Original: Fish Division
cc: Mr. Hans Peterson
Dr. Allison
Education-Game

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

Institute for Fisheries Research

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

November 2, 1943

REPORT NO. 894

A FISHERIES SURVEY OF ESS LAKE, MONTMORENCY COUNTY

by

Leonard N. Allison and Hugo Kilpela

Introduction

Location and Drainage

Ess Lake (Round Lake) is a small pot-hole lake located in the northeast part of Montmorency County (T. 31, 32 N., R. 4 E., Sec. 5, 6, 31, 32). The lake lies about seven miles northwest of Hillman and can be reached by following County Road 451 north from Hillman and taking the sand and gravel road that meanders westward for about one and one-half miles on the high ground north of Avalon Lake. It is one of a number of small lakes in this region and is at the present time reported to afford good fishing for walleyed pike.

The lake is not connected with any drainage system since it has neither inlet nor outlet.

Acknowledgments

The map used during the three-day survey was made by the M. E. C. W. during the winter of 1936 and 1937. Thanks are due to Conservation Officer William Cronk who was especially helpful in providing information on the fishing history of the lake.

The fisheries inventory[*] was made in August (18-20), 1942 and the data collected were used for this report.

Past and Present Use

Few data are available on the past use of Ess Lake. The fishing in the past was limited to perch, smallmouth bass and largemouth bass. The catches were reported to be poor. At present, the fishing for the above species is still poor but fair catches of walleyed pike are reported.

There are but three cottages on the lake and the probability of extensive development is questionable because of large quantities of marl along the west shore and a considerable area of marshy ground on the southwest shore, although parts of the northeast shore are suitable for cottage development. A conservation department public fishing site is located on the little southeast bay where boats can be rented and a table and the toilets are provided for picnickers.

Physical Characteristics

Geological Origin

No information concerning the geological origin of Ess Lake is available. It lies within the boundaries of the Cheboygan moraines and is undoubtedly of glacial derivation.

Shape of the Basin and Extent of the Drainage

The basin of Ess Lake is bowl-shaped, with the exception of the west side where an extensive sand-marl shoal reaches nearly one-third of the distance across the lake. The surrounding country is covered with a second-growth trees typical of burned-over Michigan pine barrens. The soil is sandy and unproductive for farming except for the lower marshy areas.

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[*] The fisheries inventory party included: Hugo Kilpela, leader, R. D. Van Deusen, Pat Galvin, Stanley Lievense, assistants.

Considerable high ground is found on the east side of the lake and both Ess and Long lakes can be seen from the summit, Long Lake lying to the east.

About one square mile of land is drained by the lake.

Water Fluctuation

Ess Lake has a stable water level. It has neither inlet nor outlet and is said to be spring-fed. The lake level in the summer of 1942 was reported to be six to eight inches higher than the level of 1941.

Other Physical Data

The surface area of Ess Lake is 114 acres and the maximum depth 51 feet. Approximately one-half of the lake is less than 20 feet deep, about one-third of this area supporting vegetation. Very few plants extend beyond a depth of 10 feet. The bottom soil from the shore to a depth of about 15 feet is composed chiefly of marl; beyond 15 feet of depth the bottom soil is predominantly pulpy peat.

The shoreline development is 1.04, which means the shoreline is only 1.04 times as long as it would be if the lake were perfectly round and had the same area. This is below the average for Michigan inland lakes and is unfavorable to high productivity. In general, the greater the shoreline development, the greater the plant beds and feeding grounds for fish.

The water is colorless to slightly brown. The Secchi disk reading was 10 feet (average for all lakes studied is 10.6), which indicates that light penetration is about average.

Wave and Ice Action

No disturbances to the biological productivity have been reported due to wave and ice action.

Discussion of Physical Factors in Relation to Fisheries

The round and regular basin of Ess Lake favors little biological productivity. Bottom soils favor a relatively high biological productivity and account for the better than average plant growth in Ess Lake. Much of the lake is quite deep and the lack of suitable temperature and chemical conditions limit the amount of deeper water available as a habitat for warm-water fish. In general the physical factors of Ess Lake are not very favorable to a high biological productivity.

Temperature and Chemical Characteristics

Data on the temperature and chemical characteristics of Ess Lake were obtained on August 16, 1942 by the survey party. The following table is a summary of the data taken.

Date	Depth in feet	Temperature °F.	Oxygen p.p.m.	Methyl Orange Alkalinity	pH
8-16-42	0	71.4	8.0	148	7.9
	3	71.4	...	...	...
	12	71.2	...	...	...
	24	66.0	7.5	...	...
	30	55.8	2.0	...	...
	36	53.4	1.0	...	...
	48	51.1	0.9	131	7.4
	51 (bottom)	...	...	...	...

