Cooperative Lakes Monitoring Program

Michigan Lakes– Ours to Protect

2023 Data Report for Long Lake, Grand Traverse County

Site ID: 280084

44.7247°N, 85.7561°W

The CLMP is brought to you by:

Michigan Clean Water Corps

EGLE MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

MICHIGAN STATE UNIVERSITY

MICHIGAN LAKES AND STREAMS ASSOCIATION

Huron River Watershed Council

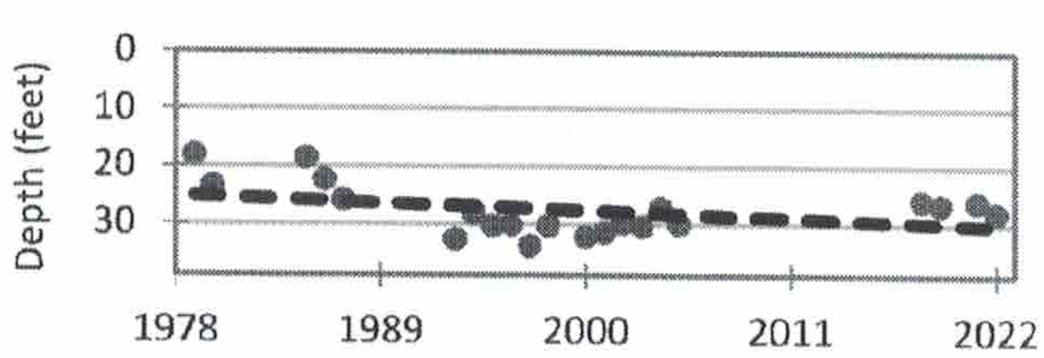
Site ID: 280084

Long Lake, Grand Traverse County
2023 CLMP Results

Cooperative Lakes Monitoring Program

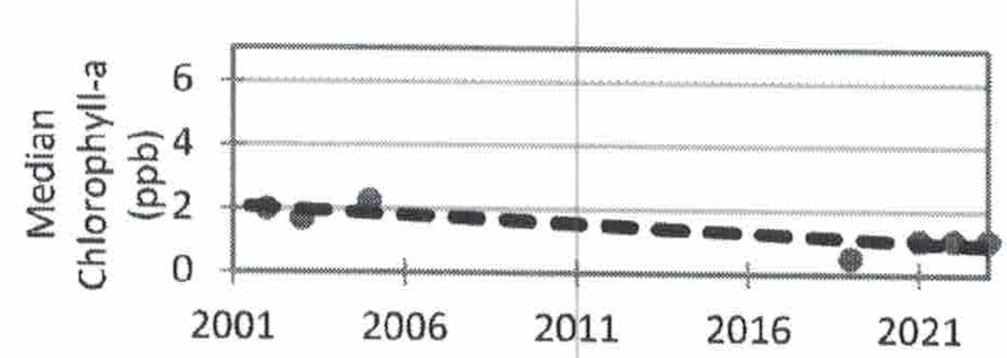
Secchi Disk Transparency (feet)

Year	# Readings	Min	Max	Average	Std. Dev	Carlson TSI
2022	17	21.0	41.0	27.9	7.5	29
2017-2021	46	14.5	39.5	26.1	5.0	30
1979-2016	310	10.0	62.0	27.9	9.0	29
2023 All CLMP Lakes	2825	0.5	51.0	12.2	2.7	43



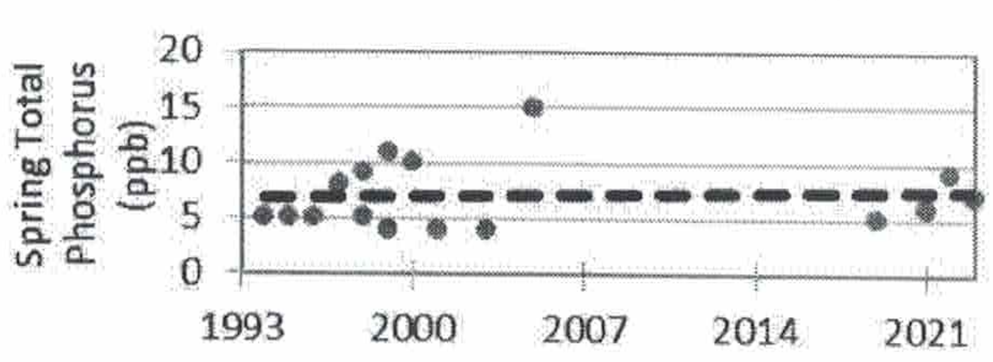
Chlorophyll-a (parts per billion)

