

ATLANTIC SALMON AND TROUT INVESTIGATIONS

1948

REPORT No. III. Survey of four lakes in the Shubenacadie system.

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A survey of the depth, temperature and plankton in the four lakes, William, Thomas, Fletcher and Shubenacadie (Grand) draining into the Shubenacadie river was carried out during July and August.

Depth

Enquiry was made from the local fishermen regarding the location of the deepest areas of each lake. Soundings were made from a row boat along a straight line between points on opposite shores. The direction of these lines is indicated on the accompanying map of each lake (figs. 6-8; tab. 5-8). The distance between the soundings and the number of lines surveyed depended on the size of the lake. More work was done on the small lakes to avoid missing deep areas.

Temperature

A reversing thermometer was used to obtain a series of readings from bottom to top in that part of each lake in which the deepest water had been found in the previous survey (tab. 5-8). A comparison between the temperatures at the same depths in each lake is shown in fig. 9.

Plankton

Preliminary studies of the plankton were made by examining surface hauls taken with No. 5 and No. 20 nets in Grand

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1 Inch to 1 Mile



1 Inch to 1/4 Mile

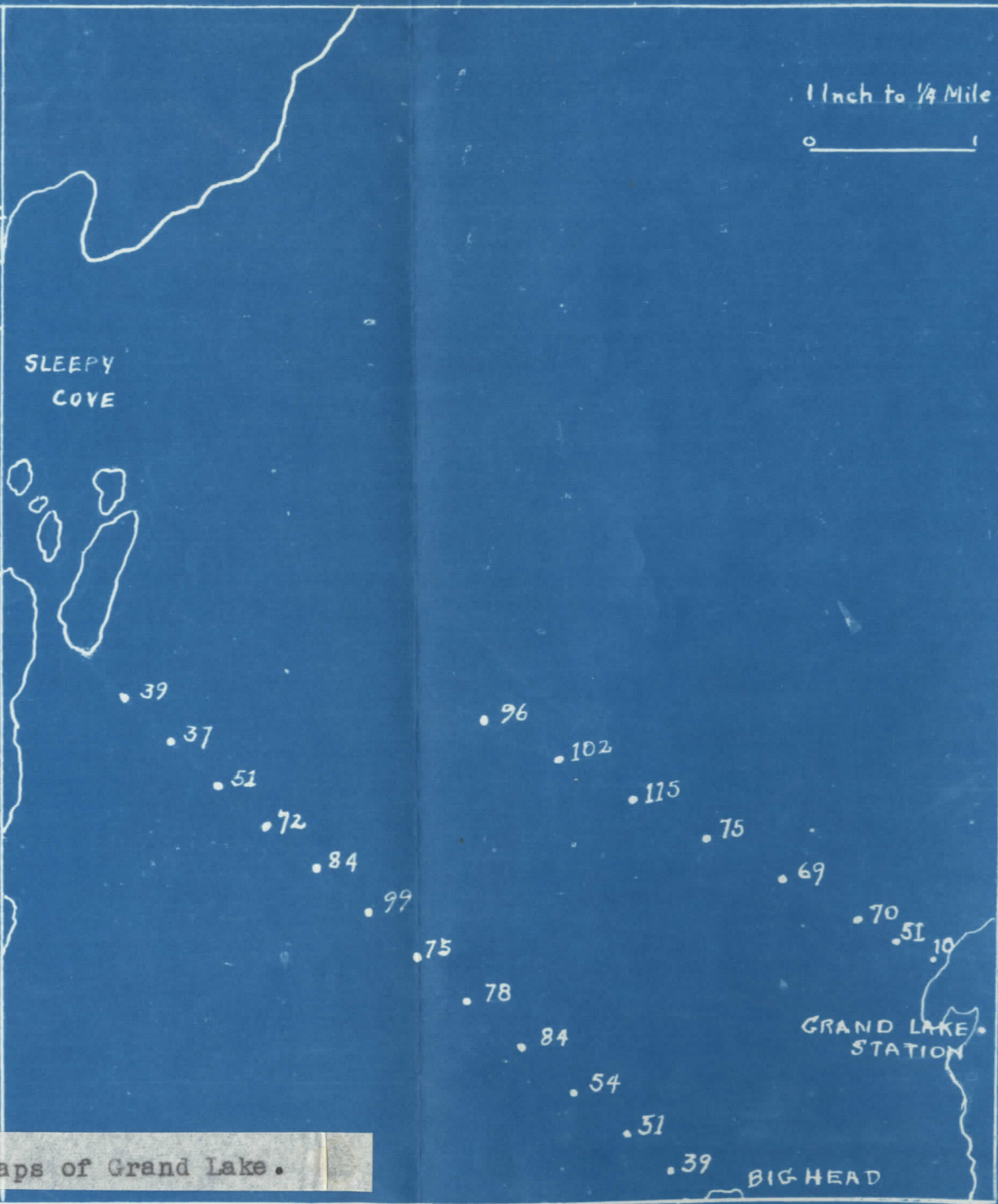


Fig. 6. Maps of Grand Lake.

1 Inch to 1 Mile

0 1



1 Inch to 1/2 Mile

0 1

Fig 8

Fig. 8. Maps of Lake William.

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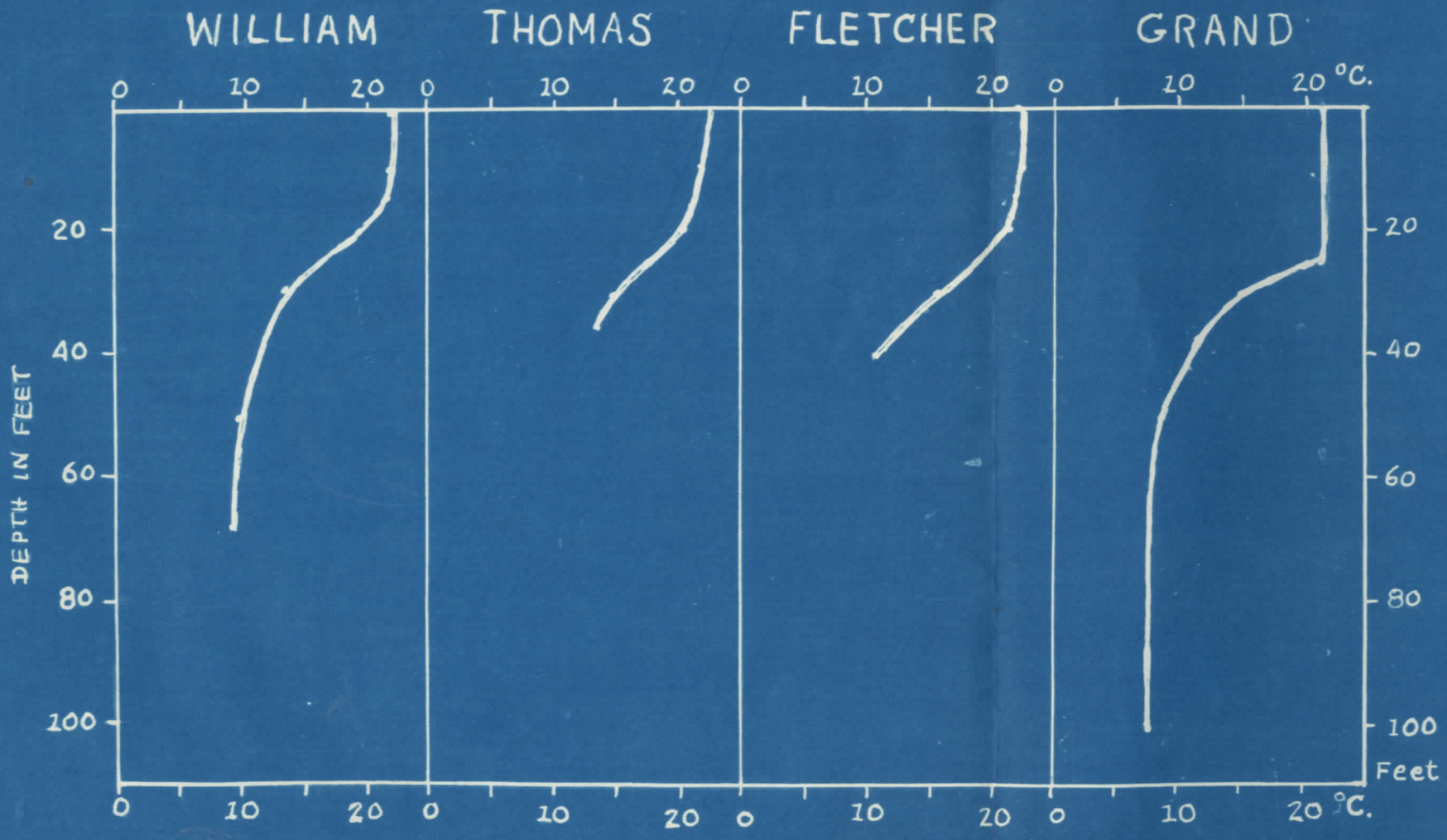


Fig. 9. Comparison between the temperature and the depth of lakes William, Thomas, Fletcher and Grand.

