Population monitoring of Pepeshquasati River brook trout, fall 2016

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Summary
The largest spawning population of brook trout that inhabit Mistassini Lake originate from the Pepeshquasati River at Mistassini's northeast end. Previous research conducted in the early 2000s suggest that 35-40% of all brook trout captured throughout Mistassini Lake annually originate from the Pepeshquasati (Fraser & Bernatchez 2005). Pepeshquasati brook trout are genetically distinct from all other brook trout populations in Mistassini Lake but share a closer, 'sister' relationship with brook trout that spawn in the Cheno River (Fraser et al. 2004), another northeast tributary of Mistassini Lake. Life history and catch data are now available on Mistassini's spawning brook trout populations for the years 2000-2002 and 2011; data from 2016 on the Pepeshquasati population were compared to historical time periods in the present study. Previous interactions with local Cree fishers and collation of Cree traditional ecological knowledge have raised some concerns about possible declining abundance of brook trout in relation to increased human development and accessibility to Mistassini Lake's more isolated areas (Fraser et al. 2006, 2013). Therefore, population monitoring of brook trout in the region every few to several years is recommended to update the Cree Nation of Mistissini on any biological signs of changing trout population status, and to ensure long-term sustainable use of the resource through community-based conservation decision-making.

Fish sampling
Between September 12 and 16, 2016, a total of 79 pre-spawning adult brook trout were sampled from the Pepeshquasati (Papas) River in order to obtain basic life history characteristics and tissue samples for future DNA research. Brook trout were captured via angling and immediately placed in freshwater baths with aerators. Any bycatch species were quickly returned to the river if not kept by Cree fishers for consumption. From each brook trout, we collected total length (TL ± 1 mm), wet mass (± 50 g), and sex. Fish were then returned to the water near the location of capture. The 2016 monitoring was collaborative with the Cooncome family: Norman, Josy and George Cooncome all assisted with the field logistics and brook trout sampling.

We used linear models in R (R Core Team, 2013) to determine if any temporal changes occurred in body size (TL) and CPUE of breeding adults between 2000-2002, 2011 and 2016, the years in which similar sampling was conducted in previous studies. TL was considered for all trout as well for each sex in separate analyses.

Results
We detected no differences in body size of Pepeshquasati brook trout between 2000-2002 vs. 2011 vs. 2016. The average length of trout in these three periods was 504.6mm, 503.4mm and 512.9mm, respectively (Figure 1). While males were consistently larger than females, we also found no changes in body size (TL) over time in either sex (Figure 2). Mass was not collected in earlier time periods, but average body size of the 79 trout in 2016 was 1.37kg (female average: 1.20kg; male average: 1.58kg).

The average daily CPUE declined in 2016 from previous time periods (8.2 trout/day vs. 11.2 and 11.7 trout per day), though the difference was not statistically significant, and the 2016 data had more variability (Figure 3).

Conclusions & Recommendations

The 2016 monitoring suggests that there has been no change in the average body size of Pepeshquasati River brook trout over the past 15 years. This is encouraging for two primary reasons. First, the Pepeshquasati trout population contributes most fish to the annual harvest

throughout Mistassini Lake of all spawning brook trout populations (Fraser & Bernatchez 2005). Second, Cree fishers have expressed some concerns regarding possible changes to brook trout abundance and catchability in recent years (Fraser et al. 2006, 2013). The temporal stability of Pepeshquasati River body size is also in sharp contrast to recent body size reductions observed in walleye populations from rivers near the community of Mistissini over a similar time period, and re-emphasizes that significant changes have taken place in the southern part of the lake.

Although CPUE was not statistically lower in 2016, trout were on average more difficult to catch compared to 2011 or 2000-2002. Our Cree guides suggested that the sampling may have been initiated a bit early in the spawning run in 2016 given the warmer weather in the fall. We indeed observed poorer catchability of trout at the beginning of our sampling period. Nevertheless, CPUE did not consistently increase later in the sampling period to levels observed in 2000-2002 and 2011. A lack of decline in average body size of fish does not rule out the possibility of a decline in the abundance of the population given the reduction of CPUE in 2016. We suggest that it may be beneficial for the Cree Nation of Mistissini to have the same sampling conducted within the next couple of years to re-assess CPUE.

