Original: Fish Division
cc: Education-Game
Mr. A. T. Stewart 1-20-42
Mr. Funk

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

January 8, 1942

REPORT NO. 726

FISHERIES SURVEY OF LOBDELL LAKE
GENESEE AND LIVINGSTON COUNTIES

by

John Funk

Introduction

Lobdell Lake (T. 4, 5 N., R. 5 E., Sec. 1, 2, 35, 36) is located chiefly in Argentine Township of Genesee County, but the southern part projects into Deerfield Township of Livingston County. The outlet stream flows into the Shiawassee River. The village of Argentine is located on the shores of the lake. Fenton is about 8 miles distant and Flint 20 miles.

A map of the lake showing shoreline and soundings was prepared by the Civil Works Administration in 1934. This formed a very satisfactory basis for plotting bottom types and vegetation beds, and for locating sampling stations in the biological survey. Fish were collected in the lake June 10-12, 1941.* The biological survey was made July 17-21, 1941.**

The lake is reported to have originated from a dam put in what is now the outlet stream 140 years ago. It seems likely that the deeper parts of

* Personnel of fish party: W. C. Beckman, leader; Ray Buller, Lee Anderson, and Don Thomas, assistants.

** Personnel of survey party: John Funk, leader; Eugene Roelofs and Stanley Lievense, assistants.

the lake have always contained water but the parts which are ten feet or less in depth were probably dry land before the installation of the dam. The original dam produced a head of water to operate a sawmill. Logs were no doubt transported on the lake. Stumps and deadheads are very numerous and indicate the use of the lake in logging operations. At present the dam furnishes power for a flour and feed mill and is used as a road.

The lake has always had a good reputation as a fishing lake. However, in recent years, many anglers say the catches have declined both in size and numbers. Bass, bluegills, and perch are taken with about equal frequency.

Resort development on the lake is quite extensive. There are over 200 cottages, two large resorts, and four boat liveries. In addition, the Conservation Department has purchased and developed a Public Fishing Site south of the village of Argentine. The lake is easily accessible by good paved roads. It is within fifty miles of some of the largest centers of population in the state. For all of these reasons Lobdell Lake is of great importance as public fishing water.

Physical Characteristics

The basin of Lobdell Lake is very irregular in shape. The main axis of the lake runs east and west. From this central basin four long, narrow bays protrude, three northward and one southward. The inlet from Dennett Lake enters the south bay at its head. This bay is quite shallow except for a small depression near the south end. It was probably the channel of the stream before the dam was installed. It joins the main basin at the western extremity of the lake. The western-most north bay is probably the continuation of the stream channel, since the outlet flows from its north end.

The other two bays, Whitehead and Divinne Coves, project from the central part of the north shore. Whitehead, the more western, runs almost directly north and decreases gradually in depth from the main basin. Divinne, the more eastern, runs toward the northeast. It is shallow near the middle and is considerably depressed near its head.

The peninsula separating Whitehead and Divinne Coves is probably a morainic ridge. This ridge is evident, as Long Island almost separates the basin into two parts. The two principal depressions of the lake parallel this island. The depression on the west side is the deeper.

The eastern part of the basin is of rather uniform depth and fairly regular in outline. One rather large point extends out from the southeast shore. There are numerous other islands in the lake besides Long Island. The largest are Beach Island and the Ovid Bluegill Club Island located near the center of the eastern part of the basin.

The very irregular shoreline and the fact that much of it is high and wooded, allows for many pleasant cottage sites. Not all are equally desirable, however, since in many cases the water is shallow and the bottom soft. In almost all cases the shoals are very weedy.

The geological history of this basin should be very interesting. However, beyond the fact that it is undoubtedly of glacial origin, no information is available.

The topography of the surrounding country is irregular. There are many lakes in the vicinity. The soil seems to be of moderate fertility and to make fair farm land.

Lobdell Lake is in the drainage of the Shiawassee River which is a tributary of the Saginaw. The Saginaw flows into Lake Huron at Saginaw Bay. Lobdell Lake receives most of its water from Bennett Lake. The two main

tributaries of Bennett Lake, Denton and North Ore Creeks, drain much of the northeastern part of Livingston County.

