

Lake Superior Commercial Monitoring Report 2019

Sam Schneider and Dray Carl

WDNR Lake Superior Fisheries Management Team

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Introduction

Over the past 25 years Wisconsin DNR and Red Cliff and Bad River Bands of Lake Superior Chippewa have moved toward a smaller and better-regulated commercial fishery targeting five species: Lake Whitefish, Cisco (Lake Herring), Siscowet Lake Trout, Chub species, and Lean Lake Trout. Today, the Lake Whitefish and Cisco fisheries comprise the majority of the catch and value of the Lake Superior commercial fishery in Wisconsin waters. Commercial fishery management in Wisconsin waters of Lake Superior is built on three principles: annual harvest limits, limited entry, and individual transferable quotas. Harvest regulation is the primary day-to-day tool for protecting and enhancing fish populations, and onboard commercial monitoring is one avenue the biologists from the three parties use to collect information required for effective regulation. Biological staff from all three parties jointly conduct onboard commercial monitoring of all commercial fishers (state and tribal) as per the 2018-2028 Lake Superior Fishing Agreement. Joint commercial monitoring has been conducted consistently since 1990. Commercial monitoring is conducted primarily for three purposes.

First, during onboard monitoring staff collect biological data such as fish lengths, sexes, and aging structures (e.g., otoliths) for the purpose of characterizing the size and age structure of the Cisco, Lake Whitefish, and Lake Trout commercial fisheries. For example, these data are crucial inputs into the statistical catch-at-age model used to estimate Lake Trout population size and eventually determine the total allowable catch (TAC).

Second, onboard monitoring is used to track Lake Trout catch-per-unit-effort (CPE) for the purpose of appropriating effort limitations (gillnet footage) that commercial fishers are allowed to fish in the following year. This effort limitation is calculated using a formula involving the commercial allocation of the Lake Trout TAC and the 3-year rolling average of the Lake Trout CPE. As Lake Trout CPE increases, the amount of available gillnet footage decreases. Gillnet effort limitation and Lake Trout CPE's are calculated for each of Periods 1, 2, and 3 (more details in methods). Lake Trout CPE's from commercial monitoring are not used to assess relative abundance of Lake Trout through time; they are solely used to limit gillnet footage.

Third, onboard monitoring also allows staff to count and assess bycatch of recreationally-important sport fish in commercial gears. Sport fish species (e.g., Chinook Salmon, Coho Salmon, Brown Trout, Steelhead, Brook Trout, Splake, Smallmouth Bass, Northern Pike, Yellow Perch) can sometimes be vulnerable to capture in all types of commercial gears and are not allowed to be harvested or sold by state-licensed commercial fishers. Tribal-licensed commercial fishers can harvest sport fish species for home-use purposes only. It should be noted that not all bycatch is subject to mortality, and many fish are released back to the water.

Methods

In 2019, the State and Red Cliff and Bad River Bands of Lake Superior Chippewa commercial fishers fished using large mesh gillnets (> 4 7/16 inch mesh size), small mesh gillnets (2 3/8" - 3" inch mesh size), and trap nets in the western arm (WI-1) and the Apostle Islands region (WI-2) of Lake Superior. Gillnets were monofilament or nylon, complied with mesh size regulations, and were lifted within the allotted time period and areas as stated in the Lake Superior Fishing Agreement. Commercial effort was jointly monitored by biological staff to determine total number of all species caught.

Biological data were also collected from a sample of individual fish including total length, sex, maturity, and otolith samples for aging. Other information collected by onboard monitors included location, effort (total length of gillnet), depth, and gear specifications.

Large mesh gillnet lifts (bottom sets) were conducted in three commercial fishing periods. Period 1 extends from November 28th through March 31st, Period 2 extends from April 1st through May 31st, and Period 3 extends from June 1st through September 30th. A gillnet lift is defined as the act of lifting and completely emptying a single, connected string of gillnet. Commercial monitoring data collected in Period 1, Period 2, and Period 3 were pooled from all agencies from 2015–2019 and used to create a time series of Lake Trout mean gillnet CPE's (i.e., fish per 1,000 feet of gillnet).

Cisco harvest in small mesh gillnets (mostly suspended or floated sets) primarily occurs from October through December. Pooled (all parties) small mesh gillnet lift data from October through December in 2019 was used to estimate the total number of Cisco harvested during monitoring events. Total number of Cisco was calculated by multiplying the total boxes of Cisco by the average number of Cisco per box.

Trap nets are only fished in Periods 2 and 3, and pooled data are also presented. A trap net lift is defined as the act of lifting and completely emptying the pot-end (area where fish are trapped and held) of the trap net.

