Manitoba/Manitoba Hydro
Coordinated Aquatic Monitoring Pilot Program (CAMPP):
Three Year Summary Report (2008-2010) - Volume 2

Results of the Three Year Program
Section 5.1: Winnipeg River Region

VOLUME 2

SECTION 5.1: WINNIPEG RIVER REGION

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5.1 WINNIPEG 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 Winnipeg River Region.

5.1.1 Climate

Mean monthly temperatures at Pinawa measured over the CAMPP monitoring period were generally similar to the 1971-2000 temperature normals (Figure 5.1.1-1). Exceptions included September and November 2009 and March 2010 when temperatures were noticeably warmer than the normal. In addition, monthly mean temperatures in 2010 were either very similar to or warmer than the normal monthly temperatures. Overall, the mean annual temperature was slightly lower in 2008, about the same in 2009, and slightly higher in 2010 than the mean annual temperature normal.

In general, precipitation was lower during the winter months and higher during the summer months at Pinawa over the monitoring period (Figure 5.1.1-1). However, total monthly precipitation at Pinawa over the monitoring period varied considerably from the monthly 1971-2000 precipitation normals. Precipitation levels for the period of June-October were generally higher in 2008, 2009, and 2010 than precipitation normals, with the exception of June and August 2008, and October 2009, when levels were considerably lower. In 2008, precipitation peaked in July at 150 mm, whereas precipitation in both 2009 and 2010 peaked in August at 178 mm and 176 mm, respectively. Overall annual precipitation was slightly lower in 2008, and higher in 2009 and 2010, than the 1971-2000 annual normal.

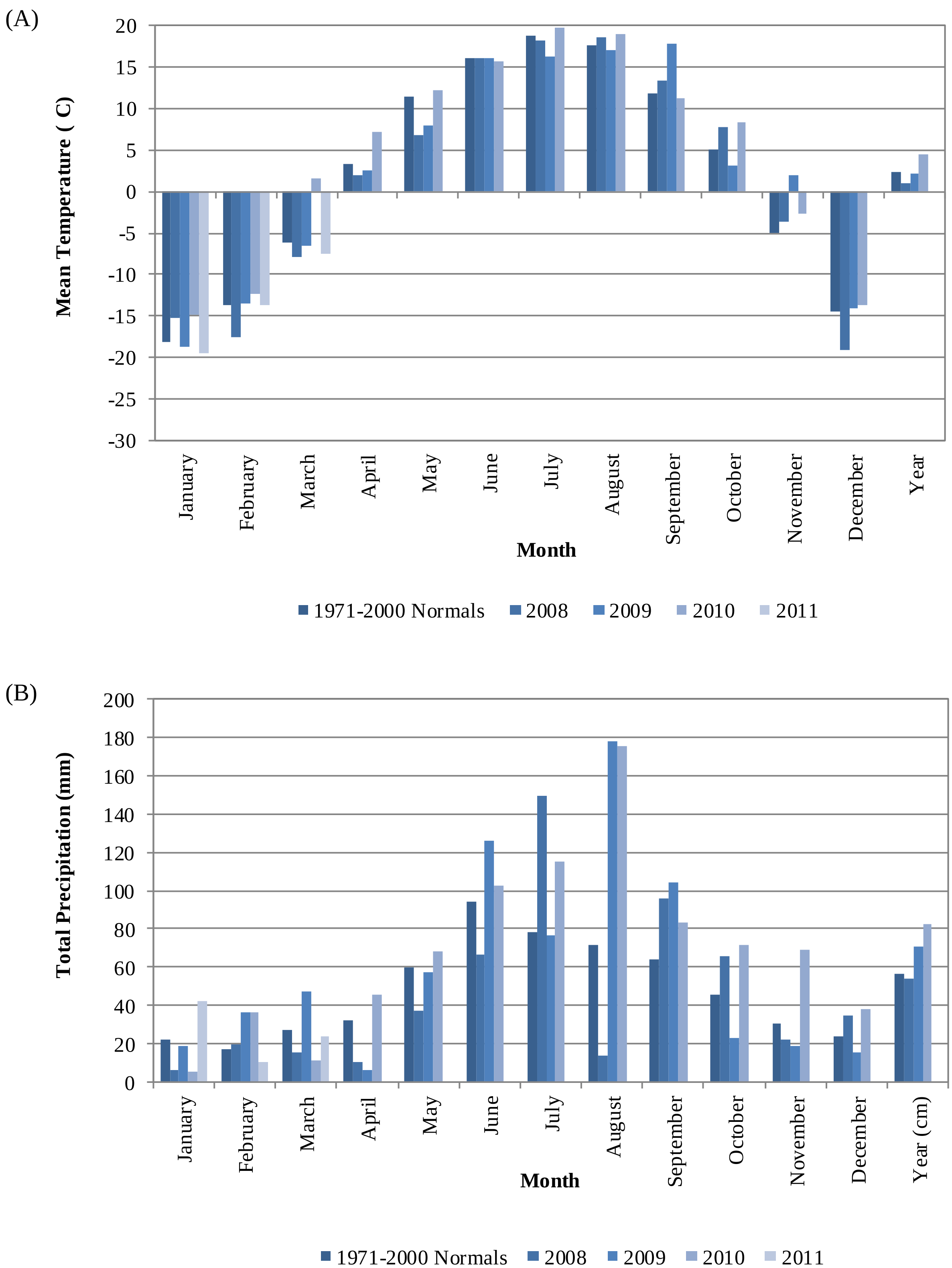


Figure 5.1.1-1. Monthly (A) mean air temperature and (B) total precipitation for 2008-2010 compared to climate normals (1971-2000), Pinawa, MB.

5.1.2 Hydrology

Although river flows are primarily determined by precipitation within the river's drainage basin, a major influence on Winnipeg River flows is releases from upstream storage reservoirs in Ontario, which are regulated by the Lake of the Woods Control Board considering the interest of all users. Outflows from Lake of the Woods on the Winnipeg River and Lac Seul on the English River combine at Boundary Falls just east of the Manitoba-Ontario border.

Six Manitoba Hydro generating stations along the Winnipeg River create upstream impoundments of fairly stable water levels under almost all flow conditions. CAMPP monitoring occurred in the Pointe du Bois Generating Station (GS) forebay and on Lac du Bonnet, which acts as the McArthur Falls GS forebay. Flows for the entire reach are reported based on outflows from the Slave Falls GS since it has the longest and most reliable record along the Winnipeg River. Flows also do not change significantly from the Slave Falls GS to Lake Winnipeg. Manigotagan and Eaglenest lakes are the off-system waterbodies for this region.

Snowpack in the Winnipeg River basin was below average in 2008 and 2010 and above average in 2009, leading to below and above average Winnipeg River flows in the spring of each respective year. Between 2008 and 2010, Winnipeg River watershed precipitation from June to October was generally above average. As a result, flows were also generally above average except for in October 2008 and May-June 2010. Flows also reached a record high in August 2008 and nearly again in July 2009 (Figure 5.1.2-1). From January through March 2011, flows remained steady near the upper quartile.

Pointe du Bois forebay water levels are controlled within a narrow range between 299.0 and 299.1 m, typically fluctuating by less than 0.1 metres. Water levels between 2008 and early 2011 generally remained within this range except during two wind events in early summer 2010, which caused the water level to temporarily fluctuate more than normal (Figure 5.1.2-2).

Lac du Bonnet water levels are controlled within a narrow range, typically fluctuating by less than 0.2 metres. Water levels in each year from 2008 to early 2011 were very near the average (Figure 5.1.2-3).

Although there are no direct water level data for Eaglenest Lake, relative lake levels can be inferred from Winnipeg River flows presented above. Similarly, there are no direct water level data for Manigotagan Lake and relative lake levels must be inferred from Manigotagan River flows. Water Survey of Canada measured Manigotagan River flows from 1913 to 1996 when monitoring of the gauging station was discontinued. No data were collected in either 2008 or 2009 however the gauge was re-established in late 2010 by Water Survey of Canada in order to provide data for CAMPP. In late fall 2010, Manigotagan River flows were the highest on record indicating that Manigotagan Lake levels were likely the highest on record for that time of year and remained above average for the remainder of the year (Figure 5.1.2-4). Above average precipitation in late 2010, including a significant event during the last week of October, appear to be the cause of the above average flow. Flows remained near the upper quartile from January through March in 2011.

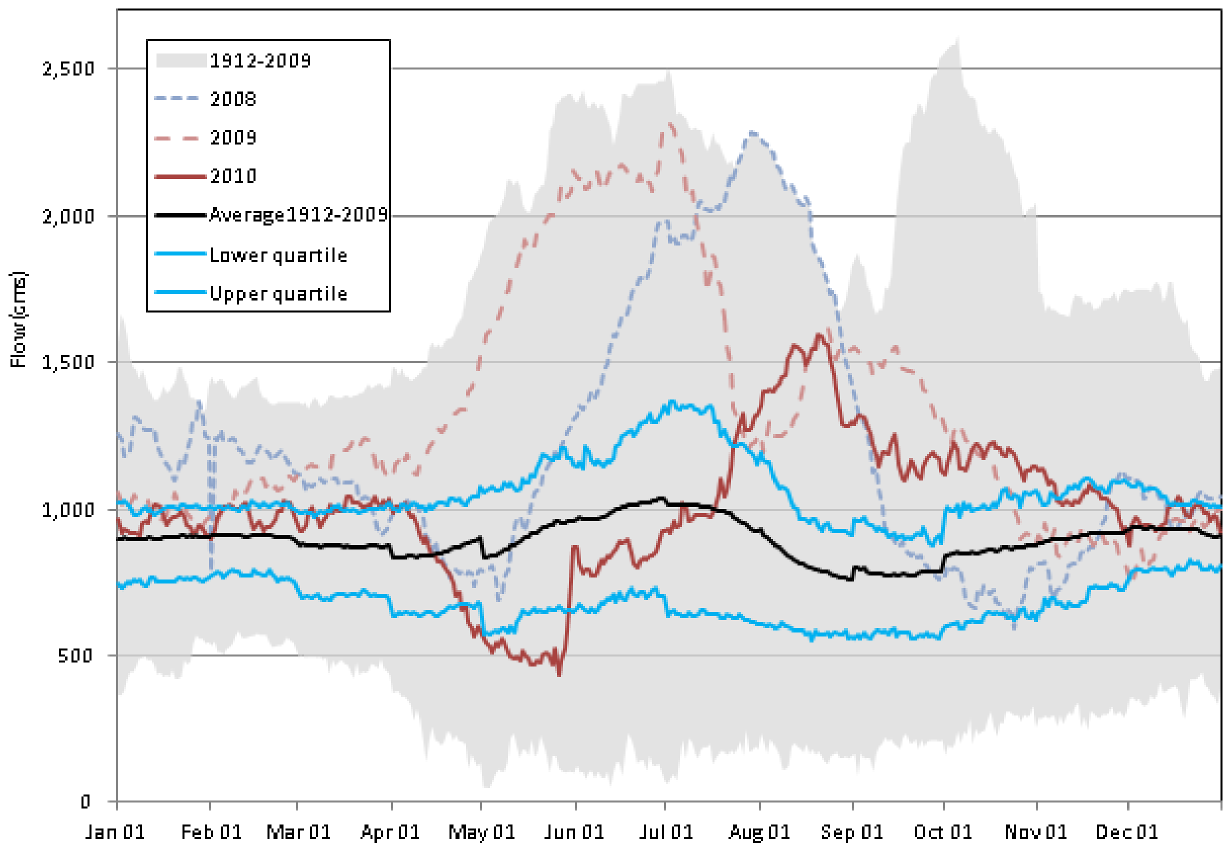


Figure 5.1.2-1. 2008-2010 Winnipeg River flow at Slave Falls GS.

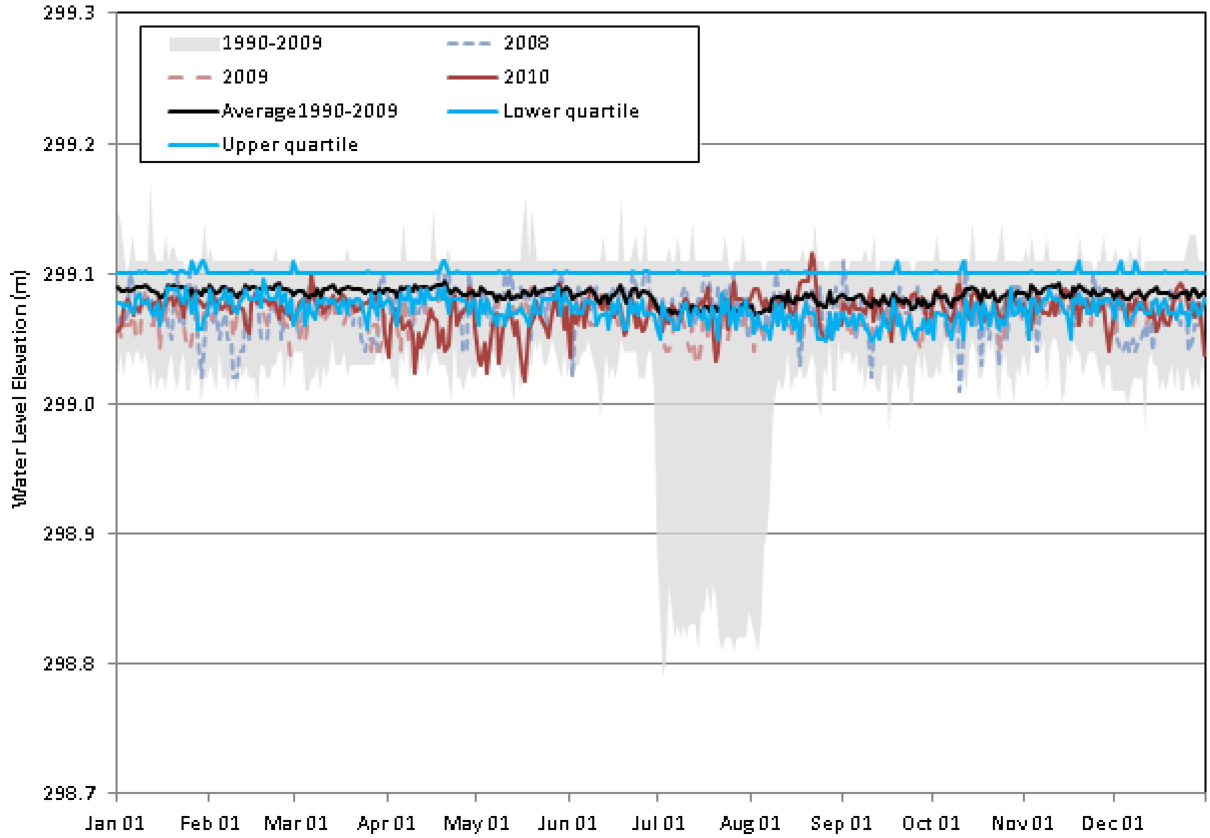


Figure 5.1.2-2. 2008-2010 Pointe du Bois Outer Forebay water level elevation.

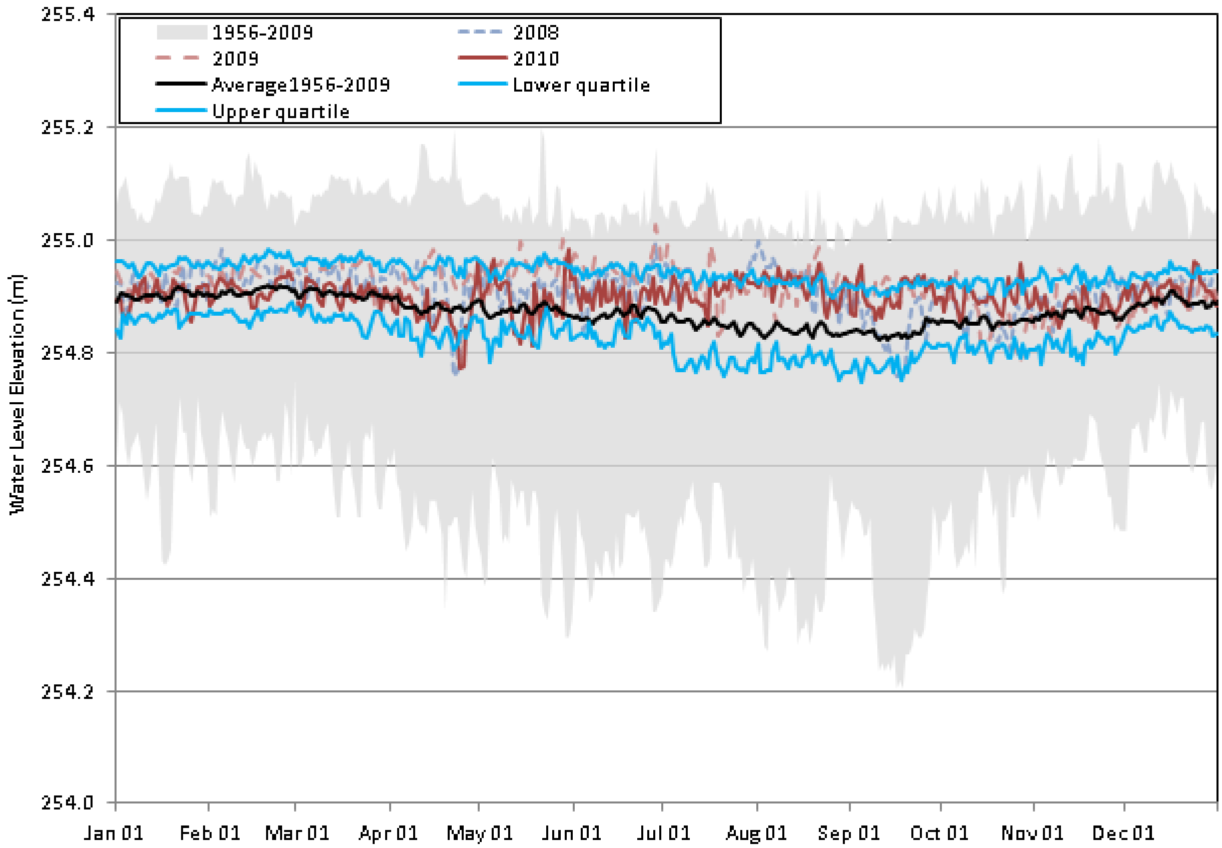


Figure 5.1.2-3. 2008-2010 Lac du Bonnet (05PF062) water level elevation.

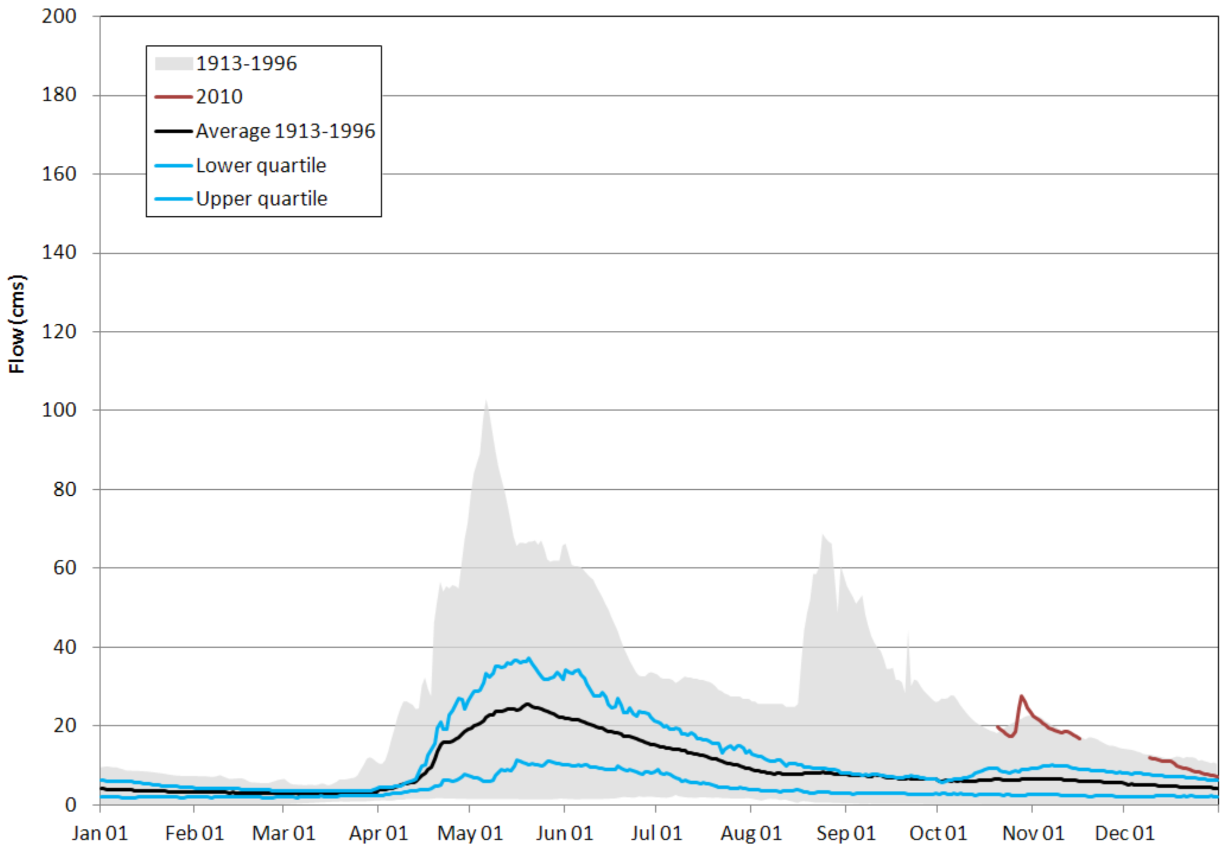


Figure 5.1.2-4. 2010 Manigotagan River flow.

5.1.3 Aquatic Habitat

Aquatic habitat surveys were not conducted in the Winnipeg River Region in years 1 to 3 of CAMPP.

5.1.4 Water Quality

The following provides an overview of water quality conditions measured over the three years of CAMPP in the Winnipeg River Region. Waterbodies sampled annually included two on-system waterbodies, the Pointe du Bois Forebay and Lac du Bonnet (approximately 86.5 km downstream), and an off-system lake (Manigotagan Lake). Water quality was also measured at Eaglenest Lake (an off-system lake) at a site approximately 24 km upstream of the Pointe du Bois site in 2010/2011 (Figure 5.1.4-1). Sampling times relative to air temperature are presented in Figure 5.1.4-2.

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

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

The primary objective of spatial comparisons (i.e., comparison between waterbodies) was to evaluate whether water quality conditions differ between sites on the Winnipeg River as water flows from Eaglenest Lake (an off-system waterbody located upstream of the effects of Manitoba Hydro’s hydraulic system) downstream to the MacArthur Falls generating station (GS; i.e., Lac du Bonnet). Comparisons were also made between waterbodies lying directly on the Winnipeg River including the on-system waterbodies (Pointe du Bois Forebay and Lac du Bonnet) and the off-system waterbodies (Eaglenest Manigotagan lakes. Water quality would be expected to differ between waterbodies located along the Winnipeg River and waterbodies located in the same general region but within separate catchments 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 Winnipeg 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.

5.1.4.1 Overview

Water quality of the Winnipeg River from Eaglenest Lake to Lac du Bonnet can be generally described as moderately nutrient-rich, slightly alkaline, soft, and well-oxygenated, and is characterized by low water clarity. Eaglenest Lake, the Pointe du Bois Forebay, and Lac du Bonnet did not generally stratify and maintained DO concentrations above MWQSOGs for PAL (MWS 2011) across depth over the monitoring period. Waterbodies sampled on the Winnipeg River are classified as meso-eutrophic on the basis of total phosphorus (TP) concentrations and mesotrophic on the basis of chlorophyll *a* and total nitrogen (TN) concentrations.

Most routine or conventional water quality parameters (e.g., pH) and metals were within the MWQSOGs for PAL in waterbodies on the Winnipeg River system. Exceptions included aluminum, iron, selenium, silver, and TP; TP concentrations exceeded the Manitoba narrative nutrient guideline in 50% or more of the samples collected at each site on the Winnipeg River. Few differences in water quality were observed between annual sites (Pointe du Bois Forebay and Lac du Bonnet) on the Winnipeg River.

As expected, water quality of Manigotagan Lake (the off-system lake), while similar to the Winnipeg River in some respects, exhibits some notable differences. Manigotagan Lake thermally stratifies in the open-water season, experiences DO depletion across depth with concentrations sometimes dropping below MWQSOGs for PAL, and is generally more coloured, more dilute (i.e., contains lower levels of conductivity), and clearer than the Winnipeg River. Nutrient concentrations are similar between Manigotagan Lake and sites on the Winnipeg River, but the trophic categorization of Manigotagan Lake (mesotrophic to meso-eutrophic) on the basis of TP is slightly lower than sites on the Winnipeg River. Trophic status of Manigotagan Lake based on chlorophyll *a* and TN was the same (mesotrophic) as waterbodies located on the Winnipeg River. In addition, a number of metals are present in lower concentrations in Manigotagan Lake than the Winnipeg River. 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 periods, 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 of the annual waterbodies between the three sampling years, indicating that water quality conditions in the Winnipeg River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.1.4.2 Limnology and In Situ Variables

Water temperatures were generally near zero degrees Celsius in the ice-cover season and ranged up to approximately 22 ^{o}C over the study period in waterbodies of the Winnipeg River Region. The annual mean air temperatures at Pinawa were lower than the 1971-2000 normal in 2008 and 2009 and above normal in 2010 (Figure 5.1.1-1). However, air temperature was notably above normal in September 2009, which was reflected in the relatively high water temperatures measured in the Winnipeg River Region during that period.

Winnipeg River

The Pointe du Bois Forebay and Lac du Bonnet did not thermally stratify during the period of study (Figures 5.1.4-3 and 5.1.4-4) but did develop vertical differences in DO concentrations in some seasons (Figures 5.1.4-5 and 5.1.4-6). Specifically, DO decreased with depth in summer 2009 and winter 2011 in the Pointe du Bois Forebay and Lac du Bonnet. Eaglenest Lake exhibited weak thermal stratification in the upper 1 m of water in spring 2010 but was isothermal for the remaining sampling periods (Figure 5.1.4-7). Like other waterbodies on the Winnipeg

River, DO decreased with depth in winter 2011 at Eaglenest Lake (Figure 5.1.4-8). However, DO concentrations were consistently above the most stringent MWQSOGs for the protection of cool- and cold-water aquatic life across depth during each sampling event at the on-system sites in the Winnipeg River Region (Figures 5.1.4-5, 5.1.4-6 and 5.1.4-8).

Other *in situ* variables including specific conductance (Figures 5.1.4-9 to 5.1.4-11), pH (Figures 5.1.4-12 to 5.1.4-14), and turbidity (Figures 5.1.4-15 to 5.1.4-17) were generally similar across depth in each of the waterbodies. However, turbidity was highest at a depth of approximately 4 to 8 m in Lac du Bonnet in summer 2010, though there is no immediate explanation for this occurrence (Figure 5.1.4-16). Secchi disk depths were relatively similar across sites, generally ranging between 1 and 2 m in the open-water season (Figures 5.1.4-18 to 5.1.4-20). Mean Secchi disk depths indicate water clarity is low in the region, based on the Swedish Environmental Protection Agency (Swedish EPA 2000) lake categorization scheme (Figure 5.1.4-21).

Off-system Waterbody: Manigotagan Lake

Limnological conditions of Manigotagan Lake differ from the more riverine lake/reservoir sites on the Winnipeg River. Manigotagan Lake is more lentic in nature and exhibits more lacustrine limnological conditions, including development of thermal stratification over the open-water season as surface waters continue to be warmed by solar radiation (Figure 5.1.4-22). The depth of the epilimnion increased over the open-water season and reached depths of over 15 m (Figure 5.1.4-22). Although temperature is slightly higher at depth in winter in comparison to surface waters, thermal stratification did not develop in the three winters over which monitoring was conducted.

DO concentrations decreased across depth in the summer, fall, and winter of each year in Manigotagan Lake (Figure 5.1.4-23). Unlike waterbodies on the Winnipeg River system, DO concentrations in Manigotagan Lake were below the most stringent MWQSOGs for the protection of aquatic life during some sampling periods (Figure 5.1.4-23). DO concentrations dropped below the most stringent objectives for cool- and cold-water aquatic life (6.0 and 6.5 mg/L, respectively) in the lower portion of the water column in the fall of each year and reached as low as 2 mg/L at depth in the fall of 2010. DO depletion was also evident under ice cover, most notably in winter 2010 when concentrations fell below the most stringent PAL objectives and reached 4.6 mg/L at depth.

As noted for Winnipeg River sites, other *in situ* variables were relatively similar across depth including specific conductance (Figure 5.1.4-24), pH (Figure 5.1.4-25), and turbidity (Figure 5.1.4-26) and Secchi disk depths ranged between 1 and 2 m (Figure 5.1.4-27).

Seasonal Differences

Of the *in situ* water quality variables measured under CAMPP in the Winnipeg River Region, Secchi disk depth (Figure 5.1.4-28), oxidation-reduction potential (ORP; Figure 5.1.4-29), pH (Figure 5.1.4-30), and specific conductance (Figure 5.1.4-31) did not differ significantly across the sampling periods in the Pointe du Bois Forebay, Lac du Bonnet, or Manigotagan Lake. Qualitatively, *in situ* turbidity appeared to be lower in winter at Lac du Bonnet and Manigotagan Lake but statistical comparisons between the open-water sampling periods and winter could not be made for these waterbodies due to data limitations (Figure 5.1.4-32). DO in surface water was significantly higher in winter in Manigotagan Lake (Figure 5.1.4-33) and, although not statistically significant, DO concentrations were also highest in winter in Lac du Bonnet and the Pointe du Bois Forebay. It is common for DO concentrations to be highest in winter due to the higher inherent capacity of water to hold more DO at lower water temperatures.

Spatial Comparisons

Only two statistically significant differences were observed between the two annual waterbodies on the Winnipeg River (i.e., Pointe du Bois Forebay and Lac du Bonnet) indicating that, based on available data, water quality did not differ notably between a site upstream of the Pointe du Bois GS and a site located approximately 86.5 km downstream. One of these two significant differences was Secchi disk depth, which was lower in Lac du Bonnet in comparison to the Pointe du Bois Forebay (Figure 5.1.4-34). The other was magnesium, which is discussed in Section 5.1.4.6.

Several water quality variables differed significantly between Winnipeg River waterbodies and Manigotagan Lake, including two *in situ* variables. Both turbidity (Figure 5.1.4-35) and specific conductance (Figure 5.1.4-36) were lower in Manigotagan Lake. Due to the size of the drainage basin, clearer and more dilute conditions on Manigotagan Lake are not unexpected.

While statistical analyses did not incorporate Eaglenest Lake due to limited data (i.e., only one year of data), some variables qualitatively indicated potential changes in water quality conditions from upstream to downstream along the Winnipeg River, including turbidity (Figure 5.1.4-35), conductivity (Figure 5.1.4-36), and Secchi disk depth (Figures 5.1.4-21 and 5.1.4-34). 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 the Pointe du Bois Forebay, Lac du Bonnet, or Manigotagan Lake 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 is notable in light of the relatively large range of flow conditions observed in the Winnipeg River over the period of 2008-2010 (see Section 5.1.2 for a discussion of hydrological conditions). Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.1.4.3 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.

Winnipeg River

All measurements of laboratory pH (Figure 5.1.4-37; MWQSOG: 6.5-9), ammonia (Figure 5.1.4-38; MWQSOGs vary with pH and temperature), and nitrate/nitrite (Figure 5.1.4-39; MWQSOG: 2.93 mg N/L) were within MWQSOGs for PAL at all sites and sampling times at the Winnipeg River sites. Conversely, 50% or more of the samples collected at each site on the Winnipeg River exceeded the Manitoba narrative guideline for TP for lakes, reservoirs and ponds (0.025 mg/L; Figure 5.1.4-40). Acid sensitivity of the Winnipeg River is classified as least to low based on pH, calcium, and total alkalinity and moderate based on TDS (Table 5.1.4-1).

Dissolved phosphorus (DP) generally comprised a greater fraction of TP than the particulate fraction (Figure 5.1.4-41) whereas total nitrogen (TN; Figure 5.1.4-42) was dominated by organic nitrogen at sites on the Winnipeg River (Figure 5.1.4-43). Of the dissolved inorganic nitrogen (DIN) pool, nitrate/nitrate was present in higher concentrations than ammonia. Molar TN:TP ratios indicate that phosphorus limitation occurred at all sites during most sampling events (Figure 5.1.4-44).

Off-system Waterbody: Manigotagan Lake

Like the Winnipeg River sites, pH (Figure 5.1.4-37; MWQSOG: 6.5-9), ammonia (Figure 5.1.4-38; MWQSOGs vary with pH and temperature), and nitrate/nitrite (Figure 5.1.4-39; MWQSOG: 2.93 mg N/L) were within MWQSOGs for PAL in Manigotagan Lake and acid sensitivity of this lake ranged from least to moderate (Table 5.1.4-1). A slightly lower frequency of exceedance (42%) of the narrative Manitoba guideline for TP (0.025 mg/L) occurred for Manigotagan Lake, relative to sites on the Winnipeg River (Figure 5.1.4-40).

The composition of total nitrogen and phosphorus in Manigotagan Lake was also relatively similar to that observed on the Winnipeg River. Specifically, TP was dominated by phosphorus in the dissolved form (Figure 5.1.4-41) while TN was dominated by organic nitrogen (Figure 5.1.4-43). Also like the Winnipeg River, nitrate/nitrite was present in higher concentrations than ammonia and TN:TP ratios (Figure 5.1.4-44) indicate phosphorus limitation in Manigotagan Lake.

Water samples collected at depth (1 m above the sediment-water interface) in Manigotagan Lake during periods of thermal stratification indicate that DIN, nitrate/nitrite, DP, total particulate phosphorus (TPP), and TP were generally higher at depth than near the surface (Figures 5.1.4-45 and 5.1.4-46). The exception occurred in spring 2010 where near surface and near bottom samples were relatively similar; however, thermal stratification was weak and shallow during this period (Figure 5.1.4-22).

Seasonal Variability

Total and bicarbonate alkalinity, ammonia, organic nitrogen, dissolved organic carbon (DOC), conductivity (laboratory), TDS, TSS, turbidity (laboratory), true colour, and pH (laboratory) did not differ significantly across the sampling periods in the Pointe du Bois Forebay, Lac du Bonnet, or Manigotagan Lake. Other routine variables exhibited seasonal differences in at least one of these waterbodies, as illustrated in Figures 5.1.4-47 to 5.1.4-55. In general, nitrate/nitrite and chlorophyll *a* exhibited the most consistent seasonal differences for each of the waterbodies; nearly all seasonal differences were related to the ice-cover season, where nitrate/nitrite (Figure 5.1.4-47) and DIN (Figure 5.1.4-48) were higher and chlorophyll *a* (Figure 5.1.4-55) was lower in winter, relative to one or more of the other sampling periods. The highest number of parameters exhibiting seasonal differences occurred for Manigotagan Lake.

In general, nitrate/nitrite, DIN, total Kjeldahl nitrogen (TKN), TN, and chlorophyll *a* exhibited similar seasonal patterns in the Winnipeg River waterbodies as in Manigotagan Lake (Figures 5.1.4-47 to 5.1.4-50, and 5.1.4-55), whereas DP and TP seasonal patterns were similar between the Pointe du Bois Forebay and Lac du Bonnet but differed for Manigotagan Lake (Figures 5.1.4-51 and 5.1.4-52, respectively).

Spatial Comparisons

None of the routine water quality laboratory variables were significantly different between Lac du Bonnet and the Pointe du Bois Forebay, indicating that water quality conditions were relatively similar between these two waterbodies. While statistical analyses did not incorporate Eaglenest Lake due to limited data, some variables qualitatively indicated potential changes in water quality conditions from upstream to downstream, including TN (Figure 5.1.4-42), TSS (Figure 5.1.4-56), and turbidity (Figure 5.1.4-57), each of which increased with distance downstream. Statistical differences will be re-assessed in the future when additional data are acquired for this upstream waterbody.

Similar to the *in situ* water quality conditions, statistical differences were observed for a number of routine laboratory water quality variables between Manigotagan Lake and the Winnipeg River sites (i.e., Pointe du Bois Forebay and Lac du Bonnet). Water quality variables that were significantly higher in Manigotagan Lake than the Winnipeg River sites were DOC (Figure 5.1.4-58), total organic carbon (TOC; Figure 5.1.4-59), and true colour (Figure 5.1.4-60). Routine water quality variables that were significantly lower in Manigotagan Lake than the Winnipeg River sites were: TSS (Figure 5.1.4-56); laboratory turbidity (Figure 5.1.4-57); laboratory conductivity (Figure 5.1.4-61); total and bicarbonate alkalinity (Figures 5.1.4-62 and 5.1.4-63); and total inorganic carbon (TIC; Figure 5.1.4-64). As previously discussed, differences in water quality between the on- and off-system waterbodies would be expected due to inherent differences in the lakes' drainage basins, morphometries, and hydrological conditions.

Temporal Comparisons

Statistical comparisons between sampling years for annual waterbodies revealed few significant differences (Figures 5.1.4-65 to 5.1.4-67). Differences observed for routine laboratory variables were restricted to: total and bicarbonate alkalinity were higher in 2008 than either 2009 or 2010 in the Pointe du Bois Forebay (Figures 5.1.4-65 and 5.1.4-66); and DOC was lower in 2008 than in either 2009 or 2010 in Lac du Bonnet (Figure 5.1.4-67).

The lack of consistent year-to-year differences indicates that water quality conditions in the Winnipeg River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. The lack of interannual differences is notable in light of the relatively large range of flow conditions observed in the Winnipeg River over the period of 2008-2010 (see Section 5.1.2 for a discussion of hydrological conditions). Future evaluations of temporal variability or trends will be undertaken when additional data are acquired for the region.

5.1.4.4 Trophic Status

Winnipeg River

Waterbodies located on the Winnipeg River are classified as meso-eutrophic on the basis of TP concentrations (Table 5.1.4-2). Application of trophic categorization schemes for lakes based on chlorophyll *a* and TN yield similar results (Tables 5.1.4-3 and 5.1.4-4); each site would be classified as mesotrophic on the basis of mean open-water concentrations of chlorophyll *a* and TN. TP was not significantly correlated to chlorophyll *a* in the Pointe du Bois Forebay (Figure 5.1.4-68) or in Lac du Bonnet (Figure 5.1.4-69). However, TN was significantly correlated to chlorophyll *a* in the Pointe du Bois Forebay (Figure 5.1.4-68) but not in Lac du Bonnet (Figure 5.1.4-69). The lack of a significant relationship for TP and chlorophyll *a* may at least in part reflect the relatively low range of concentrations of these parameters measured over the monitoring period and/or the relatively limited data set.

Off-system Waterbody: Manigotagan Lake

Based on TP, the trophic status of Manigotagan Lake, lying on the boundary between mesotrophic and meso-eutrophic, was slightly lower than measured on the Winnipeg River (Table 5.1.4-2). However, application of trophic categorization schemes for lakes based on chlorophyll *a* and TN indicates the same status (mesotrophic) for Manigotagan Lake as observed at the Winnipeg River sites. Neither TP nor TN was significantly correlated to chlorophyll *a* in Manigotagan Lake (Figure 5.1.4-70). However, as noted above, this may reflect limitations with the data set.

5.1.4.5 *Escherichia coli*

Winnipeg River

E. coli was detected at each of the Winnipeg River sites and the mean, median, and maximum concentrations of *E. coli* increased from Eaglenest Lake downstream to Lac du Bonnet (Table 5.1.4-5). However, all measurements were well below the Manitoba water quality objective for primary recreation of 200 colony forming units (CFU)/100 mL.

Off-system Waterbody: Manigotagan Lake

E. coli was not detected in Manigotagan Lake over the period of 2008-2010 (Table 5.1.4-4).

5.1.4.6 Metals and Major Ions

Winnipeg River

The dominant cation in the Winnipeg River is calcium, followed by magnesium (Figure 5.1.4-71) and hardness measurements indicate that waters are soft (Figure 5.1.4-72). Chloride concentrations were relatively low in the Winnipeg River (i.e., < 2.2 mg/L; Figure 5.1.4-73), which is consistent with concentrations reported elsewhere in the "unimpacted Canadian shield region of central Canada" (Canadian Council of Ministers of the Environment [CCME] 1999, updated to 2013). Concentrations of chloride were also 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 10 mg/L, averaged less than 6 mg/L across sites (Figure 5.1.4-71), and fell on the lower range of concentrations reported across Canada (Canadian Council of Resource and Environment Ministers [CCREM] 1987). While there is currently no Manitoba or CCME PAL guideline for sulphate, concentrations were consistently below the British Columbia Ministry of Environment (BCMOE) guidelines which range from 128 to 429 mg/L for waters ranging from soft to very hard (Meays and Nordin 2013).

Of the 38 metals/metalloids measured in the Winnipeg River, only eight were never detected at any site (beryllium, bismuth, cesium, mercury, tellurium, thallium, tungsten, and zinc; Table 5.1.4-6). Metals that were consistently detected at all sites and times included: aluminum; arsenic; barium; calcium; iron; magnesium; manganese; potassium; rubidium; silicon; sodium; strontium; and titanium. The remaining metals were detected at varying frequencies, although antimony, boron, lithium, molybdenum, nickel, selenium, and silver 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 Winnipeg River waterbodies; the exceptions included aluminum, iron, selenium, and silver (Table 5.1.4-7). The majority (≥92%) of samples collected on the Winnipeg River exceeded the PAL guideline for aluminum (0.1 mg/L; Figure 5.1.4-73) and iron exceeded the PAL guideline (0.3 mg/L) in 36-50% of samples (Figure 5.1.4-74). One sample collected in Lac du Bonnet was at the analytical detection limit for selenium (i.e., 0.001 mg/L), which is equivalent to the PAL guideline (Table 5.1.4-7). In addition, three samples from Lac du Bonnet contained silver at concentrations equivalent to or marginally above the analytical detection limit, which is also equivalent to the PAL guideline (i.e., 0.0001 mg/L). However, measurements that are at or near analytical detection limits (DL) 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 a DL.

The analytical DL for mercury varied over the study period and was 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 DL was sufficiently low to facilitate this comparison, all measurements from Winnipeg River sites were below the current MWQSOG PAL.

Off-system Waterbody: Manigotagan Lake

Like the Winnipeg River, the dominant cation in Manigotagan Lake is calcium, followed by magnesium (Figure 5.1.4-71), and hardness measurements indicate that waters are soft (Figure 5.1.4-72). Also like the Winnipeg River, chloride concentrations are low in Manigotagan Lake (i.e., < 1.2 mg/L; Figure 5.1.4-73), which is consistent with concentrations reported elsewhere in the "unimpacted Canadian shield region of central Canada" (CCME 1999, updated to 2013), 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 15 mg/L (Figure 5.1.4-73) 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 BCMOE guidelines (Meays and Nordin 2013).

Of the 38 metals/metalloids measured in Manigotagan Lake, 10 were never detected (beryllium, bismuth, cesium, mercury, nickel, silver, tellurium, thallium, thorium, and zinc; Table 5.1.4-6). Metals that were consistently detected included: aluminum; arsenic; barium; calcium; iron; magnesium; manganese; potassium; rubidium; silicon; sodium; and strontium. The remaining metals were detected at varying frequencies, although antimony, boron, chromium, cobalt, lithium, molybdenum, selenium, tin, tungsten, and zirconium were detected in less than 30% of samples collected in Manigotagan Lake.

With the exception of aluminum and selenium, metals were present in concentrations below the MWQSOGs for PAL in surface samples collected from Manigotagan Lake (Table 5.1.4-7). Slightly less than one-half (42%) of samples exceeded the PAL guideline for aluminum (0.1 mg/L; Figure 5.1.4-74) and one sample contained a concentration slightly above the PAL guideline for selenium (0.001 mg/L; Table 5.1.4-7). As previously noted, the analytical DL for selenium was at the PAL guideline and this exceedance should be interpreted with caution. Mercury was not detected in either sample where mercury was analysed using a detection limit lower than the current PAL guideline.

As observed for some forms of nutrients, concentrations of total aluminum, iron, and manganese in Manigotagan Lake were higher in samples collected near the sediment-water interface relative to surface grabs collected in summer and fall in each of the three years of monitoring (Figure 5.1.4-76) when the lake was thermally stratified (Figure 5.1.4-22). Some of these bottom samples also contained aluminum and iron concentrations above the MWQSOG PAL (Figure 5.1.4-76). These metals are commonly elevated in freshwater ecosystems at depth under stratification and/or low DO concentrations.

Seasonal Variability

Several metals exhibited statistically significant seasonal differences for one or more of the annual CAMPP waterbodies in the Winnipeg River Region. These included arsenic (Figure 5.1.4-77) and manganese (Figure 5.1.4-78) for the Winnipeg River sites (both were highest in fall) and magnesium (Figure 5.1.4-79) and strontium (Figure 5.1.4-80) for Manigotagan Lake (both were highest in winter). In addition, hardness varied seasonally in Manigotagan Lake, being highest in winter (Figure 5.1.4-81).

Spatial Comparisons

As previously noted, only two statistically significant differences (Secchi disk depth and magnesium) were observed between the two annual waterbodies on the Winnipeg River (i.e., Pointe du Bois Forebay and Lac du Bonnet) indicating that, based on available data, water quality did not differ notably between a site upstream of the Pointe du Bois GS and a site located approximately 86.5 km downstream. Magnesium (Figure 5.1.4-82) was higher in Lac du Bonnet than the Pointe du Bois Forebay.

While statistical analyses did not incorporate Eaglenest Lake due to limited data, some variables qualitatively indicated potential changes in water quality conditions from upstream to downstream, including magnesium (Figure 5.1.4-82), manganese (Figure 5.1.4-83), and potassium (Figure 5.1.4-84). Statistical differences will be re-assessed in the future when additional data are acquired for this upstream waterbody.

Similar to other water quality variables discussed above, a number of metals were significantly lower in Manigotagan Lake than sites on the Winnipeg River, including: aluminum (Figure 5.1.4-74); arsenic (Figure 5.1.4-85); barium (Figure 5.1.4-86); calcium (Figure 5.1.4-87); chloride (Figure 5.1.4-73); iron (Figure 5.1.4-75); manganese (Figure 5.1.4-83); potassium (Figure 5.1.4-84); and sodium (Figure 5.1.4-88). Copper (Figure 5.1.4-89), magnesium (Figure 5.1.4-82), and vanadium (Figure 5.1.4-90) were also lower in Manigotagan Lake than Lac du Bonnet but not the Pointe du Bois Forebay. Manigotagan Lake was also softer (i.e., lower hardness) than either site sampled annually on the Winnipeg River (Figure 5.1.4-91).

Temporal Comparisons

Statistical comparisons between sampling years for annual waterbodies revealed few significant differences (Figures 5.1.4-93 to 5.1.4-96). The small number of exceptions included: barium was higher in 2009 than 2010 in the Pointe du Bois Forebay (Figure 5.1.4-92); copper and uranium were higher in 2009 than 2008 in the Pointe du Bois Forebay (Figures 5.1.4-93 and 5.1.4-94); and lead was higher in 2009 than 2010 at Manigotagan Lake (Figure 5.1.4-95). However, of these four metals, statistical differences for copper, uranium, and lead likely reflect changes in the analytical detection limits between the sampling years and not actual temporal differences.

The lack of consistent year-to-year differences indicates that water quality conditions in the Winnipeg River Region remained generally stable during the monitoring program and/or temporal differences were not large enough to be detected statistically. The lack of interannual differences is notable in light of the relatively large range of flow conditions observed in the Winnipeg River over the period of 2008-2010 (see Section 5.1.2 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 5.1.4-1. Saffran and Trew (1996) categorization of acid sensitivity of aquatic ecosystems and sensitivity ranking for the Winnipeg River Region.

Parameter	Units	Acid Sensitivity							
		High	Moderate	Low	Least	Eaglenest Lake	Pointe du Bois	Lac du Bonnet	Manigotagan Lake
pH	-	<6.5	6.6-7.0	7.1-7.5	>7.5	Least	Least	Least	Least
Total Alkalinity	mg/L (as $CaCO_3$)	0-10	11-20	21-40	>40	Low	Least	Least	Low
Calcium	mg/L	0-4	5-8	9-25	>25	Low	Low	Low	Low
Total Dissolved Solids	mg/L	0-50	51-200	201-500	>500	Moderate	Moderate	Moderate	Moderate

Table 5.1.4-2. Total phosphorus concentrations (open-water season and annual means) measured in the Winnipeg River Region and CCME (1999, updated to 2013) trophic categorization: 2008/2009-2010/2011.

Waterbody	Period	Trophic Status Based on TP (mg/L)						Years Sampled
		Ultra-oligotrophic	Oligotrophic	Mesotrophic	Meso-eutrophic	Eutrophic	Hypereutrophic	
		<0.004	0.004 - 0.010	0.010 - 0.020	0.020 - 0.035	0.035 - 0.100	> 0.100	
Eaglenest Lake	Open-water season				0.025			2010
	Annual				0.026			2010/2011
Pointe du Bois Forebay	Open-water season				0.025			2008
	Annual				0.026			2008/2009
	Open-water season				0.024			2009
	Annual				0.024			2009/2010
	Open-water season				0.025			2010
	Annual				0.025			2010/2011
	Open-water season				0.024			2008-2010
	Annual				0.025			2008/2009 - 2010/2011
Lac du Bonnet	Open-water season				0.028			2008
	Annual				0.028			2008/2009
	Open-water season				0.025			2009
	Annual				0.026			2009/2010
	Open-water season				0.029			2010
	Annual				0.029			2010/2011
	Open-water season				0.027			2008-2010
	Annual				0.028			2008/2009 - 2010/2011
Manigotagan Lake	Open-water season			0.017				2008
	Annual			0.020				2008/2009
	Open-water season			0.020				2009
	Annual				0.023			2009/2010
	Open-water season				0.025			2010
	Annual				0.025			2010/2011
	Open-water season			0.020				2008-2010
	Annual				0.023			2008/2009 - 2010/2011

Table 5.1.4-3. Chlorophyll *a* concentrations (open-water season and annual means) measured in the Winnipeg River Region and the OECD (1982) trophic categorization scheme for lakes: 2008/2009-2010/2011.

Waterbody	Period	Lake Trophic Status Based on Chlorophyll *a* (µg/L)						Years Sampled
		Ultra-oligotrophic	Oligotrophic	Mesotrophic	Meso-eutrophic	Eutrophic	Hypereutrophic	
		-	<2.5	2.5 - 8	-	8 - 25	> 25	
Eaglenest Lake	Open-water season			4.2				2010
	Annual			3.2				2010/2011
Pointe du Bois Forebay	Open-water season			6.3				2008
	Annual			4.9				2008/2009
	Open-water season			5.6				2009
	Annual			5.6				2009/2010
	Open-water season			3.5				2010
	Annual			2.7				2010/2011
	Open-water season			5.1				2008-2010
	Annual			4.3				2008/2009 - 2010/2011
Lac du Bonnet	Open-water season			6.0				2008
	Annual			4.6				2008/2009
	Open-water season			6.6				2009
	Annual			5.4				2009/2010
	Open-water season			3.6				2010
	Annual			2.8				2010/2011
	Open-water season			5.4				2008-2010
	Annual			4.3				2008/2009 - 2010/2011
Manigotagan Lake	Open-water season			5.3				2008
	Annual			4.3				2008/2009
	Open-water season			6.1				2009
	Annual			4.8				2009/2010
	Open-water season			3.6				2010
	Annual			3.1				2010/2011
	Open-water season			5.0				2008-2010
	Annual			4.0				2008/2009 - 2010/2011

Table 5.1.4-4. Total nitrogen concentrations (open-water season and annual means) measured in the Winnipeg River Region and comparison to a trophic classification scheme for lakes (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	Hypereutrophic	
		-	<0.350	0.350-0.650	-	0.651-1.2	>1.2	
Eaglenest Lake	Open-water season			0.36				2010
	Annual			0.41				2010/2011
Pointe du Bois Forebay	Open-water season			0.52				2008
	Annual			0.52				2008/2009
	Open-water season			0.41				2009
	Annual			0.41				2009/2010
	Open-water season			0.30				2010
	Annual			0.37				2010/2011
	Open-water season			0.41				2008-2010
	Annual			0.43				2008/2009 - 2010/2011
Lac du Bonnet	Open-water season			0.52				2008
	Annual			0.52				2008/2009
	Open-water season			0.40				2009
	Annual			0.45				2009/2010
	Open-water season			0.44				2010
	Annual			0.48				2010/2011
	Open-water season			0.45				2008-2010
	Annual			0.48				2008/2009 - 2010/2011
Manigotagan Lake	Open-water season			0.58				2008
	Annual			0.59				2008/2009
	Open-water season			0.46				2009
	Annual			0.51				2009/2010
	Open-water season			0.48				2010
	Annual			0.51				2010/2011
	Open-water season			0.50				2008-2010
	Annual			0.54				2008/2009 - 2010/2011

Table 5.1.4-5. Detection frequency and summary statistics for *E. coli* (CFU/100 mL) measured in the Winnipeg River Region.

Waterbody	Sample Years	# Detected	n	% Detected	Mean	Median	Max
Eaglenest Lake	2010	2	4	50	1	<1	2
Pointe du Bois Forebay	2008-2010	5	11	45	2	2	<10
Lac du Bonnet	2008-2010	8	12	67	7	3	50
Manigotagan Lake	2008-2010	0	12	0	<1	<1	<10

Table 5.1.4-6. Frequency of detection of metals and major ions measured in the Winnipeg 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	Dissolved Chloride	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum
Eaglenest Lake	2010	# Detected	**4**	1	**4**	**4**	0	0	0	**2**	**4**	0	**4**	0	0	**4**	**4**	**4**	1	4	4	0	0
		n	**4**	4	**4**	**4**	4	4	4	**4**	**4**	4	**4**	4	4	**4**	**4**	**4**	4	4	4	4	4
		% Detected	**100**	25	**100**	**100**	0	0	0	**50**	**100**	0	**100**	0	0	**100**	**100**	**100**	25	100	100	0	0
Pointe du Bois Forebay	2008-2010	# Detected	**11**	2	**11**	**11**	0	0	1	**8**	**11**	0	**11**	**4**	3	**10**	**11**	**4**	1	**11**	**11**	0	1
		n	**11**	11	**11**	**11**	11	11	11	**11**	**11**	11	**11**	**11**	11	**11**	**11**	**11**	4	**11**	**11**	11	11
		% Detected	**100**	18	**100**	**100**	0	0	9	**73**	**100**	0	**100**	**36**	27	**91**	**100**	**36**	25	**100**	**100**	0	9
Lac du Bonnet	2008-2010	# Detected	**12**	1	**12**	**12**	0	0	1	**9**	**12**	0	**12**	**4**	**5**	**12**	**12**	**5**	0	**12**	**12**	0	1
		n	**12**	12	**12**	**12**	12	12	12	**12**	**12**	12	**12**	**12**	**12**	**12**	**12**	**12**	4	**12**	**12**	12	12
		% Detected	**100**	8	**100**	**100**	0	0	8	**75**	**100**	0	**100**	**33**	**42**	**100**	**100**	**42**	0	**100**	**100**	0	8
Manigotagan Lake	2008-2010	# Detected	**12**	3	**12**	**12**	0	0	1	**7**	**12**	0	**12**	3	2	**10**	**12**	**5**	1	**12**	**12**	0	1
		n	**12**	12	**12**	**12**	12	12	12	**12**	**12**	12	**12**	12	12	**12**	**12**	**12**	4	**12**	**12**	12	12
		% Detected	**100**	25	**100**	**100**	0	0	8	**58**	**100**	0	**100**	25	17	**83**	**100**	**42**	25	**100**	**100**	0	8

Table 5.1.4-6. continued.

Waterbody	Sample Years		Nickel	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Dissolved Sulphate	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
Eaglenest Lake	2010	# Detected	0	**4**	**4**	0	**4**	0	**4**	**4**	**4**	0	0	1	1	**4**	0	**4**	**4**	0	1
		n	4	**4**	**4**	4	**4**	4	**4**	**4**	**4**	4	4	4	4	**4**	4	**4**	**4**	4	4
		% Detected	0	**100**	**100**	0	**100**	0	**100**	**100**	**100**	0	0	25	25	**100**	0	**100**	**100**	0	25
Pointe du Bois Forebay	2008-2010	# Detected	0	**11**	**11**	0	**4**	0	**11**	**11**	**11**	0	0	1	1	**11**	0	**6**	**8**	0	**4**
		n	11	**11**	**11**	11	**4**	11	**11**	**11**	**11**	11	11	4	11	**11**	11	**11**	**11**	11	**11**
		% Detected	0	**100**	**100**	0	**100**	0	**100**	**100**	**100**	0	0	25	9	**100**	0	**55**	**73**	0	**36**
Lac du Bonnet	2008-2010	# Detected	1	**12**	**12**	1	**4**	3	**12**	**12**	**12**	0	0	**3**	**4**	**12**	0	**8**	**9**	0	**5**
		n	12	**12**	**12**	12	**4**	12	**12**	**12**	**12**	12	12	**4**	**12**	**12**	12	**12**	**12**	12	**12**
		% Detected	8	**100**	**100**	8	**100**	25	**100**	**100**	**100**	0	0	**75**	**33**	**100**	0	**67**	**75**	0	**42**
Manigotagan Lake	2008-2010	# Detected	0	**12**	**12**	1	**4**	0	**12**	**12**	**9**	0	0	0	2	**11**	2	**9**	**5**	0	3
		n	12	**12**	**12**	12	**4**	12	**12**	**12**	**12**	12	12	4	12	**12**	12	**12**	**12**	12	12
		% Detected	0	**100**	**100**	8	**100**	0	**100**	**100**	**75**	0	0	0	17	**92**	17	**75**	**42**	0	25

Table 5.1.4-7. Frequency of exceedances of MWQSOGs for PAL for metals measured in the Winnipeg 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	0.00012-0.00016	0.0345-0.0497	0.0036-0.0053	0.3	0.00077-0.00135	0.000026	0.073	0.020-0.030	0.001	0.0001	0.0008	0.015	0.046-0.068
Eaglenest Lake	2010	n	**4**	4	4	4	4	4	**4**	4	0	4	4	4	4	4	4	4
		# Exceedances	**4**	0	0	0	0	0	**2**	0	-	0	0	0	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**50**	0	-	0	0	0	0	0	0	0
Pointe du Bois Forebay	2008-2010	n	**11**	11	11	11	11	11	**11**	11	2	11	11	11	11	11	11	11
		# Exceedances	**11**	0	0	0	0	0	**4**	0	0	0	0	0	0	0	0	0
		% Exceedances	**100**	0	0	0	0	0	**36**	0	0	0	0	0	0	0	0	0
Lac du Bonnet	2008-2010	n	**12**	12	12	12	12	12	**12**	12	2	12	12	**12**	**12**	12	12	12
		# Exceedances	**11**	0	0	0	0	0	**5**	0	0	0	0	**1**	**3**	0	0	0
		% Exceedances	**92**	0	0	0	0	0	**42**	0	0	0	0	**8**	**25**	0	0	0
Manigotagan Lake -Surface	2008-2010	n	**12**	12	12	12	12	12	12	12	2	12	12	**12**	12	12	12	12
		# Exceedances	**5**	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0
		% Exceedances	**42**	0	0	0	0	0	0	0	0	0	0	**8**	0	0	0	0
Manigotagan Lake -Bottom	2008-2010	n	**7**	7	7	7	7	7	**7**	7	2	7	7	7	7	7	7	7
		# Exceedances	**6**	0	0	0	0	0	**3**	0	0	0	0	0	0	0	0	0
		% Exceedances	**86**	0	0	0	0	0	**43**	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).

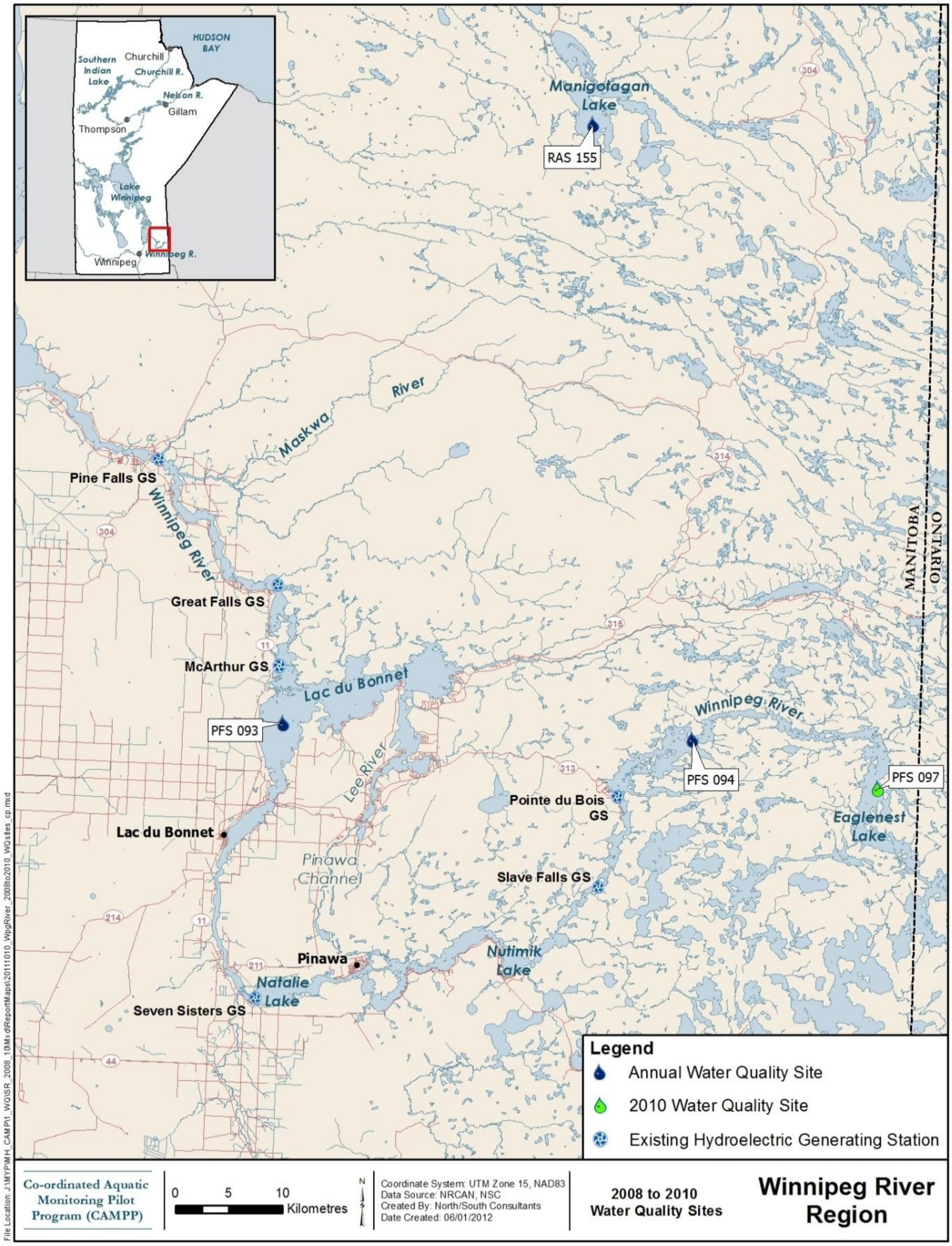
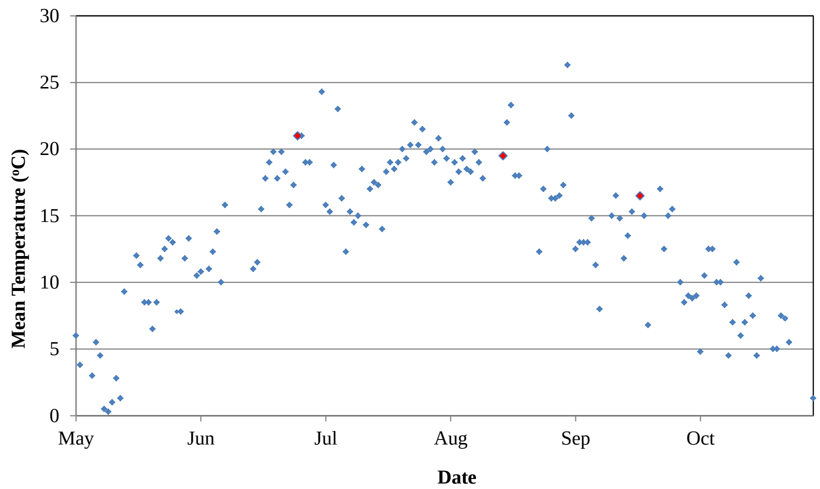
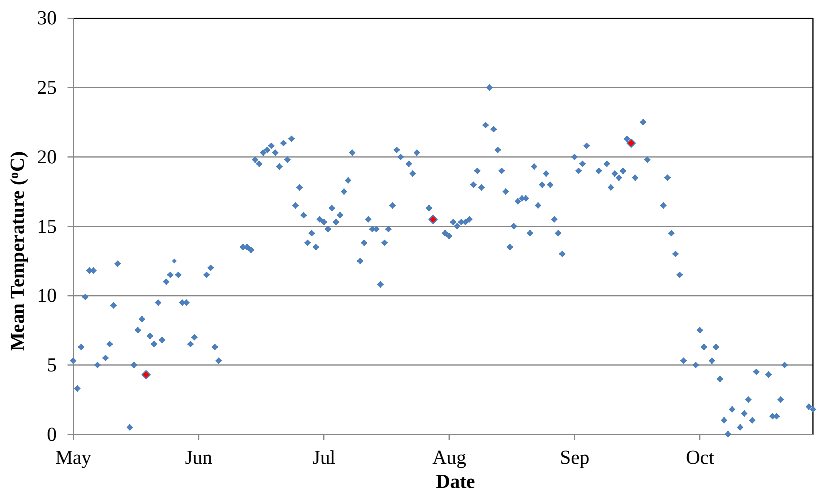


Figure 5.1.4-1. Water quality and phytoplankton monitoring sites in the Winnipeg River Region.





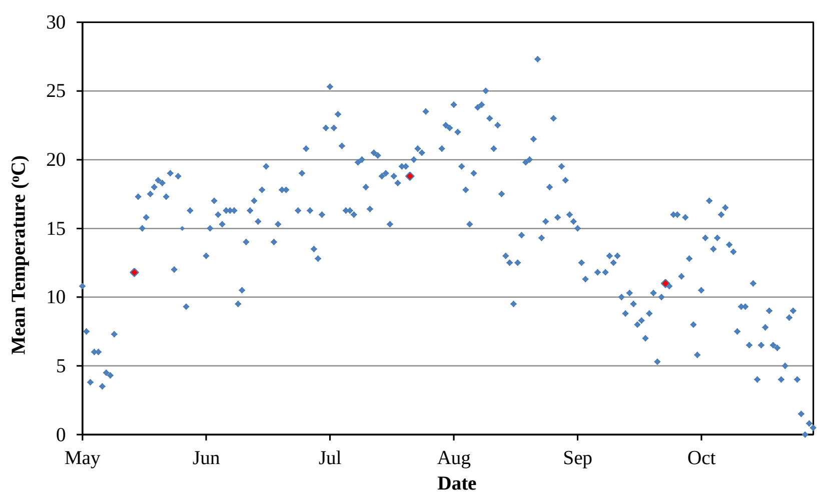


Figure 5.1.4-2. Mean daily air temperature and water quality sampling dates (indicated in red) for the Winnipeg River Region: (A) 2008; (B) 2009; and (C) 2010.

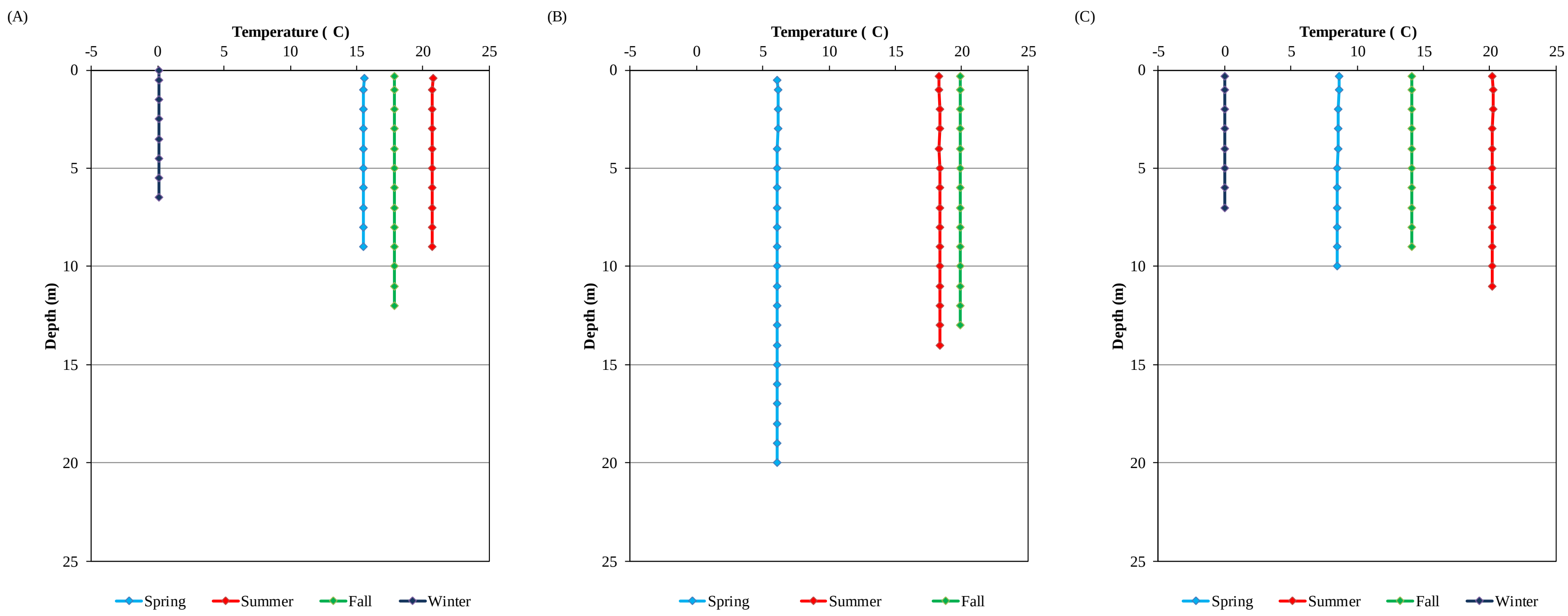


Figure 5.1.4-3. Water temperature profiles measured in the Pointe du Bois Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

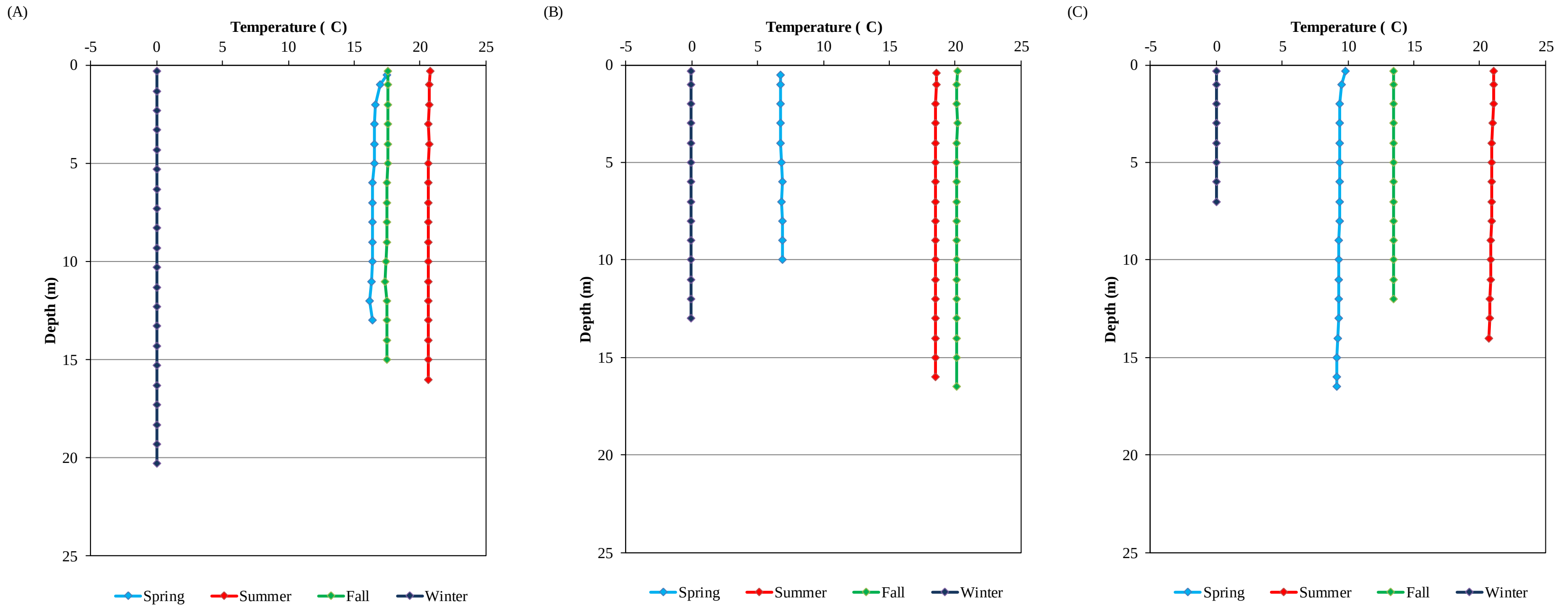


Figure 5.1.4-4. Water temperature profiles measured in Lac du Bonnet: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

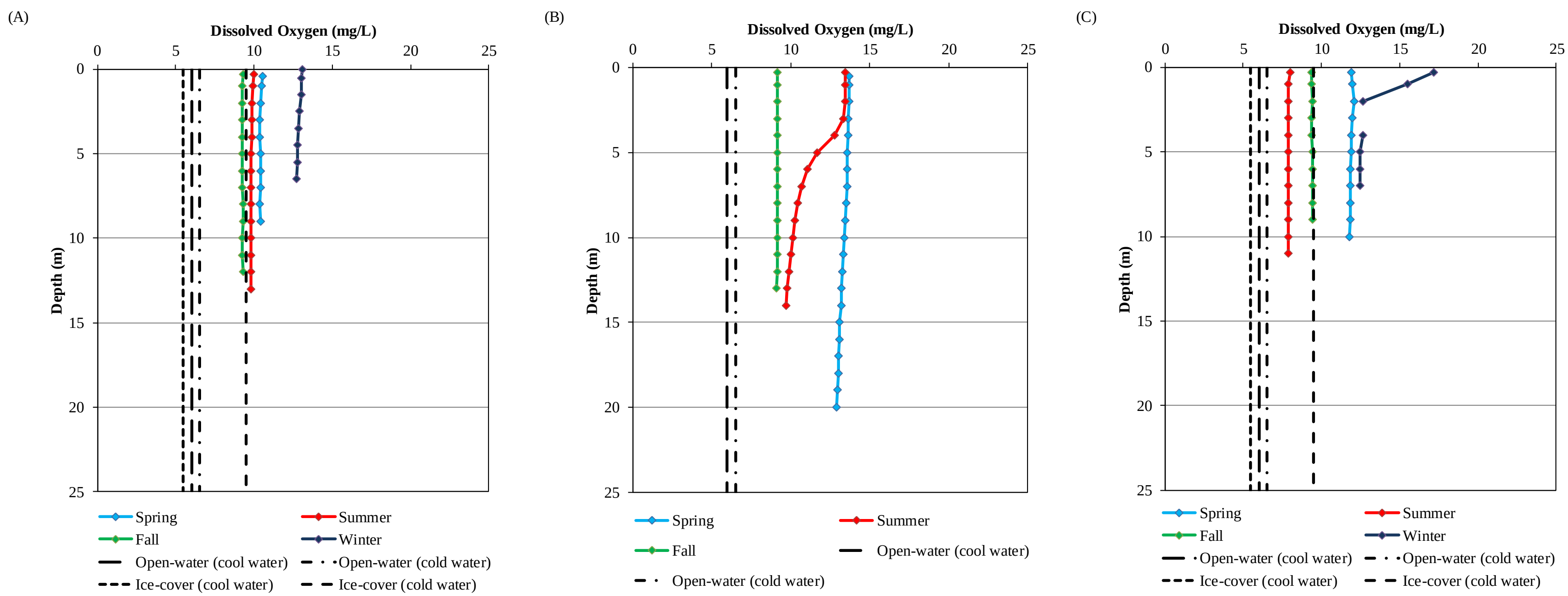


Figure 5.1.4-5. Dissolved oxygen depth profiles measured in the Pointe du Bois Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

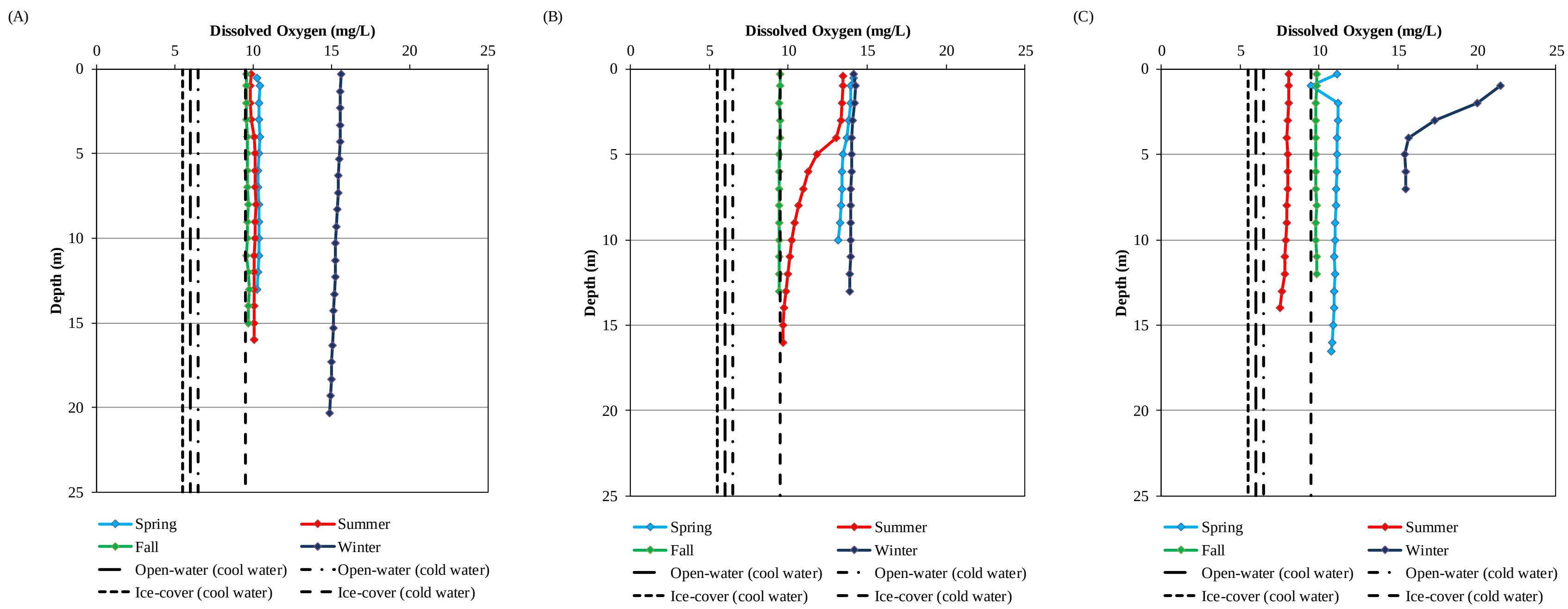


Figure 5.1.4-6. Dissolved oxygen depth profiles measured in Lac du Bonnet: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

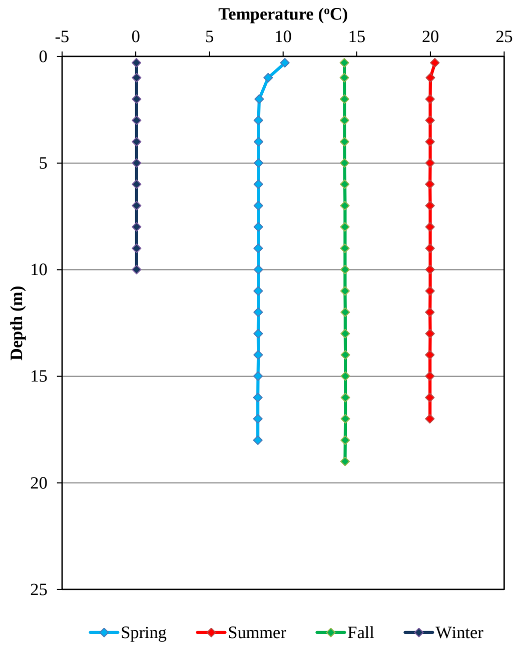


Figure 5.1.4-7. Water temperature profiles measured in Eaglenest Lake 2010/2011.

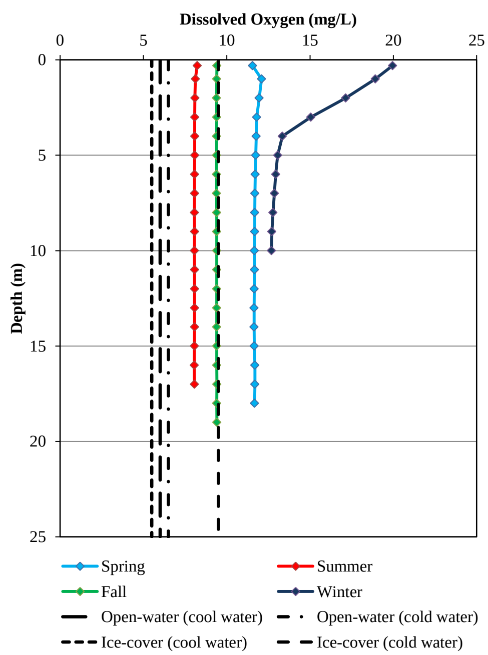


Figure 5.1.4-8. Dissolved oxygen depth profiles measured in Eaglenest Lake 2010/2011

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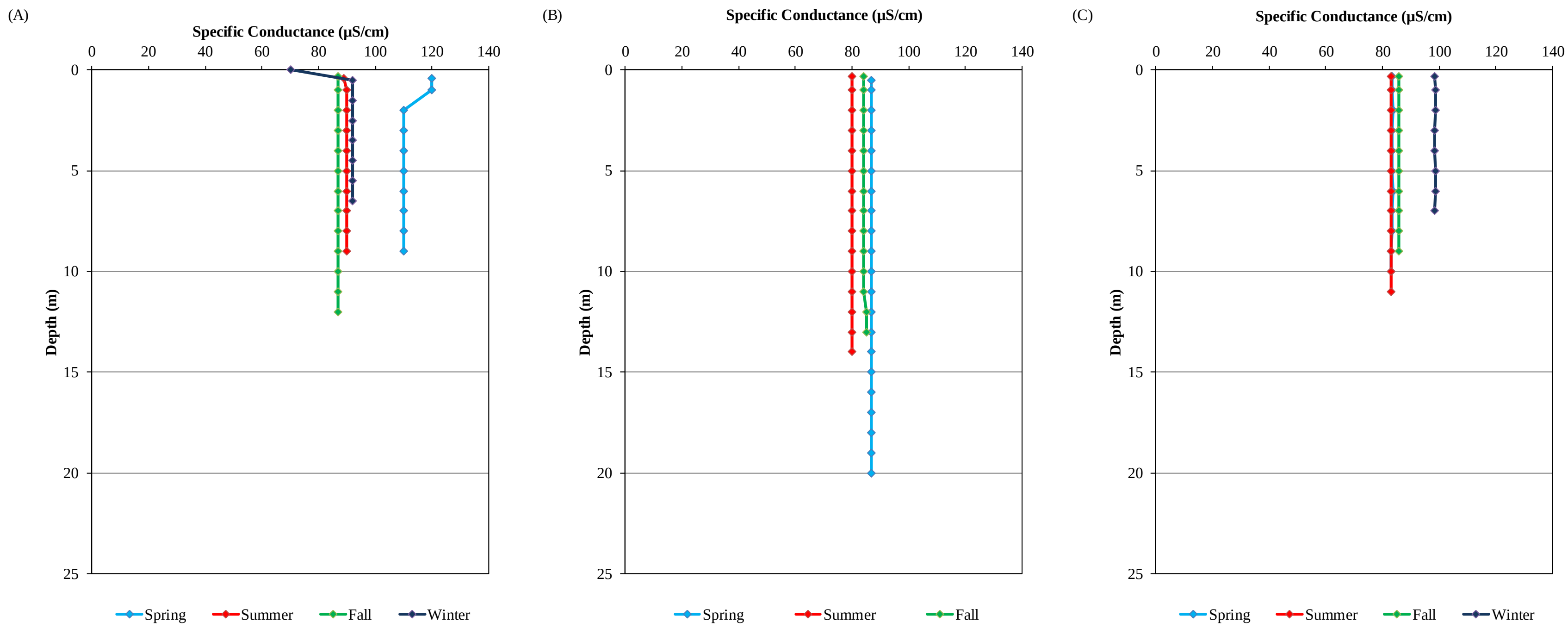


Figure 5.1.4-9. Specific conductance depth profiles measured in the Pointe du Bois Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

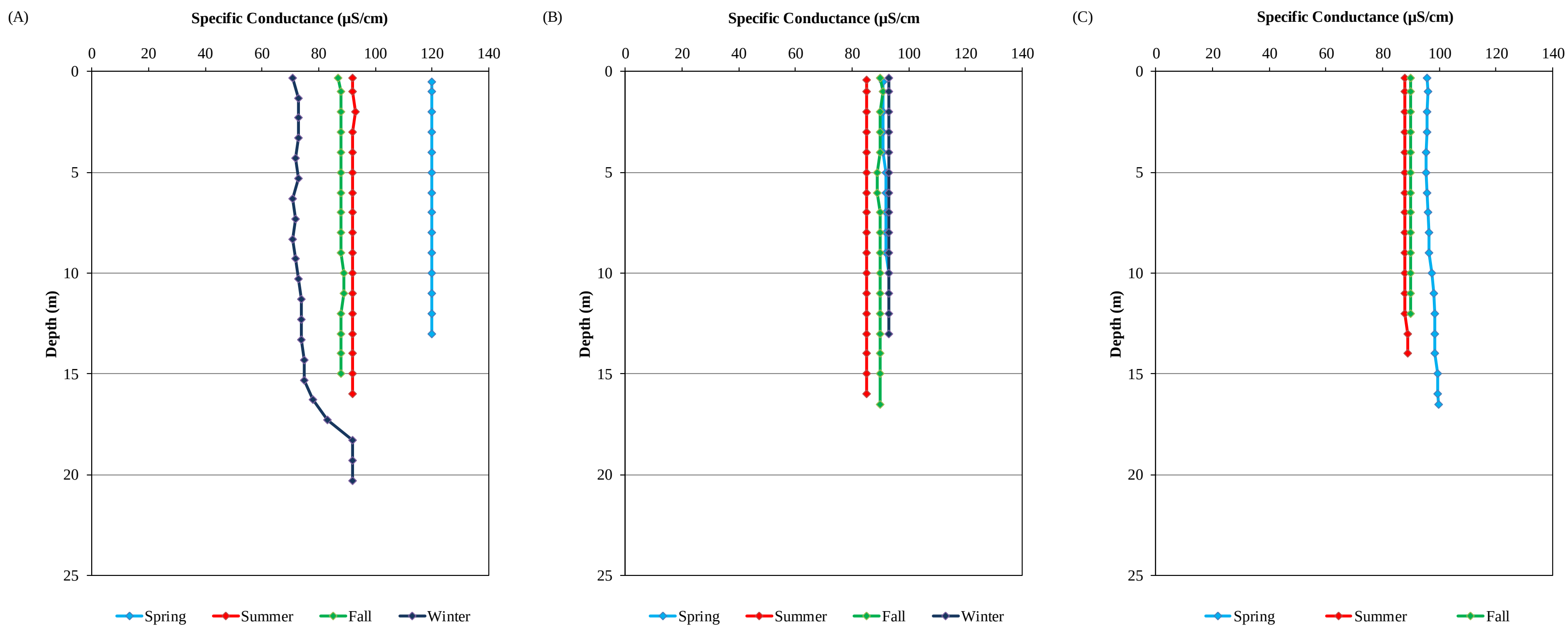


Figure 5.1.4-10. Specific conductance depth profiles measured in Lac du Bonnet: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

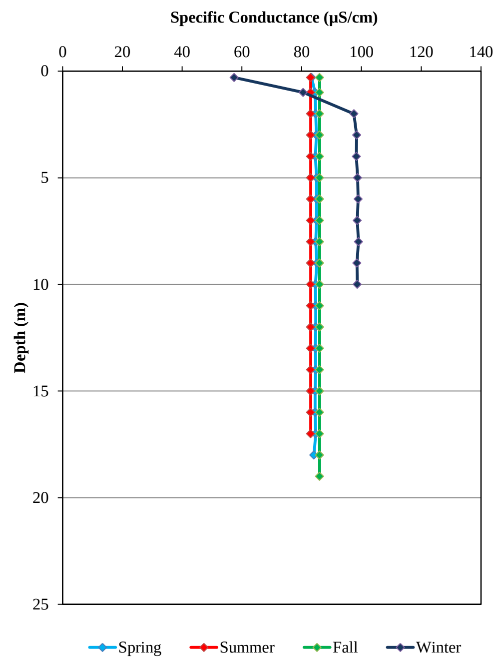


Figure 5.1.4-11. Specific conductance depth profiles measured in Eaglenest Lake 2010/2011.

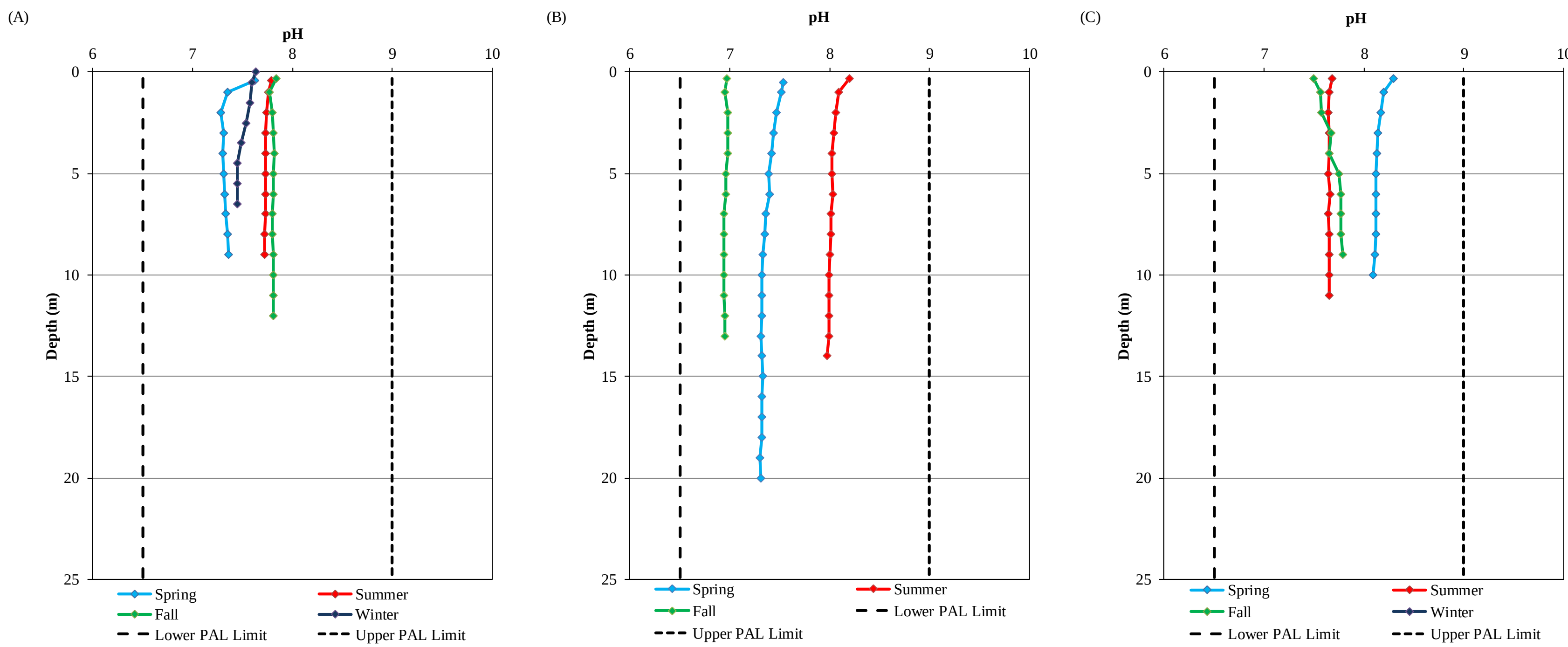


Figure 5.1.4-12. pH depth profiles measured in the Pointe du Bois Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

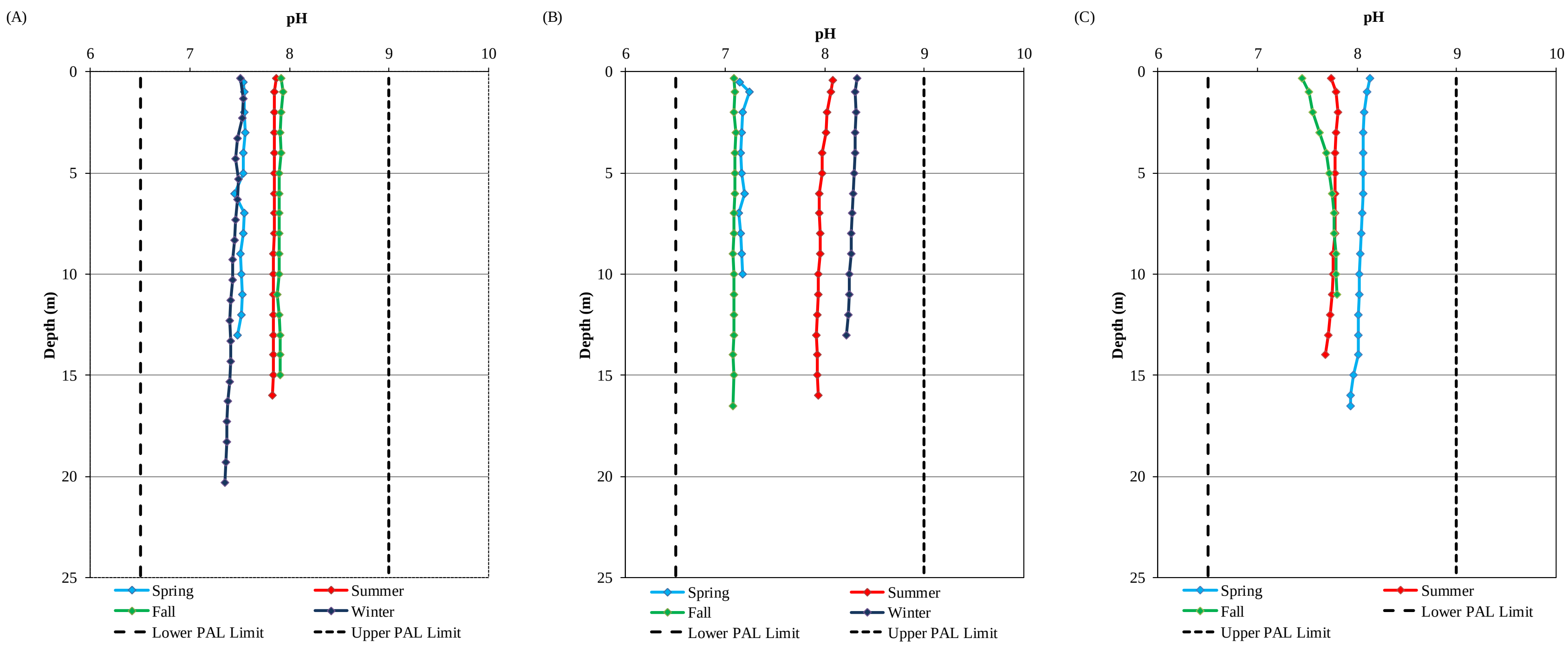


Figure 5.1.4-13. pH depth profiles measured at Lac du Bonnet: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

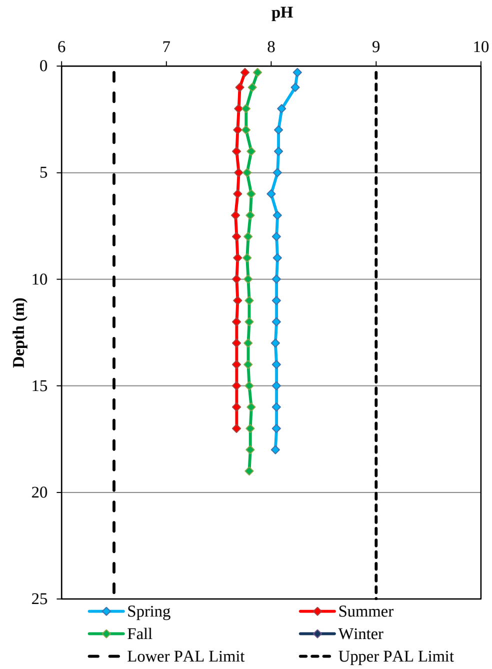


Figure 5.1.4-14. pH depth profiles measured at Eaglenest Lake 2010/2011.

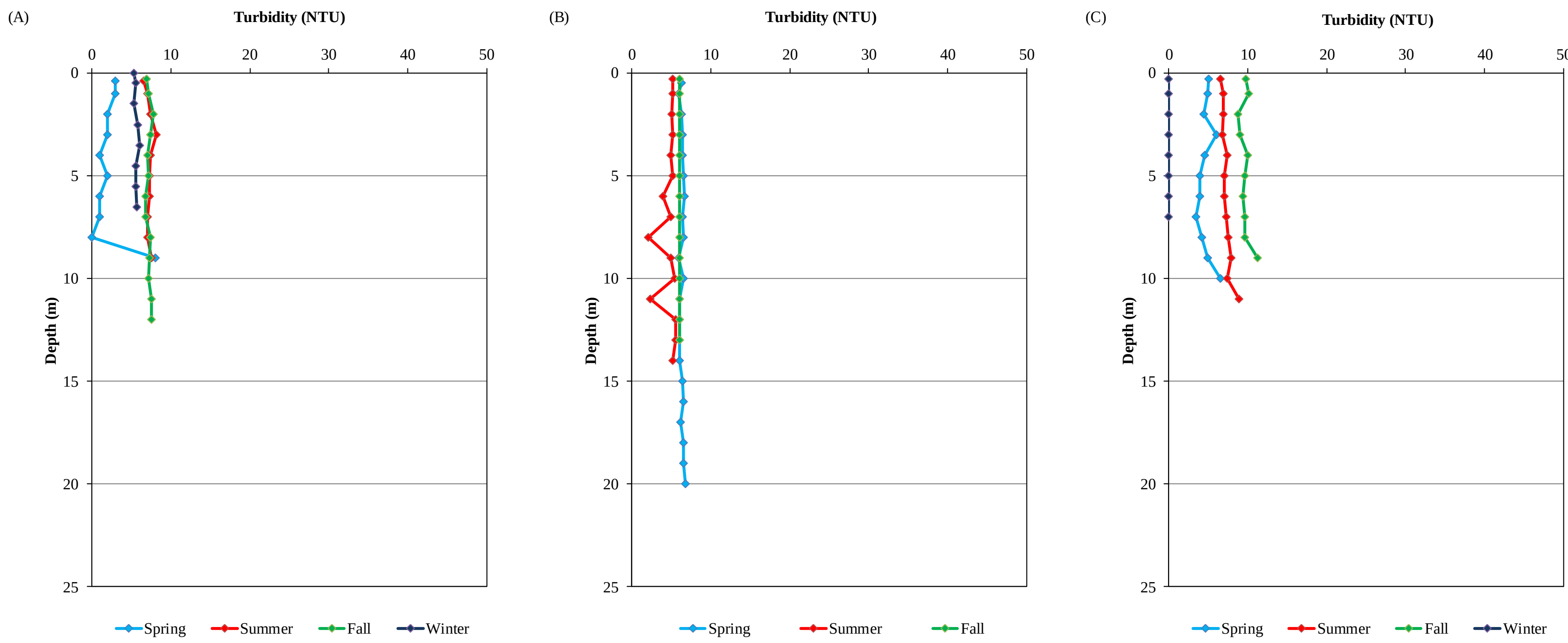


Figure 5.1.4-15. Turbidity depth profiles measured in the Pointe du Bois Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

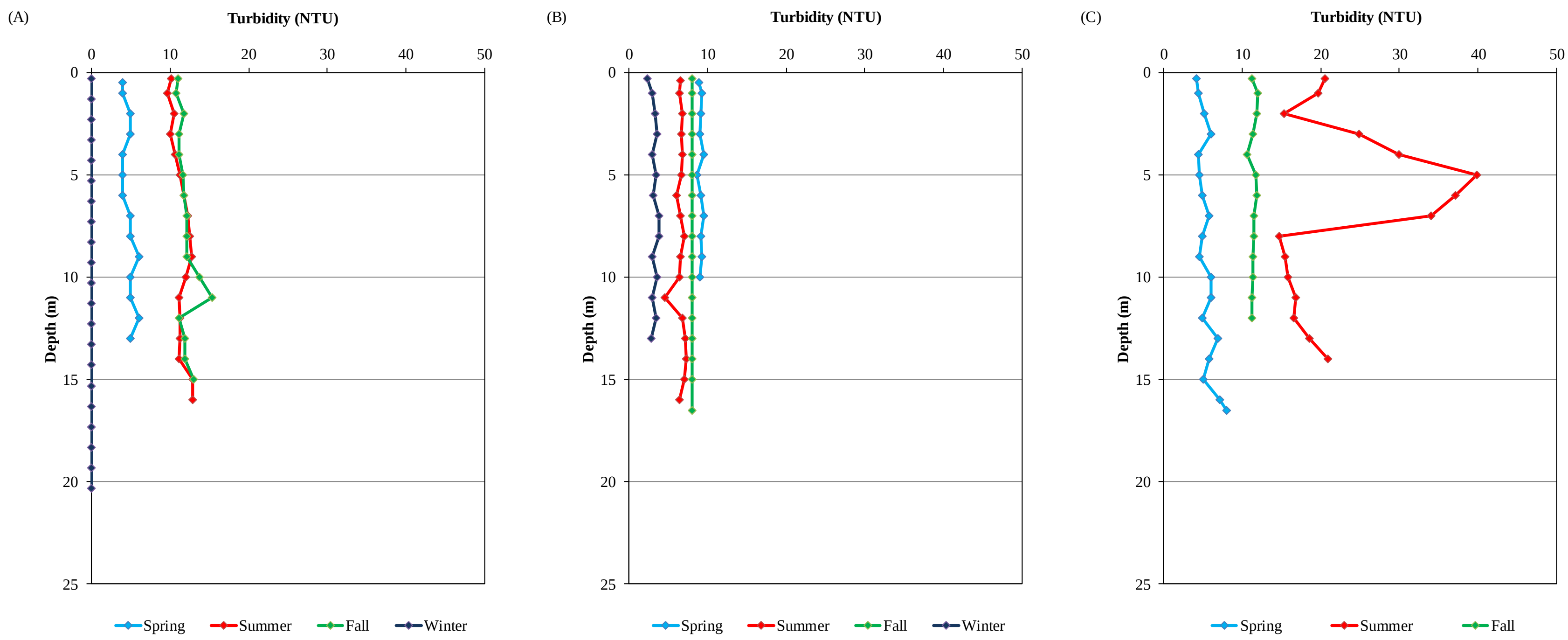


Figure 5.1.4-16. Turbidity depth profiles measured in Lac du Bonnet: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

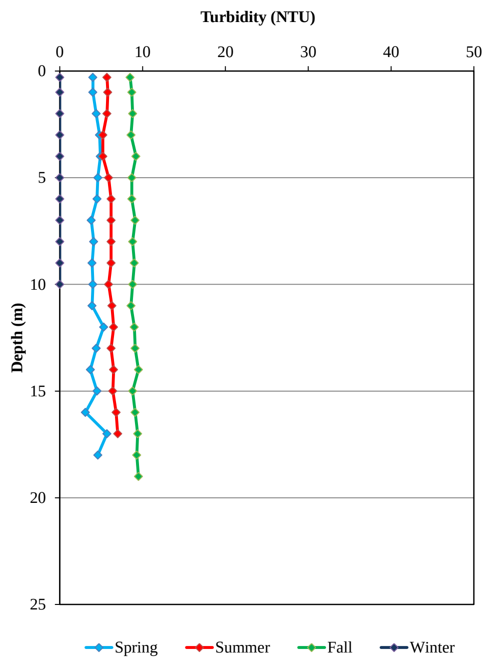


Figure 5.1.4-17. Turbidity depth profiles measured in Eaglenest Lake 2010/2011.