The inlet from Bennett Lake is about 60 feet wide and 4 feet deep with a moderate current. The two lakes are closely connected, being separated by a channel only a few hundred feet long.

The outlet stream joins the Shiawassee River about a mile northwest of the lake. It is a stream about 20 feet wide, one foot deep, with a swift current. The dam in the outlet is of earth reinforced with concrete. It serves to maintain a water level 10 - 15 feet above the natural level. It is owned by the Woolcott-Argentine Milling Company and is used by them to furnish power for their mill. Since it is to their interest to maintain a constant head of water, fluctuations of level are as slight as possible.

Additional physical factors not discussed above are presented in the following table.

Area in acres	Maximum depths	Shore development	Approximate per cent shoal	Bottom types		Color of water	Secchi disc
				Shoal	Depths		
545	78 ft.	3.98	90	Marl and pulpy peat	Pulpy peat, marl, and pulpy peat and marl	Light brown	8-10 ft.

These factors tell some interesting things about the lake. Passing over the data on area and depth, the significance of which is obvious, it will be noted that the lake has a shore development of almost 4. This is very high. It means that the shoreline of the lake is almost 4 times as long as that of a perfectly round lake of the same area. This is important, for the most productive areas of a lake are usually along shore and in protected bays and coves. Therefore, if other conditions are favorable, a lake with a high shore development should be more productive than one where the shore development is low.

Lobdell Lake is estimated to be 90 per cent shoal. The shoal of a lake is the area that is potentially able to produce plants. In most lakes the shoal, i.e. the plant producing area, is the most productive in the lake. However, beyond a certain point, plants may be actually detrimental to a lake. This will be discussed more thoroughly later.

The bottom types are such as might be expected in a lake of this sort. The large amount of pulpy peat and marl explains the soft bottom conditions found over most of the lake. The light brown color of the water might be expected from the extensive peat deposits. The Secchi disc readings of 8 - 10 feet show that light penetrates the water at least that deep. This is important because the depth to which plants will grow is limited chiefly by the depth of light penetration.

Temperature and Chemical Characteristics

Temperature and chemical characteristics of a lake have important effects on the fish population. Since fish are most active and feed most when the water is warm, temperature has a direct effect on growth rate. Other conditions being favorable, the warmer the water (within the range of toleration of the fish) the faster the growth. However, some fish cannot withstand water which is warm. Trout, for instance, are generally considered to require water which does not exceed 70°F.

In the chemical analysis of water for fisheries purposes, tests are made to determine the amount of dissolved oxygen (O_2), dissolved minerals (M. O. Alkalinity), and acidity or alkalinity (pH) at different depths.

Since definite amounts of oxygen are required by fish and most other animals, its absence has a limiting effect. A knowledge of the amount of dissolved inorganic solids or hardness of the water is important because aquatic plants are thought to depend, at least in part, on the water rather

than entirely on the soil for their minerals. Moderately hard water, i.e. water with a considerable amount of dissolved minerals, is usually more productive than very soft or very hard water. pH indicates the degree of acidity or alkalinity of the water. Productive waters are usually slightly alkaline.

A summary of the temperature and chemical characteristics of Lobdell Lake is given in the following table.

Station	Location	Date	M. O. Alkalinity range	pH range	Depth, temperature and oxygen	Surface	Thermocline Top	Thermocline Bottom	Bottom
I	Near outlet	7/18/41	168-171	8.0-8.1	Depth in ft.	...	...	...	6.5
					Temp. in °F.	75	...	...	75
					O_2 in p.p.m.	8.2	...	...	8.2
II	Near inlet	7/18/41	195	8.0	Depth in ft.	...	...	...	4
					Temp. in °F.	74	...	...	74
					O_2 in p.p.m.	8.3	...	...	...
III	Depression west of Long Island	7/19/41	135-212	7.0-8.7	Depth in ft.	...	17.5	30	75 ✣
					Temp. in °F.	72	59	40	...
					O_2 in p.p.m.	8.3	9.8	5.8	0.0
IV	Depression east of Long Island	7/19/41	130-125	8.5-8.8	Depth in ft.	...	17.5	✣✣	22.5
					Temp. in °F.	73	70	...	64
					O_2 in p.p.m.	7.9	7.9	...	7.0
V	Depression at head of Divinne Cove	7/19/41	144-170	7.2-8.3	Depth in ft.	...	...	...	20
					Temp. in °F.	73	...	...	61
					O_2 in p.p.m.	8.0	...	...	0.7

✣ Bottom at 79 ft., temperature 39° F.
✣✣ Thermocline extended to bottom.

