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1-10-40

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December 5, 1939

REPORT NO. 561

REPORT ON LAKE INDEPENDENCE, MARQUETTE COUNTY

by

C.J.D. Brown

During late June and early July of 1937, an Institute for Fisheries Research survey party\* made an inventory of Independence Lake, Marquette County (T. 51 N., R. 27 W., Sec. 13, 14, 15, 22, 23, 26). The outline and depth contour map of this lake had been prepared previously by the Michigan E.C.W. in the winter of 1935-36. This lake is about two miles from Lake Superior, near the town of Big Bay. In the past it has had a good reputation as a fishing lake and attracted a considerable number of tourists and summer residents. The beaches were considered good at the time of the survey, but somewhat littered with logs from early lumbering and domestic wastes dumped in from the town of Big Bay.

The lake basin is comparatively shallow and fairly regular. The surface area is approximately 1,900 acres, and the maximum depth 33 feet-- this occurs a little to the west of the lake's center. The lake shores

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\* The personnel of this party included Dr. Donald E. Miller, leader, W. F. Carbine and Hugo Ericson (from the Thompson Hatchery), assistants. Mr. Gerald Cooper assisted the party in seining for several days.

and surrounding country are mostly wooded. A dam at the outlet (Iron River), owned by the Brunswick Lumber Company, raised the natural water level six to eight feet, which of course increased the area of the lake by at least ten per cent. This structure is probably impassable to fish except during high water periods. The main tributary, the Yellow Dog River, fluctuates greatly in the volume of water it carries. It has a very high flood stage in the spring and a very low level during late summer and fall. Alder Creek and the inlet in McKenzie Bay are the only other substantial water sources to the lake. The outlet flows directly into Lake Superior.

About 30% of the lake is shoal (water less than 20 feet in depth). The bottom of this area is almost exclusively sand with the exception of McKenzie Bay and the area between the 10 and 20 foot contours in the west end which are of pulpy peat. Gravel patches are prominent in the shallow water along the northeast and southwest sides. The bottom beyond the 20 foot contour is entirely of pulpy peat.

The water is brownish in color and quite turbid. A secchi disc was only visible down to 6 feet. Shallow lakes of this size ordinarily have a rather high turbidity due to an almost constant wave action keeping finely divided bottom materials in suspension. A considerable quantity of the suspended matter undoubtedly comes from the Yellow Dog River.

Shallow basin lakes, such as Lake Independence, are usually rather productive of fish life. The broad, sandy shallow areas characterize this as a good pike lake, which has been proven by the fine pike fishing in the past.

Temperatures taken at the time of the survey show the surface water to be 67°F. and the bottom water 63°F. There is almost certain to be no thermal stratification in which the bottom water is much colder than the surface--so common in the deeper, more protected lakes. August

surface temperatures probably reach the high seventies or low eighties. There was abundant oxygen from top to bottom and it is fairly safe to conclude that the bottom waters maintain sufficient oxygen to support fish life the year around. The water is soft (methyl orange alkalinity 45 ppm) and yet is well on the alkaline side (pH 7.3-8.1).

Submerged aquatic vegetation is fairly abundant, especially in the mouths of the inlets and on the slope. There is practically no vegetation beyond the 20 foot contour.

The ordinary pondweed (Potamogeton) is the most common plant present, there having been seven species of this genus collected along the slope of the lake. Other water plants found here include coontail (Ceratophyllum), water milfoil (Myriophyllum), smart weed (Polygonum), waterweed (Anacharis), spike rush (Eleocharis), beggartick (Bidens), water buttercup (Ranuncululus), and bulrush (Scirpus). Muskgrass (Chara) and many other algae were common.

The presence of moderately abundant vegetation almost ensures a good fish-food supply. Reports show food organisms to be abundant in this lake. Mayflies, caddisflies, and snails were particularly numerous on the shoal, while midges and Corethra were very common in the deeper water. Plankton was very abundant at the time the survey was made.

Besides the invertebrate food organisms, there were large numbers of forage fish represented by ten different species. A summary of the fish species taken is given in the table below. This table also includes a summary of stocking records for the past five years. The fish are listed in the order of abundance--the most abundant first, etc.

