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A FISHERIES SURVEY OF THUNDER LAKE, SCHOOLCRAFT COUNTY

by

E. W. Roelofs

Introduction

Thunder Lake, located in Inwood Township, Schoolcraft County (T. 43 N., R. 17 W., Sec. 19, 20, 29, 30), is 8 miles northwest from Indian Lake and 8 miles northeast from Cooks C.C.C. Camp, on Thunder Lake Truck Trail. It is on the southeastern side of a large group of lakes in the region surrounding the point where Schoolcraft, Alger, and Delta Counties meet. The lake lies in the Hiawatha National Forest and is in the Manistique River drainage system.

The outline and contour map used in the fisheries survey was prepared by the United States Forest Service. An Institute for Fisheries Research field party* charted in the weed beds and bottom types on the map, and made a biological inventory of the lake during the first half of August, 1937. Data collected at that time form the basis for this report.

The lake is not known to have had any past industrial uses or relation to a town site. It has always been considered a good fishing lake, but is reported to have been better for bass in the past than at present.

* The party included: H. Telford, leader; J. Bailey and L. Shettles, assistants.

At the time of the survey there were six cottages and two resorts on Thunder Lake. Boats, bait, and meals are available. Although a good swimming beach is present, no extensive use is made of it. Fishing is the chief recreational use made of the lake. There is no apparent reason for the lake losing its present position among the better fishing lakes of the region.

Physical Characters

Thunder Lake occupies an irregular basin of 480 acres in a wooded region of the Upper Peninsula. The basin is relatively shallow and undoubtedly of glacial origin.

The lake lies in the Manistique River drainage system. The outlet, Big Murphy River, flows into Indian River about 5 miles north of Indian Lake. Indian River flows from Indian Lake and into the Manistique River at Manistique. Thunder Lake has two streams flowing into it, namely Carr Creek and Kilpecker Creek. The latter divides into 3 parts a short distance from the lake, making a total of 4 inlets at the lake margin. Carr Creek enters the lake immediately adjacent to the outlet so has little influence on the lake proper. The headwaters of the inlet streams are not more than 5 or 6 miles distant, so the watershed of Thunder Lake is rather limited.

The north part of the lake has a large area exposed to the prevailing winds and is roughened considerably.

Other physical characters are given in the following table:

Area (acres)	480
Maximum depth (ft.)	20
Per cent shoal	100
Bottom types	Sand and pulpy peat
Color of water	Colorless
*Secchi disc (ft.)	12
**Shoreline development	1.57

* The Secchi disc is a circular metal disc used to measure the approximate depth of effective light penetration.

** The shoreline development is obtained by dividing the circumference of a lake by the circumference of a circle having the same area, and is therefore an expression of shoreline irregularity.

Thunder Lake has nearly all of the physical features usually associated with productive lakes. It is shallow, making plant growth possible over the entire bottom; it has a large area suitable for the spawning of nearly all warm-water fish; it has an irregular outline, providing necessary protected places; and the water is relatively clear, enabling effective light to penetrate to its greatest depth.

These features are important to fisheries because in them lie many of the causes for good or poor fishing. For example, large lakes with little shoal area and large volumes of open deep water are not productive. Rather, it is the smaller and shallower lakes with a generous supply of plant beds and protected bays which attract the average fisherman--and which pay off in catches of pike, bass, and other game species.

The effect of these physical characters upon other conditions in the lake will be pointed out later.

Temperature and Chemical Characters

Water temperature is correlated directly with fish growth. Generally, and within toleration limits, fish growth increases as the water gets

warmer. This is due to increased activity--particularly feeding.

Chemical conditions also affect fish life. The oxygen supply is a vital factor in fish distribution. Other chemical conditions affect fish more indirectly, chiefly through food abundance and related environmental characters.

The temperature and chemical conditions in Thunder Lake as of August 5, 1937, are given in the table below:

	Surface	Bottom (19 ft.)
Temperature (°F.)	77	64
Oxygen (p.p.m.)	10.8	10.6
CO_2 (p.p.m.)	0.0	0.0
M. O. Alkalinity (p.p.m.)	80	82
pH	8.6	8.4

The water in Thunder Lake is subject to complete circulation throughout the summer months (or when not under ice cover), resulting in an abundant oxygen supply at all depths. The temperature is quite uniform throughout; differences may occur when the air temperature is high and there is no wind to mix the water. These oxygen and temperature conditions are mainly the result of the shallow nature of the lake.