Lake on July 20 and in Lake Fletcher on July 30. The forms occurring most abundantly were identified by comparison with figures and descriptions given in "Fresh-water Biology" by Ward and Whipple and "Life in Inland Waters" by Needham and Lloyd. No critical examination of the copepods was attempted and few of the Protozoa were identified.

Oblique hauls were made with No. 5 and No. 20 nets from the deepest water to the surface in Lake William on Aug. 7 and in Lake Thomas and Grand Lake on Aug. 9. These hauls were compared as to volume and content. They were also compared with similar hauls made in Grand Lake on Aug. 24. Oblique hauls were made in L. Fletcher on July 30 from a depth of 18 feet and on Aug. 17 from 37 feet are considered less satisfactory for volumetric comparison with the other lakes since the former was taken in shallow water and the latter on a stormy day. They serve, however, for comparison of the content of the plankton (see tables 9-11).

Volumetric determination was made by measuring the contents of each haul after it had settled in a cylinder for 24 hours. A rough estimate of the relative percentages of the most abundant forms was made by calculating the percentage of the total volume occupied by the upper gelatinous part which was chiefly Cladocera as well as by examining on a glass slide samples of the haul after it had been thoroughly stirred.

Purpose of the Survey

the following were found in significant numbers. Lakes Grand and William are known to contain grayling.

or land locked salmon. None have been reported from Lakes
Bosmina and the Copepoda as adults, larvae and nauplii. The
Fletcher and Thomas for some time. It was, therefore, deemed
results are given in detail in Tables 9, 10 and 11.
advisable to study the conditions in these lakes.

Content of the Plankton

Phytoplankton

Cyanophyceae - *Oscillatoria prolifica*
Anabena sp?

Bacillariaceae - *Cyclotella* sp?
Stephanodiscus sp?
Asterionella gracillima
Asterionella sp?
Tabellaria fenestrata
Rhizosolenia setigra

Chlorophyceae - *Desmidium* sp?
Botryococcus sp?
Dictyosphaeropsis sp?
*Sphaerocystis schraeteri**

Zooplankton

Mastigophora - *Uroglena* sp?
Ceratium hirundinella
Vorticella campanula

Rotatoria - *Conochilus unicornis*
Notholca longispina
Anuraea cochlearis

Cladocera - *Daphnia pulex*
Holopedium gibberum
Bosmina longirostris

Copepoda - *Epischura lacustris*
*Diaptomus oregonensis**
Diaptomus sp?
Cyclops viridis

Hydracarina - several species not identified.

Of the list given above which the writer feels may be far from complete only the following were found in significant numbers: *Anabena*, *Asterionella*, *Conochilus*, *Daphnia*, *Holopedium*

Bosmina and the Copepoda as adults, larvae and nauplii. The results are given in detail in Tables 9, 10 and 11.

TABLE 5. Survey of Grand Lake.

Depths July 20, 1948

Direction of First Line

Big Head to south tip of the largest of Five Islands

1 unit	-	39 ft.
2 units	-	51 "
3 "	-	54 "
4 "	-	84 "
5 "	-	78 "
6 "	-	75 "
7 "	-	99 "
8 "	-	84 "
9 "	-	72 "
10 "	-	51 "
11 "	-	37 "
12 "	-	39 "

Direction of Second Line Aug. 24, 1948

Middle of the lake looking N. E. through main channel and S. E. to distant high shore beyond Big Point to the east shore at stone quarry near Grand Lake Station.

1 unit	-	96 ft.
2 units	-	102 "
3 "	-	115 "
4 "	-	75 "
5 "	-	69 "
6 "	-	70 "
6.5 "	-	51 "
7 "	-	10 "
1/8 "	-	to shore

Water Temperatures Aug. 3, 1948

100 ft.	-	7.9°C.
50 "	-	8.4°C.
37.5 "	-	11.2°C.
30 "	-	15.0°C.
25 "	-	21.4°C.
10 "	-	21.6°C.
0 "	-	21.6°C.

