

Evaluation of Hatchery-Reared Brook Trout Stocked in the Upper Peninsula of Michigan

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Abstract—Population estimates and creel surveys were conducted two years before (1988-89) and three years after (1990-92) stocking individually tagged, hatchery-reared brook trout *Salvelinus fontinalis* in three streams (East Branch Escanaba, West Branch Escanaba, and Middle Branch Ontonagon) in Michigan's Upper Peninsula. Similar data were collected on the Iron River, which was not stocked, as a study control. We related densities and catch rates of feral brook trout to average daily temperatures, groundwater yield and physical stream parameters. We measured fish health parameters in samples of hatchery-reared and feral brook trout for comparison. The purpose of our study was to evaluate impacts of stocked fish on sport catches and feral brook trout populations. Estimated numbers (± 2 SE) of legal-sized brook trout were significantly greater during the stocking period (1990-92) than during the pre-stocking period (1988-89) and were not significantly different in the control river between the two periods. Brook trout catch per hour increased an average of 79% and catch increased an average of 72% after stocking in the East Branch Escanaba, West Branch Escanaba, and Middle Branch Ontonagon rivers combined. The increase in catch per hour and catch attributable to stocking was 26% and 39%, respectively. However, due to large variances on estimates, the increases were statistically significant only at the Middle Branch Ontonagon River. Return to the creel of stocked fish was 7.8% at the Middle Branch Ontonagon River, 3.6% at the West Branch Escanaba River, and 1.8% at the East Branch Escanaba River; the average for three rivers was 4.5%. The estimated cost per harvested hatchery-reared brook trout was \$9 at the Middle Branch Ontonagon River, \$19 at the West Branch Escanaba River, and \$38 at the East Branch Escanaba River; the average for three rivers was \$16 per fish. Feral brook trout catch per hour and catch did not change in stocked rivers (1990-92 versus 1988-89) and declined 23% in the Iron River. Number of feral brook trout per acre and catch per angler hour were more closely related to an index of groundwater yield and to average daily river water temperature than to physical parameters, such as substrate, frequency and size of pools, and flow. Health parameters ranked higher for hatchery fish before stocking than feral fish, but after three months in the rivers, hatchery fish ranked lower than feral fish.

Most anglers (71%) did not catch any brook trout during an angling trip, 12% caught only one brook trout, and more anglers (0.7%) caught the 10-fish limit than caught seven, eight, or nine fish. Over 60% of angler effort and 64% of brook trout catch occurred from the beginning of the fishing season through the end of June. The majority (66%) of anglers on the Middle Branch Ontonagon River were not local residents, but 71-87% were local residents at the other three rivers.

Brook trout *Salvelinus fontinalis* is the premier salmonine species sought by anglers in rivers of the Upper Peninsula of Michigan. Michigan Sport Fisheries Surveys showed that around 624,000 brook trout, representing 79% of the total salmonine harvest, were caught each year from Upper Peninsula streams during 1975 to 1981 (Michigan Department of Natural Resources [MDNR], Lansing, unpublished data). The estimates of catch in the Michigan Sport Fisheries Surveys are biased upward by an unknown amount but the relative proportion of each species in the fishery is probably accurate (Gale Jansen [retired], MDNR, personal communication).

Hatchery-reared brook trout have been used by managers to enhance river fisheries in the Upper Peninsula. Various forms of stocking guidelines have been in place since about 1921, and trout stocking has occurred since 1873 in Michigan (McFadden et al. 1964). Michigan fish stocking guidelines currently recommend that stocking of brook trout should be made in streams where natural reproduction is inadequate but good rearing and holding capabilities are present. In such streams, more pounds of fish are expected to be taken in the fishery than were stocked, and the fishery produced should justify the cost of the program (Borgeson 1987). The stocking guidelines also suggest stocking fingerlings, and that stocking of yearling brook trout in streams is rarely justified. Beyond consideration of the guidelines, political pressure on fisheries managers also may influence stream stocking in some cases.

During 1960-1964 most of the brook trout stocked in Michigan waters were legal-sized (≥ 7 in) fish and in 1965 mostly sublegal (< 7 in) fish were stocked. In 1966 the classifications of stocked trout were changed to indicate their life stages. The classifications were: adult (≥ 7 in long), yearling (4 - 8 in), fall fingerling (3 - 6 in),

and spring fingerling (≤ 3 in). From 1966 to 1971, nearly all brook trout were stocked as yearlings or as spring fingerlings. During 1972 to 1983, stocking of fall fingerlings predominated. During 1984 to 1987, yearlings and fall fingerlings were stocked.

Recently, anglers have reported poor brook trout fishing in many Upper Peninsula streams where they feel fisheries were formerly better. It is unclear when this perceived decline in the fishery began. Adequate data to document a decline in brook trout or to determine possible causes for poor fishing are lacking. Possible causes for declines in the fisheries include: low pH due to acid precipitation, overfishing, competition with other salmonines, sediment bedload due to improper road construction and timbering practices, warming of water due to excessive beaver damming, and changes in stocking strategies. A variety of stocking strategies have been used since 1960. We needed to determine how brook trout stocked currently are contributing to the sport catch and to the population. There had been no formal evaluations of the return to the angler in the Upper Peninsula of the various sizes or ages of brook trout stocked, but some studies have been made in other areas. Cooper (1952) reported on the returns of the legal-sized (≥ 7 in) brook trout stocked in late April to early June in a heavily fished stream in the Lower Peninsula of Michigan. During the first year after stocking 61% were caught but only 0.07% of the original stocking were caught the second year. Shetter et al. (1964) summarized results of 40 brook trout stocking experiments in Michigan rivers. Six experiments involved 4.0-6.9 inch fish. The average return to the creel was 1.9%. Whereas, the average return to the creel in 18 experiments with fish seven inches and longer was 41.7%. McCrimmon (1960) found that fall fingerlings stocked in two small southern Ontario streams