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MREAC

pH Monitoring Ice & Snow

Miramichi River Environmental Assessment Committee (MREAC)

Report 2019

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4.0 Introduction

Interest in pH monitoring on the Miramichi River and tributaries is based on a concern primarily for fish habitat, Many waterways with lower pH levels (e.g. Nova Scotia's southeast shore) due to "acid rain" and low buffering capacities have suffered the complete loss of some species, Atlantic salmon being an example. We do not currently have this level of concerns for pH levels on the Miramichi.

The land use history of some Miramichi tributaries however presents a storyline that included serious issues related to low pH levels. Mining on the headwaters of the Northwest Miramichi River resulted in the release of "acid mine drainage" that, combined with copper and zine levels, resulted in conditions that were locally lethal to Atlantic salmon based on caged fish studies in the 1980's and 1990's. These issues were mitigated with the capture and treatment of the drainage. Following the Heath Steele Mine closure in 1999 the site underwent significant remediation. The drainage from the mine site continues to be captured and mutualized prior to release.

More recently pH levels are being revisited as a habitat concern. Fisheries and Oceans Canada are undertaking real-time monitoring at the Oxbow on the Little Southwest Miramichi. MREAC staff and volunteers are engaged in sampling available open-water sites in late winter and spring on a variety of waterways, well before ice-out. Snow sampling is conducted during these same outings.

Water sampling that begins in early March have resulted in only spotty results as most points of access to these tributaries are still ice-bound. This sampling continues throughout March and April on an opportunistic level and with increased availability of samples as open water becomes more available. Other pH samples are taken well into the open water season.

Snow samples are also collected and analysed for pH levels in conjunction with MREAC's winter and spring outings for snow course monitoring and ice observations. Core samples of snow are taken down through the available depth of the snow column. The sampler avoids contact with the ground to exclude any influence from this source. Samples are bagged and kept frozen until they can be melted and tested for pH at the MREAC office.

2.0 Discussion

Hand-held monitoring equipment is used to measure pH levels. These instruments (i.e. YSI or Myron L) require calibration prior to field use. Water temperatures are also recorded. Temperature is noted to have a defined effect on pH (i.e. levels slightly suppressed with lower temperatures) readings for which correction tables can apply to offer consistency.

Figure 1 shows the widespread distribution of sampling sites visited in 2019. Most of these sites were visited in late winter and spring in association with other MREAC monitoring projects. The river water samples are collected at accessible open water sites, mostly at bridges, using a sample bottle that is lowered on a rope (Figure 2 and 3). The samples are transferred into a mason jar, that is rinsed by the sample water prior to taking the reading. The pH reading is taken as soon as possible thereafter, usually with 15 minutes of the sampling.