The surface water of the lake is warm enough to promote good fish growth. At the time of the survey it was too warm for trout. Oxygen was abundant near the surface.

In the two depressions on opposite sides of Long Island, thermoclines had developed. A thermocline is a zone of rapidly changing temperature ($\frac{1}{2}$° F. or more per foot in depth) which forms during the summer. This zone serves rather effectively to shut off from circulation the water below it. As this lower water stagnates, its oxygen supply may be used up by decomposition

of organic matter, and other changes take place. If the oxygen is reduced below about 3 or 4 p.p.m., the area becomes uninhabitable by fish.

In the main depression west of Long Island the water within and below the thermocline was cold enough to support cold water fish. Although oxygen was absent at the bottom, it was still abundant at the bottom of the thermocline. In the depression east of Long Island the thermocline extended to the bottom. The water in the thermocline was fairly cold. Oxygen was abundant from top to bottom. In the Divinne Cove depression the temperature was rather high and the oxygen was almost gone at the bottom. Since the survey was made the middle of July, it is likely that conditions of temperature and oxygen will become more extreme as the season advances.

The water was hard (M. O. Alkalinity range 125-212) although not excessively so. It was somewhat alkaline in reaction (pH 7.0-8.8). These factors are not far from average for productive lakes.

Biological Characteristics

Plants are generally beneficial to a lake. They add oxygen by their photosynthetic activity; they support numerous insects and other fish food organisms; and they provide shelter for fish. The most productive lakes have an abundance of plants. However, it is probable that some lakes may have too much vegetation. When plant beds become so dense that free movement of the fish is hampered, they cease to be beneficial. In shallow lakes, abundant vegetation hastens the filling process which, if allowed to proceed, will eventually take over the lake. Thick weed beds also make it difficult to fish and prevent the fisherman from harvesting a maximum crop of fish.

The kinds and abundance of plants found in Lobdell Lake are given in the following table.

Species*	Abundance
Waterweed (Anacharis canadensis)	Common
Coontail (Ceratophyllum demersum)	Few
Musk grass (Chara sp.)	Common
Swamp loosestrife (Decodon verticillatus)	Few
Water moss (Drepanocladus adurcus var. aquatilis)	Rare
Water star grass (Heteranthera dubia)	Common
Water milfoil (Myriophyllum verticillatum)	Common
Bushy pondweed (Najas flexilis)	Few
Yellow water lily (Nuphar variegatum)	Common
White water lily (Nymphaea odorata)	Few
Arrow arum (Peltandra virginica)	Few
Pickerel weed (Pontederia cordata)	Few
Large-leaf pondweed (Potamogeton amplifolius)	Common
Floating-leaf pondweed (Potamogeton natans)	Few
Sago pondweed (Potamogeton pectinatus)	Common
Whitestem pondweed (Potamogeton praelongus)	Common
Clasping-leaf pondweed (Potamogeton Richardsonii)	Few
Flat-stemmed pondweed (Potamogeton zosteriformis)	Few
Pondweed (Potamogeton panormitanus var. minor)	Rare
Pondweed (Potamogeton illinoensis)	Few
Water crowfoot (Ranunculus longirostris)	Few
Big bulrush (Scirpus acutus)	Rare
Three-square bulrush (Scirpus americanus)	Rare
Cattail (Typha latifolia)	Rare
Bur reed (Sparganium eurycarpum)	Few
Bladderwort (Utricularia vulgaris var. americana)	Rare
Wild celery (Vallisneria americana)	Common

*Identification by B. M. Robertson

Twenty-seven species were collected on the lake. Nine of these are quite common. It is probable that Lobdell Lake has too much vegetation, at least in places. There is little that can be done about it since no very satisfactory method for controlling aquatic plants has as yet been discovered.