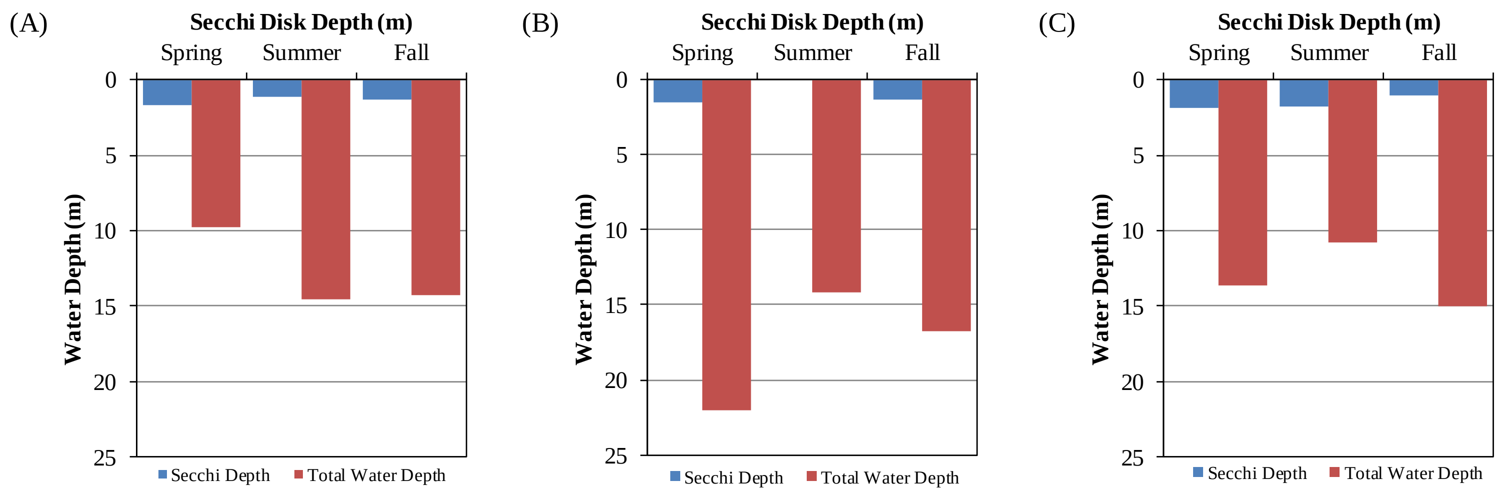


Figure 5.1.4-18. Secchi disk depths measured in the Pointe du Bois Forebay: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

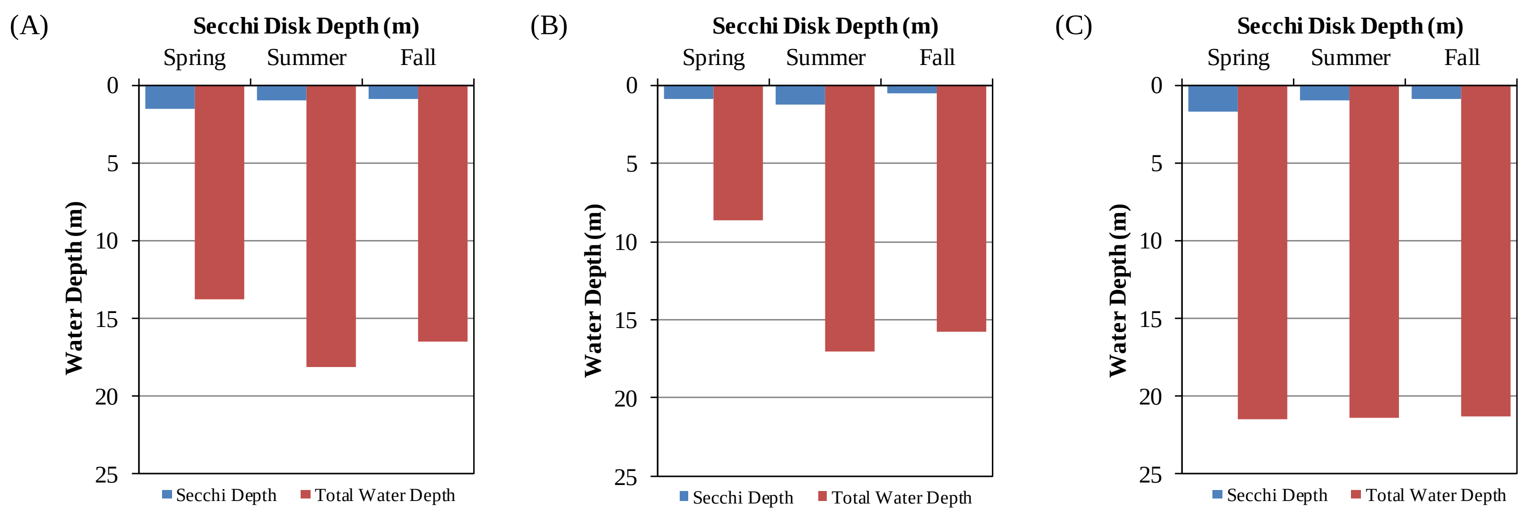


Figure 5.1.4-19. Secchi disk depths measured in Lac du Bonnet: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

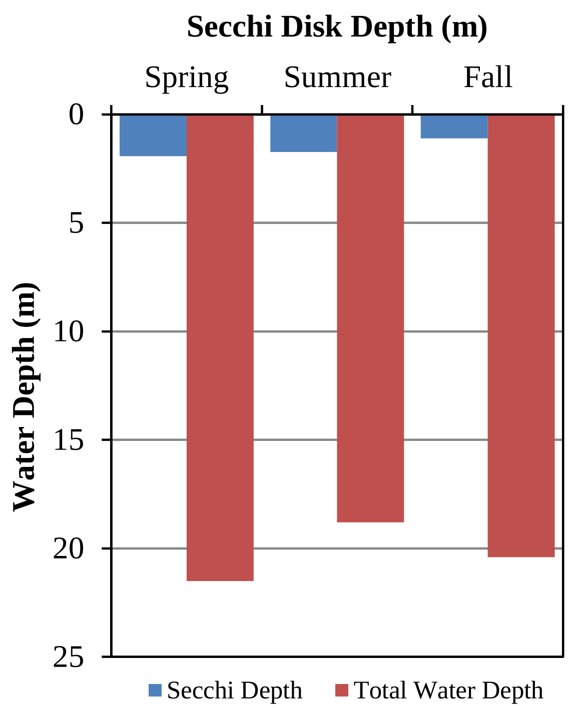


Figure 5.1.4-20. Secchi disk depths measured in Eaglenest Lake 2010/2011.

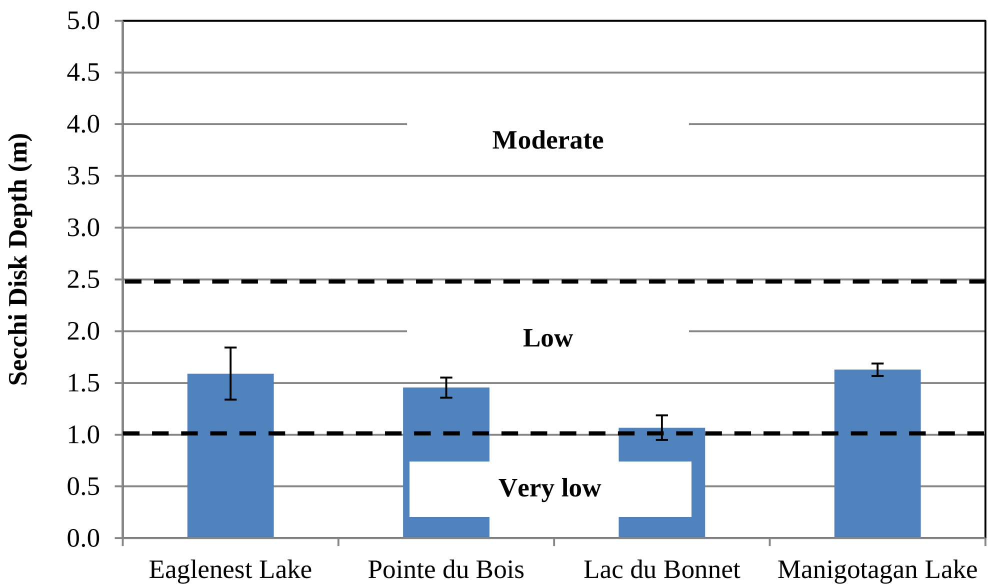


Figure 5.1.4-21. Mean±SE Secchi disk depths measured in the open-water seasons in lakes of the Winnipeg River Region. Water clarity categories are those applied by the Swedish EPA (2000).

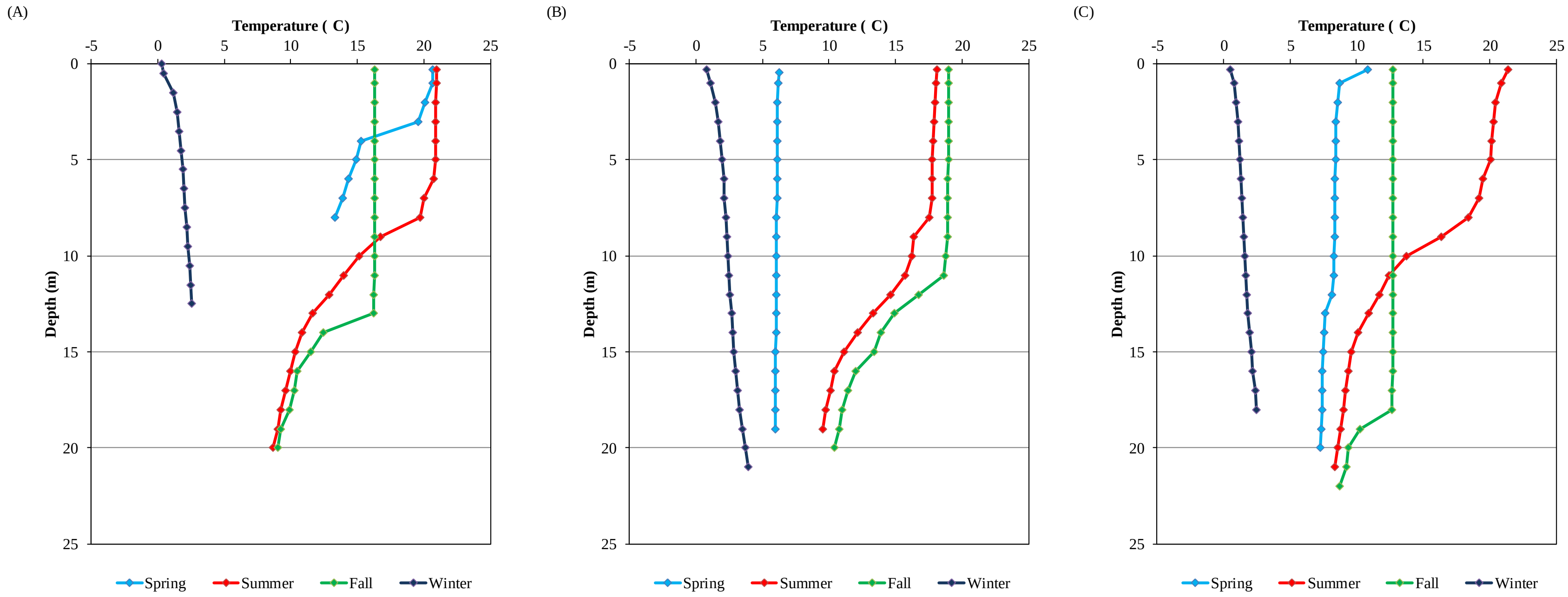


Figure 5.1.4-22. Water temperature profiles measured in Manigotagan Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

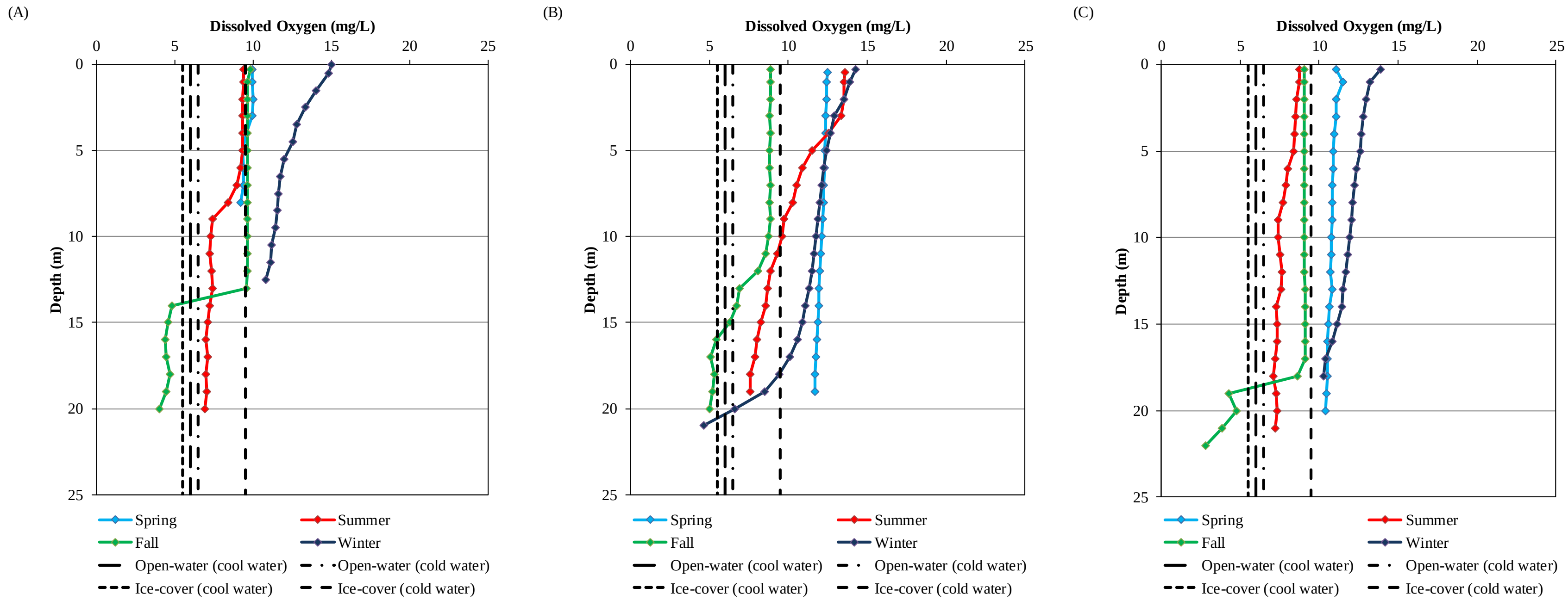


Figure 5.1.4-23. Dissolved oxygen depth profiles measured in Manigotagan Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

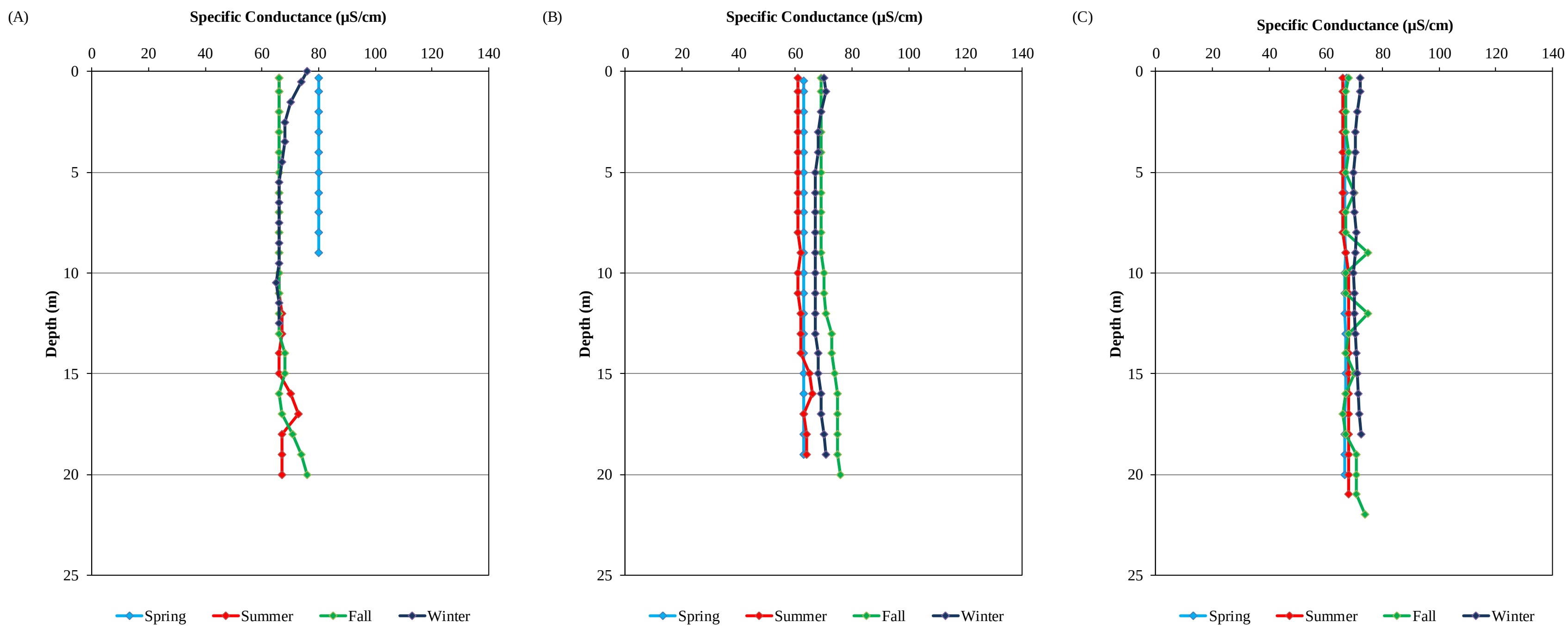


Figure 5.1.4-24. Specific conductance depth profiles measured at Manigotagan Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

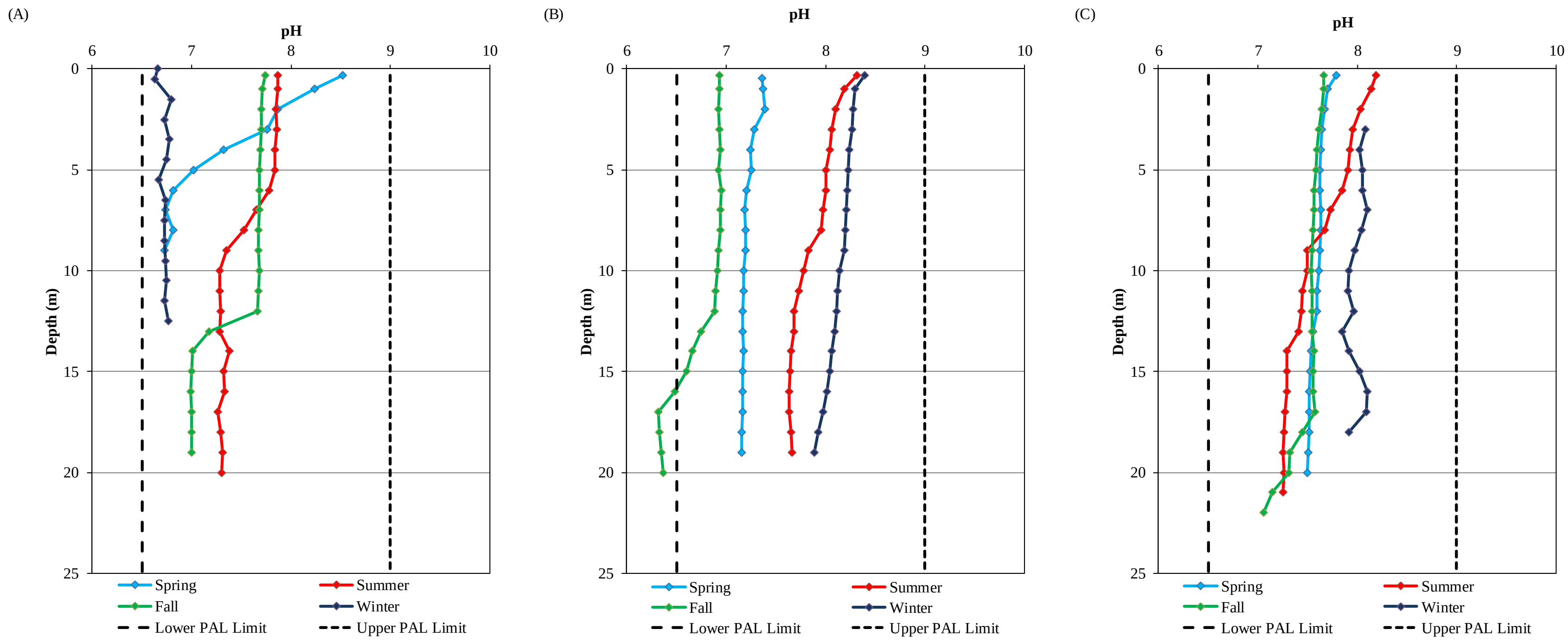


Figure 5.1.4-25. pH depth profiles measured in Manigotagan Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

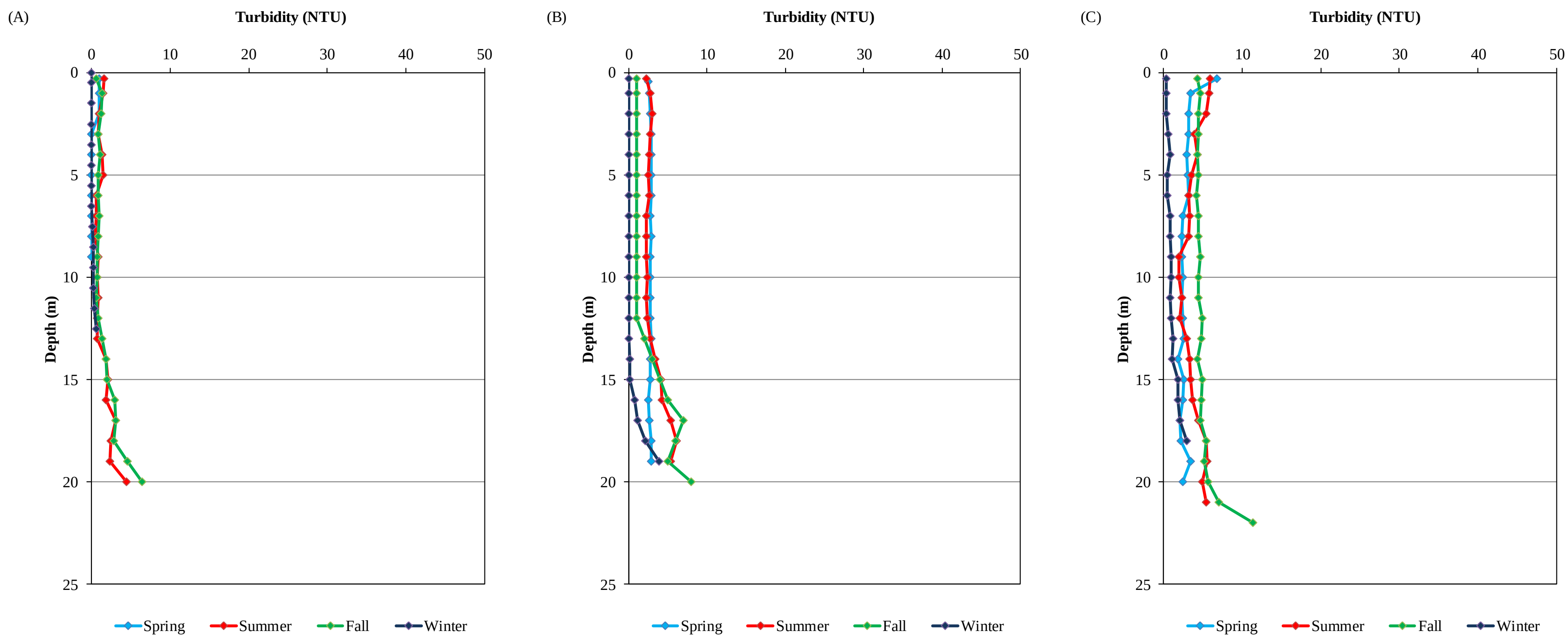


Figure 5.1.4-26. Turbidity depth profiles measured in Manigotagan Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

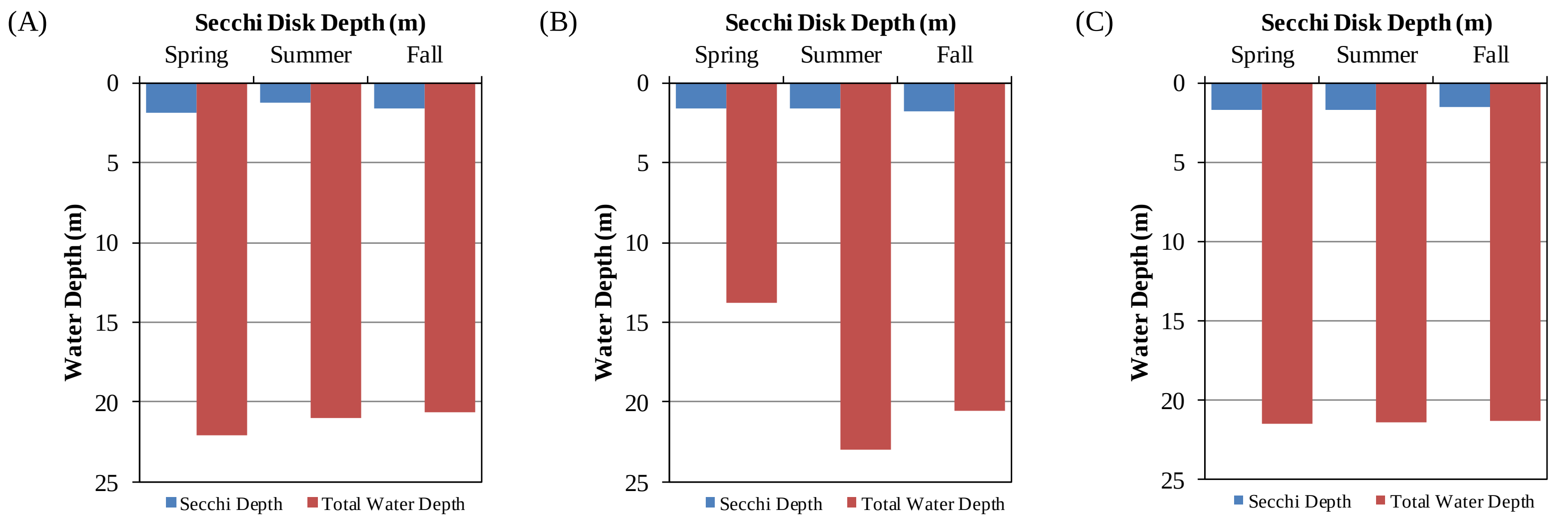


Figure 5.1.4-27. Secchi disk depths measured in Manigotagan Lake: (A) 2008/2009; (B) 2009/2010; and (C) 2010/2011.

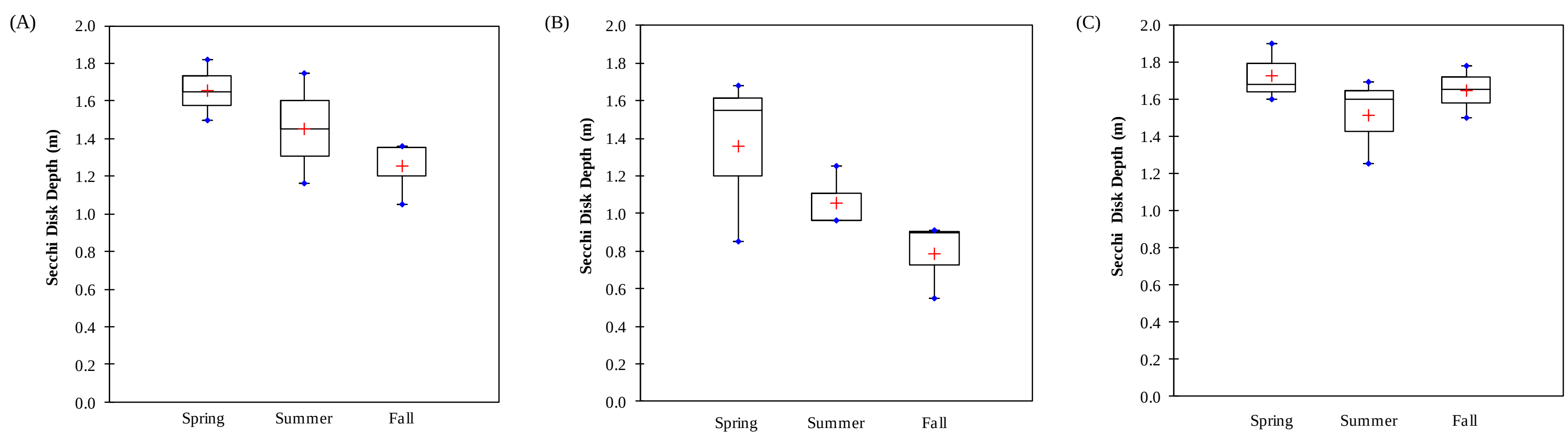


Figure 5.1.4-28. Secchi disk depth in the Winnipeg River Region by season (open-water season only): (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. There were no significant differences between seasons.

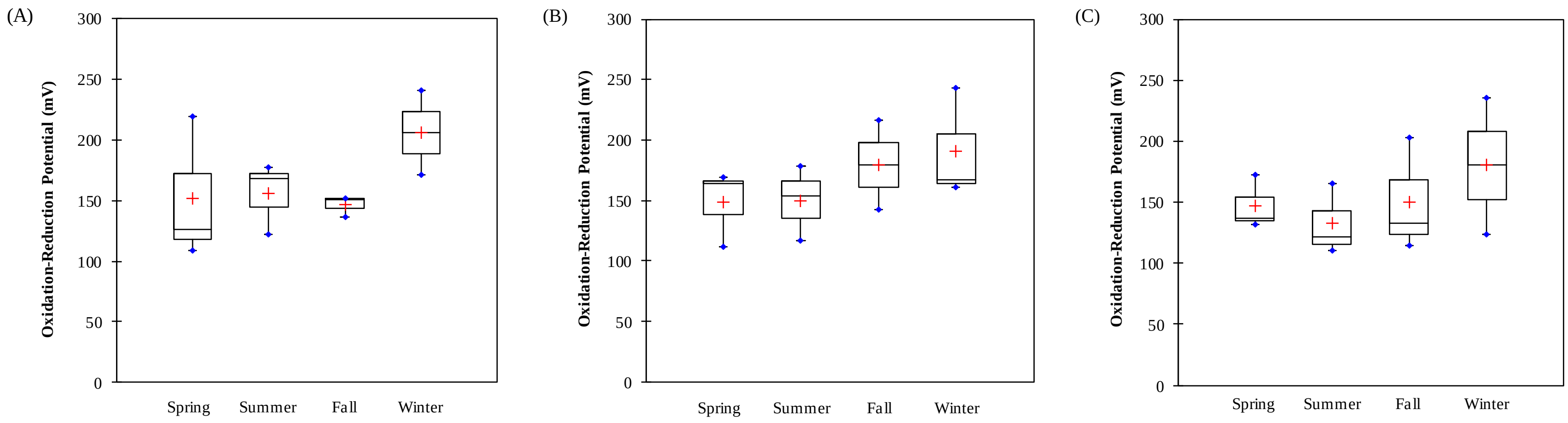


Figure 5.1.4-29. Oxidation-reduction potential in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. There were no significant differences between seasons.

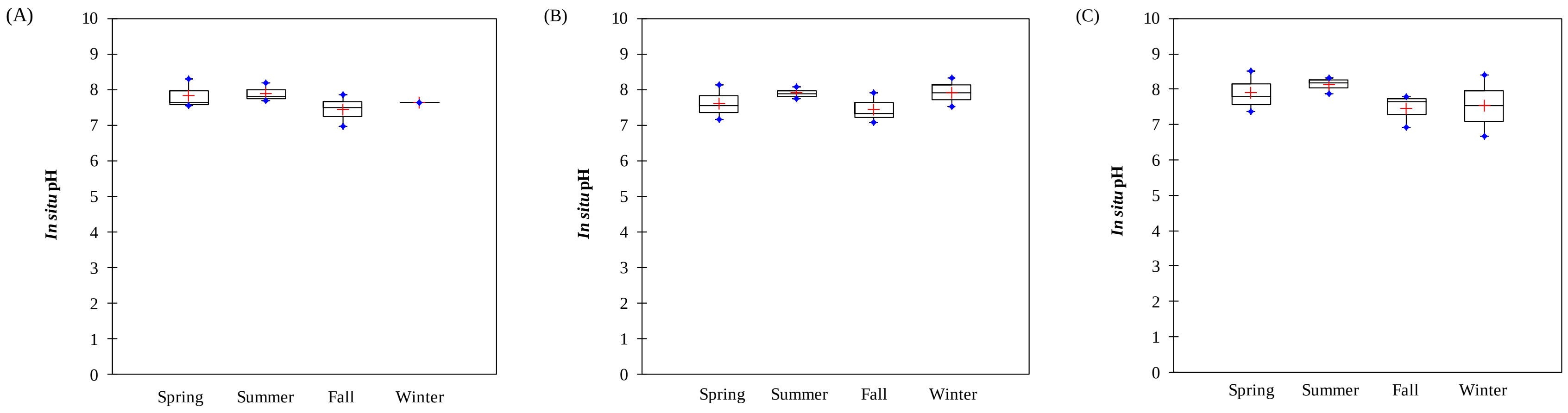


Figure 5.1.4-30. *In situ* pH in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. There were no significant differences between seasons.

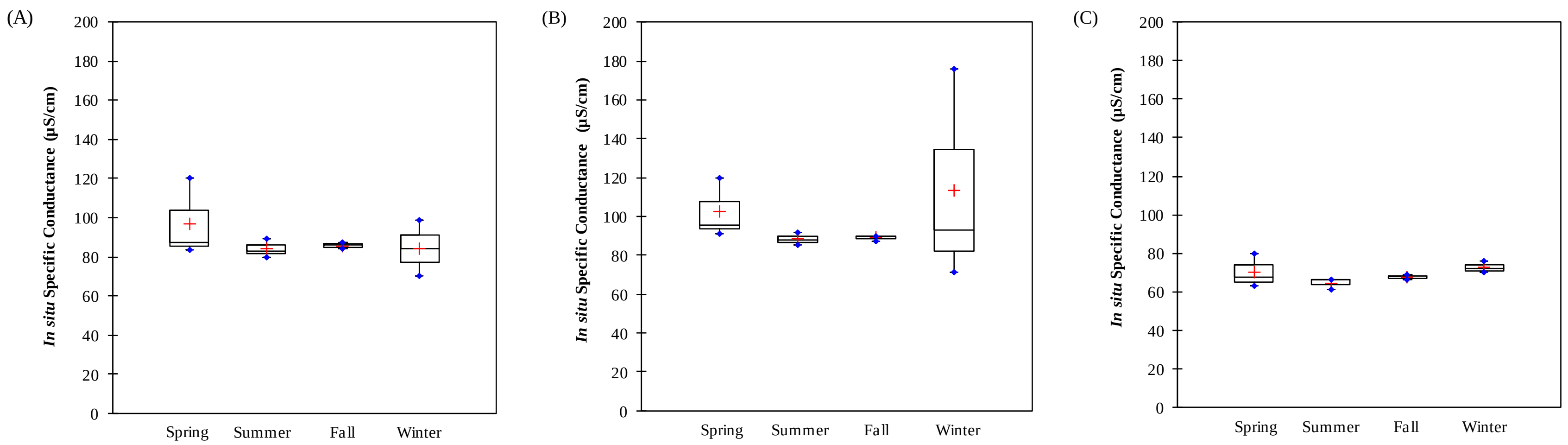


Figure 5.1.4-31. *In situ* specific conductance in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. There were no significant differences between seasons.

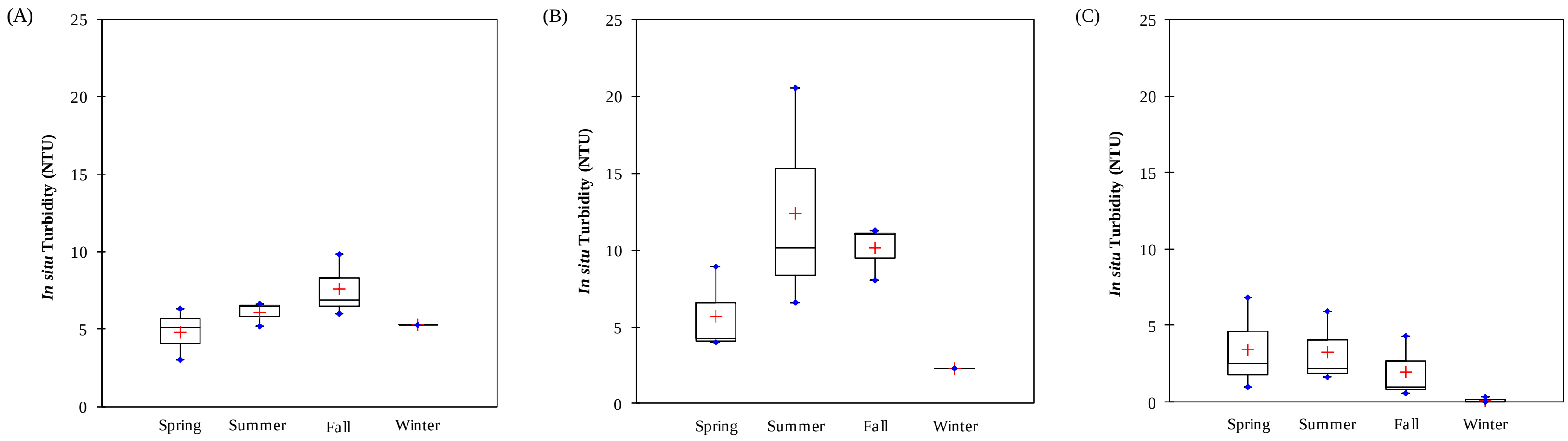


Figure 5.1.4-32. *In situ* turbidity in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. There were no significant differences between seasons.

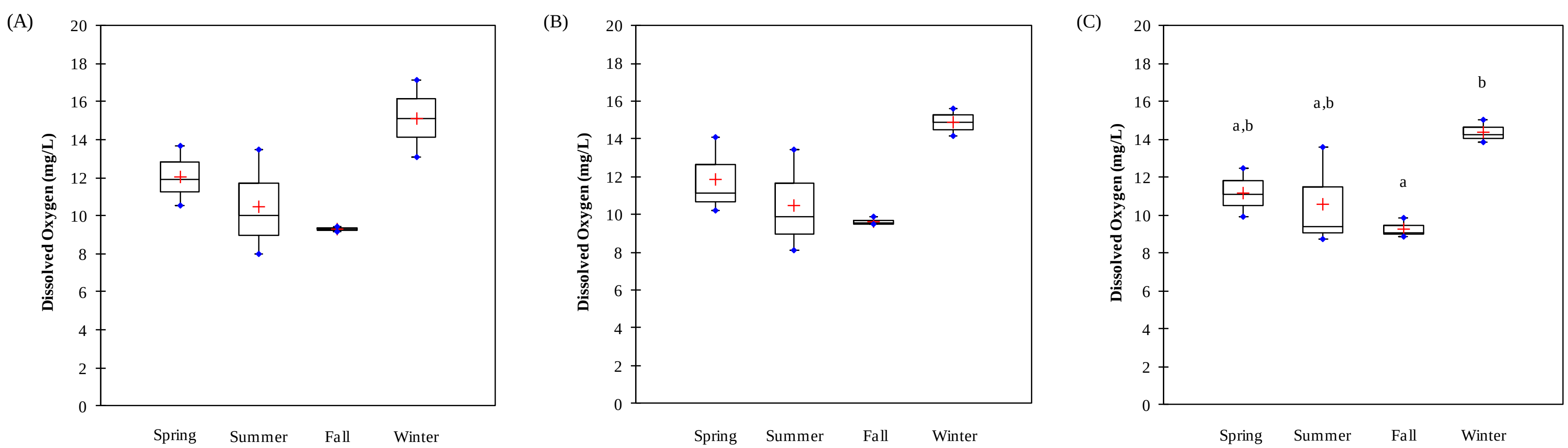


Figure 5.1.4-33. Dissolved oxygen in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

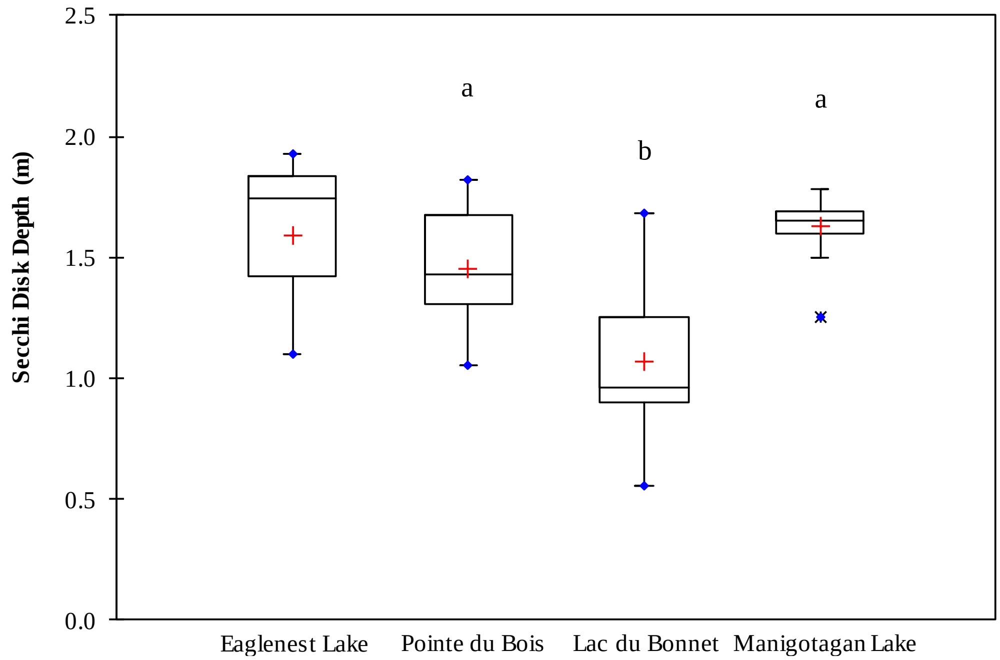


Figure 5.1.4-34. Secchi disk depths (open-water season only) in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

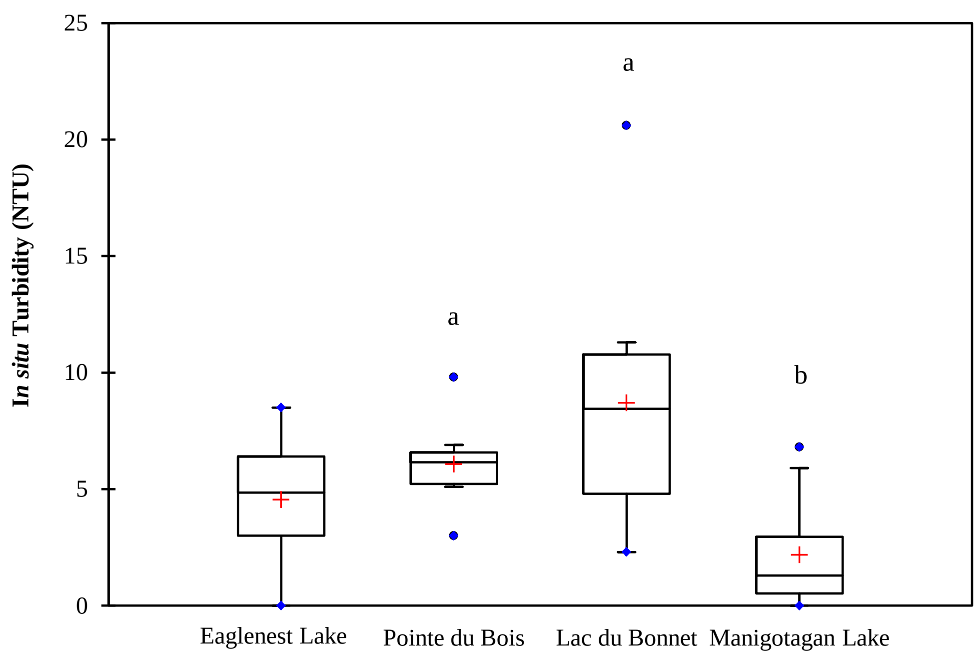


Figure 5.1.4-35. *In situ* turbidity in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

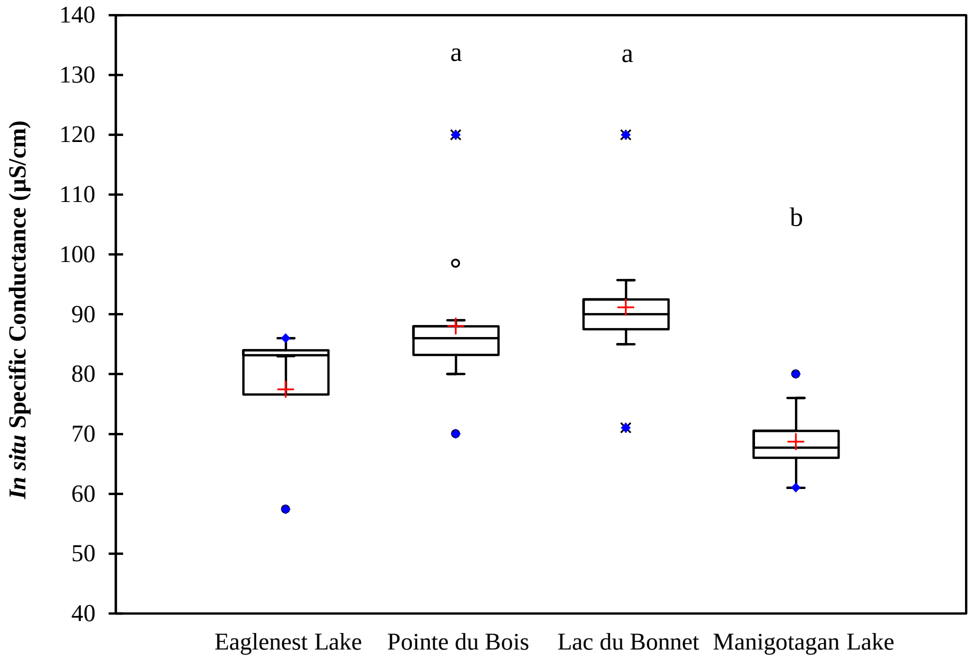


Figure 5.1.4-36. *In situ* specific conductance in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

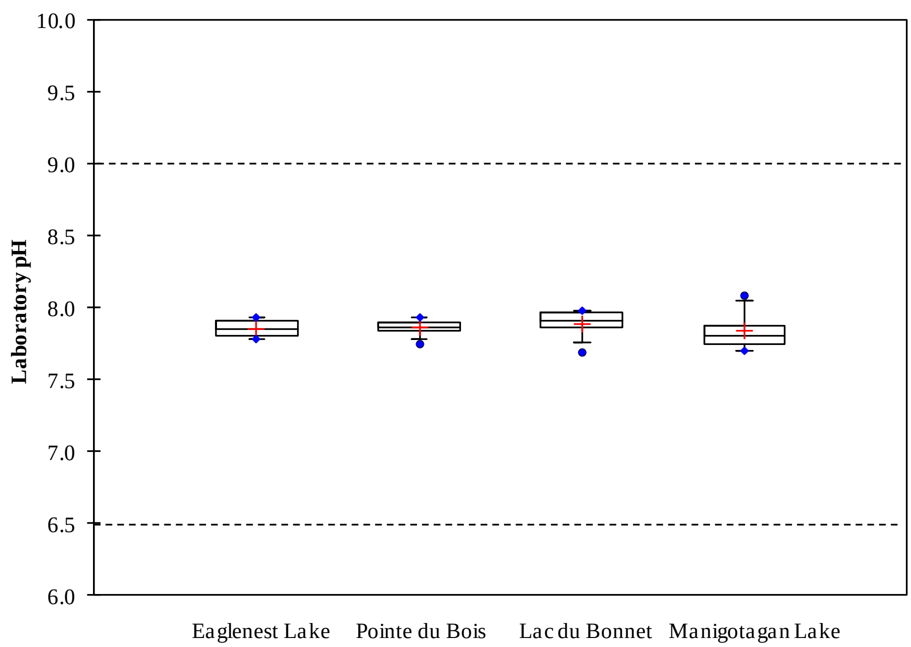


Figure 5.1.4-37. Laboratory pH in the Winnipeg River Region: 2008-2010. No significant spatial differences were noted . Area between the dashed lines indicates the MWQSOG PAL guideline (6.5-9).

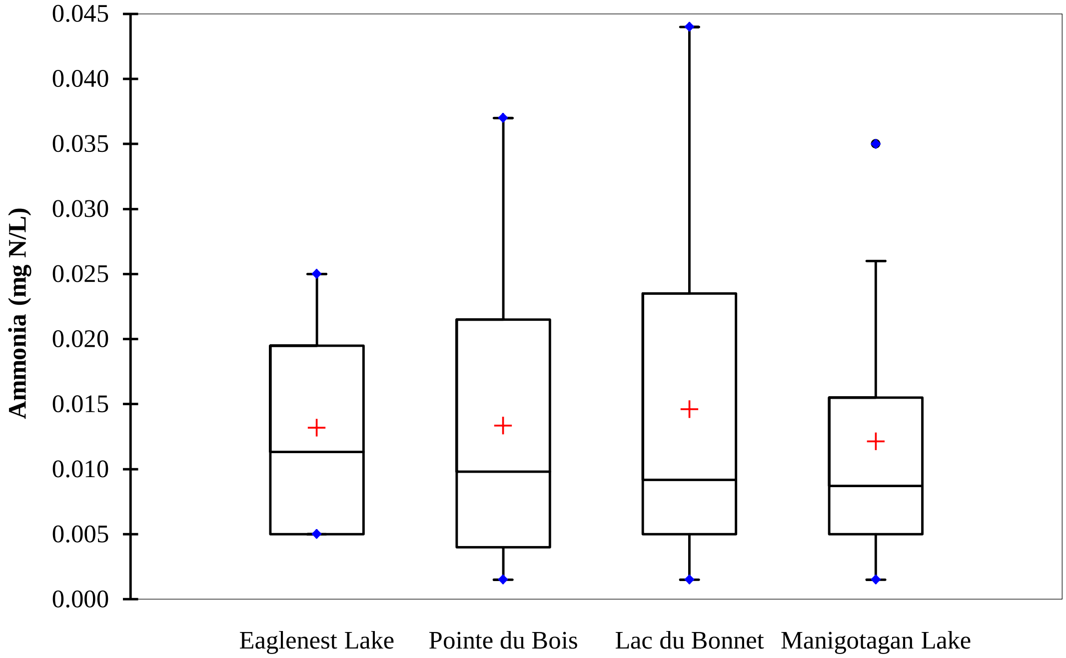


Figure 5.1.4-38. Ammonia in the Winnipeg River Region: 2008-2010. No significant spatial differences were noted . The most stringent site-specific PAL objective is 1.36 mg N/L.

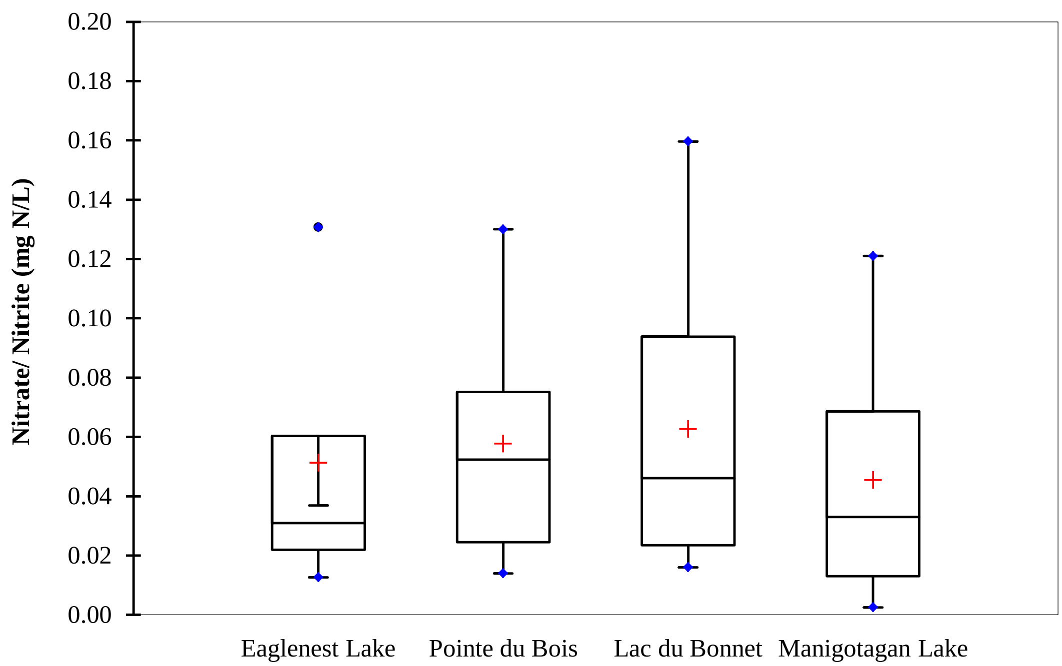


Figure 5.1.4-39. Nitrate/nitrite in the Winnipeg River Region: 2008-2010. No significant spatial differences were noted. The MWQSOG PAL guideline is 2.93 mg N/L.

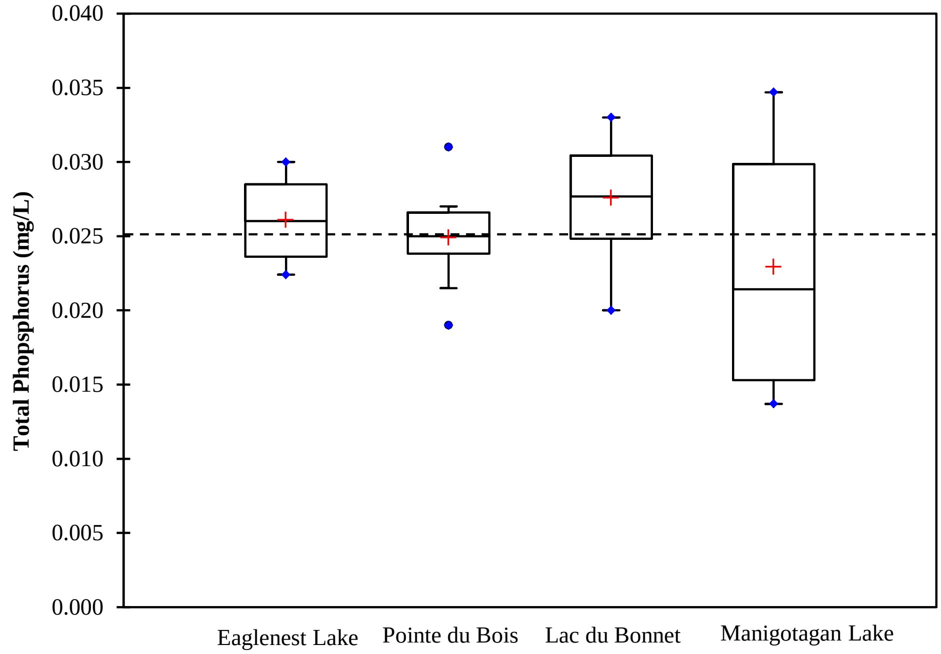


Figure 5.1.4-40. Total phosphorus in the Winnipeg River Region: 2008-2010. No significant spatial differences were noted. The dashed line represents the Manitoba narrative guideline for lakes, ponds, and reservoirs.

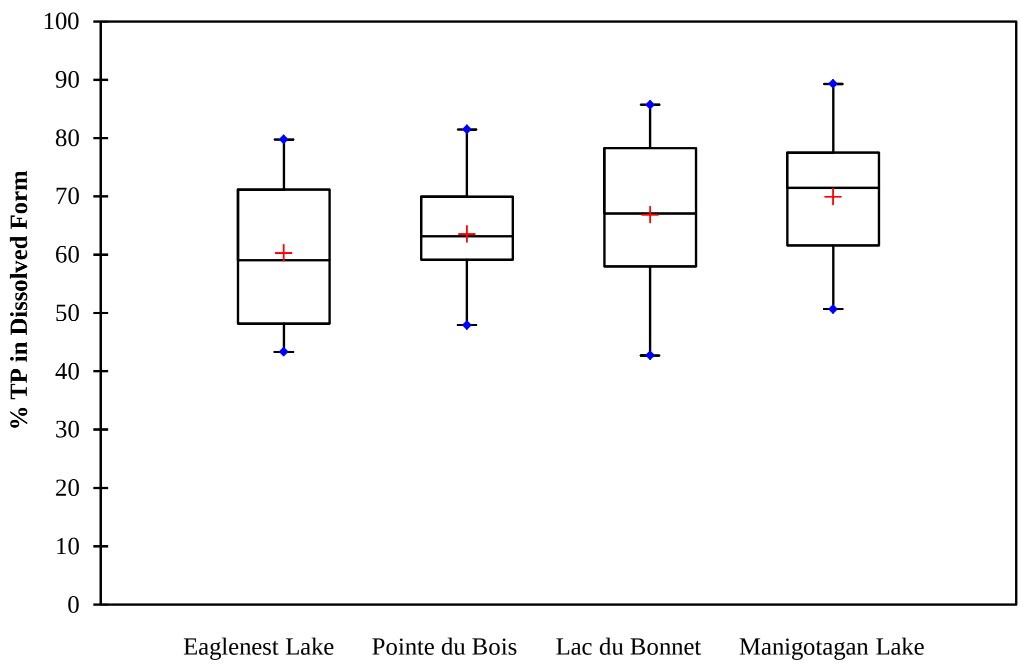


Figure 5.1.4-41. Fraction of total phosphorus in dissolved form in the Winnipeg River Region.

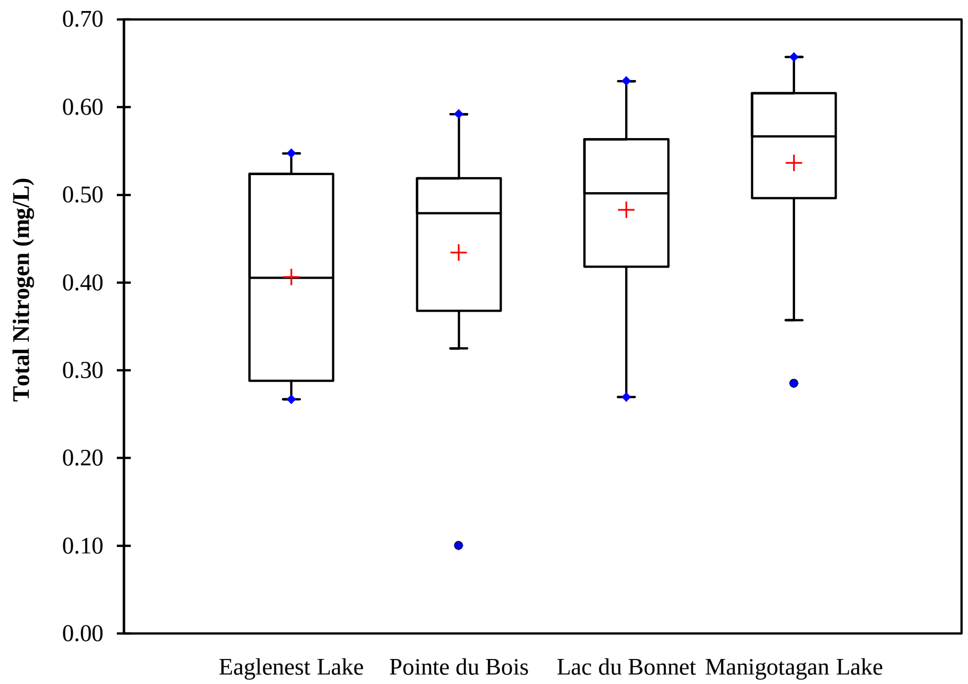


Figure 5.1.4-42. Total nitrogen in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

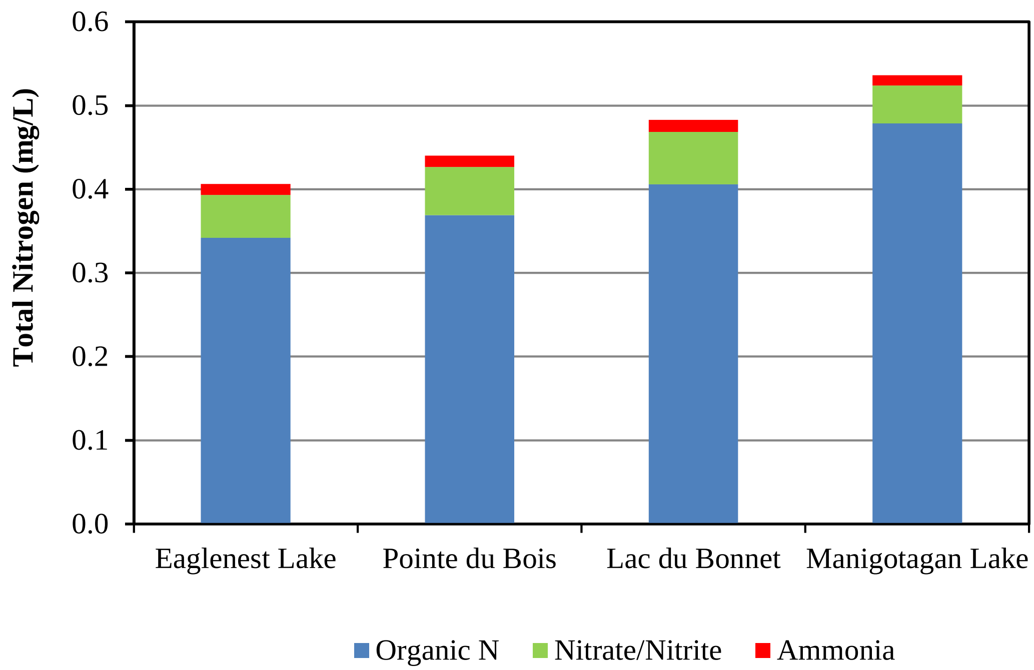


Figure 5.1.4-43. Composition of total nitrogen as organic nitrogen, nitrate/nitrite, and ammonia in the Winnipeg River Region.

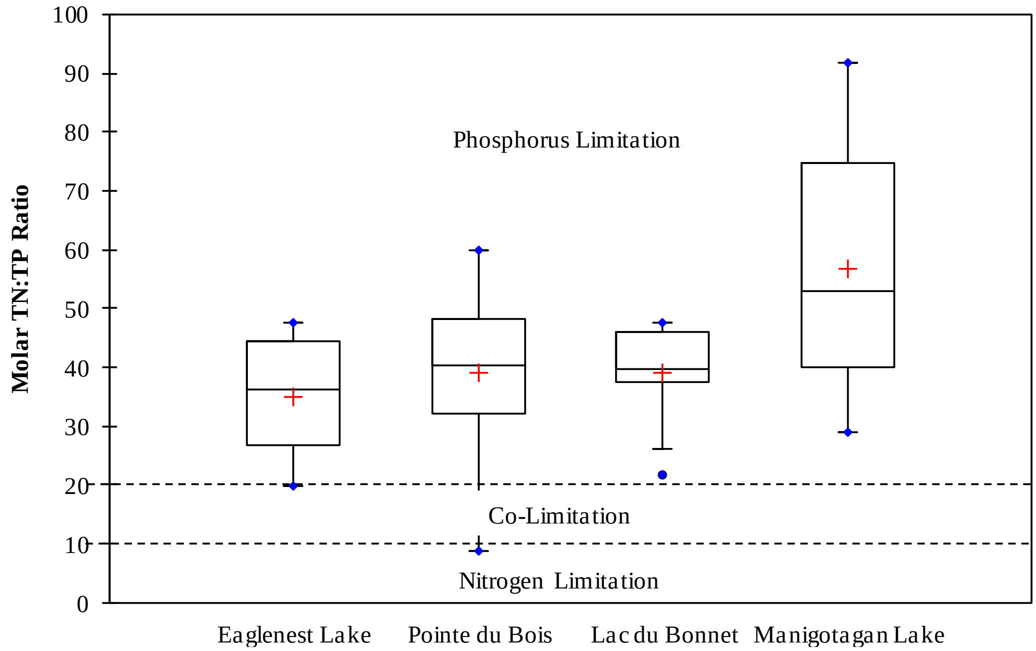


Figure 5.1.4-44. Total nitrogen to total phosphorus molar ratios in the Winnipeg River Region.

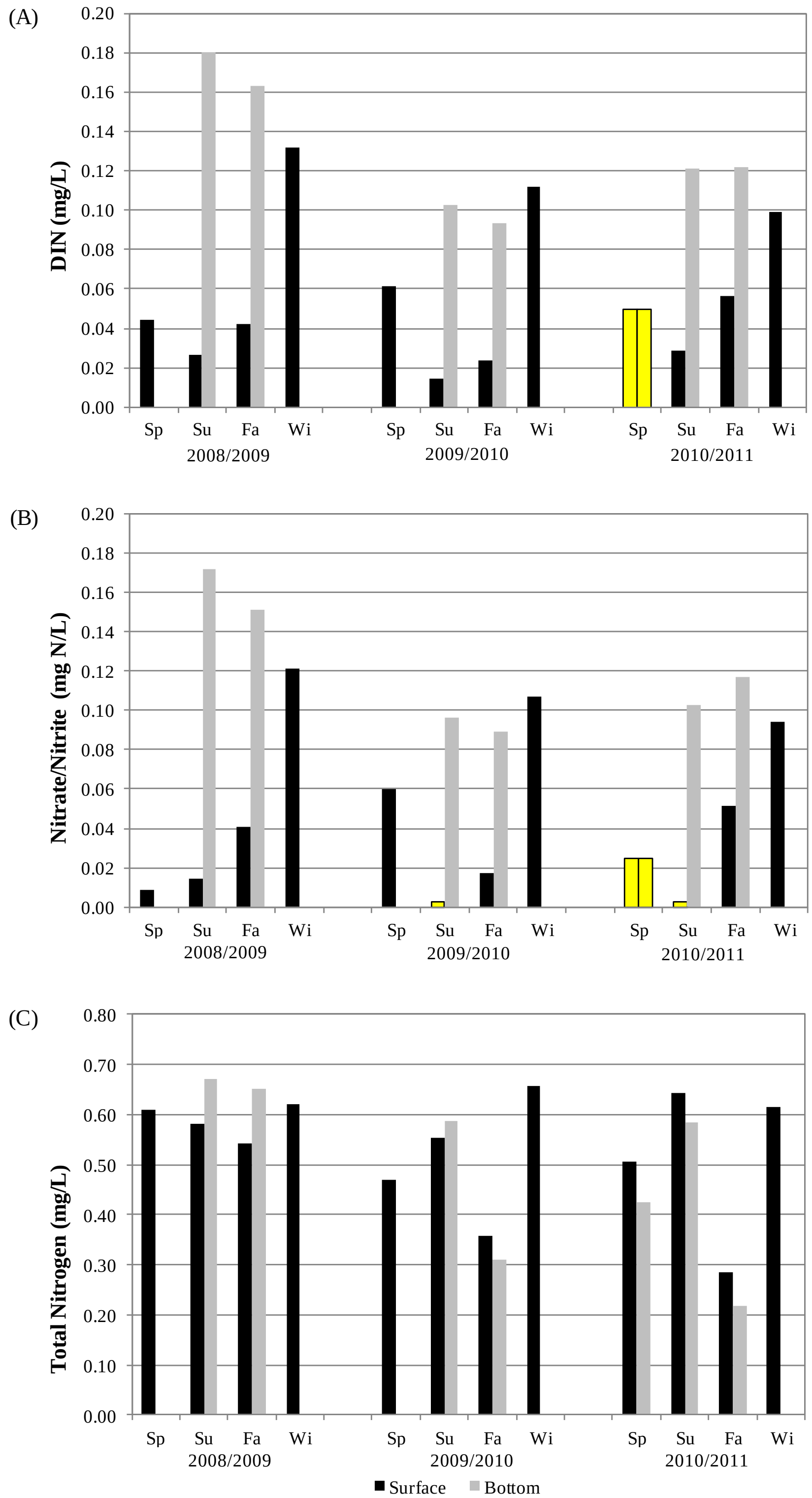


Figure 5.1.4-45. Dissolved inorganic nitrogen (DIN; A), nitrate/nitrite (B), and total nitrogen (C) measured in surface grabs and bottom samples in Manigotagan Lake, 2008/2009-2010/2011. Yellow bars indicate values below the analytical detection limit.

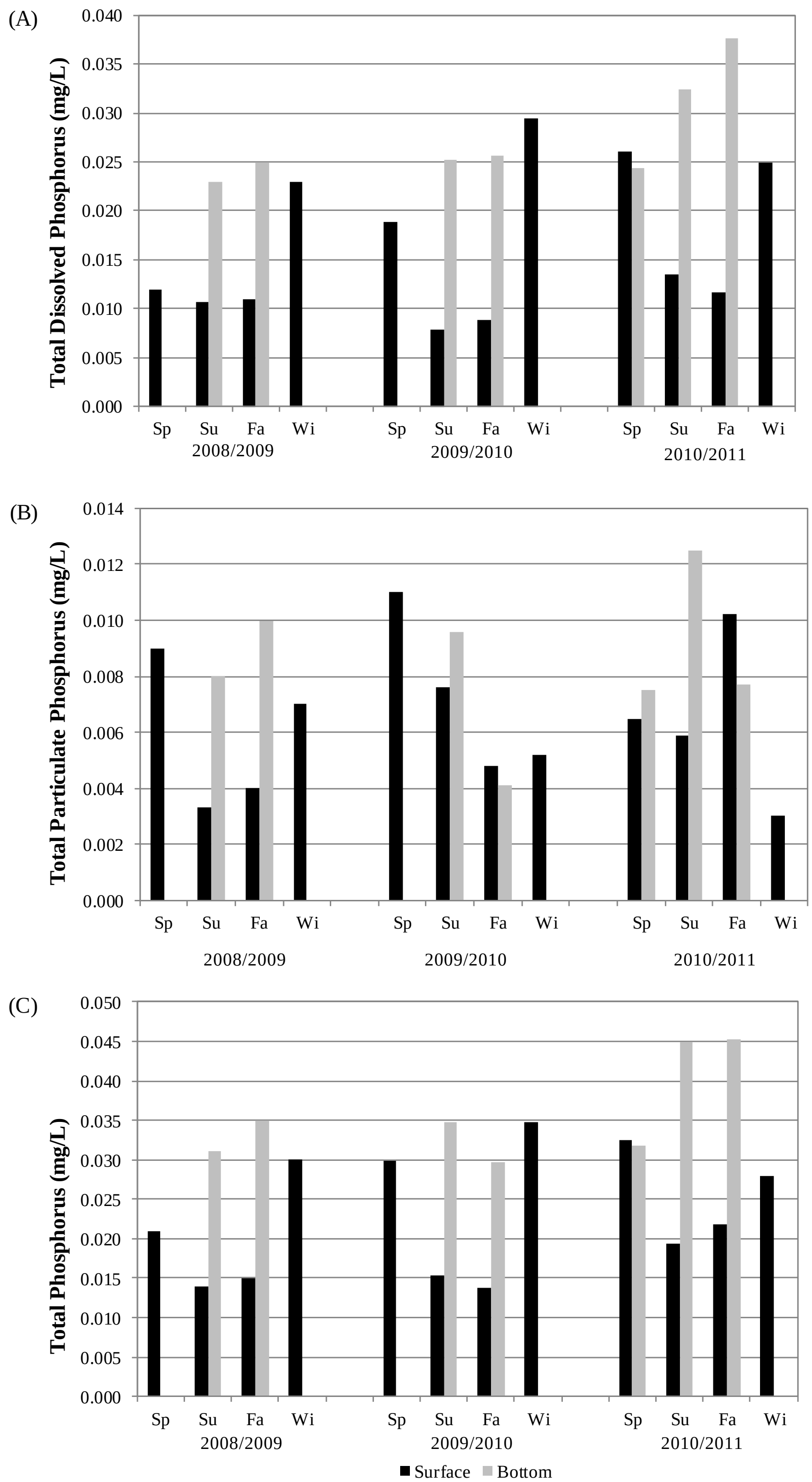


Figure 5.1.4-46. Total dissolved phosphorus (A), total particulate phosphorus (B), and total phosphorus (C) measured in surface grabs and bottom samples in Manigotagan Lake, 2008/2009-2010/2011.

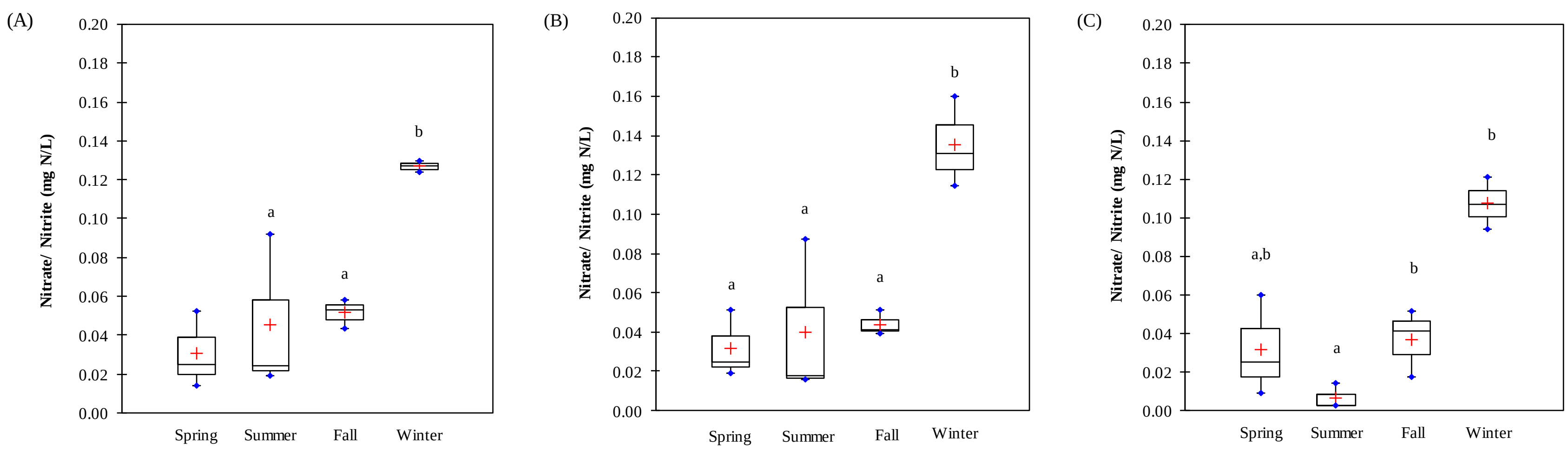


Figure 5.1.4-47. Nitrate/nitrite in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

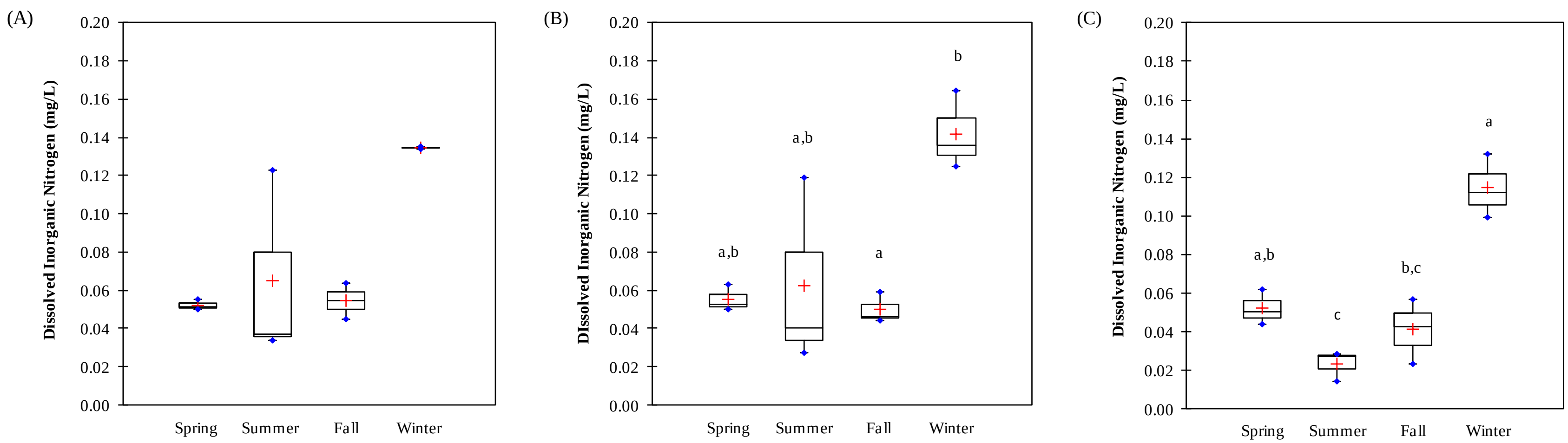


Figure 5.1.4-48. Dissolved inorganic nitrogen in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

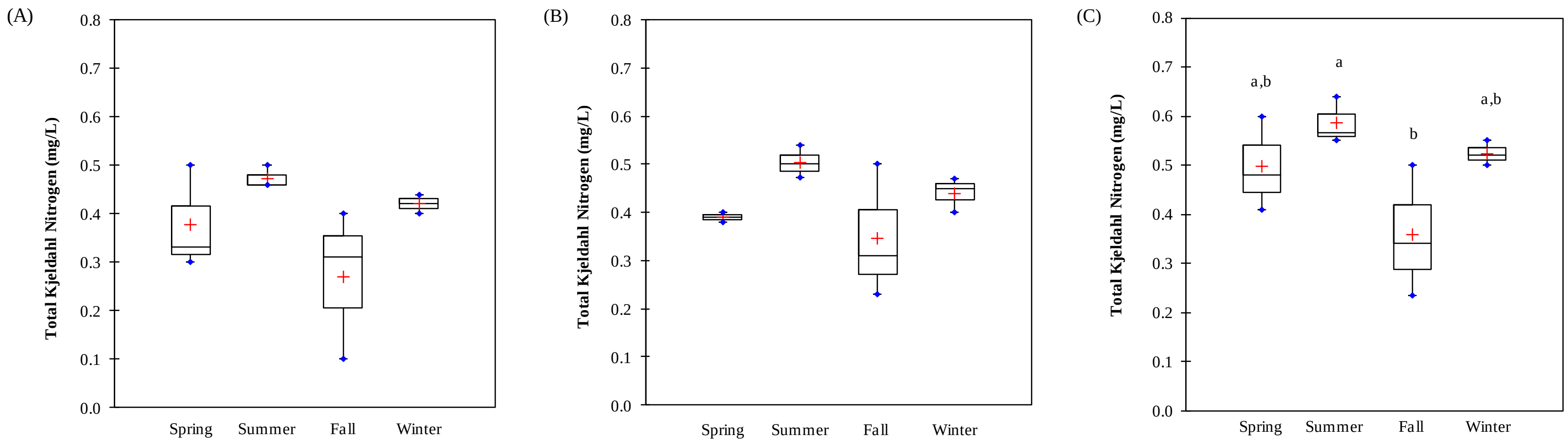


Figure 5.1.4-49. Total Kjeldahl nitrogen in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

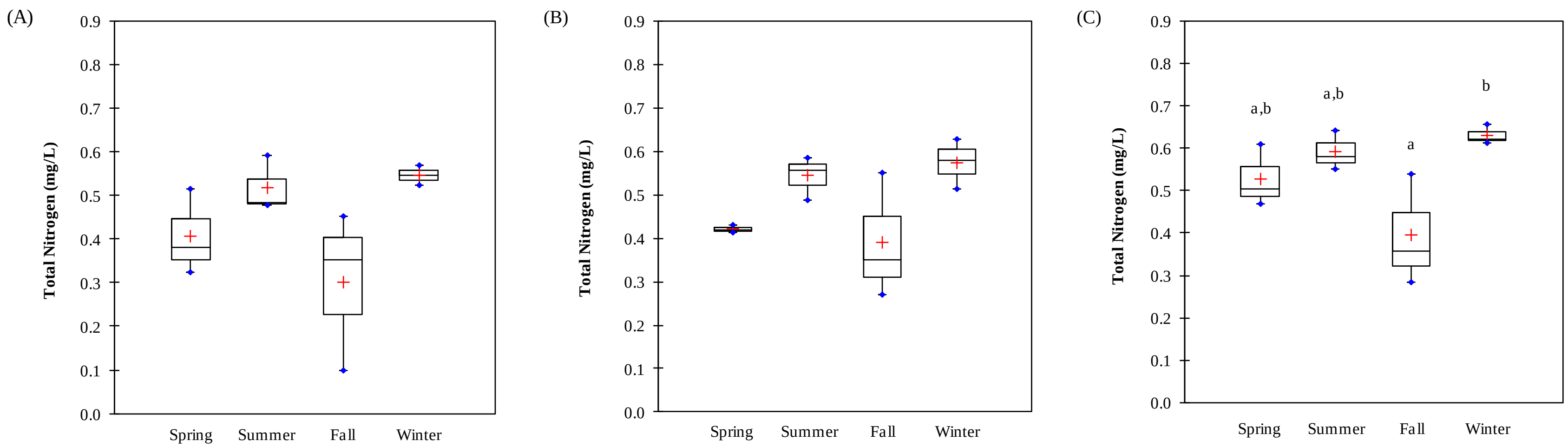


Figure 5.1.4-50. Total nitrogen in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

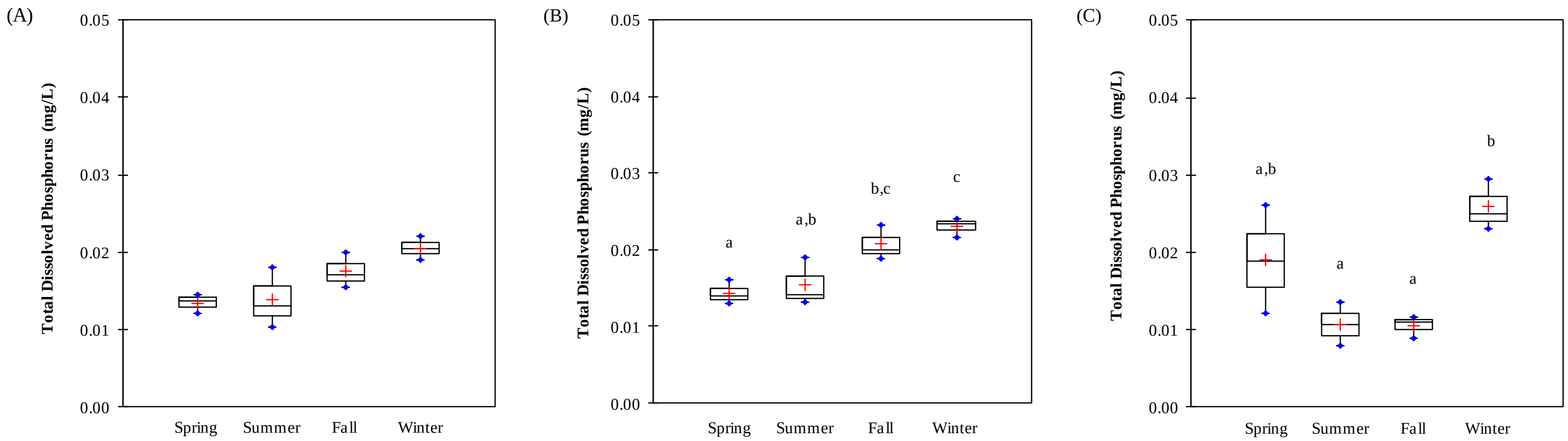


Figure 5.1.4-51. Total dissolved phosphorus in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

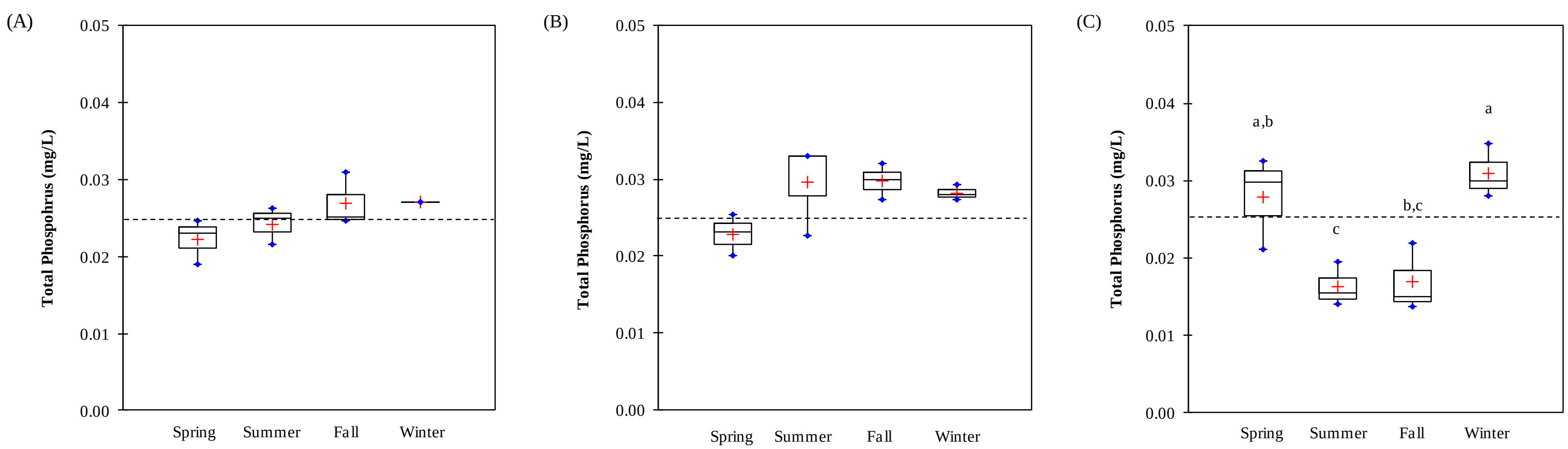


Figure 5.1.4-52. Total phosphorus in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts. The dashed lines represent the Manitoba narrative guideline for lakes, ponds, and reservoirs.

