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 2013, 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 Pike using the standardized Fall Index Net (FIN) method. **Note:** *Thresholds align with species management frameworks.*

Mature Walleyes / 1/2 net	Mature Pike / 1/2 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 2013 FIN at Amisk Lake

Amisk Lake (527 ha) is located approximately 158 km north from the city of Edmonton. From September 17 to 18, 2013, ten ½ length nets captured 19 Northern Pike, 124 Walleye, and 64 Yellow Perch.

Walleye

The mean catch rate of Walleyes was 12.4/ ½ net-night. The catch rates of mature (Figure 1) and immature Walleye were 5.9/ ½ net-night and 6.5/ ½ net-night, respectively. The corresponding FSI score for the current mature density of Walleye was assessed at high risk.

The length distribution was broad with unstable recruitment, high abundance of Walleye from 250-400 mm, and moderate abundance of fish larger than 400 mm (Figure 2).

The 2013 FIN sample represented approximately 2% of the estimated mature Walleye population size.
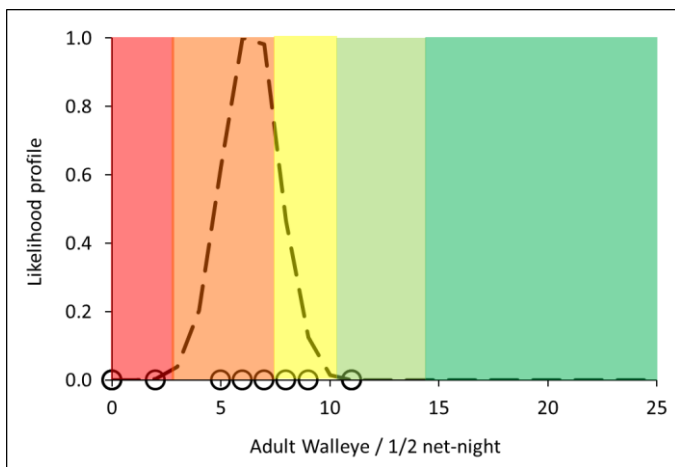
Figure 1 - The FIN catch rate of mature Walleyes from Amisk Lake, 2013. Dashed line is the mean catch rate (5.9 fish/ ½ net-night), with net data as hollow circles (n=10 nets).
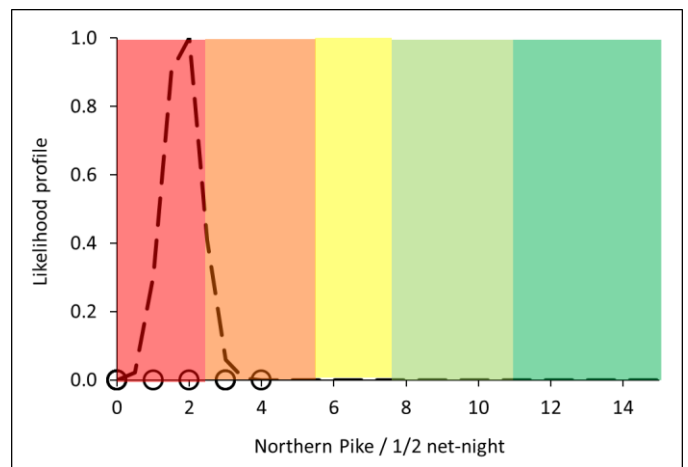

Figure 3 - The FIN catch rate of Northern Pike from Amisk Lake, 2013. Dashed line is the mean catch rate (1.6 fish/ ½ net-night), with net data as hollow circles (n=10 nets).
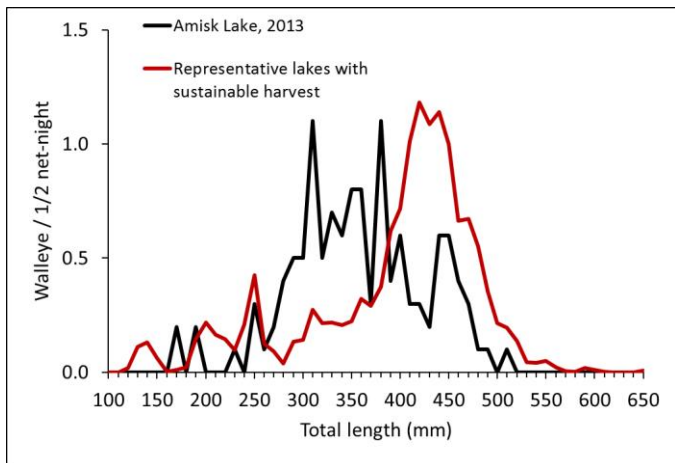

Figure 2 – FIN sample of showing size of Walleyes from Amisk Lake, 2013. The red line indicates the average length distribution of Walleye from 5 Alberta lakes supporting long-term sustainable harvests of Walleye.
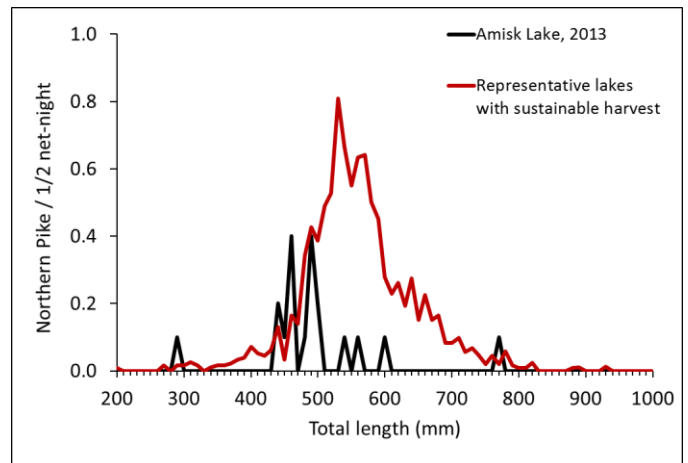

Figure 4 – FIN sample showing size of Northern Pike from Amisk Lake, 2013. The red line indicates the average length distribution of Pike from 6 Alberta lakes supporting long-term sustainable harvests of Pike.

Northern Pike

The mean catch rate of mature Northern Pike was 1.6/ ½ net-night (Figure 3). The corresponding FSI score for the current mature density of Northern Pike was assessed at **very high risk**.

The length distribution of Northern Pike shows a severe truncation of fish larger 500 mm and very unstable recruitment (Figure 4). This is indicative of growth to recruitment overfishing.

The 2013 FIN sample represented approximately 0.4% of the estimated mature Northern Pike population size.

Summary

Since the FINs on Amisk Lake in 2005 and 2010, the density of mature Walleye has declined from **very low risk** to **high risk** in 2013. Dependant on the management objective, conservation-based management will support the long-term sustainability of the fishery.

Since the FINs in 2005 and 2010, the corresponding FSI status of mature Northern Pike has declined from **very low risk** to **very high risk** in 2013, likely as a result of severe overfishing. Given the current status and dependant on the management objective, stringent conservation efforts are necessary to improve the long-term sustainability of this fishery.

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.