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MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
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September 9, 1943

REPORT NO. 383

A FISHERIES SURVEY OF CUSINO (ROUND) LAKE, SCHOOLCRAFT COUNTY

by

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Introduction

Location and Drainage

Cusino Lake (formerly known as Round Lake) is located in the Cusino State Game Area, 22 miles northeast of Shingleton (T. 47N., R. 16W., Sec. 23, 24). Ross and Wolf Lakes are within two miles of Cusino Lake, and the Driggs and Fox Rivers are within an hours driving distance. None of these are directly connected with Cusino Lake.

The lake can be reached by leaving M-28 on the Driggs Lake Truck Trail (3 miles east of Walsh) and traveling north and west about 15 miles, or by leaving M-28 at Creighton on the Creighton Truck Trail, driving north about the same distance. Both roads are good gravel roads.

Acknowledgments

A map of the lake, prepared during the winter of 1936-1937 by the M. E. C. W., was used by the Fisheries Survey Party[1] July 20-24, 1942 for planting stations and vegetation. Game Manager Blaine Brannon allowed the survey party of use the game laboratory as a field office and laboratory during its stay on the lake.

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[1] The party consisted of: H. E. Kilpela, leader; R. Van Deusen, P. Galvin, and S. Lievense, assistants.

Past and Present Use

Prior to the establishment of the game headquarters on this lake about three or four years ago, little use had been made of the lake since it is quite a distance from population centers and there is no resort development. It perhaps will never be an important public fishing water. However, there is a state-owned camping ground on the lake shores to accommodate visitors, and this may increase its use.

Physical Characteristics

Geological Origin

Cusino Lake is a typical "pot-hole" lake, very probably formed by the melting of a block of ice following the recession of the ice in glacial times.

Shape of Basin and Extent of Drainage

The lake outline is nearly round. The basin is relatively shallow; one small depression is 36 feet deep, but most of the lake is less than 20 feet in depth.

The surrounding country is slightly rolling and heavily wooded, mixed stands of conifers and hardwoods being predominant.

Water Fluctuation

There is very little fluctuation in the water level of Cusino Lake. It has but one small inlet, bringing in a small amount of seepage water. It also has an outlet which functions only after the spring run-off. The drainage area of the lake, therefore, is limited to the immediate vicinity. The lake lies in the upper reaches of the Manistique River system.

Physical Data

Table I summarizes the physical data from Cusino Lake.

Table I.

Summary of Physical Data from Cusino Lake,

Schoolcraft County

1. Area 140 acres

2. Maximum depth 36 feet

3. Shore development 1.5*

4. Dominant bottom types
   a. Shallows (0-15 feet) sand on most shoals, except in protected bays, where fibrous peat is dominant. At about 11 feet the bottom changes from sand to pulpy peat.
   b. Depths (over 15 feet) pulpy peat for the most part, although sand was found in the 36 foot depression.

5. Color of water—slightly brown

6. Transparency of water—
   Secchi disc reading—12 feet

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*This means that the lake has a shoreline 1.5 times as long as a perfectly round lake of the same size.

Wave and Ice Action

Due to the heavily wooded hills surrounding the lake, there is little wave or ice action.

Discussion of Physical Factors in Relation to Fisheries

From the standpoint of basin shape, Cusino Lake could be fairly productive. It has wide shoal areas and is quite shallow throughout. Shallow areas are generally associated with high productivity because such conditions are required by the majority of fish for spawning and for growth of young fish. Too, most plants grow in shallow water—under 15 feet. Weed beds usually harbor abundant insect life which can be utilized as food by the fish.

However, the prevalence of a sand bottom throughout the shallow areas definitely limits productivity. Pure sand bottoms generally are

not productive, either of plants or bottom organisms. Hence, while the shape of the basin favors productivity, the type of bottom is not especially favorable.

The transparency of the water determines to a certain degree the depth at which plants will be able to receive enough light for normal growth. In Cusino Lake, plants should be able to grow to a depth of 12-15 feet, providing other conditions were favorable. Plants are not found beyond the 10 foot contour, however.

Temperature and Chemical Characteristics

Temperature

A study of the water temperature on July 21, 1942 showed that the waters of Cusino Lake were thermally stratified. The thermocline, zone of rapid temperature change, occurred between the depths of 15 and 24 feet. The depth of water at the sampling station was 36 feet.

Chemical Conditions

Tolerable oxygen (4.7 p.p.m.) existed down to 18 feet; and, since the average depth of the water in the lake is between 12 and 15 feet, it is evident that most of the lake contains water suitable for fish life from the standpoint of oxygen requirements.

The lake has a pH of 6.8 and a methyl orange alkalinity of 2.0 to 4.0 p.p.m. It is therefore slightly acid and extremely soft. These chemical conditions limit the number of species of plants and animals which are able to grow in the lake. Snails and clams, for example, were not observed by the party and very probably do not exist in the lake due to its lack of mineral salts, particularly calcium salts. The pH is almost neutral (7.0 is neutral) and is not prohibitive to most plant or animal growth.