Total sport fish bycatch (total number observed during onboard monitoring and proportion of total harvest) was reported for each family of commercial fishing gears: large mesh gillnet, small mesh gillnet, and trap nets. Bycatch of recreationally-important salmonid species (i.e., Brown Trout, Coho Salmon, Chinook Salmon, Splake, and Steelhead) was also reported in a time series since 2015.

Analyses were conducted using Program R, and this report was formatted using RMarkdown.

Results

Large Mesh Gillnets

In 2019, a combined total of 153 lifts and 275,365 feet of large mesh gillnet was monitored onboard commercial vessels throughout Periods 1, 2, and 3 by all parties. This represented 6.0% of the total large mesh gillnet effort set in fishing year 2019 by all parties, which is slightly under our overall goal of 7%. Mean length of measured Lake Whitefish caught by commercial fishers using large mesh gillnets was 18.6 inches, and mean length of measured Lake Trout caught by commercial fishers was 22.6 inches (Figure 1).

In Period 1 of 2019, a total of 29 lifts and 60,155 feet of large mesh gillnet was monitored. During onboard monitoring, a total of 1,719 Lake Trout were caught during Period 1. Mean Lake Trout CPE was 31.1/1,000-ft which is the highest CPE in Period 1 in the past 5 years (Figure 2). Lake Trout CPE is generally highest in Period 1 relative to the other Periods.

In Period 2 of 2019, a total of 50 lifts and 79,890 feet of large mesh gillnet was monitored. During onboard monitoring, a total of 823 Lake Trout were caught during Period 2. Mean Lake Trout CPE was 10.4/1,000-ft which is the highest average Lake Trout CPE in Period 2 since 2015 (Figure 2).

In Period 3 of 2019, a total of 74 lifts and 135,320 feet of large mesh gillnet was monitored. During onboard monitoring, a total of 1,199 Lake Trout were caught during Period 3. Mean Lake Trout CPE was 8.4/1,000-ft in Period 3 which was higher than Lake Trout CPE's in 2015, 2016, and 2018 but less than in 2017. Period 3 has the lowest average CPE among periods and is relatively consistent annually (Figure 2).

Small Mesh Gillnets

A total of 54 lifts and 50,000 ft of small mesh gillnet was monitored in 2019. Lifts started on November 8th and ended on December 5th. An estimated 38,730 Cisco were harvested while monitors were present. Mean length of the measured Cisco was 15.1 inches (Figure 1). The age structure of the 2019 Cisco catch was mainly comprised of the 2015 (31%), 2009 (35%), 2003 (6%), and 1998 (6%) year-classes. This means approximately 78% of the entire catch of Cisco in the commercial fishery was born in one of four years, suggesting poor Cisco recruitment (i.e., birth rate) to the fishery in all other years.

Trap Nets

In 2019, 10 trap net lifts were monitored, with all 10 lifts occurring in Period 3. A total of 4,399 Lake Whitefish and a total of 39 Lake Trout were caught using trap nets during monitored lifts. The average length of measured Lake Whitefish and measured Lake Trout caught in trap nets were 18.2 inches and 22.9 inches, respectively (Figure 1).

Bycatch

Bycatch made up a small proportion of the overall catch in large mesh gillnets, small mesh gillnets, and trap nets in 2019 (Figure 3). Values expressed as percentages are proportions of the total catch by number. Throughout the entire fishing year, onboard monitors observed 146 (0.447%) sport fish caught in large mesh gillnets, 60 (0.072%) sport fish caught in small mesh gillnets, and 1 (0.02%) sport fish caught in trap nets.

The majority of sport fish caught in large mesh gillnets observed by onboard monitors in 2019 were Splake (N = 67; 0.205%) and Brown Trout (N = 63; 0.193%). Supplemental stocking and relative stocking success of both Splake and Brown Trout likely contributes to higher rates of commercial bycatch. Other sport fish observed in large mesh gillnets in 2019 included Coho Salmon (N = 9; 0.028%) and Chinook Salmon (N = 2; 0.006%). No Steelhead were observed in commercial large mesh gillnets in 2019 (Figure 3).

Bycatch of recreationally-important salmonid species (i.e., Brown Trout, Coho Salmon, Chinook Salmon, Splake, and Steelhead) was similar to the past two years (Figure 3). Salmonid bycatch is variable from year to year, but has generally stayed below 0.5% on an annual basis.

