

6. Fish Div.

Original: Fish Division

cc: Education-Game

Dr. Shetter

Mr. Harold Aarons, Spectacle Lakes Club

INSTITUTE FOR FISHERIES RESEARCH Institute for Fisheries Re-

search

DIVISION OF FISHERIES

MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATING WITH THE

UNIVERSITY OF MICHIGAN

(W) 9-4-44.

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

August 14, 1944

REPORT NO. 951

A PARTIAL LAKE SURVEY OF THE SPECTACLE LAKE BASINS

NUMBERS 1, 2, 3, 4 AND 5, MONTMORENCY COUNTY

by

David S. Shetter

Location of lakes

The Spectacle Lakes (of which there are seven basins, connected by small, sluggish channels, lying in low, grass-marsh valleys) are located in southwestern Montmorency and southeastern Otsego Counties. The flowage from these lakes form one of the headwaters of the West Branch of Big Creek, which is a tributary of the North Branch of the Au Sable River.

The lakes investigated lie in Albert township (T. 29N., R. 1E., Secs. 17, 18, and 19). Local inhabitants have designated them by number, starting with the basin farthest to the east. Basins Number 2 and 3 are really one lake, but all the rest are separate lakes. As will be seen from the map, Numbers 1, 2, 3 and 4, are grouped close together in Sections 17 and 18, while Number 5 (shown usually on the maps as Shoepack Lake) is some distance from the others in Section 19. Small, usually weed filled channels connect Basins 1 and 2, and Basins 2 and 4. The outlet of Number 4 flows southwesterly across the Meridian Line Road and empties into Number 6. Basin Number 5 (Shoepack Lake) has no inlet, but its outlet joins the connecting stream between Number 4 and Number 6 about 100 yards east of the Meridian Line Road.

Reasons for survey

With the exception of one State-owned plot of 40 acres, all of the land in Sections 17, 18, and 19, with water frontage is in private ownership (according to the Land Ownership Map corrected to Jan. 1, 1943). The State owned "40" has some frontage on the connecting stream between Basin #4 and Basin #6.

Certain interested parties resident in Montmorency County have proposed that a former, higher water level be re-established, claiming that an old dam existed which made one large lake out of the basins to the east of the Meridian Line (see correspondence between F. A. Westerman and Sidney Gassel, Apr. 18, 1944, May 23, 1944, June 23, 1944; between F. A. Westerman and H. L. Aldrich, May 15, 1944).

Mr. Westerman communicated his desire for more information on these lakes to Dr. A. S. Hazzard, Director of the Institute for Fisheries Research, and the author and his assistant, Mr. Pat Galvin, were requested to make a survey of the lakes that might be affected by the proposed dam.

Early in July, permission was obtained via mail from S. C. Hadley, of Detroit to enter on his property, and netting, physical-chemical studies and cruising of the area was done during the period July 14-20, 1944.

Description of the lakes

The lakes lie in country which has many hills and knobs of moderate height. The soil is chiefly sand with some rubble and gravel. Vegetation on the hills consists of a mixed stand of poplar, oaks, and pines. Where the lake shores are low, rushes and marsh grasses, bordered at the inland edge by tag alders, form the vegetative stand.

Number 1, which is the second smallest lake, lies farthest to the east, and except for a small strip of low land through which passes its outlet, is separated from Number 2 by wooded hills which come almost down to its

shores on the south and west sides. The north and east shores are low but rise gradually and irregularly to low hills. As shown on the map, there is considerable expanse of shallow water in Number 1 and the bottom contours are more gentle. The bottom around the edges appeared to consist of muck and fibrous peat, while in the deeper waters it was pulpy peat.

Number 2 has the greatest area, and its north shore is steep and wooded, and it is on this shore that three summer cabins are located. On this shore the marl beach is quite firm, and in places there is some egg-size gravel. The remainder of the immediate shore line is low for a short distance inland with a gentle rise to low wooded hills. Except in the eastern end of Number 2, the drop-off is steep and sudden. There is a shallow portion of varying width, then it drops, in places, as an angle of greater than 60 degrees. There is a small amount of sand at the edges of the east bay near the inlet, but the shallow shelf and most of the drop-off is marl. Marl and pulpy peat are found in the deeper waters.

Number 2 and Number 3 are really two basins of one lake connected by a channel not over 125 feet wide. Except for a short portion of the southwest shore, the entire basin of Number 3 has a low shoreline, which extends back from the water 100 or more yards, and is only 3-6 inches above the water level. The CCC maps, made in 1938-1939 show a large inlet, but this is incorrect. There are 4 small inlets on the west and northwest shore, none of which flow more than 1 gallon per minute, which have their sources within 300 yards of the lake. With the air at 74° F. on July 19, 1944, three of these were 71° F., about 50 feet from the lake. The temperature at the source of one of them was 49 degrees. Because of their size and also because of their flocculent marl bottom, they would probably be useless for spawning.

