

Evaluation of Catch-and-Release Trout Fishing Regulations on the South Branch of the Au Sable River, Michigan

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Abstract.— Flies-only, catch-and-release (no-kill) trout fishing regulations were established on a 4.7-mi-long section of the South Branch of the Au Sable River, Michigan. The former regulations restricted terminal tackle to flies only but allowed harvest of brown trout *Salmo trutta* and rainbow trout *Oncorhynchus mykiss* 10 in or larger and brook trout *Salvelinus fontinalis* 8 in or larger. The primary objective of the new regulation was to produce higher standing stocks of larger trout and higher catch rates of all trout, but particularly larger ones. We evaluated the effectiveness of the regulation in achieving this objective. We compared before (1974-82) and after (1985-90) trout populations, catch, and fishing effort in the catch-and-release section and in two separate control sections where fishing regulations remained constant. Rainbow trout were rare in all study sections, so we concentrated our efforts on brown trout and brook trout.

In general, the condition of brown trout populations improved in the catch-and-release section but deteriorated in both control sections. Total abundance of brown trout increased significantly in the catch-and-release section and decreased significantly in the control sections. Relative to the control sections, total abundance in the catch-and-release section increased by from 41% to 59%. Abundance of brown trout larger than 12 in did not change significantly in the catch-and-release section but decreased significantly in both control sections. Survival rates of brown trout did not change significantly in the catch-and-release section, but decreased significantly for age-1 and older fish in both control sections. Thus, the catch-and-release regulation produced a better population of larger trout than would have existed otherwise. Mean lengths at age of brown trout did not change significantly in catch-and-release or control sections. No change in condition factor (length-weight relation) of brown trout could be attributed to the catch-and-release regulation.

We found no detectable effect of the catch-and-release regulations on the brook trout population. Brook trout abundance remained constant in the catch-and-release section,

increased significantly in one control section, and decreased significantly in the other control section. We detected no effect on brook trout survival or growth.

The catch-and-release regulation was probably responsible for a significant decrease in fishing effort in the catch-and-release section, but we cannot be certain because fishing effort also decreased in one of the control sections. Other than eliminating the harvest, catch-and-release had no detectable effect on the total catch of brown trout. This may have been due to high variances on catch estimates, because changes in mean catch estimates were generally consistent with changes in estimates of trout abundance. Catch-and-release had essentially the same effect on the catch of brook trout as the catch of brown trout. The harvest was eliminated, but no other measurable effect was detected. We observed an increasing trend in voluntary release of trout in the control sections. During the mid-1970s, anglers released about 40% of the trout they caught, but by 1990, the release rate was up to 80-90%. This increase in voluntary release could have reduced the apparent effects of mandatory catch-and-release in the catch-and-release section, because the catch-and-release section was evaluated relative to the control sections.

We conclude that catch-and-release regulations had a positive impact on the brown trout population in the catch-and-release section, but "improvements" observed were modest. These improvements seem to take on a secondary importance considering the general decline observed in brown trout populations in the Au Sable River over the last 20 years. We should focus future research and management efforts on identifying and controlling, if possible, the factor(s) causing brown trout to decline. Based on our analysis, exploitation from fishing is not responsible for the general decline.

Catch-and-release or no-kill fishing regulations require anglers to release all the fish they catch unharmed. This type of regulation is gaining popularity among trout anglers nationwide, including those in Michigan. The popular literature is full of glowing testimonies and ethical promotions of catch-and-release fishing.

In 1983, catch-and-release fishing regulations were established for brown trout *Salmo trutta*, brook trout *Salvelinus fontinalis*, and rainbow trout *Oncorhynchus mykiss* on a 4.7-mi-long section of the South Branch of the Au Sable River, Michigan. Because rainbow trout are rare in this section, this report is focused on brown trout and brook trout. The primary objective of the regulations was to produce higher standing stocks of larger trout and higher catch rates of all trout, but particularly larger ones. The purpose of our study was to evaluate the effectiveness of catch-and-release in achieving its objective and to monitor other aspects of the fishery, such as fishing effort and recruitment, mortality, growth, and body condition of trout.

While Michigan has had much experience with other types of special trout fishing regulations (see for example, Clark et

al 1981; Clark and Alexander 1984, 1985), this was the first catch-and-release regulation to be placed on a wild trout fishery in the State. In the early 1980s, when this study was initiated, reports from other areas of the country showed mixed and sometimes conflicting results concerning the effects of catch-and-release. The catch-and-release program for cutthroat trout *Oncorhynchus clarki* and Montana grayling *Thymallus arcticus* in Yellowstone National Park, appeared to be highly successful in both increasing the number of larger fish in the population and increasing the catch rate of larger fish (Anderson 1977). However, rainbow trout *O. mykiss* and brown trout fisheries within the Park did not respond in the same way. While the number of older, larger trout increased in the population, the catch rate of larger trout did not improve, except for the expert angler. This suggested that catch-and-release regulations may stockpile large, uncatchable fish.

In Pennsylvania, a 20-in minimum size limit (essentially a catch-and-release fishery) for brown trout in Penns Creek appeared to increase the density but decrease the condition factor of trout. These results suggested the