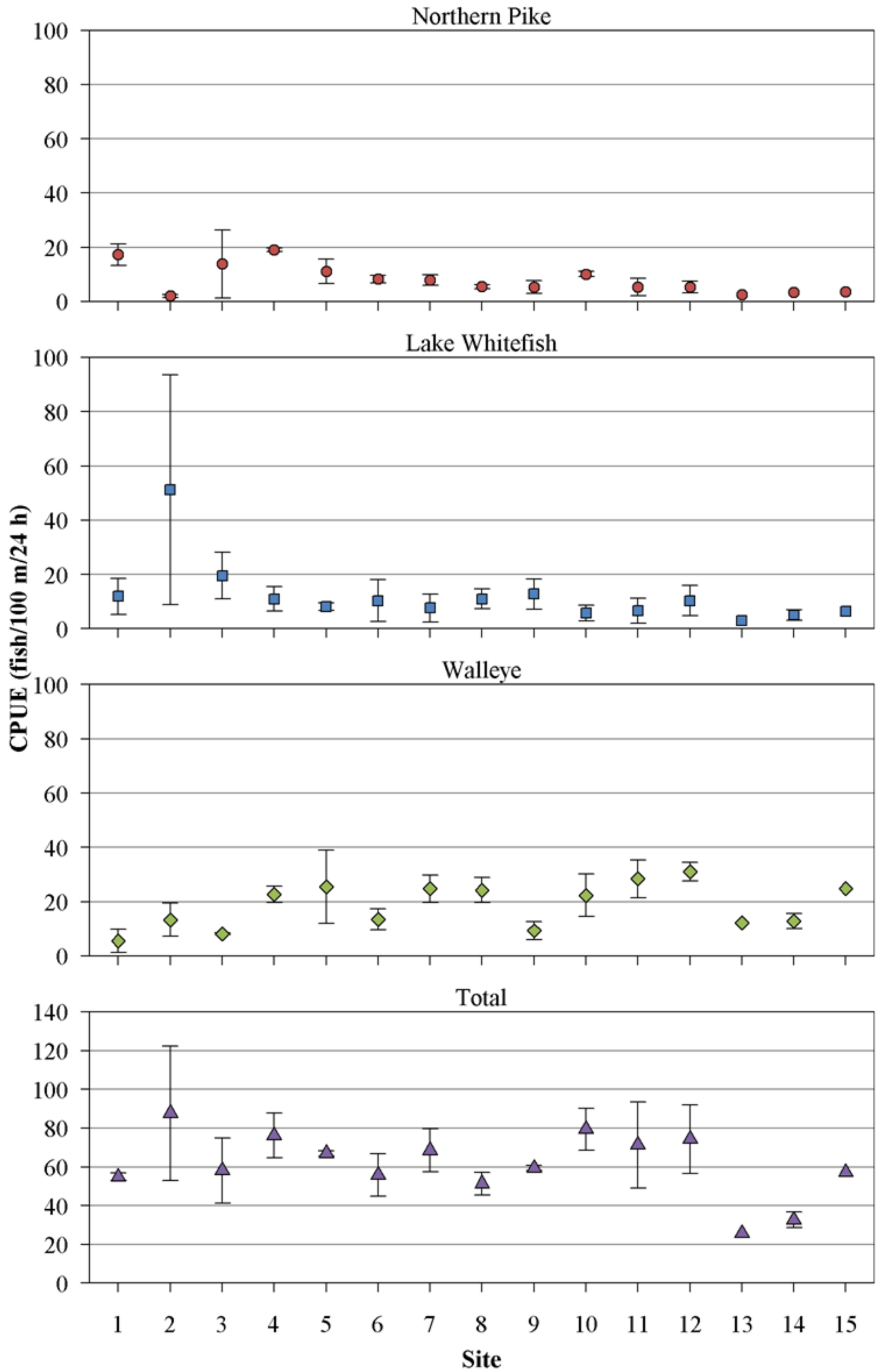


Figure 5.4.7-19 Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Northern Indian Lake, 2008-2010.

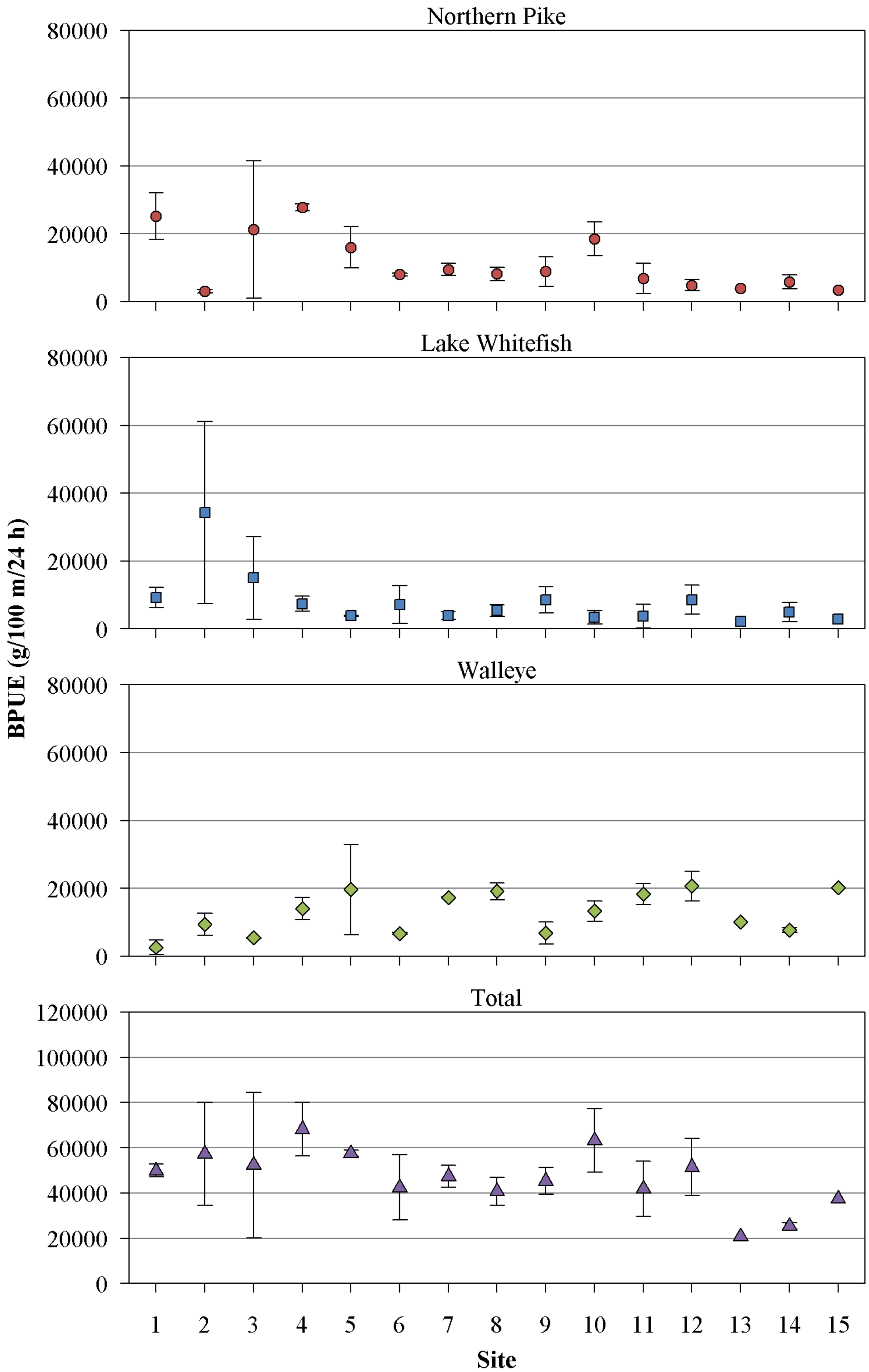


Figure 5.4.7-20 Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Northern Indian Lake, 2008-2010.

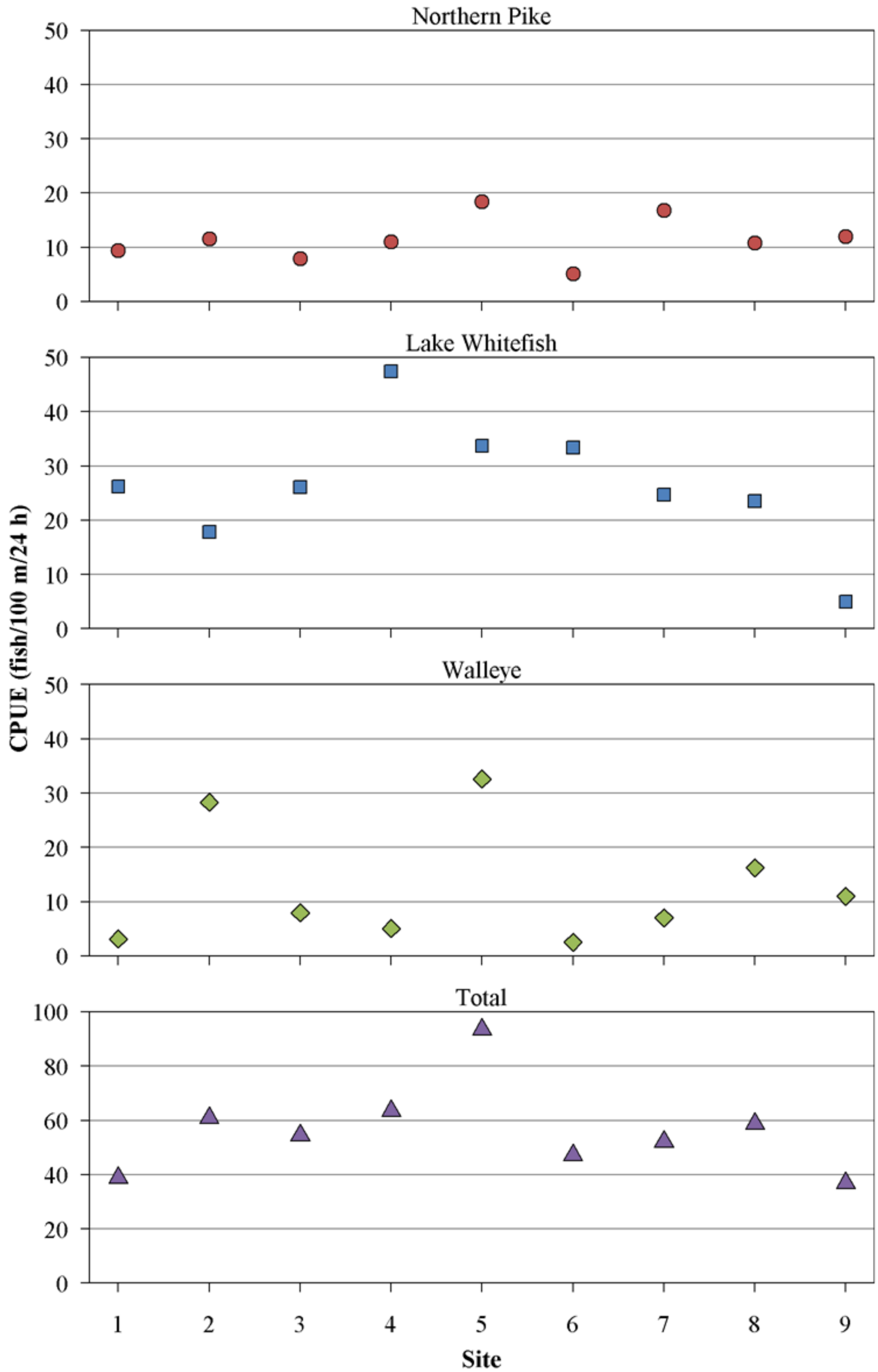


Figure 5.4.7-21 CPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Billard Lake, 2010.

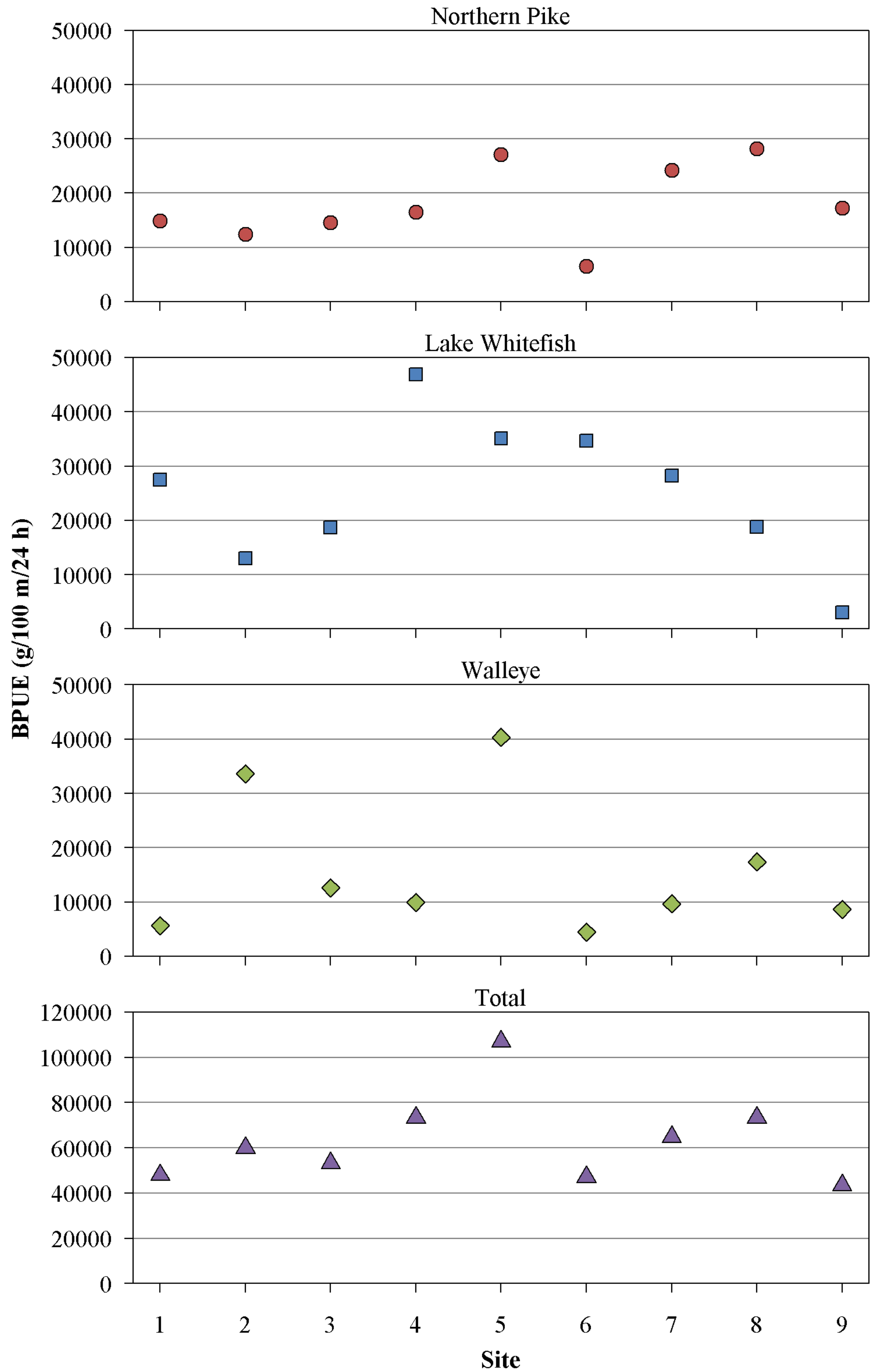


Figure 5.4.7-22 BPUE by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Billard Lake, 2010.

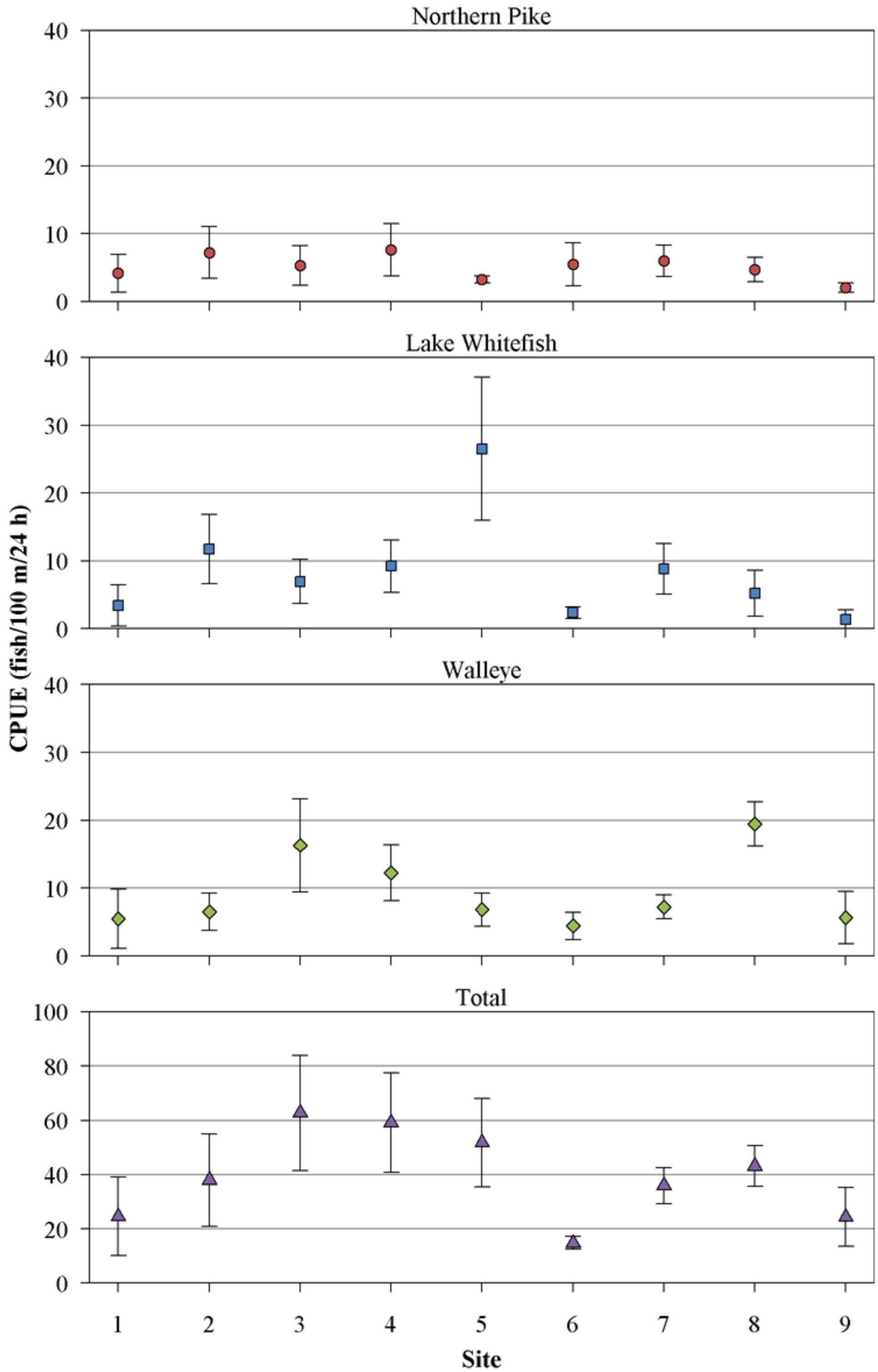


Figure 5.4.7-23 Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the lower Churchill River, 2008-2010.

