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A FISHERIES SURVEY OF FRAIN'S AND MURRAY LAKES, WASHTENAW COUNTY, MICHIGAN

by

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Introduction

Location and Drainage

Frain's Lake (T. 2 S., R. 7 E., Sec. 9) and Murray Lake (T. 2 S., R. 7 E., Sec. 9, 10) are located on or near highway U.S. 12, approximately 2 1/2 miles and 3 miles respectively, northeast of the village of Dixboro. U.S. 12 borders Frain's Lake on its north shore. Murray Lake lies east of Frain's Lake, about one-half a mile.

Frain's Lake is easily accessible at its northwest shore, at the junction of U.S. 12 and Frain's Lake Road. Murray Lake can be reached by Prospect Road, which originates in the City of Ypsilanti, and terminates in the Frain's Lake Road. There is also an undeveloped private route leading from U.S. 12 to the north shore of Murray Lake.

Acknowledgments

The original maps for these lakes, including the shorelines, bottom contours and soil types, were made by the Institute for Fisheries Research mapping parties in January 1940.*

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*Frain's Lake mapping party consisted of: R. Bohland, leader; W. Mason and L. Newton, assistants.
Murray Lake mapping party consisted of: R. Myers, leader; W. Mason and L. Newton, assistants.

The biological inventory of Frain's and Murray Lakes were conducted during the period from July to September, 1943 by the writer. We wish to acknowledge the cooperation of Mr. "Tobe" Shoemaker, the owner of the only frontage on Frain's Lake accessible by road. Mr. Emmanuel Krull, the operator of a boat livery on the south shore of Murray Lake furnished the party a boat for the entire survey.

This inventory was carried out with limited help due to a large number of the Institute's staff serving in the armed forces. Aid was rendered by R. Stout in collecting fish in Frain's Lake and by E. L. Perry who made the chemical tests on both lakes. Mr. Ronnie Krull of Murray Lake gave much assistance.

Past and Present Use

Frain's and Murray Lake are semi-private lakes. The shores are owned privately, but access is allowed by land owners operating boat liveries. Frain's Lake is surrounded partly by cultivated land, by brushland, and by a swamp. Murray Lake is bordered by sandy and grassy hills on its northeast and southwest shores, and by a marshland on the north and south ends.

Frain's Lake has no resort development. There is one house on the lake shore and one schoolhouse. Murray Lake has three cottages on its southwest shore, and two houses also located on that shore.

The fishing in Frain's and Murray lakes has been fair. The lakes have produced chiefly bluegills and largemouth bass. Both lakes were reported as having good numbers of large perch several years back, but the perch have declined considerably in late years. Bluegill and bass are still being caught in fair numbers; in the early summer limit catches of both species are not uncommon. Resident fishermen claim they are able to make good catches throughout the summer.

Physical Characteristics

Geological Origin

In so far as we know, nothing has been written regarding the origin of these lakes. It is probable however, that these two bodies of water are pit lakes formed in an outwash plain of a glacier.

Shape of Basin and Extent of Drainage

Frain's and Murray Lakes are oblong lakes with a regular shoreline. The long axis of Frain's Lake extends in an east-west direction; that of Murray, in a northwest-northeast direction. The depth contours are regular with the deepest depression towards the center of each lake.

These two lakes are in the Huron River drainage system. The drainage extends northwest from Murray to Frain's Lake, to Fleming's Creek, and hence to the Huron River. Their drainage area is small and is now mostly cultivated land.

Water Fluctuation

The fluctuation of the water level seems to correspond closely to the water table. The lakes are fed from springs and runoff and have no inlets or outlets excepting the intermittent channel between Frain's and Murray Lake.

Physical Data

Table 1

Lake	Area (acres)	Maximum depth (feet)	Shore development	Dominant bottom type	Color of water	Transparency (Secchi disc in feet)
Frain's	16.6	30	1.23	Pulpy peat	Light brown	13
Murray	17.4	40	1.29	Pulpy peat	Light brown	7

As the shore development factor indicates, the shoreline of both lakes is approximately one and one-fourth times longer than the shoreline of a perfectly circular lake of the same area.

Discussion of Physical Factors in Relation to Fisheries

Frain's and Murray Lakes are very similar considering their physical characteristics. They are both small, oblong lakes with no bays or coves. The bottom of the shoal areas is composed of fibrous peat and in the deeper waters of pulpy peat. The lakes are protected considerably from wind and wave disturbances by highlands on the side of the prevailing winds. In general, the physical factors are conducive to good production of fish.

