

## STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-8

Study No.: 230522

Title: Assessment of predator-prey balance for Lake Huron fishery management.

Period Covered: October 1, 2006 to September 30, 2007

**Study Objective:** To improve estimates of per-predator and total-population consumption, by synthesizing stock assessments, measuring energy density, measuring diet composition, and developing new models.

**Summary:** All job requirements for 2007 were met. Standard protocols were updated and applied for collecting and recording diet composition, and for measuring percentage of dry weight in dorsal muscle plugs. Biological samples and laboratory analyses continued to reveal the spatial difference in diet composition changes, and the difference between Chinook salmon and lake trout in their growth and body condition changes. This was the second year of this study. Methods for modeling time-varying growth were published in the Transactions of the American Fisheries Society. A method for modeling time-varying length-mass relations and conditions, with comparison among lake regions, between species, and between size groups, is in press at Transactions of the American Fisheries Society.

**Findings:** Jobs 1 through 5 were scheduled for 2006-07, and the progress is reported below.

**Job 1. Title: Synthesize existing stock assessments.**—Chinook salmon assessment modeling was conducted, led by the Quantitative Fisheries Center at Michigan State University. Lake trout assessment models for northern, north-central, and southern Lake Huron were updated using data collected in 2007, including commercial fishery data, recreational fishery data, and fishery independent survey data. The assessment included three catch-at-age models for northern, north-central, and southern Lake Huron respectively.

**Job 2. Title: Write and improve protocols.**—Survey and monitoring protocols for cold-water species were updated, and the protocols were used in the 2007 field season. Standard data sheets for “Lake Huron Fish Stomach Laboratory” and for “Lake Huron Fish Energetic Laboratory” were updated and used during the 2007 field season.

**Job 3. Title: Collect and analyze data.**—A total of 60 lake trout whole-body samples were collected during October 2006, and another 60 whole-body samples were collected during spring 2007. This collection of lake trout samples was a joint effort by Ontario Ministry of Natural Resources at Owen Sound, USFWS Fisheries Resource Office at Alpena, Chippewa/Ottawa Resource Authority, and Alpena Fisheries Research Station, Michigan DNR. These samples were used by the Quantitative Fisheries Center at Michigan State University for developing a predictive relation between water percentage of dorsal muscle plug tissue and whole body energy density.

Dorsal muscle plugs were collected from 237 lake trout during the 2007 spring survey, and from 301 salmon biological samples collected from the 2007 recreational fishery. Average dry-weight percentages of these muscle plugs were measured for each species from different regions, ages, and size groups. The results will be reported in technical papers along with findings from 2006. Stomach contents were analyzed in the laboratory for 257 lake trout collected during the spring. Results will be reported in a technical paper along with findings from all previous years.

**Job 4. Title: Develop, improve, and apply models.**—Method for modeling time varying growth was published as:

He, J. X., and J. R. Bence. 2007. Modeling annual growth variation using a hierarchical Bayesian approach and the von Bertalanffy growth function, with application to lake trout in southern Lake Huron. Transactions of the American Fisheries Society 136:318–330.

Method for modeling time-varying length-mass relations and conditions, with comparison among lake regions, between species, and between size groups, is in press at Transactions of the American Fisheries Society.

**Job 5. Title: Write annual report.**—This progress report was prepared as scheduled.

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**Date: September 30, 2007**