Year	# Samples	Min	Max	Median	Std. Dev	Carlson TSI
2023	5	<1.0	1.4	1.1	0.4	32
2018-2022	17	<1.0	1.9	1.1	0.5	32
2000-2017	21	<1.0	2.5	1.1	0.7	37
2023 All CLMP Lakes	687	< 1.0	43.0	3.7	5.3	43



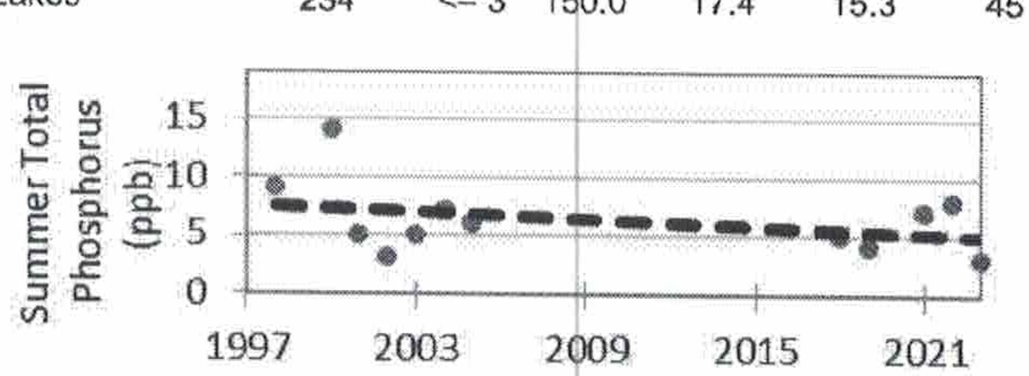
Spring Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev
2023	1	7.0	7.0	7.0	NA
2018-2022	3	5.0	9.0	6.7	2.1
1994-2017	12	<5 T	15.0	7.1	3.5
2023 All CLMP Lakes	220	<5	220.0	20.7	21.3



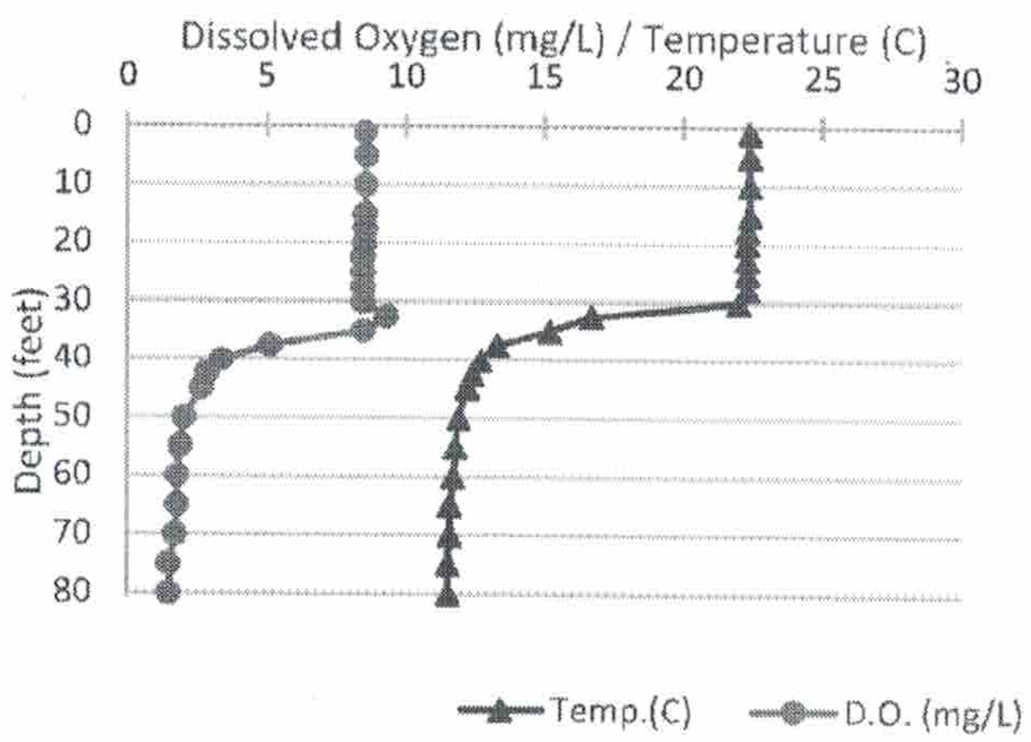
Summer Phosphorus (parts per billion)

Year	# Samples	Min	Max	Average	Std. Dev	Carlson TSI
2023	1	<=3 W	<=3 W	<=3 W	NA	27
2018-2022	4	<5 T	8.0	6.0	1.8	30
1998-2017	7	<=3 W	14.0	7.0	3.6	32
2023 All CLMP Lakes	234	<= 3	150.0	17.4	15.3	45



Dissolved Oxygen and Temperature Profile

8/16/2023



Summary

Average TSI	2023	2018-2022	1979-2017
Long Lake	29	31	31
All CLMP Lakes	44	41	42

With an average TSI score of 29 based on 2023 summer total phosphorus and chlorophyll data, this lake is rated as oligotrophic.

