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FISHERIES SURVEY OF HUBBARD LAKE, ALCONA COUNTY

by

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Introduction

Location and drainage

Hubbard Lake, one of the larger of Michigan's inland lakes, is located in Caledonia, Alcona and Hawes Townships of the north central part of Alcona County (T. 27 N., R. 7 E., S. 1-3; T. 28 N., R. 7 E., S. 3, 4, 9, 10, 12-16, 21-27, 34-36; T. 28 N., R. 8 E., S. 19, 30). It is only 11 miles inland from Lake Huron.

Hubbard Lake is easily reached during all seasons of the year by county roads from the main highway, U.S. 23, which is 7 miles from the east shores. Good roads make over half of the shore available in all weather. The principal nearby towns are Harrisville, about 20 miles southeast and Alpena, about 22 miles northeast.

Acknowledgments

An outline and bottom contour map of Hubbard Lake was made during the winter of 1936-37 as a project of the Michigan Emergency Conservation Work, Camp Alpena 117-S. Several investigations of the fisheries have been made by the Department of Conservation. The principal ones of which were those of J. Metzelaar and T. H. Langlois in 1926 and a party of the Institute for Fisheries Research, August 26 to September 7, 1942.*

Past and present use

During more active lumbering days, Hubbard Lake was used to float logs from the several inlets to the outlet. The lake was dammed to raise the level and facilitate this process. More recently the lake has served as a reservoir for the Alpena Power Company, with a concrete dam now in the outlet.

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*Biological inventory party of the Institute consisted of R. D. Van Deusen, P. Galvin, S. Lievense and L. E. Perry.

The lake has considerable cottage and resort development. A few resorts and hotels were operating at the time of the survey and rental cottages were available at about 40 locations. Permanent homes and summer cottages were found around most of the shore. Only about one tenth of the shore is not suitable for the construction of homes because of marshy ground.

The fishing on Hubbard Lake is moderate during the summer season and light in winter. Perch and pike are predominant in catches and have been so for many years. Recently smallmouth bass are frequently caught. Persistent efforts have been made to introduce walleye and lake trout but the results have been poor. Only a few fish of these species have been caught.

Physical characters

Geological origin

The moraines around Hubbard Lake are fragmentary instead of being arranged in continuous belts. The lake comes in contact with these morainic fragments* in four places. Large boulders may be found where wave action has eaten into the moraines.

Shape of basin and extent of drainage

With the exception of a large bay on the east side, Hubbard Lake is roughly oblong in outline. Its long axis runs nearly NNW-SSE. The lake bottom is fairly regular with three very small depressions found near the middle of the lake.

Hubbard Lake has a drainage area of approximately 105 square miles. The immediate shore has rolling topography and is composed mostly of sand and gravel topsoils. The surrounding country is also rolling and mostly wooded, with several intervening marshy areas, and some cultivated farm land of poor quality.

Water fluctuation

The water level of Hubbard Lake is maintained by the presence of a dam in the outlet (Lower South Branch of the Thunder Bay River) which is owned and operated by the Alpena Power Company. At the time of the survey a five foot head was being held, which appeared to be satisfactory to most cottage owners. The dam, however, is capable of holding a 6.5 foot head as was maintained early this year. At the high level, wave action caused considerable damage to shore installations. According to the caretaker of the dam the lowest point possible is the 4.2 foot level.

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*"Inland Lakes of Michigan" by I. D. Scott.

The water of Hubbard Lake is supplied mainly by five streams, which have the following approximate sizes: West Branch River, 10-15 ft. wide by 1-2 ft. deep; Holcomb Creek, 25 ft. wide by 1 ft. deep; Sucker Creek, 25 ft. wide by 2 ft. deep; Stevens Creek, 3 feet wide by ½ foot deep; Shafer Creek, 2 feet wide by ¼ foot deep. These inlets are augmented by numerous springs, seeps, and natural run-off.

Wave and ice action

Because the long axis of Hubbard Lake is nearly parallel with that of the prevailing winds, the wave and ice action is most violent on the southeast shores of the lake. However, the sweep is great enough in almost any direction to allow considerable wave and ice action.

