


Summary of Fish Populations Status in Quetico Provincial Park based on Results of Broadscale Monitoring 2010 – 2017

April 2019

Introduction

Broadscale Monitoring (BsM) is the standard aquatic ecosystem monitoring program in Ontario (Sandstrom et al 2015). This method uses a combination of large and small mesh gill nets, water and zooplankton sampling to assess fish population and ecosystem health of lakes larger than 50 ha across a Fisheries Management Zone (FMZ). In 2010 as part of the first cycle of BsM, 130 lakes were sampled in FMZ 5 (the southwest part of northern Ontario), of which 20 (15% of FMZ 5 lakes) were sampled in Quetico Provincial Park, with an additional two lakes sampled in 2011. In Cycle 2 between 2015 and 2017, 16 of the lakes sampled in 2010 were re-assessed and 3 additional lakes were sampled (Figure 1). The lakes ranged in size from 80 ha to ~6000 ha.

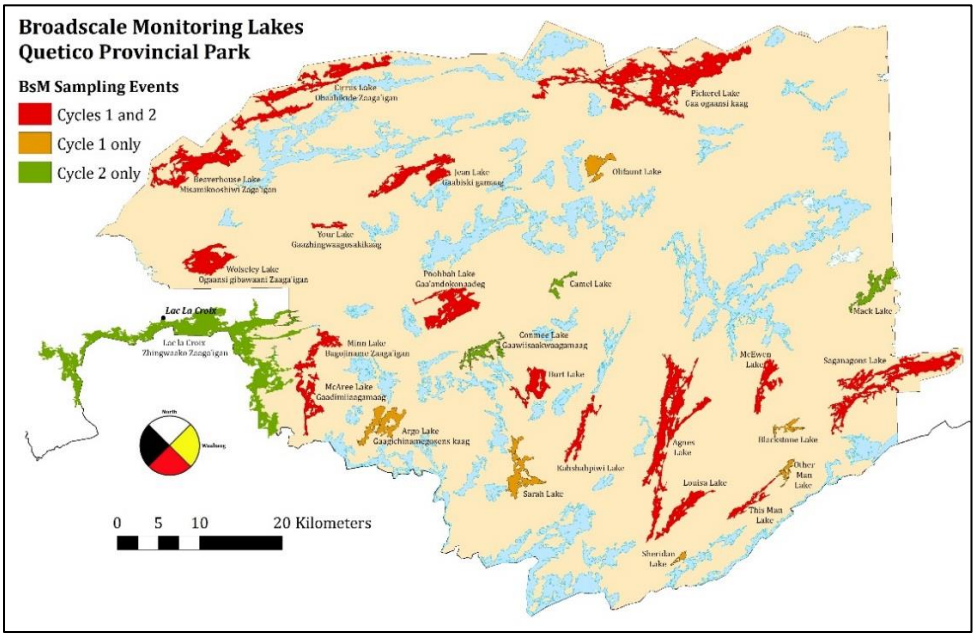

Figure 1. Broadscale Monitoring (BsM) lakes in Quetico Provincial Park – 2010-2017

Aquatic Ecosystem Description

Water chemistry of lakes and streams is strongly influenced by the underlying bedrock geology which in turn has an important influence on lake productivity. Compared to other areas of Northwest Ontario, Quetico lakes have significantly clearer water and lower productivity as measured by both total phosphorus and total amount of dissolved solids. These water quality characteristics are generally a result of the granitic bedrock which dominates the park as well as Quetico's location at the upper reaches of the Rainy River-Lake of the Woods watershed. While it is the reason for the clear, deep lakes which Quetico is famous for, it also results in reduced productivity of fish populations.

Biodiversity refers to the variety of life described by the different species and ecosystems present on the landscape. Size spectra analysis is a way of assessing health of aquatic ecosystems by measuring the balance between different levels of an ecosystem; a simple size spectra analysis that looks at two levels (i.e. large sized fish and small fish) has been developed using available data collected from the BsM program. The results of this analysis indicate that within Quetico, ecosystem balance is closer to expected with healthier function and processes and lower fish harvest compared to other lakes in northwest Ontario. The abundance values for both large and small fish are lower for Quetico lakes indicating lower productivity in these lakes as was also suggested by the water chemistry data.

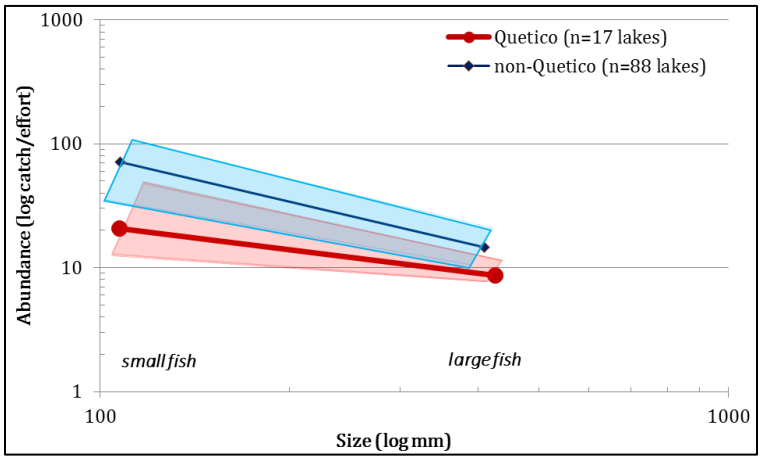

Figure 2. Size spectra analysis calculated from large bodied and small bodied fish data collected FMZ5 Broadscale Monitoring comparing Quetico and non-Quetico lakes (slopes significantly different at p=0.02).

