Original: Fish Division
cc: Education-Game
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DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
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November 25, 1941

REPORT NO. 696

FISHERIES SURVEY OF FOUR MILE LAKE, WASHTENAW COUNTY

by

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Four Mile Lake is situated in Lima and Dexter townships in the northwest part of Washtenaw County (T.1, 2 S., R. 4 E., Sec. 33,4). It is only 2 miles northeast of Chelsea and 14 miles northwest of Ann Arbor. It lies within the mill creek drainage which in turn is tributary to the Huron River.

This lake was mapped* during March 1941, fish samples** were taken on June 6-9, 1941, and the biological inventory*** was completed on July 14, 1941. The information collected by these three Institute parties is the basis for this report.

Four Mile Lake has had a reputation as a good pike, bluegill and rock bass lake for a long time. However, reports indicate a decrease in the good fishing of a few years back. There is no evidence that the lake should produce less today than in the past. Possibly the increased fishing may account for the smaller catch per fisherman.

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* The mapping party included: G. Perry, leader; Lyle Newton and Oscar Jasmin, assistants.

** Fish party included: W. C. Beckman, leader; Lee Anderson, Raymond Buller, and Donald Thomas, assistants.

*** Biological survey party included: John Funk, leader; Gene Roelofs and Stanley Lievense, assistants.

Four Mile Lake is practically all state owned, having been purchased many years ago to be exploited by the Prisons Industries for its marl resources. Dredging operations were fairly extensive around the margins, particularly on the north end and west side where isolated patches of water some distance from the main lake occupy depressions dug by dredging apparatus. Operations of this sort were discontinued about 10 years ago and now the cement plant near the southern boundary of the lake is almost completely in ruins. During 1941 the lake was turned over to the Conservation Department. There are only 3 cottages on the lake and no hotels or public resorts. Boats are available at only one livery.

Four Mile Lake is oblong in general shape - the north end being somewhat broader than the south. The shore line is irregular and almost indefinite in the marshy sections to the north and west. There are no deep embayments, however. It has a shore line development of 1.27 which means the shore line is only 1.27 times longer than it would be if the lake were perfectly round and of the same area.

This lake has a surface area of 256 acres and a maximum depth of 18 feet. About 80% of the lake is less than 5 feet in depth. The only depression is situated in the northwest quarter of the lake and the deepest point is located in the south central part of this depression.

Almost the entire lake is shoal (water less than 15 feet) and the bottom is exclusively marl except for a patch of sand along the east shore. This is not pure sand but rather a mixture of marl and sand.

The immediate shore is low and marshy and the surrounding country has rolling topography consisting mostly of cleared or cultivated lands. The farms in the vicinity are of fair quality.

This lake has a drainage of 6 - 8 square miles. West Lake to the northwest is the headwaters and supplies the only permanent tributary entering

Four Mile Lake. This small stream is about 10 feet wide, 6 inches deep and has a very slow current at the point where it enters the lake. There is considerable fluctuation in the water level, however, and during the period of run-off this stream is probably many times larger than during low water periods. Since the inlet enters Four Mile Lake through a marsh, much of the low-lying ground near the point of entrance is flooded during the spring run-off. The outlet from this lake joins the North Branch of Mill Creek about 3/4 of a mile south of the lake.

The water in Four Mile Lake is light brown in color and a Secchi disc was visible at a depth of 8½ feet. Wave action no doubt increases the turbidity in this lake a great deal and there are sure to be times when the suspended matter (mostly fine marl particles) almost completely shuts out the light. Shallow lakes are naturally more subject to this phenomenon than deeper waters because bottom materials are easily stirred into suspension.

Four Mile Lake had a surface temperature of 74°F. and a bottom (17 feet) temperature of 72°F. There was abundant oxygen all the way from the surface to the bottom (8.1 p.p.m.). The water is very alkaline (pH 8.4) and moderately hard (Methyl Orange alkalinity 111-115 p.p.m.). Temperature and chemical conditions seem favorable to good fish production except possibly for excessive amounts of marl.