Temperature and Chemical Characteristics*

Temperature

Both Frain's and Murray Lakes were found to have thermoclines (a zone in which there is a rapid change of temperature, i.e. 1°C. per meter of depth). The temperatures were as follows:

Frain's Lake		Murray Lake	
0' (surface) ...	77° F.	0' (surface) ...	77°F.
10'	73	5'	77
15'	64	10'	70
20'	57	15'	57
28'	52	20'	51
		25'	48
		30'	48
		37'	46

It can be noted that the thermocline in Frain's Lake is approximately from 12' - 20' and from 8' - 20' in Murray Lake.

Chemical Conditions

Oxygen was completely absent at 20' in both lakes. In Frain's Lake sufficient oxygen to support fish life extended to approximately 12 feet, and in Murray to 15 feet. The oxygen analyses follow:

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* All chemical and temperature data were obtained on September 29, 1943.

Frain's		Murray	
0'	6.4 (parts per million	0'	6.4
10'	4.9 of dissolved oxygen)	10'	6.4
15'	1.9	15'	5.4
28'	0	20'	0
		37'	0

Alaklinity and pH

The water in Frain's and Murray Lakes is moderately hard (methyl orange alkalinity: Frain's, 106-148; Murray, 118-161).

Frain's Lake is slightly alkaline at the surface (pH 7.9) to slightly acid at the bottom (pH 6.7). Murray Lake is alkaline from the surface to the bottom (pH 8.0 and 7.2 respectively).

Pollution

No evidence of pollution was found in either lake.

Discussion of Temperature and Chemical Factors in Relation to Fisheries

Frain's and Murray Lakes are typical "thermocline lakes." Stratification undoubtedly occurs early in the summer and continues until late in the fall. Stratification with a combined depletion of oxygen below the thermocline, as found in these lakes, severely cuts down the productive area of a lake as well as the tolerable region for fish. Frain's and Murray Lakes are moderately hard, alkaline lakes. This condition is favorable to good productivity.

Biological Characteristics

Vegetation

A list of the aquatic plants found and their relative abundance is given in Table 2.

Table 2

Species	Frain's Lake	Murray Lake
Typha latifolia	Rare	Few
Decodon verticillatus	Abundant	Common
Vallisneria americana	Common	Common
Scirpus validus	Rare	Few
Nuphar advena	Common	Common
Sagittaria latifolia	Few	
Potamogeton amplifolius	Rare	Common
Potamogeton zosteriformis	Abundant	Common
Potamogeton pectinatus	Common	Abundant
Potamogeton natans	Rare	
Potamogeton praelongus	Few	Few
Potamogeton Friesii	Abundant	Few
Potamogeton gramineus		Few
Anacharis canadensis	Common	Common
Myriophyllum sp.	Few	Common
Lemna trisulca	Common	Common
Lemna minor	Few	
Pontederia cordata	Few	Few
Polygonum natans	Rare	
Ceratophyllum demersum	Abundant	Abundant
Sparganium chlorocarpum		Rare
Nymphaea odorata	Few	Common
Heteranthera dubia	Few	Rare
Scirpus acutus	Rare	
Equisetum sp.	Rare	
Chara	Common	Abundant

The existing plants are favorable to fish productivity and no immediate problem exists. The plants in Frain's Lake were exceptionally thick along the entire shoal area. It is possible that in future years this excessive abundance of vegetation may prove detrimental.

Fish Foods

Plankton (the miscroscopic, free-living organisms in the water) was abundant in both lakes. Frain's Lake was amply supplied with plant and animal plankton, whereas Murray Lake was predominant in animal or zooplankton. The bottom soil of both lakes harbored food organisms in fair numbers. Phantom midge larvae were common in the deep water. Midges and mayflies were predominant along the shoal. The food organisms on the plants were very abundant in both lakes. The problem of determining the abundance of

forage fish was hindered in the two lakes by poor seining conditions, such as a soft bottom and dense vegetation. It is believed that no serious problem exists at present, as indications lead us to believe there is an ample supply of forage fishes.

Fish Present

A list of the fish collected and their relative abundance is given in Table 3. Stocking records are given for the period of 1933-1942.