Walleye/Ogaa

Walleye populations in Quetico lakes appear very healthy and dominated by older, larger fish suggesting low harvest stress with mortality estimates being similar to natural (unfished) estimates. Abundance as measured by netting catches tends to be lower than non-Quetico lakes but the biomass status suggests this reflects the lower productivity of Quetico lakes and that walleye populations in the park tend to be closer to potential maximum biomass estimates. Walleye populations in some of the motorized guide lakes which had previously shown indications of harvest stress have improved to be similar to other populations in Quetico.

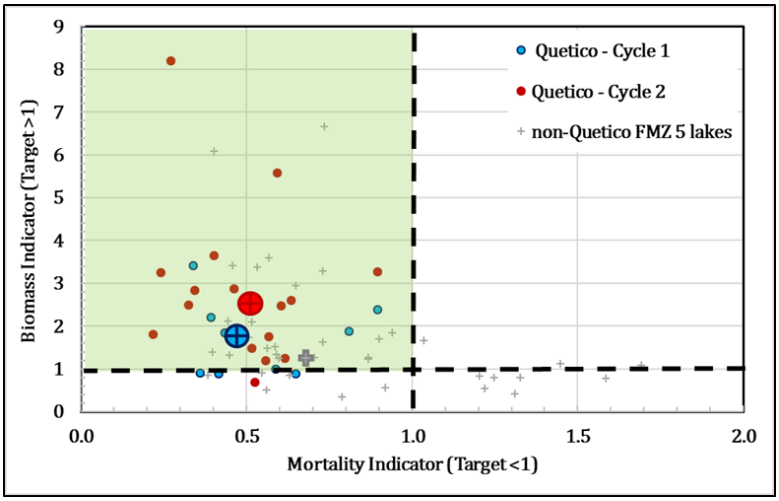

Figure 3. Biomass-mortality status of Quetico walleye/ogaa populations based on Cycle 1 (blue) and Cycle 2 (red) BsM data compared to non-Quetico FMZ 5 walleye populations sampled in Cycle 2. Large symbols represent median values and the green box indicates range of healthy populations.

Lake Trout/Namaygoos

Lake trout populations are dominated by older, larger fish suggesting very low harvest stress with mortality estimates being similar to natural (unfished) estimates. There was trend to lower abundance and fewer young age classes observed between Cycle 1 and Cycle 2 assessments for both Quetico and non-Quetico lakes. Although it is preliminary and based on limited data, this is what would be predicted if warming temperatures were impacting recruitment of lake trout populations. Specifically, warmer fall temperatures such as those observed in the Quetico area in the recent decade have been shown to result in reduced survival of young that hatch in studies of lakes trout in other areas.

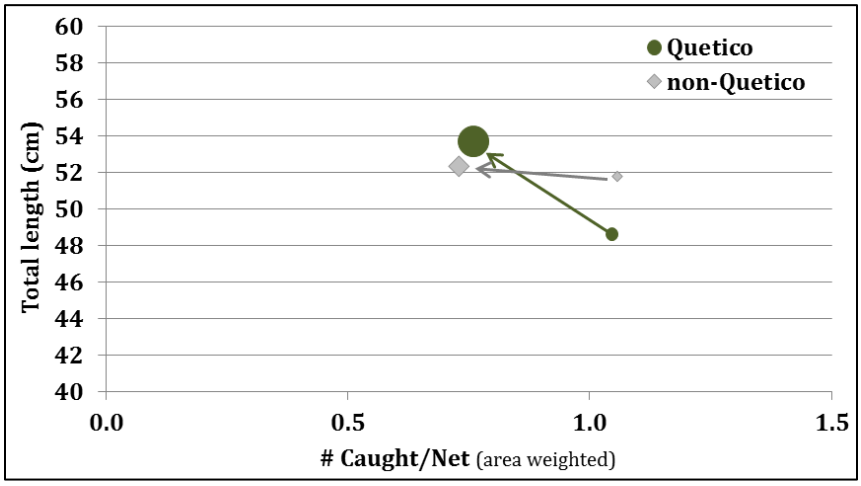

Figure 4. Abundance versus average size between Cycle 1 (small circle) and Cycle 2 (large circle) for lake trout/namaygoos from Quetico (green) and non-Quetico (gray) populations in FMZ 5.