Methyl Orange Alkalinity, an expression of dissolved mineral salts, indicates moderately soft water. Harder waters are generally more productive, but the water in Thunder Lake is not soft enough to be serious.

The pH (hydrogen ion concentration) is an expression of acidity or alkalinity (pH of 7.0 is neutral; lower than 7.0 is acid; higher is alkaline). The water of Thunder Lake is distinctly alkaline, a condition favoring general productivity.

Biological Characters

The biological attributes of a lake help to determine the kind, amount, and distribution of our more important game fish. Weed beds

harbor quantities of fish foods which, in turn, attract certain species of fish. Weed beds also provide some protection for forage fish and young fish of the game species.

Vegetation

The importance of plant growths has been discussed. The plants found in Thunder Lake are given below:

Common name	Scientific name*	Abundance
Waterweed	(Anacharis canadensis)	Common
Sedge	(Carex sp.)	Common
Coontail	(Ceratophyllum demersum)	Common
Leatherleaf	(Chamaedaphne calyculata)	Common
Musk grass	(Chara sp.)	Abundant
Mud plantain	(Heteranthera dubia)	Few
Duckweed	(Lemna and/or Spirodela)	Rare
Water marigold	(Megalodonta Beckii)	Few
Water milfoil	(Myriophyllum spicatum)	Abundant
Bushy pondweed	(Najas flexilis)	Abundant
Yellow water lily	(Nuphar advena)	Rare
White water lily	(Nymphaea odorata)	Few
Sago pondweed	(Potamogeton pectinatus)	Abundant as a group. Individual abundance unknown.
Whitestem pondweed	(Potamogeton praelongus)	
Clasping-leaf pondweed	(Potamogeton Richardsonii)	
Pondweed	(Potamogeton strictifolius)	
Flat-stemmed pondweed	(Potamogeton zosteriformis)	
Water crowfoot	(Ranunculus trichophyllous)	...
Duck potato	(Sagittaria sp.)	Common
Bulrush	(Scirpus sp.)	Few
Bur reed	(Sparganium americanum)	Common
Cattail	(Typha latifolia)	Few
Bladderwort	(Utricularia sp.)	Rare
Wild celery	(Vallisneria americana)	Rare

* Plants identified by C. O. Grassl, University of Michigan Botany Department.

The above table shows a wide variety and a general abundance of plants. This means an abundance of cover and indicates a large supply of insects and other food organisms.

Fish foods

On the basis of four bottom samples taken by the survey party, bottom foods are not plentiful. A total of only 11 bottom organisms was found; these included 9 midge larvae, one snail, and one dragonfly nymph.

Studies since this survey have shown that vegetation is possibly the most important habitat for fish food organisms. Perhaps, also, more of the organisms on plants are available to fish than those on the lake bottom. In any event, there should be no shortage of invertebrate food organisms in Thunder Lake.

Plankton (very small, free floating plants and animals) was abundant at the time of the survey; plant forms predominated. Since plankton populations are subject to large and rapid fluctuations, one day's sampling may not give a reliable basis for an accurate judgement of the annual plankton crop.

Fish

The following table shows the kind and relative abundance of fish collected or reported by the survey party. Stocking records (total numbers) for 1936-1940 are also included in this table.

