Original: Fish Division
cc: Education-Game
Mr. Stanley Shust 12-15-41
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INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

Mr. Calvert, Gulliver 10-29-41
Sent to Shust

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December 5, 1941

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

REPORT NO. 708

FISHERIES SURVEY OF GULLIVER LAKE, SCHOOLCRAFT COUNTY

by

E. W. Roelofs and F. E. Locke

Gulliver Lake lies in Doyle Township, Schoolcraft County (T. 41, 42 N., R. 14 W., Sec. 1, 2, 3, 34, 35, 36). It is situated within a quarter mile of the town of Gulliver on U. S. 2 and is 13 miles east of Manistique. It also lies about a mile north from Lake Michigan.

A map showing the lake outline and soundings had been previously prepared by the Michigan Emergency Conservation Works (winter 1936 - 37). The Institute is indebted to Messrs. Calvert and Calvert, proprietors of Old Deerfield Camp, who provided camping facilities, also to Mr. Howard Peters, Conservation Officer, Mr. Stanley Schust, Superintendent of the Thompson Fish Hatchery, and others who supplied information regarding the early history of the lake.

The biological survey was made from June 10 to June 17, 1940.*

Gulliver Lake has long had a reputation for its catches of northern and walleyed pike. However, during the last 5 or 6 years, anglers report a decided decline in the take of these species. This decline has been accompanied by a substantial increase in the take of smallmouth bass.

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

Gulliver Lake has some cottage development but there is room for much more. The northeast, east and southeast shores are those most used. The remainder of the shore, while having favorable conditions, has not been developed. There were 40 cottages, one resort, and one boat livery on the lake in June, 1940.

The large size of the lake, together with its extensive sand shoals, its reasonable fish population, and its proximity to U. S. 2 and Manistique, make it a potential recreational center.

Gulliver Lake occupies a large shallow basin which undoubtedly was formerly included as part of Lake Michigan but has been separated by bar or spit formation. The land surrounding the lake is of very low relief and for the most part is covered with second growth hardwoods.

The watershed of Gulliver Lake is very small. The lake has but one small inlet (Gents Creek or Gulliver Creek) which drains the territory extending from the lake about 1½ miles north. The outlet of the lake (Gulliver Creek) runs directly into Lake Michigan. The annual fluctuation of the water level is about one foot. During periods of low level, the outlet dries up. There are no dams in either inlet or outlet.

The lake has a surface area of 836 acres and a maximum depth of 28 feet. The shoal area, which represents approximately 60 per cent of the lake, has a sand and gravel bottom. The deeper portions of the lake (over 15 feet) have a highly organic bottom. The water is brown; a Secchi disc (circular metal disc) disappeared from view in between 9 and 10 feet of water.

The lake should be fairly productive on the basis of the physical characteristics. There is an abundance of shallow water, sand and gravel shoals for bass and bluegill spawning, a few protected bays, and adequate cover in the form of deadheads and trash. These conditions all favor the production

of fish and fish food. The brown color of the water tends to limit light penetration but the lake is quite shallow, and would not suffer by a restriction of the vegetation to the shallower water (less than 15 feet).

The factors discussed above play only a partial role in lake economy. The temperature and chemical nature of the water also influences the kind, abundance, distribution, and condition of the fish and fish food present. The following table summarizes the temperature and chemical data for Gulliver Lake as taken June 11, 1940.

Depth (ft.)	Temp. °F	Oxygen p.p.m.	CO_2 p.p.m.	M. O. alk. p.p.m.	pH
0	64	8.1	0.0	93	8.2
3	63.5	...	...	...	...
6	63	...	...	...	...
9	63	...	...	...	...
12	63	...	...	...	...
15	62	...	...	...	...
18	62	...	...	...	...
21	61.5	...	...	...	...
25	61	8.0	0.0	94	8.2

These data were taken in the deepest part of the lake. Additional readings taken at the inlet indicate different conditions. The temperature at the surface was 49° F., oxygen - 7.4 p.p.m., carbon dioxide - 6.0 p.p.m., M. O. alkalinity 134 p.p.m., and pH - 7.6. This means an inflow of colder and harder water into the lake. It also indicates that Gulliver Creek originates from springs. Its constant summer flow also points toward its being spring fed. The flow, however, is very small and probably has only slight effect on the lake as a whole

It is significant to note that the water in Gulliver Lake is thoroughly mixed and aerated during the summer season. (The rather uniform temperature and oxygen supply from top to bottom bears this out). This condition favors the propagation and growth of both fish and fish food organisms. While the

temperature was suitable for trout in June, there is no doubt but that as summer progresses, the water gets warmer than trout can tolerate.

All of the chemical conditions in the lake are well within the range of potential productivity. No pollution was observed.

In addition to the operation of physical and chemical factors in a lake, certain biological factors influence fish food and fish life. Vegetation, plankton (small, free swimming or free floating animals and plants), insects, and various relationships between these and fish all figure in the fish productiveness of lakes.

A list of plants*/ with their relative abundance and depth distribution follows.