A thermocline (zone of rapid change in temperature) occurs between 24 and 33 feet in the 51-foot depression. This thermal stratification provides a considerable volume of cool water for those fish which require lower water temperatures. Tolerable oxygen was found up to 27 feet, and four walleyed pike were taken at a depth of 25 feet.

Due to the thermal stratification, oxygen throughout the summer changes very little from the surface to the thermocline. Wind action keeps this layer well mixed. From the thermocline to the bottom of the lake only slight mixing occurs. Consequently the oxygen content of the water

decreases as the depth increases and in late summer very little oxygen is found in the water near the bottom of the lake.

The water in Ess Lake is moderately hard (methyl orange alkalinity 131-148 p.p.m.) and is distinctly alkaline (pH 7.4-7.9). This lake is nearly ideal in respect to these properties since moderately alkaline waters are usually the more productive.

No pollution of any kind was found or reported in Ess Lake.

Biological Characteristics

Vegetation

The following table lists the species of aquatic vegetation found and the estimated abundance of each.

Common Name	Scientific Name	Abundance
Stonewart	*Chara* sp.	Common
Pondweed	*Potamogeton gramineus* var. *graminifolius* f. *myriophyllus*	Common
Bushy pondweed	*Najas flexilis*	Common
Floating-leaf pondweed	*Potamogeton natans*	Abundant
Three-way sedge	*Dulichium arundinacium*	Common
Cladium	*Cladium mariscoides*	Common
Arrowhead	*Sagittaria latifolia*	Few
Soft-stemmed bulrush	*Scirpus validus*	Common
Three-square	*Scirpus americanus*	Common
Spike rush	*Eleocharis Smallii*	Few
Blue flag	*Iris versicolor*	Few

Ess Lake contains a fair number of both submergent and emergent aquatic plants. An almost continuous band of *Scirpus* follows the entire shoreline; *Scirpus validus* and *S. americanus* are the species found. *Potamogeton natans* was the predominant submergent species.

Fish Foods

Superficial examination of the plankton sample taken over the depths showed it to be fair in richness and to be comprised of phyto- (plant) and zoo- (animal) plankters in about equal numbers. However, samples of this nature may not be representative of average conditions in the lake.

The bottom soil of Ess Lake contained very few invertebrate organisms in water deeper than five feet. Vegetation samples were also poor in insect life except those taken in marginal shallows.

The following organisms were found and are given in the order of their relative abundance: dragonfly larvae, mayfly larvae, midge larvae, damselfly larvae, crustaceans, leeches, stonefly larvae, caddisfly larvae, flat-worms, beetle larvae and water spiders. No organisms were found in samples taken at 22 and 45 feet.

Fish Present

Fish collected from Ess Lake, Montmorency County were as follows:

Species	Abundance
Game fish:	
Rock bass	Abundant
Bluegill	Common
Perch	Common
Pumpkinseed	Common
Smallmouth bass	Few
Walleyed pike	Common
Largemouth bass	Reported
Forage Fish:	
Bluntnosed minnow	Abundant
Iowa darter	Few
Coarse Fish:	
Common sucker	Common

Sufficient samples of scales were not secured for a growth rate study.

The following table gives the stocking records for the past five years:*

	1937	1938	1939	1940	1941
Walleyed pike	90,000 F	...	80,000 F	...	...
Smallmouth bass	...	...	98 A 300 4M	144 A 480 4M	...
Largemouth bass	...	400 5M	...	400 4M	...
Bluegills	2,000 3M	3,000 5M	10,000 5M	10,000 3M	5,000 3M
Perch	...	...	5,000 7M	...	...

* F = Fry
A = Adult
M = Month

Management Recommendations

Designation of Lake

Ess Lake is designated in the "all other lakes" classification. This classification should be changed to the pike classification since walleyes are a dominant species and since this season is also proper for the taking of rainbow trout, especially if waters are open to fall fishing for this species.

Stocking

It is recommended that 1,500 rainbow trout of legal size be stocked in the fall of each year for three consecutive years. The stocking of all other species should be discontinued. The physical characteristics appear to be more suitable for cold-water fish. Although there are large predacious fish in the lake, it would be desirable to stock rainbow trout for several consecutive years to determine by close observation whether they can survive successfully in such waters. Few conclusive experiments have been performed on this type of association and Ess Lake offers good opportunity to test the value of such plantings. Further management policies will be suggested when the results of the three year planting with rainbows are known.

Predators and Parasites

No predator or parasite is known to cause damage to fish life in Ess Lake.

Shelter

Shelter appears to be adequately provided by the weed beds and 34 brush shelters on the shoals.

Regulation of Water Level.

The water level of Ess Lake is fairly constant and no regulation is necessary or possible.

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Report approved by: A. S. Hazzard
Report typed by V. Andras