Summary and discussion of physical factors in relation to fisheries

Hubbard Lake has a surface area of 8850 acres and a maximum depth of 87 feet. Its shoreline development is 1.5 which means that the lake has a shore line 1.5 times that of a circle containing the same area. A lake with a high shore line development usually has protected shallow bays and is therefore more productive. Hubbard Lake has few well protected areas. The dominant bottom types on the shoal (0-15 ft.) consist of sand, marl, gravel, and rubble. The bottom types in the depths (over 15 ft.) are mainly marl and pulpy peat with small amounts of muck in the 80 foot depressions. The water was colorless, and the average Secchi disk reading was 7 feet which is indicative of moderate low transparency.

In general, the physical factors in Hubbard Lake favor about average productivity.

Temperature and chemical characteristics

Temperature

Temperature observations were made from the surface to the bottom of the lake near the location of the deepest depression. The surface temperature was 68° F. and there was practically no change down to 43 feet. From there to 50 feet the temperature dropped nearly 10 degrees (59° F.). The bottom (68 feet) was 57° F. Thus, there was a thermocline (zone of rapid change in temperature) of minor proportions between 43 and 50 feet. The thermocline is important because it separates the cooler bottom water from the warm surface water and creates favorable temperature conditions for cold water fishes.

Chemical conditions

Oxygen was found in abundance above the thermocline. At the time of the survey (August 27, 1942) there were 8.1-8.2 parts per million in surface water. The amount dropped in the thermocline to 1.9 parts per million at 50 feet. At 68 feet there was only 0.5 part per million.

Oxygen below the thermocline was not sufficient to support normal fish life. Although a few species of fish, such as bullheads can live in water with very low concentrations of oxygen, most game fish require at least 3 or 4 parts per million.

The water in Hubbard Lake was found to be rather hard (methyl orange alkalinity, 158-162 parts per million) and alkaline (pH 7.4-8.1). These conditions are generally favorable to high productivity.

Pollution

No serious pollution was observed or reported.

The chemical and temperature data are summarized in Table I.

Table I

Observations on chemistry and temperature of Hubbard Lake, August 27, 1942

Depth (feet)	Temperature (°F.)	Oxygen (parts per million)	M. O. Alkalinity (parts per million)	pH
Surface	68	8.2	158	8.1
42	68	8.1	...	...
50	59	1.9	...	...
68	57	0.5	162	7.4

Discussion of temperature and chemical factors in relation to fisheries

Although there was a thermocline in Hubbard Lake which insured colder water on the bottom, the difference in temperature from top to bottom was not great and the amount of oxygen below the thermocline was not sufficient to support fish. Therefore only the upper waters were available, ranging in temperature from about 60° to 68° F. These conditions are most suitable to warm-water fish, however, the temperature of the surface water is not excessively high for rainbow trout, which will live satisfactorily in water up to 75° or 80° F. if cooler water is also available. The thin layer of water in the thermocline may be suitable to lake trout, but above the thermocline, it is probably too warm.

During the survey in 1925 by Metzelaar and Langlois there was no thermocline in late August and it was not known how long this condition existed. Because of the large size of the lake, the moderate depth and the strong winds, it is likely that temperature conditions in Hubbard Lake would vary considerably from year to year, but the water would never be expected to reach the high temperatures of small southern Michigan lakes.

Biological characters

Vegetation

A list of aquatic plants and the approximate relative abundance of each species is found in Table II.

Table II

Aquatic vegetation of Hubbard Lake

Common Name	Scientific Name	Relative Abundance*
White-stemmed Pondweed	Potamogeton praelongus	D
Floating-leaf Pondweed	Potamogeton natans	S
Sago Pondweed	Potamogeton pectinatus	S - M
Bushy Pondweed	Najas flexilis	D
Stonewort	Chara sp.	D
Arrowhead	Sagittaria latifolia	S
Water Milfoil	Myriophyllum sp.	D
C. Cattail	Typha latifolia	S
Hard-stemmed Bulrush	Scirpus validus	M
Water Marigold	Megalodonta Beckii	S
Wild Rice	Zizania aquatica	S
White Water Lily	Nymphaea tuberosa	S
Bur Reed	Sparganium eurycarpum	S
Horsetail	Equisetum fluviatile	S
Flat-stemmed Pondweed	Potamogeton zosteriformis	M
Leafy Pondweed	Potamogeton epihydrus	S
Coontail	Ceratophyllum demersum	M
Bladderwort	Utricularia vulgaris var. americana	S - M
Bur Reed	Sparganium sp.	S
Three Square	Scirpus americanus	S
Pondweed	Potamogeton angustifolius	M
Variable Pondweed	Potamogeton gramineus	M
Pondweed	Potamogeton pectinatus	S
Wild Celery	Vallisneria americana	S - M
Clasping-leaf Pondweed	Potamogeton Richardsonii	S
Waterweed	Anacharis canadensis	M
Nitella sp.	Nitella sp.	S

* S - sparse, M - medium, D - Dense.
Identifications by Betty R. Clarke.

