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PARTIAL FISHERIES SURVEY OF CERTAIN BEAVER ISLAND LAKES

CHARLEVOIX COUNTY, MICHIGAN

by

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Certain Lakes on Beaver Island were investigated by the District Biologist and the District Supervisor of Fisheries Operations as follows:

Barney's Lake	T. 38 N.,	R. 10 W.,	Sec. 4,5	Aug. 4,5	1942
Fox Lake	T. 38 N.,	R. 10 W.,	Sec. 29	Aug. 5,6	1942
Lake Genesareth	T. 37 N.,	R. 10 W.,	Many	Aug. 6,7	1942
Font Lake	T. 39 N.,	R. 10 W.,	Many	Aug. 7,8	1942
Green Lake	T. 38 N.,	R. 10 W.,	Sec. 31	Aug. 6,7	1942

None of these lakes has been sounded or mapped by lake survey parties, but good outline maps of the lakes are available on a map of the island prepared by Archie LaFreniere of St. James. Areas of the lakes were estimated from this map, and soundings were taken by the investigators. Obviously, the deepest parts of some of the lakes may have been missed, but it is not considered likely.

The investigation was made at the request of the District Supervisor, and had as its object the determination of the success

of past stocking policy, and whether or not any change in management was needed.

All the lakes on the island are at present in the "all other lakes" classification, and with the exception of Lake Genersareth no change is suggested.

Barney's Lake

Barney's Lake is the smallest of the fishing lakes on the island, with an estimated area of 40 acres. It is surrounded by woods on the west, and by pasture land on the east. The basin is oblong, with the long axis running in a N.W.-S.E. direction. Its length is about 4 times its width. This small attractive lake is reported to have furnished good fishing in the past few years, but in 1942 it was apparently very poor.

A maximum depth of about 15 feet was located, but clear water samples could not be obtained below 12 feet. The temperature ranged from 22.6°C. (72.6°F.) at the surface to 21.4°C. (70.5°F.) at the bottom (12 ft.). No thermocline (zone of rapid temperature change) was present. Dissolved oxygen, in parts per million, was 8.0 at the bottom and 8.1 at the surface. The water was alkaline (pH 7.9) and colorless. The Secchi disc (an apparatus used for determining transparency) disappeared at 9 feet. The lake bottom was found to be sand out to about the one foot contour, then marl, and at a depth of 12 feet, the marl is overlain by a mixture of fibrous and pulpy peat. Fibrous peat is the main bottom component in the dense beds of vegetation along the west and southwest shores.

Vegetation (musk grass, bulrushes, pond weeds, water lilies) is very abundant over most of the lake basin. Forage fish were found to be scarce, although Iowa darters were obtained in very limited numbers. No determinations of bottom food abundance or of plankton abundance were made.

Two 125 ft. experimental gill nets set for 24 hours caught only 2 small largemouth bass, and 1 small bluegill. This poor catch, as compared with the netting results in the other lakes, is a good indication that the present fish population is light. Fishing by the investigators was unsuccessful, and two expert fishermen who were familiar with the lake and who had fished it for about a week had had similar results. The present poor fishing may be attributed to improper stocking. The stocking record for the past five years is given below:

1938	109 adult smallmouth bass	4,000 5 mo. bluegills
1939	118 adult smallmouth bass	2,800 4 mo. bluegills
1940	744 adult smallmouth bass	
1941	No stocking	
1942	2,500 4 mo. largemouth bass	5,000 4 mo. bluegills

That fishing is reported to have been good for smallmouth bass is not in the least surprising when one realizes that this small lake received almost 100 adult smallmouth to the acre in 1940. The significant fact is that in spite of the heavy stocking of smallmouth, fishing for this species is poor at present. It is probably true that a large percentage of these planted smallmouth were removed in 1941, but it seems very unlikely that all were removed by angling. All the bass caught at the time of the investigation both by nets and by fishermen were largemouth

bass. Also young of the year largemouth and bluegills were found to be numerous in the shallow water and amongst the vegetation. No smallmouth bass of any size were observed. It is therefore evident that the lake is not suited to this species, and fishing for smallmouth in the past has been maintained through stocking alone. It is the opinion of most fish managers that natural reproduction among warm-water species (bass, bluegills, etc.) is sufficient to maintain sport fishing and that stocking for maintenance unnecessary. This lake with its weed filled basin, and shallow water, with little exposed shoal is much better suited to largemouth and bluegills than to smallmouth bass. The fact that these species have been able to reproduce successfully is also good evidence that the lake is better suited to them than it is to smallmouth. The smallmouth requires gravel shoals in order to spawn.

Recommendations

The classification of the lake should remain unchanged, but stocking should be discontinued for at least 3 years. In the fall of 1942 a plant of 2,500 largemouth fingerlings was made, at the suggestion of the biologist and with the supervisors agreement. It is hoped that this plant will help to build up the present, apparently small, population of largemouth bass. Stocking of smallmouth bass and all other species should be discontinued for the time being at least. It is not expected that fishing will improve immediately, but in time the largemouth bass should build up their numbers in the absence of competition with adult smallmouth bass.