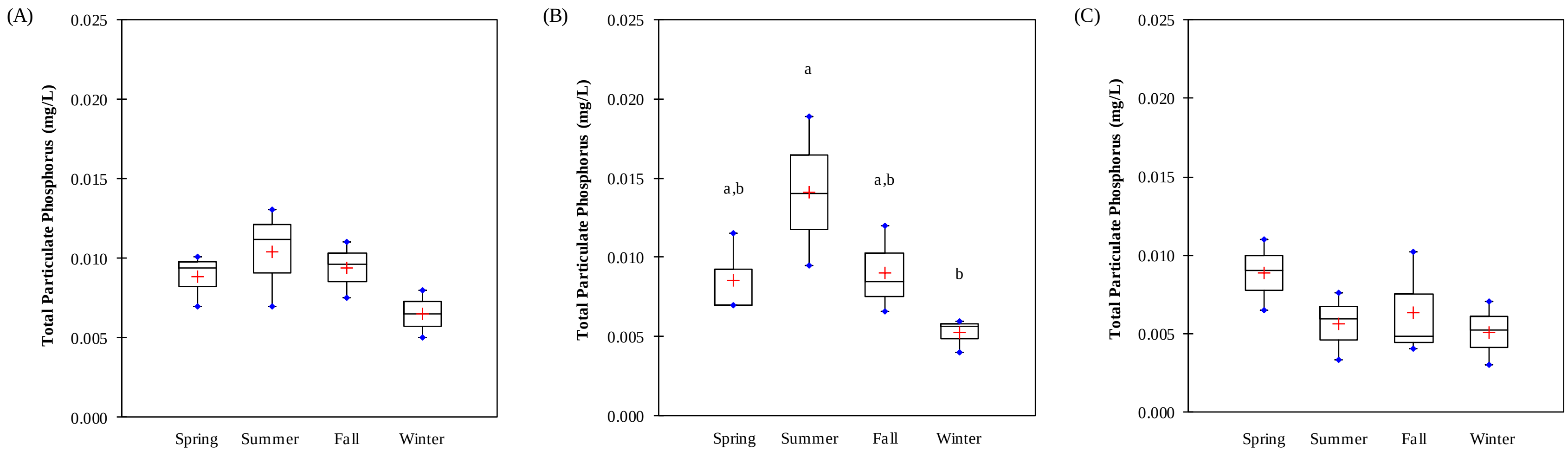


Figure 5.1.4-53. Total particulate phosphorus in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

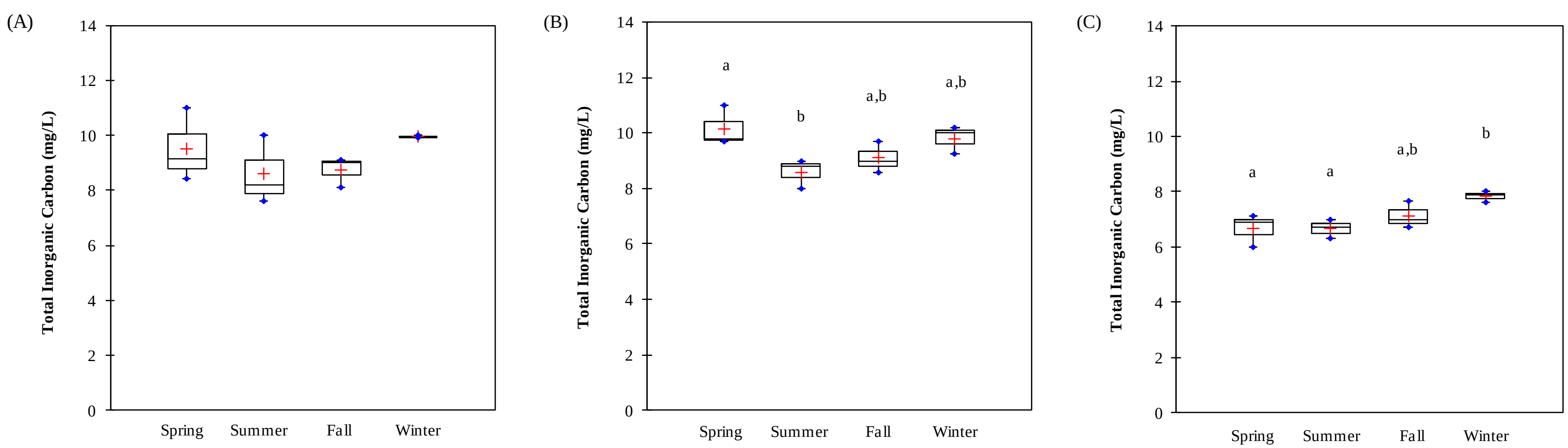


Figure 5.1.4-54. Total inorganic carbon in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

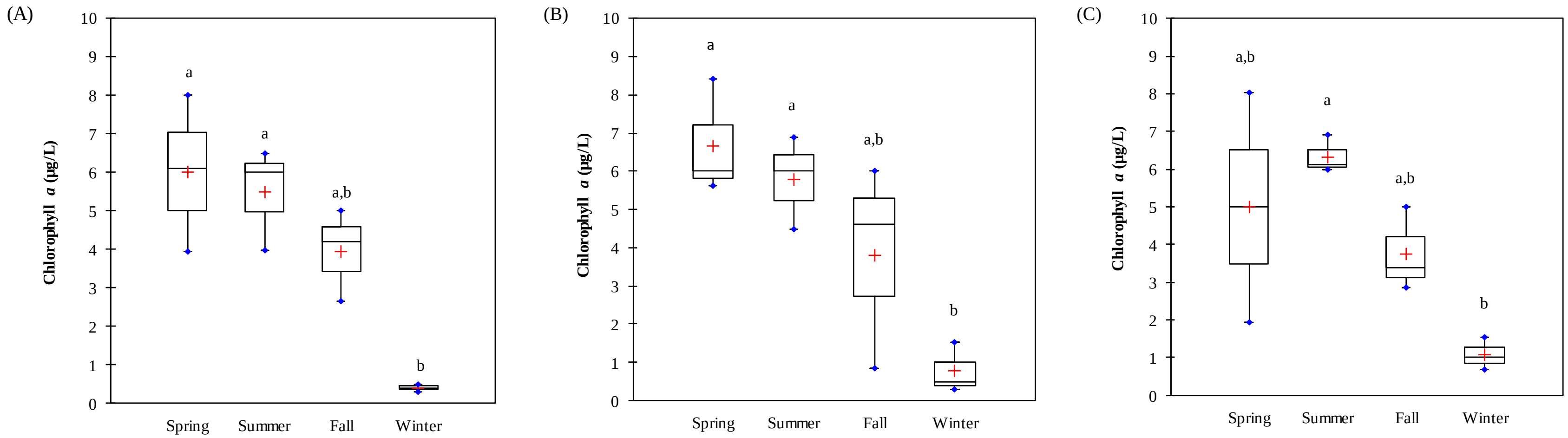


Figure 5.1.4-55. Chlorophyll *a* in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

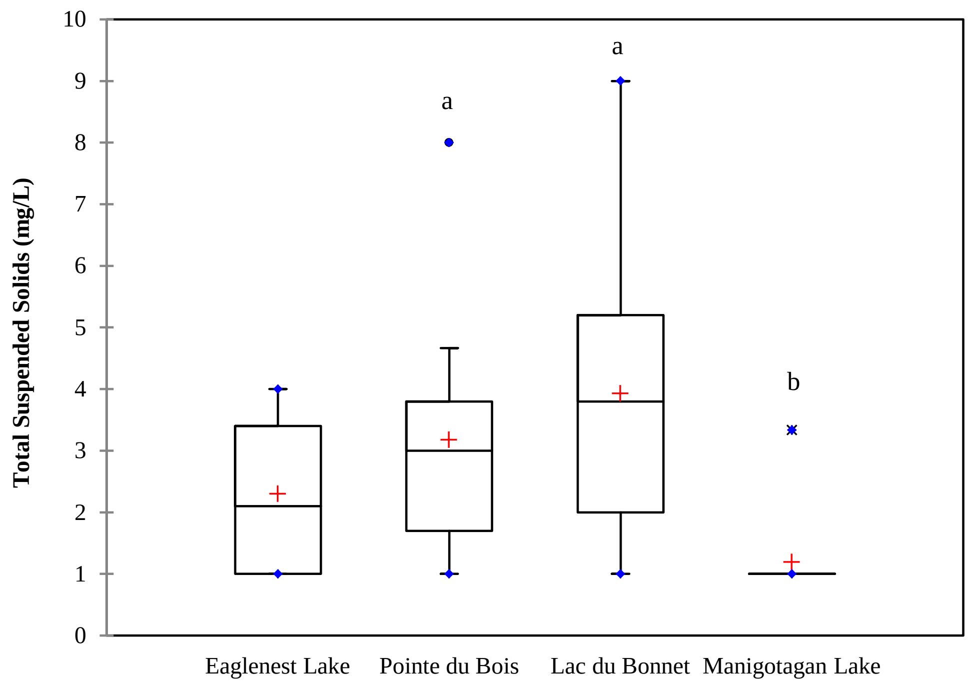


Figure 5.1.4-56. Total suspended solids in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

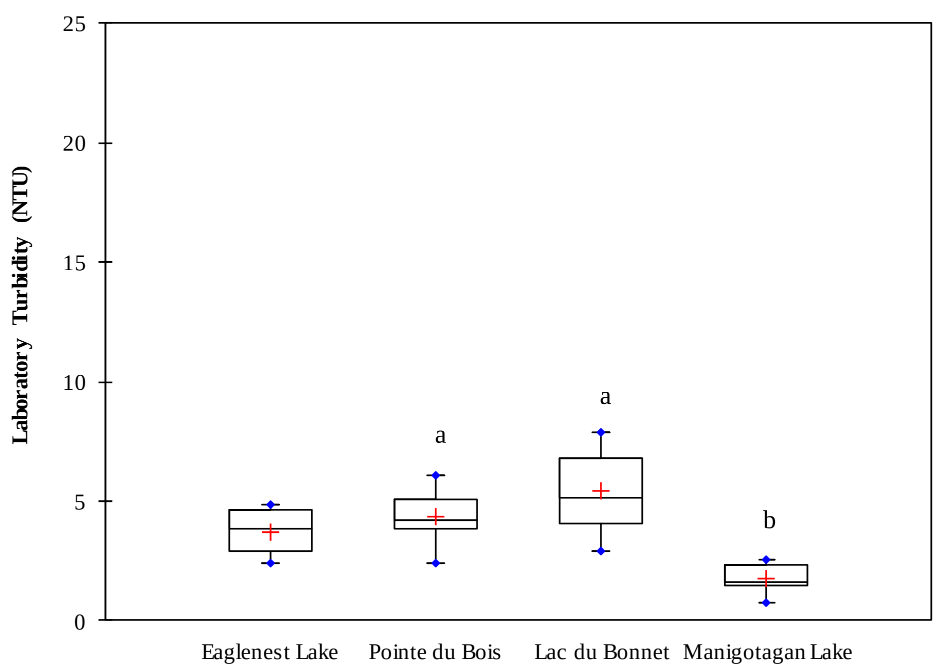


Figure 5.1.4-57. Laboratory turbidity in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

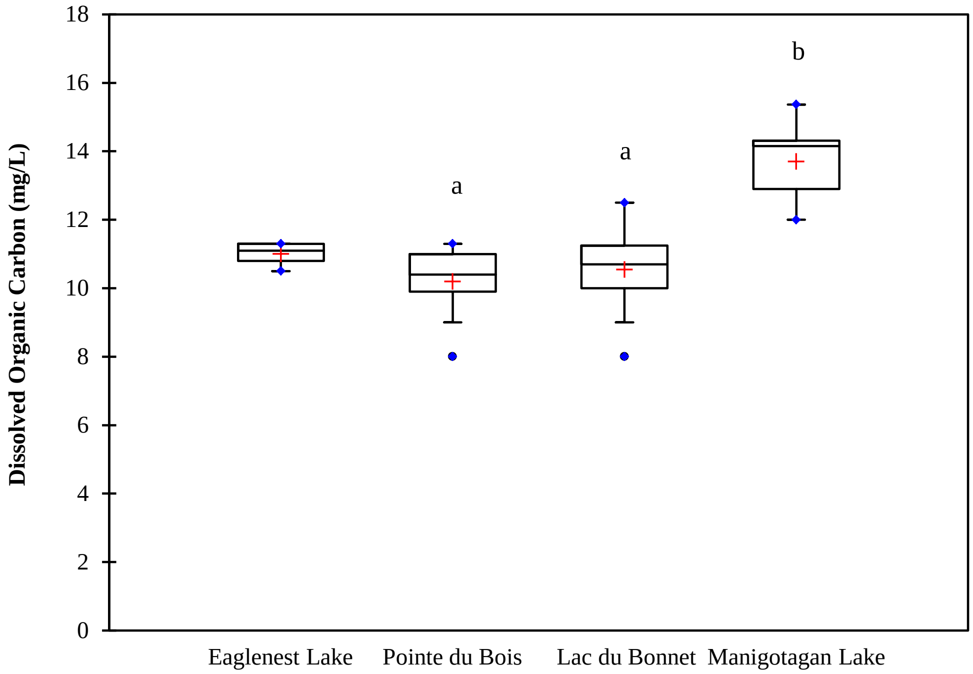


Figure 5.1.4-58. Dissolved organic carbon in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

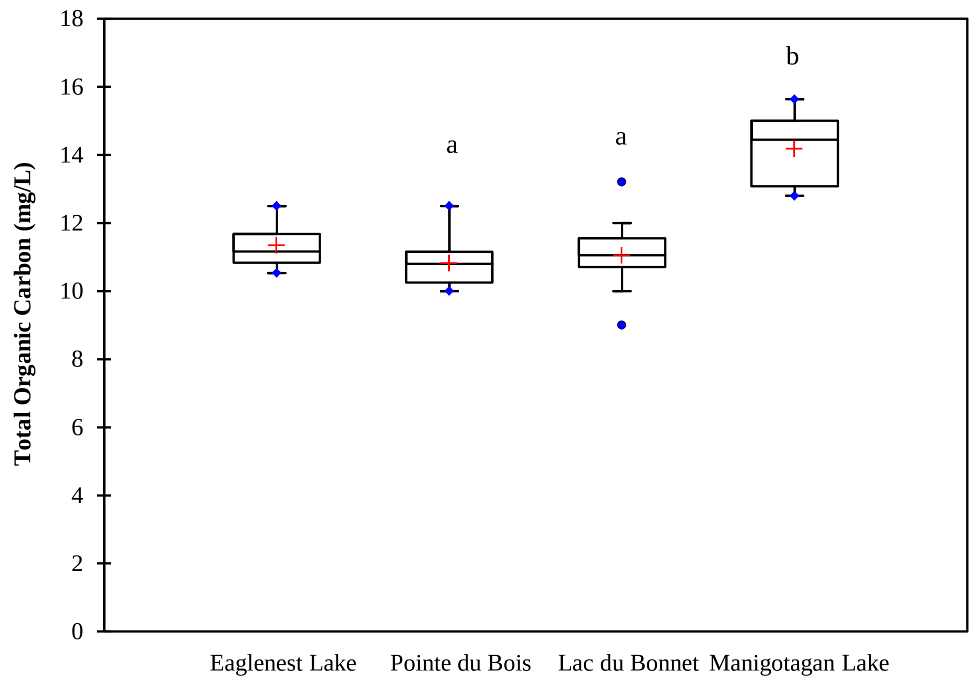


Figure 5.1.4-59. Total organic carbon in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

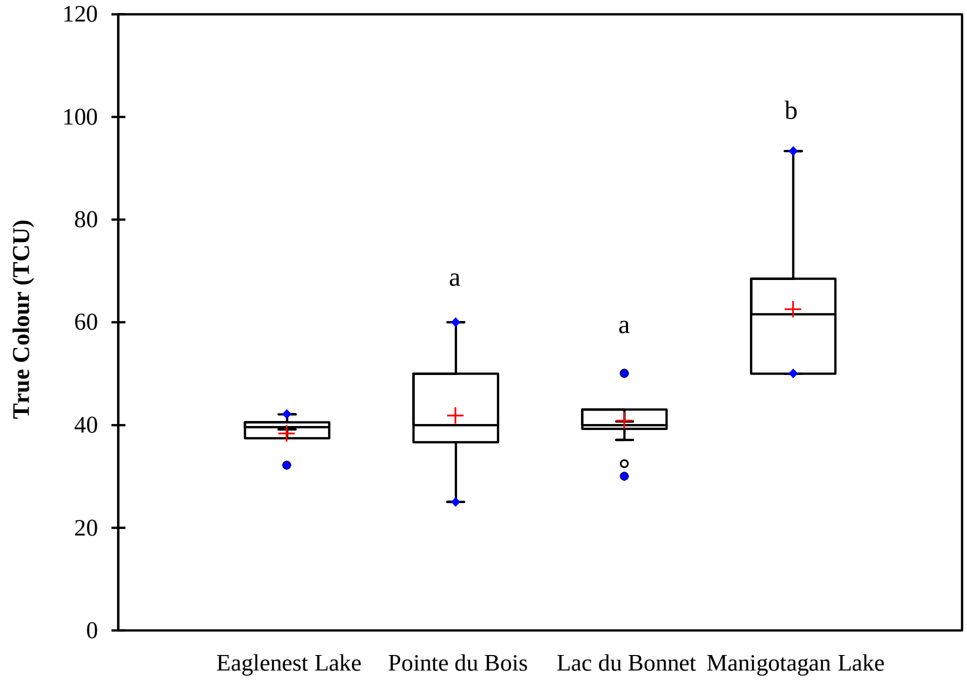


Figure 5.1.4-60. True colour in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

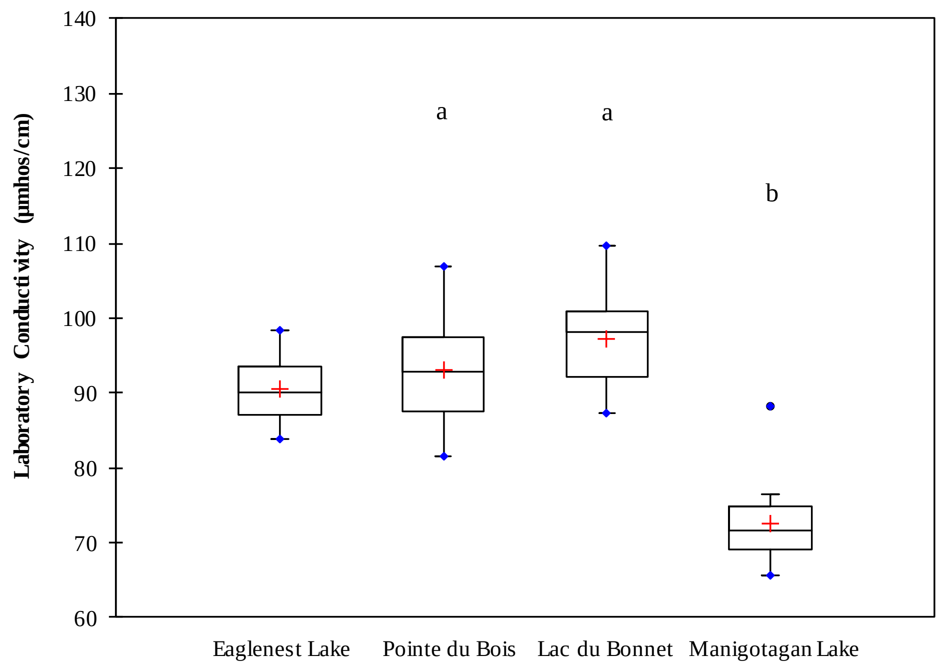


Figure 5.1.4-61. Laboratory conductivity in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

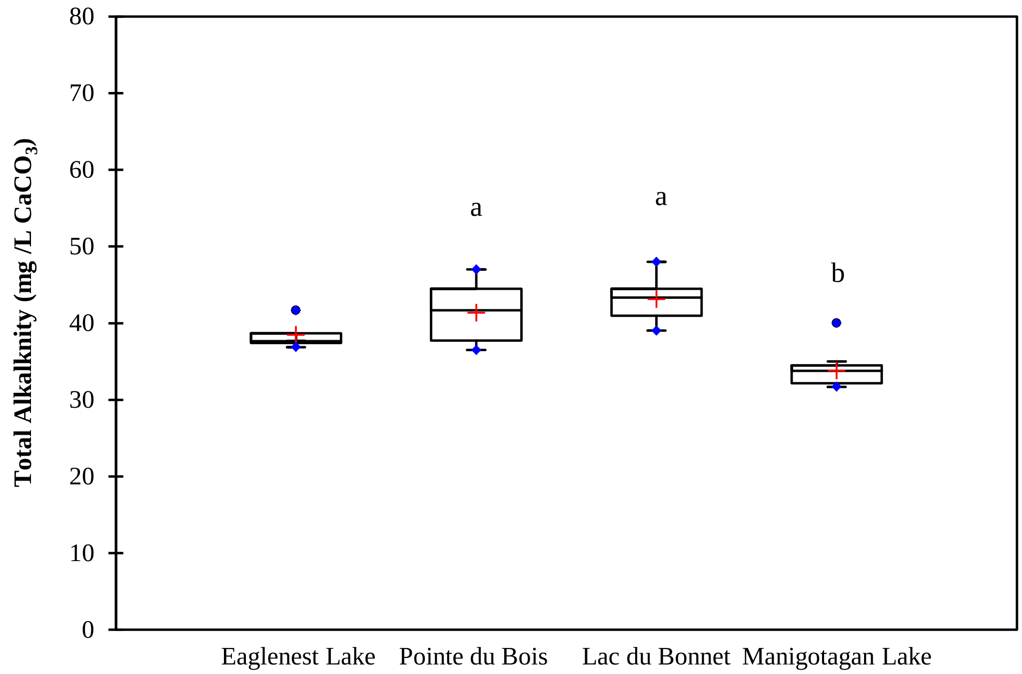


Figure 5.1.4-62. Total alkalinity in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

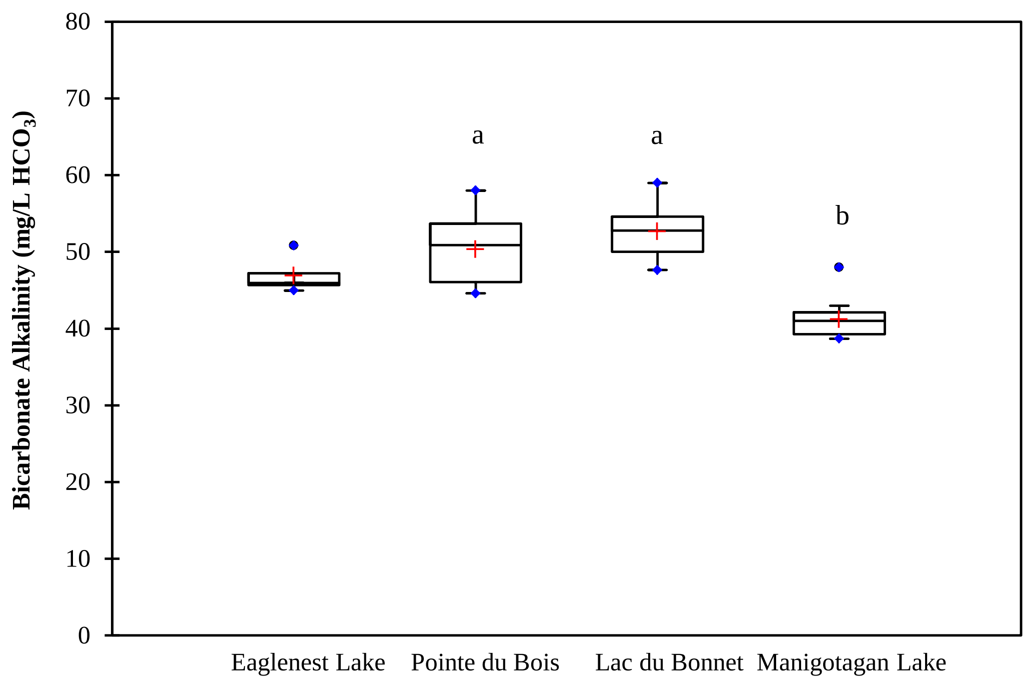


Figure 5.1.4-63. Bicarbonate alkalinity in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

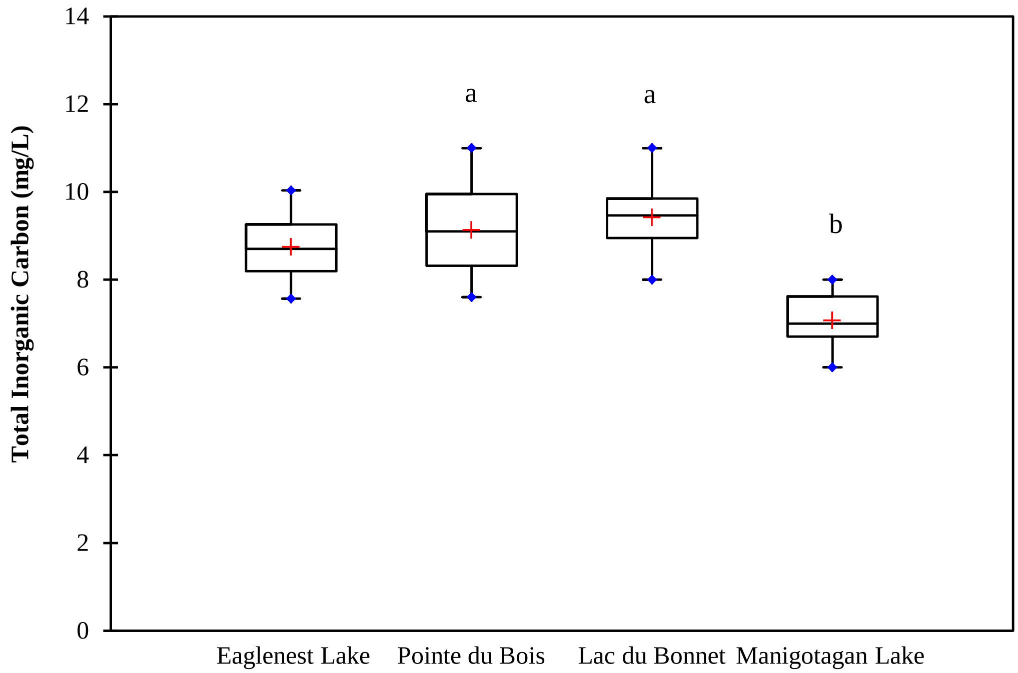


Figure 5.1.4-64. Total inorganic carbon in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

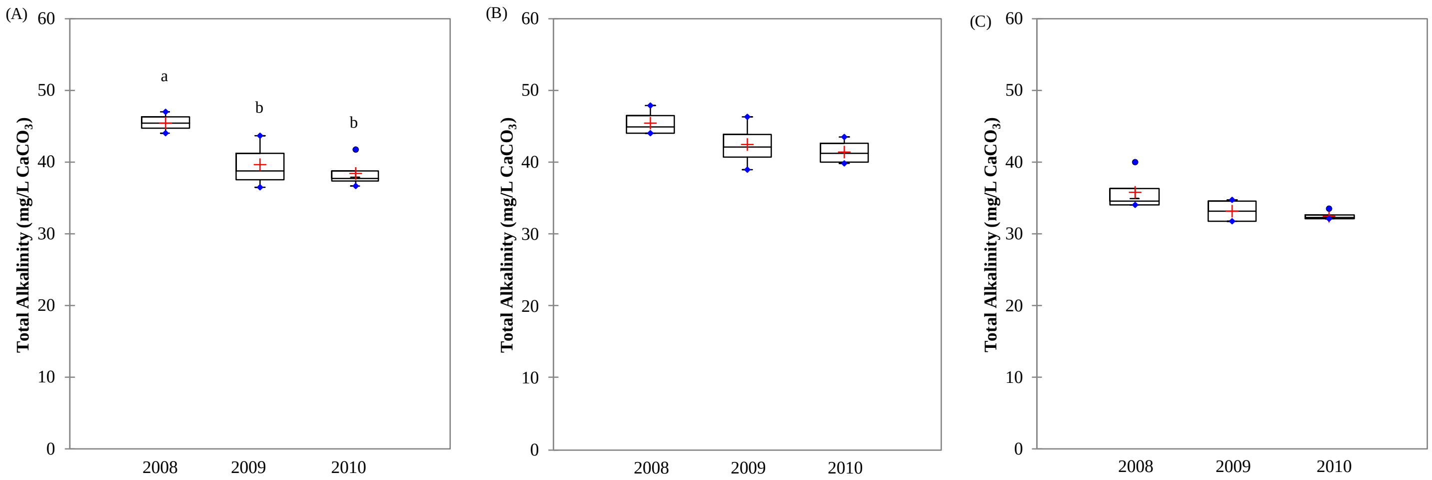


Figure 5.1.4-65. Total alkalinity measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

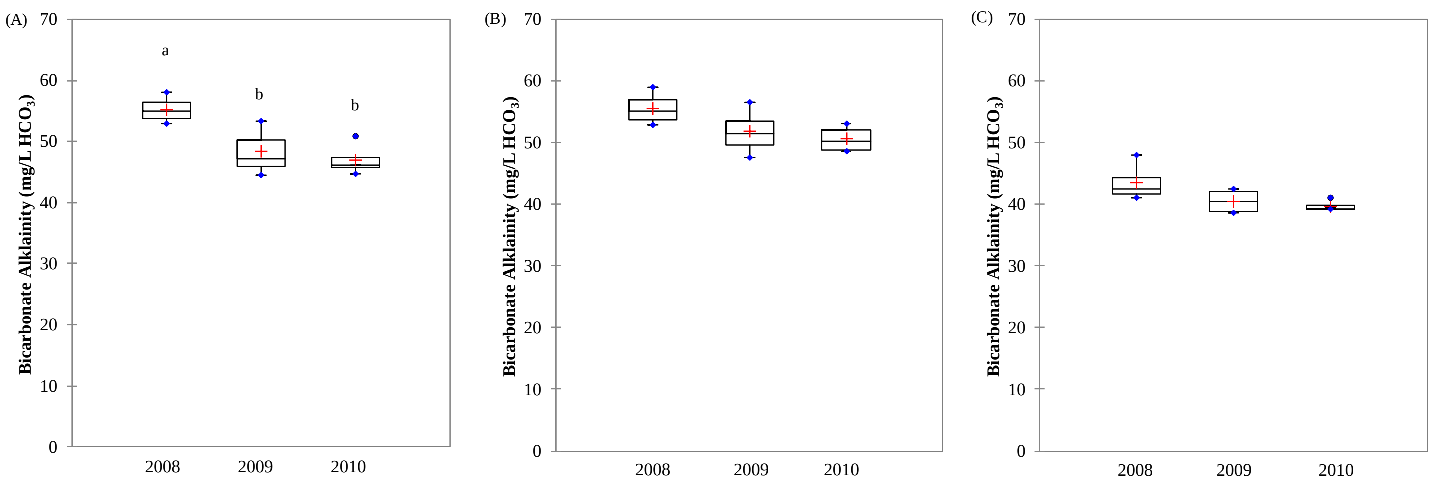


Figure 5.1.4-66. Bicarbonate alkalinity measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

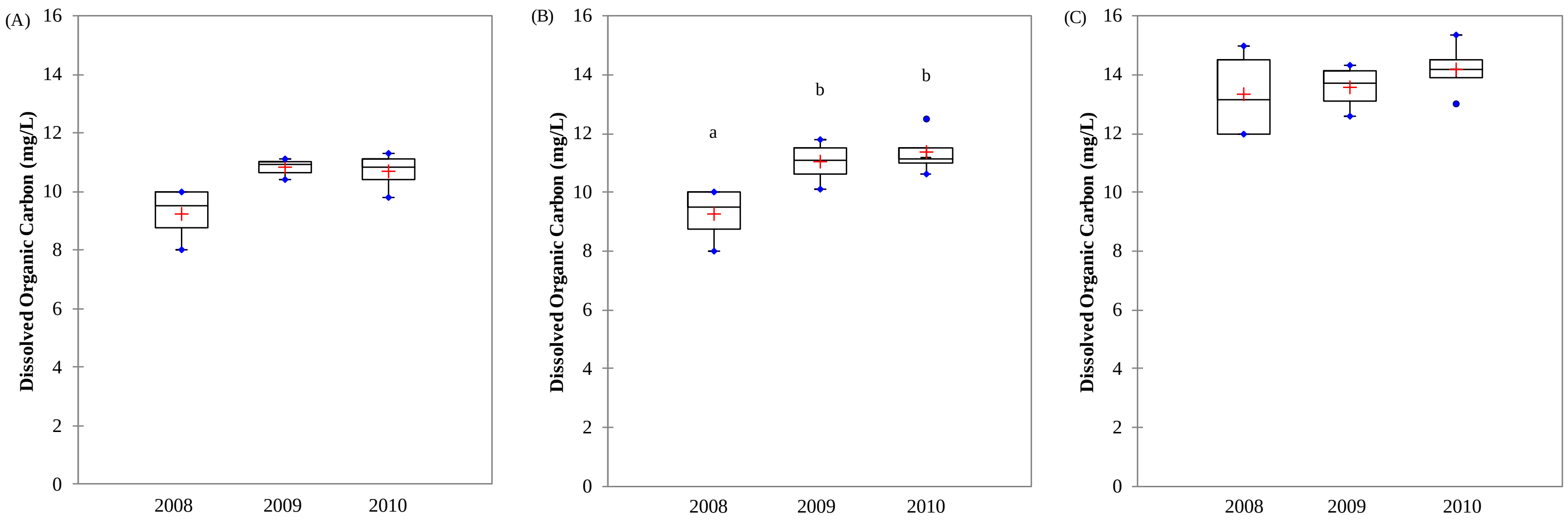
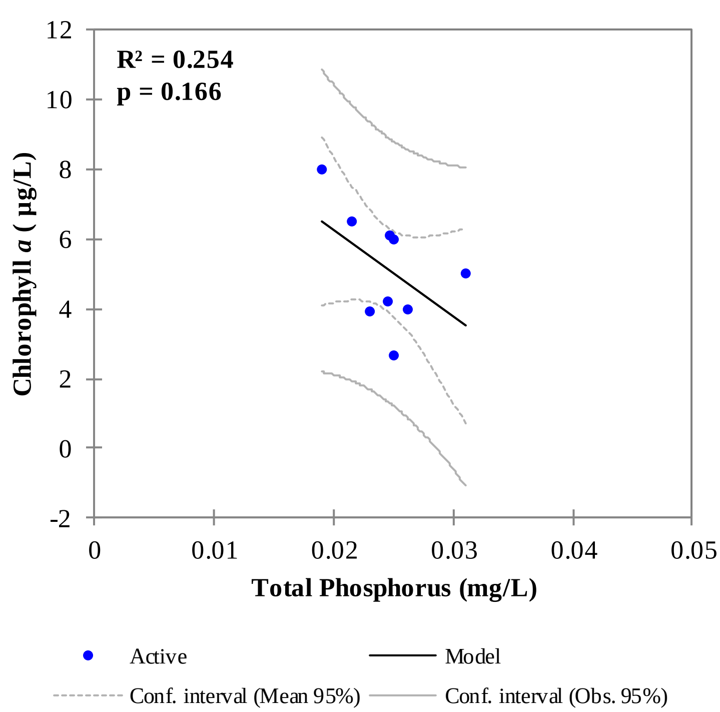


Figure 5.1.4-67. Dissolved organic carbon measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

(A)



(B)

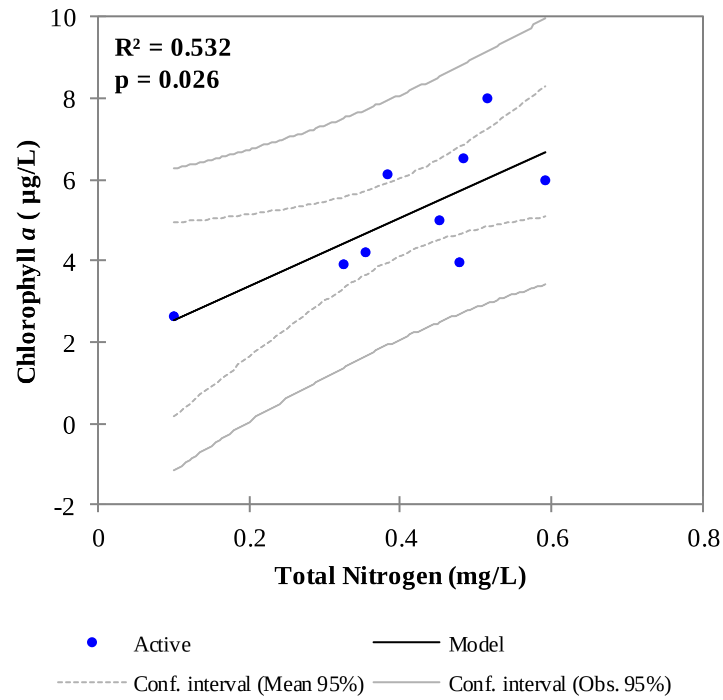
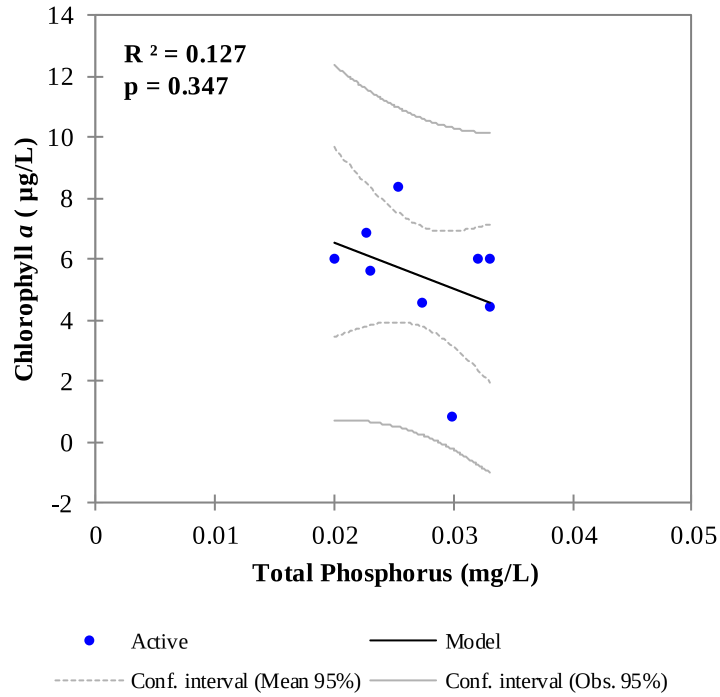


Figure 5.1.4-68. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in the Pointe du Bois forebay: open-water seasons 2008-2010.

(A)



(B)

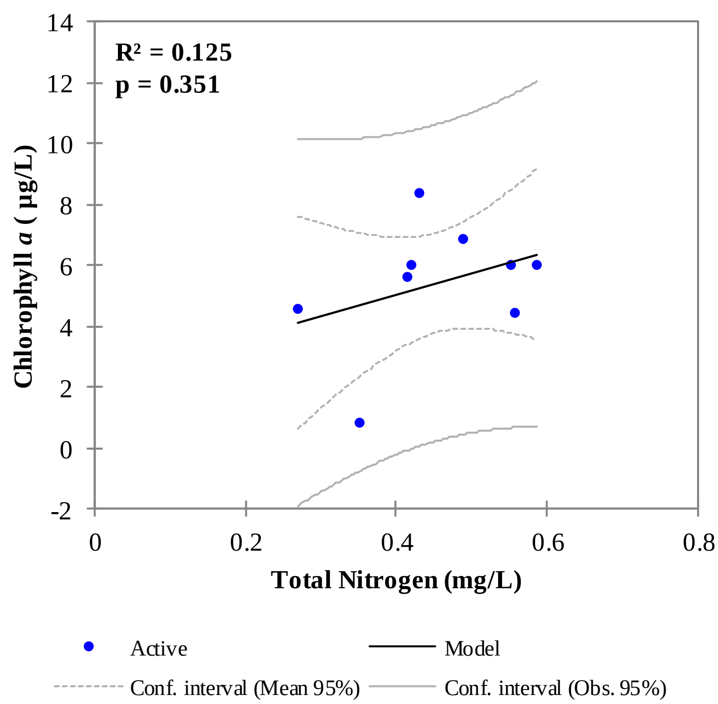
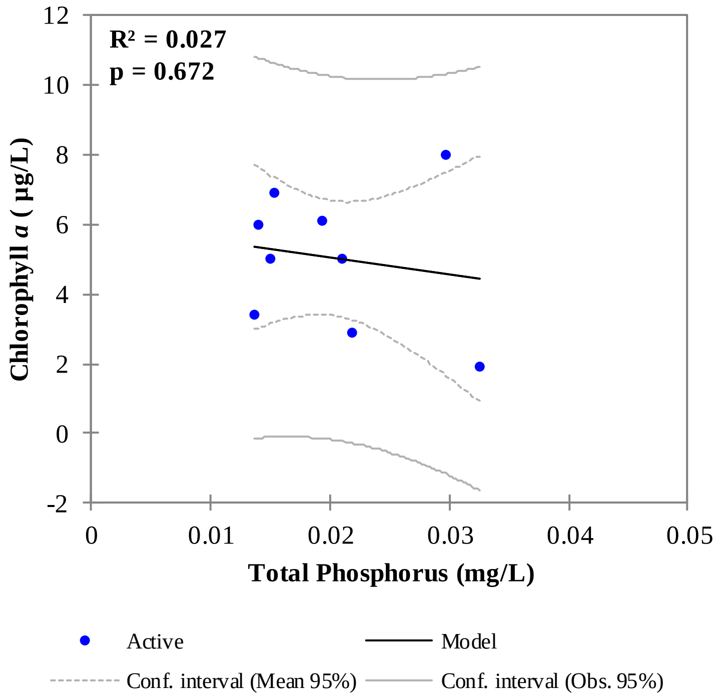


Figure 5.1.4-69. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in Lac du Bonnet: open-water seasons 2008-2010.

(A)



(B)

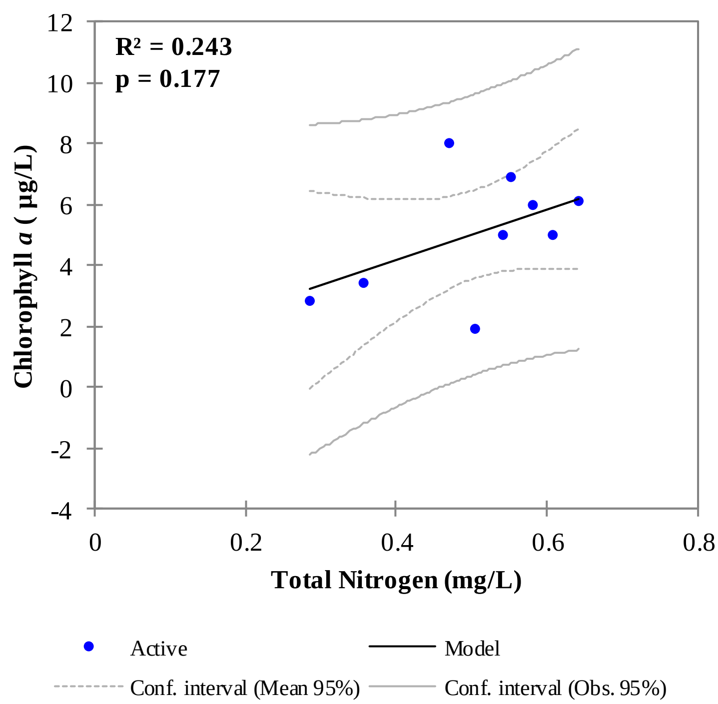


Figure 5.1.4-70. Linear regression between chlorophyll *a* and (A) total phosphorus and (B) total nitrogen in Manigotagan Lake: open-water seasons 2008-2010.

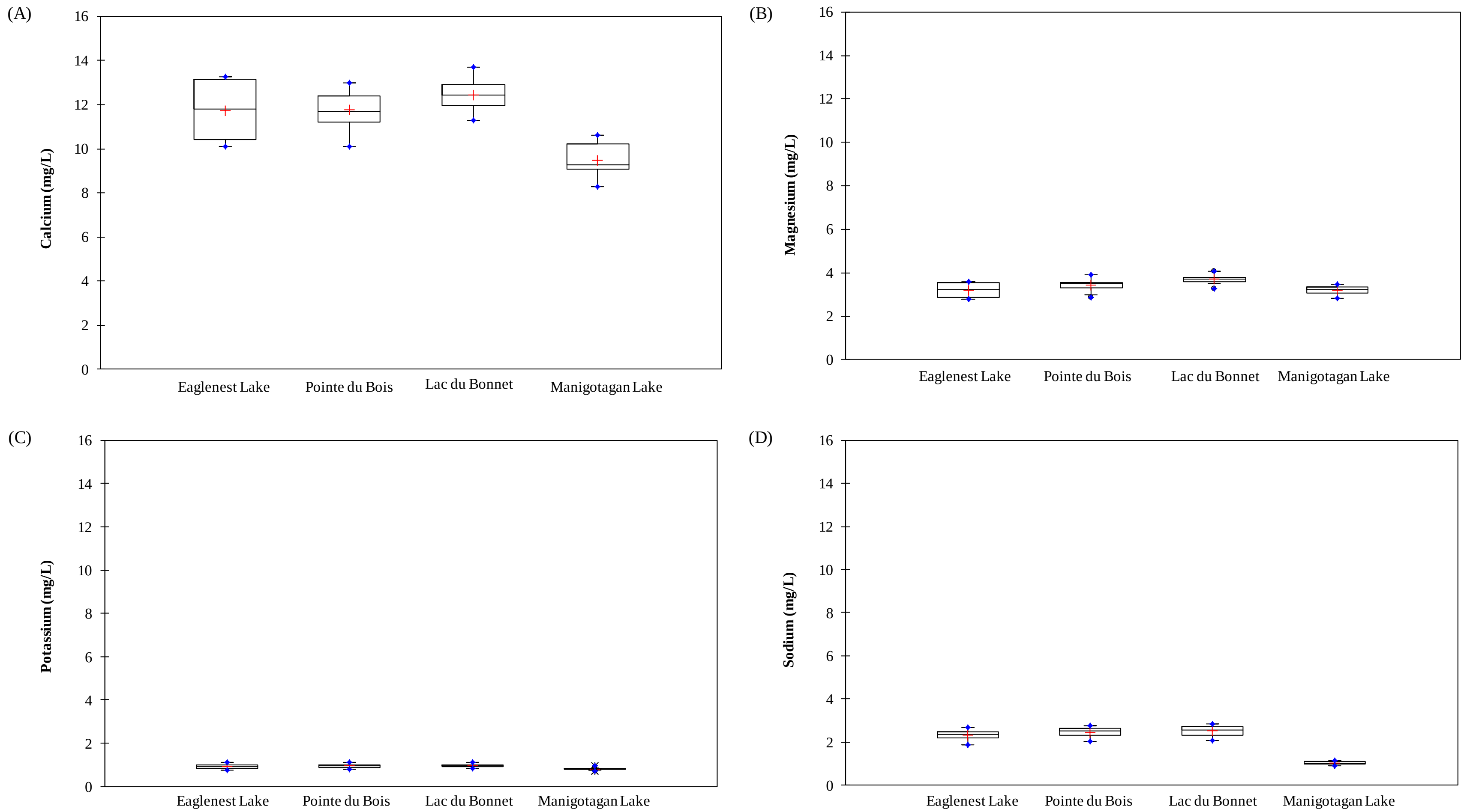


Figure 5.1.4-71. Concentrations of (A) calcium, (B) magnesium, (C) potassium, and (D) sodium measured in the Winnipeg River Region by waterbody.

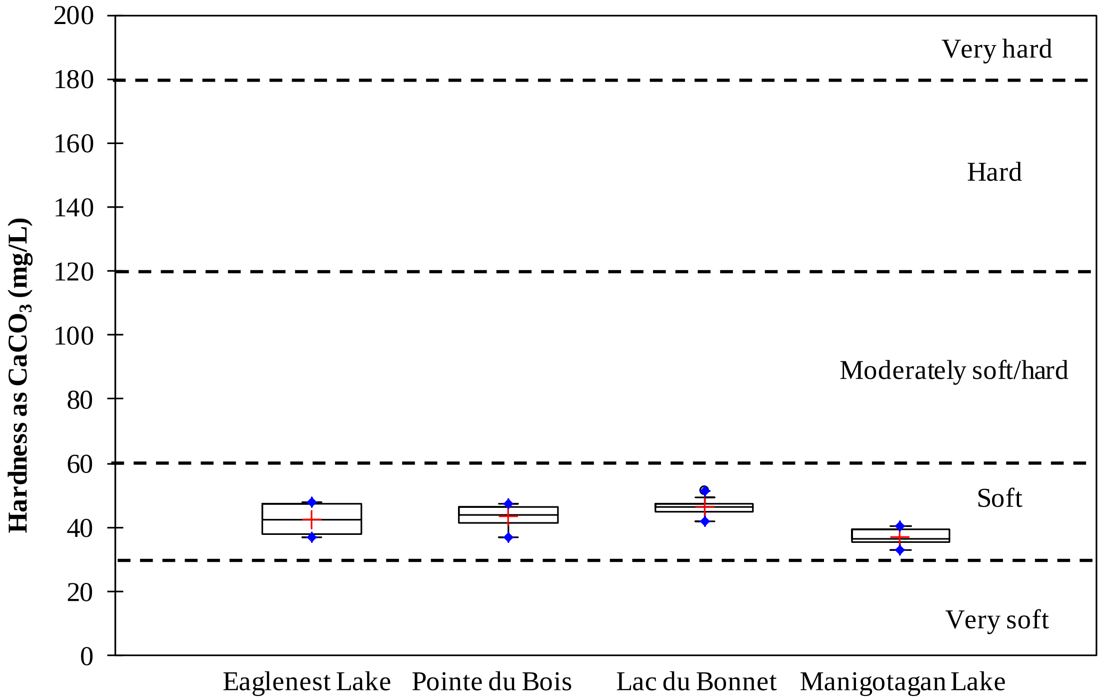


Figure 5.1.4-72. Water hardness measured in the Winnipeg River Region by waterbody.

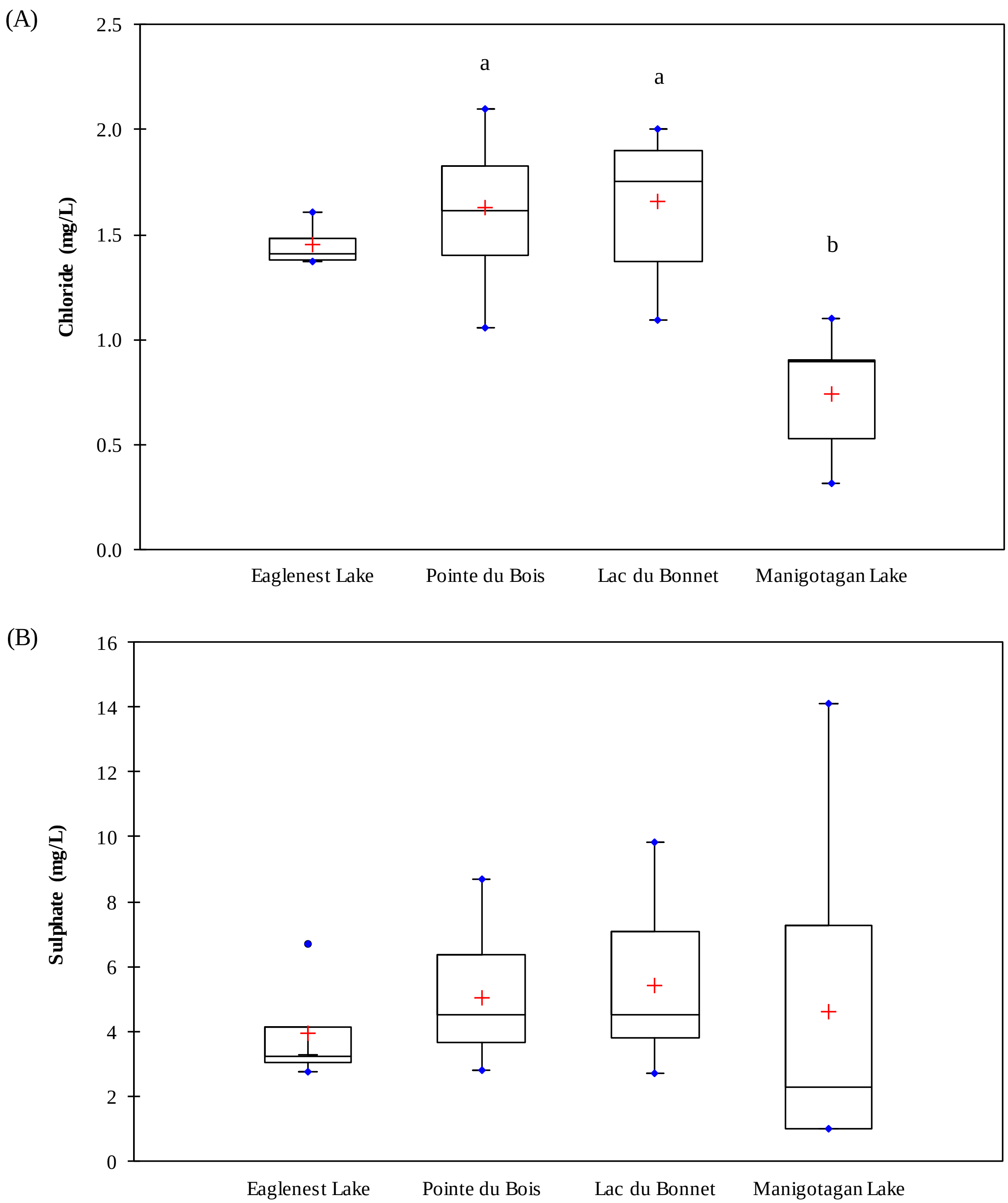


Figure 5.1.4-73. Concentrations of (A) chloride and (B) sulphate measured in the Winnipeg River Region by waterbody. Statistically significant spatial differences are denoted with different superscripts.

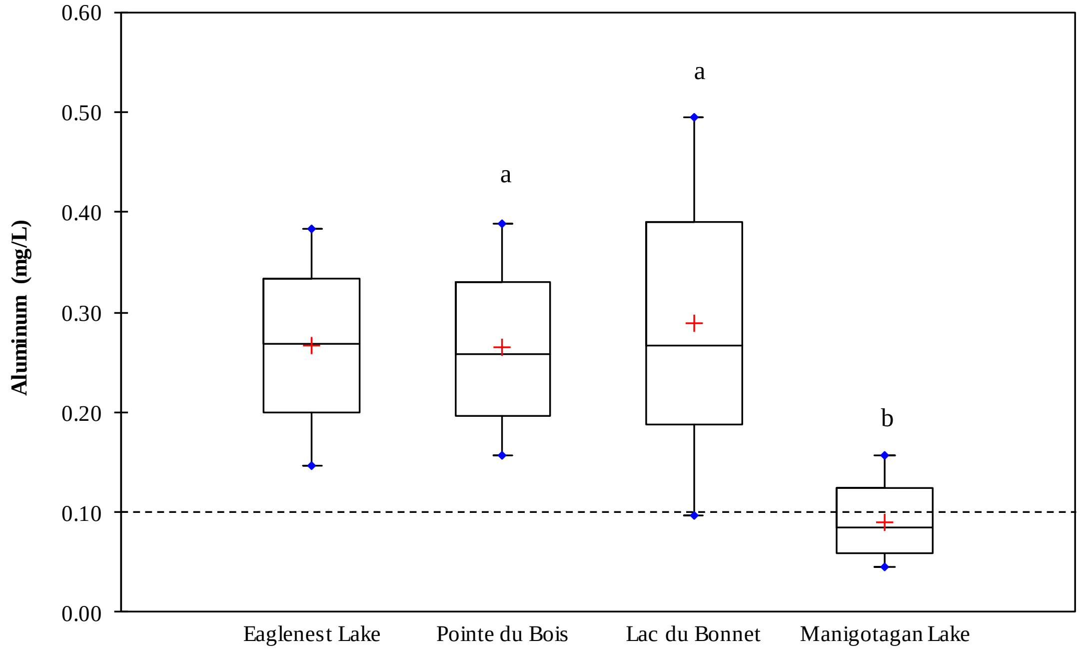


Figure 5.1.4-74. Aluminum in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The dashed line represents the Manitoba PAL guideline.

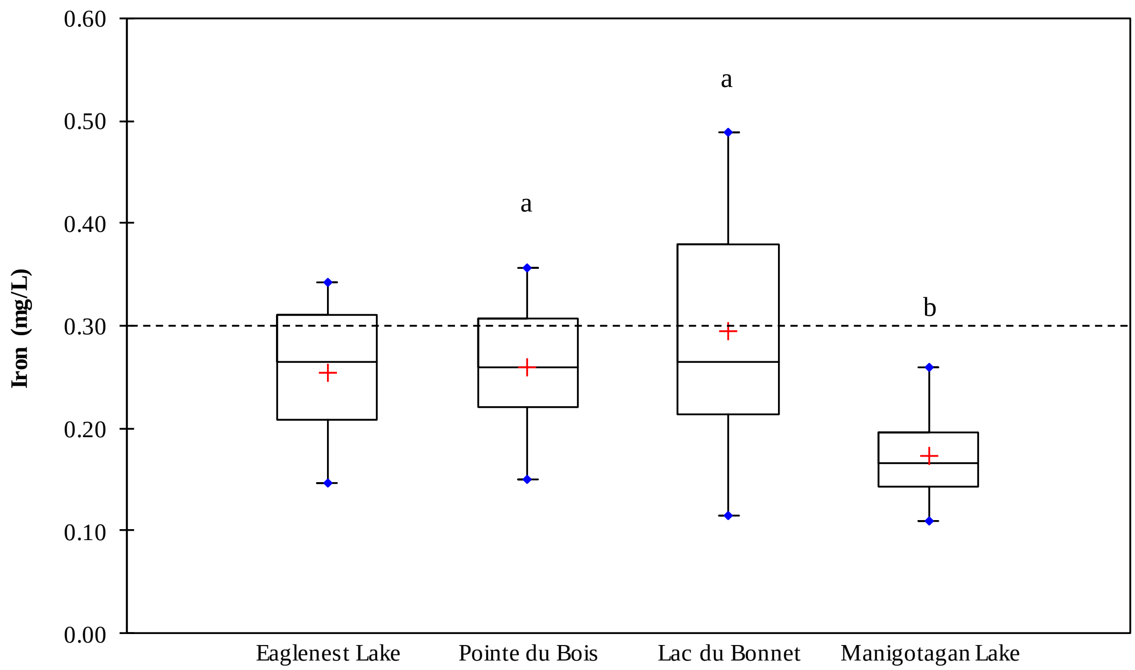


Figure 5.1.4-75. Iron in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts. The dashed line represents the Manitoba PAL guideline.

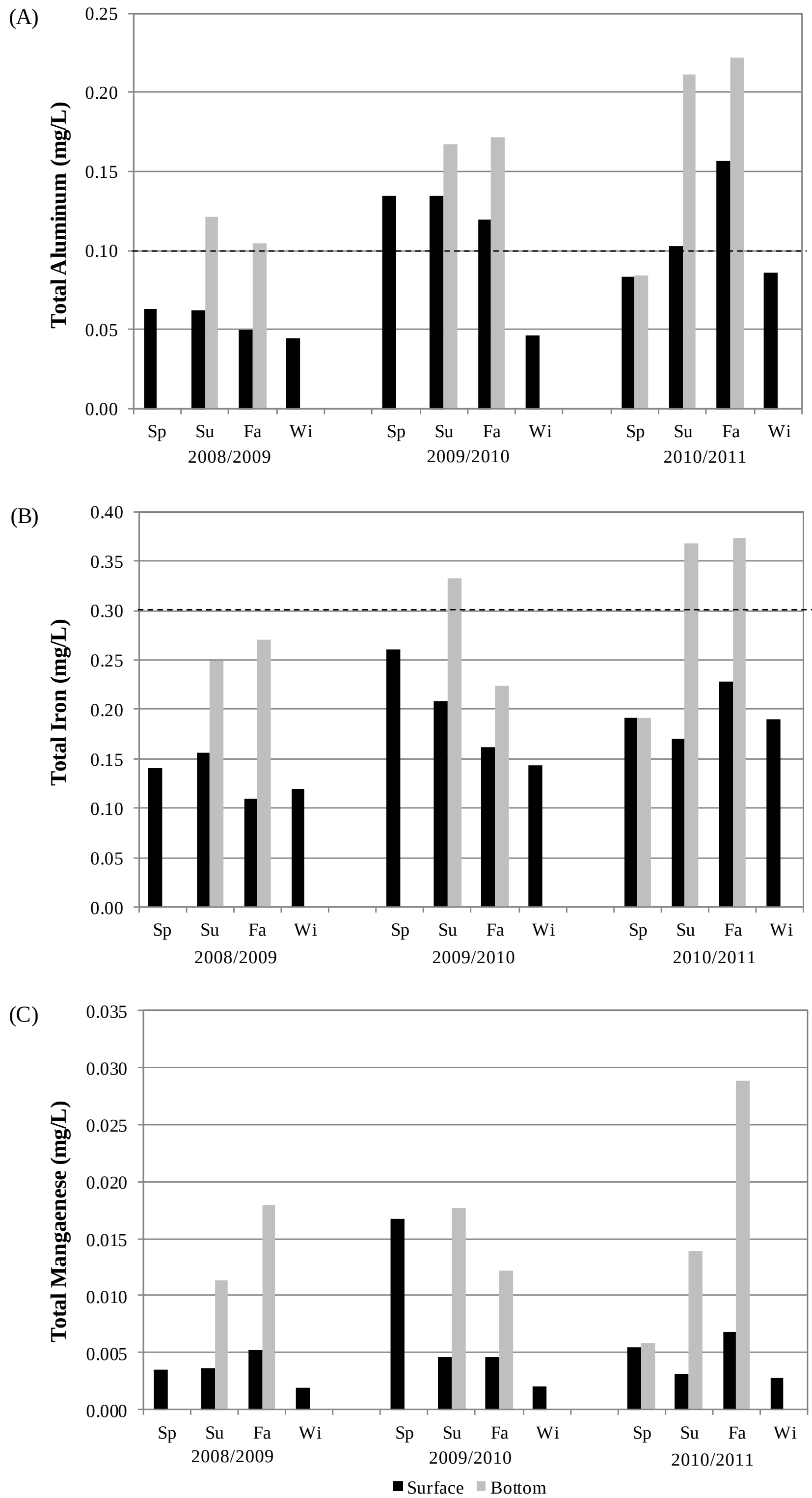


Figure 5.1.4-76. Total aluminum (A), iron (B), and manganese (C) measured in surface grabs and bottom samples in Manigotagan Lake, 2008/2009-2010/2011. The black dashed line indicates the MWQSOG for PAL for aluminum and iron.

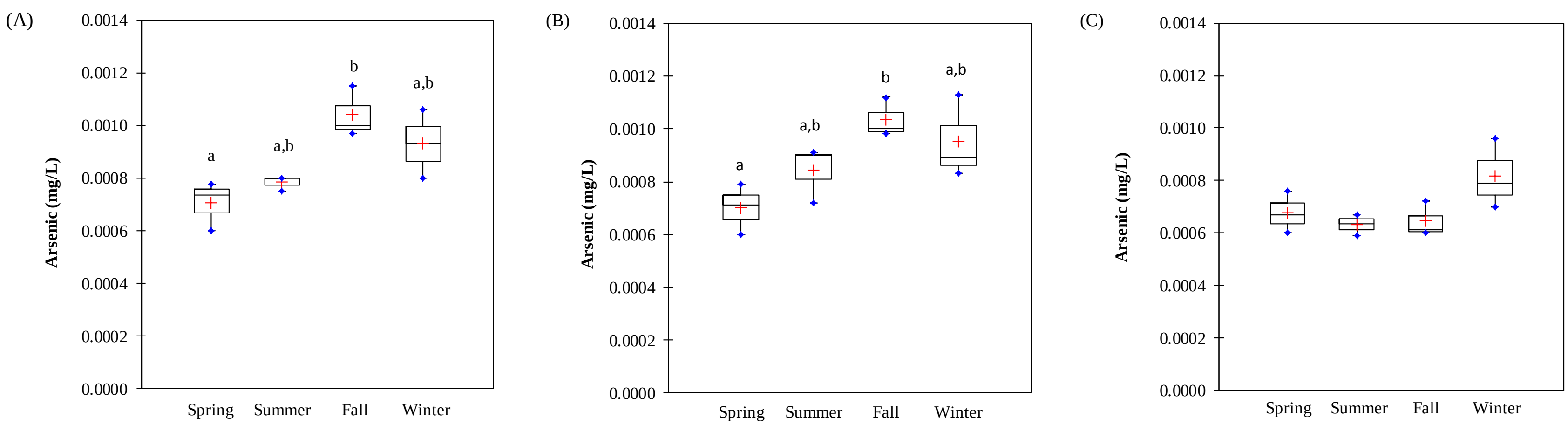


Figure 5.1.4-77. Arsenic in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

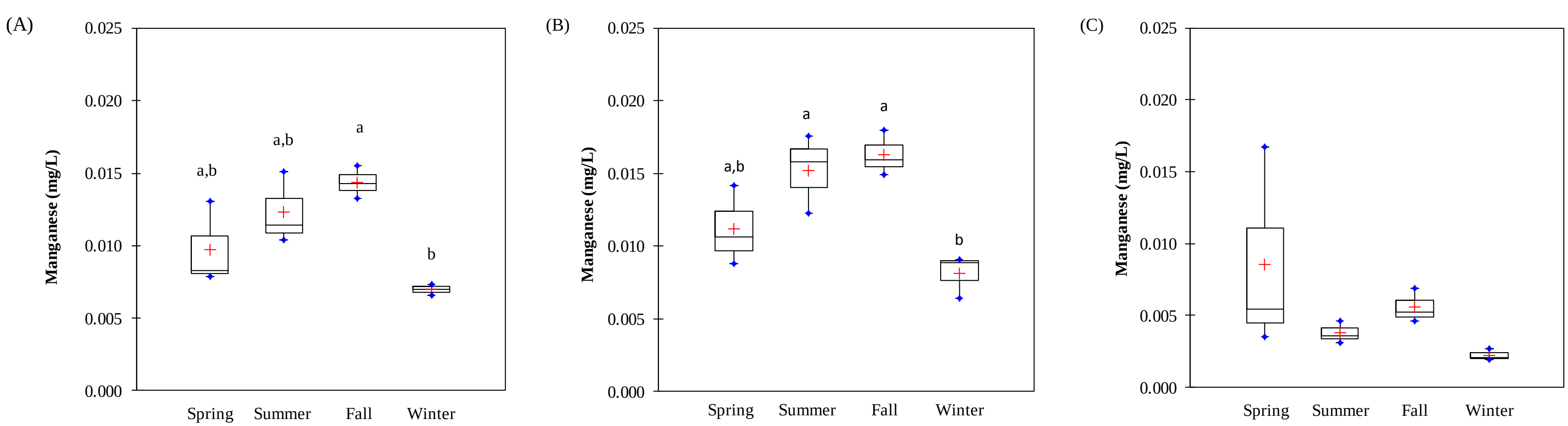


Figure 5.1.4-78. Manganese in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

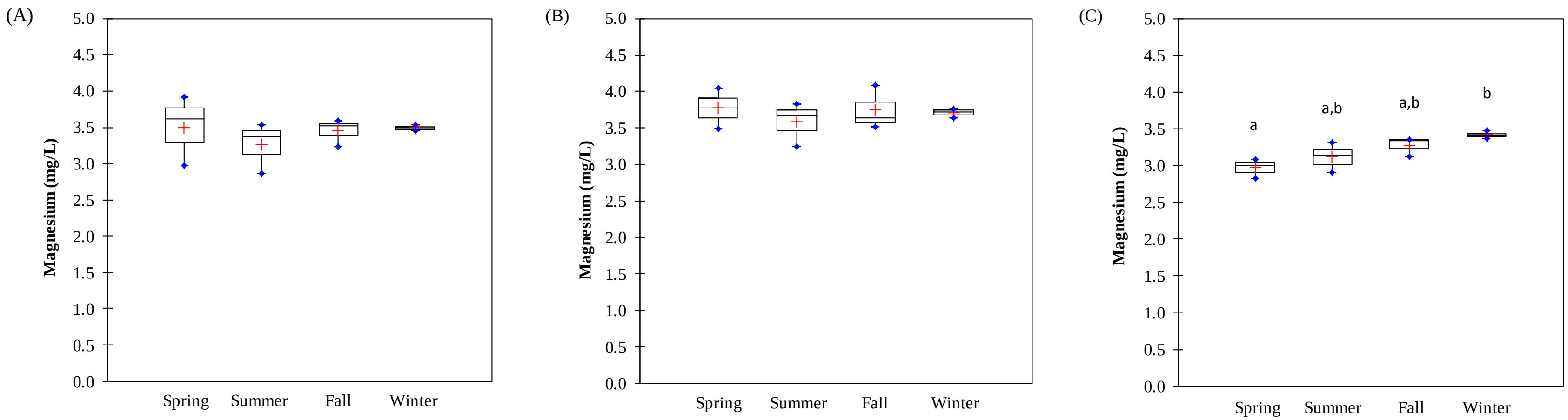


Figure 5.1.4-79. Magnesium in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

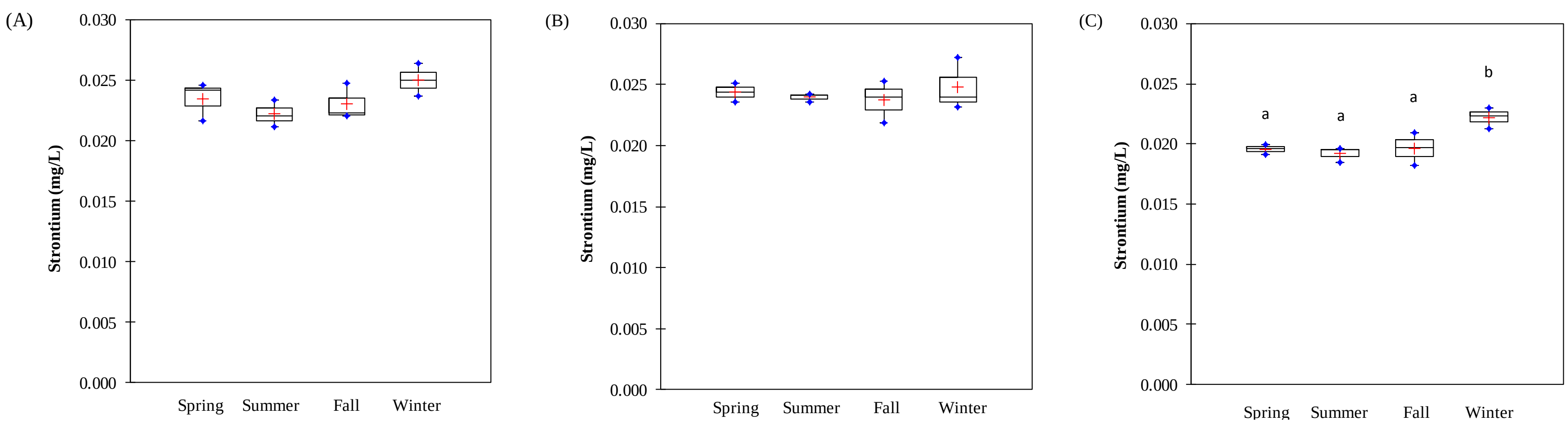


Figure 5.1.4-80. Strontium in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

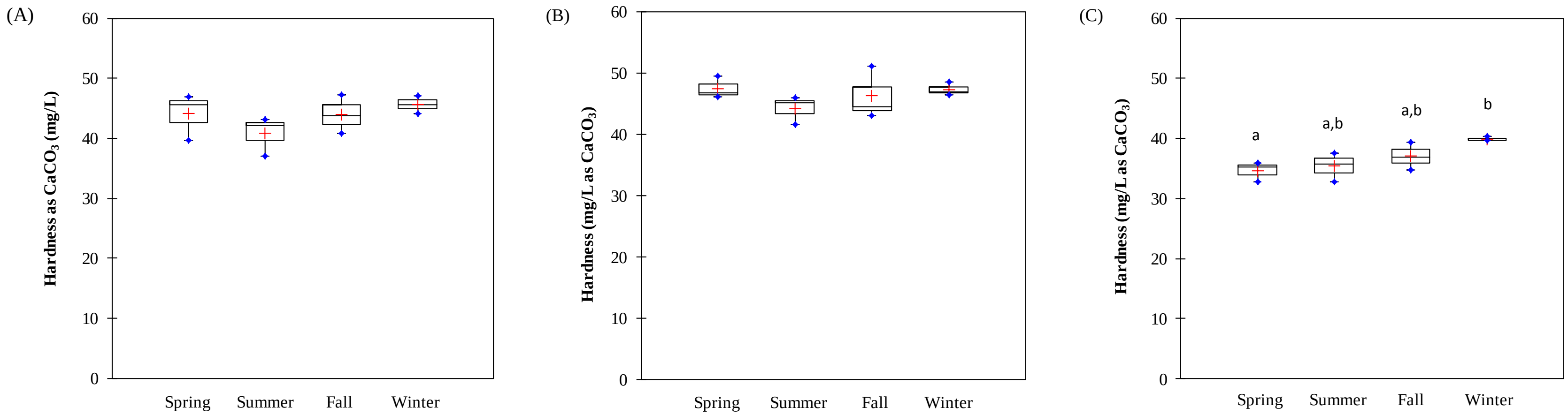


Figure 5.1.4-81. Hardness in the Winnipeg River Region by season: (A) Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant seasonal differences are denoted with different superscripts.

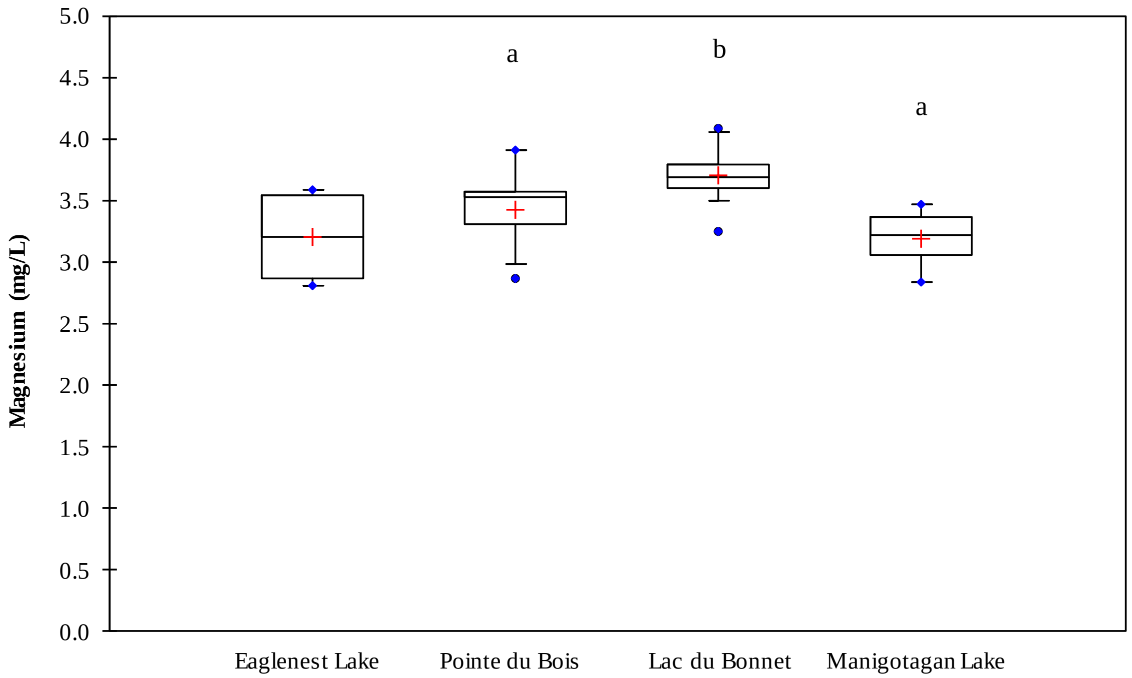


Figure 5.1.4-82. Magnesium in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

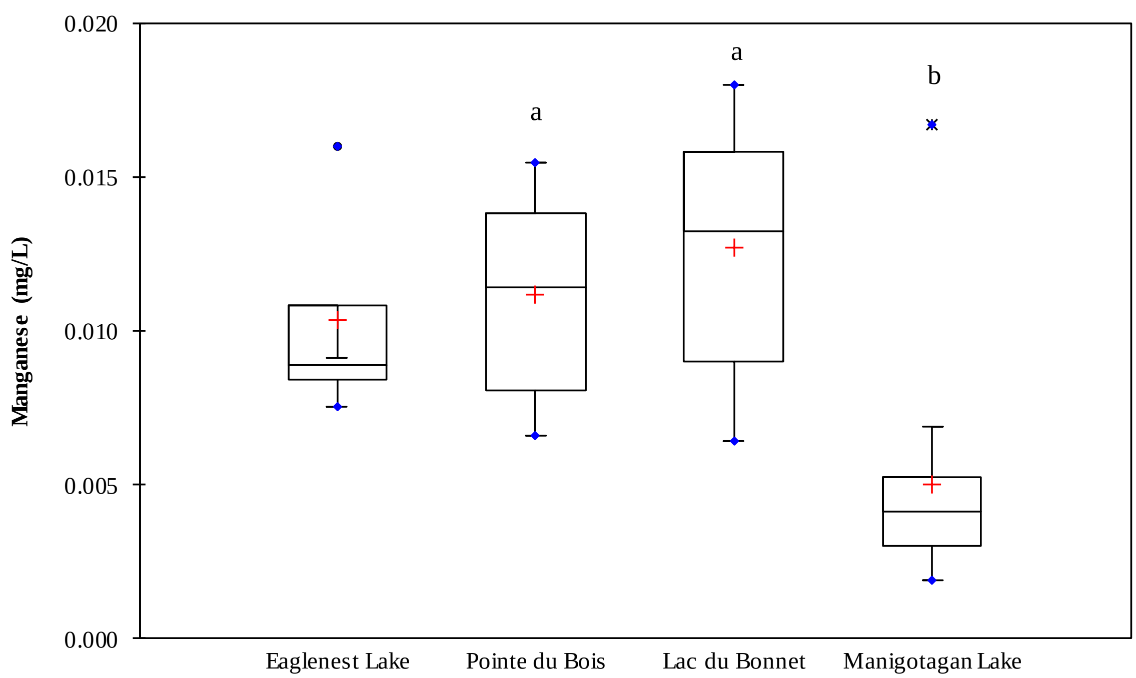


Figure 5.1.4-83. Manganese in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

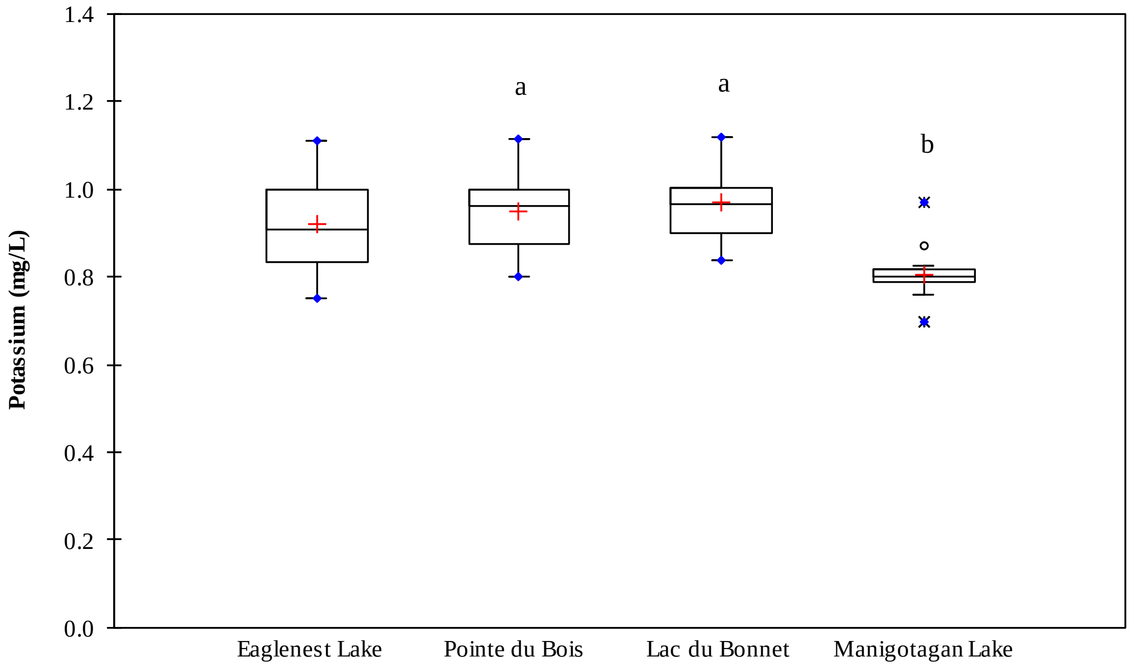


Figure 5.1.4-84. Potassium in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

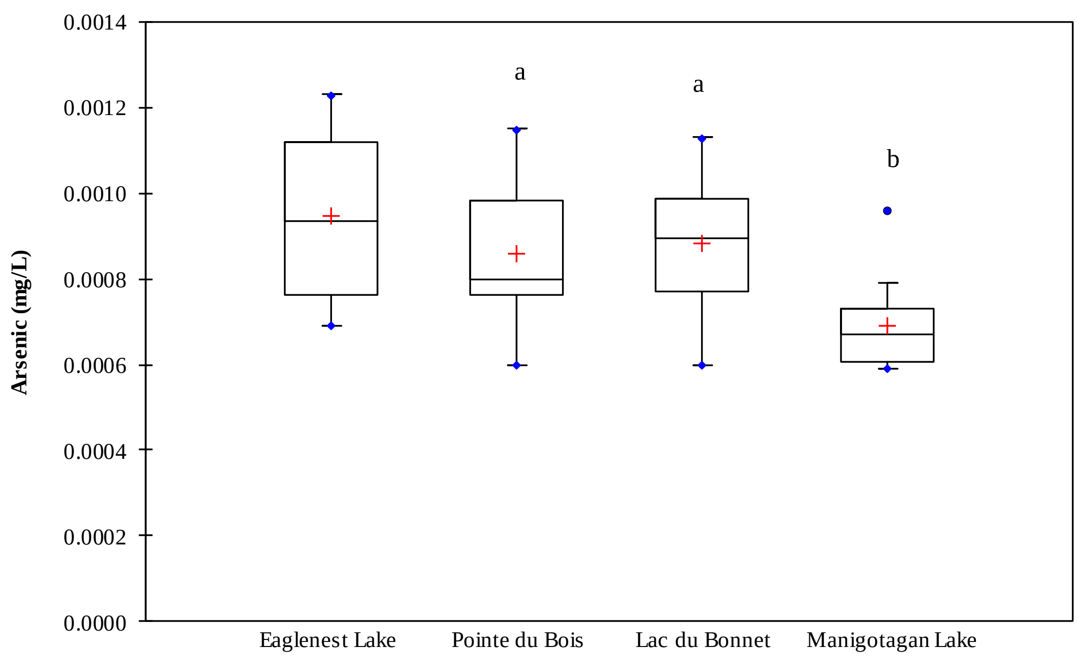


Figure 5.1.4-85. Arsenic in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

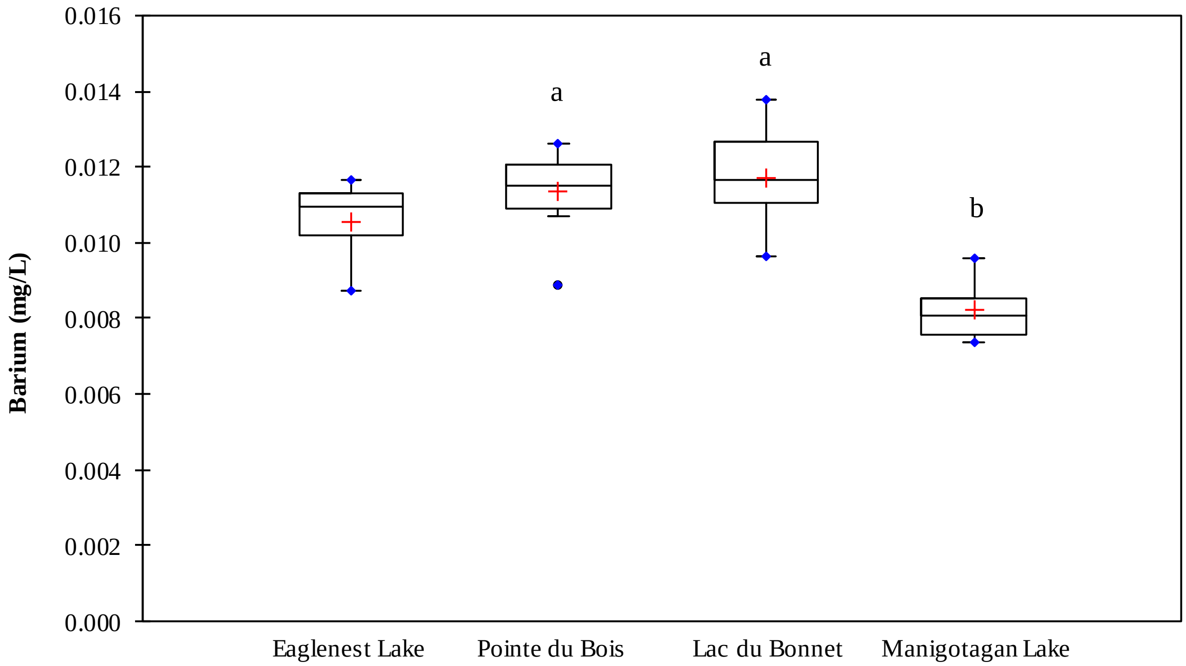


Figure 5.1.4-86. Barium in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

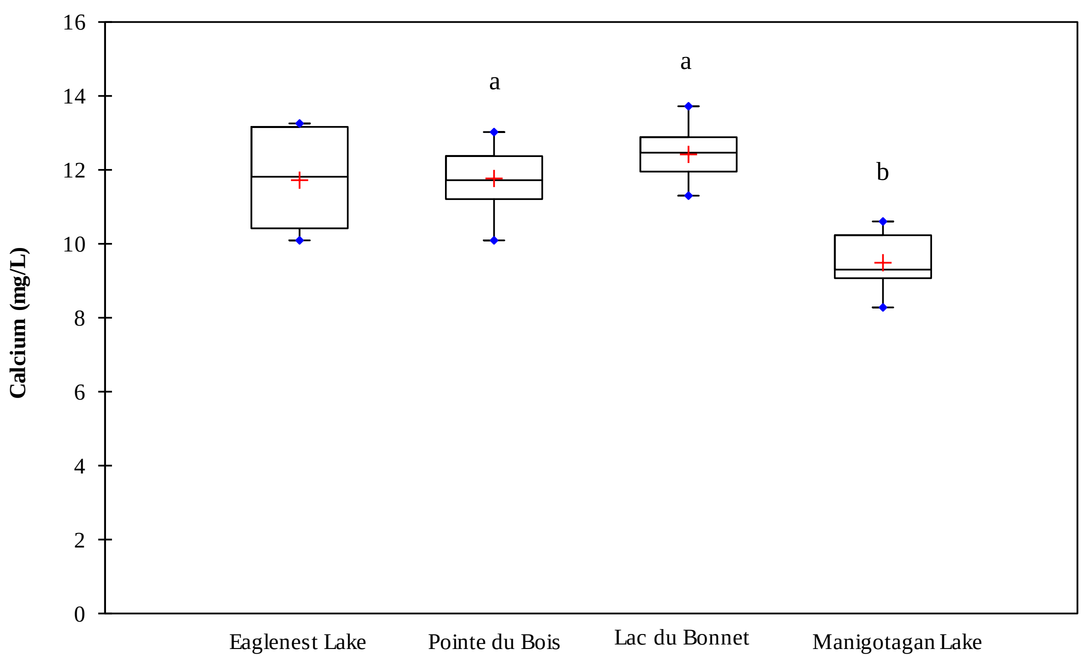


Figure 5.1.4-87. Calcium in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

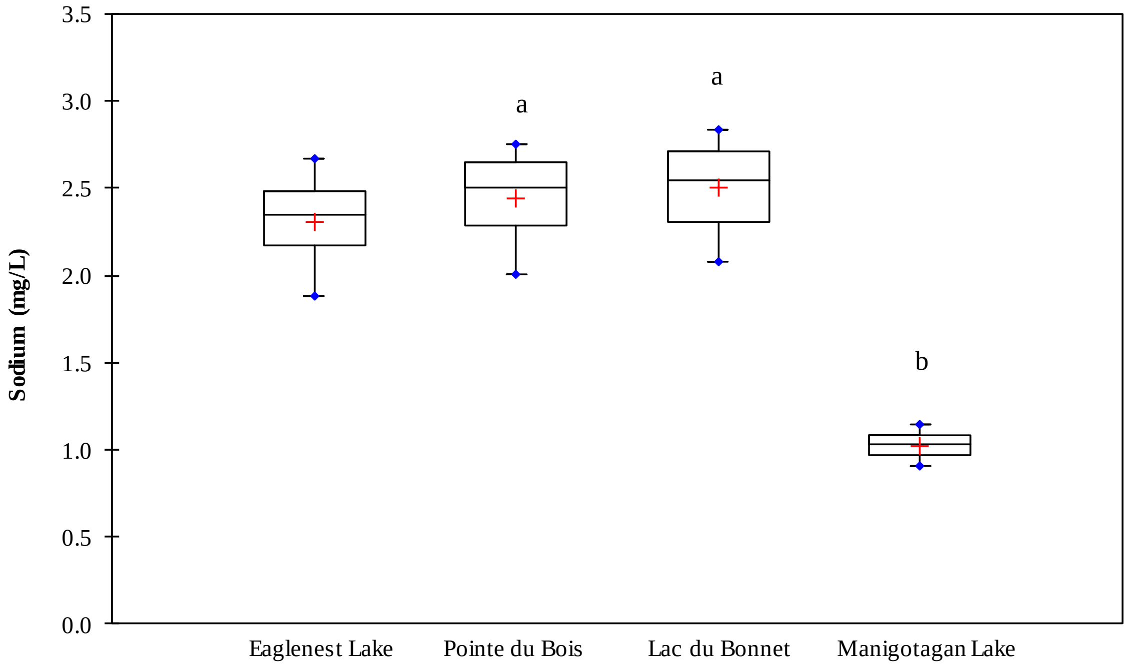


Figure 5.1.4-88. Sodium in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

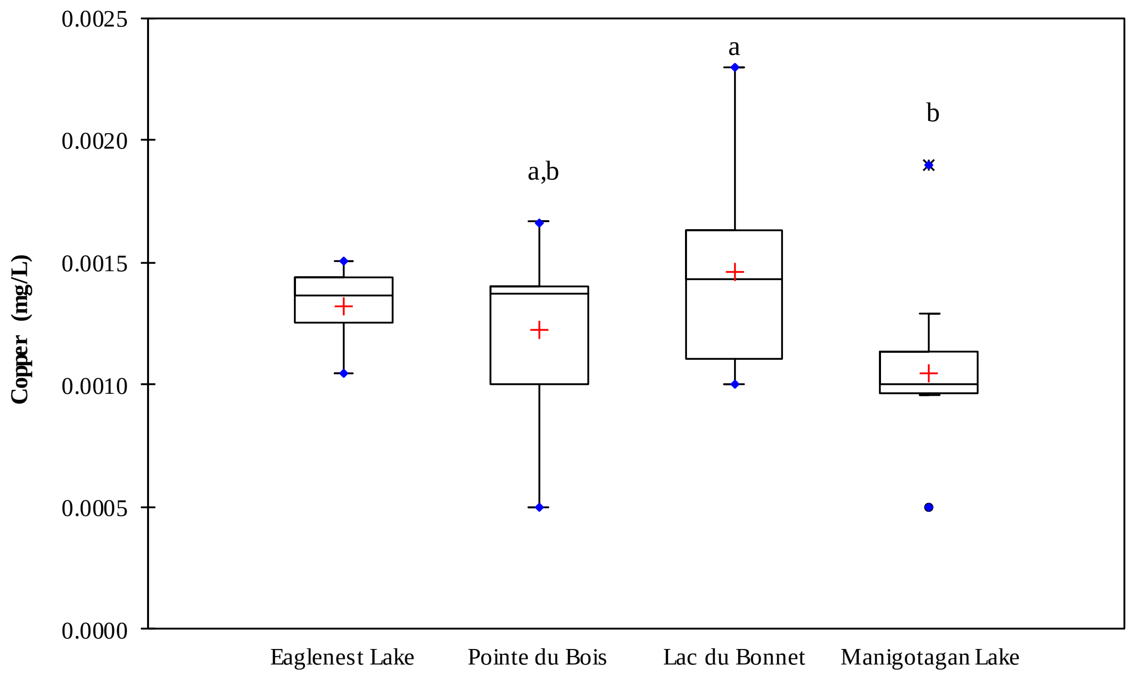


Figure 5.1.4-89. Copper in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

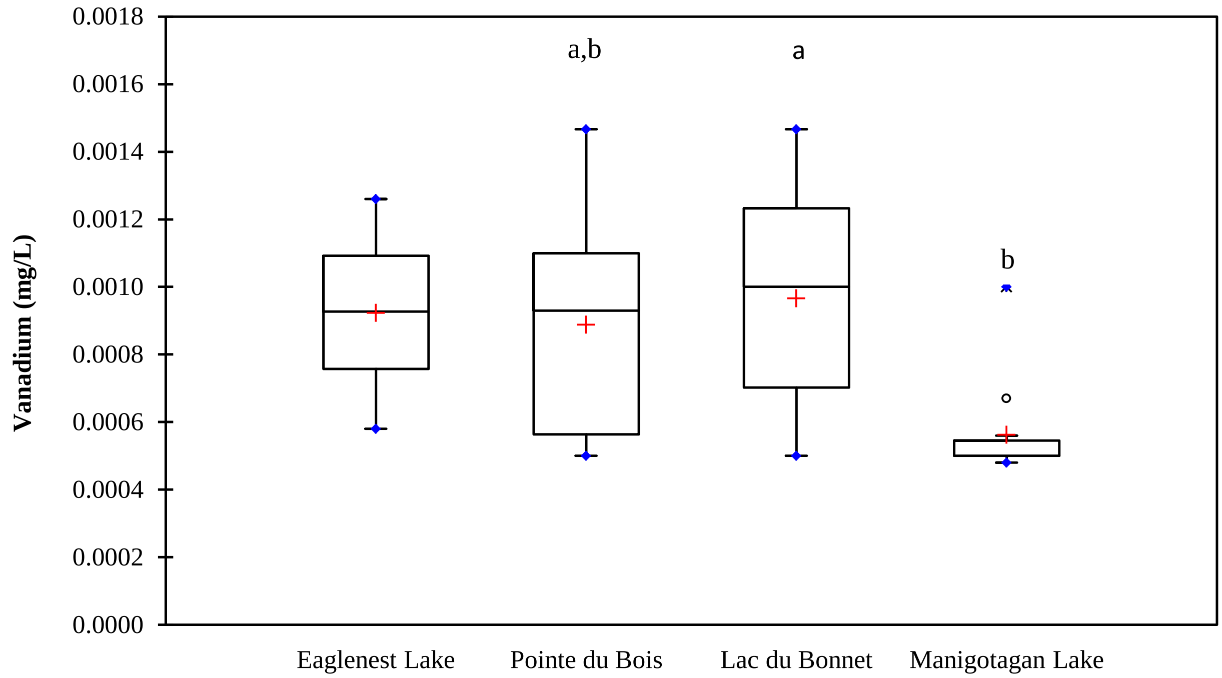


Figure 5.1.4-90. Vanadium in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

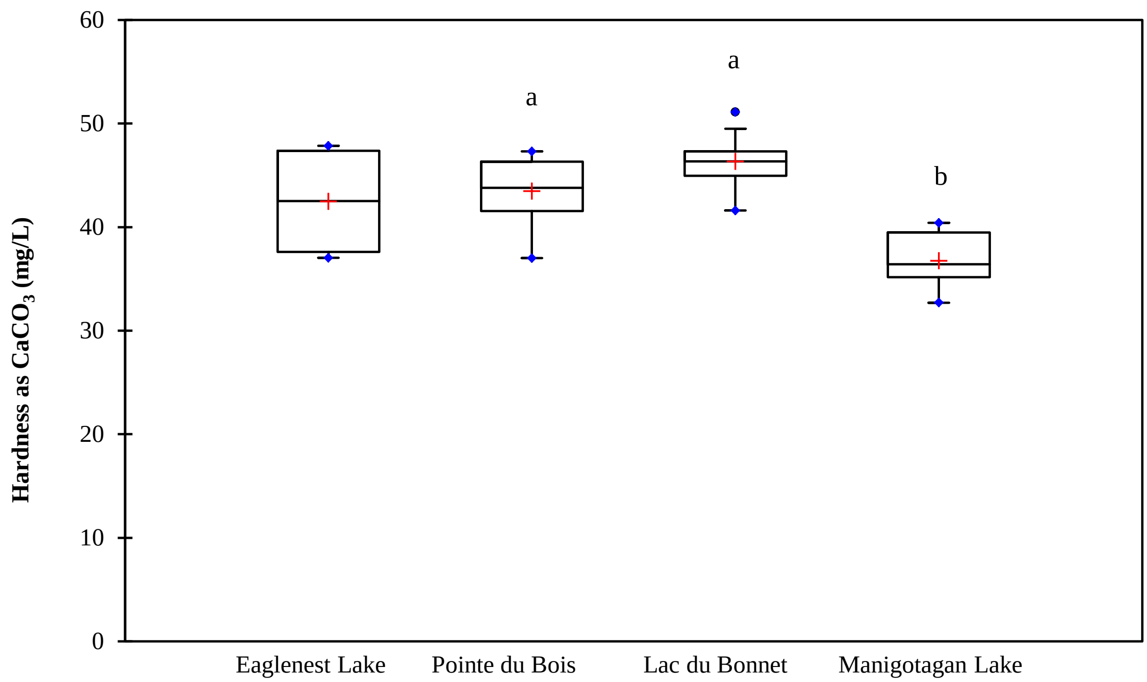


Figure 5.1.4-91. Hardness in the Winnipeg River Region: 2008-2010. Statistically significant spatial differences are denoted with different superscripts.

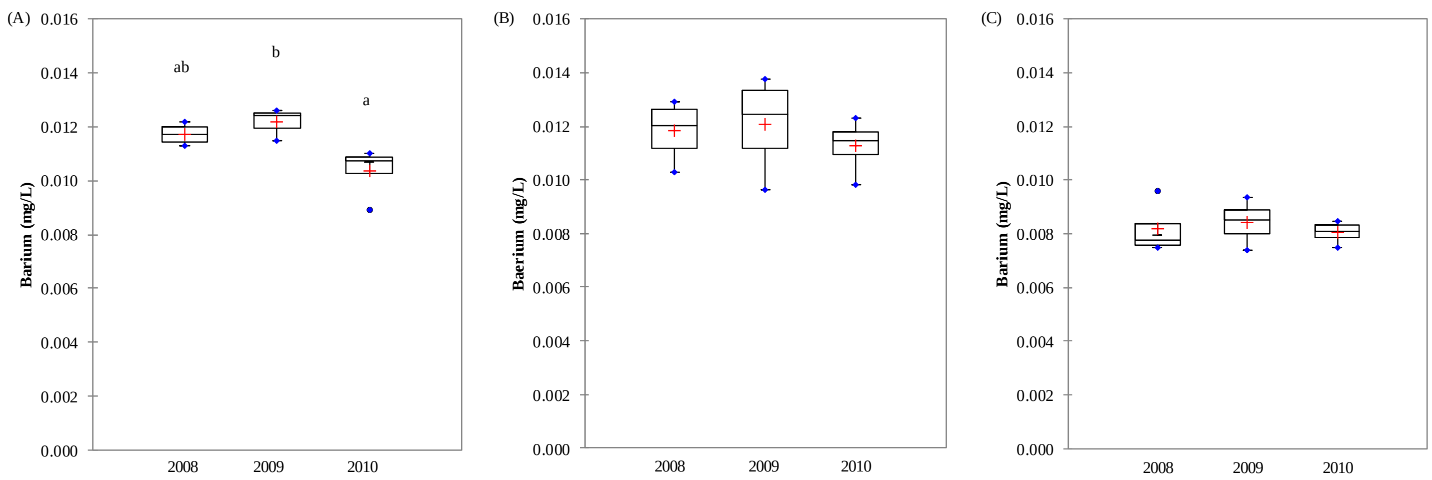


Figure 5.1.4-92. Barium measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

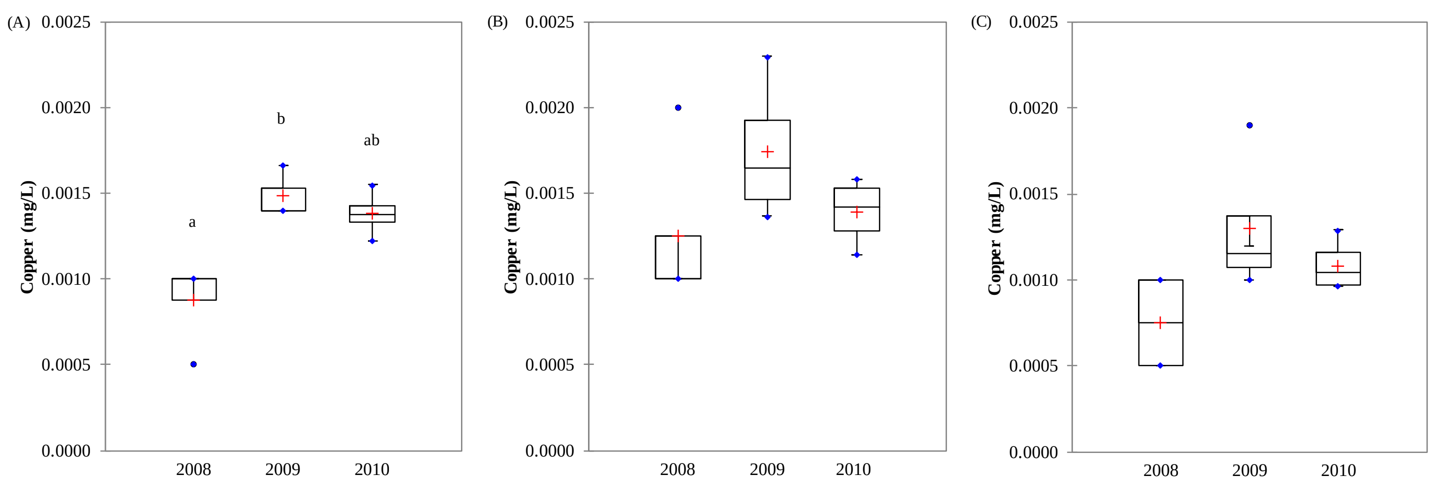


Figure 5.1.4-93. Copper measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

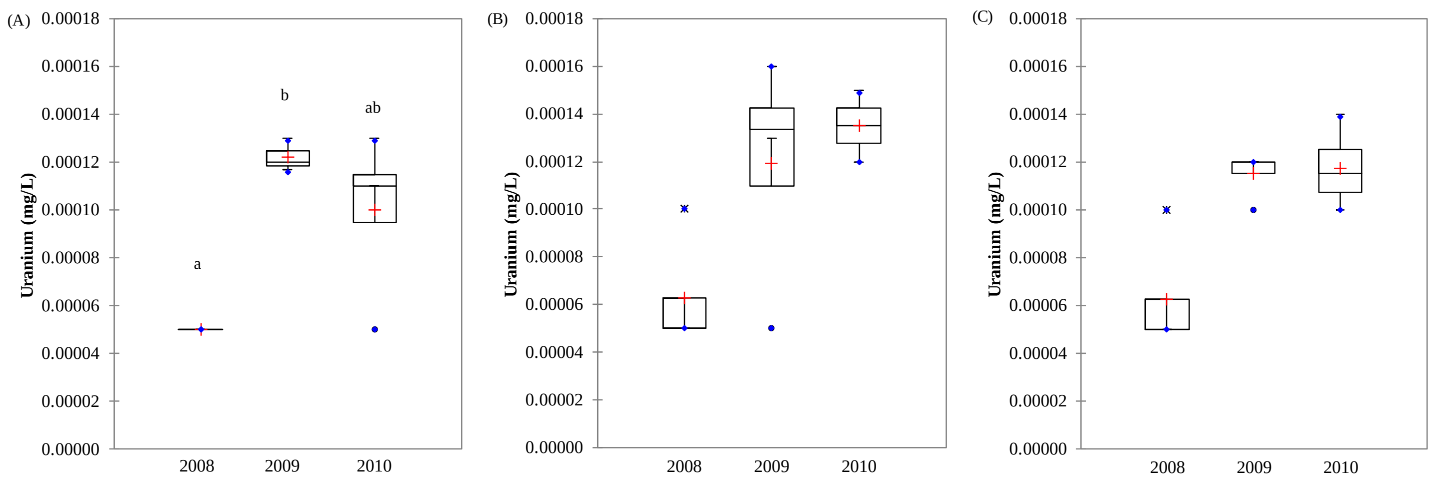


Figure 5.1.4-94. Uranium measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

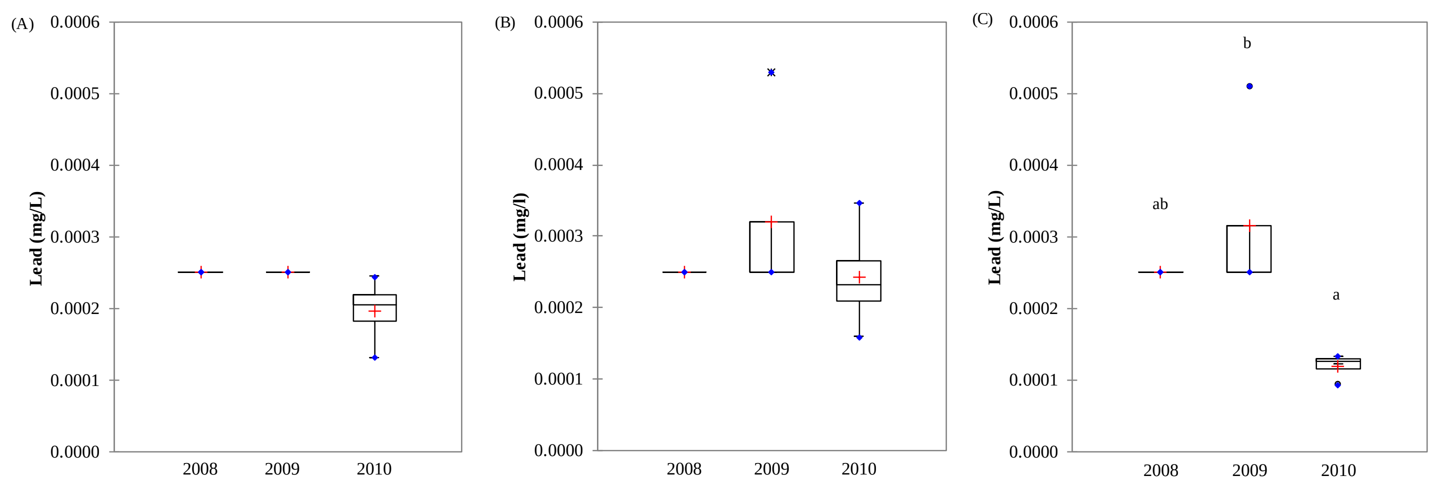


Figure 5.1.4-95. Lead measured by year in: (A) in the Pointe du Bois Forebay; (B) Lac du Bonnet; and, (C) Manigotagan Lake. Statistically significant differences are denoted with different superscripts.

5.1.5 Phytoplankton

The following provides an overview of phytoplankton monitoring results for the Winnipeg River Region over the three years of CAMPP. Sampling sites and periods were consistent with water quality sampling sites and included annual monitoring at the Winnipeg River in the Pointe du Bois Forebay, Lac du Bonnet, and an off-system lake (Manigotagan Lake; Figure 5.1.4-1). Water quality and phytoplankton were also monitored at one rotational off-system waterbody (Eaglenest Lake at a site approximately 24 km upstream of Pointe du Bois). Sampling times relative to air temperature are presented in Figure 5.1.4-2.

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 in the Pointe du Bois Forebay, Lac du Bonnet, and Manigotagan Lake in 2009/2010 and in Eaglenest Lake 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 collected.

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

5.1.5.1 Chlorophyll a

Over the three years of CAMPP, chlorophyll *a* concentrations in the Winnipeg River Region were relatively low; chlorophyll *a* ranged up to 8.40 µg/L during the open-water season but remained below 2 µg/L in the ice-cover period (Figure 5.1.5-1).

5.1.5.2 Taxonomic Composition and Biomass

Phytoplankton biomass measured during the open-water season varied between the four waterbodies in the Winnipeg River Region. The most notable difference was the higher biomass measured in spring and fall at Eaglenest Lake, relative to Manigotagan Lake, Lac du Bonnet, or the Pointe du Bois Forebay (Figure 5.1.5-2); however, as Eaglenest Lake was sampled in 2010 and the other waterbodies were sampled in 2009, these differences may reflect temporal and not spatial differences.

With the exception of Eaglenest Lake, phytoplankton biomass in all waterbodies was lowest in fall and highest in summer. In Eaglenest Lake, the maximum biomass occurred in spring.

Phytoplankton communities also varied between the waterbodies in the region, particularly between waterbodies along the Winnipeg River and Manigotagan Lake. Phytoplankton assemblages along the Winnipeg River were consistently dominated by diatoms during the open-water season (Figure 5.1.5-3). In contrast, phytoplankton in Manigotagan Lake was composed of varying combinations of chrysophytes, cryptophytes, diatoms, dinoflagelettes and blue-greens with no one group dominating consistently in the year of sampling (2009).

Metrics describing the phytoplankton community were calculated on a seasonal basis and are presented in Table 5.1.5-1. Overall, the Pointe du Bois Forebay had a less diverse, even, and rich community that was also more homogeneous compared to the other sites. In contrast, Lac du Bonnet and/or Manigotagan typically had the most complex phytoplankton assemblages in the region. Comparisons of results for the Winnipeg River sites to Eaglenest Lake cannot be made because sampling was conducted in different years.

Relationships between phytoplankton biomass and composition and water levels and flows will be evaluated in the future with acquisition of additional data.

5.1.5.3 Bloom Monitoring

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

5.1.5.4 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. Additionally, *Planktothrix* was found in the Pointe du Bois Forebay, Lac du Bonnet and Manigotagan Lake but not Eaglenest Lake.

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

5.1.5.5 Trophic Status

Based on mean open-water chlorophyll *a* concentrations, all CAMPP waterbodies in the Winnipeg River Region are classified as mesotrophic (Table 5.1.4-3).

5.1.5.6 Seasonal Variability

Chlorophyll *a* concentrations measured during the ice-cover season were lower than those measured during the open-water season at all sites (Figure 5.1.5-1). Specifically, winter chlorophyll *a* concentrations were significantly lower than spring and summer concentrations in the Pointe du Bois Forebay and Lac du Bonnet, and chlorophyll *a* was significantly lower in winter than all open-water sampling periods in Manigotagan Lake. Concentrations in Manigotagan Lake were also significantly lower in fall compared to spring.

5.1.5.7 Spatial Comparisons

Mean annual chlorophyll *a* concentrations were not significantly different between the three annual waterbodies (Lac du Bonnet, the Pointe du Bois Forebay, and Manigotagan Lake; Figure 5.1.5-4).

5.1.5.8 Temporal Variability

Statistical comparisons between sampling years for the annual waterbodies revealed that there were no significant differences in chlorophyll *a* concentrations at any of the sites over the monitoring period (Figure 5.1.5-5). The lack of interannual differences is notable in light of the relatively large range of flow conditions observed in the Winnipeg River over the period of 2008-2010 (see Section 5.1.2 for a discussion of hydrological conditions).

Table 5.1.5-1. Diversity, evenness, heterogeneity, and effective richness of the phytoplankton communities in the four waterbodies in the Winnipeg River Region.

