STUDY PERFORMANCE REPORT

State: Michigan  Project No.: F-81-R-16
Study No.: 230495  Title: Assessment of Lake Trout _Salvelinus namaycush_ populations in Michigan waters of Lake Superior

Period Covered: October 1, 2014 to September 30, 2015

Study Objectives: (1) To determine relative abundance, length and age composition, sex, maturity, sea lamprey wounding, growth, and mortality for lean and siscowet strains of Lake Trout in Michigan’s Lake Superior Lake Trout management areas; (2) To periodically determine relative abundance, diet, and demographic variables (age, growth, etc.) of Lake Trout forms, other predator fish, and forage fish at various depth strata in Lake Superior; and (3) To calculate total allowable catch (TAC) for Lake Trout in Michigan’s Lake Superior management areas.

Summary: During this performance period, the summer Lake Trout survey was conducted. However, spring survey was only conducted in management unit MI-5 because of mechanical issues with the R/V Lake Char during the spring. Survey data were entered in the Lake Trout database and stomach samples and age structures will be processed during the winter months of 2015–16. Data from this study were used to update statistical catch-at-age models to estimate Lake Trout harvest quotas for 1836 Treaty waters in management units MI-5, MI-6, and MI-7. Various manuscripts based on data and expertise from this study were submitted for publication or published during this performance period.

Findings: Jobs 1 through 6 were scheduled for 2014–15, and progress is reported below.

Job 1. Survey design and coordination.–During this performance period, two Lake Trout surveys were conducted including: spring lean (adult) and summer lean (pre-recruit).

Job 2. Conduct surveys and process samples.–

a. Spring lean Lake Trout survey. During spring 2015, 10 sampling stations in management units MI-5 were surveyed. Length, weight, sex, and Sea Lamprey _Petromyzon marinus_ wounding data were collected from netted fish. Age structures were collected and will be processed during the winter months of 2015–16. Due to mechanical issues with the R/V Lake Char, the spring survey in other management units was not conducted.

b. Pre-recruit lean Lake Trout survey. During summer 2015, 29 sampling stations in Lake Trout management units MI-2, MI-3, MI-4, MI-5, MI-6, and MI-7 were surveyed. Length, weight, sex, maturity, visceral fat index, and Sea Lamprey wounding data were collected from netted fish. Age structures and stomachs were collected and will be processed during the winter months of 2015–16.

c. Periodic specialized surveys.

_ Stannard Rock survey._–During June 2015, six sampling stations were sampled at Stannard Rock, a popular offshore sport fishing destination for Lake Trout. There were four stations on the reef and two stations off the reef in deep water. This is year three of a five-year survey at this site to assess the status of lean and siscowet Lake Trout populations. Length, weight, sex, and Sea Lamprey wounding data were collected from netted fish. Age structures and stomachs were collected and will be processed during the winter months of 2015–16.
Lake trout PSAT (pop-up satellite archival tag) study. During, October 2014 and June 2015, Lake Trout were collected and tagged with PSATs to study habitat use and preference around Isle Royale (MI-1) and Marquette (MI-5). Tags were programmed to record time, depth, and temperature between 4- and 10-minute intervals during their missions.

In October 2014, 6 wild leans and 3 wild siscowets were collected and tagged with PSATs near Marquette for a 7-month mission duration. In June of 2015, 8 of 9 tags popped off and 7 have been recovered in southern Lake Superior.

In June 2015, near Marquette, 15 hatchery lean and 15 hatchery siscowet Lake Trout were tagged with PSATS for a 4-month mission. Tags are scheduled to pop off September 27–October 1, 2015 and will be recovered that week.

In June 2015, at Isle Royale, 11 lean, 12 siscowet, and 7 redfin Lake Trout about 5 kg or larger were tagged with PSATs for a 4-month deployment. Between September 14 and 20, 24 of 30 tags popped off and 19 tags have been recovered thus far.

Recovery of the remaining at-large tags from all mission deployments will be attempted during October 2015.

f. Process diet samples.--During this performance period, 2,181 stomachs from the 2014 field season were dissected and analyzed. The 2015 diet samples will be processed during the winter months of 2015–16.

g. Process age samples.--During this performance period, ages were determined for 1,639 fish collected during the 2014 field season. Age structures collected during the current performance period will be processed during the winter months of 2015–16.

Job 3. Manage data, maintain databases.--All survey data have been entered in the Lake Trout database using all phases of the data management quality control procedures.

Job 4. Analyze data, modeling.--Survey data from the previous performance period have been processed, analyzed, and integrated into various models. As required by the 2000 Consent Decree of the 1836 Treaty of Washington, lean Lake Trout total allowable harvest limits were estimated for the 2015 fishing season for MI-5, MI-6, and MI-7. Furthermore, survey data from this study were used to develop statistical catch-at-age models for 1842 Treaty waters of Lake Superior (Michigan) in MI-2, MI-3, and MI-4.

