## 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 Pigeon Lake

Pigeon Lake (9731 ha) is located 66 km southwest from the city of Edmonton. From a severely collapsed status in the late 1990s, this lake has recovered to become one of Alberta's premier walleye fisheries. From September 29 to 30, 2015, seven gill nets captured 110 Lake Whitefish, 7 Northern Pike, 360 Walleyes, and 1 Yellow Perch, from Pigeon Lake.

## Walleye

The mean catch rate of Walleyes was 51.4/net-night. The catch rates of mature (Figure 1) and immature Walleye were 33.9/net-night and 17.6/net-night, respectively. The corresponding FSI score for the current mature density of Walleye was assessed at **very low risk**.

The length distribution shows some instability, but with recent (past 4 years) strong recruitment and exceptional densities of larger fish (Figure 2).

The 2015 FIN sample represented approximately 0.1% of the estimated Walleye population size.

## Northern Pike

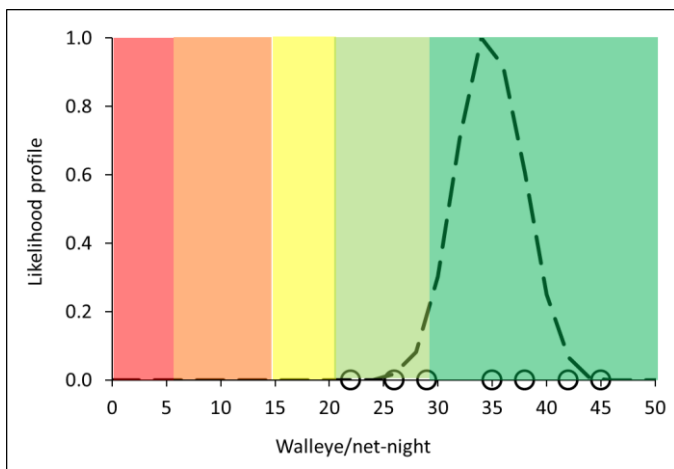The mean catch rate of mature Northern pike was 1.0/net-

*Figure 1 - The FIN catch rate of mature Walleyes from Pigeon Lake, 2015. Dashed line is the mean likelihood catch rate (33.9 fish/net-night), with individual net data as hollow circles (n=7 nets).*
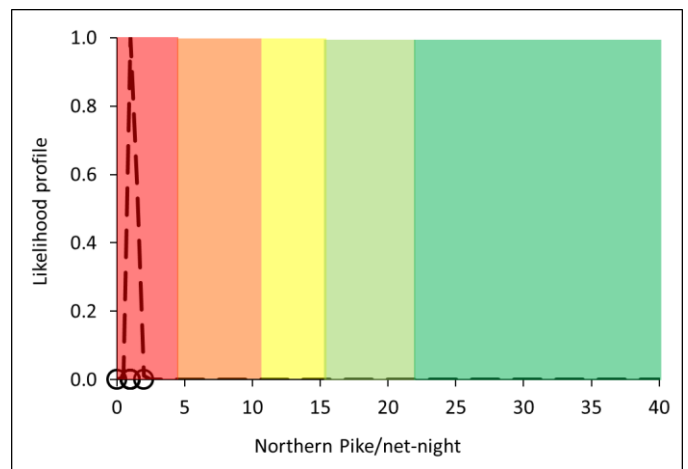


*Figure 3 - The FIN catch rate of Northern Pike from Pigeon Lake, 2015. Dashed line is the mean likelihood catch rate (1.2/net-night), with individual net data as hollow circles (n=7 nets).*
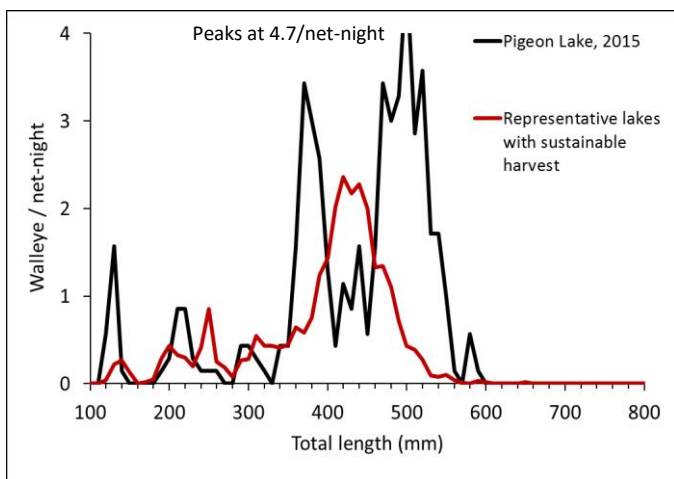


*Figure 2 – FIN sample of showing size of Walleyes from Pigeon Lake, 2015. The red line indicates the average length distribution of Walleye from 5 Alberta lakes supporting long-term sustainable harvests of Walleye.*
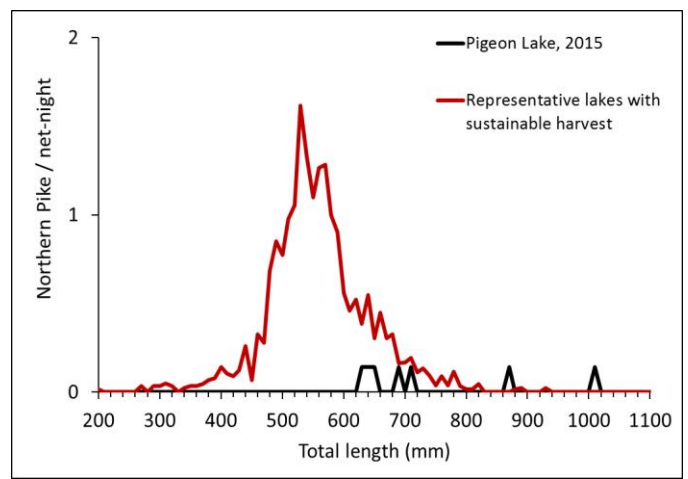


*Figure 4 – FIN sample showing size of Northern Pike from Pigeon Lake, 2015. The red line indicates the average length distribution of pike from 6 Alberta lakes supporting long-term sustainable harvests of pike.*

night (Figure 3). The corresponding FSI score for the mature density of Northern Pike was **very high risk**.

Northern Pike show weak recruitment and poor survival (Figure 4).

The 2015 FIN sample represented approximately <0.1% of the estimated Northern Pike population size.

### *Summary*
The FIN surveys since 2010 all assessed the FSI status of the Walleye population in Pigeon Lake as **very low risk**. Strong recruitment of young walleye suggests that long-term

sustainability objectives are being met and anglers continue to enjoy a superlative fishery.

The 2015 FIN assessed the density of mature Northern Pike in Pigeon Lake at a corresponding FSI status of **very high risk**. The collapse of this population necessesitates stringent conservation-oriented management.

### *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.