

Original: Fish Division  
cc: Education-Game  
Mr. Roelofs  
Mr. Stanley Shust 4-27-42

**INSTITUTE FOR FISHERIES RESEARCH**

DIVISION OF FISHERIES  
MICHIGAN DEPARTMENT OF CONSERVATION  
COOPERATING WITH THE  
UNIVERSITY OF MICHIGAN

April 15, 1942

ALBERT S. HAZZARD, PH.D.  
DIRECTOR

ADDRESS  
UNIVERSITY MUSEUMS ANNEX  
ANN ARBOR, MICHIGAN

REPORT NO. 770

A FISHERIES SURVEY OF SAGOLA LAKES,

MARQUETTE COUNTY

by

E. W. Roelofs and F. E. Locke

Introduction

The Sagola Lakes are located approximately 10 miles southeast of Republic (Ely Township, T. 45 N., R. 28 W., Sec. 5 and 6) in the southwestern part of Marquette County.

A party<sup>✓</sup> from the Institute for Fisheries Research mapped and inventoried the lakes in August, 1940. While working on the lakes, Mr. Ernest Libby, Supervisor of District 3, Region 1, donated the use of the nearby conservation camp as working quarters for the party. This service is appreciated.

The Sagola Lumber Company operated a lumbering camp in the early logging days on the shore of the north lake. Other than this, the lakes have had no relation to industry or towns. From ten to twenty years ago, these lakes provided excellent brook trout fishing, according to local anglers. It is reported that frequently 15 or 20 trout, averaging 9-10 inches, could be taken in one half hour. In more recent years, the trout catch has dropped off considerably until now only a few are taken

---

\*<sup>✓</sup>The party consisted of: F. E. Locke, leader; B. P. Hunt, I. J. Cantrall, and P. Galvin, assistants.

in the early part of the season.

There is no resort or cottage development on the Sagola Lakes except for the Conservation Department cabin.

The potentiality of these lakes for public fishing is dependent, to a degree, on the establishment of a good fish population. They are not suited to recreational use, other than fishing, and, although somewhat isolated, they might be much frequented if fishing were profitable.

#### Physical Characters

The basins of both North and South Sagola Lakes are roughly oval in shape and unusually shallow. The deepest water recorded is 9 feet. The two basins are connected by a marshy area, through which is a shallow channel of open water. The north basin has one small inlet while the south basin forms the headwaters of Flat Rock Creek, a tributary of the West Branch of the Escanaba River. An old beaver dam in the outlet at the time of the survey raised the water level two feet and is believed to prevent upstream migration of fish, except during high water.

The lakes lie in a hilly region and have only one small inlet which drains an adjacent swamp. Their drainage area is very limited and water fluctuations are slight. Although the immediate shore is largely marshy, the surrounding land is sandy and gravelly.

The physical characters of the Sagola Lakes are given below:

---

Area	
North basin	8.2 acres
South basin	7.7 acres
Maximum depth	9 feet
Shoal area	All under 10 feet.
Bottom type	Sand margin, fibrous peat and pulpy peat in deeper waters.
Color of water	Colorless
Secchi disc	9 feet

---

The shallow basins of these lakes, along with the relatively small amount of water entering, subjects them to wide variations in temperature.

A false bottom, as found in the Sagola Lakes, is usually unproductive both of vegetation and bottom food organisms. Inability to anchor is believed responsible. This counterbalances the usual beneficial effects of shallowness and is the cause of low productivity.

#### Temperature and Chemical Character

Temperature and chemical conditions influence the kind and abundance of plants and animals. Most organisms grow best under certain conditions, varying for each organism. For example, conditions favoring the best growth of bluegills are wholly unsuited for trout. In the plant kingdom, certain plants grow best in hard alkaline water while these conditions prevent the growth of others. However, most plants and animals will live and reproduce under a wide range of temperature and chemical conditions.

The following table gives a summary of the temperature and chemical conditions in Sagola Lakes as of July 18-20, 1940.

	North Basin (6/18/40)	South Basin (6/20/40)
Temperature		
Surface	71°F.	76°F.
Bottom	62°F.	68°F.
Oxygen		
Surface	8.8 p.p.m.	7.3 p.p.m.
Bottom	8.2 p.p.m.	8.6 p.p.m.
CO <sub>2</sub> range	0.0 p.p.m.	1.0 p.p.m.
M. O. Alkalinity range	81-84 p.p.m.	74 p.p.m.
pH range	8.2-8.3	8.0-8.2

The difference in temperature between the two basins may be due to differences in air temperatures at the time of examination. The air temperature increased from 74° to 82° during the two-day interval between the examination of the north basin and that of the south.

