Original: Fish Division
cc: ~~A. T. Stewart~~
Education-Game
L. E. Perry
Institute for Fisheries Research
Harold Hughes 8-6-43

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

July 8, 1943

REPORT NO. 873

A FISHERIES SURVEY OF CEDAR AND LITTLE CEDAR LAKES, WASHTENAW COUNTY

by

L. Edward Perry

Introduction

Location and Drainage

The Cedar Lakes are about three and one-half miles west of Chelsea in Washtenaw County. They lie in Sylvan Township, T. 2 S., R. 3 E., Section 9, and are partly within the boundaries of the Waterloo Recreational Project of the National Park Service. Nearby are such lakes as Cavanaugh, Mill , and Crooked. All are in the Huron River drainage. Cedar Lake is made accessible throughout the year by county roads and the arterial highway, U. S. 12, which passes within a mile and a half of the south shore.

Because of similarity in character and the broad connection between them these two lakes will be considered as one and referred to, for convenience, in this report as Cedar Lake.

Acknowledgments

Cedar Lake was mapped, January 8-9, 1941, and given a biological inventory, June 5-7, 1941, by parties of the Institute for Fisheries Research.*

* Mapping party: C. J. D. Brown, leader; J. W. Moffett, L. Anderson and R. Matthews, assistants.

Biological inventory party: J. Funk, leader; E. Roelofs and S. Lievense, assistants.

Fish collection party: W. C. Beckman, leader; L. Anderson, R. Buller and D. Thomas, assistants.

During the winter of 1940-41, Dr. J. W. Moffett and B. P. Hunt made a study of the winter feeding habits of bluegills and perch in Cedar Lake (Report 791). Also, studies were made of the summer and winter fishing by Drs. A. S. Hazzard and R. W. Eschmeyer, in 1936 and 1937 (Reports No. 411 and 471, and published in the Papers of the Michigan Academy of Science, Arts, and Letters, Vol. XXIII, pp. 633-643).

Past and Present Use

The prime importance of Cedar Lake is that of recreation. Since it is located in the Waterloo Project it has been subject to some development for swimming and picnicking. There were 14 cottages on the south shore at the time of the survey, but no resorts or boat liveries.

The lake is accessible to fishing during all seasons of the year and is fished rather heavily with good success, as shown by creel census records.

Physical Characteristics

Geological Origin

As far as known, no definite information is available on the geological origin of Cedar Lake, however, it is undoubtedly a morainic lake of the Kalamazoo system.

Shape of Basin and Extent of Drainage

The main basin of Cedar Lake has a slightly irregular, oval shape with a width that is nearly as great as the length. The maximum depth is 27 feet. The smaller basin or Little Cedar Lake is broadly joined to the west side of the main basin. It has a depth of 16 feet and an area of about 9 acres. The combined area is 73 acres.

Cedar Lake is largely surrounded by rolling farm land of sandy loam soil, however, stretches of marsh land extend from the morthwest and east sides. Most of the immediate shore is high and partly wooded. A marsh surrounds the smaller basin.

Cedar Lake drainage is limited to seepage and runoff and would not exceed one square mile.

Water Fluctuation

Fluctuation of water level is insignificant. The main source of water is seepage which comes principally from the marshes. Likewise, seepage is the only means of outlet, through the marshes to Mill Creek and eventually to the Huron River.

Physical Characteristics in Relation to Fisheries

The physical data are summarized in Table I.

Table I

Summary of Physical Data of Cedar Lake

Area (acres)	Maximum depth (feet)	Shore development	Dominant bottom types		Color of water	Transparency (Secchi disc in feet)
			Shallows	Depths		
73	27	1.2*	sand, marl, fibrous peat	pulpy peat	colorless	8 to 10.5

* Not including Little Cedar Lake

Shore development is the number of times the shoreline is greater than that of a perfectly round lake of the same area. The index of 1.2 for the large basin alone is indicative of few bays and coves which generally provide good protection for both plants and fish. In small, protected lakes of this sort, however, abundant plant growth usually occurs over the entire shallow areas.

Discussion of Physical Factors in Relation to Fisheries

Most physical features of Cedar Lake indicate that it is satisfactory for warm-water fishes. It has broad shallow areas that are capable of high productivity.

Temperature and Chemical Characteristics

Temperature

At the time of the survey, June 7, there was a surface layer of relatively warm water (67-71°F.), and a lower layer known as the thermocline that dropped rapidly in temperature to the bottom (67-55°F.). The thermocline extended from a depth of 13 feet to the bottom at 22 feet. Later in summer the water would become warmer at the surface but remain relatively cool at the bottom.

Chemical Conditions

Oxygen was found in sufficient amounts for fish life from the surface to near the bottom, however, later in the summer and possibly in late winter the decomposition of the organic materials on the bottom probably reduces the oxygen supply in the lower waters to such an extent that fish are unable to live there.

The water is alkaline (pH range, 7.4-8.6) and moderately hard (methyl orange alkalinity range, 118-135 parts per million). Such conditions are generally favorable to good productivity.