Waterbody	Season	Species Richness	Simpson's Diversity Index (1-G)	Simpson's Evenness (E_D)	Shannon-Weaver Index (H)	Evenness (E_H)	Hill's Effective Richness ($E^{H`}$)	Evenness ($E^{H`}/S$)
Eaglenest Lake	Spring	22	0.74	0.17	1.66	0.54	5.27	0.24
	Summer	22	0.70	0.15	1.69	0.55	5.44	0.25
	Fall	32	0.60	0.08	1.53	0.44	4.63	0.14
Pointe du Bois Forebay	Spring	15	0.42	0.11	1.03	0.38	2.81	0.19
	Summer	23	0.61	0.11	1.49	0.48	4.43	0.19
	Fall	14	0.66	0.21	1.54	0.58	4.66	0.33
Lac du Bonnet	Spring	21	0.85	0.31	2.22	0.73	9.19	0.44
	Summer	21	0.74	0.18	1.79	0.59	5.99	0.29
	Fall	18	0.80	0.28	1.94	0.67	6.99	0.39
Manigotagan Lake	Spring	14	0.80	0.36	1.82	0.69	6.17	0.44
	Summer	21	0.85	0.31	2.16	0.71	8.66	0.41
	Fall	13	0.84	0.47	1.99	0.77	7.29	0.56

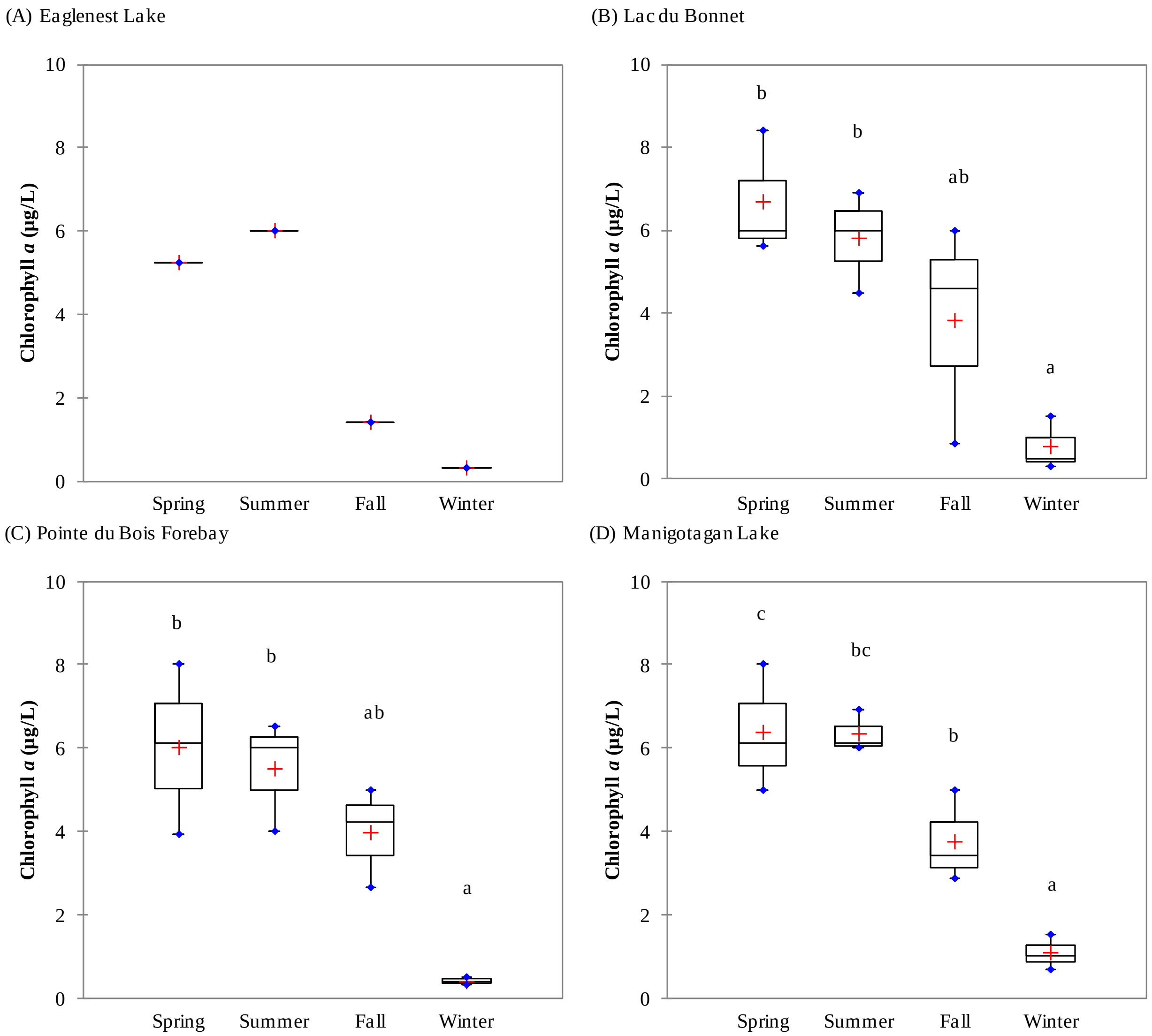


Figure 5.1.5-1. Chlorophyll *a* concentrations measured in the Winnipeg River Region, 2008-2010 (Lac du Bonnet, Pointe du Bois Forebay, and Manigotagan Lake) and 2010 (Eaglenest Lake). Statistically significant seasonal differences are denoted by different superscripts.

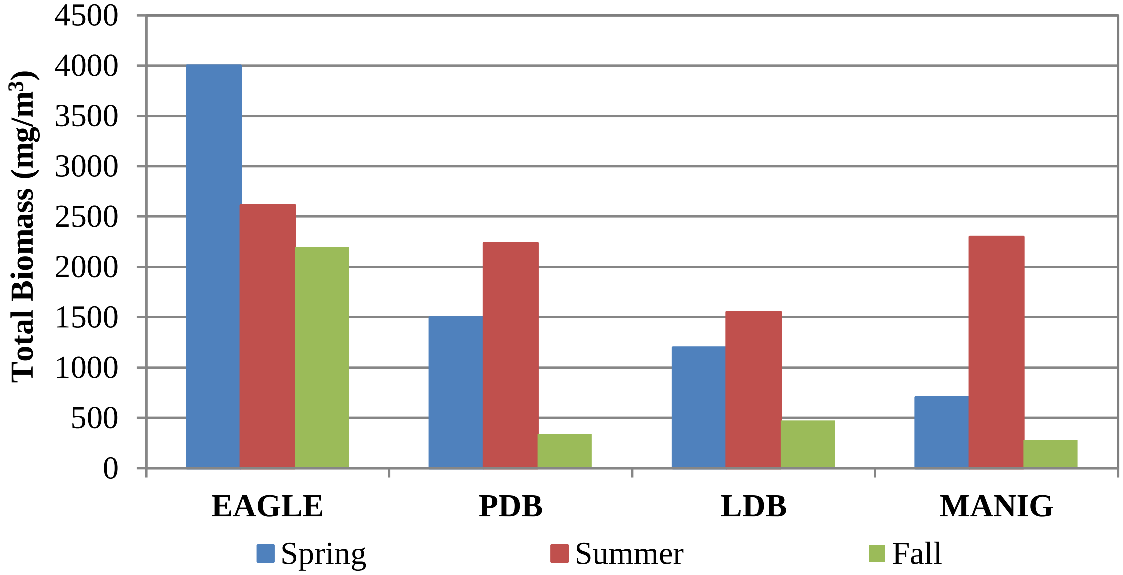


Figure 5.1.5-2. Phytoplankton biomass measured in the Winnipeg River Region during the open-water seasons of 2009 (Pointe du Bois Forebay, Lac du Bonnet, and Manigotagan Lake) and 2010 (Eaglenest Lake).

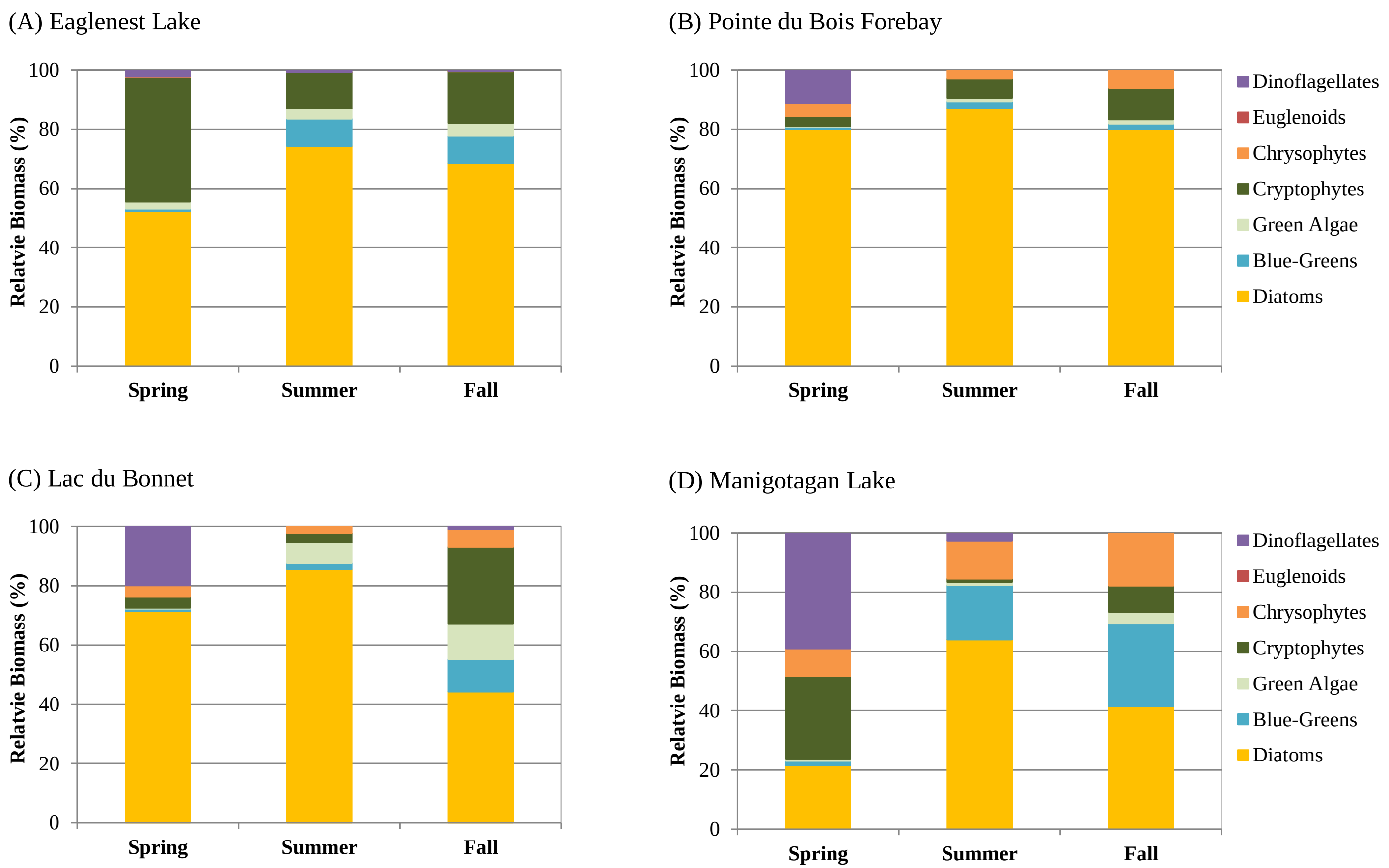


Figure 5.1.5-3. Phytoplankton community composition in the Winnipeg River Region by season, as measured during the open-water seasons of 2009 (Pointe du Bois Forebay, Lac du Bonnet, and Manigotagan Lake) and 2010 (Eaglenest Lake).

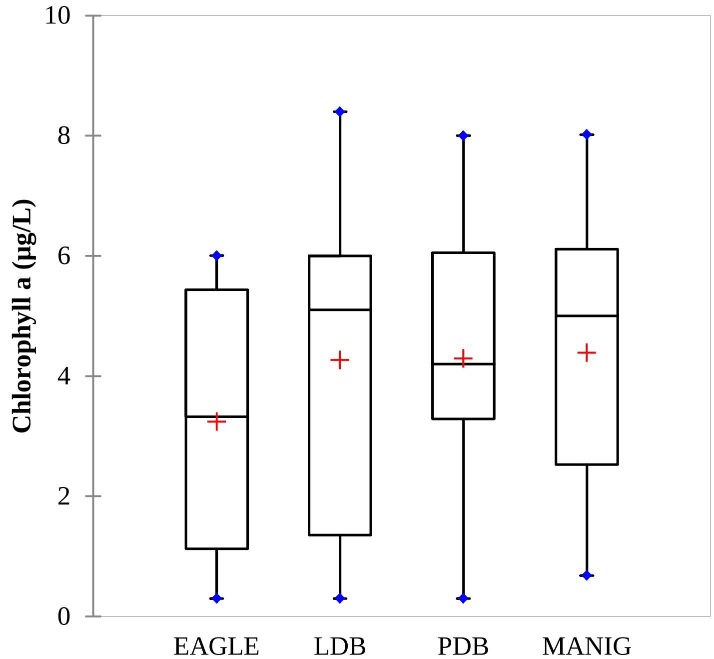


Figure 5.1.5-4. Chlorophyll *a* concentrations in the Winnipeg River Region. No statistically significant spatial differences were found between the annual sites.

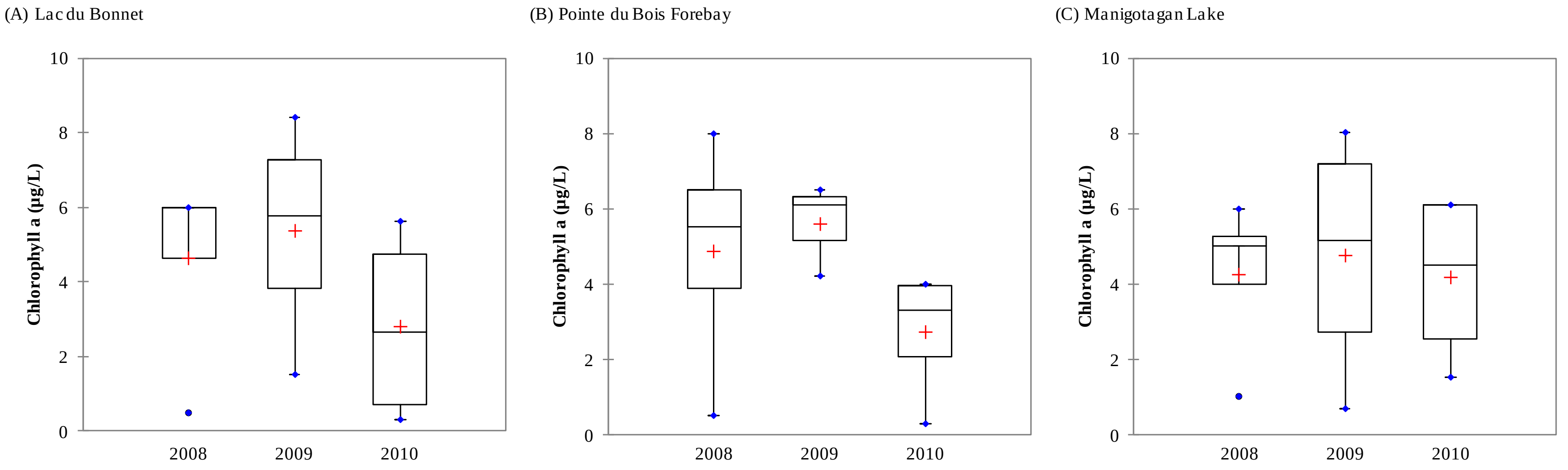


Figure 5.1.5-5. Chlorophyll *a* concentrations measured at the annual waterbodies in the Winnipeg River Region. No statistically significant interannual differences were found at any site.

5.1.6 Benthic Macroinvertebrates

The following provides an overview of the benthic macroinvertebrate (BMI) community sampled over the first three years of CAMPP in the Winnipeg River Region (Figure 5.1.6-1). Waterbodies sampled annually included the on-system waterbodies, Pointe du Bois Forebay and Lac du Bonnet (approximately 86.5 km downstream); and the off-system waterbody, Manigotagan Lake. In 2010, the BMI community was sampled at the off-system, rotational site, Eaglenest Lake. Nearshore and offshore habitats were sampled in all waterbodies, except in 2008 where the offshore habitat was not sampled in Manigotagan Lake due to inability to comply with the water depth/substrate criteria within the pre-determined polygons of the initial study design. BMI sampling was conducted in mid-September in all three years.

BMI are described for waterbodies in the Winnipeg 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. The sampling design for the offshore habitat was comparable among the three years and offshore data were summarized for all waterbodies.

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

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

5.1.6.1 Supporting Environmental Variables

Supporting environmental variables (biophysical) were measured in the field in nearshore and offshore habitats in each waterbody, and included water depth, water temperature, water velocity, Secchidepth, substrate type, type of riparian vegetation, and algal presence (Table 5.1.6-1). Benthic sediment samples were collected from BMI sampling sites and analyzed for particle size analysis (PSA) and total organic carbon (TOC). In 2010, relative benchmarks were established along the shore at each waterbody to record the current water level and high water mark at the time of sampling.

In the intermittently wetted nearshore habitat (2010), water depths ranged from 0.8 m (Lac du Bonnet) to 1.0 m (Manigotagan Lake). In the predominantly wetted nearshore habitat (2008 to 2009), mean water depths ranged from 2.3 m (Pointe du Bois Forebay) to 4.2 m (Lac du Bonnet) (Table 5.1.6-1). Mean water depths within the offshore habitat (2008 to 2010) ranged between 7.0 m (Eaglenest Lake) and 16.7 m (Manigotagan Lake) (Table 5.1.6-1).

Mean TOC in the intermittently wetted nearshore ranged between 0.1% (Manigotagan Lake) and 7.3% (Eaglenest Lake) (Figure 5.1.6-2). Predominantly wetted nearshore sediment resulted in mean TOC values ranging between 1.6% (Manigotagan Lake) and 3.1% (Lac du Bonnet) (Figure 5.1.6-3). In the offshore, mean TOC ranged from 0.4% (Eaglenest Lake) to 2.0% (Manigotagan Lake) (Figure 5.1.6-4).

Sediment composition (PSA) within the intermittently wetted nearshore habitat of Eaglenest Lake and Pointe du Bois Forebay were of similar composition (mainly sand and silt); and sand was the main component of sediments collected at Lac du Bonnet and Manigotagan Lake (Figure 5.1.6-2). Sediment in the predominantly wetted nearshore sampling sites consisted of mainly silt, with similar amounts of sand and clay (Figure 5.1.6-3). The offshore sediments also varied between sampling sites, Eaglenest Lake and Pointe du Bois were similar in comparison and consisted of mainly sand; sediments from Lac du Bonnet and Manigotagan Lake were comprised of similar amounts of silt and sand (Figure 5.1.6-4).

5.1.6.2 Species Composition, Distribution, and Relative Abundance

Eaglenest Lake

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat of Eaglenest Lake was 401 individuals (Table 5.1.6-2; Figure 5.1.6-5). Overall, insects dominated the BMI community in terms of abundance and mainly consisted of Chironomidae (midges), Ephemeroptera (mayflies), and small numbers of Trichoptera (caddisflies) (Figures 5.1.6-6 and 5.1.6-7). Of the non-insects, Amphipoda (scuds) and Gastropoda (snails) were proportionately most abundant though Oligochaeta (aquatic worms) and Bivalvia (clams) were also present (Figure 5.1.6-7). Mean density of BMI collected in offshore grab samples (n=5; 2010) was 721 individuals/m^2 (Table 5.1.6-3; Figure 5.1.6-8). Similar to the nearshore, insects dominated the BMI community; chironomids, ephemeropterans, and trichopterans were the most abundant (Figures 5.1.6-9 and 5.1.6-10). Of the non-insects, bivalves were proportionately more abundant and to a lesser degree amphipods and oligochaetes (Figure 5.1.6-10).

Total EPT (mean abundance of Ephemeroptera, Plecoptera, and Trichoptera) comprised 23% and 34% of the mean total BMI community in the nearshore and offshore habitats, respectively (Tables 5.1.6-2 and 5.1.6-3; Figures 5.1.6-11 and 5.1.6-12). Of the EPT, ephemeropterans were proportionately most abundant in both habitats (Tables 5.1.6-2 and 5.1.6-3). In the nearshore, Caenidae (*Caenis* sp., small square-gilled mayfly) was dominant; and Ephemeridae (*Hexagenia* sp. burrowing mayfly) was dominant in offshore grab samples (Tables 5.1.6-2 and 5.1.6-3). Small numbers of Trichoptera were collected in both habitat types; no Plecoptera were found. Mean EPT:C (ratio of EPT to Chironomidae) in the nearshore was 0.88, indicating a balanced community with respect to EPT and Chironomidae abundance (Table 5.1.6-2). Mean EPT:C was 1.87 in the offshore habitat and indicated a EPT-dominant community compared to chironomid abundance (Table 5.1.6-3).

Ten of a total 30 families (Hill's effective and taxonomic richness) were identified from nearshore kicknet samples, most notably were: Chironomidae, Amphipoda (Hyalellidae), Ephemeroptera (Caenidae), and Gastropoda (Planorbidae) (Table 5.1.6-2). Mean taxonomic richness for the nearshore habitat was 7 families (Figure 5.1.6-13). Four of the 13 families identified in offshore grab samples were proportionately abundant, namely Chironomidae, Ephemeroptera (Ephemeridae), and Bivalvia (Pisidiidae) (Table 5.1.6-3). Mean taxonomic richness for the offshore habitat was 6 families (Figure 5.1.6-14). Mean diversity (Simpson's) was 0.85 in the nearshore and 0.61 in the offshore (Figures 5.1.6-15 to 5.1.6-16). Mean evenness (Simpson's equitability) was 0.33 in the nearshore and 0.43 in the offshore (Figures 5.1.6-15 to 5.1.6-16).

Pointe du Bois Forebay

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 174 individuals (Table 5.1.6-2; Figure 5.1.6-5). The BMI community was equal with respect to non-insect and insect abundance (Figure 5.1.6-6). Non-insects consisted of mainly Amphipoda, with smaller numbers of Gastropoda, Oligochaeta, and Bivalvia, while insects consisted of mainly Hemiptera (Corixidae) and Chironomidae, with a smaller number of Ephemeroptera, and Trichoptera also present (Figure 5.1.6-7). Mean BMI density of benthic grab samples (n=30, 2008 to 2009) collected in the predominantly wetted nearshore habitat of Pointe du Bois Forebay was 3,373 invertebrates/m^2 (Table 5.1.6-4; Figure 5.1.6-17). Non-insects dominated the BMI community in abundance, mainly consisting of Amphipoda; though Gastropoda, Oligochaeta, Bivalvia, were also present (Figures 5.1.6-18 and 5.1.6-19). Insects mainly consisted of Chironomidae followed by Ephemeroptera and Trichoptera, (Figures 5.1.6-

19). Mean total density for BMI collected in offshore benthic grab samples (n=35, 2008 to 2010) was 1,196 individuals/m^2 (Table 5.1.6-3; Figure 5.1.6-8). Insects dominated the offshore BMI community, mainly consisting of Ephemeroptera, followed by Chironomidae (Figures 5.1.6-9 and 5.1.6-10). Of the non-insects, oligochaetes and bivalves dominated; a small number of amphipods and gastropods were also present (Figure 5.1.6-10).

In 2010, total EPT comprised 8% of the total BMI community collected in the intermittently wetted nearshore habitat, with the prevalence being within the Ephemeroptera (Table 5.1.6-2; Figure 5.1.6-11). Caenidae (*Caenis* sp., small square-gilled mayfly) was the most abundant of the mayflies (Table 5.1.6-2). Mean EPT comprised 13% and 52% of the mean total BMI density in the predominantly wetted nearshore and offshore, respectively (Tables 5.1.6-4 and 5.1.6-2; Figures 5.1.6-20 and 5.1.6-12). Ephemeridae (*Hexagenia* sp., burrowing mayflies) was the dominant taxon in both nearshore and offshore grab samples (Tables 5.1.6-4 and 5.1.6-2). Mean EPT:C in the intermittently wetted nearshore habitat was 1.48 indicating an established EPT community with respect to chironomid abundance (Table 5.1.6-4). Mean EPT:C was 1.54 (EPT-dominant) in the predominantly wetted nearshore (Table 5.1.6-4); and 4.34 (EPT-dominant) in the offshore (Table 5.1.6-2).

Seven of 32 families (Hill's effective and taxonomic richness) were dominant in the intermittently wetted nearshore habitat (notably, Hyalellidae, Corixidae, and Chironomidae) (Table 5.1.6-2). Mean taxonomic richness was 18 families (Figure 5.1.6-13). Six of the 33 families identified in nearshore grab samples dominated the total BMI community; notably, Amphipoda (Hyallelidae), Chironomidae, and Ephemeroptera (Ephemeridae) (Table 5.1.6-4). Mean taxonomic richness for the nearshore was 8 families (Figure 5.1.6-21). Three of the 13 families identified in the offshore were proportionally abundant particularly, Ephemeroptera (Ephemeridae) and Chironomidae (Table 5.1.6-3). Mean taxonomic richness for the offshore was 4 families (Figure 5.1.6-14). Diversity and evenness values intermittently wetted nearshore habitat were 0.71 and 0.21, respectively (Figure 5.1.6-15). Mean diversity index was 0.72 in the predominantly wetted nearshore and 0.57 in the offshore (Figures 5.1.6-22 and 5.1.6-16). Evenness values were 0.50 and 0.55 in the predominantly wetted nearshore and offshore, respectively (Figures 5.1.6-22 and 5.1.6-16).

Lac du Bonnet

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 556 individuals (Table 5.1.6-2; Figure 5.1.6-5). Non-insects dominated the BMI community, mainly consisting of Amphipoda; Oligochaeta, Gastropoda, and were also present (Figures 5.1.6-6 and 5.1.6-7). Insects mainly consisted of Ephemeroptera and Chironomidae, and a small number of Trichoptera (Figure 5.1.6-7). Mean BMI density of benthic grab samples (n=30, 2008 to 2009) collected in the predominantly wetted nearshore habitat of Lac du Bonnet was 1,063 invertebrates/m^2 (Table 5.1.6-4; Figure 5.1.6-17). Overall, non-insects dominated the BMI community and mainly consisted of Gastropoda followed by Bivalvia; Oligochaeta and Amphipoda were also present (Figures 5.1.6-18 and 5.1.6-19). Insects mainly consisted of Ephemeroptera and Chironomidae; small numbers of Trichoptera and Plecoptera were also present (Figure 5.1.6-19). Mean BMI density in offshore benthic grab samples (n=35, 2008 to 2010) was 4,097 individuals/m^2 (Table 5.1.6-3; Figure 5.1.6-8). Similar to the nearshore, non-insects dominated the BMI community, with Amphipoda dominating the community; Bivalvia, Oligochaeta, and small numbers of Gastropoda were also present (Figures 5.1.6-9 and 5.1.6-10). Insects mainly consisted of Chironomidae, Ephemeroptera; and Trichoptera (Figure 5.1.6-10).

Mean EPT collected in the intermittently wetted nearshore habitat comprised 8% of the total BMI community (Table 5.1.6-2; Figure 5.1.6-11). *Ephemera* sp. (Ephemeridae) was the dominant mayfly (Table 5.1.6-2). Mean EPT comprised 9% of the total BMI community in the predominantly wetted nearshore and offshore; of the EPT, ephemeropterans were proportionately most abundant in both habitats (Tables 5.1.6-4 and 5.1.6-3; Figures 5.1.6-20 and 5.1.6-12). *Hexagenia* sp. was the dominant mayfly taxon identified in both near and offshore benthic samples (Tables 5.1.6-4 and 5.1.6-3). Mean EPT: C in the intermittently wetted nearshore habitat was 1.42, indicating an EPT-dominated community with respect to chironomid abundance (Table 5.1.6-2). Mean EPT:C was 1.13 and 1.04 in the predominantly wetted nearshore and offshore, respectively (Tables 5.1.6-4 and 5.1.6-3). Both ratio values indicated a fairly balanced EPT: C community in both habitat types.

Three out of the 26 families identified from the intermittently wetted nearshore habitat (Hill’s effective and taxonomic richness) were predominant, specifically Amphipoda (Hyalellidae) (Table 5.1.6-2). Mean taxonomic richness was 16 families (Figure 5.1.6-13). Three out of 15 BMI families (Hill’s effective and taxonomic richness) dominated the nearshore BMI community (benthic grabs), particularly, Gastropoda (Hydrobiidae and Pisidiidae) (Table 5.1.6-4). Mean taxonomic richness for the predominantly wetted nearshore habitat was 5 families (Figure 5.1.6-21). Four of 21 families identified dominated the offshore BMI community, most notably Amiphipoda (Haustoridae) (Table 5.1.6-3). Mean taxonomic richness for the offshore habitat was 7 families (Figure 5.1.6-14). Diversity and evenness values in the intermittently wetted nearshore habitat were 0.40 and 0.09, respectively (Figure 5.1.6-15). Simpson’s diversity and evenness values were 0.52 and 0.56 in the predominantly wetted nearshore and 0.57 and 0.55 in the offshore, respectively (Figures 5.1.6-22 and 5.1.6-16).

<u>Manigotagan Lake</u>

Mean BMI abundance of kicknet samples (n=5; 2010) collected in the intermittently wetted nearshore habitat was 107 individuals (Table 5.1.6-2; Figure 5.1.6-5). Non-insects dominated the BMI community and the predominant major groups were Amphipoda and Oligochaeta (Figures 5.1.6-6 and 5.1.6-7). Insects were primarily comprised of Chironomidae and small numbers of Ephemeroptera and Trichoptera (Figure 5.1.6-7). Mean BMI density of benthic grab samples (n=30, 2008 to 2009) collected in the predominantly wetted nearshore habitat of Manigotagan Lake was 3,669 individuals/m^2 (Table 5.1.6-4; Figure 5.1.6-17). Overall, insects dominated the BMI community in abundance and mainly consisted of Chironomidae followed by Ephemeroptera and Trichoptera (Figures 5.1.6-18 and 5.1.6-19). Non-insects mainly consisted of Oligochaeta, followed by Bivalvia, Gastropoda, and Amphipoda (Figure 5.1.6-19). Mean BMI density of offshore benthic grab samples (n=20, 2009 to 2010) was 1,869 individuals/m^2 (Table 5.1.6-3; Figure 5.1.6-8). Insects marginally dominated the BMI community, mainly consisting of Chironomidae; small numbers of Ephemeroptera and Trichoptera were also present (Figures 5.1.6-9 and 5.1.6-10). Of the non-insects, the main groups were Amphipoda, followed by Bivalvia, Oligochaeta; and Gastropoda (Figure 5.1.6-10).

Mean EPT for nearshore kicknet samples comprised 9% of the BMI community (Table 5.1.6-2). Mayflies dominated the EPT, and Leptophlebiidae (unidentified genera) and Baetidae (*Procloeon* sp.) were most abundant (Table 5.1.6-2). Mean EPT comprised 9% and <1% of the mean abundance in the predominantly wetted nearshore and offshore habitats, respectively; and of the EPT, mayflies were most abundant in both habitats (Tables 5.1.6-4 and 5.1.6-3, Figures 5.1.6-11 and 5.1.6-12). *Hexagenia* sp. was dominant in the predominantly wetted nearshore and offshore samples (Tables 5.1.6-4 and 5.1.6-3). Mean EPT:C in the intermittently wetted nearshore habitat was 0.43, indicating a chironomid-dominated (Table 5.1.6-2).Mean EPT: C was 0.20 and 0.04 in the predominantly wetted nearshore and offshore habitats, respectively; indicating a chironomid-dominated community with respect to EPT and Chironomidae abundance (Tables 5.1.6-4 and 5.1.6-3).

Six out of the 23 families (Hill’s effective and taxonomic richness) identified from nearshore kicknet samples dominated the community, of those Amphipoda (Hyalellidae), Chironomidae, and Oligochaeta predominated (Table 5.1.6-2). Mean taxonomic richness in the intermittently wetted nearshore habitat was 11 families (Figure 5.1.6-13). Four out the 19 families identified in the predominantly wetted nearshore significantly contributed to the overall BMI composition; most notably were Chironomidae, Oligochaeta, and Ephemeroptera (Ephemeridae) (Table 5.1.6-4). Mean taxonomic richness of the predominantly wetted nearshore habitat was 7 families (Figure 5.1.6-21). Five out of 9 families identified from the offshore dominated, specifically

Chaoboridae, Amphipoda (Haustoriidae), and Chironomidae (Table 5.1.6-3). In the offshore, mean taxonomic richness was 5 families (Figure 5.1.6-14). Simpson's diversity and evenness values in the intermittently wetted nearshore habitat were 0.69 and 0.31, respectively (Figure 5.1.6-15). Simpson's diversity index was 0.64 and 0.73 in the predominantly wetted nearshore and offshore, respectively (Figures 5.1.6-22 and 5.1.6-16). Simpson's equitability values were 0.41 in the nearshore and 0.62 in the offshore habitats (Figures 5.1.6-22 and 5.1.6-16).

5.1.6.3 Spatial Comparisons

Few differences amongst sites were detected in BMI abundance and richness metrics for the intermittently wetted nearshore habitat. While statistical analysis only incorporated one year of data (2010), Lac du Bonnet and Manigotagan Lake appeared to be significantly different from each other with respect to abundances of non-insects, amphipods, Shannon's and Hill's evenness values; and in all cases Lac du Bonnet was greater (Figures 5.1.6-5 to 5.1.6-7, 5.1.6-11, 5.1.6-13, 5.1.6-15).

Several differences amongst sites were detected in the offshore habitat. While statistical analysis on incorporated two years of data (2008 to 2009), no difference was apparent for abundances of gastropods, insects, and chironomids. For several of these measures trends were difficult to summarize, however all three sites appeared significantly different for abundances of non-insects, amphipods, EPT:C, and Shannon's evenness (Figures 5.1.6-8 to 5.1.6-10, 5.1.6-12, 5.1.6-14, 5.1.6-16). Differences between Manigotagan Lake and Pointe du Bois forebay were more obvious in the offshore habitat, with Lac du Bonnet significantly greater for most measures.

Differences in BMI abundance and richness metrics for the predominantly wetted nearshore habitat of Pointe du Bois forebay (on-system), Lac du Bonnet (on-system), and Manigotagan Lake (off-system) were detected. While statistical analysis only incorporated two years of data (2008 to 2009), it appears that abundances of insects, chironomids, EPT, Shannon-Weaver index, and Hill's effective richness varied amongst all sites (Figures 5.1.6-17 to 5.1.6-22). Lac du Bonnet differed significantly from the other two sites, with respect to the majority of measures (i.e., abundances of macroinvertebrates, oligochaetes, ephemeropterans, and taxa richness). For all of these measures, Lac du Bonnet appears to be significantly lower than the other two sites. While there was considerable overlap, it appeared that Pointe du Bois and Manigotagan Lake were more similar to one another with respect to BMI metrics.

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

5.1.6.4 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.

Few temporal differences in BMI abundance measures for Pointe du Bois predominantly wetted nearshore habitat were detected. While statistical analysis only incorporated two years of data (2008 to 2009), it appeared that abundance of ephemeropterans, EPT, and EPT:C varied between years with 2008 was significantly greater than 2009 (Figures 5.1.6-23 to 5.1.6-28). No significant differences were detected in the any other abundance measure or any of the diversity metrics. Temporal differences in macroinvertebrate abundance and diversity metrics for the offshore were detected. Statistical analysis incorporated three years of data (2008 to 2010) and it appears that abundances of macroinvertebrates, insects, chironomids were significantly greater in 2008 than in 2009 and 2010 (Figures 5.1.6-29 to 5.1.6-34). Differences were also found for taxa richness, Shannon-Weaver index and Hill’s effective richness, where 2009 was significantly less than 2010. No significant differences were detected for abundances of non-insects, oligochaetes, amiphipods, bivalves, gastropods, ephemeropterans, trichopterans, EPT, EPT:C, Simpson’s diversity, and Simpson’s, Shannon’s, or Hill’s evenness values. Few temporal differences in BMI abundance and diversity measures of Lac du Bonnet predominantly wetted nearshore habitat were detected. While statistical analysis only incorporated two years of data (2008 to 2009), it appeared that abundance of macroinvertebrates, gastropods, plecopterans, taxonomic and Hill’s effective richness varied between years (Figures 5.1.6-35 to 5.1.6-40). Except for plecopterans, measures were significantly greater in 2008. Temporal differences in macroinvertebrate abundance and diversity metrics for the offshore were detected. Statistical analysis incorporated three years of data (2008 to 2010) and its appears that abundances of all major groups except EPT:C and all diversity metrics varied amongst years (Figures 5.1.6-41 to

5.1.6-46). For several measures, trends were difficult to summarize, however it appears that 2008 was significantly greater for abundances of macroinvertebrates, non-insects, insects, chironomids, ephemeropterans and EPT. Also, 2009 appears to be significantly lower with respect to taxonomic richness and Simpson's diversity index when compared to 2008 and 2010.

Temporal differences in BMI abundance and diversity metrics for the predominantly wetted nearshore habitat of Manigotagan Lake were detected. While statistical analysis only incorporated two years of data (2008 to 2009), it appeared that abundance of bivalves, gastropods, insects, chironomids, ephemeropterans, EPT, taxa richness, Simpson's evenness, Shannon-Weaver index, and Hill's effective richness and evenness varied between years (Figures 5.1.6-47 to 5.1.6-52). Except for Simpson's evenness, all measures were significantly greater in 2008 compared to 2009. No significant differences were detected for abundances of non-insects, oligochaetes, amphipods, trichopterans, EPT:C, Simpson's diversity index, or Shannon's evenness. Temporal differences in macroinvertebrate abundance and diversity metrics for the offshore were detected. While statistical analysis only incorporated two years of data (2009 to 2010), it appeared that 2009 and 2010 were significantly different in all abundance and diversity measures except Simpson's diversity, and Simpson's, Shannon's and Hill's evenness values (Figures 5.1.6-53 to 5.1.6-58). Except for EPT-related measures and taxonomic richness, 2010 was significantly less than 2009.

Table 5.1.6-1. Habitat and physical characteristics recorded at benthic macroinvertebrate sites in the Winnipeg 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)	(°C)			(%)	
Pointe du Bois Forebay (2008)	Nearshore	15	2.6	0.8	6.2	--	--	--	--	--	--	--
	Offshore	15	12.7	6.4	18.3	--	--	--	--	--	--	--
Lac du Bonnet (2008)	Nearshore	15	4.3	3.7	5.0	--	--	--	--	--	--	--
	Offshore	15	13.0	11.3	15.2	--	--	--	--	--	--	--
Manigotagan Lake (2008)	Nearshore	15	2.5	1.1	3.2	--	--	--	--	--	--	--
	Offshore	0	--	--	--	--	--	--	--	--	--	--

Table 5.1.6-1. continued.

Waterbody	Habitat Type	No. of Samples (n)	Water Depth Mean (m)	Water Depth Min (m)	Water Depth Max (m)	Mean Water Velocity (m/sec)	Mean Secchi Depth (m)	Water Temperature (°C)	Predominant Substrate	Riparian Vegetation	Canopy Cover (%)	Algae
Pointe du Bois Forebay (2009)	Nearshore	15	1.9	0.9	3.7	0.01	1.05	20.0	--	reeds, mixed forest	0	--
	Offshore	15	10.5	6.0	15.3	0.07	1.23	19.0	--	--	--	--
Lac du Bonnet (2009)	Nearshore	15	4.2	3.6	4.9	0.15	1.00	20.0	--	shrubs, mixed forest	0	--
	Offshore	15	12.4	10.7	14.7	0.15	1.15	19.0	--	--	--	--
Manigotagan Lake (2009)	Nearshore	15	2.9	2.0	3.4	0.02	0.90	18.0	--	reeds, shrubs, mixed forest	0	--
	Offshore	15	19.5	18.3	20.4	0.01	1.05	18.0	--	--	--	--

Table 5.1.6-1. 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)	(°C)			(%)	
Eaglenest Lake (2010)	Nearshore	5	0.9	0.8	1.0	0.00	0.97	15.0	bedrock, organic matter	shrubs, deciduous	0	attached, filamentous
	Offshore	5	7.0	5.6	7.9	0.14	1.08	15.0	clay, sand	--	--	--
Pointe du Bois Forebay (2010)	Nearshore	5	0.9	0.9	1.0	--	0.76	16.5	clay, silt, gravel	mixed forest	0	filamentous
	Offshore	5	7.2	5.9	9.2	0.00	1.21	15.0	clay, sand	--	--	--
Lac du Bonnet (2010)	Nearshore	5	0.8	0.6	0.9	0.00	0.65	15.0	sand, gravel, boulder	mixed forest	0	attached
	Offshore	5	7.0	6.5	7.7	0.18	0.89	15.0	clay, sand	--	--	--
Manigotagan Lake (2010)	Nearshore	5	1.0	0.8	1.0	--	>1.00	12.0	sand, woody debris, gravel	shrubs, mixed forest		--
	Offshore	5	8.0	6.3	9.7	0.00	1.61	12.0	clay, sand	--	--	--

Table 5.1.6-2. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate nearshore kicknet samples collected in the Winnipeg River Region for CAMPP, 2010.

Waterbody and Habitat	Eaglenest Lake Nearshore (2010)							Pointe du Bois Forebay Nearshore (2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--	5	--	--	--	--	--	--
Water Depth (m)	--	0.9	0.08	0.04	0.9	0.8	1.0	--	0.9	0.03	0.01	0.9	0.9	1.0
Abundance (no. per kicknet)														
Total Invertebrates	--	401	204.5	91.5	407	138	707	--	174	121.3	54.2	115	91	378
Non-Insecta	45	182	119.1	53.3	195	57	316	50	87	67.3	30.1	72	14	188
Oligochaeta	5	18	17.9	8.0	15	6	49	9	15	26.0	11.6	5	1	61
Amphipoda	21	85	76.0	34.0	41	17	196	28	48	47.8	21.4	43	4	117
Bivalvia	0	1	0.6	0.3	1	0	1	1	3	3.9	1.7	1	0	9
Gastropoda	19	77	74.6	33.4	29	20	179	10	17	34.9	15.6	1	0	79
Insecta	15	62	89.4	40.0	29	8	220	5	9	10.9	4.9	3	0	25
Chironomidae	55	219	143.6	64.2	212	74	429	50	86	62.5	28.0	75	21	190
Ephemeroptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Plecoptera	8	31	20.3	9.1	23	9	59	3	5	6.3	2.8	2	0	15
Trichoptera	23	93	52.7	23.6	76	43	156	16	27	33.7	15.1	18	4	86
EPT	23	93	87.8	39.3	83	21	240	8	14	17.1	7.7	4	0	40
EPT to Chironomidae Ratio	--	0.88	0.459	0.205	0.72	0.41	1.54	--	1.48	2.900	1.297	0.19	0.08	6.67
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)	30	17	2.6	1.2	17	15	21	32	18	7.4	3.3	19	8	25
Simpson's Diversity Index	--	0.85	0.045	0.020	0.84	0.79	0.91	--	0.71	0.188	0.084	0.74	0.40	0.89
Evenness (Simpson's Equitability)	--	0.33	0.120	0.050	0.31	0.21	0.53	--	0.21	0.070	0.030	0.19	0.15	0.32
Shannon-Weaver Index	--	2.26	0.257	0.115	2.25	1.90	2.57	--	1.80	0.651	0.291	1.96	0.85	2.58
Evenness (Shannon's Equitability)	--	0.74	0.086	0.039	0.73	0.60	0.84	--	0.59	0.152	0.068	0.62	0.35	0.78
Hill's Effective Richness	--	10	2.5	1.1	10	7	13	--	7	4.1	1.8	7	2	13
Evenness (Hill's)	--	0.46	0.122	0.054	0.45	0.29	0.62	--	0.32	0.096	0.043	0.31	0.21	0.47

Table 5.1.6-2. continued.

Waterbody and Habitat	Lac du Bonnet Nearshore (2010)							Manigotagan 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)	--	0.8	0.12	0.05	0.9	0.6	0.9	--	1.0	0.07	0.03	1.0	0.8	1.0
Abundance (no. per kicknet)														
Total Invertebrates	--	556	651.1	291.2	257	128	1672	--	107	78.3	35.0	110	14	226
Non-Insecta	86	478	565.3	252.8	226	95	1447	66	71	81.0	36.2	47	9	213
Oligochaeta	6	34	50.4	22.5	9	2	123	16	17	7.9	3.5	17	6	26
Amphipoda	78	434	509.4	227.8	193	84	1301	50	53	81.3	36.3	29	3	197
Bivalvia	0	2	2.1	0.9	2	0	5	0	0	0.0	0.0	0	0	0
Gastropoda	1	7	9.4	4.2	2	0	22	0	0	0.1	0.1	0	0	0
Insecta	6	31	40.8	18.3	9	1	97	7	7	8.4	3.7	6	0	21
Chironomidae	14	78	86.2	38.6	33	16	225	34	36	27.0	12.1	36	4	63
Ephemeroptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Plecoptera	2	11	14.9	6.7	5	1	37	3	3	2.8	1.3	2	0	6
Trichoptera	5	26	33.3	14.9	9	9	85	22	24	21.1	9.4	20	3	55
EPT	8	42	54.7	24.5	15	5	134	9	10	10.6	4.7	7	1	27
EPT to Chironomidae Ratio	--	1.42	0.862	0.386	1.57	0.54	2.60	--	0.43	0.283	0.127	0.40	0.13	0.83
Genus analysis of Ephemeroptera	Ephemeridae: *Ephemera*	--	--	--	--	--	--	Leptophlebiidae: unidentified + Baetidae: *Procloeon*	--	--	--	--	--	--
No. of Samples with No Aquatic Invertebrates	0	--	--	--	--	--	--	0	--	--	--	--	--	--
No. Samples with Only OLIGO +/or CHIRON	0	--	--	--	--	--	--	0	--	--	--	--	--	--
Taxonomic Richness (Family-level)	26	16	3.0	1.4	16	12	19	23	11	3.0	1.4	12	7	15
Simpson's Diversity Index	--	0.40	0.100	0.045	0.39	0.29	0.55	--	0.69	0.254	0.113	0.79	0.24	0.85
Evenness (Simpson's Equitability)	--	0.09	0.020	0.010	0.08	0.07	0.12	--	0.31	0.150	0.070	0.31	0.11	0.53
Shannon-Weaver Index	--	1.06	0.217	0.097	1.05	0.79	1.34	--	1.65	0.610	0.273	1.76	0.64	2.24
Evenness (Shannon's Equitability)	--	0.36	0.062	0.028	0.34	0.31	0.46	--	0.61	0.205	0.092	0.71	0.26	0.74
Hill's Effective Richness	--	3	0.6	0.3	3	2	4	--	6	2.8	1.2	6	2	9
Evenness (Hill's)	--	0.16	0.031	0.014	0.15	0.13	0.20	--	0.40	0.151	0.067	0.45	0.16	0.56

Table 5.1.6-3. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate offshore grab samples collected in the Winnipeg River Region for CAMPP, 2008 to 2010.

Waterbody and Habitat	Eaglenest Lake Offshore (2010)							Pointe du Bois Offshore (2008 to 2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	5	--	--	--	--	--	--	35	--	--	--	--	--	--
Water Depth (m)	--	7.0	1.1	0.5	7.7	5.6	7.9		11.0	3.8	0.6	10.1	5.9	18.3
Abundance (no. per m^2)														
Total Invertebrates	--	721	366.3	163.8	563	462	1356	--	1196	778.9	131.7	1082	87	3463
Non-Insecta	30	214	337.6	151.0	72	0	808	13	157	158.6	26.8	87	0	563
Oligochaeta	1	6	7.9	3.5	0	0	14	7	80	104.7	17.7	43	0	390
Amphipoda	2	17	23.7	10.6	14	0	58	0	1	7.3	1.2	0	0	43
Bivalvia	26	190	331.1	148.1	43	0	779	6	74	107.2	18.1	43	0	433
Gastropoda	0	0	0.0	0.0	0	0	0	0	0	2.4	0.4	0	0	14
Insecta	70	508	38.7	17.3	491	462	548	87	1039	722.9	122.2	822	43	2900
Chironomidae	33	239	169.1	75.6	216	87	519	31	367	449.9	76.0	216	0	1775
Ephemeroptera	30	219	143.0	63.9	216	0	361	51	609	435.0	73.5	519	43	1948
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	4	29	36.8	16.4	14	0	87	1	17	28.7	4.9	0	0	87
EPT	34	248	148.0	66.2	274	14	404	52	626	432.6	73.1	563	43	1948
EPT to Chironomidae Ratio	--	1.87	1.803	0.806	1.12	0.03	4.67	--	4.34	5.291	0.894	2.40	0.00	21.00
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)	13	6	1.5	0.7	6	4	7	13	4	1	0	4	1	7
Simpson's Diversity Index	--	0.61	0.108	0.048	0.61	0.48	0.78	--	0.57	0.151	0.026	0.62	0.00	0.79
Evenness (Simpson's Equitability)	--	0.43	0.130	0.060	0.48	0.26	0.57	--	0.55	0.186	0.031	0.53	0.29	1.02
Shannon-Weaver Index	--	1.25	0.298	0.133	1.15	0.92	1.70	--	1.13	0.355	0.060	1.15	0.00	1.77
Evenness (Shannon’s Equitability)	--	0.67	0.104	0.046	0.67	0.52	0.82	--	0.71	0.174	0.029	0.72	0.00	1.00
Hill's Effective Richness	--	4	1.1	0.5	3	3	5	--	3	1.1	0.2	3	1	6
Evenness (Hill's)	--	0.55	0.131	0.059	0.61	0.35	0.68	--	0.67	0.150	0.025	0.65	0.43	1.00

Table 5.1.6-3. continued.

Waterbody and Habitat	Lac du Bonnet Offshore (2008 to 2010)							Manigotagan Lake Offshore (2009 to 2010)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	35	--	--	--	--	--	--	20	--	--	--	--	--	--
Water Depth (m)		11.9	2.32	0.39	12.2	6.5	15.2		16.7	5.19	1.16	19.3	6.3	20.4
Abundance (no. per m^2)														
Total Invertebrates	--	4097	1945.0	328.8	3434	1385	8483	--	1869	1136.1	254.0	2164	144	3592
Non-Insecta	78	3181	1292.5	218.5	2900	1298	5930	45	838	629.9	140.8	844	43	2251
Oligochaeta	6	266	544.0	92.0	43	0	2308	11	201	186.9	41.8	173	14	779
Amphipoda	61	2501	1580.6	267.2	2467	0	5367	23	430	451.2	100.9	368	0	1861
Bivalvia	9	371	279.2	47.2	303	0	1096	11	206	305.3	68.3	130	0	1125
Gastropoda	1	38	105.1	17.8	0	0	491	0	1	4.4	1.0	0	0	14
Insecta	22	917	741.2	125.3	563	0	2554	55	1032	632.0	141.3	1298	72	1991
Chironomidae	13	529	489.6	82.8	346	0	1601	23	424	303.9	67.9	433	43	909
Ephemeroptera	8	315	229.5	38.8	303	0	779	0	4	10.6	2.4	0	0	43
Plecoptera	0	0	0.0	0.0	0	0	0	0	0	0.0	0.0	0	0	0
Trichoptera	2	64	78.6	13.3	43	0	260	0	1	3.2	0.7	0	0	14
EPT	9	379	282.9	47.8	303	0	952	0	5	11.7	2.6	0	0	43
EPT to Chironomidae Ratio	--	1.04	0.715	0.121	0.82	0.00	3.00	--	0.04	0.082	0.018	0.00	0.00	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)	21	7	2	0	7	3	10	9	5	0.8	0.2	5	4	7
Simpson's Diversity Index	--	0.58	0.097	0.016	0.59	0.40	0.77	--	0.73	0.060	0.013	0.75	0.59	0.85
Evenness (Simpson's Equitability)	--	0.33	0.102	0.017	0.30	0.21	0.78	--	0.62	0.126	0.028	0.62	0.45	0.95
Shannon-Weaver Index	--	1.27	0.272	0.046	1.34	0.79	1.75	--	1.49	0.176	0.039	1.54	1.17	1.89
Evenness (Shannon's Equitability)	--	0.62	0.091	0.015	0.61	0.45	0.84	--	0.82	0.070	0.016	0.83	0.69	0.97
Hill's Effective Richness	--	4	1.0	0.2	4	2	6	--	5	0.8	0.2	5	3	7
Evenness (Hill's)	--	0.47	0.101	0.017	0.45	0.30	0.84	--	0.73	0.096	0.021	0.73	0.58	0.94

Table 5.1.6-4. Summary statistics calculated from the taxonomic analysis of benthic macroinvertebrate nearshore grab samples collected in the Winnipeg River Region for CAMPP, 2008 to 2010.

Waterbody and Habitat	Pointe du Bois Forebay Nearshore (2008 to 2009)							Lac du Bonnet Nearshore (2008 to 2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	30	--	--	--	--	--	--	30	--	--	--	--	--	--
Water Depth (m)	--	2.3	1.52	0.28	2.0	0.8	6.2	--	4.2	0.44	0.08	4.3	3.6	5.0
Abundance (no. per m^2)														
Total Invertebrates	--	3373	4148.0	757.3	1753	173	17529	--	1063	794.1	145.0	995	130	3766
Non-Insecta	65	2209	3587.2	654.9	606	43	13894	86	913	745.0	136.0	844	0	3549
Oligochaeta	7	248	362.3	66.1	151	0	1948	2	17	29.2	5.3	0	0	87
Amphipoda	40	1363	2784.2	508.3	65	0	10994	1	12	25.2	4.6	0	0	87
Bivalvia	5	179	294.6	53.8	87	0	1428	31	333	379.1	69.2	173	0	1342
Gastropoda	11	355	486.6	88.8	108	0	2121	52	551	615.5	112.4	325	0	2510
Insecta	35	1164	1044.6	190.7	779	87	4155	14	150	106.5	19.4	130	0	433
Chironomidae	19	630	789.4	144.1	260	0	3030	4	38	45.1	8.2	43	0	173
Ephemeroptera	10	349	299.4	54.7	260	0	1601	8	87	80.4	14.7	43	0	260
Plecoptera	0	0	0.0	0.0	0	0	0	0	1	7.9	1.4	0	0	43
Trichoptera	3	102	113.4	20.7	87	0	390	1	7	20.0	3.6	0	0	87
EPT	13	452	333.1	60.8	368	87	1731	9	95	76.6	14.0	87	0	260
EPT to Chironomidae Ratio	--	1.54	1.613	0.295	0.88	0.00	6.00	--	1.13	1.589	0.290	0.17	0.00	5.00
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)	33	8	3.4	0.6	9	3	15	15	5	1.9	0.4	5	1	9
Simpson's Diversity Index	--	0.72	0.142	0.026	0.74	0.29	0.87	--	0.52	0.220	0.040	0.59	0.00	0.78
Evenness (Simpson's Equitability)	--	0.50	0.225	0.041	0.49	0.10	0.90	--	0.56	0.244	0.045	0.48	0.26	1.01
Shannon-Weaver Index	--	1.66	0.408	0.075	1.67	0.78	2.41	--	1.05	0.467	0.085	1.17	0.00	1.78
Evenness (Shannon’s Equitability)	--	0.77	0.153	0.028	0.80	0.29	0.97	--	0.64	0.264	0.048	0.72	0.00	1.00
Hill's Effective Richness	--	6	2.1	0.4	5	2	11	--	3	1.2	0.2	3	1	6
Evenness (Hill's)	--	0.64	0.203	0.037	0.65	0.16	0.94	--	0.68	0.197	0.036	0.65	0.38	1.00

Table 5.1.6-4. continued.

Waterbody and Habitat	Manigotagan Lake Nearshore (2008 to 2009)						
	Proportion (%)	Mean	SD	SE	Median	Min	Max
No. of Samples (n)	30	--	--	--	--	--	--
Water Depth (m)	--	2.7	0.57	0.10	2.9	1.1	3.4
Abundance (no. per m^2)							
Total Invertebrates	--	3669	2063.8	376.8	3268	866	9479
Non-Insecta	23	835	860.7	157.1	541	0	3852
Oligochaeta	14	529	817.9	149.3	260	0	3592
Amphipoda	2	88	271.2	49.5	0	0	1428
Bivalvia	3	114	138.5	25.3	87	0	476
Gastropoda	3	102	150.1	27.4	22	0	563
Insecta	77	2834	1824.0	333.0	2575	649	8613
Chironomidae	65	2381	1777.5	324.5	1926	476	8354
Ephemeroptera	7	261	290.1	53.0	173	0	1255
Plecoptera	0	0	0.0	0.0	0	0	0
Trichoptera	1	55	134.5	24.5	0	0	693
EPT	9	316	345.2	63.0	195	0	1428
EPT to Chironomidae Ratio	--	0.20	0.264	0.048	0.10	0.00	1.18
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)	19	7	2.1	0.4	7	3	10
Simpson's Diversity Index	--	0.64	0.126	0.023	0.67	0.27	0.80
Evenness (Simpson's Equitability)	--	0.41	0.140	0.025	0.40	0.19	0.76
Shannon-Weaver Index	--	1.35	0.318	0.058	1.36	0.60	1.84
Evenness (Shannon’s Equitability)	--	0.67	0.122	0.022	0.68	0.37	0.90
Hill's Effective Richness	--	4	1.2	0.2	4	2	6
Evenness (Hill's)	--	0.53	0.139	0.025	0.52	0.27	0.84

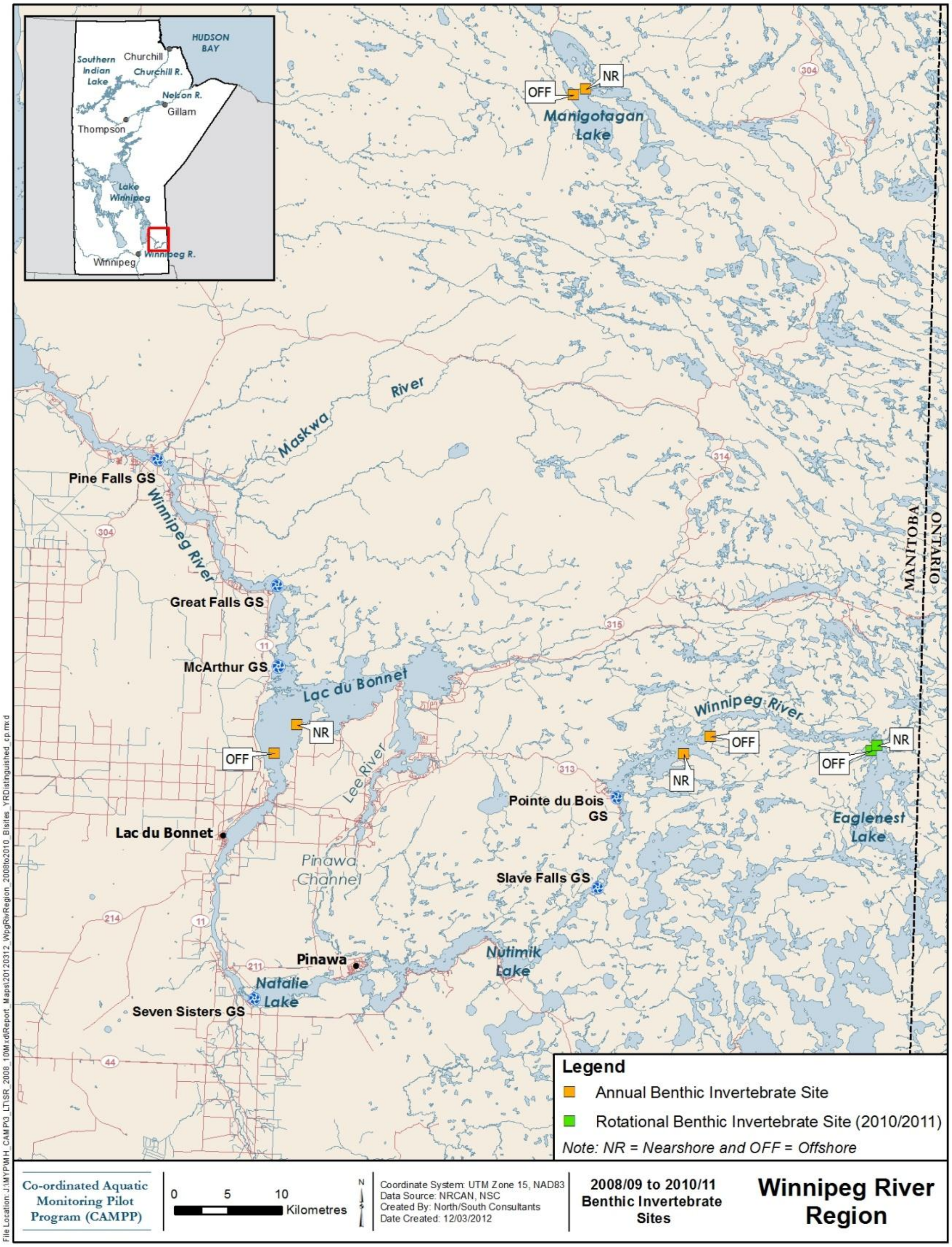
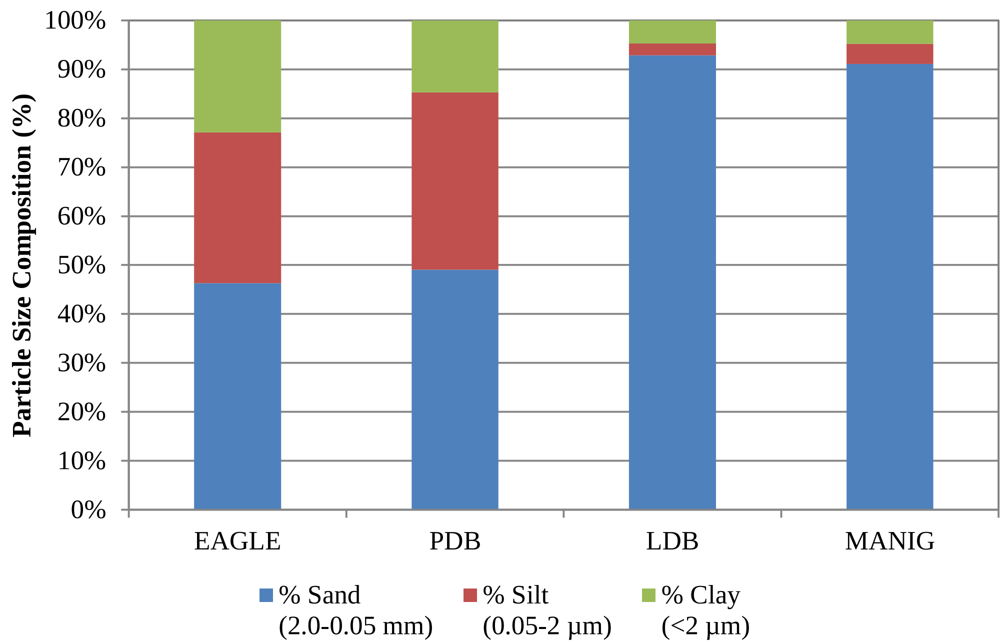


Figure 5.1.6-1. Benthic invertebrate sampling sites located in CAMPP waterbodies in the Winnipeg River Region, 2008 to 2010.



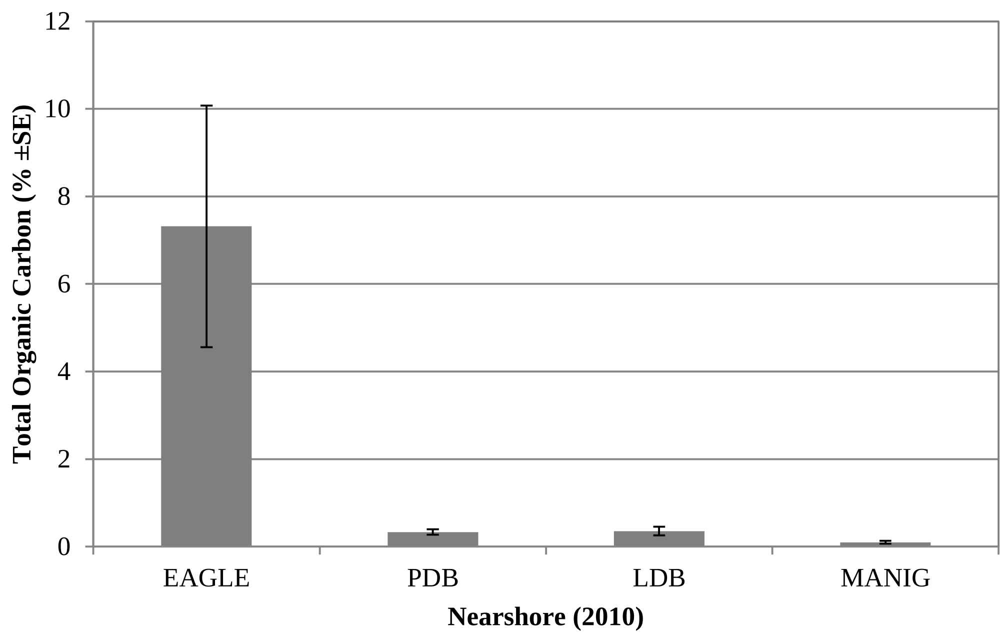
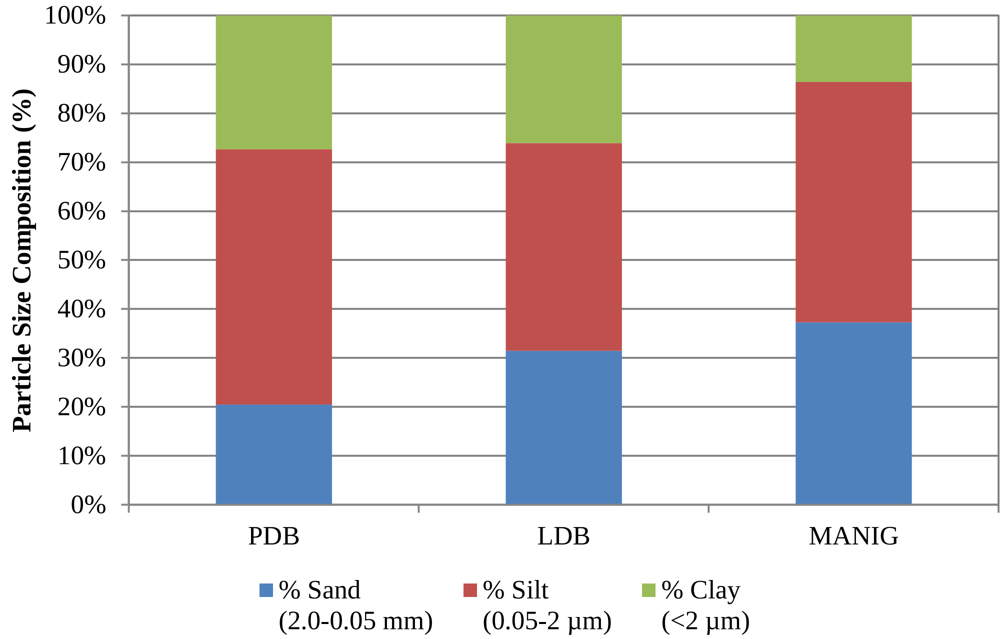


Figure 5.1.6-2. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with nearshore invertebrate sampling in the Winnipeg River Region for CAMPP, 2010.



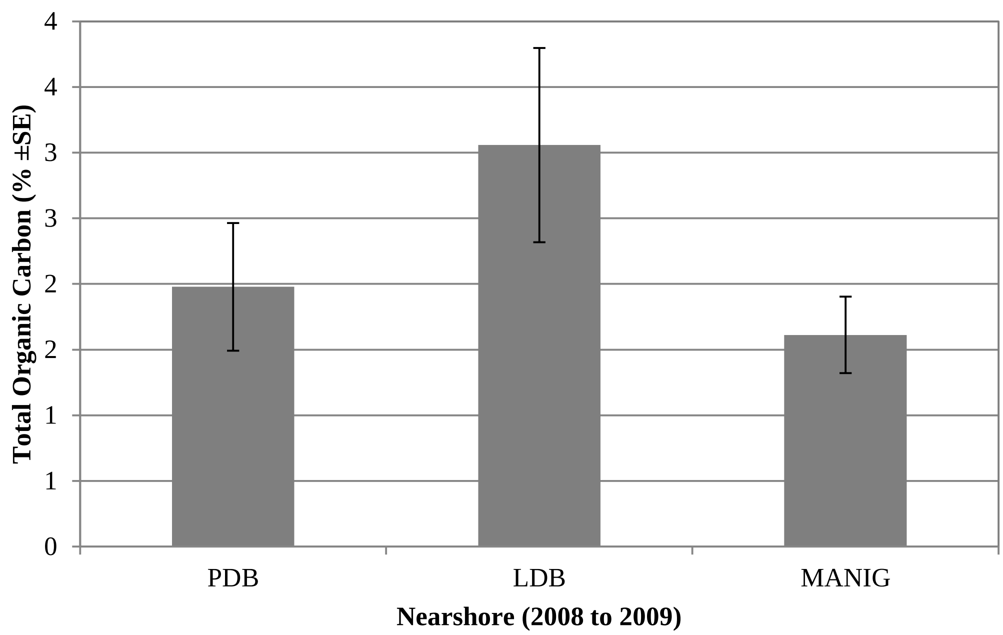


Figure 5.1.6-3. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with nearshore invertebrate sampling in the Winnipeg River Region for CAMPP, 2008 to 2009.

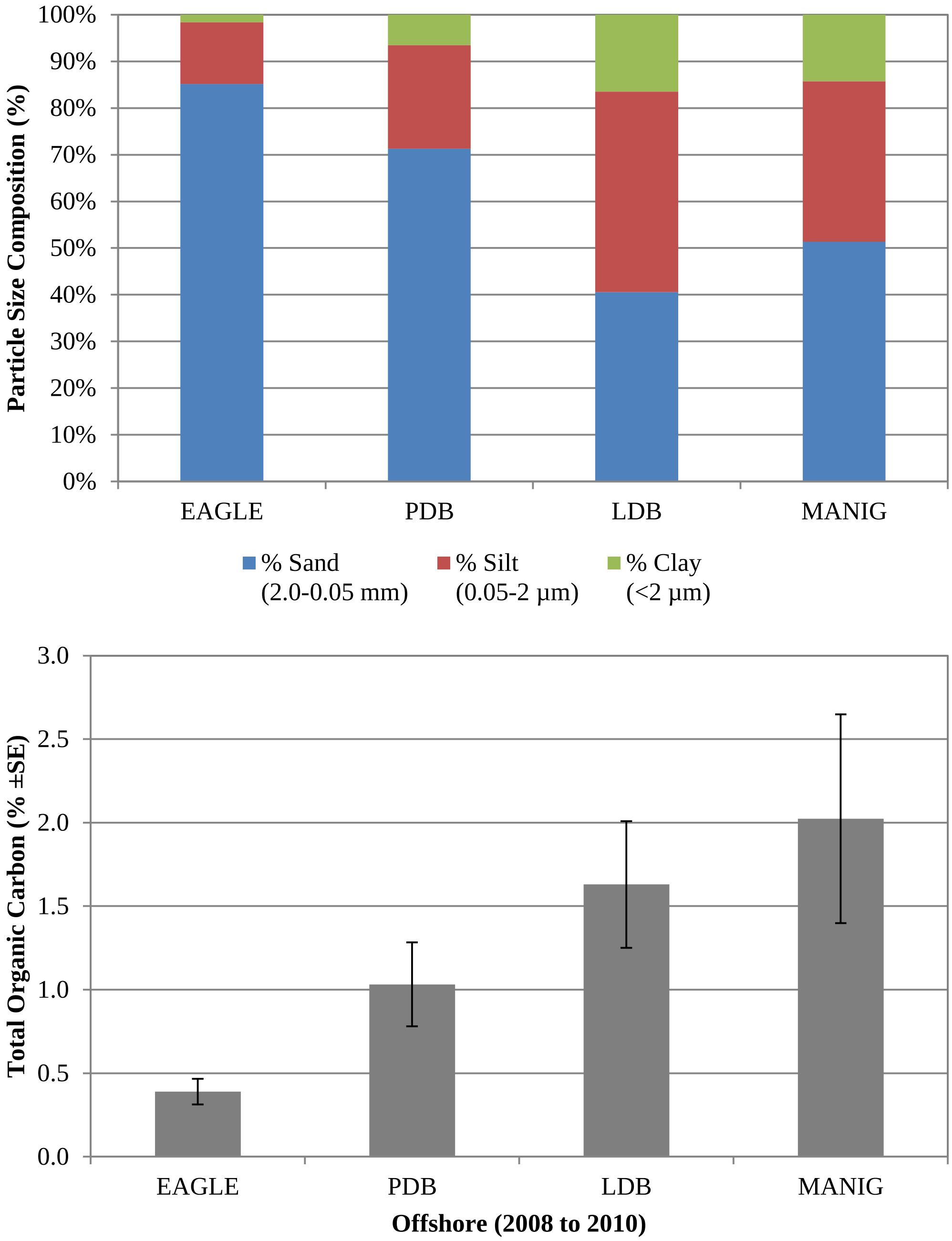


Figure 5.1.6-4. Sediment analyses (particle size composition and total organic carbon ± SE) of the benthic sediment collected in conjunction with offshore invertebrate sampling in the Winnipeg River Region for CAMPP, 2008 to 2010.

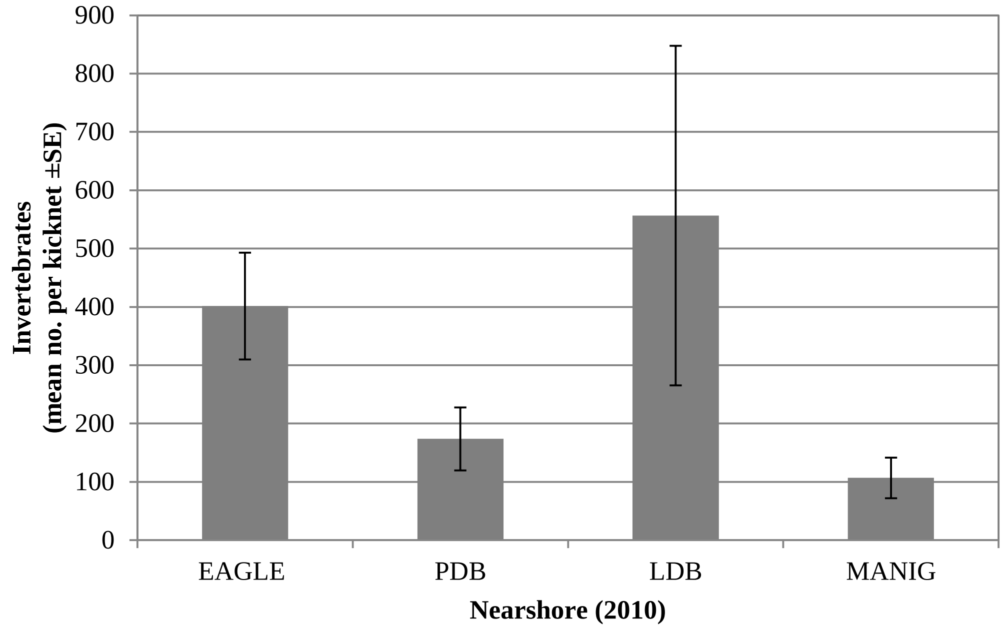


Figure 5.1.6-5. Abundances of benthic invertebrates (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2010.

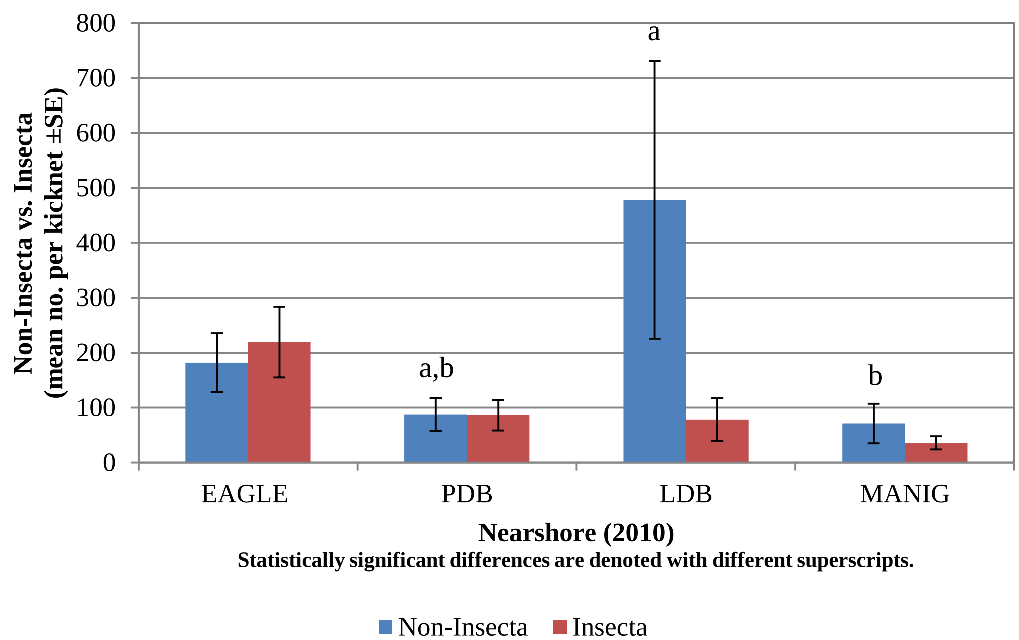


Figure 5.1.6-6. Abundances of non-insects and insects (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2010.

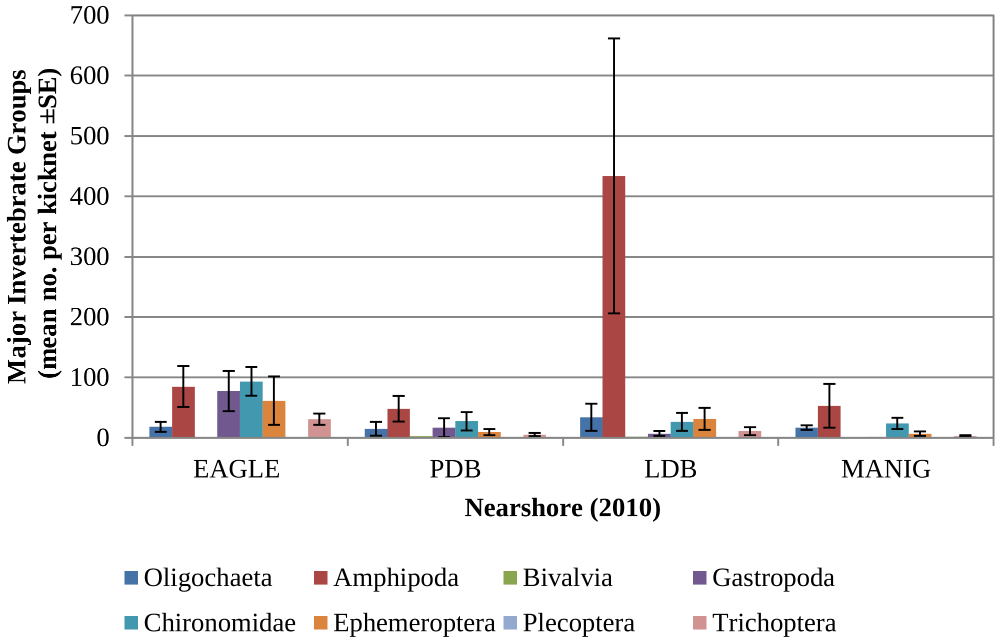


Figure 5.1.6-7. Abundances of the major invertebrate groups (no. per kicknet ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2010.

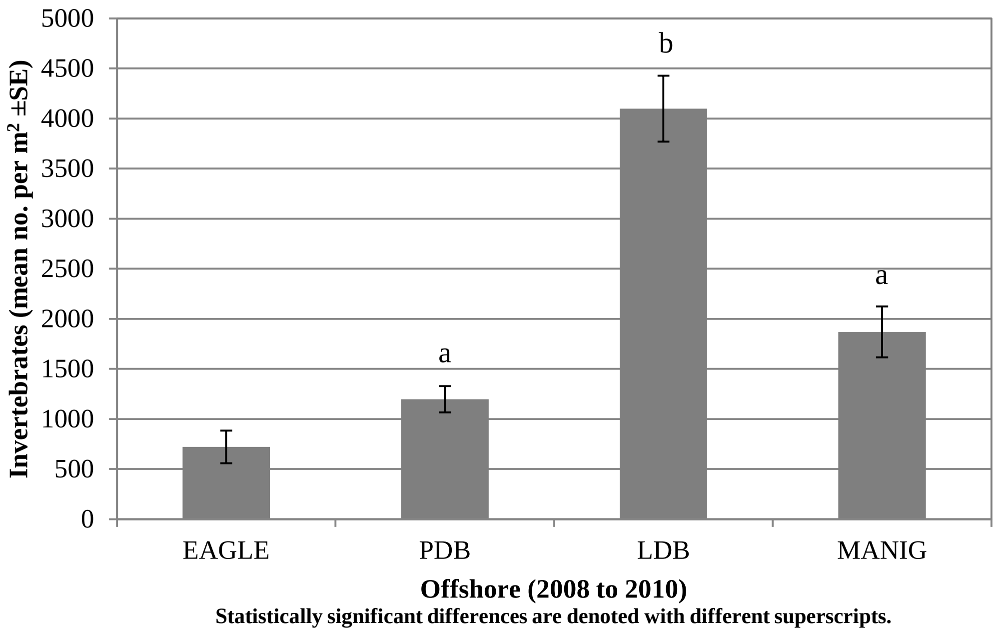


Figure 5.1.6-8. Abundances of benthic invertebrates (no. per m^2 ± SE) collected in the offshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2010.

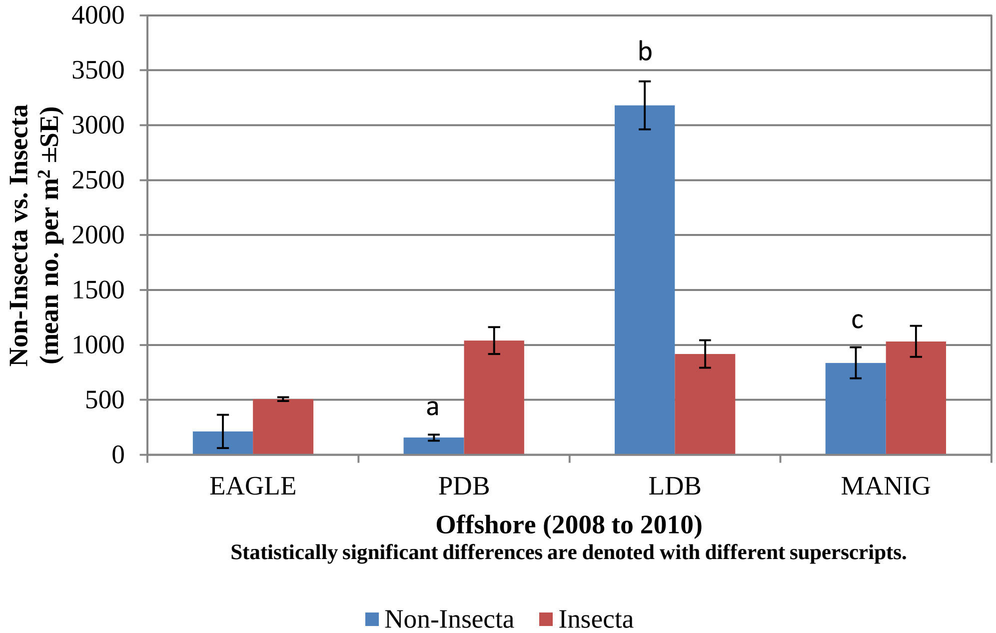


Figure 5.1.6-9. Abundances of non-insects and insects (no. per m^2 ± SE) collected in the offshore habitat of CAMPP waterbodies within the Winnipeg River Region, 2008 to 2010.

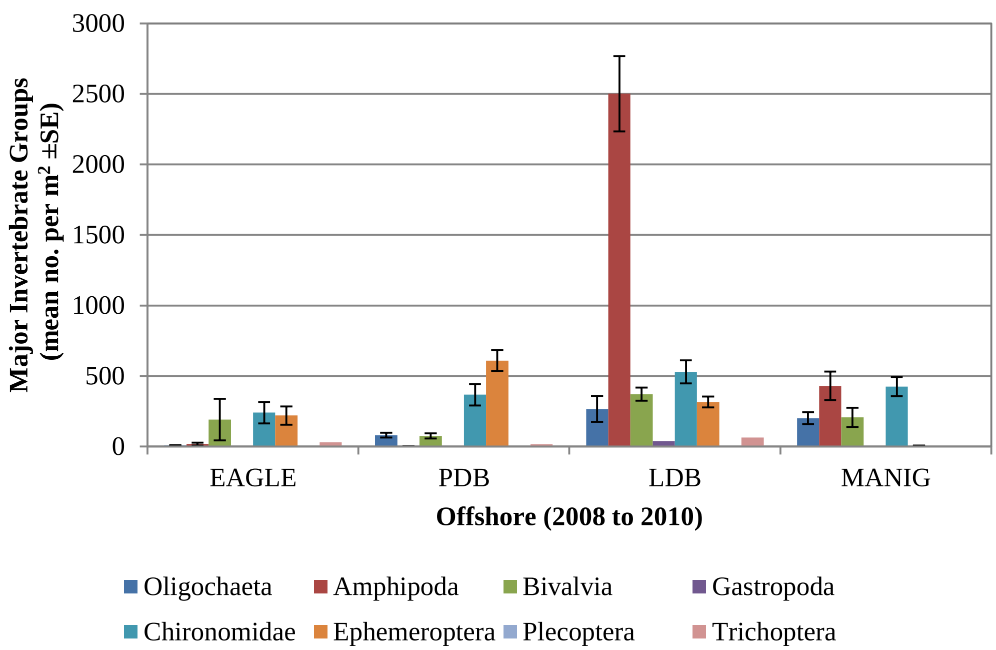


Figure 5.1.6-10. Abundances of the major invertebrate groups (no. per m^2 ± SE) collected in the offshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2010.

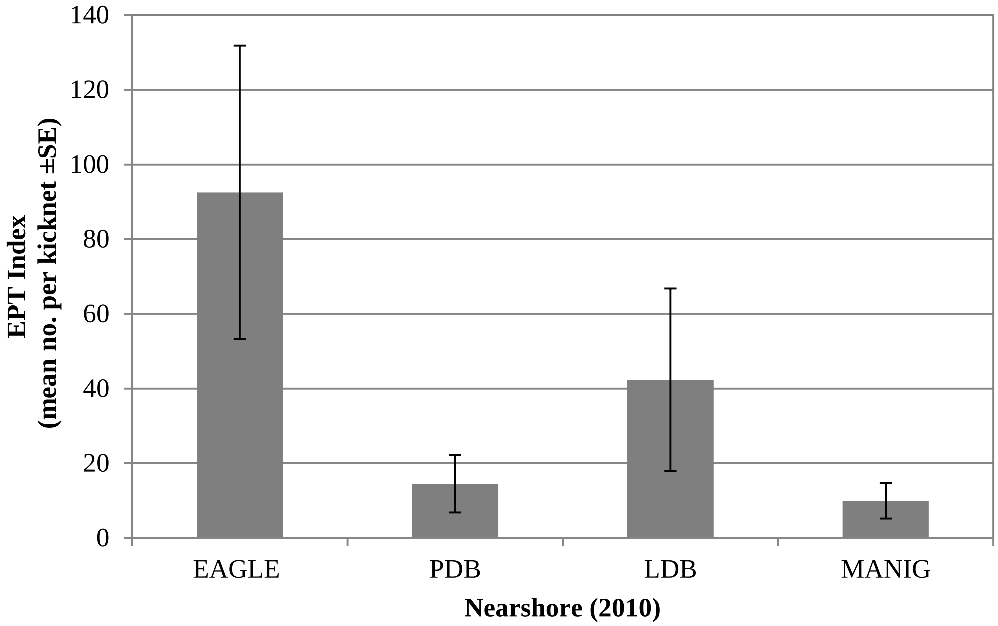


Figure 5.1.6-11. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from nearshore kicknet samples in CAMPP waterbodies in the Winnipeg River Region, 2010.

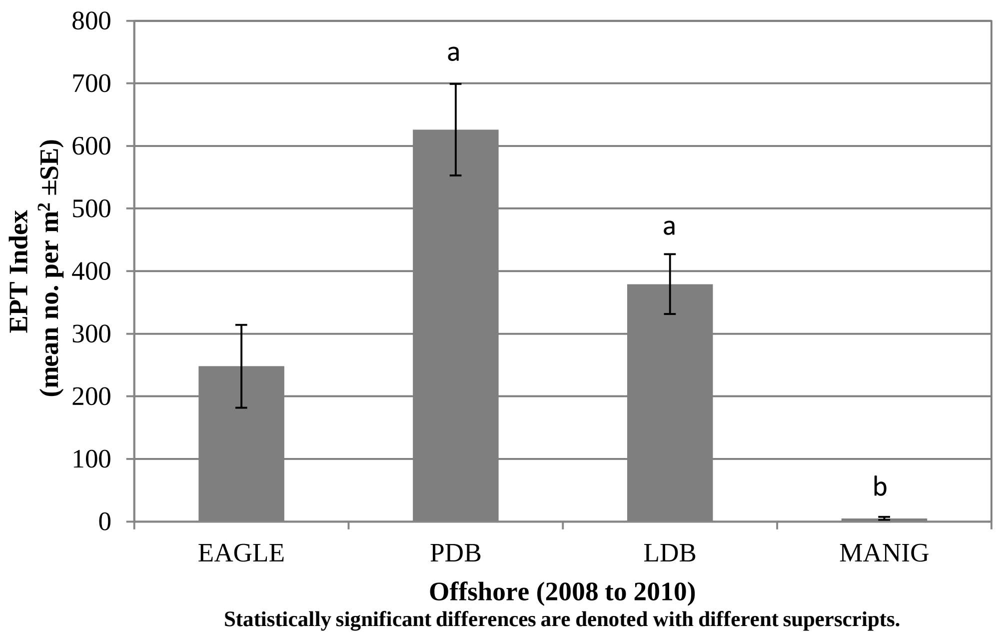


Figure 5.1.6-12. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from offshore grab samples in CAMPP waterbodies in the Winnipeg River Region, 2008 to 2010.

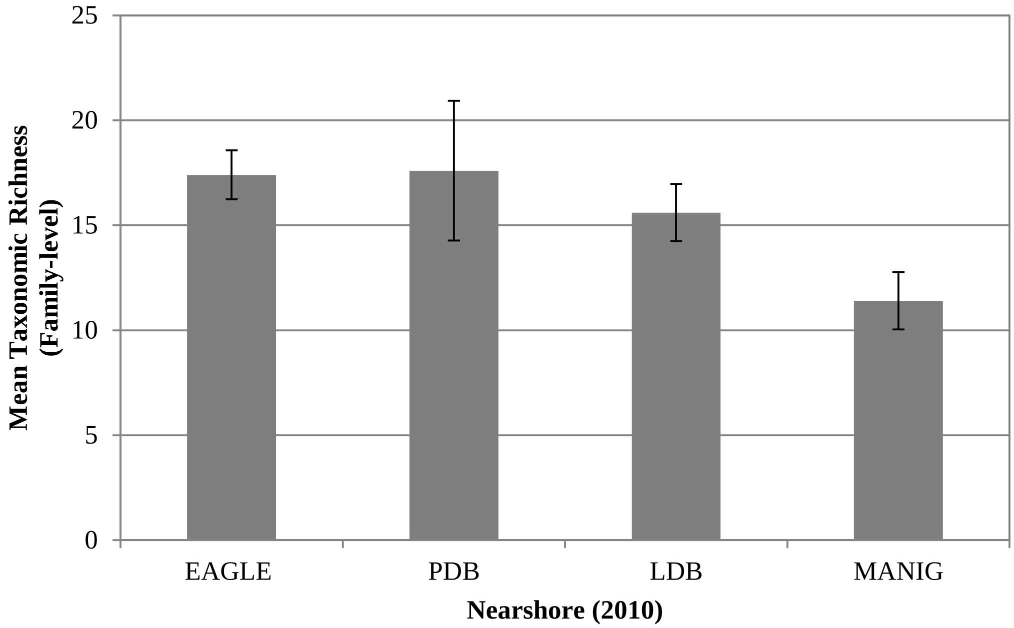


Figure 5.1.6-13. Taxa richness (mean no. of families) from benthic invertebrate kicknet samples collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2010.

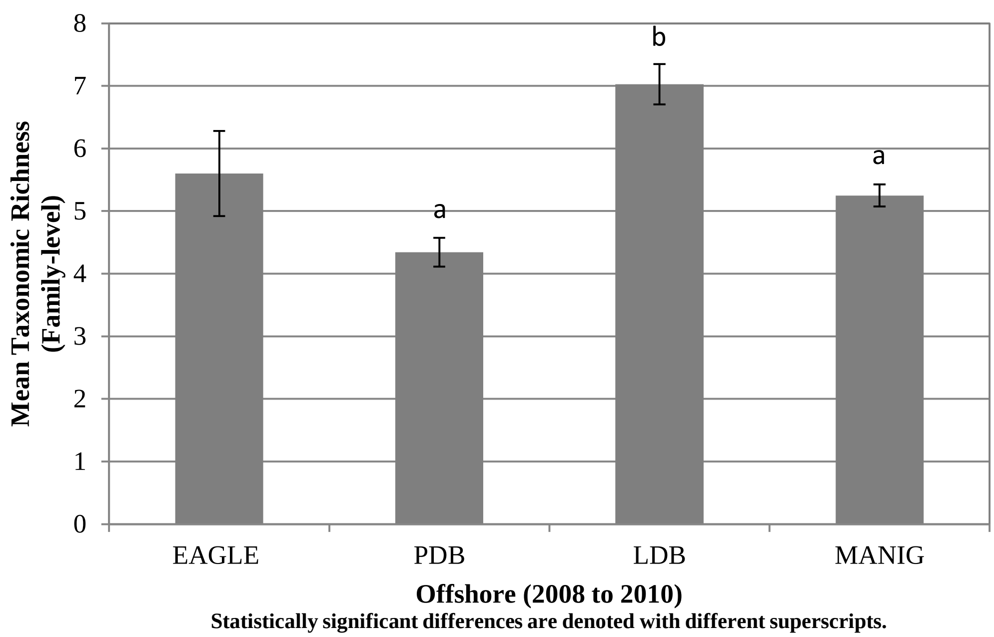


Figure 5.1.6-14. Taxa richness (mean no. of families) from benthic invertebrate grab samples collected in the offshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2009 to 2010.

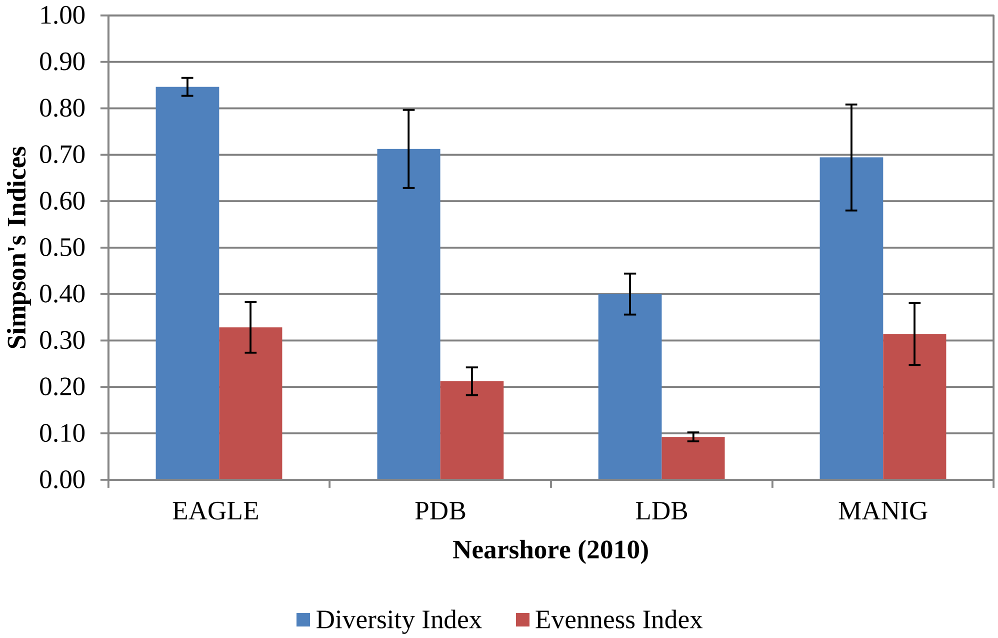


Figure 5.1.6-15. Diversity and evenness (Simpson's) indices calculated from nearshore kicknet samples of CAMPP waterbodies in the Winnipeg River Region, 2010.

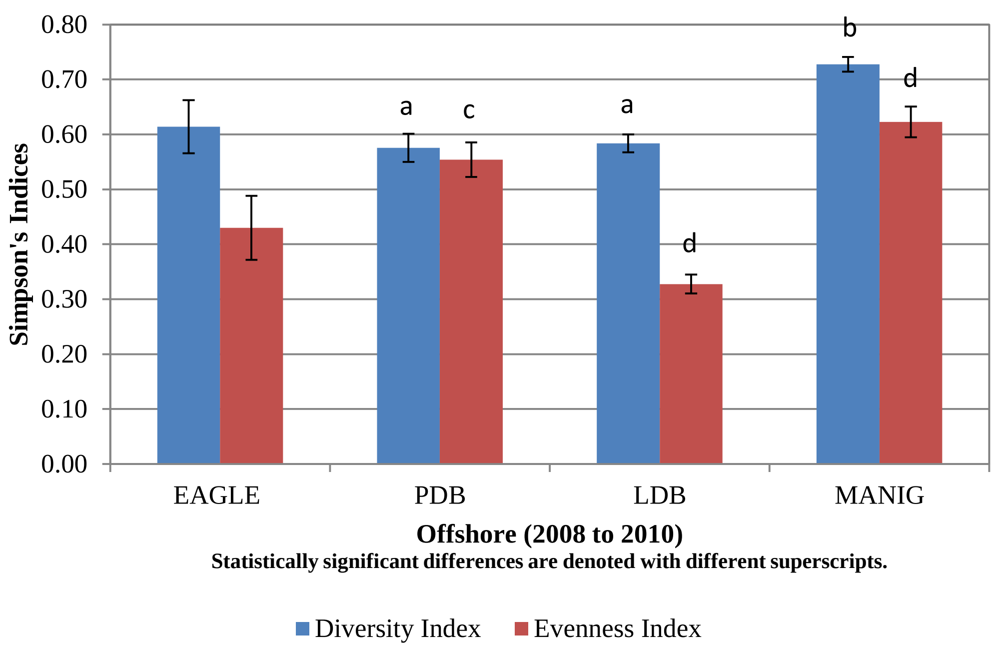


Figure 5.1.6-16. Diversity and evenness (Simpson's) indices calculated from offshore grab samples of CAMPP waterbodies within the Winnipeg River Region, 2008 to 2010.

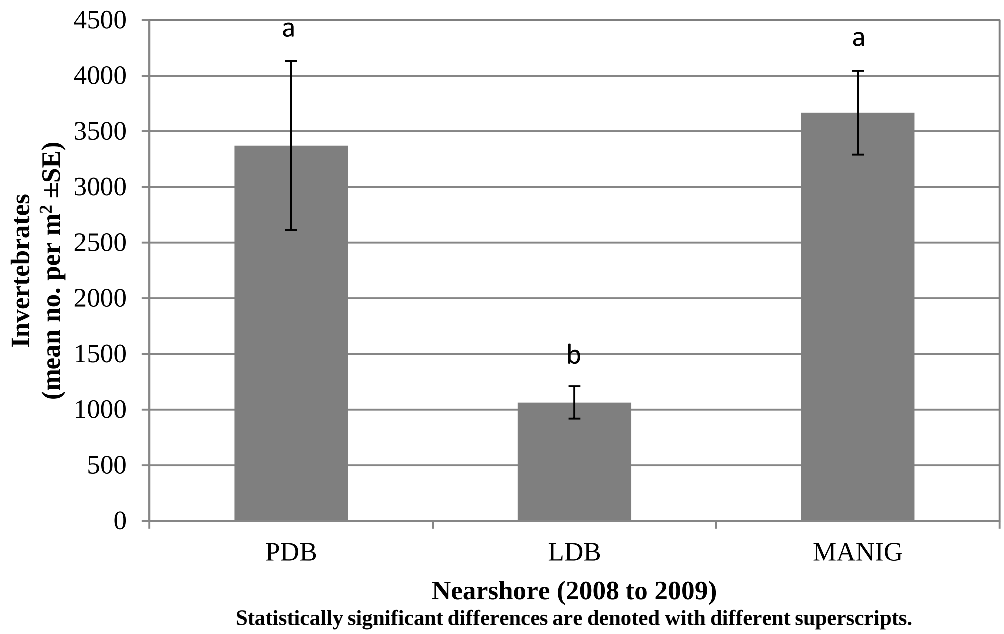


Figure 5.1.6-17. Abundances of benthic invertebrates (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2009.

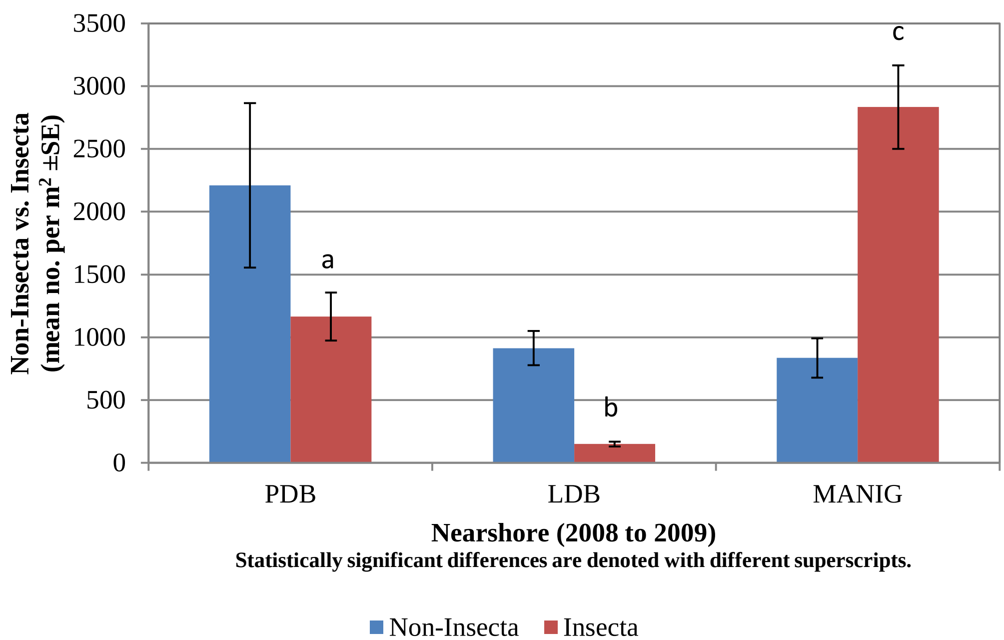


Figure 5.1.6-18. Abundances of non-insects and insects (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2009.

