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FISHERIES SURVEY OF HOUSE, HOISTER AND TROUT LAKES, GLADWIN COUNTY, MICHIGAN

by

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These three very small lakes are located in the extreme northwest corner of Gladwin County (T. 20 N., R. 2 W., Sec. 8, 9) on the Gladwin Game Refuge. They are all within one-half mile of the Refuge headquarters and receive frequent visits from Refuge visitors mainly because they are inhabited by beaver. All of them lie within the Cedar River drainage, although House Lake has neither inlet nor outlet. Hoister and Trout lakes enter the North Branch of the Cedar by separate tributaries located about a mile apart. The town of Gladwin is situated 18 miles to the southeast via highway M-18.

The fisheries survey of these lakes was requested by the Game Division of the Department of Conservation and was carried out by the Institute* during the last week of August, 1938. Plane table maps showing the lake margin, contours, vegetation beds, bottom types, etc. were prepared at the time of this investigation by the same party.

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* The Institute survey party included the following: Robert Ball, leader; Paul Eschmeyer, Arthur Whiteley, and Walter Crowe, assistants.

Very little is known about the past history of fishing on these lakes, but they seem to have been used very little. Of course lakes of this size and type are not capable of producing many fish and so naturally would not attract many fishermen. There are no cottages or boat liveries on these lakes since the property is all part of the Refuge and State owned.

There is considerable water fluctuation. Hoister and Trout had higher than normal levels at the time of the survey because of beaver dams at their outlets. The dam on Hoister Lake was approximately 6 feet and the one on Trout Lake about 5 feet.

Their small original basins were undoubtedly of glacial origin but no detailed study has been made on this subject. The contour of each basin is regular with the deepest point approximately in the center of the lake. There are no regular inlets and their source of water is entirely from a very limited surface drainage and springs. Hoister Lake is particularly well supplied with springs.

The surrounding country is rolling and heavily wooded. The soil is sandy and poor in fertility. The size, maximum depth, etc. of each lake is summarized in the following table.

Lake	Size, acres	Maximum depth	% of shoal	Shore development	Bottom types		Color of water	Secchi disc
					Shoal	Depths		
House	4.4	21	45	1.2	Sand	Pulpy peat	Greenish brown	7 1/2 ft.
Hoister	13.3	31	70	1.8	Fibrous peat	Marl	Greenish	12 ft.
Trout	5.3	15	75	1.9	Fibrous peat + marl	Pulpy peat	Greenish	12 1/2 Ft.

House lake is the smallest of the three and Hoister the largest. The latter is also the deepest, with a maximum of 31 feet. There is a larger percentage of shoal in Hoister and Trout lakes than in House Lake. This has resulted from the flooding caused by the beaver dams. The bottom in the shallow water is composed of sand in House Lake and fibrous peat in Hoister and Trout. In the deeper areas, pulpy peat is predominant in House and Trout, while marl is most abundant in Hoister Lake.

The water has a slightly brown color in House Lake but is colorless in the other two lakes although it appears greenish. The depth at which a Secchi disc could be seen varied from 7 1/2 feet in House Lake to 12 1/2 feet in Trout Lake. This is about average for small lakes of this type.

The surface temperatures taken during the survey were warmest in House Lake (78°F) and coldest in Trout Lake (72°F). Bottom temperatures taken at the same time were highest in House Lake (67°F) and lowest in Hoister Lake (53°F). All of these lakes show thermal stratification, i.e., marked zones of different temperatures. The thermocline (zone of rapid changing temperatures) in each case, however, extends almost to the bottom of the lake.

SUMMARY OF TEMPERATURE AND CHEMICAL ANALYSES

FOR HOUSE, HOISTER AND TROUT LAKES

Lake	Date	Surface Temp.	Bottom Depth	Bottom Temp.	Thermocline Top Depth	Thermocline Top Temp.	Thermocline Top ppm. O_2	Thermocline Top ppm. CO_2	Thermocline Bottom Depth	Thermocline Bottom Temp.	Thermocline Bottom ppm. O_2	Thermocline Bottom ppm. CO_2	ppm. M O alk. range	pH range top to bottom
House	8/23/38	78°F.	18'	67°F.	12'	74°F.	7.7	0.0	18'	67°F.	3.0	5.0	125-135	7.6-8.0
Hoister	8/25/38	73°F.	27'	53°F.	18'	65°F.	1.5	6.0	27'	53°F.	1.0	14.0	153-185	7.0-8.2
Trout	8/24/38	72°F.	15'	63°F.	8'	67°F.	9.0	1.0	12'	65°F.	3.9	5.0	158-172	7.6-8.0

