Introduction

Michigan Department of Natural Resources (MDNR), Fisheries Division surveyed fish populations and angler catch and effort at Crooked and Pickerel lakes, Emmet County, Michigan from April 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 (Clark et al. 2004).

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 walleyes *Sander vitreus* and northern pike *Esox lucius* as special-interest species in this survey of Crooked and Pickerel lakes. Finally, we want to evaluate the suitability of various statistical estimators for use in large lakes. For example, we applied and compared three types of abundance and two types of exploitation rate estimators for walleyes and northern pike in this survey of Crooked and Pickerel lakes.

The Large Lakes Program will maintain consistent sampling methods over lakes and time. 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 Crooked and Pickerel lakes were two 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.

Study Area

The size of Crooked and Pickerel lakes is about 3,400 acres, with sources disagreeing only slightly on size. Humphries and Green (1962) estimated 2,300 and 1,080 surface acres (3,380 acres total) for Crooked and Pickerel lakes, respectively by taking measurements from United States Geological Survey (USGS) topographical maps using handheld drafting tools. Michigan Digital Water Atlas[1] (2003) reported 2,352 and 1,082 acres (3,434 total acres) for Crooked and Pickerel lakes, respectively by using computerized digitizing equipment and USGS topographical maps. They overlaid the boundaries of the lake polygon from the Michigan Digital Water Atlas GIS layer with aerial photos of the lake using ArcView[©], and the two matched well. In the Large Lakes Program, we will compare various measures of productivity among lakes, such as number of fish per acre or harvest per acre, so a measure of lake size is fairly important. Therefore, we will use the more modern estimate of 3,434 acres as the size of Crooked and Pickerel lakes in our analyses.

Pickerel Lake is fed by Mud and Cedar creeks and flows out to Crooked Lake through the Pickerel Lake channel (Figure 1). In addition to the Pickerel Lake channel, Crooked Lake is fed by Minnehaha Creek, Mud Creek that flows from Round Lake, and the creek that drains the outflow from springs at the Oden State fish hatchery. Crooked Lake

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[1] A statewide program conducted by MDNR, Fisheries Division, Lansing to develop computerized maps and reference data for aquatic systems in Michigan.