Northern Pike/Ginoozhe

Northern pike populations in Quetico appear very healthy and dominated by older, larger fish suggesting low harvest stress with mortality estimates being similar to natural (unfished) estimates. Although pike are larger in Quetico, abundance as measured by netting catches tends to be lower than non-Quetico lakes which likely reflects the lower productivity of Quetico lakes.

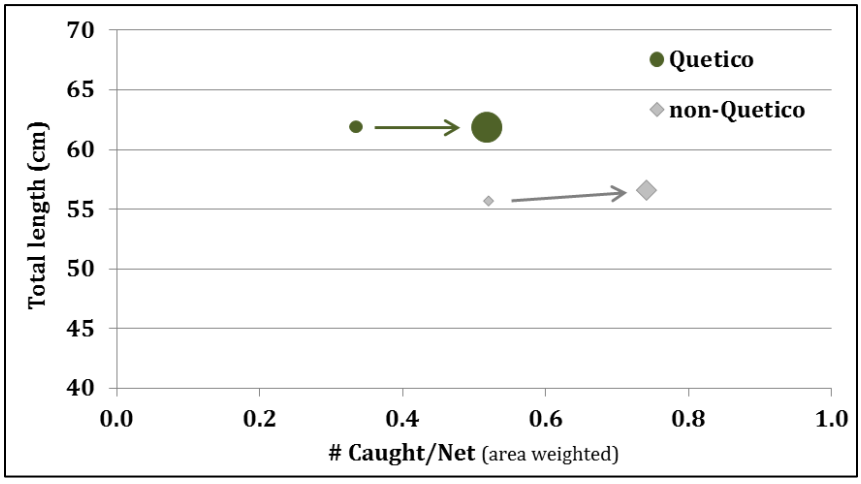

Figure 5. Abundance (median catch/per net) versus average size between Cycle 1 (small circle) and Cycle 2 (large circle) for northern pike/ginoozhe from Quetico (green) and non-Quetico (gray) populations in FMZ 5.

Smallmouth Bass/Noosa'owesi

Smallmouth bass populations appear healthy with age distribution dominated by large, older fish and mortality rates very similar to natural mortality estimates suggesting current angling harvest is have no measurable effect on populations in Quetico. There was little change observed between 2010-11 and 2015-17 BsM surveys. Although BsM data suggests bass from Quetico lakes have a smaller average size than non-Quetico lakes in FMZ 5, the proportion of large and very large bass is slightly higher.

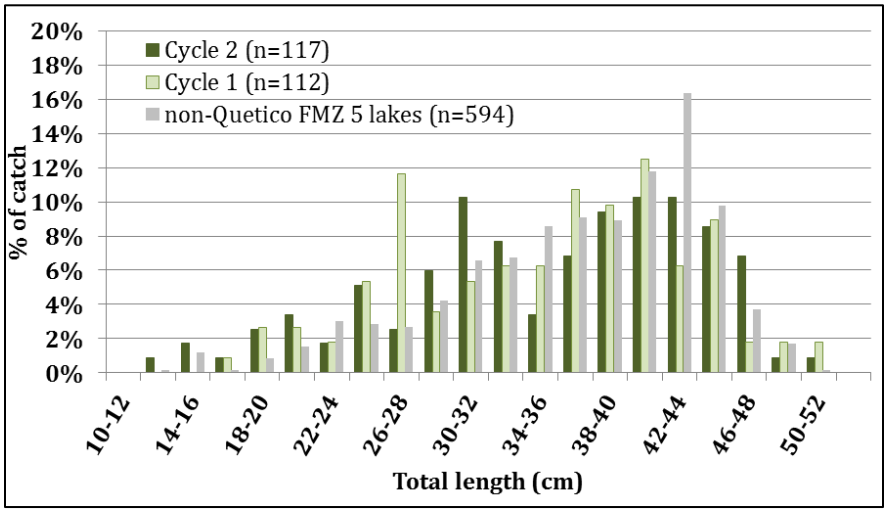

Figure 6. Comparison of size distribution of smallmouth bass/noosa'owesi caught from Quetico (Cycle 1 vs. Cycle 2) and non-Quetico populations in FMZ 5 (Cycle 2) by BsM surveys.

Conclusions

The Broadscale Monitoring surveys of Quetico lakes since 2010 suggest that the aquatic ecosystem of lakes in Quetico Provincial Park is healthy and the current level of fish harvest is having little impact on fish populations.

There are still possible risks to the aquatic ecosystem in Quetico however. Climate change has the potential to impact fish populations, particularly species that require cold water habitat such as lake trout. Non-native species that get introduced into park lakes can affect abundance of native species and disrupt ecosystem balance and function. Although the park protects lakes from local development, lakes are still susceptible to development in the watershed outside of Quetico's boundaries as well as air-borne contaminants such as mercury.

Management plans for the aquatic ecosystem and fish populations of Quetico will attempt to maintain the current healthy status of the lakes and limit impact of potential risks in the future.