

## 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 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 2013 FIN at Lake Newell

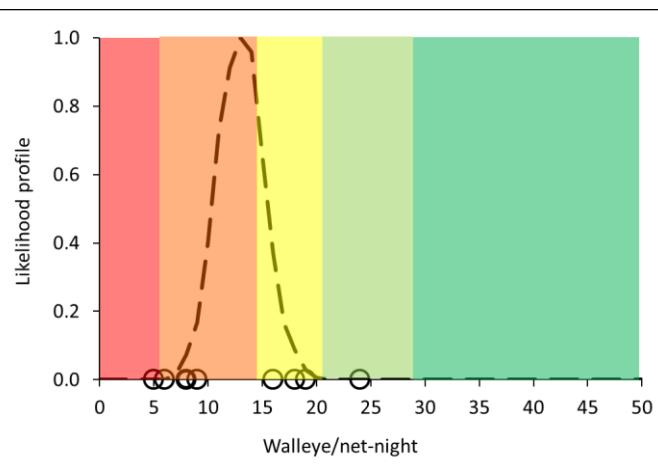
Lake Newell (12431 ha) is located approximately 210 km southeast from the city of Calgary. From September 22 to 23, 2013, nine FIN nets captured 103 Lake Whitefish, 22 Northern Pike, 204 Walleye, and 137 Yellow Perch.

## Walleye

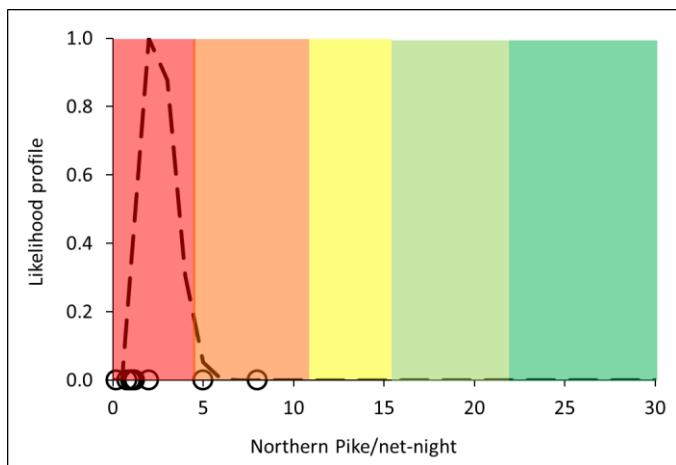
The mean catch rate of Walleyes was 22.7/net-night. The catch rates of mature (Figure 1) and immature Walleye were 12.6/net-night and 11.1/net-night, respectively. The corresponding FSI score for the current mature density of Walleye was assessed at **high risk**.

The length distribution shows strong though unstable recruitment, a low abundance of Walleye 350 to 500 mm, and a high abundance of fish larger than 500 mm (Figure 2). As Lake Newell is an irrigation reservoir, fluctuating water levels may contribute to unstable recruitment. However, the fishery appears to be supported by several moderate to strong year-classes.

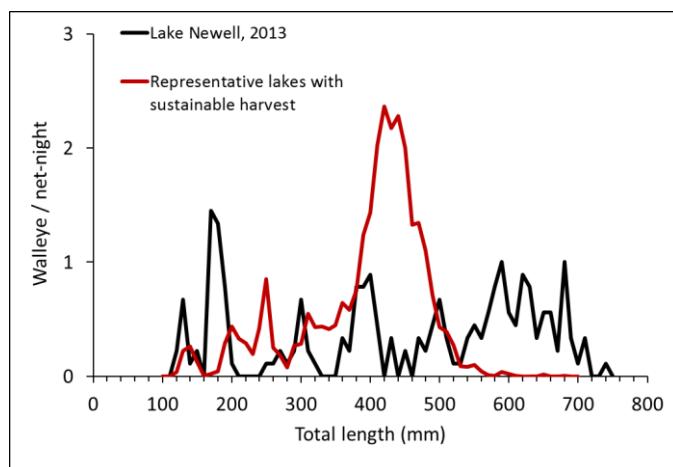
The 2013 FIN sample represented approximately 0.1% of the estimated mature Walleye population size.



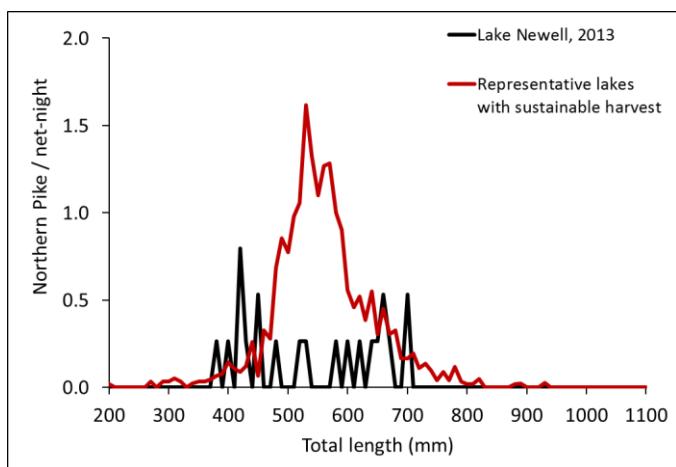
**Figure 1 - The FIN catch rate of mature Walleyes from Lake Newell, 2013. Dashed line is the mean catch rate (12.6 fish/net-night), with net data as hollow circles ( $n=9$  nets).**



**Figure 3 - The FIN catch rate of Northern Pike from Lake Newell, 2013. Dashed line is the mean catch rate (2.2/net-night), with net data as hollow circles ( $n=9$  nets).**



**Figure 2 – FIN sample of showing size of Walleyes from Lake Newell, 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 Lake Newell, 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 2.2/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 shows variable recruitment and low abundance of all sizes of Northern Pike (Figure 4). Fluctuating water levels or the lack of littoral zone may contribute to unstable recruitment of Pike.

The 2013 FIN sample represented approximately 0.03% of the estimated mature Northern Pike population size.

## Summary

The abundance of mature Walleye in Lake Newell has increased and the corresponding FSI status has improved

from **very high risk** in 2005 to **high risk** from 2006 to 2013. Dependant on the management objectives, conservation-focused management is necessary for long-term sustainability.

From 2006 to 2013, the abundance and corresponding FSI status for mature Northern Pike, in Lake Newell, has decreased from **high risk** to **very high risk**. Conservation-focused efforts are necessary to recover this population, dependant on the management objective.

## 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.