

Background

“How are the fish in my lake doing?” We need this answer to set appropriate fishing regulations, to understand and correct any problems with fish habitat, and to guard against invasive species. A healthy fish population and fish community means we can all enjoy the benefits of sustainable fisheries and healthy ecosystems. A standard method of assessing the status of fish populations is necessary to allow comparisons of fish sustainability across the years at a lake, and to compare to other lakes. In Alberta, we use an accepted standard of index netting for lake fisheries assessment. This method provides the necessary data on fish abundance, biological data (such as age and sex), and species diversity to assess sustainability.

Fall Index Netting (FIN)

Alberta Environment and Parks monitor Walleye and Northern Pike populations using standardized index netting (Morgan, 2002). Fall index netting occurs during late summer and fall when water temperatures are 10-15 °C. Standardized multi-mesh gill nets are set at random locations between 2 and 15 metres deep, set for 21-27 hours (i.e., a net-night), and then reset in new random locations. Information from Yellow Perch, Lake Whitefish, Burbot, minnow, and sucker species are also collected. The information collected from each fish includes length, weight, age, gender, and maturity. After sampling, if fish are appropriate for human consumption, Alberta biologists provide the fish to local Indigenous peoples or to persons on approved subsistence lists. Typically, a tiny proportion of the lake’s fish population (usually less than 1 or 2%) are killed in this sampling.

How is this information used?

Catch rates (i.e., number of fish captured per net-night) of Walleye and Northern Pike are an index of the populations’ abundance, with higher catch rates meaning there are more fish in the lake. The abundance of adult fish is compared to the standardized thresholds for 5 broad categories of risk to the long-term sustainability of the fish population, with higher densities of fish having lower risk (Table 1). The sizes and age of fish also tell us if problems with overharvest (e.g. too few fish living to old age) or habitat (e.g., poor spawning success) are a concern. Biologists use this information, as well as a variety of data on water quality, access, development, and habitat threats as part of Alberta’s Fish Sustainability Index (FSI).

The management goal for most Alberta fisheries is **long-term sustainability**, shown by the red lines on the graphs below.

Achieving this goal uses the netting data and the FSI to determine the most appropriate sport fishing regulations for a lake. This landscape-level assessment allows for consistent, broad temporal comparisons of fish sustainability and status. For more information please see Alberta’s FIN and FSI websites,

- <http://aep.alberta.ca/fish-wildlife/fisheries-management/fall-index-netting/default.aspx>
- <http://aep.alberta.ca/fish-wildlife/fisheries-management/fish-sustainability-index/default.aspx>

Table 1 – Alberta’s Fish Sustainability Index risk thresholds for Walleye and Northern Pike using the standardized Fall Index Net (FIN) method. Note: Thresholds align with species management frameworks.

Mature Walleyes/net	Mature Pike/net	Risk to Sustainability
>29.0	>21.8	Very Low
20.3-29.0	15.3-21.8	Low
14.5-20.2	10.9-15.2	Moderate
5.8-14.4	4.4-10.8	High
<5.8	<4.4	Very High

Results of the 2017 FIN at Graham Lake

Graham Lake (4201 ha) is located approximately 140 km north from the town of Slave Lake. From September 18-20, 2017, fourteen gill nets captured 2 Burbot, 61 Cisco, 130 Lake Whitefish, 2 Longnose Suckers, 45 Northern Pike, 4 Spottail Shiners, 148 Walleyes, 6 White Suckers and 80 Yellow Perch.

Walleye

The mean catch rate of Walleyes was 10.6/net-night. The catch rates of mature (Figure 1) and immature Walleyes were 10.1/net-night and 0.5/net-night, respectively. The corresponding FSI score for the current mature density of Walleye was assessed at **high risk**.

The length distribution indicates weak recruitment, no fish in the 240 to 400 mm size classes and moderate to high abundances of Walleyes over 500 mm (Figure 2). The fishery is almost entirely supported by a single strong adult year classes. Poor recruitment is possibly the result of habitat issues.

The 2017 FIN sample represented approximately 0.6% of the estimated mature Walleye population size.

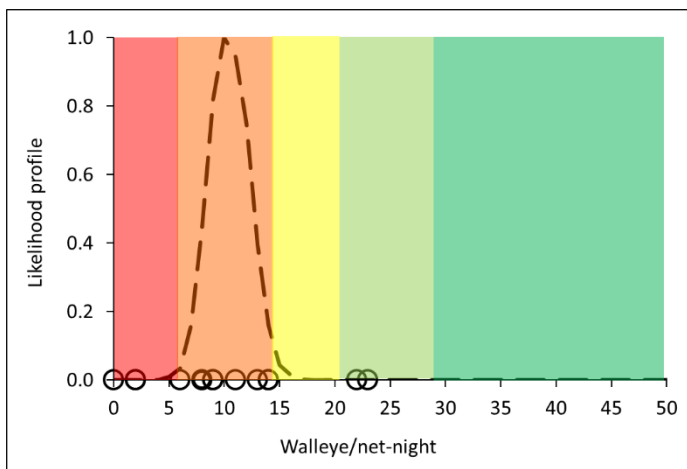


Figure 1 - The FIN catch rate of mature Walleyes from Graham Lake, 2017. Dashed line is the mean likelihood catch rate (10.1 fish/net-night), with individual net data as hollow circles (n=14 nets).