Pollution

No pollution was noticed or reported.

A summary of the chemical and temperature data are given in Table II.

Table II

Chemical and Temperature Observations of the Cedar Lakes, June 7, 1941

	Cedar Lake				Little Cedar Lake			
Depth (feet)	Temperature (°F.)	Oxygen (parts per million)	M. O. Alkalinity (parts per million)	pH*	Temperature (°F.)	Oxygen (parts per million)	M. O. Alkalinity (parts per million)	pH*
0	71	8.6	118	8.6	72	7.0	123	8.2
10	68	...	...	...	68	...	...	...
12 1/2	67	7.8	112	...	65	5.6	122	7.1
15	63	...	...	...	60	...	...	...
17 1/2	62	...	...	...				
19	..	3.2	135	...				
20	55	...	...	...				
22	..	...	...	7.4				

* pH observations were made on July 15, 1941 at approximately the same location as the previous stations.

Discussion of Temperature and Chemical Factors in Relation to Fisheries

The temperature and chemical properties of the water of Cedar Lake are favorable to warm-water fishes at all times of the year. The lower colder water is not good for fish of any species because of oxygen depletion in this zone.

Biological Characteristics

Vegetation

Plants are fairly abundant. They were found in the shallow water areas down to a depth of 10 to 15 feet which includes more than half of Cedar Lake. This zone is the most productive in any lake.

A list of the species and their relative abundance is given in Table III.

The vegetation is sufficient to provide the necessary shelter for fish and to nourish and protect invertebrate organisms for fish food.

Table III

Relative Abundance of Plants Found in the Cedar Lakes

Common Name	Scientific Name	Relative Abundance
Waterweed	Anacharis canadensis	Common
Water shield	Brasenia Schreberi	Few
Sedge	Carex comosa	Rare
Sedge	Carex lasiocarpa	Common
Coontail	Ceratophyllum demersum	Rare
Water willow	Decodon verticillatus	Few
Spike rush	Eleocharis Smallii	Rare
Iris	Iris versicolor	Rare
White water lily	Nymphaea odorata	Common
Yellow water lily	Nuphar variegatum	Common
Arrow arum	Peltandra virginica	Few
Pickerel weed	Pontederia cordata	Few
Pondweed	Potamogeton angustifolius	Common
Pondweed	P. Friesii	Few
Pondweed	P. gramineus graminifolius f. myriophyllus	Few
Floating-leaf pondweed	P. natans	Few
Whitestem pondweed	P. praelongus	Few
Flat-stemmed pondweed	P. zosteriformis	Few
Hardstem bulrush	Scirpus acutus	Common
Three-square	S. americanus	Few
Bulrush	Scirpus sp.	Rare
Common cattail	Typha latifolia	Few
Bladderwort	Utricularia vulgaris var. americana	Few
Muskgrass	Chara	Common

Identifications by Betty Robertson Clarke

Fish Foods

Plankton, the small organisms that float in the water, was fairly abundant, however, this is not of much significance because of the variability of these organisms from time to time and from place to place in a lake. A few samples give only very general information.

Other food organisms were rather abundant on the plants, but few were found in the bottom soils in either deep or shallow water. The following groups were represented in the samples: free-living flatworms, aquatic earthworms, leeches, snails, scuds, water mites and larval forms of mayflies, dragon flies, damsel flies, phantom midges, blood worms and other true flies.

Forage fishes in the form of minnows were present in considerable numbers.

The report of Moffett and Hunt (No. 791) has emphasized the adequacy of fish food in Cedar Lake. They found plankton to

be the most important food for bluegills and young perch in the winter. Insect larvae were next in importance. Large perch ate principally bluegills.

Fish Present

Bluegills, perch and pumpkinseeds were found to be the most common game fishes in Cedar Lake. Other species were pike, smallmouth bass (reported), largemouth bass and black crappies. Bullheads and minnows were fairly common (See Table IV).

Records show that hatchery stock has not been introduced into this lake, at least not since 1934.

Table IV

List of Fishes and Their Relative Abundance in the Cedar Lakes

Game Fishes	
Northern pike	Few reported
Perch	Few
Smallmouth bass	Few reported
Largemouth bass	Few
Bluegills	Abundant
Pumpkinseeds	Common
Green sunfish	Few
Black crappie	Few
Rock bass	Few reported
Warmouth bass	Few reported
Coarse Fishes	
Mud pickerel	Few
Yellow bullheads	Few
Forage Fishes	
Black-nosed shiner	
Black-chin shiner	
Blunt-nosed minnow	
Golden shiner	
Menona Killifish	
Iowa darter	
Silversides	

Creel Census

As already mentioned, an intensive creel census of this lake through the cooperation of the National Park Service was reported by Hazzard and Eschmeyer (Report Nos. 411 and 471) in conjunction with other lakes in the Waterloo Project during 1936 and early 1937. In the summer and fall of 1936 a census was made of the creels of 452 fishermen which constituted at least 90 per cent of the total number that fished the lake. Sixteen per cent caught no fish, however the average catch per man was 6.2 fish or 2.2 fish per hour. The average catch for the entire Waterloo Project was 1.2 fish per hour. A total of 2,795 fish were recorded, being distributed in the following percentages: bluegills, 71; sunfish, 14; perch, 5; largemouth bass, 4½;

smallmouth bass, 3; bullheads, 1; rock bass and black crappies, 1½. The average sizes were bluegills, 7.2 inches; pumpkinseeds, 6.8 inches; perch, 8.1 inches and largemouth bass, 13.3 inches.

