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✓Original: Fish Division
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DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

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September 30, 1942

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ANN ARBOR, MICHIGAN

REPORT NO. 827

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PARTIAL FISHERIES SURVEY OF DUKE LAKE, CHIPPEWA COUNTY

by

Eugene W. Roelofs

Introduction

Duke Lake is located one mile south and $3\frac{1}{2}$ miles east of Kinross (T. 45 N., R. 1 W., Sec. 28). It is less than a half mile east of the new Kinross Airport.

No map of the lake is available. A preliminary survey was conducted by Conservation Officers Nelson and Speck and Fire Warden Peterman at the suggestion of the Field Administration District Supervisor, F. P. Furlong. This report includes the findings of their survey, which are embodied in a letter from Mr. Furlong to Mr. Westerman, dated May 27, 1942, and a recent investigation by the author.

Because of its small size, the lake has never served in an industrial capacity. As far as can be determined, it has never produced outstanding fishing. At present it is much frequented by bathers, although it has a very narrow shoal area.

Physical Characters

Duke Lake is a typical pot-hole lake situated in the rather level jack pine plains country. Since it has no inlet nor outlet, its watershed is extremely limited. The water level is undoubtedly maintained by springs or direct connection with the ground water table, since although an enormous amount of water is pumped out for the airport construction work, the level has not changed noticeably.

The following table summarizes the physical characters of the lake:

Size.....	8.5 acres
Maximum depth....	54 feet
Bottom type	
Shallows.....	Sand
Depths.....	Pulpy peat
Color of water...	Colorless

The above combination of characters, particularly the depth and small shallow area, do not favor high productivity. As a general rule, shallower lakes are more productive. The depth, however, suggested that perhaps the lake had trout possibilities and this idea prompted the investigation.

Temperature and Chemical Characters

Conditions under this heading govern, in part, the suitability of waters for various species of fish. Each species can tolerate a particular range of conditions. Trout, for example, require colder water and more dissolved oxygen than do other Michigan game fish. Other factors help determine the success or failure of a species, but cold water and adequate oxygen are the primary requisites of trout.

Temperature and chemical data from Duke Lake are given below:

Date - 9/21/42		
Air temperature	60°F.	
Water temperature		
Surface	62°F.	
Thermocline		
Top	61°F.	(20 feet)
Bottom	48°F.	(30 feet)
Bottom	46°F.	(40 feet)
Oxygen		
Surface	7.65	
Thermocline		
Top	7.65	(20 feet)
5 feet from top	2.30	(25 feet)
Bottom	0.0	(40 feet)
M. O. alkalinity	30 p.p.m.	at surface
pH range	6.5 to 6.8	

The surface waters were suitable for trout at the time of the survey, but during midsummer temperatures undoubtedly rise above the toleration limit for trout (usually figured at about 70°F.). The deeper waters remain cold throughout the summer but a sharp decline in the oxygen is noted in the upper few feet of the thermocline (the zone of rapid temperature change) so that all of the colder water is unsuitable for fish life because of an oxygen deficiency. The upper waters are suitable for game fish other than trout, and other chemical conditions are generally favorable for all fish life.

Biological Characters

Vegetation is very scant in Duke Lake. Scattered bulrushes are found on the sandy shoals. Only a few submerged plants were observed on the edge of the drop-off.

Fish food studies were not made, but it is quite probable that insect life is not abundant owing to the scarcity of vegetation and the hard sand shoal.

According to reports the lake produces a few northern pike and a few bluegills. The bluegills are said to be small, rarely reaching legal size. This points to a stunted population or heavy predation by the pike. Some of the pike taken have been of "fair size but they are not plentiful." No other game species have been reported.

The lake contains many small bullheads about six inches in length. No other coarse fish are reported. Nothing is known concerning forage species.

There are no records of past stocking. Natural propagation, therefore, has maintained the population for some time. Spawning facilities for northern pike seem entirely lacking, however, so they have either been stocked anonymously or they are reproducing without benefit of the usual marshy conditions.

Management Suggestions

Local conservation officers have recommended that the designation of Duke Lake be changed from "all other" to "pike," and this recommendation has been forwarded to the Lansing office. This change seems proper since the northern pike is the only game species reaching legal size.

No stocking is recommended because the lake is not productive enough to support more than a limited pike population. As mentioned previously, the lake is unsuitable for trout.

The lake is small and relatively unimportant as a potential public fishing water, and no improvements are likely to be profitable.

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