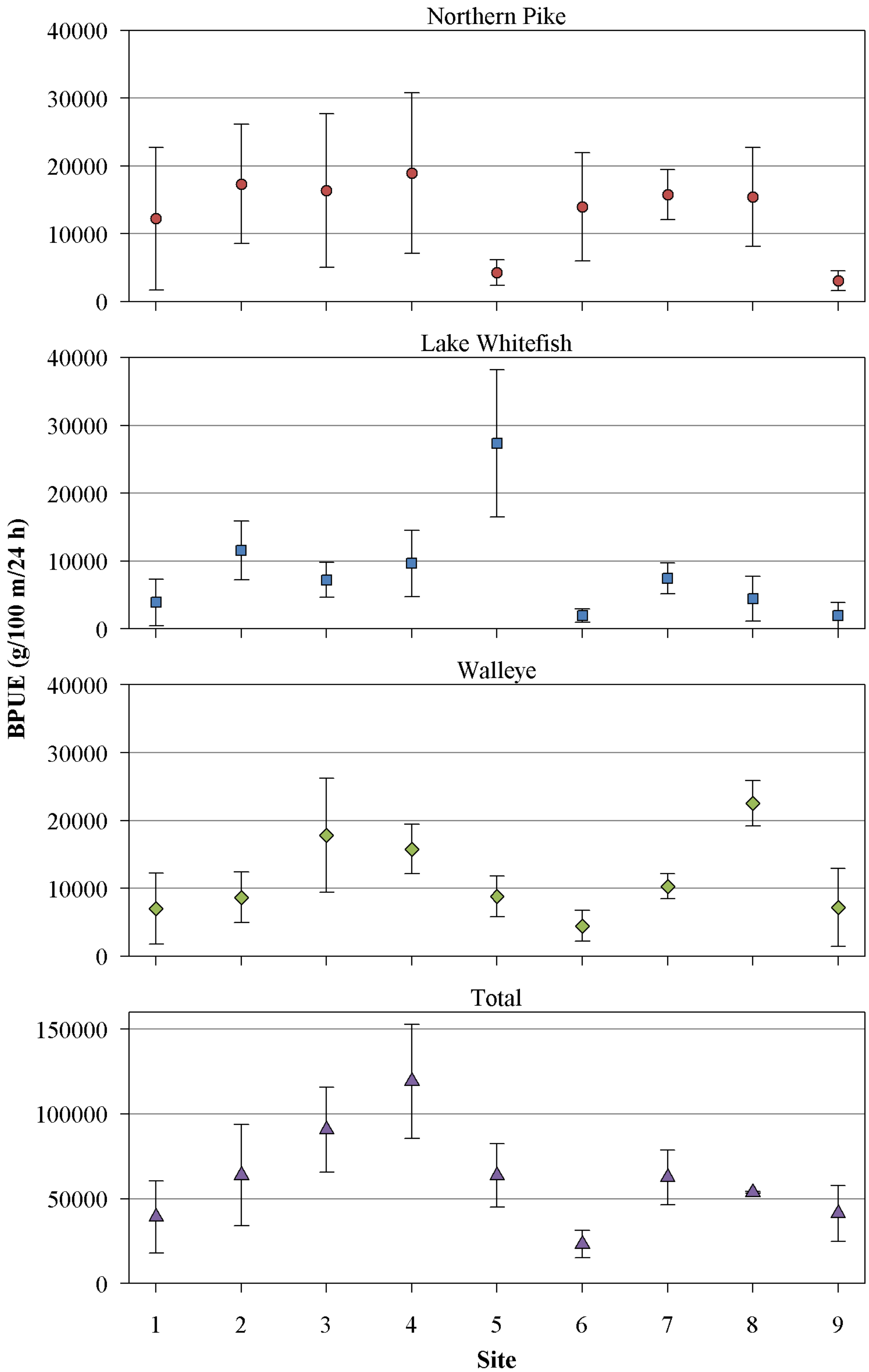


Figure 5.4.7-24 Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the lower Churchill River, 2008-2010.

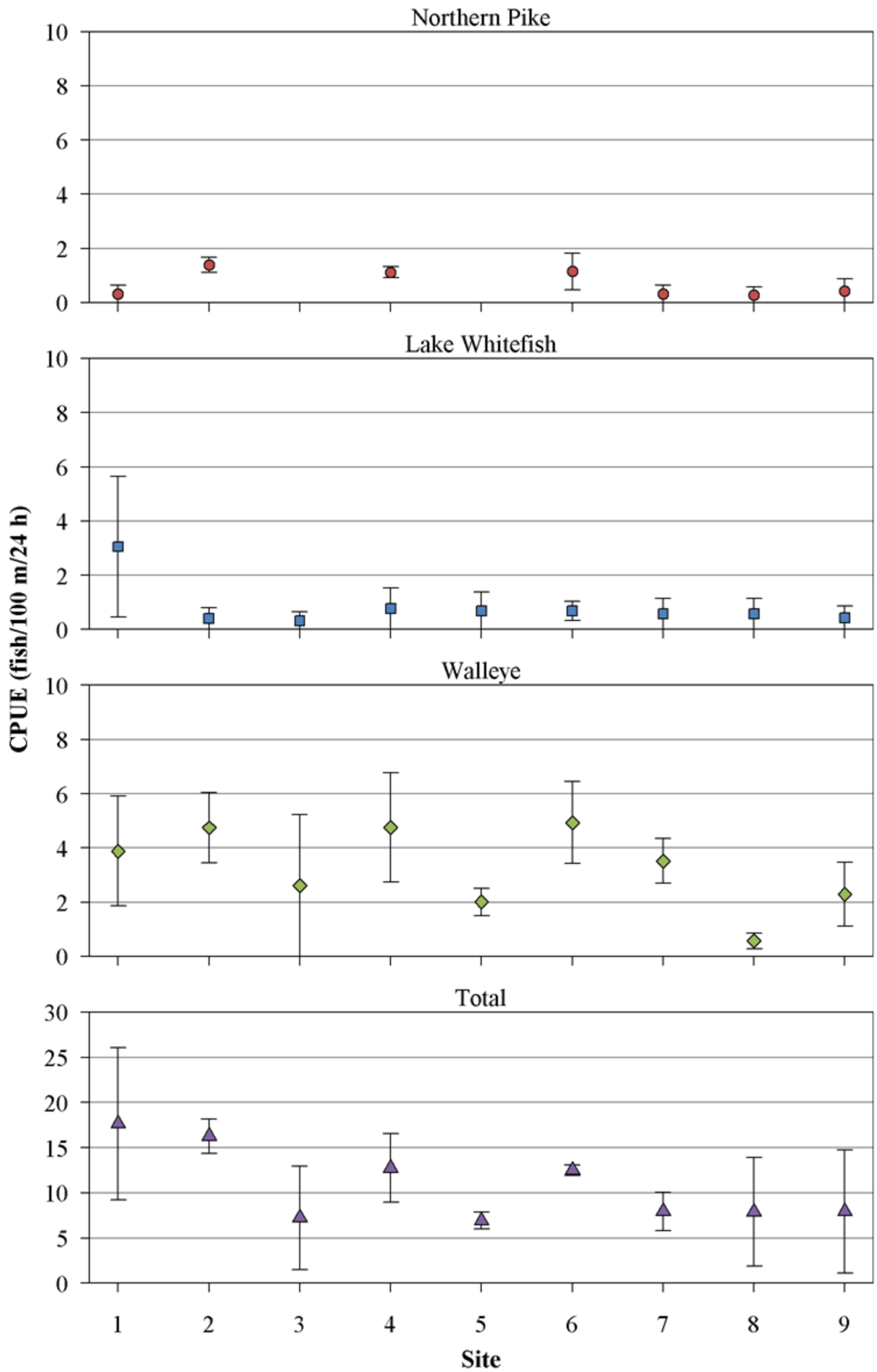


Figure 5.4.7-25 Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the Hayes River, 2008-2010.

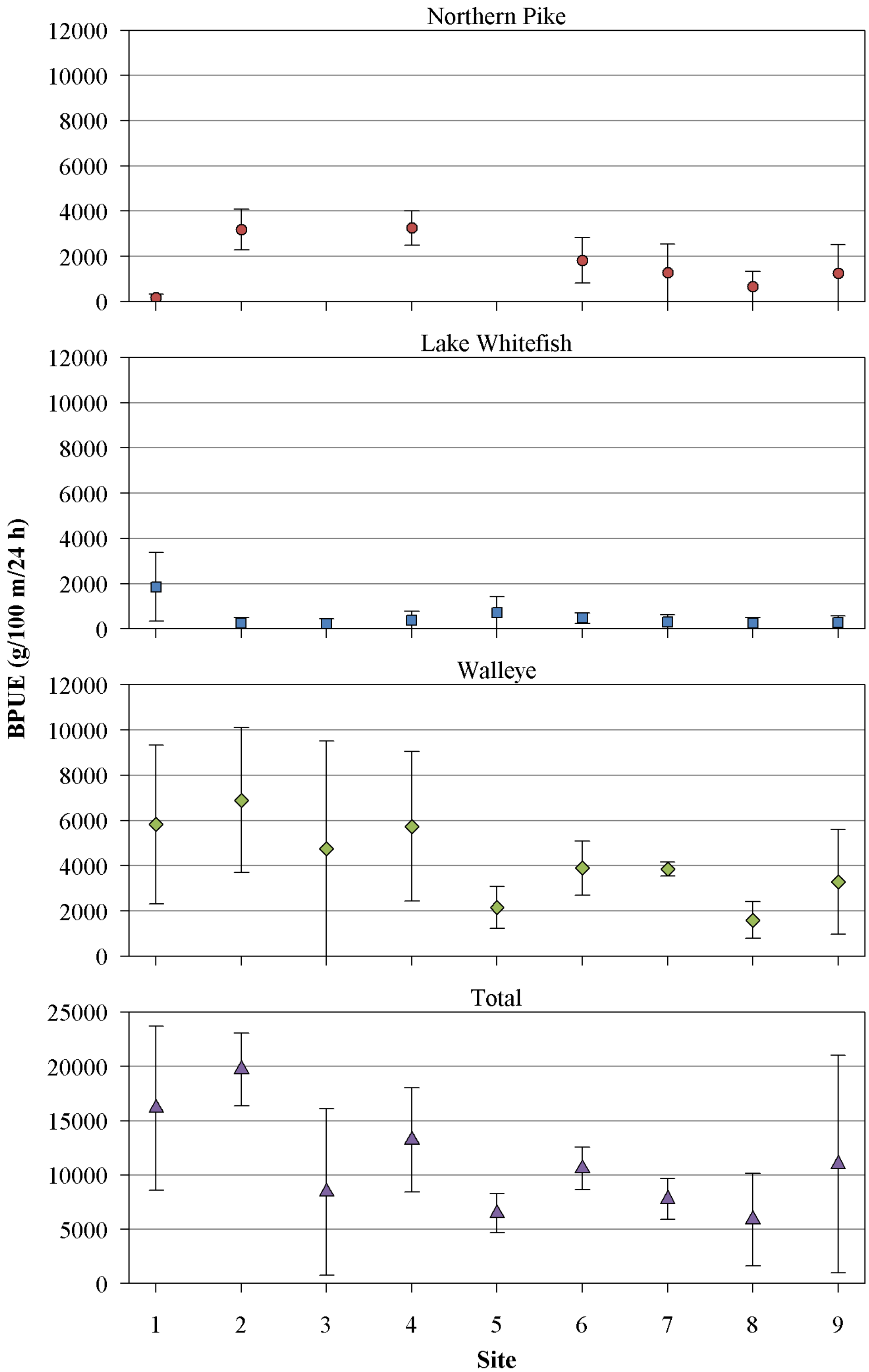


Figure 5.4.7-26 Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in the Hayes River, 2008-2010.

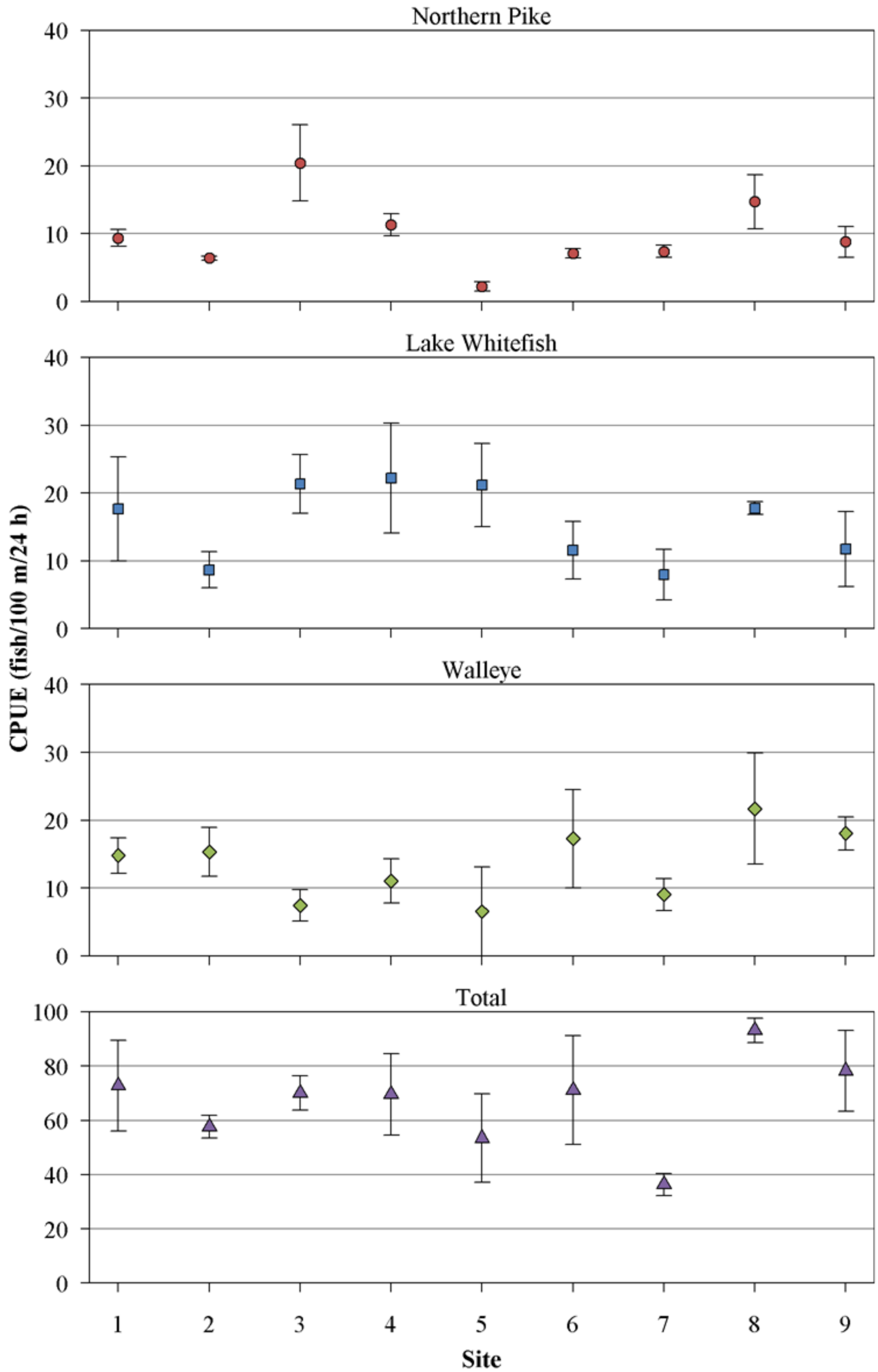


Figure 5.4.7-27 Mean CPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Gauer Lake, 2008-2010.