Fox Lake

This lake with an estimated area of about 150 acres and a roughly circular basin was being fished to a considerable extent at the time of the investigation, and with good results. It is surrounded on the south and east by a large and extensive bog, while the north and west shores are densely wooded.

A maximum depth of about 18 feet was located near the center of the lake. Here temperatures and chemical analysis of the water were taken. A thin, and perhaps temporary thermocline was found between the depths of 14 and 17 feet. The temperature dropped 2.9 degrees C. in this 3 foot stratum, whereas the drop in temperature over the whole 18 feet was 4.9 degrees Centigrade. Dissolved oxygen in parts per million varied between 4.7 at the bottom and 5.4 at the surface. The water was found to be quite acid (pH range 6.2-6.3) and was definitely brown in color. The Secchi disk disappeared from view at 9 feet.

The north and west shores of the lake were found to be sand and gravel to a depth of about 3 feet. The south and east shores were sandy to a water depth of about 2-3 feet, but here the sand was only a few inches thick, and in many places firm peat protruded through the sand. Most of the lake bottom except in the shallow water along shore was found to be firm fibrous peat.

Vegetation is limited in extent, the only prominent bed was located in the small bay on the northeast shore. The vegetation here consists largely of water lilies, and a few pond weeds.

Forage minnows were very scarce, and none were collected. No determinations of bottom foods, or of plankton abundance were made.

Two 125 foot experimental gill nets set over night captured 22 perch from 6.0 to 9.0 inches long, and 2 large bluegills 9.6 inches long. Additional perch, black crappies, and smallmouth bass were captured by fishing. Measurements on 20 black crappies gave an average length of 10.6 inches (248 - 336 mm.). One smallmouth bass caught by a fisherman on the evening of Aug. 5 was 16.3 inches long. Two small smallmouth bass, caught by the biologist were 6.0 and 6.5 inches long. Numerous young of the year smallmouth bass, and bluegills were observed in shallow water. Stocking in Fox Lake for the past 5 years is as follows:

1938	182 adult smallmouth bass	6,000 5 mo. bluegills
1939	630 adult smallmouth bass	
1940	524 adult smallmouth bass	
1941	No fish stocked	
1942		5,000 4 mo. bluegills

From the data collected during the investigation it is apparent that black crappies, perch, smallmouth bass, and bluegills have been fairly successful in this lake. Observation, and fishermens results would indicate that the black crappie is at present the dominant game species, and it is of interest to note that it has not been stocked since sometime prior to 1938. The young of the year smallmouth and bluegills observed indicate that these species are at least able to maintain themselves in some numbers. Undoubtedly, the heavy population of black crappies takes a toll of young fish, as do the perch, but the fishing in the lake at the present time is satisfactory, and is not likely

to be improved through the addition of small fish.

Recommendations

The classification should remain "all other lakes." All stocking should be discontinued until such time as a change in conditions show a need for additional planting.

Lake Genesareth

This is the most important lake on the island, and the only one with any resort development. One boat livery and several cabins are present. It differs from the other lakes examined in that it has an outlet into Lake Michigan. The basin is quite irregular in outline, and the area was estimated to be about 700 acres. The shores are densely wooded with a mixture of hardwoods, and conifers.

A maximum depth of about 45 feet was found near the middle of the lake. This is due west of Cole's cabins. Chemical analysis of the water, and a vertical temperature series were taken at this point. A thermocline was found to be present between the depths of 24 and 33 feet. Dissolved oxygen in parts per million varied from 0.5 parts at the bottom to 7.7 parts at the surface. The water was found to be acid (pH 6.5) and rather stained in color. The Secchi disk disappeared from view at 12 feet, 9 inches.

The bottom of the lake basin was sand and gravel out to a water depth of 3-4 feet, beyond that it was found to be peat.

Vegetation was abundant, particularly in the bay to the northeast, and at the south end of the lake. Most of the west shore had considerable vegetation also.

Forage minnows, (blunt-nosed minnows), young of the year largemouth bass, smallmouth bass, bluegills, and rock bass were also quite common. A few crayfish, and dragon fly larvae were seen. Other than these observations, no examination of bottom food, or of plankton were made.