There is an abundance of vegetation in Four Mile Lake. Almost the entire bottom is covered with either submerged or emergent varieties except for the area greater than 12 feet in depth. Musk grass is the most abundant species over the bottom in the deeper areas while bulrush was the most abundant emergent form in the shallower and marginal water.

The following table gives the common and scientific names of the 19 different kinds of plants found in Four Mile Lake, their relative abundance and range in depth.

Common Name	Scientific Name	Abundance	Range of depth(feet)
Stonewort	Chara sp.	Very abundant	½ - 15
Cattail	Typha latifolia	Few	0 - ½
Bulrush	Scirpus acutus	Abundant	0 - 4
"	Scirpus americanus	Common	0 - 3
"	Scirpus subterminalis	Common	0 - 2
Bur Reed	Sparganium eurycarpum	Sparse	0 - 1
Bladderwort	Utricularia vulgaris	Sparse	1 - 4
Wild Celery	Vallisneria americana	Sparse	2 - 4
Pondweeds	Potamogeton gramineus	Common	½ - 3
"	Potamogeton angustifolius	Common	1 - 4
"	Potamogeton natans	Common	1 - 4
"	Potamogeton pectinatus	Common	½ - 2½
Yellow Water Lily	Nuphar advena	Common	1 - 3
White Water Lily	Nymphaea odorata	Sparse	1 - 3
Bushy Pondweed	Najas flexilis	Sparse	1 - 4
Horsetail	Equisetum fluviatile	Sparse	0 - 1
Jointed Spike Rush	Eleocharis equisetoides	Common	1 - 2
Cladium	Cladium mariscoides	Common	0 - 1
Swamp Milkweed	Asclepias incarnata	Common	0 - 1½

Fish-food organisms were observed to be fairly numerous in this lake. Fresh -water shrimp, midge larvae and Mayfly nymphs were the most abundant of the invertebrate forms. Snails were common and crayfish, dragonfly nymphs, damselfly nymphs, water beetles, caddis larvae, water bugs, water mites, leeches and flatworms were all present in lesser quantities. The microscopic organisms (plankton) were relatively abundant and consisted mostly of plant species. However, no significant conclusion can be drawn from a single set of samples. Plankton is known to be exceedingly variable from week to week and place to place in lakes.

Fish samples taken by the Institute party included 9 species of game fish, 8 species of forage fish and 3 species of coarse or "obnoxious" fish. A summary of each kind and its relative abundance as well as the stocking during the past 6 years (1935-1940) is given in the following table.

Species	Abundance	Stocking, 1935-1940 incl.
GAME FISH		
Mud pickerel	Few	
Northern pike	Common	
Yellow perch	Common	13,000
Largemouth bass	Common	4,000
Warmouth bass	Few	
Bluegill	Abundant	50,500
Pumpkinseed	Common	
Rock bass	Common	
Black crappie	Common	
COARSE FISH		
Yellow bullhead	Few	
OBNOXIOUS FISH		
Long-nosed gar	Common	
Dog fish	Few	
FORAGE FISH		
Black-nosed shiner	Common	
Black-chinned shiner	Abundant	
Common Shiner	Common	
Blunt-nosed minnow	Abundant	
Mud minnow	Few	
Menona killifish	Few	
Black-banded top minnow	Common	
Least darter	Common	

The bluegill is the most abundant gamefish found in the lake. Good catches of rock bass, largemouth bass, black crappies and perch have been reported. Northern pike are common and grow to a good size in this lake. The black-chinned shiner and blunt-nosed minnow are the predominant forage fishes.

Studies have been made on the age and growth rate of the game fish collected. A summary of these data is given in the following table.