As might be expected, fish food organisms were abundant in the lake. Plankton (microscopic or nearly microscopic floating plants and animals) was generally abundant. These forms are important because they are eaten by very young fish, by larger fish food organisms and, to some extent, by game fish. In two of the three hauls made, plant plankton, or phytoplankton, was dominant. The larger organisms which inhabit the bottom or the vegetation were also very numerous. The following table gives the types and

abundance of bottom food organisms, also the depth range, bottom type, and average area of bottom or weight of plants of the samples.

Location	Depths	Shoal
Depth range	18-72 ft.	4-6 ft.
Bottom type	Pulpy peat	Fibrous and pulpy peat, marl.
Average size of sample	¼ sq. ft. of bottom	5+ lb. of plants
Number of samples	4	10
Flatworms (Turbellaria)	...	Few
Aquatic earthworms (Oligochaeta)	...	Rare
Leeches (Hirudinea)	...	Few
Snails (Gastropoda)	...	Common
Clams (Pelecypoda)	...	Rare
Scuds (Amphipoda)	...	Abundant
Mites (Hydracarina)	...	Common
Mayflies (Ephemeroptera)	...	Common
Dragonflies (Anicoptera)	...	Few
Damselflies (Zygoptera)	...	Few
Fish flies (Neuroptera)	...	Rare
Caddisflies(Trichoptera)	...	Common
Beetles (Coleoptera)	...	Few
Phantom midges (Corethra)	...	Rare
Midges (Chironomidae)	Rare	Common

In the deep water, life was not abundant. In the shoals, however, 15 species of animals were taken, six of which were common or abundant. Those forms which were most abundant were of species frequently eaten by fish. No doubt the food supply is very good in this lake.

The different types of fish in order of abundance are given in the following table. Stocking for the years 1934-1940 is also included.

Species	Relative abundance	Stocking 1934-40
GAME FISH		
Yellow perch (Perca flavescens)	Abundant	30,500
Bluegill (Lepomis macrochirus)	Abundant	126,500
Pumpkinseed (Lepomis gibbosus)	Common	...
Largemouth bass (Huro salmoides)	Common	10,950
Warmouth bass (Chaenobryttus gulosus)	Few	...
Black crappie (Pomoxis nigro-maculatus)	Rare	...
Northern pike (Esox lucius)	Rare	...
Mud pickerel (Esox vermiculatus)	Rare	...
Walleyed pike (Stizostedion vitreum)	...	430,000
COARSE FISH		
Yellow bullhead (Ameiurus natalis)	Few	...
Lake chub-sucker (Erimyzon sucetta)	Rare	...
FORAGE FISH		
Blunt-nosed minnow (Hyborhynchus notatus)	Abundant	...
Golden shiner (Notemigonus crysoleucas)	Few	...
Pug-nosed shiner (Notropis anogenus)	Rare	...
OBNOXIOUS FISH		
Dogfish (Amia calva)	Few	...

Perch and bluegills were the most abundant fish, but largemouth bass were also quite numerous. Although large numbers of walleyed pike have been stocked, none was taken or reported. The small number of forage fish taken was probably due to the difficulty of seining over the soft bottom of the lake. Had it been possible to seine more thoroughly, there is little doubt but that more minnows would have been collected.

The age of the game fish taken was determined from scale samples. When the ages are compared to the average length for the group, as in the following table, an idea of the growth rate can be obtained.