Fish	Abundance	No. planted 1936-1940
GAME FISH		
Northern pike (Esox lucius)	Abundant	...
Walleyed pike (Stizostedion vitreum)	Reported	1,250,000
Largemouth bass (Huro salmoides)	Few	...
Smallmouth bass (Micropterus dolomieu)	Rare	...
Perch (Perca flavescens)	Common	16,200
Bluegill (Lepomis macrochirus)	Common	...
Rock bass (Ambloplites rupestris)	Few	...
Pumpkinseed (Lepomis gibbosus)	Common	...
Brook trout (Salvelinus fontinalis)	Reported	...
COARSE FISH		
Common sucker (Catostomus commersonnii)	Common	...
Brown bullhead (Ameiurus nebulosus)	Common	...
FORAGE FISH		
Black-chinned shiner (Notropis heterodon)	Abundant	...
Blunt-nosed minnow (Hyborhynchus notatus)	Common	...
Spot-tailed shiner (Notropis hudsonius)	Abundant	...
Common shiner (Notropis cornutus)	Abundant	...
Golden shiner (Notemigonus crysoleucas)	Abundant	...
Mimic shiner (Notropis volucellus)	Common	...
Straw-colored shiner (Notropis deliciosus)	Common	...
Mudminnow (Umbra limi)	Common	...
Muddler (Cottus bairdii)	Common	...
Northern creek chub (Semotilus atromaculatus)	Common	...
Iowa darter (Poecilichthys exilis)	Rare	...
Johnny darter (Boleosoma nigrum)	Rare	...
Black-nosed shiner (Notropis heterolepis)	Rare	...
Least darter (Microperca microperca)	Rare	...
Menona killifish (Fundulus diaphanus)	Rare	...
OTHER FORAGE		
Crayfish	Abundant	...

The above table shows a wide variety of game fish and an abundance of forage fish. It seems that there should be plenty of food for the piscivorous species. The trout reported from the lake may have come in from Carr Creek or Kilpecker Creek; both are trout streams.

Growth studies on the game species collected are given in the following table.

Fish	No. of specimens	Age group	Ave. length (in.)
Northern pike	4	I	10.3
	7	II	13.3
	11	III	17.8
	7	IV	20.1
Perch	2	II	5.7
	9	III	6.2
	5	IV	6.7
	3	V	8.0
	1 ♀	VI	9.9
	1 ♂	VII	7.7
Bluegill	1	II	4.6
	6	IV	6.7
	2	V	7.7
Pumpkinseed	15	IV	6.4
	3	V	6.9
Rock bass	1 ♀	III	5.6
	3	IV	7.6
	1 ♂	VI	10.1
	1 ♀	IX	9.6

These studies indicate average growth of bluegills, pumpkinseeds, and rock bass, and rather slow growth for perch and northern pike. No large specimens of bass were available for study.

There is no apparent reason for the slow growth of the perch and northern pike. Food conditions seem unusually good, considering the amount of forage fish and smaller game fish. The water temperature is rather low, but this should affect bluegills and pumpkinseeds as much or more than pike and perch. There may be too many fish in the lake, but ordinarily this condition does not develop in a large lake with an abundant pike population. Further speculation leads to the suggestion that perhaps the forage fish are too well protected by the weed beds and therefore not readily available to the pike and perch. But this is mere speculation; the reasons for the slow growth cannot be found in the present available information.

General Discussion

Thunder Lake conforms, in nearly every respect, to the present conception of the ideal fish lake, i.e., when considering warm-water fish. The characters used in reaching this conclusion have all been discussed above, but will be summarized briefly.

Spawning facilities abound for most of the game species except, perhaps, for smallmouth bass, walleyes and trout. Natural propagation, therefore, can easily maintain good fishing for most species.

Food conditions seem excellent; cover is plentiful (perhaps too plentiful); and chemical conditions favor high productivity.

The only unfavorable situation in an otherwise ideal lake is the unknown conditions causing the slow growth of pike and perch.

Management Suggestions

Thunder Lake is appropriately designated as a "pike" lake.

The stocking of perch in lakes for the purposes of maintenance is believed unnecessary. Their spawning requirements are apparently met so readily that they reproduce well (in some cases too well) in nearly all lakes. No more perch should be planted.

Walleyes have been planted for several years. Some legal walleyes have been taken. The addition of this species to a lake already containing four piscivorous species is believed undesirable. If the reason for the slow growth of the northern pike is the unavailability of the forage fish, the condition will only be aggravated by the establishing of a large walleye population, even if this should be possible. Planting of walleyes should therefore be discontinued.

Several predators, some of which perhaps do little damage, were observed by the survey party. They are: American merganser, western painted turtle, great blue heron, pied-billed grebe, herring gull, and

kingfisher. Since the fishery has withstood the predation of these same forms for perhaps many years, there is no present need for their control.

No parasites were reported by the survey party.

Cover and spawning facilities are adequate; no improvements are suggested.

The water level is fairly constant, requiring no regulation.

INSTITUTE FOR FISHERIES RESEARCH

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