

## **The Walleye Population and Fishery of the Muskegon Lake System, Muskegon and Newaygo Counties, Michigan in 2002**

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### **Introduction**

The Michigan Department of Natural Resources (MDNR), Fisheries Division surveyed fish populations and angler catch and effort in the Muskegon Lake System, Muskegon and Newaygo Counties, Michigan from March 2002 through March 2003. For the purposes of this report, we defined the Muskegon Lake System as Muskegon Lake and about 45 miles of the Muskegon River from the lake to Croton Dam (Figure 1). When we refer to the Muskegon System, we mean both the lake and river combined. We will be specific when we are referring to either the lake or the river separately. This work was part of a 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 through 2010 (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 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* as a special-interest species in this survey of the Muskegon Lake System. 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.

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. However, Muskegon Lake has unique features that caused us to deviate somewhat from our usual methods. Muskegon Lake is one of several lakes in Michigan commonly known as "drowned-river-mouth lakes". All these lakes are located at the mouths of rivers flowing into Lake Michigan and are separated from Lake Michigan only by short channels (Figure 1). Both Lake Michigan and the lower Muskegon River significantly affect the ecology of Muskegon Lake, especially with regard to our target species, walleye. Because it was well

known from previous biological surveys that most walleyes in the system spawned in the Muskegon River between the lake and Croton Dam, we devoted most of our biological sampling efforts to electrofishing the river. Most of the biological sampling efforts in previous large lake surveys were devoted to netting in the lakes.

We will refer to fishes by common name in the text. We listed common and scientific names of all fish species referenced in the Appendix.