Figure 1: Miramichi Watershed pH Monitoring Sites 2019

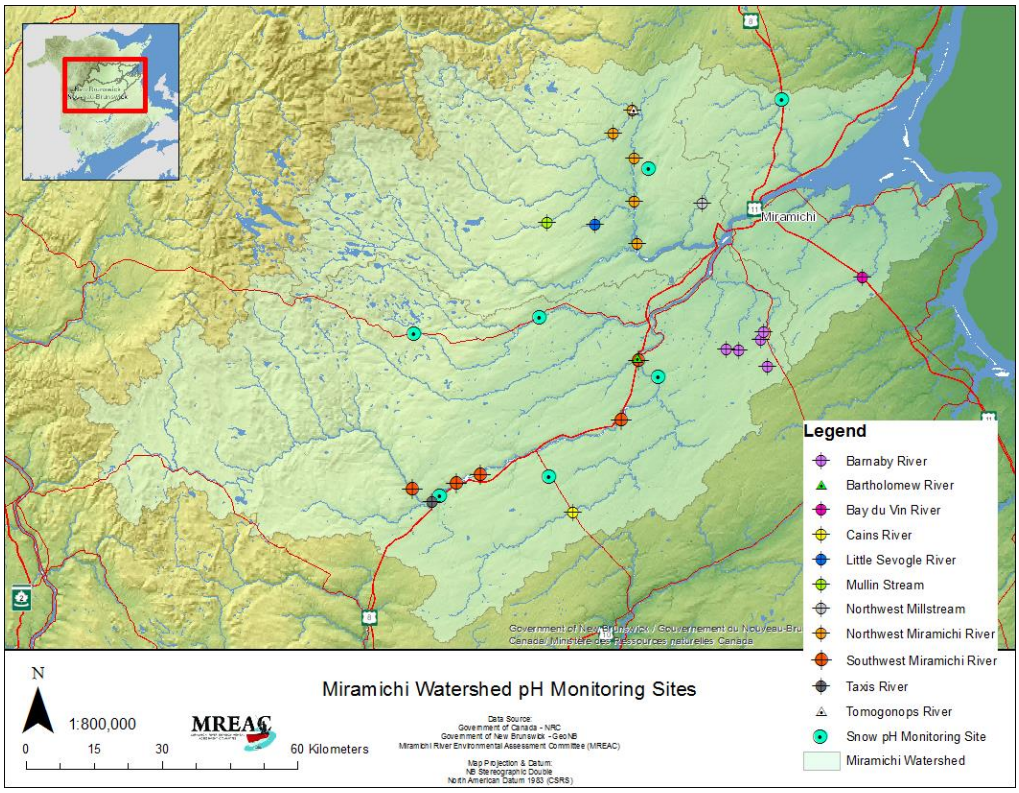


Figure 2: Surface Water Collection at the Bartholomew River pH Monitoring Site

Figure 3 Sample and bottle and rope used in water sample collection

Figure 4: pH Monitoring on the Bartholomew River – Using YSI Monitoring Probe

Snow samples are also collected at sites widely distributed throughout the Miramichi River watershed. Snow samples are taken using a core sampling tool (Figure 5) that is used in snow course monitoring. The sample is taken to include the entire depth of the snow-pack but does not extend to the snow/ground interface. This caution is taken to avoid the potential influence ground contact might have on the sample result.

Figure 5: Snow Course Monitoring Tool Used in Collection of Snow for pH samples

Graphs of the various results are shown in the following Figures. These Figures are broken out to represent snow sample results (Figure 6), water samples results from the Southwest Miramichi (Figure 7), from the Northwest Miramichi (Figure 8) , Barnaby River results (Figure 9) from summer sampling on the Barnaby River and finally from other Miramichi tributaries. (Figure 10). An Excel file of numeric results is provided in a sperate file.