Pollution

No pollution was observed or reported.

Chemical and Temperature Data

Table II.

Chemical and Temperature Data from Cusino Lake,

Schoolcraft County (7/21/42)

Temperature °F.
- Surface - 70.9
- Bottom - 35.0
- Thermocline
  - Top - 69.9 (15 feet)
  - Bottom - 57.3 (24 feet)

Oxygen (p.p.m.)
- Surface - 7.0
- Bottom - 0.0
- Thermocline
  - 18 feet - 4.7
  - 24 feet - 0.0

Methyl Orange Alkalinity Range 2.0-4.0 p.p.m.

pH - 6.8

Discussion of Temperature and Chemical Factors in Relation to Fisheries

The factors listed above and their relation to fisheries have been discussed under the separate headings. In summarizing this information, it might be said that the chemical conditions in Cusino Lake probably limit productivity to a greater extent than other factors. The extremely soft and slightly acid water, somewhat typical of bog lakes, limit plant and animal growth to fewer species than are generally found in harder and more alkaline water. These factors influence fish growth indirectly, through the small amount of available invertebrate food organisms.

Biological Characteristics

Vegetation

The following table lists and gives the relative abundance of the plant species found in Cusino Lake.

Table III.

Common Name	Scientific Name	Relative Abundance
Water shield	Brasenia Schreberi	Common
Cladium	Cladium mariscoides	Few
Three-way sedge	Dulichium arundinaceum	Common
Pipewort	Eriocaulon septangulare	Common
St. John's wort	Hypericum punctatum	Few
Rush	Juncus sp.	Few
Water milfoil	Myriophyllum sp.	Common
Bushy pondweed	Najas flexilis	Few
White water lily	Nymphaea odorata	Common
Yellow water lily	Nuphar variegatum	Few
Pondweed	Potamogeton confervoides*	Common
Pondweed	Potamogeton oakesianus	Few
Bulrush	Scirpus subterminalis	Few
Bur reed	Sparganium angustifolium	Few
Cattail	Typha latifolia	Few
Bladderwort	Utricularia sp.	Common

*Not previously reported in Michigan

Vegetation Needs and Significance

The plant life in Cusino Lake is limited to 16 species. The weed beds are confined largely to the shallow bays. The sandy shoals produce very sparse growths of pipewort, bulrushes, and water shield. These plants have very little foliage suitable for cover for insects and other fish foods.

Soft water lakes are usually not productive of vegetation, and there is perhaps little that can be done to improve this condition in a large lake. Fertilization or artificial enrichment might increase the mineral content of the water, but this is not feasible or practicable in a large lake so lightly fished and so far from population centers.

Fish Foods

The study of fish foods is important in a fisheries survey because of the diversity in feeding habits of various species of fish. Young fish of most species feed on plankton (small plants and animals which float free in the water) or small insects. Older and larger fish feed on a

variety of foods, depending upon their specific habits; some feed on plankton, some on larger insects and other invertebrates, and some on fish. It is therefore important that all of these types of food are present in a lake in order to maintain a varied fish population.

Plankton was abundant at the time of the survey, with animal forms predominating.

Bottom food organisms were numerous in the organic bottom in the deeper water, but very sparse on the sandy shoals. Few insect forms are adapted to life in the relatively hard sand bottom, and those that are able to live there are often unavailable to fish. It has been observed that beds of aquatic vegetation produce much more available fish food organisms than does the lake bottom. However, the fish food organisms in the plant beds of Cusino Lake were rather limited, perhaps due to the chemical condition of the water. It is also important to note that snails and other shell-forming invertebrates were completely lacking.

Three species of forage fish were taken by the survey party.

Fish Present

Table IV shows the kinds and relative abundance of all species reported or taken from Cusino Lake.

It is interesting to note that there are several species of game fish which have been planted in Cusino Lake but which apparently failed to become established. Some of these may be present but, if so, are very few in number because the party made a special effort to take these species. Another rather unusual condition is the presence of a bluegill X pumpkinseed hybrid population apparently without either of the pure species being present. Mr. Prannon, game manager of the State Game Area, reports that several years ago, a number of small fish, supposedly bluegills, were transferred from a nearby lake into Cusino Lake, and this may account for

Table IV.

