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INSTITUTE FOR FISHERIES RESEARCH

DIVISION OF FISHERIES
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FISHERIES SURVEY OF NORTH LAKE,

VAN BUREN COUNTY

by

John Funk

North Lake (T. 1, 2, S., R. 13 W., Sec. 3, 4, 33, 34) is located on the border of Pine Grove and Almena Townships in Van Buren County. It is within the drainage of the Paw Paw River although it has no direct connection with this stream. It is about 2 miles from Pine Grove and 15 miles from Kalamazoo.

A map showing shoreline and bottom contours, and a fisheries inventory* were made by an Institute party July 14-18, 1937. In addition, the author visited the lake October 1, 1941.

Any important industrial use of North Lake seems unlikely. It seems to have always furnished good fishing. There are about twenty cottages on the lake and one resort and boat livery. Much of the marginal land is high so that desirable cottage sites are abundant. The lake may be reached via about 2 miles of fair gravel road from M-43. It is of considerable potential importance as a public fishing water.

* Personnel of party: David C. Chandler, leader; Walter Crowe and E. L. Cheatum, assistants.

Physical Characteristics

North Lake occupies a basin of undoubted glacial origin. It is about 0.8 of a mile long and 0.3 of a mile wide. Its main axis runs almost directly northeast - southwest. The bottom of the basin is rather regularly bowl shaped with the deepest part near the north end. The topography of the surrounding country is quite irregular and shows the effect of glaciation. The soil is of moderate fertility and makes fair farm land.

The lake has no inlets. It apparently receives its water supply from springs, seepage and the usual "runoff". It has no definite outlet but apparently is connected with the lakes to the south and west by extensive areas of swampy land. The water level is reported to fluctuate somewhat. At the time of the 1941 visit the level was about two feet below normal. Such fluctuations may have serious effects on fish productivity but little can be done about them in a lake of this type.

Other physical characteristics not discussed above are given in the following table.

Area in acres	Maximum depths in feet	Shore development	Approximate per cent of shoal	Bottom types		Color of water	Secchi disc
				Shoal	Depth		
132.7	60+	1.25	45	Sand, gravel, marl, fibrous peat	Pulpy peat	Clear colorless	20 ft.

The shore development of 1.25 means that the shoreline is 1.25 times as long as that of a perfectly round lake of equal area. This is a rather low shore development. The shoal of a lake is the part which is potentially able to produce plants. A rather large part (45 per cent) of North Lake is estimated as capable of producing vegetation. This large amount was chiefly due to the clearness of the water which allowed deep light penetration (Secchi disc - 20 feet). These things are all important from a

fisheries standpoint because the plant beds along shore are usually the most productive areas of a lake. Other things being equal, a productive lake is most likely to be one with a high shore development and a large per cent of shoal.

Temperature and Chemical Characteristics

The temperature and chemical characteristics of this lake are summarized in the following table.

Station Location (July 15, 1937)	M. O. Alkalinity range	Carbon dioxide range	pH range	Surface	Thermocline		Bottom	
					Top	Bottom		
Over deepest part of lake	50-82	0.0-1.3	6.9-8.2	Depth in feet	...	24*	36	55
				Temperature in °F.	81	59	51	48
				Oxygen in p.p.m.	7.9	4.7	0.2	0.0

* Actual top of thermocline at 15 feet, temperature 76°F.

The temperature of the upper water was high enough to promote good fish growth. The colder, deeper water was probably uninhabited because oxygen was absent or very much reduced. Oxygen was abundant only in the upper few feet of water. The water was moderately soft (M. O. Alkalinity 50-82), slightly alkaline (pH 6.9-8.2), and contained only a very small amount of carbon dioxide. Productive waters are usually moderately hard and slightly alkaline.

Biological Characteristics

The relative abundance of the various types of plants collected in the lake is given in the following table.

Species	Abundance
Waterweed (<u>Anacharis canadensis</u>)	Common
Water marigold (<u>Megalodonta Beckii</u>)	Few
Water shield (<u>Brasenia Schreberi</u>)	Common
Coontail (<u>Ceratophyllum demersum</u>)	Abundant
Spike rush (<u>Eleocharis polustris</u>)	Rare
Water pennywort (<u>Hydrocotyle umbellata</u>)	Rare
Bushy pondweed (<u>Najas flexilis</u>)	Few
White water lily (<u>Nymphaea odorata</u> ?)	Few
Yellow water lily (<u>Nuphar advena</u>)	Common
Pickerelweed (<u>Pontederia cordata</u>)	Few
Large-leaf pondweed (<u>Potamogeton amplifolius</u>)	Few
Pondweed (<u>Potamogeton angustifolius</u>)	Common
Leafy pondweed (<u>Potamogeton foliosus</u>)	Few
Flat-stemmed pondweed (<u>Potamogeton zosteriformis</u>)	Common
Robbins' pondweed (<u>Potamogeton Robbinsii</u>)	Common
Three-square bulrush (<u>Scirpus americanus</u>)	Few
Big duckweed (<u>Spirodela polyrrhiza</u>)	Few
Musk grass (<u>Chara sp.</u>)	Abundant
Cattail (<u>Typha latifolia</u>)	Few