Aquatic plant beds of varying density were found to a depth of fifteen feet. Quite extensive beds of bulrushes exist along the somewhat protected west shore. The pond weeds (Potamogeton), were found near the "drop-off" and in protected bays, while dense beds of Chara were found quite consistently near the outer limit of the area potentially capable of supporting plant growth. Aquatic plants are important to a fish production in that they provide shelter for fish and harbor large numbers of food organisms. They also facilitate spawning of certain species. Abundance of aquatic vegetation in Hubbard Lake would be considered medium.

Fish foods

The abundance of small, free-floating fish food organisms (plankton) was considered fair at the time of inventory. Collections consisted

mostly of zooplankton, of the following genera: Diaptomus, Cyclops, Daphnia, Leptodora, Epischura, and Diaphanosoma.

Bottom food organisms of the following groups were found in fair abundance: crayfish (Decapoda), clams (Pelecypoda), snails (Gastropoda), mayflies (Ephemeroptera), caddis (Trichoptera), sow bugs (Isopoda), scuds (Amphipoda), dragon and damsel flies (Odonata), and bloodworms (Chironomidae).

The most productive samples were taken in vegetation at the south end of the lake. The samples from the bottom soil contained less than average numbers of organisms.

Forage fish were fairly abundant in Hubbard Lake. The most frequent forms were common shiners, spot-tail shiners, black-nose shiners, young suckers, and ciscoes.

Fishes present

The fish collected and reported from Hubbard Lake are listed in Table III.

Perch were the most abundant fish in the lake and were caught in the nets at almost every setting. Northern pike and rock bass were probably next in order of abundance. Smallmouth bass were claimed to be increasing rapidly in importance. Adult smallmouth were caught with difficulty by the party but young of the year were frequently taken. Largemouth bass, bluegills and pumpkinseed sunfish were only taken rarely. Ciscoes are believed to be fairly abundant, although not many were caught.

No walleye, lake trout or Great Lakes whitefish were taken by the party but they are reliably reported to occur in the lake. Walleye and lake trout have been planted in Hubbard Lake annually for many years, yet they have never become more than a novelty. It is reported that each year a few are caught. The lack of these species may either be due to the fact that the lake is unsuitable or that the fish planted were too small when stocked and were unable to survive the predation of the large number of pike and perch. A few large walleye have been planted rather recently but their success is not yet known. No adult lake trout have been planted and it is very doubtful that many fry have survived. The lake is probably marginal for this species but it is believed they would be more desirable than walleye since the latter are known to damage the bass fishery of lakes where their introduction has been successful. In the early 1930's an attempt was made to keep lake trout fry in a rearing stream (Madison's Creek) for a summer before releasing them to the lake. This was apparently not very successful and the fish were planted when still of small size. Another attempt may be worth while but much larger fish should be planted. A small number of Great Lakes whitefish weighing from six to eight pounds are reported caught in Hubbard Lake in winter and early spring.

Table III

List of fishes, their relative abundance and stocking, Hubbard Lake

Name	Relative abundance	Stocking (1937-1941)
Game fishes:		
Lake trout	Reported	362,000 fry
Great Lakes whitefish	Reported	
Northern pike	Common	17 adults
Walleyes	Reported	2,495,000 fry
		2,352 adults*
Perch	Abundant	96,480 fingerlings
		1,464 adults
Smallmouth bass	Few	
Largemouth bass	Few	
Bluegills	Few	
Pumpkinseed sunfish	Few	
Rock bass	Common	
Ciscoes	Common	
Coarse fishes:		
Common sucker	Common	
Black bullhead	Few	
Brown bullhead	Abundant	
Channel catfish	....	17 adults
Forage fishes:		
Common shiner	Abundant	
Spot-tail shiner	Abundant	
Sand shiner	Few	
Golden shiner	Few	
Blunt-nosed minnow	Few	
Black-nosed shiner	Rare	
Log perch	Common	
Trout perch	Reported	
Johnny darter	Common	
Iowa darter	Few	
Black-sided darter	Few	
Hornyhead chub	Few	
Mud minnow	Few	
Muddler	Few	
Great Lakes shiners	....	31,200 adults

*Includes approximately 2,000 adult walleyes stocked by local residents and the Department of Conservation in 1940 which are not included in the department stocking records.