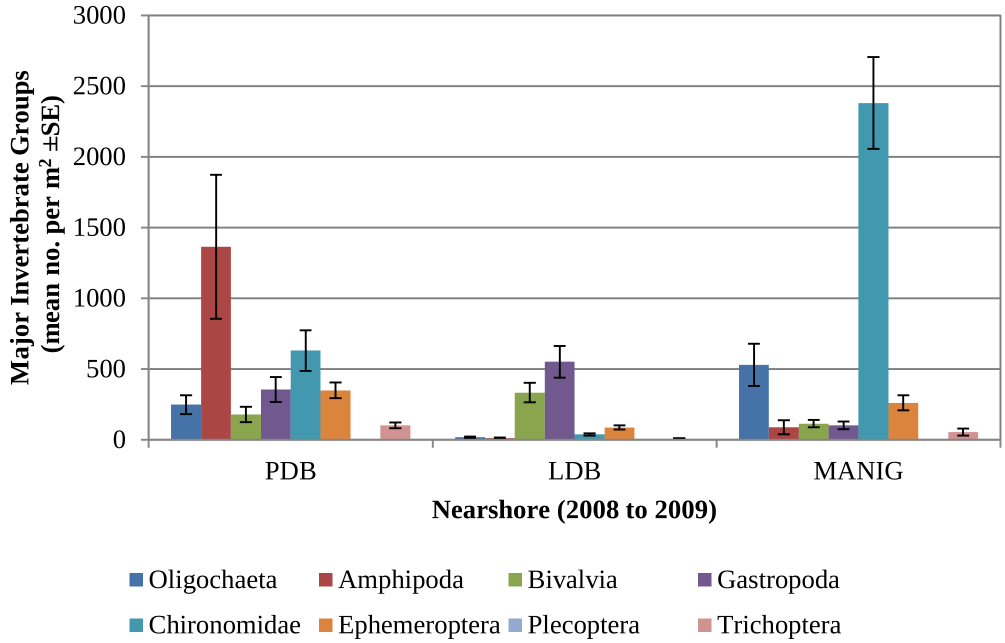


Figure 5.1.6-19. Abundances of the major invertebrate groups (no. per m^2 ± SE) collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2009.

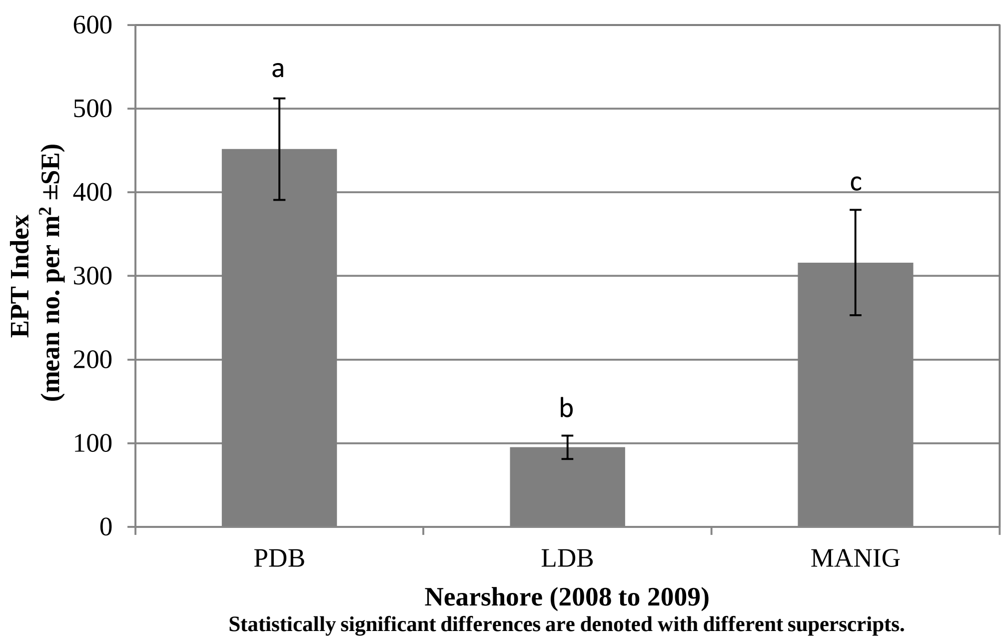


Figure 5.1.6-20. Total abundances of Ephemeroptera, Plecoptera, and Trichoptera (EPT Index) collected from nearshore grab samples in CAMPP waterbodies in the Winnipeg River Region, 2008 to 2009.

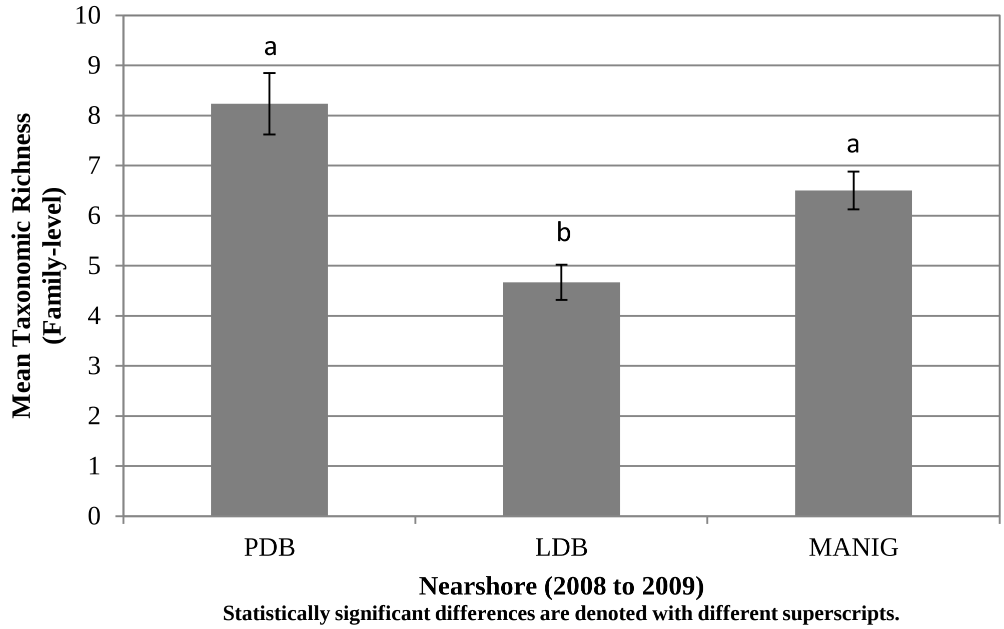


Figure 5.1.6-21. Taxa richness (mean no. of families) from benthic invertebrate grab samples collected in the nearshore habitat of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2009.

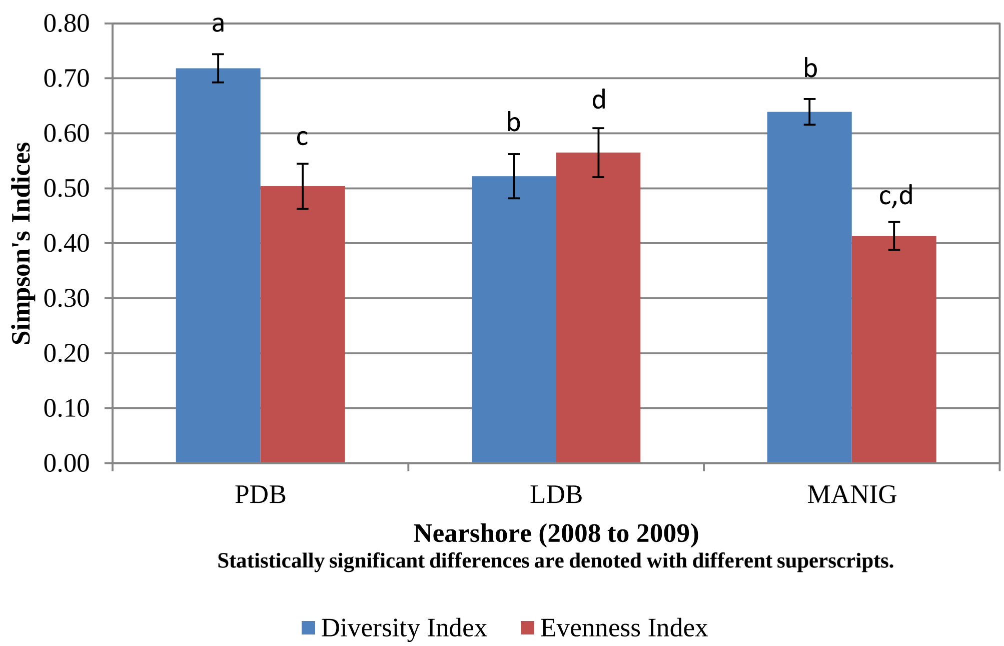


Figure 5.1.6-22. Diversity and evenness (Simpson's) indices calculated from nearshore grab samples of CAMPP waterbodies in the Winnipeg River Region, 2008 to 2009.

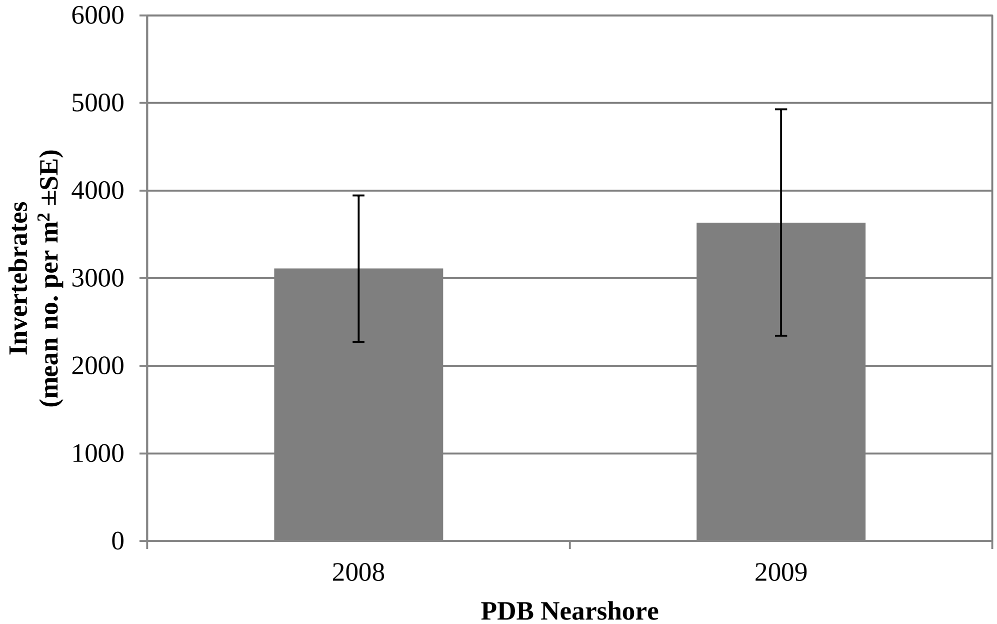


Figure 5.1.6-23. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the nearshore habitat of Pointe du Bois forebay, 2008 to 2009.

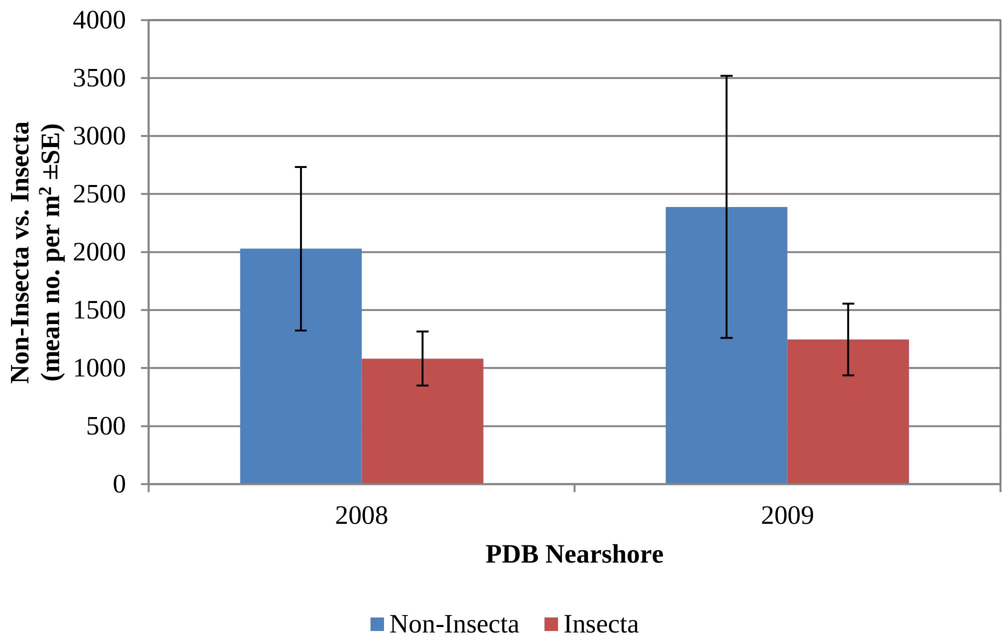


Figure 5.1.6-24. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the nearshore habitat of Pointe du Bois forebay, 2008 to 2009.

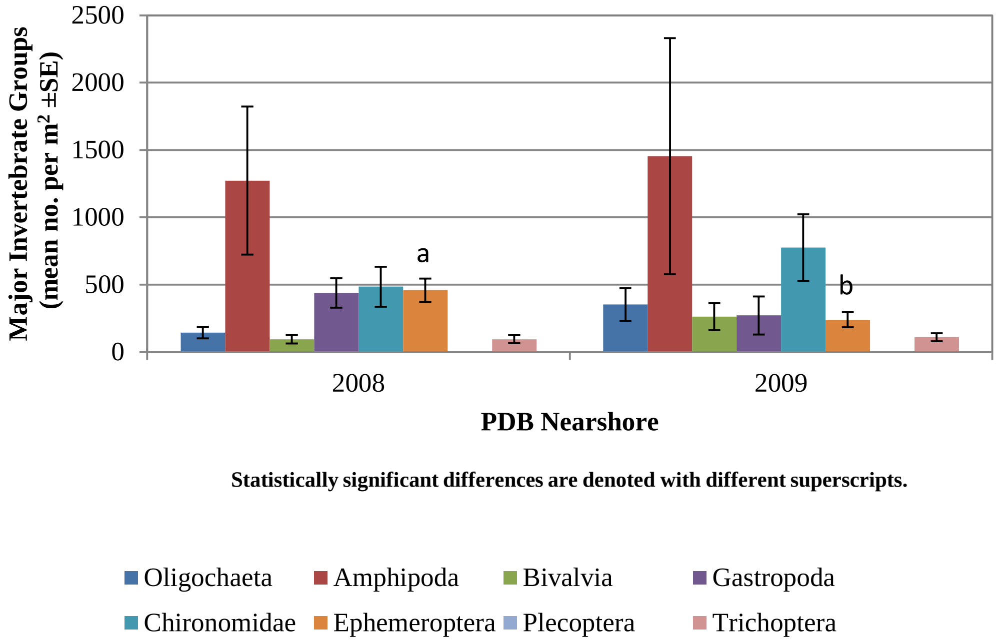


Figure 5.1.6-25. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the nearshore habitat of Pointe du Bois forebay, 2008 to 2009.

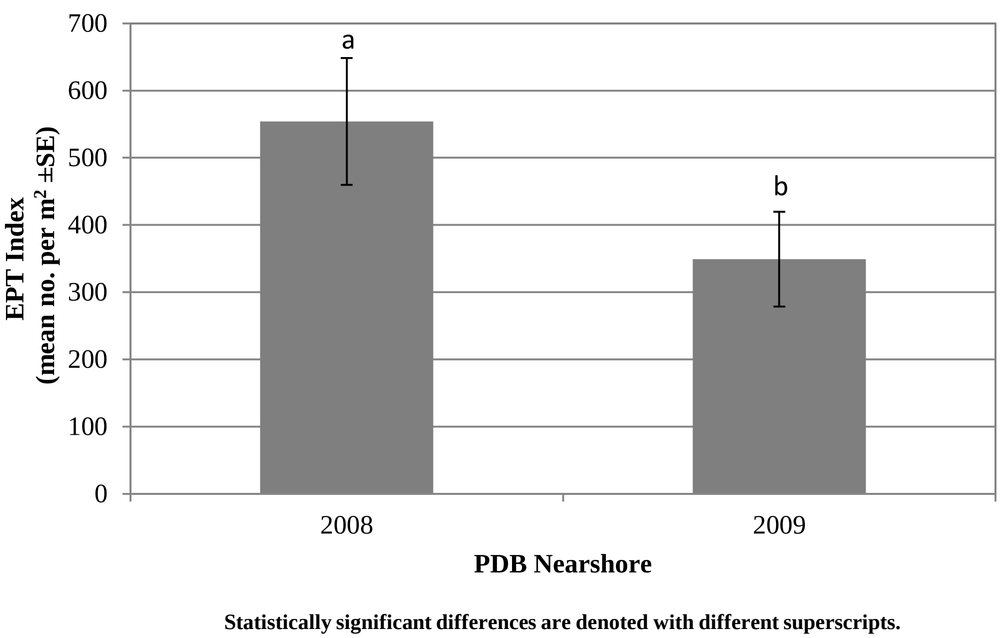


Figure 5.1.6-26. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of nearshore grab samples from Pointe du Bois forebay, 2008 to 2009.

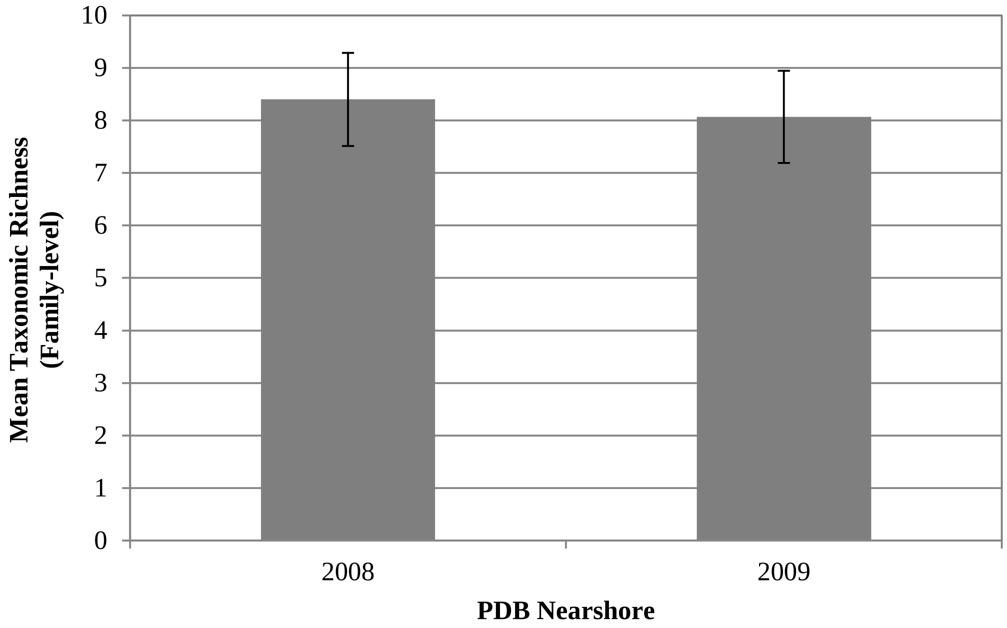


Figure 5.1.6-27. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of nearshore grab samples from Pointe du Bois forebay, 2008 to 2009.

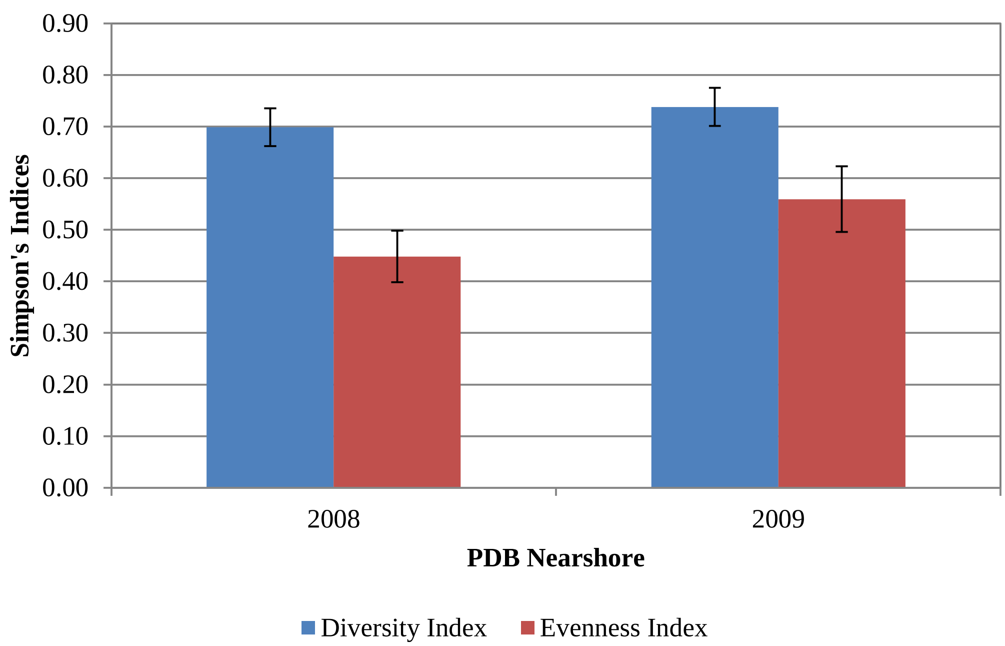


Figure 5.1.6-28. Temporal comparison of diversity and evenness (Simpson's) indices of nearshore grab samples from Pointe du Bois forebay, 2008 to 2009.

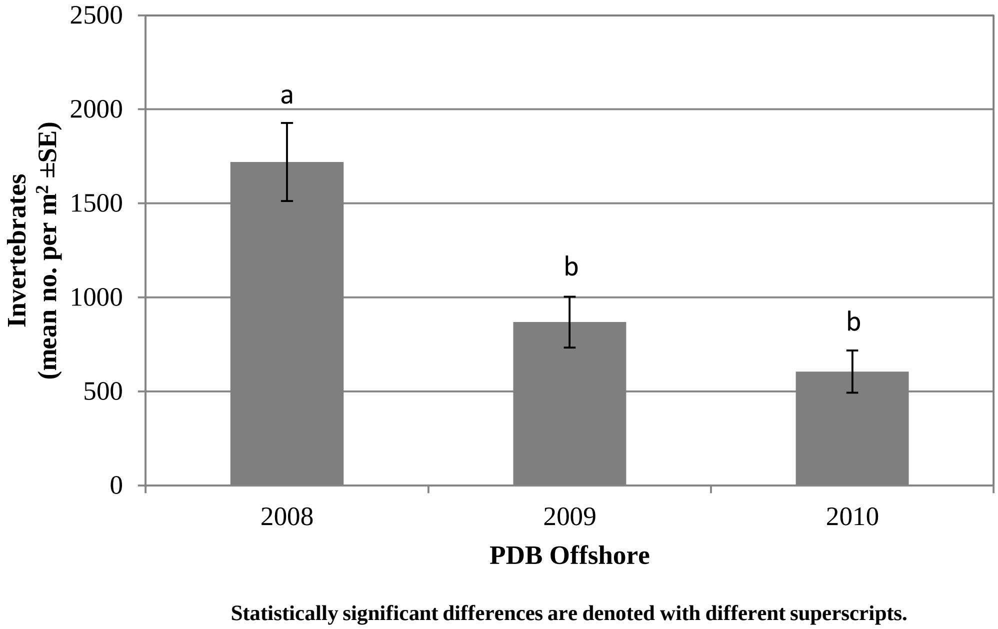


Figure 5.1.6-29. Temporal comparison of benthic invertebrate abundances (no. per $m^2 \pm$ SE) collected in the offshore habitat of Pointe du Bois forebay, 2008 to 2010.

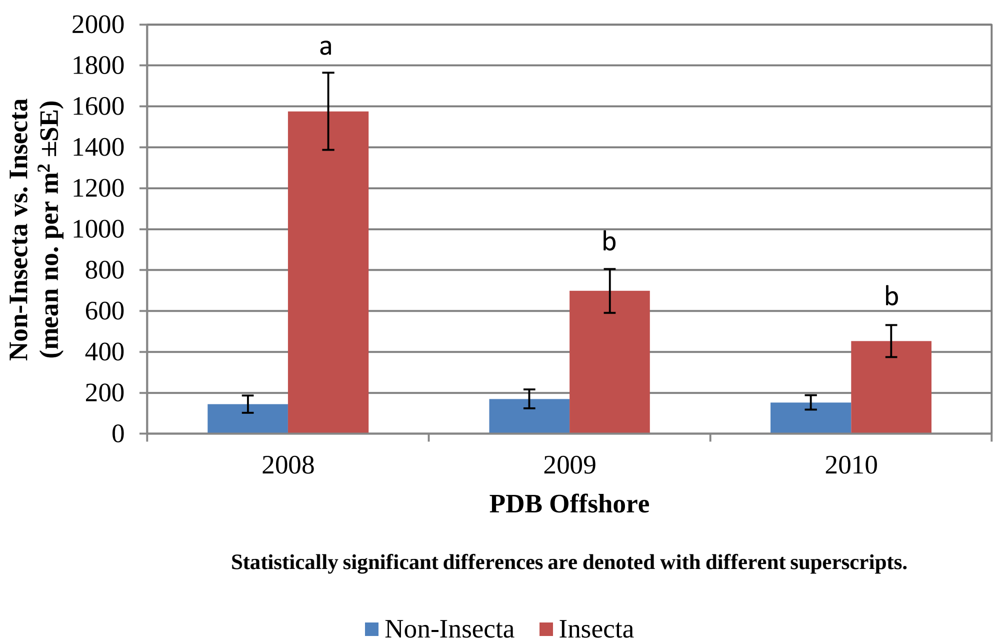


Figure 5.1.6-30. Temporal comparison of non-insect and insect abundances (no. per $m^2 \pm$ SE) collected in the offshore habitat of Pointe du Bois forebay, 2008 to 2010.

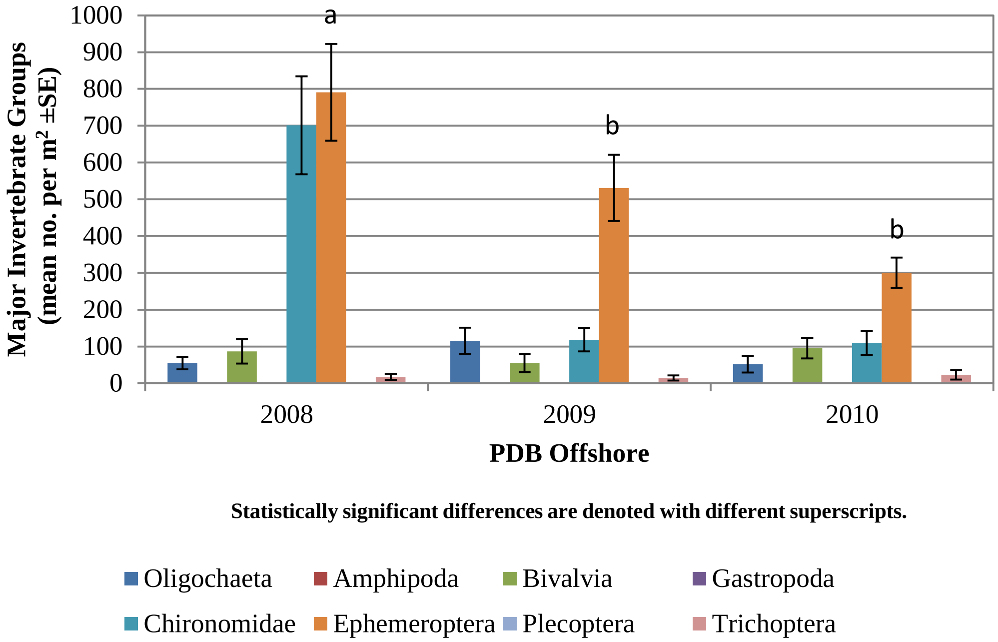


Figure 5.1.6-31. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the offshore habitat of Pointe du Bois forebay, 2008 to 2010.

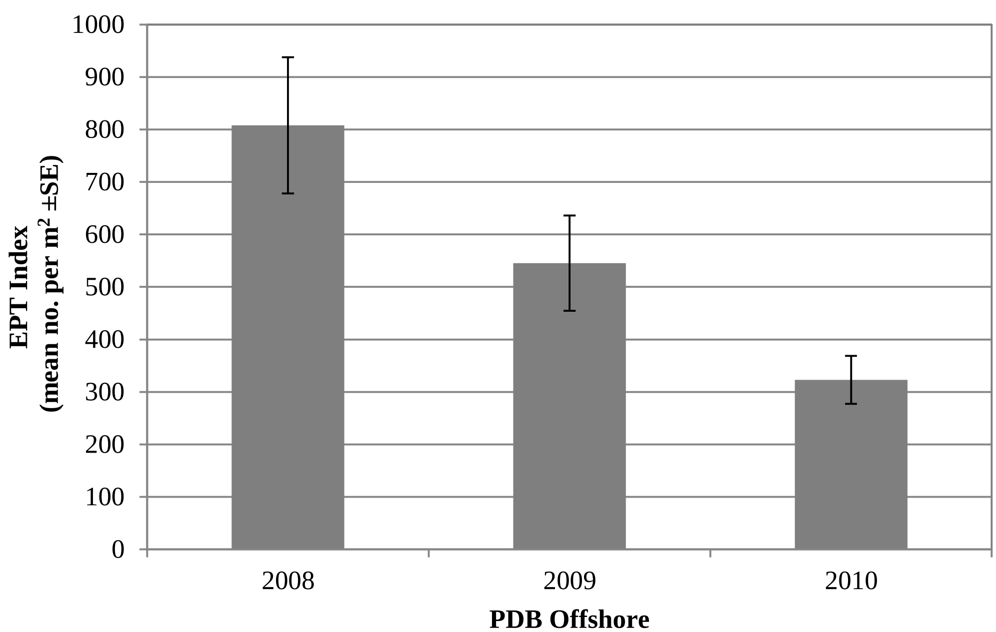


Figure 5.1.6-32. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore grab samples from Pointe du Bois forebay, 2008 to 2010.

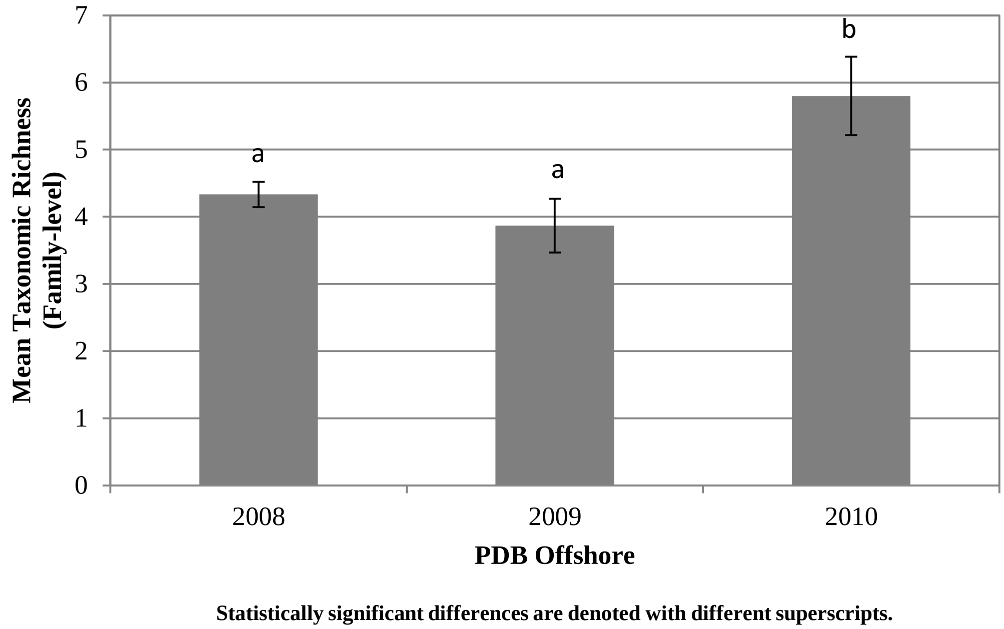


Figure 5.1.6-33. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of offshore grab samples from Pointe du Bois forebay, 2008 to 2009.

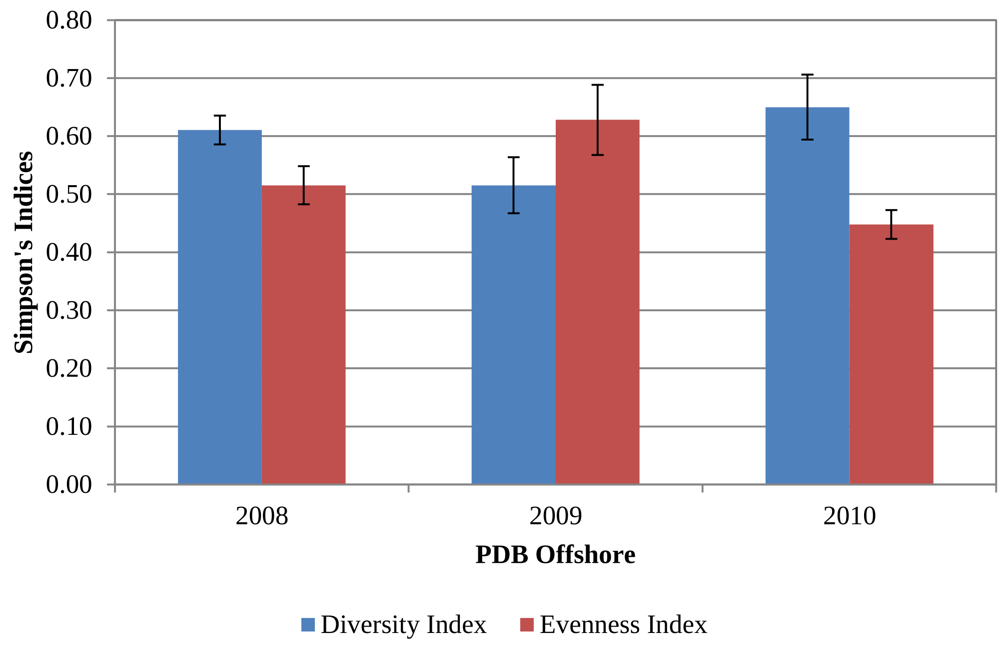
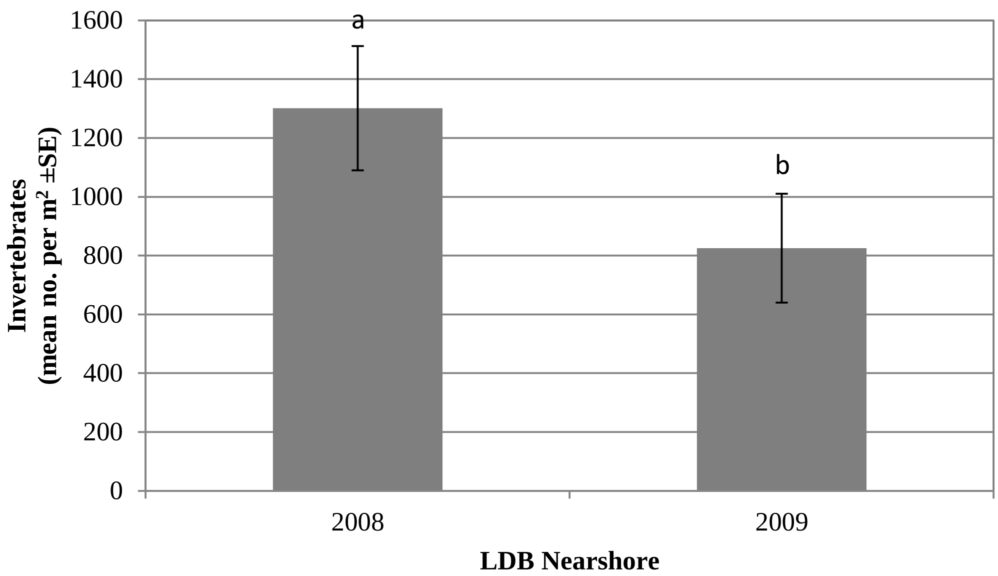


Figure 5.1.6-34. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Pointe du Bois forebay, 2008 to 2010.



Statistically significant differences are denoted with different superscripts.

Figure 5.1.6-35. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the nearshore habitat of Lac du Bonnet, 2008 to 2009.

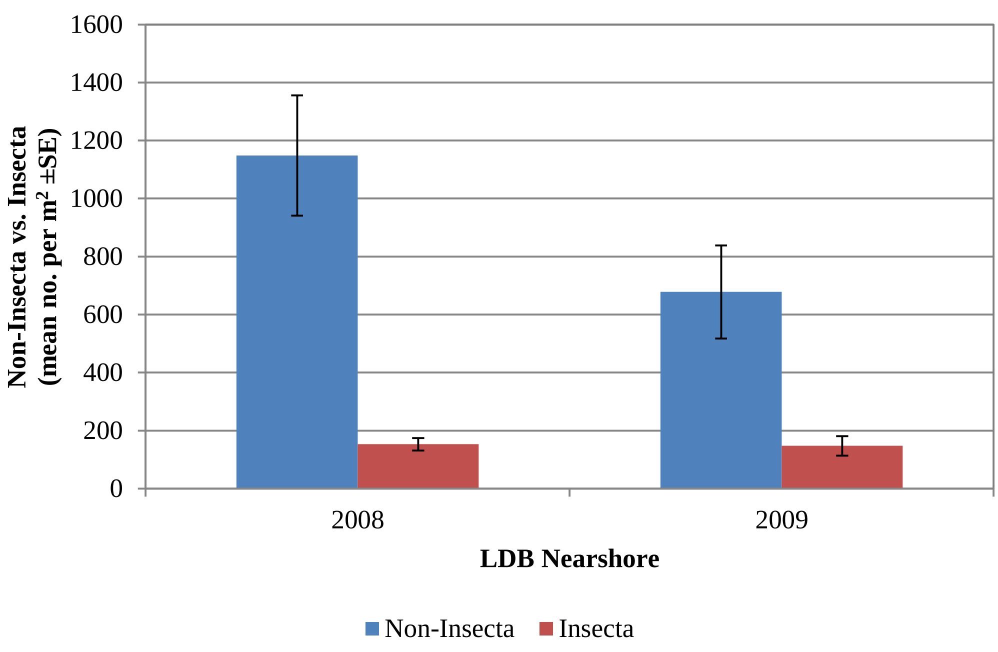


Figure 5.1.6-36. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the nearshore habitat of Lac du Bonnet, 2008 to 2009.

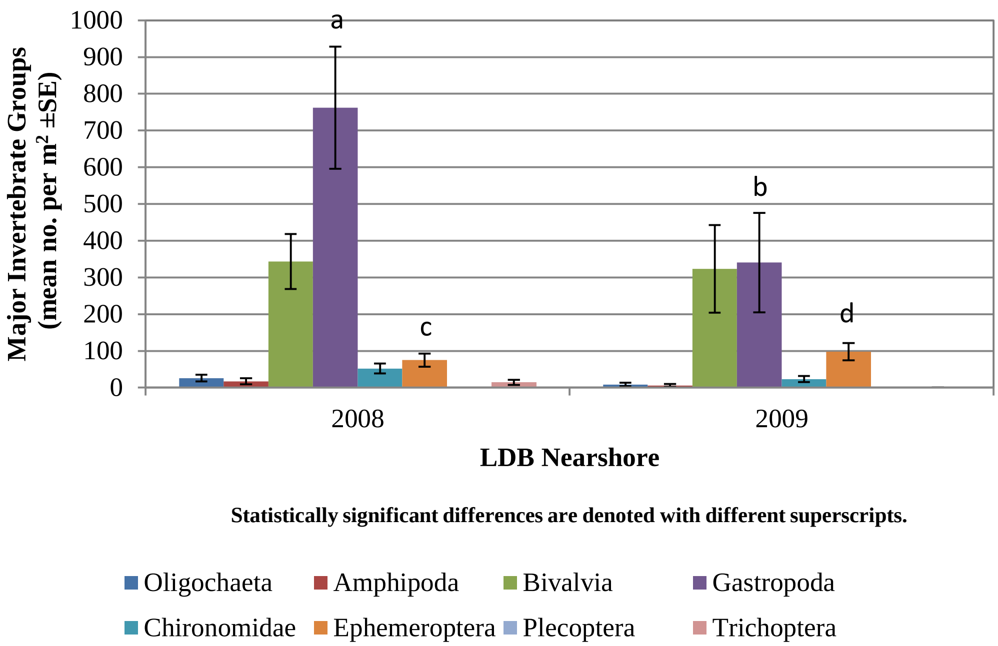


Figure 5.1.6-37. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the nearshore habitat of Lac du Bonnet, 2008 to 2009.

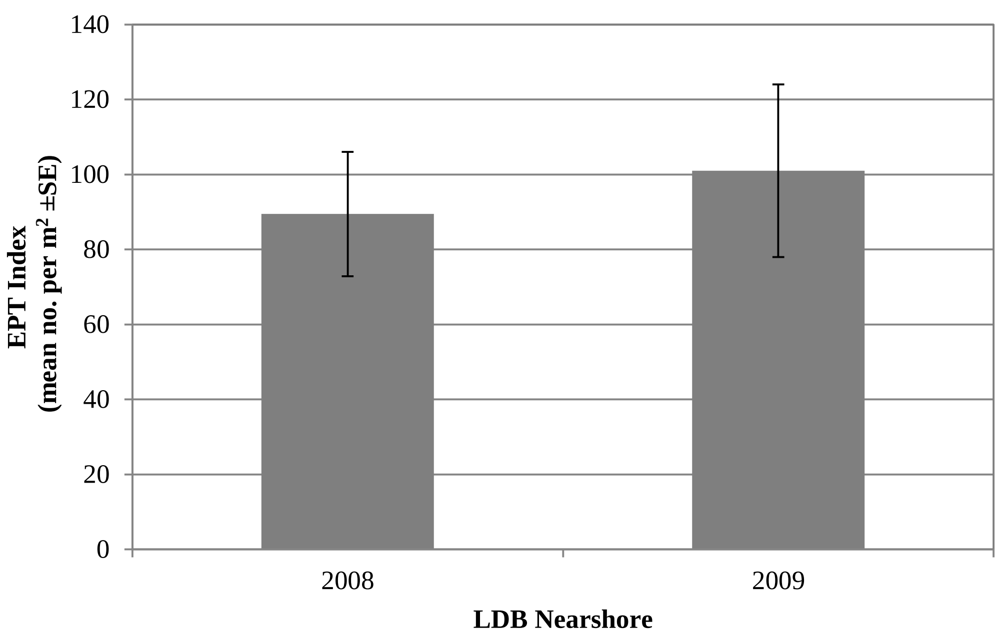
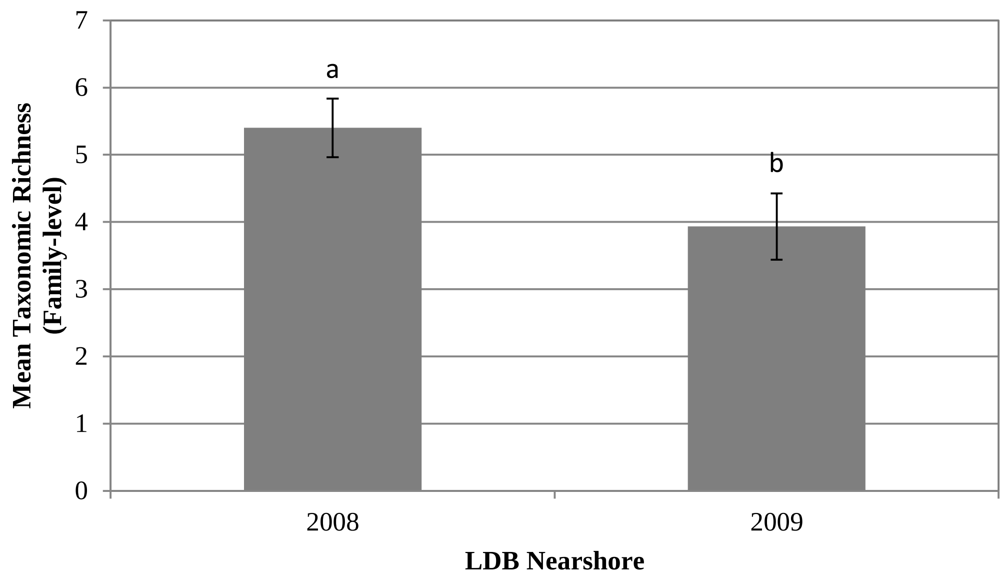


Figure 5.1.6-38. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of nearshore grab samples from Lac du Bonnet, 2008 to 2009.



Statistically significant differences are denoted with different superscripts.

Figure 5.1.6-39. Temporal comparison of benthic invertebrate taxa richness (mean no. of families) of nearshore grab samples from Lac du Bonnet, 2008 to 2009.

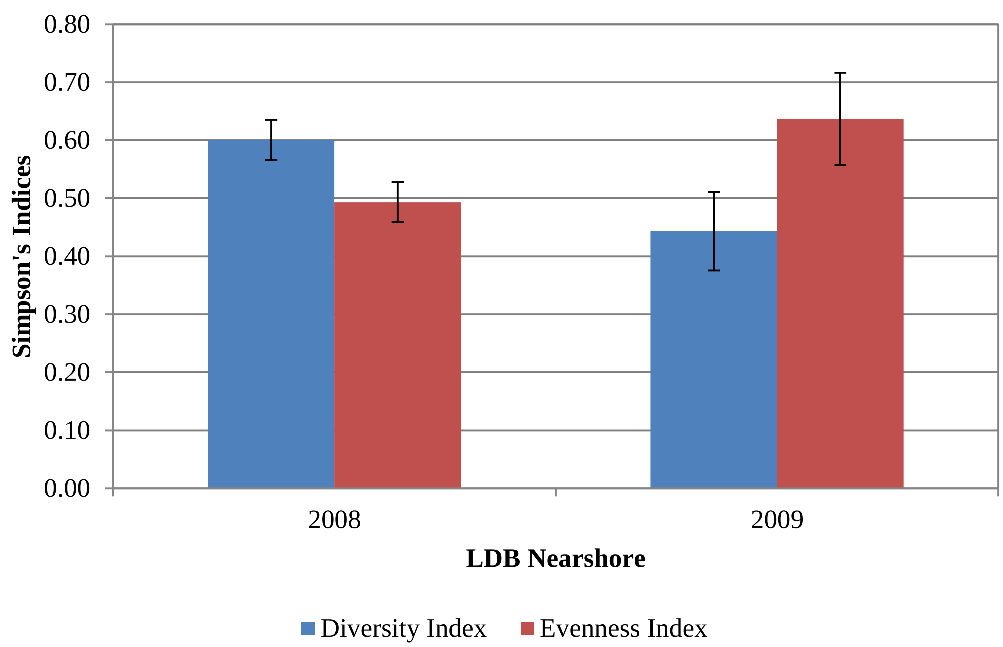


Figure 5.1.6-40. Temporal comparison of diversity and evenness (Simpson's) indices of nearshore grab samples from Lac du Bonnet, 2008 to 2009.

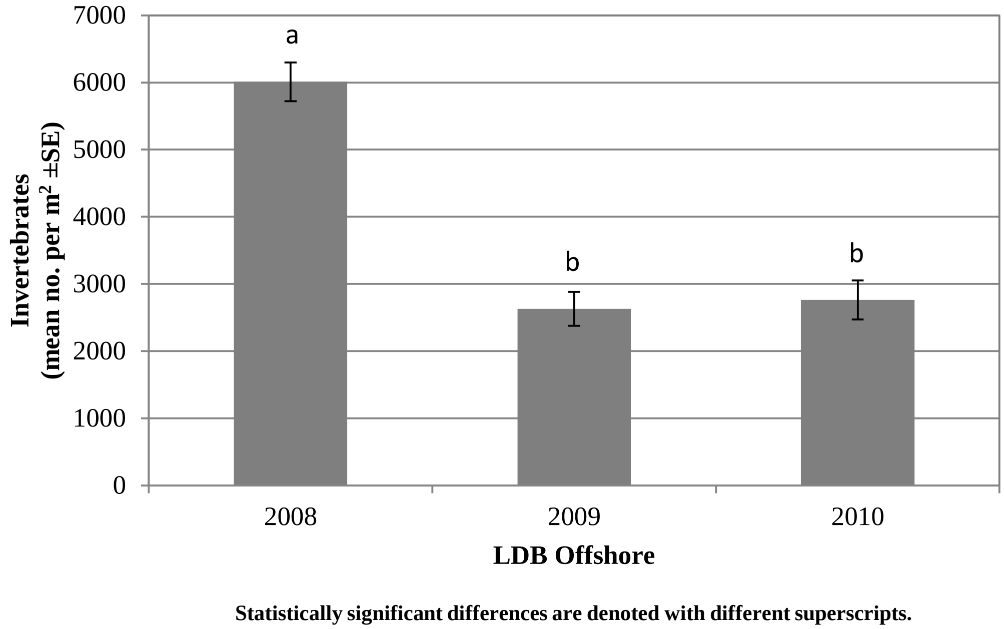


Figure 5.1.6-41. Temporal comparison of benthic invertebrate abundances (no. per m^2 ± SE) collected in the offshore habitat of Lac du Bonnet, 2008 to 2010.

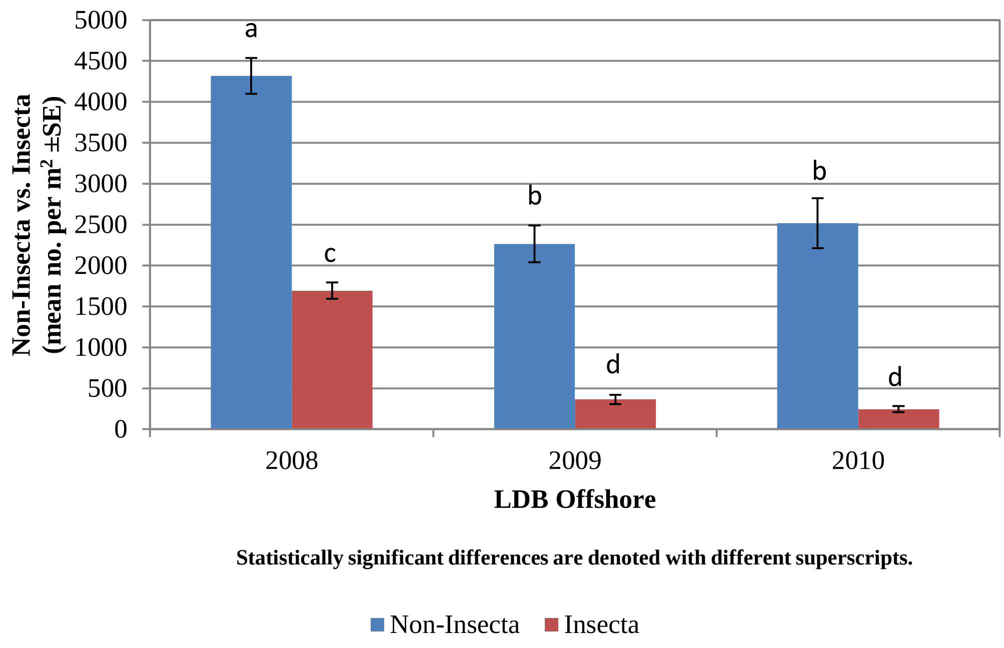


Figure 5.1.6-42. Temporal comparison of non-insect and insect abundances (no. per m^2 ± SE) collected in the offshore habitat of Lac du Bonnet, 2008 to 2010.

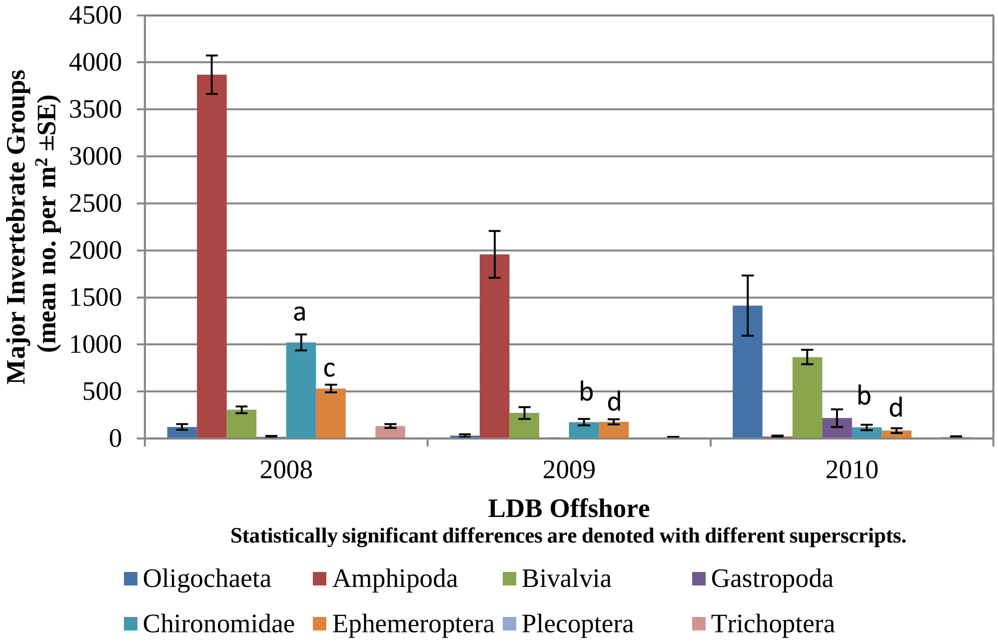


Figure 5.1.6-43. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the offshore habitat of Pointe du Bois forebay, 2008 to 2010.

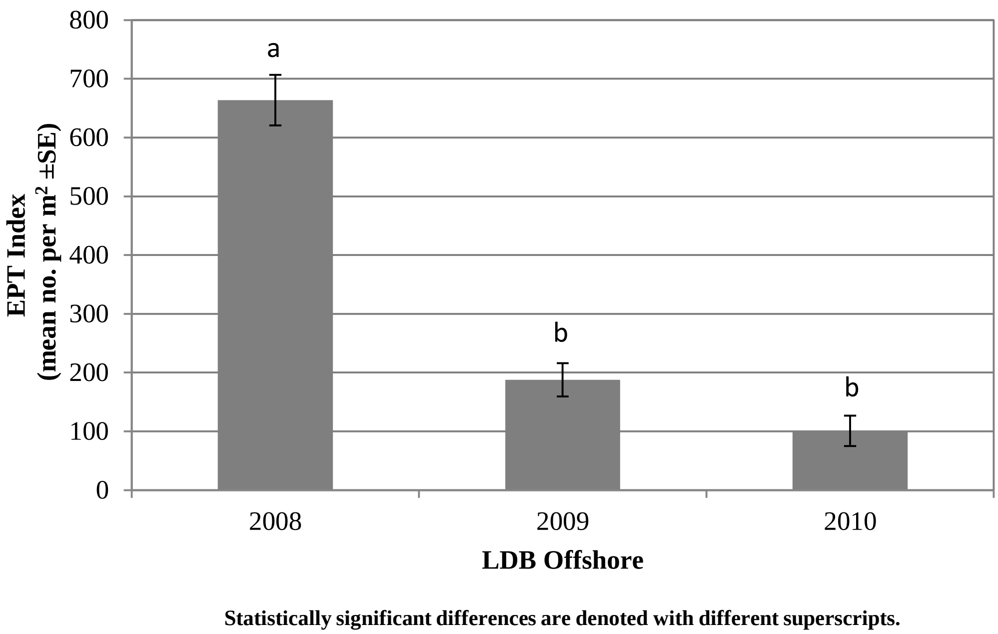
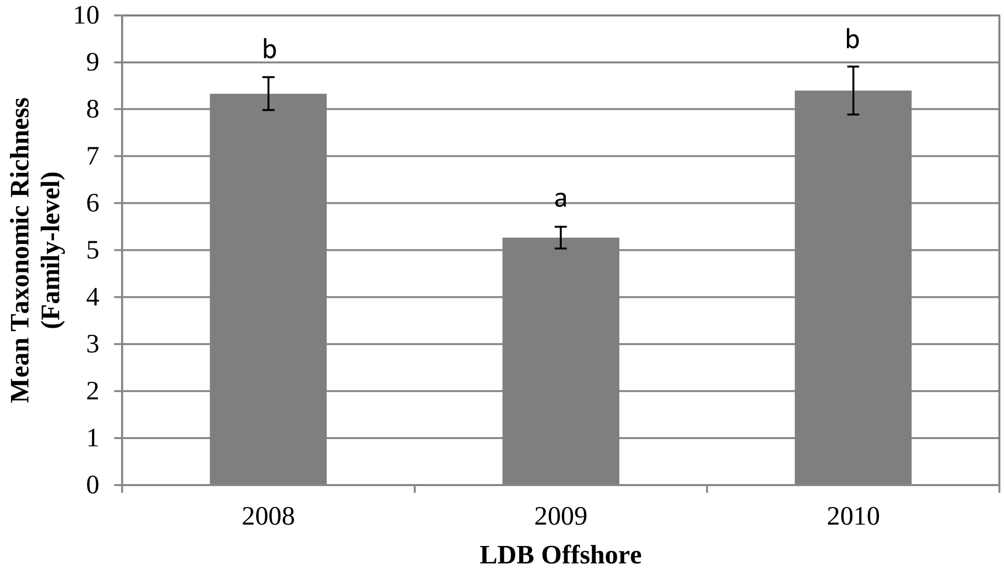
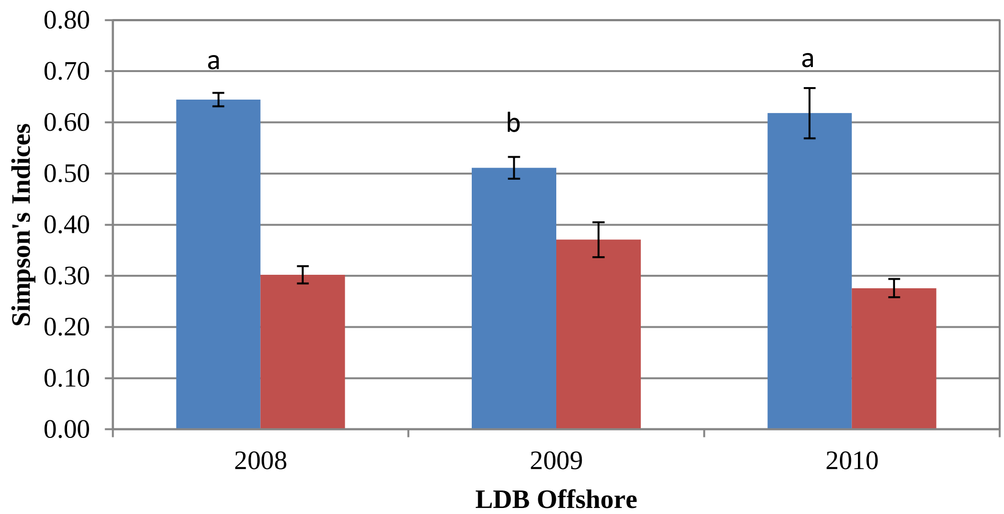


Figure 5.1.6-44. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore grab samples from Lac du Bonnet, 2008 to 2010.



Statistically significant differences are denoted with different superscripts.

Figure 5.1.6-45. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Lac du Bonnet, 2008 to 2009.



Statistically significant differences are denoted with different superscripts.

Figure 5.1.6-46. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Lac du Bonnet, 2008 to 2010.

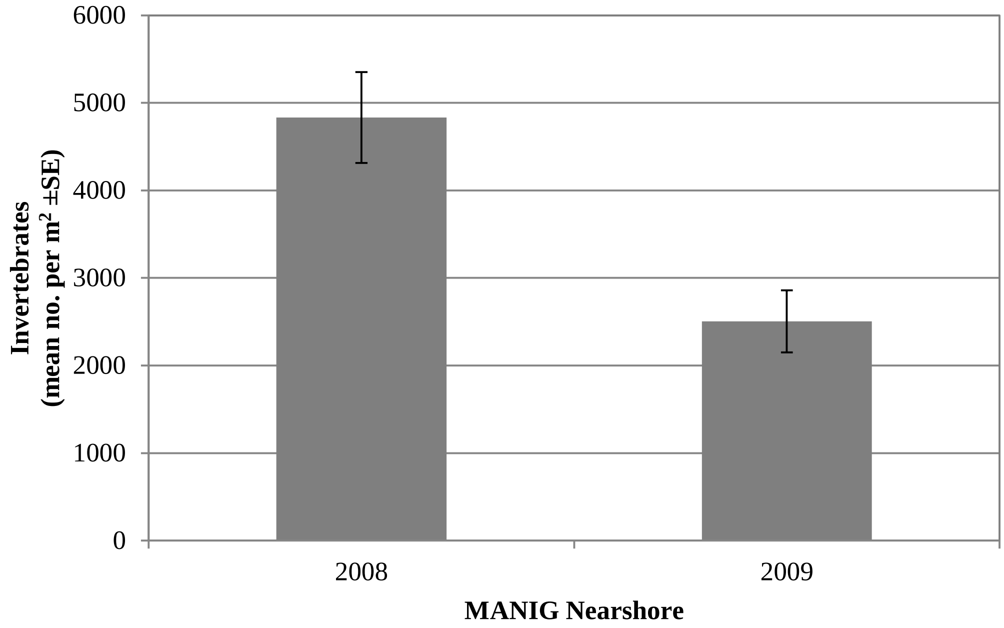


Figure 5.1.6-47. Temporal comparison of benthic invertebrate abundances (no. per $m^2 \pm$ SE) collected in the nearshore habitat of Manigotagan Lake, 2008 to 2009.

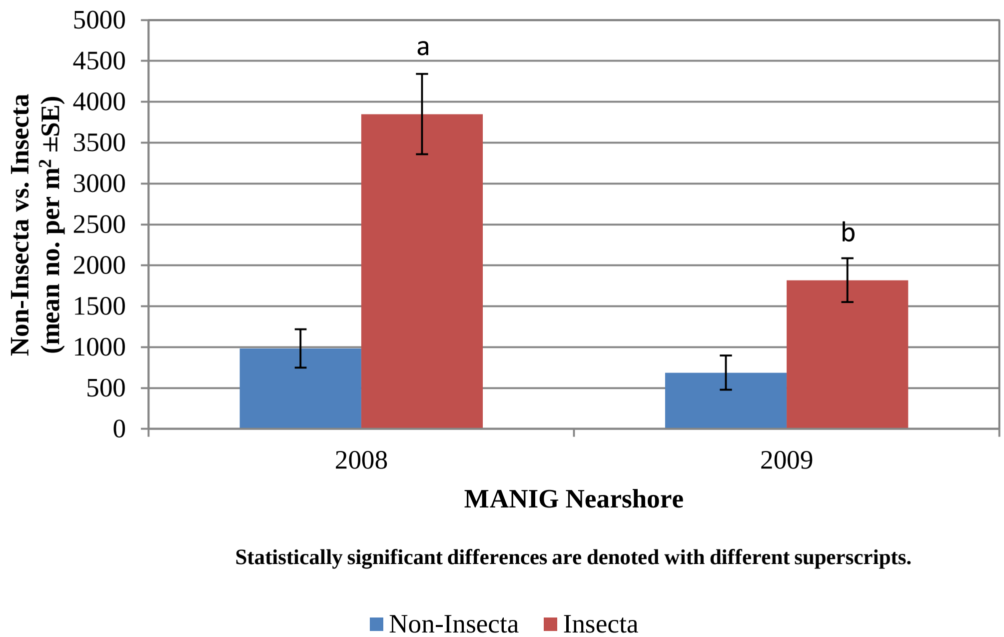


Figure 5.1.6-48. Temporal comparison of non-insect and insect abundances (no. per $m^2 \pm$ SE) collected in the nearshore habitat of Lac du Bonnet, 2008 to 2009.

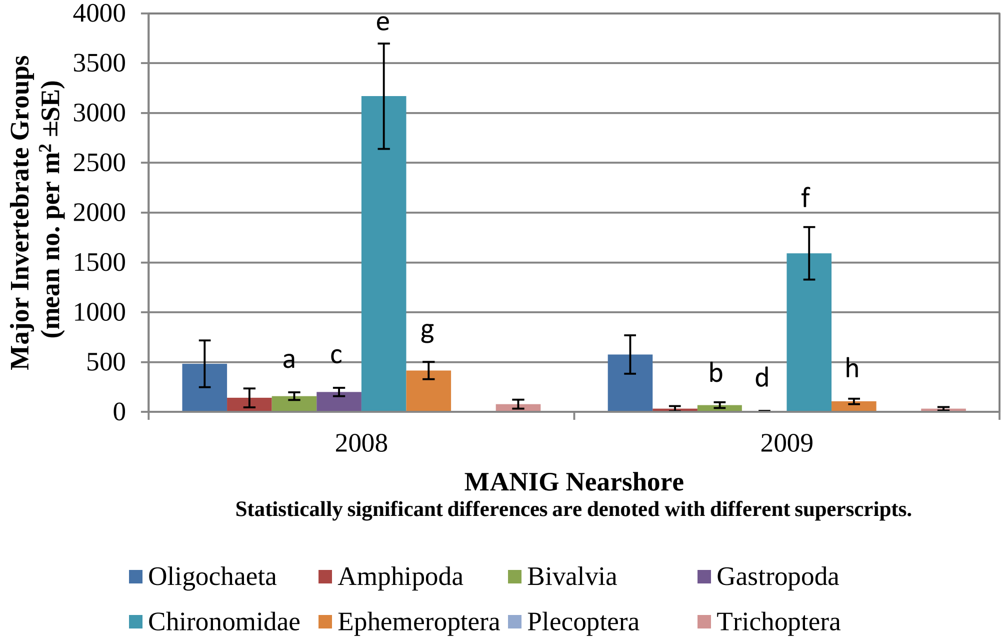


Figure 5.1.6-49. Temporal comparison of major invertebrate group abundances (no. per m^2 ± SE) collected in the nearshore habitat of Manigotagan Lake, 2008 to 2009.

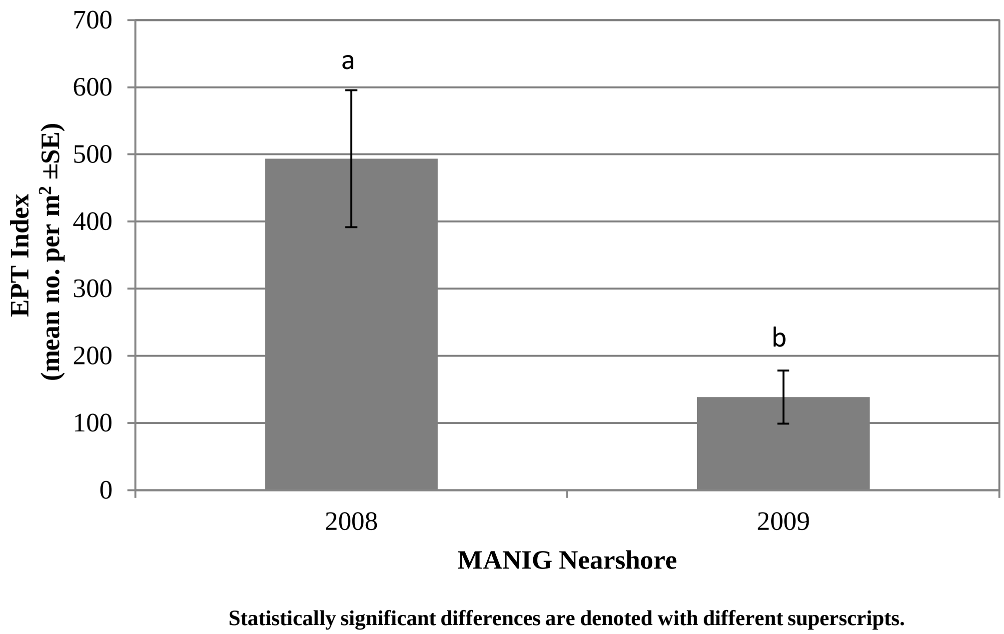
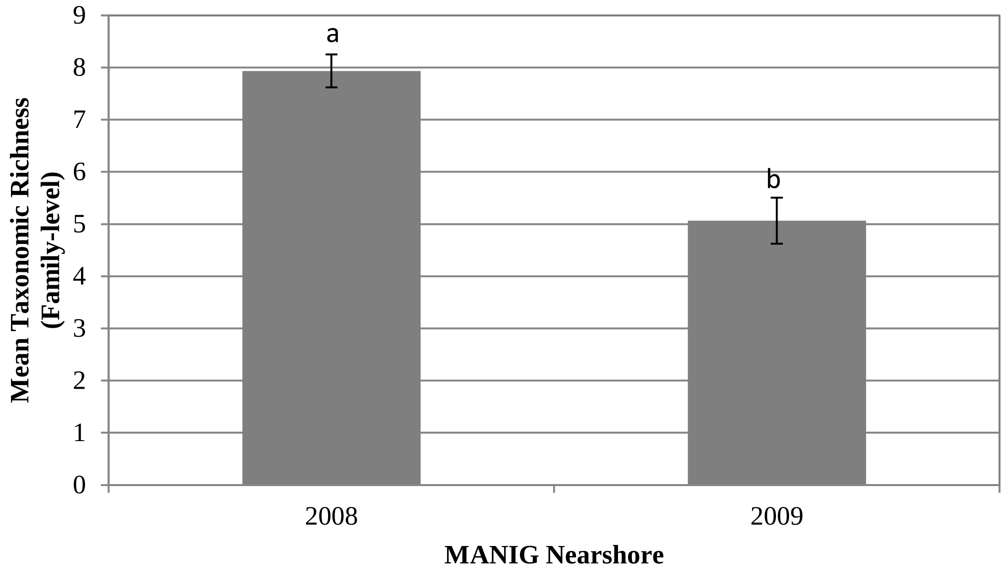
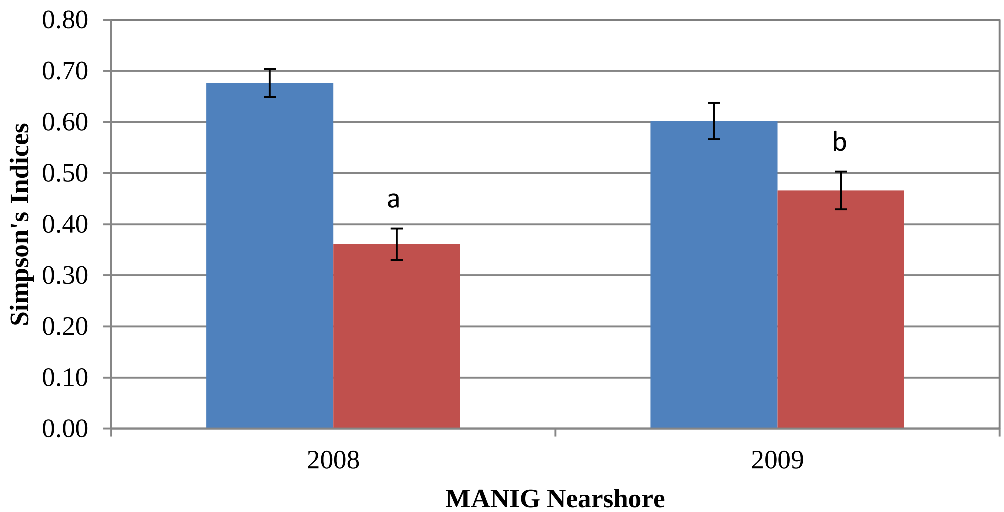


Figure 5.1.6-50. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of nearshore grab samples from Manigotagan Lake, 2008 to 2009.



Statistically significant differences are denoted with different superscripts.

Figure 5.1.6-51. Temporal comparison of diversity and evenness (Simpson's) indices of nearshore grab samples from Manigotagan Lake, 2008 to 2009.



Statistically significant differences are denoted with different superscripts.

Figure 5.1.6-52. Temporal comparison of diversity and evenness (Simpson's) indices of nearshore grab samples from Manigotagan Lake, 2008 to 2009.

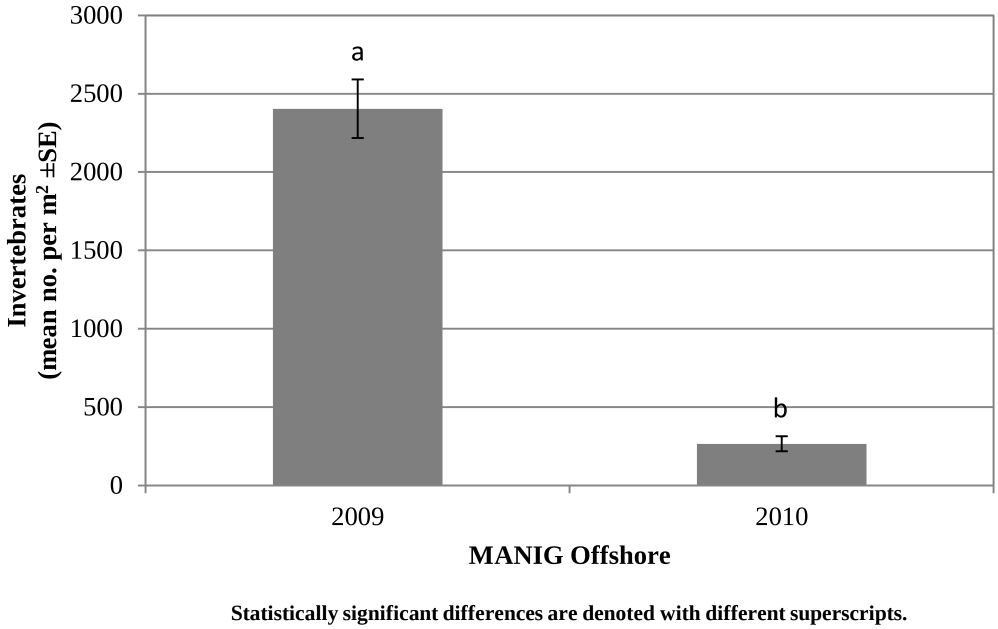


Figure 5.1.6-53. Temporal comparison of benthic invertebrate abundances (no. per $m^2 \pm$ SE) collected in the offshore habitat of Manigotagan Lake, 2009 to 2010.

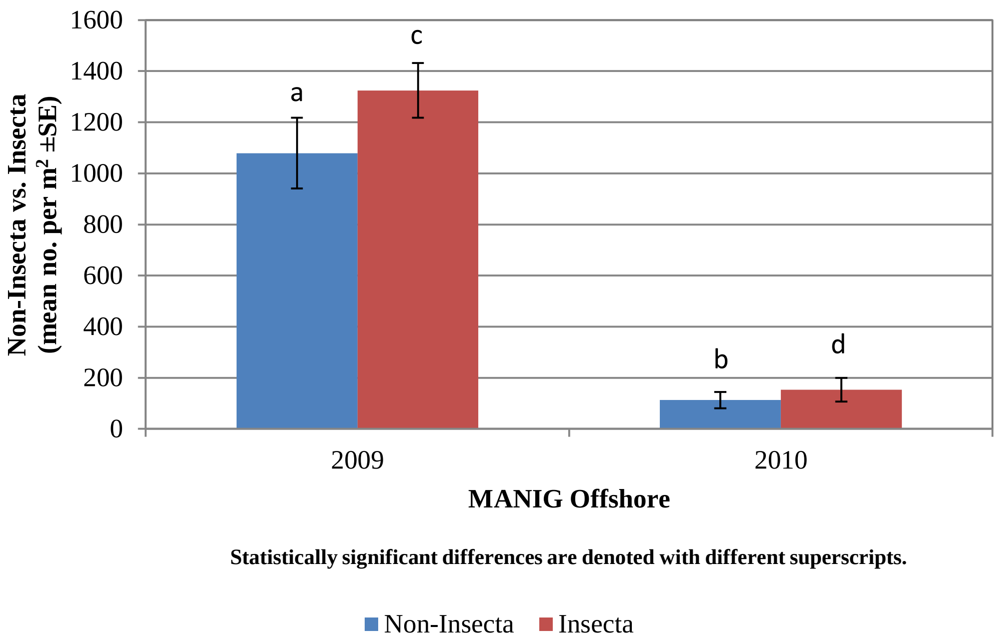


Figure 5.1.6-54. Temporal comparison of non-insect and insect abundances (no. per $m^2 \pm$ SE) collected in the offshore habitat of Manigotagan Lake, 2009 to 2010.

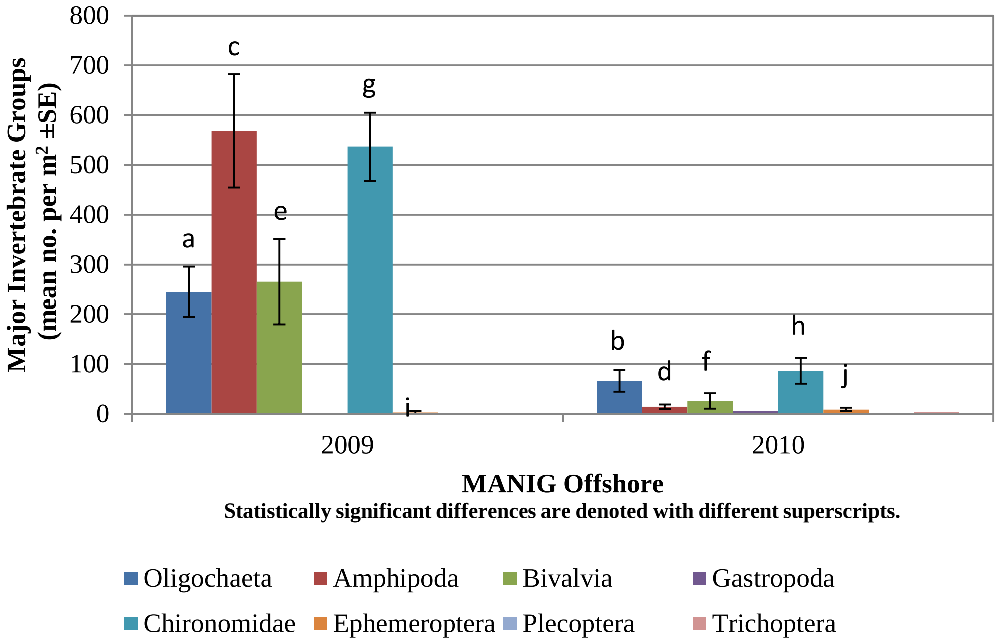


Figure 5.1.6-55. Temporal comparison of major invertebrate group abundances (no. per $m^2 \pm SE$) collected in the offshore habitat of Manigotagan Lake, 2009 to 2010.

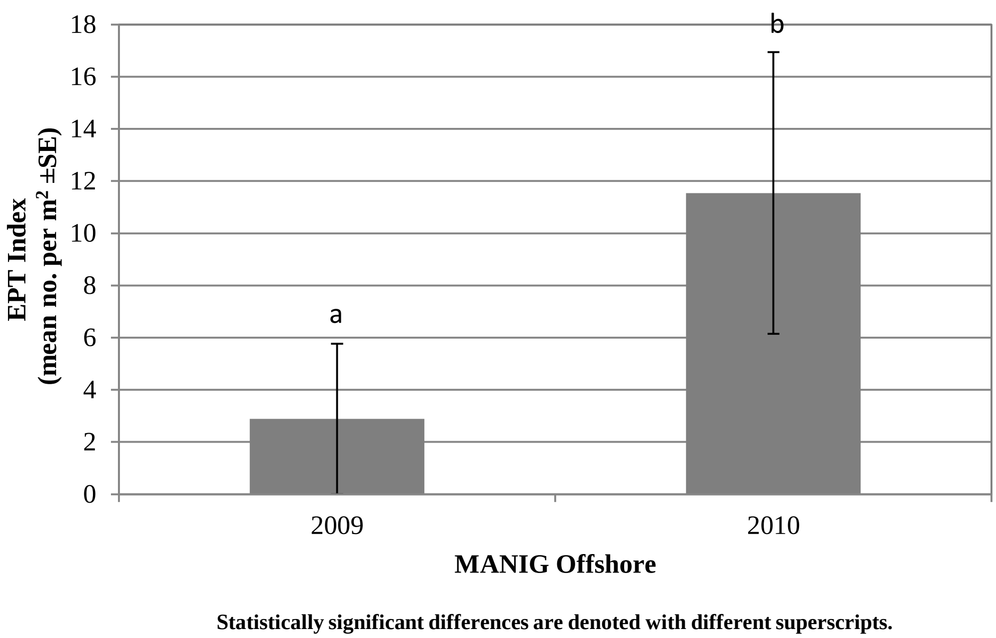


Figure 5.1.6-56. Temporal comparison of Ephemeroptera, Plecoptera, and Trichoptera abundances (EPT Index) of offshore grab samples from Manigotagan Lake, 2009 to 2010.

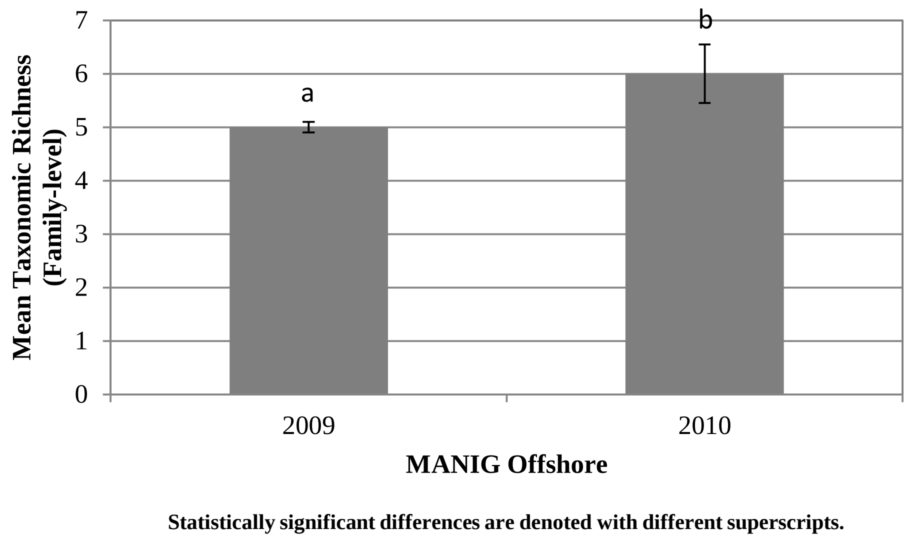


Figure 5.1.6-57. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Manigotagan Lake, 2008 to 2009.

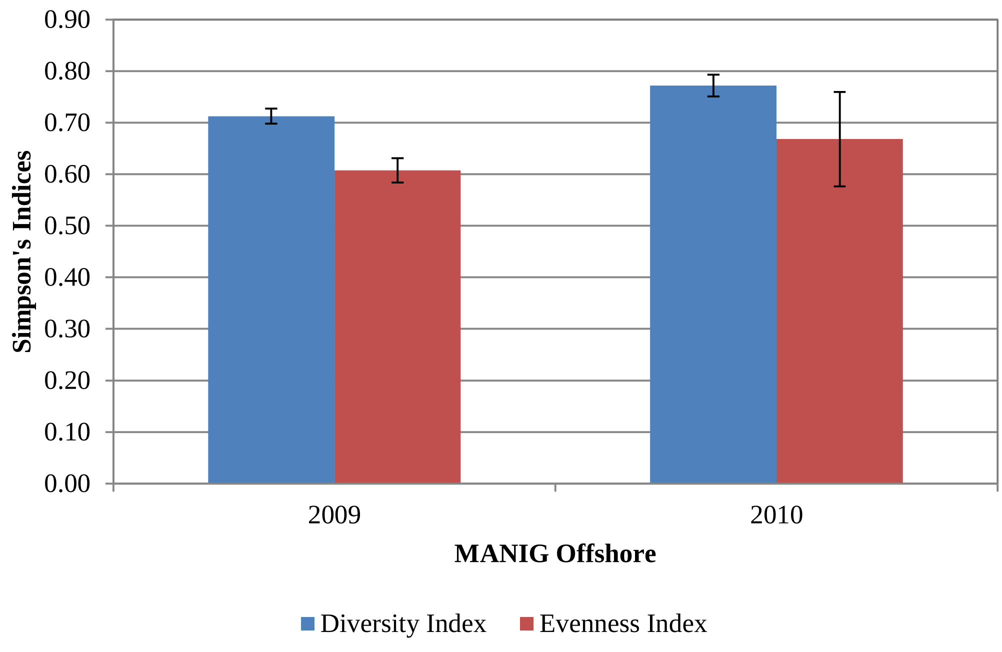


Figure 5.1.6-58. Temporal comparison of diversity and evenness (Simpson's) indices of offshore grab samples from Manigotagan Lake, 2009 to 2010.

5.1.7 Fish Communities

5.1.7.1 Overview

The following provides an overview of fish communities present in four waterbodies within the Winnipeg River Region sampled as part of the CAMPP program conducted from 2008 to 2010. Waterbodies sampled annually included two on-system waterbodies (the Pointe du Bois Forebay and Lac du Bonnet) and one off-system waterbody (Manigotagan Lake). In addition, the fish community of Eaglenest Lake (rotational off-system waterbody) was sampled in 2010.

Gill netting, using both standard gang and small mesh index gill nets, was conducted at a pre-determined number of sites in each waterbody and these sites were typically consistently fished in each of the years of study. Individual fish from each site were enumerated by species and mesh size. For selected species (i.e., Northern Pike [*Esox lucius*], Lake Whitefish [*Coregonus clupeaformis*], Sauger [*Sander canadensis*], and Walleye [*Sander vitreus*]), individual metrics were collected from all fish captured in the standard gang index gill nets. Selected metrics were also collected from Lake Sturgeon (*Acipenser fulvescens*) and White Sucker (*Catostomus commersoni*).

No individual metrics were collected from fish captured in the small mesh index gill net gangs. Metrics collected included length, weight, occurrence of deformities, erosion, lesions and tumours (DELTs), and ageing structures. The remaining species from the standard gang index gillnet catch were counted and bulk weighed to the nearest 25 g by species and mesh size. Fish from the small mesh index gill nets were not separated by mesh size, but were separated on the basis of species, counted and bulk weighed to the nearest 25 g (large bodied species) or 1 g (small bodied species).

Overall, the fish assemblage in all on-system waterbodies was found to be dominated by percids (i.e., Walleye, Sauger and Yellow Perch (*Perca flavescens*). White Sucker and Northern Pike were also common in the standard gang index gill nets. In comparison, the fish community in Manigotagan Lake was found to be dissimilar in many respects to that found in the other three waterbodies sampled. The fish assemblage was noticeably less diverse, with nine species captured as compared to 18-21 species for the other waterbodies. Emerald Shiner (*Notropis atherinoides*), Spottail Shiner (*Notropis hudsonius*), Rainbow Smelt (*Osmerus mordax*), and Sauger were absent from the catch, White Sucker abundance was relatively low, and Cisco (*Coregonus artedi*), Lake Whitefish, Burbot (*Lota lota*), and Walleye comprised a much higher percentage of the overall catch.

On-system waterbodies were also found to be generally similar with respect to mean overall total CPUE and size and condition. Manitogotagan Lake had higher mean overall CPUE values than the on-system waterbodies and Eaglenest Lake for total catch, Walleye and Lake Whitefish while the values for Northern Pike were similar.

Year-class strength for species of management interest, while showing some patterns, was not consistent among all waterbodies in the region. For Northern Pike, data from Eaglenest Lake suggested that good year-classes were produced from 2001 to 2003, while data from the other three waterbodies showed that younger Northern Pike (particularly five-year old fish) dominated the catch in all three sampling years. Good year-classes of Lake Whitefish were produced in Manigotagan Lake in 1997 and 1998. Although somewhat variable among waterbodies, in general good year-classes of Walleye were produced in on-system waterbodies in 2003 and 2006, while poor year-classes were produced in 2000 and 2004. In Manigotagan Lake, good year-classes of Walleye were produced in 2006 and, to a lesser extent, in 2005. Year-classes for Walleye were also high in 2005 and 2006 in Eaglenest Lake. Data for Sauger suggested no consistently strong or weak year-classes in Pointe du Bois, while in Lac du Bonnet a strong year-class was apparent in 2006 and a weak year-class in 2004.

The incidence rate for deformities, erosion, lesions and tumours in species of management interest declined in a downstream direction from Eaglenest Lake (3.6%) to Lac du Bonnet (0.5%) and was lowest in Manigotagan Lake (0.4%).

Temporal comparisons were undertaken for the three waterbodies sampled in each of 2008, 2009, and 2010 to provide a preliminary assessment of temporal variability. Within Pointe du Bois Forebay both the standard gang and small mesh index gillnet mean total CPUE varied considerably among years. In the former the value for 2009 was more than double that for 2010, while in the latter case the value for 2008 was more than double that for 2009. However, in Lac du Bonnet, mean total CPUE showed little variability between years. In Manigotagan Lake, standard gang index gillnet mean total CPUE also showed little variability between years but small mesh index gillnet mean total CPUE increased almost ten-fold from 2009 to 2010. As additional data are acquired, more formal trend analysis will be undertaken to evaluate any potential long-term changes.

Index of Biotic Integrity is one measure of overall biological condition of a waterbody. IBI scores were relatively similar for all waterbodies sampled in the region, with Pointe du Bois having the lowest IBI followed closely by Manigotagan Lake and Eaglenest Lake. Lac du Bonnet had the highest overall IBI scores in the region.

5.1.7.2 Gill netting

Eaglenest Lake was sampled with standard gang index gill nets in late July, 2010 at a total of 12 sites (Table 5.1.7-1, Figure 5.1.7-1). As Eaglenest Lake is a rotational site no sampling occurred in either 2008 or 2009. In the Pointe du Bois Forebay, Lac du Bonnet and Manigotagan Lake, standard gang index gill nets were set in mid-July, late September, and early September, respectively, in each of 2008, 2009 and 2010 (Figures 5.1.7-2, 5.1.7-3, and 5.1.7-4, Table 5.1.7-1). A total of 17 sites were sampled in the Pointe du Bois Forebay with 15 of these sites consistently sampled each year. Ten and six sampling sites were established in Lac du Bonnet and Manigotagan Lake, respectively.

At four of the 12 sampling sites on Eaglenest Lake, small mesh gill nets were attached to the smallest mesh end of the standard gang gill net set in order to sample the small fish community (Table 5.1.7-1, Figure 5.1.7-1). Similarly, small mesh nets were set at five of the 15 sampling sites in the Pointe du Bois Forebay (Figure 5.1.7-2), at three of the 10 sites on Lac du Bonnet (Figure 5.1.7-3), and at two of the six sites on Manigotagan Lake (Figure 5.1.7-4).

5.1.7.3 Species Composition

A comprehensive list of all fish species captured, including common and scientific names, family, and identification code, for all Winnipeg River Region waterbodies is provided in Table 5.1.7-2.

Eaglenest Lake

A total of 494 fish representing 15 species were captured in standard gang index gill nets set in Eaglenest Lake in 2010 (Table 5.1.7-3). The most common species captured in standard gang index gill nets was Yellow Perch (relative abundance = 24.7%) and the next three most common species were Walleye (20.9%), White Sucker (18.0%) and Sauger (13.4%) (Table 5.1.7-3, Figure 5.1.7-5). The biomass of these fish (n = 480) was 327,055 g (Table 5.1.7-4). White Sucker accounted for the highest proportion of total biomass (30.4%), followed by Northern Pike (27.1%) and Walleye (20.3%) (Table 5.1.7-4).

For the small mesh index gill nets, a total of 200 fish representing nine species were captured (Table 5.1.7-5). Troutperch (*Percopsis omiscomaycus*) was the most common species captured in 2010 (relative abundance = 43.5%), followed by Sauger (18.5%), Yellow Perch (13.5%) and Walleye (12.5%) (Table 5.1.7-5, Figure 5.1.7-5). The biomass of the catch (n = 199) was 9,575 g (Table 5.1.7-6). For small-bodied fish species captured in the small mesh index gill nets, Yellow Perch accounted for the highest proportion of total biomass (11.5%), followed by Troutperch (3.3%) and Spottail Shiner (0.5%) (Table 5.1.7-6).

Pointe du Bois Forebay

Overall, a total of 1,817 fish representing 18 species were captured in standard gang index gill nets set in the Pointe du Bois Forebay (Table 5.1.7-3). The number of species captured ranged from a low of 14 in 2008 to a high of 17 in 2009. Longnose Sucker (*Catostomus catostomus*) was captured in 2008 only while Golden Redhorse (*Moxostoma erythrurum*) and Troutperch were captured in 2009 only. Silver Redhorse (*Moxostoma anisurum*) and Cisco were captured in 2009 and 2010 but not in 2008. Overall, the most common species captured in standard gang index gill nets was White Sucker (mean relative abundance = 34.7%), followed by Sauger (17.5%), Yellow Perch (16.7%), and Walleye (12.3%) (Table 5.1.7-3, Figure 5.1.7-6). The total biomass of the overall catch (n = 1,780) was 1,351,282 g and was dominated by White Sucker (51.2%), followed by Walleye (16.8%), and Northern Pike (9.8%) (Table 5.1.7-4).

For the small mesh index gill nets for all years of sampling, a total of 357 fish representing 10 species were captured (Table 5.1.7-5). The number of species captured in small mesh index gill nets ranged from a low of seven species in 2009 to a high of nine species in 2010. Mooneye (*Hiodon tergisus*) and White Sucker were captured in 2010 only while Northern Pike was captured in 2008 and 2009, but not 2010 and Rainbow Smelt was captured in 2008 and 2010, but not in 2009. Overall, Sauger was the most common species captured (mean relative abundance = 32.5%), followed by Troutperch (21.9%), Yellow Perch (16.0%) and Walleye (12.0%) (Table 5.1.7-5, Figure 5.1.7-6). The biomass of the total catch was 26,806 g (Table 5.1.7-6). Yellow Perch accounted for the highest proportion of total biomass (11.9%) of all small-bodied fish species captured in the small mesh index gill nets, followed by Troutperch (2.1%), and Spottail Shiner (0.6%) (Table 5.1.7-6).

Lac du Bonnet

Overall, a total of 964 fish representing 16 species were captured in standard gang index gill nets set in Lac du Bonnet (Table 5.1.7-3). The number of species captured ranged from a low of 14 in both 2009 and 2010 to a high of 15 species in 2008. Longnose Sucker was captured in 2008 only and Burbot was captured in 2010 only. Channel Catfish (*Ictalurus punctatus*) was captured in 2008 and 2009 but not in 2010. For all years combined, the most common species captured in standard gang index gill nets was Sauger (mean relative abundance = 26.1%) and the next three most common species were Walleye (15.8%), White Sucker (12.2%) and Yellow Perch (11.1%) (Table 5.1.7-3, Figure 5.1.6-7). The biomass of the overall catch (n = 955) was 704,368 g (Table 5.1.7.4). Northern Pike accounted for the highest proportion of total overall biomass (25.3%), followed by White Sucker (22.2%), and Walleye (16.9%) (Table 5.1.7-4).

For the small mesh gill nets for all years of sampling, a total of 345 fish (15,189 g) representing 10 species were captured Tables 5.1.7-5 and 5.1.7-6). The number of species captured ranged from eight species in both 2008 and 2009 to 10 species in 2010. Mooneye was captured in 2008 and 2010 but not 2009 while Cisco was captured in 2009 and 2010 but not 2008. Lake Whitefish was captured only in 2010. Yellow Perch was the most common species captured overall (mean relative abundance = 32.2%) (Table 5.1.7-5, Figure 5.1.7-7). Sauger (24.9%), Spottail Shiner (14.2%) and Troutperch (11.0%) were also abundant in catches. Sauger and Troutperch were common in all years while Spottail Shiner was common in 2008 and 2010 but not in 2009. For small-bodied fish species captured in the small mesh index gill nets, Yellow Perch accounted for the highest proportion of total biomass (10.0%), followed by Spottail Shiner (14.2%), Troutperch (1.9%) and Spottail Shiner (1.6%) (Table 5.1.7-6).

Manigotagan Lake

Overall, a total of 978 fish (527,481 g) representing nine species were captured in standard gang index gill nets set in Manigotagan Lake (Tables 5.1.7-3 and 5.1.7-4). The number of species captured ranged from a low of eight in both 2008 and 2009 to a high of nine in 2010. Troutperch was captured in 2010 but not in either 2008 or 2009. Overall, the most common species captured in standard gang index gill nets was Walleye (mean relative abundance = 35.9%), followed by Cisco (32.7%), Lake Whitefish (11.0%) and Burbot (6.1%) (Table 5.1.7-3, Figure 5.1.7-8). Walleye accounted for the highest proportion of total biomass (42.8%), followed by Lake Whitefish (18.0%), and White Sucker (11.9%) (Table 5.1.7-4).

For the small mesh index gill nets for all years of sampling, a total of 76 fish representing five species were captured. The number of species captured in small mesh index gill nets ranged from a low of one in 2008 to a high of four in 2010. Cisco and Smallmouth Bass (*Micropterus dolomieu*) were captured in both 2009 and 2010 but not in 2008 while Lake Whitefish and Troutperch were captured only in 2010. Overall, Walleye was the most common species captured (mean relative abundance = 81.6%), followed by Cisco (10.5%), Troutperch (4.0%) and Smallmouth Bass (2.6%). Walleye was the only species captured in all years (Table 5.1.7-5, Figure 5.1.7-8). The biomass of the overall catch (n = 58) was 12,166 g (Table 5.1.7-6). Troutperch was the only small-bodied species captured in the small mesh index gill nets and accounted for 0.25% of the biomass (Table 5.1.7-6).

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

Eaglenest Lake

Mean total CPUE (n = 494) and BPUE (n = 480) for the standard gang index gillnet catch in Eaglenest Lake were 33.3 fish/100 m of net/24 h and 21,872 g/100m of net/24 h, respectively (Tables 5.1.7-7 and 5.1.7-8, Figures 5.1.7-9 and 5.1.7-10). The highest individual species' CPUE values were recorded for Yellow Perch (8.3) and Walleye (7.0) (Table 5.1.7-7, Figure 5.1.7-11) while White Sucker (6,483 g), Northern Pike (5,952 g) and Walleye (4,489 g) had the highest individual species' BPUE values (Table 5.1.7-8, Figure 5.1.7-12).

For the small mesh index gill nets, mean total CPUE (n=200) and mean total BPUE (n = 199) values were 45.3 fish/30 m of net/24 h and 2156 g/30 m of net/24 h, respectively (Tables 5.1.7-9 and 5.1.7-10, Figures 5.1.7-9 and 5.1.7-10). The highest individual species CPUE value was recorded for Troutperch (19.6) (Table 5.1.7-9, Figure 5.1.7-11). For small-bodied fish species captured in the small mesh index gill nets, the highest BPUE values were recorded for Yellow Perch (25.7) followed by Troutperch (7.1) (Table 5.1.7-10, Figure 5.1.6-12).

Mean CPUE and BPUE for Northern Pike, Lake Whitefish, Sauger, Walleye and all species combined captured in standard gang index gill nets are provided in Figures 5.1.7-13 and 5.1.7-14, respectively, by site. Northern Pike were captured at all sites except sites GN-01 and GN-08 while Lake Whitefish were captured at only half of the sites. Sauger and Walleye were captured at all sites with Walleye showing the highest variability among sites for all species followed by Sauger. The mean CPUE and BPUE values for Northern Pike, Sauger and Walleye were highest at Sites GN-02, GN-12 and GN-10, respectively. For Lake Whitefish the highest mean CPUE value was recorded from Site GN-04 while the highest mean BPUE was from Site GN-03. The highest mean CPUE and values for all fish combined were found at sites GN-10, 11 and 12.

Pointe du Bois Forebay

Mean overall total CPUE (n = 1,817) and BPUE (n = 1,780) for the standard gang index gillnet catch in Pointe du Bois Forebay were 33.3 fish and 24,759 g, respectively (Tables 5.1.7-7 and 5.1.7-8). Mean total CPUE and BPUE values were lowest in 2010 at 20.7 fish and 15,410 g and highest in 2009 at 45.6 fish and 31,428 g (Tables 5.1.7-7 and 5.1.7-8, Figures 5.1.7-9 and 5.1.7-10). The highest individual species' mean overall CPUE and BPUE values were recorded for White Sucker (11.7 and 12,842 g) (Tables 5.1.7-7 and 5.1.7-8 and Figures 5.1.7-11 and 5.1.7-12).

For the small mesh index gillnet catch, mean overall total CPUE and BPUE values were 22.6 fish and 1,487.6 g, respectively (Tables 5.1.7-9 and 5.1.7-10). The lowest mean total CPUE value was recorded in 2009 at 14.0 fish and the highest in 2008 at 35.6 fish (Figure 5.1.7-9). With respect to biomass, the lowest mean total BPUE value was recorded in 2010 at 1,227.3 g and the highest was in 2009 at 1,682.2 g (Figure 5.1.7-10). The highest mean overall CPUE value for individual species was recorded for Sauger (7.4) (Table 5.1.7-9, Figure 5.7-11). For BPUE, the highest mean overall value (small-bodied fish species only) was recorded for Yellow Perch (176.7) (Table 5.1.7-10, Figure 5.7-12).

Mean overall CPUE and BPUE by site for Northern Pike, Lake Whitefish, Sauger, Walleye and all species combined captured in standard gang index gill nets are provided in Figures 5.1.6-15 and 5.1.6-16, respectively. Northern Pike were captured at nearly all sites while Lake Whitefish were captured at approximately half of the sites. Sauger were captured at all sites while Walleye were captured at all sites except one. The mean CPUE and BPUE values for Northern Pike were similar for all sites with GN-01 showing the greatest variability for CPUE and GN-07 and GN-06 showing the greatest amount of variability for BPUE. For Lake Whitefish all CPUE values were similarily low, while for BPUE one site (GN-07) showed some variability between years. Sauger mean overall CPUE showed the greatest amount of variability both between years for the same sites and between all sites; mean BPUE values for Sauger however were similar within and between sites. Walleye mean overall CPUE values were generally consistent between and within sites with some variability present at GN-01 and GN-10. Mean BPUE values for Walleye were again similar for the majority of sites however, there were three sites (GN-01, GN-08, and GN15) that were higher than all other sites and also varied more from year to year than the other sites. For total catch, mean CPUE was highest at Site GN-17, although it was sampled in 2010 only. Sites GN-08 and GN-10 also had high CPUE values with GN-10 showing the greatest amount of variability between years. Most of the other sites had similar and consistent CPUE values, particularly for sites GN-11 to GN-16. Mean overall BPUE values for the total catch were more consistent than the CPUE values for most sites, the main exception being GN-10 which had the highest BPUE values and also the most variable between years.

