

## NOTES ON DEPTH AND TEMPERATURE OF GREEN LAKE.

---

By C. DWIGHT MARSH.

Green Lake is situated in Green Lake county, and is something over seven miles in length, and rather less than two miles in its greatest breadth. It extends in a northeast and southwest direction, and is considered by geologists, to be of glacial origin, its shores at the western extremity being formed of drift hills.

The lake is of especial interest because of its depth, it being, I think, the deepest lake within the limits of the state.

While at various times soundings have been made by which the deepest parts of the lake were located with a fair amount of accuracy, the only attempt at systematic soundings was made some years ago by Prof. C. A. Kenaston, when he was connected with Ripon college. Through the kindness of Mr. Henry Wolcott, of Ripon, I was enabled to get the results of Prof. Kenaston's work. The soundings were made in winter through the ice and the distances between stations chained off.

Four lines of soundings were made: from Bowen's cottage to Oakwood Hotel, from Sandstone Bluff to Oakwood, from Sandstone Bluff to Sherwood Forest, and from Sandstone Bluff to Sugar Loaf. The following tables give the results:

From Bowen's Point to Oakwood.

<i>Distance.</i>	<i>Depth.</i>
64 rds.	63 feet.
192 "	96 "
256 "	84 "
272 "	97 "
288 "	90 "
304 "	20 "
320 "	61 "
336 "	66 "
352 "	53 "
384 "	38 "
432 "	49 "
464 "	41 "
626 "	Shore.

## From Sandstone to Oakwood.

<i>Distance.</i>	<i>Depth.</i>
27 rds.	52 feet.
43 "	89 "
59 "	144 "
75 "	160 "
91 "	160 "
155 "	151 "
267 "	88 "
315 "	27 "
363 "	25 "
395 "	48 "
427 "	22 "
491 "	Shore.

## From Sandstone to Sugar Loaf.

<i>Distance.</i>	<i>Depth.</i>
48 rds.	75 feet.
96 "	136 "
144 "	160 "
208 "	180 "
320 "	190 "
560 "	195 "
720 "	180 "
752 "	152 "
816 "	40 "
896 "	Shore.

## From Sandstone to Sherwood Forest.

<i>Distance.</i>	<i>Depth.</i>
40 rds.	150 feet.
64 "	160 "
100 "	159 "
196 "	140 "
256 "	132 "
292 "	73 "
316 "	15 "
348 "	Shore.

From these tables and the profiles derived from them, it will be seen that the eastern part of the lake is comparatively shallow, and that there is a bar not far from the center where the depth is only twenty feet. The greatest depth—195 feet—is reached between Sandstone Bluff and Sugar Loaf.

I have made no attempt at systematic soundings, but, in connection with dredging, have always taken the depth at the time of the haul, and my figures agree in all respects with those of Prof. Kenaston, except that they are uniformly somewhat less; this is easily explained by the fact that the level of the lake has been lower than usual for the past two or three years.

In the western part of the lake but few soundings have been made by any one. Capt. Pierce tells me that the greatest depth he has found is 172 feet. It is popularly supposed that the deepest place is between Sugar Loaf and the south shore, as that is the last place to freeze. I have found there, however, only 189 feet.

It will be noticed that the littoral zone, in most parts of the lake, is very narrow, considerable depths being reached quite near the shore.

When dredging in deep water, I also took surface and bottom temperatures. This work was done in Aug., Sept., and Oct. 1890, and July, 1891. As, so far as I know, very little work of this kind has been done in our lakes, I have thought the results worth recording, although my observations were too few to form a basis for any general inferences.

For bottom temperatures, I used a Miller-Casella deep sea thermometer, loaned by the United States Commissioner of Fish and Fisheries, and for surface temperatures a common chemical thermometer. As the thermometers were not tested, the results may not be absolutely accurate. The deep sea thermometer was attached about two meters from the sounding lead, giving the "bottom temperature."

The following tables give the temperatures arranged by depths:

AUGUST, 1890.