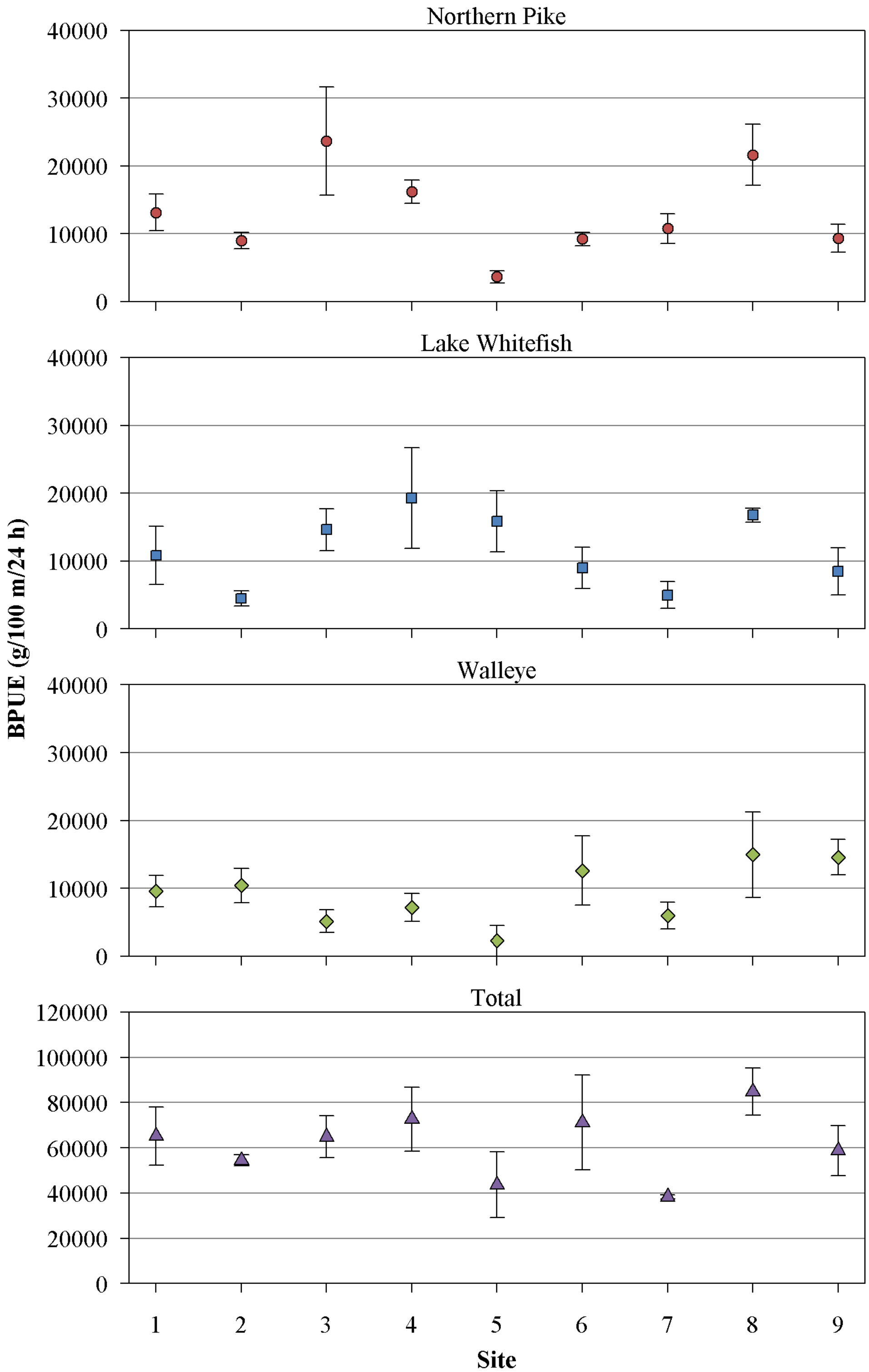


Figure 5.4.7-28 Mean BPUE (SE) by site for Northern Pike, Lake Whitefish, Walleye and all species combined (total) captured in standard gang index gill nets set in Gauer Lake, 2008-2010.

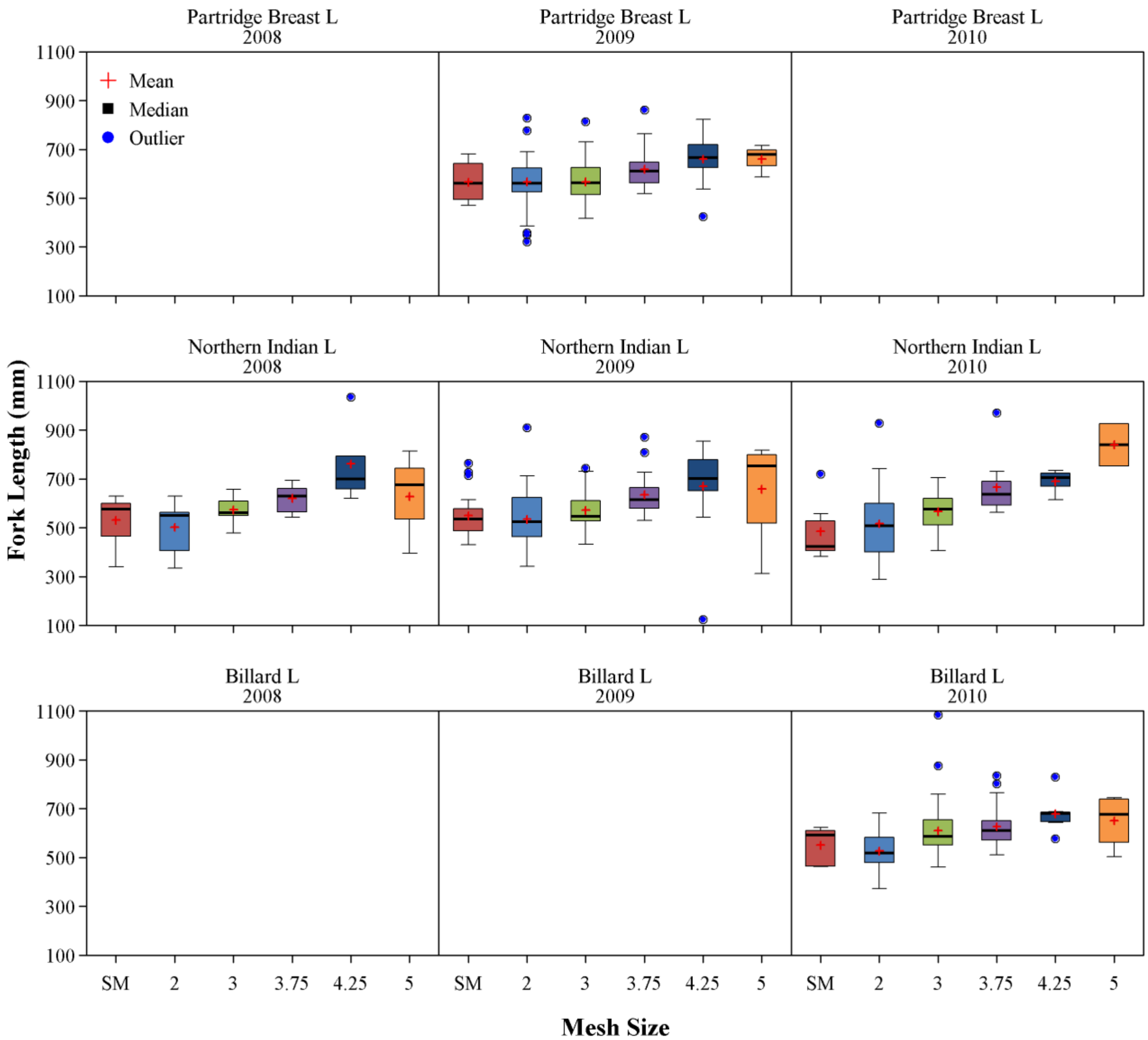


Figure 5.4.7-29 Mean and median (range) fork length (mm) per mesh size calculated for Northern Pike captured in standard gang and small mesh index gill nets set in Partridge Breast Lake, Northern Indian Lake, Billard Lake, lower Churchill River, Hayes River, and Gauer Lake, 2008-2010.

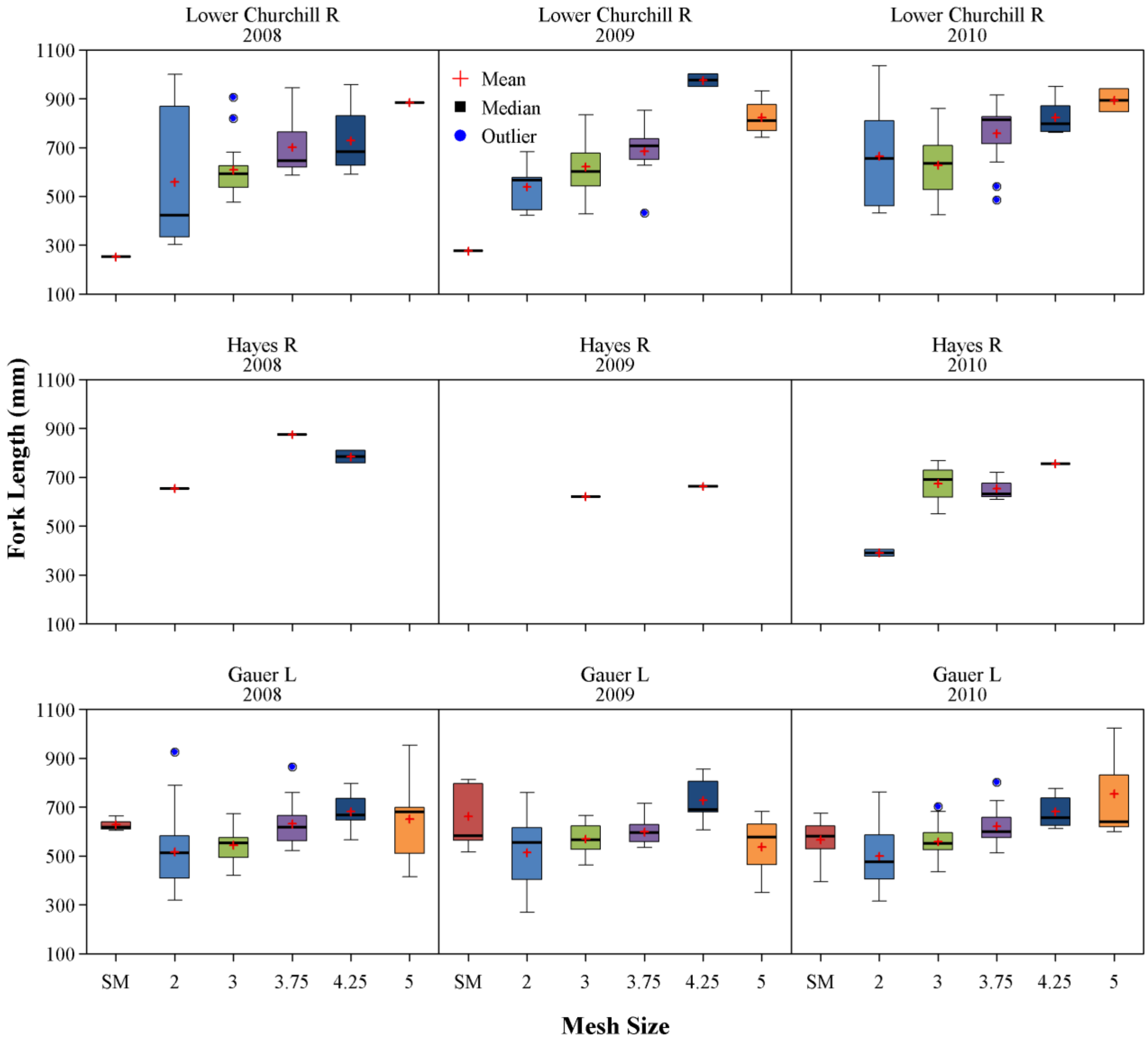


Figure 5.4.7-29 continued.

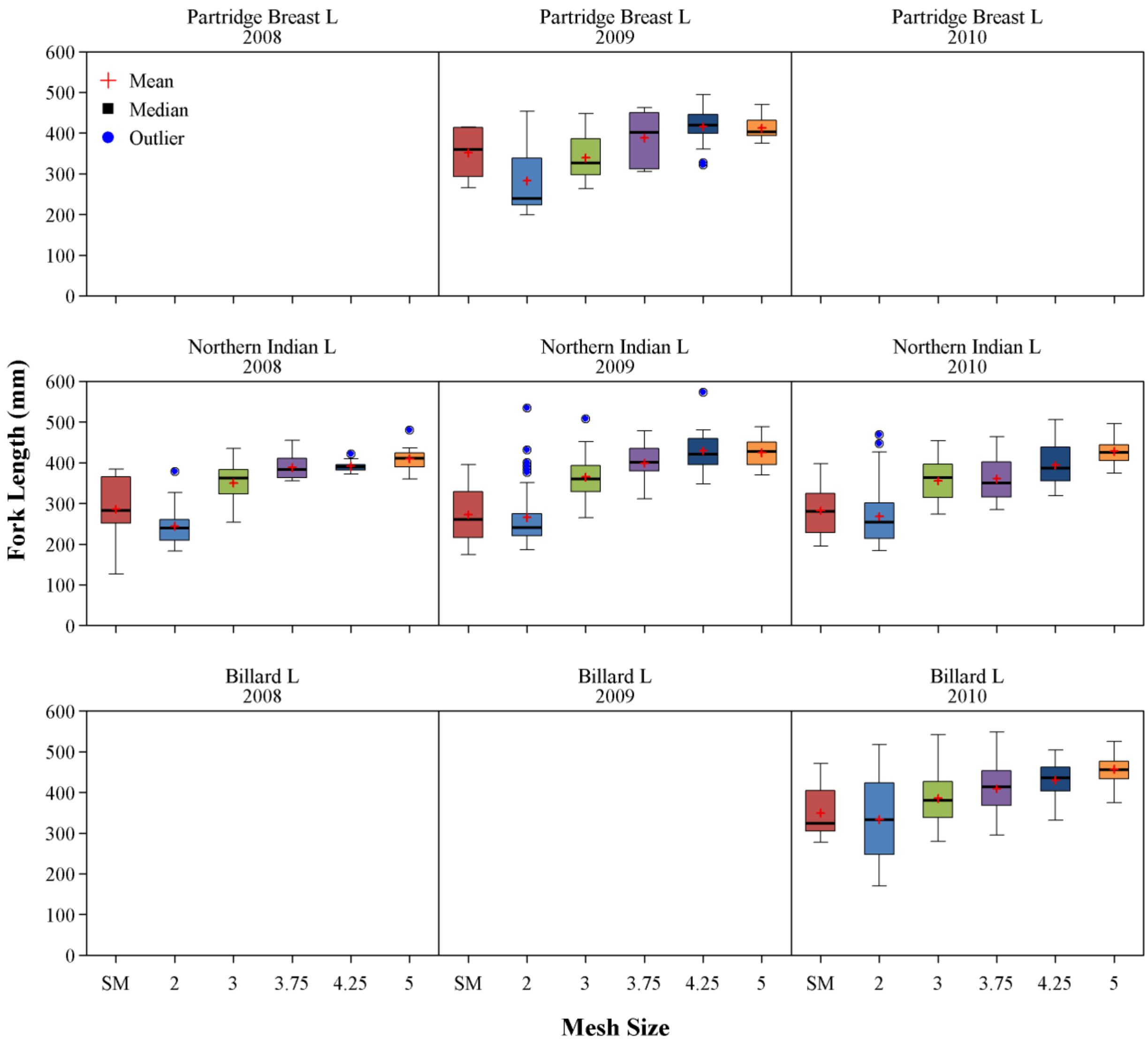


Figure 5.4.7-30 Mean and median (range) fork length (mm) per mesh size calculated for Lake Whitefish captured in standard gang and small mesh index gill nets set in Partridge Breast Lake, Northern Indian Lake, Billard Lake, lower Churchill River, Hayes River, and Gauer Lake, 2008-2010.

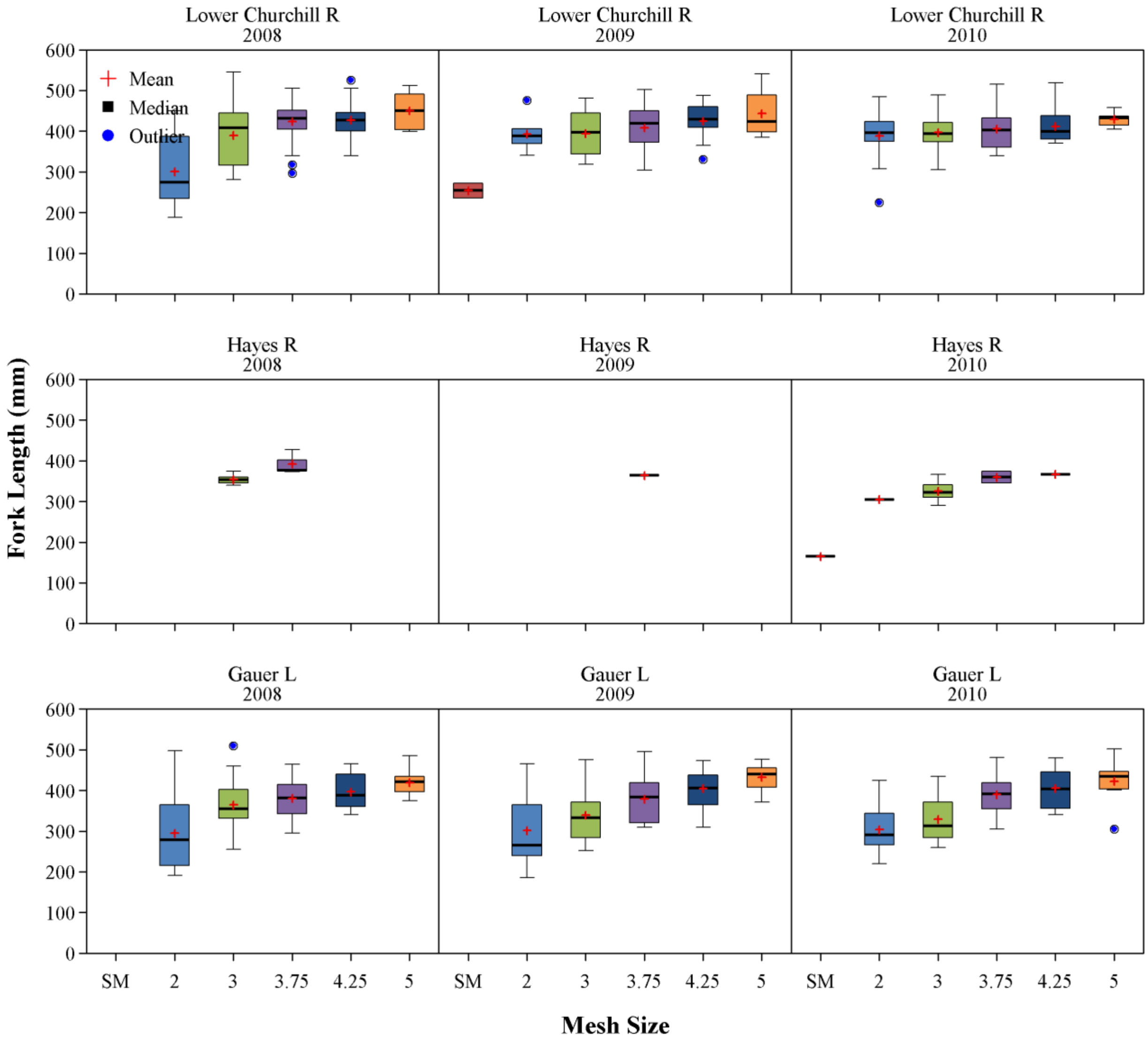


Figure 5.4.7-30 continued.