Vegetation was quite abundant in the lake. Water lilies (Nuphar) and Water shield (Brasenia) were numerous in the shallow water while along the drop-off there was a dense growth of pondweeds (Potamogetons). A lake of this type could hardly have too many plants. They provide shelter for the fish, support great numbers of fish food organisms, and add to the productivity of the lake in numerous other ways.

Plankton, the microscopic, free floating plants and animals, was moderately abundant in the water. These organisms are used for food by small fish, larger fish-food organisms, and, to some extent, by game fish themselves. Bottom food organisms were moderately abundant on the shoals. Midge (Chironomidae) larvae and scuds (Amphipoda) were most numerous. No attempt was made to determine the type or abundance of food organisms supported by the vegetation. However, experience in similar lakes has shown that plants harbor great numbers of animals. In the depths, midge larvae were the predominant organisms. It seems probable that there is a substantial food supply.

The species of fish taken or reported by the survey party, their relative abundance, and the number planted since 1933 are given in the following table.

Species	Relative abundance	Stocking 1933-40
GAME FISH		
Mud pickerel (<u>Esox vermiculatus</u>)	Few	...
Yellow perch (<u>Perca flavescens</u>)	Few	15,175
Walleyed pike (<u>Stizostedion vitreum</u>)	Reported	1,081,500
Smallmouth bass (<u>Micropterus dolomieu</u>)	...	1,000
Largemouth bass (<u>Huro salmoides</u>)	Few	6,700
Bluegill (<u>Lepomis macrochirus</u>)	Abundant	254,000
Pumpkinseed (<u>Lepomis gibbosus</u>)	Common	...
Black crappie (<u>Pomoxis nigro-maculatus</u>)	...	10,000
Green sunfish (<u>Lepomis cyanellus</u>)	Rare	...
COARSE FISH		
Brown bullhead (<u>Ameiurus nebulosus</u>)	Common	...
FORAGE FISH		
Black-nosed shiner (<u>Notropis heterolepis</u>)	Rare	...
Black-chinned shiner (<u>Notropis heterodon</u>)	Common	...
Golden shiner (<u>Notemigonus crysoleucas</u>)	Few	...
Blunt-nosed minnow (<u>Hyborhynchus notatus</u>)	Common	...
OBNOXIOUS FISH		
None taken or seen		

The above estimates of relative abundance may vary widely from actual conditions in the lake since very few fish were taken in the survey. Reports indicate that bluegills and largemouth bass are the most important game fish in the lake and that fishing for them is good.

Age and growth studies were made of the game species collected. In all cases, however, the series is so small as to make the results questionable.

A summary is given below.

Species*	Age group	Number specimens	Length in inches
Perch	VI	1	11.0
Bluegills	II	1	5.3
	III	1	6.9
	IV	2	8.1
	V	2	9.0
	III	1	5.0
Pumpkinseed	IV	1	5.9

* Age determinations by W. C. Beckman

The perch seemed to be growing at near average rate for Lower Penninsula lakes. The six bluegills all showed better than average growth for their age while the two pumpkinseeds were growing at about an average rate. Of course there is no way of knowing how representative these fish are of the general population in the lake.

Spawning facilities for all species present in the lake seem to be excellent. There is a great deal of solid sand and marl shoal suitable for bluegills, sunfish, etc. Weedy areas such as are generally considered to be utilized by perch and largemouth bass are abundant. There are also extensive marshes which would provide facilities suitable for pike if they were present. It is evident that natural propagation should be able to maintain the population.

Management Suggestions

The survey results show no reason why the designation of North Lake should be changed from that of "all other lakes".

The lake has been heavily stocked. A total of 1,368,375 fish of 6 species have been planted over a period of 8 years. As mentioned above, there is reason to believe that the population can be maintained by natural propagation. It is therefore suggested that all stocking be stopped. It would seem to be particularly important to discontinue the stocking of walleyes. Although a few are reported to have been taken, they apparently have not become established in the lake. This is probably a good thing since North Lake is too small to support walleyes without harm to the bass and bluegill fishing.

Some predators were observed on the lake but they were not numerous enough to warrant any control measures. Cover seemed to be adequate. No

improvement structures are suggested. As mentioned above, the water level fluctuation is probably serious but control would be almost impossible. Spawning facilities seem to be adequate; no improvements are suggested.

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