Job 5. Write annual performance report.--This progress report was written as scheduled. In addition, a project summary was prepared (Attachment 1).

Job 6. Write other reports.--Stock assessment reports addressing 2015 Lake Superior Lake Trout total allowable catch limits in 1836 Treaty waters were written and are currently under review. During this performance period, the following report was published:


Prepared by: Shawn P. Sitar
Date: September 30, 2015
Lake Trout Assessment in Michigan waters of Lake Superior

Shawn P. Sitar
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Background

Regular assessment of Lake Trout populations supports management needs and Lake Trout rehabilitation. These assessments require the use of research vessels such as the R/V Lake Char (Photo 1), which is used by the Marquette Fisheries Research Station in Lake Superior. The assessments measure relative abundance, age composition, growth, and mortality rates of lean Lake Trout in Michigan waters of Lake Superior. Furthermore, the 2000 Consent Decree of the Treaty of 1836 negotiated by the State of Michigan, Native American tribes, and the federal government requires annual assessment of lean Lake Trout stocks to develop safe harvest levels for the commercial and recreational fisheries in Treaty waters.

Lake Superior is currently the only Great Lake where multiple unique Lake Trout forms are still found (Photo 2). In addition to the lean form that is common to all Great Lakes, humper, redfin, and siscowet (fat trout) forms also inhabit Lake Superior. Prior to 1996, Lake Trout assessment in Michigan waters was directed at lean Lake Trout populations in depths of 40 fathoms or less. Siscowets were often captured in these assessments and humpers rarely, but our surveys did not really sample for them. Analyses of commercial fishing at depths greater than 40 fathoms during the late 1980s and early 1990s and lake-wide inter-agency assessments in 1996 and 1997 that included all depths to 100 fathoms indicated that siscowet Lake Trout may be the dominant predator in the lake and even in depths considered lean Lake Trout habitat. Both sport and commercial fisheries currently target lean Lake Trout because these fisheries are concentrated near shore, there is a preference for the lean form, and regulations based on contaminant body-burden discourage the harvest of siscowets. However, all forms of Lake Trout are harvested in both commercial and sport fisheries to some extent. Therefore, assessment of Lake Trout in Lake Superior must be a comprehensive program for all Lake Trout types that includes surveys at all depths and both nearshore and offshore regions.
Objectives

(1) To determine relative abundance, length and age composition, sex, maturity, sea lamprey wounding, growth, and mortality for lean and siscowet Lake Trout in Lake Superior waters of Michigan Lake Trout.

(2) To determine relative abundance, diet, and demographics (age, growth, etc.) of all Lake Trout forms, other predator fish, and forage fish at various depths in Lake Superior.

(3) To calculate total allowable catch (TAC) for Lake Trout in Michigan’s Lake Superior management areas.

Results

Wild lean Lake Trout populations have mostly recovered from collapse in the 1950s due to: 1) an aggressive recovery program employing sea lamprey suppression; 2) stocking of appropriate hatchery fish; and 3) well-targeted harvest restrictions. Recovery began with the buildup of large populations of hatchery Lake Trout, which was superseded by wild fish in the 1980s. In recent years, abundance and recruitment of most Lake Trout populations are declining from the near historic high levels to more expected values and are showing declining growth, symptoms of too large a population. Siscowet is the most abundant form of Lake Trout in Lake Superior occupying deep-water areas and have recovered from depressed levels in the 1940s. Harvest is low, though emerging industrial interest in extracting omega-3 fatty acid from siscowets may develop a demand. Sea lamprey wounding rates on siscowets are higher than measured for lean Lake Trout, though the mortality inflicted may not be higher than that experienced by lean Lake Trout. There is a potential that siscowet populations may act as a buffer to sea lamprey predation on lean Lake Trout. Although leans and siscowets do not appear to compete with each other, there may be more complex relationships between the two types. Similar to leans, siscowets are at high levels and experiencing declining growth issues.

Data summarized from this study have been and are used in fisheries models to assist in determining annual Lake Trout harvest quotas and to develop sport fish regulations for Lake Superior. Furthermore, study data on sea lamprey marking for Lake Trout are used by the U.S. Fish and Wildlife Service Sea Lamprey Control Program to direct their control efforts to trouble areas. Lean and siscowet Lake Trout diet data from this study are also being used to develop fish community models of Lake Superior that help managers understand the interactions between fish species under different management options such as stocking or changes in fish harvest.

Additional detailed information on this study can be found at http://www.michigan.gov/dnr/0,4570,7-153-10364_52259_19056-333302--,00.html.