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. At Amisk Lake in 2017, a half-length variation of the standard index net was used, balancing precision of the catch rates with reduced sampling effort. 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 / ½ net	Mature Pike / ½ net	Risk to Sustainability
>14.5	>10.9	Very Low
10.2-14.5	7.7-10.9	Low
7.3-10.1	5.5-7.6	Moderate
2.9-7.2	2.2-5.4	High
<2.9	<2.2	Very High

Results of the 2017 FIN at Amisk Lake

Amisk Lake (527 ha) is located approximately 158 km north from the city of Edmonton. From October 2-4, 2017, ten ½ length nets captured 11 Cisco, 1 Lake Whitefish, 56 Northern Pike, 173 Walleyes, 12 White Suckers and 103 Yellow Perch.

Walleye

The mean catch rate of Walleyes was 17.3/ ½ net-night. The catch rates of mature (Figure 1) and immature Walleyes were 11.8/ ½ net-night and 5.5/ ½ net-night, respectively. The corresponding FSI score for the current mature density of Walleyes was assessed at **low risk**.

The length distribution shows variable but strong recruitment and abundant Walleyes in all size classes (Figure 2).

The 2017 FIN sample represented approximately 1.8% of the estimated mature Walleye population size.
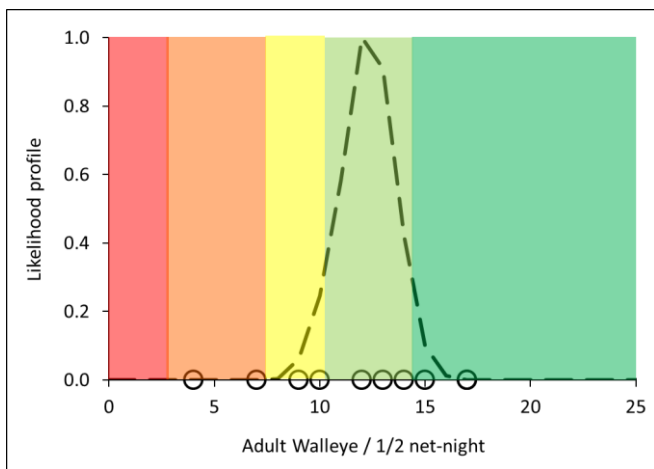
Figure 1 - The FIN catch rate of mature Walleyes from Amisk Lake, 2017. Dashed line is the mean catch rate (11.8 fish/ ½ net-night), with individual net data as hollow circles (n=10 nets).
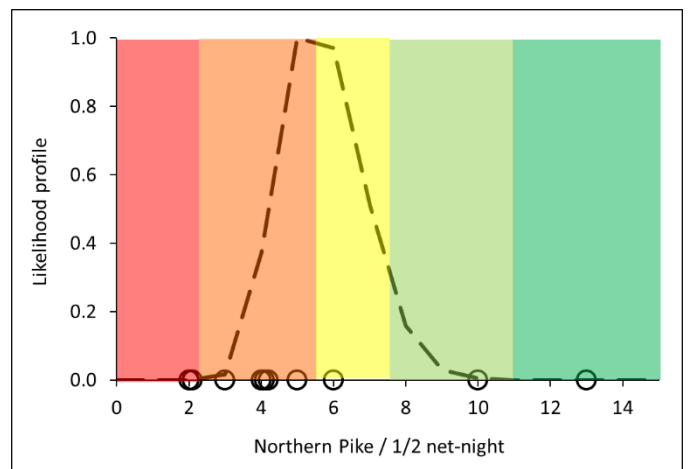