Game fishes taken 1937 survey	Game fishes planted 1934-1938 inclusive	Forage fishes	Coarse fishes	Obnoxious fishes
Yellow Perch )	30,600	Mimic Shiner	Common Sucker	None
)	fingerlings	Log Perch	very abundant	present
)	10,400 adults	Spottail Shiner		
Walleye Pike	2,081,000 fry	Johnny Darter		
Northern Pike		Iowa Darter		
Rock Bass		Black Chin Shiner		
Smallmouth Bass		Golden Shiner		
		Black Nose Shiner		
		Northern Lake Chub		
		Muddler		

From the point of view of fish food abundance, this lake is probably much above the average for the region.

A creel census conducted during the winter of 1935-36 showed the northern pike to be the only important fish taken in large enough numbers to have significance. This lake produced about 1 1/4 fish per acre. However, at the time of the survey this lake was reported to be very good for northern pike, walleye pike and perch, which means that winter fishing is probably not representative of the annual catch.

Growth rate studies show that pike, perch and rock bass grow quite rapidly, indicating that conditions are very suitable for these species. A summary of the growth rate of each game species is given below.

Species of fish	Number of year marks on scales	Average size in inches	Number of specimens studied
Perch	2	4 1/4	1
	3	6 1/4	3
	4	6 3/8	3
	5	10 2/3	4
	6	11 1/8	5
	7	11 1/3	3
	8-9	12 1/8	2
Walleye	2	10 1/4	1
	3	15 1/4	2
	4	15 1/3	3
	5	15 4/5	5
	6	15 3/8	3

Species of fish	Number of year marks on scales	Average size in inches	Number of specimens studied
Northern Pike	3	20 3/4	4
	4	21 3/5	4
	5	24 3/4	1
Rock Bass	4	8 1/2	2
	5	8 1/3	12
Smallmouth Bass	3	10 1/2	1

Since this fish sample was taken right after the time of annulus formation, it is safe to conclude that they have just reached the ages given. All of these game species reached legal length by the end of their second year, which is probably better than average growth for the district.

The spawning facilities for perch, rock bass and smallmouth bass are certainly adequate and also for northern pike or else how would this last species maintain itself in such large numbers in spite of heavy fishing and no stocking? So little is known about the spawning requirements for walleye pike that no statement can be made as to its natural propagation in this lake.

#### Management Suggestions

Independence Lake should under no circumstances be changed from its present designation as a pike lake.

In view of the fact that no observations have been made on this lake since the time of the survey in 1937, it is difficult to make suggestions as to the stocking policy.

There seems to be no reason why perch, northern pike and rock bass cannot maintain themselves by natural propagation.

It may be desirable and necessary to stock walleye fry at regular intervals if it appears that natural reproduction is not adequate.

According to recent reports, the pike fishing is on the decline

in this lake. This decline is probably the result of the natural cycle which seems to occur in all waters. It doesn't seem possible in nature to have a crop of large fish ready to harvest every year. In the years of "good fishing," there are a large number of big fish which keep the on-coming younger generations of the same species reduced due to competition and predators. Then due to the removal of the larger fish, either by angling, old age or disease epidemics, the new crop for a year or two find no great competition and develop rapidly. The time between the removal of the old fish and the growing up of the new crop is that of "poor fishing." Sometimes game species alternate so that when pike fishing is poor, bass fishing is good and vice versa. No alarm should be felt for this natural phenomenon which has probably been going on since fish first inhabited our lakes. Stocking doesn't alter this picture and may even slow down the growing up process because the more fish present of a like competitive class, the slower they will grow, i.e. the food supply being constant.

In our opinion a lake of this type will recover best if left alone.

Fish predators, including the great blue heron, mergansers and loon, were fairly abundant around the lake. There is no evidence, however, that these birds are a serious menace to fish productivity and no reduction in their numbers is recommended at this time.

It is believed that no lake improvement is needed on this lake. Natural cover is abundant all around the lake. Any additional shelters would seem unnecessary. The higher level of the lake maintained by the dam at the outlet probably has a very beneficial effect in creating more shoal and its resulting benefits. The present water level should be maintained.