Species	Age group*	Number of specimens	Average length in inches
Mud pickerel	IV	2	11.2
Northern pike	I	2	13.8
	IV	1	28.3
Perch	I	2	3.6
	II	28	5.3
	III	9	7.3
	IV	5	7.2
	V	4	8.4
	VI	1	10.3
Largemouth bass	I	7	3.5
	II	8	6.2
	III	1	8.3
	IV	4	9.4
	V	5	11.0
Warmouth bass	III	1	4.2
	V	2	4.9
	VI	2	6.1
	VII	1	5.7
	VIII	2	6.5
Bluegill	I	2	1.5
	II	15	2.6
	III	11	4.0
	IV	5	5.3
	VI	5	6.3
	VII	2	6.9
	VIII	2	7.4
	IX	1	6.3
Pumpkinseed	II	3	2.9
	III	10	4.8
	IV	8	5.9
	V	4	6.3
	VI	6	6.4
	VII	2	6.9
	VIII	1	6.8
	IX	1	7.4
	X	1	7.1
Black crappie	II	5	5.0

*Age determinations by W. C. Beckman

The few northern pike taken were apparently growing very well. The average Michigan perch reaches legal length by the end of the second summer or the beginning of the third. The Lobdell Lake perch are only slightly below this average. The series of largemouth bass is large enough to be representative. They seem to be making about average growth.

Too few warmouth bass were taken to give consistent results. The variation in results may mean that 6 inches is about maximum size for this fish. The average Michigan bluegill reaches legal length in its fourth season. Those in Lobdell are growing much slower than average since they reach 6 inches early in the seventh summer. The pumpkinseed also show below average growth since it takes them five or six years to reach legal size. The two crappies taken seem to be doing very well.

Spawning facilities are probably adequate for all species of fish present in the lake. Solid shoals are not abundant, but there is a narrow band of sand along both sides of Long Island and along some of the promontories on the north shore. Bluegills are now known to utilize freely soft, weedy areas, so they should not be limited. There are abundant facilities which should be ideal for largemouth bass. Perch should be able to find suitable areas easily in the vast weed beds. Marshy areas suitable for pike are common in many places. It seems certain that natural propagation should be able to maintain the population now present against any ordinary fishing pressure.

Management Suggestions

At present the lake is in the "all other lakes" classification and the results of the survey show no reason why this designation should be changed.

Since natural propagation should be able to maintain all species now in the lake, it is suggested that all stocking of perch, bluegills and largemouth bass be stopped. Although walleyed pike have been stocked in large numbers, they apparently have not become established. Experience has shown that if walleyes do become established in a small lake they may ruin the fishing for bass and bluegills in a very short time. It is therefore recommended that no more walleyed pike be stocked in Lobdell Lake.

Since the temperature and chemical condition of the water in the main depression is suitable for trout, and since trout waters are not numerous in this part of the state, it would be well to try an experimental planting of trout in this lake. It is suggested, therefore, that 2,000 yearling rainbow trout be planted in Lobdell Lake each year for the next three years as an experiment. Only yearling trout of good size should be used in order to decrease the loss due to predation by perch, bass, etc. They should be planted just before the ice forms in the late fall, a few hundred feet off the center of the west shore of Long Island, in order to introduce them into the proper water.

At the end of the three-year period, a careful check should be made to determine the success of the experiment. It is unlikely that trout will be able to reproduce in the lake. If, by the end of the three-year period, the trout are established, it should be possible to estimate the number needed to be stocked annually to maintain a healthy population.

Herons, terns, turtles and dogfish were among the predators observed on the lake. None were especially numerous. Since it is very doubtful if these so-called predators do much damage to game fish under ordinary conditions, no control measures are suggested. No serious infestations of parasites were observed in the fish taken. Those present were certainly harmless to man,

and probably caused little inconvenience to the fish. No practical methods of control are known.

The dense vegetation and the numerous submerged logs, stumps, etc., provide an abundance of natural cover. In addition, a large number of brush shelters were installed in 1934 by the C.W.A. None of them could be located by the survey party. There are many lakes which need artificial cover devices much more than this, but they probably do no harm. Certainly no more are advised.

Due to the large amount of relatively shallow water, water level fluctuation on this lake could have serious results. The dam at the outlet should be operated so as to keep the level as constant as possible.

As indicated above, spawning facilities are probably adequate.

Spawning boxes and numerous piles of loose gravel were placed in the lake by the C.W.A. in 1934. None of them could be located by the survey party. All have probably long since sunk in the soft peat bottom. Such improvement attempts in a lake of this type are probably not only useless but unnecessary.

INSTITUTE FOR FISHERIES RESEARCH

By John Funk

Report approved by: A. S. Hazzard

Report typed by: R. Bauch