Lac du Bonnet

Mean overall total CPUE (n = 964) and BPUE (n = 955) for the standard gang index gillnet catch in Lac du Bonnet were 34.2 fish and 24,967 g, respectively (Tables 5.1.7-7 and 5.1.7-8). Mean total CPUE and BPUE values were similar between all years of study for the standard gang index gillnet sets (Figures 5.1.7-9 and 5.1.7-10). The mean total CPUE value for the standard gang index gill net was highest in 2009 at 37.5 and lowest in 2008 at 32.5. Mean total BPUE values, on the other hand, were highest in 2010 at 27,566 g and lowest in 2009 at 20,147 g. Sauger had the highest mean overall CPUE value in Lac du Bonnet (8.9) followed by Walleye (5.3) (Table

5.1.7-7, Figure 5.1.7-11). The highest mean overall BPUE values were recorded for Northern Pike (6,177), White Sucker (5,583), and Walleye (4,194) (Table 5.1.7-8 and Figure 5.1.7-12).

For the small mesh index gill nets, the mean overall total CPUE and BPUE values were 46.5 fish and 2,044 g, respectively (Tables 5.1.7-9 and 5.1.7-10). The mean total CPUE values for each of the three years were also relatively similar (Figure 5.1.7-9). The mean total BPUE values for 2008 and 2009 were similar while the value for 2010 was considerably lower (Figure 5.1.7-10). The highest mean overall CPUE values for individual species were recorded for Yellow Perch (15.2) and Sauger (11.3) (Table 5.1.7-9, Figure 5.1.7-11). For mean overall BPUE, the highest value (small bodied fish species only) was recorded for Yellow Perch (206) (Table 5.1.7-10, Figure 5.7-12).

Mean overall CPUE and BPUE for Northern Pike, Lake Whitefish, Sauger, Walleye and all species combined captured in standard gang index gill nets are provided in Figures 5.1.6-17 and 5.1.6-18, respectively, by site. Northern Pike, Sauger and Walleye were captured at all sites while Lake Whitefish were captured at all sites except one. The mean overall CPUE values for Northern Pike were similar among all sites and between years while BPUE varied considerably both among sites and between years. Mean overall CPUE and BPUE values for Lake Whitefish were similar among sites and varied little between years with the exception of GN-09 which had higher CPUE and BPUE values than all other sites. Sauger CPUE values were the most variable of all species both among sites and between years, while BPUE values were the most consistent of all species. Walleye CPUE values were similar among sites and between years with GN-09 having the highest values and greatest variability. This was even more apparent in regards to BPUE where GN-09 and to a lesser extent GN-05 differed from the other sites. The mean overall CPUE and BPUE values were very consistent for most sites with the exception again of GN-09 which was considerably higher and GN-10 which was slightly higher.

Manigotagan Lake

Mean overall total CPUE and BPUE values for the standard gang index gillnet catch in Manigotagan Lake were 61.8 fish and 32,269 g, respectively (Tables 5.1.7-7 and 5.1.7-8). Mean total CPUE values were similar between all years with the highest value occurring in 2008 at 68.1 fish and the lowest value occurring in 2009 at 50.4 fish (Table 5.1.7-7, Figure 5.1.7-9). Mean total BPUE was also highest in 2008 at 39,942 g but was lowest in 2010 at 27,873 g (Table 5.1.7-8, Figure 5.1.7-10). For individual species, the highest mean overall CPUE value for the standard gang index gill net catch in Manigotagan Lake was recorded for Cisco (21.9), followed by Walleye (20.5) (Table 5.1.7-7, Figure 5.1.7-11). The highest mean overall BPUE value was recorded for Walleye (13,176) (Table 5.1.7-8 and Figure 5.1.6-12).

For the small mesh index gill nets, the mean overall total CPUE and BPUE values were 11.9 fish and 2,453 g, respectively (Tables 5.1.7-9 and 5.1.7-10). The mean total CPUE and BPUE values for each of the three years varied considerably but both were lowest in 2009 and highest in 2010 (Figures 5.1.7-9 and 5.1.7-10). The highest mean overall CPUE value for an individual species was recorded for Walleye (9.3) (Table 5.1.7-9, Figure 5.1.7-11). The highest mean overall BPUE value (small bodied fish species only) was recorded for Troutperch (6) (Table 5.1.7-10, Figure 5.1.7-12).

Mean overall CPUE and BPUE for Northern Pike, Lake Whitefish, Walleye and all species combined captured in standard gang index gill nets are provided in Figures 5.1.7-19 and 5.1.7-20, respectively, by site. Northern Pike were captured at only three sites with low CPUE and BPUE values. Lake Whitefish were captured at nearly all sites. Walleye were captured at nearly all sites and varied little among sites and between years with the exception of GN-04. For all fish combined the mean overall CPUE was consistent among most sites with the exception of GN-01 which was higher than all other sites and more variable between years. For BPUE this was reversed with GN-01 having the lowest value and being consistent between years.

5.1.7.5 Size and Condition

Fish length, weight and condition factor data for Northern Pike, Lake Whitefish, Sauger, and Walleye captured in Winnipeg River Region waterbodies are presented in Tables 5.1.7-11, 5.1.7-12, 5.1.7-13, and 5.1.7-14, respectively. Mean and median fork lengths of Northern Pike, Lake Whitefish, Sauger, and Walleye, by waterbody, year, and mesh size, captured in Winnipeg River Region waterbodies are presented in Figures 5.1.7-21, 5.1.7-22, 5.1.7-23, and 5.1.7-24, respectively. Fork length frequency distributions for Northern Pike, Lake Whitefish, Sauger, and Walleye, by waterbody and year, captured in Winnipeg River Region waterbodies are presented in Figures 5.1.7-25, 5.1.7-26, 5.1.7-27, and 5.1.7-28, respectively.

Eaglenest Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 34 Northern Pike and 103 Walleye captured in standard gang and small mesh index gill nets from Eaglenest Lake in 2010 (Tables 5.1.7-11 and 5.1.7-14). Weights only were collected from an additional six Northern Pike and 25 Walleye as well as all Lake Whitefish (n = 12) and Sauger (n = 103) captured (Tables 5.1.7-12 and 5.1.7-13). For Northern Pike mean (±SD) fork length was 660 (±167) mm, while for Walleye mean (±SD) fork length was 363 (±101) mm.

The mean fork lengths of Northern Pike and Walleye captured by various mesh sizes are presented in Figures 5.1.7-21 and 5.1.7-24, respectively. Similarly, fork length frequency distributions for Northern Pike and Walleye are provided in Figures 5.1.7-25 and 5.1.7-28, respectively.

Mean weights for Northern Pike, Lake Whitefish, Sauger and Walleye were 2,263 g, 950 g, 149 g and 529 g, respectively (Tables 5.1.7-11 – 5.1.7-14). Mean (±SD) condition factors for Northern Pike and Walleye were 0.73 (±0.10) and 1.07 (±0.11) respectively.

Pointe du Bois Forebay

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 84 Northern Pike, 13 Lake Whitefish, 319 Sauger and 249 Walleye captured in standard gang and small mesh index gill nets from Pointe du Bois Forebay in 2008, 2009 and 2010 (Tables 5.1.7-11, 5.1.7-12, 5.1.7-13 and 5.1.7-14). Weights only were taken from an additional 115 Sauger and 17 Walleye. Mean fork lengths for each species were similar for all years of sampling. Mean (±SD) fork lengths for Northern Pike were 548 (±186) mm, 552 (±155) mm and 522 (±190) mm for 2008, 2009 and 2010, respectively, while those for Lake Whitefish in 2009 and 2010 were 445 (±75) mm and 403 (±109) mm respectively. Mean (±SD) fork lengths for Sauger were 269 (±56) mm, 297 (±40) mm and 289 (±42) mm in 2008, 2009 and 2010, respectively, while corresponding values for Walleye were 369 (±152) mm, 413 (±131) mm and 354 (±151) mm, respectively.

The mean fork lengths of Northern Pike, Lake Whitefish, Sauger and Walleye captured by various mesh sizes are presented in Figures 5.1.7-21, 5.1.7-22, 5.1.7-23 and 5.1.7-24, respectively. Similarly, fork length frequency distributions for the same species are provided in Figures 5.1.6-25, 5.1.6-26, 5.1.6-27 and 5.1.6-28.

Species-specific mean weights for Northern Pike and Sauger were relatively similar among years (Tables 5.1.7-11 and 5.1.7-13). Mean weight for Lake Whitefish was lower in 2010 than in 2009, based on few fish captured (Table 5.1.7-12) and mean weight for Walleye was noticeably lower in 2010 than in either 2008 or 2009 (Table 5.1.7-14). Mean condition factor for northern pike, sauger, and walleye differed little among years. Mean (±SD) condition factor from 2008, 2009 and 2010 were 0.70 (±0.11), 0.67 (±0.12) and 0.63 (±0.08), respectively, for Northern Pike; 1.09 (±0.16), 0.87 (±0.10) and 0.88 (±0.11), respectively, for Sauger; and 1.19 (±0.18), 1.10 (±0.16), and 1.03 (±0.12), respectively, for Walleye. Mean (±SD) condition factors for Lake Whitefish were 1.76 (±0.13), and 1.46 (±0.11) for 2009 and 2010, respectively.

Lac du Bonnet

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 75 Northern Pike, 45 Lake Whitefish, 334 Sauger and 185 Walleye captured in standard gang and small mesh index gill nets from Lac du Bonnet in 2008, 2009 and 2010 (Tables 5.1.7-11, 5.1.7-12, 5.1.7-13 and 5.1.7-14). Mean fork lengths for Sauger and Walleye were similar for all years of sampling. Mean fork length for Northern Pike was noticeably higher in 2008 than in 2009 while mean length for Lake Whitefish was considerably lower in 2010 than in either 2008 or 2009. Mean (±SD) fork lengths for Northern Pike were 700 (±150) mm, 594 (±184) mm and 649 (±138) mm for 2008, 2009 and 2010, respectively, while those for Lake Whitefish were 414 (±65) mm, 448 (±109) mm and 283 (±120) mm, respectively, for the same years. Mean (±SD) fork lengths for Sauger were 256 (±36) mm, 235 (±45) mm and 247 (±29) mm in 2008, 2009 and 2010, respectively, while corresponding values for Walleye were 325 (±167) mm, 290 (±132) mm and 343 (±153) mm, respectively.

The mean fork lengths of Northern Pike, Lake Whitefish, Sauger and Walleye captured by various mesh sizes are presented in Figures 5.1.7-21, 5.1.7-22, 5.1.7-23 and 5.1.7-24 respectively. Similarly, fork length frequency distributions for the same species are provided in Figures 5.1.7-25, 5.1.7-26, 5.1.7-27 and 5.1.7-28.

As was the case with mean length, mean weight for Northern Pike was noticeably higher in 2008 than in 2009, while mean weight for Lake Whitefish was considerably lower in 2010 than in either 2008 or 2009. As well, mean weight for Walleye was noticeably lower in 2009 than in either 2008 or 2010. Mean (±SD, where calculated) weights for Northern Pike were 2,876 (±2,094) g, 1,847 (±2,057) g and 2,274 (±1,435) g for 2008, 2009 and 2010, respectively. For Lake Whitefish in 2008, 2009 and 2010 these values were 1,226 (±540) g, 1,292 g, and 494 (±583) g. Values for Sauger were 160 g, 133 g, and 144 (±45) g for 2008, 2009 and 2010, respectively, while for Walleye the corresponding values were 700 g, 463 g, and 792 (±983) g. Mean (±SD) condition factors from 2008, 2009 and 2010 were 0.74 (±0.17), 0.66 (±0.07) and 0.73 (±0.07), respectively, for Northern Pike; 1.61 (±0.15), 1.56 (±0.22) and 1.32 (±0.16), respectively, for Lake Whitefish; 0.91 (±0.14), 0.91 (±0.13), and 0.92 (±0.07), respectively, for Sauger; and 1.16 (±0.26), 1.07 (±0.10), and 1.09 (±0.16), respectively, for Walleye.

Manigotagan Lake

Fish length, weight and condition factor data were collected and analyzed (by mesh size and total catch) for 36 Northern Pike, 76 Lake Whitefish (2008 and 2009 only) and 386 Walleye captured in standard gang and small mesh index gill nets from Manigotagan Lake in 2008, 2009 and 2010 (Tables 5.1.7-11, 5.1.7-12, 5.1.7-13 and 5.1.7-14). Weights only were collected from an additional 33 Lake Whitefish in 2010. Mean fork lengths for Northern Pike, Lake Whitefish and Walleye were similar for all years of sampling. Mean (±SD) fork lengths for Northern Pike were 563 (±81) mm, 556 (±77) mm and 583 (±80) mm for 2008, 2009, and 2010, respectively, while those for Lake Whitefish were 410 (±50) mm and 402 (±57) mm for 2008 and 2009, respectively. Mean (±SD) fork lengths for Walleye were 352 (±130) mm, 354 (±131) mm and 340 (±86) mm in 2008, 2009 and 2010, respectively.

The mean fork lengths of Northern Pike, Lake Whitefish and Walleye captured by various mesh sizes are presented in Figures 5.1.7-21, 5.1.7-22 and 5.1.7-24 respectively. Similarly, fork length frequency distributions for the same species are provided in Figures 5.1.7-25, 5.1.7-26 and 5.1.7-28.

As was the case with mean length, mean weights for Northern Pike, Lake Whitefish, and Walleye were generally similar among sampling years. One exception to this was the mean weight of Walleye in 2010 which was noticeably lower in 2010 than in either 2008 or 2009. Mean (±SD, where calculated) weights for Northern Pike were 1,063 g, 1,196 (±638) g, and 1,271 (±862) g for 2008, 2009, and 2010, respectively. For Lake Whitefish in 2008, 2009 and 2010 these values were 882 (±298) g, 920 (±378) g and 794 g. Values for Walleye were 654 g, 661 g and 495 (±430) g for 2008, 2009, and 2010, respectively. Mean (±SD) condition factors from 2008, 2009 and 2010 were 0.61 (±0.08), 0.66 (±0.09) and 0.58 (±0.13), respectively, for Northern Pike; and 0.99 (±0.13), 1.00 (±0.13), and 1.05 (±0.08), respectively, for Walleye. Mean (±SD) condition factors from 2008 and 2009 only for Lake Whitefish were 1.22 (±0.14) and 1.34 (±0.18).

5.1.7.6 Age Composition

Year-class and age-frequency distributions for Northern Pike, Lake Whitefish, Sauger, and Walleye captured in standard gang index gill nets in Winnipeg River Region waterbodies are presented in Tables 5.1.7-15 – 5.1.7-18 and Tables 5.1.7-19 – 5.1.7-22, respectively. Age-frequency distributions for Northern Pike, Lake Whitefish, Sauger, and Walleye are also illustrated in Figures 5.1.7-29 – 5.1.7-32, respectively. Where sufficient data existed, mean fork length, weight, and condition factor, by age and year-class, for Northern Pike, Lake Whitefish, Sauger, and Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies are presented in Tables 5.1.7-23 – 5.1.7-35. Where sufficient data existed, von Bertalanffy growth curves were produced and are presented for Northern Pike, Lake Whitefish, Sauger, and Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies in Figures 5.1.7-33 – 5.1.7-36, respectively.

Eaglenest Lake

Age frequency distributions were calculated for Northern Pike and Walleye captured in standard gang index gill nets in Eaglenest Lake during 2010. Age frequency distributions are presented by cohort (Tables 5.1.7-15 and 5.1.7-18) and by age (Tables 5.1.7-19 and 5.1.7-22, Figures 5.1.6-29 and 5.1.6-32). Year-classes represented ranged from 1994 to 2007 for Northern Pike and from 1989 to 2007 for Walleye.

The data for Northern Pike suggest relatively strong year-classes from 2001 to 2003, with a fairly normal distribution of fish ranging from three to 16 years. For Walleye, the data suggest that the 2004 year-class is under-represented in the catch.

Length, weight and condition factor by age and year-class data from 2010 for Northern Pike and Walleye are provided in Tables 5.1.7-23 and 5.1.7-32, respectively. Fitted typical von Bertalanffy growth curves for Northern Pike and Walleye are provided in Figures 5.1.6-33 and 5.1.6-36, respectively.

Pointe du Bois Forebay

Age frequency distributions were calculated for Northern Pike, Lake Whitefish, Sauger and Walleye captured in standard gang index gill nets in Pointe du Bois Forebay during 2008, 2009 and 2010. Age-frequency distributions are presented by cohort (Tables 5.1.7-15 - 5.1.7-18) and by age (Tables 5.1.7-19 - 5.1.7-22, Figures 5.1.6-29 - 5.1.6-32). Year-classes represented ranged from 1997 to 2007 for Northern Pike, 1995, 2006, and 2007 for Lake Whitefish, from 1995 to 2007 for Sauger, and from 1988 to 2008 for Walleye.

In each of the three years, four- and five-year old Northern Pike make up the majority of the catch. In 2008 and 2009 there was good representation across several year-classes while in 2010 there was only one fish older than six years. Too few data are available for Lake Whitefish to assess year-class strength. For Sauger, the data for all years of sampling suggest fairly normal distributions with no consistent missing or weak year-classes (Figure 5.1.7-31). The data for Walleye suggest that a broad range of year-classes are represented in the population, with a strong 2003 cohort and weaker year-classes in 2000 and 2004 (Table 5.1.7-18).

Length, weight and condition factor by age and year-class data from 2008, 2009 and 2010 for Northern Pike, Lake Whitefish, Sauger and Walleye are provided in Tables 5.1.7-24, 5.1.7-27, 5.1.7-30 and 5.1.7-33, respectively. Fitted typical von Bertalanffy growth curves for Northern Pike, Sauger, and Walleye are provided in Figures 5.1.7-33, 5.1.7-35 and 5.1.7-36 respectively.

Lac du Bonnet

Age-frequency distributions were calculated for Northern Pike, Lake Whitefish, Sauger and Walleye captured in standard gang index gill nets in Lac du Bonnet during 2008, 2009 and 2010. Age-frequency distributions are presented by year-class cohort (Tables 5.1.7-15 - 5.1.7-18), and by age (Tables 5.1.7-19 - 5.1.7-22, Figures 5.1.7-29 - 5.1.7-32). Year-classes represented ranged from 1991 and 1995 to 2008 for Northern Pike, from 1992 to 2009 for Lake Whitefish, from 1995 to 2009 for Sauger, and from 1991 to 2009 for Walleye.

Small sample sizes in 2008 and 2009 limit the ability to assess Northern Pike year-class strength; however, data from 2010 suggest that young Northern Pike make up the majority of the catch with few fish older than seven years (Table 5.1.7-15). Similarly, too few data are available to assess Lake Whitefish year-class strength. For Sauger, the data suggest a weak year-class in 2004 (never accounting for more than 9% of the aged sample of fish) and a strong year-class in 2006 (accounting for 45% of the aged sample of fish in 2010) (Table 5.1.7-17). Similar to Pointe du Bois, the data for Walleye suggest that a broad range of year-classes are represented in the population, with a stronger 2006 cohort and weaker year-classes in 2000 and 2004 (Table 5.1.7-18).

Length, weight and condition factor by age and year-class data from 2008, 2009 and 2010 for Northern Pike, Lake Whitefish, Sauger and Walleye are provided in Tables 5.1.7-25, 5.1.7-28, 5.1.7-31 and 5.1.7-34, respectively. Fitted typical von Bertalanffy growth curves for Northern Pike, Lake Whitefish, Sauger and Walleye are provided in Figures 5.1.7-33, 5.1.7-34, 5.1.7-35, and 5.1.7-36, respectively.

Manigotagan Lake

Age-frequency distributions were calculated for Northern Pike, Lake Whitefish and Walleye captured in standard gang index gill nets in Manigotagan Lake during 2008, 2009 and 2010. Age-frequency distributions are presented by year-class cohort (Tables 5.1.7-15, 5.1.7-16, and 5.1.7-18) and by age (Tables 5.1.7-19, 5.1.7-20, 5.1.7-22 and Figures 5.1.6-29, 5.1.6-30, 5.1.6-32). Year-classes represented ranged from 1996 to 2005 for Northern Pike, from 1985 to 2003 for Lake Whitefish, and from 1990 to 2008 for Walleye.

Although small sample sizes limit the ability to assess Northern Pike year-class strength, five year-old fish accounted for the majority of the catch in all three years suggesting that a number of good cohorts are present in the population (Table 5.1.7-19). For Lake Whitefish, relatively strong cohorts are apparent in 1997 and 1998 (Table 5.1.7-16). The data for Walleye suggest a broad range of year-classes are present in the population with a particularly strong 2006 cohort reflected in all years of data collection and a strong 2005 cohort evident only in the 2010 data.

Length, weight and condition factor by age and year-class data from 2008, 2009 and 2010 for Northern Pike, Lake Whitefish, and Walleye are provided in Tables 5.1.7-26, 5.1.7-29 and 5.1.7-35, respectively. Fitted typical von Bertalanffy growth curves for Northern Pike, Lake Whitefish, and Walleye are provided in Figures 5.1.6-33, 5.1.6.3-34 and 5.1.6-36, respectively.

5.1.7.7 Deformities, Erosion, Lesions and Tumours (DELTs)

Eaglenest Lake

A total of 11 Deformities, Erosion, Lesions, and Tumours (DELTs) were recorded from 304 (3.6%) fish examined from Eaglenest Lake in 2010 (Table 5.1.7-36). The highest incidence rate was observed in White Sucker (7.9%, n = 89), followed by Northern Pike (5.9%, n = 34), Sauger (1.5%, n = 66) and Walleye (1.0%, n = 103). In total, one deformity and six lesions were found on White Sucker; one lesion and one tumour were found on Northern Pike; one lesion was found on Sauger and one deformity was found on Walleye. Lake Whitefish (n = 12) also were examined for DELTs but none were observed.

Pointe du Bois Forebay

A total of 19 DELTs were recorded from 1,287 (1.5%) fish examined from Pointe du Bois Forebay in 2008, 2009, and 2010 (Table 5.1.7-36). Of species captured in large numbers, the highest incidence rate occurred in White Sucker (2.2%, n = 630), Walleye (0.4%, n = 223), and Sauger (0.3%, n = 318). In addition, a total of three of 16 captured Lake Sturgeon were observed to have deformities, resulting in an incidence rate of 18.8%. In total, four deformities, eight lesions and two tumours were found on White Sucker, one tumour was found on Walleye, and one lesion was found on Sauger. Lake Whitefish (n = 16) and Northern Pike (n = 84) also were examined for DELTS but none were observed.

Lac du Bonnet

A total of three DELTs were recorded from 649 (0.5%) fish examined from Lac du Bonnet in 2008, 2009, and 2010 (Table 5.1.7-36). The highest incidence rate occurred in Northern Pike (1.4%, n = 71), followed by White Sucker (0.8%, n = 118), and Walleye (0.7%, n = 152). In total, one lesion was found on Northern Pike, one lesion was found on White Sucker, and one tumour was found on Walleye. Lake Sturgeon (n = 11), Lake Whitefish (n = 45) and Sauger (n = 252) also were examined for DELTs but none were observed.

Manigotagan Lake

A total of two DELTs were recorded from 553 (0.4%) fish examined from Manigotagan Lake in 2008, 2009, and 2010 (Table 5.1.7-36). The highest incidence rate was observed in White Sucker (1.8%, n = 57), followed by Walleye (0.3%, n = 351). In total, one deformity was found on White Sucker and one lesion and one deformity were found on one individual Walleye. Lake Whitefish (n = 108) and Northern Pike (n = 37) were also examined for DELTs but none were observed.

5.1.7.8 Index of Biotic Integrity

Index of Biotic Integrity (IBI) (Karr 1981) scores based on 11 metrics were calculated for all Winnipeg River Region waterbodies. The Winnipeg River Region IBI scores varied from 55.8 (Pointe du Bois Forebay 2010) to 73.9 (Lac Du Bonnet 2010) with Eaglenest Lake and Manigotagan Lake having scores of approximately 65 (Table 5.1.7-37 and Figure 5.1.7-37). The on-system waterbodies were found to have very similar annual species assemblages ranging from 17 to 19 species, while the off-system waterbody, Manigotagan Lake, only had a total of nine species. All waterbodies had seven sensitive species present for at least one of the years of sampling with Pointe du Bois having eight in 2009. Manigotagan Lake, Lac du Bonnet, and Eaglenest Lake had low proportions of tolerant individuals (7.0 to 13.1%) while Pointe du Bois Forebay had considerably higher proportions of tolerant individuals over all three years (27.4 to 34.3%). The number of insectivore species was again very similar among the on-system waterbodies, ranging from nine to 11 while Manigotagan Lake had three to four. Evenness values ranged from 4.25 (Manigotagan Lake 2010) to 11.43 (Lac Du Bonnet 2010) species contributing the majority of information while Pointe du Bois Forebay and Eaglenest Lake had values of approximately eight species. Eaglenest Lake and Pointe du Bois Forebay were dominated by piscivore and omnivore species in terms of proportion of biomass while Lac du Bonnet and Manigotagan Lake were found to be dominated by piscivores, followed in order by insectivores and omnivores. The proportion of simple lithophilic spawners was highest in Manigotagan Lake (0.92) and lowest in Eaglenest Lake (0.5). CPUE ranged from 20.7 fish/100 m/24 h (Pointe du Bois Forebay 2010) to 68.1 fish/100 m/ 24 h (Manigotagan Lake 2008). The percentage of deformities, erosion, lesions, and tumours was less than 3% for all but one waterbody, i.e., Eaglenest Lake (3.62%).

5.1.7.9 Spatial Comparisons

Overall, the fish assemblage, as assessed using both standard gang and small mesh index gillnet sets, in the two sampled on-system Winnipeg River waterbodies was found to be dominated by percids (i.e., Walleye, Sauger and Yellow Perch) (Tables 5.1.7-3 and 5.1.7-5). White Sucker and

Northern Pike were also common in standard gang index gill nets while Troutperch and Spottail Shiner were common only in the small mesh gillnet catches.

Moving from upstream to downstream on the Winnipeg River, the catch in Eaglenest Lake was comprised of 18 species, of which only Black Crappie (*Pomoxis nigromaculatus*) and Logperch (*Percina caprodes*) were not found in the other Winnipeg River waterbodies sampled. Notable absences from the catch in Eaglenest Lake (species captured in other Winnipeg River waterbodies farther downstream) included Burbot, Lake Sturgeon, Longnose Sucker, and Emerald Shiner. The fish assemblage captured in the Pointe du Bois Forebay was comprised of 21 species, of which only Golden Redhorse was not captured in any of the other Winnipeg River waterbodies sampled. Nineteen species were captured in Lac du Bonnet, of which only Channel Catfish was not found in any of the other Winnipeg River waterbodies sampled.

By comparison, the fish community in Manigotagan Lake, as assessed using standard gang and small mesh index gill nets, was found to be dissimilar in several ways to the fish communities of the three sampled Winnipeg River mainstem waterbodies. The fish assemblage was noticeably less diverse, with nine species captured as compared to 18-21 species for the on-system waterbodies. Emerald Shiner, Spottail Shiner, Rainbow Smelt, and Sauger were absent from the catch, White Sucker abundance was relatively low, and Cisco, Lake Whitefish, Burbot, and Walleye comprised a much higher percentage of the overall catch.

A comparison of mean CPUE values for the catch from the standard gang and small mesh index gill nets from the on-system waterbodies and the two off-system waterbodies that together represent the Winnipeg River Region is presented in Tables 5.1.7-7 and 5.1.7-9 while both mean and median CPUE values for all fish are presented in Figure 5.1.7-9. Figure 5.1.7-11 provides mean CPUE values for select species for all sampled waterbodies in the region. The Winnipeg River mainstem waterbodies (Eaglenest Lake, Pointe du Bois Forebay and Lac du Bonnet) were found to have very similar overall mean CPUE values for standard gang index gillnet total catch (Table 5.1.7-7), and similar CPUE values for Northern Pike and Walleye. Manigotagan Lake, the annual off-system waterbody, had higher overall mean CPUE values for the standard gang gill nets than the on-system waterbodies for total catch, Walleye, Cisco, and Lake Whitefish, while the Northern Pike values were similar. The small mesh gillnet overall mean CPUE for the on-system waterbodies ranged from a low of 22.6 fish/30 m/h in Pointe du Bois Forebay to a high of 46.5 fish in Lac du Bonnet. The small mesh gillnet overall mean CPUE for Manigotagan Lake was considerably lower at 11.9 fish, with a catch that was composed primarily of Walleye. The only small-bodied species present in the small mesh gillnet catch in Manigotagan Lake was Troutperch.

A comparison of BPUE values for the standard gang and small mesh index gillnet catches from all sampled waterbodies in the region is provided in Tables 5.1.7-8 and 5.1.7-10 while both mean and median BPUE values for all fish are presented in Figure 5.1.7-10. Figure 5.1.7-12 provides mean BPUE values for select species for all sampled waterbodies in the region. In general, overall mean BPUE values for the standard gang index gillnet total catch were relatively similar among on-system waterbodies and somewhat higher in Manigotagan Lake. The overall mean BPUE value for the small mesh index gillnet total catch was also somewhat higher in Manigotagan Lake than in the on-system waterbodies, although this was primarily due to a large biomass of Walleye in 2010 (Table 5.1.7-10). With regard to individual species, the BPUE values show a higher biomass for White Sucker in the Pointe du Bois Forebay standard gang index gillnet catch than in other waterbodies in the region. As well the data indicate a higher biomass for Walleye and Lake Whitefish in Manigotagan Lake than in the on-system waterbodies and Eaglenest Lake.

Within each waterbody site variability was examined by comparing mean CPUE values for individual sites. With the exception of Eaglenest Lake, which only had one year of data, the three years of collected data were pooled for individual sites. Total CPUE values are presented along with values for Northern Pike, Lake Whitefish, Sauger, and Walleye. The Eaglenest Lake sites were found to have total CPUE values ranging from approximately 10 fish/100m of net/24 h (Site GN-01) to nearly 60 fish (Site GN-11) (Figure 5.1.7-13). In the Pointe du Bois Forebay total CPUE values ranged from below 5 fish (Site GN-09) to nearly 90 fish (Site GN-17) (Figure 5.1.7-15), although the majority of sites had total CPUE values ranging from 20 to 40 fish. For Lac du Bonnet the majority of sites also had total CPUE values between 20 and 40 fish with the exception of Site GN-09 which had a CPUE value close to 60 fish (Figure 5.1.7-17). For Manigotagan Lake the majority of total CPUE values ranged from 40 to 70 fish; however, Site GN-01 had a total CPUE of nearly 100 fish (Figure 5.1.7-19).

With respect to IBI, scores were similar for all waterbodies with Pointe du Bois having the lowest IBI on average followed closely by Manigotagan Lake and Eaglenest Lake. Lac du Bonnet had the highest overall IBI scores suggesting that, based on the selected metrics, this waterbody has the best overall fish community condition. The scores for the other waterbodies are very close to one another suggesting that they are approximately equivalent in overall fish community health. Although Manigotagan Lake, Pointe du Bois Forebay, and Eaglenest Lake received similar overall IBI scores, there was considerable difference between the Winnipeg River mainstem waterbodies and Manigotagan Lake for some metrics. Manigotagan Lake scored lower in some metrics (e.g., fewer species, lower evenness values) and higher in others considered to be indicative of biological integrity (e.g., CPUE, proportion of simple lithophilic spawners, piscivore and insectivore biomass).

5.1.7.10 Temporal Variability

CPUE values were used to examine temporal variability within waterbodies. Within the Pointe du Bois Forebay, overall standard gang index gillnet CPUE varied from a low of 20.7 in 2010 to a high of 45.6 in 2009. Small mesh index gillnet CPUE varied from a low of 14.0 in 2009 to a high of 35.6 in 2008. The wide range of standard gang and small mesh CPUEs, combined with the fact that highest and lowest CPUEs among gear types varied between years, illustrates considerable variability in the gillnet catches in this waterbody. However, in Lac du Bonnet overall standard gang index gillnet CPUEs and small mesh index gillnet CPUEs showed little variability among years. Standard gang index gillnet CPUEs ranged from 32.5 fish in 2008 to 37.5 fish in 2009 while small mesh index gillnet CPUEs ranged from 40.6 fish in 2009 to 54.3 fish in 2008. In Manigotagan Lake, standard gang index gillnet CPUE showed little variability among years (i.e., ranging from 50.4 fish in 2009 to 68.1 fish in 2008) but small mesh gillnet CPUE increased almost ten-fold from 2009 to 2010 (i.e., ranging from 3.0 fish in 2009 to 24.4 fish in 2010).

Examination of temporal variation using IBI values was possible for all waterbodies except Eaglenest Lake which only had one year of data collection. The IBI values for Pointe du Bois Forebay increased from 56 in 2008 to 64.5 in 2009 and then dropped again to 55.8 in 2010 (Table 5.1.7-37 and Figure 5.1.7-37). The increased IBI value in 2009 was due to several slightly higher scoring metrics contributing to the overall value rather than a single metric; however, the number of sensitive species and CPUE metrics were both higher than in the other two years. The IBI values for Lac du Bonnet were consistent throughout all three years with values of approximately 73. The IBI values for Manigotagan Lake were similar between years with 2008 having the lowest value (61.8) and 2009 and 2010 having nearly the same values (66.1 and 65.8, respectively). The insectivore biomass metric was the only lower scoring metric for 2008 than both 2009 and 2010; all others varied only slightly among the years.

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

Table 5.1.7-1. Summary of site-specific physical measurements collected during CAMPP index gillnetting conducted in Winnipeg 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	
Eaglenest Lake	GN-01	15	342838	5579777	19-Jul-10	22.08	4.2	3.5	19.0
Eaglenest Lake	GN-02	15	342972	5578980	20-Jul-10	25.08	3.2	3.3	19.0
Eaglenest Lake	GN-03	15	341990	5576703	19-Jul-10	24.42	7.8	8.1	19.5
Eaglenest Lake	GN-04	15	343679	5577547	20-Jul-10	25.08	12.9	14.2	20.0
Eaglenest Lake	GN-05	15	341358	5573610	21-Jul-10	24.58	7.8	10.9	20.0
Eaglenest Lake	GN-06	15	341263	5576055	21-Jul-10	29.83	2.4	5.5	20.0
Eaglenest Lake	GN-07	15	345398	5569004	22-Jul-10	27.33	4.2	3.9	19.5
Eaglenest Lake	GN-08	15	346310	5569611	22-Jul-10	25.25	12.3	16.2	19.5
Eaglenest Lake	GN-09	15	342276	5571804	23-Jul-10	28.58	4.8	3.8	19.5
Eaglenest Lake	GN-10	15	342879	5571475	23-Jul-10	28.58	7.4	14.5	19.5
Eaglenest Lake	GN-11	15	340695	5570949	24-Jul-10	25.08	3.0	3.1	21.0
Eaglenest Lake	GN-12	15	340769	5571569	24-Jul-10	25.08	8.9	10.3	21.0
Eaglenest Lake	SN-01	15	342794	5579838	19-Jul-10	22.92	4.5	4.2	19.0
Eaglenest Lake	SN-02	15	343718	5577472	20-Jul-10	29.83	12.6	12.9	20.0
Eaglenest Lake	SN-03	15	346239	5569587	22-Jul-10	26.17	11.7	12.3	19.5
Eaglenest Lake	SN-04	15	340623	5570926	24-Jul-10	26.58	2.9	3.0	21.0
Pointe du Bois	GN-01	14	326434	5579359	14-Jul-08	22.00	7.3	7.9	18.0
Pointe du Bois	GN-02	14	325353	5580046	14-Jul-08	26.33	3.3	11.6	18.0
Pointe du Bois	GN-03	14	324982	5580785	14-Jul-08	26.73	11.5	6.2	19.0
Pointe du Bois	GN-04	14	323895	5579878	14-Jul-08	27.47	18.0	6.9	18.0
Pointe du Bois	GN-05	14	323540	5577759	15-Jul-08	24.67	14.9	14.7	20.0
Pointe du Bois	GN-06	14	325451	5579018	15-Jul-08	17.80	25.2	12.2	19.0
Pointe du Bois	GN-07	14	322553	5578660	16-Jul-08	23.80	5.5	6.1	18.0
Pointe du Bois	GN-08	14	322816	5580051	16-Jul-08	22.33	8.2	7.2	18.0
Pointe du Bois	GN-09	14	321238	5578621	16-Jul-08	21.33	14.5	12.3	18.0
Pointe du Bois	GN-10	14	322201	5577408	17-Jul-08	22.42	12.8	13.5	18.0
Pointe du Bois	GN-11	14	320098	5578585	17-Jul-08	26.23	4.5	5.6	20.0
Pointe du Bois	GN-12	14	319766	5577488	17-Jul-08	20.42	11.4	16.6	19.0
Pointe du Bois	GN-13	14	313982	5577856	18-Jul-08	16.00	13.4	14.7	19.0
Pointe du Bois	GN-14	14	321202	5577647	18-Jul-08	16.25	12.5	7.4	20.0
Pointe du Bois	GN-15	14	314474	5575530	19-Jul-08	23.25	10.1	7.5	19.0
Pointe du Bois	SN-01	14	326409	5579338	14-Jul-08	20.92	5.8	7.3	18.0
Pointe du Bois	SN-02	14	323569	5577793	15-Jul-08	23.58	10.8	14.9	20.0
Pointe du Bois	SN-03	14	321268	5578616	16-Jul-08	22.25	12.2	14.5	18.0
Pointe du Bois	SN-04	14	319788	5577462	17-Jul-08	21.17	-	-	19.0
Pointe du Bois	SN-05	14	313947	5577882	18-Jul-08	16.82	9.2	13.4	19.0

Table 5.1.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Pointe du Bois	GN-01	14	326366	5579325	14-Jul-09	46.25	7.2	7.9	17.0
Pointe du Bois	GN-02	14	325251	5580104	20-Jul-09	26.42	6.2	6.8	16.5
Pointe du Bois	GN-03	14	324972	5580891	17-Jul-09	25.58	6.0	5.0	16.0
Pointe du Bois	GN-05	14	333487	5577708	17-Jul-09	24.75	15.4	15.2	16.0
Pointe du Bois	GN-06	14	325369	5579037	15-Jul-09	28.75	14.7	17.4	17.0
Pointe du Bois	GN-07	14	322561	5578643	13-Jul-09	22.25	6.6	5.1	20.5
Pointe du Bois	GN-08	14	322802	5580072	14-Jul-09	24.83	6.8	7.9	17.5
Pointe du Bois	GN-09	14	321159	5578606	19-Jul-09	26.33	16.6	16.0	16.0
Pointe du Bois	GN-10	14	322191	5577415	18-Jul-09	25.58	12.5	12.6	16.5
Pointe du Bois	GN-11	14	320112	5578578	15-Jul-09	48.83	5.1	4.5	17.0
Pointe du Bois	GN-12	14	319738	5577533	18-Jul-09	24.67	11.0	12.5	16.0
Pointe du Bois	GN-14	14	321238	5577641	19-Jul-09	22.92	5.8	5.6	17.0
Pointe du Bois	GN-15	14	319493	5575532	19-Jul-09	22.83	6.9	7.4	16.5
Pointe du Bois	GN-16	14	323786	5581047	20-Jul-09	26.92	4.8	4.6	16.5
Pointe du Bois	GN-17	14	322710	5575740	20-Jul-09	23.75	11.8	11.0	17.0
Pointe du Bois	SN-01	14	326386	5579343	14-Jul-09	46.25	7.1	7.2	17.0
Pointe du Bois	SN-02	14	323529	5577737	17-Jul-09	24.75	14.2	15.4	16.0
Pointe du Bois	SN-03	14	321197	5578609	19-Jul-09	26.33	15.0	16.6	16.0
Pointe du Bois	SN-04	14	319755	5577493	18-Jul-09	24.67	11.4	11.0	16.0
Pointe du Bois	SN-05	14	323839	5581029	20-Jul-09	26.92	4.5	4.8	16.5
Pointe du Bois	GN-01	14	326330	5579312	13-Jul-10	25.08	7.6	6.5	19.0
Pointe du Bois	GN-03	14	324805	5580920	15-Jul-10	27.33	5.6	6.9	19.0
Pointe du Bois	GN-04	14	324032	5579877	13-Jul-10	24.42	19.6	15.8	19.0
Pointe du Bois	GN-05	14	323449	5577738	14-Jul-10	29.83	15.8	16.0	19.0
Pointe du Bois	GN-06	14	325218	5579095	15-Jul-10	25.25	8.1	24.6	19.0
Pointe du Bois	GN-07	14	322557	5578674	16-Jul-10	26.17	6.5	6.2	19.0
Pointe du Bois	GN-08	14	322795	5579936	14-Jul-10	24.58	7.9	7.1	19.5
Pointe du Bois	GN-09	14	320993	5578569	16-Jul-10	25.08	16.1	12.7	19.0
Pointe du Bois	GN-10	14	322233	5577384	16-Jul-10	26.58	12.3	13.6	19.0
Pointe du Bois	GN-11	14	320126	5578551	17-Jul-10	24.00	4.7	6.0	19.0
Pointe du Bois	GN-12	14	319643	5577488	17-Jul-10	24.08	13.0	9.7	19.0
Pointe du Bois	GN-13	14	320101	5577897	12-Jul-10	22.92	15.7	21.0	20.0
Pointe du Bois	GN-14	14	321236	5577653	12-Jul-10	22.08	6.8	5.7	20.0
Pointe du Bois	GN-15	14	319538	5575533	17-Jul-10	24.00	6.9	5.9	19.0
Pointe du Bois	GN-16	14	324027	5581109	15-Jul-10	28.58	5.4	4.9	19.0
Pointe du Bois	SN-01	14	326300	5579283	13-Jul-10	25.08	7.9	7.6	19.0
Pointe du Bois	SN-02	14	323495	5577776	14-Jul-10	29.83	12.8	15.8	19.0
Pointe du Bois	SN-03	14	320935	5578579	16-Jul-10	25.08	11.1	16.1	19.0
Pointe du Bois	SN-04	14	319610	5577472	17-Jul-10	24.08	12.1	13.0	19.0
Pointe du Bois	SN-05	14	324067	5581119	15-Jul-10	28.58	5.2	5.4	19.0

Table 5.1.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Lac du Bonnet	GN-01	15	300757	5586695	21-Sep-08	18.42	13.2	13.3	17.1
Lac du Bonnet	GN-02	15	301067	5588844	21-Sep-08	19.85	3.9	7.9	17.3
Lac du Bonnet	GN-03	15	297646	5586239	21-Sep-08	21.00	8.0	7.9	16.6
Lac du Bonnet	GN-04	15	298543	5583161	22-Sep-08	20.83	5.0	6.1	16.4
Lac du Bonnet	GN-05	15	294154	5584383	22-Sep-08	20.00	7.5	7.7	16.1
Lac du Bonnet	GN-06	15	293387	5587195	22-Sep-08	22.00	5.2	5.2	16.1
Lac du Bonnet	GN-07	15	291311	5583254	23-Sep-08	19.00	4.5	5.9	16.3
Lac du Bonnet	GN-08	15	288429	5586292	23-Sep-08	19.00	2.0	11.4	17.0
Lac du Bonnet	GN-09	15	288004	5582048	24-Sep-08	18.50	8.0	3.0	17.0
Lac du Bonnet	GN-10	15	286599	5579621	24-Sep-08	21.00	5.0	3.9	17.0
Lac du Bonnet	SN-01	15	300612	5586709	21-Sep-08	18.42	13.2	13.2	17.1
Lac du Bonnet	SN-04	15	298654	5583047	22-Sep-08	20.83	5.0	5.0	16.4
Lac du Bonnet	SN-08	15	288592	5586328	23-Sep-08	19.00	2.0	2.0	17.0
Lac du Bonnet	GN-01	15	300801	5586766	20-Sep-09	17.75	17.0	17.0	20.4
Lac du Bonnet	GN-02	15	301078	5588621	20-Sep-09	18.13	6.5	3.5	21.3
Lac du Bonnet	GN-03	15	297768	5586211	21-Sep-09	20.53	7.9	7.9	20.3
Lac du Bonnet	GN-04	15	298678	5583062	21-Sep-09	20.05	1.7	5.8	20.0
Lac du Bonnet	GN-05	15	294285	5584308	22-Sep-09	18.35	7.8	7.6	19.9
Lac du Bonnet	GN-06	15	293285	5587369	22-Sep-09	18.58	4.5		19.9
Lac du Bonnet	GN-07	15	291360	5583363	23-Sep-09	19.93	4.4	5.1	19.6
Lac du Bonnet	GN-08	15	288602	5586327	23-Sep-09	20.50	1.6	11.5	19.3
Lac du Bonnet	GN-09	15	288150	5582048	24-Sep-09	20.17	3.5	8.0	20.3
Lac du Bonnet	GN-10	15	286655	5579739	24-Sep-09	21.08	5.3	5.0	19.9
Lac du Bonnet	SN-01	15	300801	5686766	20-Sep-09	17.75	17.0	17.0	20.4
Lac du Bonnet	SN-04	15	298678	5583062	21-Sep-09	20.05	1.7	1.7	20.0
Lac du Bonnet	SN-08	15	288602	5586327	23-Sep-09	20.50	4.4	4.4	19.3
Lac du Bonnet	GN-01	15	300801	5586766	21-Sep-10	21.83	15.6	15.1	13.8
Lac du Bonnet	GN-02	15	301078	5588621	21-Sep-10	20.50	6.5	7.8	13.5
Lac du Bonnet	GN-03	15	297768	5586211	21-Sep-10	22.00	9.2	8.8	13.3
Lac du Bonnet	GN-04	15	298678	5583062	22-Sep-10	21.75	7.3	3.7	12.4
Lac du Bonnet	GN-05	15	294285	5584308	22-Sep-10	21.33	9.0	8.7	12.9
Lac du Bonnet	GN-06	15	293285	5587369	22-Sep-10	24.25	6.5	6.0	12.9
Lac du Bonnet	GN-07	15	291360	5583363	23-Sep-10	17.92	6.1	7.3	12.8
Lac du Bonnet	GN-08	15	288602	5586327	23-Sep-10	19.25	2.5	7.8	13.7
Lac du Bonnet	GN-09	15	288150	5582048	20-Sep-10	19.75	1.5	9.1	14.4
Lac du Bonnet	GN-10	15	286655	5579739	20-Sep-10	16.25	5.5	5.8	14.5
Lac du Bonnet	SN-01	15	300801	5686766	21-Sep-10	21.83	15.6	15.1	13.8
Lac du Bonnet	SN-04	15	298678	5583062	22-Sep-10	21.75	7.3	7.3	12.4
Lac du Bonnet	SN-08	15	288602	5586327	23-Sep-10	19.25	2.5	2.5	13.7

Table 5.1.7-1. continued.

Location	Site	UTM Coordinates			Set Date	Set Duration (h)	Water Depth (m)		Water Temperature (ºC)
		Zone	Easting	Northing			Start	End	
Manigotagan Lake	GN-01	15	318961	5640604	7-Sep-08	15.75	18.2	17.5	17.0
Manigotagan Lake	GN-02	15	320044	5639418	7-Sep-08	16.75	6.7	3.7	17.0
Manigotagan Lake	GN-03	15	317163	5639414	8-Sep-08	18.60	5.7	13.0	17.0
Manigotagan Lake	GN-04	15	317424	5636260	8-Sep-08	21.72	3.5	1.4	16.0
Manigotagan Lake	GN-05	15	316202	5637849	9-Sep-08	15.48	20.5	20.3	16.5
Manigotagan Lake	GN-06	15	314841	5640180	9-Sep-08	16.18	15.0	14.0	16.5
Manigotagan Lake	SN-01	15	318961	5640604	7-Sep-08	15.75	18.2	18.2	17.0
Manigotagan Lake	SN-03	15	317163	5639414	8-Sep-08	18.60	3.3	5.7	17.0
Manigotagan Lake	GN-01	15	318955	5640676	1-Sep-09	17.42	19.0	19.0	18.2
Manigotagan Lake	GN-02	15	320137	5639470	1-Sep-09	18.67	7.6	4.7	18.0
Manigotagan Lake	GN-03	15	317135	5639444	2-Sep-09	20.87	1.0	13.0	19.7
Manigotagan Lake	GN-04	15	317454	5636318	2-Sep-09	23.37	4.5	1.5	18.5
Manigotagan Lake	GN-05	15	316224	5637833	3-Sep-09	17.58	21.7	21.5	22.7
Manigotagan Lake	GN-06	15	314846	5640208	3-Sep-09	18.42	16.0	14.8	22.0
Manigotagan Lake	SN-01	15	318955	5640676	1-Sep-09	17.42	19.0	19.0	18.2
Manigotagan Lake	SN-03	15	317135	5639444	2-Sep-09	20.87	1.0	13.0	19.7
Manigotagan Lake	GN-01	15	318918	5640658	7-Sep-10	16.77	19.0	19.0	16.0
Manigotagan Lake	GN-02	15	320077	5639435	7-Sep-10	18.00	7.3	5.2	16.0
Manigotagan Lake	GN-03	15	317176	5639330	8-Sep-10	20.18	11.0	3.9	16.0
Manigotagan Lake	GN-04	15	317422	5636276	8-Sep-10	23.50	4.3	1.9	16.0
Manigotagan Lake	GN-05	15	315996	5637930	9-Sep-10	17.50	22.0	21.0	16.0
Manigotagan Lake	GN-06	15	314778	5640225	9-Sep-10	15.42	16.0	13.0	16.0
Manigotagan Lake	SN-01	15	318950	6540638	7-Sep-10	16.77	19.0	19.0	16.0
Manigotagan Lake	SN-03	15	317138	5639436	8-Sep-10	20.18	11.0	3.9	16.0

Table 5.1.7-2. Fish species list compiled from standard gang and small mesh index gillnetting conducted in Winnipeg River Region waterbodies, 2008-2010.

Family	Common Name	Scientific Name	ID Code	Captured in Region		
				2008	2009	2010
Petromyzontidae	Silver Lamprey	*Ichthyomyzon unicuspis*	SLLM	+	+	+
Acipenseridae	Lake Sturgeon	*Acipenser fulvescens*	LKST	+	+	
Hiodontidae	Mooneye	*Hiodon tergisus*	MOON	+	+	+
Cyprinidae	Emerald Shiner	*Notropis atherinoides*	EMSH	+	+	+
	Spottail Shiner	*Notropis hudsonius*	SPSH	+	+	+
Catostomidae	Longnose Sucker	*Catostomus catostomus*	LNSC	+		
	White Sucker	*Catostomus commersoni*	WHSC	+	+	+
	Silver Redhorse	*Moxostoma anisurum*	SLRD		+	+
	Golden Redhorse	*Moxostoma erythrurum*	GLRD		+	
	Shorthead Redhorse	*Moxostoma macrolepidotum*	SHRD	+	+	+
Ictaluridae	Channel Catfish	*Ictalurus punctatus*	CHCT		+	
Esocidae	Northern Pike	*Esox lucius*	NRPK	+	+	+
Osmeridae	Rainbow Smelt	*Osmerus mordax*	RNSM	+		+
Salmonidae	Cisco	*Coregonus artedi*	CISC	+	+	+
	Lake Whitefish	*Coregonus clupeaformis*	LKWH	+	+	+
Percopsidae	Troutperch	*Percopsis omiscomaycus*	TRPR	+	+	+
Gadidae	Burbot	*Lota lota*	BURB	+	+	+
Centrarchidae	Rock Bass	*Ambloplites rupestris*	COTT	+	+	+
	Smallmouth Bass	*Micropterus dolomieu*	SMBS	+	+	+
	Black Crappie	*Pomoxis nigromaculatus*	BLCR			+
Percidae	Yellow Perch	*Perca flavescens*	YLPR	+	+	+
	Logperch	*Percina caprodes*	LGPR			+
	Sauger	*Sander canadensis*	SAUG	+	+	+
	Walleye	*Sander vitreus*	WALL	+	+	+

Table 5.1.7-3. Standard gang index gillnet relative abundance summaries from Winnipeg River Region waterbodies, 2008-2010 (and overall).

Common Name	Eaglenest L (#sites=12)		Pointe du Bois (#sites=15)								Lac du Bonnet (#sites=10)								Manigotagan L (#sites=6)							
	2010		2008		2009		2010		Overall		2008		2009		2010		Overall		2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	%	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	13	2.63	2	0.36	17	1.91	18	4.79	37	2.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	5	0.91	5	0.56	6	1.60	16	0.88	6	1.97	4	1.15	1	0.32	11	1.14	-	-	-	-	-	-	-	-
Mooneye	33	6.68	2	0.36	4	0.45	8	2.13	14	0.77	9	2.95	5	1.43	27	8.71	41	4.25	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	9	1.64	-	-	-	-	9	0.50	1	0.33	-	-	-	-	1	0.10	-	-	-	-	-	-	-	-
White Sucker	89	18.02	197	35.82	273	30.64	160	42.55	630	34.67	49	16.07	34	9.74	35	11.29	118	12.24	26	7.58	20	7.12	11	3.11	57	5.83
Silver Redhorse	7	1.42	-	-	1	0.11	2	0.53	3	0.17	9	2.95	16	4.58	19	6.13	44	4.56	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	2	0.22	-	-	2	0.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	2	0.40	22	4.00	13	1.46	5	1.33	40	2.20	9	2.95	8	2.29	22	7.10	39	4.05	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	1	0.33	6	1.72	-	-	7	0.73	-	-	-	-	-	-	-	-
Northern Pike	34	6.88	26	4.73	40	4.49	18	4.79	84	4.62	22	7.21	11	3.15	38	12.26	71	7.37	13	3.79	13	4.63	11	3.11	37	3.78
Rainbow Smelt	1	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	1	0.20	-	-	72	8.08	1	0.27	73	4.02	21	6.89	23	6.59	9	2.90	53	5.50	91	26.53	84	29.89	145	40.96	320	32.72
Lake Whitefish	12	2.43	3	0.55	9	1.01	4	1.06	16	0.88	16	5.25	13	3.72	16	5.16	45	4.67	35	10.20	41	14.59	32	9.04	108	11.04
Troutperch	-	-	-	-	1	0.11	-	-	1	0.06	-	-	-	-	-	-	-	-	-	-	-	-	1	0.28	1	0.10
Burbot	-	-	8	1.45	12	1.35	3	0.80	23	1.27	-	-	-	-	2	0.65	2	0.21	29	8.45	18	6.41	13	3.67	60	6.13
Rock Bass	4	0.81	3	0.55	13	1.46	1	0.27	17	0.94	7	2.30	3	0.86	4	1.29	14	1.45	-	-	-	-	-	-	-	-
Smallmouth Bass	6	1.21	2	0.36	3	0.34	3	0.80	8	0.44	4	1.31	2	0.57	1	0.32	7	0.73	2	0.58	1	0.36	2	0.56	5	0.51
Black Crappie	1	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	122	24.70	61	11.09	188	21.10	54	14.36	303	16.68	35	11.48	53	15.19	19	6.13	107	11.10	17	4.96	8	2.85	14	3.95	39	3.99
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	66	13.36	133	24.18	137	15.38	48	12.77	318	17.50	71	23.28	116	33.24	65	20.97	252	26.14	-	-	-	-	-	-	-	-
Walleye	103	20.85	77	14.00	101	11.34	45	11.97	223	12.27	45	14.75	55	15.76	52	16.77	152	15.77	130	37.90	96	34.16	125	35.31	351	35.89
Total	494	100	550	100	891	100	376	100	1817	100	305	100	349	100	310	100	964	100	343	100	281	100	354	100	978	100

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

Table 5.1.7-4. Standard gang index gillnet biomass summaries from Winnipeg River Region waterbodies, 2008-2010 (and overall).

Common Name	Eaglenest L			Pointe du Bois											
	2010			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	2	40	0.01	-	-	-	-	-	-	2	40	0.003
Lake Sturgeon	-	-	-	5	9250	2.06	5	14897	2.39	6	8640	3.08	16	32787	2.43
Mooneye	33	15215	4.65	2	560	0.12	4	1400	0.22	8	3510	1.25	14	5470	0.40
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	9	8870	1.98	-	-	-	-	-	-	9	8870	0.66
White Sucker	89	99520	30.43	197	222795	49.71	273	303430	48.75	160	165450	58.94	630	691675	51.19
Silver Redhorse	7	12220	3.74	-	-	-	1	2600	0.42	2	2490	0.89	3	5090	0.38
Golden Redhorse	-	-	-	-	-	-	2	2690	0.43	-	-	-	2	2690	0.20
Shorthead Redhorse	2	3110	0.95	22	29640	6.61	13	21290	3.42	5	6780	2.42	40	57710	4.27
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	34	88600	27.09	26	44080	9.83	40	61600	9.90	18	26126.9	9.31	84	131807	9.75
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	1	150	0.05	-	-	-	70	23220	3.73	1	630	0.22	71	23850	1.76
Lake Whitefish	12	11400	3.49	3	3540	0.79	9	14830	2.38	4	4385.2	1.56	16	22755	1.68
Troutperch	-	-	-	-	-	-	1	10	0.00	-	-	-	1	10	0.001
Burbot	-	-	-	8	5360	1.20	12	6040	0.97	3	880	0.31	23	12280	0.91
Rock Bass	4	410	0.13	3	590	0.13	13	2240	0.36	1	240	0.09	17	3070	0.23
Smallmouth Bass	6	4300	1.31	2	1070	0.24	3	1980	0.32	3	1750	0.62	8	4800	0.36
Black Crappie	1	500	0.15	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	122	14060	4.30	61	8700	1.94	188	27900	4.48	54	7390	2.63	303	43990	3.26
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	66	11080	3.39	133	33705	7.52	137	32880	5.28	48	10685	3.81	318	77270	5.72
Walleye	103	66490	20.33	77	80010	17.85	101	105370	16.93	45	41737.7	14.87	223	227118	16.81
Total	480	327055	100	550	448210	100	872	622377	100	358	280695	100	1780	1351282	100

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

Table 5.1.7-4. continued.

Common Name	Lac du Bonnet												Manigotagan L											
	2008			2009			2010			Overall			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	6	16690	6.52	-	-	-	1	150	0.06	7	16840	2.39	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	9	3370	1.32	5	1400	0.74	27	8150	3.14	41	12920	1.83	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	1	1010	0.39	-	-	-	-	-	-	1	1010	0.14	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	49	63020	24.63	34	47430	25.14	35	46020	17.71	118	156470	22.21	26	30470	14.60	20	21075	12.62	11	10910	7.19	57	62455	11.84
Silver Redhorse	9	13230	5.17	16	18580	9.85	19	25240	9.71	44	57050	8.10	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	9	7000	2.74	8	4690	2.49	22	15440	5.94	39	27130	3.85	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	1	1840	0.72	6	9790	5.19	-	-	-	7	11630	1.65	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	22	65560	25.62	11	22080	11.70	38	90670	34.89	71	178310	25.31	13	15246	7.31	13	15550	9.31	11	13980	9.21	37	44776	8.49
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	16	1730	0.68	23	2317	1.23	9	793	0.31	48	4840	0.69	91	11560	5.54	84	10055	6.02	145	14560	9.59	320	36175	6.86
Lake Whitefish	16	19620	7.67	13	21526	11.41	16	8378	3.22	45	49524	7.03	35	30860	14.79	41	37700	22.57	32	26196	17.26	108	94756	17.96
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	20	0.01	1	20	0.004
Burbot	-	-	-	-	-	-	2	1092	0.42	2	1092	0.16	29	23660	11.34	18	15700	9.40	13	12260	8.08	60	51620	9.79
Rock Bass	7	1662	0.65	3	530	0.28	-	-	-	14	2692	0.38	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	4	4530	1.77	2	2120	1.12	1	1280	0.49	7	7930	1.13	2	1920	0.92	1	1100	0.66	2	2650	1.75	5	5670	1.07
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	35	6060	2.37	53	9380	4.97	19	3704	1.43	107	19144	2.72	17	2380	1.14	8	1200	0.72	14	2750	1.81	39	6330	1.20
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	71	11347	4.43	116	18111	9.60	65	9593	3.69	252	39051	5.54	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	45	39220	15.33	55	30686	16.27	52	48830	18.79	152	118736	16.86	130	92577	44.36	96	64632	38.70	125	68470	45.11	351	225679	42.78
Total	300	255889	100	345	188639	100	310	259840	100	955	704368	100	343	208673	100	281	167012	100	354	151796	100	978	527481	100

Table 5.1.7-5. Small mesh index gillnet relative abundance summaries from Winnipeg River Region waterbodies, 2008-2010 (and overall).

Common Name	Eaglenest L		Pointe du Bois								Lac du Bonnet								Manigotagan L							
	2010		2008		2009		2010		Overall		2008		2009		2010		Overall		2008		2009		2010		Overall	
	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)	n	RA (%)
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	0.50	-	-	-	-	2	2.02	2	0.56	1	0.75	-	-	1	0.91	2	0.58	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	19	12.58	1	0.93	1	1.01	21	5.88	9	6.77	1	0.98	5	4.55	15	4.35	-	-	-	-	-	-	-	-
Spottail Shiner	13	6.50	11	7.28	5	4.67	14	14.14	30	8.40	29	21.80	1	0.98	19	17.27	49	14.20	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	0.50	-	-	-	-	1	1.01	1	0.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	3.00	1	0.66	4	3.74	-	-	5	1.40	1	0.75	1	0.98	2	1.82	4	1.16	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	2	1.32	-	-	2	2.02	4	1.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	2	1.96	2	1.82	4	1.16	-	-	1	20.00	7	12.07	8	10.53
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.91	1	0.29	-	-	-	-	1	1.72	1	1.32
Troutperch	87	43.50	29	19.21	21	19.63	28	28.28	78	21.85	10	7.52	7	6.86	21	19.09	38	11.01	-	-	-	-	3	5.17	3	3.95
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	20.00	1	1.72	2	2.63
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	27	13.50	27	17.88	23	21.50	7	7.07	57	15.97	49	36.84	25	24.51	37	33.64	111	32.17	-	-	-	-	-	-	-	-
Logperch	3	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	37	18.50	43	28.48	44	41.12	29	29.29	116	32.49	21	15.79	53	51.96	12	10.91	86	24.93	-	-	-	-	-	-	-	-
Walleye	25	12.50	19	12.58	9	8.41	15	15.15	43	12.04	13	9.77	12	11.76	10	9.09	35	10.14	13	100.00	3	60.00	46	79.31	62	81.58
Total	200	100	151	100	107	100	99	100	357	100	133	100	102	100	110	100	345	100	13	100	5	100	58	100	76	100

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

Table 5.1.7-6. Small mesh index gillnet biomass summaries from Winnipeg River Region waterbodies, 2008-2010 (and overall).

Common Name	Eaglenest L			Pointe du Bois											
	2010			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	650	6.79	-	-	-	-	-	-	2	770	11.42	2	770	2.87
Emerald Shiner	-	-	-	19	70	1.07	1	7	0.05	1	5	0.07	21	82	0.30
Spottail Shiner	13	50	0.52	11	80	1.22	5	27	0.20	14	54	0.80	30	161	0.60
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	50	0.52	-	-	-	-	-	-	1	21	0.31	1	21	0.08
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	1930	20.16	1	410	6.25	4	4200	31.10	-	-	-	5	4610	17.20
Rainbow Smelt	-	-	-	2	30	0.46	-	-	-	2	19	0.27	4	49	0.18
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	86	320	3.34	29	280	4.27	21	170	1.26	28	111	1.64	78	561	2.09
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	27	1100	11.49	27	1100	16.77	23	1400	10.37	7	686	10.17	57	3186	11.88
Logperch	3	15	0.16	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	37	4250	44.39	43	2880	43.90	44	4460	33.03	29	4440	65.86	116	11780	43.95
Walleye	25	1210	12.64	19	1710	26.07	9	3240	23.99	15	638	9.46	43	5588	20.85
Total	199	9575	100	151	6560	100	107	13504	100	99	6742	100	357	26806	100

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

Table 5.1.7-6. continued.

Common Name	Lac du Bonnet												Manigotagan L											
	2008			2009			2010			Overall			2008			2009			2010			Overall		
	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%	n	B (g)	%
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	720	10.47	-	-	-	1	212	7.23	2	932	6.14	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	9	50	0.73	1	2	0.04	5	19	0.65	15	71	0.47	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	29	150	2.18	1	3	0.06	19	95	3.24	49	248	1.63	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	1	580	8.44	1	80	1.49	2	275	9.38	4	935	6.16	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	2	30	0.56	2	29	0.99	4	59	0.39	-	-	-	1	170	14.46	6	1290	13.42	7	1460	12.00
Lake Whitefish	-	-	-	-	-	-	1	16	0.55	1	16	0.11	-	-	-	-	-	-	1	20	0.21	1	20	0.16
Troutperch	10	90	1.31	7	34	0.63	21	161	5.49	38	285	1.88	-	-	-	-	-	-	3	30	0.31	3	30	0.25
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	0.17	-	-	-	1	2	0.02
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	49	680	9.89	25	505	9.38	37	333	11.35	111	1518	9.99	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	21	3220	46.84	53	4347	80.77	12	1512	51.55	86	9079	59.77	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	13	1384	20.14	12	381	7.08	10	281	9.58	35	2046	13.47	13	1381	100	3	1004	85.37	30	8270	86.06	46	10654	87.57
Total	133	6874	100	102	5382	100	110	2933	100	345	15189	100	13	1381	100	5	1176	100	40	9610	100	58	12166	100

Table 5.1.7-7. Mean catch-per-unit-effort (CPUE) calculated for fish species captured in standard gang index gill nets (fish/100 m/24 h) set in Winnipeg River Region waterbodies, 2008-2010 (and overall).

Species	Eaglenest L (#sites=12)			Pointe du Bois (#sites=15)											
	2010			2008			2009			2010			Overall		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	13	0.8	1.49	2	0.1	0.32	17	0.9	2.77	18	1.0	1.15	37	0.7	0.28
Lake Sturgeon	-	-		5	0.3	1.03	5	0.2	0.48	6	0.3	0.62	16	0.3	0.03
Mooneye	33	2.2	4.25	2	0.1	0.31	4	0.2	0.47	8	0.4	0.97	14	0.2	0.09
Emerald Shiner	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-		9	0.6	1.70	-	-	-	-	-	-	9	0.2	-
White Sucker	89	5.8	3.66	197	12.2	10.27	273	14.0	20.46	160	8.9	6.94	630	11.7	1.49
Silver Redhorse	7	0.5	0.60	-	-	-	1	0.1	0.21	2	0.1	0.30	3	0.1	0.03
Golden Redhorse	-	-		-	-	-	2	0.1	0.24	-	-	-	2	0.03	-
Shorthead Redhorse	2	0.1	0.31	22	1.2	1.54	13	0.6	0.90	5	0.3	0.60	40	0.7	0.29
Channel Catfish	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	34	2.3	1.47	26	1.5	1.96	40	1.8	1.39	18	1.0	0.91	84	1.4	0.24
Rainbow Smelt	1	0.1	0.25	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	1	0.1	0.24	-	-	-	72	4.3	15.95	1	0.0	0.18	73	1.4	1.41
Lake Whitefish	12	0.8	1.00	3	0.2	0.38	9	0.5	0.84	4	0.2	0.43	16	0.3	0.10
Troutperch	-	-		-	-	-	1	0.03	0.12	-	-	-	1	0.01	-
Burbot	-	-		8	0.6	1.53	12	0.6	1.35	3	0.2	0.35	23	0.4	0.14
Rock Bass	4	0.3	0.41	3	0.2	0.62	13	0.7	0.89	1	0.1	0.21	17	0.3	0.21
Smallmouth Bass	6	0.4	0.62	2	0.1	0.28	3	0.2	0.36	3	0.2	0.36	8	0.1	0.02
Black Crappie	1	0.1	0.22	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	122	8.3	7.97	61	3.7	4.71	188	9.6	11.27	54	2.9	3.83	303	5.4	2.10
Logperch	-	-		-	-	-	-	-	-	-	-	-	-	-	-
Sauger	66	4.5	3.44	133	8.0	7.13	137	6.8	7.84	48	2.7	1.59	318	5.8	1.61
Walleye	103	7.0	5.81	77	4.8	4.30	101	5.1	4.48	45	2.4	2.33	223	4.1	0.83
Total	494	33.3	14.35	550	33.5	17.76	891	45.6	36.16	376	20.7	10.80	1817	33.28	7.21

#sites = number of sites 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 5.1.7-7. continued.

Species	Lac du Bonnet (#sites=10)												Manigotagan L (#sites=6)											
	2008			2009			2010			Overall			2008			2009			2010			Overall		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	6	0.6	1.38	4	0.4	1.00	1	0.1	0.41	11	0.4	0.14	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	9	0.9	1.78	5	0.5	1.16	27	3.0	4.88	41	1.5	0.75	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	1	0.1	0.36	-	-	-	-	-	-	1	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	49	5.3	4.75	34	3.6	2.54	35	3.8	3.99	118	4.2	0.53	26	4.9	6.04	20	3.4	4.48	11	2.0	1.78	57	3.4	0.84
Silver Redhorse	9	1.0	1.44	16	1.7	2.99	19	2.2	3.79	44	1.6	0.35	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	9	1.0	1.79	8	0.8	2.01	22	2.7	6.45	39	1.5	0.61	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	1	0.1	0.35	6	0.6	1.29	-	-	-	7	0.2	0.19	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	22	2.3	1.63	11	1.2	0.82	38	3.9	2.16	71	2.5	0.78	13	2.4	2.96	13	2.0	3.63	11	1.8	2.52	37	2.0	0.18
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	21	2.2	1.58	23	2.6	3.44	9	0.9	1.42	53	1.9	0.51	91	20.0	37.84	84	16.1	27.88	145	29.6	47.91	320	21.9	4.03
Lake Whitefish	16	1.7	2.87	13	1.4	1.19	16	1.7	2.45	45	1.6	0.10	35	7.3	8.09	41	7.6	7.58	32	6.4	8.46	108	7.1	0.38
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2	0.42	1	0.1	-
Burbot	-	-	-	-	-	-	2	0.2	0.41	2	0.1	-	29	6.4	9.88	18	3.5	4.72	13	2.6	4.11	60	4.2	1.16
Rock Bass	7	0.8	1.28	3	0.3	0.70	4	0.4	1.05	14	0.5	0.14	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	4	0.5	1.44	2	0.2	0.44	1	0.1	0.34	7	0.3	0.10	2	0.4	0.92	1	0.1	0.37	2	0.3	0.85	5	0.3	0.07
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	35	3.7	2.82	53	5.6	9.08	19	2.0	2.28	107	3.7	1.04	17	3.2	4.76	8	1.4	2.38	14	2.3	3.27	39	2.3	0.51
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	71	7.6	5.80	116	12.7	6.07	65	6.4	3.82	252	8.9	1.94	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	45	4.8	4.44	55	5.9	2.88	52	5.3	3.90	152	5.3	0.29	130	23.5	26.46	96	16.2	17.79	125	21.8	23.07	351	20.5	2.20
Total	305	32.49	21.2	349	37.45	16.2	310	32.6	19.22	964	34.2	1.63	343	68.1	21.41	281	50.4	16.31	354	67.0	35.30	978	61.8	5.72

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

CPUE = mean catch per unit effort per site (2008, 2009 and 2010) and per year (overall); SD = standard deviation; SE = standard error

Table 5.1.7-8. Mean biomass-per-unit-effort (BPUE) calculated for fish species captured in standard gang index gill nets (g/100 m/24 h) set in Winnipeg River Region waterbodies, 2008-2010 (and overall).

Species	Eaglenest L (#sites=12)			Pointe du Bois (#sites=15)											
	2010			2008			2009			2010			Overall		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	2	2	6	-	-	-	-	-	-	2	1	1
Lake Sturgeon	-	-	-	5	617	1675	5	744	1415	6	498	947	16	620	71
Mooneye	33	1033	1967	2	35	123	4	74	228	8	180	462	14	96	43
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	9	557	1807	-	-	-	-	-	-	9	186	186
White Sucker	89	6483	4168	197	13713	11149	273	15615	22868	160	9197	7281	630	12842	1903
Silver Redhorse	7	866	1181	-	-	-	1	142	551	2	141	380	3	95	47
Golden Redhorse	-	-	-	-	-	-	2	114	308	-	-	-	2	38	38
Shorthead Redhorse	2	209	508	22	1660	2230	13	1042	1447	5	374	816	40	1025	371
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	34	5952	4557	26	2551	3274	40	2609	2736	18	1387	2298	84	2182	398
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	1	10	36	-	-	-	70	1369	5301	1	30	115	71	466	451
Lake Whitefish	12	772	1051	3	214	446	9	783	1601	4	212	555	16	403	190
Troutperch	-	-	-	-	-	-	1	0	1	-	-	-	1	0	0
Burbot	-	-	-	8	417	1072	12	276	769	3	51	125	23	248	107
Rock Bass	4	29	52	3	31	121	13	127	183	1	13	52	17	57	35
Smallmouth Bass	6	283	619	2	57	157	3	114	242	3	96	211	8	89	17
Black Crappie	1	32	111	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	122	955	954	61	525	681	188	1414	1681	54	394	570	303	778	320
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	66	758	585	133	2049	1595	137	1622	1914	48	587	341	318	1419	434
Walleye	103	4489	3679	77	5011	5316	101	5382	5518	45	2251	1941	223	4215	988
Total	480	21872	9245	550	27440	13018	872	31428	27152	358	15410	9142	1780	24759	4814

#sites = number of sites 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 5.1.7-8. continued.

Species	Lac du Bonnet (#sites=10)												Manigotagan L (#sites=6)											
	2008			2009			2010			Overall			2008			2009			2010			Overall		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	6	1759	3753	-	-	-	1	19	61	7	593	583	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	9	349	619	5	151	333	27	899	1573	41	467	224	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	1	115	363	-	-	-	-	-	-	1	38	38	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	49	6762	5918	34	5003	3516	35	4983	5481	118	5583	590	26	5689	6689	20	3584	4980	11	1925	1770	57	3733	1089
Silver Redhorse	9	1438	2067	16	1933	3120	19	2866	5073	44	2079	418	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	9	739	1376	8	483	1202	22	1917	4883	39	1047	442	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	1	203	643	6	995	2106	-	-	-	7	399	303	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	22	6736	5504	11	2486	2899	38	9310	4652	71	6177	1990	13	2765	3652	13	2371	4744	11	2222	3313	37	2452	162
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	16	187	207	23	260	334	9	79	135	48	175	53	91	2538	4424	84	1938	3376	145	2967	4816	320	2481	298
Lake Whitefish	16	2065	3187	13	2285	2457	16	853	826	45	1735	445	35	6414	7306	41	6940	6588	32	5205	6506	108	6186	514
Troutperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	8	1	1	1
Burbot	-	-	-	-	-	-	2	105	282	2	35	35	29	5225	7748	18	2967	3658	13	2414	3698	60	3535	860
Rock Bass	7	183	324	3	55	116	4	56	128	14	98	42	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	4	514	1626	2	223	527	1	136	430	7	291	114	2	361	885	1	165	403	2	460	1126	5	329	87
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	35	645	677	53	983	1725	19	387	521	107	672	173	17	441	665	8	219	407	14	467	604	39	376	79
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	71	1218	921	116	1996	1392	65	943	522	252	1385	315	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	45	4276	6788	55	3293	2389	52	5012	3961	152	4194	498	130	16511	18694	96	10808	11773	125	12210	11729	351	13176	1716
Total	300	27189	19530	345	20147	11984	310	27566	17106	955	24967	2413	343	39942	19578	281	28992	16306	354	27873	13162	978	32269	3850

#sites = number of sites 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 5.1.7-9. Mean catch-per-unit-effort (CPUE) calculated for fish species captured in small mesh index (fish/30 m/24 h) gill nets set in Winnipeg River Region waterbodies, 2008-2010 (and overall).

Species	Eaglenest L (#sites=4)			Pointe du Bois (#sites=5)											
	2010			2008			2009			2010			Overall		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	0.2	0.45	-	-	-	-	-	-	2	0.3	0.75	2	0.1	0.11
Emerald Shiner	-	-	-	19	4.4	9.75	1	0.1	0.23	1	0.2	0.36	21	1.5	1.41
Spottail Shiner	13	2.9	5.87	11	2.5	5.03	5	0.5	1.16	14	2.4	4.37	30	1.8	0.65
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	0.2	0.45	-	-	-	-	-	-	1	0.2	0.38	1	0.1	0.06
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	1.4	2.71	1	0.2	0.51	4	0.4	0.93	-	-	-	5	0.2	0.12
Rainbow Smelt	-	-	-	2	0.4	0.96	-	-	-	2	0.3	0.72	4	0.3	0.13
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	87	19.6	26.02	29	6.9	5.25	21	2.6	3.41	28	5.3	5.34	78	4.9	1.26
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	27	6.3	7.00	27	6.2	10.70	23	2.4	5.34	7	1.3	2.08	57	3.3	1.50
Logperch	3	0.8	1.57	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	37	8.3	4.35	43	10.3	8.11	44	6.5	5.62	29	5.4	5.25	116	7.4	1.50
Walleye	25	5.7	5.99	19	4.6	4.67	9	1.5	1.46	15	2.7	3.76	43	2.9	0.90
Total	200	45.3	45.97	151	35.6	33.86	107	14.0	15.11	99	18.0	15.69	357	22.56	6.63

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

CPUE = mean catch per unit effort per site (2008, 2009 and 2010) and per year (overall)

SD = standard deviation; SE = standard error

Table 5.1.7-9. continued.

Species	Lac du Bonnet (#sites=3)												Manigotagan L (#sites=2)											
	2008			2009			2010			Overall			2008			2009			2010			Overall		
	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE	n	CPUE	SD	n	CPUE	SD	n	CPUE	SD	n	CPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	0.4	0.73	-	-	-	1	0.4	0.72	2	0.3	0.14	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	9	3.5	5.99	1	0.4	0.69	5	1.8	3.19	15	1.9	0.88	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	29	12.0	16.10	1	0.4	0.69	19	7.7	9.78	49	6.7	3.39	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	1	0.4	0.73	1	0.4	0.68	2	0.8	1.44	4	0.5	0.14	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	2	0.9	1.56	2	0.7	1.27	4	0.5	0.28	-	-	-	1	0.7	0.97	6	4.2	4.22	7	1.6	1.29
Lake Whitefish	-	-	-	-	-	-	1	0.4	0.64	1	0.1	0.12	-	-	-	-	-	-	1	0.6	0.84	1	0.2	0.20
Troutperch	10	4.0	3.58	7	2.8	3.85	21	8.5	10.30	38	5.1	1.74	-	-	-	-	-	-	3	1.8	2.52	3	0.6	0.59
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.6	0.81	-	-	-	1	0.2	0.19
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	49	20.4	28.59	25	9.8	12.16	37	15.4	26.63	111	15.2	3.05	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	21	8.3	7.86	53	21.2	19.18	12	4.6	1.80	86	11.3	5.03	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	13	5.3	5.07	12	4.8	5.49	10	4.2	7.20	35	4.7	0.33	13	8.4	11.86	3	1.7	2.44	30	17.8	25.23	46	9.3	4.68
Total	133	54.29	51.7	102	40.61	31.2	110	44.5	52.93	345	46.5	4.07	13	8.4	11.86	5	3.0	2.28	40	24.4	24.37	58	11.9	6.43

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

CPUE = mean catch per unit effort per site (2008, 2009 and 2010) and per year (overall)

SD = standard deviation; SE = standard error

Table 5.1.7-10. Mean biomass-per-unit-effort (BPUE) calculated for fish species captured in small mesh index gill nets (g/30 m/24 h) set in Winnipeg River Region waterbodies, 2008-2010 (and overall).

Species	Eaglenest L (#sites=4)			Pointe du Bois (#sites=5)											
	2010			2008			2009			2010			Overall		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	147	293	-	-	-	-	-	-	2	129	289	2	43	43
Emerald Shiner	-	-	-	19	16	36	1	1	2	1	1	2	21	6	5
Spottail Shiner	13	11	23	11	18	38	5	3	6	14	9	15	30	10	5
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	11	23	-	-	-	-	-	-	1	4	8	1	1	1
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	6	436	871	1	93	208	4	436	975	-	-	-	5	176	133
Rainbow Smelt	-	-	-	2	6	14	-	-	-	2	3	7	4	3	2
Cisco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troutperch	86	71	83	29	66	60	21	20	29	28	21	22	78	36	15
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	27	257	230	27	255	439	23	145	325	7	129	255	57	177	40
Logperch	3	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	37	947	464	43	696	500	44	673	579	29	812	600	116	727	43
Walleye	25	272	221	19	402	399	9	404	561	15	119	212	43	308	95
Total	199	2156	802	151	1554	1275	107	1682	2203	99	1227	1084	357	1488	135

#sites = number of sites 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 5.1.7-10. continued.

Species	Lac du Bonnet (#sites=3)												Manigotagan L (#sites=2)											
	2008			2009			2010			Overall			2008			2009			2010			Overall		
	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE	n	BPUE	SD	n	BPUE	SD	n	BPUE	SD	n	BPUE	SE
Silver Lamprey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooneye	1	303	525	-	-	-	1	88	153	2	130	90	-	-	-	-	-	-	-	-	-	-	-	-
Emerald Shiner	9	19	33	1	1	1	5	7	12	15	9	5	-	-	-	-	-	-	-	-	-	-	-	-
Spottail Shiner	29	62	71	1	1	2	19	39	52	49	34	18	-	-	-	-	-	-	-	-	-	-	-	-
Longnose Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White Sucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Golden Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shorthead Redhorse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel Catfish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northern Pike	1	244	423	1	31	54	2	114	198	4	130	62	-	-	-	-	-	-	-	-	-	-	-	-
Rainbow Smelt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cisco	-	-	-	2	14	23	2	11	18	4	8	4	-	-	-	1	117	166	6	824	214	7	314	257
Lake Whitefish	-	-	-	-	-	-	1	6	10	1	2	2	-	-	-	-	-	-	1	12	17	1	4	4
Troutperch	10	36	33	7	14	20	21	65	84	38	38	15	-	-	-	-	-	-	3	18	25	3	6	6
Burbot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smallmouth Bass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	-	-	-	1	0	0
Black Crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow Perch	49	279	314	25	199	175	37	138	240	111	206	41	-	-	-	-	-	-	-	-	-	-	-	-
Logperch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sauger	21	1309	603	53	1754	746	12	570	186	86	1211	345	-	-	-	-	-	-	-	-	-	-	-	-
Walleye	13	559	495	12	151	144	10	117	202	35	276	142	13	891	1260	3	577	816	30	4918	6955	46	2129	1398
Total	133	2812	2230	102	2164	1072	110	1155	757	345	2044	482	13	891	1260	5	695	652	40	5771	7211	58	2453	1660

#sites = number of sites 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 5.1.7-11. 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 Winnipeg River Region waterbodies, 2008-2010.

Mesh (in)	Eaglenest L			Pointe du Bois									Lac du Bonnet									Manigotagan L								
	2010			2008			2009			2010			2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																														
SM	-	-	-	1	420	-	-	-	-	-	-	-	1	348	-	1	230	-	2	267	52	-	-	-	-	-	-	-	-	-
2	10	499	145	12	496	165	17	476	153	9	481	95	6	685	173	2	581	137	11	656	102	4	580	85	5	544	53	2	632	106
3	12	672	117	10	538	154	16	556	105	6	550	171	3	645	65	5	533	52	13	626	72	7	525	25	6	521	21	8	572	82
3.75	3	845	177	-	-	-	4	718	150	3	588	425	6	741	143	1	678	-	3	711	100	2	662	147	1	606	-	1	575	-
4.25	4	748	90	3	835	161	3	739	70	-	-	-	7	753	109	2	841	225	7	675	114	-	-	-	1	772	-	-	-	-
5	5	773	93	-	-	-	-	-	-	-	-	-	-	-	-	1	708	-	4	803	151	-	-	-	-	-	-	-	-	-
Total	34	660	167	26	548	186	40	552	155	18	522	190	23	700	150	12	594	184	40	649	138	13	563	81	13	556	77	11	583	80
Weight (g)																														
SM	6	322	-	1	410	-	4	1050	-	-	-	-	1	580	-	1	80	-	2	138	73	-	-	-	-	-	-	-	-	-
2	10	1073	972	13	1161	1367	17	1081	1680	9	812	662	6	2630	1632	2	1220	665	11	2142	805	4	795	-	5	1020	295	2	1525	1167
3	12	2480	1531	10	1398	1589	16	1161	890	6	1417	1864	3	1857	826	5	984	363	13	1822	613	7	874	93	6	967	178	8	1201	918
3.75	3	4863	2647	-	-	-	4	3423	2670	3	3439	5376	6	3420	3191	1	2060	-	3	2850	1347	2	2260	1612	1	1500	-	1	1320	-
4.25	4	3640	1889	3	5003	2672	3	3650	808	-	-	-	7	3384	1756	2	5135	3995	7	2576	1729	-	-	-	1	3150	-	-	-	-
5	5	3792	1488	-	-	-	-	-	-	-	-	-	-	-	-	1	2390	-	4	4213	2526	-	-	-	-	-	-	-	-	-
Total	40	2263	-	27	1648	1946	44	1495	-	18	1451	2354	23	2876	2094	12	1847	2057	40	2274	1435	13	1063	-	13	1196	638	11	1271	862
Condition Factor (K)																														
SM	-	-	-	1	0.55	-	-	-	-	-	-	-	1	1.38	-	1	0.66	-	2	0.69	0.03	-	-	-	-	-	-	-	-	-
2	10	0.66	0.07	12	0.69	0.10	17	0.65	0.09	9	0.62	0.08	6	0.70	0.04	2	0.60	0.08	11	0.72	0.07	3	0.55	0.10	5	0.63	0.13	2	0.54	0.18
3	12	0.74	0.10	10	0.68	0.10	16	0.61	0.08	6	0.61	0.07	3	0.66	0.11	5	0.63	0.06	13	0.72	0.08	7	0.60	0.05	6	0.68	0.06	8	0.58	0.13
3.75	3	0.73	0.06	-	-	-	4	0.77	0.16	3	0.68	0.12	6	0.70	0.15	1	0.66	-	3	0.73	0.11	2	0.70	0.08	1	0.67	-	1	0.69	-
4.25	4	0.82	0.10	3	0.80	0.15	3	0.90	0.09	-	-	-	7	0.73	0.10	2	0.77	0.05	7	0.76	0.05	-	-	-	1	0.68	-	-	-	-
5	5	0.79	0.07	-	-	-	-	-	-	-	-	-	-	-	-	1	0.67	-	4	0.76	0.08	-	-	-	-	-	-	-	-	-
Total	34	0.73	0.10	26	0.70	0.11	40	0.67	0.12	18	0.63	0.08	23	0.74	0.17	12	0.66	0.07	40	0.73	0.07	12	0.61	0.08	13	0.66	0.09	11	0.58	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 5.1.7-12. 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 Winnipeg River Region waterbodies, 2008-2010.

Mesh (in)	Eaglenest L			Pointe du Bois									Lac du Bonnet									Manigotagan L								
	2010			2008			2009			2010			2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																														
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	112	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	180	-	7	187	11	1	248	-	-	-	-	-	-	-
3	-	-	-	-	-	-	1	361	-	-	-	-	4	336	57	3	462	54	3	319	26	6	371	54	7	315	43	-	-	-
3.75	-	-	-	-	-	-	-	-	-	2	331	15	4	446	47	3	535	126	4	379	103	12	413	37	10	396	48	-	-	-
4.25	-	-	-	-	-	-	4	428	26	1	391	-	6	427	41	3	459	13	1	462	-	9	420	26	11	411	30	-	-	-
5	-	-	-	-	-	-	4	484	98	1	560	-	2	466	57	3	427	62	1	462	-	7	449	18	13	447	23	-	-	-
Total	-	-	-	-	-	-	9	445	75	4	403	109	16	414	65	13	448	109	17	283	120	35	410	50	41	402	57	-	-	-
Weight (g)																														
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	16	-	-	-	-	-	-	-	1	20	-
2	2	220	-	-	-	-	-	-	-	-	-	-	-	-	-	1	60	-	7	81	12	1	170	-	-	-	-	-	-	-
3	3	813	-	-	-	-	1	810	-	-	-	-	4	640	388	3	1650	620.73	3	420	139	6	673	345	7	432	153	5	792	-
3.75	4	650	-	1	940	-	-	-	-	2	517	56	4	1495	550	3	990	-	4	963	734	12	918	258	10	890	392	11	641	-
4.25	2	1990	240	2	1300	71	4	1438	270	1	971	-	6	1280	309	3	1693	335.01	1	1400	-	9	833	128	11	909	265	11	805	-
5	1	1940	-	-	-	-	4	2068	931	1	2380	-	2	1700	636	3	1247	490.54	1	1300	-	7	1161	188	13	1213	243	5	1264	-
Total	12	950	-	3	1180	214	9	1648	742	4	1096	883	16	1226	540	13	1292	-	17	494	583	35	882	298	41	920	378	33	794	-
Condition Factor (K)																														
SM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.14	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.03	-	7	1.24	0.06	1	1.11	-	-	-	-	-	-	-
3	-	-	-	-	-	-	1	1.72	-	-	-	-	4	1.56	0.10	3	1.60	0.14	3	1.29	0.30	6	1.22	0.12	7	1.36	0.11	-	-	-
3.75	-	-	-	-	-	-	-	-	-	2	1.43	0.04	4	1.63	0.22	2	1.50	0.03	4	1.49	0.10	12	1.27	0.14	10	1.36	0.19	-	-	-
4.25	-	-	-	-	-	-	4	1.83	0.16	1	1.62	-	6	1.62	0.18	3	1.73	0.20	1	1.42	-	9	1.12	0.14	11	1.29	0.23	-	-	-
5	-	-	-	-	-	-	4	1.71	0.09	1	1.36	-	2	1.64	0.03	3	1.55	0.06	1	1.32	-	7	1.28	0.13	13	1.35	0.16	-	-	-
Total	-	-	-	-	-	-	9	1.76	0.13	4	1.46	0.11	16	1.61	0.15	12	1.56	0.22	17	1.32	0.16	35	1.22	0.14	41	1.34	0.18	-	-	-

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

Table 5.1.7-13. Summary of mean fork length (mm), weight (g), and condition factor (K) calculated for Sauger captured in standard gang and small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Mesh (in)	Eaglenest L			Pointe du Bois									Lac du Bonnet								
	2010			2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																					
SM	-	-	-	22	183	36	-	-	-	-	-	-	21	241	56	53	197	49	12	231	47
2	-	-	-	91	280	37	113	290	34	39	287	41	63	263	25	103	255	28	63	251	19
3	-	-	-	18	327	27	22	333	49	5	296	58	1	236	-	5	228	29	1	300	-
3.75	-	-	-	1	158	-	-	-	-	3	289	42	3	239	54	5	228	47	-	-	-
4.25	-	-	-	1	181	-	-	-	-	-	-	-	4	237	25	3	209	36	1	150	-
5	-	-	-	1	340	-	2	315	13	1	325	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	134	269	56	137	297	40	48	289	42	92	256	36	169	235	45	77	247	29
Weight (g)																					
SM	37	115	-	43	67	-	44	101	-	29	153	-	21	153	120	53	81	-	12	126	69
2	64	166	64	112	233	-	113	221	78	39	219	86	63	167	-	103	161	-	63	148	34
3	1	360	-	18	384	91	22	336	111	5	256	118	1	110	-	5	105	46	1	255	-
3.75	-	-	-	1	50	-	-	-	-	3	210	106	3	150	115	5	147	80	-	-	-
4.25	1	120	-	1	90	-	-	-	-	-	-	-	4	123	59	3	86	54	1	30	-
5	-	-	-	1	500	-	2	265	21	1	250	-	-	-	-	-	-	-	-	-	-
Total	103	149	-	176	208	-	181	206	-	77	196	-	92	160	-	169	133	-	77	144	45
Condition Factor (K)																					
SM	-	-	-	22	1.22	0.27	-	-	-	-	-	-	21	0.92	0.11	52	0.88	0.07	12	0.92	0.09
2	-	-	-	91	1.05	0.11	113	0.87	0.10	39	0.89	0.11	61	0.90	0.15	102	0.93	0.13	63	0.92	0.06
3	-	-	-	18	1.08	0.09	22	0.87	0.10	5	0.93	0.12	1	0.84	-	5	0.83	0.12	1	0.94	-
3.75	-	-	-	1	1.27	-	-	-	-	3	0.83	0.15	3	0.95	0.12	5	1.13	0.25	-	-	-
4.25	-	-	-	1	1.52	-	-	-	-	-	-	-	4	0.87	0.17	3	0.87	0.07	1	0.89	-
5	-	-	-	1	1.27	-	2	0.85	0.04	1	0.73	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	134	1.09	0.16	137	0.87	0.10	48	0.88	0.11	90	0.91	0.14	167	0.91	0.13	77	0.92	0.07

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

Table 5.1.7-14. 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 Winnipeg River Region waterbodies, 2008-2010.

