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Dr. Brown

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ALBERT S. HAZZARD, PH.D.
DIRECTOR

REPORT NO. 815

A FISHERIES SURVEY OF HOPKINS LAKE, SHIAWASSEE COUNTY

by

C. J. D. Brown

Introduction

Location and Drainage

Hopkins Lake, or Hopkins Pond as it is usually called, is situated at the south edge of the City of Owosso in Shiawassee County (T. 7 N., R. 2 E., Sec. 25). It is accessible from M-47 by one-fourth mile of good gravel road.

The lake has no inlet but is connected to the Shiawassee River, about a mile distant, by a small outlet.

Acknowledgments

Hopkins Lake was mapped by an Institute party[✓] in February, 1941. Fish collections were made by another Institute party^{**} in June, while the regular limnological survey^{***} was made in July of the same year.

Past and Present Use

So far as is known, Hopkins Lake has never had any industrial use. Its location almost within the city limits of Owosso, however, makes it of rather high potential value as a recreation center, particularly since the territory in this vicinity is almost wholly without lakes. There is no resort or cottage development on this lake and no boat liveries. Most of the land surrounding the lake is owned by the City of Owosso, and a city park has been developed on the east side. This project required considerable filling.

[✓] Personnel of the mapping party was G. F. Perry, leader; Lyle Newton and Oscar Jasmin, assistants.

^{**}The personnel of the fish party included W. C. Beckman, leader; L. R. Anderson, R. Buller, and D. Thomas, assistants.

^{***}The lake inventory party was led by John Funk, with Eugene Roelofs and Stanley Lievense, assistants.

In spite of reported poor fishing, Hopkins Lake is said to be heavily fished in both summer and winter.

Physical Characteristics

Geological Origin

Insofar as we are aware, nothing is known about the geological origin of this lake.

Shape of the Basin and Extent of Drainage

Hopkins Lake is roughly oval in outline with the long axis running almost due north and south. There are no embayments or pronounced irregularities in the shoreline. The basin is regular with the center of the depression being almost in the center of the lake.

The immediate shore of the lake is fairly high and of sandy soil. It has been mostly cleared and is covered by low brush and herbaceous plants. The surrounding country is rolling, mostly cleared farm land of fair quality.

Water Fluctuation

The water supply comes from seeps and springs, as well as from "runoff" of the immediate surroundings. The outlet, which is tributary to the Shiawassee River is about 6 feet wide and 6 inches deep with a slow current at the point where it leaves the lake. The lake level fluctuates only slightly.

Other Physical Characteristics

Hopkins Lake has a surface area of 7.9 acres and a maximum depth of 2½ feet. Its shoreline development is 1.07, which means that the lake has a circumference only very slightly greater than a circle of the same area. Lakes with a high shoreline development are usually more productive because they have protected shallow bays. This does not apply so much to small lakes or ponds, however, which are little affected by wave action.

The entire bottom of Hopkins Lake is composed of peat. Fibrous peat is predominant in the shallow water while pulpy peat is the main bottom constituent out beyond the 15-foot contour. The bottom peat is soft and very probably has considerable depth. The instability of the bottom in water over 5 or 6 feet may account, at least in part, for the lack of rooted vegetation out beyond this point. The light brown color and turbidity of the water are also limiting factors to plant production. A Secchi disc was only visible to a depth of 5½ feet which is evidence of limited light penetration.

As a whole the physical factors operating in Hopkins Lake are not favorable for high fish production. The complete lack of solid bottom, high color and turbidity, lack of shallow bays, etc., limit the lake greatly in production of fish foods and, consequently, fish. ✓

Temperature and Chemical Characteristics

There was a considerable difference between the surface (74°F.) and bottom (46°F.) water temperature on July 22. The thermocline (zone of rapid change in temperature) extended between the 8- and 20-foot levels. Dissolved oxygen was abundant down to 8 feet (7.6 p.p.m.) and absent at the bottom. No analyses were made on the water in the thermocline, but it is fairly safe to assume that there was little or no oxygen below the 15-foot level. The decaying of accumulated peat deposits very probably reduces the oxygen beyond the toleration of fishes. The water in this lake is hard (Methyl Orange alkalinity range 165-264) p.p.m. and distinctly alkaline (pH 7.4-8.2 p.p.m.).

Ordinarily alkaline, hard-water lakes are more productive of fish than soft, acid lakes. The optimum conditions with respect to alkalinity and hardness are not known, however.

On the whole, temperature and chemical conditions in Hopkins Lake are not extremely favorable for fish. Surface temperatures are suitable for warm-water fish but low oxygen most certainly prevents the use of water below 15 feet during the critical late summer period.

Pollution

No pollution of any kind has been reported.

Biological Characteristics

Vegetation

Plant beds were dense from shore out to about the 5-6 foot contour. Beyond this depth no rooted plants were observed. Cattails and yellow water lilies were abundant near shore and coontail was common in water 3-6 feet deep.

Seven species of aquatic plants were found in the lake. They are listed in the table below.

Aquatic Plants Found in Hopkins Lake

Common name	Scientific name	Abundance
Coontail	<u>(<i>Ceratophyllum demersum</i>)</u>	Common
Spike rush	<u>(<i>Eleocharis calva</i>)</u>	Common
White water lily	<u>(<i>Nymphaea odorata</i>)</u>	Common
Yellow water lily	<u>(<i>Nuphar advena</i>)</u>	Abundant
Pickrel weed	<u>(<i>Pontederia cordata</i>)</u>	Common
Pondweed	<u>(<i>Potamogeton foliosus</i> var. <i>marcellus</i>)</u>	Common
Cattail	<u>(<i>Typha latifolia</i>)</u>	Abundant

The importance of aquatic vegetation in fish production can hardly be overestimated. Water plants harbor the most important food organisms and provide shelter and spawning facilities for fish. Hopkins Lake has fair weed beds although the number of varieties of plants found is not large. Cattails and water lilies which were the most abundant species are not the most desirable shelter or food producing plants.