The oxygen supply, while abundant at the top of the thermocline in House and Trout lakes, is below the point suitable for fish in Hoister Lake. These analyses reveal the following conditions: House Lake has suitable oxygen from surface to 18 feet, Hoister Lake from surface to about 12 feet, and in Trout Lake from surface to bottom. House Lake is definitely more suited to warm-water species and Trout Lake to cold-water species; while Hoister Lake, although having a sufficiently low temperature for trout has only a very limited zone (about 10 feet) in which fish of any kind can exist. Trout may find conditions tolerable here, but there is some question whether or not they will find conditions suitable.

The water of these lakes is moderately hard with a methyl orange alkalinity between 125-185 ppm. The hardest water occurs in Hoister Lake. The pH ranges from 7.0-8.2, which indicates that the water is definitely alkaline.

There is no pollution in these lakes other than that caused by the beaver. It is a known fact that beaver may at times seriously affect ponds and lakes by bringing in enormous quantities of debris, organic matter and excrement. Lakes so affected become acid in nature, poor in food and not capable of producing many fish.

Aquatic vegetation is rather abundant in all three lakes. Submerged vegetation is very abundant in Hoister Lake down to 15 feet in depth and in Trout Lake down to 12 feet in depth.

As shown in the accompanying table, the pond weeds are the most abundant species. A total of twenty-two species of plants were collected from these lakes.

SUMMARY OF AQUATIC PLANTS COLLECTED IN GLADWIN LAKES

Species of Plant	House Lake			Hoister Lake			Trout Lake		
	Abundance	Range Depth in feet	Bottom type	Abundance	Range Depth in feet	Bottom type	Abundance	Range Depth in feet	Bottom type
Sedge (Carex)	common	...	...	abundant	0-1	FP			
Spike rush (Eleocharis palustris)	common	0-1	S						
Rush (Juncus nodusus)							common	0-½	FP
Duckweed (Lemna minor)				sparse	½-1	FP			
(Spirodela polyrhiza)				sparse	½-1	FP			
Milfoil (Myriophyllum)				common	2-7	FP	sparse	1-2	M
Bushy pondweed (Najas flexilis)	common	1-3	S	abundant	1-5	FP	abundant	1-6	FP
White waterlily (Nymphaea odorata)	sparse	1-5	S						
Yellow waterlily (Nuphar variegatum)	sparse	1-6	S	sparse	3-6	FP	sparse	6	FP
Water smartweed (Polygonum natans)	sparse	0-1	S	sparse	3-4	FP			
Pondweed (Potamogeton gramineus)	common	1-5	S	common	2-5	FP			
(P. foliosus)				common	2-5	FP			
(P. natans)	common	1-6	S	common	2-15	FP	common	2-12	FP
(P. pectinatus)				common	2-5	FP			
(P. pusillus)	abundant	3-9	S and FP				sparse	1-4	FP
(P. zosteriformis)							common	2-15	FP
Arrowhead (Sagittaria)							sparse	2-8	FP
Bulrush (Scirpus validus)	common	0-1	S	sparse	...	...	sparse	½-3	FP
Bur reed (Sparganium)				common	0-1	FP	common	5	...
Cattail (Typha latifolia)	sparse	0-1	S						
Bladderwort (Utricularia vulgaris)	sparse	½-2	S	common	2-19	FP	common	2-8	FP
Muskgrass (Chara)	abundant	1-8	S	abundant	2-18	PP	abundant	1-12	FP

S - Sand; M - Marl; FP - Fibrous peat; PP - Pulpy peat.

Plankton (small, free-floating animals and plants) was fairly abundant in House and Hoister lakes but much less abundant in Trout Lake. Zooplankton was predominant in House and Trout lakes, while phyto- and zooplankters was equally numerous in Hoister Lake. While plankton as a rule is not an important direct food of larger game fish, it is fundamental for young game and forage fishes. The collections made in these lakes, although not representative for an entire year, indicate a rather good plankton development.