Table 3

	Frain's Lake		Murray Lake	
Species	Abundance	Stocking	Abundance	Stocking
Game Fish:				
Perch	Rare		Reported	
Bluegill	Abundant	23,250	Abundant	5,000
Pumpkinseed	Few		Common	
Largemouth bass	Few	2,900	Common	
Black crappie	Rare			
Smallmouth bass	...	300	...	
Green sunfish	Few		Few	
Long-ear sunfish	Rare		Few	
Coarse Fish:				
Common sucker	Common		Common	
Lake chub sucker	Common		Common	
Yellow bullhead	Common		Common	
Obnoxious Fish:				
Dogfish	Rare		Reported	
Mud pickerel	Common		Common	
Forage Fish:				
Blacknosed shiner	Few			
Blackchin shiner	Common			
Golden shiner	Few		Reported	
Mud minnow	Common		Common	
Madtom	Rare			
Creek chub	Caught (1925)			
Iowa darter	" "		Few	
Bluntnose			Few	
Spot-tail shiner			Rare	

Bluegills were abundant in both lakes. Reports by local people and observation indicate that largemouth bass are common in Frain's Lake as well as in Murray. Largemouth were more easily caught in Murray Lake due to better seining conditions. Perch were rare in both lakes. Although no perch were taken in Murray Lake, they have been reliably reported.

Only one dogfish was taken and that was in Frain's Lake. Reports by fishermen indicate that dogfish are also common in both lakes. The common sucker and the lake chub sucker are common in both lakes. Long-eared, green, and common sunfish were present in small numbers. Large numbers of mud pickerel were found in each lake.

Growth Rate of Game Species

The rate of growth of fish in Frain's and Murray Lakes is shown in Table 4.

Table 4

Frain's Lake					Murray Lake				
Species	Growing seasons completed	Number of fish	Average total length	Average weight	Species	Growing seasons completed	Number of fish	Average total length	Average weight
Bluegill	I	0	...	...	Bluegill	I	2	3.7	...
	II	6	4.4	21.6 gms.		II	13	4.3	27.8 gms
	III	5	5.2	60.0		III	4	5.6	43.3
	IV	16	6.7	76.7		IV	5	6.7	78.0
Largemouth bass	0	2	2.8	...	Largemouth bass	0	4	3.6	10.0
	I	...	...	...		I	..	...	...
	II	5	7.1	114		II	2	9.9	200.
						III	4	10.9	255.
						IV	4	11.9	331
Pumpkinseed	I	1	3.1	...	Pumpkinseed	II	3	4.7	37
	II	2	5.1	...		IV	1	7.3	138
	III	...	...	...		V	1	5.3	56
	IV	3	6.4	...					
Yellow perch	0	1	2.5						
	I	3	5.5						
	III	1	8.7						
	IV	1	8.7						

By comparing the bluegills of the two lakes with the state average, it is seen that they have about average growth. In both lakes legal size is reached in their fourth summer. The bass in Frain's lake appear to have fair growth, whereas the largemouth in Murray Lake have excellent growth. The bass in Murray Lake nearly reach legal size in their second year. The perch that were found present in Frain's Lake showed excellent growth, although the numbers taken were inadequate for any definite conclusions.

Natural Propagation

Young bluegills were abundant in Frain's and Murray Lake. Young largemouth were common in Murray Lake; although only one fingerling bass was taken during seining operations in Frain's Lake, several were observed, indicating they were common in this lake. One small perch was taken from Frain's Lake and none from Murray. It is doubted whether these results are indicative of the true young perch population. The perch seem to be at a low in their cycle, however. Spawning facilities are certainly adequate in both lakes. At the beginning of the survey several spawning beds of bass and bluegill were noted. The nest sites in Frain's Lake were surrounded by dense vegetation. Although much of this vegetaion may have come in after the nest was abandoned, there is the possibility that the dense vegetation may interfere with proper propagation. Murray Lake has one shoal area of approximately 100 feet in length which is weedless and sandy. This was found to be an ideal spawning site and abandoned nests were noted.

Management Proposals

Designation of Lake

Frain's and Murray Lakes are at present in the "all other lakes" category. There is no reason for changing this classification.

Stocking

No stocking is recommended for these lakes. It is believed that natural propagation is adequate to supply the necessary stock.

Predator and Parasites

There is no problem with predation or parasitism. Some of the fish were infected with "white grubs" but this parasite is not abundant and is not harmful to either fish or man. Turtles and Great Blue Herons were common. It is seriously questioned whether these so-called predators

inflict serious damage on a fish population as found in these lakes.

Shelter

Frain's and Murray Lakes have an abundance of vegetation, which provides the needed shelter for young game fish, forage fish, and food organisms. There is no other source of shelter worthy of mention, but the shelter of the plants is considered entirely adequate.

Regulation of Water Level

The water level of Frain's and Murray Lakes corresponds to the water table and hence the regulation of the level need not be considered.

Improvement of Spawning Facilities

No improvement is believed necessary.

Further Investigation

The abundance of perch should be checked in Frain's and Murray Lakes in a few years. If the perch do not make a "come back" it may be advisable to stock them.

INSTITUTE FOR FISHERIES RESEARCH

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