On Number 4, a short portion of the east shore line is bordered by

low slopes which come almost to the waters edge, and this is true for the north shore also. The remaining banks and surrounding country are only slightly above water level. Its bottom contours are gentler at each end and on the south shore than in the other lakes, but the north shore has a sharp drop-off. The bottom materials of Number 4 appear to be similar to Number 2 and 3.

Number 5 basin, which is almost $3/4$ mile distant from Number 4, is the only lake with an encroaching shore line. The north and east shores consist of low, steep hills which come almost to the waters' edge, while on the east and south shore, the shoreline is an encroaching bog mat. This is the smallest and shallowest of the lakes, as only 12 feet of water were found, and the contours appear to be quite gradual. The bottom in this lake was fibrous and pulpy peat.

No acreages have been given, as it was noted in the course of the field work that the map of Numbers 1, 2, 3, and 4 (no map is available for Shoepack Lake) was sadly in error, both as to position of contours and as to certain features of the shape of the lakes. For instance, the channel between Numbers 1 and 2 is drawn as being 875 feet, whereas it is not over 125 feet at the most.

Results of netting

Overnight sets with experimental gill nets (stretched mesh size running from $1\ 1/2$ to 4 inches) were made in all of the lakes, consisting of two nets in each lake. Two overnight sets were made in Number 2 Basin. Seining was attempted in various localities but the soft bottom, rushes, or dead-falls made use of the seine impossible except along the north shore of Number 2 and in the vicinity of the outlet of Number 2 and 3.

The species of fish captured are summarized in Table 1, and would indicate the present game fish population of all the lakes probably consists

Table 1

Summary of Fish Collected From the Spectacle Lake Basins West of the Meridian Line

(T. 29 N., R. 1 E., Secs. 17, 18, 19) Montmorency County

Fishes found	Spectacle Lake Basin				
	Number 1	Number 2	Number 3	Number 4	Number 5
<u>Game Fishes</u>					
Northern pike (<u>E. lucius</u>)	3	4	3	1 yrly.	5
Yellow perch (<u>P. flavescens</u>)	1	15	...	1	1
Walleye (<u>S. vitreum</u>)	...	1	...	...	...
L. M. Bass (<u>H. salmoides</u>)	2-yrlyg. observed	3-yrlyg. observed	1	Adults and yrlyg. observed	Observed
Rock bass (<u>A. rupestris</u>)	3	5-yrlyg. observed	...	2	1
Pumpkinseed (<u>L. gibbosus</u>)	...	...	...	...	3
<u>Coarse Fishes</u>					
Brown bullhead (<u>A. melas</u>)	...	1	...	...	...
Longeared sunfish (<u>L. m. peltastes</u>)	Adults and yrlyg. observed	Adults and yrlyg. observed	Adults and yrlyg. observed	Adults and yrlyg. observed	Adults and yrlyg. observed
<u>Forage Fishes</u>					
Bluntnosed minnow (<u>H. notatus</u>)	...	300	...	Observed	...
Menona killifish (<u>F. d. menona</u>)	...	25	2	...	...

of the following: northern pike, yellow perch, largemouthed bass, and rock bass. One excellent specimen of a walleye, weighing about 6 pounds, was captured in Lake Number 2 and returned alive, but this was the only one seen. Pumpkinseed sunfish were taken in Number 5 Basin only.

The only coarse fish captured was a brown bullhead (in Number 2), but numerous long-eared sunfish (which seldom if ever reach the legal size of 6 inches prescribed by law) were observed in every basin, and a number of them were captured in the seining of Number 2.

The only forage fishes taken or observed were bluntnosed minnows and Menona killifishes. These were taken in the seining in Lake Number 2 and Number 3, and observed in Number 4. Compared with other lakes, minnows were not abundant.

Fishing history

Stocking records since 1938 were examined, but these lakes have received no plantings in the period 1938-1944.

Local reports indicate that fishing has been good to excellent. During the survey, cottagers staying at Hadley's cabin took several largemouth bass ranging from 13 to 18 inches in size. The author took two legal bass from Number 2 while cruising the shoreline in about 1 1/2 hours trolling. A number of largemouthed bass fingerlings were observed on the marl shoals. The majority of the northern pike captured by netting were of good size (2-3 pounds) and in good condition and the smaller pike netted indicated successful reproduction. The presence of one or more abandoned spear coops in each basin also indicates some past use of these lakes in winter time for pike spearing before these waters passed into private ownership.

Temperature and chemical data

Temperature and chemical studies on these lakes are presented in Table 2.