Mesh (in)	Eaglenest L			Pointe du Bois									Lac du Bonnet									Manigotagan L								
	2010			2008			2009			2010			2008			2009			2010			2008			2009			2010		
	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD
Fork Length (mm)																														
SM	-	-	-	15	171	44	-	-	-	12	161	41	13	157	102	12	141	29	10	128	49	13	202	65	3	311	58	30	281	76
2	33	289	69	23	264	63	30	290	105	16	300	52	26	292	116	33	263	50	20	290	99	70	269	42	62	289	87	60	306	53
3	44	366	81	25	414	102	27	373	68	12	408	109	10	405	92	11	335	115	13	381	102	20	410	77	16	395	91	44	364	44
3.75	14	423	95	2	364	8	15	474	90	5	469	103	3	526	83	5	434	86	11	459	88	12	463	69	9	502	68	15	434	78
4.25	11	479	87	17	513	69	19	536	65	6	474	58	2	530	31	3	597	82	5	492	104	18	508	50	2	592	6	5	556	54
5	1	538	-	9	573	42	10	569	43	6	560	141	4	627	36	3	471	201	3	583	76	10	590	65	7	598	55	1	577	-
Total	103	363	101	91	369	152	101	413	131	57	354	151	58	325	167	67	290	132	62	343	153	143	352	130	99	354	131	155	340	86
Weight (g)																														
SM	25	48	-	19	90	-	9	360	-	15	43	-	13	106	-	12	32	28	10	28	47	13	71	-	3	283	-	30	276	163
2	33	309	277	24	251	255	30	411	695	16	292	190	26	436	719	33	220	190	20	388	605	70	200	128	62	312	-	60	323	195
3	44	611	436	25	1024	795	27	617	381	12	912	889	10	842	744	11	538	-	13	810	1020	20	801	504	16	798	561	44	540	237
3.75	14	937	631	2	560	0	15	1368	873	5	1248	732	3	1777	780	5	1030	669	11	1328	880	12	1164	612	9	1436	586	15	977	563
4.25	11	1326	689	17	1662	708	19	1853	678	6	1142	349	2	1815	389	3	2520	861	5	1668	1088	18	1427	292	2	2150	354	5	1844	655
5	1	1680	-	9	2113	447	10	2067	376	6	2172	1175	4	2625	320	3	1590	1221	3	2530	968	10	2291	811	7	2171	657	1	1470	-
Total	128	529	-	96	851	-	110	987	-	60	706	-	58	700	-	67	463	-	62	792	983	143	654	-	99	661	-	155	495	430
Condition Factor (K)																														
SM	-	-	-	15	1.32	0.31	-	-	-	12	0.93	0.09	12	1.35	0.47	12	0.98	0.09	10	0.84	0.11	4	0.83	0.16	2	1.04	0.07	30	1.05	0.07
2	33	1.03	0.13	23	1.14	0.17	30	1.06	0.22	16	0.99	0.13	26	1.10	0.15	33	1.06	0.10	20	1.06	0.09	70	0.93	0.12	61	0.96	0.12	60	1.04	0.07
3	44	1.10	0.10	25	1.21	0.09	27	1.08	0.13	12	1.09	0.08	10	1.10	0.07	10	1.09	0.06	13	1.13	0.09	20	1.05	0.09	16	1.12	0.09	44	1.07	0.07
3.75	14	1.09	0.06	2	1.17	0.08	15	1.15	0.13	5	1.11	0.08	3	1.17	0.06	5	1.14	0.06	11	1.22	0.09	12	1.09	0.07	9	1.09	0.09	15	1.10	0.08
4.25	11	1.10	0.07	17	1.18	0.12	19	1.16	0.11	6	1.06	0.08	2	1.21	0.05	3	1.15	0.07	5	1.24	0.11	18	1.09	0.11	2	1.04	0.20	5	1.04	0.09
5	1	1.08	NA	9	1.12	0.10	10	1.12	0.13	6	1.10	0.09	4	1.08	0.14	3	1.20	0.14	3	1.23	0.03	10	1.08	0.06	7	1.00	0.14	1	0.77	-
Total	103	1.07	0.11	91	1.19	0.18	101	1.10	0.16	57	1.03	0.12	57	1.16	0.26	66	1.07	0.10	62	1.09	0.16	134	0.99	0.13	97	1.00	0.13	155	1.05	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 5.1.7-15. Year-class frequency distributions (%) for Northern Pike captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Year-class	Eaglenest L		Pointe du Bois						Lac du Bonnet						Manigotagan L					
	2010		2008		2009		2010		2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2008	-	-	-	-	-	-	-	-	-	-	-	-	1	2.63	-	-	-	-	-	-
2007	1	3.13	1	4.00	-	-	1	6.25	-	-	-	-	2	5.26	-	-	-	-	-	-
2006	3	9.38	1	4.00	2	5.13	7	43.75	-	-	1	9.09	7	18.42	-	-	-	-	-	-
2005	3	9.38	5	20.00	11	28.21	6	37.50	1	4.76	4	36.36	6	15.79	-	-	3	23.08	4	36.36
2004	3	9.38	5	20.00	10	25.64	1	6.25	-	-	1	9.09	7	18.42	3	23.08	5	38.46	4	36.36
2003	5	15.63	5	20.00	6	15.38	-	-	1	4.76	2	18.18	10	26.32	5	38.46	2	15.38	1	9.09
2002	4	12.50	1	4.00	2	5.13	-	-	-	-	1	9.09	2	5.26	1	7.69	1	7.69	-	-
2001	5	15.63	2	8.00	1	2.56	-	-	4	19.05	-	-	0	0.00	2	15.38	-	-	1	9.09
2000	1	3.13	1	4.00	2	5.13	1	6.25	5	23.81	1	9.09	1	2.63	1	7.69	1	7.69	1	9.09
1999	2	6.25	2	8.00	2	5.13	-	-	2	9.52	-	-	1	2.63	-	-	-	-	-	-
1998	1	3.13	1	4.00	2	5.13	-	-	-	-	1	9.09	-	-	1	7.69	-	-	-	-
1997	2	6.25	1	4.00	1	2.56	-	-	5	23.81	-	-	-	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-	-	1	4.76	-	-	1	2.63	-	-	1	7.69	-	-
1995	1	3.13	-	-	-	-	-	-	1	4.76	-	-	-	-	-	-	-	-	-	-
1994	1	3.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1992	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	-	-	1	4.76	-	-	-	-	-	-	-	-	-	-
Total	32	100	25	100	39	100	16	100	21	100	11	100	38	100	13	100	13	100	11	100

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

Table 5.1.7-16. Year-class frequency distributions (%) for Lake Whitefish captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Year-class	Pointe du Bois		Lac du Bonnet						Manigotagan L			
	2010		2008		2009		2010		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	4	30.77	-	-	-	-
2008	-	-	-	-	1	8.33	2	15.38	-	-	-	-
2007	1	25.00	-	-	-	-	2	15.38	-	-	-	-
2006	2	50.00	3	20.00	2	16.67	-	-	-	-	-	-
2005	-	-	2	13.33	3	25.00	1	7.69	-	-	-	-
2004	-	-	2	13.33	-	-	-	-	-	-	-	-
2003	-	-	3	20.00	3	25.00	2	15.38	1	2.94	2	4.88
2002	-	-	2	13.33	-	-	-	-	-	-	3	7.32
2001	-	-	-	-	-	-	-	-	1	2.94	5	12.20
2000	-	-	-	-	-	-	-	-	1	2.94	1	2.44
1999	-	-	-	-	1	8.33	1	7.69	2	5.88	3	7.32
1998	-	-	-	-	1	8.33	-	-	5	14.71	9	21.95
1997	-	-	1	6.67	-	-	-	-	6	17.65	5	12.20
1996	-	-	-	-	-	-	-	-	2	5.88	2	4.88
1995	1	25.00	-	-	-	-	-	-	8	23.53	-	-
1994	-	-	-	-	-	-	-	-	2	5.88	1	2.44
1993	-	-	-	-	1	8.33	1	7.69	2	5.88	2	4.88
1992	-	-	2	13.33	-	-	-	-	-	-	1	2.44
1991	-	-	-	-	-	-	-	-	1	2.94	1	2.44
1990	-	-	-	-	-	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	2	4.88
1988	-	-	-	-	-	-	-	-	2	5.88	2	4.88
1987	-	-	-	-	-	-	-	-	-	-	-	-
1986	-	-	-	-	-	-	-	-	-	-	1	2.44
1985	-	-	-	-	-	-	-	-	1	2.94	1	2.44
Total	4	100	15	100	12	100	13	100	34	100	41	100

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

Table 5.1.7-17. Year-class frequency distributions (%) for Sauger captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Year-class	Pointe du Bois						Lac du Bonnet					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-	1	1.56
2008	-	-	-	-	-	-	-	-	2	1.74	1	1.56
2007	-	-	-	-	5	10.64	-	-	6	5.22	3	4.69
2006	10	9.26	7	5.22	10	21.28	4	5.71	39	33.91	29	45.31
2005	8	7.41	25	18.66	3	6.38	9	12.86	23	20.00	16	25.00
2004	25	23.15	4	2.99	10	21.28	6	8.57	5	4.35	1	1.56
2003	21	19.44	37	27.61	7	14.89	16	22.86	9	7.83	4	6.25
2002	18	16.67	20	14.93	8	17.02	19	27.14	13	11.30	6	9.38
2001	8	7.41	13	9.70	-	-	9	12.86	7	6.09	3	4.69
2000	4	3.70	1	0.75	1	2.13	2	2.86	2	1.74	-	-
1999	4	3.70	8	5.97	2	4.26	2	2.86	3	2.61	-	-
1998	5	4.63	8	5.97	-	-	-	-	5	4.35	-	-
1997	4	3.70	7	5.22	1	2.13	-	-	1	0.87	-	-
1996	-	-	1	0.75	-	-	2	2.86	-	-	-	-
1995	1	0.93	3	2.24	-	-	1	1.43	-	-	-	-
Total	108	100	134	100	47	100	70	100	115	100	64	100

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

Table 5.1.7-18. Year-class frequency distributions (%) for Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Year-class	Eaglenest L		Pointe du Bois						Lac du Bonnet						Manigotagan L					
	2010		2008		2009		2010		2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2009	-	-	-	-	-	-	-	-	-	-	3	5.45	6	11.54	-	-	-	-	-	-
2008	-	-	-	-	-	-	1	2.38	1	2.33	1	1.82	4	7.69	1	0.77	-	-	3	2.42
2007	8	8.70	1	1.43	-	-	-	-	3	6.98	20	36.36	8	15.38	2	1.54	22	22.92	6	4.84
2006	13	14.13	2	2.86	13	12.87	7	16.67	11	25.58	11	20.00	7	13.46	60	46.15	42	43.75	36	29.03
2005	23	25.00	6	8.57	7	6.93	2	4.76	6	13.95	1	1.82	4	7.69	11	8.46	2	2.08	59	47.58
2004	3	3.26	4	5.71	6	5.94	3	7.14	-	-	2	3.64	-	-	10	7.69	6	6.25	5	4.03
2003	15	16.30	9	12.86	12	11.88	8	19.05	3	6.98	3	5.45	8	15.38	8	6.15	3	3.13	2	1.61
2002	10	10.87	7	10.00	8	7.92	2	4.76	3	6.98	3	5.45	1	1.92	6	4.62	2	2.08	2	1.61
2001	3	3.26	8	11.43	6	5.94	1	2.38	3	6.98	2	3.64	4	7.69	4	3.08	-	-	2	1.61
2000	3	3.26	3	4.29	1	0.99	2	4.76	-	-	-	-	-	-	4	3.08	3	3.13	2	1.61
1999	4	4.35	4	5.71	12	11.88	3	7.14	1	2.33	1	1.82	2	3.85	4	3.08	-	-	3	2.42
1998	1	1.09	6	8.57	5	4.95	4	9.52	1	2.33	-	-	-	-	5	3.85	4	4.17	-	-
1997	-	-	5	7.14	3	2.97	1	2.38	4	9.30	3	5.45	2	3.85	8	6.15	5	5.21	2	1.61
1996	3	3.26	4	5.71	9	8.91	2	4.76	1	2.33	1	1.82	3	5.77	2	1.54	-	-	2	1.61
1995	2	2.17	5	7.14	9	8.91	1	2.38	3	6.98	3	5.45	-	-	1	0.77	3	3.13	-	-
1994	2	2.17	-	-	7	6.93	1	2.38	1	2.33	1	1.82	3	5.77	3	2.31	2	2.08	-	-
1993	1	1.09	2	2.86	3	2.97	-	-	1	2.33	-	-	-	-	0	0.00	1	1.04	-	-
1992	-	-	1	1.43	-	-	1	2.38	-	-	-	-	-	-	1	0.77	-	-	-	-
1991	-	-	1	1.43	-	-	-	-	1	2.33	-	-	-	-	-	-	-	-	-	-
1990	-	-	1	1.43	-	-	1	2.38	-	-	-	-	-	-	-	-	1	1.04	-	-
1989	1	1.09	-	-	-	-	1	2.38	-	-	-	-	-	-	-	-	-	-	-	-
1988	-	-	1	1.43	-	-	1	2.38	-	-	-	-	-	-	-	-	-	-	-	-
Total	92	100	70	100	101	100	42	100	43	100	55	100	52	100	130	100	96	100	124	100

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

Table 5.1.7-19. Age frequency distributions (%) for Northern Pike captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Age-class	Eaglenest L		Pointe du Bois						Lac du Bonnet						Manigotagan L					
	2010		2008		2009		2010		2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	1	4.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	1	4.00	-	-	-	-	-	-	-	-	1	2.63	-	-	-	-	-	-
3	1	3.13	5	20.00	2	5.13	1	6.25	1	4.76	1	9.09	2	5.26	-	-	-	-	-	-
4	3	9.38	5	20.00	11	28.21	7	43.75	-	-	4	36.36	7	18.42	3	23.08	3	23.08	-	-
5	3	9.38	5	20.00	10	25.64	6	37.50	1	4.76	1	9.09	6	15.79	5	38.46	5	38.46	4	36.36
6	3	9.38	1	4.00	6	15.38	1	6.25	-	-	2	18.18	7	18.42	1	7.69	2	15.38	4	36.36
7	5	15.63	2	8.00	2	5.13	-	-	4	19.05	1	9.09	10	26.32	2	15.38	1	7.69	1	9.09
8	4	12.50	1	4.00	1	2.56	-	-	5	23.81	-	-	2	5.26	1	7.69	-	-	-	-
9	5	15.63	2	8.00	2	5.13	-	-	2	9.52	1	9.09	0	0.00	-	-	1	7.69	1	9.09
10	1	3.13	1	4.00	2	5.13	1	6.25	-	-	-	-	1	2.63	1	7.69	-	-	1	9.09
11	2	6.25	1	4.00	2	5.13	-	-	5	23.81	1	9.09	1	2.63	-	-	-	-	-	-
12	1	3.13	-	-	1	2.56	-	-	1	4.76	-	-	-	-	-	-	-	-	-	-
13	2	6.25	-	-	-	-	-	-	1	4.76	-	-	-	-	-	-	1	7.69	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	1	2.63	-	-	-	-	-	-
15	1	3.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	1	3.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	1	4.76	-	-	-	-	-	-	-	-	-	-
Total	32	100	25	100	39	100	16	100	21	100	11	100	38	100	13	100	13	100	11	100

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

Table 5.1.7-20. Age frequency distributions (%) for Lake Whitefish captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Age	Pointe du Bois		Lac du Bonnet						Manigotagan L			
	2010		2008		2009		2010		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	1	8.33	4	30.77	-	-	-	-
2	-	-	3	20.00	-	-	2	15.38	-	-	-	-
3	1	25.00	2	13.33	2	16.67	2	15.38	-	-	-	-
4	2	50.00	2	13.33	3	25.00	-	-	-	-	-	-
5	-	-	3	20.00	-	-	1	7.69	1	2.94	-	-
6	-	-	2	13.33	3	25.00	-	-	-	-	2	4.88
7	-	-	-	-	-	-	2	15.38	1	2.94	3	7.32
8	-	-	-	-	-	-	-	-	1	2.94	5	12.20
9	-	-	-	-	-	-	-	-	2	5.88	1	2.44
10	-	-	-	-	1	8.33	-	-	5	14.71	3	7.32
11	-	-	1	6.67	1	8.33	1	7.69	6	17.65	9	21.95
12	-	-	-	-	-	-	-	-	2	5.88	5	12.20
13	-	-	-	-	-	-	-	-	8	23.53	2	4.88
14	-	-	-	-	-	-	-	-	2	5.88	-	-
15	1	25.00	-	-	-	-	-	-	2	5.88	1	2.44
16	-	-	2	13.33	1	8.33	-	-	-	-	2	4.88
17	-	-	-	-	-	-	1	7.69	1	2.94	1	2.44
18	-	-	-	-	-	-	-	-	-	-	1	2.44
19	-	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	2	5.88	2	4.88
21	-	-	-	-	-	-	-	-	-	-	2	4.88
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	1	2.94	1	2.44
24	-	-	-	-	-	-	-	-	-	-	1	2.44
Total	4	100	15	100	12	100	13	100	34	100	41	100

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

Table 5.1.7-21. Age frequency distributions (%) for Sauger captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Age-class	Pointe du Bois						Lac du Bonnet					
	2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%
1	-	-	-	-	-	-	-	-	2	1.74	1	1.56
2	10	9.26	-	-	-	-	4	5.71	6	5.22	1	1.56
3	8	7.41	7	5.22	5	10.64	9	12.86	39	33.91	3	4.69
4	25	23.15	25	18.66	10	21.28	6	8.57	23	20.00	29	45.31
5	21	19.44	4	2.99	3	6.38	16	22.86	5	4.35	16	25.00
6	18	16.67	37	27.61	10	21.28	19	27.14	9	7.83	1	1.56
7	8	7.41	20	14.93	7	14.89	9	12.86	13	11.30	4	6.25
8	4	3.70	13	9.70	8	17.02	2	2.86	7	6.09	6	9.38
9	4	3.70	1	0.75	-	-	2	2.86	2	1.74	3	4.69
10	5	4.63	8	5.97	1	2.13	-	-	3	2.61	-	-
11	4	3.70	8	5.97	2	4.26	-	-	5	4.35	-	-
12	-	-	7	5.22	-	-	2	2.86	1	0.87	-	-
13	1	0.93	1	0.75	1	2.13	1	1.43	-	-	-	-
14	-	-	3	2.24	-	-	-	-	-	-	-	-
Total	108	100	134	100	47	100	70	100	115	100	64	100

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

Table 5.1.7-22. Age frequency distributions (%) for Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Age	Eaglenest L		Pointe du Bois						Lac du Bonnet						Manigotagan L					
	2010		2008		2009		2010		2008		2009		2010		2008		2009		2010	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	-	-	-	-	-	-	-	-	1	2.33	3	5.45	-	-	1	0.77	-	-	-	-
1	-	-	1	1.43	-	-	-	-	3	6.98	1	1.82	6	11.54	2	1.54	-	-	-	-
2	-	-	2	2.86	-	-	1	2.38	11	25.58	20	36.36	4	7.69	60	46.15	22	22.92	3	2.42
3	8	8.70	6	8.57	13	12.87	-	-	6	13.95	11	20.00	8	15.38	11	8.46	42	43.75	6	4.84
4	13	14.13	4	5.71	7	6.93	7	16.67	-	-	1	1.82	7	13.46	10	7.69	2	2.08	36	29.03
5	23	25.00	9	12.86	6	5.94	2	4.76	3	6.98	2	3.64	4	7.69	8	6.15	6	6.25	59	47.58
6	3	3.26	7	10.00	12	11.88	3	7.14	3	6.98	3	5.45	-	-	6	4.62	3	3.13	5	4.03
7	15	16.30	8	11.43	8	7.92	8	19.05	3	6.98	3	5.45	8	15.38	4	3.08	2	2.08	2	1.61
8	10	10.87	3	4.29	6	5.94	2	4.76	-	-	2	3.64	1	1.92	4	3.08	-	-	2	1.61
9	3	3.26	4	5.71	1	0.99	1	2.38	1	2.33	-	-	4	7.69	4	3.08	3	3.13	2	1.61
10	3	3.26	6	8.57	12	11.88	2	4.76	1	2.33	1	1.82	-	-	5	3.85	-	-	2	1.61
11	4	4.35	5	7.14	5	4.95	3	7.14	4	9.30	-	-	2	3.85	8	6.15	4	4.17	3	2.42
12	1	1.09	4	5.71	3	2.97	4	9.52	1	2.33	3	5.45	-	-	2	1.54	5	5.21	-	-
13	-	-	5	7.14	9	8.91	1	2.38	3	6.98	1	1.82	2	3.85	1	0.77	-	-	2	1.61
14	3	3.26	-	-	9	8.91	2	4.76	1	2.33	3	5.45	3	5.77	3	2.31	3	3.13	2	1.61
15	2	2.17	2	2.86	7	6.93	1	2.38	1	2.33	1	1.82	-	-	0	0.00	2	2.08	-	-
16	2	2.17	1	1.43	3	2.97	1	2.38	-	-	-	-	3	5.77	1	0.77	1	1.04	-	-
17	1	1.09	1	1.43	-	-	-	-	1	2.33	-	-	-	-	-	-	-	-	-	-
18	-	-	1	1.43	-	-	1	2.38	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.04	-	-
20	-	-	1	1.43	-	-	1	2.38	-	-	-	-	-	-	-	-	-	-	-	-
21	1	1.09	-	-	-	-	1	2.38	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	1	2.38	-	-	-	-	-	-	-	-	-	-	-	-
Total	92	100	70	100	101	100	42	100	43	100	55	100	52	100	130	100	96	100	124	100

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

Table 5.1.7-23. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Northern Pike captured in standard gang index gill nets set in Eaglenest Lake, 2010.

Age	Year- Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
3	2007	1	320	-	1	200	-	1	0.61	-
4	2006	3	373	34	3	337	125	3	0.63	0.05
5	2005	3	506	45	3	897	280	3	0.68	0.07
6	2004	3	581	46	3	1307	337	3	0.66	0.11
7	2003	5	642	26	5	1996	251	5	0.76	0.09
8	2002	4	643	79	4	2093	972	4	0.74	0.11
9	2001	5	739	37	5	3268	660	5	0.80	0.04
10	2000	1	716	-	1	2480	-	1	0.68	-
11	1999	2	719	45	2	2970	891	2	0.79	0.09
12	1998	1	870	-	1	5060	-	1	0.77	-
13	1997	2	914	16	2	5990	382	2	0.79	0.01
14	1996	-	-	-	-	-	-	-	-	-
15	1995	1	920	-	1	6040	-	1	0.78	-
16	1994	1	968	-	1	6520	-	1	0.72	-
Total		32			32			32		

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 5.1.7-24. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Northern Pike captured in standard gang index gill nets set in Pointe du Bois Forebay, 2008-2010.

Age	2008										2009										2010									
	Year- Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	1	293	-	1	160	-	1	0.64	-	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2006	1	334	-	1	240	-	1	0.64	-	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
3	2005	5	412	58	5	494	213	5	0.68	0.03	2006	2	384	54	2	405	163	2	0.70	0.01	2007	1	336	-	1	232	-	1	0.61	-
4	2004	5	455	37	5	658	127	5	0.70	0.12	2005	11	427	35	11	486	120	11	0.61	0.04	2006	7	459	27	7	569	115	7	0.58	0.04
5	2003	5	527	58	5	884	226	5	0.60	0.08	2004	10	504	31	10	781	133	10	0.61	0.07	2005	6	496	32	6	751	156	6	0.61	0.07
6	2002	1	532	-	1	1250	-	1	0.83	-	2003	6	580	57	6	1177	337	6	0.59	0.07	2004	1	678	-	1	2460	-	1	0.79	-
7	2001	2	680	42	2	2350	212	2	0.75	0.07	2002	2	595	4	2	1565	134	2	0.75	0.08	2003	-	-	-	-	-	-	-	-	-
8	2000	1	790	-	1	3880	-	1	0.79	-	2001	1	713	-	1	3120	-	1	0.86	-	2002	-	-	-	-	-	-	-	-	-
9	1999	2	900	42	2	5425	191	2	0.75	0.13	2000	2	733	66	2	3680	608	2	0.94	0.10	2001	-	-	-	-	-	-	-	-	-
10	1998	1	828	-	1	4460	-	1	0.79	-	1999	2	874	38	2	5815	1549	2	0.86	0.11	2000	1	897	-	1	5220	-	1	0.72	-
11	1997	1	926	-	1	7520	-	1	0.95	-	1998	2	854	51	2	4410	240	2	0.72	0.17	1999	-	-	-	-	-	-	-	-	-
12	1996	-	-	-	-	-	-	-	-	-	1997	1	884	-	1	6210	-	1	0.90	-	1998	-	-	-	-	-	-	-	-	-
Total		25			25			25				39			39			39				16			16			16		

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

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

Table 5.1.7-25. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Northern Pike captured in standard gang index gill nets set in Lac du Bonnet, 2008-2010.

Age	2008										2009										2010									
	Year-Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
2	2006	-	-	-	-	-	-	-	-	-	2007	-	-	-	-	-	-	-	-	-	2008	1	400	-	1	440	-	1	0.69	-
3	2005	1	390	-	1	400	-	1	0.67	-	2006	1	510	-	1	700	-	1	0.53	-	2007	2	577	55	2	1400	396	2	0.72	0.00
4	2004	-	-	-	-	-	-	-	-	-	2005	4	509	44	4	860	218	4	0.64	0.02	2006	7	595	58	7	1624	521	7	0.75	0.06
5	2003	1	632	-	1	1650	-	1	0.65	-	2004	1	602	-	1	1530	-	1	0.70	-	2005	6	634	34	6	1955	245	6	0.77	0.06
6	2002	-	-	-	-	-	-	-	-	-	2003	2	680	3	2	2185	177	2	0.70	0.05	2004	7	663	55	7	2029	563	7	0.68	0.07
7	2001	4	642	49	4	1788	262	4	0.68	0.05	2002	1	708	-	1	2390	-	1	0.67	-	2003	10	702	57	10	2533	666	10	0.72	0.08
8	2000	5	718	48	5	2632	581	5	0.70	0.09	2001	-	-	-	-	-	-	-	-	-	2002	2	827	134	2	4760	2376	2	0.81	0.02
9	1999	2	732	37	2	2980	396	2	0.76	0.01	2000	1	678	-	1	1690	-	1	0.54	-	2001	-	-	-	-	-	-	-	-	-
10	1998	-	-	-	-	-	-	-	-	-	1999	-	-	-	-	-	-	-	-	-	2000	1	770	-	1	3740	-	1	0.82	-
11	1997	5	749	169	5	3800	3590	5	0.71	0.16	1998	1	1000	-	1	7960	-	1	0.80	-	1999	1	830	-	1	3640	-	1	0.64	-
12	1996	1	832	-	1	5000	-	1	0.87	-	1997	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
13	1995	1	868	-	1	4760	-	1	0.73	-	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
14	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-	1996	1	1000	-	1	7900	-	1	0.79	-
15	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
16	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-
17	1991	1	950	-	1	6380	-	1	0.74	-	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
Total		21			21			21				11			11			11				38			38			38		

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 5.1.7-26. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Northern Pike captured in standard gang index gill nets set in Manigotagan Lake, 2008-2010.

Age	2008										2009										2010									
	Year- Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
4	2004	3	521	19	3	873	110	3	0.62	0.02	2005	3	506	32	3	850	132	3	0.65	0.07	2006	-	-	-	-	-	-	-	-	-
5	2003	5	541	26	5	914	149	5	0.57	0.07	2004	5	538	51	5	1010	315	5	0.64	0.05	2005	4	555	12	4	848	105	4	0.50	0.08
6	2002	1	494	-	1	790	-	1	0.66	-	2003	2	550	25	2	1300	212	2	0.78	0.02	2004	4	544	27	4	930	296	4	0.58	0.15
7	2001	2	550	62	1	820	-	1	0.63	-	2002	1	596	-	1	1000	-	1	0.47	-	2003	1	544	-	1	1070	-	1	0.66	-
8	2000	1	692	-	1	1620	-	1	0.49	-	2001	-	-	-	-	-	-	-	-	-	2002	-	-	-	-	-	-	-	-	-
9	1999	-	-	-	-	-	-	-	-	-	2000	1	550	-	1	1200	-	1	0.72	-	2001	1	707	-	1	2350	-	1	0.66	-
10	1998	1	766	-	1	3400	-	1	0.76	-	1999	-	-	-	-	-	-	-	-	-	2000	1	770	-	1	3450	-	1	0.76	-
11	1997	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-	1999	-	-	-	-	-	-	-	-	-
12	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
13	1995	-	-	-	-	-	-	-	-	-	1996	1	772	-	1	3150	-	1	0.68	-	1997	-	-	-	-	-	-	-	-	-
Total		13			12			12				13			13			13				11			11			11		

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 5.1.7-27. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Lake Whitefish captured in standard gang index gill nets set in Pointe du Bois Forebay, 2010.

Age-Class	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
3	2007	1	341.00	-	1	556.30	-	1	1.40	-
4	2006	2	355.50	50.20	2	724.45	348.82	2	1.54	0.11
15	1995	1	560.00	-	1	2380.00	-	1	1.36	-
Total		4			4			4		

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 5.1.7-28. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Lake Whitefish captured in standard gang index gill nets set in Lac du Bonnet, 2008-2010.

Age-Class	2008										2009										2010									
	Year-Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	-	-	-	-	-	-	-	-	-	2008	1	180	-	1	60	-	1	1.03	-	2009	4	193	9	4	87	11	4	1.21	0.03
2	2006	3	308	16	3	450	95	3	1.53	0.09	2007	-	-	-	-	-	-	-	-	-	2008	2	282	11	2	330	28	2	1.48	0.05
3	2005	2	380	23	2	930	297	2	1.67	0.25	2006	2	424	34	2	1150	297	2	1.49	0.03	2007	2	325	21	2	490	127	2	1.41	0.10
4	2004	2	422	6	2	1230	28	2	1.64	0.03	2005	3	413	43	3	1113	304	3	1.55	0.06	2006	-	-	-	-	-	-	-	-	-
5	2003	3	444	3	3	1577	158	3	1.80	0.14	2004	-	-	-	-	-	-	-	-	-	2005	1	328	-	1	330	-	1	0.94	-
6	2002	2	430	17	2	1195	205	2	1.50	0.08	2003	3	468	10	3	1780	219	3	1.74	0.20	2004	-	-	-	-	-	-	-	-	-
7	2001	-	-	-	-	-	-	-	-	-	2002	-	-	-	-	-	-	-	-	-	2003	2	451	16	2	1355	64	2	1.48	0.08
8	2000	-	-	-	-	-	-	-	-	-	2001	-	-	-	-	-	-	-	-	-	2002	-	-	-	-	-	-	-	-	-
9	1999	-	-	-	-	-	-	-	-	-	2000	-	-	-	-	-	-	-	-	-	2001	-	-	-	-	-	-	-	-	-
10	1998	-	-	-	-	-	-	-	-	-	1999	1	494	-	1	1920	-	1	1.59	-	2000	-	-	-	-	-	-	-	-	-
11	1997	1	506	-	1	2150	-	1	1.66	-	1998	1	490	-	1	1750	-	1	1.49	-	1999	1	462	-	1	1300	-	1	1.32	-
12	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-	1998	-	-	-	-	-	-	-	-	-
13	1995	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
14	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-
15	1993	-	-	-	-	-	-	-	-	-	1994	-	-	-	-	-	-	-	-	-	1995	-	-	-	-	-	-	-	-	-
16	1992	2	495	24	2	1825	460	2	1.49	0.16	1993	1	492	-	1	2090	-	1	1.75	-	1994	-	-	-	-	-	-	-	-	-
17	1991	-	-	-	-	-	-	-	-	-	1992	-	-	-	-	-	-	-	-	-	1993	1	490	-	1	1830	-	1	1.56	-
Total		15			15			15				11			11			11				13			13			13		

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 5.1.7-29. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Lake Whitefish captured in standard gang index gill nets set in Manigotagan Lake, 2008/2009.

Age-Class	2008										2009									
	Year-Class	FL (mm)			W (g)			K			Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
5	2003	1	350	-	1	550	-	1	1.28	-	2004	-	-	-	-	-	-	-	-	-
6	2002	-	-	-	-	-	-	-	-	-	2003	2	290	6	2	338	18	2	1.39	0.01
7	2001	1	248	-	1	170	-	1	1.11	-	2002	3	337	51	3	575	288	3	1.42	0.09
8	2000	1	380	-	1	670	-	1	1.22	-	2001	5	400	18	5	860	171	5	1.34	0.16
9	1999	2	421	24	2	995	219	2	1.32	0.07	2000	1	276	-	1	300	-	1	1.43	-
10	1998	5	430	21	5	1012	171	5	1.26	0.10	1999	3	380	46	3	767	347	3	1.33	0.16
11	1997	6	407	51	6	945	385	6	1.31	0.19	1998	9	412	56	9	1033	388	9	1.41	0.12
12	1996	2	440	14	2	1075	106	2	1.26	0.00	1997	5	412	42	5	940	286	5	1.31	0.06
13	1995	8	394	57	8	803	362	8	1.24	0.07	1996	2	448	14	2	1288	124	2	1.43	0.00
14	1994	2	425	7	2	830	99	2	1.09	0.18	1995	-	-	-	-	-	-	-	-	-
15	1993	2	435	24	2	1090	226	2	1.31	0.06	1994	1	434	-	1	1150	-	1	1.41	-
16	1992	-	-	-	-	-	-	-	-	-	1993	2	478	31	2	1475	247	2	1.35	0.04
17	1991	1	420	-	1	870	-	1	1.17	-	1992	1	446	-	1	1525	-	1	1.72	-
18	1990	-	-	-	-	-	-	-	-	-	1991	1	438	-	1	700	-	1	0.83	-
19	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-
20	1988	2	427	27	2	815	304	2	1.02	0.20	1989	2	428	42	2	988	194	2	1.26	0.13
21	1987	-	-	-	-	-	-	-	-	-	1988	2	400	25	2	650	106	2	1.01	0.03
22	1986	-	-	-	-	-	-	-	-	-	1987	-	-	-	-	-	-	-	-	-
23	1985	1	476	-	1	990	-	1	0.92	-	1986	1	420	-	1	700	-	1	0.94	-
24	1984	-	-	-	-	-	-	-	-	-	1985	1	466	-	1	1525	-	1	1.51	-
Total		34			34			34				41			41			41		

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 5.1.7-30. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Sauger captured in standard gang index gill nets set in Pointe du Bois Forebay, 2008-2010.

Age	2008										2009										2010									
	Year-Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
2	2006	10	219	29	10	120	42	10	1.13	0.20	2007	-	-	-	-	-	-	-	-	-	2008	-	-	-	-	-	-	-	-	-
3	2005	8	243	25	8	141	51	8	0.96	0.17	2006	7	220	36	7	104	45	7	0.90	0.06	2007	5	225	14	5	114	21	5	0.99	0.10
4	2004	25	267	25	25	198	62	25	1.02	0.11	2005	25	257	14	25	144	31	25	0.84	0.12	2006	10	247	20	10	137	35	10	0.89	0.10
5	2003	21	283	26	21	252	62	21	1.09	0.10	2004	4	282	6	4	173	43	4	0.77	0.18	2005	3	274	15	3	180	20	3	0.88	0.10
6	2002	18	314	22	18	324	68	18	1.04	0.07	2003	37	293	23	37	233	58	37	0.91	0.08	2004	10	291	30	10	233	79	10	0.91	0.11
7	2001	8	316	22	8	349	69	8	1.10	0.08	2002	20	316	24	20	280	77	20	0.87	0.09	2003	7	318	14	7	271	67	7	0.83	0.14
8	2000	4	328	15	4	370	61	4	1.05	0.04	2001	13	319	25	13	280	70	13	0.85	0.09	2002	8	327	16	8	305	44	8	0.87	0.07
9	1999	4	341	17	4	444	58	4	1.12	0.03	2000	1	382	-	1	380	-	1	0.68	-	2001	-	-	-	-	-	-	-	-	-
10	1998	5	341	12	5	440	64	5	1.11	0.12	1999	8	323	15	8	279	31	8	0.83	0.11	2000	1	316	-	1	230	-	1	0.73	-
11	1997	4	341	15	4	440	63	4	1.11	0.12	1998	8	350	23	8	379	86	8	0.87	0.07	1999	2	348	17	2	310	42	2	0.74	0.01
12	1996	-	-	-	-	-	-	-	-	-	1997	7	340	16	7	344	52	7	0.88	0.05	1998	-	-	-	-	-	-	-	-	-
13	1995	1	348	-	1	470	-	1	1.12	-	1996	1	350	-	1	420	-	1	0.98	-	1997	1	335	-	1	350	-	1	0.93	-
14	1994	-	-	-	-	-	-	-	-	-	1995	3	342	21	3	317	75	3	0.78	0.06	1996	-	-	-	-	-	-	-	-	-
Total		108			108			108				134			134			134				47			47			47		

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 5.1.7-31. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Sauger captured in standard gang index gill nets set in Lac du Bonnet, 2008-2010.

Age	2008										2009										2010									
	Year-Class	FL			W			K			Year-Class	FL			W			K			Year-Class	FL			W			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	-	-	-	-	-	-	-	-	-	2008	2	180	6	2	42	2	2	0.72	0.11	2009	1	150	-	1	30	-	1	0.89	-
2	2006	4	217	15	4	98	33	4	0.94	0.17	2007	6	206	23	6	89	42	6	0.97	0.27	2008	1	178	-	1	49	-	1	0.87	-
3	2005	9	247	16	9	140	27	9	0.93	0.11	2006	39	234	12	39	116	23	39	0.90	0.14	2007	3	226	7	3	100	14	3	0.86	0.06
4	2004	6	242	16	6	128	29	6	0.90	0.18	2005	23	254	15	23	148	27	23	0.90	0.06	2006	29	244	11	29	135	21	29	0.92	0.07
5	2003	16	262	17	16	167	39	16	0.92	0.09	2004	5	264	18	5	167	40	5	0.89	0.11	2005	16	254	11	16	151	19	16	0.91	0.04
6	2002	19	266	16	19	172	48	19	0.90	0.17	2003	9	267	11	9	177	33	9	0.92	0.08	2004	1	276	-	1	189	-	1	0.90	-
7	2001	9	292	22	9	226	77	9	0.87	0.15	2002	13	278	13	13	203	23	13	0.95	0.15	2003	4	270	13	4	183	28	4	0.92	0.02
8	2000	2	249	13	1	160	-	1	0.93	-	2001	7	281	14	7	231	56	7	1.03	0.15	2002	6	274	12	6	192	33	6	0.93	0.06
9	1999	2	281	38	2	200	156	2	0.81	0.36	2000	2	288	17	2	238	18	2	1.00	0.10	2001	3	277	20	3	199	51	3	0.93	0.06
10	1998	-	-	-	-	-	-	-	-	-	1999	3	291	8	3	243	12	3	0.99	0.05	2000	-	-	-	-	-	-	-	-	-
11	1997	-	-	-	-	-	-	-	-	-	1998	5	293	22	5	256	63	5	1.01	0.18	1999	-	-	-	-	-	-	-	-	-
12	1996	2	298	-	2	265	21	2	1.00	0.08	1997	1	298	-	1	340	-	1	1.28	-	1998	-	-	-	-	-	-	-	-	-
13	1995	1	200	-	-	-	-	-	-	-	1996	-	-	-	-	-	-	-	-	-	1997	-	-	-	-	-	-	-	-	-
Total		70			68			68				115			115			115				64			64			64		

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 5.1.7-32. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Walleye captured in standard gang index gill nets set in Eaglenest Lake, 2010.

Age	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
3	2007	8	229	33	8	126	46	8	1.03	0.10
4	2006	13	256	47	13	190	123	13	1.00	0.08
5	2005	23	309	25	23	324	91	23	1.07	0.11
6	2004	3	361	11	3	503	84	3	1.07	0.08
7	2003	15	370	42	15	605	221	15	1.14	0.12
8	2002	10	402	46	10	718	280	10	1.06	0.09
9	2001	3	410	22	3	763	106	3	1.11	0.04
10	2000	3	453	29	3	1053	214	3	1.12	0.04
11	1999	4	473	57	4	1213	447	4	1.11	0.12
12	1998	1	538	-	1	1510	-	1	0.97	-
13	1997	-	-	-	-	-	-	-	-	-
14	1996	3	439	11	3	877	68	3	1.03	0.01
15	1995	2	498	75	2	1605	544	2	1.29	0.13
16	1994	2	500	110	2	1480	1032	2	1.08	0.11
17	1993	1	520	-	1	1600	-	1	1.14	-
18	1992	-	-	-	-	-	-	-	-	-
19	1991	-	-	-	-	-	-	-	-	-
20	1990	-	-	-	-	-	-	-	-	-
21	1989	1	545	-	1	1420	-	1	0.88	-
Total		92			92			92		

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 5.1.7-33. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Walleye captured in standard gang index gill nets set in Pointe du Bois Forebay, 2008-2010.

Age	2008										2009										2010									
	Year-Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
1	2007	1	145	-	1	30	-	1	0.98	-	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2006	2	230	28	2	130	14	2	1.10	0.28	2007	-	-	-	-	-	-	-	-	-	2008	1	260	-	1	190	-	1	1.08	-
3	2005	6	228	19	6	130	18	6	1.12	0.20	2006	13	237	25	13	135	53	13	0.95	0.16	2007	-	-	-	-	-	-	-	-	-
4	2004	4	258	29	4	195	54	4	1.14	0.21	2005	7	256	39	7	209	103	7	1.18	0.35	2006	7	286	35	7	270	116	7	1.09	0.09
5	2003	9	285	28	9	271	78	9	1.14	0.12	2004	6	287	38	6	272	99	6	1.09	0.10	2005	2	281	30	2	232	68	2	1.04	0.02
6	2002	7	333	33	7	446	140	7	1.17	0.11	2003	12	337	35	12	453	144	12	1.14	0.09	2004	3	312	49	3	307	173	3	0.93	0.12
7	2001	8	384	64	8	764	433	8	1.24	0.08	2002	8	374	40	8	601	224	8	1.10	0.12	2003	8	325	43	8	357	184	8	0.97	0.16
8	2000	3	435	54	3	1033	388	3	1.21	0.06	2001	6	402	55	6	747	349	6	1.09	0.16	2002	2	395	69	2	699	437	2	1.05	0.16
9	1999	4	466	71	4	1330	546	4	1.27	0.09	2000	1	513	-	1	1700	-	1	1.26	-	2001	1	532	-	1	1580	-	1	1.05	-
10	1998	6	509	82	6	1672	651	6	1.21	0.15	1999	12	456	61	12	1139	470	12	1.12	0.11	2000	2	459	33	2	1063	281	2	1.09	0.06
11	1997	5	521	59	5	1790	706	5	1.22	0.04	1998	5	511	119	5	1712	1067	5	1.08	0.17	1999	3	440	78	3	935	428	3	1.06	0.08
12	1996	4	591	55	4	2275	822	4	1.07	0.10	1997	3	524	71	3	1830	645	3	1.24	0.04	1998	4	538	100	4	1834	813	4	1.11	0.04
13	1995	5	594	31	5	2540	408	5	1.21	0.09	1996	9	558	77	9	2100	931	9	1.12	0.16	1997	1	508	-	1	1636	-	1	1.25	-
14	1994	-	-	-	-	-	-	-	-	-	1995	9	563	35	9	2021	470	9	1.11	0.15	1996	2	567	25	2	1835	212	2	1.01	0.02
15	1993	2	467	33	2	1165	64	2	1.16	0.18	1994	7	566	66	7	2063	733	7	1.10	0.09	1995	1	522	-	1	1347	-	1	0.95	-
16	1992	1	640	-	1	2800	-	1	1.07	-	1993	3	513	97	3	1620	811	3	1.15	0.09	1994	1	470	-	1	1071	-	1	1.03	-
17	1991	1	525	-	1	1750	-	1	1.21	-	1992	-	-	-	-	-	-	-	-	-	1993	-	-	-	-	-	-	-	-	-
18	1990	1	490	-	1	1470	-	1	1.25	-	1991	-	-	-	-	-	-	-	-	-	1992	1	632	-	1	2710	-	1	1.07	-
19	1989	-	-	-	-	-	-	-	-	-	1990	-	-	-	-	-	-	-	-	-	1991	-	-	-	-	-	-	-	-	-
20	1988	1	455	-	1	1000	-	1	1.06	-	1989	-	-	-	-	-	-	-	-	-	1990	1	428	-	1	776	-	1	0.99	-
21	1987	-	-	-	-	-	-	-	-	-	1988	-	-	-	-	-	-	-	-	-	1989	1	658	-	1	3340	-	1	1.17	-
27	1981	-	-	-	-	-	-	-	-	-	1982	-	-	-	-	-	-	-	-	-	1983	1	710	-	1	3820	-	1	1.07	-
Total		70			70			70				101			101			101				42			42			42		

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 5.1.7-34. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Walleye captured in standard gang index gill nets set in Lac du Bonnet, 2008-2010.

2008

Age	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
0	2008	1	86	-	1	10	-	1	1.57	-
1	2007	3	211	6	3	100	10	3	1.07	0.08
2	2006	11	251	29	11	175	63	11	1.07	0.17
3	2005	6	310	27	6	323	98	6	1.06	0.06
4	2004	-	-	-	-	-	-	-	-	-
5	2003	3	377	26	3	613	110	3	1.15	0.12
6	2002	3	360	16	3	503	84	3	1.07	0.04
7	2001	3	401	56	3	763	349	3	1.12	0.05
8	2000	-	-	-	-	-	-	-	-	-
9	1999	1	468	-	1	1140	-	1	1.11	-
10	1998	1	624	-	1	2700	-	1	1.11	-
11	1997	4	574	55	4	2283	637	4	1.19	0.05
12	1996	1	576	-	1	2310	-	1	1.21	-
13	1995	3	562	112	3	2207	1063	3	1.17	0.06
14	1994	1	542	-	1	1750	-	1	1.10	-
15	1993	1	642	-	1	2870	-	1	1.08	-
16	1992	-	-	-	-	-	-	-	-	-
17	1991	1	656	-	1	2450	-	1	0.87	-
Total		43			43			43		

2009

Age	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
0	2009	3	126	6	2	18	4	2	0.94	0.09
1	2008	1	210	-	1	100	-	1	1.08	-
2	2007	20	249	13	20	164	37	20	1.06	0.10
3	2006	11	291	30	11	272	88	11	1.07	0.09
4	2005	1	278	-	1	220	-	1	1.02	-
5	2004	2	365	21	2	520	85	2	1.07	0.01
6	2003	3	399	9	3	713	25	3	1.13	0.05
7	2002	3	369	86	3	630	453	3	1.13	0.06
8	2001	2	366	17	2	555	78	2	1.13	0.00
9	2000	-	-	-	-	-	-	-	-	-
10	1999	1	506	-	1	1590	-	1	1.23	-
11	1998	-	-	-	-	-	-	-	-	-
12	1997	3	500	59	3	1563	629	3	1.21	0.05
13	1996	1	460	-	1	1190	-	1	1.22	-
14	1995	3	619	47	3	2697	585	3	1.12	0.02
15	1994	1	604	-	1	2300	-	1	1.04	-
16	1993	-	-	-	-	-	-	-	-	-
17	1992	-	-	-	-	-	-	-	-	-
Total		55			54			54		

2010

Age	Year-Class	FL (mm)			W (g)			K		
		n	Mean	SD	n	Mean	SD	n	Mean	SD
0	2010	-	-	-	-	-	-	-	-	-
1	2009	6	223	9	6	114	16	6	1.03	0.10
2	2008	4	256	8	4	173	12	4	1.04	0.04
3	2007	8	282	17	8	238	43	8	1.06	0.05
4	2006	7	356	31	7	533	163	7	1.15	0.08
5	2005	4	356	42	4	553	211	4	1.17	0.13
6	2004	-	-	-	-	-	-	-	-	-
7	2003	8	413	46	8	856	319	8	1.17	0.11
8	2002	1	450	-	1	980	-	1	1.08	-
9	2001	4	475	104	4	1503	978	4	1.23	0.09
10	2000	-	-	-	-	-	-	-	-	-
11	1999	2	515	21	2	1725	318	2	1.26	0.08
12	1998	-	-	-	-	-	-	-	-	-
13	1997	2	523	1	2	1870	156	2	1.31	0.12
14	1996	3	635	29	3	3183	445	3	1.24	0.01
15	1995	-	-	-	-	-	-	-	-	-
16	1994	3	617	78	3	3010	1260	3	1.22	0.11
17	1993	-	-	-	-	-	-	-	-	-
Total		52			52			52		

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 5.1.7-35. Mean fork length- (mm), weight- (g) and condition factor- (K) at-age for Walleye captured in standard gang index gill nets set in Manigotagan Lake, 2008-2010.

Age	2008										2009										2010									
	Year-Class	FL (mm)			W (g)			K			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		n	Mean	SD	n	Mean	SD	n	Mean	SD
0	2008	1	140	-	1	20	-	1	0.73	-	2009	-	-	-	-	-	-	-	-	-	2010	-	-	-	-	-	-	-	-	-
1	2007	2	234	23	2	110	28	2	0.85	0.03	2008	-	-	-	-	-	-	-	-	-	2009	-	-	-	-	-	-	-	-	-
2	2006	60	262	23	60	173	64	60	0.93	0.13	2007	22	235	10	22	113	21	22	0.87	0.13	2008	3	234	39	3	143	57	3	1.09	0.08
3	2005	11	341	31	11	401	112	11	0.99	0.06	2006	42	294	30	41	277	89	41	1.04	0.08	2007	6	250	19	6	160	32	6	1.02	0.08
4	2004	10	409	34	10	723	227	10	1.03	0.06	2005	2	354	3	2	450	71	2	1.02	0.18	2006	36	298	26	36	279	83	36	1.03	0.07
5	2003	8	439	29	8	951	219	8	1.11	0.10	2004	6	410	71	6	775	345	6	1.04	0.04	2005	59	355	29	59	492	131	59	1.07	0.07
6	2002	6	451	53	6	1080	373	6	1.14	0.08	2003	3	509	18	3	1517	176	3	1.15	0.07	2004	5	409	47	5	750	241	5	1.07	0.05
7	2001	4	475	42	4	1200	319	4	1.10	0.04	2002	2	480	14	2	1375	247	2	1.24	0.11	2003	2	413	25	2	755	120	2	1.08	0.02
8	2000	4	477	49	4	1253	349	4	1.13	0.03	2001	0	-	-	0	-	-	0	-	-	2002	2	504	37	2	1325	191	2	1.04	0.08
9	1999	4	509	15	4	1430	23	4	1.09	0.10	2000	3	541	55	3	1767	448	3	1.10	0.05	2001	2	532	33	2	1700	424	2	1.12	0.08
10	1998	5	549	67	5	1818	624	5	1.07	0.06	1999	0	-	-	0	-	-	0	-	-	2000	2	551	18	2	1650	14	2	0.99	0.11
11	1997	8	576	91	8	2193	1008	8	1.09	0.09	1998	4	542	39	4	1788	440	4	1.11	0.12	1999	3	524	41	3	1413	423	3	0.96	0.10
12	1996	2	596	8	2	2345	92	2	1.11	0.01	1997	5	578	87	5	2130	886	5	1.06	0.08	1998	-	-	-	-	-	-	-	-	-
13	1995	1	538	-	1	1750	-	1	1.12	-	1996	0	-	-	0	-	-	0	-	-	1997	2	571	8	2	1710	339	2	0.93	0.22
14	1994	3	577	44	3	1737	142	3	0.91	0.14	1995	3	615	20	3	2283	431	3	0.97	0.09	1996	2	613	24	2	2500	566	2	1.08	0.12
15	1993	0	-	-	0	-	-	0	-	-	1994	2	602	25	2	2063	265	2	0.94	0.00	1995	-	-	-	-	-	-	-	-	-
16	1992	1	618	-	1	2420	-	1	1.03	-	1993	1	582	-	1	1500	-	1	0.76	-	1994	-	-	-	-	-	-	-	-	-
17	1991	0	-	-	0	-	-	0	-	-	1992	0	-	-	0	-	-	0	-	-	1993	-	-	-	-	-	-	-	-	-
18	1990	-	-	-	-	-	-	-	-	-	1991	0	-	-	0	-	-	0	-	-	1992	-	-	-	-	-	-	-	-	-
19	1989	-	-	-	-	-	-	-	-	-	1990	1	646	-	1	2250	-	1	0.83	-	1991	-	-	-	-	-	-	-	-	-
Total		130			130			130				96			95			95				124			124			124		

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 5.1.7-36. Deformities, erosion, lesions, and tumours (DELTs) summary for select fish species captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

Species	Deformities		Erosions		Lesions		Tumors		Total		
	n	%	n	%	n	%	n	%	$n_{Inspect}$	n_{DELTs}	$\%_{DELTs}$
Eagle Nest L											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	1.12	-	-	6	6.74	-	-	89	7	7.87
Northern Pike	-	-	-	-	1	2.90	1	2.90	34	2	5.88
Lake Whitefish	-	-	-	-	-	-	-	-	12	-	-
Sauger	-	-	-	-	1	1.50	-	-	66	1	1.52
Walleye	1	0.97	-	-	-	-	-	-	103	1	0.97
Total	2	0.66	-	-	8	2.63	1	0.33	304	11	3.62
Pointe du Bois											
Lake Sturgeon	3	18.75	-	-	-	-	-	-	16	3	18.75
White Sucker	4	0.63	-	-	8	1.27	2	0.32	630	14	2.22
Northern Pike	-	-	-	-	-	-	-	-	84	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	16	-	-
Sauger	-	-	-	-	1	2.10	-	-	318	1	0.31
Walleye	-	-	-	-	-	-	1	1.30	223	1	0.45
Total	7	0.54	-	-	9	0.70	3	0.23	1287	19	1.48
Lac du Bonnet											
Lake Sturgeon	-	-	-	-	-	-	-	-	11	-	-
White Sucker	-	-	-	-	1	2.90	-	-	118	1	0.85
Northern Pike	-	-	-	-	1	2.60	-	-	71	1	1.41
Lake Whitefish	-	-	-	-	-	-	-	-	45	-	-
Sauger	-	-	-	-	-	-	-	-	252	-	-
Walleye	-	-	-	-	-	-	1	1.90	152	1	0.66
Total	-	-	-	-	2	0.31	1	0.15	649	3	0.46
Manigotagan L											
Lake Sturgeon	-	-	-	-	-	-	-	-	-	-	-
White Sucker	1	1.75	-	-	-	-	-	-	57	1	1.75
Northern Pike	-	-	-	-	-	-	-	-	37	-	-
Lake Whitefish	-	-	-	-	-	-	-	-	108	-	-
Sauger	-	-	-	-	-	-	-	-	-	-	-
Walleye	1	0.28	-	-	1	0.28	-	-	351	1*	0.28
Total	2	0.36	-	-	1	0.18	-	-	553	2	0.36

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 5.1.7-37. Winnipeg River Region Index of Biotic Integrity (IBI) values, 2008-2010.

Metric	Eaglenest	Pointe du Bois			Lac du Bonnet			Manigotagan		
	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
Non standardized values										
Number of species	18	18	19	19	18	17	17	8	8	9
Number of sensitive species	7	5	8	7	7	7	7	3	3	3
Proportion of tolerant individuals	13.1	29.7	27.4	34.3	11.6	8.9	8.3	7.3	7.0	2.8
Number of Insectivore species	10	9	11	10	11	10	10	3	3	4
Hill's Evenness Index	8.74	7.55	7.72	8.00	10.65	7.37	11.43	5.12	5.16	4.25
Insectivore biomass	17.3	11.7	16.1	12.3	26.4	28.4	23.9	21.5	29.3	27.8
Omnivore biomass	29.6	50.9	48.4	57.6	24.4	25.1	17.2	14.6	12.5	6.8
Piscivore biomass	53.1	37.3	35.4	30.1	49.3	46.5	58.8	63.8	58.2	65.4
Proportion lithophilic spawners	0.50	0.74	0.68	0.67	0.60	0.75	0.59	0.91	0.92	0.92
CPUE	33.3	33.5	45.6	20.7	32.5	37.5	32.7	68.1	50.4	67.0
% individuals with DELTS	3.62	2.27	0.88	2.14	0.00	0.00	1.45	0.49	0.59	0.00
IBI Scores										
Number of species	9.0	9.0	9.5	9.5	9.0	8.5	8.5	4.0	4.0	4.5
Number of sensitive species	8.4	6.0	9.6	8.4	8.4	8.4	8.4	3.6	3.6	3.6
Proportion of tolerant individuals	7.8	5.0	5.3	4.2	8.0	8.5	8.6	8.8	8.8	9.5
Number of Insectivore species	7.5	6.8	8.3	7.5	8.3	7.5	7.5	2.3	2.3	3.0
Hill's Evenness Index	7.6	6.6	6.7	7.0	9.3	6.4	9.9	4.5	4.5	3.7
Insectivore biomass	3.1	2.1	2.9	2.2	4.7	5.1	4.3	3.9	5.3	5.0
Omnivore biomass	5.6	2.4	2.7	1.4	6.3	6.2	7.4	7.8	8.1	9.0
Piscivore biomass	5.3	3.7	3.5	3.0	4.9	4.7	5.9	6.4	5.8	6.5
Proportion lithophilic spawners	5.0	7.4	6.8	6.7	6.0	7.5	5.9	9.1	9.2	9.2
CPUE	3.3	3.4	4.6	2.1	3.3	3.8	3.3	6.8	5.0	6.7
% individuals with DELTS	3.2	3.9	4.6	3.9	5.0	5.0	4.3	4.8	4.7	5.0
Total IBI	65.8	56.0	64.5	55.8	73.2	71.5	73.9	61.8	61.3	65.8

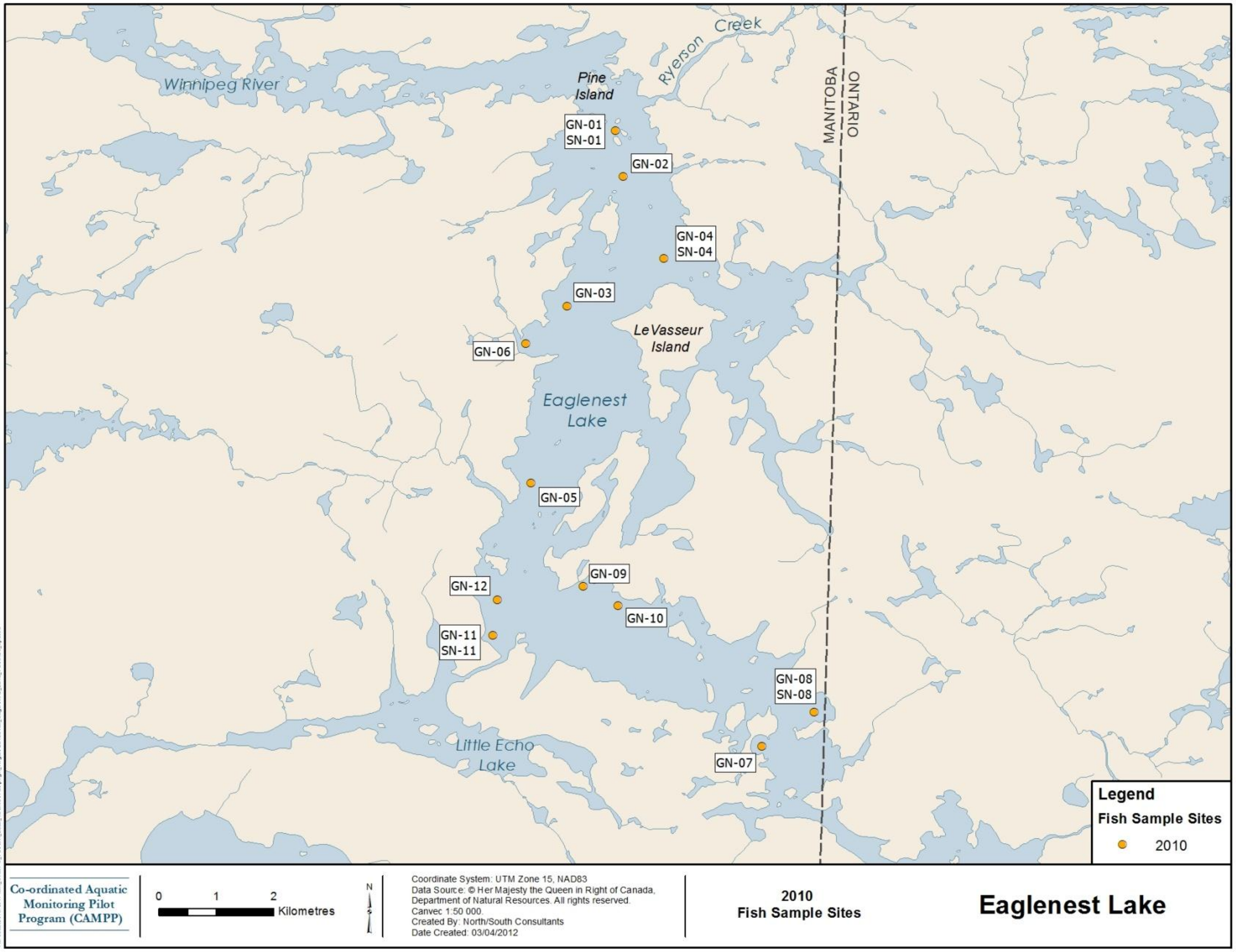


Figure 5.1.7-1. Map depicting standard gang and small mesh index gillnet sites sampled in Eaglenest Lake, 2010.

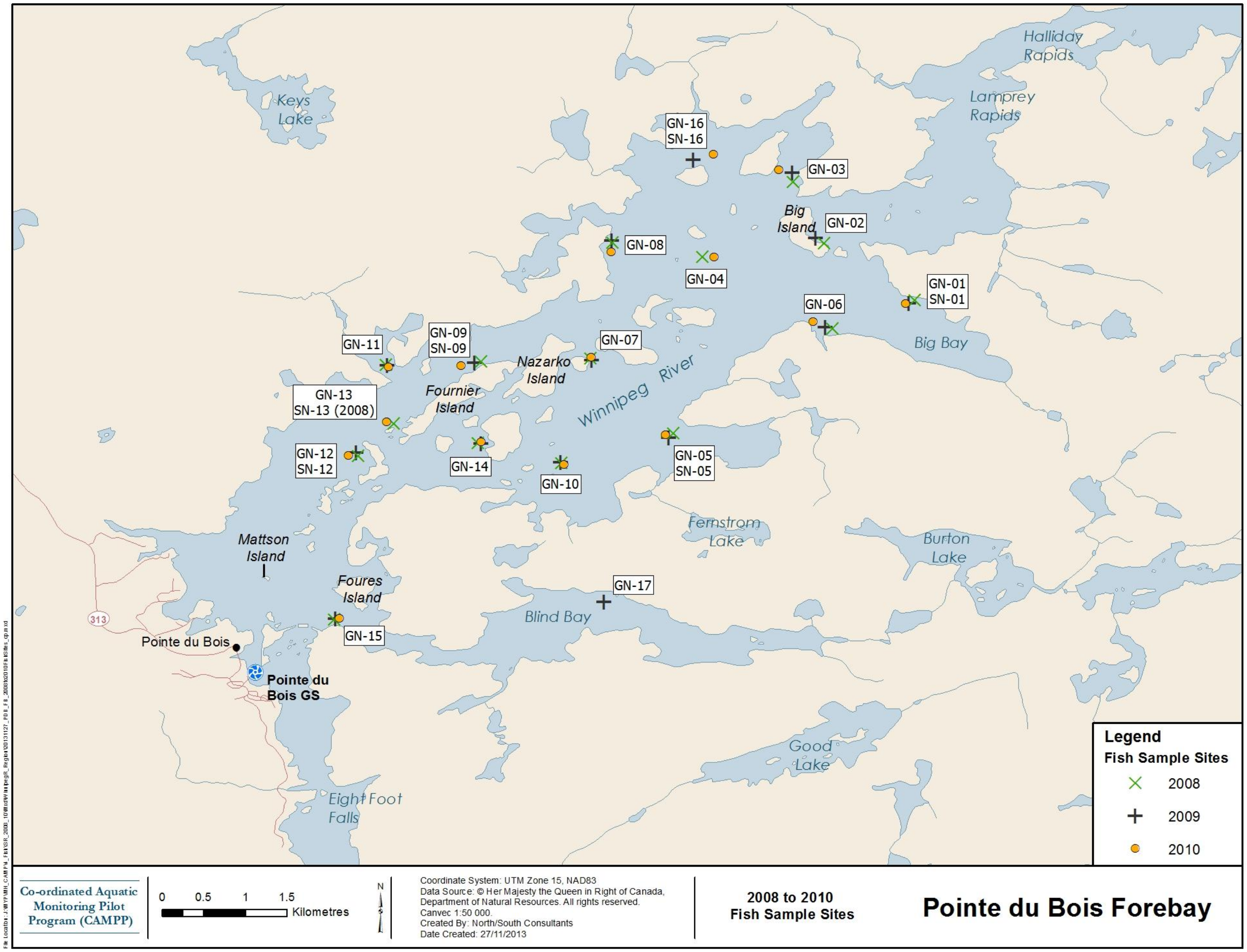


Figure 5.1.7-2. Map depicting standard gang and small mesh index gillnet sites sampled in Pointe du Bois Forebay, 2008-2010.

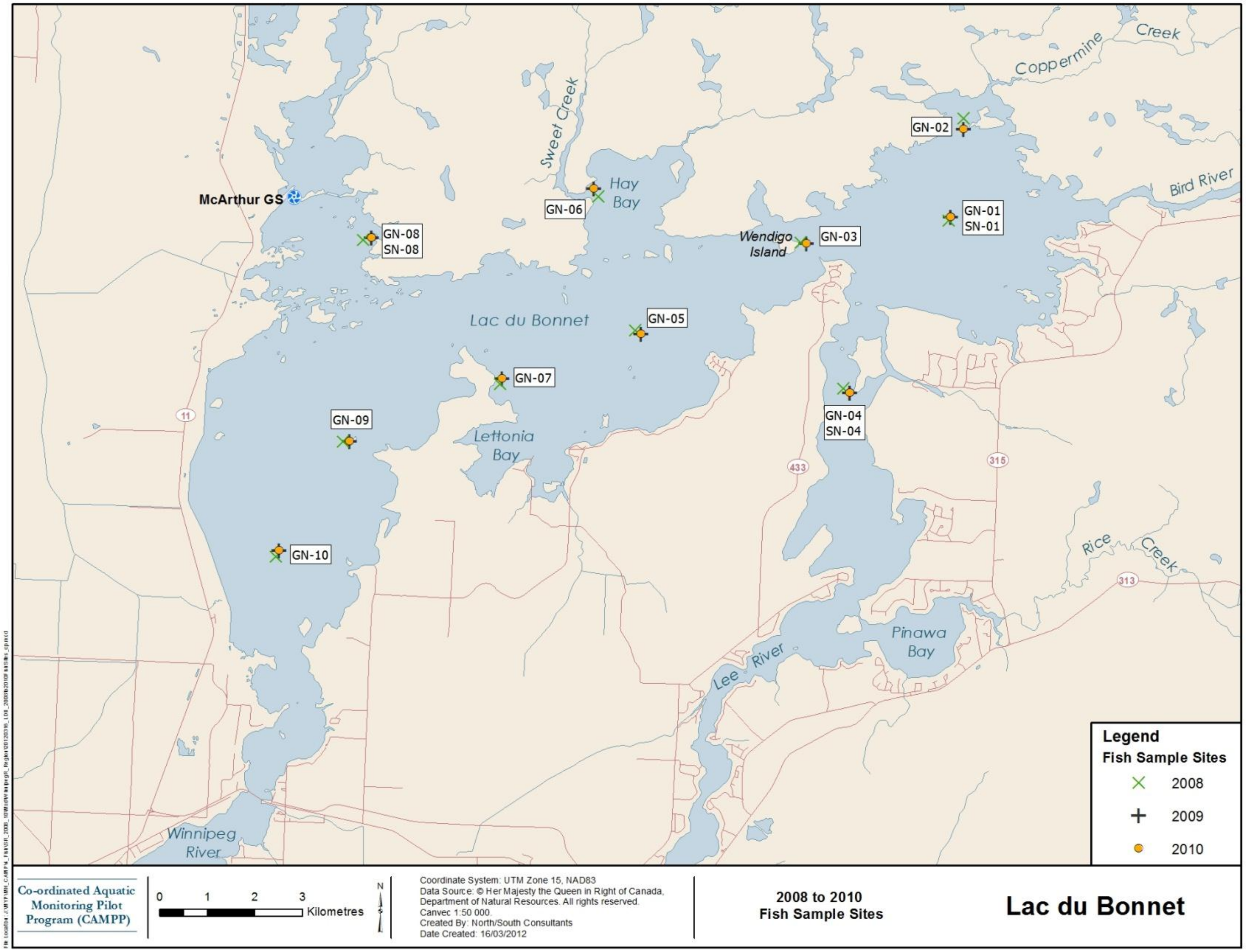


Figure 5.1.7-3. Map depicting standard gang and small mesh index gillnet sites sampled in Lac du Bonnet, 2008-2010.

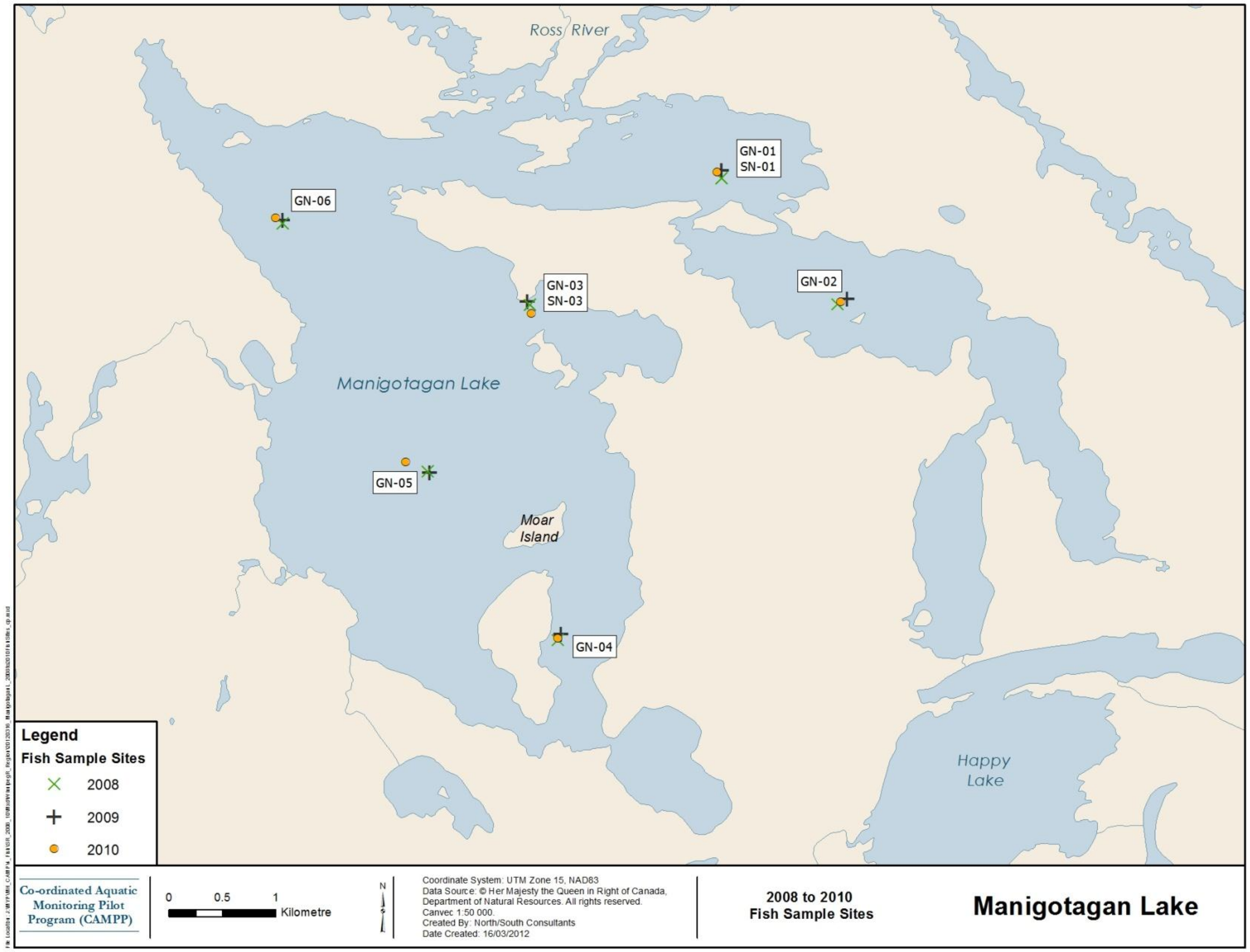


Figure 5.1.7-4. Map depicting standard gang and small mesh index gillnet sites sampled in Manigotagan Lake, 2008-2010.

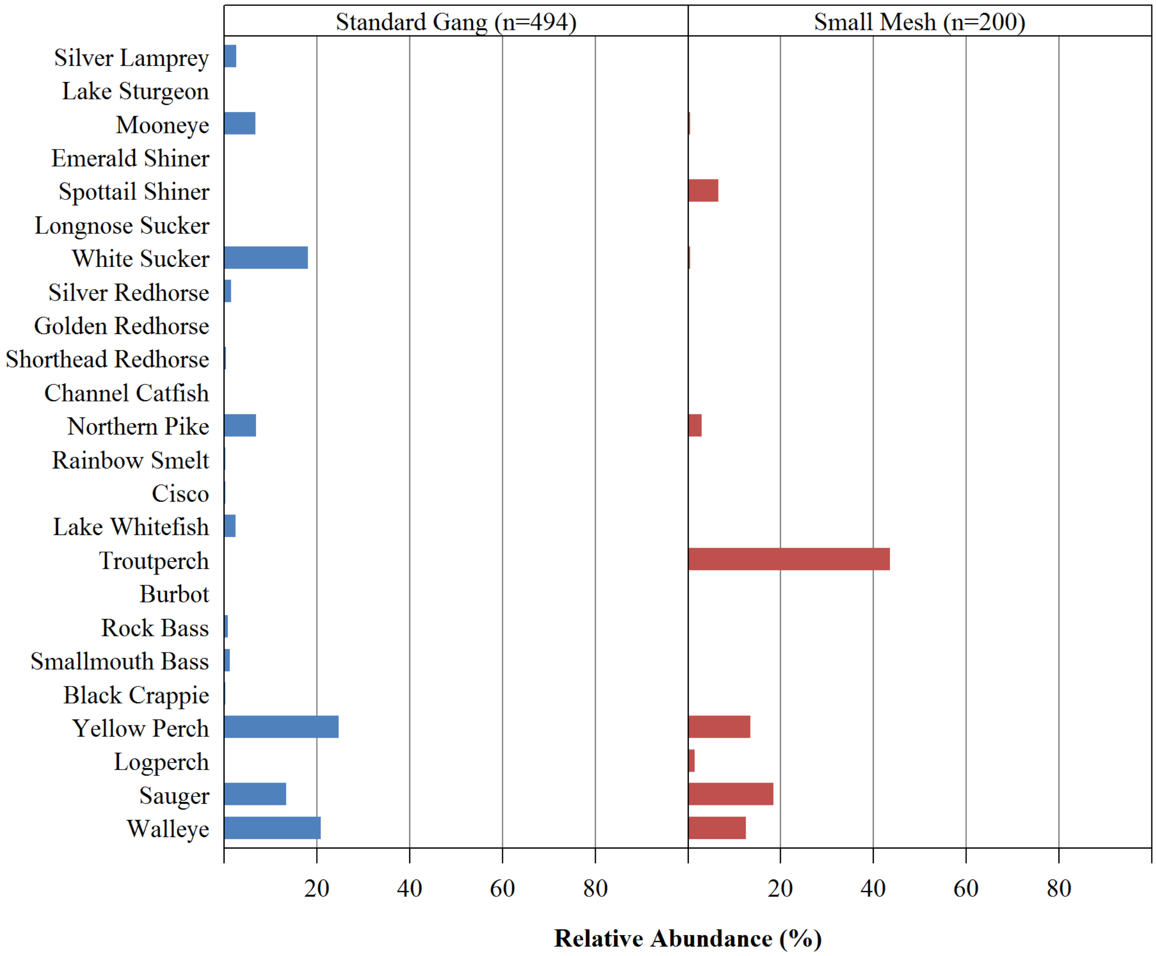


Figure 5.1.7-5. Relative abundance (%) distribution for fish species captured in standard gang and small mesh index gill nets set in Eaglenest Lake, 2010.

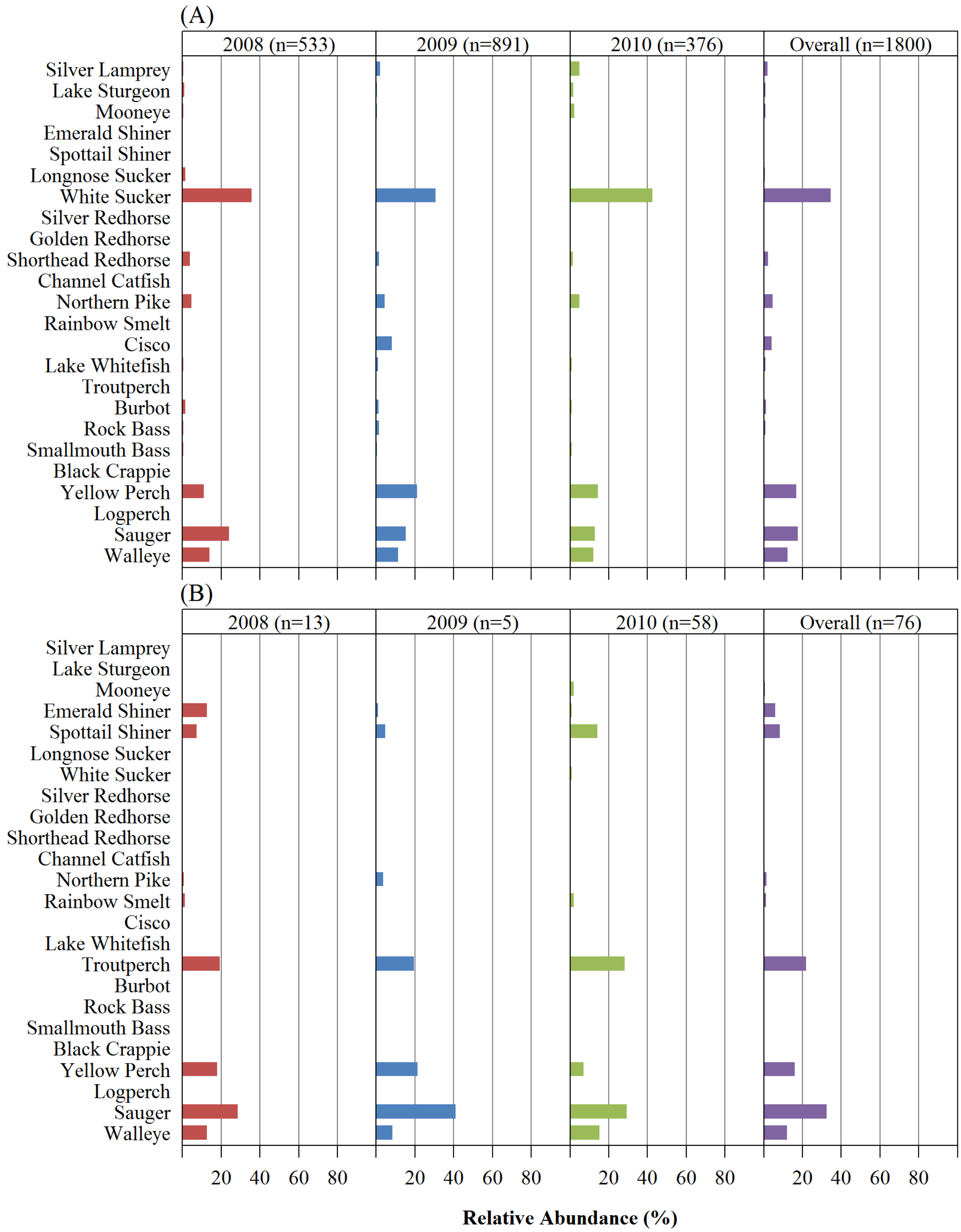


Figure 5.1.7-6. Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in Pointe du Bois Forebay, 2008-2010 (and overall).

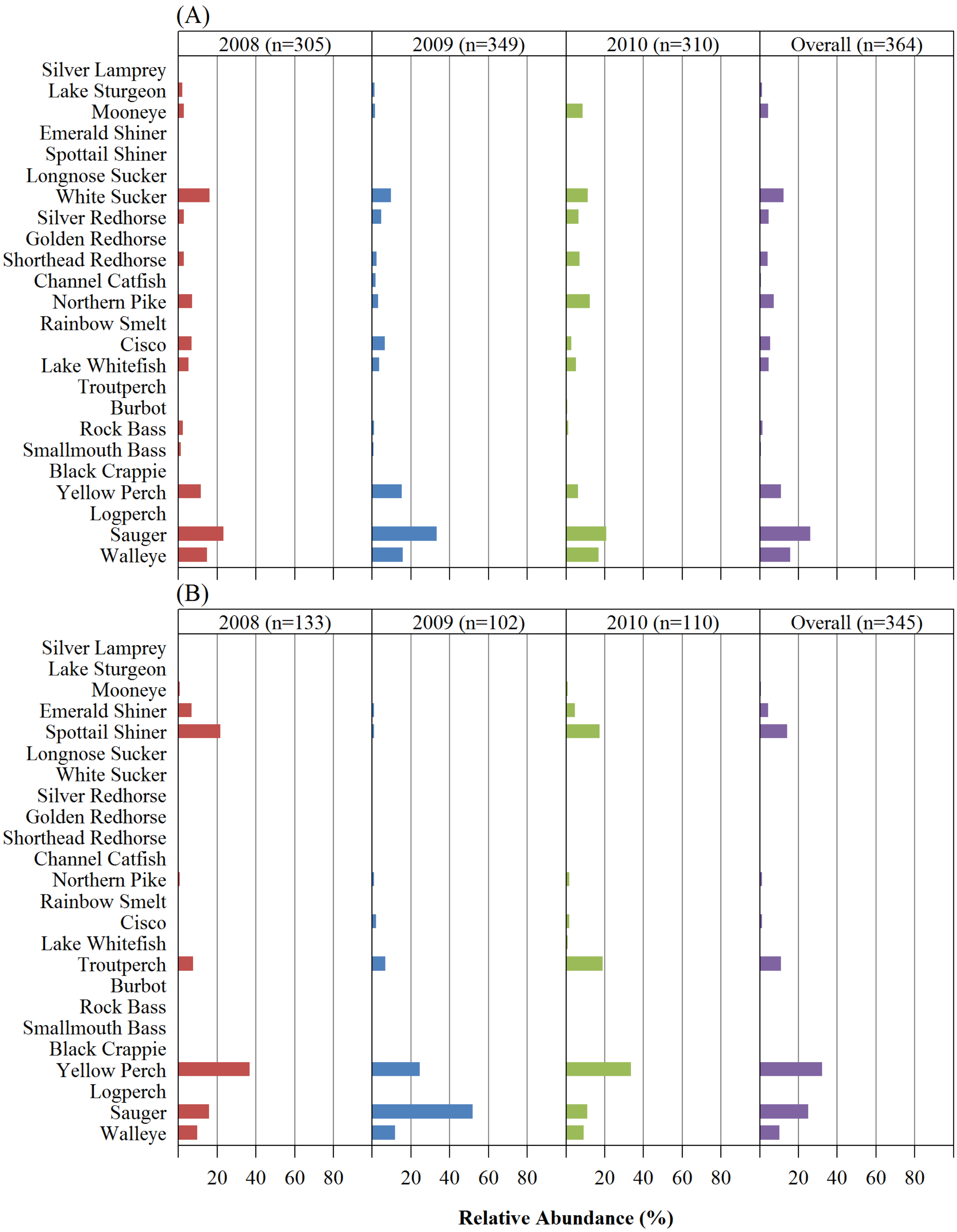


Figure 5.1.7-7. Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in Lac du Bonnet, 2008-2010 (and overall).

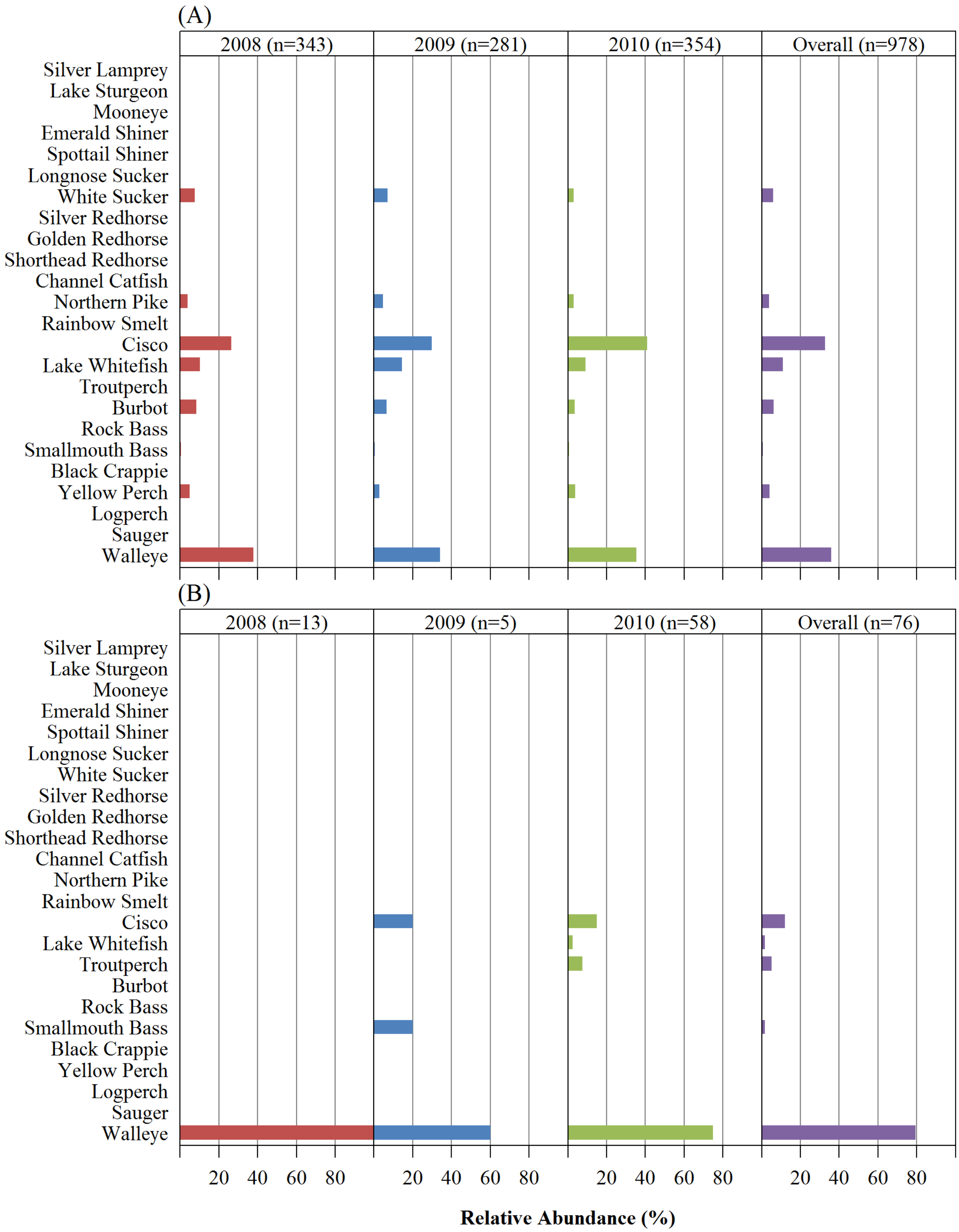


Figure 5.1.7-8. Relative abundance (%) distribution for fish species captured in (A) standard gang and (B) small mesh index gill nets set in Manigotagan Lake, 2008-2010 (and overall).

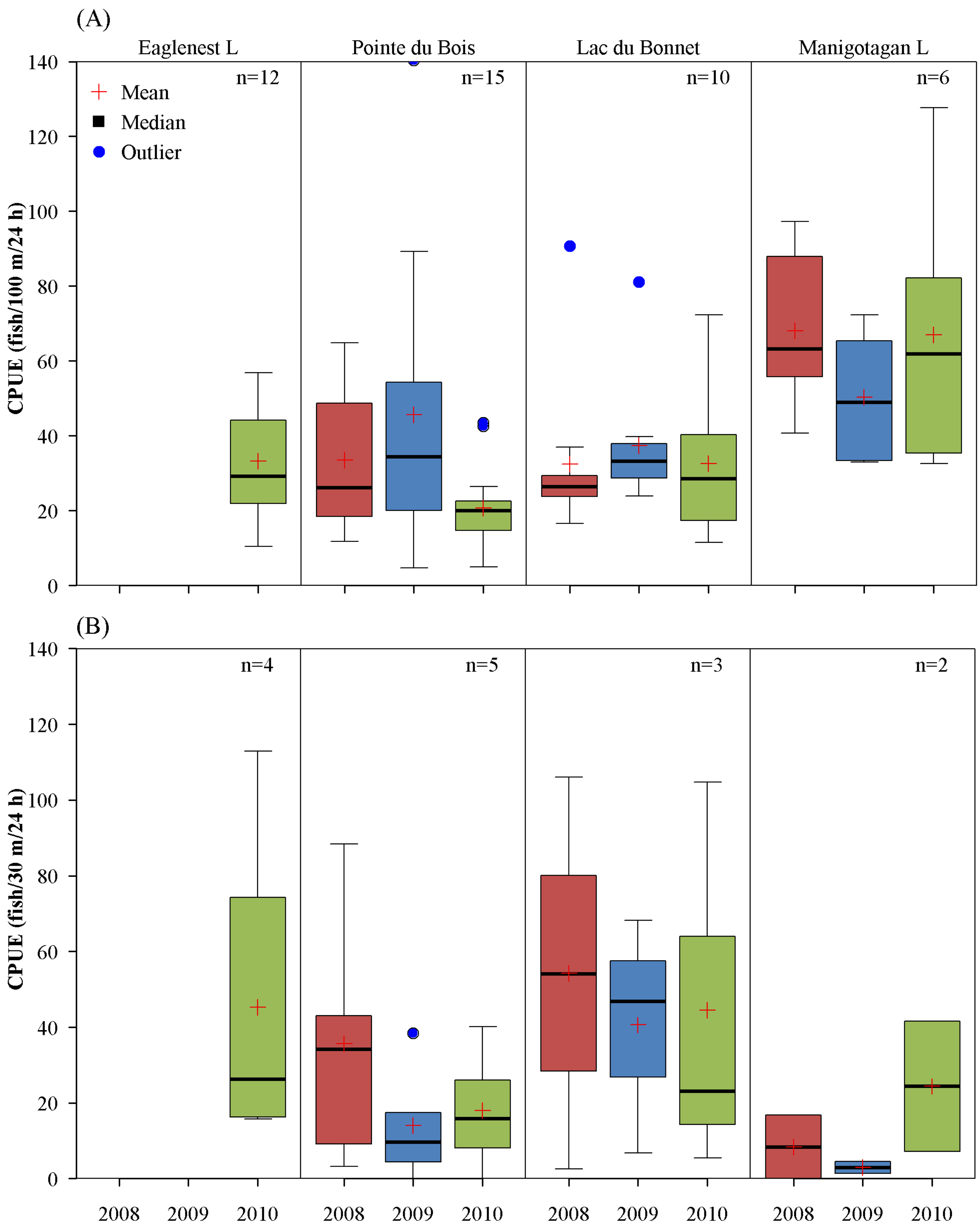


Figure 5.1.7-9. Mean and median (range) total CPUE per site calculated for fish captured in (A) standard gang and (B) small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

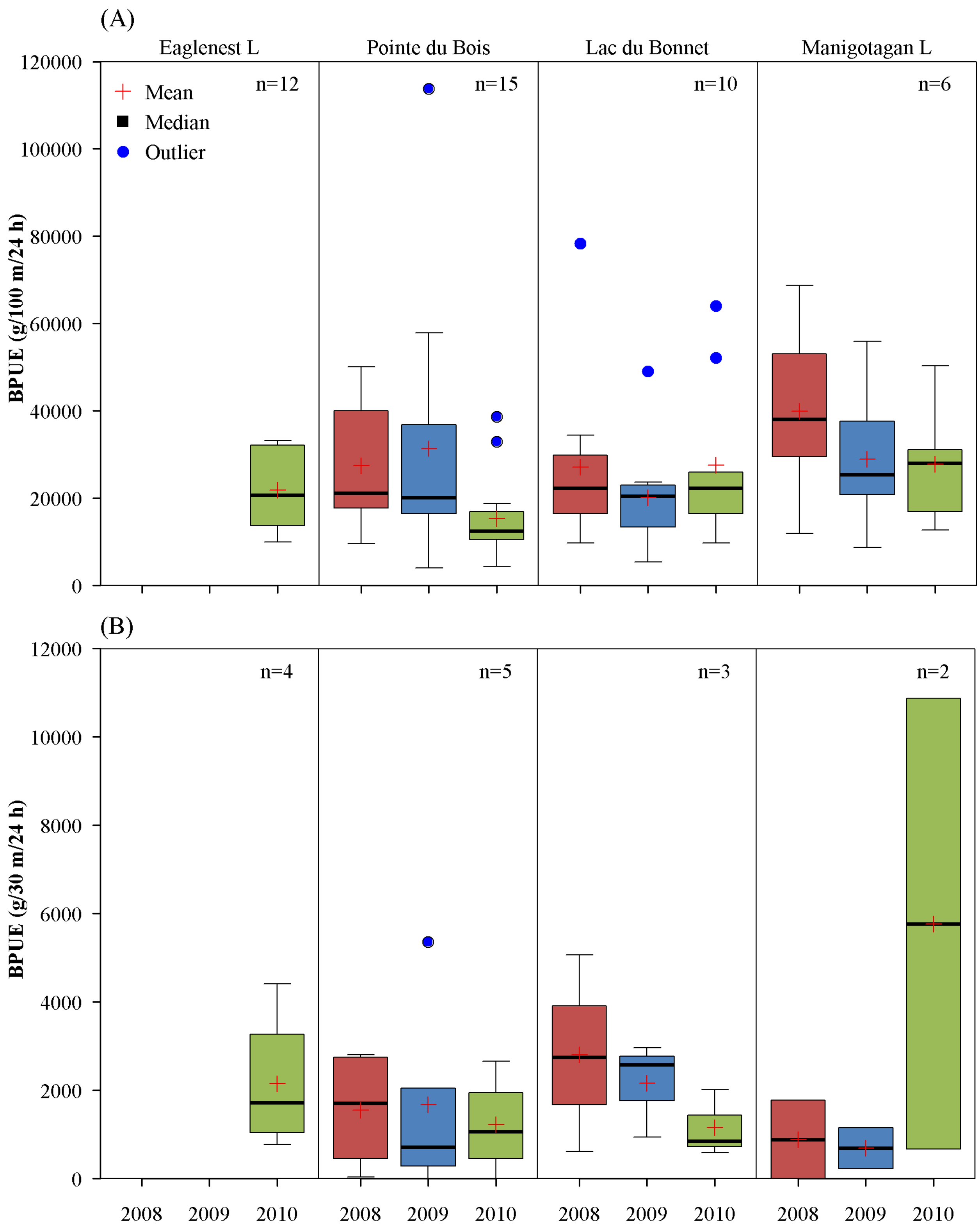


Figure 5.1.7-10. Mean and median total BPUE per site calculated for fish captured in (A) standard gang and (B) small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

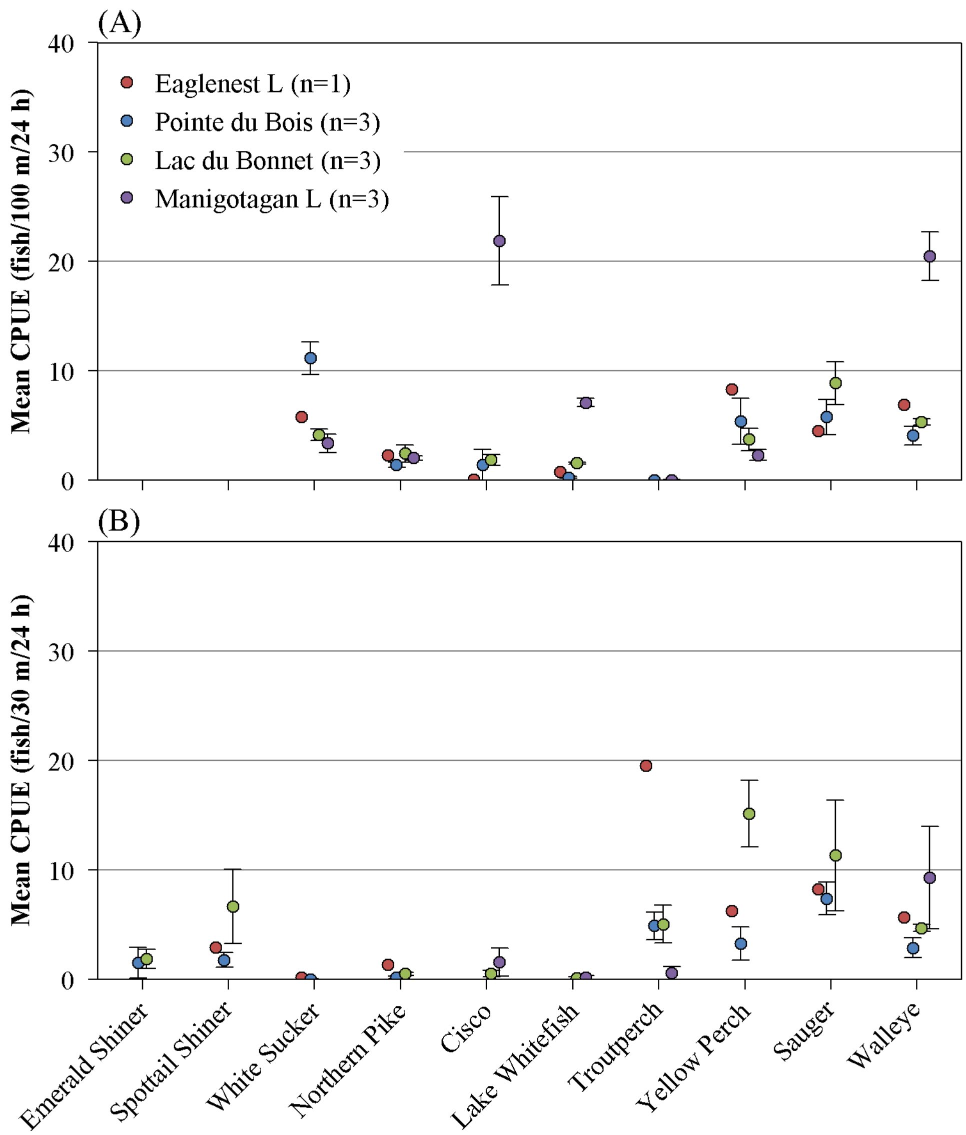


Figure 5.1.7-11. Mean (SE) overall CPUE per year calculated for a subset of fish species captured in (A) standard gang and (B) small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

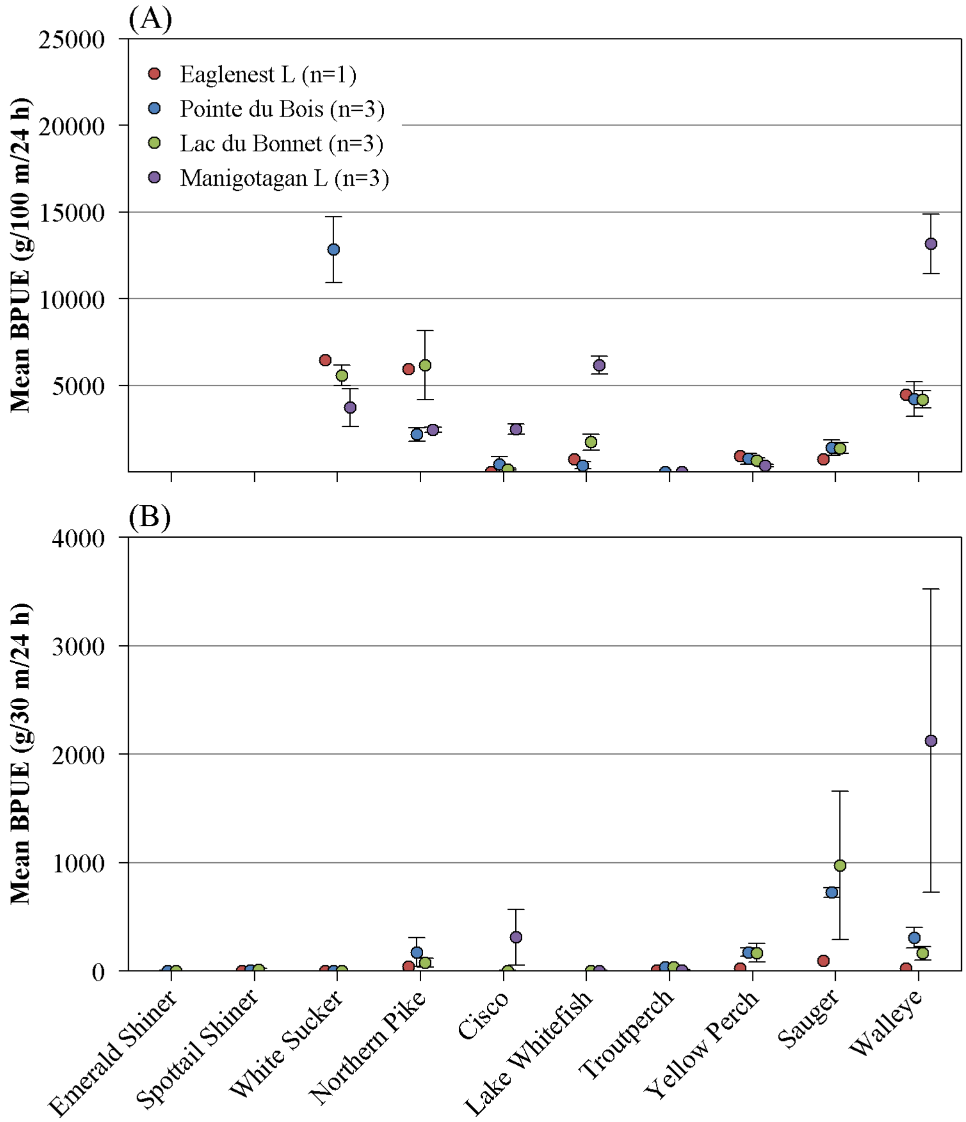


Figure 5.1.7-12. Mean (SE) overall BPUE per year calculated for a subset of fish species captured in (A) standard gang and (B) small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

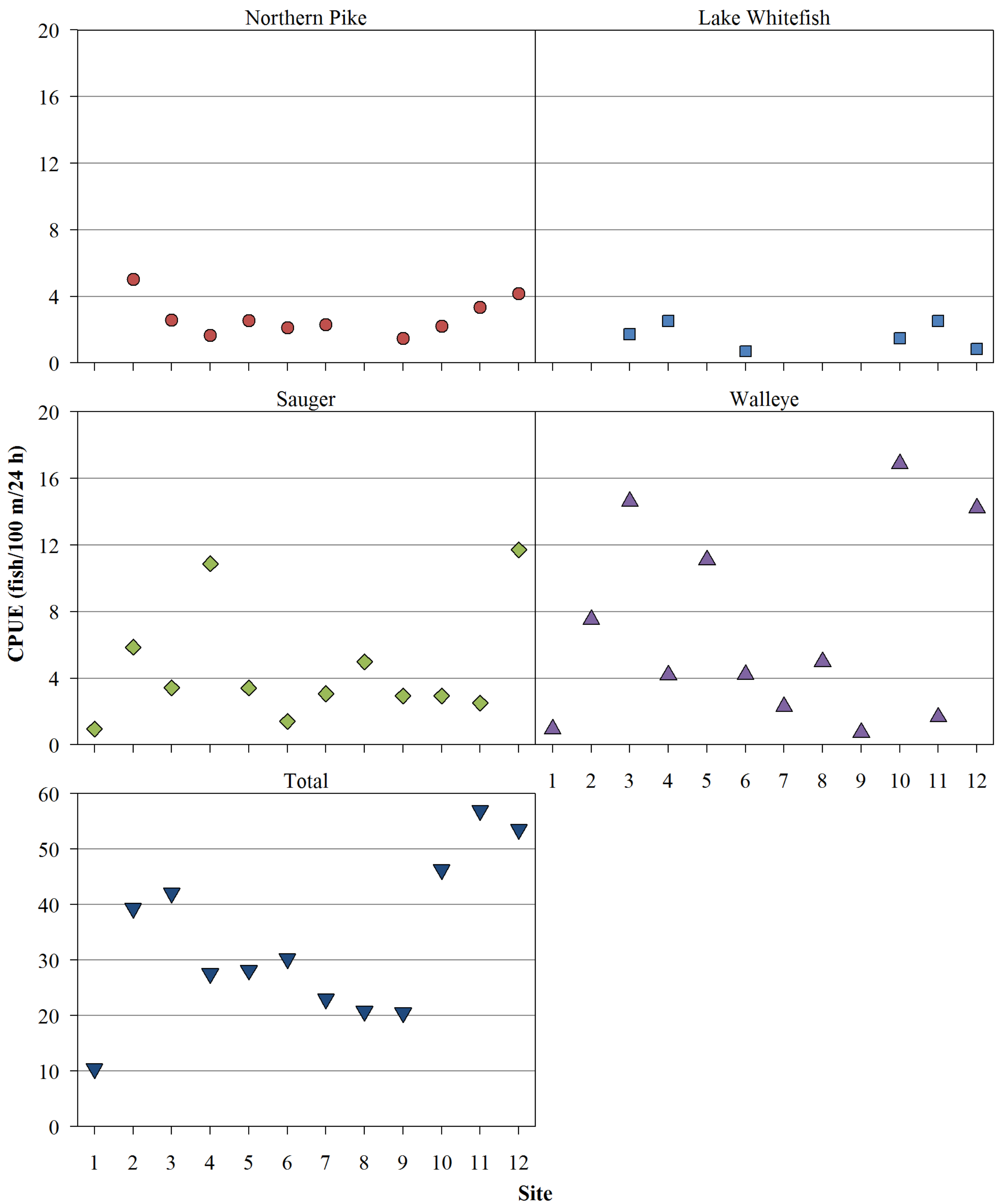


Figure 5.1.7-13. Northern Pike, Lake Whitefish, Sauger, Walleye, and Total CPUE calculated for each standard gang index gill net site surveyed in Eaglenest Lake, 2010.

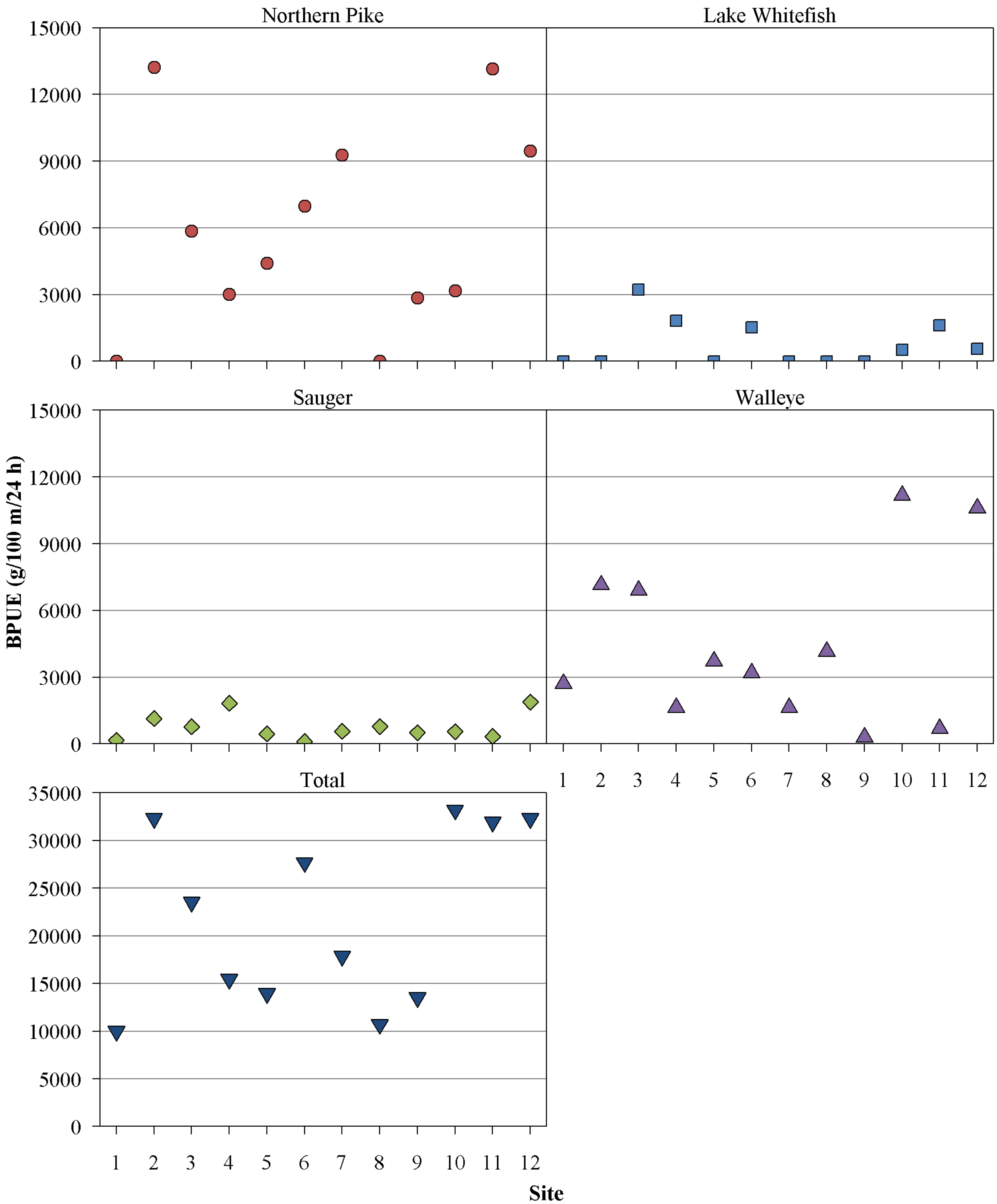


Figure 5.1.7-14. Northern Pike, Lake Whitefish, Sauger, Walleye, and Total BPUE calculated for each standard gang index gill net site surveyed in Eaglenest Lake, 2008-2010.

