Original: Fish Division
cc: Education-Game
Mr. Roy Johnston 1-26-42
Mr. Eschmeyer

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 16, 1942

REPORT NO. 732

A FISHERIES SURVEY OF ONGIE LAKE, HOUGHTON COUNTY

by

Paul Eschmeyer

Ongie Lake* covers portions of Sections 19, 20, 29 and 30, in T. 53 N., R. 35 W. It is located in Elm River Township of Houghton County, in the western part of the Upper Peninsula of Michigan. The City of Houghton is situated about 16 miles north of the lake, and the Village of Donken is 2 miles south. Ongie Lake is near the headwaters of the Elm River. It is about one mile south of the Taviola Lakes and about 6 miles north of the popular Twin Lakes (Lake Roland and Lake Gerald).

Ongie Lake may be reached by a short dirt road which turns west from highway M-26 at a point about 2 miles south of the Village of Taviola. The lake is located less than a quarter mile from the main highway. The Copper Range Railroad passes along the east shore of the lake.

The map of Ongie Lake was made by the writer, assisted by Mr. Raymond Nye of the Watersmeet Hatchery Staff, on October 2, 1941. The biological survey of the lake was completed on October 4 by the writer.

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*Commonly confused with Stonington Lake, which is immediately south of Ongie Lake, also in Sections 29 and 30, T. 53 N., R. 35 W.

Ongie Lake appears never to have been of any particular importance, either for fishing or for other uses. Most of the shoreline of the lake is privately owned. The public is not ordinarily excluded from fishing at the lake, although the only direct access, without crossing land owned by individuals (whose roads are blocked by locked gates except when they are actually living in their lakeshore cottages), is along the Copper Range Railroad grade, which passes along the east side of the lake. Fishing in Ongie Lake appears never to have been much better than average, although some good catches have been verbally reported from time to time. The fisheries survey of the lake was made at the request of one of the riparian owners, who believed the lake might be suitable for trout.

Only three cottages are located along the shore of Ongie Lake, and there are no boat liveries, resorts or hotels.

Ongie Lake will probably continue in the future in its present status as a lightly fished lake. The lack of direct public access is largely responsible for this.

Physical Characteristics of Ongie Lake

Ongie Lake has an irregularly shaped basin with an area of 18.7 acres and a maximum depth of 27 feet. Its longer axis is about 1500 feet in length, and lies in a southeast-northwest direction. The average width of the basin is about 500 feet.

The area surrounding Ongie Lake is rather heavily wooded, has sandy glacial soils, and is gently rolling. This evidence of glacial action, as well as the fact that the basin has some characters of a "pot hole" type of lake, makes it quite probable that it was formed by the melting of a huge ice cube left by the retreating glacier.

Ongie Lake is situated near the headwaters of the Elm River. The lake's drainage is limited to nearby areas and is served by two intermittent inlet streams. One of these enters the lake from the north and drains 3 small ponds (one of which is known as Morrison Lake). The second is a very short stream which enters the southeast end of the lake and seldom carries any water. Neither of the streams was flowing (in fact, neither was recognized as a stream) at the time of the survey, and apparently they flow only during times of abnormal precipitation or during the spring break-up. The entire drainage basin of Ongie Lake is less than a square mile in area.

A single outlet leaves the extreme southern end of Ongie Lake and, apparently, enters Stonington Lake. It is not functional during most of the year. There is no dam in the outlet.

Ongie Lake has a shoreline development of 1.42. This means that the lake has a shoreline which is 42 per cent (1.42 times) longer than that of a perfectly circular lake of the same area. Ongie Lake has very few shallow bays and coves, which offer food and shelter for fish. Ordinarily, the greater the shoreline development of a lake, the greater is its productivity.

About 20 per cent of the area of Ongie Lake is shoal. There is a relatively gradual declivity from the shoal to the depths in most of the lake, with the steepest drop-off occurring along the northeast shore of the south bay of the lake. A broad, shallow, weedy shoal covers the area in the vicinity of the outlet of the lake. The shoal area of the lake has, almost exclusively, sandy bottom soils, with small amounts of fine gravel. The deeper waters have a pulpy peat substratum.

Water in Ongie Lake is light brown in color and a Secchi disk (white metal disk about 6 inches in diameter), when lowered into the water, disappears from view at a depth of 10 feet. This represents above-average

transparency for lakes in the vicinity. The degree of clearness of the water is an important factor in determining the depth to which aquatic vegetation will grow in a given water. None of the higher aquatic plants can survive in the continued absence of light.

Temperature and Chemical Characteristics of Ongie Lake

As a part of the survey conducted at Ongie Lake, various physical and chemical data concerning the lake water itself were collected. Temperature of the water at various depths was observed, and the amount of certain dissolved gases and minerals was determined. Such data are very important in determining the degree of adaptability of a lake to the different fish species. All fish have certain ranges of temperature, dissolved gas content, etc., which they will tolerate, and within these ranges are optima. Not only the ranges, but particularly the optima, vary among the different fish species, as well as among food organisms and other living things in the water.