Figure 6: Snow Monitoring pH Results 2019

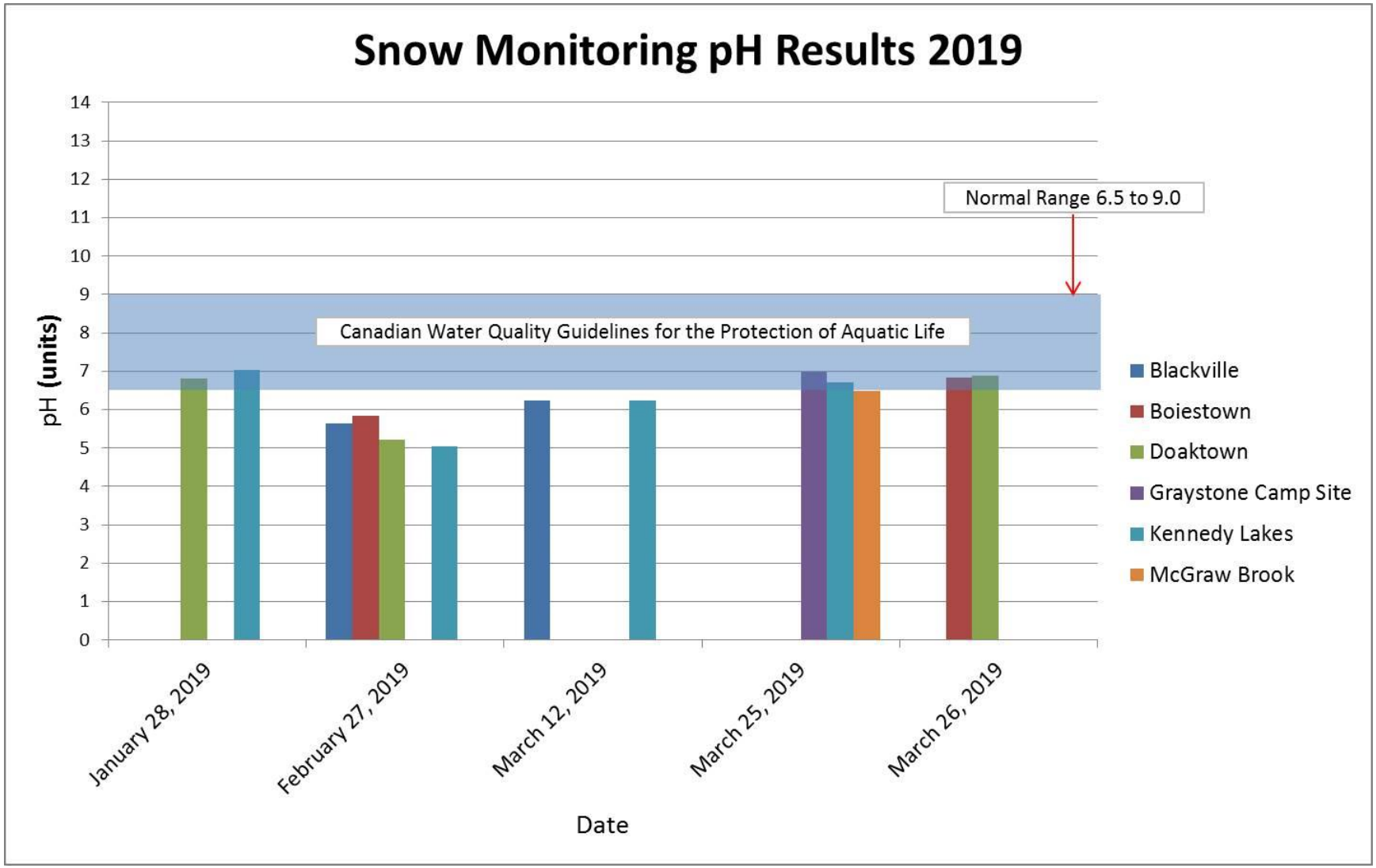


Figure 7: Southwest Miramichi River pH Monitoring Results 2019

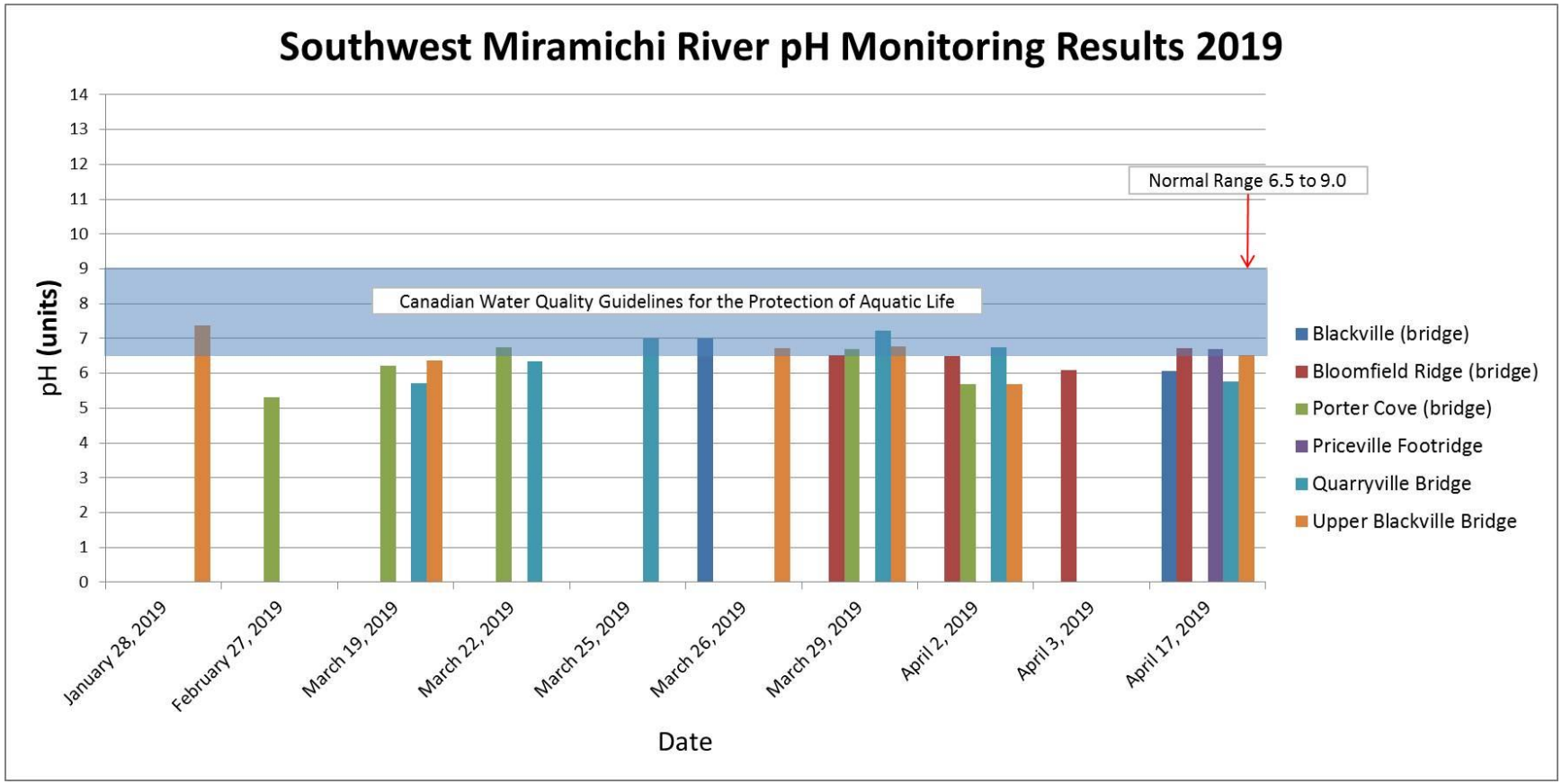


Figure 8: Northwest Miramichi River pH Monitoring Results 2019

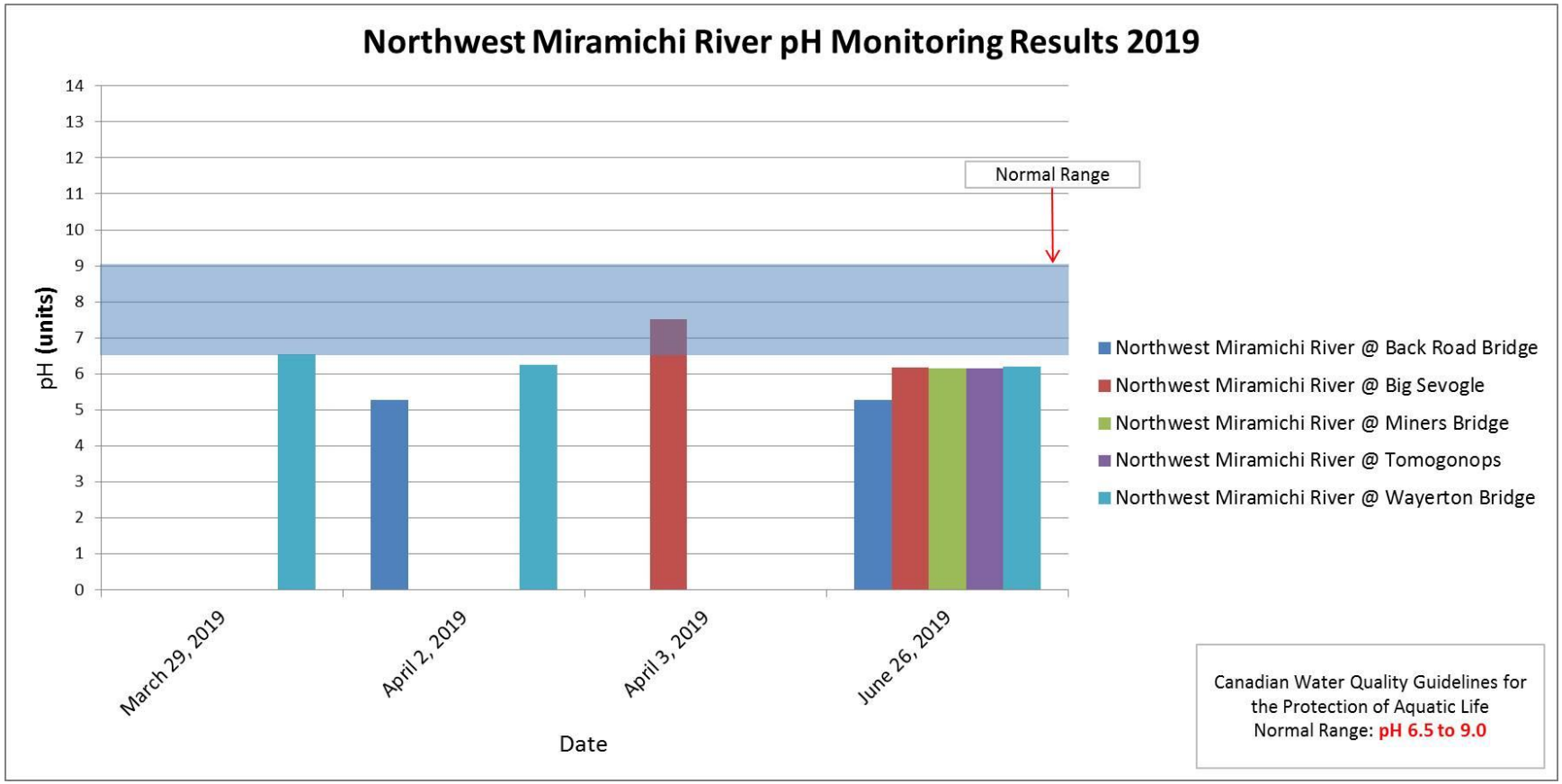