Suckers and bullheads were common. A few adult channel catfish have been planted in the lake but none has been reported.

Fourteen species of forage fishes were collected from Hubbard Lake but none appeared to be very abundant. In very few places was it possible to make large collections of any forage fish. Common and spot-tail shiners were most common. Great Lakes shiners were stocked in Hubbard Lake in 1938. They have not been reported since.

Creel census

The general creel census reports on Hubbard Lake taken by conservation officers over the last several years show little change in the general trend of fishing. Records of three seasons were considered numerous enough to have some general significance. The seasons are as follows: intensive census during the winter of 1936 by the C.C.C., and general censuses during the summers of 1940 and 1941. The following tables IV and V express the results.

Table IV

	Intensive Census 1936	General Census 1940	General Census 1941
Successful men	96	221	241
Percentage taking fish	45%	59%	58%
Hours fished	...	629.75	592.00
Unsuccessful men	119	152	177
Percentage not taking fish	55%	41%	42%
Hours fished	...	241.25	291.00
Total number of men	215	373	418
Total hours	893.75	871.00	883.00
Hours per man	4.16	2.34	2.11
Number of legal fish	262	698	687
Fish per man	1.22	1.87	1.64
Catch per hour	0.30	0.80	0.78

Table V

Kinds of fish taken and catch per hour

	1936 (winter)		1940 (summer)		1941 (summer)	
	Number	Catch per hour	Number	Catch per hour	Number	Catch per hour
Largemouth black bass	...	...	1	0.001	...	...
Smallmouth black bass	...	...	12	0.01	12	0.01
Common sunfish	...	...	...	...	5	0.006
Rock bass	...	...	6	0.007	14	0.02
Yellow perch	210	.23	554	0.64	638	0.72
Walleye	7	0.008	16	0.02	4	0.005
Northern pike	32	0.04	67	0.08	3	0.003
Whitefish	12	0.01	...	...	...	...
Common sucker	1	0.001	...	...	...	...
Bullhead	...	...	42	0.05	11	0.01

It is obvious that 215 fishermen on a lake the size of Hubbard during the entire winter of 1936 is a very small number. Winter fishing on this lake must be considered very light. Also, the fact that the catch per hour was only 0.3 fish is further evidence that winter fishing could not possibly be injurious to summer fishing as is claimed by some local residents.

The records of 1940 and 1941 are not complete enough to tell how many people fished the lake but they do show that approximately 60 per cent caught fish at the rate of about 0.8 fish per hour. The average catch per hour in non-trout waters of the Harrisville hatchery district was 0.7 in both 1940 and 1941; however, the state average during these years was 1.04 and 1.06. The creel census records also bear out that yellow perch are taken in greatest numbers.

Growth rate of game species

Scale samples were taken from a series of each species of game fish collected for the purpose of determining the age and growth rate. The results of this study are given in Table VI. The tentative state averages for different age groups are also included in this table.

Table VI

Species	Age*	Number of specimens	Average total length in inches	State average** total length in inches	Average weight Pounds	Ounces
Smallmouth	0	1	3.6	3.7	...	0.5
black bass	II	2	8.9	8.8	...	5.8
	IV	1	14.5	13.3	...	...
Largemouth						
black bass	II	2	9.4	8.4	...	8.3
	III	1	12.9	10.8	1	5.0
Rock bass	II	7	5.3	4.3	...	1.8
	III	10	6.4	4.9	...	3.2
	IV	7	7.3	5.6	...	4.7
	V	6	8.3	6.6	...	7.0
	VI	2	9.8	8.3	...	11.2
	VII	4	10.6	8.7	...	15.2
	VIII	1	10.8	9.6	1	0.3
Northern	0	3	9.0	...	...	2.4
pike	I	7	19.3	...	1	12.0
	II	4	19.7	...	1	15.2
Common	II	5	5.9	4.4	...	2.7
sunfish	III	3	6.3	5.8	...	3.6
	V	1	8.2	6.8	...	8.3

(continued)

Table VI (Continued)

