

## Introduction

Michigan Department of Natural Resources (MDNR), Fisheries Division surveyed fish populations and angler catch and effort at Houghton Lake, Roscommon County, Michigan from January 2001 through March 2002. This work was part of a new, statewide program designed to improve assessment and monitoring of fish communities and fisheries in Michigan's largest inland lakes. Known as the Large Lakes Program, it is currently scheduled to survey about four lakes per year over the next ten years. This report on Houghton Lake is the first in a series that will document the work of the program.

In Michigan, any body of standing water other than the Great Lakes is generally defined as an inland lake. This includes both natural and man-made water bodies. The Large Lakes Program will target the 92 inland lakes that are 1,000 acres or more in size (Table 1). Combined, these lakes total about 360,000 acres and provide a significant proportion of the total fishing activity in the State. Yet, only 20 of these lakes have had modern angler harvest surveys within the last 50 years. The average fishing effort per year on the 20 lakes surveyed was 18.0 hours per acre. Assuming the 20 are representative of the other large lakes, then the combined annual fishing effort on all 92 lakes is probably about 6.5 million angler hours per year (18.0 times 360,000). And this rough estimate is probably on the low side, because the 18.0 hours per acre figure does not include the winter fisheries on most of the 20 lakes surveyed. By comparison, the combined annual fishing effort for all Michigan waters of the Great Lakes was only 5.2 million angler hours in 2001 (Rakoczy and Wessander-Russell 2002).

These larger inland lakes, especially those over 1,000 acres, present a special challenge to fisheries managers. While they support some of the most important, productive fisheries in the State, their size makes detailed biological assessment of fish populations and harvest difficult and costly. Area fisheries managers rarely have sufficient time, personnel, or equipment to conduct detailed surveys on large lakes. By establishing a statewide program, Fisheries Division was able to pool personnel

and equipment to better conduct such surveys. Lakes will be selected for sampling under the Large Lakes Program based on fisheries management priorities. Some might be sampled every 5 years, while others might never be sampled. Even so, lakes not selected for sampling under this program will not be ignored. As in the past, they will continue to receive attention by local managers through smaller, less extensive surveys geared to answer specific management questions, and possibly, through other statewide programs, such as the Lakes Status and Trends<sup>1</sup> or general angler survey<sup>2</sup> programs.

The Large Lakes Program has three primary objectives. First, we want to produce consistent indices of abundance and estimates of annual harvest and fishing effort for important fishes. Initially, important fishes are defined as species susceptible to trap or fyke nets and/or those readily harvested by anglers. Our hope is to produce statistics for important fishes to help detect major changes in their populations over time. Second, we want to produce abundance estimates and sufficient growth and mortality statistics to be able to evaluate effects of fishing on special-interest species which support valuable fisheries. This usually involves targeting special-interest species with nets or other gears to collect, sample, and mark sufficient numbers. We selected walleye *Sander vitreus* and northern pike *Esox lucius* as special-interest species in this survey of Houghton Lake. Finally, we want to evaluate the suitability of various statistical estimators for use in large lakes. For example, we applied and compared

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<sup>1</sup> A statewide program conducted by MDNR, Fisheries Division, Lansing to describe and monitor status of lake fish populations and habitat in Michigan. Lakes to be sampled are determined through a stratified, random sampling scheme. Sampling protocols include collection of fish, water chemistry, and physical habitat parameters.

<sup>2</sup> A statewide program conducted by MDNR, Fisheries Division, Lansing to estimate fish harvest by recreational anglers in important public waters in Michigan. Waters to be sampled are determined based on statewide and local management priorities. Sampling protocols are similar to angler survey procedures described in this report.

three types of abundance and two types of exploitation rate estimators for walleyes and northern pike in this survey of Houghton Lake.

The Large Lakes Program will maintain consistent sampling methods over lakes and time as much as possible. This will allow us to build a body of fish population and harvest statistics to directly evaluate differences between lakes or changes within a lake over time. Because Houghton was one of the first lakes to be sampled under the protocols of the program, we were sometimes limited in our ability to make valid comparisons in this report. For example, most types of quantitative comparisons between catch per effort in our netting operations and those of most other surveys would not be valid. Our netting targeted walleyes, northern pike, and other spring spawners during spawning. Most past netting surveys occurred later in the year. Of course, as our program progresses we will eventually have a large body of netting data collected under the same conditions in the future. This first report is meant as a general outline and model for future reports in the program.