Observations on the other food items show midges to be the most abundant form. Fresh-water shrimp were taken in Hoister and Trout lakes but not in House Lake. Mayflies and caddisflies were common as well as snails and water mites.

In comparison with other lakes studied in the region, we consider the fish food organisms in these lakes to be moderately abundant.

Fish collections were made from all three lakes and the kinds and abundance are included in the following table:

Lake	Species of Fish	Abundance	Stocking in last 6 years
House	Perch	Common	None
	Hybrid green sunfish x pumpkinseed	Abundant	"
	Creek chub	Common	"
	Carp - Reported	Few	"
Hoister	Perch	Common	None
	Pumpkinseed	"	"
	Rock bass	"	"
	Creek chub	"	"
	Blunt-nose minnow	"	"
Trout	Brook trout	Few	None
	Perch	Abundant	"
	Common sucker	Few	"
	Creek chub	Common	"
	Common shiner	Abundant	"
	Blunt-nose minnow	Abundant	"

The extremely large population of hybrid sunfish in House Lake was very striking. This was not a stunted population, although, as can be seen from the following table, the growth rate of these fish is rather slow.

Forage fishes were extremely abundant in Trout Lake and moderately so in Hoister. While perch were present in all these lakes, they did not seem to be excessively abundant.

A summary of the growth rate for the few perch and sunfish collected is given below. Perch reach legal length late in their third or early in their 4th summer. The sunfish grow more slowly, reaching legal length in their 4th or 5th summer. Growth rate of all species is somewhat below the average of the more productive waters in the State.

Growth Rate of Fish Collected in the Gladwin Game Refuge Lakes*

Lake	Species	Age**	Number specimens	Ave. total length (in.)	Ave. total weight (oz.)
House	Perch	I	1	4.6	0.38
	Sunfish (green x pumpkinseed)	II	4	4.2	0.75
		III	4	5.2	1.50
		IV	5	6.1	2.40
		V	1	7.2	4.45
Hoister	Perch	III	3	7.2	2.30
		IV	1	9.1	4.80
	Rock bass	III	1	3.9	0.56
		IV	1	7.9	4.70
	Sunfish	II	2	3.7	0.50
Trout	Perch	III	1	7.8	2.80
		IV	4	6.6	1.90
		V	2	7.5	2.70

* Age analyses made by W. C. Beckman.

** Add one year to the above to determine the actual number of growing seasons.

About the only parasite rated was "black spot" (Neascus) on perch. This was not very numerous and certainly is of little consequence to the well-being of these fish.

Management Suggestions

At the present time House Lake is in the "all other lakes" classification, while Hoister and Trout lakes are designated as trout lakes. We recommend that this present classification be adhered to for the present.

Largemouth bass and bluegills should be encouraged in House Lake. After these species are introduced, no further stocking should be necessary, since spawning facilities here are undoubtedly adequate.

It seems desirable to reduce the present population of perch in Trout and possibly Hoister lakes. We recommend that these lakes be poisoned out this summer and then be planted back with brook or rainbow trout. Since spawning grounds are completely lacking in these lakes, it will be necessary to make regular plantings of trout in order to maintain a reasonable population. Care should be taken not to stock an excessive number of fish because only a few trout can find space and food to grow at a good rate.

After a trial planting of trout in Hoister Lake, it will be possible to tell how satisfactory the lake has been for this species. Should it prove unsatisfactory, then largemouth bass and bluegills should be introduced.

There seems to be adequate cover in all these lakes. Deadheads are numerous and the beaver cuttings and debris make additional cover seem unnecessary. Besides this, there is abundant vegetation which forms ideal cover for young game fish, forage fish and invertebrate food organisms.

We believe these lakes would be more suitable for fish if the beaver were removed from them, but at the same time fully realize that the presence of beaver there is probably as important or more so than fish to the average visitor. This question will need to be settled by the Game Division, who control this tract.

No parasite or predator control is recommended. The effect of either parasites or predators is so negligible here that it probably has no significance.

The higher water level found at the time of the survey is only desirable if a more constant level can be maintained. Efforts should always be toward cutting down abrupt or drastic water fluctuations.

It may be possible to clean out the short spring runs and add sufficient gravel to make these places suitable for brook trout spawning. Further study should be made on this subject.

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