The Cooncome family mentioned concerns regarding the development of roads into the Otish Mountain region. These roads are close to the headwaters of the Pepeshquasati drainage. Many of the locations where brook trout spawn in the Pepeshquasati appear to be unknown; the Cooncome family knows of a couple of spawning locations, but not the full extent to which brook trout from Mistassini Lake migrate up the river drainage. As further mining development takes place in the Otish Mountains, it may be very useful to conduct a tagging study of spawning brook trout in the Pepeshquasati, to determine the locations of critical breeding and rearing habitat for the population.

Acknowledgements

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Figure 1. Box plots of the length (mm) of Pepeshquasati River brook trout over three time periods (sexes pooled).

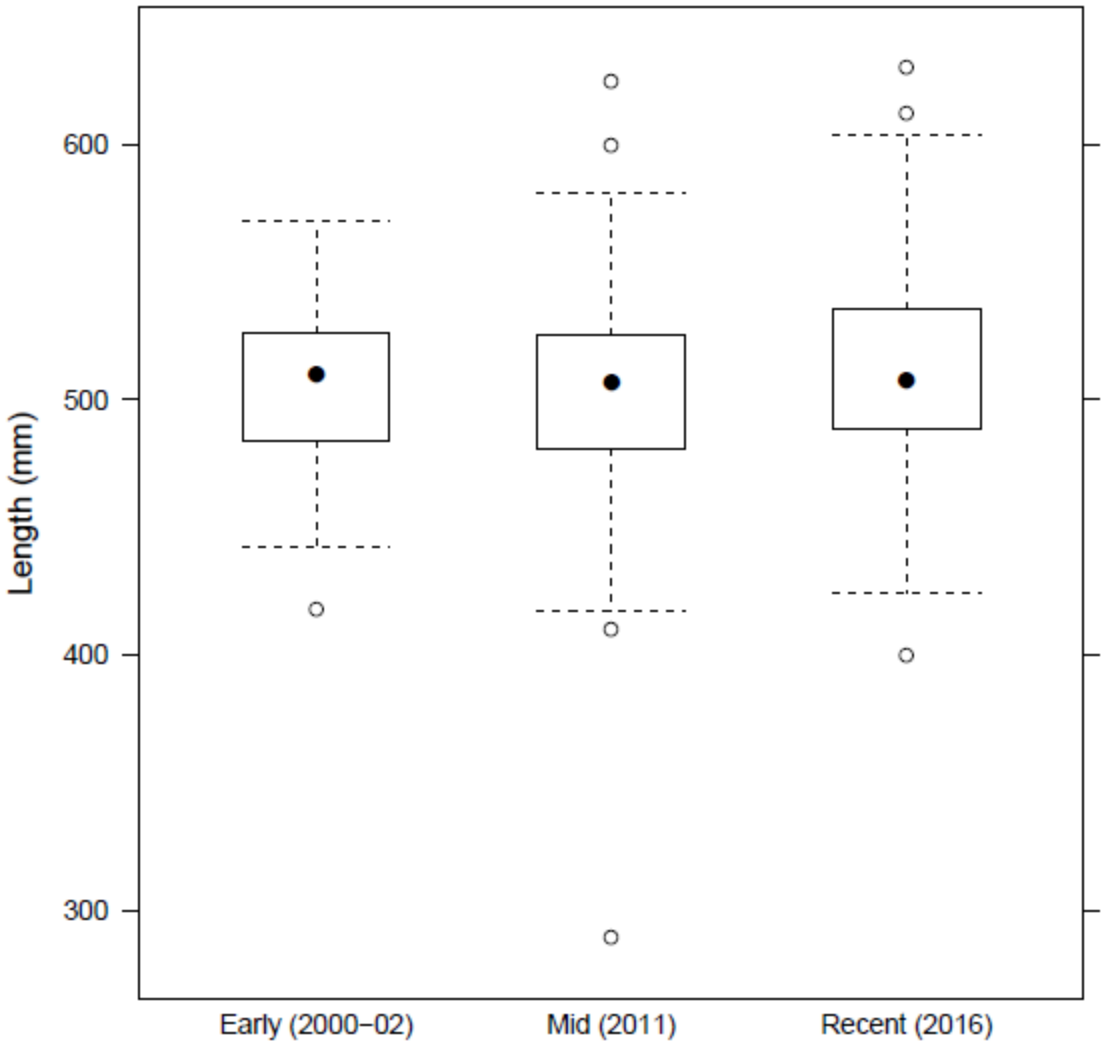


Figure 2. Box plots of the length (mm) of female and male brook trout from the Pepeshquasati River over three time periods.