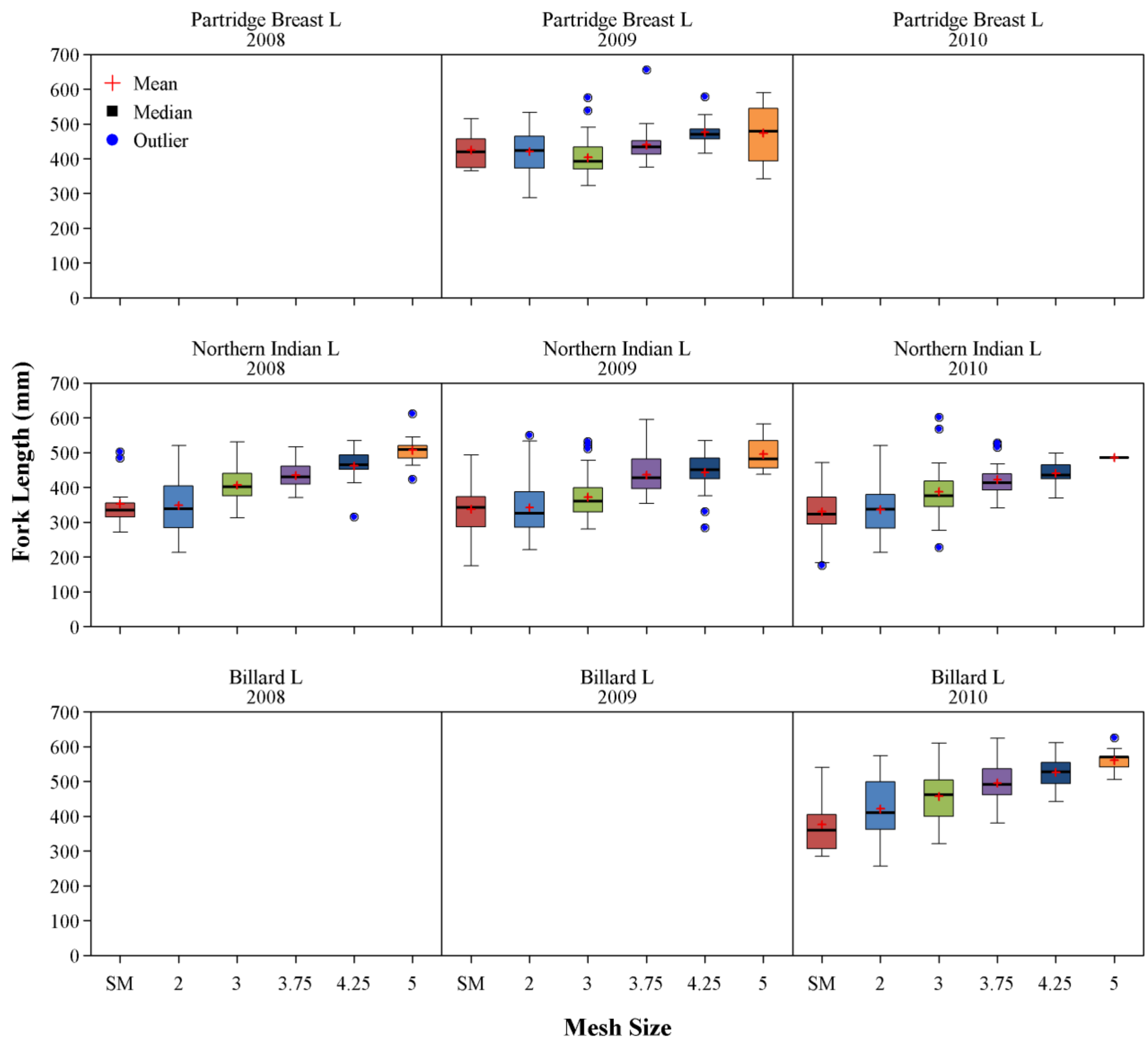


Figure 5.4.7-31 Mean and median (range) fork length (mm) per mesh size calculated for Walleye captured in standard gang and small mesh index gill nets set in Partridge Breast Lake, Northern Indian Lake, Billard Lake, lower Churchill River, Hayes River, and Gauer Lake, 2008-2010.

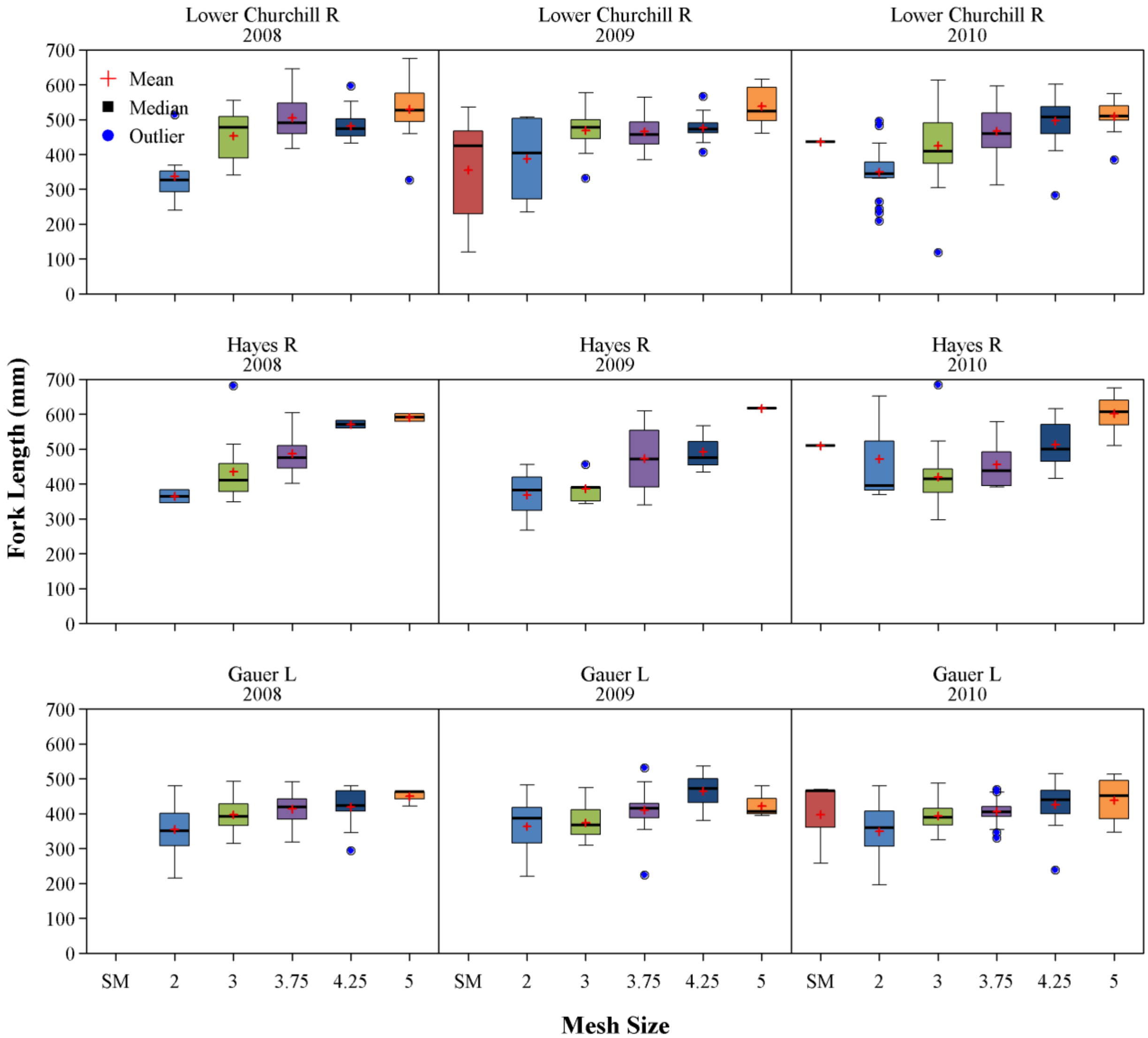


Figure 5.4.7-31 continued.

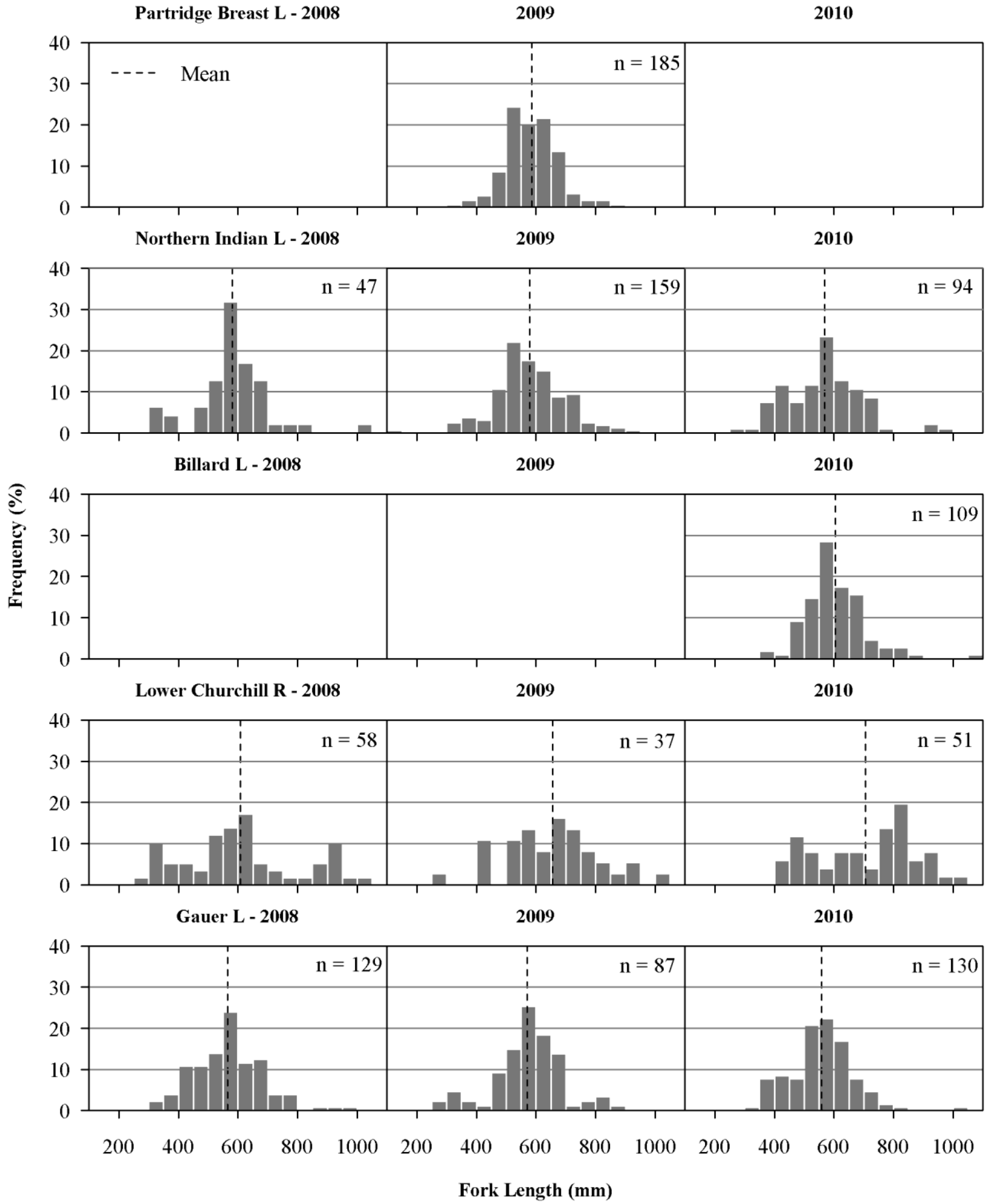


Figure 5.4.7-32 Fork length frequencies for Northern Pike captured in Lower Churchill River Region waterbodies, 2008-2010. Dashed vertical line represents mean fork length. Note: Hayes River sample size insufficient to plot.

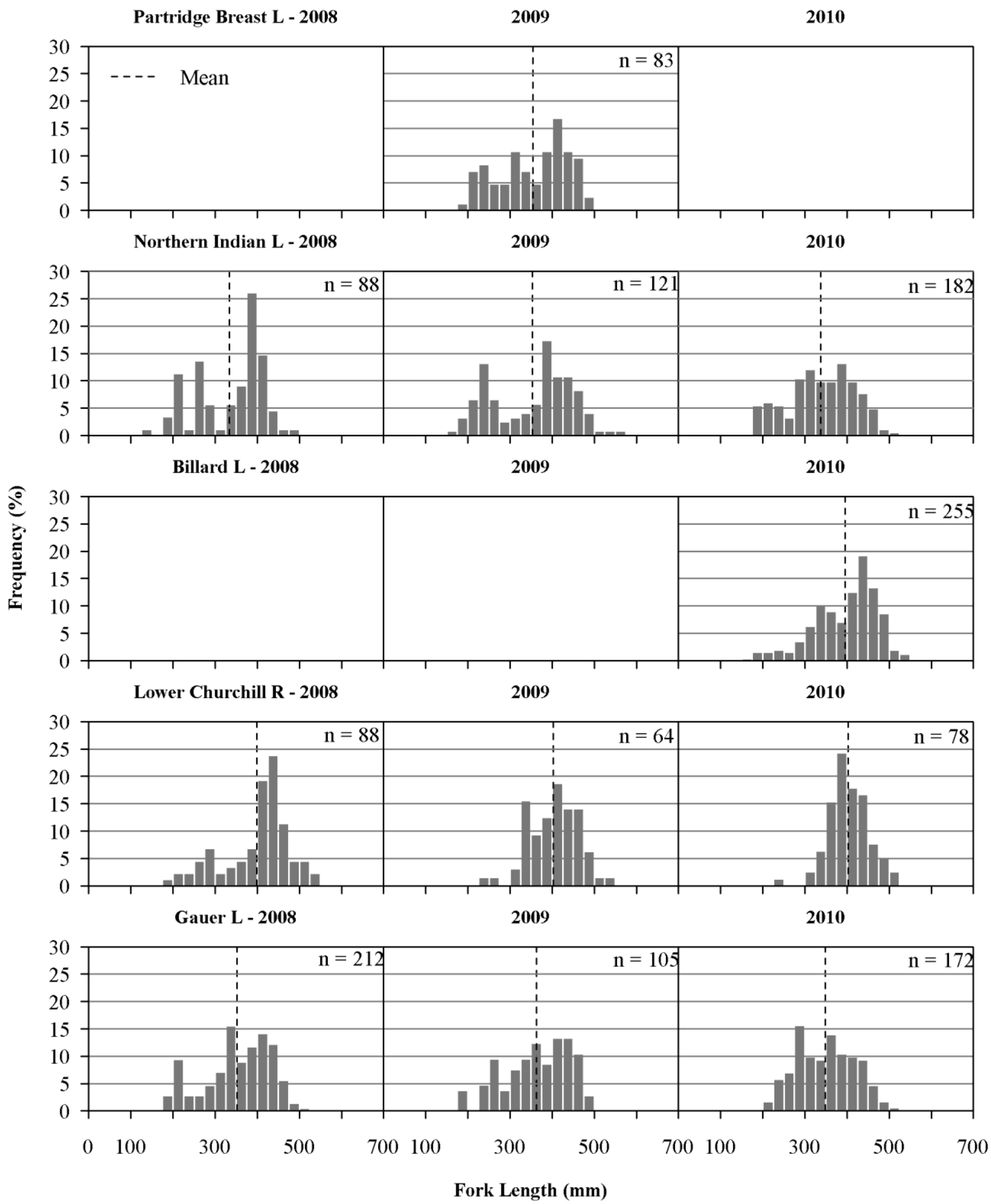


Figure 5.4.7-33 Fork length frequencies for Lake Whitefish captured in Lower Churchill River Region waterbodies, 2008-2010. Dashed vertical line represents mean fork length. Note: Hayes River sample size insufficient to plot.

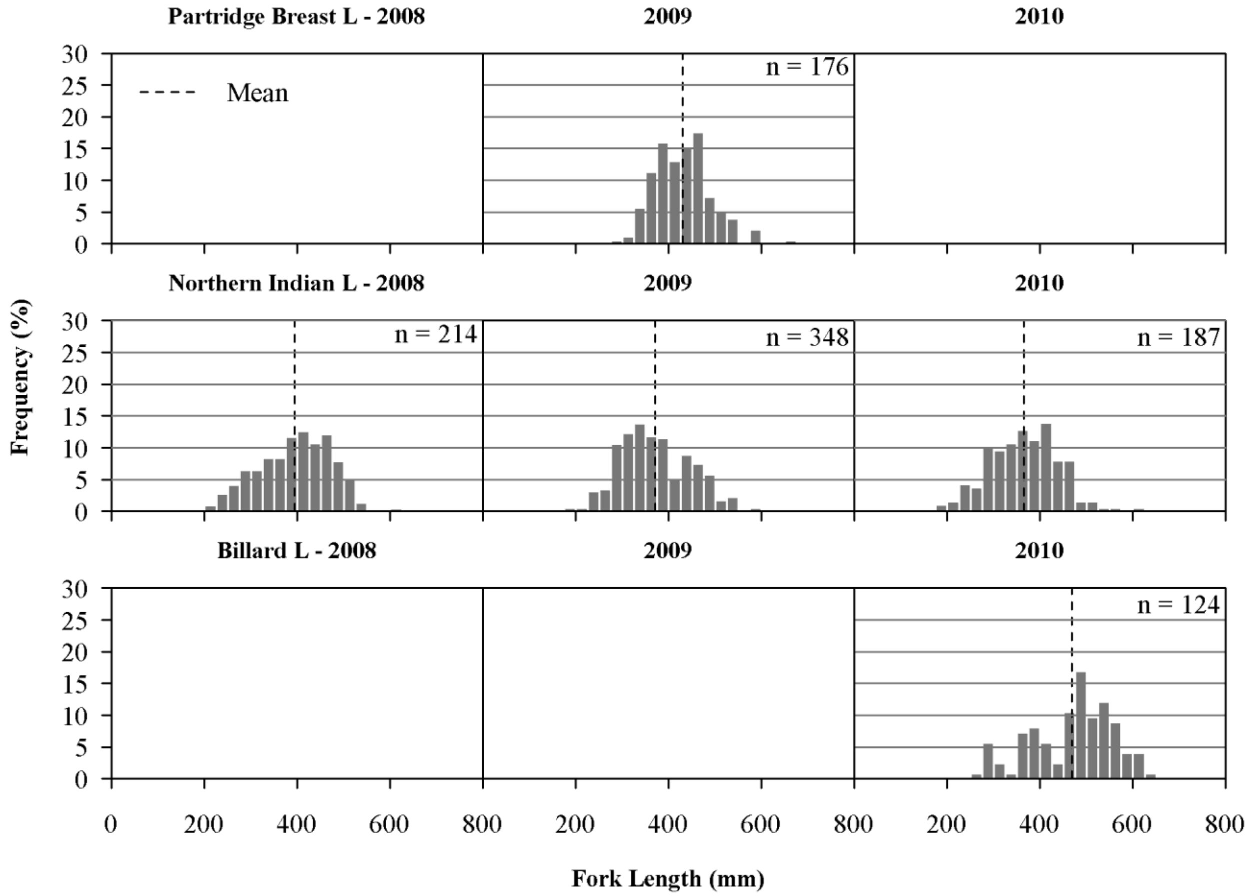


Figure 5.4.7-34 Fork length frequencies for Walleye captured in Lower Churchill River Region waterbodies, 2008-2010. Dashed vertical line represents mean fork length.

