# Smoke Lake FIN Summary, 2013

### *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 2013 FIN at Smoke Lake*

Smoke Lake (938 ha) is located approximately 230 km northwest of the city of Edmonton. From September 23-25, 2013, eight gill nets captured 19 Lake Whitefish, 22 Northern Pike, 1 Trout-perch, 230 Walleye, 6 White Suckers, and 6 Yellow Perch, from Smoke Lake.

### *Walleye*

The mean catch rate of Walleyes was 28.8/net-night. The catch rates of mature (Figure 1) and immature Walleye were 17.0/net-night and 11.6/net-night, respectively. The corresponding FSI score for the current mature density of Walleye was assessed at moderate risk.

The length distribution shows moderate recruitment, with abundant fish in most size classes, and truncation of Walleye larger than 510 mm (Figure 2).

The 2013 FIN sample represented approximately 1.6% of the estimated Walleye population size.

### *Northern Pike*

The mean catch rate of mature Northern Pike was 2.4/net-night (Figure 3). The corresponding FSI score for the mature density of Northern Pike was assessed at **very high risk**.

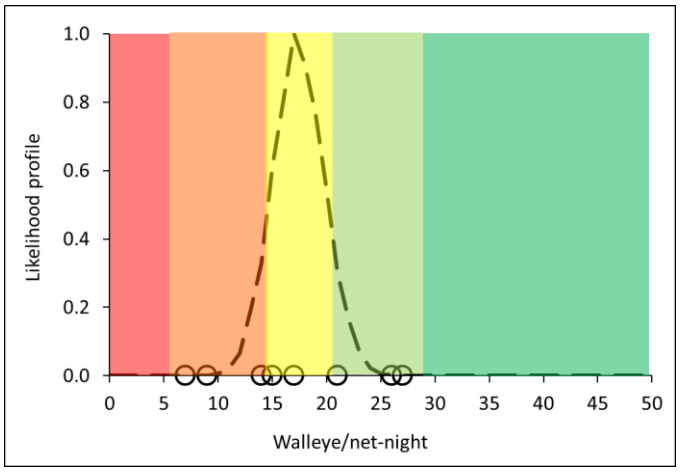


*Figure 1 - The FIN catch rate of mature Walleyes from Smoke Lake, 2013. Dashed line is the mean likelihood catch rate (17.0/fish/net-night), with net individual data as hollow circles (n=8 nets).*

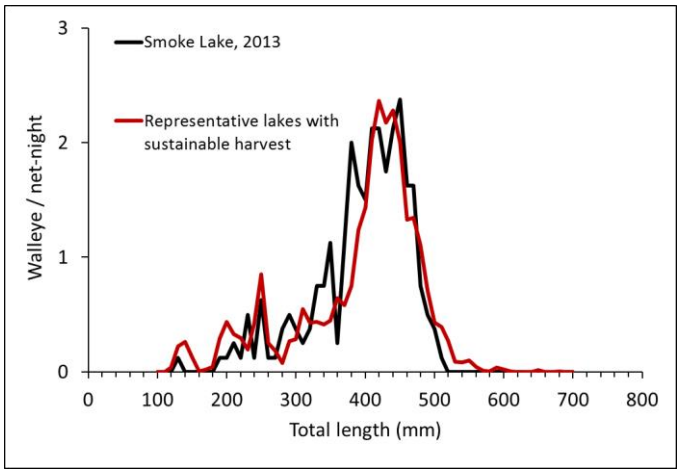


*Figure 2 – FIN sample of showing size of Walleyes from Smoke Lake, 2013. The red line indicates the average length distribution of Walleye from 5 Alberta lakes supporting long-term sustainable harvests of Walleye.*

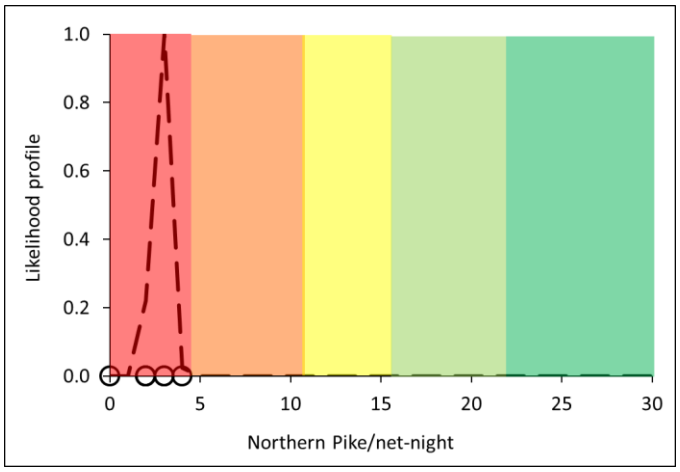


*Figure 3 - The FIN catch rate of Northern Pike from Smoke Lake, 2013. Dashed line is the mean likelihood catch rate (2.4 fish/net-night), with individual net data as hollow circles (n=8 nets).*

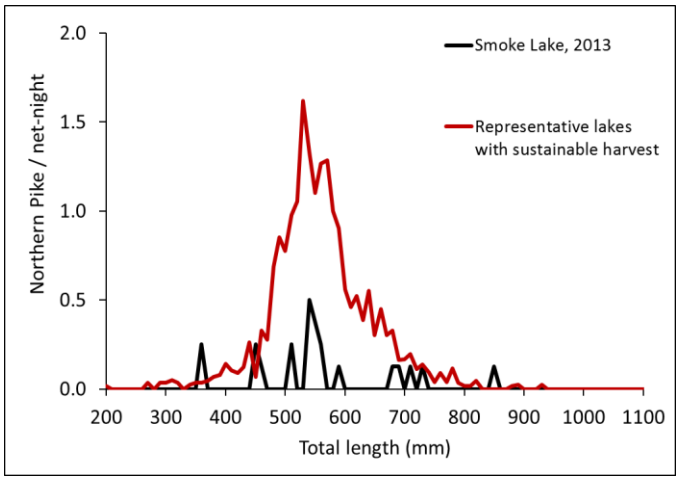


*Figure 4 – FIN sample showing size of Northern Pike from Smoke Lake, 2013. The red line indicates the average length distribution of pike from 6 Alberta lakes supporting long-term sustainable harvests of pike.*

The length distribution although broad, is unstable and supported by several weak year classes (Figure 4).

The 2013 FIN sample represented approximately 0.3% of the estimated Northern Pike population size.

### *Summary*

In the 2003, 2004, 2005 and 2011 FINs, the density of mature Walleye varied between a FSI status of moderate risk to low risk. The current FSI status is moderate risk. Dependent on management objectives, limited harvest opportunities (i.e. Special Harvest licences) may support the long-term sustainability of the Walleye fishery. However, continued conservation focused management will be key.

Since the 2003 FIN, the density of mature Northern Pike has remained at a FSI status **very high risk**, likely due to overharvest. Rigorous conservation-based efforts are necessary to ensure the continued sustainability of the pike population and 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.