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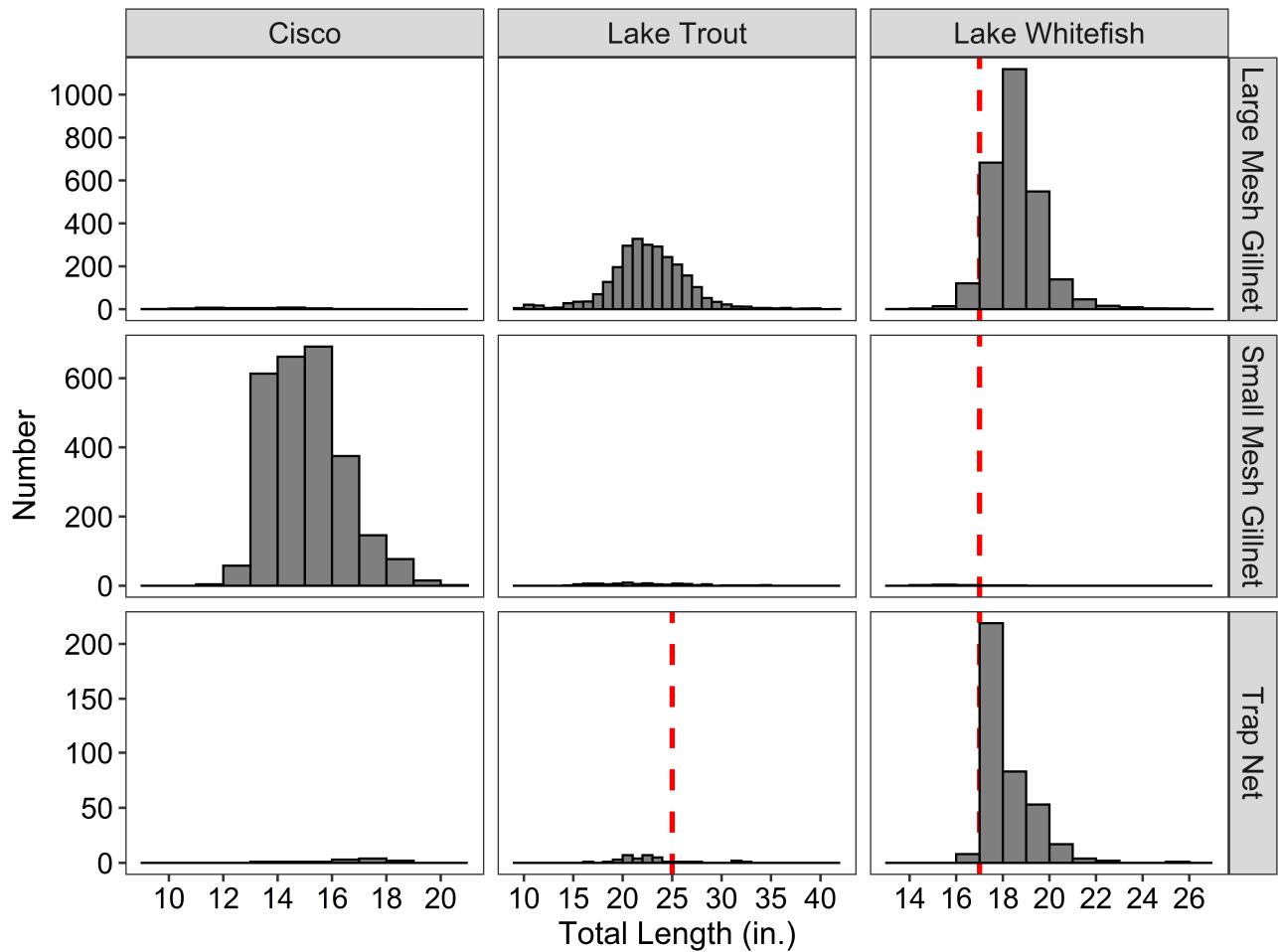


Figure 1. Length frequency histograms (one-inch length bins) of measured Cisco (left), Lake Trout (middle), and Lake Whitefish (right) caught by commercial fishers of all parties while a monitor was present using large mesh gillnets (top), small mesh gillnets (middle), and trap nets (bottom) in Wisconsin waters of Lake Superior during the 2019 commercial fishing season. Red dashed lines represent 25 inches for Lake Trout (maximum length limit for Lake Trout caught in trap nets - State fishers only in the Apostle Islands region (WI-2) of Lake Superior) and 17 inches for Lake Whitefish (minimum length limit for Lake Whitefish caught in all gears).