Table 2

Summary of Temperatures and Chemistry Investigations on Spectacle Lake Basins
East of Meridian Line (T. 29 N., R. 1 E., Secs. 17, 18, 19) Montmorency County.

Depth (feet)	Spectacle Lake Number 1							Spectacle Lake Number 2						Spectacle Lake Number 3					
	Temp. (F)	O ₂ ppm.	ph-th alk.	M.O. alk.	CO ₂ ppm.	pH		Temp. (F)	O ₂ ppm.	ph-th alk.	M.O. alk.	CO ₂ ppm.	pH	Temp. (F)	O ₂ ppm.	ph-th alk.	M.O. alk.	CO ₂ ppm.	pH
Surface	75	9.6	4.0	82	0.0	8.3		73	10.5	0.0	117	17	8.3	75	9.2	0.0	127	32	8.1
3	75	...	...	...	...	...		73	...	...	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...		...	...	...	...	...	...	74	...	...	...	...	...
9	74	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...
12	73	...	...	...	...	...		72	...	...	...	...	...	73	...	...	...	...	...
15	72	...	...	...	...	...		72	...	...	...	...	...	72	...	...	...	...	...
18	65	...	...	...	...	...		64	14.4	0.0	119	31	8.2	65	...	...	...	...	...
21	61	7.3	0.0	109	2.0	7.7		58	...	...	...	...	...	57	...	...	...	...	...
24	54	...	...	...	...	...		54	...	...	...	...	...	55	13.2	0.0	145	35	7.9
27	52	0.8	0.0	130	14.5	6.9		51	...	...	...	...	...	52	...	...	...	...	...
28	...	...	...	...	...	...		...	...	...	...	...	...	...	11.1	0.0	145	54	7.7
30	51	...	...	...	...	...		49	...	...	...	...	...	52	...	...	...	...	...
33	49	...	...	...	...	...		48	...	...	...	...	...	...	...	...	...	...	...
36	...	...	...	...	...	...		47	0.7	0.0	176	110	7.1	...	...	...	...	...	...
40	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...
45	...	...	...	...	...	...		45	...	...	...	...	...	...	...	...	...	...	...
Bottom at 34 feet.							Bottom at 46 feet						Bottom at 30 feet						

Depth (feet)	Spectacle Lake Number 4							Spectacle Lake Number 5						Lake basin	Date examined	Air temp. (F)	Secchi Disc (ft)
	Temp. (F)	O ₂ ppm.	ph-th alk.	M.O. alk.	CO ₂ ppm.	pH		Temp. (F)	O ₂ ppm.	ph-th alk.	M.O. alk.	CO ₂ ppm.	pH				
Surface	75	9.2	0.0	*	20.0	8.4		71	9.0	6.0	96.5	0.0	8.2	#1	7/19/44	77 (2:30P.M)	13
3	...	...	...	...	...	...		71	...	...	...	...	...	#2	7/17/44	69 (10:15A.M)	18
6	74	...	...	...	...	...		70	...	...	...	...	...	#3	7/17/44	73 (1:45P.M)	20
9	...	...	...	...	...	...		70	8.5	0.0	97.5	0.0	8.4	#4	7/17/44	73 (4:15P.M)	22
12	73	...	...	...	...	...		68	...	...	...	...	...	#5	7/20/44	60 (1:30P.M)	12 (bottom)
15	73	...	...	...	...	...		...	...	...	...	...	...
18	69	...	...	...	...	...		...	...	...	...	...	...
21	61	16.1	0.0	*	38.0	7.9		...	...	...	...	...	...
24	58	...	...	...	...	...		...	...	...	...	...	...
27	56	4.7	0.0	*	70.0	7.3		...	...	...	...	...	...
30	54	...	...	...	...	...		...	...	...	...	...	...
Bottom at 30 feet.							Bottom at 12 feet.										

* - Ran out of N/50-H₂ SO₄

⊛ - Denotes limits of the thermocline.

From this table, it can be noted that thermal stratification was present at the time of the survey in all lakes except Number 5; in other words there was a warm layer of water extending from the surface to 15 feet, then a layer from 15 to 24 or 27 feet in which there was a rapid change in temperature, then a bottom layer of cold water extending from 24 or 27 feet to the bottom of the lake. In Number 5 the water temperature was about 71° F. at the surface and 68° F. on the bottom in 12 feet of water. The general weather during and immediately preceding the survey was hot and windy during the day with cool nights. Air temperatures during the time of examination ranged from 60° - 75°.

The water was quite clear, as will be noted from the Secchi Disc readings, which range from 12 to 22 feet under unfavorable light and wind conditions. The color was generally green or greenish blue.