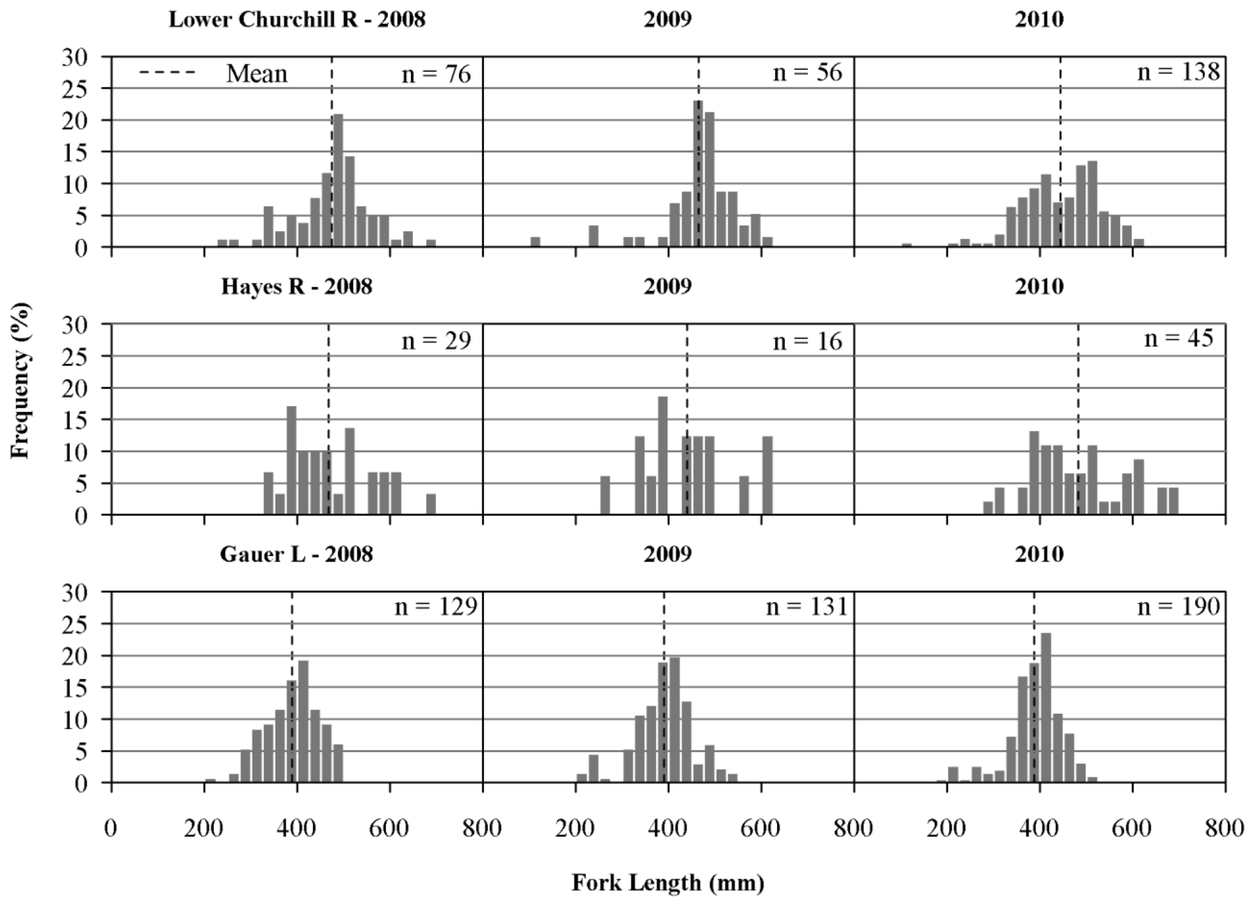


Figure 5.4.7-34 continued.

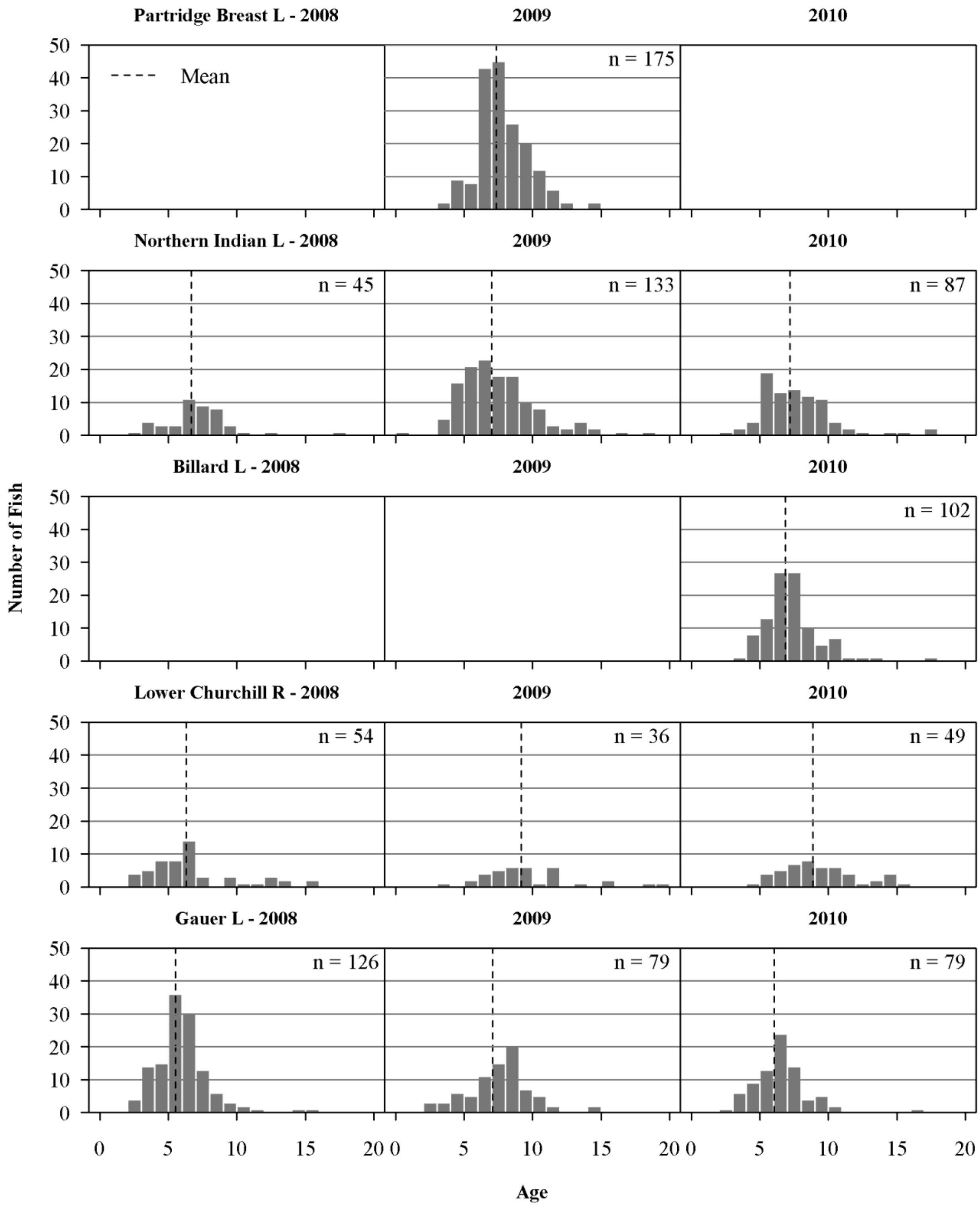


Figure 5.4.7-35 Catch-at-age plots for Northern Pike captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010. Dashed vertical line represents mean age. Note: Hayes River sample size insufficient to plot.

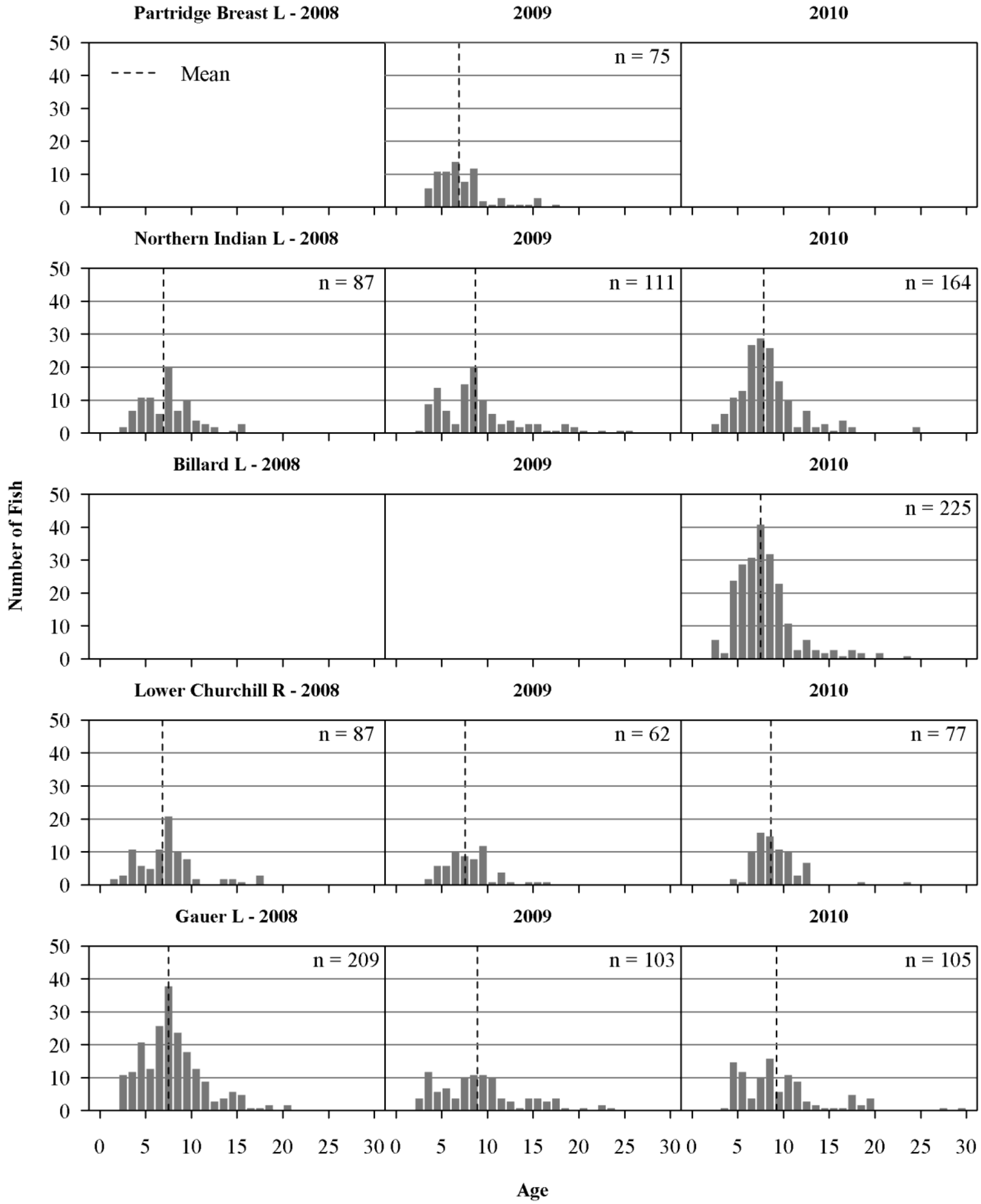


Figure 5.4.7-36 Catch-at-age plots for Lake Whitefish captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010. Dashed vertical line represents mean age. Note: Hayes River sample size insufficient to plot.

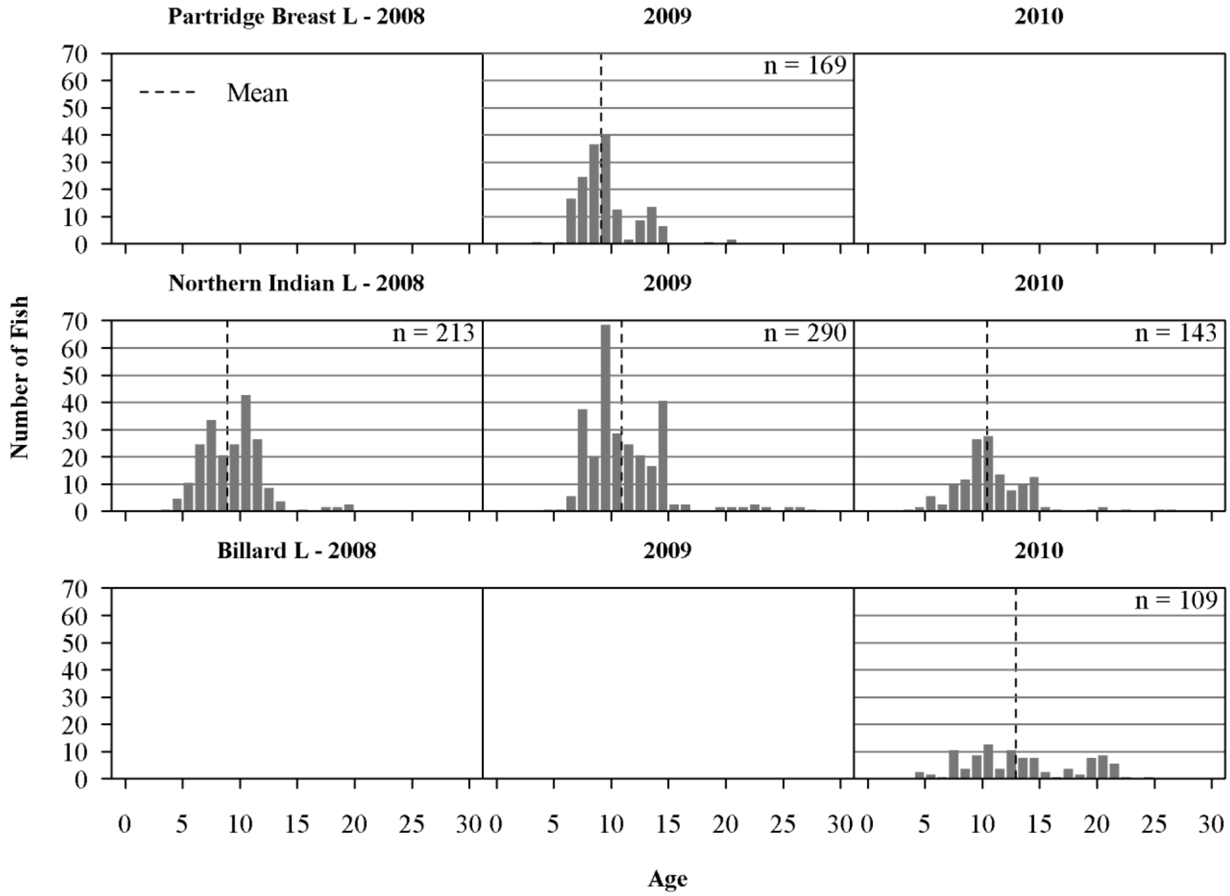


Figure 5.4.7-37 Catch-at-age plots for Walleye captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010. Dashed vertical line represents mean age.

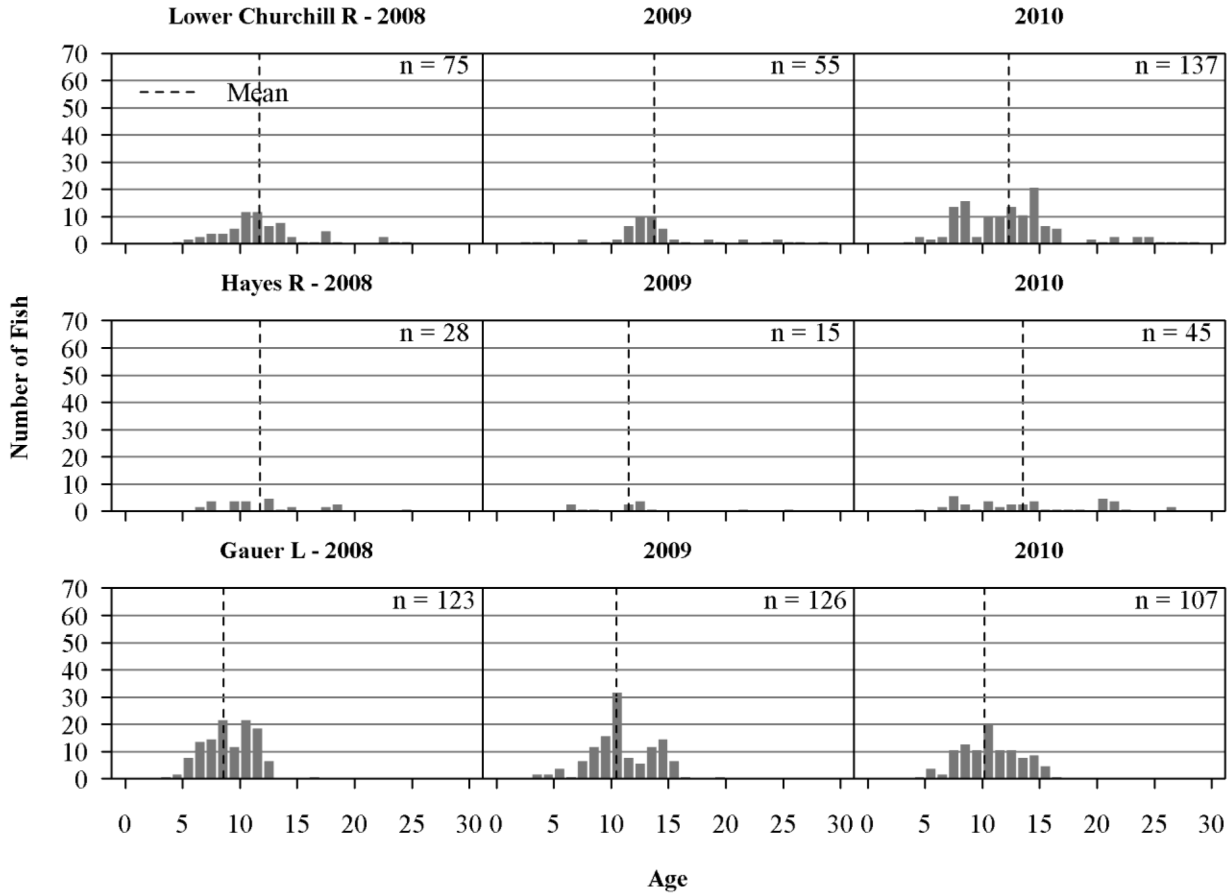


Figure 5.4.7-37 continued.