Species	Age*	Number of specimens	Average total length in inches	State average** total length in inches	Average weight Pounds	Ounces
Yellow perch	II	2	4.2	6.2	...	0.4
	III	6	4.9	7.1	...	0.7
	IV	3	6.5	7.8	...	1.5
	V	13	7.3	9.4	...	2.5
	VI	11	7.6	10.2	...	2.8
	VII	8	9.9	10.4	...	6.4
	VIII	8	10.3	11.3	...	7.7
	IX	2	11.5	11.8	...	11.2
	X	3	11.6	...	...	12.7
	XII	2	12.4	...	...	13.2
	XIII	1	12.6	...	...	15.9
Cisco	II	7	7.3	...	...	1.9
	III	1	7.6	...	...	2.0

*Ages of fish determined by L. E. Perry and R. D. Van Deusen.

**State averages determined by W. C. Beckman.

Although samples taken for age-growth determinations were not large enough for some species to give definite information, it is believed that they are sufficient to show the general trend in growth of fish in Hubbard Lake. When compared with the tentative state averages, it can be noted that the common sunfish, smallmouth bass, largemouth bass, and rock bass were all average or above. The yellow perch were slow growing until the fifth or sixth year, but then they rapidly gained to become nearly equal to the state average by the end of the ninth year.

Natural propagation

Young of the year of all common species of game fish were found in Hubbard Lake. Reproduction of smallmouth bass, northern pike, yellow perch, and rock bass was especially good.

Spawning facilities are apparently adequate for smallmouth bass, northern pike, yellow perch, rock bass, and walleye.

Management proposals

Designation of lake

Hubbard Lake is designated as a "pike lake," which according to the present survey is the most suitable classification.

Stocking

Stocking of all warm-water fish in Hubbard Lake should be discontinued. Natural reproduction is adequate to maintain desirable populations of pike,

perch and smallmouth bass which are the most popular species in the lake and probably the best suited. Extensive weed beds and mucky bottom apparently characteristic of lakes suitable for largemouth bass, bluegills and sunfish are lacking in Hubbard Lake therefore we question whether these species could ever be abundant even though heavily stocked. Further stocking of walleyes is not advised. It is suggested, however, that a substantial planting of 10,000 9 or 10 inch lake trout be made in the fall of the year as soon as they are available, followed by a similar planting the following year. This should definitely prove whether Hubbard Lake will successfully support lake trout. It is always difficult to establish a fish by planting fry or small fingerlings in a lake inhabited by predaceous forms such as bass, pike and perch. Hubbard Lake is not ideal for lake trout, but it may support a fair sized population of this species and it is worth a good try. If large fish are stocked they should be able to survive any serious predation and should find ample food and spawning ground for natural reproduction.

The temperature conditions of Hubbard Lake are suited to rainbow trout, and it is also recommended that 10,000 adult rainbow trout be stocked in the fall of the year as soon as available, followed by a second similar planting the next year. Rainbow trout will undoubtedly use Sucker Creek and West Branch River for spawning purposes.

These experimental plantings of trout will be checked by the Institute to determine their success and the extent of future stocking which may be desirable.

Predators and parasites

There was no evidence of serious predation in Hubbard Lake.

Black spot was common on the skin of pike and perch. This is a larval stage of a flatworm that is encysted in the flesh and skin of the fish. Pigment is deposited by the surrounding tissues to give the dark color. The infestation cannot be controlled satisfactorily in our lakes, however, it does not harm the meat for eating purposes and is not transferable to the human body. Yellow grubs were found on a few perch and tapeworms were found in one smallmouth bass. These were apparently infrequent in occurrence.

Shelter

Although the vegetation and deadheads provide much shelter in Hubbard Lake for fish and food organisms, fishing might be improved somewhat by installing a number of large brush shelters between the ten- and twenty-foot contours. It is recommended that about 10 of them be placed at this depth along the east side of the lake for a mile or so north of the entrance of Sucker Creek and 10 along the east side of North Bay in the region of Doctor's Point. Five should be placed along the north edge of the broad shoal projecting from the west shore near the 87-foot depression. Local fishermen and resort operators should be asked to observe and report the results of fishing in these areas.

Regulation of water level

It is well recognized in fishery biology that a stabilized water level is most desirable for high productivity in a lake. Hubbard Lake is no exception, however, the fluctuation that has been experienced in this lake in recent years is not believed to be extremely serious to the fisheries.

Improvement of spawning facilities

Spawning facilities for the desirable species in Hubbard Lake are adequate.

INSTITUTE FOR FISHERIES RESEARCH

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