One sample of water was taken in each thermal stratum for chemical analysis (specifically to determine the amounts of dissolved oxygen, free carbon dioxide, pH, and phenolphthalein and Methyl Orange alkalinity).

These lake waters are alkaline at almost every point, since all pH values (except in the lowest level of Number 1, where it was 6.9) were between 7.0 and 8.4.

In all five lakes, adequate dissolved oxygen was present in the top 15 feet of water (9.0 to 10.5 ppm.). In basins Number 1, 2, 3, and 4, adequate dissolved oxygen was present in the thermocline (7.3 to 16.1 ppm.). These comparatively high readings were probably brought about by the wind action and a series of cool nights.

However, the lakes varied in the amount of oxygen present in the cold, bottom layers. In Number 1, only 0.8 ppm. of oxygen were found at 27 feet (not adequate for fish life), and this explains why no fish were taken in

the gill-net set in the deep water. In Number 2, we had similar luck with a deep water gill-net set, and found also that the bottom layer had only 0.7 ppm. of dissolved oxygen (36 feet).

Numbers 3 and 5 had adequate amounts of dissolved oxygen in the bottom layers, and Number 4 might be considered to have barely enough (4.8 ppm.).

Varying amounts of free carbon dioxide were noted in these lakes. In the surface waters, Lakes Number 1 and 5 had no free carbon dioxide, while at the surface of Lakes Number 2, 3, and 4, free carbon dioxide content in parts per million was 17, 32 and 20 respectively. In the thermocline, the zone of rapid temperature change, Lakes 1, 2, 3 and 4 had from 2 to 28 ppm. of free carbon dioxide. These same basins all had relatively larger amounts of free carbon dioxide in the cold, bottom layers, varying from 14.5 ppm. in Number 1 to 110 ppm. in Number 2. Free carbon dioxide was not present in Number 5 at either the surface or the bottom.

The alkalinity of these lakes is due apparently to an abundance of bicarbonates, as indicated by the high Methyl Orange readings in the almost complete absence of Phenolphthalein alkalinity. Only in the surface waters of Number 1 and Number 5 was any normal carbonate present. Higher readings of Methyl Orange were noted in Lakes Number 2, 3 and 4 (to be inferred in Number 4 as there was no phenolphthalein alkalinity) where the basin has a high marl content.

Aquatic plants

Because of other duties, an extensive study of the plants was not made, and no collections were preserved. The shoreline of all lakes were hastily cruised to gain an impression of the relative abundance of plant life in the lakes and to note the common species.

Aquatic plants were most dense in Lakes Number 1 and 5 which are the two lakes with the greatest expanse of shoal area. Both of these lakes had

medium to dense stands of submerged aquatics, such as Najas flexilis, Myriophyllum, Potamogeton sp.? and Chara. Moderate stands of floating pondweeds and water lilies were to be noted in protected areas, and sparse to moderate beds of rushes were found in the shallower waters.

The plant life of the basins of Numbers 2, 3 and 4 was interesting. Except in small, protected cover, or on the few stretches of shoreline where the contour slope was gradual, the shallow marl shelf was barren of plant life except for an occasional clump of emergent Scirpus or submergent Chara. The plant life began close to the drop-off, which was outlined by a moderate to sparse stand of Scirpus. Here also, submergent and floating plants were to be noted, encompassing such species as the yellow and the white water lily, the floating pondweed, two or three unidentified species of submerged pondweed, Chara, and Myriophyllum. In all the basins, Chara appeared to be present in some abundance to a depth of 25 feet.

Conclusions

These lakes are now classified as pike lakes, and the results of the survey would indicate this as the proper listing under present conditions.

The temperature and chemical data noted in Lakes Number 1, 2, 3 and 4 suggest that it might be possible to stock those basins with brook or rainbow trout. Adequate oxygen was found in the thermoclines of these lakes, and temperatures recorded in their thermoclines ranged from 51 to 69 degrees under midsummer air temperatures, and the amount of carbon dioxide present did not appear to be excessive. Only in Lakes Number 3, and possibly Number 4, were chemical conditions suitable for trout in the bottom layers of water. However it is questionable whether such plantings would be successful in the presence of a number of northern pike.

Any increase in water level would increase the present areas of these

lakes greatly. Such an increase would favor the northern pike, as it would enlarge the type of habitat preferred by them (shallow, weedy backwaters). Any dam established at the Meridian Line would also affect the interests of landholders on Spectacle Lakes Number 6 and 7, since these lakes lie west of the Meridian Line, and receive their water from the drainage of the five lakes to the east.

In view of the relatively large numbers of young of all species which were captured or observed, no stocking with warm-water species is recommended.

INSTITUTE FOR FISHERIES RESEARCH

David S. Shetter

Report approved by: A. S. Hazzard

Report typed by: M. Klaphaak