TABLE 6. Survey of Fletcher Lake.

Aug. 6, 1948

Depths

Line 1. Lakeside to first point across the lake.

Unit 1 - 10
2 - 17
3 - 18
4 - 21
5 - 30
6 - 42
7 - 25

Line 2. Small wharf below Lakeside to second point across the lake.

Unit 1 - 17
2 - 17
3 - 17
4 - 18
5 - 18
6 - 18
7 - 16 (1/4 unit from shore)

Line 3. Shore at highway (second telegraph pole beyond cottage) to third point across the lake.

Unit 1 - 9
2 - 16
3 - 17
4 - 17
5 - 17
6 - 15
7 - 17
8 - 18
9 - 17
10 - 17
11 - 17
12 - 15

Water Temperatures

40 ft. - 11.0°C.
30 " - 15.8°C.
20 " - 21.9°C.
10 " - 22.7°C.
0 " - 22.0°C.

TABLE 7. Survey of Lake Thomas.

Aug. 9, 1948

Depths

First line. Spencer's wharf to the embayment opposite the ice house.

Unit 1	-	8	ft.	
2	-	22	"	
3	-	25	"	
4	-	26	"	
5	-	26	"	
6	-	26	"	
7	-	23	"	
8	-	23	"	
9	-	19	"	
10	-	4	"	(Wilson's Shoal)
11	-	3	"	
12	-	10	"	
13	-	14	"	
14	-	8	"	
15	-	4	"	

Second line. Eight units south from embayment to centre of cliff at culvert.

Unit 1	-	24	ft.	
2	-	25	"	
3	-	27	"	
4	-	29	"	
5	-	32	"	
6	-	35	"	
7	-	36	"	
8	-	35	"	
9	-	32	"	
10	-	28	"	
11	-	shore		

Third line. Middle of cliff to next point across the lake.

Unit 1	-	29	ft.	
2	-	35	"	
3	-	33	"	
4	-	30	"	
5	-	28	"	
6	-	14	"	
7	-	shore	of the point	

Temperature

35 ft.	-	13.5°C.
30 "	-	14.2°C.
25 "	-	17.3°C.
20 "	-	20.3°C.
10 "	-	21.8°C.
0 "	-	22.2°C.

TABLE 8. Survey of Lake William

Aug. 7, 1948

Depth

Direction of line. From the shore at a point 2.2 miles by road from Waverley to the tip of the next to last island.

Unit 1	-	9	ft.
2	-	35	"
3	-	42	"
4	-	45	"
5	-	46	"
6	-	53	"
7	-	58	"
8	-	58	"
9	-	58	"
10	-	60	"
11	-	66	"
12	-	68	"
13	-	66	"
14	-	65	"
15	-	64	"
16	-	59	"
17	-	48	"
18	-	22	"

Temperature

68 ft.	-	9.2°C.
50 "	-	9.6°C.
30 "	-	13.2°C.
20 "	-	19.2°C.
15 "	-	21.7°C.
10 "	-	21.7°C.
0 "	-	21.8°C.

Table 9. Plankton from Grand Lake

Date	Net	Depth (ft.)	Vol. (cc.)	Abundant Forms	% of vol.	Less Abundant Forms
20/7	No. 5	0-1	75	D. pulex Copepods D. oregonensis C. viridis E. lacustris	75 20	H. gibberum C. unicornis A. gracillima T. fenestrata B. longirostris N. longispina A. cochlaeris Anabena sp?
20/7	No. 20	0-1	26	D. pulex Anabena Asterionella sp? Copepod larvae and nauplii	75 5 5 10	Shaerocystis sp? T. fenestrata R. setigera Botryococcus sp? Dictyosphaeropsis sp?
28/7	No. 5	0-1	127	D. pulex H. gibberum A. gracillima C. unicornis D. Oregonensis C. viridis	75 5-10 5-10	E. lacustris Sphaerocystis sp? T. fenestrata N. longispina Uroglena sp?
28/7	No. 5	70 (Obl)	120	D. pulex H. gibberum D. oregonensis C. viridis E. lacustris C. unicornis A. gracillima	75 15 10	T. fenestrata Uroglena sp? N. longispina
28/7	No. 20	70 (Obl)	57	A. gracillima C. unicornis D. pulex H. gibberum Copepod larvae nauplii and eggs	90 10	Anabena sp? Uroglena sp? Stephanodiscus sp? C. hirundinella N. longispina A. cochlaeris Water mites

TABLE 9 cont'd.

