

Original: Fish Division
cc: Mr. Stanley Shust 3-20-42
Education-Game
Dr. Roelofs



INSTITUTE FOR FISHERIES RESEARCH

DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

March 11, 1942

REPORT NO. 757

A FISHERIES SURVEY OF ISLAND LAKE,

MARQUETTE COUNTY

by

E. W. Roelofs and F. E. Locke

Island Lake is located in Republic Township (T. 45 N., R. 30 W., Sec. 14) in the southwestern part of Marquette County. It lies approximately one and one-half miles northwest of Witch Lake and is reached by trail west from County Road 601.

A field party* from the Institute for Fisheries Research mapped and made a biological survey of the lake during July 22-25, 1940. The map shows the lake outline, bottom types, depth contours, and distribution of vegetation. The biological survey included temperature and chemical analyses of the water and a study of the vegetation, fish food, and fish.

Because of its small size and inaccessibility, it is doubtful that the lake has ever been the site of industry.

It had been fished very little previous to the summer of 1940. Few people knew of the lake, and fishing had never been worth the trouble walking in to the lake. In 1937, several hundred brook trout were planted. It was in July 1940 when the presence of large 2-3 pound trout became known. Fishing since that time has naturally been heavy. Little or no winter fishing is done.

*The party consisted of: F. E. Locke, leader; B. P. Hunt, I. J. Cantrall, and P. Galvin, assistants.

There is no cottage or resort development on the lake, and no such development is likely due to its small size and boggy shore. If a trout population is maintained, the lake will probably remain an important public fishing water however.

Physical Character

The lake is roughly elliptical with its long axis in a northwest-southeast direction. The island, located in almost the exact center, divides the basin, forming two distinct depressions--one in each end. A rapid drop-off around the entire margin leaves very little shoal.

The lake lies in a morainic region and has no inlet or outlet. The watershed is limited to the area immediately adjacent to the lake. The soil is chiefly sand and gravel, supporting a growth of aspen, birch, and some spruce. Annual water level fluctuations are slight.

The following table gives a summary of the physical characters:

Area (acres)	19.2
Maximum depth (feet)	40
% shoal area (less than 10 ft.)	20
Bottom types:	
Shoal	Sand, gravel, rubble, pulpy peat
Depths	Pulpy peat, fibrous peat
Color of water	None
Secchi disc (feet)	12

The small amount of shallow water in Island Lake limits the growth of vegetation and as a result there is little cover for fish. Spawning areas are limited, but probably adequate.

Since the lake is small and surrounded by wooded hills, wave action is negligible.

Temperature and Chemical Character

The kind and abundance of fish depend to a certain degree upon the temperature and chemical character of the water. The temperature and chemical conditions found in Island Lake July 23-24, 1940 are given below.

	North Depression				South Depression			
	Surface	Thermocline		Bottom	Surface	Thermocline		Bottom
		Top	Bottom	Bottom		Top	Bottom	Bottom
Depth (feet)		9	21	24		9	21	39
Temperature °F.	77	72	54	48	81	71	48	45
Oxygen (p.p.m.)	7.5	8.2	5.8	...	7.8	8.6	2.0	0.2
CO ₂ (p.p.m.)	1.5	1.0	12.0	...	1.0	1.0	4.5	12.0
M.O. Alkalinity (p.p.m.)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	6.8
pH	6.8	6.8	6.2	6.2	6.8	6.8	6.4	6.8

These data show that the waters of the thermocline are suitable for trout. (The thermocline is a zone of rapid temperature change.) The surface waters favor the growth of the warm-water fish, but since brook trout require waters of less than 70°F., they must be limited in their summer distribution to the thermocline region. The region below the thermocline is deficient in dissolved oxygen.

The softness of the water, expressed by methyl orange alkalinity, is indicative of low productivity; this low reading points to a lack of dissolved mineral salts. The pH, an expression of acidity or alkalinity, shows the lake to be slightly acid (a pH of 7 is neutral). Neutral or slightly alkaline waters are usually more productive.

Biological Characters

Fish, in addition to being affected by temperature and chemical conditions, are influenced by biological conditions (vegetation, fish food, and other fish).

Vegetation:

The following plants were collected from Island Lake:

<u>Plant</u>	<u>Abundance</u>
Sedge (<u>Carex substricta</u>)	Rare
Leatherleaf (<u>Chamaedaphne calyculata</u>)	Common
Pipewort (<u>Eriocaulon septangulare</u>)	Few
Quillwort (<u>Isoetes sp.</u>)	Rare
Yellow Water Lily (<u>Nuphar variegatum</u>)	Common

It will be noted that all of these plants are floating or emergent. The scarcity of vegetation results in a lack of cover and limits the production of fish food organisms.

The rapid drop-off accounts for the limited distribution of plants but does not explain the absence of submergent forms.

Fish Foods:

Plankton (semi-microscopic plants and animals) was not abundant at the time of the survey, but since plankton populations vary markedly, a single day's sampling is not particularly significant.

The shoal areas produce some food in the form of bottom organisms. Aquatic earthworms; leeches; mayfly, damselfly, and dragonfly nymphs; and caddisfly and midge larvae are present but not numerous.

The bottom samples from deeper water produced no organisms.

Fish:

The following table shows the kinds and relative abundance of fish in Island Lake:

	<u>Fish</u>	<u>Abundance</u>	<u>Number planted 1936-40</u>
GAME	Bluegill	Few	8,800
	Brook trout	Common	4,500
FORAGE	Fat-headed minnow	Abundant	

Growth studies on the game fish indicate good growth of brook trout (15 fish in age group IV averaged 16.5 inches in length). The only two bluegills taken were in their second summer of life and were 2.9 inches in length.

General Discussion:

Spawning facilities for bluegills are limited but are believed adequate for this small lake. Bluegills will build nests on very narrow shelves in shallow water. There are numerous places about the margin where sand bottoms are available. It is doubtful, however, that the lake provides spawning facilities for trout. Their continuation depends entirely upon artificial stocking.

Island Lake is one of many examples of lakes whose value has been increased tremendously by a simple management technique--introduction of a new species suited to conditions in the lake. Previous to the introduction of trout, the lake attracted very few anglers because of poor fishing. Since trout have been planted and have reached legal size, the lake has grown in popularity and some nice catches have been reported.

Stomach examinations showed the trout to be feeding on leeches and fat-headed minnows. There is plenty of this type of food available, as both the results of the survey and the good growth of trout indicate.

Management Suggestions

Island Lake is now classed as a "trout lake" and no change would be desirable.

The lake must be stocked with trout to maintain the population. An annual planting of 12,000 fingerling brook trout is suggested tentatively. This is on the basis of 600 per acre as recommended by Shetter in Institute for Fisheries Research Report No. 620.

If only fingerlings are planted in the future, the approximate percentage of survival could be determined by creel census.

Loons were the only predators observed. No parasites were seen in the trout.

There is some cover in the emergent vegetation and trash along the margin. The rapid drop-off prevents extensive weed beds.

The water level is fairly constant.

INSTITUTE FOR FISHERIES RESEARCH

By E. W. Roelofs and F. E. Locke

Report approved by: A. S. Hazzard

Report typed by: V. Andres