

STUDY FINAL REPORT

State: Michigan

Project No.: F-80-R-3

Study No.: 689

Title: Projecting piscivore predation in Lake Huron.

Period Covered: April 1, 1998 to September 30, 2002

Study Objective: Work with other investigators to refine and expand stock assessment models for major predators in Lake Huron; and package the results of these models into an integrated and easy to update projection model for evaluating consequences of stocking levels and changes in mortality rates from sea lamprey or harvest controls.

Summary: During the duration of this project, we have taken steps to examine how forage demand by the key predators in Lake Huron responds to management actions such as changes in stocking or the reduction of sea lamprey-induced mortality. Understanding this forage demand required four distinct steps: (1) determination of the caloric content of Lake Huron fish species; (2) estimation of prey consumption for an average predator using bioenergetics models; (3) estimation of consumption by extrapolating individual predator consumption to a predator population, and projection of predator consumption under different management scenarios; (4) creation of a computer program to allow fisheries managers to project future consumption of prey by the key predators under varying management actions. The program projects consumption using the conversion-efficiency method and presents standard graphical output. We projected consumption for a baseline scenario, a scenario which included estimates of the reduction of sea lamprey induced mortality, and a scenario investigating a reduction in chinook salmon stocking.

Findings: This final report was prepared, including Jobs 1, 5, and 6, which were scheduled for 2001-02. All jobs are reported on below.

Job 1. Title: Review literature on Great Lakes, Lake Huron, and Models.—The purpose of this task was for the Graduate Student Research Assistant to become familiar with background literature and to develop a comprehensive understanding of past work directly related to this project. Literature review has been an ongoing process throughout the project (Dobiesz Dissertation: Chapters 1, 2, 3 and Appendices A, B, C).

Job 2. Title: Develop a flexible projection model.—The “No Name model” assessed the overall consumption of prey fish by predators in the main basin of Lake Huron using a series of linked spreadsheets. While the spreadsheet implementation can be amended with new data and additional calculations, correctly updating the series of spreadsheets is cumbersome. The Consumption Projection Model (CPM) computer program, formerly called “Consume”, was created to simplify the process of projecting consumption under multiple management scenarios. The CPM employs a user-friendly Microsoft Windows-based interface that allows users to quickly and easily obtain and compare projections of consumption resulting from various management actions. For the projection period, CPM uses assumptions regarding key population attributes (Dobiesz Dissertation: Appendix B).

A review of the CPM computer program was presented during the January 2002 Lake Huron Technical Committee meeting. Then at the June 2002 meeting, a training session was conducted on using the CPM.

Job 3. Title: Update projection models.—The CPM has been updated to reflect new data and estimates of lake trout mortality and abundance that have resulted from the 1836 Treaty Modeling Subgroup. Size limit regulations have been implemented for northern and central lake trout populations. Gross conversion efficiencies were estimated using our energy density data for Lake Huron species (Dobiesz Dissertation: Chapter 2 and Appendix A), current diet data through 1999, and weight-at-age from various surveys (Dobiesz Dissertation: Appendix C).

Job 4. Title: Bioenergetics models.—The CPM uses the production-conversion efficiency method to estimate consumption. This requires estimates of gross conversion efficiency, which we obtained through bioenergetics models using Lake Huron-specific values (Dobiesz Dissertation: Appendix C).

Job 5. Title: Evaluate potential future.—The CPM provides a simple method of creating and comparing multiple projections. It was used to explore several management scenarios (Dobiesz Dissertation: Chapter 3). During early testing of the CPM, it was also used by the Lake Huron Basin Team to develop a "Vision Statement" describing the expected changes to the fish community in Lake Huron if and when full lake trout recovery is realized, and if and when full walleye recovery is realized in Saginaw Bay. (Personal Communication, Dave Fielder).

Job 6. Title: Publish results and prepare annual reports.—This final report was prepared. A Ph.D. dissertation is being prepared and the drafts are attached. As part of this study we contributed to the Lake Huron Case Study as part of the Salmonid Communities of Oligotrophic Lakes Symposium. We contributed written sections to the case study editor (David McCleish, Ontario Ministry of Natural Resources) who is integrating these into a long report (to be published as a Great Lakes Fishery Commission report) and a short report, which will be submitted for journal publication. We also contributed a written section for the Great Lakes Fishery Commission report on the State of Lake Huron, which evaluates current status in relationship to fish community objectives. This material is being integrated into the report by the editor (Mark Ebener, Chippewa/Ottawa Resource Authority). Manuscripts based on dissertation chapters will be prepared in early 2003.

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