Date	Net	Depth (ft.)	Vol. (cc.)	Abundant Forms	% of vol.	Less Abundant Forms
9/8	No. 5	115 (Ob1)	50	Copepods D. oregonensis C. viridis E. lascastris A. gracillima	50-60 30-40	D. pulex T. fenestrata N. longispina C. unicornis Water mites
9/8	No. 20	115 (Ob1)	30	A. gracillima Copepods: eggs larvae and nauplii C. unicornis	60-75 20-25 5-10	D. pulex Uroglena sp? Stephanodiscus sp? B. longirostris Sphaerocystis sp? Anabena sp?
24/8	No. 5	115 (Ob1)	40	D. oregonensis C. viridis D. pulex B. longirostris	40-50 40-50	C. unicornis H. gibberum Asterionella sp? N. longispina
24/8	No. 20	115 (Ob1)	25	Asterionella sp? Copepods: larvae eggs and nauplii D. pulex	80 10 5	Anabena sp? Uroglena sp? Sphaerocystis sp? T. fenestrata C. unicornis B. longirostris N. longispina

TABLE 10. Plankton from Lake Fletcher.

Date	Net	Depth (ft.)	Vol. (cc.)	Abundant Forms	% of vol.	Less Abundant Forms
30/7	No. 5	0-1	175	H. gibberum Copepods: D. oregonensis E. lacustris C. viridis	60-75 25-30	D. pulex B. longirostris C. unicornis Copepod eggs and nauplii
30/7	No. 20	0-1	115	H. gibberum D. oregonensis C. viridis Copepod eggs and larvae	60	C. unicornis B. longirostris Anabena sp? T. fenestrata A. cochlearis
30/7	No. 5	18 (Obl)	65	H. gibberum D. oregonensis C. viridis	75 25	C. unicornis D. pulex V. campanula
30/7	No. 20	18 (Obl)	60	H. gibberum Copepods: eggs larvae and nauplii	75 25	B. longirostris T. fenestrata Asterionella sp? V. campanula A. cochlearis
17/8	No. 5	37 (Obl)	15	D. oregonensis C. viridis H. gibberum D. pulex B. longirostris	50-60 25-30	C. unicornis Sphaerocystis sp? Water mites
17/8	No. 20	37 (Obl)	20	D. oregonensis C. viridis Nauplii and larvae B. longirostris H. gibberum	50-60 25-30	Sphaerocystis sp? Desmidium sp? A. gracillima T. fenestrata N. longispina V. campanula

TABLE 11. Plankton from Lake William.

Date	Net	Depth (ft.)	Vol. (cc.)	Abundant Forms	% of vol.	Less Abundant Forms
7/8	No. 5	68 (Obl)	157	H. gibberum } D. pulex } D. oregonensis } C. viridis } E. lacustris }	70-75 25	C. unicornis B. longirostris Water mites
7/8	No. 20	68 (Obl)	141	H. gibberum } D. pulex } D. oregonensis } C. viridis } A. gracillima } Anabena sp? } C. hirundinella }	70-75 20 5	N. longispina B. longirostris Uroglena sp? Sphaerocystis sp? Redbrown mites

Plankton from Lake Thomas.

9/8	No. 5	36 (Obl)	40	D. pulex } H. gibberum } C. viridis } D. oregonensis } E. lacustris } C. unicornis }	75 20-25 5-10	B. longirostris O. prolifica Redbrown mites
9/8	No. 20	36 (Obl)	17	D. pulex } H. gibberum } C. viridis } D. oregonensis } larvae and nauplii } C. unicornis }	70-75 20-25 5-10	Sphaerocystis sp? A. gracillima C. hirundella sp? Uroglena sp? Anabena sp? Notholca longispina

Summary

Volume

(a) Less plankton was taken in the shallow lakes than in the deep lakes on corresponding dates.

(b) The volume taken in Grand Lake decreased gradually from July 28 to Aug. 24.

Content

(a) The Cladocera formed a greater proportion of the August hauls in Lakes William, Thomas and Fletcher than in Grand Lake. The maximum of this group was taken in July in Grand Lake.

(b) The relative scarcity of the phytoplankton in the three upper lakes was conspicuous in both surface and oblique hauls. There was a richer flowering of Asterionella in all the No. 20 hauls from Grand Lake.