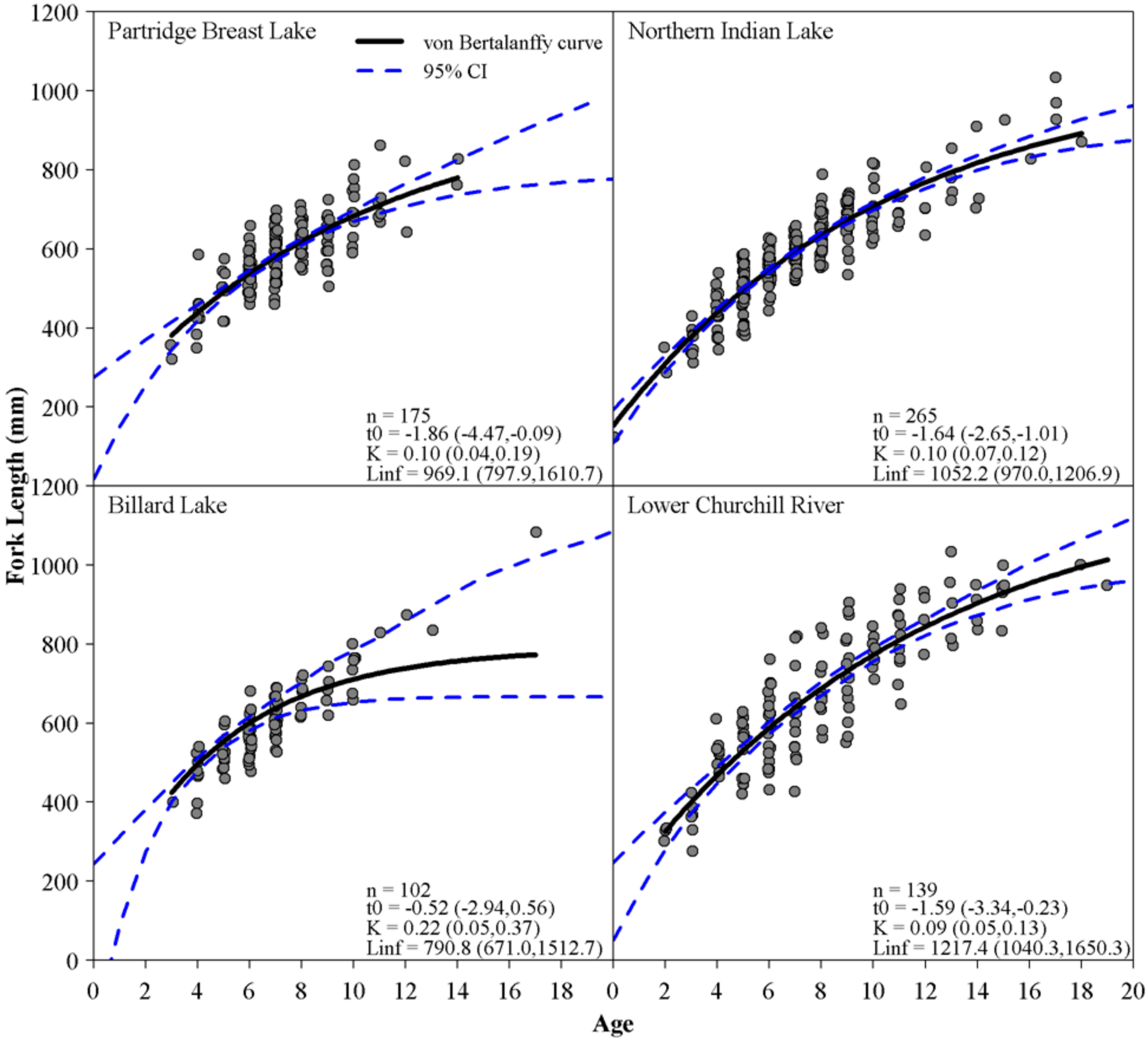


Figure 5.4.7-38 Fitted typical von Bertalanffy growth models for Northern Pike captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, and age when the average length was zero t0) are shown.

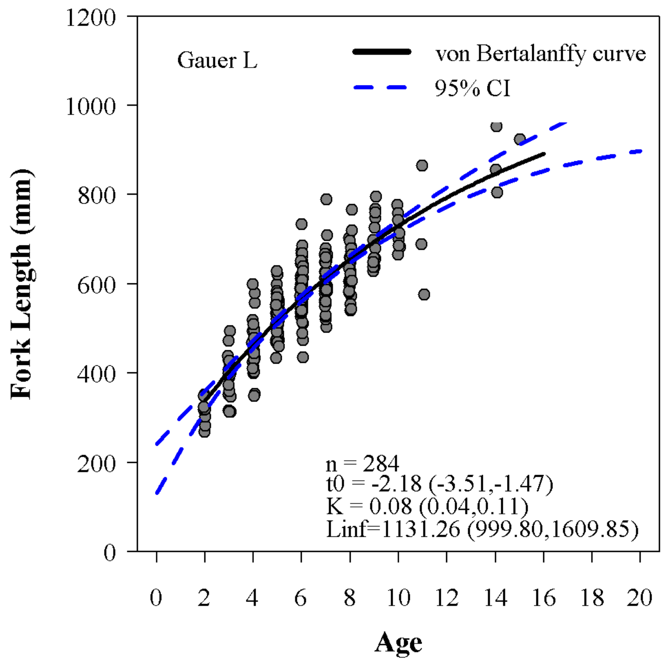


Figure 5.4.7-38 continued.

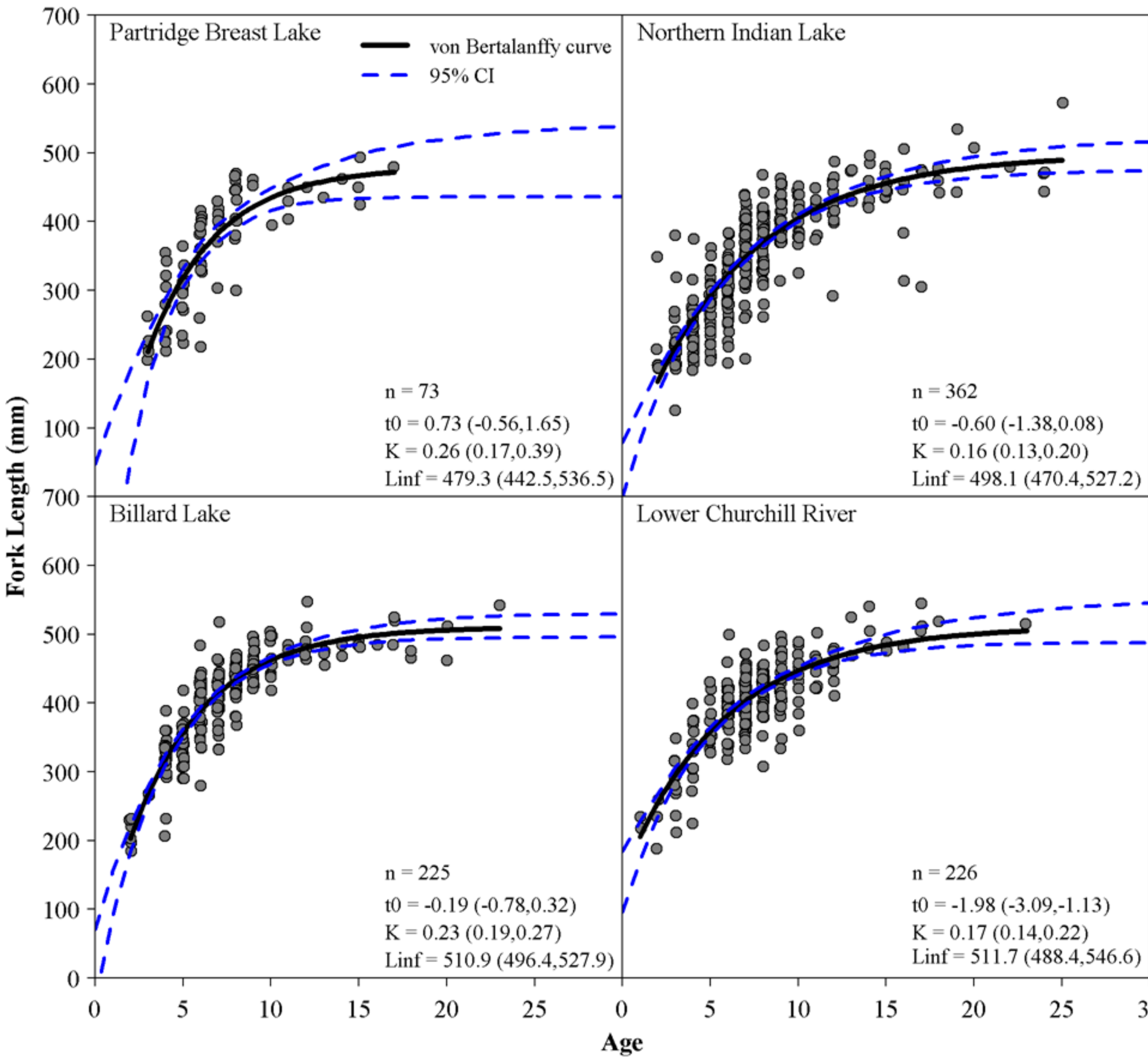


Figure 5.4.7-39 Fitted typical von Bertalanffy growth models for Lake Whitefish captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, and age when the average length was zero t0) are shown.

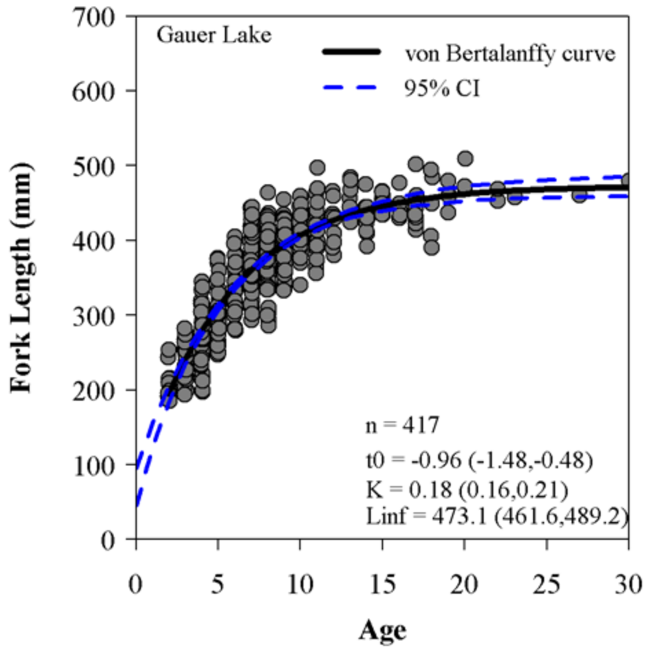


Figure 5.4.7-39 continued.

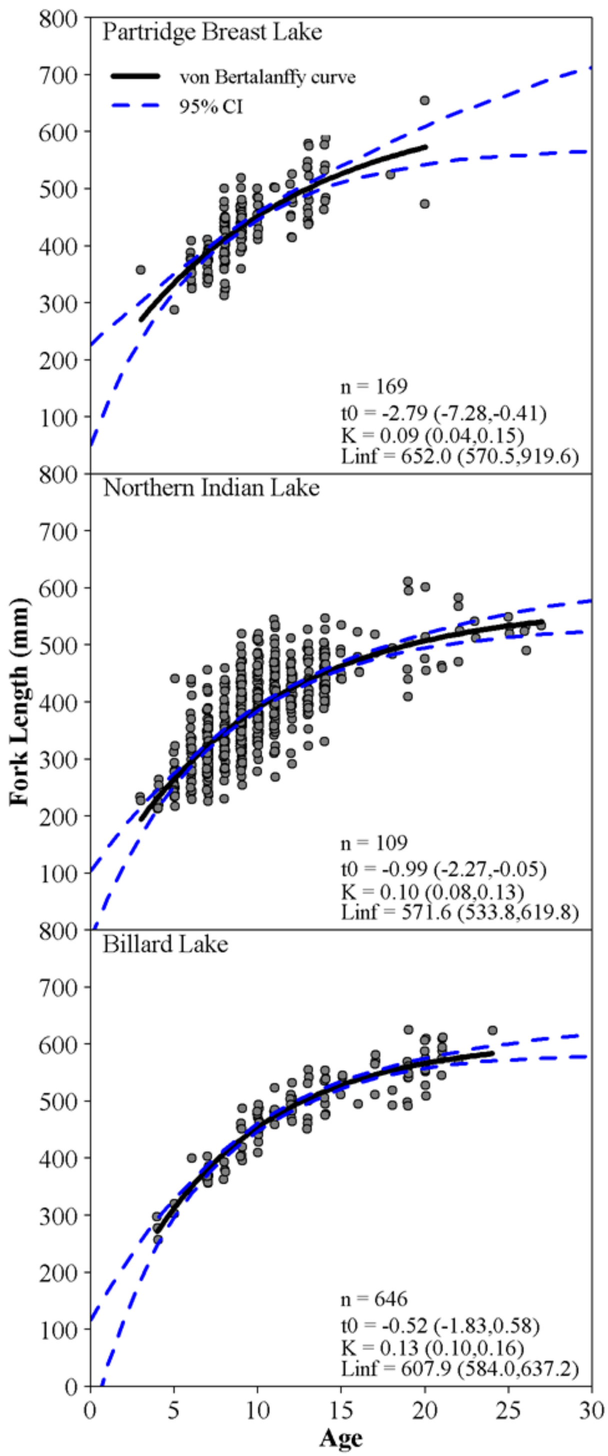


Figure 5.4.7-40 Fitted typical von Bertalanffy growth models for Walleye captured in standard gang index gill nets set in Lower Churchill River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, and age when the average length was zero t0) are shown.

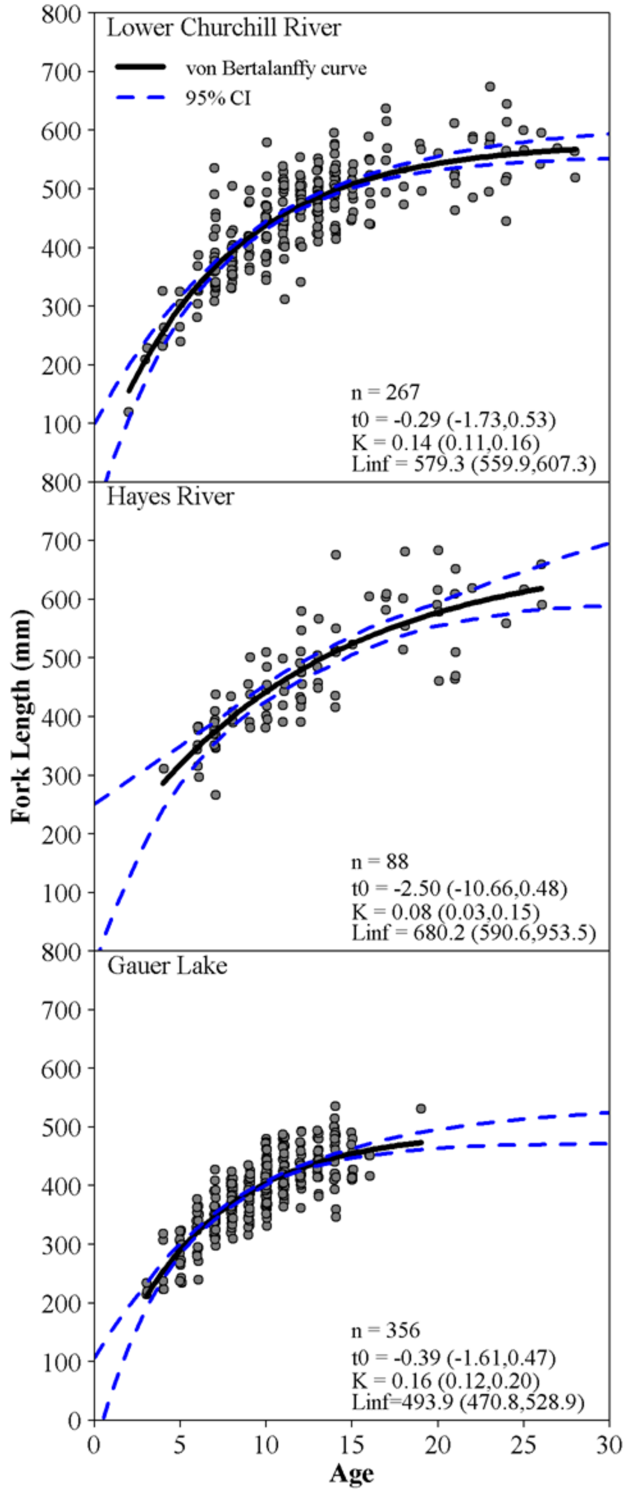


Figure 5.4.7-40 continued.

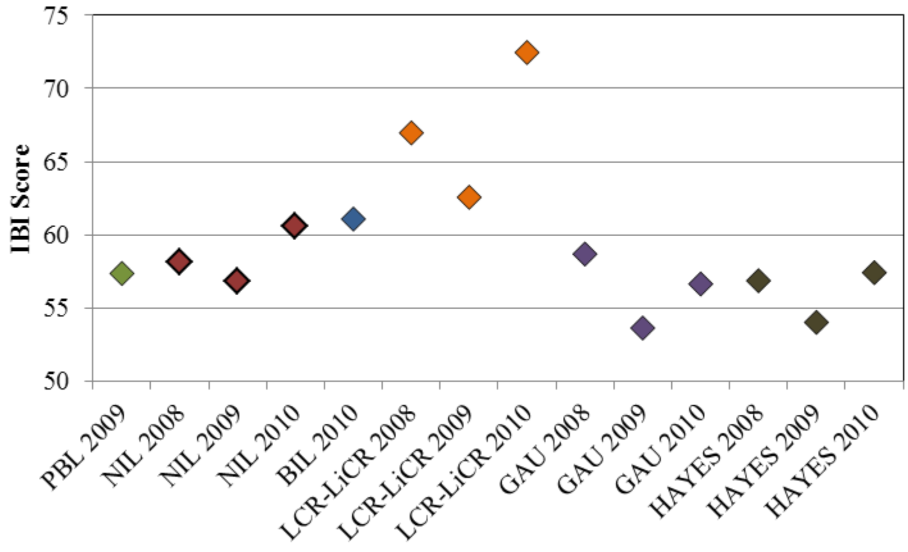


Figure 5.4.7-41. Scatter plot of yearly IBI scores for Lower Churchill River Region waterbodies, 2008-2010.

