

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 Fisheries Management Objective for most Alberta fisheries is **long-term sustainability**, shown by the red lines on the graphs below. Achieving this objective 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 / 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 2015 FIN at Eagle Lake

Eagle Lake (1179 ha) is located 45 km east from the city of Calgary. From September 23-24, 2015, eight gill nets captured 1 Longnose sucker, 40 Northern Pike, 238 Walleye, and 10 White suckers, from Eagle Lake.

Walleye

The mean catch rate of Walleye was 29.8/net-night. The catch rates of mature (Figure 1) and immature Walleye were 10.0/net-night and 19.4/net-night, respectively. The corresponding FSI score for the current mature density of Walleye was assessed at **high risk**. One of the 8 nets had an unusually high catch, skewing the mean density.

The length distribution shows very strong recruitment, but with only low to moderate densities of Walleye larger than 300 mm (Figure 2). The fishery appears to be supported by several year-classes.

The 2015 FIN sample represented approximately 1.3% of the estimated Walleye population size.

Northern Pike

The mean catch rate of mature Northern pike was 4.9/net-night (Figure 3). The corresponding FSI score for the mature

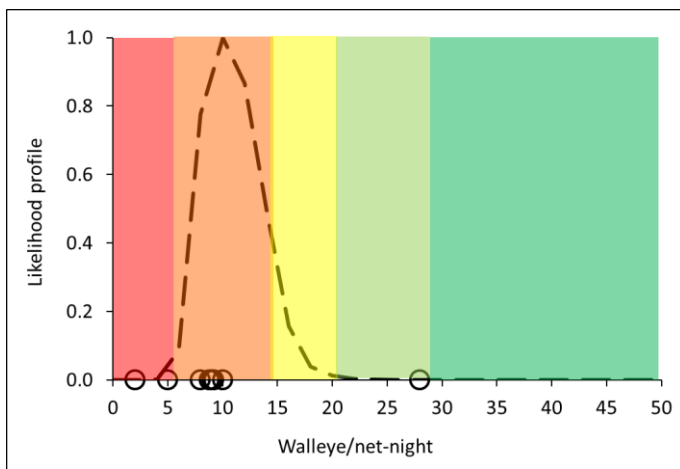


Figure 1 - The FIN catch rate of mature Walleyes from Eagle Lake, 2015. Dashed line is the mean likelihood catch rate (7.7 fish/net-night), with individual net data as hollow circles (n=8 nets).

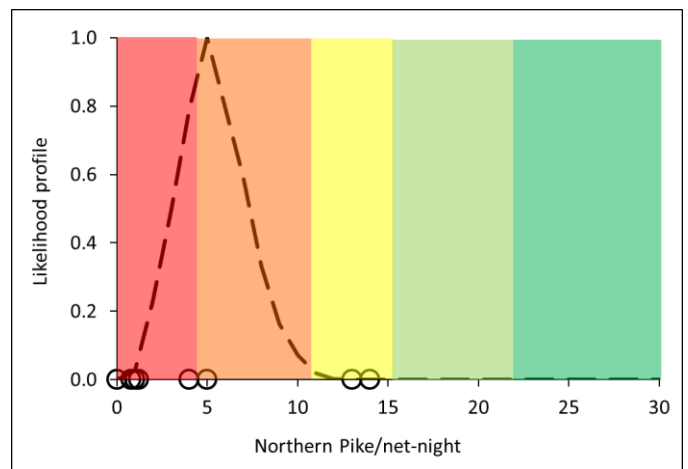


Figure 3 - The FIN catch rate of mature Northern Pike from Eagle Lake, 2015. Dashed line is the mean likelihood catch rate (4.9 fish/net-night), with individual net data as hollow circles (n=8 nets).

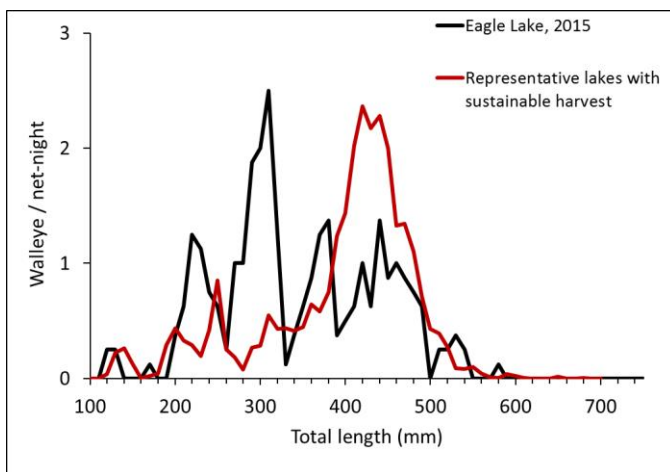


Figure 2 - FIN sample of showing size of Walleyes from Eagle Lake, 2015. The red line indicates the average length distribution of Walleye from 5 Alberta lakes supporting long-term sustainable harvests of Walleye.

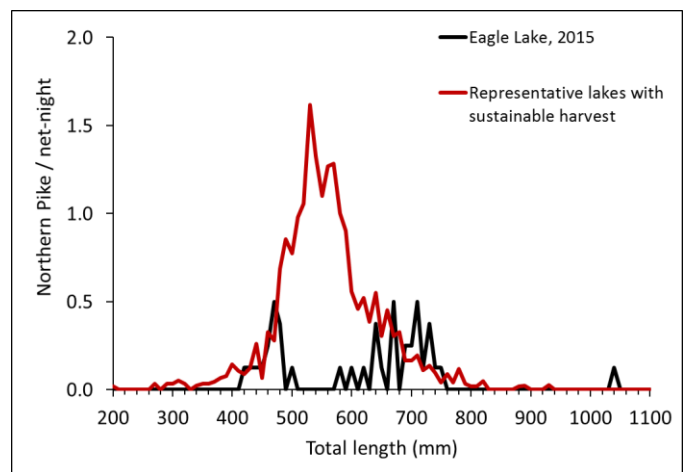


Figure 4 - FIN sample showing size of Northern Pike from Eagle Lake, 2015. The red line indicates the average length distribution of pike from 6 Alberta lakes supporting long-term sustainable harvests of pike.

density of Northern Pike was assessed at **high risk**.

The length distribution shows poor and unstable recruitment, with a single abundant pulse of fish larger than 640 mm (Figure 4). The poor recruitment is likely a result of habitat issues in this small and shallow waterbody.

The 2015 FIN sample represented approximately 0.3% of the estimated Northern Pike population size.

Summary

The FSI status of Eagle Lake, as determined by the 2015 FIN, assessed the Walleye population to be at **high risk**. However in the near future, the large density of immature Walleye in

Eagle Lake, dependant on its Fisheries Management Objectives, may provide opportunities for carefully managed harvests.

The 2015 FIN at Eagle Lake assessed the FSI status of Northern Pike to be **high risk** although long term sustainable harvest may be a challenging goal at this small waterbody.

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.