Kinds and Relative Abundance of Fish in Cusino Lake, Schoolcraft County. (Stocking Records for 1937-1941 included)

Species	Relative Abundance	Total Number Stocked '37-'41.
GAME		
Yellow perch	Common	0
Northern pike	Common	46 adult
Bluegill X pumpkinseed	Few	?
Smallmouth bass	Neither taken nor reported	700, 3-5 month; 225 adult
Largemouth bass	Neither taken nor reported	2300, 3-5 month
Walleyed pike	Neither taken nor reported	1,085,000 fry
Bluegill	Neither taken nor reported	37,820, 3-5 month
FORAGE		
Mud minnow	Common	
Golden shiner	Common	
Menona killifish	Common	
COARSE		
Black bullhead	Common	
OBNOXIOUS		
None		

the hybrid population. Another possibility is that the planting of bluegills may have contained some pumpkinseeds or hybrids and that the hybrids survived.

Growth Rate of Game Species

The growth rate studies on the game fish are summarized in Table V.

The northern pike are apparently able to secure enough food, as shown by their rapid growth rate. The perch are growing slower than average. (The average perch reaches 6 inches during its third summer—or in Age Group II.) This may be the result of too large a population for the food supply. The pike probably feed to a large extent on perch, but the weak link in the food chain may well be the limited invertebrate life upon which the young fish normally feed.

There are too few data on the hybrid population upon which to base conclusions.

Table V.

Growth Rate Studies on Game Fish from Cusino Lake, Schoolcraft County.

Species	Age Group	Number of Specimens	Average Length (inches)
Northern pike	III	3	27 7/8
	IV	4	30 3/8
	V	5	32 1/8
Yellow perch	I	7	3 5/8
	II	4	4 3/4
	III	4	6 1/8
	IV	3	6 3/4
	V	2	8 7/8
	VI	1	9 3/4
	VII	7	11 7/8
	VIII	8	11 1/2
	IX	1	13 3/4
Bluegill X Pumpkinseed	I	1	3 7/8
	III	3	5 1/2
	IV	1	6 1/4

Natural Propagation

Young perch were the only game fish taken in seining operations. Spawning facilities for perch are adequate or more than adequate in most inland lakes.

Northern pike are apparently able to spawn only during years in which the lake level is high. Then, considerable marshy areas adjoining the bays on the west side and the inlets are flooded and afford spawning facilities. In other years there can be very little spawning. This may account for the lack of one and two-year-old pike in the catch.

Judging from the lake bottom, smallmouth bass and bluegills should find suitable spawning facilities. However, there are few adults, if any, of these species in the lake.

Management Proposals

Designation of the Lake

The lake is now in the "all other" lakes class, but since northern

pike and perch are the only game species taken, it is recommended that the designation be changed to the "pike" lake class.

Stocking

The food supply in the lake is a factor limiting the kind and amount of game fish which can be produced. Since spawning facilities for perch are adequate and facilities for pike can be improved, no further stocking of these species should be necessary.

An attempt to locate young smallmouth bass should be made in the summer of 1943 and if none or only a few are found, another planting of adult fish (about 400) should be made. (See "Other Recommendations")

Since walleye fry have been planted in large numbers since 1936 apparently without success further stocking of this species should be discontinued. Although the walleye is a fine fish it is questionable whether suitable spawning areas are available in Cusino Lake. Also since they compete with northern pike their establishment, if this were possible, would interefere with pike production in a lake of this size.

Evidence is accumulating that bluegills are not adapted to northern lakes of this type. No further attempts to establish this species should be made at the present time. If spawning conditions are improved for pike and smallmouth bass as recommended in a later section of this report Cusino Lake should afford reasonably good fishing for these species and perch should become reduced in numbers and should make better growth.

Predators and Parasites

The fish in the lake were apparently free from parasites and no predators have been reported.

Shelter

Vegetation is limited by the softness of the water and attempts to increase the vegetation are therefore not practicable.

When labor becomes available, it might prove beneficial to install brush shelters on the sandy shoals. These should be placed in 6-10 feet of water. Such shelters may increase the food supply for young fish, as well as afford protection. They might also improve fishing by concentrating the fish in the vicinity of the shelters.

Regulation of Water Level and Improvement of Spawning Facilities

It is recommended that a dam be constructed to raise the water level at least 12 inches in order to improve spawning facilities for the northern pike in the vicinity of the inlet and the bays on the west side. There would be little if any flowage of water over the dam because of the small amount of water entering the lake. The dam would raise the lake level, flood considerable marshy area, and would maintain a higher level, at least until the young pike are able to reach the lake.

Other Recommendations

It is apparently not unusual to find the chemical conditions reported from Cusino Lake in lakes of the bog type. It is suggested, however, that the district Biologist make a check on the pH and methyl orange alkalinity of Cusino Lake and other "pot-hole" lakes in the vicinity, to learn more concerning the relationship between pH and M. O. alkalinity in these waters.

If adult smallmouth bass are introduced gravel spawning areas (about a bushel of gravel from pea to walnut size in each pile in water from 1½ to 4 feet in depth—piles fifty feet apart) should be established at intervals along the north, west, and south sides of the lake.

INSTITUTE FOR FISHERIES RESEARCH

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