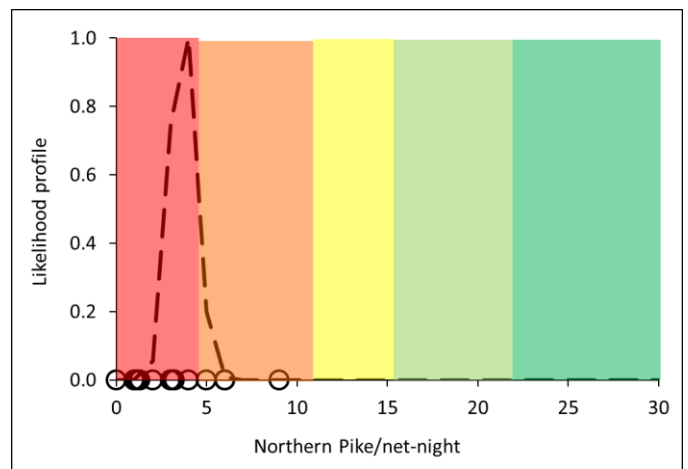


Figure 3 - The FIN catch rate of mature Northern Pike from Graham Lake, 2017. Dashed line is the mean likelihood catch rate (3.2 fish/net-night), with individual net data as hollow circles (n=14 nets).

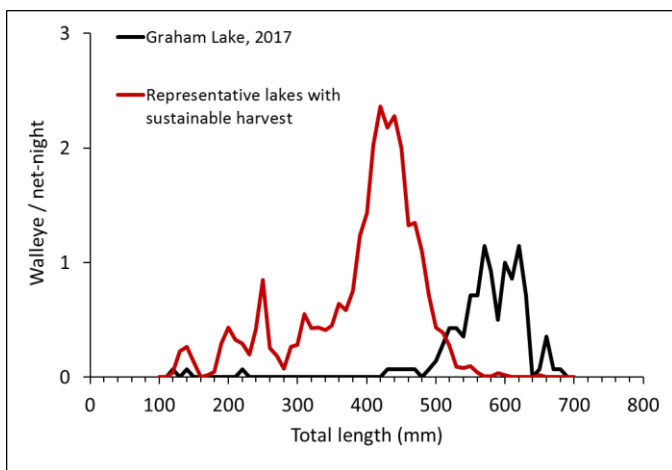


Figure 2 – FIN sample of showing size of Walleyes from Graham Lake, 2017. The red line indicates the average length distribution of Walleye from 5 Alberta lakes supporting long-term sustainable harvests of Walleye.

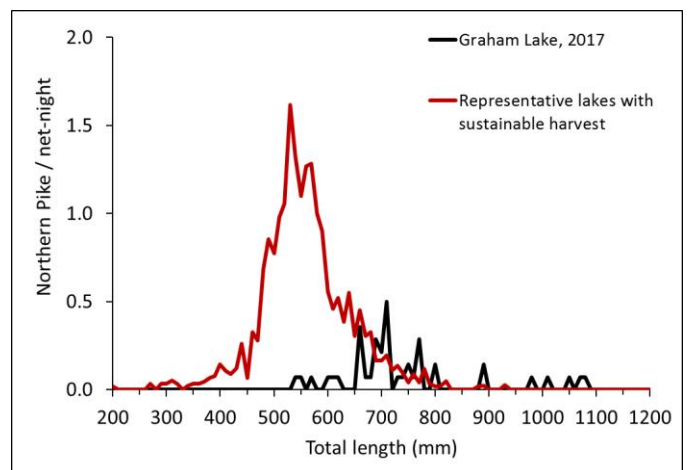


Figure 4 – FIN sample showing size of Northern Pike from Graham Lake, 2017. The red line indicates the average length distribution of pike from 6 Alberta lakes supporting long-term sustainable harvests of pike.

Northern Pike

The mean catch rate of mature Northern pike was 3.2/net-night (Figure 3). The corresponding FSI score for the mature density of Northern Pike was assessed at **very high risk**.

The length distribution shows no recent recruitment, very few fish between 300 to 650 mm, and moderate abundances of Northern Pike over 650 mm (Figure 4). Poor recruitment to the fishery is potentially the result of habitat issues.

The 2017 FIN sample represented approximately 0.1% of the estimated mature Northern Pike population size.

Summary

The abundance of mature Walleyes in Graham Lake has decreased from an FSI status of **moderate risk** in 2009 to

high risk in 2017. To ensure declines do not continue, careful conservation-based management will be necessary.

Graham Lake has decreased from an FSI status for mature Northern Pike of **high risk** in 2009 to **very high risk** in 2017. Conservation-focused management for pike remains necessary to maintain this population.

Literature

Morgan, G.E. 2002. Manual of Instructions-Fall Walleye Index Netting. Percid Community Synthesis, Diagnostics and Sampling Standards Working Group. Laurentian University, Sudbury Ontario.