Depth.	Surface tem.	Bottom tem.
17 meters.	25° C.	10.25° C.
24.5	25.	7.7
31.	26.	7.45
33.	24.	7.2
36.	25.5	7.2
40.5	26.	7.
40.85	25.	7.
41.5	24.	7.
42.	24.5	7.
42.2	24.	7.
43.	24.	7.
45.25	.....	6.6
46.75	24.	6.6
48.45	22.	6.6

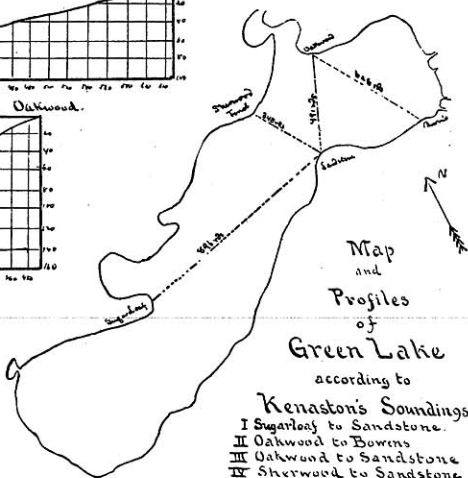
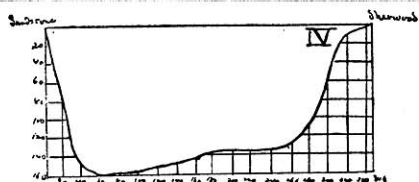
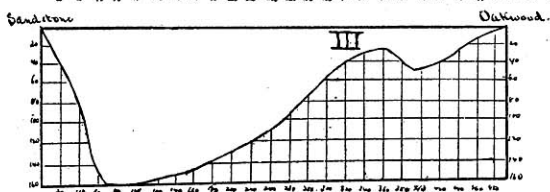
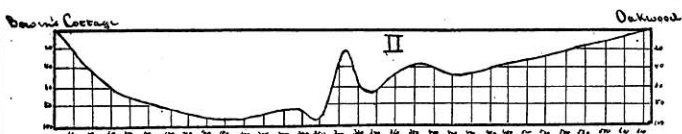
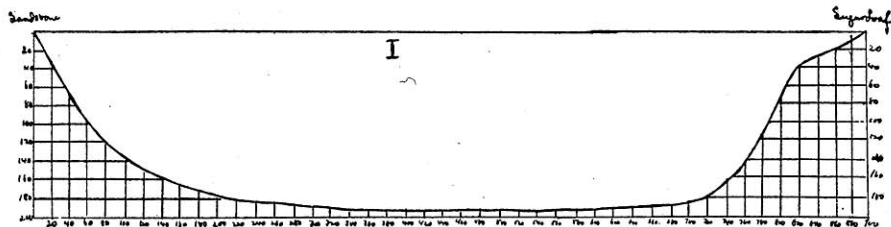
JULY, 1891.

Depth.	Air tem.	Surface tem.	Bottom tem.
41.85 meters.	22° 77 C.	21° C.	5.4° C.
43.5	23.33	23.	5.56
50.	22.22	22.	5.28
50.5	25.	22.	5.28
51.2	20.55	22.	5.28
56.	21.11	21.	5.28
57.75	24.72	21.	5.28
58.	26.3		5.28

We notice that in August, 1890, there was a uniform temperature of 6.6° C. below a depth of 45 meters, and that up to 25 meters there was an elevation of temperature of only one degree. In July, 1891, the bottom temperature was 5.28° C. While we cannot compare temperatures taken in August, 1890, with those taken in July, 1891, I think we may fairly infer that the maximum bottom temperature in Green Lake is reached in August, and that it remains nearly the same during September and October. The surface temperature is nearly the same in all the deeper parts of the lake. Swimmers, in crossing the lake, claim that they pass through "streaks" of different temperatures, but the thermometer determinations show a practical uniformity of surface temperature.

In comparing these temperatures with those obtained by Prof. and Mrs. Peckham in Pine Lake (Trans. Wis. Acad. V, 273), I notice that

although the surface temperatures in Pine Lake, in both July and August, are higher than in Green Lake, the temperature of the deep water is nearly the same. For instance, in August, 1879, at a depth of 18.28 meters, the bottom temperature was  $7.23^{\circ}$  C., while the surface temperature at the same time was  $24.44^{\circ}$  C., and in July, at a depth of 24.38 meters, the bottom temperature was  $5.56^{\circ}$  C., and the surface temperature  $26.12^{\circ}$  C. Thus, at 24.38 meters, was reached very nearly the minimum temperature which I found in Green Lake at 50 meters and below.



Scale of Profiles  
Horizontal 1 cm = 80 rods  
Vertical 1 cm = 80 ft