The water temperatures undoubtedly rise higher than the toleration limits of trout, except perhaps near a small spring inlet where the only two trout taken by the party were captured. Nets in other parts of the lake failed to take trout. It is therefore possible that this small spring can accommodate a small trout population during short periods when conditions in the rest of the lake become unfavorable.

Oxygen conditions are suitable all over the lake. Other chemical conditions (moderately hard and alkaline water) also favor high productivity.

It is entirely possible, because of the highly organic bottom and shallowness of the basins, that these lakes would winter kill, although no such kills have been reported.

#### Biological Character

##### Vegetation

The plants collected from Sagola Lakes are as follows:

<u>Plants</u>	<u>Abundance</u>
Sedge ( <u>Carex lasiocarpa</u> )	Abundant
Sedge ( <u>Carex lenticularis</u> )	Common
Musk grass ( <u>Chara sp.</u> )	Abundant
Sweet Gale ( <u>Myrica Gale</u> )	Common
Smartweed ( <u>Polygonum natans v. genuinum</u> )	Few
Floating-leaf pondweed ( <u>Potamogeton natans</u> )	Few
Big bulrush ( <u>Scirpus acutus</u> )	Few

\* Plants identified by Miss B. M. Robertson.

All of the weed growths are confined to the channel or the immediate lake margin. No plants are recorded from depths over 2 or 3 feet, chiefly because of the semi-fluid nature of the bottom.

##### Fish Foods

Bottom organisms in Sagola Lakes are varied, but not numerous. In a few bottom samples midge larvae (Chironomidae) and phantom midge larvae (Corethra) were reported common or numerous, but were generally rare. Other bottom food organisms found include free-swimming flatworms,

aquatic earthworms, snails, scuds, water mites, mayfly nymphs, and caddisfly larvae. Bottom foods may be adequate for smaller fish but probably would not maintain a large population of larger insect eating fish. Vegetation generally provides a more readily available source of larger food organisms but, due to the scarcity of vegetation throughout most of the lake, this source is limited.

Plankton (small swimming or floating animals and plants) organisms were abundant at the time of the survey and indicate a potential source of food especially for smaller fish.

Fish

The following table gives a summary of the kind and abundance of fish in the Sagola Lakes.

Fish	Abundance
GAME FISH	
Perch	Common
Brook trout*	Rare
FORAGE FISH	
Red-bellied dace	Abundant
Black-nosed shiner	Abundant
Fine-scaled dace	Few
Northern dace	Few
Common shiner	Common
Creek chub	Few
Fat-headed minnow	Few
Iowa darter	Few
COARSE FISH	
Common sucker	Few

\*1,000 ten-month-old brook trout were planted in 1937.

Growth studies on the perch and brook trout are given below.

Fish	No. of specimens	Age group	Ave. length (in.)
Perch	1	II	4.3
	7	III	5.1
	9	IV	7.4
	8	V	7.9
	2	VI	9.6
	1	II	9.9
Brook trout	1	III	13.8

These studies indicate rather slow growth of perch, particularly during the first three years. The reason is not obvious. It is possible that perch are more numerous than reported by the party. While forage fish are abundant, their availability to the perch is another matter. The habits and size of the forage fish may be such that they are available only to the larger perch, and the smaller perch must feed on a limited invertebrate fauna.

The brook trout seem to be growing at an average rate or better, if the two specimens examined are representative of the trout population.

Spawning facilities are adequate for perch, and natural propagation has maintained the population. It is doubtful that brook trout spawn in the lake since the requirements for their spawning are completely lacking.

A study of these lakes leads to the conclusion that they are nearing extinction and therefore time and money spent on their improvement is not justified. The water level is subject to a two-foot drop when the beaver dam in the outlet gives way. This leaves a maximum of seven feet of water with an average depth of about three feet. The soft bottom is unproductive of vegetation and invertebrate food organisms. The temperature, except for one small, spring-fed hole, rises considerably higher than the toleration limits of trout.

The present perch population should provide some fishing, as in the past.

#### Management Suggestions

The Sagola Lakes are designated "trout lakes". Due to the unfavorable temperature conditions for trout, it is recommended that the designation be changed to "all other".

Regarding other points of management, it is suggested that the lakes be left as they are.

There is one alternative to the above management plan of these lakes. This consists of "pumping out" the false bottom. Since the two basins are similar, a good check could be had by pumping out one basin and leaving the other basin as it is. This process is very costly and, at present, our knowledge of the value and results of such an experiment do not warrant the expenditure.

INSTITUTE FOR FISHERIES RESEARCH

By E. W. Roelofs and F. E. Locke

Report approved by: A. S. Hazzard

Report typed by: R. Bauch