Species	Abundance	Depth range in feet
Waterweed (Anacharis canadensis)	Rare	11 - 12
Sedge (Carex substricta)	Rare	1 - 1½
Musk grass (Chara)	Abundant	3 - 10
Water milfoil (Myriophyllum sp.)	Few	10 - 13
Yellow water lily (Nuphar microphyllum)	Rare	1 - 1½
White-stemmed pondweed (Potamogeton praelongus)	Common	10 - 11
Robbin's pondweed (Potamogeton Robbinsii)	Rare	12 - 14
Rush (Scirpus sp.)	Common	0 - 4
Cattail (Typha latifolia)	Rare	1 - 1½

Since the survey was made very early in the growing season of aquatic plants, this list may be incomplete and the recorded abundance may be incorrect. Natives relate that about 25 per cent of the lake bottom produces plants while less than 10 per cent had vegetation growing at the time of the survey. If the reports of the natives are correct, there should be ample vegetation to produce a large quantity of fish food, but if the weeds are no more abundant than the survey party found them, fish food also would probably be inadequate.

*/Plants identified by Miss B. M. Robertson.

Bottom foods were not particularly abundant. The sandy shoals produced snails and clams, the former being abundant in certain localities. A few larvae of the mayfly and caddisfly, as well as some adult aquatic beetles, were also found in the shallow waters.

The deeper portion of the bottom produced very little in the way of fish food--only a few phantom midge larvae were observed. Some snails and clams invade this area.

Plankton samples taken during the survey yielded an average of 16.0 cubic centimeters per cubic meter of water. This concentration of plankton is probably adequate to support the population of small fish. Plankton populations, however, are not constant.

Before a statement concerning the adequacy of the food can be made, the distribution of vegetation in the summer should be known. It is probably safe to assume that the opinions of those who frequent the lake at all seasons are reliable and that plants do cover at least 25 per cent of the bottom. In that event, food should be adequate during the late summer months.

The kind and relative abundance of fish are recorded below. Stocking records for 1936 to 1940 inclusive are also given.

Fish	Relative abundance	Number planted 1936-1940
GAME FISH		
Northern pike	Few	
Perch	Abundant	5,000 adult 3,000 - 7 month
Walleye	Few	1,710,000 fry
Smallmouth bass	Common	
Pumpkinseed	Few	
Rock bass	Common	
Cisco	Rare	
COARSE FISH		
Common sucker	Few	
FORAGE FISH		
Mimic shiner	Abundant	
Straw colored shiner	Rare	
Blunt-nosed minnow	Abundant	
Common shiner	Abundant	
Sand shiner	Rare	
Log perch	Few	
Johnny darter	Few	
Iowa darter	Few	
Muddler	Rare	

Scale samples were taken from all the game fish; individual measurements were made of the length and weight. The fish were aged* and the growth determined. The growth rates are shown in the following table.

*Age determinations made by W. C. Beckman

Species	Age group	Number of specimens	Average length (inches)	Average weight (ounces)
Great northern pike	II	17	18.4	21.9
	III	5	23.2	41.1
	IV	2	29.2	95.2
	V	1	24.1	33.8
Perch	I	10	2.1	6.5
	III	2	6.0	1.4
	IV	3	6.0	1.6
	V	9	7.5	3.2
	VI	5	9.7	6.6
	VII	3	10.8	8.8
Walleye	VI	1	17.0	25.9
	VII	7	19.0	32.5
Rock bass	I	3	1.2	0.17
	III	1	5.1	7.3
	IV	1	7.1	4.5
	VI	2	8.0	7.3
	VII	9	9.8	11.1
	VIII	5	10.2	13.8
Smallmouth bass	II	1	6.3	1.8
	V	2	16.1	32.0
	VII	2	16.5	37.5
Pumpkinseed	IV	2	6.9	5.3
	V	2	7.6	7.1
	VI	1	7.9	6.6
Cisco	VI	2	13.7	14.5

It seems that the perch are growing rather slowly for the first few years but this is compensated for by faster growth during and following their fourth year. Other species are growing at a suitable rate.

Management Suggestions

Spawning facilities are adequate for all species present, with the possible exception of northern pike. This species must limit its spawning to a limited area near the inlet, and perhaps some use is made of the inlet stream itself. Since the lake has maintained a good pike population for many years, there need be no particular concern since spawning facilities are likely as adequate now as they have been. The large gravel and rubble shoal areas should be suitable for smallmouth bass and walleyes. The bass have been observed while spawning but no evidence of walleye spawning has been reported.

The lake is a designated pike lake but pike catches are decreasing while bass are becoming more numerous. The present designation should be retained until a further investigation is made (in 2 or 3 years) to determine the relative abundance of the three species as taken by fishermen. If the northern pike and walleyes are still declining and smallmouths are the predominant species, the designation should be changed to the "all other lakes" class.

Since walleyes are present in Gulliver Lake, it is recommended that plantings be discontinued for 2 years (1942 and 1943) in order that it may be determined whether walleyes spawn successfully. Gulliver Lake should provide some spawning, particularly on the gravel and rubble bottom on the east and west sides, but it would be well to check this by some observation during the spawning season. Since perch are abundant, stocking should be discontinued.

Parasites and predators require no control. A few parasites such as black spot, bass tapeworm, and flukes were noted but heavy infestations were rare.

The water level is not subject to severe fluctuation and at present requires no regulation.

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