Figure 9: Barnaby River pH Monitoring Results July 3, 2019

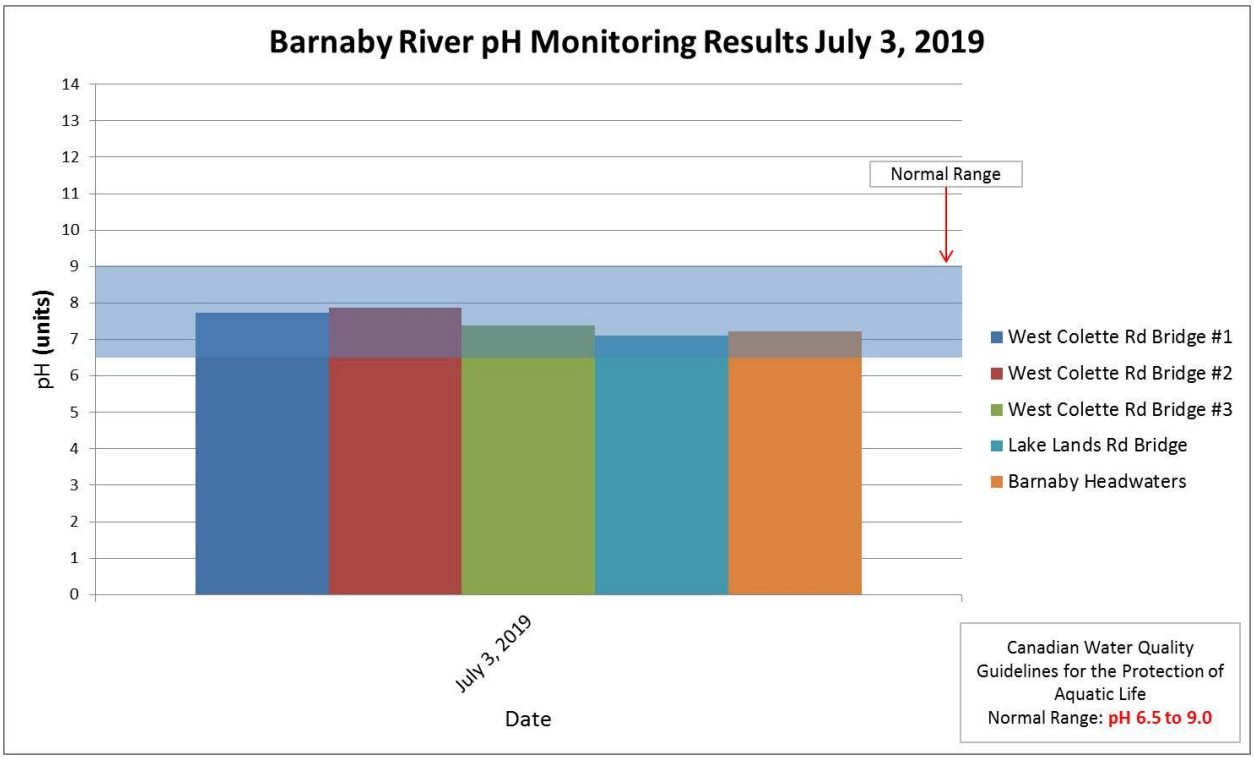
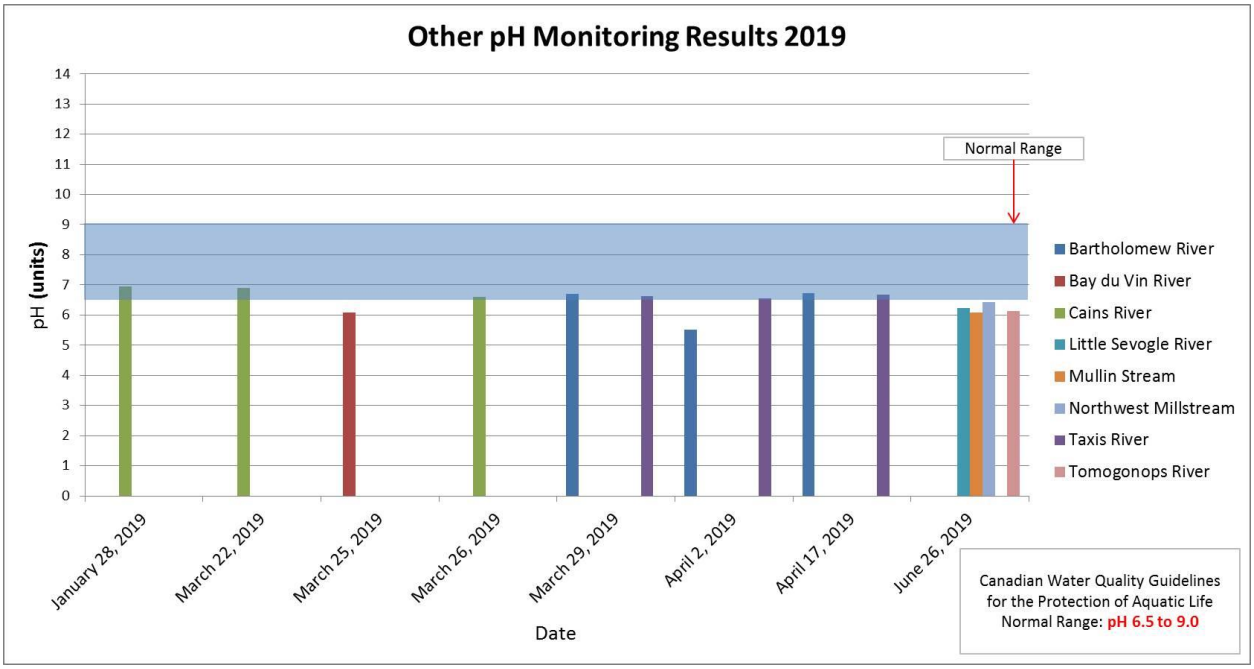


Figure 10: Other pH Monitoring Results 2019



3.0 Conclusion

The pH results for 2019 illustrated above are compared to the Canadian Water Quality Guidelines for the Protection of Aquatic Life. Several of the early season (winter and spring) water samples show depressed pH levels. Snow samples were marginally lower in pH than water samples. While being below the normal range the pH values appear unlikely to have resulted in serious harm to habitat conditions.

Notably the samples taken in the later spring and summer were within the normal range.

MREAC will again collect and compile pH values from water and snow samples throughout 2020, with most of the effort applied to winter and spring conditions.