The lake keeps some dissolved oxygen in the bottom waters through mid-summer. By late summer the lake has stratified and the bottom water is mostly devoid of oxygen.

There is too little data to assess long-term trends. CLMP recommends eight years of consistent monitoring in order to develop a strong baseline and draw reliable conclusions. However, compared to historic data, it appears that this lake is becoming more nutrient poor over time.

** = Minimum # samples not met for average/median/TSI value*

<1.0 = Chlorophyll-a: Sample value is less than limit of quantification (<1 ppb).

W= Value is less than the detection limit (<3 ppb) T = Value reported is less than the reporting limit (5 ppb)

Trophic Status Index Explained

In 1977, limnologist Dr. Robert Carlson developed a numerical scale (0-100) where the numbers indicate the level of nutrient enrichment. Using the proper equations, we can convert results from Summer Total Phosphorus, Secchi Depth, and Chlorophyll-a to this Trophic Status Index (TSI). The TSI numbers are furthermore grouped into general categories (oligotrophic, mesotrophic, eutrophic, and hypereutrophic), to quickly give us a way to understand the general nutrient level of any lake.

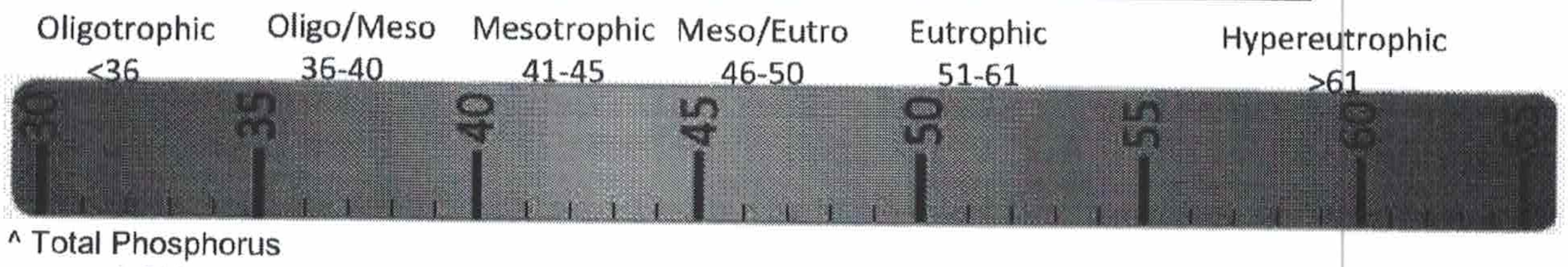
The tables below give the results-to-TSI conversions for the water quality data ranges normally seen in the CLMP. The formulas for this conversion can be found in the CLMP manual (link is on page 2 of this report).

Phosphorus (ppb)	TSI Value
<5	<27
6	30
8	34
10	37
12	40
15	43
18	46
21	48
24	50
32	54
36	56
42	58
48	60
>50	>61

Secchi Depth (ft)	TSI Value
>30	<28
25	31
20	34
15	38
12	42
10	44
7.5	48
6	52
4	57
<3	>61

Chlorophyll-a (ppb)	TSI Value
<1	<31
2	37
3	41
4	44
6	48
8	51
12	55
16	58
22	61
>22	>61

TSI for Long Lake in 2023	
Average	29
Secchi Disk	
Summer TP	27
Chlorophyll-a	32



^ Total Phosphorus

^ Chlorophyll-a

Oligotrophic: Generally deep and clear lakes with little aquatic plant or algae growth. These lakes maintain sufficient dissolved oxygen in the cool, deep-bottom waters during late summer to support cold water fish, such as trout and whitefish.

Mesotrophic: Lakes that fall between oligotrophic and eutrophic. Mid-ranged amounts of nutrients.

Eutrophic: Highly productive eutrophic lakes are generally shallow, turbid, and support abundant aquatic plant growth. In deep eutrophic lakes, the cool bottom waters usually contain little or no dissolved oxygen. Therefore, these lakes can only support warm water fish, such as bass and pike.

Hypereutrophic: A specialized category of euthrophic lakes. These lakes exhibit extremely high productivity, such as nuisance algae and weed growth.