During the winter of 1936-37 only 13 fishermen were reported. They caught a total of 81 legal fish at the rate of 6.2 fish per man or 2.0 fish per hour. The percentage of each species was: bluegills, 41; sunfish, 28; perch, 25; pike, 2; bullheads and golden shiners, 4. The catch per hour was approximately the same as during the preceding summer, however, the ratio of species changed somewhat in that fewer bluegills but more sunfish and perch were caught.

Record was also kept of fishing effort at the time of the winter food study. Collections were made by members of the Institute staff. The catch of 1428 fish that winter (1940-41) averaged 4.56 fish per hour per person, 70 per cent of which were legal size, making about 3.2 legal fish per hour. The percentage of each species was bluegills, 74; perch, 15; sunfish, 7; black crappies, 3; and largemouth bass, 1. The percentage of bluegills is about the same as during the summer of 1936.

It is obvious that fishing in Cedar Lake is good. It has been rather heavily fished in the summer but only sparingly in the winter with the exception of the winter of 1940-41.

Growth Rate of Game Species

Scale samples were taken from a large number of fish caught during the winter of 1940-41 to give material for study of the growth rate of these fish. The results for bluegills and perch were given in Report No. 791 and have been included in the table below with slight modifications. In comparing the data from Cedar Lake with the average for the state of Michigan, given in the last column, some allowance must be made for the differences in time of capture. The state average is determined from fish collected during the summer, in other words, during the middle of a growing season; whereas those from Cedar Lake were collected in the winter. Thus a two-year-old fish from the Cedar Lake sample would be approximately a half-year younger than the two-year-old average for the state, and thus would be expected to be a little smaller. In spite of this, however, only the black crappies and possibly the largemouth bass have normal growth. All the other species, perch, bluegills and pumpkinseeds, grow at a much slower rate than average. No smallmouth bass were taken. Ordinarily slow growth is induced by overcrowded conditions. Such may be the case in Cedar Lake.

Table V

Growth of Game Fishes in the Cedar Lakes

Name	Age*	Number of Individuals	Average length	Total (inches)	Average weight (ounces)	Tentative Michigan average length (inches)*
Perch**	II	2	5.1		1.2	6.2
	III	17	4.6		0.6	7.1
	IV	17	5.0		0.5	7.8
	V	19	6.3		1.6	9.4
	VI	15	6.5		1.8	10.2
	VII	9	6.9		2.3	10.4
	VIII	7	7.7		2.7	11.3
	IX	1	7.4		2.7	11.8
Largemouth bass	VI	1	14.5			14.4
Bluegills**	III	1	3.8		0.5	5.6
	IV	19	5.3		1.2	6.7
	V	62	5.9		1.6	7.4
	VI	139	6.5		2.2	7.8
	VII	34	7.1		3.2	7.9
	VIII	8	7.0		2.9	8.3
Pumpkinseeds	IV	6	4.7		0.9	6.4
	V	4	5.5		1.1	6.8
	VI	10	5.1		1.4	7.1
	VII	5	5.7		2.1	7.8
Black crappie	III	11	7.2		2.7	8.7
	IV	6	9.3		8.2	9.2
	V	10	9.2		6.7	9.7
	VI	1	9.2		6.1	10.1

* Determined by W. C. Beckman.
** Taken from Tables 2 and 3, Report 791.

Natural Propagation

Spawning facilities are sufficient for all species of fish in the lake. Since there has been no stocking and a large population of game fish is present it is quite obvious that natural reproduction is adequate. Spawning boxes were installed in the past by the National Park Service and are reported to be used by some fish.

Management Proposals

Designation of Lake

Cedar Lake is in the "all other lakes" category which is suitable according to the findings of the recent survey.

Stocking

No stocking is recommended for any species of fish in Cedar Lake, since natural propagation is more than adequate to give the lake a plentiful supply and provide good fishing.

Predators and Parasites

No serious predation or parasitism was observed or reported, therefore, no control measures are necessary.

Regulation of Water Level

The water level is reasonably stable.

Improvement of Spawning Facilities

Spawning conditions are sufficient and no improvement is necessary.

Other Suggestions

An increase in the fishing on Cedar Lake should be beneficial in reducing the overcrowded condition of perch, bluegills and sunfish and permit an increase in their growth rates. The intensive fishing during the winter of 1940-41 probably helped toward this. Another study of fish taken during the winter of 1942-43 or the following summer would show if this is true.

INSTITUTE FOR FISHERIES RESEARCH

By L. Edward Perry

Report approved by: A. S. Hazzard

Report typed by: B. Stout