One 125 ft. experimental gill net set over night caught 1 bluegill (7½ inches); 6 northern pike (18.0 to 21.0 inches); 2 pumpkinseeds (4.2 - 5.6 inches); 4 rock bass (5.2 - 10.5 inches); and 4 brown bullheads (9.0 - 11.0 inches). The stocking record for the past 5 years is as follows:

1938	139 adult smallmouth bass	10,000 5 mo. bluegills
1939	207 adult smallmouth bass	16,560 4½ mo. bluegills
1940	719 adult smallmouth bass	250 yearling rainbow trout
1941	No fish stocked	
1942	No fish stocked	

At the time of the investigation Lake Genesareth was being fished to a considerable extent, and with good success. Bluegills, northern pike, and brown bullheads were caught in almost equal numbers. Bass and rock bass were caught less frequently. The bluegills captured have an average size of near 8 inches, and the northern pike were also of good size, averaging about 2 pounds in weight. The bullheads probably average about 8 ounces in weight. The abundance of the northern pike probably has a very beneficial effect on the growth of the fish in the lake as evidenced by the size of the bluegills and rock bass. The numerous young of the year of bluegills, both species of black bass, and rock bass observed indicates that these species are able to maintain themselves in the face of undoubted heavy predation by the northern pike.

Recommendations

It is suggested that the classification be changed to "pike lake." The populations of bass, bluegills, rock bass are well established, and stocking with these species is not likely to contribute much to the present good fishing. It has been pretty well established that natural reproduction by warm-water species (bass and bluegills) is sufficient to maintain fishing. The pike at present is apparently the dominant game species, and if the classification of the lake were changed a greater crop of this species might be harvested. The bass and bluegill populations are not likely to be harmed by exposure to fishing earlier in the season. The deficiencey of oxygen below the thermocline (where the water is cold enough for trout) is probably the reason why the rainbows planted in 1940 were not successful. It is suggested that all stocking of fish in this lake be discontinued.

Font Lake

Font Lake, the other large lake on the island is fished neither by the residents or by visiting fishermen. The lake is divided into two basins by a point jutting out from the east shore. Both basins are of approximately equal size, and the total area was estimated to be about 500 acres. The lake is surrounded by woods and sandy plain.

The maximum depth was found to be only 7 feet. Temperatures and chemical analysis of the water were taken just off the point

on the east shore. The nets were also set in this area. Oxygen in parts per million was found to be 8.4 at the bottom, and 8.3 at the surface. The water was alkaline, and colorless. The Secchi disk disappeared at 5 feet 6 inches.

Two experimental gill nets set off the point for about 24 hours caught 5 common suckers (6.5 - 13.8 inches) and 25 perch from 5.6 to 12.8 inches long. Forage fish (blunt-nosed minnows and Menona killifish) were found to be abundant.

Casual examination of the contents of the perch stomachs revealed that as food they were using minnows (2 stomachs); dragon fly larvae (2 stomachs; smaller perch (1 stomach); and crayfish (1 stomach). All these food items would also serve as food for smallmouth bass. Other perch stomachs examined were empty.

The basin, except in the vicinity of the point on the east shore is weed filled, and has a soft bottom. In the region of the point on the east shore the bottom is firm, composed of sand and gravel. The bottom near the margins of the lake is sand, but the sand is overlain with a fine flocculent peat.

As pointed out above, this lake is very seldom fished, and when the excellent population of perch was noticed this was hard to understand. The obvious explanation is that good perch fishing is already available in the harbor at St. James, and in Lake Michigan proper, but here is an unusual situation where a good crop of sport fish is being disregarded.

Recommendations

It was thought that the introduction of a more popular species

might encourage fishing in this lake, and thereby bring about the utilization of the crop of perch already present. Consequently, at the recommendation of the biologist, and with the agreement of the district supervisor, 500 4-month smallmouth bass were planted in the fall of 1942. Other than this planting the only record is of a planting of 200,000 walleye fry in 1940. These were not successful as might be expected in this shallow lake, and in face of the predation by the perch. It is understood that the lake is in many ways suited to other species better than to the smallmouth (the weed filled basin and soft bottom make it more suitable to largemouth, for example); but in the vicinity of the point on the east shore a considerable area is well suited to the smallmouth. The shallow water makes winter kill a possibility, but the large perch already present indicate that winter kill has not occurred for some few years at least. Smallmouth were therefore suggested with these reasons in mind: the smallmouth is more attractive to fishermen than many of the other warm-water species; the available fingerlings were large enough to have a good chance of escaping predation by the perch, and the hard sand and gravel shoal in the region of the point on the east shore suggested that they could spawn and thus maintain themselves. No further stocking should take place until the success of this initial planting can be determined. If the planting is successful further stocking will probably be unnecessary, and if the smallmouth have not survived further introductions would be futile. Hatchery reared fingerlings rather than Lake Michigan adults were suggested in order to prevent the spread of the bass tapeworm. The lake should be investigated in the summer of 1943.

Green Lake

This small lake about 100 acres in area was examined only briefly. A net set over night captured 10 small black bullheads. In 1939 the lake was stocked with 650 1½-month bluegills, and 48 small black bullheads. The lake is obviously nearly extinct, and apparently very acid. The water was for the most part under 3 feet in depth, and it must be considered that the bluegills were winter killed. As a fishing lake it should be abandoned in so far as additional stocking or management policies are concerned. It is considered improbable that it will support game fish, with the possible exception of bullheads, and those stocked in 1939 have apparently grown but little.

INSTITUTE FOR FISHERIES RESEARCH

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