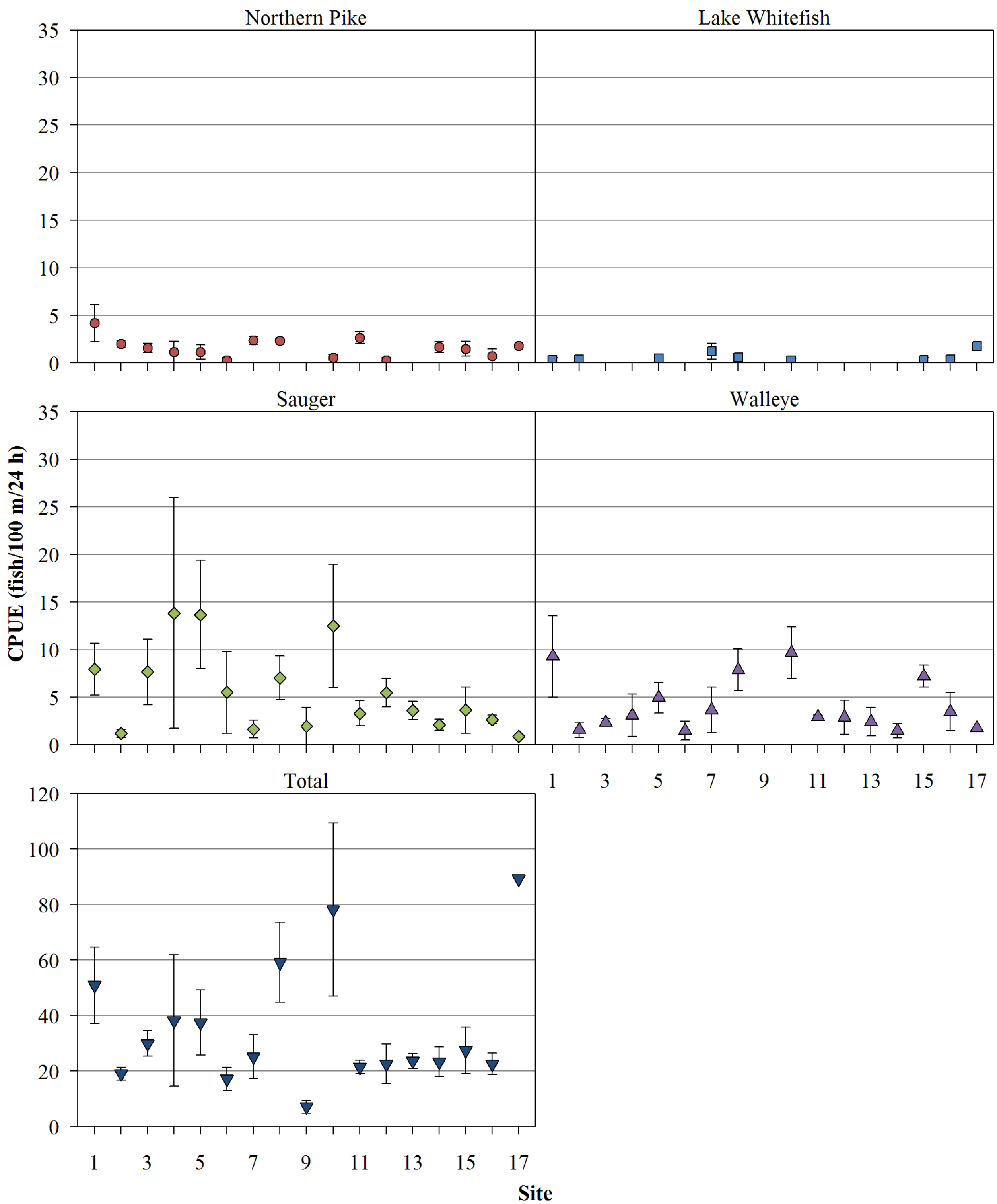


Figure 5.1.7-15. Mean (SE) overall Northern Pike, Lake Whitefish, Sauger, Walleye, and Total CPUE calculated for each standard gang index gill net site surveyed in Pointe du Bois Forebay, 2008-2010.

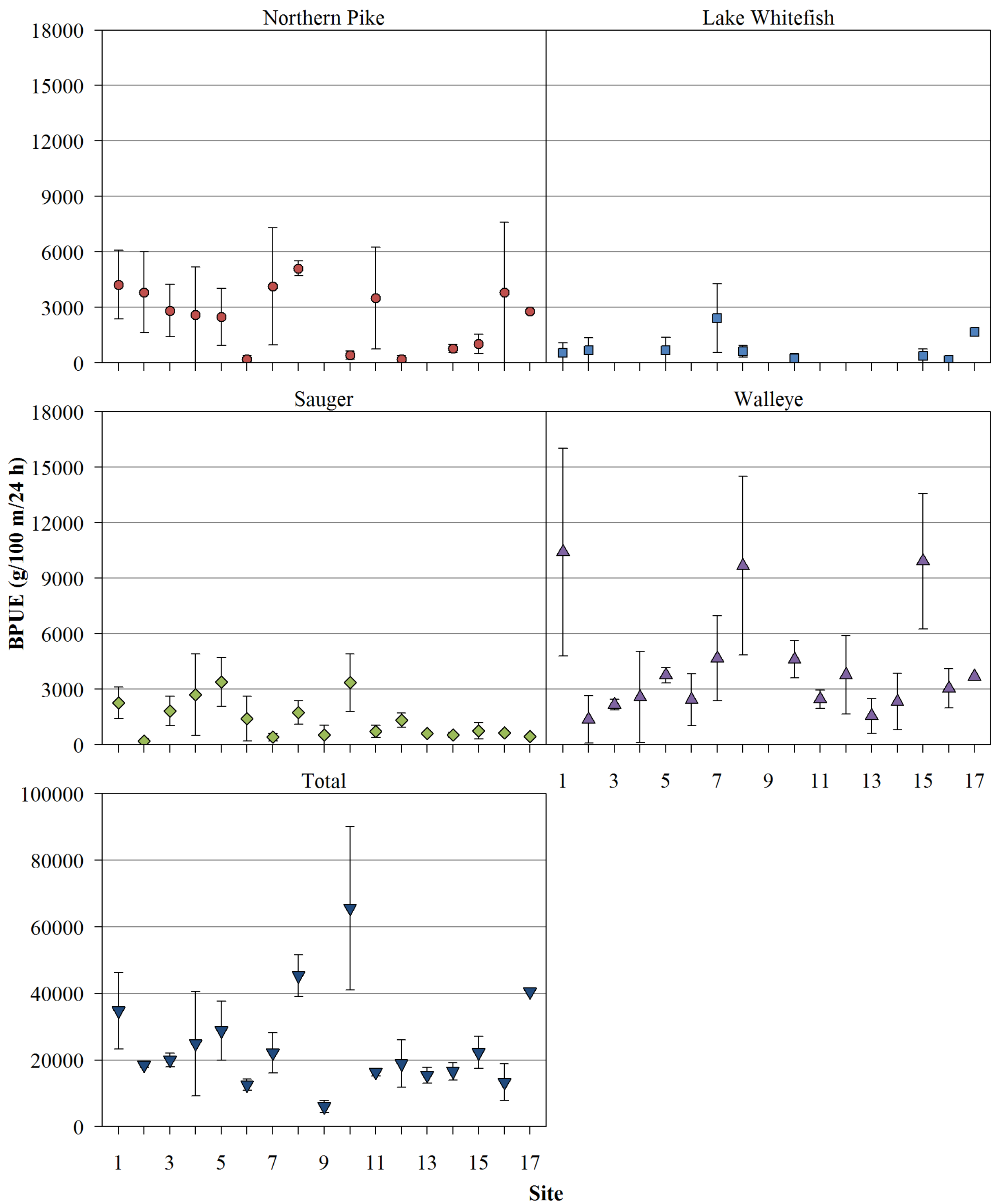


Figure 5.1.7-16. Mean (SE) overall Northern Pike, Lake Whitefish, Sauger, Walleye, and Total BPUE summarized by standard gang index gill net sites surveyed in Pointe du Bois Forebay, 2008-2010.

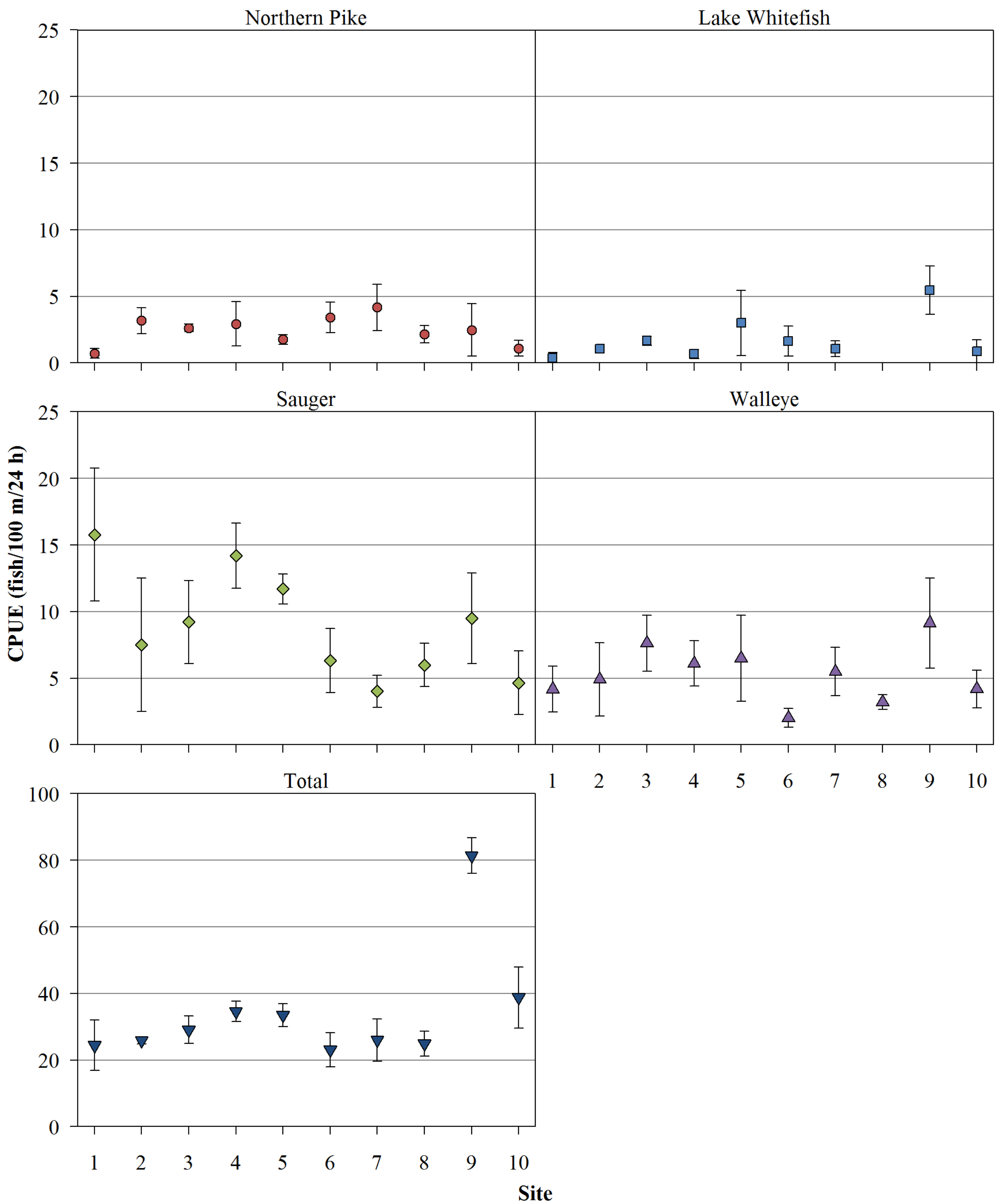


Figure 5.1.7-17. Mean (SE) overall Northern Pike, Lake Whitefish, Sauger, Walleye, and Total CPUE summarized by standard gang index gill net sites surveyed in Lac du Bonnet, 2008-2010.

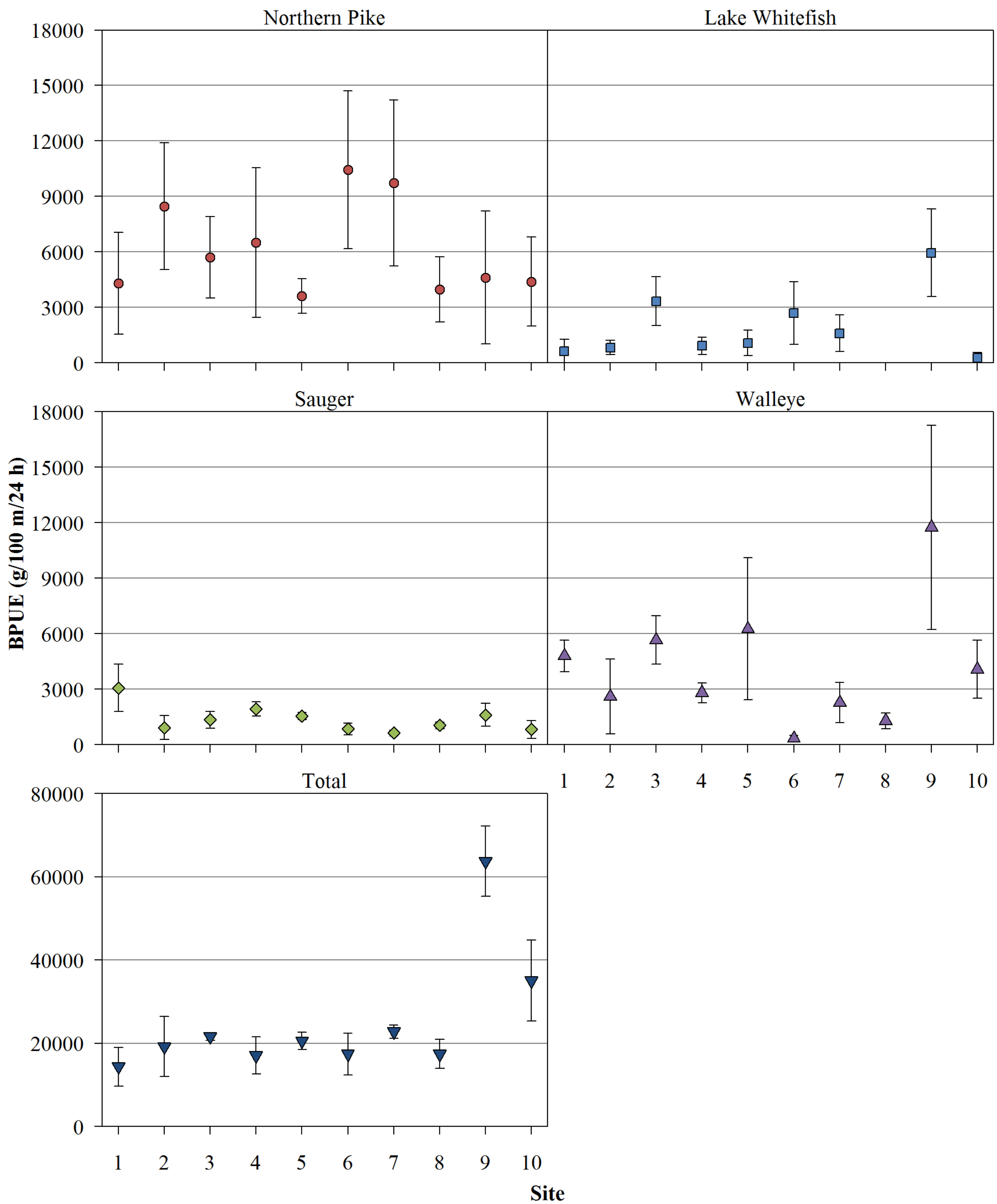


Figure 5.1.7-18. Mean (SE) overall Northern Pike, Lake Whitefish, Sauger, Walleye, and Total BPUE summarized by standard gang index gill net sites surveyed in Lac du Bonnet, 2008-2010.

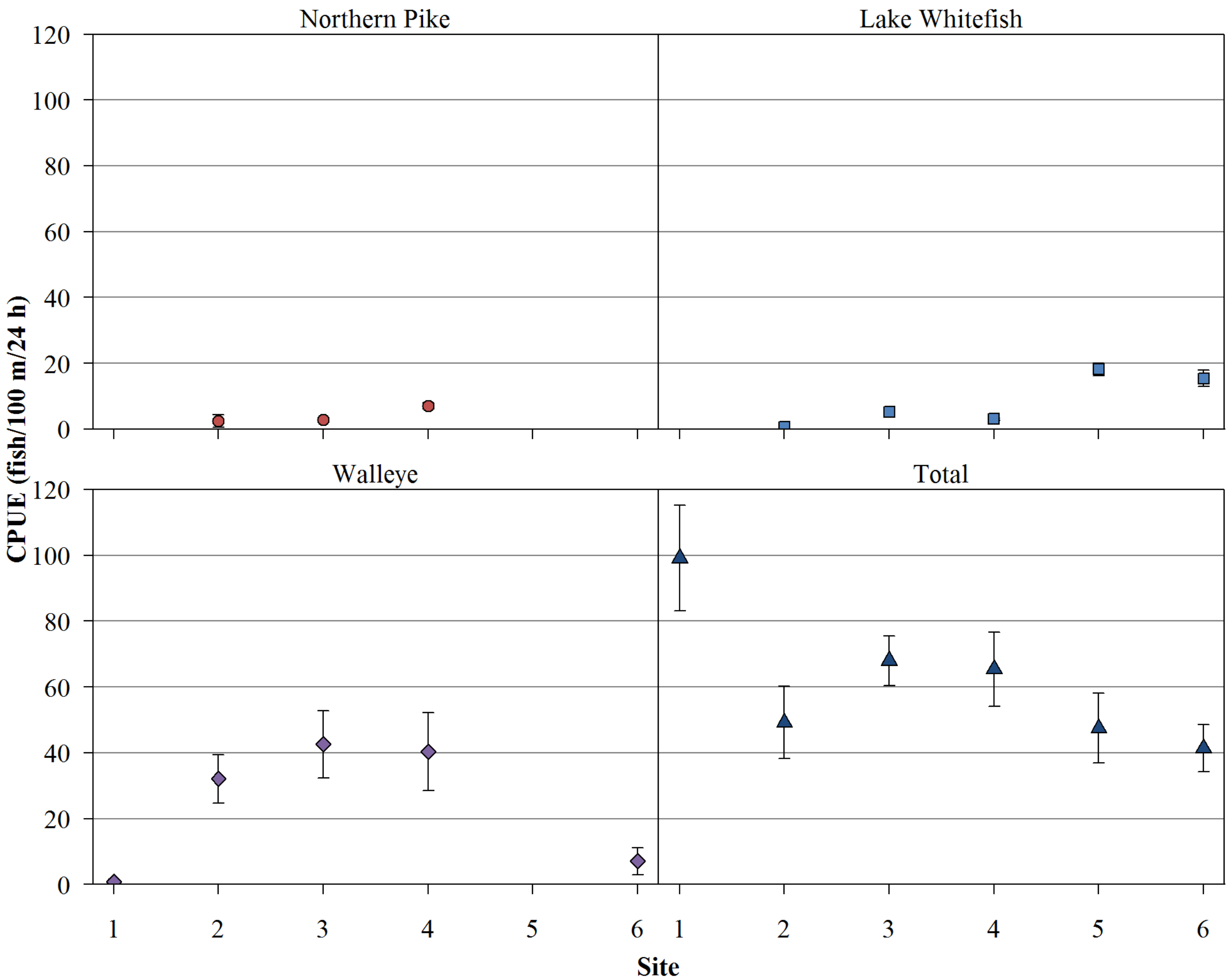


Figure 5.1.7-19. Mean (SE) overall Northern Pike, Lake Whitefish, Sauger, Walleye, and Total CPUE summarized by standard gang index gill net sites surveyed in Manigotagan Lake, 2008-2010.

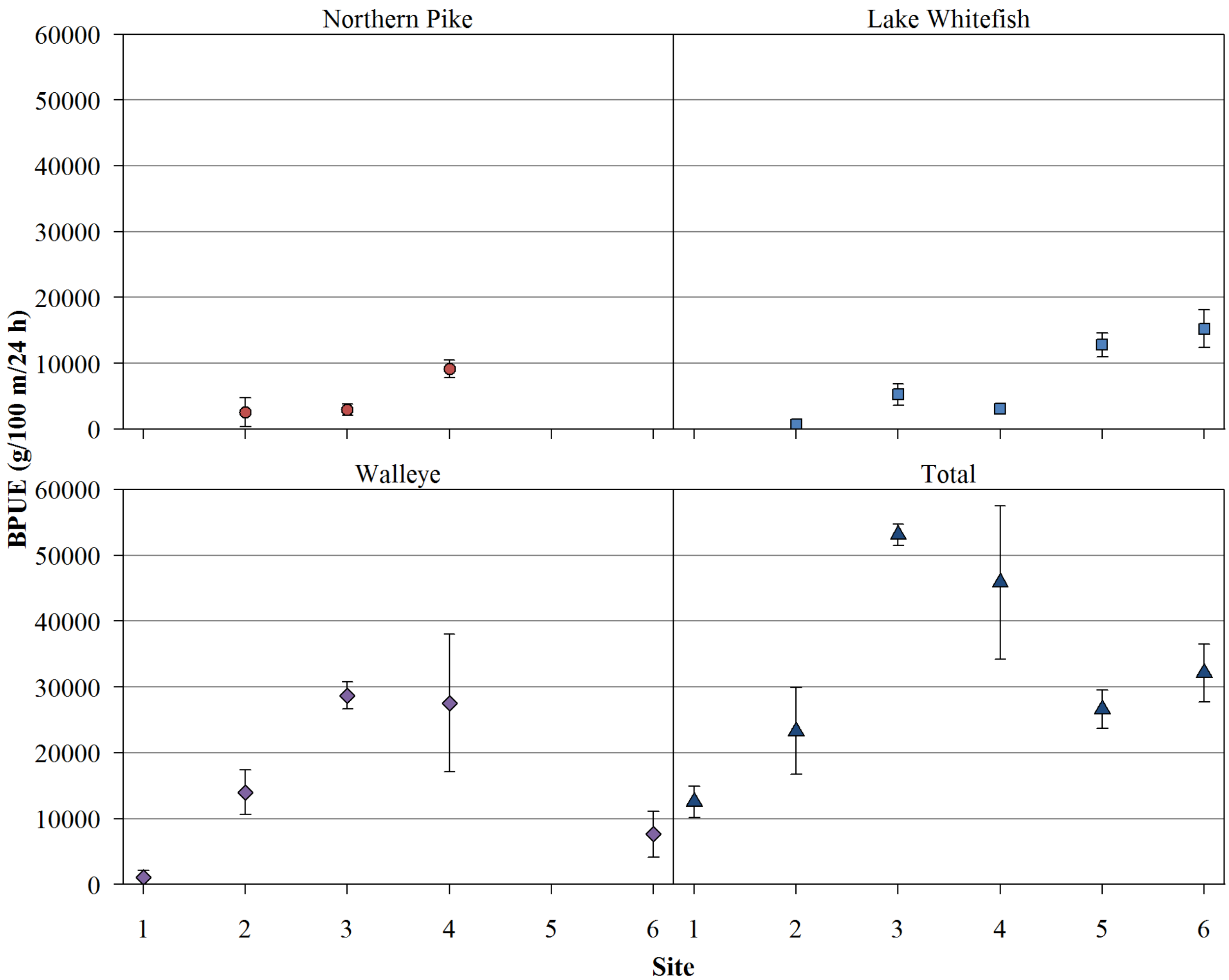


Figure 5.1.7-20. Mean (SE) overall Northern Pike, Lake Whitefish, Sauger, Walleye, and Total BPUE summarized by standard gang index gill net sites surveyed in Manigotagan Lake, 2008-2010.

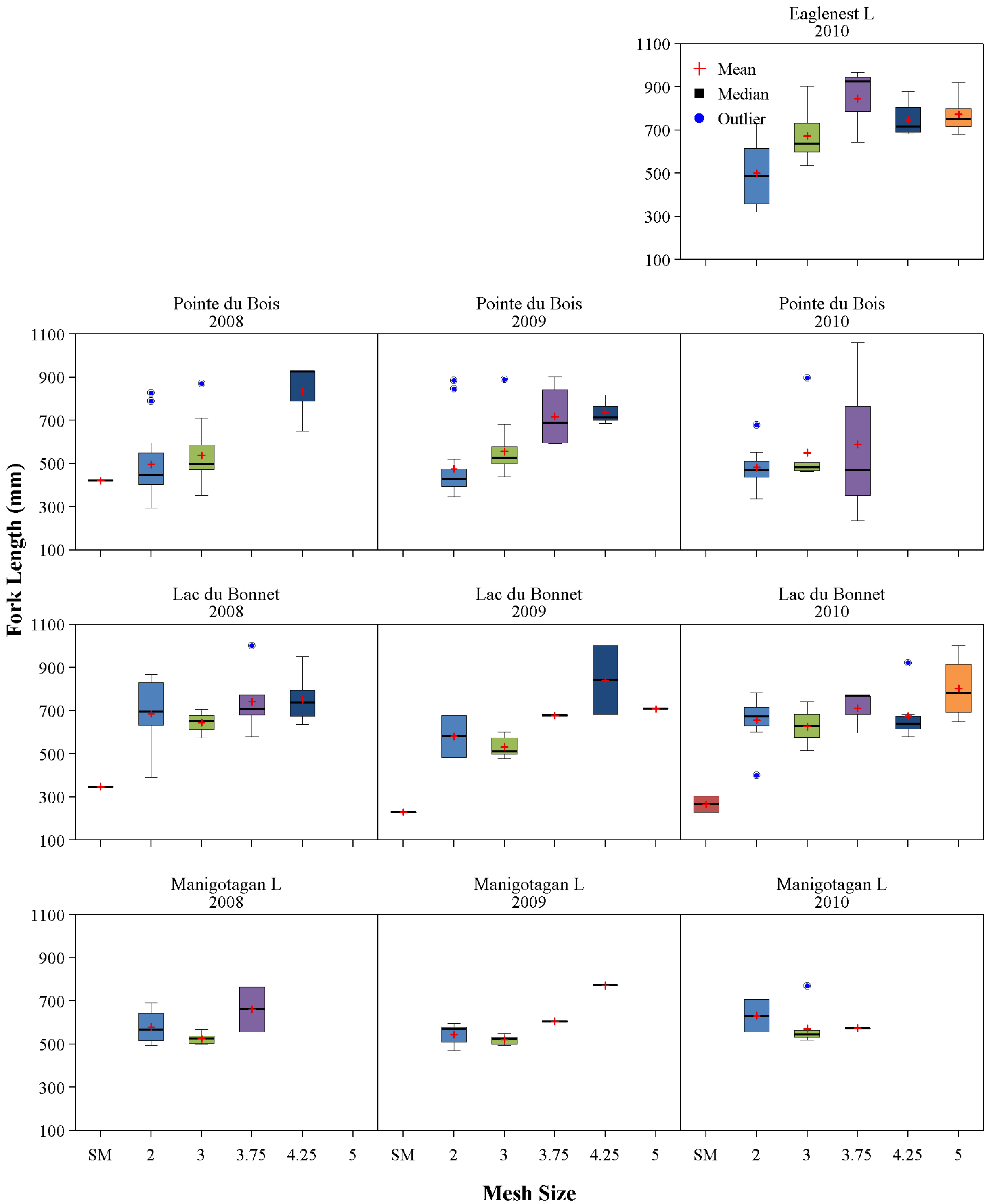


Figure 5.1.7-21. Mean and median (range) fork length (mm) per mesh size calculated for Northern Pike captured in standard gang and small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

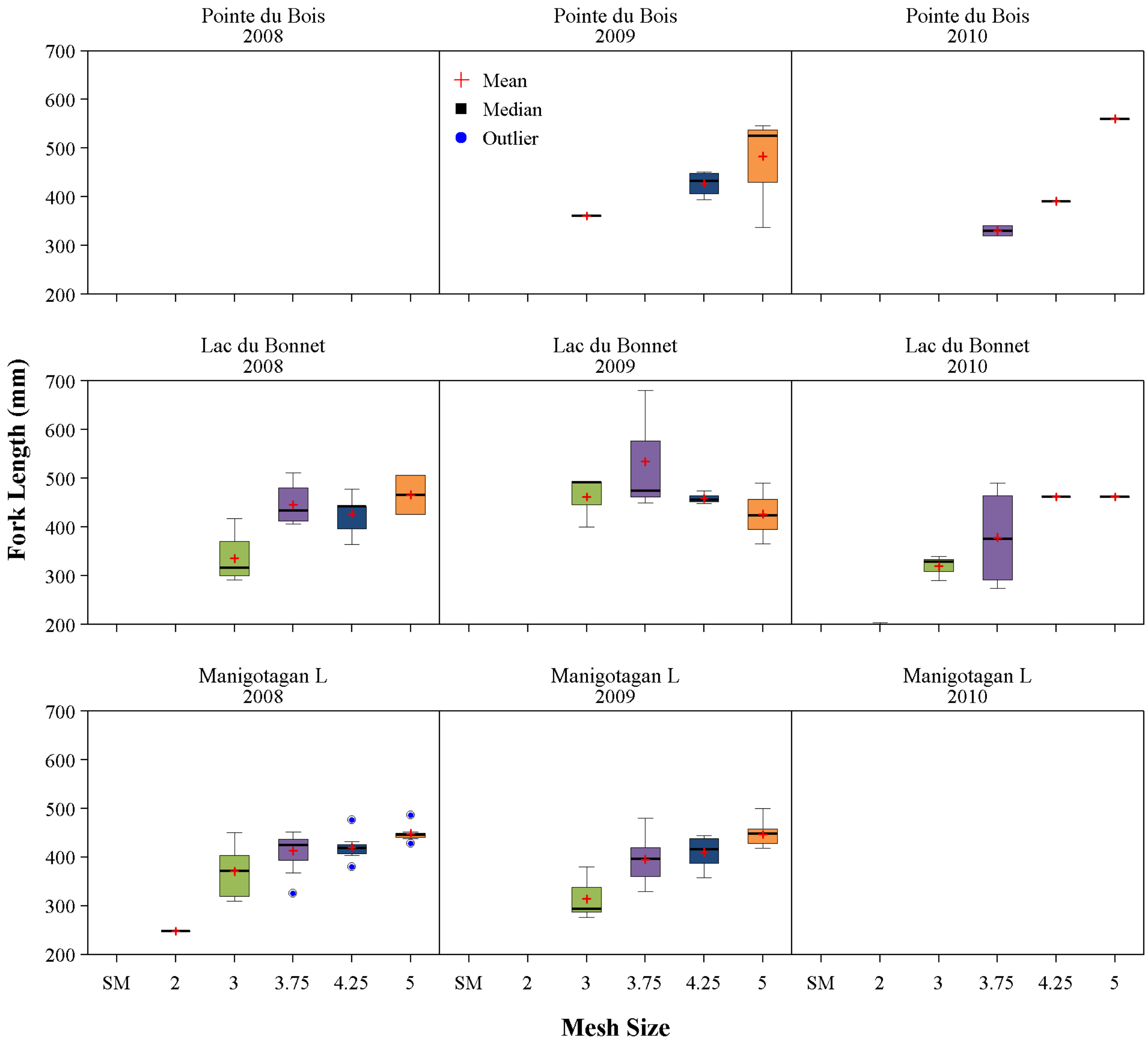


Figure 5.1.7-22. Mean and median (range) fork length (mm) per mesh size calculated for Lake Whitefish captured in standard gang and small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

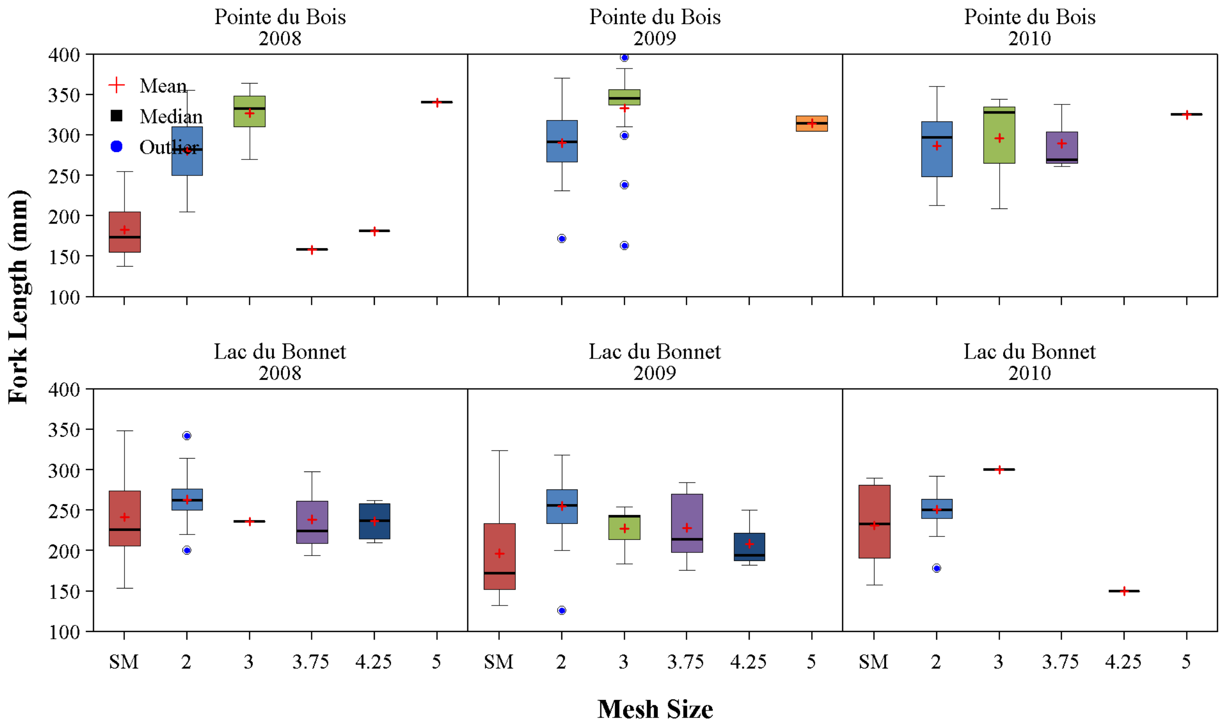


Figure 5.1.7-23. Mean and median (range) fork length (mm) per mesh size calculated for Sauger captured in standard gang and small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

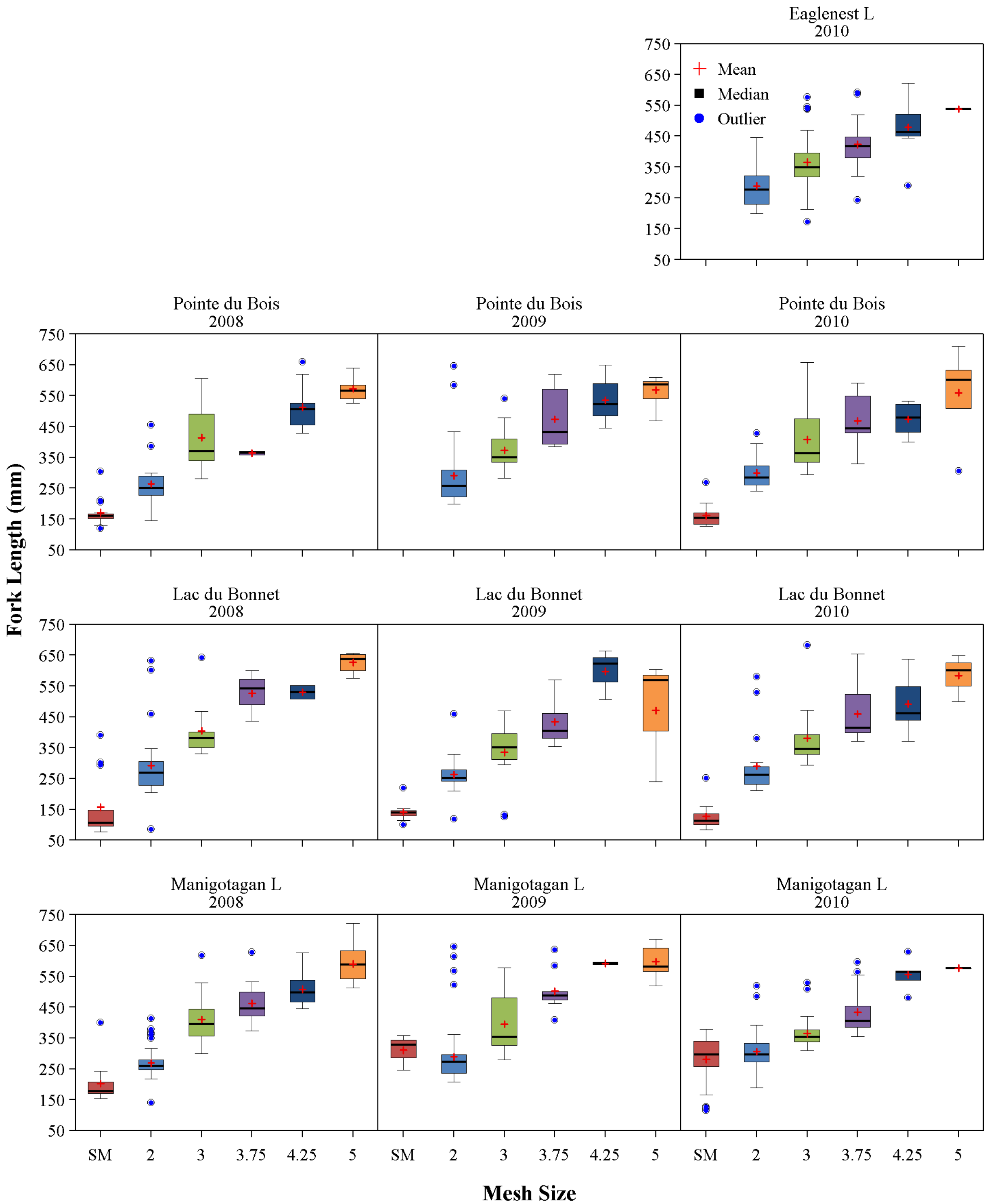


Figure 5.1.7-24. Mean and median (range) fork length (mm) per mesh size calculated for Walleye captured in standard gang and small mesh index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

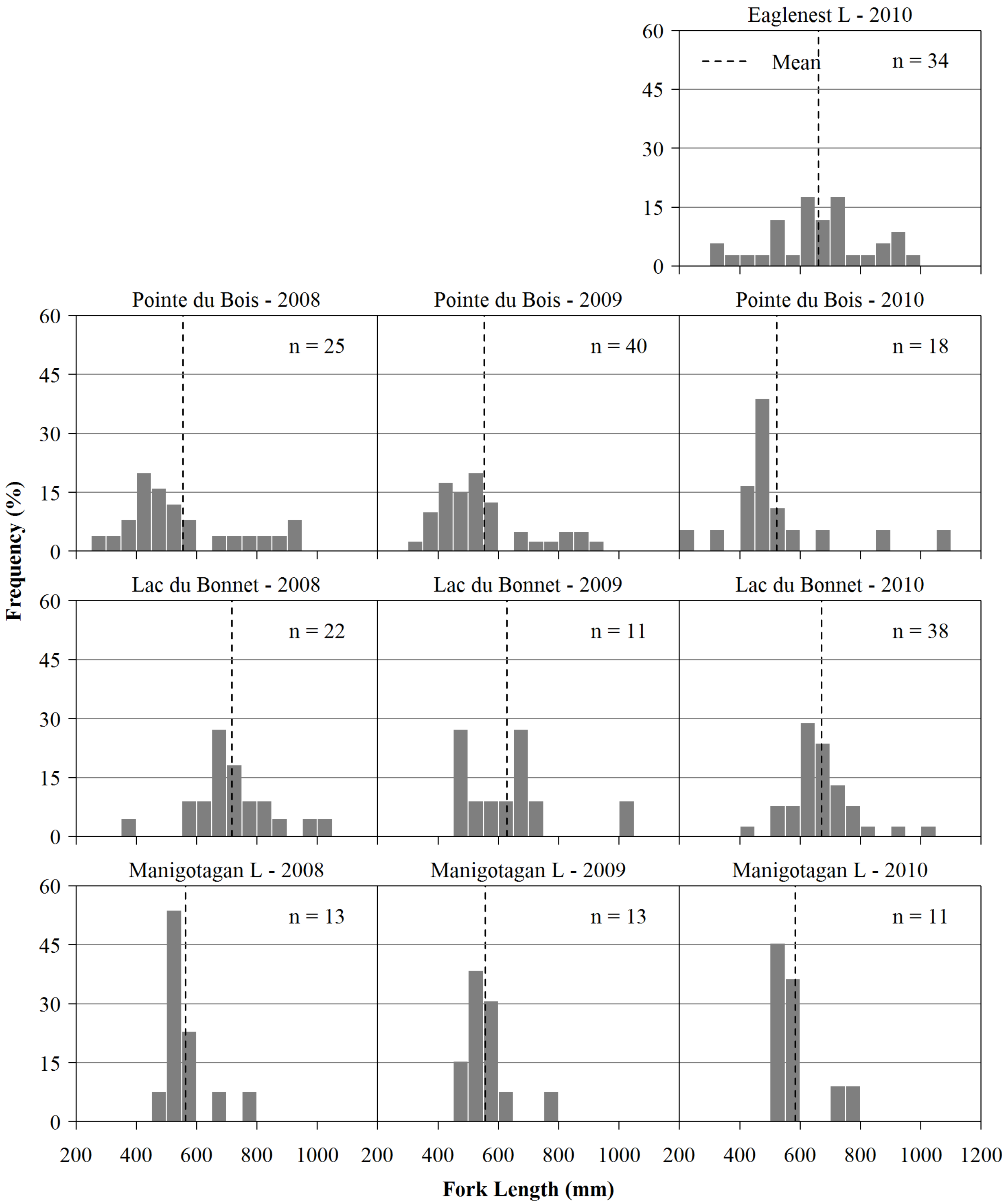


Figure 5.1.7-25. Fork length frequency histograms for Northern Pike captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

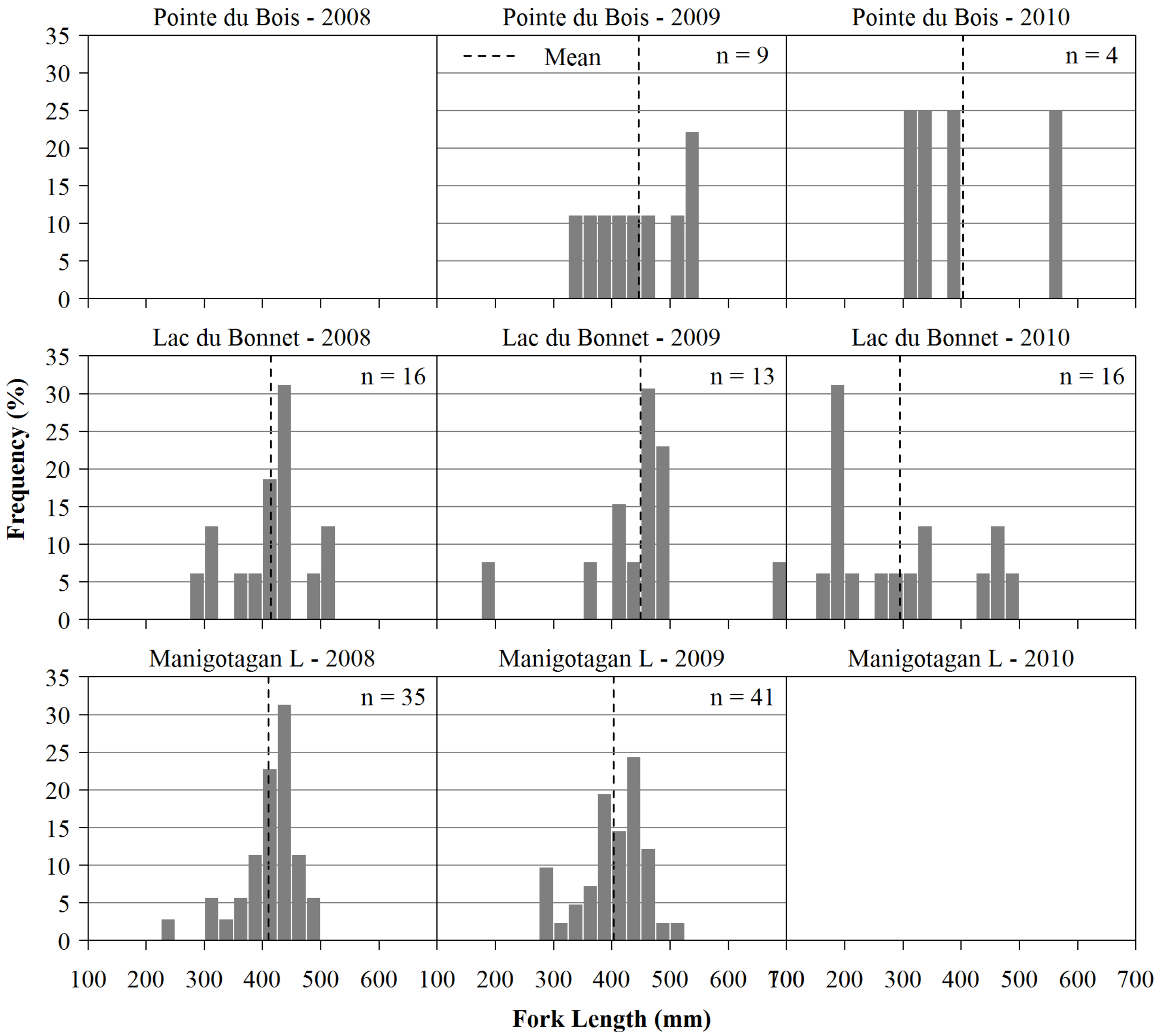


Figure 5.1.7-26. Fork length frequency histograms for Lake Whitefish captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

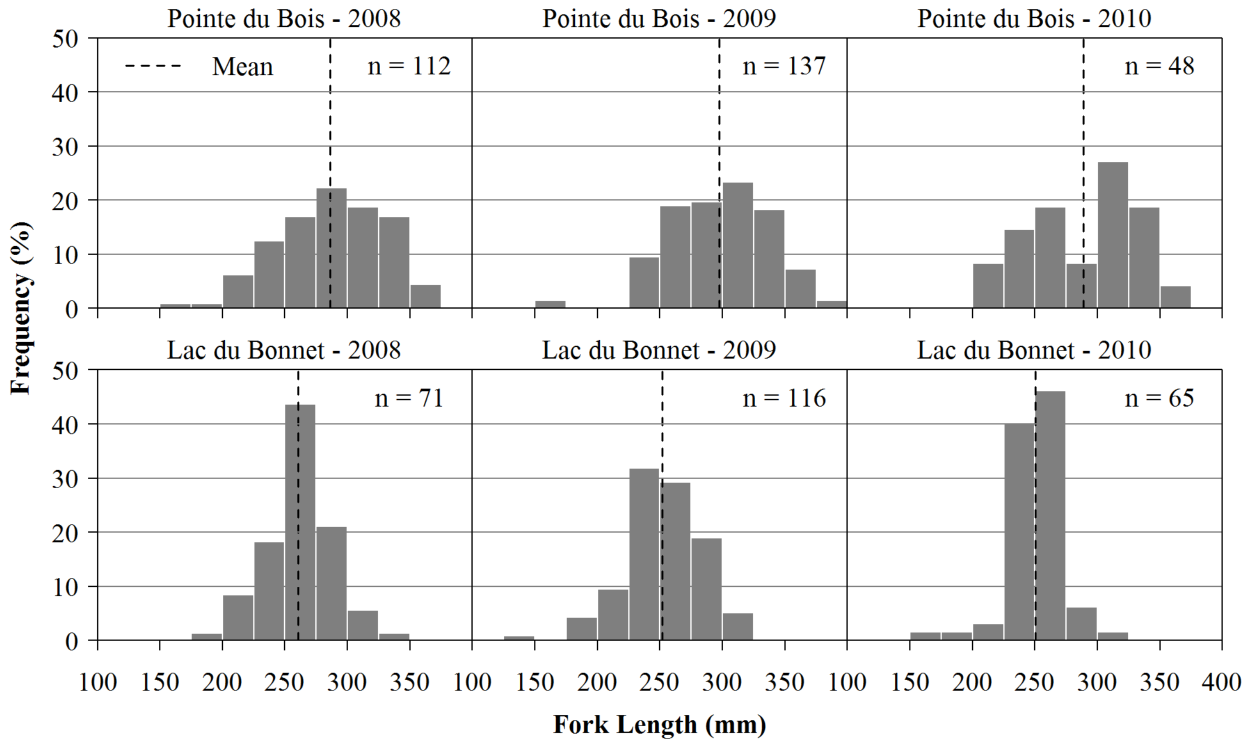


Figure 5.1.7-27. Fork length frequency histograms for Sauger captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

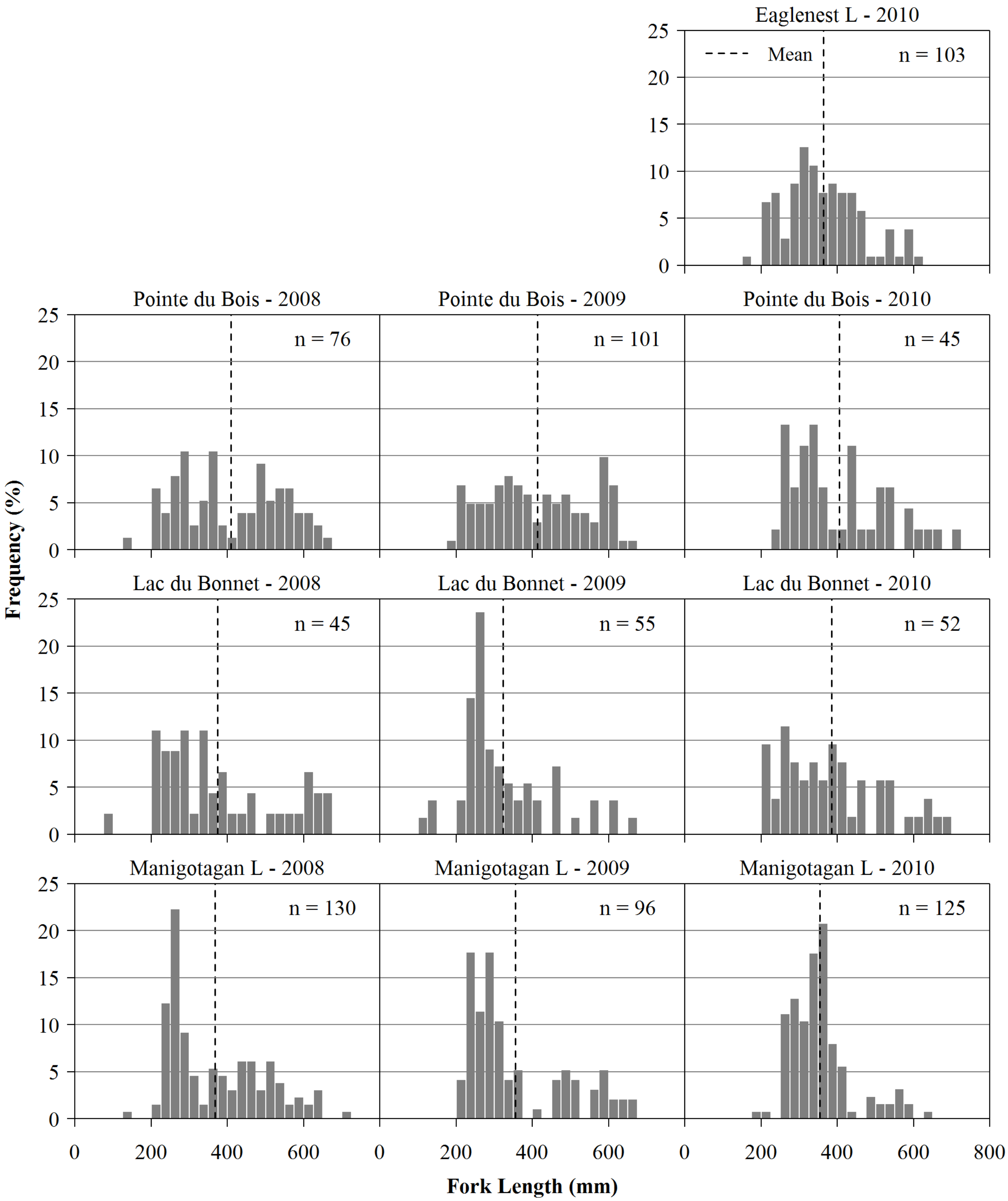


Figure 5.1.7-28. Fork length frequency histograms for Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

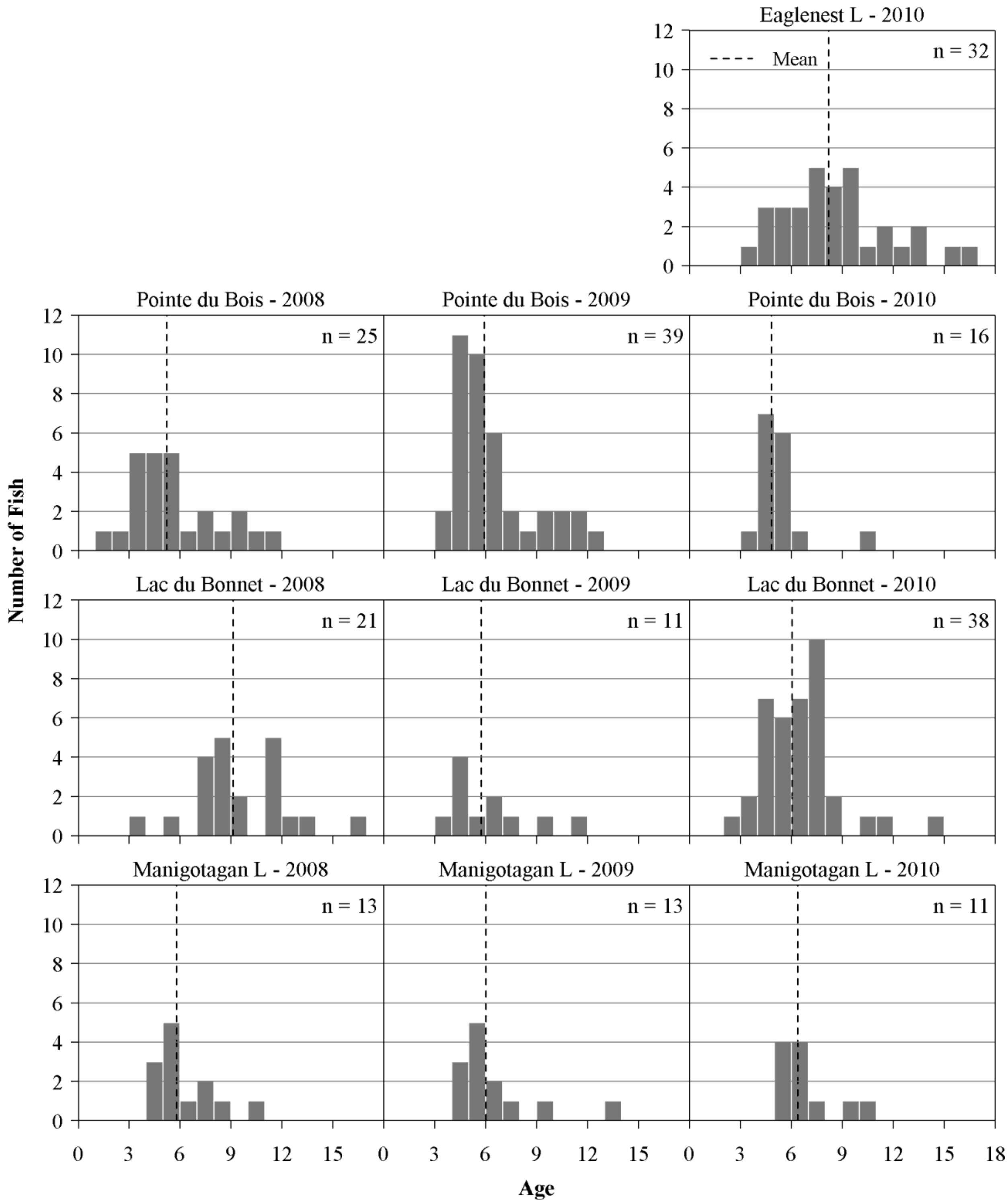


Figure 5.1.7-29. Catch-at-age histograms for Northern Pike captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

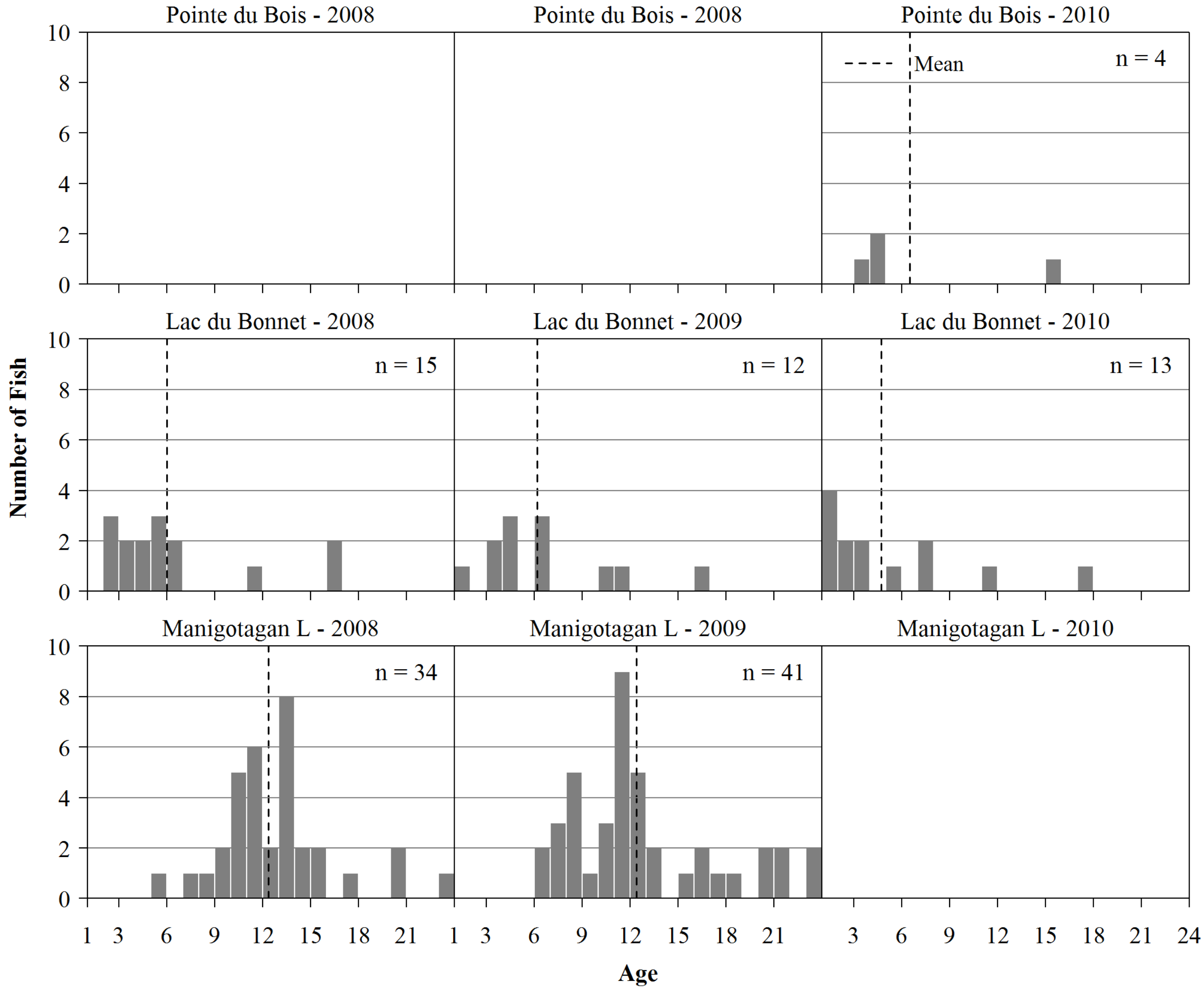


Figure 5.1.7-30. Catch-at-age histograms for Lake Whitefish captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

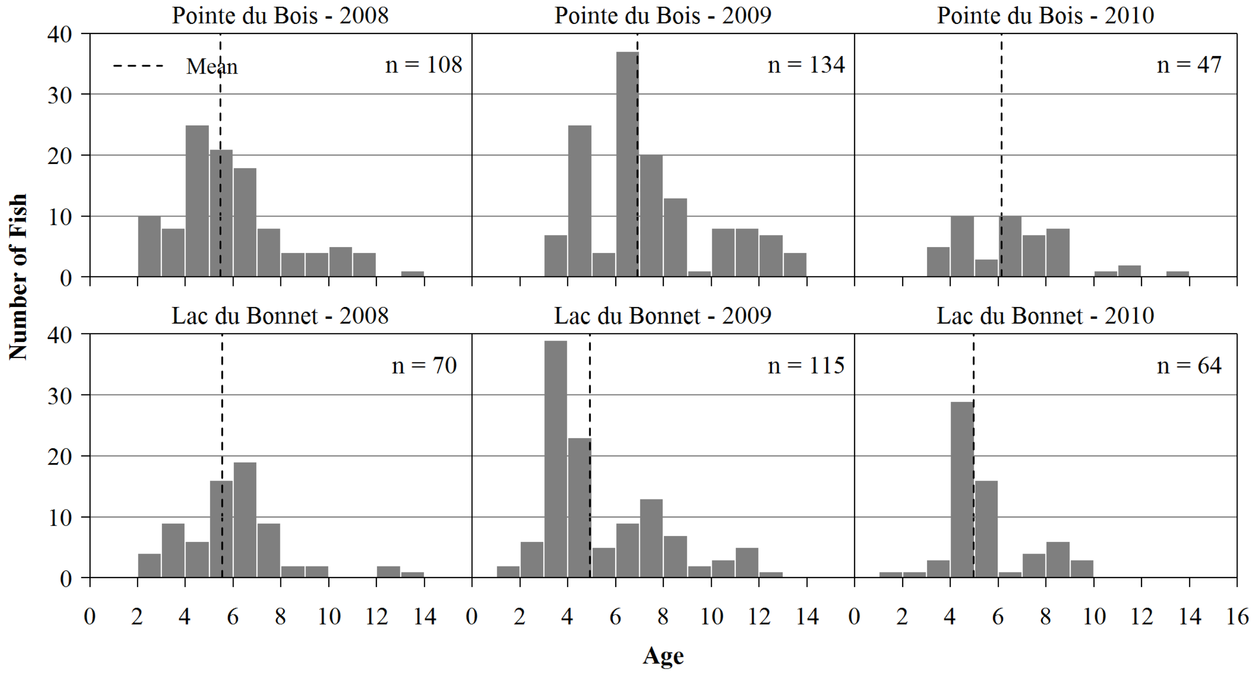


Figure 5.1.7-31. Catch-at-age histograms for Sauger captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

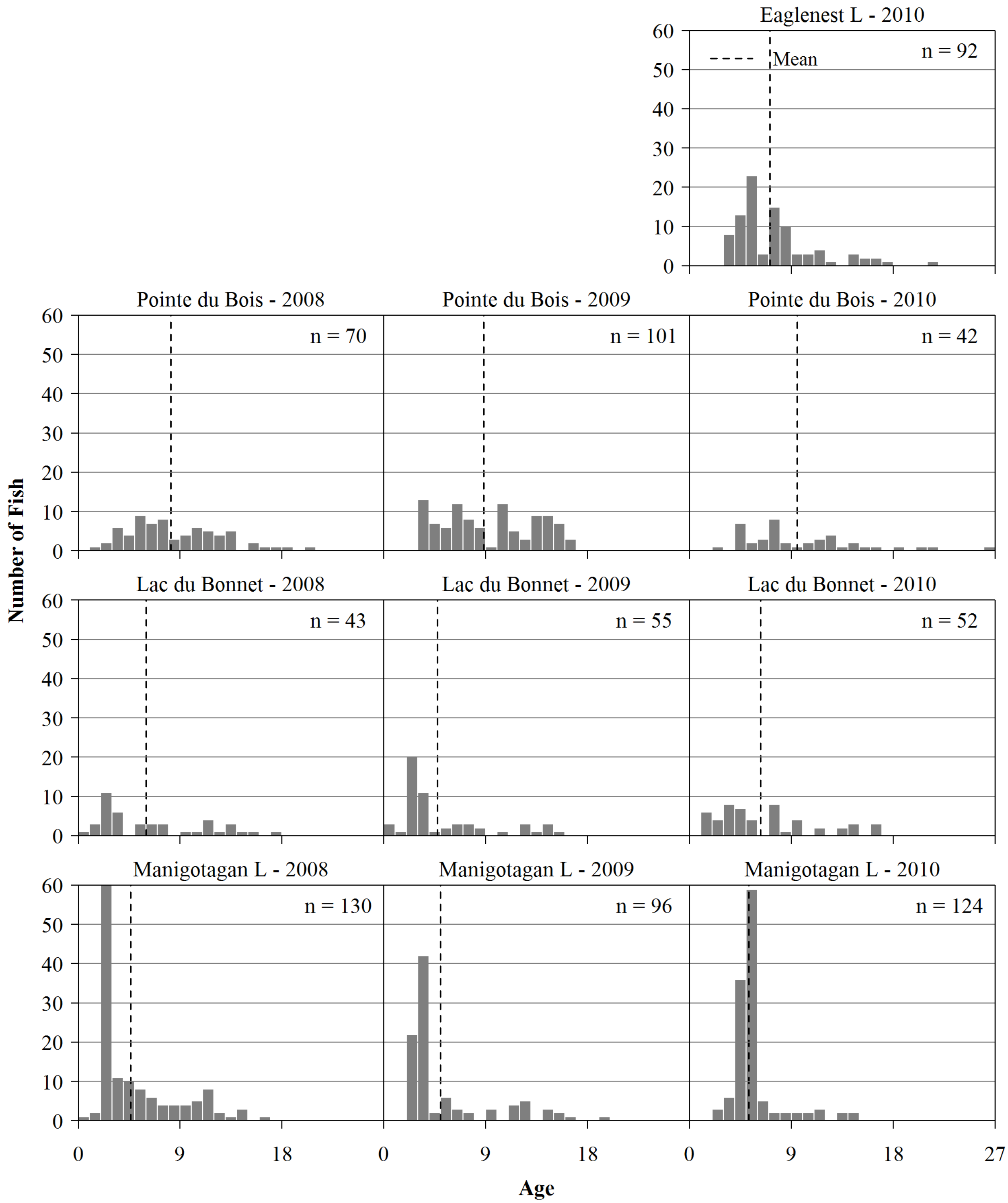


Figure 5.1.7-32. Catch-at-age histograms for Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010.

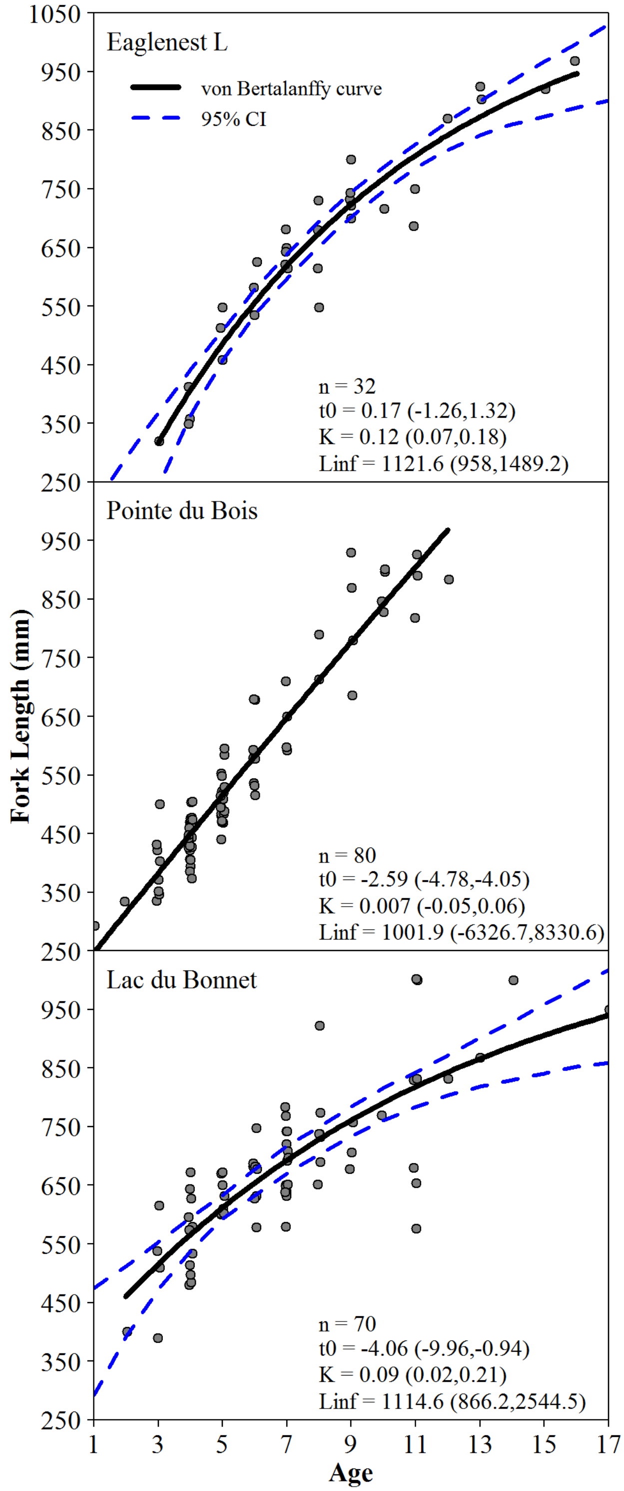


Figure 5.1.7-33. Fitted typical von Bertalanffy growth models for all Northern Pike captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, and age when the average length was zero t0) are shown.

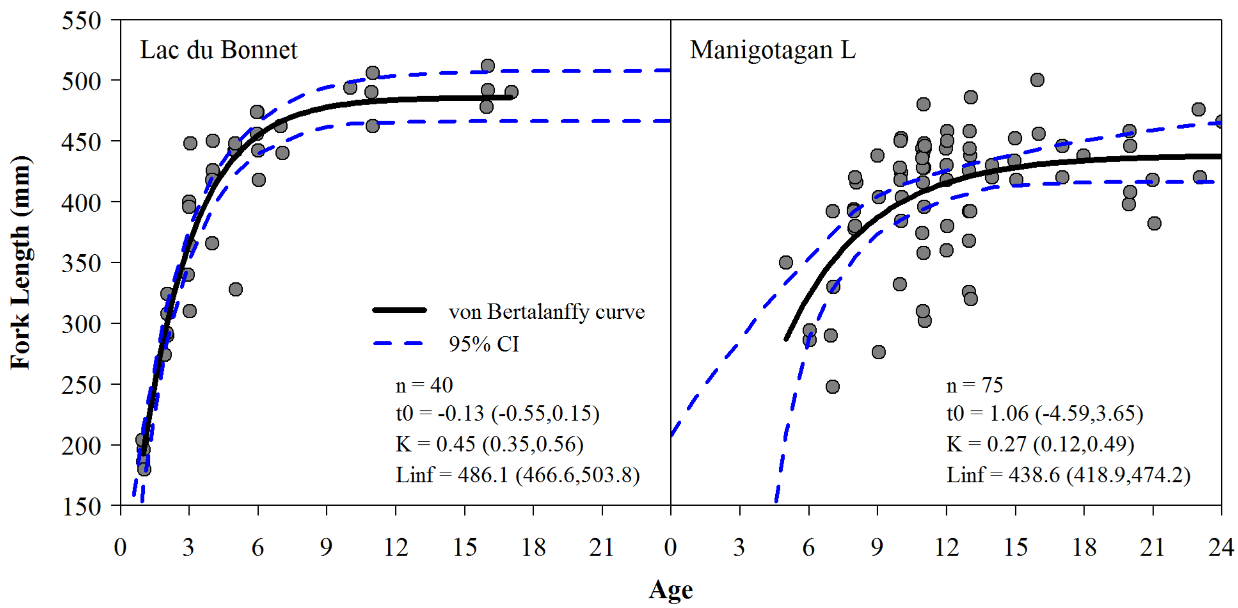


Figure 5.1.7-34. Fitted typical von Bertalanffy growth models for all Lake Whitefish captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, and age when the average length was zero t0) are shown.

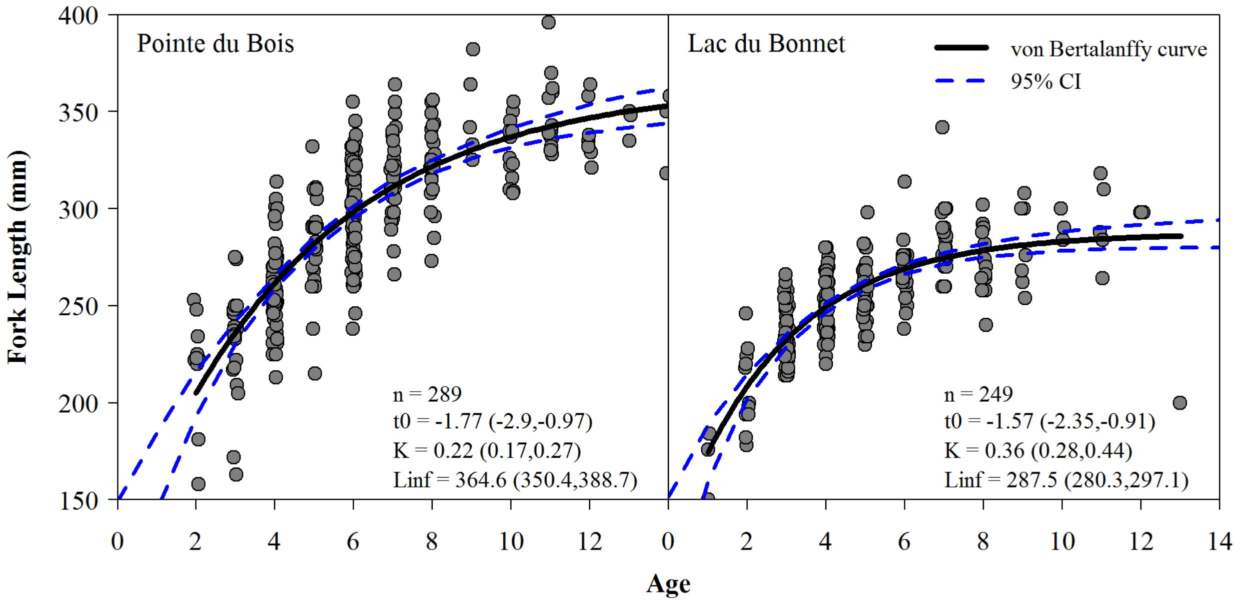


Figure 5.1.7-35. Fitted typical von Bertalanffy growth models for all Sauger captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, and age when the average length was zero t0) are shown.

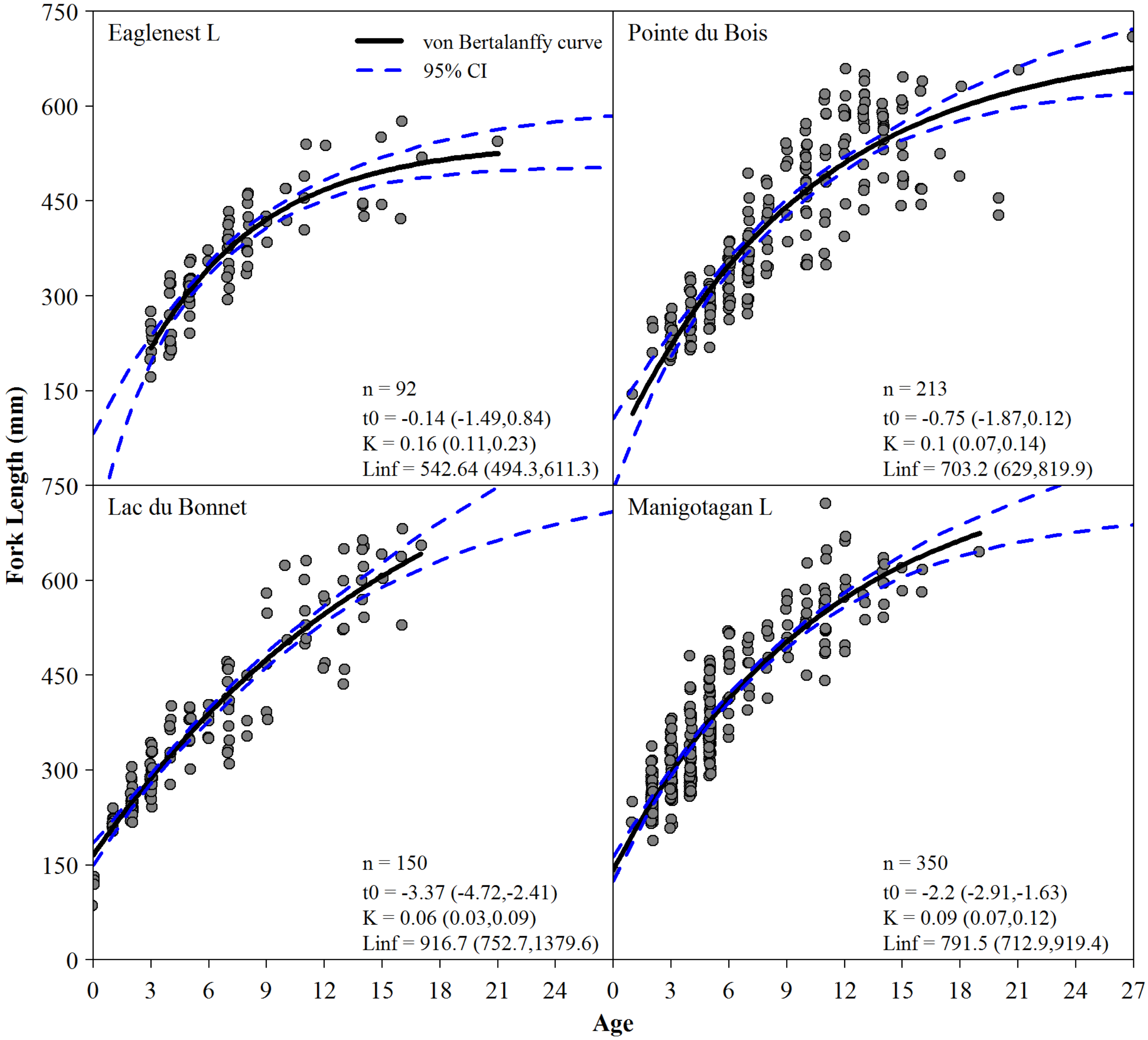


Figure 5.1.7-36. Fitted typical von Bertalanffy growth models for all Walleye captured in standard gang index gill nets set in Winnipeg River Region waterbodies, 2008-2010. Estimated von Bertalanffy growth model parameters (asymptotic length Linf, growth coefficient K, age when the average length was zero t0) and their associated bootstrapped 95% confidence intervals are shown.

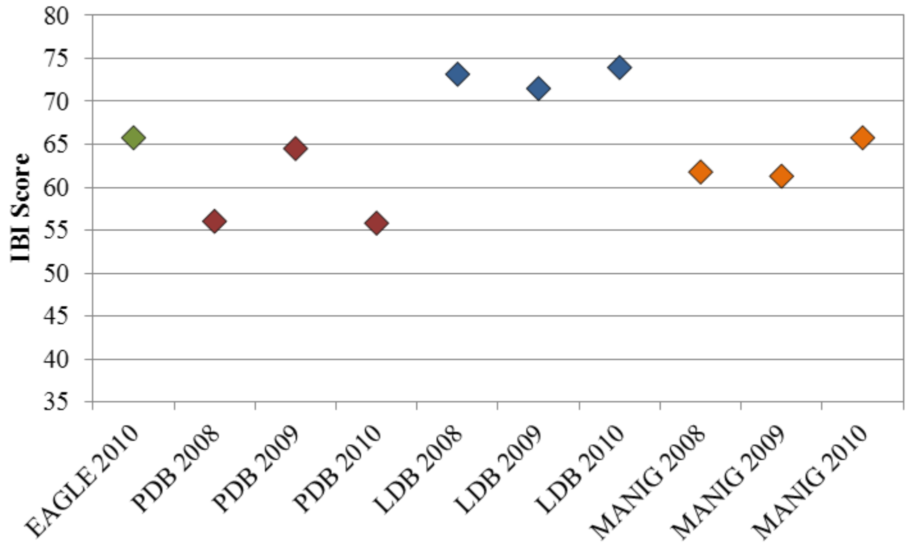


Figure 5.1.7-37. Scatter plot of yearly Index of Biotic Integrity (IBI) scores for Winnipeg River Region waterbodies, 2008-2010.

5.1.8 Fish Mercury

The following provides an overview of fish mercury concentrations measured in the Winnipeg River Region under CAMPP. Waterbodies sampled included the Pointe du Bois Forebay and an off-system reference waterbody, Manigotagan Lake (Figures 5.1.8-1 and 5.1.8-2). Fish from both waterbodies were collected only in 2010. Details of sampling locations, times, and methodology are provided in Appendix 1.

5.1.8.1 Species comparisons

A total of 121 fish caught in the Pointe du Bois Forebay and Manigotagan Lake were analyzed for mercury. No 1-year old Yellow Perch were captured from either waterbody, and Lake Whitefish were not retained from Manigotagan Lake (Table 5.1.8-1). With 11 and 17 fish, sample sizes of Northern Pike from Manigotagan Lake and the Pointe du Bois Forebay, respectively, were substantially lower than the target sample size of 36 fish. Conversely, 53 Walleye muscle samples were collected from Manigotagan Lake. This larger sample (17 more than the 36 sample target) was analyzed because there are no historic data available on mercury concentrations of any fish species from Manigotagan Lake.

Mercury concentration and fish length were significantly positively correlated for each species sampled from both waterbodies (Figure 5.1.8-3), indicating that length-standardization of concentrations was necessary for comparative purposes (i.e., the mean mercury concentration was adjusted to a standard length for each fish species). Length-standardized concentrations were within approximately 10% of arithmetic concentrations, except for Lake Whitefish from the Pointe du Bois Forebay, for which the arithmetic concentration was almost twice the concentration calculated for fish of a standard length. This difference was mainly a result of the small sample size (n=4) and the relatively large average size of the Whitefish, which was 53 mm longer than the standard length of 350 mm (Table 5.1.8-2).

Mean arithmetic mercury concentrations of Northern Pike and Walleye from the Pointe du Bois Forebay were five times higher than concentrations in Lake Whitefish (Table 5.1.8-1). Mercury concentrations in piscivorous species such as Pike and Walleye typically are substantially higher than concentrations in benthivorous species such as Whitefish, as has been shown for Manitoba waterbodies (Bodaly et al. 2007; Jansen and Strange 2007a,b; Green 1986). However, the observed interspecies differences in mercury concentrations from the Winnipeg River are higher than what is typically observed in Manitoba waters. Mean arithmetic mercury concentrations were also significantly different between Pike and Walleye from Manigotagan Lake, with concentrations in Pike being almost threefold higher.

5.1.8.2 Comparison to consumption guidelines

Length-standardized concentrations of Northern Pike and Walleye from the two waterbodies sampled in the Winnipeg River Region substantially exceeded 0.2 parts per million (ppm) mercury (Figure 5.1.8-4), a level commonly accepted as a safe consumption limit for people eating large quantities of fish domestically (see section 4.8.2.3). Based on individual concentrations, approximately 90% of all Pike and 78% of Walleye exceeded the 0.2 ppm guideline (Figure 5.1.8-3). Approximately 64% and 38%, respectively, of these individuals contained mercury concentrations that also exceeded 0.5 ppm, the Health Canada standard for commercial marketing of freshwater fish in Canada (Health Canada 2007a,b) and the Manitoba aquatic life tissue residue guideline for human consumers (Manitoba Water Stewardship [MWS] 2011). In addition to these exceedances of guidelines and standards relating to human health, every fish analyzed for total mercury from the Winnipeg River Region exceeded the Canadian Council of 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). 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.

5.1.8.3 Spatial comparisons

Northern Pike and Walleye collected from Manigotagan Lake contained significantly higher and lower length-standardized mercury concentrations, respectively, than their conspecifics from the Pointe du Bois Forebay (Figure 5.1.8-4). In fact, with 1.01 ppm mercury, Pike from Manigotagan Lake had the highest concentration recorded from any waterbody in Manitoba over the past 20 years (Jansen 2010a,b; Jansen 2009; Jansen and Strange 2009; 2007a,b; Bodaly et al. 2007). No past or contemporary data could be located regarding mercury concentrations in fish from Manigotagan Lake and it is unknown if the small sample of relatively large, old Northern Pike that also were of poor condition (Table 5.1.8-2) adequately represents the entire population of the lake.

Table 5.1.8.-1. Arithmetic mean (± standard error, SE) and length-standardized (95% confidence limits, CL) mercury concentrations (ppm) for Lake Whitefish, Northern Pike, and Walleye captured in the Winnipeg River Region in 2010.

Waterbody	Species	n	Arithmetic	SE	Standard	95% CL
Pointe du Bois	Northern Pike	17	0.509[b]	0.078	0.559	0.527 - 0.663
	Walleye	36	0.651[b]	0.075	0.648	0.585 - 0.718
	Lake Whitefish	4	0.096[a]	0.045	0.053	0.028 - 0.101
Manigotagan L	Northern Pike	11	1.178	0.121	1.012	0.799 - 1.282
	Walleye	53	0.396[a]	0.038	0.429	0.386 - 0.477
	Lake Whitefish	0	-	-	-	-

Note: Different superscripts indicate significant differences between species within a waterbody. For significant differences between standardized means (i.e., within species between waterbodies) see Figure 5.1.8-4.

Table 5.1.8-2. Mean (± standard error, SE) fork length, round weight, condition (K), and age of fish species sampled for mercury from the Winnipeg River Region in 2010.

Waterbody	Species	n	Length (mm)	Weight (g)	K	Age (years)
Pointe du Bois	Lake Whitefish	4	403.0 ± 54.4	1096.3 ± 441.4	1.46 ± 0.06	6.5 ± 2.8
	Northern Pike	17	490.4 ± 33.5	969.8 ± 292.2	0.62 ± 0.02	4.7 ± 0.4
	Walleye	36	374.8 ± 27.2	891.2 ± 167.6	1.03 ± 0.02	10.7 ± 1.1
Manigotagan L	Lake Whitefish	0	-	-	-	-
	Northern Pike	11	583.3 ± 24.1	1270.9 ± 259.9	0.58 ± 0.04	6.4 ± 0.5
	Walleye	53	351.2 ± 15.5	581.5 ± 69.7	1.05 ± 0.01	5.2 ± 0.4

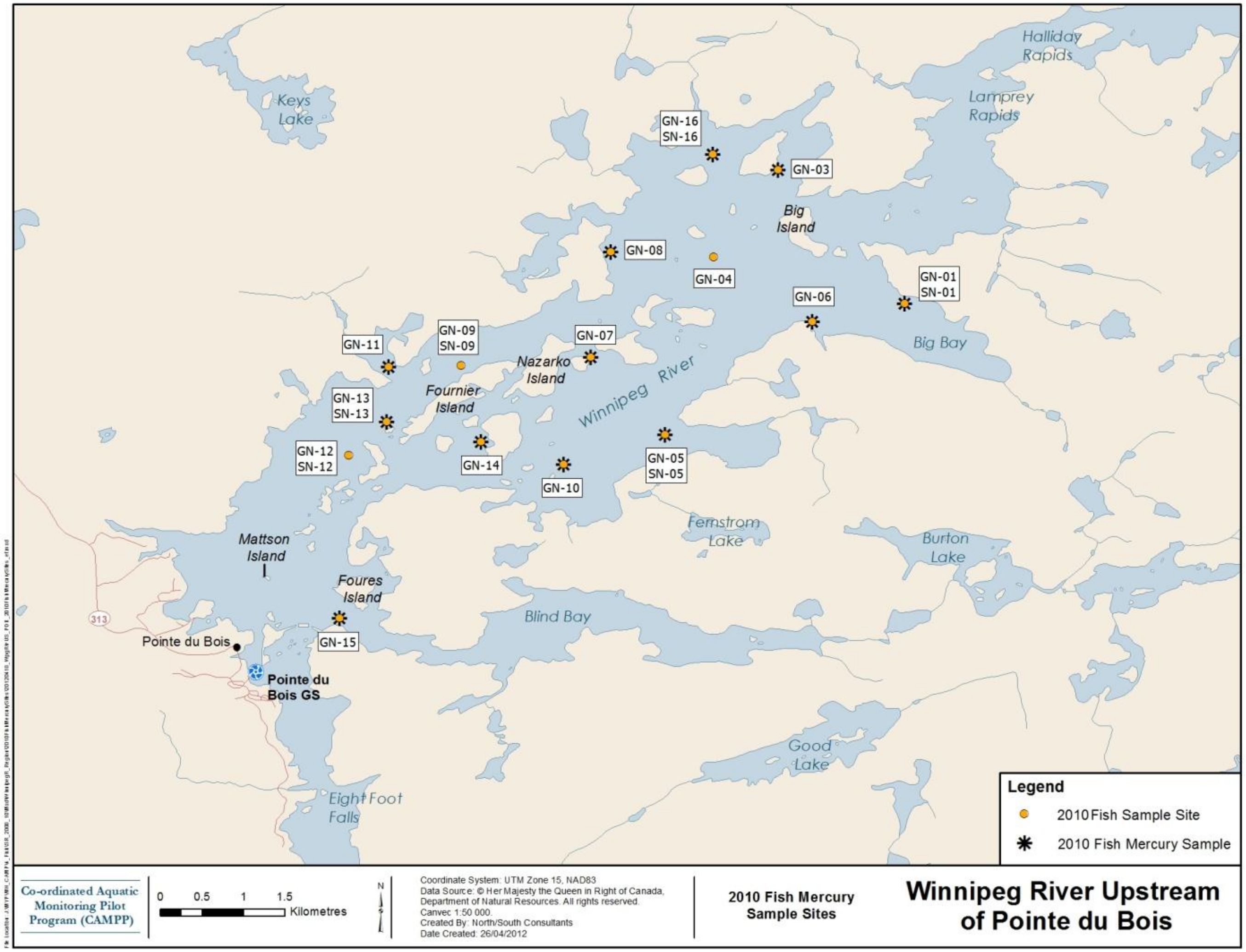


Figure 5.1.8-1. Fish sampling sites in the Pointe du Bois Forebay, indicating those sites where fish were collected for mercury analysis.

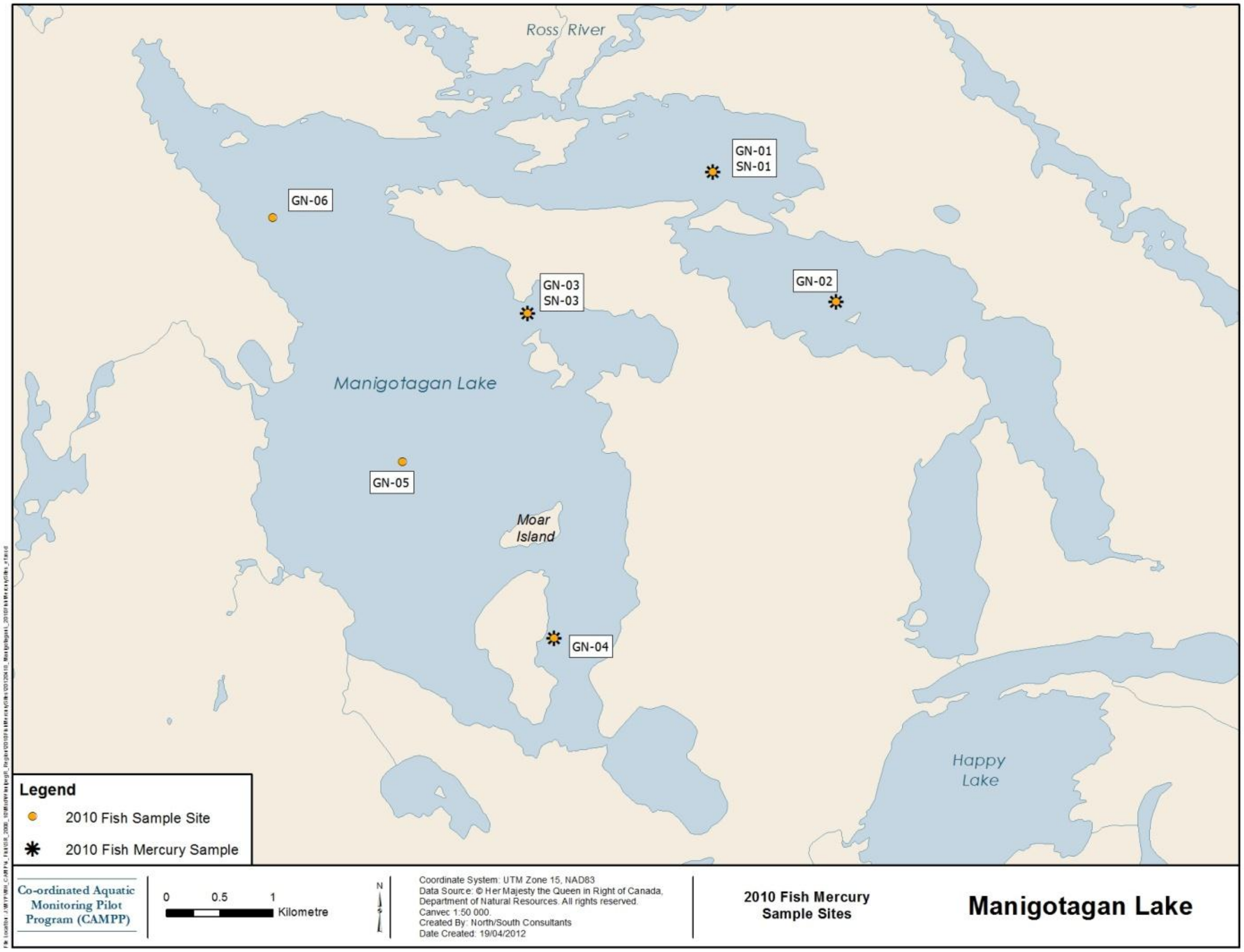


Figure 5.1.8-2. Fish sampling sites in Manigotagan Lake, indicating those sites (X) where fish were collected for mercury analysis.

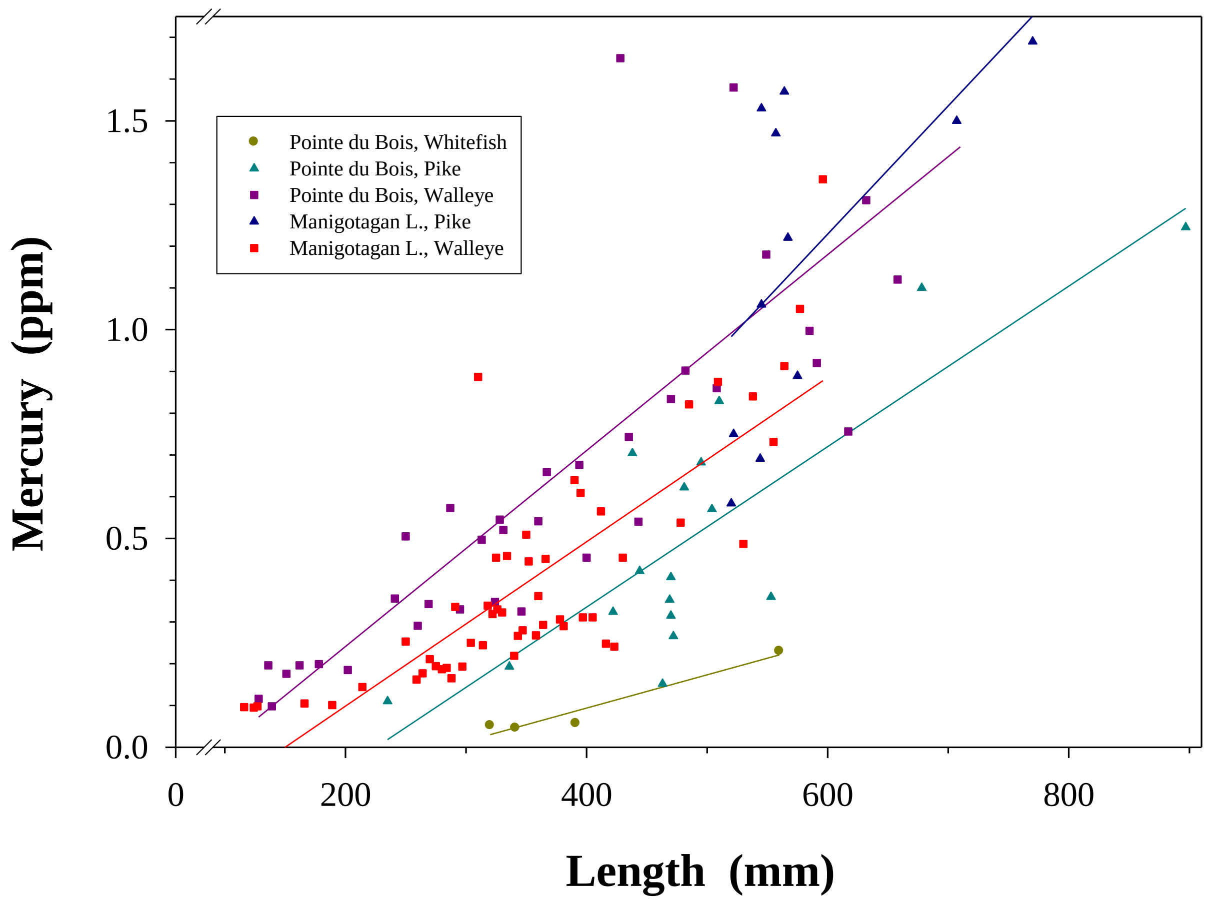


Figure 5.1.8-3. Relationship between muscle mercury concentration and fork length for Lake Whitefish, Northern Pike, and Walleye captured in the Winnipeg River Region in 2010. Significant linear regression lines are shown. One Walleye from Pointe du Bois with a mercury concentration of 1.92 ppm and a length of 710 mm is not shown but was included in the analyses.

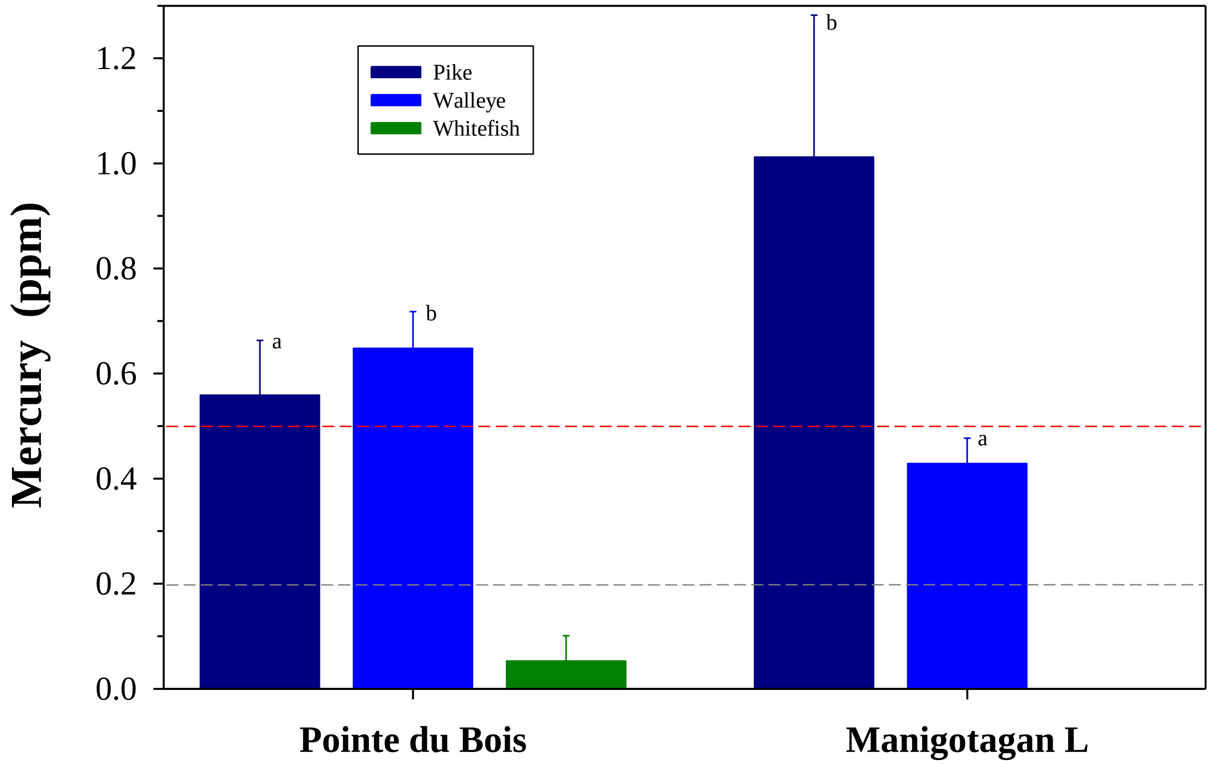


Figure 5.1.8-4. Length-standardized mean (+95% CL) mercury concentrations of Northern Pike, Walleye, and Lake Whitefish (no sample from Manigotagan Lake) from the Winnipeg River Region in 2010. Means with different superscripts indicate a significant difference between waterbodies within species. Stippled lines indicate the 0.5 ppm standard and the 0.2 ppm guideline for human consumption.