Temperatures were taken and water analyses were made on October 2. The temperature of the water ranged from 54°F. at the surface to 45°F. at the bottom. The air temperature at 11 A.M. was 54°F. It was found that a thermocline (area of rapid change in temperature, e.g., one degree centigrade or more per meter of depth) was present, extending from a depth of 18 to 21 feet. Temperature at the top of this stratum was 52.5°F. and at the bottom (21 feet), 46.6°F.

The presence of a thermocline in a lake indicates that the lake is divided into 3 distinct horizontal temperature strata during the summer. The uppermost of these is the epilimnion, which is a warm, circulating layer of water above the thermocline. The hypolimnion is a cold, non-circulating stratum of water extending from the thermocline to the bottom

of the lake. If there is sufficient oxygen present in the thermocline or hypolimnion, a lake will ordinarily support cold-water species, such as trout, since temperatures remain well below the maximum (about 70°F.) of such fish. If a thermocline is not present, or if insufficient oxygen is present in the thermocline or hypolimnion throughout the summer, the water can ordinarily be managed only for warm-water species, since either the water in the entire lake is too warm to support cold-water fish or else it has insufficient oxygen to support such species in parts of the lake where temperature is suitable.

In the case of Ongie Lake, although a thermocline was found, the oxygen in this area, as well as in the hypolimnion, was insufficient to support trout. These were among the most important data obtained in the survey, since the principal reason for making the inventory was to determine whether or not the lake would support trout. The survey showed 0.1 parts per million of oxygen near the bottom of the lake and 1.4 parts per million in the thermocline, at a depth of 20 feet. (At least 4 parts per million are required to support trout). Oxygen would be expected to be ample in the circulating waters above the thermocline, but, as has been mentioned, that area, without doubt, becomes too warm during the summer months to permit the existence of trout.

The early October survey does not entirely exclude trout from consideration at Ongie Lake without further investigation, even though the very low content of oxygen of the thermocline as here reported leaves little hope that the water will sustain this species. Since the temperature above the thermocline was 54°F. or less, while that of the thermocline itself ranged from 46.6°F. to 52.5°F., it is entirely possible that the upper portion of the thermocline had become dissipated by the circulating waters above it.

In other words, the temperature of the top of the thermocline and the epilimnion were so nearly equal that a partial mixing had occurred, affecting principally the top portion of the thermocline. It is this part of the thermocline which would be the last to lose its oxygen. As a result it is possible, although not probable, that a narrow layer of water near the top of the thermocline has both proper temperature and adequate oxygen for trout during the summer. A water analysis should be made during mid-August to check this possibility.

A small amount of carbon dioxide was found in the water near the bottom of Ongie Lake, but this gas is present in insufficient quantities to require consideration in the management of the fishery there.

Methyl Orange Alkalinity tests (designed to show the amounts of certain buffer salts and minerals in the water) showed that the water in Ongie Lake is quite soft. A Methyl Orange Alkalinity ranging from 15 to 28 parts per million was found. From 100 to 200 parts per million are ordinarily considered optimum for high productivity, when the management of warm-water species of fish is being considered.

The pH (hydrogen ion concentration) of Ongie Lake was found to range from 6.2 to 6.9 degrees, or from fairly acid to almost neutral (7.0 is neutral). Moderately alkaline waters are ordinarily more productive than are acid waters.

No pollution was found at Ongie Lake. None would be expected in view of the lake's far removal from sources of industrial or significant amounts of domestic wastes.

Biological Characteristics of Ongie Lake

Ongie Lake has above-average amounts of vegetation for a lake of its physical and chemical nature. A strip of emergent and submergent vegetation

follows almost the entire lake shore. The small bay in the southwest end of the lake, near the outlet, has a particularly dense growth of vegetation. The water weeds present appear to be sufficiently abundant to be adequate for the lake. A list of the species of vegetation collected at the lake and an estimate of their abundance is shown in Table I.

Table I
Aquatic Vegetation Collected in Ongie Lake*

Species	Abundance
Sedge (Carex lasciocarpa)	Common
Rattlesnake manna grass (Glyceria canadensis)	Sparse
Three-way sedge (Dulichium arundinaceum)	Abundant
Horsetail (Equisetum fluviatile f. linnaeanum)	Common
Pipewort (Eriocaulon septangulare)	Common
Yellow water lily (Nuphar variegatum)	Sparse
Leafy pondweed (Potamogeton epihydrus var. Nuttalii)	Common
Floating-leaf pondweed (Potamogeton natans)	Common
Floating-leaf bur reed (Sparganium angustifolium)	Common
Bur reed (Sparganium sp.)	Sparse
Bladderwort (Utricularia vulgaris var. americana)	Sparse
Water moss (Fontinalis)	Very abundant

*Identifications by B. M. Robertson, Department of Botany, University of Michigan.

Plankton (microscopic free swimming and floating plants and animals) was found to be of about average abundance in Ongie Lake. Crustaceans were the dominant organisms at the time the survey was made.