5.4.8 Fish Mercury

The following provides an overview of the results of fish mercury monitoring conducted in the Lower Churchill River Region under CAMPP; sampling was conducted exclusively in 2010. Waterbodies sampled included, Northern Indian Lake (Figure 5.4.8-1), the lower Churchill River at the Little Churchill River (hereafter referred to as “lower Churchill River”; Figure 5.4.8-2), and the off-system Gauer Lake (Figure 5.4.8-3). Comparisons are also made to data collected in the Hayes River, which serves as an off-system riverine waterbody (Figure 5.4.8-4). Details of sampling locations, times, and methodology are provided in Appendix 1.

5.4.8.1 Species comparisons

A total of 424 fish were analyzed for mercury in the Lower Churchill River Region, including 33 Lake Sturgeon (Table 5.4.8-1). One-year old Yellow Perch were only collected from Northern Indian Lake, where 19 of the target of 25 fish were captured. The mean age and length of Yellow Perch collected from Northern Indian Lake were 2.1 years and 102 mm, respectively (Table 5.4.8-2). Sample sizes for other species were close or equal to the target sample size of 36 fish. Two exceptions were Northern Pike and Lake Whitefish from the Hayes River, where only nine and ten individuals were collected, respectively (Table 5.4.8-1).Mercury concentration and fish length were significantly positively correlated for all large-bodied species from the four waterbodies (Figures 5.4.8-5 and 5.4.8-6), indicating that length-standardization of concentrations was necessary for comparative purposes. Length-standardized concentrations were within approximately 10% of arithmetic concentrations in Northern Indian Lake, Gauer Lake, and the Hayes River. Conversely, length-standardized concentrations for all species captured in the lower Churchill River differed by up to 60% from arithmetic mean concentrations (Table 5.4.8-1). This difference was mainly due to the above average size of Northern Pike, Walleye, and Lake Whitefish and the below average size of Lake Sturgeon when compared to the standard length of each species (Table 5.4.8-2).

With the exception of the Hayes River, arithmetic mean mercury concentrations of Northern Pike and Walleye were relatively similar, and were approximately four to seven times higher than that of Lake Whitefish (Table 5.4.8-1). Mercury was nearly three times higher in the large (compared to the standard length) Walleye collected from the Hayes River relative to the large Northern Pike (Tables 5.4.8-1 and 5.4.8-2). Yellow Perch contained the lowest mercury concentrations among all species analyzed from Northern Indian Lake, with the arithmetic mean being significantly lower than for Lake Whitefish, Northern Pike and Walleye. The relationship between mercury concentration and fish length was not significant for Yellow Perch (see Figure 6.6-1).

Northern Pike and Walleye collected from the lower Churchill River had significantly higher arithmetic mean concentrations than Lake Sturgeon caught at the same location. Little is known regarding mercury concentrations in Lake Sturgeon from Manitoba waters, but the mean and distribution of concentrations measured in Lake Sturgeon collected from the lower Churchill River is similar to those of several small, recent (2002-2011) samples of Lake Sturgeon collected from the Nelson River at Gull Lake (Jansen and Strange 2007b) and downstream of the Limestone generating station (North/South Consultants Inc. [NSC], unpublished data). The collective results of these studies indicate that Lake Sturgeon generally contain relatively low (0.1-0.2 parts per million [ppm]) mercury concentrations at a length of up to approximately 1,000 mm, with larger individuals occasionally containing concentrations exceeding 0.6 ppm (Figure 5.4.8-6).

5.4.8.2 Comparison to consumption guidelines

At 0.53 ppm, length-standardized concentrations of Northern Pike and Walleye collected from Northern Indian Lake slightly exceeded the 0.5 ppm 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). These same species collected from the three other waterbodies in the region had length-standardized concentrations below 0.5 ppm but at or above 0.2 ppm (Figure 5.4.8-7), a level commonly accepted as a safe consumption limit for people eating large quantities of fish domestically (see section 4.8.2.3). Length-standardized concentrations in Lake Sturgeon from the lower Churchill River were just below 0.2 ppm, whereas mean concentrations in Lake Whitefish and Yellow Perch from all sampling locations were well below this guideline (Figure 5.4.8-7).

Based on individual concentrations, 85% of all Northern Pike and 78% of Walleye collected from the Lower Churchill River Region exceeded the 0.2 ppm guideline (Figures 5.4.8-5 to 5.4.8-7). The percentage of piscivorous fish exceeding the 0.5 ppm standard differed markedly between waterbodies (28-56% in Northern Indian Lake and the Churchill River and 3-6% in Gauer Lake). None of the Yellow Perch and only nine Lake Whitefish from the on-system waterbodies contained mercury concentrations higher than 0.2 ppm. Six of the 32 Lake Sturgeon from the lower Churchill River exceeded concentrations of 0.2 ppm, and only two Lake Sturgeon contained more than 0.5 ppm mercury in muscle (Figure 5.4.8-6). In addition, mercury concentrations of most fish from the Lower Churchill River Region were substantially higher than the Canadian Council for Ministers of the Environment (CCME) and Manitoba tissue residue guidelines of 0.033 ppm methylmercury for the protection of wildlife consumers of aquatic biota (CCME 1999; updated to 2013; MWS 2011); exceptions were 17 Lake Whitefish and one Lake Sturgeon. 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.

5.4.8.3 Spatial comparisons

Length-standardized mercury concentrations in Lake Whitefish, Northern Pike, and Walleye differed significantly between waterbodies, showing a declining trend from Northern Indian Lake to the site on the lower Churchill River, with the lowest concentrations occurring in Gauer Lake (Figure 5.4.8-6). The length-standardized mean for Northern Pike from the Hayes River was identical to that for fish from Gauer Lake (Figure 5.4.8-6). The length-standardized concentration for Walleye, however, was significantly higher in the Hayes River than Gauer Lake and approached the mean (no significant difference) for Northern Indian Lake. Lake Whitefish from the Hayes River also had a significantly higher mercury concentration than their conspecifics from Gauer Lake, similar concentrations to Lake Whitefish from the lower Churchill River, and significantly lower concentrations than fish from Northern Indian Lake (Figure 5.4.8-6).

Table 5.4.8-1. Arithmetic mean (± standard error, SE) and length-standardized (± 95% confidence limit, CL) mercury concentrations (ppm) for Lake Whitefish, Northern Pike, Walleye, Yellow Perch, and Lake Sturgeon captured in the Lower Churchill River Region in 2010.

Waterbody	Species	n	Arithmetic	SE	Standard	95% CL
Northern Indian L	Northern Pike	36	0.592[c]	0.050	0.530	0.483 - 0.582
	Walleye	36	0.520[c]	0.042	0.526	0.469 - 0.590
	Lake Whitefish	32	0.126[b]	0.013	0.112	0.100 - 0.125
	Yellow Perch	19	0.075[a]	0.004	-*	0.067 - 0.083
Lower Churchill R	Northern Pike	36	0.472[b]	0.041	0.330	0.292 - 0.371
	Walleye	36	0.481[b]	0.056	0.304	0.227- 0.333
	Lake Whitefish	36	0.117[a]	0.011	0.073	0.062 - 0.085
	Yellow Perch	0	-	-	-	-
	Lake Sturgeon	32	0.156[a]	0.023	0.192	0.165 - 0.223
Gauer L	Northern Pike	36	0.238[b]	0.022	0.202	0.182 - 0.224
	Walleye	33	0.249[b]	0.017	0.246	0.222 - 0.272
	Lake Whitefish	36	0.041[a]	0.003	0.036	0.032 - 0.040
	Yellow Perch	0	-	-	-	-
Hayes R	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
	Yellow Perch	0	-	-	-	-
	Lake Sturgeon	1	0.194	-	-	-

* The relationship between mercury concentration and fish length was not significant; the CL is for the arithmetic mean.

Note: Letters represent significant differences between species within a waterbody. For significant differences between standardized means (i.e., within species between waterbodies) see Figure 5.4.8-7.

Table 5.4.8-2. Mean (± standard error, SE) fork length, round weight, condition (K), and age of fish species sampled for mercury from the Lower Churchill River Region in 2010.

Waterbody	Species	n	Length (mm)	Weight (g)	K	Age (years)
Northern Indian L	Northern Pike	36	571.9 ± 24.5	1490.6 ± 228.3	0.64 ± 0.01	7.0 ± 0.5
	Walleye	36	379.8 ± 13.7	667.9 ± 74.8	1.06 ± 0.02	11.2 ± 0.8
	Lake Whitefish	32	352.6 ± 14.8	672.1 ± 72.6	1.32 ± 0.02	8.9 ± 0.8
	Yellow Perch	19	101.8 ± 1.8	14.3 ± 0.7	1.33 ± 0.03	2.1 ± 0.1
Lower Churchill R	Northern Pike [a]	36	668.2 ± 27.3	2324.2 ± 277.4	0.74 ± 0.02	8.7 ± 0.5
	Walleye	36	442.2 ± 17.8	1194.7 ± 121.2	1.18 ± 0.02	13.1 ± 1.1
	Lake Whitefish [b]	36	399.7 ± 9.8	975.3 ± 69.4	1.44 ± 0.02	8.7 ± 0.6
	Yellow Perch	0	-	-	-	-
	Lake Sturgeon [c]	32	797.6 ± 44.5	2179.8 ± 171.1	0.68 ± 0.02	12.1± 0.7
Gauer L	Northern Pike	36	572.8 ± 20.9	1492.8 ± 234.5	0.68 ± 0.01	6.2 ± 0.4
	Walleye [d]	36	390.2 ± 10.2	682.9 ± 49.4	1.08 ± 0.02	10.4 ± 0.6
	Lake Whitefish [e]	36	372.7 ± 11.8	824.9 ± 79.6	1.41 ± 0.02	10.1 ± 1.1
	Yellow Perch	0	-	-	-	-
Hayes R	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 [f]	9	318.1 ± 21.4	517.3 ± 72.8	1.45 ± 0.04	5.8 ± 0.4
	Yellow Perch	0	-	-	-	-
	Lake Sturgeon	1	664	-	-	-

[a] n = 33 for weight and K, [b] n = 35 for age; [c] n = 23 for weight and K, n = 21 for age; [d] n = 32 for age; [e] n = 33 for age; [f] n = 8 for age.

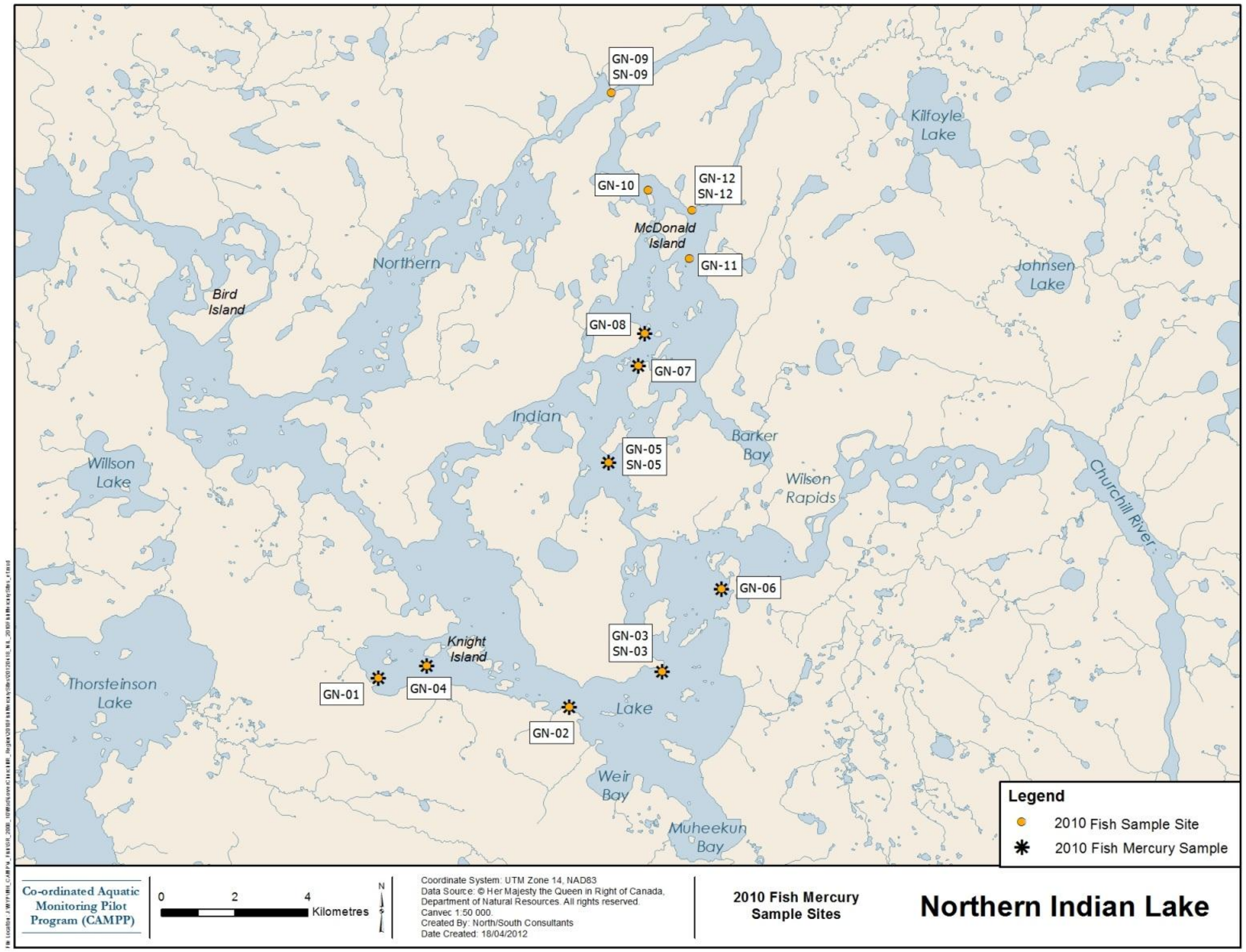


Figure 5.4.8-1. Fish sampling sites in Northern Indian Lake, indicating those sites where fish were collected for mercury analysis.

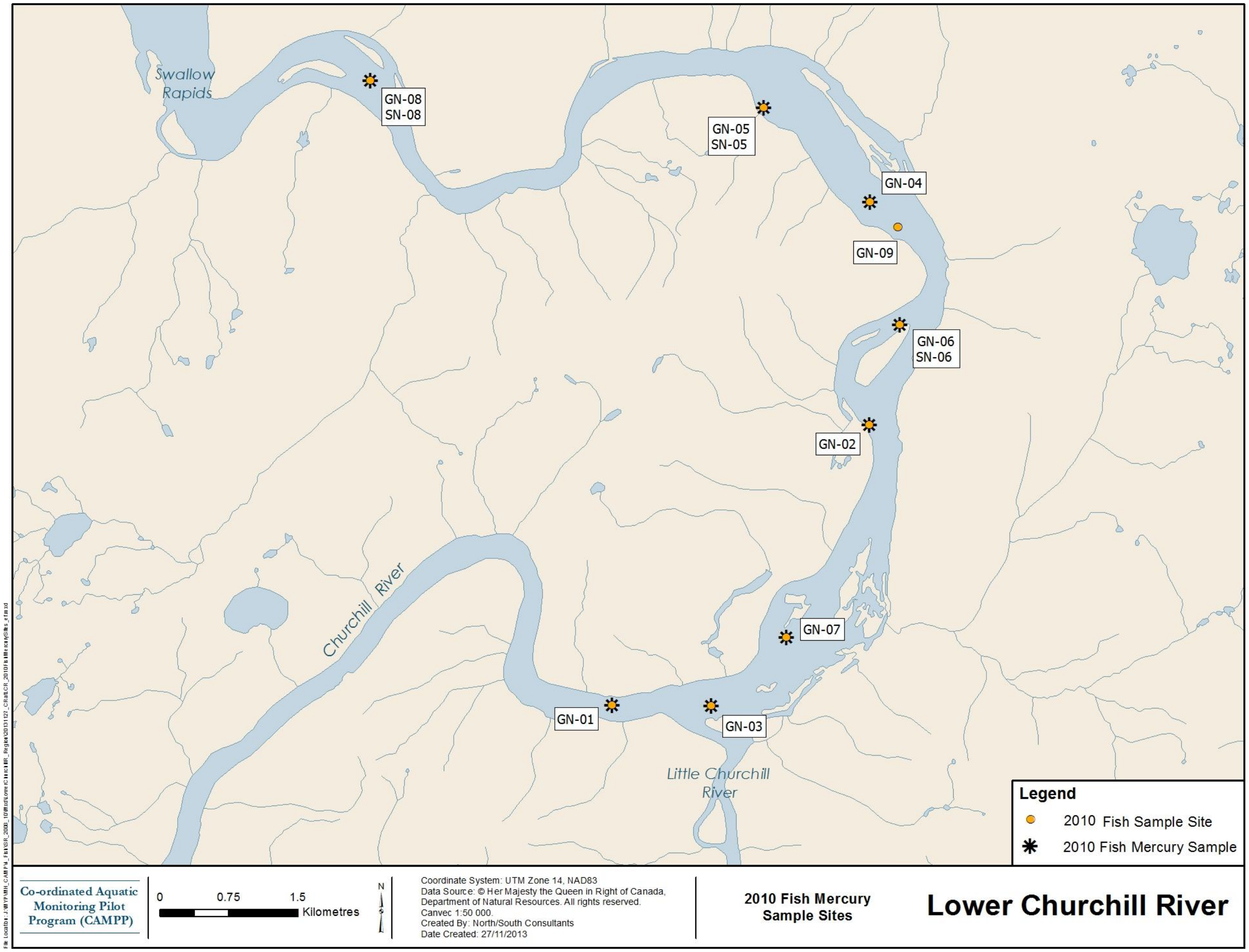


Figure 5.4.8-2. Fish sampling sites in the lower Churchill River indicating those sites where fish were collected for mercury analysis.