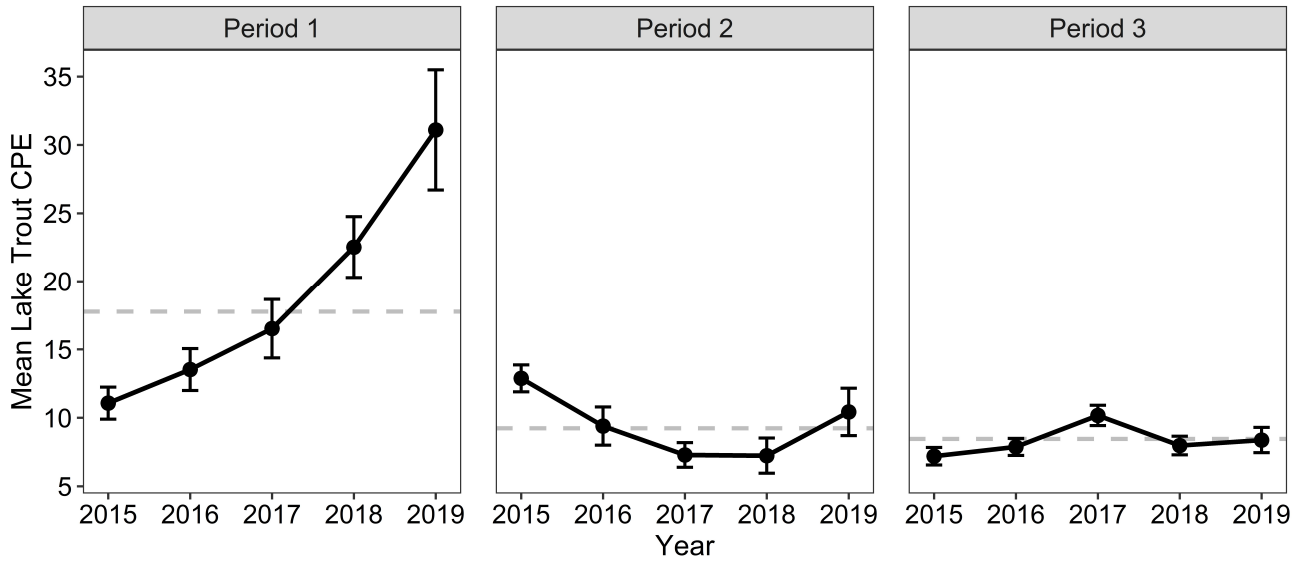


Figure 2. Average annual Lake Trout large mesh gillnet CPE (fish per 1,000 ft \pm standard error of the mean) during Period 1, Period 2, and Period 3 of the commercial fishing season from 2015 to 2019 in Wisconsin waters of Lake Superior (all parties combined). Average Lake Trout CPE throughout the time series is represented by the dashed line.

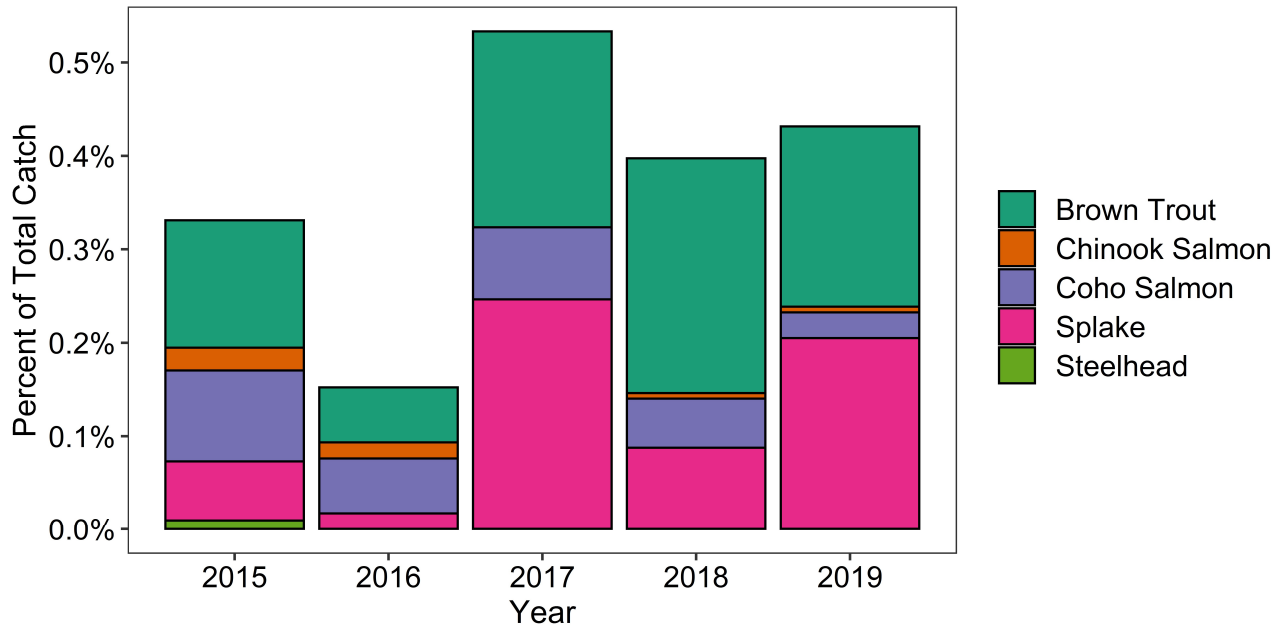


Figure 3. Time series of annual total catch percentages from large mesh gillnets of five recreationally-important salmonid species from 2015 to 2019.