Fish Foods

Small, free-floating fish food organisms (plankton) were abundant at the time of the survey. Most of these were animal organisms. One plankton sample is not adequate to judge the abundance of these small plants and animals because they vary from time to time and place to place in a lake. It is believed, nevertheless, that conditions with regard to plankton production are very good in this lake.

Souds, mayflies and dragonflies were the most abundant food organisms found on the aquatic plants. Some leeches, bloodworms, snails and midge larvae were also observed.

In general, food conditions in this lake are fair to good but certainly not excellent.

The golden shiner was the only forage fish found in the lake.

Fish

Only 9 species of fish were collected from Hopkins Lake. Three of these were game fish, five were coarse fish and one was forage fish. A summary of the species caught along with their general abundance is given in the following table.

Fish Collected in Hopkins Lake

<u>Species</u>	<u>Abundance</u>
GAME FISH	
Bluegill	Common
Pumpkinseed	Abundant
Black crappies	Common
COARSE FISH	
Lake chub-sucker	Abundant
Black bullhead	Few
Brown bullhead	Common
Yellow bullhead	Few
Common sucker	Few
FORAGE FISH	
Golden shiner	Few (all adults)

Our records show that no fish have been planted in this lake during the last 8 years. However, a local resident, Mr. M. F. Blair of Owosso, claims that a planting of perch was made about four or five years ago.

Creel Census

We have no creel census information on this lake.

Growth Rate of Game Species

Practically all of the game fish captured in Hopkins Lake were sub-legal in length. Bluegills in the middle of their fourth summer of life had only reached 5.4 inches in total length, while pumpkinseeds in their

seventh summer averaged 4.7 inches. Black crappies reach legal length in their third summer. A summary of the age, lengths and weights of game fish is given in the following table.

Growth Rate of Game Fish From Hopkins Lake

Species	Age group	Number specimens	Average total length, inches	Average weight, ounces
Bluegills	I	6	2.4	0.2
	II	14	3.9	0.6
	III	16	5.4	1.6
Pumpkinseeds	I	8	2.2	0.2
	II	3	3.1	0.4
	III	19	3.8	0.7
	IV	15	4.2	1.0
	V	4	4.4	1.3
	VI	2	4.7	1.6
Black crappies	II	2	4.8	0.9
	III	26	6.3	2.0
	IV	1	6.8	2.3

It is obvious that the bluegills and particularly the pumpkinseeds are stunted; on the other hand, the black crappies are growing about at an average rate.

Management Proposals

Designation of Lake

Hopkins Lake is, at present, in the "pike lake" classification. In view of the fact that pike do not exist in the lake and that, in general, it is far more suited to largemouth bass and bluegills, we recommend that the designation be changed to the "all other lakes" class.

Stocking

Largemouth bass should be stocked in this lake, preferably 200 adults the first year, although a liberal planting of large fingerlings would probably establish this species. No other game species should be planted. Since the lake almost completely lacks forage fish, there being at present only the adults of the golden shiner, the introduction of black-nosed or black-chinned shiners or both and mudminnows might improve food conditions in the lake. The introduction of both bass and forage fish should be made in the fall of the year.

Predators and Parasites

No predators were reported. The lake even lacks predacious fish of consequence. The black crappie is the only pisciferous species in the lake.

It is interesting to note that none of the fish caught and examined had parasites. They were surprisingly free from all the common parasitic forms.

Shelter

Numerous stumps and deadheads were noted by the survey party and it is believed that the lake as it now stands has adequate shelter for fish.

Regulation of Water Level

We have no information on how practicable it would be to raise the water level on Hopkins Lake. If it is possible and the expense can be justified, the fisheries there certainly would be improved by raising the water level even two or three feet. If a higher level is established, it should be maintained as constantly as possible.

Improvement of Spawning Facilities

The spawning facilities for most of the game fish found in the lake are rather poor; however, the abundance of bluegills, pumpkinseeds and crappies indicates that in spite of what appears to us to be poor spawning conditions, reproduction has apparently been adequate at least for bluegills and pumpkinseeds.

The development of some spawning areas would be both possible and practicable. If the water level is to be raised, generous patches of gravel could be placed on what is now shore, and after the higher level is established, these would be submerged. If no increase in water level proves to be possible, then cribs or boxes containing gravel could be constructed on the ice or on shore in summer and placed in position in water from 18 inches to 3 feet in depth.

Other Suggestions

In view of the rather high potential value of Hopkins Lake, it is suggested that an experiment be undertaken to pump out at least part of the accumulated peat. This, if successful, would expose enough of the bottom for spawning grounds, decrease the turbidity and color of the water, encourage vegetation and do away with the possibility of winter-kill. If such an experiment is contemplated, then all the foregoing management suggestions should be postponed until the success of a pumping operation is determined.

A more thorough study before pumping begins as well as careful checks during and after should be made by the Institute.

INSTITUTE FOR FISHERIES RESEARCH

By C. J. D. Brown

Report approved by: A. S. Hazzard

Report typed by: R. Bauch.