

## Evaluation of Catch-and-Release Fishing Regulations for Smallmouth Bass on the Huron River, Michigan

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*Abstract*—Catch-and-release fishing regulations for smallmouth bass *Micropterus dolomieu* were established on 5-mi of Michigan's Huron River. An adjacent 5-mi stretch of river served as a control. Minimum size limit on smallmouth bass during before period (1985-88) and in control section during both before and after period (1990-93) was 12 in. No special terminal tackle restrictions were involved, anglers could use natural or artificial bait. We evaluated catch-and-release fishing regulations with regard to angling pressure, catch, and catch rates; bass population indices of abundance and survival. Angler harvest rates and population dynamics of rock bass *Ambloplites rupestris* were also evaluated.

Anglers released 67% of legal-size bass in our control section, during before period, and 75% during after period. In the treatment section, anglers released 53% of legal-size bass during before period and 95% of bass  $\geq 12$  in during after period (catch-and-release).

In the control section, significant differences ( $P_{\alpha}=0.10$ ) were not detected in angling pressure (mean annual estimated hours) between time periods. Shore anglers catch and catch-per-hour (CPH) of caught-and-released smallmouth bass  $< 12$  in and estimated harvest of smallmouth bass  $\geq 12$  in were significantly greater during after period.

In the treatment section, mean annual shore angler effort was significantly less during after period than during before period. Shore angler estimated catch and CPH of smallmouth  $< 12$  in released and smallmouth  $\geq 12$  in released was significantly greater during after period. Wading angler harvest and CPH of smallmouth bass  $\geq 12$  in was significantly less during after period. However, wading angler catch and CPH of smallmouth bass  $\geq 12$  in released were significantly greater during after period.

Indices of smallmouth bass abundance did not change significantly in control section. In treatment section, indices of smallmouth bass 6.0-11.9 in decreased significantly during after period. However, indices of smallmouth bass  $\geq 12$  in increased significantly as did age-4 and -5 bass. Smallmouth bass survival from age 3 to 4 was significantly less in control section during after period. In treatment section, smallmouth bass survival from age 1 to 2 was significantly less. Survival of larger bass, more directly affected by catch-and-release regulations, improved in treatment section during after period. Survival from age 2 to 3, age 3 to 4, and age 4 to 5 was significantly better.

Anglers sought rock bass less often during after period in both sections. Rock bass harvest and CPH by wading anglers in control section were significantly less ( $P_{\alpha}=0.10$ ) during after period. In treatment section, rock bass harvest and CPH by shore and wading anglers were significantly less during after period. Abundance indices of  $\geq 6$ -in rock bass and age-5 rock bass

were significantly greater in control section during after period. In treatment section, indices were significantly greater for rock bass 4.0-5.9 in and, ages 4 and 5 increased during after period. Survival from age 1 to 2 and age 4 to 5 declined significantly in control section. Survival from age 2 to 3 was significantly greater in treatment section. Control section rock bass ages 1, 3 and, 4 were significantly smaller during after period. Ages 1 and 2 were significantly smaller during after period in treatment section. Rock bass in treatment section were significantly larger than rock bass in control section during each time period.

## Introduction

Information addressing effects of catch-and-release angling are readily found in the literature (Barnhart 1989, Clapp and Clark 1989, Gigliotti 1989, Schneider, et. al. 1989, Milon 1991, Clark and Alexander 1992). However, much of the literature on catch-and-release angling concerns largemouth bass and various species of trout.

Possible catch-and-release effects are frequently evaluated with emphasis placed on hooking mortality, angling catch rates and changes in standing stock. For example, Clapp and Clark (1989) found that mortality of smallmouth bass *Micropterus dolomieu* was significantly greater for caught-and-released fish when live bait was used than for fish which were never caught. Similarly, hooking mortality has been shown to be greater for trout caught with worm-baited hooks than for artificial flies or lures (Shetter and Allison 1955, and Pauley and Thomas 1993).

Angler catch rates for trout, largemouth bass and northern pike (*Esox lucius*) may be increased if anglers release 10% or more of their catch rather than harvest all fish permitted by fishing regulations (Clark 1982). Catch rates may be improved by increasing numbers of fish or by increasing numbers of catchable fish. Since catchability of individual largemouth and smallmouth bass may be quite different (Hackney and Linkous 1978, Burkett et al 1986, Clapp and Clark 1989), allowing the more catchable fish to remain in a population can potentially increase angler catch per hour.

Increases in standing stock of smallmouth bass, particularly spawning size, have

occurred when minimum size limits were changed from liberal regulations, such as no minimum size limit, to more restrictive size limits. For example, densities of age 3+ smallmouth bass increased in a Wisconsin lake when the minimum size limit was increased from no minimum size limit to an 8-in minimum size limit (Serns 1984). When regulations on a smallmouth bass fishery were changed to a 12-in minimum size limit from no minimum size limit, a substantial increase in counts of spawning nests occurred in a Virginia river (Surber 1969). A two-fold increase in standing stock (pounds per acre) was attained for smallmouth bass in a Missouri river when regulations were changed from no minimum size limit to catch and release (Fajen 1975).

We selected 10 miles of the Huron River located in Southeastern Michigan to evaluate catch-and-release fishing regulations on a self-sustaining population of smallmouth bass. A 12-in minimum size limit was in effect during the 4-year before period. We also examined angler harvest and population dynamics of rock bass *Ambloplites rupestris*.

## Study Area

The Huron River, located in southeastern Michigan, drains 900 square mi and flows 136 mi over 19 dams from its headwaters in Big Lake before emptying into Lake Erie at Pte. Mouillee (Hay-Chemielewski et al 1995). We selected a free flowing 10 mi stretch of river as our study area, located in Michigan's Washtenaw County, approximately 71 mi upstream of Lake Erie (Figure 1). Mean flow at the USGS Ann Arbor gage site, located