

## **The Fish Community and Fishery of Grand Lake, Presque Isle County, Michigan in 2004–05 with Emphasis on Walleye, Northern Pike, and Smallmouth Bass**

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### **Introduction**

The Michigan Department of Natural Resources (MDNR), Fisheries Division surveyed fish populations and angler catch and effort at Grand Lake, Presque Isle County, Michigan from April 2004 through March 2005. This work was part of the Large Lakes Program, which is designed to improve assessment and monitoring of fish communities and fisheries in Michigan's largest inland lakes (Clark et al. 2004).

The Large Lakes Program has three primary objectives. The first objective is to produce consistent indices of abundance and estimates of annual harvest and fishing effort for walleye, northern pike, smallmouth bass, and muskellunge. These species were selected since they are susceptible to trap or fyke nets and are readily harvested by anglers. The intent is to produce statistics for important fishes to help detect major changes in their populations over time. The second objective is to produce estimates of abundance, growth, and mortality to evaluate the effects of fishing on those species which support valuable fisheries. This usually involves targeting species with nets or other gears to collect, sample, and mark sufficient numbers. I selected walleye (I will refer to fishes by common name in the text. I listed common and scientific names of fish species in the Appendix), northern pike, and smallmouth bass as target species in this survey of Grand Lake. The final objective is to evaluate the suitability of various statistical estimators for use in large lakes. For example, in the current survey I applied and compared two types of abundance and three types of exploitation rate estimators.

### **Study Area**

Grand Lake drains a watershed of approximately 21,650 acres (Laarman 1976). The surface area is approximately 6,000 acres, with sources disagreeing only slightly on size. Humphrys and Green (1962) estimated an area of 6,080 surface acres by taking measurements from United States Geological Survey (USGS) maps using hand-held drafting tools, while Laarman (1976) reported 5,660 acres. Breck (2004) estimated 5,823 acres for Grand Lake by using computerized digitizing equipment and USGS topographical maps. He overlaid the boundaries of the lake polygon from the Michigan Digital Water Atlas Geographical Information System with aerial photos of the lake using ArcView<sup>®</sup>, and the two matched well. In the Large Lakes Program, comparisons of various measures of productivity will be made among lakes, such as number of fish per acre or harvest per acre, so an accurate measure of lake size is important. Therefore, I will use the more modern estimate of 5,823 acres as the size of Grand Lake in analyses.