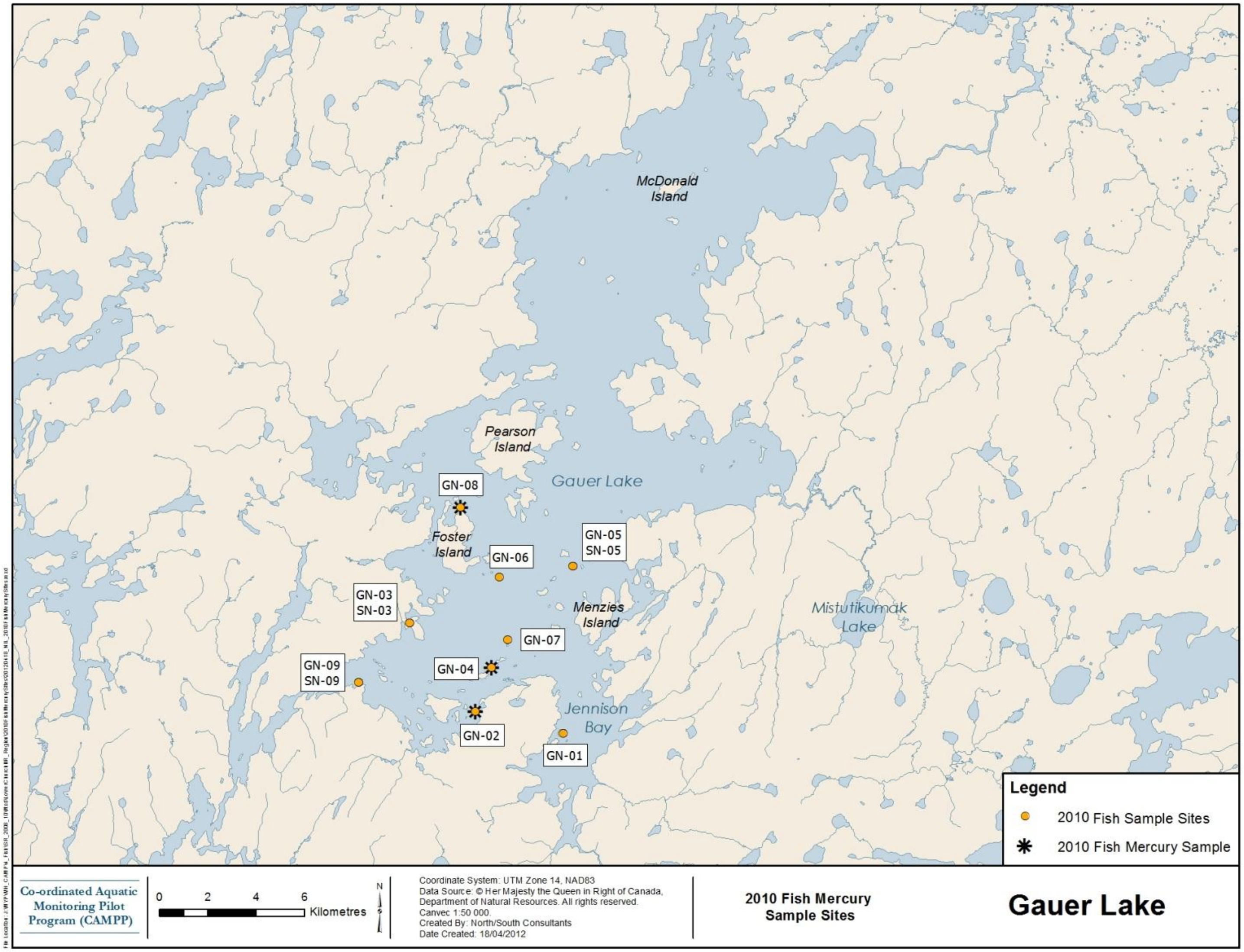


Figure 5.4.8-3. Fish sampling sites in Gauer Lake, indicating those sites where fish were collected for mercury analysis.

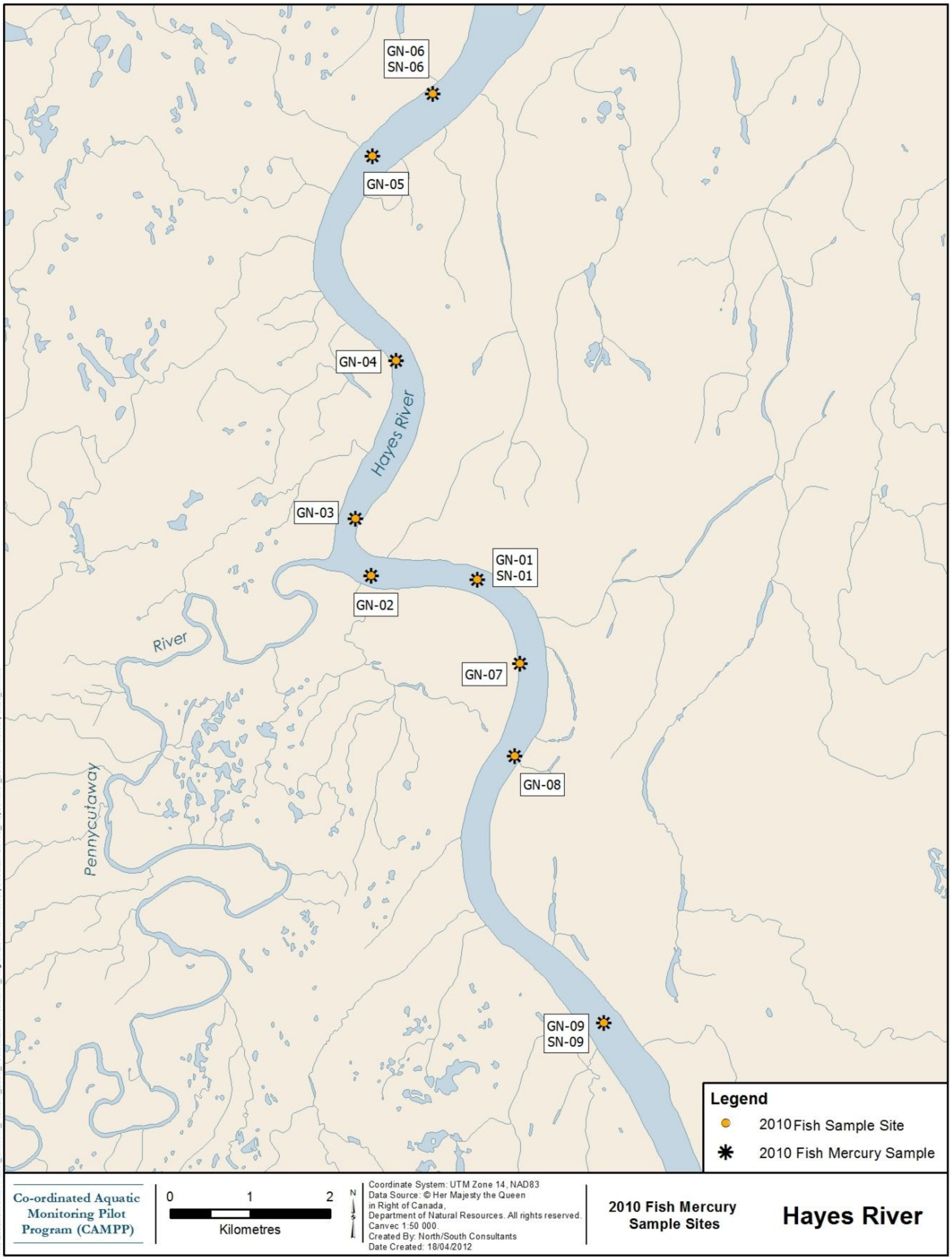


Figure 5.4.8-4. Fish sampling sites in the Hayes River, indicating those sites where fish were collected for mercury analysis.

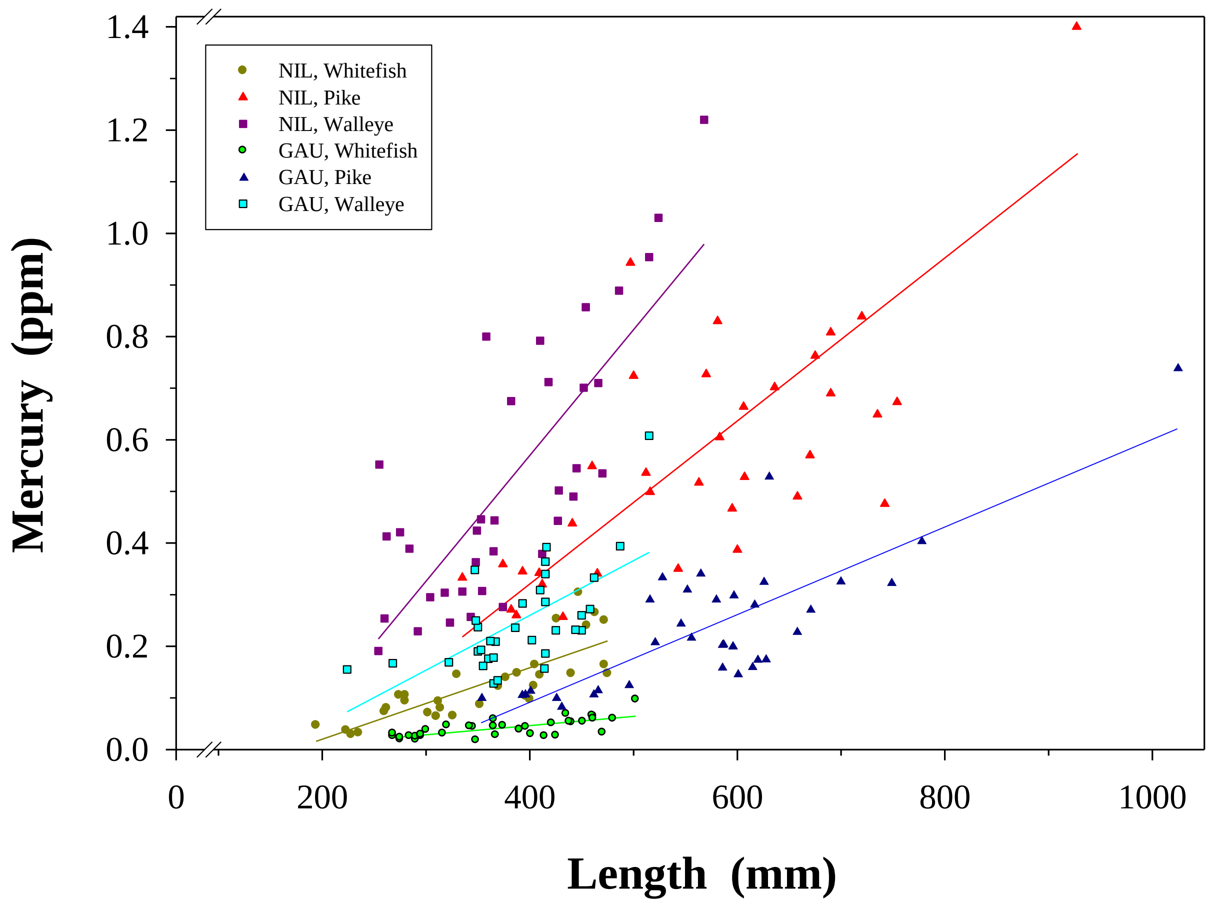


Figure 5.4.8-5. Relationship between mercury concentration and fork length for Lake Whitefish, Northern Pike, and Walleye from Northern Indian Lake and Gauer Lake in 2010. Significant linear regression lines are shown.

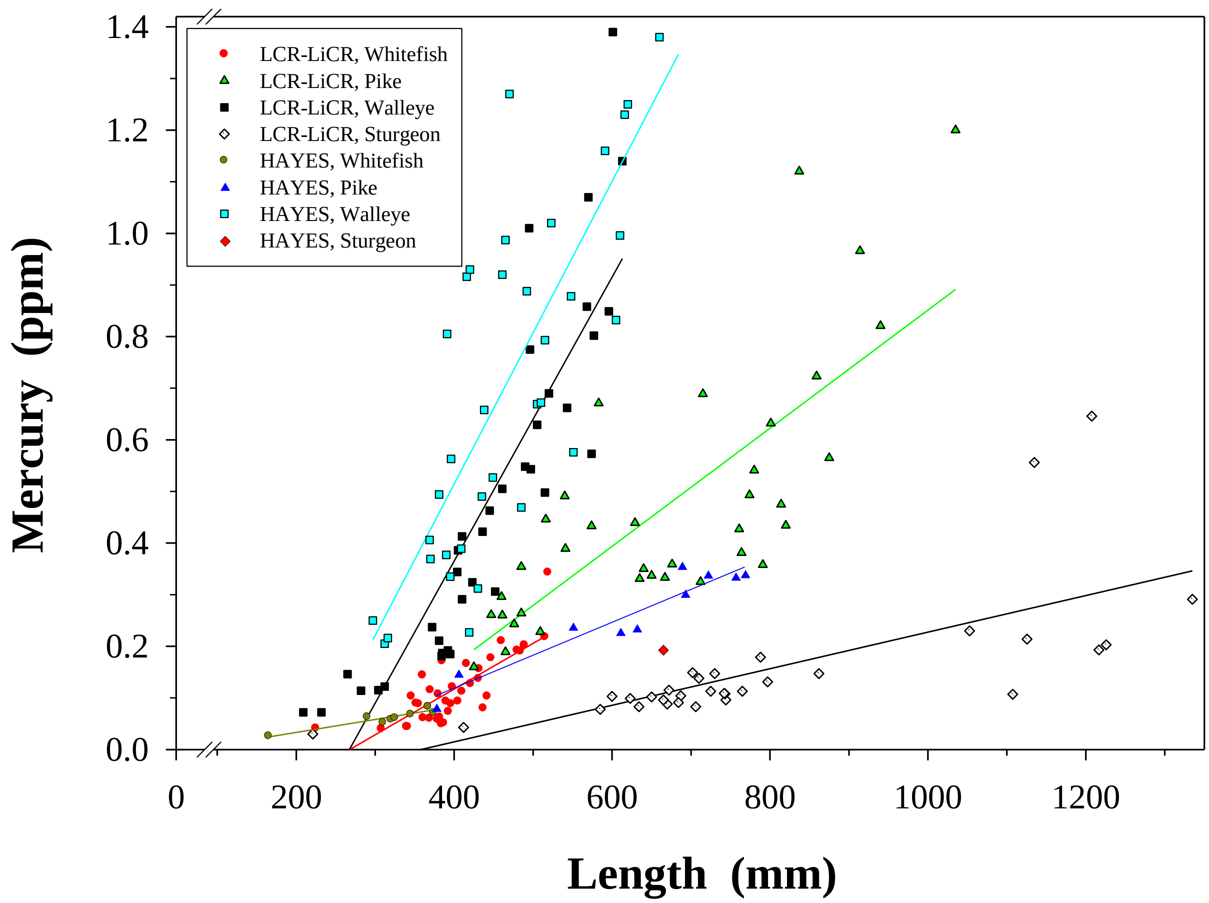


Figure 5.4.8-6. Relationship between mercury concentration and fork length for Lake Whitefish, Northern Pike, Walleye, and Lake Sturgeon from the lower Churchill River and the Hayes River in 2010. Significant linear regression lines are shown.

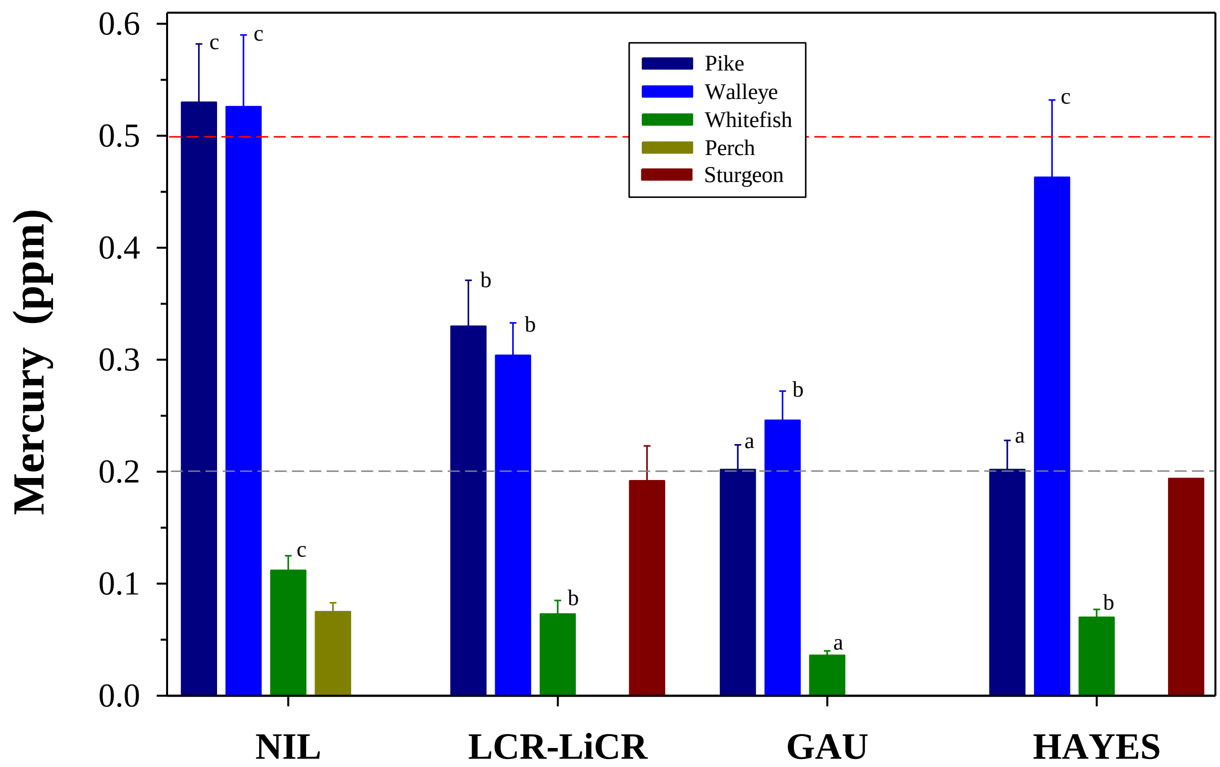


Figure 5.4.8-7. Length-standardized mean (+95% CL) muscle mercury concentrations of Northern Pike, Walleye, Lake Whitefish, and Lake Sturgeon (lower Churchill River only), and arithmetic mean (+95% CL) concentration of Yellow Perch captured in the Lower Churchill River Region in 2010. Means with different 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. The sample for Lake Sturgeon from the Hayes River is from a single fish.