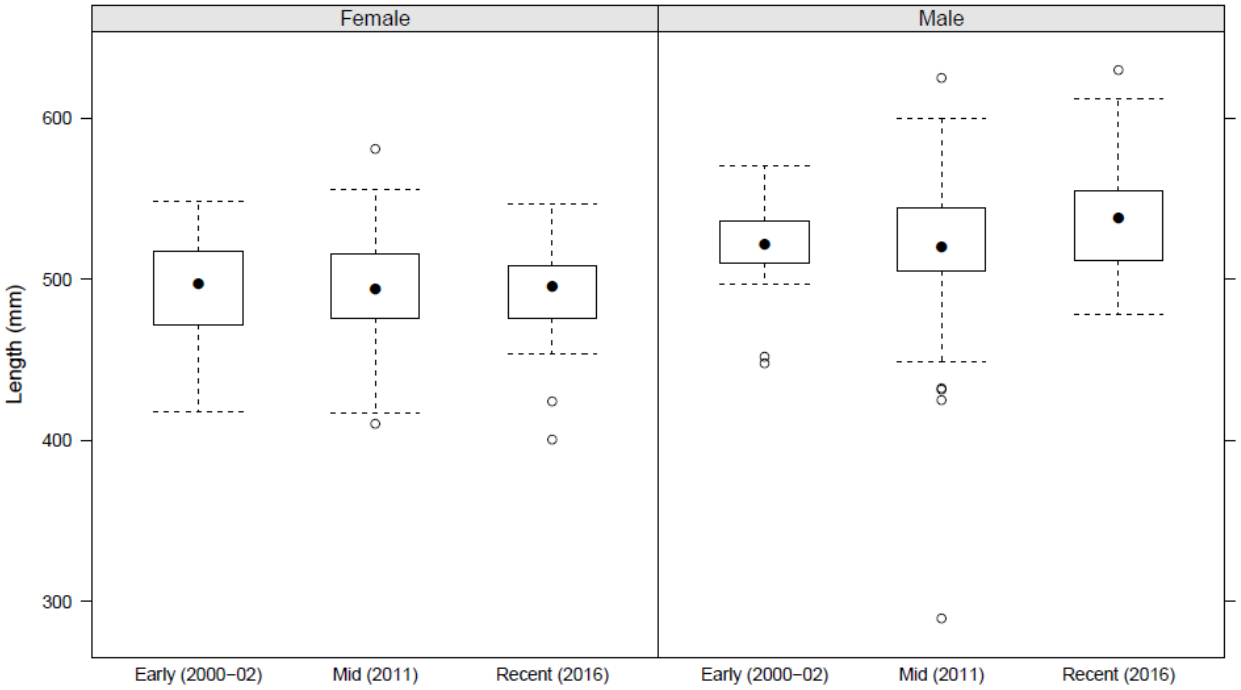
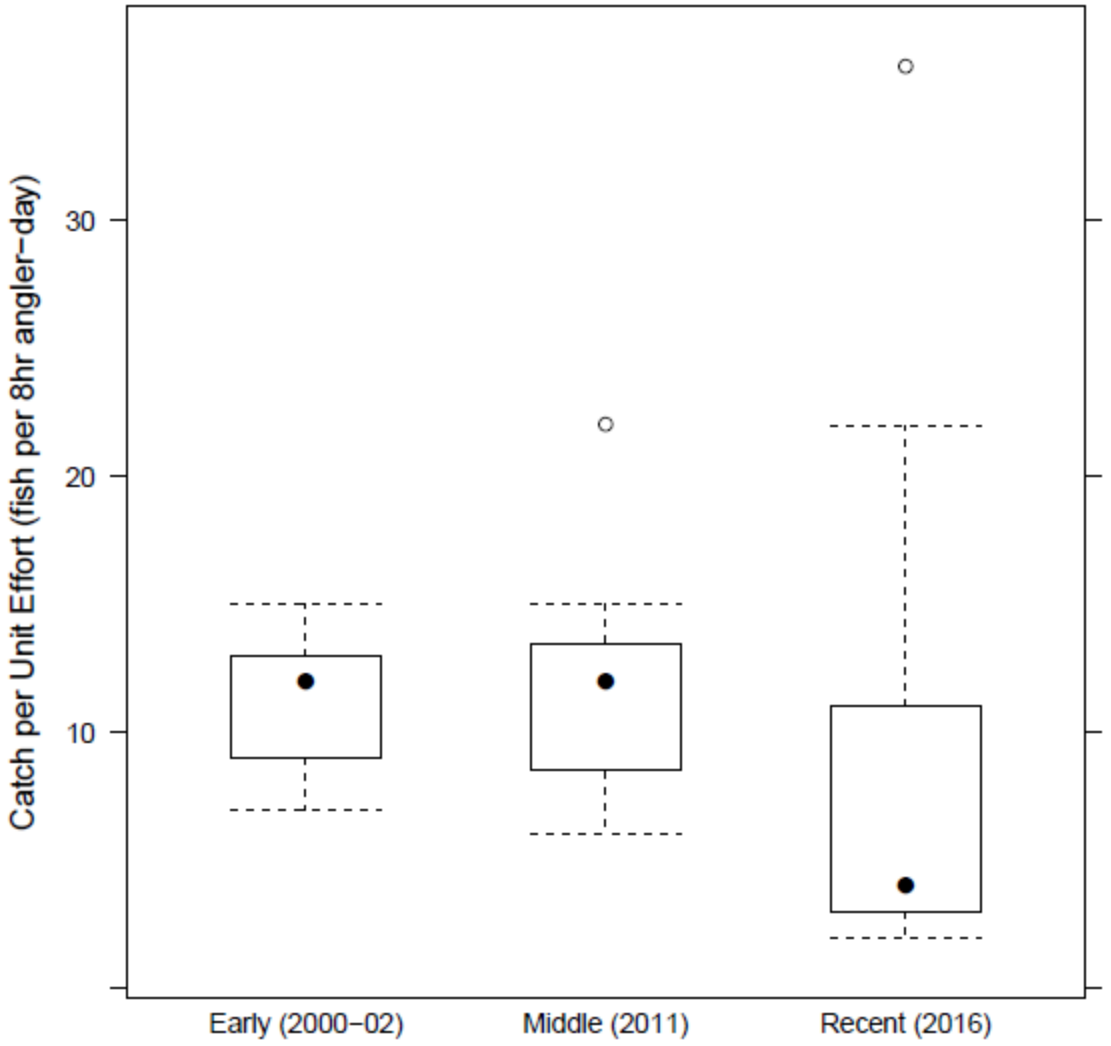


Figure 3. Box plots of catch-per-unit-effort (CPUE) of Pepeshquasati River brook trout over three time periods, based on an eight hour day of fishing.



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