

The Sport Fishery and Contribution of Hatchery Trout and Salmon in Lake Superior and Tributaries at Marquette, Michigan, 1984-87

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Abstract.—A creel survey of the sport fishery in Lake Superior and three tributaries (Dead, Carp, and Chocolay rivers) at Marquette, Michigan, during 1984-87 revealed an intensive fishery, mainly for naturally produced trout and salmon. Annual fishing effort in the lake and three tributaries averaged 119,000 and 37,000 angler hours, respectively. Most effort in the lake was by boat (68-84%) but fishing from shore was substantial (16-20%), especially in Marquette Bay (41-51%). Ice-fishing effort fluctuated considerably among years (1-14%). Effort in the tributaries was mainly by shore angling (69-100%). The Lake Superior sport fishery was particularly active during March-September, with the highest effort in April. Lake Superior anglers fished an average 3.2 hours per trip, whereas those fishing the tributaries averaged 2.1-2.5 hours. Fishing in the tributaries was mainly during April-May and September-October. More fishing was done in the Dead River than in the Carp and Chocolay rivers combined. Over 90% of all anglers surveyed were from Marquette County. Anglers sought mainly lake trout and coho salmon in Lake Superior, and rainbow trout and coho salmon in the tributaries. Salmonid fishes made up most of the catch and were represented by eight species of trout and salmon, one trout hybrid, and two species of whitefish. Most numerous in the catch were coho salmon, lake trout, and round whitefish in Lake Superior, coho salmon and chinook salmon in the Dead River, rainbow trout and coho salmon in the Carp River, and coho salmon and rainbow trout in the Chocolay River. Most trout and salmon caught in Lake Superior were immature, whereas those caught in the tributaries were usually mature fish. In the Lake Superior sport fishery, lake trout averaged 23.5 inches, 4.4 pounds, 8 years old, and the highest monthly catch was in August; coho salmon averaged 16.6 inches, 1.4 pounds, 2 years old, and the highest monthly catch was in April; chinook salmon averaged 25.4 inches, 6.8 pounds, 3 years old, and the highest monthly catch was August; rainbow trout averaged 21.1 inches, 3.6 pounds, 4 years old, and the highest monthly catch was in May; brown trout averaged 17.2 inches, 2.2 pounds, 3 years old, and the highest monthly catch was in March; splake averaged 13.6 inches, 0.9 pound, 2 years old, and the highest monthly catch was in February.

The majority of fish in the catch were naturally produced with the exception of splake and Atlantic salmon at all sites, coho salmon in the Dead River, and brown trout in the Carp River. Hatchery coho salmon provided 80% of the coho catch in the Dead River but 6% or less in Lake Superior, and the Carp and Chocolay rivers. Hatchery rainbow trout made up 15% of the Lake Superior catch and 10-44% of the catch in the tributaries. Hatchery brown trout made up 40% of the catch in Lake Superior and 4-50% in the tributaries. The contribution of hatchery lake trout decreased from 38% in 1984 to 18% in 1987.

Returns from hatchery planting to the sport fishery were less than 2% except for one plant of large yearling splake which was about 13%. Steelhead strains planted in the Chocolay River provided a better return (0.64-1.44%) than either steelhead or domestic rainbow trout planted in Lake Superior (0.08-0.52%). The returns of Siletz steelhead and coho salmon were about 1.4%. Brown trout returns were all less than 1%. These low returns prevented a conclusive assessment of the performance of domestic versus steelhead strains of rainbow trout and yearling versus fall-fingerling brown trout planted in Lake Superior. Straying and mortality both likely contributed to the poor return. Coho salmon planted in Lake Superior strayed as far as Lake Erie and were abundant in the sport fishery and in at least one tributary of Lake Michigan. Michigan should (1) maintain an annual sport fishery creel survey, (2) protect and enhance spawning habitat and populations of native and naturalized trout and salmon, (3) cease planting hatchery trout and salmon, or (4) if some planting is judged necessary, apply documented strategies for improving return to the fishery.

Management efforts such as reduction of sea lamprey populations, controls on the commercial fishery, introduction of Pacific salmon, and rehabilitation of previously existing trout populations resulted in a substantial and increasing sport fishery on the Great Lakes during the late 1960s and early 1970s (Rybicki 1973). A mail creel survey of a 2-4% sample of licensed anglers was employed during 1967-82 to gather information on this fishery (G. C. Jansen, Michigan Department of Natural Resources (MDNR), personal communication; and Jansen 1985). This survey provided a much-needed picture of the growing lakewide fishery, but estimates for specific ports were found to be imprecise. The small sample size and biases associated with voluntary recall for a 1- to 3-month period contributed to variation in estimates for specific ports and usually resulted in overestimates of catch and effort when compared to concurrent on-site creel surveys (Rybicki and Keller 1978; Patriarche 1980). In addition, no biological data were obtained on fish in the catch.

As management needs for the Great Lakes sport fishery required more information on catches at individual ports and on individual fish in the catch, survey efforts shifted to on-site creel surveys. Some on-site creel surveys were conducted at a few sites in lakes Michigan, Huron, and Erie during 1974-82 (Ryckman and Lockwood 1985). There have been only two published and one unpublished creel surveys on Lake Superior and tributaries prior to this study. Stauffer (1966) estimated the lake trout catch in

Keweenaw Bay with an on-site creel survey in 1964, and Wagner and Stauffer (1978) estimated the rainbow trout catch in a Lake Superior tributary (Huron River) with a similar method during the early 1970s (see Table 1 for common and scientific names of fishes). An unpublished on-site creel survey was conducted between Keweenaw Bay and Grand Marais in 1967 and 1968 (R. W. Rybicki, MDNR, personal communication).

The MDNR initiated a Great Lakes catch sampling program at major fishing ports on Lake Superior and the other Great Lakes in 1983 (G. P. Rakoczy, MDNR, personal communication). This program gathered on-site data on catch per unit effort and catch composition, but there was no estimate of effort so total catch could not be determined. The catch-sampling program was upgraded to a full on-site creel survey in Lake Michigan in 1985, lakes Huron and Erie were included in 1986, with Lake Superior added in 1987 (Rakoczy and Lockwood 1988; Rakoczy and Rogers 1987 and 1988a).

Salmonid populations and the sport fishery in Lake Superior responded to the management strategies initiated in the 1960s much like in lakes Michigan and Huron, but to a lesser degree. Although sea lamprey control efforts and commercial fishing restrictions were similar to those in the lower lakes, fewer trout and salmon were planted in Lake Superior because forage was considered to be less abundant and fishing pressure was much less. Coho salmon plants were reduced in 1971 because growth, survival, and contribution to the fishery had not met