No quantitative samples of the bottom organisms in the lake were taken. General observations indicated that bottom foods are quite scant, although about average for waters of the physical and chemical nature of Ongie Lake. The pulpy peat substratum covering most of the lake basin is very unproductive. Some mayfly nymphs and considerable numbers of dragonfly nymphs were present on the shoal areas. The food present in the lake would probably support a normal, balanced (though not large) population of game and forage fish. It is inadequate to support the present large population of perch and bluegills.

The fish known to be present in Ongie Lake include only yellow perch, bluegills, and an unidentified species of minnows. Of these, only the yellow perch was collected during the survey. A 48-hour set of 2 graded mesh experimental gill nets yielded only 10 perch, ranging in size from 6 to 12.4 inches. Fish are not readily collected with nets in the late fall, and the gill net catch cannot be considered as being representative of the fish population in the lake. A large school of unidentified minnows and large numbers of bluegills were seen in a visit to the lake on August 1. Large colonies of nests of the latter species were seen along the south and southwest shores. Further collections of bluegills and other species which may be in the lake would be highly desirable.

Ongie Lake has been heavily stocked during recent years. From 1936 to 1940 there were planted 26,000 bluegills, 400 largemouth bass, and 1,000 smallmouth bass. In addition, 1,000 yellow perch were planted during 1935. The age of several of the specimens collected during the survey reveals that the latter species had become established in the lake previous to the time of the 1935 stocking.

The growth rate of perch taken in Ongie Lake is shown in Table II. Due to the few specimens available upon which the growth rate could be based, the figures may not be representative. They seem to quite definitely present evidence of a stunted population, however.

Table II
The Growth Rate of Perch in Ongie Lake*

Growing seasons completed	Number of specimens	Average length in inches	Average weight in ounces
V	7	6	1.3
VI	1	7.4	2.4
VIII	1	7.4	2.3
IX	1	12.4	13.9

*Growth determinations made by W. C. Beckman.

In average Michigan waters, perch reach legal size (6 inches) during their second summer of growth. In Ongie Lake it seems quite evident that

perch require a full 5 summers to reach the legal limit. The perch, during the course of years, have apparently become overabundant and have outgrown their food supply. The one 9-year-old fish had apparently become large enough to feed on its smaller relatives, and obviously thrived well on the abundant food supply.

Unfortunately no growth data are available on the bluegills in the lake. The large numbers of bluegills seen on August 1, their uniformity in size (apparently all very close to 5½ or 6 inches), the tendency of bluegills to have feeding habits closely related to those of the perch (in the size groups here considered), and the fact that the bluegills were inclined to follow the boat in schools, presumably in search of food (typical of the behavior of stunted bluegills in other lakes observed by the writer), all give weight to the supposition that this species is also stunted in Ongie Lake. In the absence of scale samples, however, no factual information on the growth of bluegills in this water is available.

Spawning facilities in Ongie Lake are adequate for the Centrarchid fishes as well as for perch. Ample sandy shoal, with some gravel, is present for bass and bluegills, and the perch have considerable amounts of aquatic vegetation upon which to lay their eggs.

Management Suggestions

Ongie Lake is at the present time in the "all others" classification. The survey revealed no reason for changing this designation.

It is recommended that about 25 adult largemouth bass be stocked in Ongie Lake for the purpose of establishing the species and attempting to reduce and control the perch and bluegill population. Planting of largemouth bass fry and fingerlings has been attempted in the past without success. Apparently the perch have consumed the planted fish before the latter could reach a sufficiently large size to avoid predation. If large

adults are introduced, the perch population should ultimately become reduced to the point where the bass can successfully reproduce (naturally) in the lake. A drastic reduction in numbers of perch and bluegills in the lake is certainly necessary if the fishing is to be improved. The largemouth bass is the most highly pisciverous species which could be introduced into the lake and be expected to reproduce, thus perpetuating the balance between predator and prey. More costly methods of reducing the stunted populations (e.g. poisoning) cannot be justified in view of the semi-private nature of the lake and the very light public use made of the water.

No predators were observed during the survey of Ongie Lake. None would be likely to occur which would do sufficient damage to require consideration in the management of the fishery there.

Occasional black spot parasites and yellow grubs were observed in the skin and musculature of perch taken from Ongie Lake. These were apparently doing no harm and no practical control methods are known.

Cover present in Ongie Lake consists of the vegetation described above and numbers of deadfalls, besides debris and brush. The cover is adequate to meet the needs of the lake.

No regulation of the water level or improvement of spawning facilities is necessary to promote the quality of the fishing at Ongie Lake.

As has been suggested above, a mid-August water analysis should be made at Ongie Lake to conclusively determine whether or not the water will support trout. Since there are very few trout lakes in the vicinity of Ongie Lake, the possibility for development of a trout fishery should not be overlooked. If the lake is found suitable for trout, proper management

procedure would include the poisoning of the present population, re-stocking with trout, and establishment of means for easy public access to the lake.

INSTITUTE FOR FISHERIES RESEARCH

By Paul Eschmeyer

Report approved by: A. S. Hazzard

Report typed by: R. Bauch