Species	Age✓ Group	No. of specimens	Average total length in inches	Average weight-oz.
Northern pike	I	4	12.5	5.9
	II	2	16.6	13.3
	III	1	17.6	18.9
	IV	1	24.4	50.0
Yellow perch	I	2	3.6	0.28
	II	14	5.1	0.78
	III	8	6.5	1.8
	IV	5	7.3	2.3
	V	4	8.7	4.8
Largemouth bass	II	15	7.1	2.3
	III	3	10.1	7.2
	IV	3	12.2	10.4
	V	2	12.2	12.8
	VI	1	14.2	25.0
Rock bass	I	3	2.0	0.07
	II	2	3.6	0.5
	III	6	4.2	0.8
	IV	4	6.7	3.7
	V	1	7.0	4.0
	VII	1	7.2	3.8
	VIII	4	7.7	5.3
	IX	3	8.5	7.0
Black crappie	II	17	5.1	1.0
	III	3	7.1	3.3
	VII	2	11.3	10.5
Bluegills	I	2	1.8	0.07
	II	6	2.7	0.17
	III	26	4.2	0.7
	IV	32	5.7	2.1
	V	5	6.5	3.0
	VI	7	7.2	4.5
	VIII	5	8.6	7.4
Pumpkinseed	I	3	2.2	0.1
	II	5	3.2	0.4
	III	7	4.3	0.9
	IV	6	6.1	2.5
	V	3	6.0	2.7
	VI	3	6.7	4.0
	VII	3	7.4	3.8

✓ Age determinations by W. C. Beckman

Since the fish collected for this study were taken fairly early (June 6-9, 1941) it is quite safe to assume that they represent the exact age in years. Northern pike reach legal length late in their first year or early in their second year; perch were 6.5 inches at the end of their third year; largemouth bass reached legal length by the end of their third

year; rock bass became legal during their fourth year; black crappies reached 7 inches by the end of their third year while bluegills and pumpkinseeds reached 6 inches in length late in their fourth or early in their fifth years.

In all of these species this represents average or better than average growth rate when compared with a number of other lakes in the state.

Spawning facilities for all of the game fish in this lake seem to be fair to good. Pike most surely utilize the swampy, weed filled areas as well as the inlet stream. Largemouth bass and bluegills, pumpkinseeds and black crappies find abundant grounds in the extensive marl and sand shoals. Yellow perch use the weed beds, particularly the extensive bulrush patches.

Management Suggestions

Four Mile Lake should certainly be retained in the "all other lakes" classification. Stocking of panfish, largemouth bass, and yellow perch is not recommended. It is very doubtful that the stocking of any of those fish present has any good effect on the fish population. On the other hand, in a lake having such a limited amount of water--deep enough for fish to "winter over" in, it is entirely possible to aggravate an already crowded condition by increased stocking. It has been found from experiments in this and other states that the stocking of pan fish and most warm water species for maintenance cannot be justified. Stocking for the introduction of a species is another matter.

Although dog fish and long-nosed gar are numerous and several species of fish eating birds were observed by the survey parties on or near this lake, no control is considered advisable. It is possible that predation by fish and birds may often do more good than damage by removing sick and diseased fish and especially by keeping in check fish populations that might

otherwise increase in numbers great enough to cause a serious decrease in size.

Black spot and bass tape worm were observed in inconsequential numbers. No practical method of control is known but even so the incidence of worms in the fishes of this lake does not warrant any concern.

Plant beds are abundant and cover seems entirely satisfactory.

Any improvement of the water conditions in Four Mile Lake should be in the direction of raising the present water level. Fish production is probably limited to about one-half of the surface area due to the extremely shallow water. No free movement for the larger fish is possible in the very shallow, plant-filled parts of the lake. Larger game fish usually avoid shallow water because it does not permit their escape from predators. Food production over these shallow areas is undoubtedly good but this is hardly accessible to the larger fish.

We believe that an investigation should be made by an engineer in order to determine the practicability of a dam in the outlet. The interests of the game division in this lake should also be investigated in connection with a higher water level.

At any rate, conditions for game fish would most certainly be improved by a higher water level.

INSTITUTE FOR FISHERIES RESEARCH

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