Figure 3 - The FIN catch rate of mature Northern Pike from Amisk Lake, 2017. Dashed line is the mean catch rate (5.3 fish/ ½ net-night), with individual net data as hollow circles (n=10 nets).
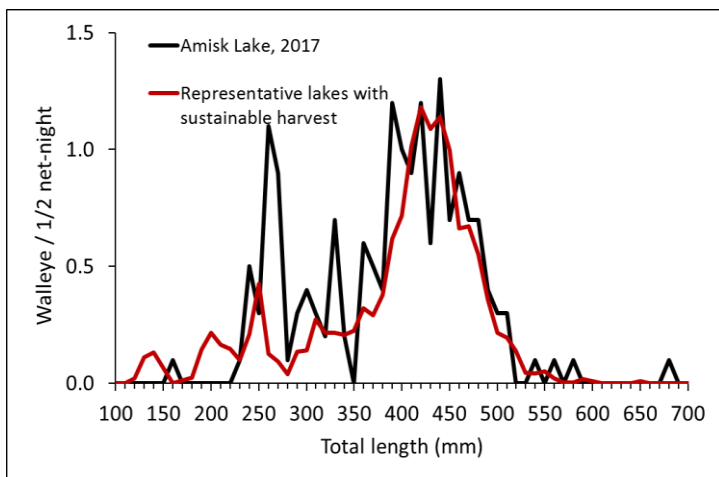

Figure 2 – FIN sample of showing size of Walleyes from Amisk Lake, 2017. The red line indicates the average length distribution of Walleye from 5 Alberta lakes supporting long-term sustainable harvests of Walleye.
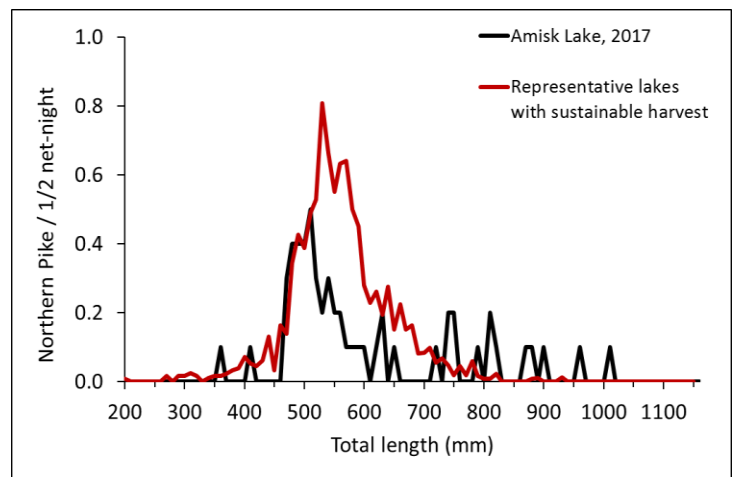

Figure 4 – FIN sample showing size of Northern Pike from Amisk Lake, 2017. The red line indicates the average length distribution of pike from 6 Alberta lakes supporting long-term sustainable harvests of pike.

Northern Pike

The mean catch rate of mature Northern Pike was 5.3/ ½ net-night (Figure 3). The corresponding FSI score for the current mature density of Northern Pike was assessed at high risk-moderate risk.

The length distribution shows strong but variable recruitment, moderate abundances of 450 to 670 mm pike, and abundant large fish (Figure 4). Variable recruitment and lower abundances may be reflective of habitat limitations and overfishing.

The 2017 FIN sample represented approximately 0.4% of the estimated mature Northern Pike population size.

Summary

Amisk Lake has been FIN'ed in 2005, 2010, and 2013. Since 2005 the density of mature Walleyes declined from a FSI status of low risk to high risk (2010), and very high risk (2013). However, the status has increased and is now classified as low risk in 2017. With careful conservation-based management, sustainable harvests would be possible.

Since the 2005 FIN assessment, the density of mature Northern Pike has decreased from a FSI status of low risk to high risk (2010), very high risk (2013) and high risk-moderate risk (2017). However, high variation in 2017 net catches leads to larger uncertainty in our assessment. Regardless, careful conservation-focused management will likely remain the focus to ensure the sustainability of the 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.